NPI CM playbook

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Playbook Version Control

Version	Notes	Editor	Date
0.1	Release based on EPM framework	Shawn	2023/05/08
0.2	Update with appendix of chapter 1 and chapter 3 after review	Shawn	2023/08/05
0.3	Update Index and hyper link Update chapter 1's agenda name Add Index	Shawn/Dylan/Charles/ Antony	2023/09/27
0.4	Update slide link for check list Check the format of title	Shawn/Dylan/Charles	2023/9/28
1	Format update	Shawn	2023/9/28
1.1	Slide format and order adjustment in chapter 1	Shawn	2024/1/21
1.2	Add Acoustic DRIs of CM playbook Add Acoustic critical criteria to Chapter 1	Shawn	2024/4/1
1.3	Update score card link	Shawn	2024/05/18
1.4	Update score card Need to know in page 26 Update format on key events before CM downselection Add a process to update CM playbook	Shawn	2025/3/10
1.41	Page 20 update wording down selection Update page 28 with detail scoring items in link Update wording format in page 77/82/83/85	Shawn	2025/3/10
1.42	Update wording on page 29/115/116	Shawn	

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Chapter 1

CM Assessment

- CM Assessment Process Overview
- Eng Assessment
  - Recommended Critical Criteria
- CM Proposal for Executive Review

Appendix

- Cross LOB Critical Criteria

Chapter 2

CM Bring up

- Equipment
- Facility Construction
- IDL Hiring and Training
  - Recommended IDL requirement
- Training Build
  - Recommended training build plan
- Budget

Appendix

- Cross LOB IDL Requirement
- Cross LOB Training Build Plan
- Cross LOB Training Build Post Mortem

Chapter 3

CM Performance Review

- Motivation & Principle
- Competency
- Evaluation
  - Recommended Performance Review Format
- Implementation
- Incentive

Appendix

- Cross LOB Performance Review

CM Play book | More Resources

1 - Key Event Check List

2 - More Content in Box File

3 - Talk to Experts

4 - Training Video for CM Playbook

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CM Play book | Key Event Check List

Purpose

- As a reminder to list out all ket events for CM bring up

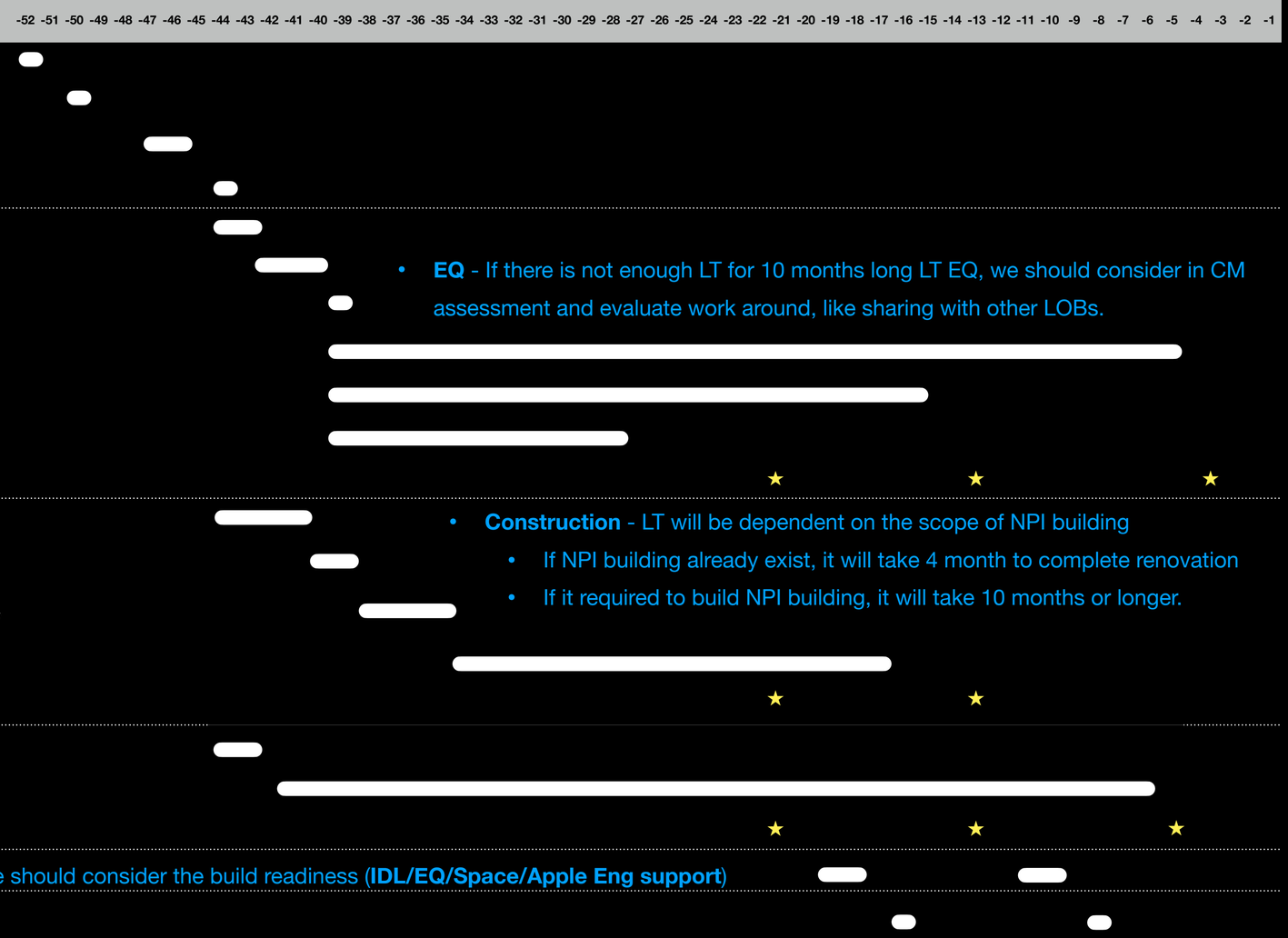
Section		Check List	DRI
CH1 - CM assessment	☑	RFP to CM	Biz
	☑	CM assessment	Eng
	☑	Executive review for CM decision	Eng
	☑	Ok2engage w/ new CM	Biz
CH2 - Equipment	☑	Kick off EQ list collection	Eng
	☑	Kick off EQ budget (Lock down EQ list)	Eng
	☑	EQ Budget review & approval for new CM	Eng
	☑	Kick off PO for EQ (10 month lead time items)	Eng
	☑	Kick off PO for EQ (6 month lead time items)	Eng
	☑	Kick off PO for EQ (3 month lead time items)	Eng
	☑	CP - EQ arrived Factory	Eng
CH2 - Construction	☑	Apple kick off NPI space design	Eng/NPO
	☑	Apple lock down request & CM kick off quotation	Eng
	☑	CM provide quotation & Apple kick off budget review	Eng
	☑	CM kick off construction	Eng
	☑	CP - NPI space Ok2use	Eng
CH2 - IDL	☑	IDL HC review and get VP approval	Eng
	☑	IDL hiring kick off	Eng
	☑	CP - Hiring for training builds and P1	Eng
CH2 - Training build	☑	Training build	Eng
CH3 - CM performance review	☑	Performance review after training build	Eng

CM Play book | Key Event Check List

Kick off time and LT assumption

- **The kick off time** is calculated backward to show **how many weeks before P1** we suggest to kick off this activities
- Equipment / Construction / IDL kick off time strongly depends on **training build start date.** We assume kick off right after ok2engage
- The **lead time** used here is for **reference only**. It could be vary for different **CM**, **LOB** and **country**.
- Assume **concept review** already finished before RFP

Kick off time	Section	Check List
- 52 weeks	CH1 - CM assessment	RFP to CM
- 50 weeks		CM assessment
- 47 weeks		Executive review for CM down selection
- 44 weeks		Ok2engage
- 44 weeks	CH2 - Equipment	Kick off EQ list collection
- 42 weeks		Kick off EQ budget (Lock down EQ list)
- 39 weeks		EQ Budget review & approval for new CM
- 39 weeks		Kick off PO for EQ (10 month lead time items)
- 39 weeks		Kick off PO for EQ (6 month lead time items)
- 39 weeks		Kick off PO for EQ (3 month lead time items)
- 15 weeks		CP - EQ arrived Factory
- 44 weeks	CH2 - Construction	Apple kick off NPI space design
- 40 weeks		Apple lock down request & CM kick off quotation
-38 weeks		CM provide quotation & Apple kick off budget review
-34 weeks		CM kick off construction
-16 weeks		CP - NPI space Ok2use
- 44 weeks	CH2 - IDL	IDL HC review and get VP approval
- 42 weeks		IDL hiring kick off
- 5 weeks		CP - Hiring for training builds and P1
- 20 weeks	CH2 - Training build	Training build
After training build	CH3 - CM performance review	Performance review after training build



- **EQ** - If there is not enough LT for 10 months long LT EQ, we should consider in CM assessment and evaluate work around, like sharing with other LOBs.
- **Construction** - LT will be dependent on the scope of NPI building
  - If NPI building already exist, it will take 4 month to complete renovation
  - If it required to build NPI building, it will take 10 months or longer.
- **Training build** - Kick off time should consider the build readiness (**IDL/EQ/Space/Apple Eng support**)

CM Play book | Key Event Check List for CM Oversea

For CM oversea, there are more items we need to pay attention to

- **Work Visa or Work Permit preparation for CM, OSS and Apple employee, 2 major check points as follow**
  - **Kick off trail run for Work Visa/ Work Permit**
  - **Kick off application for Work Visa/Work Permit**

- **International Logistic, 2 major check points as follow**
  - **Kick off International transfer trail run for EQ and material**
  - **Official kick off international transfer for EQ and material**

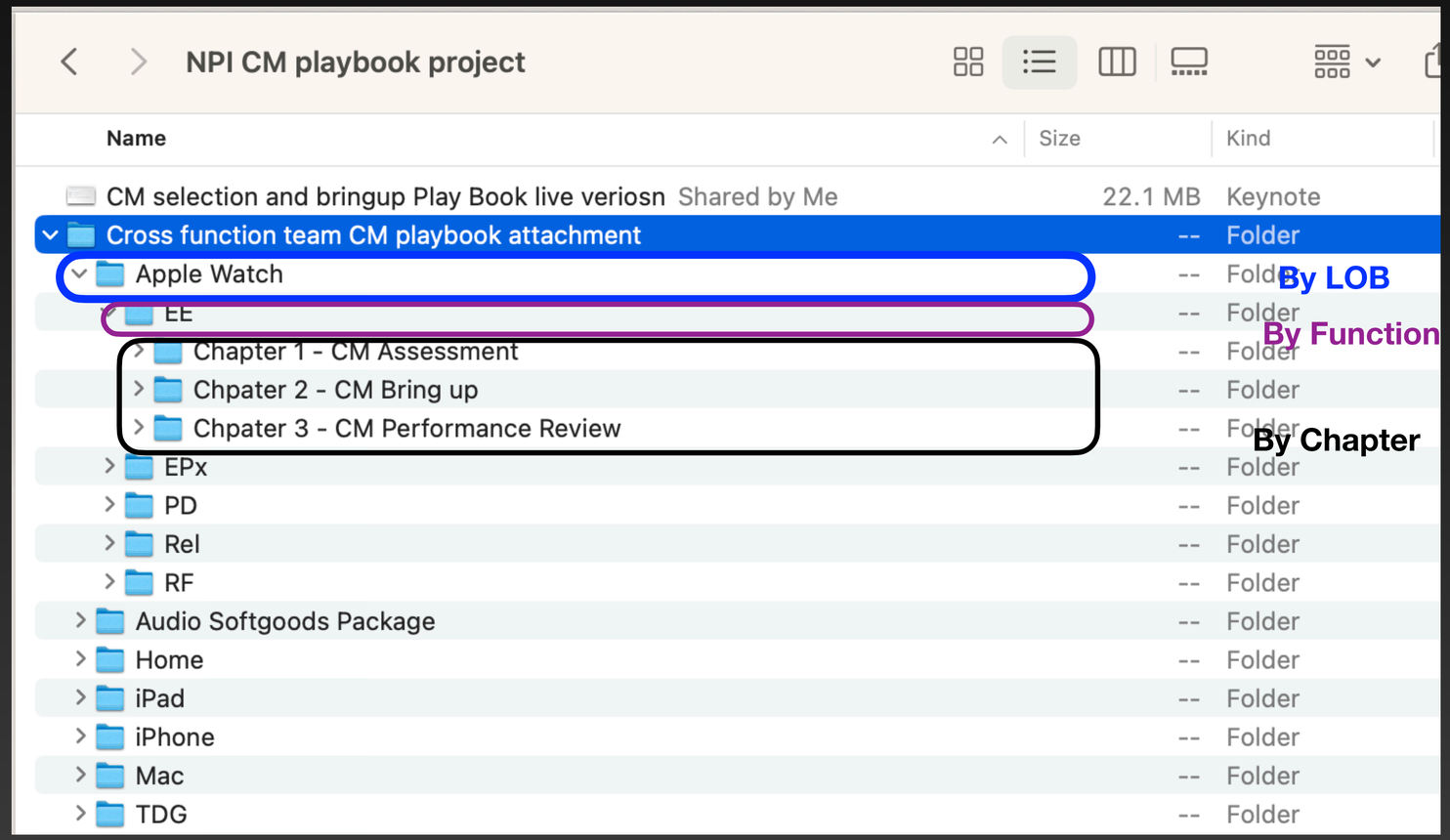
- **Local Supply Chain (Material + EnF) Capability, 2 major check points as follow**
  - **Risk assessment for local supply chain capability**
  - **Work with GSM and CM to come out with work around plan to address the risk**

* We are collecting more data for oversea CM bring up. Will update once we have

CM Play book | More Content in Box File

More content stored in box

- Including FA SOP, training material, IDL requirement, layout requirements…etc
- Link : https://apple.box.com/s/3xxkv3ql0of64d2tg0c62jrwulkmtbta
- Please send email to CM_playbook_taskforce@group.apple.com and copy LOB EPM to apply access.
- The folder layout by LOB, functional team and chapters, showed in below screen shot.



Example : FA SOP storage in Box for Watch EE

IDL	--	Folder
Diags & Non-UI basic fucntion command check	167 KB	Numbers
Display Training_0827	56.2 MB	Keynote
Display Training_0906	56.2 MB	Keynote
EE_ALS_training_0827	61 MB	Keynote
EE_ALS_training_0906	62.1 MB	Keynote
ESD interduction	22.5 MB	Keynote
LA3 & LE1 EE Training For Alert	16.2 MB	PowerP...(.pptx)
LA3 & LE1 EE Training For Sodium Function	145.6 MB	Keynote
LA3 & LE1 EE Training For Sodium Function_1	139.2 MB	Keynote
LA3 & LE1 EE Training For Sodium Function_2	139.6 MB	Keynote
LA3&LE1 Grape Trainin-0825	81.9 MB	Keynote
LA3&LE1 Training- Burnin	7.2 MB	Keynote
LA3x & LE1 EFFA EE Lisa	15.5 MB	Keynote
LA3x & LE1 EFFA EE-Lisa	16.2 MB	Keynote
LA3x& LE1 EE Training-Compass	9.5 MB	Keynote
LA3x& LE1 EE Training-Compass _V1	9.5 MB	Keynote
LA3x& LE1 EFFA Battery Life	8.5 MB	Keynote
LA3x& LE1 EFFA EE - Display_0819	104.5 MB	Keynote
LA3x& LE1 EFFA EE -Compass	13.8 MB	Keynote
LA3x& LE1 EFFA EE -platinum_0906	25 MB	Keynote
LA3x& LE1 EFFA EE -Wireless Charging_0831	20.9 MB	Keynote
LA3x& LE1 EFFA EE Alert v2.0	66.1 MB	Keynote
LA3x& LE1 EFFA EE Alert V3.0	65 MB	Keynote
LA3x& LE1 EFFA EE FA SOP	355.7 MB	Keynote
LA3x& LE1 EFFA EE Puck Introduction	27.9 MB	Keynote
LA3x& LE1 EFFA EE Readiness_Coronet	17.4 MB	Keynote
LA3x& LE1 EFFA EE Sodium Readiness	105 MB	Keynote
LA3x& LE1 EFFA EE_SA-COIL Introduction	37.7 MB	Keynote
LA3x& LE1 EFFA EE-Grape/ALS	125.8 MB	Keynote
LA3x&LE1 EFFA EE-Battery	17.1 MB	Keynote
LA4-P2-Olyto-SA Coil Fixture V1.1	4.6 MB	PowerP...(.pptx)
LAx & LEx P1 SA_FCM Introduction	16.1 MB	PowerP...(.pptx)
LTPO introduction	6.7 MB	PowerP...(.pptx)
Notebook composition and M/B architecture introduction	8.2 MB	PowerP...(.pptx)
Platinum_FA_SOP	125.8 MB	ZIP archive
QT_MASTER_PLAN	365 KB	CSV Document
QT_MASTER_PLAN.csv.zip	39 KB	ZIP archive
Radar 8-3.app.zip	48.8 MB	ZIP archive
Rel test introduction-PDF	5.2 MB	PDF Document
Speaker related introduction	5.4 MB	Keynote
SULU_FA_SOP	63.4 MB	ZIP archive
SULU_FA_SOP_0823	70.8 MB	ZIP archive
SWD_Basic_Knowdge	751 KB	PDF Document
Test plan introduction.pptx.zip	4 MB	ZIP archive

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CM Play book | Talk to Experts_Part 1

- Below are **CM playbook DRI** nominated by each function each LOB, Name already embed in email address
- The **Overall CM playbook DRI** and **chapter owners** also listed at the side
- Feel free to reach out CM playbook DRI and task force team member via email/text.
- CM task force group email : CM_playbook_taskforce@group.apple.com

CM playbook task force

Overall	Shawn Hsieh
Chapter 1 owner	Antony Chen
Chapter 2 owner	Charles Wang
Chapter 3 owner	Dylan Wu

	Mac	iPhone	iPad	Apple Watch	VPG	Audio Packaging Softgood	Home
EPM/EPS	Jerry Huang	Frank Chu	Charles Wang	Shawn Hsieh	Vincent Gong / Summer Li	Antony Chen / Eric Lian / Harry Wang	Dylan Wu
PD	James Wei	Andy Xu	Sam Liu/ Luke Chang	Alex Song	Tony Chen	Eric Shi / Bingda Liu / Tao Zhou	Marcus Sung
EE	Hiker Liu	Kevin Guo/Simon Xu	Jason Jiang	Kevin Jan	Charles Qian	Jimmy Qi	Zach Lee
RF EPM	Arvin Zhu	Kenson Sun	Zhuo Niu	JJ Xu	Johnson Wu	Henry Ji	Henry Ji
HWTE	John Tracy	John Tracy	John Tracy	John Tracy	John Tracy	John Tracy	John Tracy
REL	Jian Feng	Elly li	Johnson Liao	James Yang	Eric Xu	Jingshan Dong	Evan Gu

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CM Play book | Talk to Experts_Part 2

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Overall	Shawn Hsieh
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	Mac	iPhone	iPad	Apple Watch	VPG	Audio Packaging Softgood	Home
Acoustic	Hanlu Chen/Bofeng Pan	Roenick Wang/ Bofeng Pan	John He/Bofeng Pan	Cinwell Lu/Bofeng Pan	Hendrely Wang/ Bofeng Pan	Lily Chang/Bofeng Pan	Angel Duan/Bofeng Pan

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NPI CM Bring up Overview

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CM Play book | Process overview

3 Phases Overview

CM Assessment

CM Bring up

CM Performance review

Initial down selection — RFI — RFP — **Ok2Engage** — Training build — **P1** — **xVT**

Engineering focus

IDL

Company culture
Leadership
Hiring strategy
...

Facility

Facility location
Faculty space design for efficiency
...

Equipment

Equipment investment
Equipment readiness
...

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CM Assessment

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NPI CM Playbook | CM Assessment

- CM Assessment Process Overview
- Eng Assessment
- CM Proposal for Executive Review

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NPI CM Playbook | CM Assessment

- CM Assessment Process Overview

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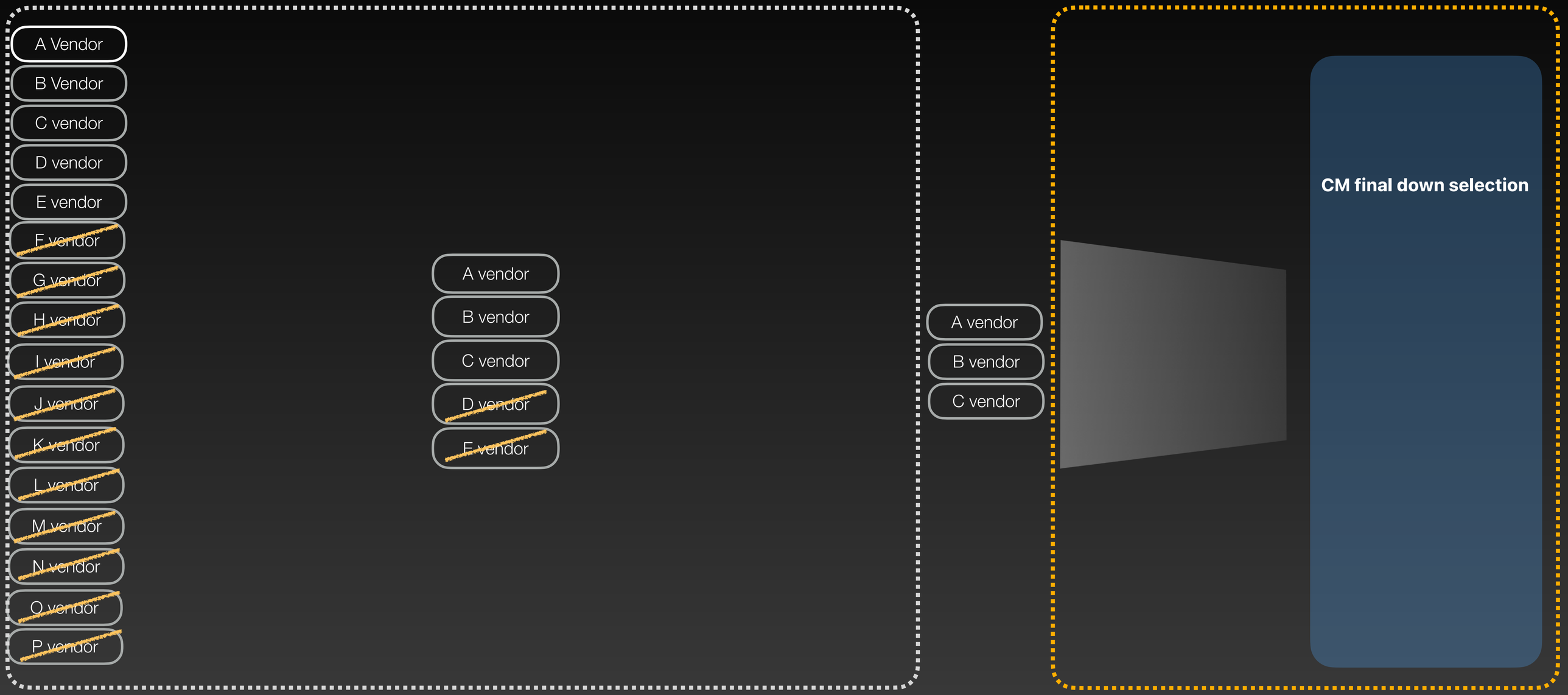
CM Assessment | CM Assessment Process Overview

CM assessment process leaded by Apple Biz team.
IR Engineering team engaged heavily for RFP and provide Eng assessment.



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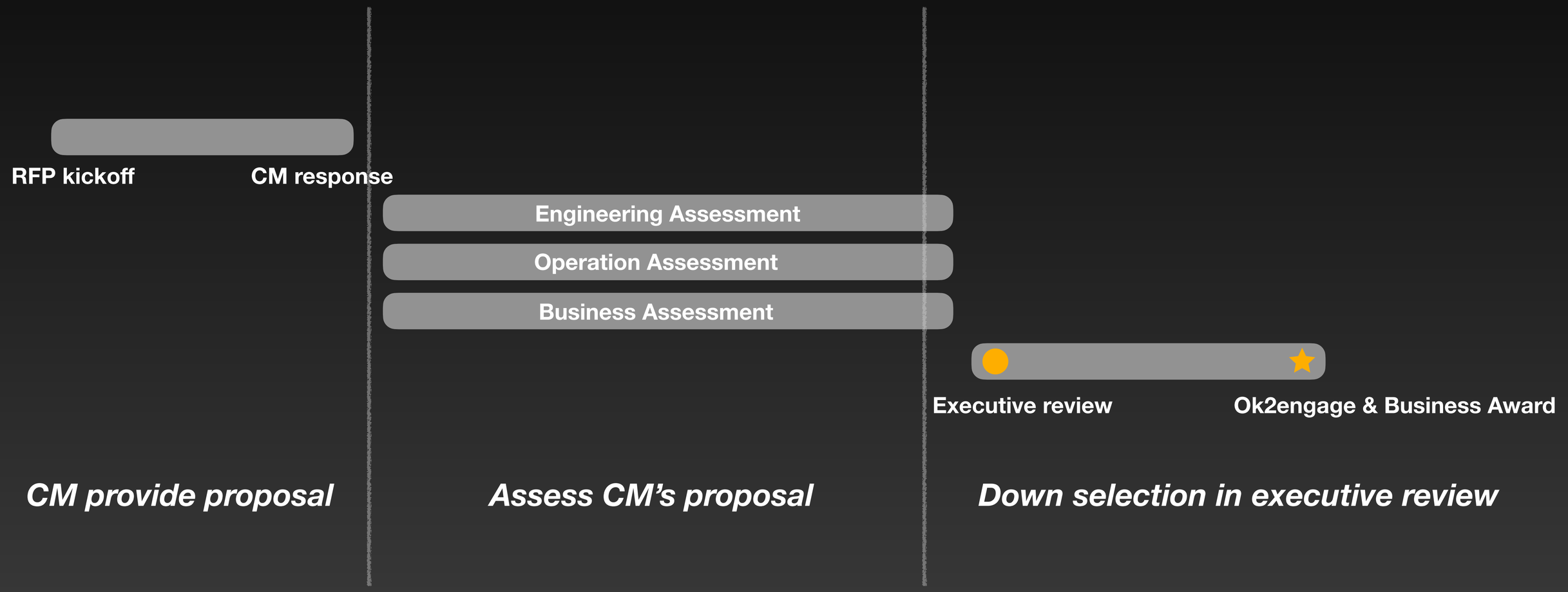
CM Assessment | Key events before down selection

3 Key Events** including **RFP, CM assessment** and **executive review
CM assessment is provided by 3 major teams, Engineering team, Operation team, and Business operation team.



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NPI CM Playbook | CM Assessment

- Eng Assessment
  - IR core team
  - Critical Criteria
    - Recommended Critical Criteria
  - CM visit
  - Collect feedback

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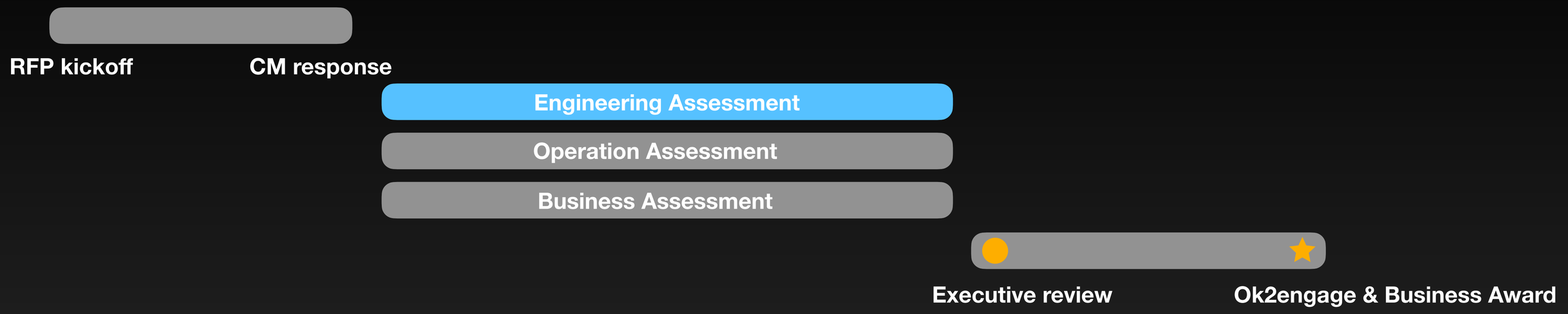
CM Assessment | Engineering Assessment

Scope *focus on Engineering Assessment*



4 Steps *of Engineering Assessment*

- **Goal** is to provide consolidate engineering feedback to executives for CM selection
- IR will provide on the ground information via CM visiting

IR Eng core team | **Critical Criteria** | **CM F2F visit** | **Feedback**

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CM Assessment | IR core team and critical criteria

IR Core team

- Selected members join to protect programs confidentiality and be able to represent CPT and IR function team
- Start with EPM/PD/EE/RF/Rel + Critical functions defined by product features + GC RnD senior executives

Critical Criteria

- **Goal** is to have a aligned standard which help provide quantitive data to each CM
- Criteria subject to change from different LOB, but should align with IR Core team

Facility

- Ease to access
- Lab/Line layout flexibility
- Space to expand
- Clean room setup and management

Engineering Resource

- Organization and Leadership
- Hiring Strategy
- Talent retention capability
- Training plan
- Localization
- Apple experience

Understanding of product

- Key technology understanding
- Manufacturing capability
- Test development capability

Company culture

- Drive for continuous improvements
- Collaboration internal/external
- Sense of urgency
- Proactiveness

More details in appendix

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CM Assessment | CM F2F visit

CM visit

- **Goal** is to communicate Eng needs and evaluate CM's engineering resource by face to face meeting and facility by line tour
- **Continuously follow up weekly** will be the critical to provide more accurate assessment

Proposed Agenda	Purpose	Topics to review

Intro. Meeting
with cross function
	• Review and align program scope/ goal/direction with **cross function**	**High level cross functional alignment**
		• **Facility** (construction schedule, Eng space layout proposal)
		• **Engineering resource**
		  • Leadership/Organization
		  • Hiring strategy/Training plan
		• Vertical integration proposal

Breakout Section
by function
	• Review CM's **professional** capability by function	**Review in detail**
		• **Facility** (RF chamber/PD lab/EE lab..etc)
		• **Engineering resource**
		  • Leadership/Organization
		  • Hiring strategy/Training plan

Line Walk	• Understand CM's capacity for NPI • Assessment to current Eng space	Visit existing apple product line or prepared Eng space. • Manufacturing Capacity (Fixture/Auto machine) • Eng build line management • Detail product development understanding

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CM Assessment | Feedback

***Feedback** is a **summarized evaluation** from core teams. 3 Steps as following.*

Create a platform*
to collect feedback

Collect and align feedback
with IR / CPT Eng team

Director pre-flight
Align w/ Eng, Ops and Biz

Format* could be **narrative and quantitive (score card)*

***Score card** (example)*

Scoring items - critical criteria
Score alignment - use reference CM as base line

Table 1

		Reference CM	CM1	CM2	CM3
Facility	**Ease to access (eg.commute to factory)**	2	**1.9**	**2.7**	**2.0**
	Space to extend	3	**2.5**	**2.3**	**2.3**
	Crisis(eg.Covid) reaction	1	**2.8**	**2.9**	**2.0**
	……..	…	**…**	**…**	**…**
	Category Score	2.0	**2.4**	**2.6**	**2.1**

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CM Assessment | Score Card Example

Need to know

- Scoring can be subjective. Before presenting to executives, cross-functional teams should discuss and align their scores.
- Using existing CM's performance is a way to setup common ground of scoring.
- If a team isn't involved in certain categories or scoring items, leave those sections blank on the scoring card.
- The latest critical criteria with more explanation released in box folder. Please click link - Online score card Link

Table 1

		Reference CM	CM1	CM2	CM3
Facility	**Ease to access (eg.commute to factory)**	2	**1.9**	**2.7**	**2.0**
	Hotel options	3	**2.5**	**2.3**	**2.3**
	Crisis(eg.Covid) reaction	1	**2.8**	**2.9**	**2.0**
	Line/lab layout flexibility (FATP line to FA lab, Rel lab, chamber)	1	**2.8**	**3.0**	**2.8**
	Facility readiness (timeline w.r.t. build schedules)	4	**1.9**	**3.0**	**2.9**
	Space to expand for future program and Ops build	1	**2.5**	**3.0**	**2.8**
	Clean room setup & management	2	**2.7**	**2.7**	**2.3**
	High quality measurement equipment support (is the plan in place for EMC chamber/ CT etc)	2	**2.9**	**2.8**	**2.4**
	Ease of material logistics	1	**2.8**	**3.0**	**3.0**
	Category Score	1.9	**2.5**	**2.8**	**2.5**

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Appendix | Recommended Critical Criteria

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CM Assessment | Recommended Critical Criteria

Facility	Engineering Resource	Product Understanding	Company Culture	Geo. Diversification
Ease to access	Organization and leadership	Key technology understanding	Drive for continuous improvements	Working culture - build support flexibility (OT & Holidays arrangement)
Hotel options	Hiring capability/quality	Manufacturing capability	Internal collaboration	Infrastructure maturity (Power / Water / Gas supply)
Crisis reaction	Talent retention capability	Test development capability	External collaboration	Logistics efficiency
Line/lab layout flexibility	Team knowledge	FA competency	Flexibility of supporting business	Supply Chain supporting coverage (E&F, consumables etc)
Facility readiness	Training plan		Sense of urgency	Local engineering competency
Space to expand for future program and Ops build	Impact to other Biz		Proactiveness	Oversea talent support / Working permit
Clean room setup & management	Business Communication		Risk of information leak	Local DL/IDL hiring capability
High quality measurement equipment support	Localization		Business communication	Local DL/IDL retention
Ease of material logistics	Vertical integration			3rd Party FA resource
	Complex system NPI experience			Government incentive
	Minimal Apple Eng resources required to transition to MP			

*The latest critical criteria with more explanation released in box folder. Please click link - Online score card Link

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CM Assessment | Recommended Critical Criteria for Acoustics

Acoustic team provide 7x specific critical criteria
More details include questionnaire for each criteria will show in later pages

*Additional criteria for acoustics should be added to Questionnaire in breakout function session

Facility	Engineering Resource	Product Understanding
Anechoic and listening chambers	Acoustics knowledge background	Acoustics component understanding
Isolated facility or building	SjL(Sound subjective listening) capability	Acoustics integration principle understanding
	Acoustics data analysis and report	

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Critical Criteria | Facility

Facility

- **Goal is to evaluate if CM's facility could support NPI program efficiently**
- **Evaluate carefully if construction can finished before 1st build**
- **Geographic factors will be considered in Geo diversification category**

Criteria List	Questionnaire
Ease to access (eg.commute to factory)	Consider the time of daily commute to factory
Hotel options	If hotel with good sanitary condition or Apple preference hotel Is there multiple hotel options or enough capacity during peak time?
Crisis reaction	If CM could quickly react to emergency event, like power shut down, covid..etc
Line/lab layout flexibility	Unit transfer time among FATP line to FA lab, Rel lab, chamber
Facility readiness	If the NPI building (space) construction timeline align to build schedules
Space to expand for future program and Ops build	If the NPI building (space) plan considering Ops build and MP transition Is there any 2 or 5 years NPI planning?
Clean room setup & management	If the clean room setup fit into program's requirement
High quality measurement equipment support	Is the plan in place for EMC chamber/ CT etc ? Is there enough space planed to support sufficient CT capacity?
Ease of material logistics	Non-Bonded zone will be beneficial to NPI

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Critical Criteria | Facility for Acoustic

Facility

- **Goal is to evaluate if CM's facility could support NPI program efficiently**
- **Evaluate carefully if construction can finished before build**
- **Consider geographic factors during CM selection**

Criteria List	Questionnaire
Anechoic and listening chambers	Could support anechoic and listening chambers in terms of floor loading and environment quite enough?
Isolated facility/building (Mac)	Have isolated facility for big chamber build. 75 weeks for construction (Mac only)

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Critical Criteria | Engineering Resource

Engineering resource

- **Goal is to evaluate if CM's is capable to execute engineering program efficiently**
- **Evaluation can be based on cooperation experience with CM and CM visit face to fcae communication**

Criteria List	Questionnaire
Organization and leadership	Is the Eng leadership worked with Apple and understand what Apple need ? Is this Eng leadership with strong influence to the team ? Is the Eng organization could support Eng build with Max efficiency ?
Hiring capability/quality	Hiring historical data
Talent retention capability	CM's retention rate CM's retention plan and strategy
Team knowledge	Mostly eval. from existing members What is the experienced Eng ratio (Apple product exp/similar product experience))
Training plan	If CM has a solid training plan
Impact to other Biz	If CM's IDL prosal is leveraging other LOB's IDL
Business Communication	If CM could understand Apple business and response what Apple wants CM willingness to cooperate with Apple's NPI strategy, for example, to move NPI side diversification, to support new program, and to support IDL optimization.
Localization	What's the local eng ratio? To be stable for long term development.
Vertical integration	If CM own business of upper stream and could seamless sync for FA
Complex system NPI experience	If CM excused Apple FATP program before with good reputation ?
NPI to MP transition	If CM has clear knowledge transition plan from NPI to MP?

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Critical Criteria | Engineering Resource for Acoustic

Engineering resource

- **Goal is to evaluate if CM's Engineer team is capable to execute engineering program efficiently**
- **Evaluation can be based on cooperation experience with CM and CM visit face to fcae communication**

Criteria List	Questionnaire
Acoustics knowledge	Does the Eng have basic acoustics knowledge? Does any Eng have acoustics or relevant education background? Does the Eng has experience to use acoustics test equipment and FA tools?
SjL(Sound subjective listening) capability	Does the Eng understand the Sound subjective listening? Does the Eng have experience of Sound subjective listening?
Acoustics data analysis and report	Does the Eng understand how to analyze acoustics data? Does the Eng have any expertise to develop script or relevant tool to process acoustics data? Does the Eng have experience of reporting the processed acoustics data?

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Critical Criteria | Product Understanding

Product understanding

- **Goal is to evaluate if CM has capacity to fit technical requirement of this product**
- **Evaluation can be based on the past cooperate experience and CM visit face to fcae communication**

Criteria List	Questionnaire
Key technology understanding	Camera, display, sensors, acoustic etc. [X-function teams define their own criteria]
Manufacturing capability	Automation development- PD/AME, Manual Fixture design - PD, PCBA
Test development capability	Test Fixture design, SW development capability - HWTE/EE/RF/Rel
FA competency	If CM's Eng team is capable to do failure analysis at apple standard Is there any successful FA examples?

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Critical Criteria | Product Understanding for Acoustic

Product understanding

- **Goal is to evaluate if CM has capacity to fit technical requirement of this product**
- **Evaluation can be based on the past cooperate experience and CM visit face to fcae communication**

Criteria List	Questionnaire
Acoustics component understanding	Does the Eng understand speaker? Does the Eng understand Mic, i.e. MEMS Mic?
Acoustics integration principle understanding	Does the Eng understand acoustics integration in form factor?

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Critical Criteria | Company Culture

Company culture

- **Goal is to evaluate if CM's company culture fit Engineering team's need**
- **Evaluation can be based on the past cooperate experience and CM visit face to fcae communication**

Criteria List	Questionnaire
Drive for continuous improvements	If CM has the mindset to improve continuously If CM actively provide the proposal to improve build efficiency
Internal collaboration	If CM could cooperate well with cross functional team If CM could cooperate well with team worked upper stream
External collaboration	Vocal to provide engineering solutions, teamwork spirit etc.
Flexibility of supporting business	Support urgent NPI needs , like OT, extra spending etc.
Sense of urgency	If CM has timely report for issue tracking
Proactiveness	If CM is wiling to take more responsibility when needed
Risk of information leak	If CM has the solid process in place to protect the product information If CM is willing to continuously to provide the proposal to improve security
Business Communication	Rate for CM's Business team. If they are intentional create obstacle to Eng program progress

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Critical Criteria | Geo Diversification Part 1

Geo Diversification

- **Goal is to evaluate for CM outside of china**
- **Score to CM oversea**

Criteria List	Questionnaire
Working culture - build support flexibility	Are CM labors willing to have flexible Sat OT to support NPI build? Is there any government policy / law for OT limitations? Are there many public holidays in the local area to impact NPI activities?
Infrastructure maturity	Is there any unexpected or short noticed power/water shut down in hotel/factory ? What's the frequency for power/water maintenance? Does road/traffic condition has severely impact on transportation (Hotel to factory) lead time?
Logistics efficiency	Is there any inbound/outbound regulation difference compare to China? Is there any import restrictions for Capex (new buy / reuse)? Especially for CT/Laser related EQ. Is there any specific certification required for un-released products ship to other countries? What's the lead time to ship products for FA? What's the frequency for inventory audit ? Is the CM NPI located in bond area? What's the Customs clearance lead time (including materials / Equipments) ? Can Customs support at weekend / holidays OT ? Is secure ship available or other constrains?
Supply Chain supporting coverage	Is there sufficient vendor (E&F, consumables, die cut etc) resource in the nearby area? What's the vendor's capability (team experience or quantity) in the nearby area? What's the equipment vendor on site support (OSS) plan? And who will pay for OSS if travel required?

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Critical Criteria | Geo Diversification Part 2

Criteria List	Questionnaire
Local engineering competency	Is there a comprehensive Eng experience sharing plan and local Eng bring up plan ?
Oversea talent support / Working permit	Is that easy to apply for VISA? Is the working VISA / business VISA impact our working efficiency? What's the max effective period for working VISA? Is there any special deal with government to apply working permit for CM IDL from China?
Local DL hiring capability	Is there any other competitors to drain talent in local area? population and working age ratio
Local IDL hiring capability	Is there large talent pool for recruiting? Key factor : Annual graduates numbers with specific major from local universities. Is the talent pool with quality (language and skill set) Eng team needs ? Is there any other competitors to drain talent in local area?
Local DL retention	Is the CM's IDL/DL attrition rate can meet our target ?
Local IDL retention	Is the CM's IDL/DL attrition rate can meet our target ?
3rd Party FA resource	Is there any 3rd party FA close to CM ? What's the 3rd party FA capability to support NPI ?
Government incentives	Is there incentive to attract oversea talents to work in local area? Or Repatriation overseas students back to work. Is there any incentive for R&D related investment? Like tax refund / waivers (equipment, lab construction etc)

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NPI CM Playbook | CM Assessment

- CM Proposal for Executive Review

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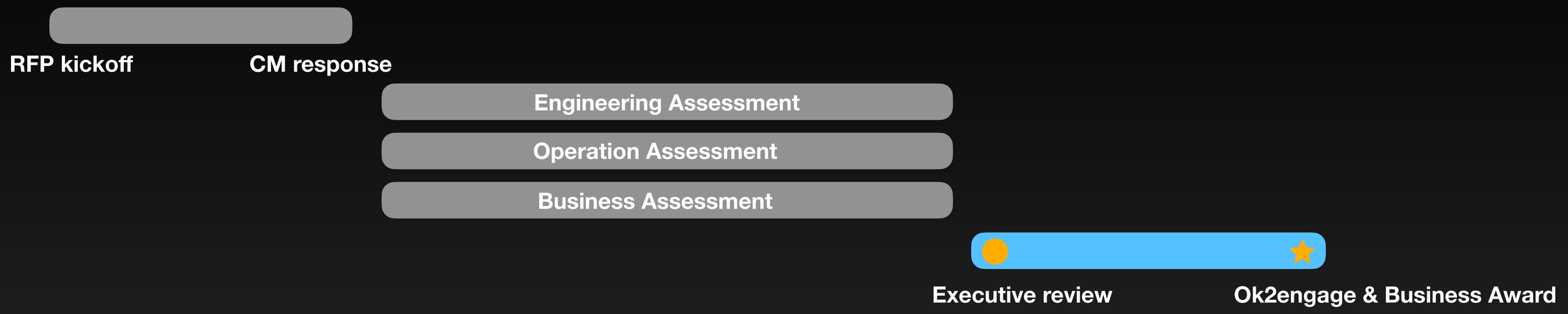
CM Assessment | CM proposal for executive review

Key Events



- How to write executive review summary
- Example of executive review summary
- More consideration for CM down selection

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Executive review summary (example)

- **Purpose** is to ask for decision of CM selection
- Leveraging color code/score to bring the decision we need

	Vendor A	Vendor B	Vendor C	Key Take-away
Facility	2.6	2.8	2.5	• **Eng building** should be able to fulfill Apple's requirement and ready before 1st Eng build and having flexibility for future layout changes
Engineering resource	2.8	2.3	2.1	• **Measure ability to hire, attract and retain talents** • Scored based on previous Apple program tracked record
Product understanding	2.7	2.5	2.1	• Score based on related product development experience or technical capability from related company acquisition.
Company culture	2.9	2.8	2.6	• **Company culture** will influence to Eng team's collaboration attitude and behavior • Score based on previous apple programs.
Overall Score	**2.8**	**2.6**	**2.3**	**Weight% can be various given each of LOB needs**

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CM Assessment | Executive review - VPG Example

- **Program time line will help explain the consideration for CM's IDL peak time and down time**
- **Show not only the score but also the reason behind and pros & cons with different scenarios**

	20xx CQx	20xx CQx	20xx CQx	20xx CQx	20xx CQx	20xx CQx	20xx CQx	20xx CQx
Program 1	xVT		xVT		xVT		xVT	

	CM A	CM B	CM C
	Program 1	Program 1	Program 1
Engineering	2.4	2.7	2.2
	• **Pros** :	• **Pros** :	• **Pros** :
	• **Cons** :	• **Cons** :	• **Cons** :

- core competency, completely fulfills Apple requirement, minimal or no gaps
- some strengths, partially fulfills Apple requirement, some gaps that could be bridged
- concerns overwhelm strengths, does not fulfill Apple requirement

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CM Assessment | More Consideration for CM selections

CM Recommendation - *should consider long term product road map, cross LOB conflict and confidentiality*

Confidentiality

How CM protect product confidentiality ?

Cross LOB conflict

*Is your facility/Eng resource conflict with **other LOB** ?*

If CM is proposing other LOB's Eng resource, we should verify with business and Eng team internally

Product Road map

*Does this CM fit into your **long term product road map** ?*

If your long term goal is to have multiple CMs, when is the timing to introduce your 2nd CM ?

CM's capacity

*Based on **critical criteria***

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Appendix | Cross LOB Critical Criteria

- VPG Engineering Core Team (6 pages)
- Home Engineering Core Team (9 pages)
- iPad Accessory Engineering Core Team (2 pages)
- Mac Engineering Core Team (4 pages)
- Audio/Package/Softgoods Engineering Core Team (3 pages)

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CM Assessment | Cross LOBs Summary

	VPG	Home	Mac	Pad	Audio Softgoods
Participants	Eng Core Team	Eng Core Team	Eng Core Team	Eng Core Team	Eng Core Team
Critical Criteria	Criteria Categories	Criteria Categories	Criteria List	Criteria List	Criteria List
	Cross Functions Share Same Criteria	Cross Functions Share Same Criteria	Cross Functions Share Same Criteria	Cross Functions Share Same Criteria	Cross Functions Different Focus
Scoring System	Yes	Yes	Yes	Yes	Yes

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Criteria Category

01 Facility Competitiveness

1) Lab & Line Layout Readiness / Flexibility
2) Advanced Equipment Held
3) Geographic Logistic Advantage

02 Engineering Resource

1) Technical Expertise & Engineering Know-How
2) FACA Capability
3) Communication & Collaboration

03 Management Efficiency

1) Execution Promptness
2) DOE control & Resource Coordination
3) OK2Build Progress Driving

04 Product Understanding

1) Past Experience with Apple / Similar Products / Same level of System Complexity
2) Understanding on core product technology
3) Unique Advanced Technical Expertise could be Leveraged

05 Company Nature

1) Goal - Orientation
2) Resilience
3) Dedication

Criteria List

Function	Evaluation Criterion
PD	FACA capability
	Technical issue management & resolution
	DFM + CAD feedback capability
	Data Analysis & management
	Communication (written/verbal)
	Vendor cooperation
	PD Score
REL	Accuracy in Reliability Reporting
	Initiative and proactiveness in response to issues
	FA capability
	Communication to Apple DRI
	Reliability technical ability
	REL Score
EPx	Ability to meet schedule
	Resources
	Development facility
	Program management
	Management support
	Logistics/Labelling
	Material Tracking Updates
	EPx Score

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Appendix | Cross LOB Critical Criteria

- VPG Engineering Core Team (6 pages)

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CM Assessment | Scoring category and Scaring standard

Scoring Category

Facility

Eng Resource

Product understanding

Company culture

Scoring standard

4	Exceptional
3	Good
2	Average
1	Need improvements
0	Unsatisfactory

*Weight of each category could be vary, based on whats needed

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CM Assessment | Format of score card - Facility

Facility

- **Goal is to evaluate if CM's facility could support NPI program efficiently**
- **Evaluate carefully if construction can finished before build**
- **Consider geographic factors during CM selection**

	CM A	CM B	Remark
Ease to access	3	2.8	Consider the time of daily commute to factory
Hotel options	2.6	2.6	
Crisis reaction	2.5	2.3	
Line/lab layout flexibility	2.6	2.2	Unit transfer time among FATP line to FA lab, Rel lab, chamber
Facility readiness	2.1	2.2	Timeline w.r.t. build schedules
Space to expand for future program and Ops build	2.2	2.8	
Clean room setup & management	2.6	2.6	
High quality measurement equipment support	2.8	2.2	Is the plan in place for EMC chamber/ CT etc ?
Ease of material logistics	3	3	Non-Bonded zone will be beneficial to NPI
Category score	2.6	2.5	

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CM Assessment | Format of score card - Engineering resource

Engineering resource

- **Goal is to evaluate if CM's Engineer team is capable to execute engineering program efficiently**
- **Evaluation can be based on cooperation experience with CM and CM visit face to fcae communication**

	CM A	CM B	Remark
Organization and leadership	3.0	2.2	
Hiring capability/quality	2.6	2.8	
Talent retention capability	2.6	2.2	
Team knowledge	2.1	2.2	Mostly eval. from existing members
Training plan	2.2	2.8	
Impact to other Biz	2.6	2.6	
Business Communication	2.8	2.2	
Localization	3	3	To stablize the team growth in the long term
Vertical integration	2.7	2.8	
Complex system NPI experience	3	2.2	
Category score	2.6	2.5	

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CM Assessment | Format of score card - Product understanding

Product understanding

- **Goal is to evaluate if CM has capacity to fit technical requirement of this product**
- **Evaluation can be based on the past cooperate experience and CM visit face to fcae communication**

	CM A	CM B	Remark
Key technology understanding	**2.8**	**3.0**	Camera, display, sensors etc.
Manufacturing capability	**2.6**	**2.6**	Automation development- PD/AME, Manual Fixture design - PD, PCBA
Test development capability	**2.8**	**2.2**	Test Fixture design, SW development capability - HWTE/EE/RF/Rel
FA competency	**3**	**3**	
Category score	**2.8**	**2.7**	

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CM Assessment | Format of score card - Company culture

Company culture

- **Goal is to evaluate if CM's company culture fit Engineering team's need**
- **Evaluation can be based on the past cooperate experience and CM visit face to fcae communication**

	CM A	CM B	Remark
Drive for continuous improvements	2.9	2.2	
Internal collaboration	2.6	2.2	Within BU and across different BUs
External collaboration	2.1	2.2	Vocal to provide engineering solutions, teamwork spirit etc.
Flexibility of supporting business	2.2	2.8	Support urgent NPI needs , like OT, extra spending etc.
Sense of urgency	2.6	2.6	
Proactiveness	2.8	2.2	
Risk of information leak	3	3	
Category score	2.5	2.6	

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CM Assessment | Format of executive review - VPG

- **Program time line will help explain the consideration for CM's IDL peak time and down time**
- **Show not only the score but also the reason behind and pros & cons with different scenarios**

	20xx CQ3	20xx CQ4	20yy CQ1	20yy CQ2	20yy CQ3	20yy CQ4	20zz CQ1	20zz CQ2
Program 1	xVT		xVT		xVT		xVT	

	CM A	CM B	CM C
	Program 1	Program 1	Program 1
Engineering	2.4	2.7	2.2
	• **Pros** :	• **Pros** :	• **Pros** :
	• **Cons** :	• **Cons** :	• **Cons** :

- core competency, completely fulfills Apple requirement, minimal or no gaps
- some strengths, partially fulfills Apple requirement, some gaps that could be bridged
- concerns overwhelm strengths, does not fulfill Apple requirement

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CM Assessment | Score Card Example

1st version of score card is release in box folder. Please click link - Online score card Link

Table 1

		Reference CM	CM1	CM2	CM3
Facility	**Ease to access (eg.commute to factory)**	2	**1.9**	**2.7**	**2.0**
	Hotel options	3	**2.5**	**2.3**	**2.3**
	Crisis(eg.Covid) reaction	1	**2.8**	**2.9**	**2.0**
	Line/lab layout flexibility (FATP line to FA lab, Rel lab, chamber)	1	**2.8**	**3.0**	**2.8**
	Facility readiness (timeline w.r.t. build schedules)	4	**1.9**	**3.0**	**2.9**
	Space to expand for future program and Ops build	1	**2.5**	**3.0**	**2.8**
	Clean room setup & management	2	**2.7**	**2.7**	**2.3**
	High quality measurement equipment support (is the plan in place for EMC chamber/ CT etc)	2	**2.9**	**2.8**	**2.4**
	Ease of material logistics	1	**2.8**	**3.0**	**3.0**
	Category Score	1.9	**2.5**	**2.8**	**2.5**

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Appendix | Cross LOB Critical Criteria

- Home Engineering Core Team (9 pages)

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CM Assessment | CM Down-Select Criteria - Home

01

Facility Competitiveness

1) Lab & Line Layout Readiness / Flexibility
2) Advanced Equipment Held
3) Geographic Logistic Advantage
4) Commute Convenience

02

Engineering Resource

1) Technical Expertise & Engineering Know-How
2) FACA Capability
3) Communication & Collaboration
4) Resource Retention

03

Management Efficiency

1) Execution Promptness
2) DOE control & Resource Coordination
3) OK2Build Progress Driving
4) VI Capability

04

Product Understanding

1) Past Experience with Apple / Similar Products / Same level of System Complexity
2) Understanding on core product technology
3) Unique Advanced Technical Expertise could be Leveraged
4) CM Development Feasibility (Automation, Testing, SW, etc.)

05

Company Nature

1) Goal - Orientation
2) Resilience
3) Dedication
4) Proactiveness

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CM A _ Engineering Resource (7.6 out of 10)

- **Purpose is to evaluate CM iDLs' technical expertise on problem solving and effective communication with Apple team**
- **An opportunity to highlight or even disqualify any engineering resource that can't meet Apple's standard**
- **Recommended Weighting (35%)**

	EPM	PD	EE	HWTE	…	Overall
Technical Expertise & Engineering Know-How	7.0	8.0	7.5	9.0	…	**8.2**
FACA Capability	6.5	7.0	7.0	8.0	…	**7.0**
Communication & Collaboration	7.5	6.5	7.0	7.0	…	**7.0**
Resource Retention	8.5	9.0	8.0	9.0	…	**8.2**
Engineering Resource Overall	**7.4**	**7.6**	**7.4**	**8.3**	**…**	**7.6**

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CM A _ Management Efficiency (7.9 out of 10)

- **Purpose is to evaluate CM's process flow control capability to ensure organized project execution and successful build record**
- **An opportunity to identify process flaws that potentially undermine effectiveness and efficiency**
- **Recommended Weighting (20%)**

	EPM	PD	EE	HWTE	…	Overall
Execution Promptness	9.0	8.5	8.0	7.0	…	**8.5**
DOE Resource Coordination	7.0	7.0	8.0	8.0	…	**7.7**
OK2Build Progress Driving	8.0	7.0	8.0	7.0	…	**7.5**
VI Management	8.5	8.0	8.0	7.5	…	**8.0**
Management Efficiency Overall	**8.1**	**7.6**	**8.0**	**7.4**	**…**	**7.9**

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CM A _ Product Understanding (6.6 out of 10)

- **Purpose is to evaluate CM's any other potential resource and capability that could be leveraged to help expedite the progress**
- **An opportunity to help CM reflect on their own competitiveness and brainstorm where they can fit**
- **Recommended Weighting (20%)**

	EPM	PD	EE	HWTE	…	Overall
Past Experience with Apple / Similar Product & Complexity	6.0	7.0	5.0	5.0	…	**6.2**
Product Core Technology Understanding	6.5	7.0	7.0	7.5	…	**6.7**
Unique Advanced Technology / Process	7.0	8.0	7.5	7.0	…	**6.6**
Self Development Feasibility	5.0	7.5	8.0	9.0	…	**7.0**
Product Understanding Overall	**6.1**	**7.4**	**6.9**	**7.1**	**…**	**6.6**

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CM A _ Facility Competitiveness (7.8 out of 10)

- **Purpose is to evaluate CM's infrastructure maturity on NPI build and get early aware of construction L/T and impacts**
- **An opportunity to highlight any space request**
- **Recommended Weighting (20%)**

	EPM	PD	EE	HWTE	…	Overall
Lab & Line Layout Readiness / Flexibility	7.0	6.0	9.0	8.0	…	**8.5**
Advanced Equipment Held	8.0	8.0	8.0	8.5	…	**8.2**
Geographic Logistic Advantage	8.5	7.5	8.0	7.0	…	**7.7**
Commute Convenience	6.5	6.5	6.5	7.0	…	**6.7**
Facility Competitiveness Overall	**7.5**	**7.0**	**7.9**	**7.6**	**…**	**7.8**

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CM A _ Company Natural (9.1 out of 10)

- **Purpose is to evaluate whether CM team is mentally prepared for any challenging tasks during NPI build**
- **An opportunity to observe whether CM leaders can inspire the team to push through tough challenges**
- **Recommended Weighting (10%)**

	EPM	PD	EE	HWTE	…	Overall
Goal Oriention	9.0	9.0	8.0	9.0	…	**8.7**
Resilience	9.5	9.5	9.5	9.5	…	**9.5**
Dedication	9.0	9.0	9.0	9.0	…	**9.0**
Proactiveness	8.5	9.5	9.5	9.5	…	**9.2**
Company Nature Overall	**9.0**	**9.3**	**9.0**	**9.3**	**…**	**9.1**

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CM Assessment | Individual Vendor Summary - Home

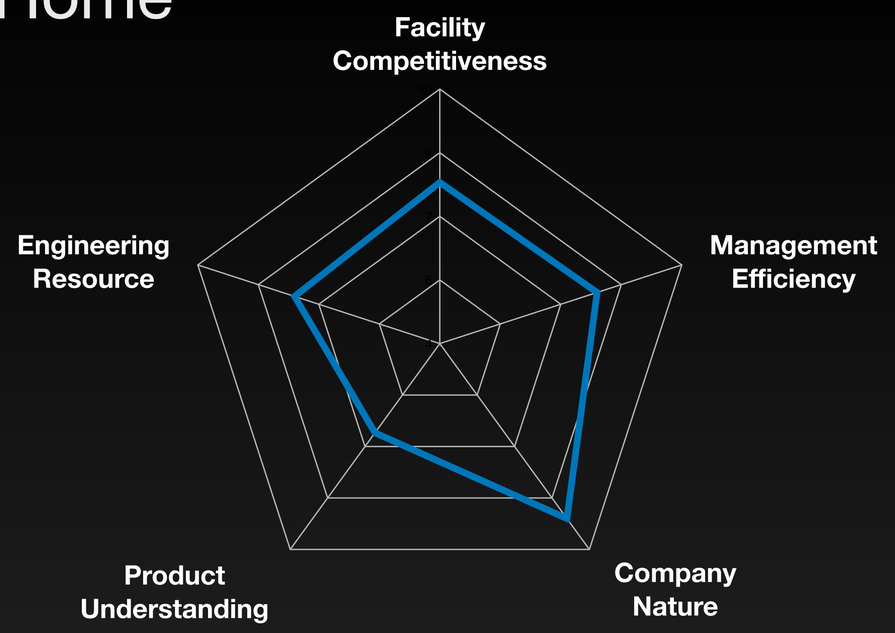
CM A Overview (7.8 out of 10)

Key Strength:

- Strong execution capability from past project experience
- HW engineering team w/ deep expertise
- Outstanding VI management capability

Potential Risks:

- Lack of complex system project experience
- Unclear FACA control flow, causing potential efficiency undermine
- Relatively weak product understanding for this project



	Score	Weighting	Weighted Score
Engineering Resource	7.6	35%	2.7
Management Efficiency	7.9	20%	1.6
Product Understanding	6.6	20%	1.3
Facility Competitiveness	7.8	15%	1.2
Company Nature	9.1	10%	0.9

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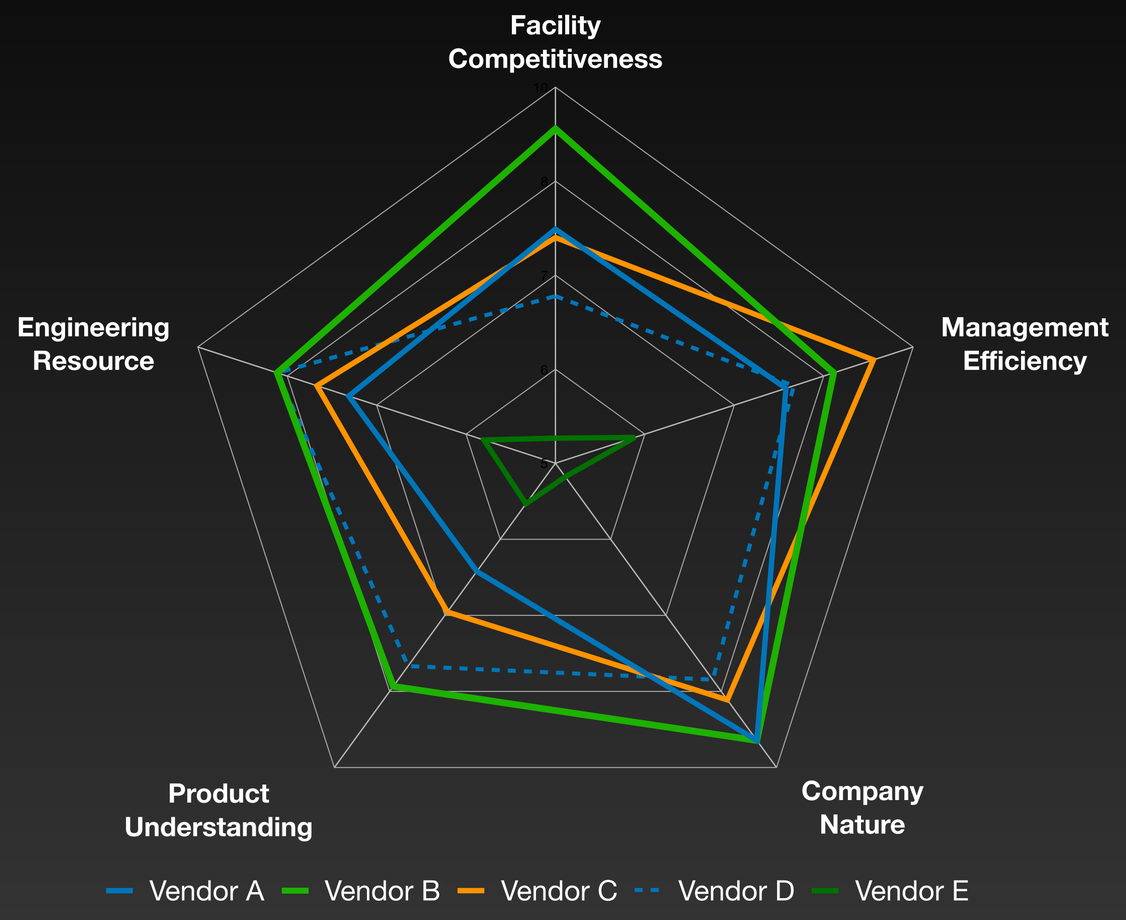
Project XXX CM Down-Selection Overview

CM	Score	Participants
A	7.8	• EPM • PD • EE • TDL • TPM • AME • RF • Acoustic • PQM
B	8.7	
C	7.6	
D	7.5	
E	5.5	

> 8.5 Recommended to Engage

> 6.0 Minor Gap towards Apple Standard

< 6.0 High Qualification Risks / Concerns



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Appendix | Cross LOB Critical Criteria

- iPad Accessory Engineering Core Team (2 pages)

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CM Assessment | Selection criteria - iPad/iPad Accessory

- **Goal is to evaluate if CM's capability to support NPI program**
- **Use score card system with established criteria list**

				Score for Pad NPI CM Score 1 (worst) to 9 (best)															Remark
Criteria	**Description**	**Priority**	**Priority -OPS**	**Priority -template**	**CM1**							**CM2**							
					EPM	PD	PD EPM	EE	RF	HWTE	REL	EPM	PD	PD EPM	EE	RF	HWTE	REL	
Capabilities	Capable vendor minimizing Apple hand-holding / involvement	High		High															
	Strong development capabilities such as technology (i.e. wireless), FA/NPI labs, CM local senior leadership	High		High															
Supply chain	Material availability and equipment support	Med		High															
Apple Resources	Presence of Apple Eng near NPI Site (Apple resources readily available)	Med		High															
Experience with Apple	Exposure and performance related to Apple Hero Products	Med		Medium															
Infrastructure / Space	Ability to support expanding roadmap and simultaneous NPI	High		Medium															
Eng IDL	Engineering IDL Support and Attrition	High		Medium															
	Heavy involvement required from the Eng resources to transition to MP	Med		Medium															
Location	Travel accessibility (easy to get in/out)	Med		Medium															
	Getting closer to home? US?	Low		Low															
Automation	Ability to add automation to process and provide cost/HC savings	Low		Low															
Commercial	MVA, Capex Investment, SOW, Ramp Support and Engineering NRE	Low		Low															
				Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

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Appendix | Cross LOB Critical Criteria

- Mac Engineering Core Team (4 pages)

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CM Engineering | NPI Scorecard

Prioritize criteria and evaluate development capabilities identifying gaps for Mac NPI partner

Criteria	Description	Priority	Weight	CM A	CM B	CM C	CM D	Comments / Gaps
Capabilities	Capable vendor minimizing Apple hand-holding / involvement	High	60%	5	4	**2**	4	WT don't have any Apple NPI experience
	Strong development capabilities such as technology (i.e. wireless), CM local senior leadership and talented resources, FA/NPI labs (or nearby services)	High		6	5	**2**	5	WT PD leader Totti is not qualify. EE leader Eric is capable. Equipment/lab is on track.
Eng IDL	Talented engineering IDL support and low attrition	High		4	7	4	6	Can't identify WT key talent yet. Attrition should be better.
Apple Resources	Presence of Apple Eng near NPI Site (Apple resources readily available)	High		9	5	8	6	
	Minimal Apple Eng resources required to transition to MP	Medium	30%	4	7	4	7	FX can transition to MP without Eng resource involve.
Experience with Apple	Exposure and performance related to Apple Hero Products	Medium		9	7	**3**	6	WT is still bring up on ATV and J313 MP. Nothing ship yet.
Infrastructure / Space	Ability to support expanding roadmap and simultaneous NPI	Medium		6	8	9	**3**	Need further review FXLH proposal on space.
Supply chain	Material availability	Medium		8	6	8	9	Most vendor around Shenzhen and Shanghai
	Equipment support	Medium		8	6	8	9	Less vendor available at CD and no enough on site FAE.
Location	Travel accessibility (easy to get in/out)	Low	10%	9	6	9	9	Less flight available for FX CD.
Automation	Ability to add automation to process and provide cost/HC savings	Low		5	5	5	5	FX LH invest more automation station.
Commercial	MVA, Capex Investment, SOW, Ramp Support and Engineering NRE	Low						
		Total	Sum	**73**	**66**	**62**	**69**	
			w/ weight	**26.3**	**23.9**	**20.6**	**24.2**	

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Mac | CM Engineering: Pros vs Cons

2021: Total 7x NPI programs (6x new ID), OK2Ship 4x programs.
2022: Total 11x NPI programs (4x new ID), target OK2Ship 5x programs.

CM Options	Location	NPI Score	Pros	Cons
CM A	Shanghai	73	- Familiar with portable NPI - Strong PD capability - Mature Mac NPI facility (Including REL)	- Short of IDL and NPI line space - High key talent attrition - Hesitate of investment because of lack of competitor
CM B	Shenzhen	69	- Can leverage Shenzhen talent - Bring in competition to Quanta - Share NPI loading from Quanta - **Diversify NPI site and reduce risk.**	- Lack of portable NPI experience - Mac NPI facility not ready (CR, REL).

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Mac | CM Engineering: Pros vs Cons

CM Options	Location	NPI Score	Pros	Cons
CM C	Shenzhen	69	- With Apple NPI experience - Can leverage Shenzhen talent - Less effort to bring up	- Business relation is not good - Hesitate to further investment
CM D	JiaXing	62	- Location near by Shanghai - Better business relationship - Willing to invest for long term	- No Apple experience - Lack of talents and leaders - Need more effort to bring up

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Appendix | Cross LOB Critical Criteria

- Audio/Package/Softgoods Engineering Core Team (3 pages)

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CM Assessment | Format of selection criteria

Softgoods CM Selection

- **Goal is to evaluate CM capability to support NPI**
- **Cross functions provide evaluation feedback base on RFP**

Blocker	1. Cannot meet expecttations	2. Meets but not consistent	3: Meets Expectation	4: Exceeds Expectations

CM Evaluation Matrix						
Function	**Evaluation Criterion**	**Weight**	**CM-1**	**CM-2**	**CM-3**	**CM-4**
PD	FACA capability	25%				
	Technical issue management & resolution	25%				
	DFM + CAD feedback capability	15%				
	Data Analysis & management	15%				
	Communication (written/verbal)	10%				
	Vendor cooperation	10%				
	PD Score	100%				
REL	Accuracy in Reliability Reporting	20%				
	Initiative and proactiveness in response to issues	20%				
	FA capability	20%				
	Communication to Apple DRI	20%				
	Reliability technical ability	20%				
	REL Score	100%				
EPx	Ability to meet schedule	25%				
	Resources	15%				
	Development facility	10%				
	Program management	30%				
	Management support	10%				
	Logistics/Labelling	5%				
	Material Tracking Updates	5%				
	EPx Score	100%				
Total	**SG Team Avg Score**					

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CM Assessment | Format of selection criteria

Audio SiP CM Selection

- **Goal is to evaluate CM capability to support NPI program**
- **Cross functions provide evaluation feedback base on RFP**

Low Risk	Medium Risk	Medium High Risk	High Risk

Function	CM A	CM B	CM C	CM D	Justification/Comments
EE					
HWTE					
RF					
EPM					
Rel					

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CM Bring up

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NPI CM Playbook | CM Bring up

- Equipment
- Facility and Construction
- IDL hiring and Training
- Training build
- Budget

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NPI CM Playbook | CM Bring up

- Equipment
  - Introduction
  - Long L/T EQ driving

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CM Bring up | Introduction

Type of equipment

- The equipment type is defined by the purpose.
- For lab EQ, most of them are re-usable (Capex). For on line and off line EQ, most of them are not re-usable (Opex)

Online/Offline

- Majority online equipment refers to POR intent equipment
- All offline equipment is Non - POR equipment to collect Eng data

Lab

- Combine with Non-POR equipment and FA equipment for FA purpose

Type of budget and purchase process

- Budget approval is required before kick off purchase process
- Different budget type correspond to different purchase process

Apple Budget

Purchase by **consign** or **reimburse** process, require GSM's approval to define

CM Budget

Purchase by CM, normally CM identified as **common** process

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CM Bring up | Long L/T Equipment

Long lead time equipment

- Here we provide the reference L/T and approaches when we have urgent needs for long LT equipment
- Normally CT and Rel chamber will be needed early by drop build

Risk level	Equipment item	Purchase L/T
●	CT-scanner	**Standard L/T** : 3 - 5 months. **Approach to drive delivery** : • Could leverage GSM's help to expedite the L/T • Have CM place order (change consign to reimburse or let CM invest) If the delivery is still later than expected date, Rental from CT scan CM I another option
●	DQE TH/TC Chamber	**Standard L/T** : 4.5 - 10 months **Approach to drive delivery** : • Have CM place order (change consign to reimburse or let CM invest)
●	EMC/RF Chamber	**Standard L/T** : 4 - 10.5 moths **Approach to drive delivery** • Leverage other LOB's chamber for long LT items (EMC and Regulatory)

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CM Bring up | Long L/T Equipment - REL

Long lead time Equipment for Rel

- The required date by 1st Drop build or 1st training build
- Have CM to follow up below format to track ETA

Equipment name	Qty	Required date	ETA	Delivery Risk	Purchase Lead time	Notes
CT	2	2022/5/6	2022/4/30	Low	6 months	BU I/T 1 Weeks, 1st required build Drop build，
TH chamber	8	2022/5/6	2022/4/28	Low	4 months	BU I/T 1 Weeks, 1st required build Drop build
TC chamber	4	2022/5/6	2022/4/28	Low	4 months	BU I/T 1 Weeks, 1st required build Drop build
Pressure tester	2	2022/5/6	2022/4/28	Low	4 months	BU I/T 1 Weeks, 1st required build Drop build
Vibration tester	1	2022/5/6	2022/5/10	Low	4 months	Loan ORT ,BU I/T 2 Weeks, 1st required build Drop build
Button cycling tester	20	2022/6/10	2022/6/9	Low	2 months	BU I/T 1 Weeks, 1st required build Drop build
Heavy set down tester	6	2022/5/6	2022/4/25	Low	3 months	BU I/T 1 Weeks, 1st required build Drop build
High speed video	8	2022/5/6	2022/4/27	Low	4 months	BU I/T 1 Weeks, 1st required build Drop build
Dust chamber	2	2022/6/30	2022/6/27	Low	3 months	BU I/T 1 Weeks, 1st required build Drop build
UV chamber	1	2022/5/6	2022/4/27	Low	4 months	BU I/T 1 Weeks, 1st required build Drop build

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CM Bring up | Long L/T Equipment - RF

Long lead time equipment for RF

- The required date by 1st training build
- Have CM to follow up below format to track ETA

Equipment name	Qty	Required date	ETA	Delivery Risk	Purchase Lead time	Notes
WSCE / Ant OTA chamber	1				4.5 months	BU I/T 3 Weeks, 1st required build Training build
WSCE / Ant Sub6 OTA chamber	4				5 months	BU I/T 3 Weeks, 1st required build Training build
WSCE Regulatory 3m Chamber	2				8.5 months	BU I/T 3 Weeks, 1st required build Training build
WSCE shield room	2				4 months	BU I/T 3 Weeks, 1st required build Training build
EMC 10m RE & 3m RI Chambers	2				10.5 months	BU I/T 3 Weeks, 1st required build Training build

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NPI CM Playbook | CM Bring up

- Facility construction and line layout
  - Process to design a NPI floor
  - Design guild line
  - Drive the construction schedule on time

Home - Apple Confidential

CM Bring up | Construction Process

Design approval	Checking CM building size, collecting cross function team lab EQ with size demand Start to engage IT support and PO, plan space for program transition
Construction	Locked down lab space allocation, Apple room size/place and production line plan Engage to NPS to check security coverage
Server setting	Engage HWTE, JMET team to set up server, like Insight, JMET server and GH
Readiness audit	Audit for server readiness, security readiness and Apple WiFi support, EHS audit

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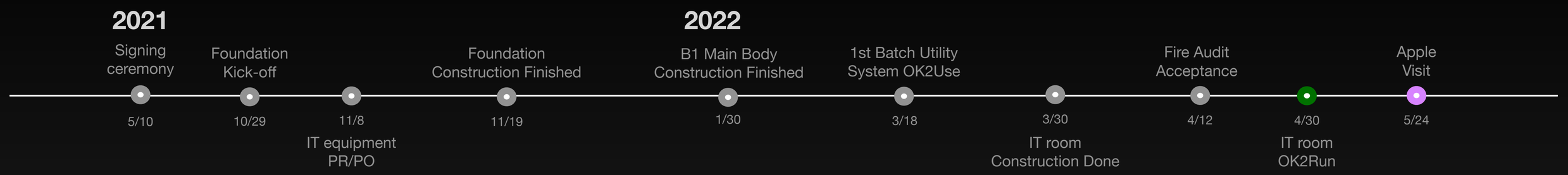
CM Bring up | Facility Set up Timeline



			2021												2022																			
			Oct				Nov				Dec				Jan				Feb				Mar				Apr				May			
	Item	**LT**	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Civil construction (ICT)	Signing ceremony																																	
	Foundation	4W																																
	Main Body	9W																																
	Utility System	7W																																
	Fire Audit	2W																																
IT construction (Allie)	BHU Budget Issued	2W																																
	Quote BOM KPR	1W																																
	PR/PO	3W																																
	Equipment delivery	10W																																
	JMET/PDCA setup	6W																																
	JMET/PDCA bringup	4W																																
	Apple wifi OK2Use	1D																																

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CM Bring up | Construction Space allocation detail

PD Room

Both PD office and PD lab should have specific meeting room inside , and it's space is about 15mm^2

Mother Room

To service female can have a comfortable place for nursing activity

Lab space

Example of each lab space from iPhone FATP program as below

	AD	AE	Apple	DFM	DQE	EE	HWTE	IE	IPQC	IQC	KPD	ME	MFG	OQC	PD	RF	SARL	SW	Grand Total
Apple			609														330		**939**
DQE					2905														**2905**
FATP	58	576				429	366	105	82	1143	762		1826	303	779	1183		82	**7694**
MLB	30			365		478	380			70		80	669			587			**2659**
	88	**576**	**609**	**365**	**2905**	**907**	**746**	**105**	**82**	**1213**	**762**	**80**	**2495**	**303**	**779**	**1770**	**330**	**82**	**14197**

Unit : M2

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CM Bring up | Construction Cost

Pay by CM

Basic construction item which can be re-used should pay by CM
Like network construction, power construction, tables, clean rooms

Pay by Apple

AVCN should pay by Apple due to security concern

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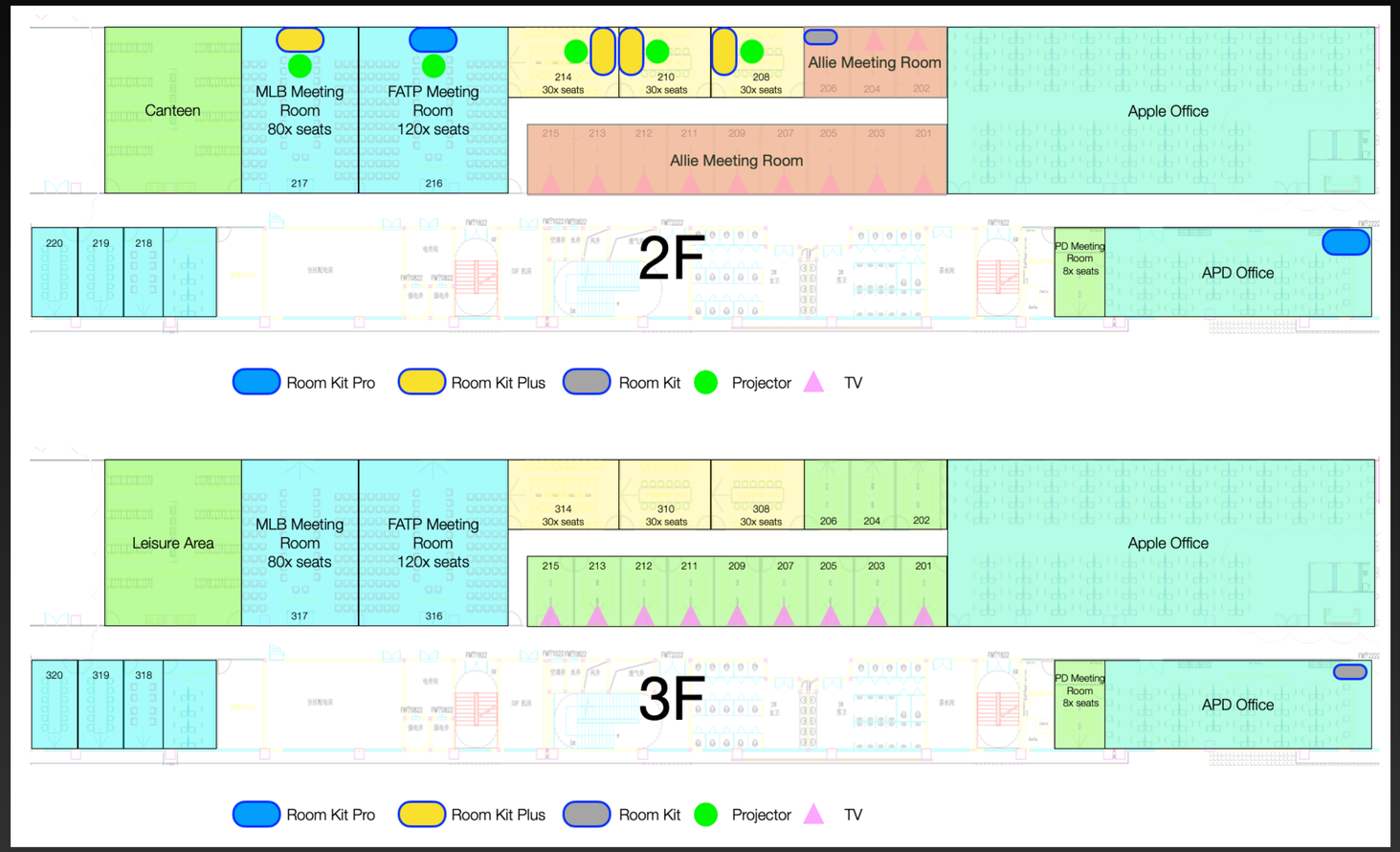
CM Bring up | NPI Apple Room

Example from iPhone program

- Space: 609 M2
- Capacity: Max to support 300x Apple engineers
- A dinning room: 60x Engineering per batch
- 30x Meeting room in Apple room
- 8x target to be with AVCN function
- 1x leisure / recreation area
- 1x mother room



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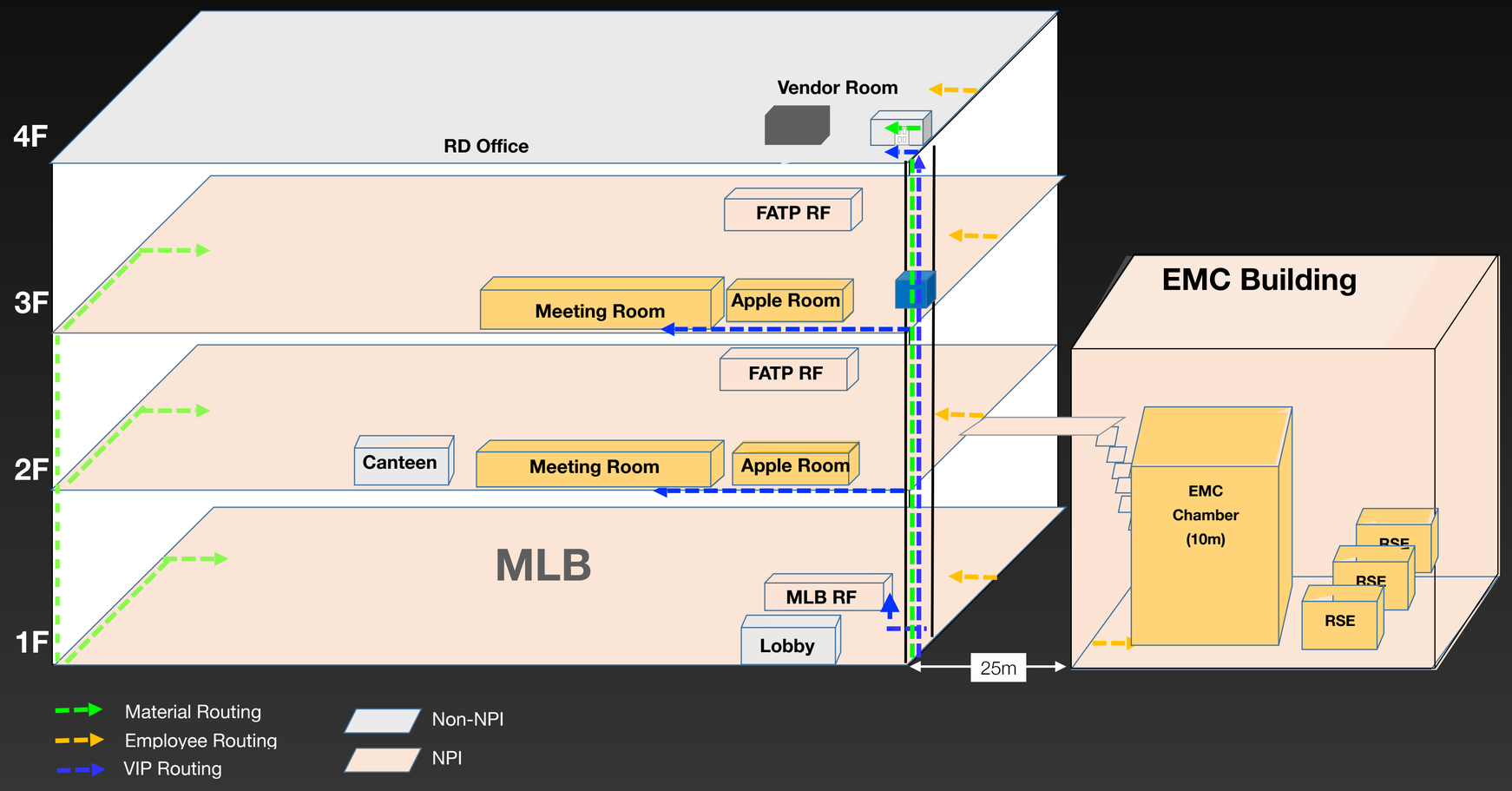
CM Bring up | Construction

- Most of team place production line in the center of building make team easy to access assembly and test line
- Apple room normally is in the same floor with production line
- Key function team lab surrounding assembly and test line



B1 NPI Building

Floor	NPI Building	Size L*W*H	Space /m²
4F	ICT Office and Meeting Room RF MLB Vendor Room	195*105*5.5	19740
3F	FATP A/B Line + C/D Line FATP lab IQC lab Apple Room	195*105**5.5	19740
2F	FATP A/B Line + C/D Line FATP lab REL lab Apple Room	195*105*5.5	19740
1F	MLB ENG Line MLB lab CSA line RIM line PAM line RFA line	195*105*6.5	19740

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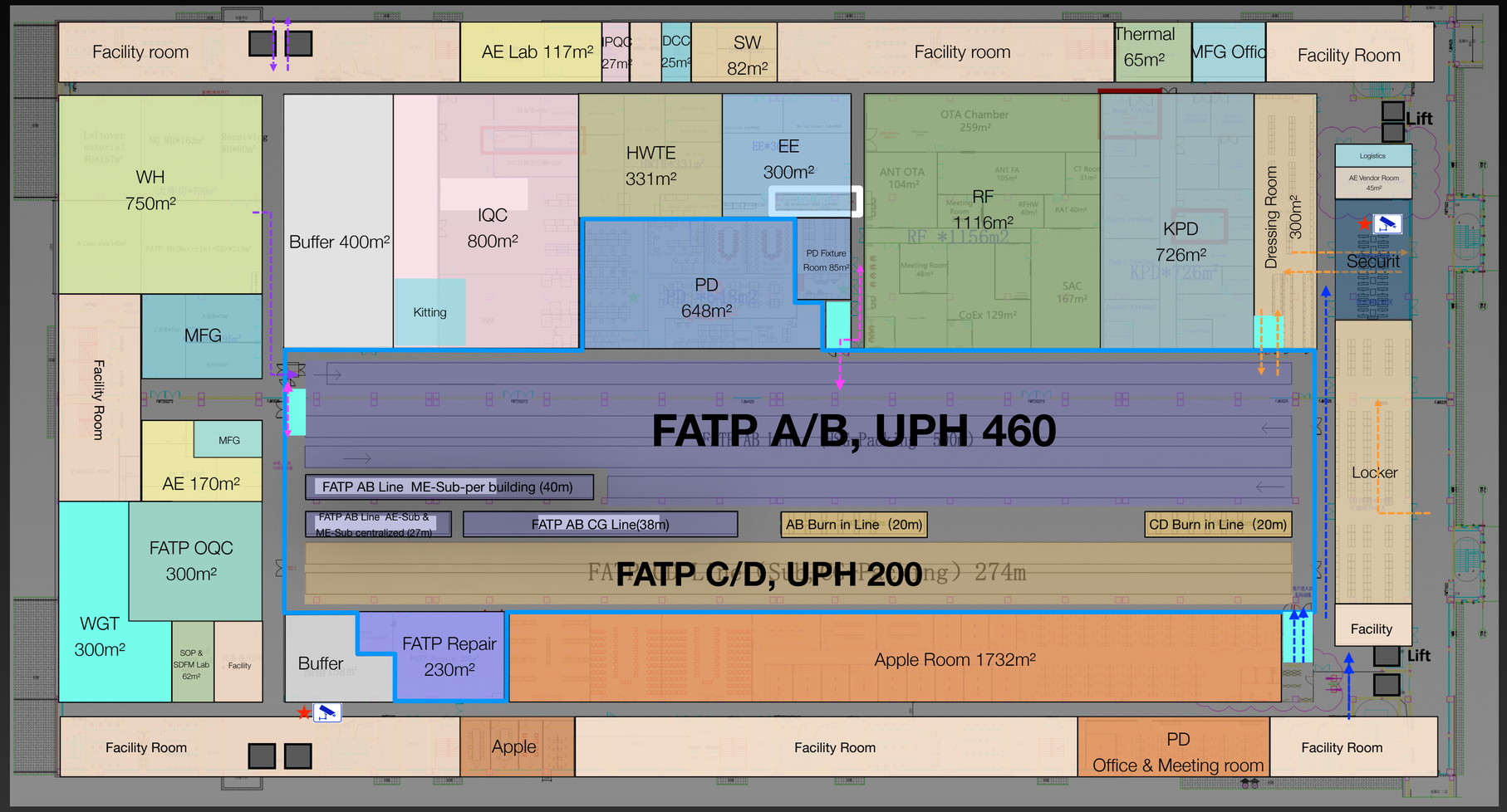
CM Bring up | Construction



Category	Area	Space/m²
FATP Lines		**5757**
1	FATP A/B Line	3559
2	FATP C/D Line	1661
3	Burnin	237
4	Dressing Room	300
FATP Labs		**6375**
1	AAE	287
2	SW	82
3	KPD	726
4	EE	300
5	HWTE	331
6	RF	1116
7	PD	648
8	Thermal Lab	65
9	IQC	800
10	WH	750
11	FATP OQC	300
12	FATP Repair	200
13	IPQC	20
14	MFG	395
15	PD Fixture room	250
16	AE Vendor Room	45
18	PD Vendor Room	60
19	WGT	300
Apple Room		**1732**
Buffer		**500**

Security Point | Clean Room | VIP Routing | ICT flow | Raw Material flow | Units flow

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NPI CM Bring up | Appendix

- iPad
- Audio
- Home
- Watch

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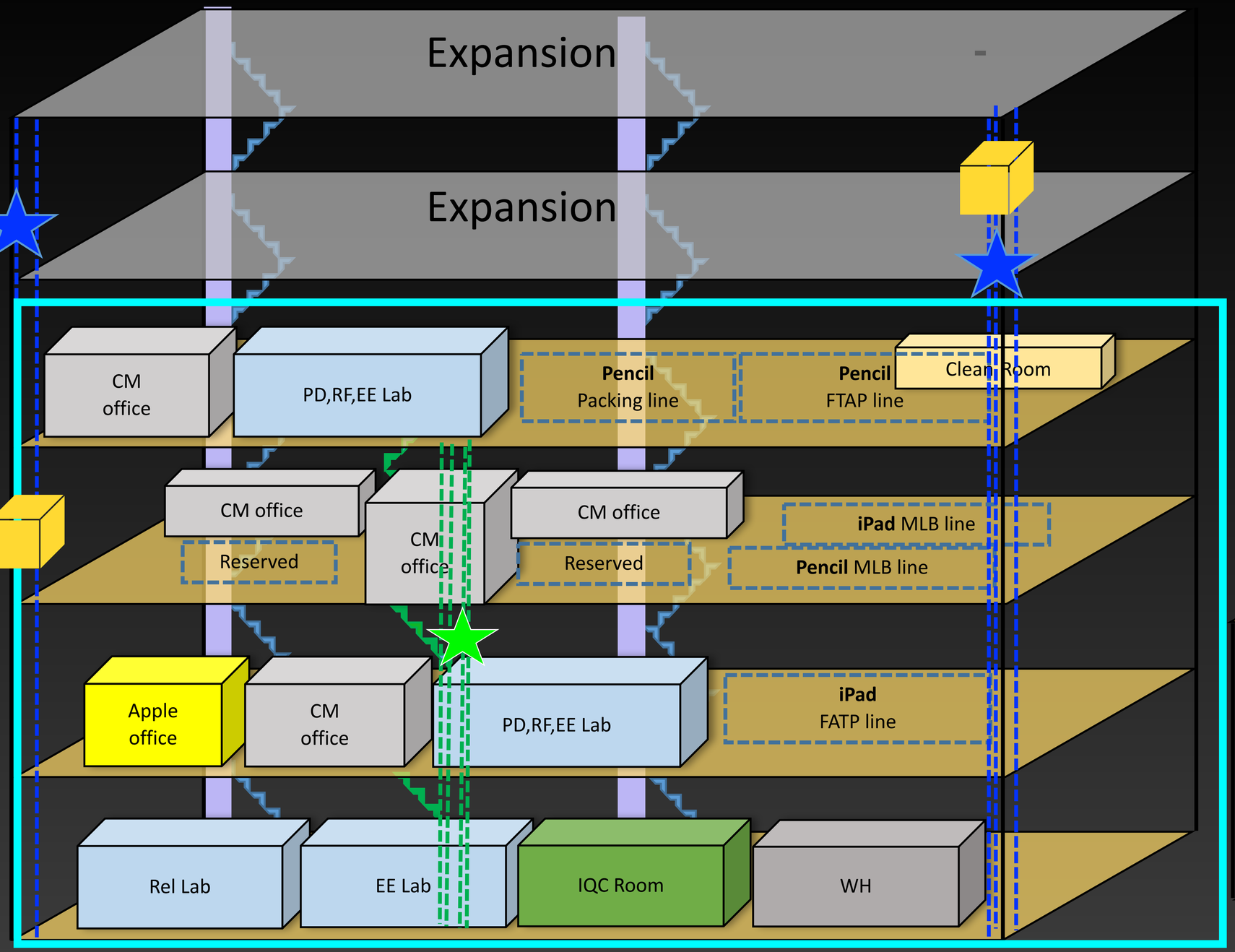
CM Bring up | Construction (iPad team)

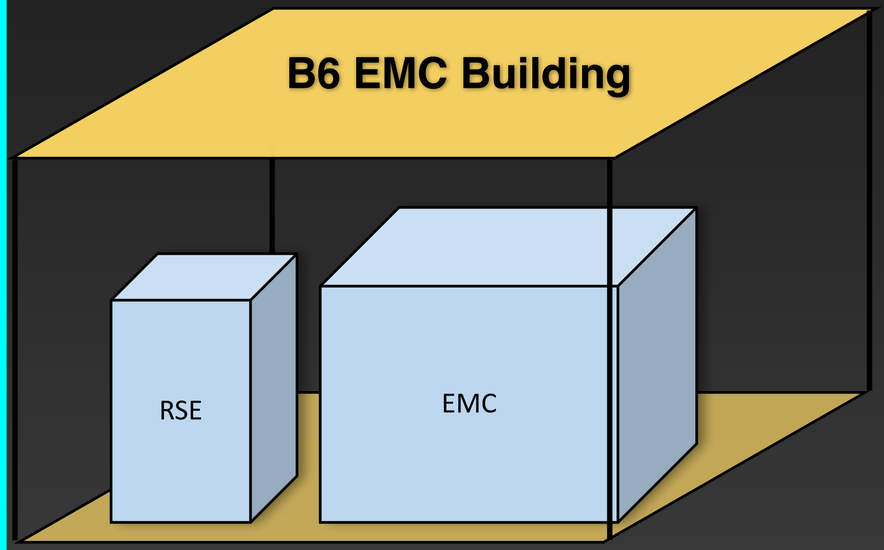


-B1,B2,B3,B4 Each floor have 15,000m²
-B5-B6 can be expansion.

Green channel

Material

NPI security Bubble



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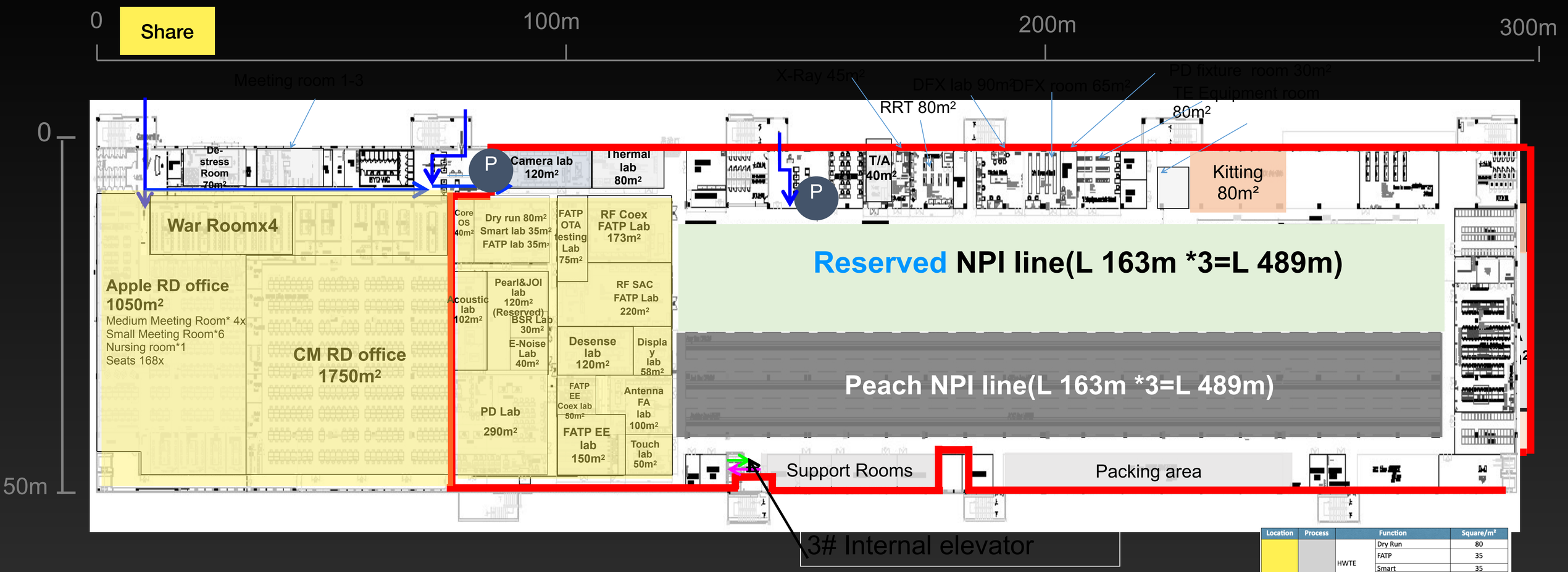
CM Bring up | Construction (iPad team)

Share



Location	Process		Function	Square/m²
B4-2F	FATP	HWTE	Dry Run	80
			FATP	35
			Smart	35
			ME lab	35
			EQ lab	80
		HWEE	FATP EE lab	150
			System Coex Lab	50
			UI lab	30
			Camera lab	120
			Display lab	58
			Touch lab	50
			Acoustic lab	102
			N&V lab	70
		PD	PD lab	290
		AME	NPI AME lab(DFX Lab)	90
		RF	Antenna FA Lab	100
			OTA Testing	75
			Desense	120
			COEX	173
			FATP WiPAS Lab	220
		QA	TA	40
			CQA	300
			RRT	80
			X-Ray	45
		Thermal PD	Thermal lab	80
		CoreOS	CoreOS lab	40
Cum				2548

NPI Area

P Personnel Checkpoint

M Material Checkpoint

C Combined Checkpoint

Personnel Flow

Material Flow

FG Flow

MLB Flow

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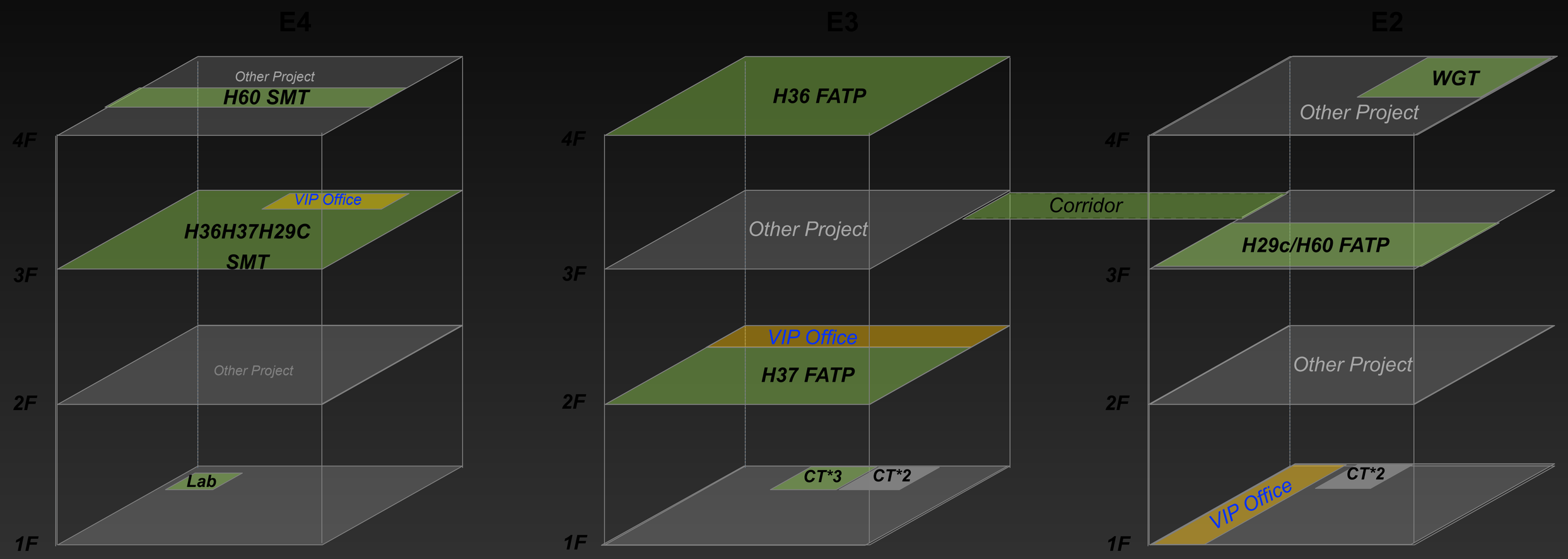
CM Bring Up | Construction (Audio team)

- B1 NPI Building 19740m², EMC building 2016m².



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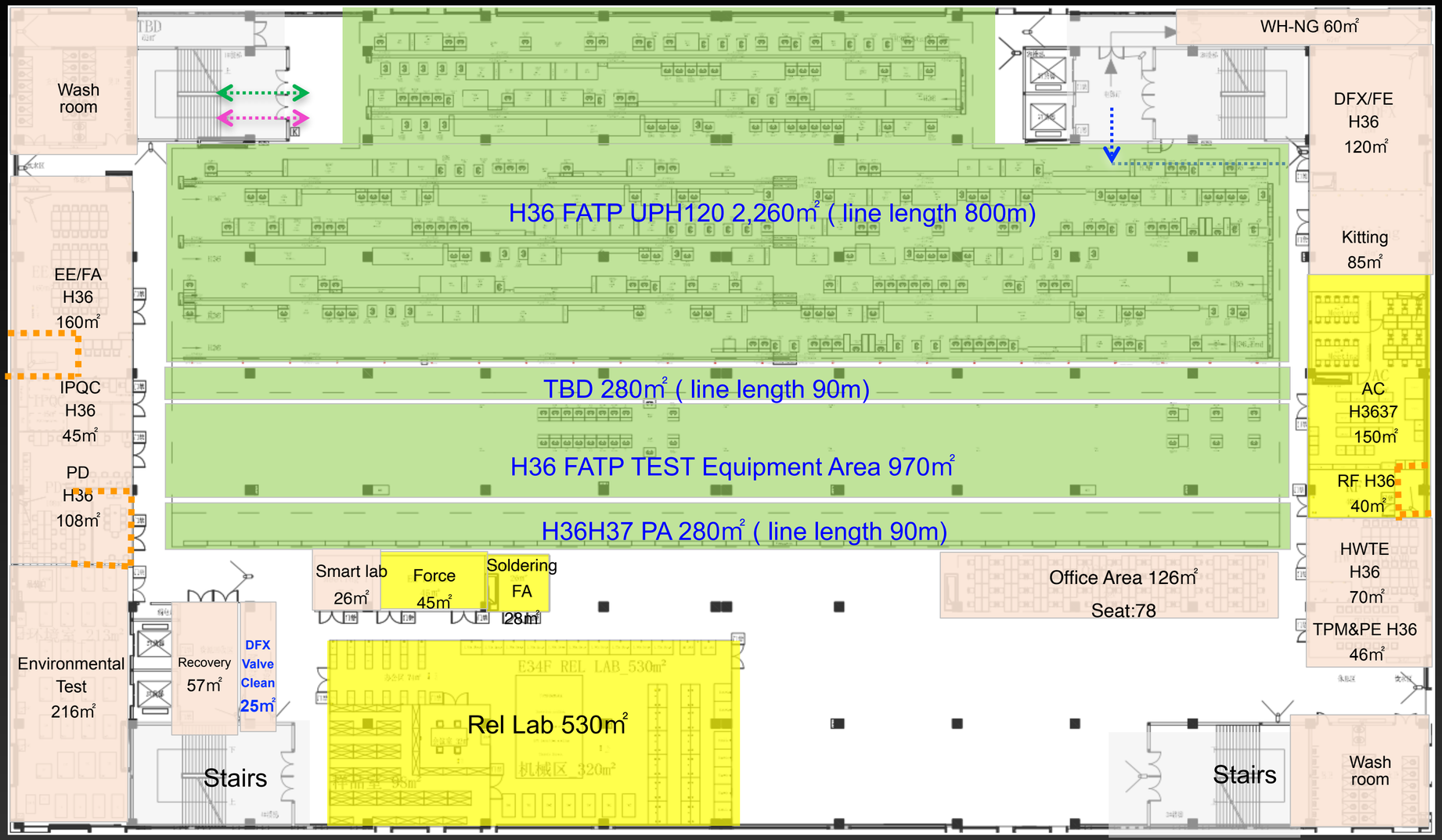
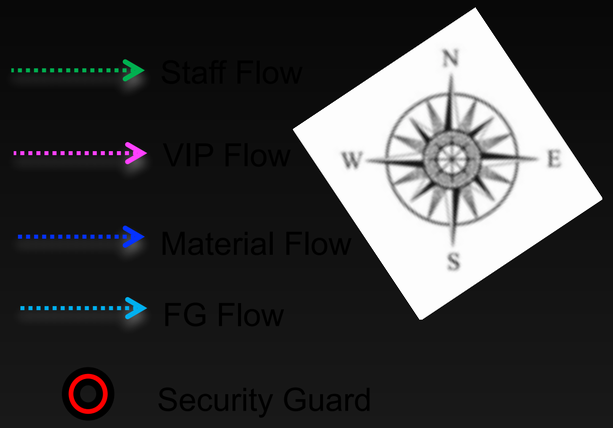
CM Bring Up | Construction (Audio team)





Name	Space(m²)	Capacity
Office	126	78
Function Room	2,375	/
H36 FATP	2,260	/
Test Equipment Area	970	/
H36/37 PA	280	/
Public Area	1,964	/
Total	8,000	/

Key Message:

- H36 FATP UPH120 base on Assembly Story x8.4
- H36H37 PA one line one station

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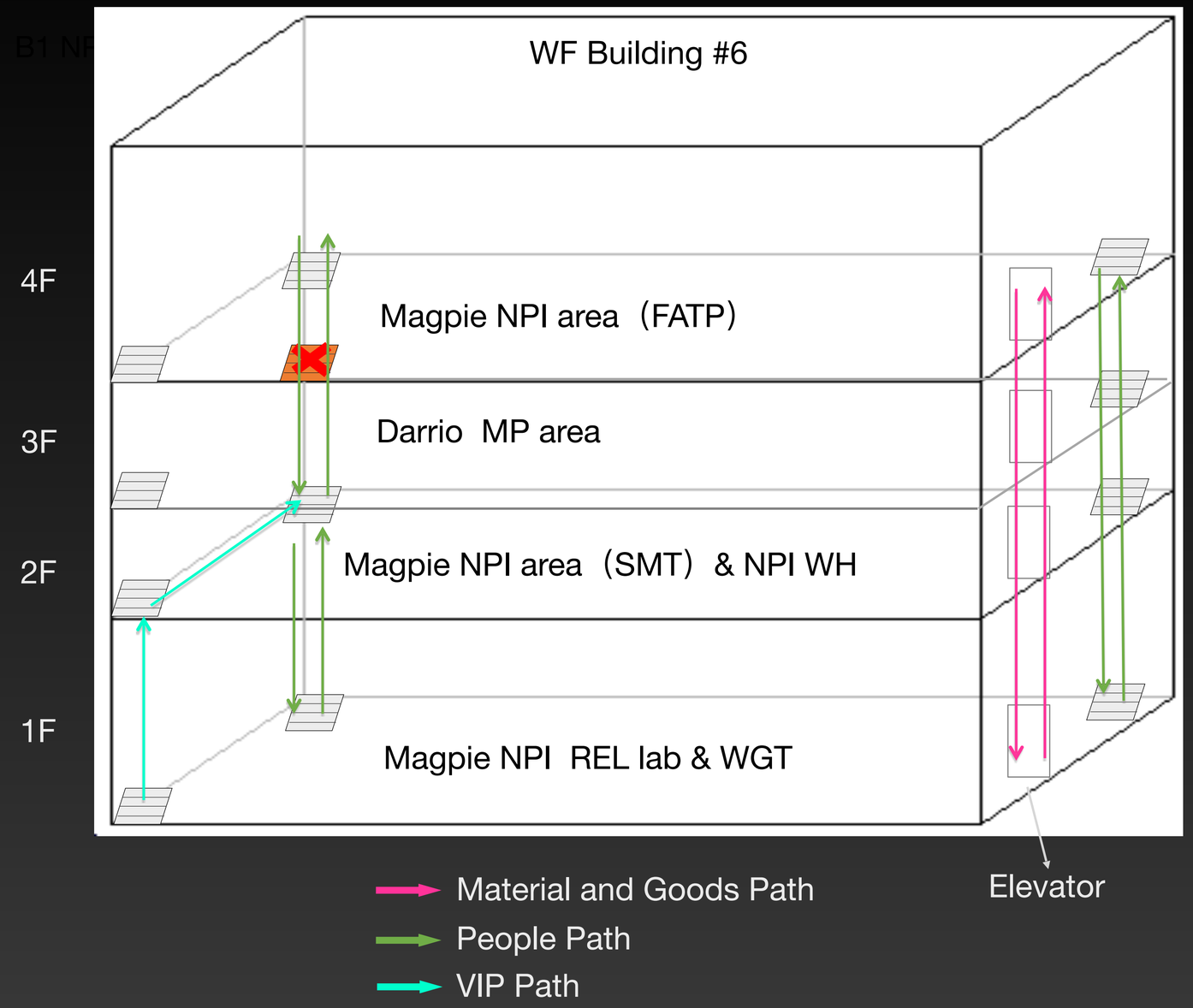
CM Bring Up | Construction (Home)



Floor	Purpose	Size L*W*H	Space/m²
4F	Magpie NPI FATP Line FATP Lab	73.9*59.2*5	4,200
3F	Darrio MP line (idle)	73.9*59.2*5	4,200
2F	SMT test line SMT Lab Raw material WH IQC Lab Apple room	73.9*59.2*5	4,200
1F	Raw material WH REL Lab WGT Lab	73.9*59.2*5	4,200

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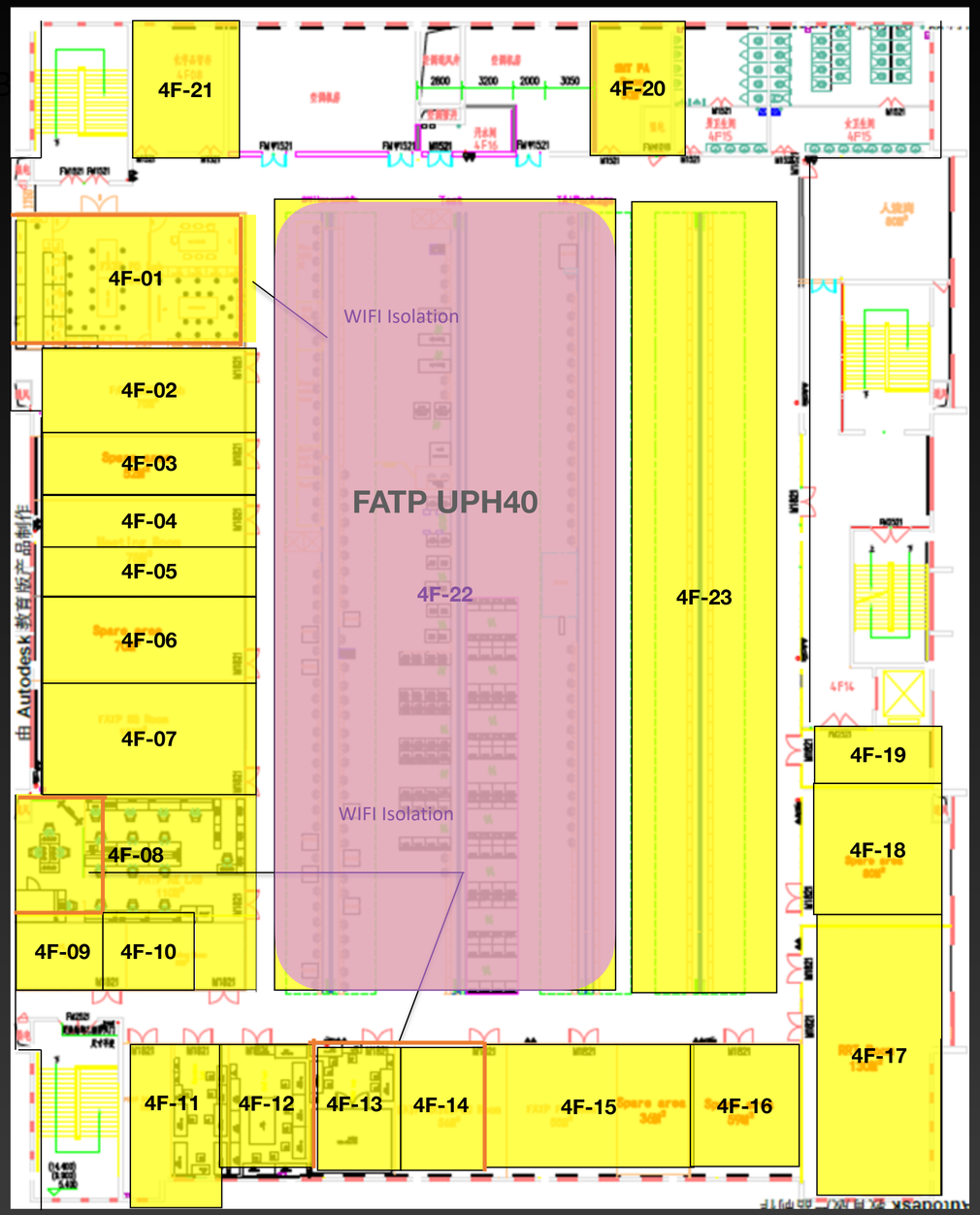
CM Bring Up | Construction (Home)



Num	Room	QTY	Space/m²
4F-01	FATP PD Lab	1	120
4F-02	FATP HWTE Lab	1	75
4F-03	FATP RRT&IPQC Room	1	52
4F-04	FA Room	1	48
4F-05	GTK Meeting Room	1	30
4F-06	FATP GB Room	1	70
4F-07	FATP NG WH	1	100
4F-08	FATP AE Lab	1	120
4F-09	FATP DFX Room	1	20
4F-10	FATP Panic Lab	1	15
4F-11	FATP RF Room（Desense）	1	42
4F-12	FATP RF Room(Coex)	1	51
4F-13	Meeting Room	1	50
4F-14	FATP EE Lab	1	40
4F-15	FATP EE Lab	1	107
4F-16	FATP FG Room	1	49
4F-17	FATP CQA Room	1	120
4F-18	Kitting Room	1	80
4F-19	Logistics channel	1	29
4F-20	Package Lab	1	30
4F-21	Chemical WH	1	48
4F-22	FATP Area	1	1500
4F-23	Spare area	1	500
Total		-	3304

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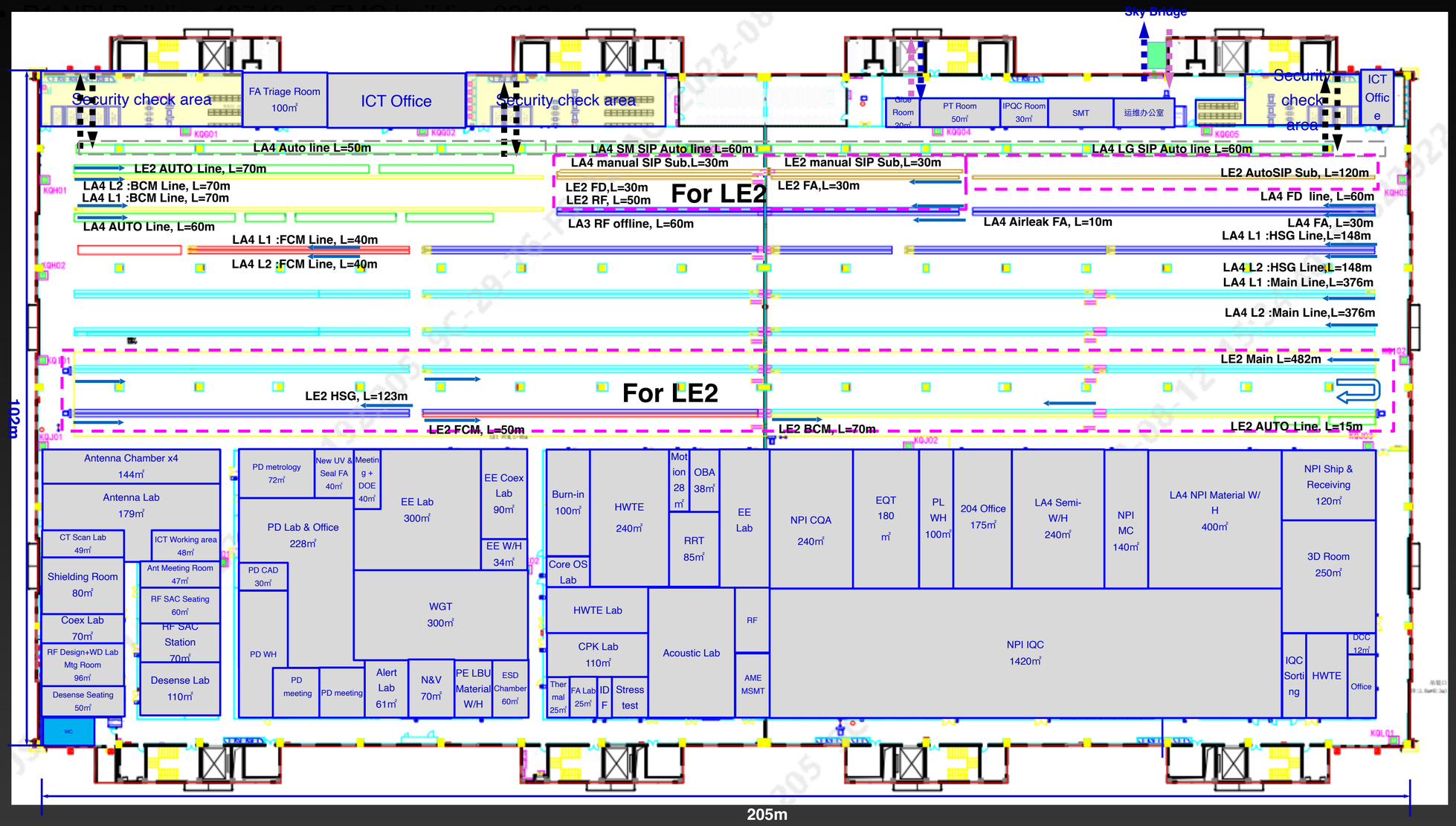
CM Bring Up | Construction (Watch)



People Flow
GB Flow
Material Flow
FG Flow

Line	Line Counts	Line length(m
Main	3	376/482
HSG	3	148/123
BCM	3	70
FCM	3	40
FD	2	60/30
RF	2	60/50
FA	2	30
LA4 SIP Sub(Auto)	2	60
LE2 SIP Sub(Manual	1	30
LA4 SIP Sub(Manual	1	30
LE2 SIP Sub(Auto)	1	120
Airleak FA	1	10

No.	Area	Sapce (sqm)
1	Antenna Lab	179
2	PD Lab	228
3	EE Lab	300
4	Acoustic	170
5	WGT	300
6	HWTE	320
7	CPK Lab	110
8	NPI CQA	240
9	EQT	180
10	NPI IQC	1420
11	Material W/H	400
	TTL	3,847

Floor size：205m x 102m
Total space：21,651㎡
Floor Loading：1000kg/sqm

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NPI CM Playbook | CM Bring up

- IDL hiring and training
  - IDL planning
  - Recommended IDL requirement template
  - Monitoring hiring status

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CM Bring up | IDL: Planning

Collect Engineering **CM IDL Requirement**

Review the **IDL requirement doc** and **confirm overall IDL qty** for the project supported in CM

- Manger level (minimum with 3-5 years Apple experience)
- Senior Level (over 3 years Apple experience)
- Junior level (minimum with 1 years Apple experience)
- Entry level (no any apple experience but with the back ground)
- Technician, should move to DL
- Operator should move to DL

Compare the IDL qty with other exiting CM to **optimize the number** & **High level executive approval** is needed

*Announce no hunting from **"Other CM"** policy

CM weekly hiring tracking

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Why we need to recommend IDL requirement

- We see vary IDL requirement in different LOB
- Request information is not clear and specific
- Hard to consolidate/understand by CM

CM Bring up | IDL: Requirement Document Template Recommendation

1. Technical Capability Definition

- **Senior Manager**- department lead with a team of > 10 years experience
- **Senior level** - Experienced structure Engineer, tech lead with > 5 years experience
- **Experienced Engineers** - structure Engineer > 3years of working experience
- **Junior level** - new grads/ engineers with < 2 years, or no prior Apple experience

Define **level** with **NPI program experience**

- Need each functional team to define the requirements/conditions for experienced level
  - Strong management & problem solving skills(Senior)
  - Proven expertises and experience (Senior)
  - Experience with Apple products and Apple NPI process(Senior)
  - Strong PD engineering understanding(Experienced)

Define the **major** and **experience** we need

2. HC & RnR requirement

Detail Technical requirement for CM IDL

Detail CM IDL HC requirement

Detail CM IDL Location requirement

Function	Major Responsibility	R&R	HC					Apple Counterpart	Additional Requirement
			Manager:	Senior Level	Exp Level	Junior Level	Entry Level		

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CM Bring up | IDL: Requirement Document Template Recommendation

	Function	Major Responsibility	R&R	HC					Apple Counterpart	Additional Requirement
				Manager:	Senior Level	Exp Level	Junior Level	Entry Level		
EPM	EPM leader	Facing Customer EPM lead and other key leaders. Monitoring Team performance and performing as escalation point for Build Blocker or major	• Define org, R&R by programs needed • Team management for programs schedules, tasks and targets • Coordinate internal and external for conflicts, concerns and different proposals to mitigate major issues. • Continuously drive process improvements.						EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	System/ Hardware EPM	Primary contact to customer team Host meeting and reporting, internal communication / coordination	• Drive build readiness, line conversion, identify issues and risks • Understand input plan and strategy, internal & external communication • Host open/close meeting, update I/O status, blockers, major issues and actions, OK2X meetings. • Drive build execution, ensure timely communication for line down, special instruction, line conversion control for material variables, bottle-neck tracker and optimization						Sys/HW EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	FATP Sub line Driver	Major focus online status, ensure config input correctly, drive throughput of FATP-sub.	• Online assembly fixtures / auto-machines / OPs status checking before build • Review special instruction and manage special configs • Drive daily I/O to meet subline / pre-snap line target • Communicate line down issue to team, co-work with engineers to perform DOE / debug to resume input • OP fixture / machine release confirmation						Sys EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	Main-Line Line Driver	Responsible for online test status, manage test waiver	• Online fixtures / testers / OPs status checking before build • Drive critical data collection per requests • Drive main-line throughput (both pre-CHM and Post-CHM), optimization post-CHM line test per shift • Manage DOE / offline tests / reflow and optimize units route to meet allocation plan • Manage units borrow / return within factory						Sys EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	Material EPM	Major focus online material status, ensure material kitted and transferred correctly	• Monitor DRP/build matrix/kitting online • Manage online material shortage (CTB, IQC priority, tossing, quality, binning, etc) • Manage material screening, swap, rework and push all materials to line as						Sys EPS	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	DOE EPM	Responsible for Master DOE request, RF offline, Offline Lab, and special process execution	• Organize master DOE request and confirm with each function DRI for test plan / special process/ special materials • Drive DOE station readiness / Mini dry run progress / HTHH plan / modified Roxer / EE coex tracker • Monitor DOE config material stuffing and online process/ RF offline and offline Lab test progress • Update DOE report twice a week to summarize "Need customer help /						Sys EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	PD EPM	Interfacing PD for PD DOE coordination and PD request fulfillment	• Tracking PD meeting actions • Taking care of PD material/equipment requests to xF team • Manage PD DOEs by working with AE/ME/PT.etc • Summarize PD DOE requests and tracking progress.						PD EPM	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility
	Shipping EPM	Responsible for shipping readiness, logistic	• Drive battery / system CSTCG, 3C waiver • NPI pack-out production management • Logistic (SAP maintain, Customs registration, Schenker tracking information) • Drive OOE issues						Sys EPS	•Location: CM R&D offline/Lab •Facility: NB/Desktop •SW: •Facility

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CM Bring up | IDL: Hiring status (CM Weekly report)

To monitor CM's IDL hiring

- When CM starts hiring, should use below similar format to track hiring progress (%), attrition rate (%)
- Any gap between expectation, need CM to provide action and Next Step

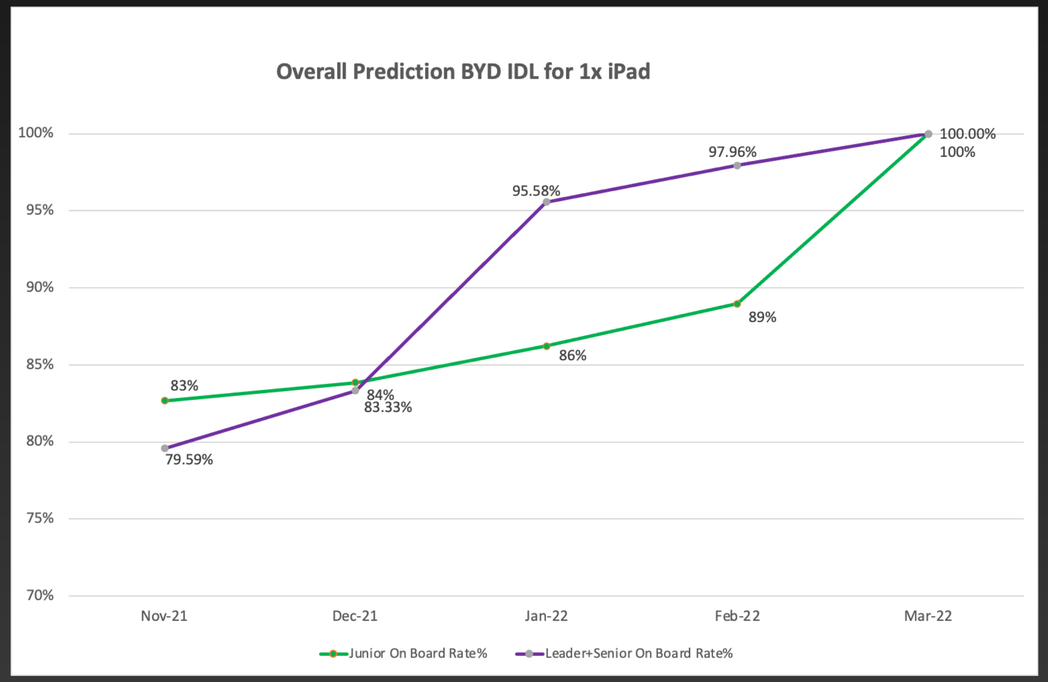
	Lead+Senior	Junior	Total
APPLE Request	294	254	548
CM Actual Hired	234	210	444
Hired Rate%	79.6%	82.7%	81.0%

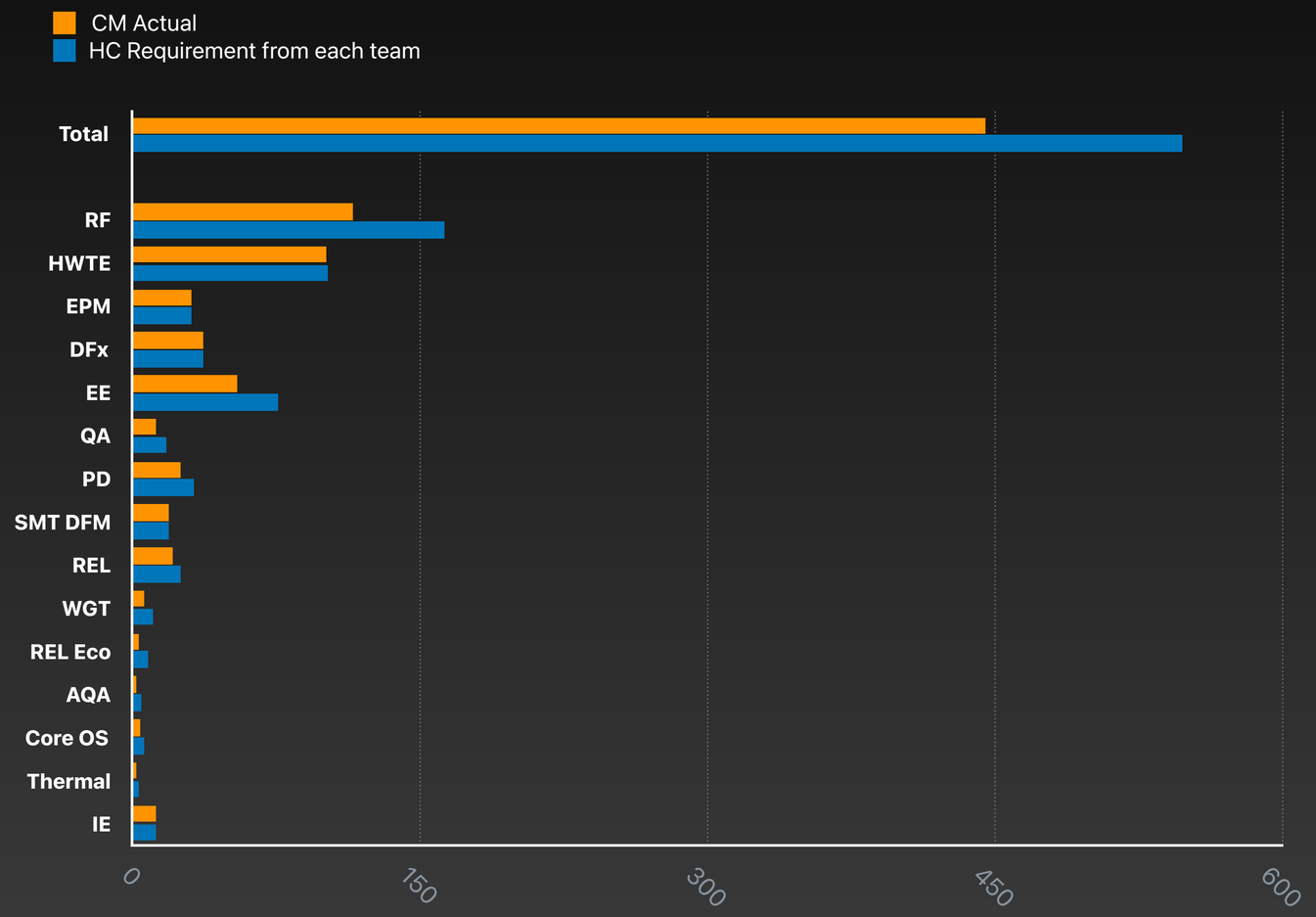
Highlight/Concerns

- Achieve rate:

- Attrition rate:

Next Step/Action





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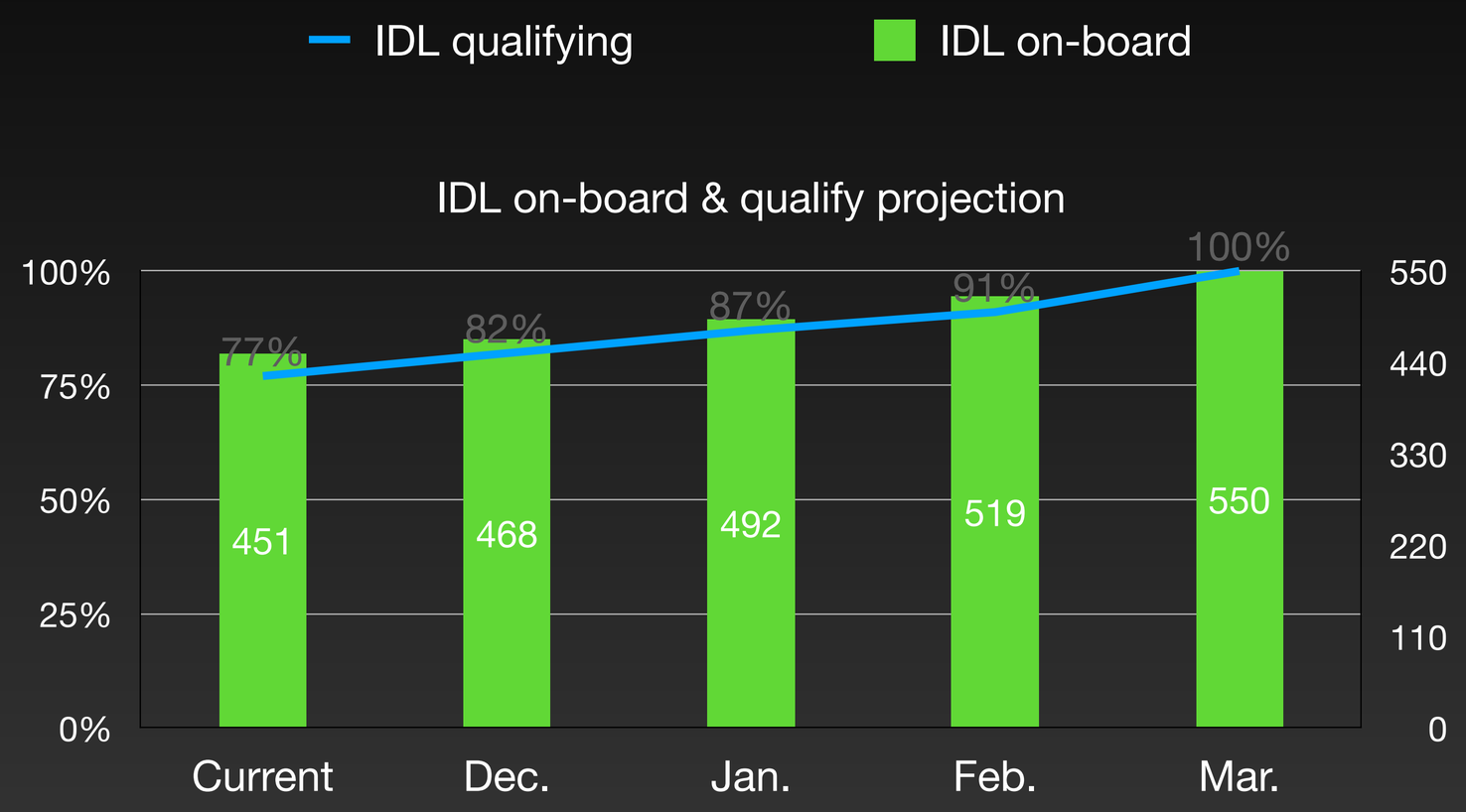
CM Bring up | IDL: CM report for hiring progress

- Hiring process needs to be done around 3x - 6x months prior training build or NPI build start
- Current on-board HC information, also show the projection for future recruiting target Mar.



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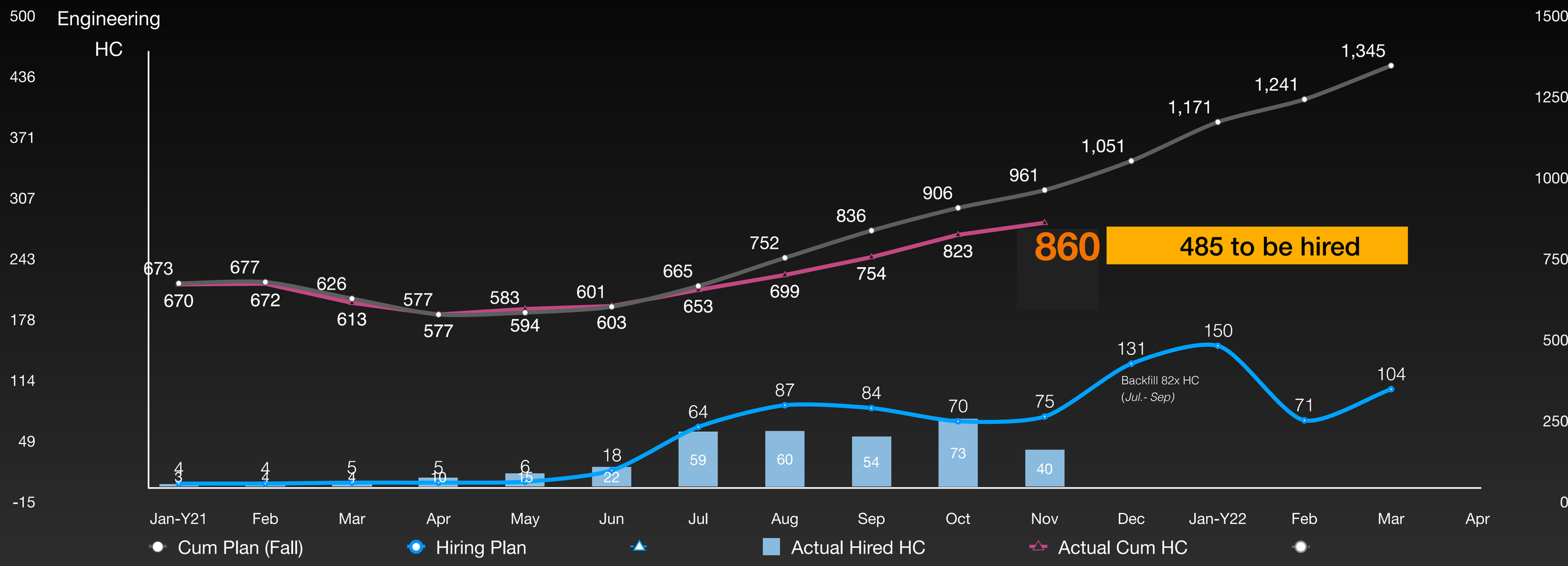
CM Bring up | Engineering Resource Hiring (iPhone)

Stage 1: Focus on hiring team leads and managers

Stage 2: Full team ready by Mar. 2022



Hiring Channel:

- Low level: Campus recruitment and training
- Middle & High level: Social recruiting and Internal transfer from other Apple BUs

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CM Bring up | IDL: Hiring status -Each Team (Internal review) iPad

To monitor satisfaction and expectations from each DRI

- DRI need to review the status from their CM DRI to confirm overall status is same as what they are presenting and what the experience + training progress for those IDLs
- Any gap or support needed should be highlighted into “Next Step/Action

Highlight/Concerns

- Training status:

-Evaluation ratiing

Next Step/Action

Measurement Area	Criteria	Evaluation	Overall (Hiring - Attrition)	Training completion %
Evaluation Frequency	Weekly/ Monthly/ Quarterly	Weekly/ Monthly/ Quarterly	Weekly/ Monthly/ Quarterly	Weekly/ Monthly/ Quarterly
Hiring and Retention	Hiring to Plan	HL Meets Expectations	95% (monthly avg.)	%
		LL Above Expectations	97.5% (monthly avg.)	%
	Critical IDL Retention	HL Meets Expectations	95%	%
		LL Above Expectations	97.5%	%
	Overall IDL Retention	HL Meets Expectations	95% -> 90%	%
		LL bove Expectations	97.5% -> 95%	%
Performance	Meeting host/ presentation	Above Expectations	Evaluation conducted by Apple Engineering at Group level.	Above Expectations
	CTB review/ highlight	Meets Expectations		Meets Expectations
	Build execution/ Factory control	Below Expectations		Below Expectations

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CM Bring up | IDL: IDL hiring progress for critical teams

- The Table is to show hiring issue might have problem to achieve hiring target member qty in time
- Show the back up plan or do the resource arrangement in order to mitigate the risk level for either training build or first NPI build

Dept	TTL HC Required	Qualify Required	Key talent on hand	Qualified OK	Qual rate cut off now	Qualify HC projection by Dec.	Gap by Dec.	Qualify rate projection by Dec.	Mitigation plan
RF	163	74	51	47	64%	51	-23	69%	**By Dec. gap 23x (5x Jan., 4x Feb. 14x Mar.), qualification plan:** - 3x offer released and will be qualified in Feb. 2022 (1x RFEPM senior; 1x RFHW Overall lead; 1x Logistics) - 3x offer process ongoing, plan to be on-board & get qualified by Mar 2022 (1x RFHW BBHW lead; 1x CoEx senior; 1x ANT Chamber senior) -1x RFHW Celluar lead interview ongoing and target to be on board & get qualified by Mar 2022 - 16x under hiring, target to get qualified by Mar 2022 (Chamber 5x by Jan. 2022, 4x by Mar. 2022 RFHW 1x by Feb. 2022, 4x by Mar. 2022 Desense 2x by Mar. 2022) **Back up plan:** Internal training plan ongoing, to bring up Juniors to meet senior requirement
HWEE	76	36	26	26	72%	26	-10	72%	**By Dec. gap 10x (3x Jan., 2x Feb., 5x Mar.), qualification plan:** - 3x Module DRIs (2x touch, 1x display,) target on-board & get qualified before CNY - 7x (4x SMT + 2x Sensor, 1x FCAM DRI) under hiring, ETC Mar. 2022 get qualified **Back up plan:** 1.For 3x SMT DFU/SOC Senior DRIs, aligned with James Zhou Alpha will help Internally training&bring up Juniors to Senior to meet requirement. 2.Modules have senior DRIs on-hand for each function, and internal training is on-going; training plan has already aligned with Alpha counterpart

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CM Bring up | IDL: CM Report

- The table shows the detail requirement for Leader hiring status only to understand the gap in order to provide the mitigation plan from both CM and Apple side

Item	Functions	Apple Requirement Leader HC	Leader hired	Gap	Hiring plan
1	RF	19	11	-8	**Total GAP 8x:** **2x RSE:** 2x hiring ongoing, target to be on board before CNY **1x EMC**: 1x hiring ongoing, plan to be on board by Mar. 2022. **1x SAR:** 1x currently covered by Lei Yang, ANT Chamber lead. Dedicated SAR lead plans to be on board by Mar. 2022. **4x RFHW:** 4x leads all target to be on board by Mar. 2022 - 1x RFHW overall lead: offer released, will be on board by Jan. 2022 - 1x RFHW Cellular lead: 1x candidate under interview - 1x RFHW BBHW lead: 1x candidate under offering - 1x RFHW WCS lead: hiring ongoing
2	HWTE	17	15	-2	**Total GAP 2x:** **1x Acoutic:** Have released offer, and candidate will be on board on Mar. of 2022 **1x ME:** Have released offer, and candidate will be on board end of Dec. 2021
3	EPM	7	6	-1	**Total GAP 1x:** **1x SMT FA EPM:** 2x potential candidates under interview, target to be on board by Jan, 2022. Mitigation plan is transfer from TPM/DFM
4	ECO REL	1	0	-1	**Total GAP 1x:** **1x Manager:** Offer released, target to be on-board by Feb. 2022
5	PD	7	7	0	Hiring completed.
6	HWEE	13	13	0	Hiring completed.
7	REL	5	5	0	Hiring completed.
8	CoreOS	1	1	0	Hiring completed.
9	WGT/AQA	1	1	0	Hiring completed.
10	DFx	2	2	0	Hiring completed.
11	SMT	3	3	0	Hiring completed.
12	Thermal Lab	1	1	0	Hiring completed.
13	IE	1	1	0	Hiring completed.
CUM		78	66	-12	

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CM Bring up | IDL: Retention Proposal from CM

Attrition rate:

Aug.: attrition rate 0.24% (1x RF: join Army)
Sept.: attrition rate 0.23% (1x EPM: back to hometown)
Oct.: attrition rate 0.23% (1x RF: national minority, custom of marriage)
Nov.: attrition rate 0.22% (1x EE: family factors)
Dec.: attrition rate 0.22% (1x WGT: back to hometown)
Jan.: by 1/17 no attrition
Feb: by 2/22 no attrition

Current HR Incentive in general (since IDL on board, Aug.2021- May.2022 training/bringup phase covered)

- Monthly (3-10% of basic salary) KPI bonus for 25% excellent IDL
- Annual (10-15% of basic salary) KPI bonus Project Award
- Annual salary increase plan for 90% (A grade 20%, B grade 70%) IDL
- Clear path for technical and management IDL promotion
- Discount for CM Yadi village commodity housing and CM Auto

Under scoping for NPI team & senior engineers

Red list: bonus for 15% key members with 3 years retention, still under reviewing with HR for in detail scope

Example from CM

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NPI CM Playbook | CM Bring up

- Training build

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CM Bring up | Training Build planning

Training Build Scope

- Why need training build
- What should be validated
- What fundamental requirement for CM
- How to evaluate CM performance

01

HL Schedule/ Support Plan

- Detail training build schedule
  - APPL Engineering support plan/ schedule
  - APPL Ops resource support plan/ schedule
  - CM resource support plan/ schedule

02

Quotation

- Build quotation
  - Materials
  - MLB/FF Allocation
  - Logistic Cost
  - SMT/FATP Test/AME/PD Reimbursement quotation
- Line construction Quotation
- Consigned Test/AME/PD fixtures/ equipment Quotation

03

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CM Bring up | Training Build planning

- **Training build Scope :**
  - Validate the overall IT system either on the line or in the labs form end to end
  - Validate the NPI process
  - To Simulate actual NPI build to train CM member understand what the fundamental requirement from engineering team
    - How CM to report the build status with report template
    - How CM to perform issue status with FA process in correct report formate
    - How CM Engineers from each function to summarize the data to report the information accurately to each Apple DRI.
    - CM should be trained to familiar the system devices. to mitigate the risk or concerns while performing iPad NPI
    - Apple team can take this chance to evaluate capability of CM Team.

01 Training Build scope

- **Schedule/ support program / CP**
  - JAMET support
  - Ops support , OPM, MPM and AME
  - Apple internal Resource check
  - IST confirm wifi secure / lab network readiness
  - Detail training build schedule for both SMT and FATP readiness

02 Schedule/ Resource arrangement

- **Preparation items:**
  - Training build fixture/ equipment quotation estimate (UPH:15)
    - SMT
    - FATP
    - IQC
    - CQA
    - REL
    - RF
    - Offline
    - Critical Lab for the build
  - Overall allocation from each team in training build (SMT (MLB) + FATP (FF))
  - Materials budget planning , include logistic expense
    - PD materials drive
    - SMT materials drive
    - FATP materials drive

03 Quotation for BPO

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CM Bring up | Training Build planning

Team should provide the detail training build Entry and Exit Criteria

Status	Function	Entry Criteria	Exit Criteria	Remark
	EPM	1.NPI build material/unit transfer and tracking processes/system ready. 2.Report formats & requirements defined. 3.BM, build plan & allocation aligned with EPM. 4.Overall readiness(IDL, facility, material, IT system, lab& line..	1.Validate and fix in sample build. 2.Report formats & requirements trial and meet customer target. 3.Well managed build execution. 4.Validate in sample build.	
	PD	1. PD overall readiness: HC, E&F, lab set up have finished. 2. All PD engineers have basic knowledge of PD working model with Alpha team, senior engineers performance can match Alpha request. 3. Sample build objectives, FATP line tracking, DOE request, FATP & Rel FMEA, PD related process match Alpha request.	1. Be proficient in PD knowledge and PD equipments using. 2. PD standard process are working, all PD engineers is familiar with that and can follow up. 3.Accurate reports and quick responses towards Alpha.	
	RF	1. RF Overall readiness(HC, E&F EIH, lab/station bring up, SW) 2. Sample build test plan, objectives and DOE request definition and alignment 3. Clear escalation path, report formats & requirements defined. 4. All employee training achieved	1. Show good SW/HW/FA/Testing activity trail and well organized execution 2. Build objectives and DOE achieved 3. Feasible RF related process 4. Provide end of build report highlighting all the major issues with respect to the product and stations 5. Provide a yield report 6. Show leadership and ownership of issues 7. Through the build show less and less reliance on Apple for common activities	
	HWTE	1. HWTE required resource onboard and key talent qualified, E&F list and lab readiness done. 2. SFC system and NPI process readiness complete. 3. Basic knowledge of related server, GHDS/Radar/Insight...etc. Account grant and access application done. 4. Clear escalation path, report formats & requirements defined.	1. NPI Process and SFC system validate ok. 2. Able to bring-up station, DOE achievement, and SW validation under counterpart's instruction. 3. Know Alpha related sever function and able to use it. 4. Release TIL/LBU readiness report, issue highlight and status tracker.	

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CM Bring up | Training Build planning

Team should provide the detail training build Entry and Exit Criteria

Status	Function	Entry Criteria	Exit Criteria	Remark
	QA	1.No blocker for quality readiness(IDL/DL, E&F EIH and station bring up, SOP, Layout, Test overlay ...) 2.Report formats & requirements defined. 3.PQP for sample build well defined and aligned with PQM 4.DOE requirements defined. 5.CQA NPS audit passed 6.KPSL defined	1.On time delivery daily quality report and IQC dashboard, clear quality summary after build 3.Thorough and solid FACA for quality issues 4.Vendor FACA driven timely 5.CQA logic validation finished and approved 6.Date integrity checked and verified	
	REL	1. Basic knowledge about Reliability. 2. Establishing basic REL internal process. 3. Familiar with REL report format/failure mode/testing RRD.	1. Be proficient in Reliability knowledge and testing operations. 2. REL internal process is efficient and achievable, could be recognized by Alpha. 3. Produce accurate reports and response Alpha's instruction timely.	
	ECO REL	1. Basic knowledge about Reliability. 2. Report formats & requirements defined.	1. Comprehensive knowledge about Reliability and related operations. 2. Accurate reports and quick responses towards Alpha.	
	WGT&AQA	1. New lab constructing and equipment readiness completed 2. Be familiar with the basic process and content of software testing， senior engineers performance can match Alpha request. 3.Familiar with test environment construction 4.Prepare various test reports, count test data, and put forward further improvement suggestions for products	1. lab construction accpetance OK， euipment OK2use 2. Be proficient in software testing knowledge and testing operations. 3.Lab internal process is efficient and achievable, could be recognized by Alpha. 4.Accurate reports and quick responses towards Alpha.	
	Thermal	1. Key talent on board 2. Training plan reviewed and approved 3. Understanding of iPAD NPI build schedule and thermal DOE requirement	1. Key talents qualified with thermal mindset 2. Be familiar with testing SOP; Have deeper understanding on thermal product design / DOE process 3. Skilled in use of all test equipments (chamber, data logger, IR camera, etc) and softwares for data analysis / issue report 4. Independently carry out DOEs, output clear data / summary / report, in-time / concise issue report 5. Basic debug and FA capability with internal tools	

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CM Bring up | Training Build planning

Status	Function	Entry Criteria	Exit Criteria	Remark
	CoreOS	1. CoreOS Overall readiness(E&F EIH, lab&station bring up, SOP, test OVL...) set up 2. Basic knowledge of related server, GHDS/Radar/Insight... Account grant and access application done. 3. dryrun and validation plan and allocation aligned 4. The panic & CoreOS issue tracking daily report template	1. The panic station bringup, validation, SOP maintenance and operation(collect data & file radar &FA...) 2. Track issue w/ panic report and CoreOS issue tracking daily report 3. Able to bring up station, DOE achievement, and SW validation under coutparts' instruction 4. Shipping out process control(Online normal unit ship out efficiently w/ FDR-SEAL station; units which can't test PASS FDR-SEAL must ship out as the "Skip FDR-SEAL station" process) 5. DRIs are able to FA common issue and try to debug the complex issue by oneself 6. FDR station and data validation and report. 7. Basic OS knowledge and common debug/FA skills 8. Interface of CoreOS for SW related issues in factory stations/tests/processes	
	HWEE	1. EE HC onboard and key talent qualified; 2. Lab construction and E&F EIH ready; 3. Function FA process ready and report requirement clear; 4. Training plan/topic and performance check standard defined.	1. Know well schematic and layout design; 2. Test coverage analysis, FA and Debugs, DOE and validation well done; 3. Good at EE debug/FA tools and method, dig out root cause during the build and follow up the improvement; 4. Training achieved: daily report and training materials upload to BOX,and pass final test in written and practical operation.	
	DFx	1. DFx required resource need be onboard and key talent need be qualified, E&F list and Lab readiness need be done. 2. Basic knowledge of GHDS/Radar/Insight...etc. Account grant and access application need be done. 3. Clear escalation path, process, report formats & requirements need be defined. 4. Sample build objectives, FATP line tracking, DOE request, DFx related process need match Alpha request.	1. DFx engineers are able to bring-up equipment, DOE achievement, and equipment modification & validation under counterpart's instruction. 2. DFx standard processes are running smoothly, all DFx engineers are familiar with that and can follow up. 3. Accurate reports and quick responses towards Alpha.	
	SMT	1.all key equipment arrive within target date, dedicated SMT line set up. 2. all SMT NPI staff be on board before Feb,2022	1.machine validation & LBU report approved by Alpha DFM. 2.SMT training on them, and pass the qualification exam	

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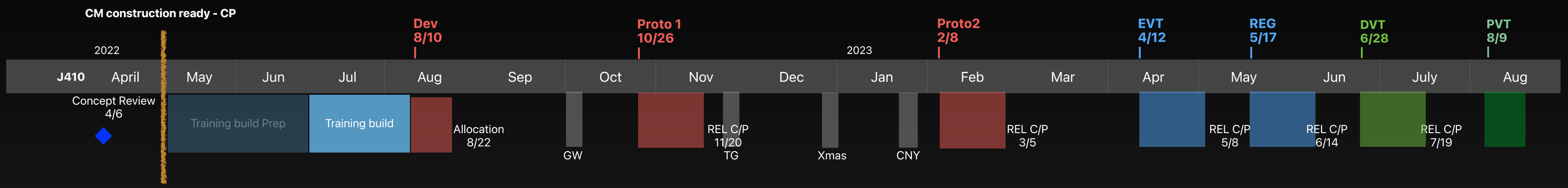
CM Bring up | Training Build Template



Schedule:

- Bring up build schedule should be on B/7 2022. To build with Jxxx model with MP/NPI materials.
- JAMET team confirmed should be ok to update to support Jxxx if needed.
- IST confirmed Wifi secure readiness CP is at the end of April.
- CM construction for both FATP /SMT will be done on XX

Training build Scope :

- Validate the overall IT system either on the line or in the labs form end to end @CM **(High priority)**
- Validate the NPI process @CM **(High priority)**
- To Simulate actual NPI build to train CM member understand what the fundamental requirement from engineering team
  - How CM to report the build status with report template
  - How CM to perform issue status with FA process in correct report formate
  - How CM Engineers from each function to summarize the data to report the information accurately to each Apple DRI.
  - CM should be trained to familiar with Jxxx system to mitigate the risk or concerns while performing Jxxx NPI
  - Apple team can take this chance to evaluate capability of CM team.

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CM Bring up | Training Build Plan

The final decision regarding whether to build a training build should consider both the level of risk involved and the associated costs. The risk assessment is based on the program's complexity and the capability of this new CM.

Below process is recommended. It answered the main questions such as

- Do we need a training build ? How many training builds we need ?
- What is the scope we need ? How do we make detail plan based on it ?

1. Training build evaluation Understand Product complexity (Engineering team sync)
   - Speed BOM
   - PD parts update
   - Minor HW + PD parts update
   - New HW features + PD design
   - New ID
2. Training build evaluation Define Training Build scope (Allocation, Line, UPH, Resources)
   - New CM w/ or w/o MP line
   - NPI Process
   - FA process
   - NPI communication
   - Lab training
3. Training Build risk level assessment to select training build option + Training Build Check List
4. Budget Planning
5. Training Build Planning

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CM Bring up | Training Build Requirement Evaluation

Examples

1. Justification: The new CM is without any NPI experience, due to product features and complexity of the system devices supported in the CM, training build is required to support bring up NPI/ engineering capability prior official engineering build start
   - Product complexity for next generation model supported in the new CM: Speed BOM
   - Training build can be started prior 3 month to P1 per the internal engineering sync for resource support
   - MP Site and JAMET team confirmed is ok to update to support Jxxx if needed, confirmed with JAMET IT set up team
   - MP Site and IST confirmed Wifi secure readiness for Lab can be ready 4x months prior P1
   - CM construction for both FATP /SMT can be completed 5x months prior P1
   - IDL will achieve 60% prior 3 months prior P1
   - 80% Lab equipments will be arrived in CM around 4 months prior P1
   - SMT Line can be ready around 3x months prior P1
   - FATP Line can be ready 3x months prior P1
   - FATP fixtures can be borrowed from MP line if UPH only 30x
2. Training build Scope :
   - Validate the overall IT system either on the line or in the labs form end to end @CM **(High priority)**
   - Validate the NPI process @CM **(High priority)**
   - To Simulate actual NPI build to train CM member understand what the fundamental requirement from engineering team
   - How CM to report the build status with report template
   - How CM to perform issue status with FA process in correct report formate
   - How CM Engineers from each function to summarize the data to report the information accurately to each Apple DRI.

Assessment: Risk Level scoring, suggest option:

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CM Bring up | Training Build Risk level Assessment (CM)

3 CM Risk assessment for Training build

Risk assessment for Training build CM		Risk Level		
		Low	Mid	High
1	Product complexity (New ID, Speed BOM)	1 (HW Speed BOM only)	2 (HW+PD partial design update)	3 (New ID + New HW features)
2	CM construction readiness for training build	1(Yes)	2 (Limited Support)	3 (Not Ready)
3	Could leverage MP/Ops resource (CM)	1 (Yes)	2 (Partial)	3 (Engineer resources only)
4	CM CTB procurement for Training build (MP, New Design)	1 (MP)	2 (MP/Partial NPI update)	3 (NPI material only)
5	CM NPI FATP Fixtures readiness (Test and Assembly)	1 (Could leverage MP)	2 (low percentage for new Design)	3 (high percentage with New Design)
6	CM NPI SMT Fixtures readiness (Test and Assembly)	1 (Could leverage MP)	2 (low percentage for new Design)	3 (high percentage with New Design)
7	CM NPI IT setting LT	1 (Leverage from MP)	2 (new assembly/test line only)	3 (new SMT + FATP)
8	CM IDL readiness	1 (80% hiring rate)	2 (60% hiring rate)	3 (40% hiring rate)
9	CM IDL with NPI experience	1 (80% with NPI experience)	2 (50% with NPI experience)	3 (30% with NPI experience)

* The weight could be vary per different LOB

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CM Bring up | Training Build Option

Training build Options 3

- 3x training options are provided, Team should do risk assessment to CM and select the one fit your purpose

Option	Risk Level	Number of Builds	Stage of Eng build	Pros	Cons
A	**11-20**	**1x**	1x Trading build (CMRB) build before P1 (Could leverage from MP Resources, such MP Line, MP fixtures)	• Less Expensive • No CTB issue (MP materials) • Fully control by engineering • Less Budget	• Mutual design and less complexity can not reflect Proto builds complexity or simulate NPI process/situation fully • Lack of NPI DOEs and cannot perform FA fully • Require high hired completion rate of CM IDL
B	**21-30**	**2x**	EVT, DVT (Could leverage from MP resources such FRB) Fast follow build	• Less CTB issue due to mutual materials (EVT and DVT) • Could leverage Ops and Eng resources and drive as a combined effort with shared goals	• Mutual design and less complexity can not reflect Proto builds complexity or simulate NPI process/situation fully
C	**30+**	**3x**	P2, EVT, DVT (All Eng Resource) Fast follow build	• NPI config • NPI materials • NPI SW • NPI • Can Simulate NPI FA, DOEs, and process Fully • Can simulate NPI communication process Fully	• Most expensive, 3x builds • Additional Apple resource is needed

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CM Bring up | Training Build Check List (Engineering)

3 Check list of Appel resources support for Training build

***The below question may change the decision of how many training build we need**

- Do we have enough time to Intercept training build option we selected?
- What level of apple engineering resource can support in training build? (Full, 50%, 30%)
- What DOEs will be performed in training build? Is the selected training build option ok to support
- What Function FA process will be performed into training build? Is the selected training build option ok to support
- Is the build qty ok for line stress? (For some LOB)
- Need to borrow the MP line or have to be on new NPI line ? (Schedule concern)
- Which Labs or equipments do need to be ready before training build ?
- Which Labs or equipments do need to be ready before training build ?

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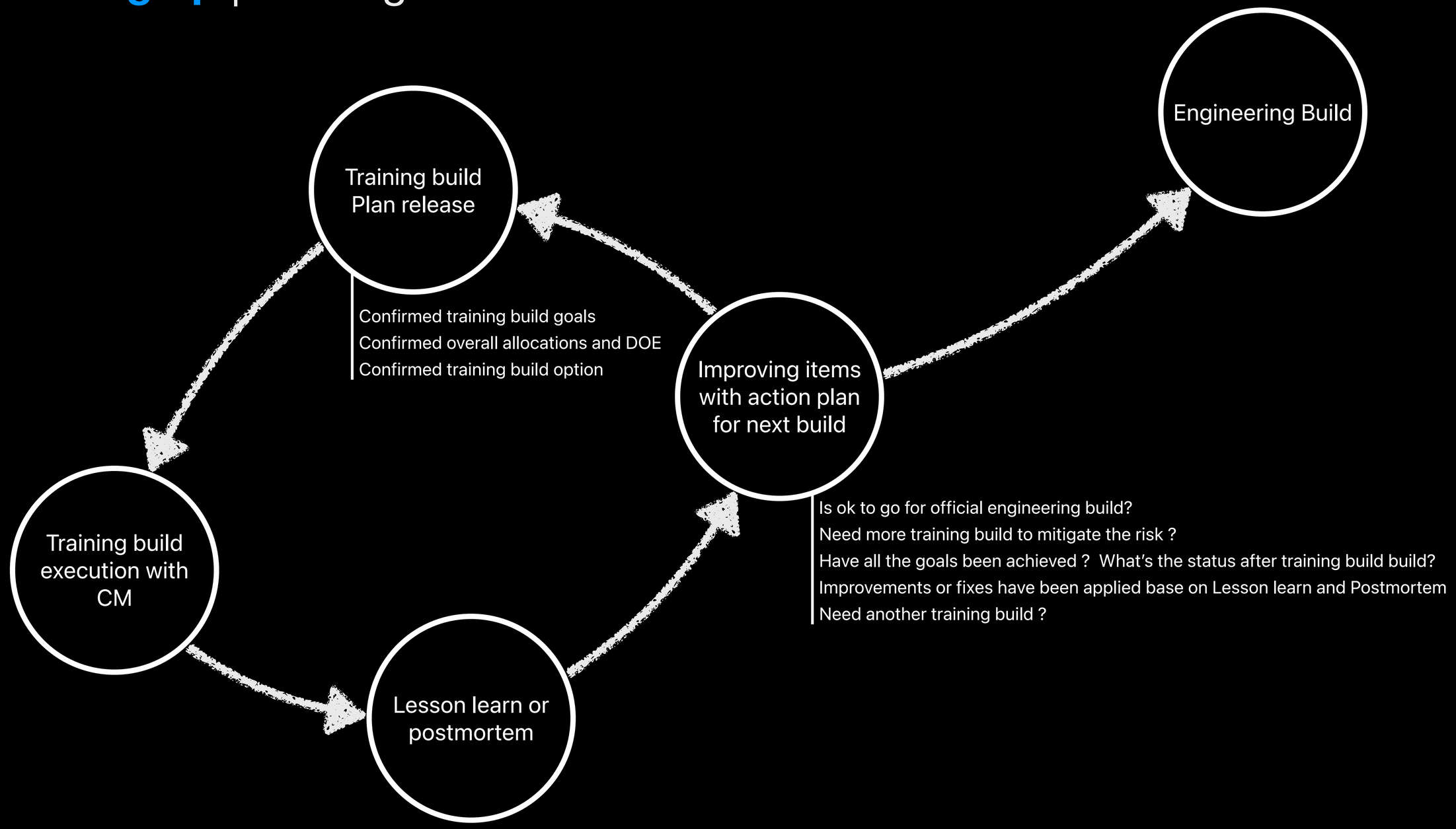
CM Bring up | Training Build flow



CM Bring up | Training Build learn from postmortem

Reviewed the lesson learnt from training build cross LOB to come up with suggestion for future training build

Key take away from Postmortem:

2 types of issues seems after training build

- Operation issue : CM cannot kit material correctly when have multiple FATP/SMT configs. Need to consider the materials preparation in training build plan
- Design/FA related issue : CM cannot performance good quality of FA. Fixture design / development capability.
  - (The material/SW used for training build is normally at late stage of existing program, with less uncertainty. This will cause the training build less challenge and not able to fully exercise CM's NPI capability)

Known NPI challenge from postmortem

Item list	Mitigation plan
Incorrect stuffing for special configs (Conducted configs for RF passive test, and SPK hole.. etc)	Prepare the special config with special stuffing
PD DOEs (DRP control, PD part change per config)	Work with vendor to prepare PD special materials to increase build complexity.
Material management with less complexity	Intentional to add multiple configs and material options in one day
New fixture Design challenge is not reflect in training build	• Pull in training build to earlier stage of Eng build • Training in existing program
FA complexity not reflect P1's complexity	

Suggestion :

- Postmortem for each training build is the must
- Collect risk assessment, review entry+exit criteria /goals with cross functional team before training build
- Make the mitigation plan + DOE plan according to risk assessment list and entry+ exit criteria/goals
- Training build could be fast follow from P2 especially for WW CM bring up, or go back to have training build assessment while planning

CM Bring up | The Template of Training Build

5

- **Build Goal, Build Qty, FATP Line UPH, SMT line UPH will depends on build goal**
- **Purpose of build allocation**
- **Engineering support plan**

Preliminary build duration & Qty

- FATP Duration : Build LT followed by micro schedule
- FATP Qty : Should include DOE and REL qty
- MLB Duration : Build LT followed by micro schedule
- MLB Qty : Should include DOE and REL qty

Line Setup

- Line layout (NPI line or leverage from MP line)
- UPH :
  - FATP Assy UPH, Day shift only or Day and Night shifts
  - MLB SMA UPH, SMT test UPH

	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun
	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14
																R1	R2																									
MLB	STK	PF	PF	DFM	BU	RF PD	OFF	BU	Mini	Mini	Mini	Mini	Mini	OFF	Main	Main	Main	Main	Main	Main	OFF	WIP	WIP	WIP	WIP	WIP	WIP	OFF														
																										R1		R2														
Planned FF															SFL	PD FC	PD FC	PD FC	OFF	OFF		SOP	SOP	Mini	Mini	Main	Main	OFF	Main	Main	Main	DOE	DOE	DOE	OFF	DOE	DOE	DOE	WIP	WIP	WIP
Cum															1	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

CM Bring up | iPad Training Build Reference

- **The build qty is base on the allocation and DOE planning discussed with each function team**
- **UPH setup up is similar as P1, UPH 30x FATP**
- **The main allocation are used for training and equipment bring up.**

Preliminary build duration & Qty

- FATP Duration : 17days
- FATP Qty : 484 (DOE/PD/REL)
- MLB Duration : 15 days
- MLB Qty : 770(2x REL configs as allocation)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 30, Post line 30(2xshifts)
  - MLB SMA 30, SMT 20

	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun
	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14
																R1	R2																									
MLB	STK	PF	PF	DFM	BU	RF PD	OFF	BU	Mini	Mini	Mini	Mini	Mini	OFF	Main	Main	Main	Main	Main	Main	OFF	WIP	WIP	WIP	WIP	WIP	WIP	OFF														
																																R1		R2								
Planned FF															SFL	PD FC	PD FC	PD FC	OFF	OFF	SOP	SOP	Mini	Mini	Main	Main	OFF	Main	Main	Main	DOE	DOE	DOE	OFF	DOE	DOE	DOE	WIP	WIP	WIP	
															1	10	10	20			24	24	48	48	37	37		37	37	37	19	19	19		19	19	19				
Cum															1	11	21	41	41	41	65	89	137	185	222	259	259	296	333	370	389	408	427	427	446	465	484				

CM Bring up | iPhone FRB1 Training Build Reference

- **The build qty, duration, UPH setup were setup on purpose to simulate normal P1**
- **The main allocation are used for training, equipment bring up.**

Preliminary build duration & Qty

- FATP Duration : 11 days
- FATP Qty : 620 (2x Rel configs, 80x each)
- MLB Duration : 11 days
- MLB Qty : 1,260 (2x Rel configs, 90x each)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 60, Post line 30
  - MLB SMA 60, SMT 25
- Only test line at night shift

	Sun 5/22	Mon 5/23	Tue 5/24	Wed 5/25	Thu 5/26	Fri 5/27	Sat 5/28	Sun 5/29	Mon 5/30	Tue 5/31	Wed 6/1	Thu 6/2	Fri 6/3	Sat 6/4	Sun 6/5	Mon 6/6	Tue 6/7	Wed 6/8	Thu 6/9	Fri 6/10	Sat 6/11	Sun 6/12	Mon 6/13	Tue 6/14	Wed 6/15	Thu 6/16	Fri 6/17	Sat 6/18	Sun 6/19	Mon 6/20	Tue 6/21
																			R1	R2											
Planned MLB		LCRPRF	BU	BU	BU	BU	Mini	OFF	Mini	Mini	Mini	Mini	Main		OFF	Main	Main	Main	Main	Main											
		8	40	40	60	60	70		70	80	80	80	100			100	100	100	132	140											
Cum		8	48	88	148	208	278	278	348	428	508	588	688	788	788	888	988	1088	1220	1360											
																							R1	R2							
Planned FF								OFF	CM FC	CM FC	CM FC	PD FC	Mini		OFF	Mini	Mini	Mini	Mini	Main	Main	OFF	Main	Main	Main	WIP	WIP	WIP	WIP	WIP	
									5	5	10	15	20			20	30	30	45	60	80		100	100	100						
Cum									5	10	20	35	55	75	75	95	125	155	200	260	340	340	440	540	640						

CM Bring up | iPhone FRB2 Training Build Reference

- **The build qty, duration, UPH setup were setup on purpose to simulate normal P1**
- **The main allocation are used for training, equipment bring up.**

Preliminary build duration & Qty

- FATP Duration : 11 days
- FATP Qty : 620 (2x Rel configs, 80x each)
- MLB Duration : 11 days
- MLB Qty : 1,260 (2x Rel configs, 90x each)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 60, Post line 30
  - MLB SMA 60, SMT 25
- Only test line at night shift

	Sun 5/22	Mon 5/23	Tue 5/24	Wed 5/25	Thu 5/26	Fri 5/27	Sat 5/28	Sun 5/29	Mon 5/30	Tue 5/31	Wed 6/1	Thu 6/2	Fri 6/3	Sat 6/4	Sun 6/5	Mon 6/6	Tue 6/7	Wed 6/8	Thu 6/9	Fri 6/10	Sat 6/11	Sun 6/12	Mon 6/13	Tue 6/14	Wed 6/15	Thu 6/16	Fri 6/17	Sat 6/18	Sun 6/19	Mon 6/20	Tue 6/21
																			R1	R2											
Planned MLB		LCRPRF	BU	BU	BU	BU	Mini	OFF	Mini	Mini	Mini	Mini	Main		OFF	Main	Main	Main	Main	Main											
		8	40	40	60	60	70		70	80	80	80	100			100	100	100	132	140											
Cum		8	48	88	148	208	278	278	348	428	508	588	688	788	788	888	988	1088	1220	1360											
																							R1	R2							
Planned FF								OFF	CM FC	CM FC	CM FC	PD FC	Mini		OFF	Mini	Mini	Mini	Mini	Main	Main	OFF	Main	Main	Main	WIP	WIP	WIP	WIP	WIP	
									5	5	10	15	20			20	30	30	45	60	80		100	100	100						
Cum									5	10	20	35	55	75	75	95	125	155	200	260	340	340	440	540	640						

NPI CM Playbook | CM Bring up

- Budget
  - Budget check list
  - Online offline EQ budget preparation
  - Lab equipment budget preparation
  - Equipment Budget kick off
  - Budget approval in executive review
  - Lab equipment budget breakdown

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Budget check list

✅	**Online / offline EQ**	• On line / off line EQ normally is tight up to **program budget**, it will be reviewed by VP in concept review.
✅	**Lab EQ**	• **Additional budget** required to buy Lab EQ in new CM. • Eng team is responsible to collect all lab EQ request and get VP's approval. • Biz team will negotiate the cover coverage with CM. (Normally in RFQ)
✅	**Infrastructure**	• **Additional budget** required build NPI line/Lab in new CM. • Eng team is responsible to collect all construction request • Biz team will negotiate the cover coverage with CM. (Normally in RFQ)
✅	**NRE**	• **Additional budget** required to pay for IDL in new CM • Eng team is responsible to collect Eng IDL HC request and get VP's approval. • Biz team will negotiate the cover coverage with CM. (Normally in RFQ)

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CM Bring up | Equipment budget for new CM

On line / Off line Equipment Preparation

Scenario 1 : New program in new CM

- If it's a new product line fo business in new CM, we normally prepare for full set of on line/ offline equipment.

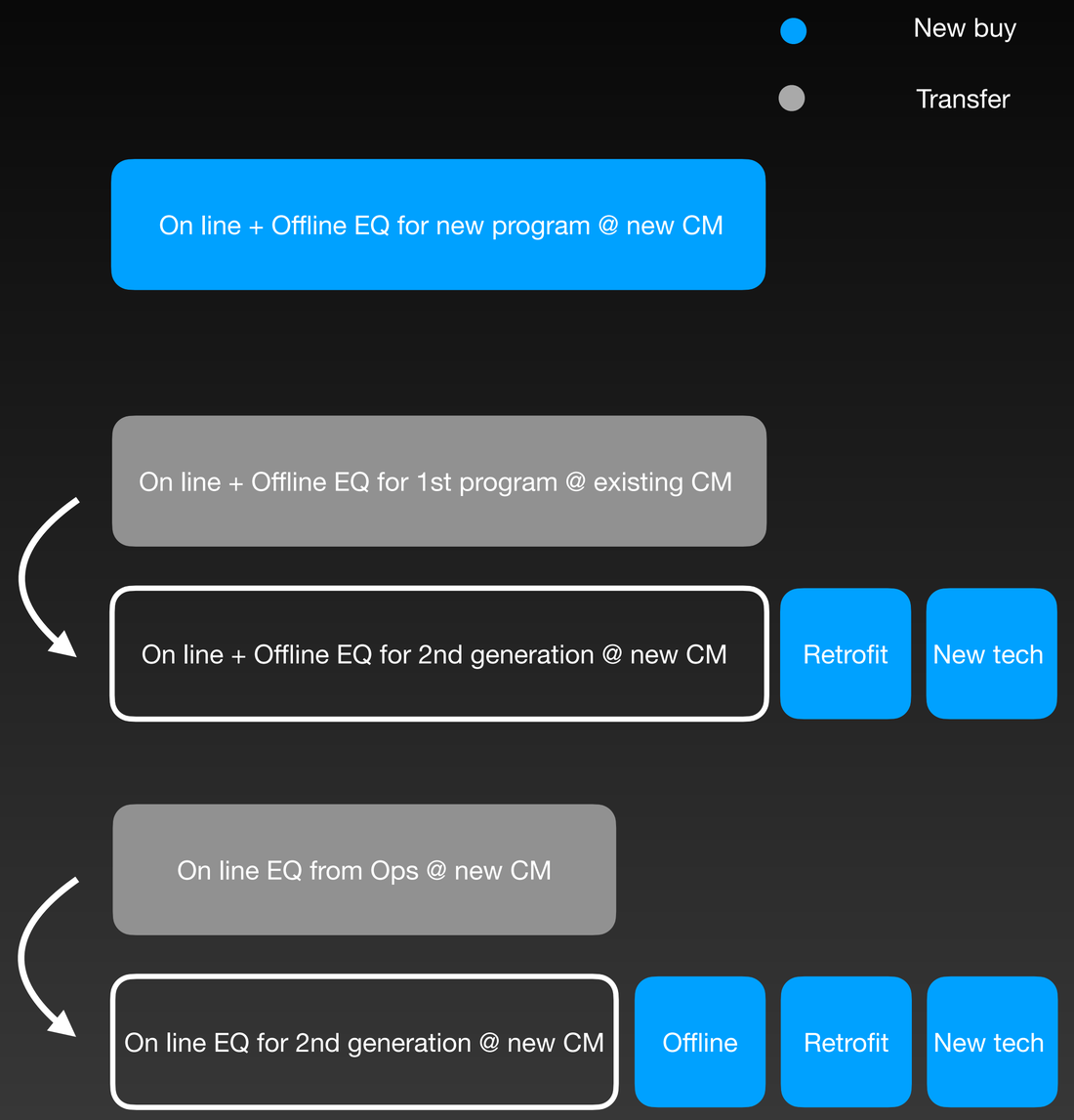
Scenario 2 : Moving existing product line to new CM

Option 1

- If time allows, we should move equipment from existing CM as much as we can.
- Budget required will be only retrofit cost from previous generation + the equipment required for new technology

Option 2

- If the NPI line in existing CM is not available, we could borrow online equipment from Ops for online POR equipment, and return later.
- Budget required will be offline EQ + retrofit cost + EQ for new tech



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CM Bring up | Equipment budget for new CM

Lab Equipment Preparation

CM's investment to Lab

- Lab equipment Capex has been paid by Apple for years.
- More CMs are willing to invest equipment expense for NPI lab to gain new program
- Check with Biz how much **%** or **amount** of money CM will share after Biz award

Lab equipment cost coverage

How to distribute the CM investment budget

- EPM could decide how to allocate these equipment based on various situation.
- The equipment invested by CM is owned by CM and cannot move. → Suggest to let CM invest the EQ not required to move.
- When CM's purchasing process is faster. → Suggest to let CM invest for long lead time EQ to help expedite purchasing process.

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CM Bring up | Kick off budget application

* Equipment include online equipment / offline equipment / lab equipment

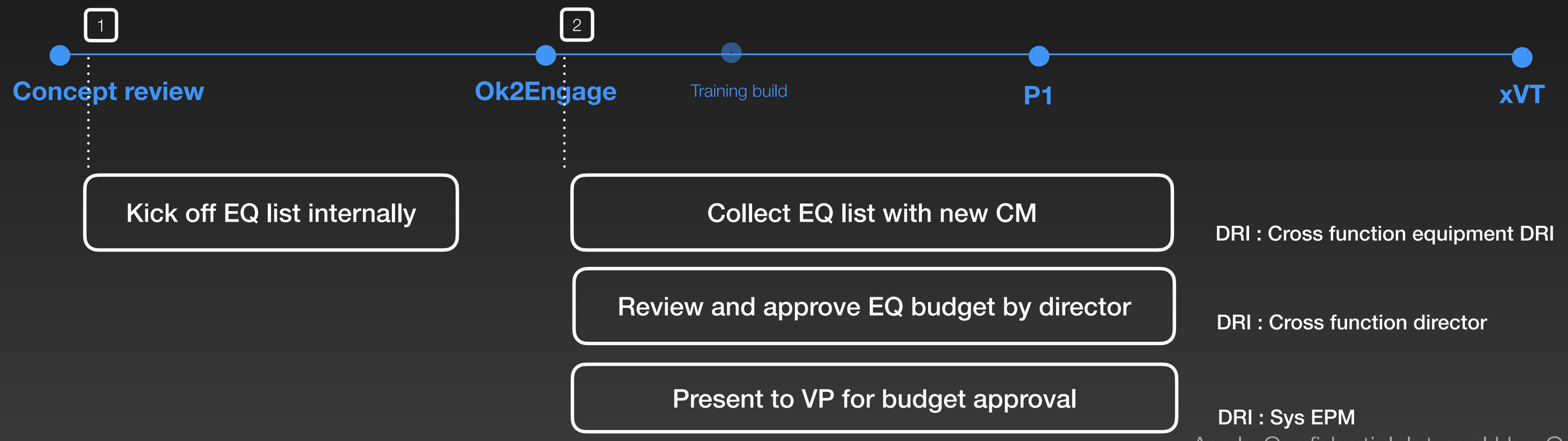
2 condition to kick off equipment budget approval

1 • To have feature lock down (1st version), so the team could based this to have equipment list

2 • Ok2engage with new CM granted, so we can work with CM to prepare the budget

• We can contact CM only after biz team provide business award or ok2engage notice by email

• If Ok2engage happen before concept review, we could collect Lab requirement before concept review. (With few new features updates)



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CM Bring up | Budget approval in executive review

New CM related cost summary

- Combine all the new CM related cost together in one review.
- On line / offline equipment will normally be included in concept review

		CM	
1	Lab equipment (Capex - CT Scan & X ray & chamber)	US$20.0	US$33.2
2	Infrastructure (AVCN, furniture, construction, etc)	US$97.5	US$0.08
3	NRE	US$31.7	US$38.8
	Total	US$149.2	US$72.1

- List out CM's coverage, the CM investment amount based on Business team's agreement
- Make sure the EQ cost is reviewed by director level and have $ breakdown by department
- Normally covered CM, Apple only pay for AVCN, some special requested furnitures
- Need to provide a NRE TTL amount and details. i.e Target HC, Cost sharing %, Wage comparison

This covers new CM program agnostic expenses

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All figures are in $ M

CM Bring up | Budget approval in executive review

Lab Budget breakdown

- Make sure the cost is verified and scrubbed (Director's sign off/EQ transfer opportunity)
- Make sure list out ~$XM equipment transfers (savings)

	TTL Estimated Cost	ICT Coverage	Additional Budget required	Approvers
RF	US$28.0	US$9.6	US$18.4	Deniz Teoman Zongjian Chen
EE	US$5.8	US$0.5	US$5.3	Carlos R
REL	US$5.6	US$2.4	US$3.2	Tom M
PD	US$2.3	US$1.2	US$1.1	Dave P
WGT	US$0.1	US$0.1	US$0.0	
CT scan	US$5.7	US$5.7	US$0.0	ICT investment
Mac Minis	US$0.5	US$0.5	US$0.0	
RIM/Eco REL	US$0.6		US$0.6	Tom M, Ryan N
EE (Sensor, Ironman, Thermal)	US$1.1		US$1.1	Approved (see next slide)
HWTE	US$0.3		US$0.3	Matt S
KPD (camera, display, acoustics)	US$3.1		US$3.1	Approved (see next slide)
TTL	**US$53.2**	**US$20.0**	**US$33.2**	

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CM Bringup | Capex Estimates Update (lab equipment) - iPad example

	Capex Estimates (USD)	Transferred Asset Value	Capex Estimates (Minus Transferred Asset)	Remark
RF			0	
REL			0	
DFM			0	
PD			0	
DFx			0	
QA			0	
REL Eco			0	
EE			0	
Touch				
Display			0	
Camera			0	
Acoustic			0	
Sensor			0	
N&V				
WGT			0	
AQA			0	
HWTE			0	
Thermal			0	
Total	$0	$0	$0	

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Appendix | CM Bring up

- Cross LOB IDL Requirement
- Cross LOB Training Build Plan
- Cross LOB Training Build Post Mortem

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Appendix | Cross LOB IDL Requirement

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Appendix | Cross LOB IDL Requirement

- Mac Engineering Core Team

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CM Bring up | IDL: Requirement Document (Mac EPM)

Apple request HC: 20x; Offer HC: 28x, EPM: 12x, PD EPM: 6x, EPS 10x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty
EPM	System : 1. Readiness/ build overall schedule coordinator. 2. Build goal execution/ main issue driving 3. Quotation HW : 1. BM config stuffing management and WO Release 2. Sample Request consolidator 3. Input, PQP, Allocation plan management Line : 1. WIP Tracking 2. Line issue monitor and task driver DOE : 1. DOE tracker management 2. DOE system distribution. Shipping : 1. Domestic/international out-bound/in-bound shipping process 2. Custom clearance tracking 3. S2F management	9	1	2
EPS	1. CTB Status Highlight and task driving 2. DRP issue list summary&update. 3. Build Matrix Management 4. Deep involving to vendor side for ETA/FAI/CPK/Cost confirmation 5. Material request consolidator	4	1	1
PD EPM	1. PD MIL 2. Overall PD Parts KO status follow up 3. PD Parts CTB Status Highlight and task driving / DRP issue list summary&update. 4. Deep involving to vendor side for ETA/FAI/CPK/Cost confirmation of PD parts. 5. PD DOE management.	7	1	2

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CM Bring up | IDL: Requirement Document (Mac PD)

Apple request HC: 38x; Offer HC: 38x, Key Part: 5x, FATP: 13x, CR 7x, QA/ REL 6x, Lab 5x, MCAD 1x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty	PDC	TBH
Key Part	1. CAD review and tolerance analysis for potential risk assessment 2. Design/Process optimization proposal for yield improvement 3. MIL DRI and responsible for issue reporting	4				1
CR/FATP	1. CAD review for structure comparison, design change, screw list and screw map 2. Design and process validation. On-Line issue FA and improvement proposal 3. DOE planning and execution. Data collection and analysis	18		1		1
QA/REL	1. QA/REL issue FA 2. QA/REL MIL DRI and responsible for issue reporting 3. TA inspection for the units post REL test	2	2		2	
Lab	1. Lab management for layout definition and construction schedule 2. FA equipment purchasing and maintenance arrangement 3. OP training and equipment SOP definition	5				
MCAD	1. SIFT account management and CAD drawing downloading 2. SFTP account management and drawing releasing	1				

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CM Bring up | IDL: Requirement Document (Mac EE)

Apple request HC: 30x; Offer HC: 30x, EE: 26x, Power: 4x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty
FATP/CR	1.Discussion with F1 to perform design change of change list for each phase 2.Perform the FATP/CR/QA/system Rel build and debugging FA issue 3.Provide the FA report to Customer review 4.Perform the system validation test and provide the test report to Customer review	10	1	1
MLB	1.Discussion with F1 to perform design change of change list for each phase 2.Perform the Schematic, BOM, Layout 3.Perform the SMT/MLB Rel build and debugging FA issue 4.Provide the FA report to Customer review 5.Perform the MLB validation test and provide the test report to Customer review	7	1	2
SOC	1.Discussion with F1 to perform design change of change list for each phase 2.Perform the SOC debugging FA issue 3.Provide the FA report to Customer review 4.Perform the SOC validation test and provide the test report to Customer review	3	0	0
Power&DOE	1.Perform the power debugging FA issue 2.Provide the FA report to Customer review 3.Perform the power validation test and provide the test report to Customer review 4.Perform the DOE summary and provide DOE report to F1	4	0	0

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CM Bring up | IDL: Requirement Document (Mac RF)

Apple request HC: 44x; Offer HC: 44x, RF EPM: 3x, Antenna: 8x, Desense: 9x, FATP RFSAC: 7x, SMT RFSAC: 7x, RFHW:3x, Coex: 4x, Regulatory:1x, EMC: 2x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty
RF EPM	1.Follow up build status, project readiness, Yield/DOE tracking and consolidate report 2.Build TIL and MIL tracking, create radar 3.Attend daily meetings and bridge with counterpart on DOE/issue FA & communicate with cross function	2	0	1
Antenna	1. Tracking Antenna MIL/DOE/Action status 2.Antenna data analysis/GU selection 3.OTA Txpower Daily Report/TRP data correlation analysis	5	1	2
Desense	1.Tracking Desense MIL/DOE/Action status 2.Desense Offline 1~9 Daily Report 3.Desense Online/Offline Data analysis	6	1	2
FATP RFSAC	1.FATP WiFi –BT-OTA&WiFi-Char&BTBF-OTA&Remote station Bring up/maintenance/WiPAS Validation/testing issue summary 2.Daily error/retest issue summary/performance plotting report/FA	3	2	2
SMT RFSAC	1.W1&W2&W3 &Load pull & WiFi-BT-Char station Bring up/maintenance/WiPAS Validation/testing issue summary 2.Daily error/retest issue summary/performance plotting report/FA	6	0	1
RF HW	1.SMT FA beach bring up and maintenance 1.Failure analysis tracking/FA &DOE report/HW issue summary	3	0	0
Coex	1.CoEx Station Bring up / Maintenance/SW Validation 3.CoEx daily DOE test and report 2.Coex HW issue summary/performance failure analysis	1	0	3
Regulatory	1.Regulatory automation validation 2.Regulatory station bring up and Maintenance/Daily DOE test and report	1	0	0
EMC	1.RE/CE/ESD/EFT HW&SW setup/Debug/testing 2.Test data analysis/Testing Report	2	0	0

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CM Bring up | IDL: Requirement Document (Mac HWTE)

Apple request HC: 84x; Manager 1x, TDL: 8x, LPM: 3x, HW 68x, SW-QT 4x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty
TDL	1. Before Build：Schedule planning, System access application, maintenance, FBU/Dry run allocation demand list, Test Flow/ build schedule tracking 2. During Build：In-build Online Tracking, Line down highlight, Failures summarize, Abnormal process solving, Test policy definition, Test yield/Retest rate follow up, Boot-args/syscfg key/insight audit, FBU and Build readiness report, Enabling Process Control in EVT/DVT 3. After Build：YBR, RR report, Lesson Learnt, Process improvement	7	0	1
LPM	1. Demand list initiation, daily update based on actual status 2. Station BOM (Bill of Material) maintain in Starling 3. Fixture changes list and impaction tracking 4. Obsolete fixture scrape and audit 5. Test station optimization& utilization 6. Spend report development (by station/by DRI/by vendor...etc.)	2	0	1
HW	1. FBU：Fixture setup, Fixture alignment, Fixture debug/calibration, Starling, Power sequence, Audit/GRR/loop, Station Maintenance 2. Dry Run：OVL validation and report, Issue analysis and improve, DOE validation and report, Station daily status tracking, Fail/ Retest data analysis with Cpk 3. Validation & DOE：HW Readiness, SW Release, Full line dry run, Unit Management	50	5	13
QTSW	1. Test Coverage: Cowork with F1 EE/TDL to lockdown test coverage each build by Radar 2. Source Code: Module source code development and maintance 3. Build OVL: Create station OVL by GOAT 4. OVL release: Notify F1/FX TDL has new OVL before cut in line 5. OVL issue FA: Cowork with F1 TDL to find out root case and update OVL	2	0	2

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CM Bring up | IDL: Requirement Document (Mac Rel)

Apple request HC: 41x; Offer HC: 41x, Manager: 1x, PM: 7x, ML: 7x, Mech: 6x, Drop: 5x, Env: 5x, Vib: 4x, Equip+PUR: 6x

Function	R&R	Mac member Q'ty	Portable VN Q'ty	AW/KB Dedicate Q'ty
PM	1. Arrange and track testing schedule. 2. Cross department communication and coordination. 3. Organized project resources, arrange test, summarized report and highlight critical issue. 4. Arrange internal and MIL meeting, correctly exchange information between Rel team, each departments and NPO.	6	0	1
ML	1. ML station bring up, troubleshooting, data summarized and schedule management 2. Compile, update and publish SOP for ML stations 3. Plan ML OP training courses and qualification programs. 4. Data analysis and to do initial judgement on failure.	4	0	3
Mech	1. Editing Mech. test SOP, updating and publishing. 2. Arrange OP training courses and audit base on SOP. 3. Consumable items management and daily equipment maintain. 4. Test conduct and schedule management, failure judgement, report summarized	4	0	2
Drop	1. Editing drop test SOP, updating and publishing. 2. Arrange OP training courses and audit base on SOP. 3. Consumable items management and daily equipment maintain. 4. Test conduct and schedule management, failure judgement, report summarized	2	2	1
Env	1. Editing environment test SOP, updating and publishing. 2. Arrange OP training courses and audit base on SOP. 3. Consumable items management and daily equipment maintain. 4. Test conduct and schedule management, failure judgement, report summarized	2	0	3
Vib	1. Editing Vib test SOP, updating and publishing. 2. Arrange OP training courses and audit base on SOP. 3. Consumable items management and daily equipment maintain. 4. Test conduct and schedule management, failure judgement, report summarized	3	1	0
Equip+PUR	1. Rel equipment calibration, and maintenance. 2. Co-work with vendor for equipment bring up and troubleshooting. 3. Purchase for Rel equipment /fixtures/ consumable item purchase. 4. Maintain all fixture and consumable material list and budget. 5. UUT maintenance and scrap, FA UUT ship out.	5	0	1

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Appendix | Cross LOB IDL Requirement

- iPhone Engineering Core Team

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CM Bring up | IDL: Requirement Document (iPhone EPM)

Sub team	Role	Description	HC Plan
MLB	MLB Lead	MLB EPM team management	
	SMA line	MLB stuffing requirements and manage input plan Build Matrix stuffing check, release, and Nimbus maintenance Drop/PRQ Build DRI, support ENG build when available	
	MLB test	Communicating MLB test requirements and presenting yield-related reports Drop/PRQ Build DRI, support ENG build when available	
	Layout/shipping	MLB constructions, layout, DL planning MLB allocation and shipping	
Commodity	Function lead	Commodity team management	
	MLB Long term CTB	LT CTB report / material issue fixing	
	MLB Build Matrix	DRP information maintain, WH&kitting management, raw material allocation	
	FATP Long term CTB	LT CTB report / material issue fixing Drop/PRQ Build DRI, support ENG build when available	
	FF build matrix	FF BM release,CTB feedback, ECN for BM urgent change, material status tracking Key Parts List Check IPN rework for Binning after material received Rel material reserve and CTB report	
	FATP allocation	FATP Subs and raw material allocation	
	Sub Assy build matrix	CSA/PAM/RIM BM release,CTB feedback, ECN for BM urgent change, material status tracking IPN rework for Binning after material received	
	Sub Assy allocation&MO	Sub Assy CSA/PAM/RIM allocation & MO management	
	Online kitting	Online kitting and online NG material swap	
	FATP repair swap	Repair swap and WIP cleaning	
Assembly	Function lead	Assembly team management	
	DFx	Assembly issue tracking and yield drive	
	Layout	Floor resource plan, construction etc	
	RIM	RIM build overall management: - Input arrangement - Issue tracking - Special process & resource coordination	
	Line management	Dayshift overall DRI	
		Line build status drive and issue shooting, ABCD lines in D shift	
		Line build status drive and issue shooting, ABCD lines in N shift	

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CM Bring up | IDL: Requirement Document (iPhone EPM)

Sub team	Role	Description	HC Plan
Shipping	Function lead	Shipping team management	
	FF arrangement	FF loan and shipping management, S2F documents	
	NED arrangement	NED loan and shipping management, S2F documents	
	Shipping doc. & pkg line	Internal shipping docs, packing line management	
CSR/Cost and others	FATP Lead	FATP leadership	
	Cost lead	cost team leader	
	Cost DRI	cost team coordinations	
	CSR lead	CSR leadership	
	CSR security	security coordinations	
	PRQ leader	PRQ leadership	
	PRQ DRI	PRQ DRI	
BOM	Function lead	Customer service & team management	
	FATP BOM	CSA/ PAM/ RIM BOM	
	FATP BOM	CG/ BG/ HSG BOM	
	FATP BOM	GB/ NED/PACKING BOM	
	MLB BOM	MLB/ drop build BOM, ECO	
Test	Function lead	Test team management	
	Top Issue &MIL	Main build entry, top issue, MIL,YB Drop/PRQ Build test DRI, support ENG build FA meeting when available	
	Yield Report	Yield report presentation	
	FA Report	FA test report presentation	
	Repair	WIP report presentation, repair room management	

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CM Bring up | IDL: Requirement Document (iPhone EE)

Function	Sub function	Approved HC	Detail	Apple DRI	Mail Address
Validation	SI		Overall Team Leads Control signal and Function check test Power sequence and Noise test	Kevin_Guo	kevin_guo@apple.com
	PI		Power and protocol Automation test	Kevin_Guo	kevin_guo@apple.com
System	BI/SOC		BurnIn FA+SOC Daily report SOC FA	Kevin_Guo	kevin_guo@apple.com
	Line FA		System EE overall Manager(Johnny) Meeting&Report(1x Project DRI+1x meeting DRI: Sync up/Wrap up/FA meeting/HWTE meeting/BurnIn meeting/QT meeting) Line FA& Debug DOE SolderingTechnician Nightshift	Kevin_Guo	kevin_guo@apple.com
	REL FA		Rel issue FA	Kevin_Guo	kevin_guo@apple.com
	Offline		Offline DRI Station1110/Station1437/Statiion1439/Siclops/Siclops Coex testing Stress Rack testing Nightshift	Kevin_Guo	kevin_guo@apple.com
Centralized	Centralized		CT-Scan&Equipment and material management LIT&Laser-cut Nightshift	Kevin_Guo	kevin_guo@apple.com
TWS	Inductive		Project DRI Inductive power FA&DOE Inductive power VnV	Haoxiang Yang	haoxiang_yang@apple.com
	Optical Sensor		Optical sensor project DRI OSD(Prox&ALS) FA OSD DOE Optical sensor FA&DOE N-shift	Stefan Fischer(ALS)&Ricki Esses(Prox)	stefan_fischer@apple.com ricki_e@apple.com
	Motion Senosr		Project DRI Motion sensor FA Motion sensor DOE Motion sensor FA&DOE N-shift	Pat Michniuk	pmichniuk@apple.com
	Thermal		Project DRI Thermal DOE DOE data process	Hugh Tsai	htsai@apple.com

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CM Bring up | IDL: Requirement Document (iPhone EE)

Function	Sub function	Approved HC	Detail	Apple DRI	Mail Address
SMT	FA		Project leader Pre DFU/DFU/ibat reset station FA Pre FCT/FCT station FA FA meeting and report REL FA Night shift for FA BOM check&LCR Solder Admin	Kevin_Guo	kevin_guo@apple.com
	FT		FT LAB station setup and maintain Smokey validation, modify, Station SW validation, DOE HW Checklist, Mini/Main build distribution data report and review, action Retest issue FA Reporting/Dry run meeting/Sync up/Wrap up meeting Night shift	Kevin_Guo	kevin_guo@apple.com
	SOC		Online testing/overlay validation/Daily report General FA, scripting(python/shell for some on-bench test/DOE purpose) Night shift 1x Pre-SOC-DOE and LVCC data collection and analysis	Kevin_Guo	kevin_guo@apple.com

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CM Bring up | IDL: Requirement Document (iPhone PD)

Function team	Job Role Distribution	HC Q`ty	Total	DL/IDL
PD Head	PD overall			IDL
Project	Project Lead			IDL
	PM			IDL
	Material			IDL
	BG&CG Line			IDL
	HSG Line			IDL
	Main Line			IDL
	FA&DOE			IDL
	IT DOE			IDL
	Fixture			IDL
Drop	Project Lead			IDL
	PM			IDL
	Material			IDL
	BG&CG Line			IDL
	HSG Line			IDL
	Main Line			IDL
	FA&DOE			IDL
	IT DOE			IDL
	Fixture			IDL
Operation&Retrofit Center	Manager			IDL
	Assistant Eng.			IDL
	Operation Eng.			IDL
	FA Support Eng.			IDL
	Retrofit Center DRI			IDL
	Machining Eng.			IDL
FEA	FEA lead			IDL
	FEA Engineers			IDL

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CM Bring up | IDL: Requirement Document (iPhone RF)

Sub team	Role	Description	HC Plan	0	Current HC
MLB	MLB Lead	MLB EPM team management			
	SMA line	MLB stuffing requirements and manage input plan Build Matrix stuffing check, release, and Nimbus maintenance Drop/PRQ Build DRI, support ENG build when available			
	MLB test	Communicating MLB test requirements and presenting yield-related reports Drop/PRQ Build DRI, support ENG build when available			
	Layout/shipping	MLB constructions, layout, DL planning MLB allocation and shipping			
Commodity	Function lead	Commodity team management			
	MLB Long term CTB	LT CTB report / material issue fixing			
	MLB Build Matrix	DRP information maintain, WH&kitting management, raw material allocation			
	FATP Long term CTB	LT CTB report / material issue fixing Drop/PRQ Build DRI, support ENG build when available			
	FF build matrix	FF BM release,CTB feedback, ECN for BM urgent change, material status tracking Key Parts List Check IPN rework for Binning after material received Rel material reserve and CTB report			
	FATP allocation	FATP Subs and raw material allocation			
	Sub Assy build matrix	CSA/PAM/RIM BM release,CTB feedback, ECN for BM urgent change, material status tracking IPN rework for Binning after material received			
	Sub Assy allocation&MO	Sub Assy CSA/PAM/RIM allocation & MO management			
	Online kitting	Online kitting and online NG material swap			
	FATP repair swap	Repair swap and WIP cleaning			
Assembly	Function lead	Assembly team management			
	DFx	Assembly issue tracking and yield drive			
	Layout	Floor resource plan, construction etc			
	RIM	RIM build overall management: - Input arrangement - Issue tracking - Special process & resource coordination			
	Line management	Dayshift overall DRI			
		Line build status drive and issue shooting, ABCD lines in D shift			
		Line build status drive and issue shooting, ABCD lines in N shift			

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CM Bring up | IDL: Requirement Document (iPhone Rel)

Function team	Job Role Distribution	HC Q`ty	Total	DL/IDL
DQE Head	DQE overall			IDL
System/MLB Rel	System REL Lead			IDL
	System Rel Branch DRI			IDL
	System Rel testing/report			IDL
	System rel shipping			IDL
	System Rel EQ calibration			IDL
	Rel JDM/Chamber			IDL
	MLB Rel Report			IDL
	MLB Rel Shipping			IDL
	MLB Rel Testing Lead			IDL
	System Rel Testing key position Operation			IDL
Miniline	Mini Line Lead			IDL
	System Mini Line DRI			IDL
	System Mini Line Setup&Maintain			IDL
	MLB Mini Line DRI			IDL
	MLB Rel Mini Line			IDL
	RIM Mini Line Lead			IDL
	RIM Mini Line			IDL
	PAM mini line			IDL
Eco/RIM Rel	RIM/PAM lead			IDL
	RIM/PAM Rel PM			IDL
	RIM/PAM Rel Testing Report			IDL
	ECO Rel lead			IDL
	ECO Rel Testing Report			IDL
	ECO Shipping/Calibration			IDL
FA	FA lead			IDL
	System Rel FA			IDL
	RIM/PAM FA			IDL
	CT Scan			IDL
	MLB Rel FA			IDL

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
LPM	FATP LPM				1. Consolidate and maintain all FATP fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for all FATP stations 3. Consolidate and maintain all FATP fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. FATP fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. FATP station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update FATP fixture/equipment inventory list 7. Coordinate fixture transfer in&out cross site 8. Manage FATP fixture loaner list. Prepensely dispose them after NPI build (Place PO/transfer out/keep loaner) 9. Organize payment review and prepare related document (FATP claim list/tech approve/POD..etc)
	MLB LPM				1. Consolidate and maintain MLB AP fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for MLB AP stations 3. Consolidate and maintain FATP fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. MLB fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. MLB station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update MLB fixture/equipment inventory list 7. Coordinate fixture transfer in&out cross site 8. Manage MLB fixture loaner list. Prepensely dispose them after NPI build (Place PO/transfer out/keep loaner) 9. Organize payment review and prepare related document (MLB claim list/tech approve/POD..etc)
	RIM/IQC LPM				1. Consolidate and maintain RIM/RIM IQC/PAM fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for all MLB stations 3. Consolidate and maintain RIM/RIM IQC/PAM fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. RIM/RIM IQC/PAM fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. RIM/RIM IQC/PAM station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update RIM/RIM IQC/PAM fixture/equipment inventory list 7. Coordinate fixture transfer in&out cross site 8. Manage RIM/RIM IQC/PAM fixture loaner list. Prepensely dispose them after NPI build (Place PO/transfer out/keep loaner) 9. Organize payment review and prepare related document (RIM/RIM IQC/PAM claim list/tech approve/POD..etc)
	LPM overall DRI				1. Review/audit/combine the reports for all section 2. Host LPM meeting 3. Track LPM daily action 4. Address internal process issue (payment/customer clearance/PO) 5. Establish temporary Taskforce for LPM's LPM's urgent demand

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP TDL	TDL Leader				1. Oversee the build status from SMT Dry Run to FATP WIP. 2. Review the build activities 3. Project handover review and promotion 4. Early preparation for next generation (Sever setup/test process confirmation/new tech training and readiness)
	FATP Host TDL				1. Overall manage FATP AP testing build activities 2. As a HWTE Spokesman for all external group meeting (sync-up/wrap-up/FA) 3. Coordinate resource to meet client's demand 4. Organize team to resolve top testing issue&build risk 5 . Review FATP TT/Down time/MP concern and push team to resolve
	FATP Yield/FA TDL				1. Compose Daily Testing Yield report and present in HWTE external meeting 2. Compose Daily Retest report and present in HWTE external meeting 3. Collaborate with Ops team for RR review and push related DRI to fix 4. Compose comprehensive HWTE daily report
	FATP HW TDL				1. Apply and coordinate with EPM to get proper material for line bring up/Dry Run 2. Apply coordinate with EPM to get FF for LBU 3. Allocate resource to fulfill GR&R demand and manage the GRR progress 4. Coordinate with PD/AE team to do unit/Sub retrofit to meet the validation request 5. Coordinate with Diags team/EPM to get intended input material for pre-input validation 6. Manage and allocate HWTE existing material/FF 7. Organize team to verify new consumables (E85 brisket cable/Beef II cable)
	FATP SW TDL				1. Check with Allie cross function team to make daily Dry Run plan 2. Organize ICT HWTE to proceed daily full line Dry Run 3. Track and update all the existing testing issue 4. Compose testing issue list report and major issue list report 5. Organize process validation like PRSQ validation 6. Track SW readiness before build and maintain on-line SW version list
	FATP Meeting TDL				1. Prepare meeting material and host HWTE external meeting 2. Organize and host HWTE internal meeting 3. Follow up meeting action item and push the progress 4. Compose main build entry and MIL 5. Track Off-line station data collection status and HL the gap. Compose the report for Allie DRI's visibility of data collection progress
	FATP Nightshift TDL				1. Follow up dayshift leftover action items 2. Organize validation in the night 3. Coordinate resource to mitigate line down in the night 4. Report nightshift status for Allie 5. Arrange resource to follow CPTO client's request 6. Oversee nightshift activities

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
MLB TDL	MLB Overall				1. Fresh Man Training & Management 2. Coordinate the internal & external Action 3. Customer cummunication & Management 4. Top issue & key action status Tracking 5 .Sync & wrap up meeting & EEFA meeting (Back up the meeting question) 6. Build schedule control & risk Pre-control 7. Test line exception Handing
	Project DRI				1. Hold dry run meeting & DR meeting Material Prepare 2. Send out DR validation plan & report 3. Validation status tracking 4. Top issue FA tracking 5. Report online test status in Daily Sync up & Wrap Up Meeting 6. Report online retest status & Attend FA meeting 7. Report MIL 8. Arrange the Key action & update the status to Allie
	Test PM				1. Build readiness Item Tracking 2. Send out Daily action and tracking action status 3. Send out Build Test report & Roll in tracker 4. Send out Full line Validation Plan & Report 5. Send out Roll in Plan 6. Send out SMA input Plan & matrix 7. Test line exception Handing 8. Vendor Management

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Sub	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. Distribution review and highlight 8. Daily report 9. Test time optimization 10. DOE/actions follow up 11. BOM maintenance 12. Daily handover meeting 13. Routine daily report, such as test rule, lay out, material application
	BG-LCR-Meter/BG-QT/CG-Sensor				
	LDCM/HSG-Button/HSG-Audio				
	Sub overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. QT stations routine dry run validation 8. Distribution review and highlight 9. Daily report 10. Test time optimization 11. DOE/actions follow up 12. BOM maintenance 13. Daily handover meeting 14. Routine daily report, such as test rule, lay out, material application 15. New material validation
	CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn				
	QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
	QT overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT&Sub	QT&Sub overall, report, meeting				1. Team resource balance 2. External meeting presentation 3. Daily report 4. Cross-function team communication 5. Team overall performance review and guidance

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
SOC SW	LVCC-DC/GateKeeper-Preburn/Pre-SoC/Post-SoC/ Pre-SOC-A3L-DOE/Pre-SOC-DOE/DFU-SoC				1. Directly working with EE on SoC offline/DOE station development, triage and maintain; 2. Co-work with vendor and Apple DRI on SoC/DFU-SoC station SW development, and first level SW triage in factory.
Sub SW	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. QT/DOE station overlay development&update 2. Efficient tool development 3. First level SW triage in factory 4. Station issue analysis 5. Overlay validation report review 6. Test time optimization
QT SW	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
Non-QT	QT0-CRB/QT0-S-CRB/QT1-CRB/QT1-S-CRB/SN Setup/ REDSIG-LAT-CRBRCAM-Coex-A149-DOE/B390-Wide_Coex/ Gyro-AcceptanceCT-SCAN/Ve-QT0/STOM/GateKeeper/ GateKeeper-RescreenBoot-args stations				
Fixture EE	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. Fixture Design ERS definition 2. RIM/Sub/QT Fixture Design review 3. OQC/IQC process control 4. Setup & Calibration & Audit SOP standardization, data review 5. Station GRR, distribution review 6. Critical design/test issue rootcause, function validation 7. DOE/actions follow up
Brunin	Overall				Burnin&Diags&DCSD overall team management
	Project leader				1.Allie SPL contact window, Daily sync with Allie. 2.Internal/external meeting DRI. 3.Team management.
	Online Report/Meeting DRI				1.Daily online report summary to Allie team. 2.Online issue status tracking and summary. 3.Internal/external FA meeting. 4Daily Burnin sync up meeting.
	DOE/DryRun				1.Daily DryRun report summary to Allie team. 2.DryRun/DOE arrangement, follow up, report summary, issue Radar and tracking. 3.Action items tracking and report summary.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	Tool Development				Burnin tools development and maintain

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Diags	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	FA DRI				1.MLB online/dryrun EFI Diags issue first level triage. 2.FATP online/dryrun EFI/OS Diags issue first level triage.
DCSD	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	DryRun DRI				1.DryRun related missions(OC/GH/validation/report summary). 2.DryRun issue first level triage. 3.DOE task follow up and tracking. 4.Dummy W/O validation. 5.Support other function DOE with different SW(Bundle/Root).
Station DRI	Prox-Test/Jasmine-Prox/IMU/IMU-CMD/IMU-EMT/Compass Cal/P-Test/ALS-Xtalk Cal/ALS-Xtalk Cal DOE/ALS-Cal/ALS-Test/ALS Audit Cart/ALS-OASM Cal/ALS-OASM Test/ALS E2E/SA-Nova/Nova-B				Detail refer to box file
	iSD-DOE1/iSD-DOE2/iSD-DOE3/iSD-DOE4/iSD/DVI-DOE1/DVI-DOE2/DVI-DOE3/DVI				Detail refer to box file
	Grape-Test-Probe/Grape-SelfTest/Grape-SelfTest DOE/Blackberry/Blackberry DOE				Detail refer to box file
	SA-FACT/FACT/VENT/Snoop				Detail refer to box file
	Ironman-VNA/Battery-Discharge/Ironman-Test Loki/Ironman Test DOE/Ironman-pFO DOE/IO2/IO3/IO4/IO5/IO6/IO7/IO8/IO Port				Detail refer to box file
	Meeting DRI & Report				Detail refer to box file

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP Camera	Leader				1. Daily meeting 2. overall cover the build status and issues
	Midgard/Haze/Fmust/Blackbox/Pineapple-F/Pineapple-R				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Athena/Athena DOE				
	Baldur				
	Odin/Rack0				
	RMUST/RMUST DOE				
	Thor				
	Conveyor leader				1. Daily meeting 2. overall cover the build status and issues
	Clematis/Clematis-DOE				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Root validation 9. Daily report
	Jasmine/Jasmine-IVY/Jasmine-postrack				
Depth & Peridot	Leader				1. Daily meeting 2. overall cover the build status and issues

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
RIM/IQC	Leader				1. Daily meeting 2. overall cover the build status and issues
	RCSB-W/Baldur-T/Winnipeg				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Flare-W/Flare-SW/Flare-T				
	APS-W/APS-SW				
	SA-RCSB/SA-Baldur/SA-Winnipeg				
	SA-Flare/SA-APS/SA-CB				
MLB Station DRI	Pre-DFU/Pre-FCT/Psot-DFU-SOC/Post-DFU-ENG/ Post-FCT/FCT-DMNS				1. 85x DFU/FCT fixture set up & Maintain 2. Full line validation 3.SW roll in(Prod fuse/Dev fuse) 4. Check List 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Pre-SOC/Post-SOC/LVCC-DC/Pre-SOC-DOE/ Post-SOC-DOE/LVCC-AC				1. 167x Fixture set up & Maintain 2. New add Post SOC DOE station (8x) 3. SOC overlay validation 4. SOC Daily report 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	IBAT Reset(1/2/3)/FA_SAF(Pre) FA_SAF(Post)/Gate Keeper				1. 14x Fixture set up & Maintain 2. Overlay validation 3. Daily report 4. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Meeting DRI & Report				Daily Meeting & EE FA Meeting

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CM Bring up | Eng Skill Level Definition Criteria

Senario	Level	Criteria
ICT iPhone Eng Skill Level	***Low Skill***	*1. Individuals who Can only perform easy tasks with the guidance from experienced engineers;* *2. Individuals who are defined as technician*
	Med Skill	*Fully understand RnR, can handle the task independently, can lead team to perform particular task*
	High Skill	*Function/Sub-Function head, provide directions to team and lead team to work based on customer/top management's requirement, participate in strategy creation.*

ICT Eng System Level definition criteria	
Level13 Level12 Level11 Level10	**Education:** Master,Bachelor,College/Associate with related major(eg. Mechanical for PD position.) **Working experience for engineers:** >8yrs working experience in industry(apple product) or equivalent product(eg. Huawei phone or Xiaomi phone); **additional requirement for managers:** Must have at least 5yrs team management experience in related area **Promotion Stay years:** 2yrs **Promotion criteria for next level:** must award A+/A in year end performance review *Exception: talents who can have special contribution to team/product(eg. Top performer at ex-employer)*
Level9 Level8 Level7	**Education:** Master,Bachelor,College/Associate with related major(eg. Mechanical for PD position.) **Working experience for engineers:** >5yrs working experience in industry(apple product) or equivalent product(eg. Huawei phone or Xiaomi phone); **additional requirement for supervisor :** Must have at least 3yrs team management experience in related area **Promotion Stay years:** 1yr **Promotion criteria for next level:** must award A+/A/B in year end performance review *Exception: 1. talents who did not have equivalent education background but with rich experience in industry, eg. Talent who only have high school education but have great experience on ProE; 2. Talents who have special skills but with limited working experience. Eg. English communication skill*
Level6 Level5 Level4	**Education:** Bachelor, College/Associate with related major(eg. Mechanical for PD position.) **Working experience for engineers:** 2-3yrs working experience in industry(apple product) or equivalent product(eg. Huawei phone or Xiaomi phone) or equivalent skills(eg. RF related) **Promotion Stay years:** 1yr **Promotion criteria for next level:** must award A+/A/B in year end performance review *Exception: 1. Freshmen with bachelor degree and from 985 or 211 academy or freshmen with Master degree: Level 6; 2. Freshmen with bachelor degree from regular academy: Level 5; 3. Freshmen with college degree: Level 4*
Level3 Level2 Level1 Technician	**Education:** College/Associate and high school or talents with vocational certificate(CT operation certificate) **Working experience for engineers:** 1-3yrs working experience in industry(apple product) or equivalent product(eg. Huawei phone or Xiaomi phone); **Promotion Stay years:** 1yr **Promotion criteria for next level:** must award A+/A/B in year end performance review *Exception: Fixed DLs in DQE and WGT are defined as Technician; particular machine operator like CT and OMM measurement are defined as level3*

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Appendix | Cross LOB IDL Requirement

- iPad Engineering Core Team

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CM Bring up | IDL: Requirement Document (iPad EPM)

CM Technical Capability	• Senior level - experience leading 3+ NPI programs • Junior level - experience supporting 1+ NPI programs • Need EPMs with experience in following field: - FATP / SMT program management (Senior) - Build matrix management (Senior) - System / MLB allocation matrix management, shipping and logistic (Junior) - Material management and domestic / international shipping & logistic (Junior) - FA meeting host / issue summary & tracking (Senior) - Report team (Build readiness report, daily SMT / FATP report, yield report, shipping report) (Junior) - Tracking SMT / FATP DOEs and status report (Junior) - PD EPM (Senior & Junior)
CM Engineering Resources	FATP • 1x EPM manager - program lead • 1x System Program EPM - host daily meetings, organize all build activities, main contact window between Apple & internal team • 3x PD EPM - 1x senior + 2x junior to manage PD parts for FATP and SMT • 1x Build matrix EPM - maintain build matrix with Apple • 1x Material EPM - material review, highlight critical items, co-ordinate material activities • 1x Shipping EPM - manage allocation, maintain Nimbus allocation, update ship to file daily • 1x Execution EPM - follow up on-line status. Input / DOE / special instruction / report line down or issues • 1x FA EPM - manage FA meeting, radar, reports, and actions • 1x DOE EPM - tracking DOEs, DOE materials, loan and test unit status, update DOE trackers • 1x Factory facility contact window, work with Apple on Apple room / layout / lab setup / line setup / server setup / material tracking setup / FA tracking setup / COF system etc • 10 - 15x support team under EPM team - ~3 Material tracking, calling vendors, arrange logistic, custom paperwork etc... - ~2 Factory system setup = create WO, maintain BOM, release material, maintain CCCC / EEEE etc. - ~3 Front desk support, manage Apple travel's factory access, bus, food, general support - ~2 Execution support = stay on line tracking daily actions, critical input, transfer material, monitor critical DOEs etc... - ~2 Report team, to generate daily yield report, WIP report, daily build report, other reports based on requests SMT • 1x EPM manager - program lead • 1x Program EPM - host daily meetings, organize all build activities, main contact window between Apple & internal team • 1x Build matrix EPM - maintain build matrix with Apple • 1x Material EPM- material review, highlight critical items, co-ordinate material activities • 5- 8x support team under EPM team - ~3 Material tracking, calling vendors, arrange logistic, custom paperwork etc... - ~2 Factory system setup = create WO, maintain BOM, release material, maintain CCCC / EEEE etc. - ~1 Report team, to generate daily yield report, WIP report, daily build report, other reports based on requests
Factory / Equipment / Facility	• Need Apple room to accommodate 80x employees • 2x large war rooms (>40 people) with video conference capability • 8x small/medium meeting rooms (6-10 people) with video conference capability • High speed internet connection • Ability to implement / upgrade: - Factory SFC control system, to meet Apple product's line / BOM / control need. Also give flexibility to support NPI build's need on COF / input non-POR material / cancel WO / adjust SKU - Material tracking system, to track key modules but also give flexibility when non-POR materials need to input w/o standard EEEE / SN format - FA check-in / out / tracking system, to track all FA units under team / transfer between team, also generate accurate tracking report - COF system, so Apple team can give instruction and maintain certain COF items, while SFC still control and make sure unit went through all critical stations
Other	• Security process to support ultra secrecy program, including managing vendor access

CM Bring up | IDL: Requirement Document (iPad EE)

CM Technical Capability

- Senior Leader - Manager/Leader role in Apple NPI, solid NPI program experience, > 8 years of industry experience
- Senior Engineer - experience leading 3+ NPI programs, > 5 years of industry experience
- Junior Engineer - experience supporting 1+ NPI programs, > 2 years of industry experience
- Need EE team with experience in following fields:
  - Strong electrical circuit FA, trouble shooting and debug capabilities (Senior)
  - Proficient EE equipment utilization for various FA/debug (Senior)
  - Leadership across CM teams (Senior)
  - Proactively and closely work with Apple teams on various issues and coordinate CM resource well (Senior)
  - Effective and real time communication with Apple EE team (Junior)
  - Execute Apple FA/debug/DOE instructions, summarize result and report (Junior)
  - Collaborate CM internal resource and deliver good results (Junior)
  - Daily report with precise issue description, accurate status update, clear logic and solid data (Junior)

CM Engineering Resources

Total HC: 44x

- EE Lead: 5x (1 for EE manager, 1 for SMT, 1 for FATP, 1 for Validation, 1 for EE PM/MIL)
  - Solid EE background with 3+ years NPI experience
  - Good English speaking
  - Strong communication capability cross teams
  - Familiar with factory SMT and FATP process
  - Excellent electrical design and debug capabilities
- SMT EE FA/Debug HC: 11x
- SMT SOC/DFU FA/Debug HC: 5x (need some SW/Python expertises)
- FATP EE FA/debug HC: 14x (not counting Camera/Display/Sensor/Touch EE for cross function team)
- EE DOE and validation dedicated resource HC: 9x
- SMT and FATP labs have dedicated rework technicians to deliver high quality reworks
- EE FA Engineers have good understanding of electrical circuit, analog circuit, scope probing, also familiar with factory process (how to check in FA, how to do on-line retest, how to use fixture...)

Factory / Equipment / Facility

- Lab space:
  - SMT and FATP EE labs:
    - 100m2 each in size with working benches, collaboration benches and rework stations
    - Easy access to the line to support FA, validation and DOE in parallel
    - Bench-top chamber setup and accessories inside the EE labs
    - DOE shelves/racks for regression test, equipment and units
  - System CoEx lab (50m2)
  - RF-System CoEx dry-run lab (100m2) and RF-System CoEx FA lab (60m2) on the first floor
- Equipments:
  - Enough Oscilloscope/PSU/DMM/LCR/IR/LA/Keyence Microscope setups for electrical FAs (specific models)
  - Enough Mac Mini to setup quick offline DOEs
  - LiT, CT scan, X-Ray and DFM cross section setup for T0 and REL FAs
  - Rework station setups
- Facilities:
  - AppleWiFiSecure coverage for FA
  - Apple Cable Network connections for remote debug station
  - Dedicated lab technician to maintain the lab

Other

- need to discuss with HWTE on SMT station DRI role

CM Bring up | IDL: Requirement Document (iPad PD)

CM Technical Capability

- Senior level - experience leading 3+ NPI programs
- Junior level - experience supporting 1+ NPI programs
- Technical ability:
- - CAD (2D/3D) drawing release
- - Qualified to use Lab tools and equipments like CT scan/Instron/keyence/CMM/OMM
- - Tolerance analysis
- - Data analysis like JMP
- - Quick mockup sample and fixture making

CM Engineering Resources

- 1x PD lead
- 2x Senior genius
- 5x Line Assy:
- 4x Line FA:
- 4x REL FA
- 5x Fixture
- 2x MCAD
- 1x PD lab management
- 3x Mockup team

Factory / Equipment / Facility

- PD lab: 200 m^2 for all lab equipment, PD CAD room (4x CAD stations, around 15~20 m^2), and PD sync meetings
- Equipments and tools (Q'ty is 1x for each).
  - CT scan (GE)
  - X-ray (Propose Nordson DAGE Quadra NT)
  - Keyence 2D (VHX5000 or 6000, 20x-200x magnification at least)
  - Keyence 3D (VR5200 Model is the newest)
  - Instron (5944 with 500N load cell)
  - OMM/CMM (Not must but preferred Hexagon OPTIV dual Z)
  - Thermo camera (Hi resolution at least 1024x768 with movie feature.)
  - WCA (Propose Kywo PCA-11)
  - 3D printer (Propose Stratsys Objet260 Connex 1/ 16µm layer thickness 255 x 252 x 200mm print area)
  - Laser cutter (Propose Trotec Speedy 100 w/ 100W CO2 laser)
  - Table cutter (Propose Graphtec FCX4000-50ES)
  - Basic tools, cameras and computers for CMPD to do FA and report.
  - 1x Projectors or 70"TV for sync meeting.
- Facility:
  - Apple secure WiFi in PD lab
  - Intranet for data transfer between lab equipments
  - Dedicated Ethernet cable line connecting to CT scanner to computer in PD lab

Other

- Remote iPAD with FaceTime Video if possible.

CM Bring up | IDL: Requirement Document (iPad Rel)

CM Technical Capability

- Senior leader - Manager/Leader role, solid NPI projects experience, 8+ years with electronics industry experience
- Senior engineer - solid experience leading 3+ NPI projects, 5+ years with electronics industry experience
- Junior engineer - solid experience leading 1+ NPI project, 3+ years with electronic industry experience
- Technical ability:
  - solid experience from product reliability, failure analysis(PFA/EFA) methodology and techniques
  - multiple projects management, strong and effective communication skill and easy to work with
  - knowledge of industry test standards from JEDEC, ASTM and IEEE
  - leadership skills and smart collaboration functional teams and flexible resources for expected deliverable
  - proactive attitude and effective communication with Apple REL teams from both in-region and the US
  - qualified ability of great reporting and test summary for both pagers working and presentation
  - educational background from mechanical/electrical/materials engineering or physical sciences

CM Engineering Resources

- 25x engineers
  - 1x DQE(REL) manager
  - 4x Leaders(4x sub-teams inside of DQE)
  - 20x engineers
    - 3x for PM
    - 7x for testing
    - 5x for miniline
    - 5x for FA
- 70x technicians
  - 2x for PM
  - 35x for testing
  - 28x for miniline
  - 5x for FA

Factory / Equipment / Facility

- Lab space:
  - 1000m2 for multiple rooms to place equipments from 1) Drop/mech/env testing, 2) Failure analysis, 3) X-ray and CT scanners as separated room, 4) Miniline stations, 5) warehouse and 6) office for engineers, and 7) 2x meeting rooms for regular REL syncing
  - detailed equipment list will be shared separately
- Equipments:
  - required REL testing and FA equipments
  - enough Mac Mini and laptop to support datas collection and reporting
- Facilities:
  - AppleWiFiSecure coverage for required meeting rooms(only access to apple REL guys)
  - dedicated Ethernet cable line connecting to CT scanner room to computer in DQE-FA lab

Other

- facility detailed plan in working level required for review with Apple REL

CM Bring up | IDL: Requirement Document (iPad Rel)

No.	Category	Equipment Item	Quantity	Vendor	Model
1	Drop	SE drop tower	2	SE	5460 A
2		Plinko drop tower	1	Consigned	TBD
3		HSVs	2	ViSiON	VEO-710L
4		Repeated-flat drop tester	4	FXN Huanan	SDT-100
5		Repeated-rotational drop tester	4	FXN Huanan	SDT-100
6	Mechanics	Pressure&Squeeze tester	5	SE	9705SFA
7		Button cycling tester	6	FXN Huanan	URC-1-K-62
8		Connector cycling tester	1	FXN Huanan	UDT-10-2
9		Ball impact drop tester	2	IST	TCI-0719196-01
10		Precision load tetser	1	SE	1220WS
11		Instron force tester	1	INSTRON	5967
12		3G vibration machine	1	LDS	V850-440-SPA32K
13	Environment	TH chamber	6	ESPEC	EPX-4HW
14		ESS chamber	2	WEISS	TempEvent T/800/70/25
			2	KSON	KESS-DS 3.0
15		UV chamber	1	ATLAS	Ci5000
		UV chamber DI water machine	1	MOLCI	MOLCI-40D
16		Salt spry chamber	1	GIANT FORCE	ISST-270
17		Dust chamber	1	WEISS	ST-1000U
	FA/inspection	CT scanner	1	Phoenix	Phoenix v/tome/x m
		X-ray	1	Date	X2.5#
		Light box	2	Apple	Cannon EOS 5DSR+ accessories
		Keyence	2	Keyence	VHX-7000
		Konica Spectrophotometer	1	Konica	CM-3700A
18	Main consumable	XenoaCal tool	1	ATLAS	Sensor XenoCal NB420
19		Conductivity meter	1	Thermo	EUTECH COND 6+
20		PH meter	1	EUTEOH	PH 6+
21		Temperature/Humidity meter	2	Vaisala	HMP77
22		Thermocouple	60	JAMU	PT100
23		Thermocouple spot welding machine	1	Agilent	34972A
25		P&S test holder, HB test holder	25	FXN EPD5	/
27		Futek forte sensor	1	FUTEK	LLB300
29		MLB Rank	46	FXN EPD5	/
31	Miniline	REL Miniline	TBD	N/A	TBD

CM Bring up | IDL: Requirement Document (iPad Rel)

Function	Engineer	Techs	Justification (engineer level)
Lab Manager	**1**	0	• 1x for DQE manager to lead whole lab
Project management(DRIs)	**3**	2	• 2x for systemREL DRIs • 1x for MLBs REL DRI
Miniline	**5**	30	• 4x for miniline test arrangement, stations bring up, debug and maintenance • 1x for datas and reporting
REL Test	**8**	35	• 1x for test lead • 3x for Drop/Mech/Env testing setup, calibration and maintenance • 3x for test execution, schedule tracking, datas reporting, and DOEs • 1x for test spec/method/profile development
FA	**6**	3	• 1x for FA lead • 4x for systemREL test failures review, FA execution and reporting • 1x for radars and FA tracker
Total	**23**	**70**	To be hired: • 22x more engineers(included 1x as manager level) • 70x more technicians

Request ~1000m2 new space

CM Bring up | IDL: Requirement Document (iPad HWTE)

CM Technical Capability	• Need hire and train engineers refer to HWTE PRDs: rdar://31365621 (HWTE: PRD document for CM engineer requirement)
CM Engineering Resources	• Need hire more resource to support HWTE NPI, including Diags. • Total 94x engineers for HWTE/Diags: SMT DRIs: 11x FATP DRIs(includes Burnin): 55x SWQT DRIs: 7x SMT&FATP TDL: 10x Diags DRIs: 5x ME DRIs: 5x 1x experienced logistic PM for NPI support
Factory / Equipment / Facility	• Need HWTE flight deck setup in both SMT(~20m2) and FATP(~50m2)
Other	

CM Bring up | IDL: Requirement Document (iPad HWTE)

	Need additional space for J410
RF HW	no extra space needed
Eureka	no extra space needed
Coex	no extra space needed
RFS Conn.	18m2 additional scpace needed
RFS Cell	no extra space needed
OTA Cell-Con	no extra space needed
RSE	8m2 additional space needed
SAR	no extra space needed
RFSAC	no extra space needed
EMC	no extra space needed
Antenna	30m2 for one additional chamber for WiFi 6e (Starlab 18)
Desense	no extra space needed

Team	Function	Apple DRI	HC for J281	Additional HC for J410	J410 additional HC Lead/Senior/Junior
RFHW	WiFi/BT	Benny		2	Junior
RFHW	WiFi/BT	Benny		1	Junior
RFHW	Cell FR1	Benny		1	Senior
RFHW	Cell FR1	Benny		1	Junior
RFHW	BBHW/ WCS	Benny		1	Junior
RFHW	Shared by RFHW	Benny		3	Senior
RFSAC	SMT	Sean, Anant	18	2	
RFSAC	FATP	Sean, Anant	11	2	
OTA Cell-Conn		Kevin	2	1	
EMC	Engineer	Mike	6	1	Junior
SAR		Bill	1	1	Junior
Antenna OTA Testing	Lead	Lu, Harish	1	0	
Antenna OTA Testing		Lu, Harish	17	6	
Antenna Lab		Lu, Harish	7	4	
Antenna FA		Lu, Harish	7	3	
Antenna FA		Lu, Harish	2	5	
Antenna FA		Lu, Harish	3	1	

Refer to iPhone ’s format

CM Bring up | IDL: Requirement Document (iPad Module)

	Apple Requirement			Junior	Actual (Apple Qualified)		Junior
	HC Qty	Lead	Senior(>3 Years ex)		Lead	Senior(>3 Years ex)	
Display_EE	5	1	1	3			
Display_Eng	3	1	1	1			1
Touch	5	1	2	2			
Acoustic	7	1	2	4	1	1	2
E-noise&BSR	2		1	1			
RCAM	5	1	1	3			1
FCAM	5	1	1	3			1
Sensor	5	1	2	2			3

	Apple Requirement			Junior	Remark	Actual (Apple Qualified)		Junior
	HC Qty	Lead	Senior(>3 years)			Lead	Senior(>3 years)	
Touch	15	1	5	9	HC: 15 Lead: 1 Senior: 5 Junior: 9 （DV request: 4 EE request: 10）			
Scorpius	3	1	1	1				

iPad | TPM Requirements

CM Technical Capability	• Senior leaders: > 8 years work experience, prefer to have apple NPI experience • Senior engineers: > 5 years work experience, prefer to have apple NPI experience • Junior engineers: > 2 years work experience • Each team has ~ average 5 years work experience
CM Engineering Resources	• 20x IE, including 5x senior IE ✦ 1x IE PM (senior leader) ✦ 1x IE FA (senior leader) ✦ 1x assy (senior engineer) ✦ 1x testing (senior engineer) ✦ 1x flow chart/line layout (senior engineer) 15x TPMs, including 7x senior TPMs for ✦ 2x MIL/RCCA drive (senior leader+senior engineer) ✦ 2x on line build tech support&co-work with apple team (senior leader+senior engineer) ✦ 2x support DOE, trial run (senior leader+senior engineer) ✦ 1x support IE(MES/PDCA) (senior engineer)
Factory / Equipment / Facility	• PD/EE/RF/DFx qualified lab to support FA
Other	

iPad | Quality Requirements

CM Technical Capability	• Quality Leader with 10+ years of experience in managing high volume production quality operations
	• Product Quality Manager with 5+ years of quality related experience
	• Data Analyst- 3+ years of experience in data analysis
	• QPM, CQA, FA, IPQC, ORT, IQC Leads with following requirements-
	  • Strong program management skills
	  • Strong communication skills - written and verbal
	  • Strong technical and analytical skills
	  • Mechanical/ EE/ Materials Engineering background

CM Engineering Resources	• Quality Leader - 1x • Product Quality Manager - 1x • QPM - 3x (1x lead, 2x DRIs) • CQA - 3x (1x lead, 2x DRIs) • FA - 3x (1x lead, 2x DRIs) • IPQC Lead - 3x (1x lead, 2x DRIs) • ORT - 4x (1x lead, 3x DRIs) • IQC - 4x (1x lead, 3x DRI) • Data analysts- 2x
Factory / Equipment / Facility	• Lab space for ORT, CQA, EUT, RRT, Mini-line • X-ray, CT-scan, T/A, FTIR equipment
Other	

iPad | Audio Requirements

CM Technical Capability	• Senior level - experience leading 3+ NPI programs • Junior level - experience supporting 1+ NPI programs • Technical ability: • - Basic FA for speaker / mic integration •
CM Engineering Resources	pick numbers from current CM
Factory / Equipment / Facility	Copy / past list for other project
Other	

iPad | AME Requirements

CM Technical Capability	• Senior leaders: > 8 years work experience, prefer to have apple NPI experience • Senior engineers: > 5 years work experience, prefer to have apple NPI experience • Junior engineers: > 2 years work experience • Each team has ~ average 5 years work experience
CM Engineering Resources	~30x total AME engineers for auto machines validation and bring-up • AME PM - 2x (Senior leader), bilingual Chinese/English • MIL Lead - 1x (Senior leader), bilingual Chinese/English • FA lead - 1x (Senior engineer), bilingual Chinese/English • Data analyst- 1x (Senior engineer), bilingual Chinese/English • AME Lab manager 1x (Senior engineer), bilingual Chinese/English • Station DRIs — 1x for each station, some complicated station may need 2x DRIs
Factory / Equipment / Facility	• AME lab to support general mechanical DOEs, ~90 m^2 of lab space needed • Instron, OMM, CMM, Water Contact Angle Tester, Keyence Microscope, 3D printer required
Other	

iPad | DFM Requirements

CM Technical Capability	• Senior level - >5 years SMT process working experience on complex rigid/flex board; experience support 5+ NPI programs
	• Junior level - >2 years SMT working experience on complex rigid/flex; experience support 2+ NPI programs
	• Need SMT team with in depth knowledge in following field:
	  • SMT process (laser barcode; screen print; SPI, pick&place; AOI; Reflow; UF/UV dispense+cure; de-panel)
	  • Hotbar process
	  • PD part assembly process
	  • Jig&fixture design and buy-off
	  • Automation machine design and buy-off

CM Engineering Resources	• SMT factory manager x1 • Engineering manager x1 • Manufacturing engineer manager x1; 6x ME per project (shift base) • QA manager x1; 1x SQE, 1x QE; 1x IPQC per project (shift base) • DFM engineer 1.5x per project • Tooling engineer 1x per project
Factory / Equipment / Facility	• N2 supply system • Standard SMT equipments (laser marking; laser cut, screen print; SPI, pick&place, AOI, reflow oven, UF curing oven; UV curing oven, de-panel machine...etc) • IQC and lab equipments (XRF, LCR measurement equipments, OMM, high magnification microscope, x-section, dye&pry, pull&shear test, torque test, X-ray, CT-scan, SEM, FTIR, solder dipping test, wetting balance, shadow moire...etc)
Other	• Please refer to 080-03566 for more details requirements on new CM • Need good english communication DRIs

Appendix | Cross LOB IDL Requirement

- Watch Engineering Core Team

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CM Bring up | IDL: Requirement Document (Watch EPM)

Function	Major Responsibility	Subitem	HC
EPM leader	Front-end program preparation, manage team the R&R with targets, guide team the acculturation of both customer and company	• New programs RFI, RFP & RFQ, align all functions with new programs projections and requirements • Define org, R&R by programs needed • Team management for programs schedules, tasks and targets • Coordinate internal and external for conflicts, concerns and different proposals	Qty depends on program
System EPM	Primary contact to customer team Host meeting and reporting, internal communication / coordination	• Drive build readiness, line conversion, SF dry-run, identify issues and risks • Understand input plan and strategy, internal & external communication • Host open/close meeting, update I/O status, blockers, major issues and actions, ok2main • Drive build execution, ensure timely communication for line down, special instruction, line conversion control for material variables, bottle-neck tracker and optimization • Daily factory report, line release tracker, post-build activity tracker, MIL / close meeting, post-mortem • Manage Fx display / demo programs, NPI pack-out programs	Qty depends on program
Assembly EPM	Major focus online status, ensure config input correctly, drive throughput	• Online assembly fixtures / auto-machines / OPs status checking before build • Review special instruction and manage special configs • Drive daily I/O to meet subline / pre-snap line target • Communicate line down issue to team, co-work with engineers to perform DOE / debug to resume input • OP, fixture / machine release confirmation • DOE support after build complete	Qty depends on program
Material EPM	Major focus online material status, ensure material kitted and transferred correctly	• Monitor DRP/build matrix/kitting online • Manage online material shortage (CTB, IQC priority, tossing, quality, binning, etc) • Manage material screening, swap, rework and push all materials to line as expected schedule	Qty depends on program
Testing EPM	Responsible for online test status, manage test waiver, DOE execution	• Online fixtures / testers / OPs status checking before build • Update test waiver and communicate properly for implementation • Drive critical data collection per requests • Drive post-snap throughput, optimization post-snap line test per shift • Manage DOE / offline tests / reflow and optimize units route to meet allocation plan • Daily waiver update, regular DOE requirements follow-up	Qty depends on program
DOE EPM	Responsible for Master DOE request, RF offline, Offline Lab, and special process execution	• Organize master DOE request and confirm with each function DRI for test plan / special process/ special materials • Drive DOE station readiness / Mini dry run progress / HTHH plan / modified Roxer / EE coex tracker • Monitor DOE config material stuffing and online process/ RF offline and offline Lab test progress • Update DOE report twice a week to summarize “Need customer help / DOE progress / New added request” • Mail and track online/waiver related, allocation related, special assembly related DOEs to ensure team is clear about the requirements • Daily Monitor Nimbus BM stuffing and ADB to catch any update from customer	Qty depends on program
FA EPM	Responsible for FA meeting host, data collection, reports making and actions follow-up	• NPI FA meeting host, co-work with all engineering functions for FA updating and reporting • Daily FA reports update of major issues / process issue tracker / RTV tracker / meeting actions • Drive FA progress of top, high-risk, appointed issues to meet requirements • Summarize and track FA radar status - open, ongoing, verified • FA server maintenance	Qty depends on program
Allocation EPM	Responsible for all the allocation requests, ensure proper arrangement to meet shipping target	• Manage units borrow / return within factory • Manage urgent allocation/shipment requests • Manage ID units (track ID config -> PD pickup -> pack) • Manage back-end process (laser, CPK, CQA, PD check, pack) • Daily allocation tracker (test, conducted, urgent shipment, mini, REL) / shipping plan, borrow status • Allocation shortage updates and proposal, nimbus allocation update, GB inventory management	Qty depends on program
Shipping EPM	Responsible for shipping readiness, logistic	• Drive battery / system CSTCG, 3C waiver • NPI pack-out production management • Logistic (SAP maintain, Customs registration, Schenker tracking information) • Daily S2F report	Qty depends on program

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CM Bring up | IDL: Requirement Document (Watch EPS)

Function	Major Responsibility	Subitem	HC
EPS leader	Front-end program preparation, manage team the R&R with targets, guide team the acculturation of both customer and company	• Define org, R&R by programs needed • Team management for programs schedules, tasks and targets • Coordinate internal and external for conflicts, concerns and different proposals	Qty depends on program
Build matrix	Responsible for latest BM release, WO release, BM verification, output data maintenance	• Work with PD / SF / IT / WH for auto-mapping BOM & WO & BM at each build stage • Latest BM downland and release to all engineering functions • WO release and maintenance, including the changes for ongoing WO • BM stuffing (config mapping majority) accuracy check and go sync with customer EPS • Built data fill-in to BM, including built quantity, consumable parts usage, etc. • WO audit, ensure that the WOs are always being synchronized with the latest BM and Input plan, especially for non-regular configs	Qty depends on program
DRP	Responsible for NPI material demand release, MIH driving to meet targets, vendor management	• Latest DRP download and release to all engineering teams • PR/PO process efficiency development and coordinate with Finance, Customs and Buyer for good execution • Demands to vendor timely and track delivery update for filling into DRP system • Driving materials MIH to meet all requirements - LBU, Input and DOE • Assist customer to manage vendors for lesson-learnt and improvement plan	Qty depends on program
CTB	Focus on current ok2use quantity, forecast from IQC and vendors, and make alternative suggestions to customers for clear-to-build	• Daily CTB meeting host, submit latest & accurate material status report and present Build matrix stuffing alternative plan before line starting • Highlight material impact risk and lead urgent material solutions according to input sequence • BM accuracy (stuffing majority) check and go sync with customer EPS • Monitor material status in IQC, track measurement / bin / sorting results and report timely if not meet the expectations • Co-work with online EPM, PD, TPM and SQE for NG swap update during input, monitor usage qty of over-stuffing parts	Qty depends on program
Audit	Responsible to ensure the accuracy of kitted, urgent changed and NG swapped materials	• Audit MC-kitted materials accuracy (Config, SN digits, PN, quantity and special call-out) for each BM config and WO • Audit reports making with clear shortage list and drive IQC / MC to inspect / transfer / kit rest on schedules • Timely audit urgent-changed materials and check NG-swapped material accuracy • Co-work with Production line and EPM for ready-to-pick up notice	Qty depends on program
Allocation	Responsible for all materials and subassemblies allocation in factory	• Raw materials and subassemblies inventory check and allocate engineering functions as customer requirements for PD KIT, LBU, DOE, etc. • Coordinate with functions for the shipping materials and subassemblies to MC for packing on schedules • Allocated/NG data maintenance on Nimbus and weekly reports making	Qty depends on program
Shipping	Responsible for all materials and subassemblies shipping, and logistics follow-up	• Read MSD and define security_level for each material and subassembly to all logistic functions • Co-work with PD / SQE about packing method for different material and subassemblies • Take over shipping materials and subassemblies for packing arrangement • Shipping progress follow-up and TKR# update to team and customer • Report makings for all shipped materials and subassemblies by stage / program	Qty depends on program
Packing/Scrap/MD	Focus on NPI pack-out WO and materials, scrapping materials and GBs management and GP certification	• Co-work with PD for NPI pack-out BOM mapping, WO maintenance and release • NPI pack-out material issues / progress from DRP to line • Collect and summarize all material and GB inventories by customer-defined categories • Co-work with MC / WH for materials SN and GB SN accuracy check before moving to Scrap WH • Scrap applications to customer stage by stage while program moving to MP • Snyc scrap process to all related functions base on customer requirements • Handle material RoHS documents deceleration	Qty depends on program

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CM Bring-up | IDL: Requirement Document (Watch PD)

Job Role Distribution	Headcount Qty	Total	DL/IDL
Head			IDL
Manager			IDL
Leads			IDL
HSG Sub-line DRIs and FA			IDL
BCM Sub-line DRIs and FA			IDL
FCM Sub-line DRIs and FA			IDL
SiP Sub-line DRIs and FA			IDL
FATP1-SiP2HSG Main line DRIs and FA			IDL
FATP2-Alert/Battery Main line DRIs and FA			IDL
FATP3-Snap Main line DRIs and FA			IDL
Night Shift			IDL
ROXER FA			IDL
PD EPM			IDL
PD BOM			IDL
PD Equipment			IDL
PD W/H			IDL
Packing			IDL
Take apart			IDL
Display FA			IDL

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CM Bring up | IDL: Requirement Document (Watch PDEPM)

Function	Major Responsibility	Subitem	HC
PD EPM Lead	Overall IPD resource coordinate	• DRI arrangement and task definition • Overall for covering cross programs • React/discuss improvement items with BUD PD EPM • Coordinate with cross functional team for the process	Qty depends on program
Project PD EPM	Primary contact to BUD team and ICT other function team Host meeting and reporting, internal communication / coordination	• Drive Build Readiness - PD files update: Change list, SOP, Die-cut, Screw list, Special Instruction • Hold daily PD meetings, update PD meeting reports - PD Open/Close report, Daily I/O, other PD doc. • PD config management(PDFC/Mini/REL/ID/NED) - assistant BUD team to organize PD DRIs for material verification, report issues, material fit checks • Coordinate ICT cross function function team work - FA cowork, online issue urgent change • PD build MIL Consolidation / follow up FA actives • Manage all IPD working tools - apple accounts, access	1/project
DOE PD EPM	All PD DOE activity management	• Cooperate with BUD PD EPM for DOE list • Work with IPD for DOE preparation - DOE material list, fixture list • Update/tracking DOE status and feedback to BUD PD EPM	0.5/project
CT Lab PD EPM	CT Lab Resource management	• Controlled PD CT room capacity • Arrange task with PD CT DRI • Compile all the CT list from online, PD regular CT, DOE/FA CT and RF CT	0.5/project
Material PD EPM	Responsible for PD allocation, shipping, logistic	• Manage PD units borrow / return within factory • Manage PD urgent allocation/shipment requests • Manage ID units (track ID config -> PD pickup -> pack) • Follow all PD FA shipping /Cross section activities	0.3/project

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CM Bring up | IDL: Requirement Document (Watch EE)

Function	Sub Function	HC	Detail
Overall Leader	Leader	1	- Overall Team Leads - At least 10 years of Apple NPI experience
System EE	Leader	2	- Leading system EE FA, strong communication capability with cross function - 5+ years of Watch EE NPI experience
	Engineer	8	- Professional FA ability of Watch system FA, skilled for basic tools apply like Oscilloscope, Power Supply, LCR Meter…… - 2+ years of Watch EE NPI experience
Vaxholm	Leader	1	- Leading Vaxholm FA/DOE - 5+ years of Watch EE NPI experience
	Engineer	6	- Good understanding of Vaxholm latest technology - 2+ years of Vaxholm FA experience
Platinum	Leader	1	- Leading Platinum FA/DOE - 8+ years of Watch EE NPI experience, expert on Platinum technology
	Engineer	6	- Good skill in Platinum FA, excellent debug capacity - 2+ years of Platinum FA experience
Charging	Leader	1	- Leading Charging FA/DOE - 5+ years of Watch EE NPI experience, charging efficiency improved
	Engineer	6	- Professional Charging FA ability and skilled for tools apply - 2+ years of Charging FA experience
FCM	Leader	1	- Leading display and touch FA/DOE - 5+ years of display / Touch NPI experience
	Engineer	6	- Display and Touch FA/DOE , skilled for advanced equipment apply - 2+ years of display / Touch NPI experience
Alert	Leader	1	- Leading Alert FA/DOE - 5+ years of Alert FA experience
	Engineer	3	- Alert FA, DOE, report and data analysis - 2+ years of Alert FA experience
HW validation	Leader	1	- Leading HW validation - 5+ years of HW validation experience, project-wise coordination.
	Engineer	8	- Dedicate HC for HW validation: Power sequence, Power noise, Control signal…… - 2+ years of Validation experience
System Coex	Leader	2	- Leading system coex testing and communication with cross function team - 5+ years of system coex debug experience and great ability of debug tools like Python
	Engineer	7	- Dedicate HC for system coex: Testing, data collection, debugging…… - 2+ years of system coex experience
REL	Leader	1	- Leading REL FA / DOE - 5+ years of REL FA experience and good FA and summarize ability.
	Engineer	6	- Inductive REL FA&DOE - 2+ years of REL FA experience, basic tools apply

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CM Bring up | IDL: Requirement Document (Watch RF)

Planning Assumptions : Cost reduction derivative (see slides 2~4)

- Radios: cellular, GPS, Wi-Fi/BT, NFC
- ~ 1 month staggered from Program xxx: P1 FATP build ~ Oct'19

	CM HC			CM LAB [m2]			
Team	Current	Addition	Total	Current	Addition	Total	Justification
Total	0	0	0	0	0	0	

CM Bring up | IDL: Requirement Document (Watch RF - Ant)

Role	Total HC	R&R	Add'l Comments
Antenna Leads	8	Manage and coordinate the activities of main functional groups in antenna team	
Antenna DOE Engineer	15	Perform modification and DOEs on units	
Antenna FA Engineer/Tech	15	Perform FA on units, feedback corrective action to production line team	
Antenna OTA Engineer/Tech	15	Calibrate, audit and maintain the OTA stations, PAT/RAT and OTA (WiFi, GPS, LTE)	- -
Antenna Data Analysis Engineer	10	Perform data analyses for OTA stations and pre-snap stations, draw conclusions and provide recommendation for material and config down-selection	
Antenna Chamber Engineer			
Antenna CT Scan			
Antenna PM	2	Coordinate the daily RF meetings, collect action items and send meeting minutes	
Total	**65**		

CM Bring up | IDL: Requirement Document (Watch RF - RF SAC)

Role	Total HC	R&R	Add'l Comments
Station Setup/ Maintenance	Cell: 7 WiFi: 7 Arrow:7 Stockholm:2 T269:4 IQC:3 RAT:3 Lead/Logistics:2	• Need to Calibrate the station with the generated golden units. • Daily OTA station pathloss monitoring on all stations • Need to roll in the test SW and Bundle to the line and track the completion of rolling of the SW. WiPAS history and change list reporting • Need to setup test stations with correct tester FW, fixture, equipment, accessories • PAT/OTA fixture status tracking • Need to do the DOEs requested by the antenna team based on the observed data.	
Analyze Data		• Overall build OTA data breakdown reporting • Look at the distribution of the data and identify parameters which require recal and identify station which have the problem. • Need to select the golden units based on the distribution of the data. • Need to analyze the data for config or HW dependencies and feed it back to the team. • Feedback to the DRIs if there is a problem with the HW (Antenna/Assembly/Match) /SW (WiPAS/BBFW/Bundle)	
SW Validation		• Whenever new WiPAS SW/Bundle is released to the line, it needs to be first validated in the Flight Deck • Need to do small CR to make sure that across units, the new SW is validated.	

Total **35**

CM Bring up | IDL: Requirement Document (Watch RF - Coex and Regulatory)

Role	Total HC	R&R	Add'l Comments
RF Lead/PM	1	- Technical and managerial lead for Coex Team - Track Build Status - Manage DOE status , implementation , offline failure units for FA & Retest - Provide daily updates to cross functional and Apple team - Able to work independently and perform FA engineer tasks, if required. - Maintain resources and assign tasks. Monitor the progress of FA engineers & other coex engineers	- Atleast 4 years of lead experience - Min. 1-2 years of Apple project experience, experience on Watch is preferred. - Min. 5 years RF experience - Good written and spoken english communication, skills - Must be available for complete build support
CoEx WiFi/BT/GPS / Cell/UWB Victim/NFC Offline	5	- Manage and maintain the RF CoEx Offline test stations. This includes SW validation, calibration, data report for GNSS/WiFI/BT/Cell/R1 victim stations.	- Min. 2 years RF experience - Understand RF matching and can explain smith chart - Can operate RF equipment (SA/VNA) to perform measurement - Prefer experience with RF hotspot measurement using tools - RF technology experience in one or more WiFi/BT/Cellular/ GPS
Regulatory Offline	1	- Manage and maintain the RF Regulatory Offline Radiated Harmonic test stations	- One Engineer to cover day and night shifts. - Understanding of WiFi & Cellular technology and familiar with basic RF measurements
CoEx FA	4	- Manage units through the FA process. - Maintain FA procedures - Identify common FA trends	- Min. 2 years RF & FA experience - Good Soldering skill - Can operate RF equipment (SA/VNA) to perform measurement - RF technology experience in one or more WiFi/BT/Cellular/ GPS
Regulatory 3m Chamber	6	- Lab testing, lab management, data management/processing, device safety and logistics - 3x HC for day shift and 3x HC for night shift	- 2x HC with at-least 4 years of lead experience in RF radiated/RSE testing - 4x HC with Min. 1-2 years of RF experience, experience on Watch programs is preferred with soldering skill, able to operate VNA/SA/CMW - RF technology experience in one or more WiFi/BT/Cellular, Good written and spoken english communication skills - Must be available for complete build support
Total	**17**		

CM Bring up | IDL: Requirement Document (Watch RF - Desense)

Role	Total HC	R&R	Add'l Comments
RF Lead/Engineer	3	- Coordinate the activities of the local RF team - FA and station maintenance audit. - Perform build data analyses - Inspect SOP of Desense DOE configs in the line - Present status every day in CM build and FA meetings	1x Lead, 2x FA Lead,
RF FA Engineer	10	- Debug (Failure analysis) of units that fail sensitivity tests at OTA station. - Provide daily FA reports: summary of incoming failures, FA results - Provide feedback to process / assembly based on failure analysis	
DRI : Desense LAB Offline Station	4	- Manage the Offline Desense station. - Verify that the station is ready before each build cycle, and meets Apple Desense Engineer's requirements - Guarantees that a minimum number of units are tested per config per build	
Logistics	1	- Manage the Desense Materials Lab - Coordinate checking / tracking failed units into FA and desense allocation requests. - Verify that the required equipment is present before a Build starts - Move materials between FATP and Desense Materials Lab	
Total	**18**		

CM Bring up | IDL: Requirement Document (Watch RF - RF EPM)

Role	Total HC N158	R&R	Add'l Comments
RF EPM	9	Responsible for end to end RF test line readiness, dry run, UPH/equipment/station planning etc Daily build and dry run reporting, support parallel RF dry runs in Cpto & China Highlight critical paths for each build Clear understanding ion build goals Yield bridge for all NPI builds Enable GH BOMs and OPS handover with USI OPS team	
Logistics/asset tracking (FATP)	2	Audit equipment after every build, asset management, dry run unit tracking, customs/import for test equipment	
Total	**11**		

Refer to iPhone ’s format

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP TDL	TDL Leader				1. Oversee the build status from SMT Dry Run to FATP WIP. 2. Review the build activities 3. Project handover review and promotion 4. Early preparation for next generation (Sever setup/test process confirmation/new tech training and readiness)
	FATP Host TDL				1. Overall manage FATP AP testing build activities 2. As a HWTE Spokesman for all external group meeting (sync-up/wrap-up/FA) 3. Coordinate resource to meet client's demand 4. Organize team to resolve top testing issue&build risk 5 . Review FATP TT/Down time/MP concern and push team to resolve
	FATP Yield/FA TDL				1. Compose Daily Testing Yield report and present in HWTE external meeting 2. Compose Daily Retest report and present in HWTE external meeting 3. Collaborate with Ops team for RR review and push related DRI to fix 4. Compose comprehensive HWTE daily report
	FATP HW TDL				1. Apply and coordinate with EPM to get proper material for line bring up/Dry Run 2. Apply coordinate with EPM to get FF for LBU 3. Allocate resource to fulfill GR&R demand and manage the GRR progress 4. Coordinate with PD/AE team to do unit/Sub retrofit to meet the validation request 5. Coordinate with Diags team/EPM to get intended input material for pre-input validation 6. Manage and allocate HWTE existing material/FF 7. Organize team to verify new consumables (E85 brisket cable/Beef II cable)
	FATP SW TDL				1. Check with Allie cross function team to make daily Dry Run plan 2. Organize ICT HWTE to proceed daily full line Dry Run 3. Track and update all the existing testing issue 4. Compose testing issue list report and major issue list report 5. Organize process validation like PRSQ validation 6. Track SW readiness before build and maintain on-line SW version list
	FATP Meeting TDL				1. Prepare meeting material and host HWTE external meeting 2. Organize and host HWTE internal meeting 3. Follow up meeting action item and push the progress 4. Compose main build entry and MIL 5. Track Off-line station data collection status and HL the gap. Compose the report for Allie DRI's visibility of data collection progress
	FATP Nightshift TDL				1. Follow up dayshift leftover action items 2. Organize validation in the night 3. Coordinate resource to mitigate line down in the night 4. Report nightshift status for Allie 5. Arrange resource to follow CPTO client's request 6. Oversee nightshift activities

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
MLB TDL	MLB Overall				1. Fresh Man Training & Management 2. Coordinate the internal & external Action 3. Customer cummunication & Management 4. Top issue & key action status Tracking 5 .Sync & wrap up meeting & EEFA meeting (Back up the meeting question) 6. Build schedule control & risk Pre-control 7. Test line exception Handing
	Project DRI				1. Hold dry run meeting & DR meeting Material Prepare 2. Send out DR validation plan & report 3. Validation status tracking 4. Top issue FA tracking 5. Report online test status in Daily Sync up & Wrap Up Meeting 6. Report online retest status & Attend FA meeting 7. Report MIL 8. Arrange the Key action & update the status to Allie
	Test PM				1. Build readiness Item Tracking 2. Send out Daily action and tracking action status 3. Send out Build Test report & Roll in tracker 4. Send out Full line Validation Plan & Report 5. Send out Roll in Plan 6. Send out SMA input Plan & matrix 7. Test line exception Handing 8. Vendor Management

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Sub	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. Distribution review and highlight 8. Daily report 9. Test time optimization 10. DOE/actions follow up 11. BOM maintenance 12. Daily handover meeting 13. Routine daily report, such as test rule, lay out, material application
	BG-LCR-Meter/BG-QT/CG-Sensor				
	LDCM/HSG-Button/HSG-Audio				
	Sub overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. QT stations routine dry run validation 8. Distribution review and highlight 9. Daily report 10. Test time optimization 11. DOE/actions follow up 12. BOM maintenance 13. Daily handover meeting 14. Routine daily report, such as test rule, lay out, material application 15. New material validation
	CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn				
	QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
	QT overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT&Sub	QT&Sub overall, report, meeting				1. Team resource balance 2. External meeting presentation 3. Daily report 4. Cross-function team communication 5. Team overall performance review and guidance

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
SOC SW	LVCC-DC/GateKeeper-Preburn/Pre-SoC/Post-SoC/ Pre-SOC-A3L-DOE/Pre-SOC-DOE/DFU-SoC				1. Directly working with EE on SoC offline/DOE station development, triage and maintain; 2. Co-work with vendor and Apple DRI on SoC/DFU-SoC station SW development, and first level SW triage in factory.
Sub SW	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. QT/DOE station overlay development&update 2. Efficient tool development 3. First level SW triage in factory 4. Station issue analysis 5. Overlay validation report review 6. Test time optimization
QT SW	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
Non-QT	QT0-CRB/QT0-S-CRB/QT1-CRB/QT1-S-CRB/SN Setup/ REDSIG-LAT-CRBRCAM-Coex-A149-DOE/B390-Wide_Coex/ Gyro-AcceptanceCT-SCAN/Ve-QT0/STOM/GateKeeper/ GateKeeper-RescreenBoot-args stations				
Fixture EE	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. Fixture Design ERS definition 2. RIM/Sub/QT Fixture Design review 3. OQC/IQC process control 4. Setup & Calibration & Audit SOP standardization, data review 5. Station GRR, distribution review 6. Critical design/test issue rootcause, function validation 7. DOE/actions follow up
Brunin	Overall				Burnin&Diags&DCSD overall team management
	Project leader				1.Allie SPL contact window, Daily sync with Allie. 2.Internal/external meeting DRI. 3.Team management.
	Online Report/Meeting DRI				1.Daily online report summary to Allie team. 2.Online issue status tracking and summary. 3.Internal/external FA meeting. 4Daily Burnin sync up meeting.
	DOE/DryRun				1.Daily DryRun report summary to Allie team. 2.DryRun/DOE arrangement, follow up, report summary, issue Radar and tracking. 3.Action items tracking and report summary.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	Tool Development				Burnin tools development and maintain

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Diags	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	FA DRI				1.MLB online/dryrun EFI Diags issue first level triage. 2.FATP online/dryrun EFI/OS Diags issue first level triage.
DCSD	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	DryRun DRI				1.DryRun related missions(OC/GH/validation/report summary). 2.DryRun issue first level triage. 3.DOE task follow up and tracking. 4.Dummy W/O validation. 5.Support other function DOE with different SW(Bundle/Root).
Station DRI	Prox-Test/Jasmine-Prox/IMU/IMU-CMD/IMU-EMT/Compass Cal/P-Test/ALS-Xtalk Cal/ALS-Xtalk Cal DOE/ALS-Cal/ALS-Test/ALS Audit Cart/ALS-OASM Cal/ALS-OASM Test/ALS E2E/SA-Nova/Nova-B				Detail refer to box file
	iSD-DOE1/iSD-DOE2/iSD-DOE3/iSD-DOE4/iSD/DVI-DOE1/DVI-DOE2/DVI-DOE3/DVI				Detail refer to box file
	Grape-Test-Probe/Grape-SelfTest/Grape-SelfTest DOE/Blackberry/Blackberry DOE				Detail refer to box file
	SA-FACT/FACT/VENT/Snoop				Detail refer to box file
	Ironman-VNA/Battery-Discharge/Ironman-Test Loki/Ironman Test DOE/Ironman-pFO DOE/IO2/IO3/IO4/IO5/IO6/IO7/IO8/IO Port				Detail refer to box file
	Meeting DRI & Report				Detail refer to box file

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP Camera	Leader				1. Daily meeting 2. overall cover the build status and issues
	Midgard/Haze/Fmust/Blackbox/Pineapple-F/Pineapple-R				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Athena/Athena DOE				
	Baldur				
	Odin/Rack0				
	RMUST/RMUST DOE				
	Thor				
	Conveyor leader				1. Daily meeting 2. overall cover the build status and issues
	Clematis/Clematis-DOE				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Root validation 9. Daily report
	Jasmine/Jasmine-IVY/Jasmine-postrack				
Depth & Peridot	Leader				1. Daily meeting 2. overall cover the build status and issues

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
RIM/IQC	Leader				1. Daily meeting 2. overall cover the build status and issues
	RCSB-W/Baldur-T/Winnipeg				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Flare-W/Flare-SW/Flare-T				
	APS-W/APS-SW				
	SA-RCSB/SA-Baldur/SA-Winnipeg				
	SA-Flare/SA-APS/SA-CB				
MLB Station DRI	Pre-DFU/Pre-FCT/Psot-DFU-SOC/Post-DFU-ENG/ Post-FCT/FCT-DMNS				1. 85x DFU/FCT fixture set up & Maintain 2. Full line validation 3.SW roll in(Prod fuse/Dev fuse) 4. Check List 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Pre-SOC/Post-SOC/LVCC-DC/Pre-SOC-DOE/ Post-SOC-DOE/LVCC-AC				1. 167x Fixture set up & Maintain 2. New add Post SOC DOE station (8x) 3. SOC overlay validation 4. SOC Daily report 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	IBAT Reset(1/2/3)/FA_SAF(Pre) FA_SAF(Post)/Gate Keeper				1. 14x Fixture set up & Maintain 2. Overlay validation 3. Daily report 4. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Meeting DRI & Report				Daily Meeting & EE FA Meeting

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

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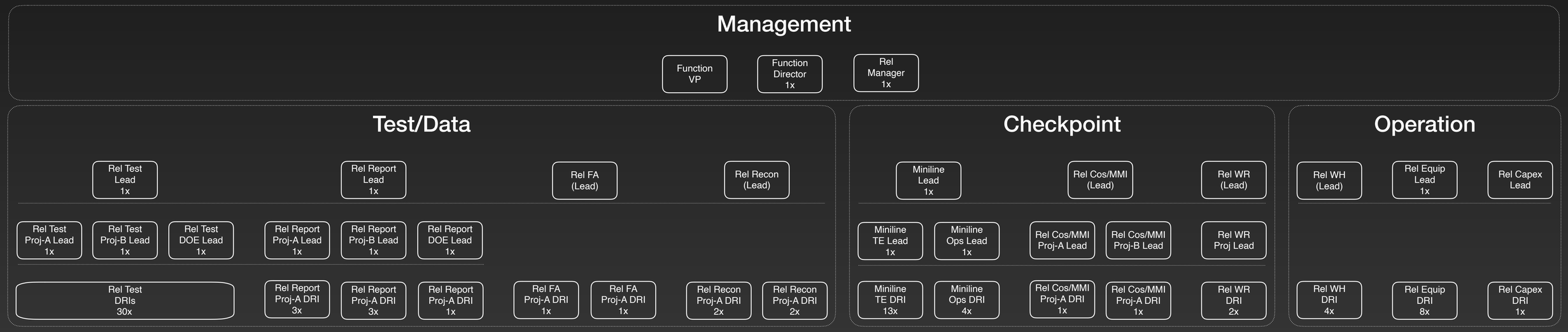
CM Bring up | IDL: Requirement Document (Watch Rel)

2x NPI projects

Day & Night shift

90x IDL
(managers, leads, engineers)

280x DL
(operators)



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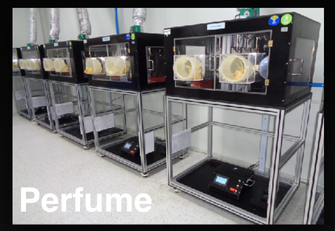
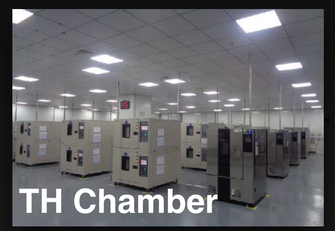
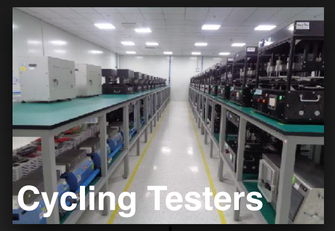
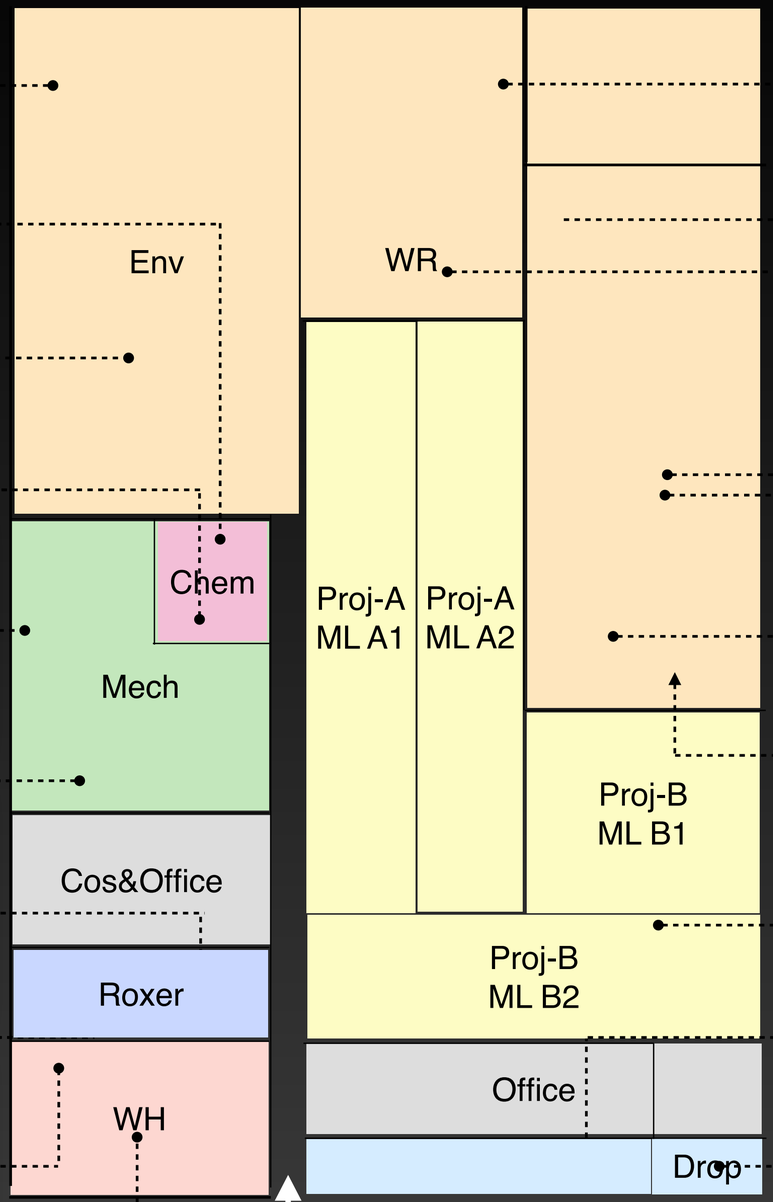
CM Bring up | IDL: Requirement Document (Watch Rel team with Lab)

Total Area 4300m²









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CM Bring up | IDL: Requirement Document (Watch Rel RnR)

Lab Readiness

↓

Receiving Units

↓

Rel Test

↓

Disposition & FA

Rel Tester Bring up

- Rel engineer work with CM Rel/Fixture team to design fixtures for new test or improve current test fixture
  - **xxx** is key contact for fixture design
  - **xxx** is in charge of procurement in Rel lab

Rel Mini line Bring up

- Rel working with HWTE and ITJS TE to purchase new test stations and upgrade old stations
- Station bring up, GR&R, Overlay readiness
  - xxx in charge of fixture purchase,
  - xxx tracking station/overlay bring up status

FATP Build

- EPM manage the build through FATP
- Main rel units expect to arrive lab ~7-9 days after input due to backend process
- Some PDFC/Minibuild units will arrive Rel lab for quick test

Allocation to Rel

- EPM allocate rel units to Rel lab .CM warehouse will transfer units to Rel lab. ~1 day for transfer.
- Rel lab will start T0 check when units arrive lab
- xxx is in charge of unit receiving, transfer and shipment.

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CM Bring up | IDL: Requirement Document (Watch Rel RnR)

Lab Readiness

Receiving Units

Rel Test

Disposition & FA

Release iRPP/Checkpoint

- Rel engineer release iRPP/Checkpoint file to CM Rel team
- CM Rel team will feedback if there is any issue
  - Reporting DRIs (xxx's team) are the key members align iRPP with Apple Rel

T0 check

- Rel lab run T0 check base on check point file
- Summarize and publish T0 result. Solve station issue observed. Send unexpected fail units to FA
  - xxx leads team for T0 check

Allocate units to rel test

- Rel will receive allocation exceptions from PD and other teams
- Rel lab will allocate units to rel test base on T0 test result and exception
  - xxx does the allocation in excel and arrange the physical units allocation to engineers

Rel test execution

- Rel lab organize engineer by different tests. 1 senior engineer lead a group of engineer/tech in charge of certain rel tests
  - xxx, xxx, …
- There are a group of operators dedicated to station test at each rel checkpoint
  - xxx is leader of the team

Daily Rel Report

- Rel lab test DRIs will send test result to data consolidation team to organize into requested format for reporters' review followed by daily publishing
  - xxx

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CM Bring up | IDL: Requirement Document (Watch Rel RnR)

Lab Readiness

Receiving Units

Rel Test

Disposition & FA

Failure verify & disposition

- Rel engineer will release disposition rules base on T0 test result and information from other team
- Rel lab engineer will collect fail units reported in previous day and verify the failures
- In-region Rel engineer will check units and publish disposition for failed units.

Unit send for FA

- xxx will collect disposition information and update in his daily FA tracking file and he will create radar for every fail unit need be sent out for FA
- xxx will arrange physical units transfer. Normally units will be transferred within the day.
- Normally, units will be sent to 4 teams base on failure mode:
  - EE: for all function failures xxx
  - PD: for all mechanical failures xxx
  - RF: for all OTA failures xxx
  - AE: for all Speaker/Mic failures xxx

Ship to Cupertino

- Shipping request of any rel test units normally will go through Rel engineer.
- Rel lab will check with in region Rel whether it's ok to ship
- Different units need different type of approval to cover the shipping cost
  - Engineering build units: no need additional approval
  - ORT units: need quality approval
  - PRQ units: need EPM approval
- xxx will arrange shipment and send out tracking #

Daily FA tracking

- xxx will check update from radar and update in the daily FA tracking file
- The FA tracking file is sent out daily to team

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Appendix | Cross LOB IDL Requirement

- VPG Engineering Core Team

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CM Bring up | IDL: Requirement Document (VPG EPM - LKKS)

Function	Major Responsibility	Subitem	HC	Apple Counter Part
EPM leader	Facing Customer EPM lead and other key leaders. Monitoring Team performance and performing as escalation point for Build Blocker or major issues.	• Define org, R&R by programs needed • Team management for programs schedules, tasks and targets • Coordinate internal and external for conflicts, concerns and different proposals to mitigate major issues. • Continuously drive process improvements.	Qty depends on program	EPM
System/Hardware EPM	Primary contact to customer team Host meeting and reporting, internal communication / coordination	• Drive build readiness, line conversion, identify issues and risks • Understand input plan and strategy, internal & external communication • Host open/close meeting, update I/O status, blockers, major issues and actions, OK2X meetings. • Drive build execution, ensure timely communication for line down, special instruction, line conversion control for material variables, bottle-neck tracker and optimization • Daily factory report, line release tracker, post-build activity tracker, MIL / close meeting, post-mortem	Qty depends on program	Sys/HW EPM
FATP Sub line Driver	Major focus online status, ensure config input correctly, drive throughput of FATP-sub.	• Online assembly fixtures / auto-machines / OPs status checking before build • Review special instruction and manage special configs • Drive daily I/O to meet subline / pre-snap line target • Communicate line down issue to team, co-work with engineers to perform DOE / debug to resume input • OP, fixture / machine release confirmation	Qty depends on program	Sys EPM
Main-Line Line Driver	Responsible for online test status, manage test waiver	• Online fixtures / testers / OPs status checking before build • Drive critical data collection per requests • Drive main-line throughput (both pre-CHM and Post-CHM), optimization post-CHM line test per shift • Manage DOE / offline tests / reflow and optimize units route to meet allocation plan • Manage units borrow / return within factory • Manage urgent allocation/shipment requests • Daily allocation tracker (test, conducted, urgent shipment, mini, REL) / shipping plan, borrow status	Qty depends on program	Sys EPM
Material EPM	Major focus online material status, ensure material kitted and transferred correctly	• Monitor DRP/build matrix/kitting online • Manage online material shortage (CTB, IQC priority, tossing, quality, binning, etc) • Manage material screening, swap, rework and push all materials to line as expected schedule	Qty depends on program	Sys EPS
DOE EPM	Responsible for Master DOE request, RF offline, Offline Lab, and special process execution	• Organize master DOE request and confirm with each function DRI for test plan / special process/ special materials • Drive DOE station readiness / Mini dry run progress / HTHH plan / modified Roxer / EE coex tracker • Monitor DOE config material stuffing and online process/ RF offline and offline Lab test progress • Update DOE report twice a week to summarize “Need customer help / DOE progress / New added request” • Mail and track online/waiver related, allocation related, special assembly related DOEs to ensure team is clear about the requirements • Daily Monitor Nimbus BM stuffing and ADB to catch any update from customer	Qty depends on program	Sys EPM
PD EPM	Interfacing PD for PD DOE coordination and PD request fulfillment	• Tracking PD meeting actions • Taking care of PD material/equipment requests to xF team • Manage PD DOEs by working with AE/ME/PT.etc • Summarize PD DOE requests and tracking progress.	Qty depends on program	PD EPM
Shipping EPM	Responsible for shipping readiness, logistic	• Drive battery / system CSTCG, 3C waiver • NPI pack-out production management • Logistic (SAP maintain, Customs registration, Schenker tracking information) • Daily S2F report	Qty depends on program	Sys EPS

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CM Bring up | IDL: Requirement Document (VPG PD - LKKS)

Function	Major Responsibility	Subitems	HC	Apple Counter Part
Project Lead/Co-lead	Monitor team performance. Co-work with customer lead and key leaders for major issues and blockers.	• Define R&R • Team resource management • Define travel plan • Major/blocker issue review • Define cross function team working model	2	PD Lead
FA Lead/ Co-lead	Overall FA issue lead with cross function and customer	• Joining FA meeting and sync with customer • FA status control • FA report review • Organization cross function FA group sync up • FA tracker maintain	2	PD Lead/EPM
REL Lead/ Co-lead	Overall REL FA issue lead with cross function and customer	• Joining REL FA meeting and sync with customer • REL FA status control • REL FA report review • Organization cross function REL FA group sync up • REL FA tracker maintain	2	PD Lead/REL
Sub Lead	Co work with counter part leader to optimize the design for assembly efficiency.	• Assign work for senior/Junior PD • Design review/Design suggestion sync up with customer • Change list review by build • POR/ALT list review • Process flow review and suggestion to customer • Accessories design and review with customer • MIL create and review • Build objective create • Fixture DFM review • FA SOP review • DOE plan create for part down selection • Design review for line efficiency • Cross function team sync up	1 1 1 1 1 2 1 1	PD sub leader/PD DRI

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CM Bring up | IDL: Requirement Document (VPG System EE - LKKS)

Function	Major Responsibility	Subitems	HC	Apple Counter Part
System EE leader	Overall Lead System EE team, arrange resource for Hot/ Top issue. Monitoring team performance, balance function resource base on workload.	• Deline System EE Org with Apple EE, bring up function leader/PM • Improve System EE team work efficiency, optimize LK internal process • Drive team solve build top issue, Co-work with LK cross teams on corrective action • Team management for build FA/DOE/Task, as escalation point for system EE team	Qty depends on program	System EE
FATP EE	Responsible for FATP unit function failure FA/DOE, QT/ encoder/Burin yield improvement	• Verify HW system with commands for system Bringup, also manually test unit function before QT ready • FA sub/main line SWDL/QT/Burn In/IPD&Connector related stations' malfunctions, • Drive online QT/IPD/Connector/Burnin yield improvement, push cross teams provide & implement CA • Set up and operate specialized or test equipment to support DOE requests, provide the correct data to Apple • FA REL malfunctions, understand corresponded REL tests to reflect issues • Update daily FA status report & Weekly QT/IPD/Connector/Burnin yield to Apple	Qty depends on program	System EE
SMT EE	Responsible for MLB level function failure FA/DOE, ICT/ DFU/FCT yield improvement	• LCR Check if MLB components is correct before MLB input. • Bench verify the MLB function with all modules during SMT BU stage. • Identify and analyze the root cause of SMT failures • FA the SMT REL related issue, understand the failure and REL test relationship. • Setup DOE according to Apple's requirement and provide the correct data to Apple review. • Update daily FA status report & Weekly ICT/DFU/FCT/SOC yield to Apple	Qty depends on program	System EE
Accessory EE	Responsible for Akita/Strap/Puck function failure FA/ DOE, Connector/Connector DCR test & improvement	• Identify and analyze FATP/Rel related accessory function failures. • Collection accessory related DOE/task data, check commonality, provide the correct data to Apple • Review, verify or modify test limit in accessory related station base on test data • Set up and operate specialized or standard test equipment to verify or analyze the performance of accessory • Manually bench test Connector & Connector DCR, analyze test data, provide report to Apple	Qty depends on program	System EE
HW Validation	Responsible for HW singal/power measurement, DOE for HW design improvement	• Validate the SI,PI&power/control sequence on each subsystem, • Review measurement result, check signal/power quality, report abnormal waveform to Apple • Develop power automation measurement tool base on other project • Complete relative DOEs according to Apple's request to improve the HW design issue. • Be familiar with different communication protocols and measure equipment(Oscilloscope/Spectrum Analyzer)	Qty depends on program	System EE
System Coex	Responsible for Coex test data collection and Coex DOE	• In the early stage of build, Coex dry run and Coex station overlay update are required • Coex test issue debug, modify Coex test script & Change test setup to solve test issue • Feedback the problems existing in the Coex dry run and solve them together with the Apple. • Coex test data collection, review test results, upload The results to radar and update Coex test daily report. • Setup test environment according to Apple's requirement, assist Apple to do some DOE verification	Qty depends on program	System EE

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CM Bring up | IDL: Requirement Document (VPG RF - LKKS)

Level #	Levels	Job Title	Experience Requirements	Capabilities Requirements
L1	Director/Senior Manager	Overall RF lead - 1 person	Director level / department lead with a team of > 20 engineers	- Very good english and communication skills - Proven RF expertises and experience - Strong management & problem solving skills - Ability to ramp and train teams / new engineers - Experience with Apple products and Apple NPI process - Capability to travel to US
L2	High	Manager/Senior Lead Engineer	Senior manager capable of managing a team of ~20 engineers and/or Experienced RF Engineer, tech lead with > 5 years experience	
L3	Medium	Experienced Engineers	RF Engineer > 2yrs of working experience	- Good english and communication skills - Proven RF expertises and experience - Strong problem solving skills - Experience with Apple products and Apple NPI process - preferred - Capability to travel to US
L4	Low	Junior Engineers	Technician/New grads/ engineers with < 2 years, no prior Apple experience	- Strong RF/ engineering understanding - Strong ability to learn and ramp - Strong problem solving skills - English capabilities preferred (future progress)

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CM Bring up | IDL: Requirement Document (VPG RF - LKKS)

Team	CM IDL HC (Peak Requirement)	P2 - Approved CM IDL	P1 - Approved CM IDL
RF/Wireless Manager	1	1	1
Antenna	22	20	15
Desense	19	18	14
RF HW / WCS	25	23	18
RFSAC FATP	22	20	16
RFSAC SMT	16	15	12
WSCE FATP	15	14	11
WSCE SMT	8	7	6
RF EPM	11	10	8
EMC	9	9	7
HE-OTA	2	2	2
Total	**150**	**139**	**110**

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CM Bring up | IDL: Requirement Document (VPG Rel)

Summary

- PP1 HC requirement total 40x.
  - 1x Rel Manager
  - 8x Leaders Total
  - 25x Medium Level Engineers

Function	PP1 Build				Sum
	Manager	H	M	L	
Management	1				1
Rel Test, Cosmetic, Report, Recon		5	13	3	21
Mini line(Operation)		1	6	3	10
FA(Tracking only)		1	2		3
Eq/Logistic		1	4		5
Sum	1	8	25	6	**40**

H	Leader, Capable of managing a team of ~5-10 engineers
M	Senior Engineer with Mater degree or 2yrs+ of working experience
L	Engineer with Bachelor Degree

Detail Break Down

Function/Project	Role	Working Experience				Sum
		Manager	H	M	L	
Management	Rel Manager	1				1
Sys Rel	REL Test Lead and Engineers		1	5	2	21
	Mini Line Lead and Engineers		1	3	2	
	FA Lead and Engineers		1	1		
	Cosmetic Lead and Engineers		1	2		
	Rel PMs and Report Engineers		1	1		
OM Rel	REL Test Engineers			2		8
	Mini Line Engineers			2	0.5	
	FA Engineers			0.5		
	Cosmetic Engineers			1		
	Rel PMs and Report Engineers		1	1		
MLB Rel	REL Test Lead and Engineers			1	1	5
	Mini Line Lead and Engineers			1	0.5	
	FA Lead and Engineers			0.5		
	Rel PMs and Report Engineers		1			
General	Equipment Setup, Calibration and Maintenance		1	3		5
	Logistics/Warehouse			1		
Sum		1	8	25	6	**40**

Role	Responsibilities
Rel Manager	High-level leader and influencer engaged at both administrative and working levels. Enables build out of labs and teams to support Coco requirements, across multiple sites.
Lab Manager	Work with cross-functional team including Eng to Sr. Director-level staff. Collaboratively plan lab resources, supplier management, facilities, equipment, etc., to enable delivery of high quality work product.
Rel PM	Manage daily operations to ensure high level of rel testing. Works with Pega internal teams to ensure the lab runs smoothly. Engage with CapEx, vendors and coco team to ensure lab readiness.
Rel Test Engineer	Manage DUTs through all stages of data collection - including cosmetic inspection, T0 data collection, failure verification. Assigned DRIs for select groupings of DUTs through all stages of data collection. Manages operators to enable effective and efficient workflow.
Rel Report Engineer	Work with Coco rel DRI to define the rel report format. Collect and summarize rel test result in rel report. Publish daily rel report to Coco team. Manage rel tagging and recon correction to ensure data integrity.
Minline Engineer	Coordinates across Rel and TE teams to ensure rel miniline is working properly. Responsible for station operation to ensure smooth station tests before, during, and after Rel testing.
FA Engineer	Work cross Pega Rel and FA team to coordinate FA process and track FA status. Publish daily FA status to Coco team. Arrange FA meeting.
Equipment Engineer	Coordinates with Apple REL, Test Station and EQ teams to ensure proper rel test fixtures setup and maintain in rel lab. Support EQ purchase.
Lab Admin	Manage all units/samples/materials in Rel lab and unit transfer, shipment. Ensure all materials in lab flow smoothly according to rel test/FA requirement.

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NPI Readiness | Rel Lab - Work Flow

Lab Readiness

↓

Receiving Units

↓

Rel Test

↓

Disposition & FA

Rel Tester Bring up

- Rel engineer work with CM Rel/Fixture team to design fixtures for new test or improve current test fixture
  - **xxx** is key contact for fixture design
  - **xxx** is in charge of procurement in Rel lab

Rel Miniline Bring up

- Rel working with HWTE and ITJS TE to purchase new test stations and upgrade old stations
- Station bring up, GR&R, Overlay readiness
  - xxx in charge of fixture purchase,
  - xxx tracking station/overlay bring up status

FATP Build

- EPM manage the build through FATP
- Main rel units expect to arrive lab ~7-9 days after input due to backend process
- Some PDFC/Minibuild units will arrive Rel lab for quick test

Allocation to Rel

- EPM allocate rel units to Rel lab .CM warehouse will transfer units to Rel lab. ~1 day for transfer.
- Rel lab will start T0 check when units arrive lab
- xxx is in charge of unit receiving, transfer and shipment.

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NPI Readiness | Rel Lab - Work Flow

Lab Readiness

Receiving Units

Rel Test

Disposition & FA

Release iRPP/Checkpoint

- Rel engineer release iRPP/Checkpoint file to CM Rel team
- CM Rel team will feedback if there is any issue
  - Reporting DRIs (xxx's team) are the key members align iRPP with Apple Rel

T0 check

- Rel lab run T0 check base on check point file
- Summarize and publish T0 result. Solve station issue observed. Send unexpected fail units to FA
  - xxx leads team for T0 check

Allocate units to rel test

- Rel will receive allocation exceptions from PD and other teams
- Rel lab will allocate units to rel test base on T0 test result and exception
  - xxx does the allocation in excel and arrange the physical units allocation to engineers

Rel test execution

- Rel lab organize engineer by different tests. 1 senior engineer lead a group of engineer/tech in charge of certain rel tests
  - xxx, xxx, …
- There are a group of operators dedicated to station test at each rel checkpoint
  - xxx is leader of the team

Daily Rel Report

- Rel lab test DRIs will send test result to data consolidation team to organize into requested format for reporters' review followed by daily publishing
  - xxx

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NPI Readiness | Rel Lab - Work Flow

Lab Readiness

Receiving Units

Rel Test

Disposition & FA

Failure verify & disposition

- Rel engineer will release disposition rules base on T0 test result and information from other team
- Rel lab engineer will collect fail units reported in previous day and verify the failures
- In-region Rel engineer will check units and publish disposition for failed units.
  - xxx

Unit send for FA

- xxx will collect disposition information and update in his daily FA tracking file and he will create radar for every fail unit need be sent out for FA
- xxx will arrange physical units transfer. Normally units will be transferred within the day.
- Normally, units will be sent to 4 teams base on failure mode:
  - EE: for all function failures xxx
  - PD: for all mechanical failures xxx
  - RF: for all OTA failures xxx
  - AE: for all Speaker/Mic failures xxx

Ship to Cupertino

- Shipping request of any rel test units normally will go through Rel engineer.
- Rel lab will check with in region Rel whether it's ok to ship
- Different units need different type of approval to cover the shipping cost
  - Engineering build units: no need additional approval
  - ORT units: need quality approval
  - PRQ units: need EPM approval
- xxx will arrange shipment and send out tracking #

Daily FA tracking

- xxx will check update from radar and update in the daily FA tracking file
- The FA tracking file is sent out daily to team

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Refer to iPhone ’s format

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP TDL	TDL Leader				1. Oversee the build status from SMT Dry Run to FATP WIP. 2. Review the build activities 3. Project handover review and promotion 4. Early preparation for next generation (Sever setup/test process confirmation/new tech training and readiness)
	FATP Host TDL				1. Overall manage FATP AP testing build activities 2. As a HWTE Spokesman for all external group meeting (sync-up/wrap-up/FA) 3. Coordinate resource to meet client's demand 4. Organize team to resolve top testing issue&build risk 5 . Review FATP TT/Down time/MP concern and push team to resolve
	FATP Yield/FA TDL				1. Compose Daily Testing Yield report and present in HWTE external meeting 2. Compose Daily Retest report and present in HWTE external meeting 3. Collaborate with Ops team for RR review and push related DRI to fix 4. Compose comprehensive HWTE daily report
	FATP HW TDL				1. Apply and coordinate with EPM to get proper material for line bring up/Dry Run 2. Apply coordinate with EPM to get FF for LBU 3. Allocate resource to fulfill GR&R demand and manage the GRR progress 4. Coordinate with PD/AE team to do unit/Sub retrofit to meet the validation request 5. Coordinate with Diags team/EPM to get intended input material for pre-input validation 6. Manage and allocate HWTE existing material/FF 7. Organize team to verify new consumables (E85 brisket cable/Beef II cable)
	FATP SW TDL				1. Check with Allie cross function team to make daily Dry Run plan 2. Organize ICT HWTE to proceed daily full line Dry Run 3. Track and update all the existing testing issue 4. Compose testing issue list report and major issue list report 5. Organize process validation like PRSQ validation 6. Track SW readiness before build and maintain on-line SW version list
	FATP Meeting TDL				1. Prepare meeting material and host HWTE external meeting 2. Organize and host HWTE internal meeting 3. Follow up meeting action item and push the progress 4. Compose main build entry and MIL 5. Track Off-line station data collection status and HL the gap. Compose the report for Allie DRI's visibility of data collection progress
	FATP Nightshift TDL				1. Follow up dayshift leftover action items 2. Organize validation in the night 3. Coordinate resource to mitigate line down in the night 4. Report nightshift status for Allie 5. Arrange resource to follow CPTO client's request 6. Oversee nightshift activities

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
MLB TDL	MLB Overall				1. Fresh Man Training & Management 2. Coordinate the internal & external Action 3. Customer cummunication & Management 4. Top issue & key action status Tracking 5 .Sync & wrap up meeting & EEFA meeting (Back up the meeting question) 6. Build schedule control & risk Pre-control 7. Test line exception Handing
	Project DRI				1. Hold dry run meeting & DR meeting Material Prepare 2. Send out DR validation plan & report 3. Validation status tracking 4. Top issue FA tracking 5. Report online test status in Daily Sync up & Wrap Up Meeting 6. Report online retest status & Attend FA meeting 7. Report MIL 8. Arrange the Key action & update the status to Allie
	Test PM				1. Build readiness Item Tracking 2. Send out Daily action and tracking action status 3. Send out Build Test report & Roll in tracker 4. Send out Full line Validation Plan & Report 5. Send out Roll in Plan 6. Send out SMA input Plan & matrix 7. Test line exception Handing 8. Vendor Management

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Sub	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. Distribution review and highlight 8. Daily report 9. Test time optimization 10. DOE/actions follow up 11. BOM maintenance 12. Daily handover meeting 13. Routine daily report, such as test rule, lay out, material application
	BG-LCR-Meter/BG-QT/CG-Sensor				
	LDCM/HSG-Button/HSG-Audio				
	Sub overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2				1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. QT stations routine dry run validation 8. Distribution review and highlight 9. Daily report 10. Test time optimization 11. DOE/actions follow up 12. BOM maintenance 13. Daily handover meeting 14. Routine daily report, such as test rule, lay out, material application 15. New material validation
	CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn				
	QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
	QT overall				1. Team resource balance 2. Internal meeting 3. Action prioritize
QT&Sub	QT&Sub overall, report, meeting				1. Team resource balance 2. External meeting presentation 3. Daily report 4. Cross-function team communication 5. Team overall performance review and guidance

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
SOC SW	LVCC-DC/GateKeeper-Preburn/Pre-SoC/Post-SoC/ Pre-SOC-A3L-DOE/Pre-SOC-DOE/DFU-SoC				1. Directly working with EE on SoC offline/DOE station development, triage and maintain; 2. Co-work with vendor and Apple DRI on SoC/DFU-SoC station SW development, and first level SW triage in factory.
Sub SW	SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. QT/DOE station overlay development&update 2. Efficient tool development 3. First level SW triage in factory 4. Station issue analysis 5. Overlay validation report review 6. Test time optimization
QT SW	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen				
Non-QT	QT0-CRB/QT0-S-CRB/QT1-CRB/QT1-S-CRB/SN Setup/ REDSIG-LAT-CRBRCAM-Coex-A149-DOE/B390-Wide_Coex/ Gyro-AcceptanceCT-SCAN/Ve-QT0/STOM/GateKeeper/ GateKeeper-RescreenBoot-args stations				
Fixture EE	BG Unit-Shutdown/BG-Install/CG Install/HFLPP/QT0/QT0-ENG IBAT-Reset-Post-Snap/Jarvis-Test/QT2 CT2/QT1/QT1-ENG/Impedance-PreBurn/Impedance-PostBurn QT0b/Impedance-PreBurn(NED)/NED-QT-Screen SA-DCR/Button-Ringer-Flex/RCVR/Strobe-Elsoft Cyclone-HB-Meter/Cyclone-HB/SPK-HB BG-LCR-Meter/BG-QT/CG-Sensor LDCM/HSG-Button/HSG-Audio				1. Fixture Design ERS definition 2. RIM/Sub/QT Fixture Design review 3. OQC/IQC process control 4. Setup & Calibration & Audit SOP standardization, data review 5. Station GRR, distribution review 6. Critical design/test issue rootcause, function validation 7. DOE/actions follow up
Brunin	Overall				Burnin&Diags&DCSD overall team management
	Project leader				1.Allie SPL contact window, Daily sync with Allie. 2.Internal/external meeting DRI. 3.Team management.
	Online Report/Meeting DRI				1.Daily online report summary to Allie team. 2.Online issue status tracking and summary. 3.Internal/external FA meeting. 4Daily Burnin sync up meeting.
	DOE/DryRun				1.Daily DryRun report summary to Allie team. 2.DryRun/DOE arrangement, follow up, report summary, issue Radar and tracking. 3.Action items tracking and report summary.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	Tool Development				Burnin tools development and maintain

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
Diags	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	FA DRI				1.MLB online/dryrun EFI Diags issue first level triage. 2.FATP online/dryrun EFI/OS Diags issue first level triage.
DCSD	Project leader				1.Allie Diags contact window. 2.Internal/external meeting DRI.
	Online DRI				1.Online station bring up and maintain. 2.Online issue first level triage. 3.Online test status report summary.
	DryRun DRI				1.DryRun related missions(OC/GH/validation/report summary). 2.DryRun issue first level triage. 3.DOE task follow up and tracking. 4.Dummy W/O validation. 5.Support other function DOE with different SW(Bundle/Root).
Station DRI	Prox-Test/Jasmine-Prox/IMU/IMU-CMD/IMU-EMT/Compass Cal/P-Test/ALS-Xtalk Cal/ALS-Xtalk Cal DOE/ALS-Cal/ALS-Test/ALS Audit Cart/ALS-OASM Cal/ALS-OASM Test/ALS E2E/SA-Nova/Nova-B				Detail refer to box file
	iSD-DOE1/iSD-DOE2/iSD-DOE3/iSD-DOE4/iSD/DVI-DOE1/DVI-DOE2/DVI-DOE3/DVI				Detail refer to box file
	Grape-Test-Probe/Grape-SelfTest/Grape-SelfTest DOE/Blackberry/Blackberry DOE				Detail refer to box file
	SA-FACT/FACT/VENT/Snoop				Detail refer to box file
	Ironman-VNA/Battery-Discharge/Ironman-Test Loki/Ironman Test DOE/Ironman-pFO DOE/IO2/IO3/IO4/IO5/IO6/IO7/IO8/IO Port				Detail refer to box file
	Meeting DRI & Report				Detail refer to box file

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
FATP Camera	Leader				1. Daily meeting 2. overall cover the build status and issues
	Midgard/Haze/Fmust/Blackbox/Pineapple-F/Pineapple-R				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Athena/Athena DOE				
	Baldur				
	Odin/Rack0				
	RMUST/RMUST DOE				
	Thor				
	Conveyor leader				1. Daily meeting 2. overall cover the build status and issues
	Clematis/Clematis-DOE				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Root validation 9. Daily report
	Jasmine/Jasmine-IVY/Jasmine-postrack				
Depth & Peridot	Leader				1. Daily meeting 2. overall cover the build status and issues

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CM Bring up | IDL: Requirement Document (iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
RIM/IQC	Leader				1. Daily meeting 2. overall cover the build status and issues
	RCSB-W/Baldur-T/Winnipeg				1. GH BOM maintain 2. Line bringup 3. GRR 4. Dry run 5. Overlay validation 6. DOEs 7. Station maintain, online issue debug 8. Daily report
	Flare-W/Flare-SW/Flare-T				
	APS-W/APS-SW				
	SA-RCSB/SA-Baldur/SA-Winnipeg				
	SA-Flare/SA-APS/SA-CB				
MLB Station DRI	Pre-DFU/Pre-FCT/Psot-DFU-SOC/Post-DFU-ENG/ Post-FCT/FCT-DMNS				1. 85x DFU/FCT fixture set up & Maintain 2. Full line validation 3.SW roll in(Prod fuse/Dev fuse) 4. Check List 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Pre-SOC/Post-SOC/LVCC-DC/Pre-SOC-DOE/ Post-SOC-DOE/LVCC-AC				1. 167x Fixture set up & Maintain 2. New add Post SOC DOE station (8x) 3. SOC overlay validation 4. SOC Daily report 5. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	IBAT Reset(1/2/3)/FA_SAF(Pre) FA_SAF(Post)/Gate Keeper				1. 14x Fixture set up & Maintain 2. Overlay validation 3. Daily report 4. Online Test Exception Handing 6.Retest issue FA&report and fixture DOE
	Meeting DRI & Report				Daily Meeting & EE FA Meeting

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Appendix | Cross LOB IDL Requirement

- Home Engineering Core Team

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CM Bring Up | iDL: Requirement Document - Home EPM

- CM Technical Capability
  - Senior level - experience leading 3+ NPI programs or over 5 years apple programs experience
  - Junior level - experience supporting 1+ NPI programs
  - Need EPMs with experience in following field:
    - FATP / SMT program management (Senior)
    - Build matrix management (Senior)
    - System / MLB allocation matrix management, shipping and logistic (Junior)

Detail Technical requirement for CM IDL

- CM Engineering Resources
  - EPM Lead * 1
    - Overall EPM Lead
  - System EPM * 1
    - Daily Activities / Status Update / Driving CM FATP Main DRI
  - SMT EPM * 1
    - Daily Activities / Status Update / Driving CM SMT Main DRI
  - Supporting PM * 2
    - IO / Production Line Control
    - Overall x-Functional DOEs Control
    - CT Scan Arrangement / SAR Lab / FACA Coordination
    - Extra Activities (FA Fixture / NED / Dongle / Eng Packout, ...etc)
  - Material CTB PM * 1
    - Material MIH Tracking (SMT&FATP)
  - EPS * 1
    - Allocation Fulfill / Ship2File Update
    - Follow-up with Logistic & Schenker to Arrange Secure Shipment

Detail CM IDL HC requirement

- Factory / Equipment / Facility
  - IDL Location close to Apple room and Manufacture line
  - Office internal network, control by IT certified by Apple NPS IT
  - Laptop to access nimbus, agile, radar, CM internal system for materials tracking
  - Standard office facility

Detail CM IDL Location requirement

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CM Bring Up | iDL: Requirement Document - Home PD

- CM Technical Capability
  - Senior Manager- department lead with a team of > 10 years experience
  - Senior level - Experienced structure Engineer, tech lead with > 5 years experience
  - Experienced Engineers - structure Engineer > 3years of working experience
  - Junior level - new grads/ engineers with < 2 years, or no prior Apple experience
  - Need PD team with experience in following field:
    - Strong management & problem solving skills(Senior)
    - Proven PD expertises and experience (Senior)
    - Experience with Apple products and Apple NPI process(Senior)
    - Strong PD engineering understanding(Experienced)

Detail Technical requirement for CM IDL

- CM Engineering Resources
  - PD Lead * 1
    - Overall PD Lead
  - Sub Lead * 2
    - Over 5 years NT system FATP FACA experiences
    - Summary team working content, review FA report, create DOE plan
    - Assign work to team member
    - Daily FACA meeting (inner and outer)
  - Experienced Engineer * 5
    - Institution-related majors, Can use UG drawing drawings, can use Mintab or JMP do data analysis
    - Structural design evaluation and optimization experience
    - FATP structure issue and REL issue FACA, making FACA report
    - Familiar with the responsibilities of each function team, communication with cross function team and IR PD is barrier-free
    - Can making design proposal & change list & BOM & assembly story & TA

Detail CM IDL HC requirement

- Factory / Equipment / Facility
  - Lab space:
    - FATP(100m2) PD labs with working benches and drawing room
    - Easy access to the line to support FA, validation and DOE
  - Equipments:
    - OMM/Instron/Keyence/3D printing/CCD/Laser cutting and FA tools
  - Facilities:
    - Internal Office Network, control by IT certified

Detail CM IDL Location requirement

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CM Bring Up | iDL: Requirement Document - Home EE

- CM Technical Capability
  - Senior Leader - Manager/Leader role in NPI programs, > 8 years of industry experience
  - Senior Engineer - experience leading 2+ NPI programs, > 5 years of industry experience
  - Junior Engineer - experience supporting 1+ NPI programs, > 2 years of industry experience
  - Need EE team with experience in following fields:
    - Leadership across CM teams and coordinate CM resource well(Senior)
    - Strong electrical circuit FA and debug capabilities (Senior)
    - Proactively and closely work with Apple teams on various issues(Senior)
    - Execute Apple FA/debug/DOE instructions, summarize result and report (Junior)
    - Daily report with clear issue description/logic/data and accurate status update(Junior)

Detail Technical requirement for CM IDL

- CM Engineering Resources
  - Leadship * 2
    - EE Manager/Overall lead
    - EE Tech Leader/Validation guidance
  - Validation & DOE * 6
    - Validation - Power Sequence
    - Validation - Pin check & BOM
    - Validation - Crystal & DOE
    - Validation - Signal Integrity
    - Validation - Power Integrity
    - Validation - PCIe & Misc(GPIO, Functional)
  - EEFA * 7
    - SMT/Rel ICT FA DRI
    - SMT/Rel DFU FA DRI
    - SMT/Rel FCT FA DRI
    - SMT/Rel SOC FA DRI
    - FATP IO-Port/SIL-CAL & Rel/CQA FA DRI
    - FATP SWDL/BURNIN FA DRI
    - FATP LOG/Hi-Pot FA DRI

Detail CM IDL HC requirement

- Factory / Equipment / Facility
  - Lab space:
    - SMT(100m2) and FATP(80m2) EE labs with working benches and rework stations
    - Easy access to the line to support FA, validation and DOE
  - Equipments:
    - Enough Oscilloscope/Power Supply/DMM/LCR/IR/LA/Microscope and Rework setups for electrical FAs
  - Facilities:
    - AppleWiFiSecure coverage for FA, Apple Wired Network connections for remote debug station
    - Internal Office Network, control by IT certified

Detail CM IDL Location requirement

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CM Bring Up | iDL: Requirement Document - Home RF

- CM Technical Capability

  - Director/Senior Manager- Director level / department lead with a team of > 20 engineers
  - Manager/Senior Lead Engineer - capable of managing a team of ~20 engineers and/or Experienced RF Engineer, tech lead with > 5 years experience
  - Experienced Engineers - RF Engineer > 2 years of working experience
  - Junior Engineers- new grads/ engineers with < 2 years, or no relevant Apple project experience
  - Need RF team with experience in following field:
    - Strong management & problem solving skills(Senior)
    - Proven RF expertises and experience (Senior)
    - Experience with Apple products and Apple NPI process(Senior)
    - Strong RF/ engineering understanding(Junior)

Detail Technical requirement for CM IDL

- CM Engineering Resources

  - RF lead * 1
    - Overall RF Lead/RF Manager
  - RF EPM/TDL/EPS * 5
    - Daily Activities / Status Update / Driving SMT/FATP station DRI
    - BOM update/EQ purchase/ETA drive/Assets audit/EQ calibration
    - Overall readiness(IDL, facility, IT system(AppleConnect/Radar/Agile/Nimbus)) drive
  - RF SAC * 9
    - SMT * 4, station setup/maintain/overlay validation/report update/issue highlight/DOE validation
    - FATP * 5, station setup/maintain/overlay validation/report update/issue highlight/DOE validation
  - Product RF * 7
    - Antenna OTA Testing * 2
    - WSCE OTA/ Antenna Chamber * 2
    - Antenna FA/DOE * 3
  - Desense * 5
    - station setup/maintain/overlay validation/report update/issue highlight/DOE validation/FA
  - RF HW * 5
    - Connectivity RF*5, RF Matching & Validation/DOE validation/FA/report update/issue highlight
  - WSCE FATP * 3
    - Coex * 3,station setup/maintain/overlay validation/report update/issue highlight/DOE validation/FA
  - WSCE SMT * 4
    - Coex * 3,station setup/maintain/overlay validation/report update/issue highlight/DOE validation/FA
    - RFS * 1, manage and maintain the RF Regulatory Offline Radiated Harmonic and 3GPP test stations
  - EMC * 3
    - Lab setup/ESD&CE offline test/FA/DOEvalidation/report update/issue highlight

Detail CM IDL HC requirement

- Factory / Equipment / Facility

  - Lab space:
    - SMT(200m2) and FATP(610m2) RF labs with working benches and rework stations,sheilding room, chamber
    - Easy access to the line to support FA, validation and DOE
  - Equipments:
    - Enough RSC/IQ/ZNBX/SA/VNA/CMW and Rework setups for FAs
  - Facilities:
    - AppleWiFiSecure coverage for FA, Apple Wired Network connections for remote debug station
    - Internal Office Network, control by IT certified

Detail CM IDL Location requirement

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CM Bring Up | iDL: Requirement Document - Home HWTE

- CM Technical Capability

  - Senior Manager- department lead with a team of > 20 engineers
  - Senior level - Experienced HW test Engineer, tech lead with > 8 years experience
  - Experienced Engineers - HW test Engineer > 3years of working experience
  - Junior level - new grads/ engineers with > 1 yearsof working experience
  - Need HWTE team with experience in following field:
    - Experienced on testing/ Fully understand test ecosystem/ Familiar with production Assembly process
    - Understand test technology and instrumentation/ System diagnostics/
    - Factory Infrastructure & Process control/ Logistics collaboration/ Driving test optimization
    - Familiar with new product development process/ Data analysis: CPK, GRR, correlation..etc

Detail Technical requirement for CM IDL

- CM Engineering Resources

  - Lead ship * 7
    - Overall Manager * 1
      - Ability to work with cross function team and driver team to achieve gold under tight schedules.
    - SDRI Manager / TDL Lead /TDLs /LPM /GH * 6
      - Tracking test solution end to end for the project
      - Driving test line readiness/ Highlight critical paths/ Material/Fixture/EQ Validation plan for each build / Engineering milestone or objective definition
  - Station DRIs * 10
    - SMT DRIs * 4
    - FATP DRIs * 6
      - Test definitions, custom instrument design and off the shelve instrument selection
      - Station mechanical CAD, Electrical schematics, PCB Gerber files with revision control.
      - Station setup/ Station SW/FW rev control/ Validation and overlay creation/ Station calibration, audit and maintenance/ GR&R and station to station variation analysis and report BOM and Demand tracking & analysis
      - Train and manage hand-off to Ops TEs
  - Development * 9
    - Station SW /Diags * 7
      - Station software setup/maintain/overlay create/report update/issue highlight/DOE validation
    - Station EE/Fixture ME * 2
      - Station issue debugging / fixture design/test tools dev/ report update/issue highlight/DOE validation

Detail CM IDL HC requirement

- Factory / Equipment / Facility

  - Lab space:
    - SMT(50m2) and FATP(130m2) HWTE labs with working benches
  - Equipments:
    - Power Supply/DMM/Microscope for station debug and FAs
  - Facilities:
    - AppleWiFiSecure coverage for FA, Apple Wired Network connections for remote debug station
    - Internal Office Network, control by IT certified

Detail CM IDL Location requirement

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CM Bring Up | iDL: Requirement Document - Home REL

- CM Technical Capability
  - Senior level - solid experience leading 3+ NPI projects, 5+ years with electronics industry experience
  - Junior level - solid experience leading 1+ NPI project
  - Technical ability:
    - solid experience from product reliability , lab management,REL readiness (Senior)
    - ability of great test schedule , test arrangement，reporting and test summary
    - experience of Environment and Mechanical test skill, like HS, four-corner,LTOS,Chemical, Vibration, Drop etc.
    - experience of REL equipment management skill, like validation, calibration, maintain etc.

Detail Technical requirement for CM IDL

- CM Engineering Resources
  - Lab manager * 1
    - Overall Lab management
  - REL Lab Leader * 1
    - Overall manpower management and lab management
  - Project EPM * 1
    - Direct contact window, readiness update/test status tracking/cross function communication
  - Reporter DRI * 1
    - Test schedule/arrangement and report update/defects confirmation…etc
  - System(Data) Engineer * 1
    - Insight and recon data audit/test data summary/FA units Tracker
  - ENV Test DRI * 1
    - Environment setup / samples distribution / test arrangement / SOP making / OP training and qualify..etc
  - ME Test DRI * 3 (1x for life,1x for V&D,1x for Night)
    - Mechanical life / V&D test setup / test arrangement / SOP making / OP training and qualify..etc
  - Cosmetic DRI * 1
    - Cosmetic inspection station setup/inspection arrangement / SOP making and OP training..etc
  - Miniline DRI * 2 (1x for Day shift,1x for Night shift)
    - Mini line station setup / validation/audit / test arrangement / SOP making / OP training and qualify etc.
  - Equipment DRI * 1
    - Equipment setup / validation / calibration / audit / maintenance and issue fixed
  - Warehouse&Sample Manage * 1
    - Purchase / Warehouse and sample management

Detail CM IDL HC requirement

- Factory / Equipment / Facility
  - Lab space:
    - > 1000m2 for multiple rooms to place equipments from Dust/Vibration/Drop/mech/env/Dust testing, Miniline stations, warehouse, Quite Room and office for engineers, 2x meeting rooms for regular REL syncing
    - detailed equipment list will be shared separately
  - Equipments:
    - required REL testing and enough Mac Mini and laptop to support datas collection and reporting
    - need enough MAC to setup Recon CPK/Cosmetic station and Recon/insight audit station
  - Facilities:
    - AppleWiFiSecure coverage for required meeting rooms/Lab(only access to apple REL guys)
    - dedicated Ethernet cable line connecting to PDCA/GH for REL Lab/Miniline

Detail CM IDL Location requirement

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R&D Playbook | Appendix - IDL requirement

- Audio Engineering Core Team

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CM Bring Up | iDL: Requirement Document - Audio EPM

Department	Role	Role Description	HC
EPM	EPM Director Overall	•Overall Build Schedule & Goal •Team Resource Coordination &Cost Review with U01 team	
EPM	EPM Lead	•Major Contact Window to Lead x-function Team to Fulfill NPI Tasks	
EPM	T03 Overall (FATP/SMT)	T03 overall management and risk monitor, T03 customer contact window and weekly/daily report	
EPM	T04 Overall (FATP/SMT)	T04 overall management and risk monitor, T04 customer contact window and weekly/daily report	
EPM	T03 Meeting Coordinator	1.T03 meeting related issue coordinate, such as organize sync-up, wrap-up daily meeting, send notice, collect material consolidation, share screen, drive meeting DRI to take part in meeting. 2.Backup to host meeting if necessary. 3.Teamroster collect and consolidation.	
EPM	T04 Meeting Coordinator	1.T04 meeting related issue coordinate, such as organize sync-up, wrap-up daily meeting, send notice, collect material consolidation, share screen, drive meeting DRI to take part in meeting. 2.Backup to host meeting if necessary.	
EPM	FATP Overall	1.FATP I/O Monitor&Control. 2.FATP Input/Output.	
EPM	MES/FATP	1.MES setup status tracking 2.FATP MES related issue coordinate 3.Material&Products tracibility &TT system setup status tracking 4.SMT T04 support	
EPM	T03 FATP On-line	•T03 Line Bring-up Request Collection and Material •T03Daily Factory Readiness Follow-up /Input Deviation/Test policy •T03 Production Abnormal Handling	
EPM	T04 FATP On-line	•T04 Line Bring-up Request Collection and Material •T04 Daily Factory Readiness Follow-up /Input Deviation/Test policy •T04 Production Abnormal Handling	

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CM Bring Up | iDL: Requirement Document - Audio EE

Sub Group	Resource	Loading	Gap
Manager	1		
Tech Leader	1		
PM	1		
Validation	6		
SMT FA	2		
FATP/CQA FA	4		1
REL FA	6		
DOE+Dev Board	3		
Optical Sensor	3		
Motion Sensor	1		
Touch/Force Sensor	5		
Python	1		
BOM	1		
Layout	1		
Total	36		1

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CM Bring Up | iDL: Requirement Document - Audio PD

Team	Role	Responsibility	Program	Experience
PD	Project Manager	Project Leader		
PD	PD PM	PD PM		
PD Leader	PD Leader	Co-Leader		
PD	CAD/Engineer	CAD/Engineer		
PD	CAD/Engineer	CAD/Engineer		
PD	IPQC/CTQ	IPQC/CTQ engineer		
PD	IPQC/CTQ	IPQC/CTQ engineer		
PD	Key station DRI	Key station DRI engineer		
PD	DOE Engineer	DOE DRI		
PD	DOE Engineer	DOE		
PD	DOE Engineer	DOE		
PD	DOE Engineer	DOE		
PD	DOE Engineer	DOE		
PD	DOE Engineer	DOE		
PD	FA PD Leader	FA Leader		
PD	FA Engineer	FACA		
PD	FA Engineer	FACA		
PD	FA Engineer	FACA		
PD	FA Engineer	FACA		
PD	REL Engineer	REL DRI		
PD	REL Engineer	REL		
PD	REL Engineer	REL		
PD	REL Engineer	REL		
PD	REL Engineer	REL		
PD	BOM Engineer	BOM DRI		
PD	BOM Engineer	BOM		
PD-Packing	PD-Packing Engineer	Packing DRI		
PD-Packing	PD-Packing Engineer	Packing		

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CM Bring up | IDL: Requirement Document (Audio HWTE)

Team	Job Title	Day	Night	Task Remark
HWTE	Project PM			1.Overall client contact window 2.Internal/external team coordination 3.Overall HWTE team management.
	LPM			1. Consolidate and maintain all SMT/FATP fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for all stations 3. Consolidate and maintain all ixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. Fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. Station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update fixture/equipment inventory list 7. Coordinate fixture transfer in&out cross site 8. Manage fixture loaner list. Prepensely dispose them after NPI build (Place PO/transfer out/keep loaner) 9. Organize payment review and prepare related document (claim list/tech approve/POD..etc)
	TDL Leader			1. Oversee the build status from SMT Dry Run to FATP WIP. 2. Review the build activities 3. Project handover review and promotion 4. Early preparation for next generation (Sever setup/test process confirmation/new tech training and readiness)
	FATP TDL			1. Overall manage FATP AP testing build activities 2. As a HWTE Spokesman for all external group meeting (sync-up/wrap-up/FA) 3. Coordinate resource to meet client's demand 4. Organize team to resolve top testing issue&build risk 5 . Review FATP TT/Down time/MP concern and push team to resolve 6. Apply and coordinate with EPM to get proper material/units for line bring up/Dry Run 7. Allocate resource to fulfill GR&R demand and manage the GRR progress 8. Compose comprehensive HWTE daily report, collaborate with Ops team for RR review and push related DRI to fix 9. Track SW readiness before build and maintain on-line SW version list
	SMT TDL			1. Overall manage SMT AP testing build activities 2. As a HWTE Spokesman for all external group meeting (sync-up/wrap-up/FA) 3. Coordinate resource to meet client's demand 4. Organize team to resolve top testing issue&build risk 5 . Review FATP TT/Down time/MP concern and push team to resolve 6. Apply and coordinate with EPM to get proper material/units for line bring up/Dry Run 7. Allocate resource to fulfill GR&R demand and manage the GRR progress 8. Compose comprehensive HWTE daily report, collaborate with Ops team for RR review and push related DRI to fix 9. Track SW readiness before build and maintain on-line SW version list

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CM Bring up | IDL: Requirement Document (Audio HWTE)

Team	Job Title	Day	Night	Task Remark
HWTE	Station DRI leader			1.Overall client contact window 2.Internal/external team coordination 3.Station DRI internal team management.
	Station DRI			1. Fixture IQC, calibration, maintenance 2. Overlay validation 3. Station GRR 4. Line set up 5. Station ESD audit 6. Station yield and retest analysis and improve 7. Stations routine dry run validation 8. Distribution review and highlight 9. Daily report 10. Test time optimization 11. DOE/actions follow up 12. BOM maintenance 13. Routine daily report, such as test rule, lay out, material application 14. New material validation
	Station SW DRI			1. Station overlay development&update 2. Efficient tool development 3. First level SW triage in factory 4. Station issue analysis 5. Overlay validation report review 6. Test time optimization
	ME			1. Fixture mechanical design or optimization 2. Mechanical issue first level triage. 3. DOE follow up
	Diags			1. FATP/SMT Diags issue first level triage. 2. DOE follow up

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CM Bring Up | iDL: Requirement Document - Audio Acoustic

	ICT JX	ICT KS			
	Bxxx0	Bxxx1	Bxxx2	Bxxx3	Bxxx4
Acoustic Leader	1	1	1	1	
Sub-leader				1	1
Acoustic EPM				2	
FATP FA	3		2	5	2
Rel FA		2		4	
Offline/Coex		3		5	1
Validation DOE				4	2
FATP DRI				4	
SMT DRI	1			1	
NV EPM		1			
NV DRI		1		3	1
Reserved HC	**5**	**10**		**37**	
On Board	**5**	**10**		**37**	
TBH	**0**	**0**		**0**	

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CM Bring Up | iDL: Requirement Document - Audio Rel

Role	Responsibilities
Rel Manager	High-level leader and influencer engaged at both administrative and working levels. Enables build out of labs and teams to support Coco requirements, across multiple sites.
Lab Manager	Work with cross-functional team including Eng to Sr. Director-level staff. Collaboratively plan lab resources, supplier management, facilities, equipment, etc., to enable delivery of high quality work product.
Rel DRI	Manage daily operations to ensure high level of rel testing. Works with Pega internal teams to ensure the lab runs smoothly. Engage with CapEx, vendors and coco team to ensure lab readiness.
Rel Test Engineer	Manage DUTs through all stages of data collection - including cosmetic inspection, T0 data collection, failure verification. Assigned DRIs for select groupings of DUTs through all stages of data collection. Manages operators to enable effective and efficient workflow.
Rel Report Engineer	Work with Coco rel DRI to define the rel report format. Collect and summarize rel test result in rel report. Publish daily rel report to Coco team. Manage rel tagging and recon correction to ensure data integrity.
Minline Engineer	Coordinates across Rel and TE teams to ensure rel miniline is working properly. Responsible for station bring-up, calibration and overlay updates to ensure station integrity before, during, and after Rel testing.
FA Engineer	Work cross Pega Rel and FA team to coordinate FA process and track FA status. Publish daily FA status to Coco team. Arrange FA meeting.
Equipment Engineer	Coordinates with Apple REL, Test Station and EQ teams to ensure proper rel test fixtures setup and maintain in rel lab. Support EQ purchase.
Lab Admin	Manage all units/samples/materials in Rel lab and unit transfer, shipment. Ensure all materials in lab flow smoothly according to rel test/FA requirement.

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CM Bring Up | iDL: Requirement Document - Audio RF

Team	Sub team	Bxx request	Bxx1 request	Total	Bxx approved	Bxx1 approved	IDL Experience Breakdown	Justification
RF/Wireless Manager		1	1	2			L1 - 2	L1 2x: Overall lead Buds and Case separately
RF TDL/EPM/LPM		3	2	5			L2- 4 L3- 1	L2 4x: Project schedule follow up; RF resource adjust; Function communication; Station bring up and test management L3 1x: Material ETA tracking; EQ tracking and Cal
Product RF	Antenna	10	5	15			L2 - 7 L3 - 8	L2 7x: for meeting, collaboration coordination and process driving, both internally and externally; antenna DOE and tuning L3 8x: for online and REL failures FA * 16x for B698/B627 and 12x for B768/B735 as reference. ANT request to add 3x IDL since there is the new architecture of antenna/system (potentially siptenna+ embedded)
	Desense	4	4	8			L2 - 4 L3 - 4	L2 4x: 4x for FA and DOE tracking, product line assembly tracking etc. L3 4x: 2x for Station DRIs and 2x for Data processing and daily report * 8x for B698/B627 and 5x for B768/B735 as reference. Desense request 3x since the VN is a new site. Not sure about the their engineering capabilities. And B747 has Arrow as B627
RF HW	Connectivity RF	2	4	6			L2 - 4 L3 - 2	L2 2x: 2x tech leader for meeting, collaboration coordination and process driving, both internally and externally. 2x For RF matching, sophisticated FA and various of characterizations. L3 2x: bench characterization and data post processing * 4x for B698/B627 and 2x for B768/B735 as reference. 2x additional IDL requested by RFHW to make FATP site do more FA since FATP site is at VN and outside China. Meanwhile, B747 has the same technology as B627
RFSAC	RFSAC SMT	1	2	3			L2 - 3	L2 3x: IQC/SA/SMT Station setup/debug; Station normal test; DOE/validation for station
	RFSAC FATP	5	6	11			L2 - 5 L3 - 6	L2 1x: Responsible for functional area ,recruiting ramping training team members, overall team execution quality, output. L2 4x: Station DRI to cover Station Setup/ Maintenance. L3 2x: Analyze Data & Report/mitigate L3 4x: Responsible for night shift and REL testing. * 2x decreased from B698 8x is because VSWR station combined. 9x decreased from B627 17x is because Arrow is not new to Audio products.
WSCE FATP	CoEx	0	3	3			L3 - 3	L3 3x: • Offline station bring up, maintenance, calibration, make sure correct data is obtained; • Perform daily offline data analysis, come out daily report; • Follow up kinds of DOE, do data analysis for each DOE; * 3x new added from B698/B627 is because the Coex test coverage is requested.
WSCE RFS	RFS	1	1	2			L3 - 2	L3 1x: SMT offline WIFI/BT test L3 1x: SMT offline UWB test
WSCE FATP	OTA	0	1	1			L3 -1	L3 1x: For ToF Cal/Verify (Shield room). Considering Zephyr POR and OTA Active characterization to be leveraged from Zephyr
EMC		1	1	2			L2 - 2	L2 2x: For meeting, collaboration coordination and process driving, both internally and externally and responsible for ESD testing.
Total		28	30	58				

CM Bring Up | IDL requirement recommendation

1. Define Technical requirement and working area requirement (Example from iPad EPM/Home PD)

Technical Capability

- **Senior Manager**- department lead with a team of > 10 years experience
- **Senior level** - Experienced structure Engineer, tech lead with > 5 years experience
- **Experienced Engineers** - structure Engineer > 3years of working experience
- **Junior level** - new grads/ engineers with < 2 years, or no prior Apple experience

Define **level** with **NPI program experience**

- Need PD team with experience in following field:
  - Strong management & problem solving skills(Senior)
  - Proven PD expertises and experience (Senior)
  - Experience with Apple products and Apple NPI process(Senior)
  - Strong PD engineering understanding(Experienced)

Define the **major** and **experience** we need

Facility / Equipment

- Lab **space**:
  - FATP(100m2) PD labs with working benches and drawing room
  - Easy access to the line to support FA, validation and DOE
- **Equipments**:
  - OMM/Instron/Keyence/3D printing/CCD/Laser cutting and FA tools
- **Facilities**:
  - Internal Office Network, control by IT certified

Define each **sub group**'s **working area/EQ**

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CM Bring Up | IDL requirement recommendation

2. Define Sub group, RnR ,and HC by day/night shift (Example from iPhone HWTE)

Team	Job Title	Day	Night	Mid	Task Remark
LPM	FATP LPM				1. Consolidate and maintain all FATP fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for all FATP stations 3. Consolidate and maintain all FATP fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. FATP fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. FATP station BOM maturity maintenance: Build stage, ECR, station type, etc …….
	MLB LPM				1. Consolidate and maintain MLB AP fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for MLB AP stations 3. Consolidate and maintain FATP fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. MLB fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. MLB station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update MLB fixture/equipment inventory list …….
	RIM/IQC LPM				1. Consolidate and maintain RIM/RIM IQC/PAM fixture/equipment/consumable demand tracker for Allie review 2. Based on demand, calculate build budget for all MLB stations 3. Consolidate and maintain RIM/RIM IQC/PAM fixture/equipment/consumable LLT item tracker. Coordinate resource and get resolution for each one 4. RIM/RIM IQC/PAM fixture readiness trace, including sending comprehensive report to summarize the overall status and HL risk. Organize team to mitigate risk and push the overall progress to be on schedule 5. RIM/RIM IQC/PAM station BOM maturity maintenance: Build stage, ECR, station type, etc 6. Maintain and update RIM/RIM IQC/PAM fixture/equipment inventory list …….
	LPM overall DRI				1. Review/audit/combine the reports for all section 2. Host LPM meeting 3. Track LPM daily action 4. Address internal process issue (payment/customer clearance/PO) 5. Establish temporary Taskforce for LPM's LPM's urgent demand

Define **Sub group** Define **HC with working shift** Define **role and responsibility**

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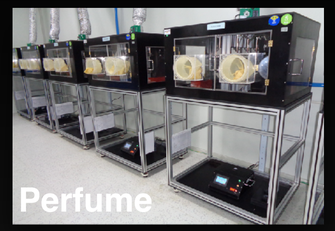
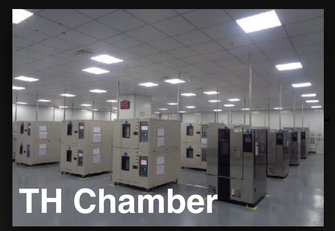
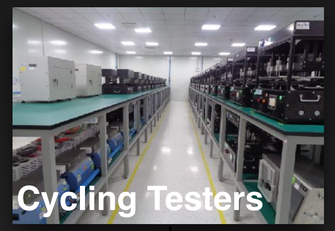
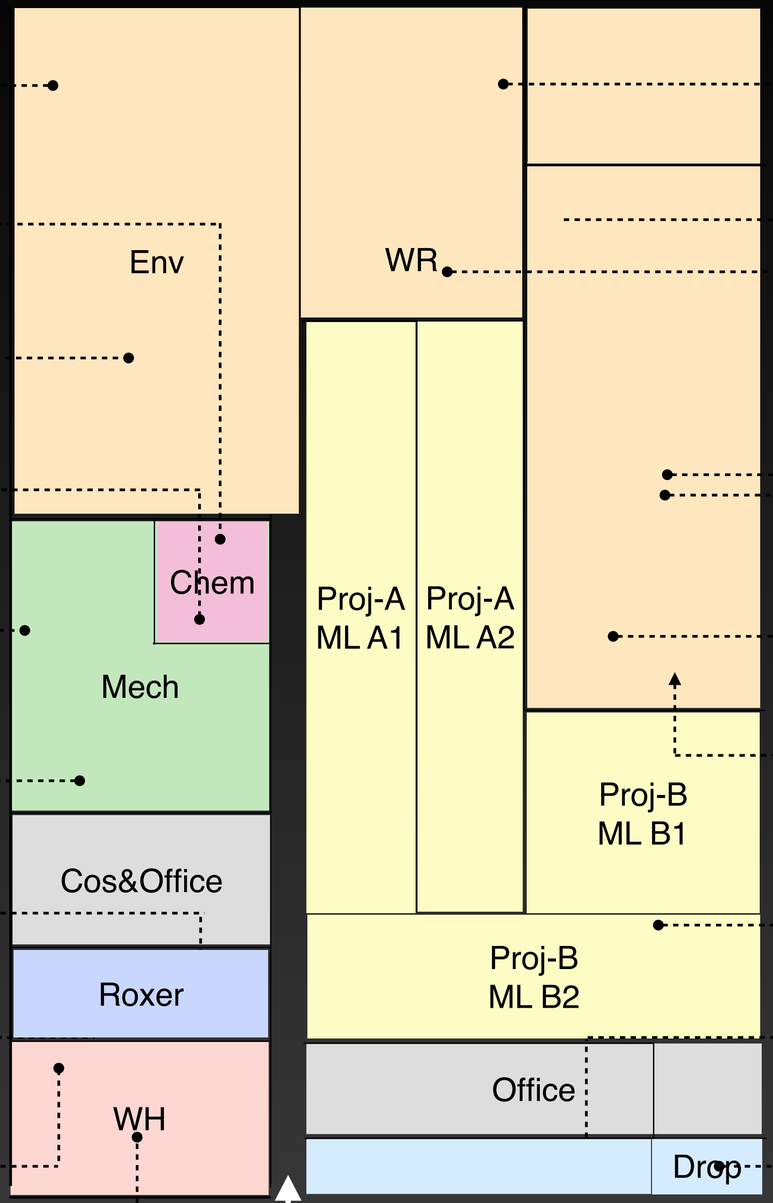
CM Bring Up | IDL requirement recommendation - IDL working area

Total Area 4300m²









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Appendix | Cross LOB IDL Training Build Plan

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NPI CM Bring up | Cross LOBs Summary - Training build planning

	iPhone	iPad	Watch
Build scope define	Build Goal	Entry /Exit criteria	Build Goal
How many Builds ?	2	1	1
Build Qty	~600 for FRB 1 ~1200 for FRB 2	Cell: 242x WiFi: 212x	~500 per size

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Appendix | Cross LOB IDL Training Build Plan

- iPhone Engineering Team

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FRB | Build Strategy

Build	Vintage
FRB1	EVT/OVB
FRB2	CRB/PRB

Collaboration
Ops
Eng

Strategy:

- Leverage Ops and Eng resources and drive as a **combined effort** with shared goals

- **Minimize variables** between FRB and P1
  - **Same** physical line **location**/floor
  - **Retain** common **fixtures** from previous program for longer to enable a smooth bringup of Eng equipment for P1

FRB1

50% of CM support quality achieved

Examples:

Build Logistics mgmt.

Consistent I/O & UPH demonstration

Complex NPI build operations (medium proficiency)

Issue & FA tracking

FRB2

85% of CM support quality achieved

Examples:

Build Logistics mgmt

On-time REL unit delivery

Complex NPI build operations (high proficiency)

Proactive issue & FA tracking/resolution

Accurate yield and issue reporting

P1

FRB - Factory Readiness Build

FRB | Build Objectives

- **With build resource combined, the build goal also combined between Eng and Ops**

Engineering

- Evaluate new CM's capabilities to execute NPI builds
- Train new CM Eng team to conduct thorough failure analysis, meeting management, agility of process
- DOEs management including system robustness for special routing and tracking

Operations

- Factory Bring up focused on fixture validations and operator training
- Validate TDM and scoping green channels for internal transfers.
- Evaluate brown box pack out capabilities and FA shipment process.

Factory Readiness Build

- Leverage previous program's second site bring up to train new CM to execute per NPI requirements
- Evaluate management of online and offline stations
- Drive meetings with Apple teams and technical discussions for FA
- Monitor assembly and baseline with previous program's EVT at previous CM
- Infrastructure and backend stress test for NPI readiness

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iPhone | Factory Training Build Goals

- **Recommended to collect build goal of each team to align what we want to achieve during training build**
- **iPhone team setup different level goals between 1st and 2nd trains build**

	FRB1	FRB2
EPM	**50% of CM standard** **FATP** • Readiness driving before build • Meeting Host : morning sync /wrap up meeting/FA meeting • OK2main driving • I/O progress driving (Rel tracker) • Oversee and driving DOE progress (only Ops related DOEs) • MIL meeting host • Scenario practice (DOE flow management/Routing agility) **MLB** • Meeting Host : morning sync /wrap up meeting/FA meeting • Line BU, sticky, LCR reports, special configs, ok2main entry • Reporting: SMA yields including FA, testing yields (pre-AP, post bond AP/RF), capturing test issues, AP/RF • Driving EEFA meeting • Converting Nimbus to material CTB to kitting to line processes • MLB transfer to labs and shipment to CPTO	**80% of CM standard** **FATP** • Readiness driving before build • Meeting Host : morning sync /wrap up meeting/FA meeting • OK2main driving • I/O progress driving (Rel tracker) • Oversee and driving DOE progress (only Ops related DOEs) • MIL meeting host • Scenario practice (DOE flow management/Routing agility) **MLB** • Meeting Host : morning sync /wrap up meeting/FA meeting • Line BU, sticky, LCR reports, special configs, ok2main entry • Reporting: SMA yields including FA, testing yields (pre-AP, post bond AP/RF), capturing test issues, AP/RF • Driving EEFA meeting • Converting Nimbus to material CTB to kitting to line processes • MLB transfer to labs and shipment to CPTO • Simulate multiple material options/configs to input
PD	• Driving PD daily sync/activities exercise • General FA process / FA Skill / FA meeting. • IT FA process / IT FA reporting • Process evaluation • Fixture evaluation / Fixture modification process • FA report, build report, PD MIL DFM report • Logistics issue discover. • PD equipment evaluations.	• Driving PD daily sync/activities exercise • General FA process / FA Skill / FA meeting. • IT FA process / IT FA reporting • Process evaluation • Fixture evaluation / Fixture modification process • FA report, build report, PD MIL DFM report • Logistics issue discover. • PD equipment evaluations.

EE	• Station setup and test overlay preparation, for both MP and offline/DOE stations;
	• Get familiar with Dry Run (if there is);
	• LCR/Polarity report preparation and radar/MIL operations;
	• Remote debug station and Radar Station setup;
	• Lab equipment preparation and audit;
	• Datasheet/Documentation management;
	• Team Leads bringup;
	• Understand the responsibilities of each EE team and the working model w/ Apple;
	  • MLB EE FA
	  • MLB SoC Test
	  • HW Validation
	  • FATP EE: FA, Offline Station, DOEs
	• General FAs with guidance from Apple side, FA meeting material preparation;
	• REL/ORT failure analysis and review
	• Turnaround monitoring for materials (MLB/Flex/FF) transferring among EE labs
		• Station setup, test bringup, coverage/limit review, station tests deep diving
		• Dry Run exercise;
		• LCR/Polarity report preparation and radar/MIL operations;
		• Remote Debug Station and Radar Station Operation;
		• Lab equipment operation;
		• Datasheet deep diving;
		• Middle level/Junior level engineer bring up
		• Proactively engage with Apple DRIs:
		  • MLB EE FA
		  • MLB SoC Test
		  • HW Validation
		  • FATP EE: FA, Offline Station, DOEs
		• Independent Failure Analysis capability and increased depth from the major leads;
		• Independent REL/ORT FA capabilities

iPhone | Factory Training Build Goals

	FRB1	FRB2
RF	• Build/Rel line Readiness tracking. • UPH ramp report; GRR/Calibration/Audit waterfall; • Test Policy tracker by config; Multi policy line flow management; • FA check in/out process; • Report format consolidated; • Offline station process simulation; • RFHW matching, FA process practice; Lab test bench bring up; Remote debug bench setup; • CSV/distribution plot report from CM. Each function data analysis bring up; • FF assemble/take apart practice.	• Build/Rel line Readiness tracking. • UPH ramp report; GRR/Calibration/Audit waterfall; • Test Policy tracker by config; Multi policy line flow management; • FA check in/out process; • Report format consolidated; • Offline station process simulation; • RFHW matching, FA process practice; Lab test bench bring up; Remote debug bench setup; • CSV/distribution plot report from CM. Each function data analysis bring up; • FF assemble/take apart practice. • Chamber measurement bring up (FTB2 only)
HWTE	Station bringup practice • Online and Rel station bring up • Majority stations are POR stations. The Non POR stations bring up request from Ops Eng Reporting • Train ICT to do all the GRR report • Burn In report • SW version report Station debug practice during build **Wont have SW support for overlay or bundle upgrade	Station bringup practice • Online and Rel station bring up • Majority stations are POR stations. The Non POR stations bring up request from Ops Eng Reporting • Train ICT to do all the GRR report • Burn In report • SW version report Station debug practice during build **Wont have SW support for overlay or bundle upgrade
DQE	**FATP** : Test Rel config in standard Eng Rel test coverage with 160x units, 2x configs Perform Rel units FA and provide FA report in Apple standard **MLB** Test Rel config in standard Eng Rel test coverage with 180x units, 2x configs (check previous FR, 20x failures)	**FATP** : Test Rel config in standard Eng Rel test coverage with 160x units, 2x configs Perform Rel units FA and provide FA report in Apple standard **MLB** Test Rel config in standard Eng Rel test coverage with 180x units, 2x configs
Prox	Bring up module IQC, FATP inline test Exercise cosmetic spec (ensure inspection capability: foreign material, module damage, etc.) Exercise FA capability Yield/issue summary reporting skills	Bring up module IQC, FATP inline test Exercise cosmetic spec (ensure inspection capability: foreign material, module damage, etc.) Exercise FA capability Prox validation (ie black hair) DOE management Yield/issue summary reporting skills
Display	• Bring up IQC, FATP inline and KPD Lab display stations • Bring up ICT Eng team including quality FA, meeting management, agility of process • General FA process and yield/issue summary reporting skills • Offline DOEs (depending on EQ readiness)	• Bring up IQC, FATP inline and KPD Lab display stations • Bring up ICT Eng team including quality FA, meeting management, agility of process • General FA process and yield/issue summary reporting skills • Offline DOEs (basic DOEs and display aggressor, LUT, TCS/TLS, friction test DOE, … etc.)

iPhone | Factory Training Build Goals

	FRB1	FRB2
Camera	• Bring up IQC, FATP inline and KPD Lab stations • General FA process and yield/issue summary reporting skills	• Bring up IQC, FATP inline and KPD Lab stations • General FA process and yield/issue summary reporting skills
Inductive / Ironman	• Bring up module IQC, CSA (hot-bar), post-hot-bar test, FCT, QT0, QT-COIL	• Inductive FCT/QT0/QT-COIL test debug and FA • Confirm QT0 fixture rack spacing requirements (free-air HF-LPP) • Offline VNA test fixture, characterization fixtures
Touch	• Bring up IQC, FATP inline and KPD Lab Touch stations • Bring up ICT Eng team including quality FA, meeting management, agility of process • Ability to generate day/night shift yield/issue summary reporting • Demonstrate FA capability and smooth data sharing (DMM, CT, OM, radar, TDR) • Demonstrate offline Touch DOE capability (depending on EQ readiness): DTN, virus, wireless charging, thermal shock	• Bring up IQC, FATP inline and KPD Lab Touch stations incl. Prime Robot • Bring up ICT Eng team including quality FA, meeting management, agility of process • Ability to generate day/night shift yield/issue summary reporting • Demonstrate FA capability and smooth data sharing (DMM, CT, OM, radar, TDR) • Demonstrate offline Touch DOE capability (depending on EQ readiness): DTN, virus, wireless charging, thermal shock

iPhone | FRB1 Build plan

- **The build qty, duration, UPH setup were setup on purpose to simulate normal P1**
- **The main allocation are used for training, equipment bring up.**

Preliminary build duration & Qty

- FATP Duration : 11 days
- FATP Qty : 620 (2x Rel configs, 80x each)
- MLB Duration : 11 days
- MLB Qty : 1,260 (2x Rel configs, 90x each)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 60, Post line 30
  - MLB SMA 60, SMT 25
- Only test line at night shift

	Sun 5/22	Mon 5/23	Tue 5/24	Wed 5/25	Thu 5/26	Fri 5/27	Sat 5/28	Sun 5/29	Mon 5/30	Tue 5/31	Wed 6/1	Thu 6/2	Fri 6/3	Sat 6/4	Sun 6/5	Mon 6/6	Tue 6/7	Wed 6/8	Thu 6/9	Fri 6/10	Sat 6/11	Sun 6/12	Mon 6/13	Tue 6/14	Wed 6/15	Thu 6/16	Fri 6/17	Sat 6/18	Sun 6/19	Mon 6/20	Tue 6/21
																			R1	R2											
Planned MLB		LCRPRF	BU	BU	BU	BU	Mini	OFF	Mini	Mini	Mini	Mini	Main		OFF	Main	Main	Main	Main	Main											
		8	40	40	60	60	70		70	80	80	80	100			100	100	100	132	140											
Cum		8	48	88	148	208	278	278	348	428	508	588	688	788	788	888	988	1088	1220	1360											
																							R1	R2							
Planned FF								OFF	CM FC	CM FC	CM FC	PD FC	Mini		OFF	Mini	Mini	Mini	Mini	Main	Main	OFF	Main	Main	Main	WIP	WIP	WIP	WIP	WIP	
									5	5	10	15	20			20	30	30	45	60	80		100	100	100						
Cum									5	10	20	35	55	75	75	95	125	155	200	260	340	340	440	540	640						

iPhone | FRB2 Build plan

- **Compared to FRB1, input with high Qty per day and longer build duration**

Preliminary build duration & Qty

- FATP Duration : 13 days
- FATP Qty : 1200 (4x Rel configs, 100x each)
- MLB Duration : 13days
- MLB Qty : 2400 (4x Rel configs, 150x each)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 120, Post line630
  - MLB SMA 120, SMT 50
- Only test line at night shift

	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23
Planned MLB	LCRPRF	BU	OFF	BU	BU	BU	Mini	Mini	Mini	OFF	Mini	Mini	Mini	Main	Main	Main	OFF	Main	Main	Main	Main			OFF						
	8	112		176	88	104	64	64	64		64	92	100	140	140	140		220	220	252	352									
Cum	8	120	120	296	384	488	552	616	680	680	744	836	936	1076	1216	1356	1356	1576	1796	2048	2400									
																				R1		R2			R3		R4			
Planned FF										OFF	CM FC	CM FC	CM FC	PD FC	Mini	Mini	OFF	Mini	Mini	Main	Main	Main	Main	OFF	Main	Main	Main	Main		
											10	10	20	30	40	50		60	60	100	100	100	100		120	120	120	120		
Cum											10	20	40	70	110	160	160	220	280	380	480	580	680	680	800	920	1040	1160		

Appendix | Cross LOB IDL Training Build Plan

- iPad Engineering Core Team

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iPad | Training Build planning

- **Collect the Entry and Exit criteria from each team to align the goal and requirement for the training build**
- **If can't meet exit criteria, the corrective action and lesson learn will be record into post-mortem/IDL review**

Function	Entry Criteria	Exit Criteria	Remark
EPM	1.NPI build material/unit transfer and tracking processes/system ready. 2.Report formats & requirements defined. 3.BM, build plan & allocation aligned with EPM. 4.Overall readiness(IDL, facility, material, IT system, lab& line..	1.Validate and fix in sample build. 2.Report formats & requirements trial and meet customer target. 3.Well managed build execution. 4.Validate in sample build.	
PD	1. PD overall readiness: HC, E&F, lab set up have finished. 2. All PD engineers have basic knowledge of PD working model with Alpha team, senior engineers performance can match Alpha request. 3. Sample build objectives, FATP line tracking, DOE request, FATP & Rel FMEA, PD related process match Alpha request.	1. Be proficient in PD knowledge and PD equipments using. 2. PD standard process are working, all PD engineers is familiar with that and can follow up. 3.Accurate reports and quick responses towards Alpha.	
RF	1. RF Overall readiness(HC, E&F EIH, lab/station bring up, SW) 2. Sample build test plan, objectives and DOE request definition and alignment 3. Clear escalation path, report formats & requirements defined. 4. All employee training achieved	1. Show good SW/HW/FA/Testing activity trail and well organized execution 2. Build objectives and DOE achieved 3. Feasible RF related process 4. Provide end of build report highlighting all the major issues with respect to the product and stations 5. Provide a yield report 6. Show leadership and ownership of issues 7. Through the build show less and less reliance on Apple for common activities	
HWTE	1. HWTE required resource onboard and key talent qualified, E&F list and lab readiness done. 2. SFC system and NPI process readiness complete. 3. Basic knowledge of related server, GHDS/Radar/Insight...etc. Account grant and access application done. 4. Clear escalation path, report formats & requirements defined.	1. NPI Process and SFC system validate ok. 2. Able to bring-up station, DOE achievement, and SW validation under counterpart's instruction. 3. Know Alpha related sever function and able to use it. 4. Release TIL/LBU readiness report, issue highlight and status tracker.	

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iPad | Training Build planning

Function	Entry Criteria	Exit Criteria	Remark
QA	1.No blocker for quality readiness(IDL/DL, E&F EIH and station bring up, SOP, Layout, Test overlay ...) 2.Report formats & requirements defined. 3.PQP for sample build well defined and aligned with PQM 4.DOE requirements defined. 5.CQA NPS audit passed 6.KPSL defined	1. On time delivery daily quality report and IQC dashboard, clear quality summary after build 3. Thorough and solid FACA for quality issues 4. Vendor FACA driven timely 5. CQA logic validation finished and approved 6. Date integrity checked and verified	
REL	1. Basic knowledge about Reliability. 2. Establishing basic REL internal process. 3. Familiar with REL report format/failure mode/testing RRD.	1. Be proficient in Reliability knowledge and testing operations. 2. REL internal process is efficient and achievable, could be recognized by Alpha. 3. Produce accurate reports and response Alpha's instruction timely.	
ECO REL	1. Basic knowledge about Reliability. 2. Report formats & requirements defined.	1. Comprehensive knowledge about Reliability and related operations. 2. Accurate reports and quick responses towards Alpha.	
WGT&AQA	1. New lab constructing and equipment readiness completed 2. Be familiar with the basic process and content of software testing， senior engineers performance can match Alpha request. 3.Familiar with test environment construction 4.Prepare various test reports, count test data, and put forward further improvement suggestions for products	1. lab construction accpetance OK， euipment OK2use 2. Be proficient in software testing knowledge and testing operations. 3. Lab internal process is efficient and achievable, could be recognized by Alpha. 4. Accurate reports and quick responses towards Alpha.	
Thermal	1. Key talent on board 2. Training plan reviewed and approved 3. Understanding of iPAD NPI build schedule and thermal DOE requirement	1. Key talents qualified with thermal mindset 2. Be familiar with testing SOP; Have deeper understanding on thermal product design / DOE process 3. Skilled in use of all test equipments (chamber, data logger, IR camera, etc) and softwares for data analysis / issue report 4. Independently carry out DOEs, output clear data / summary / report, in-time / concise issue report 5. Basic debug and FA capability with internal tools	

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iPad | Training Build planning

Function	Entry Criteria	Exit Criteria	Remark
CoreOS	1. CoreOS Overall readiness(E&F EIH, lab&station bring up, SOP, test OVL...) set up 2. Basic knowledge of related server, GHDS/Radar/Insight... Account grant and access application done. 3. dryrun and validation plan and allocation aligned 4. The panic & CoreOS issue tracking daily report template	1. The panic station bringup, validation, SOP maintenance and operation(collect data & file radar &FA...) 2. Track issue w/ panic report and CoreOS issue tracking daily report 3. Able to bring up station, DOE achievement, and SW validation under coutparts' instruction 4. Shipping out process control(Online normal unit ship out efficiently w/ FDR-SEAL station; units which can't test PASS FDR-SEAL must ship out as the "Skip FDR-SEAL station" process) 5. DRIs are able to FA common issue and try to debug the complex issue by oneself 6. FDR station and data validation and report. 7. Basic OS knowledge and common debug/FA skills 8. Interface of CoreOS for SW related issues in factory stations/tests/processes	
HWEE	1. EE HC onboard and key talent qualified; 2. Lab construction and E&F EIH ready; 3. Function FA process ready and report requirement clear; 4. Training plan/topic and performance check standard defined.	1. Know well schematic and layout design; 2. Test coverage analysis, FA and Debugs, DOE and validation well done; 3. Good at EE debug/FA tools and method, dig out root cause during the build and follow up the improvement; 4. Training achieved: daily report and training materials upload to BOX,and pass final test in written and practical operation.	
DFx	1. DFx required resource need be onboard and key talent need be qualified, E&F list and Lab readiness need be done. 2. Basic knowledge of GHDS/Radar/Insight...etc. Account grant and access application need be done. 3. Clear escalation path, process, report formats & requirements need be defined. 4. Sample build objectives, FATP line tracking, DOE request, DFx related process need match Alpha request.	1. DFx engineers are able to bring-up equipment, DOE achievement, and equipment modification & validation under counterpart's instruction. 2. DFx standard processes are running smoothly, all DFx engineers are familiar with that and can follow up. 3. Accurate reports and quick responses towards Alpha.	
SMT	1.all key equipment arrive within target date, dedicated SMT line set up. 2. all SMT NPI staff be on board before Feb,2022	1.machine validation & LBU report approved by Alpha DFM. 2.SMT training on them, and pass the qualification exam	

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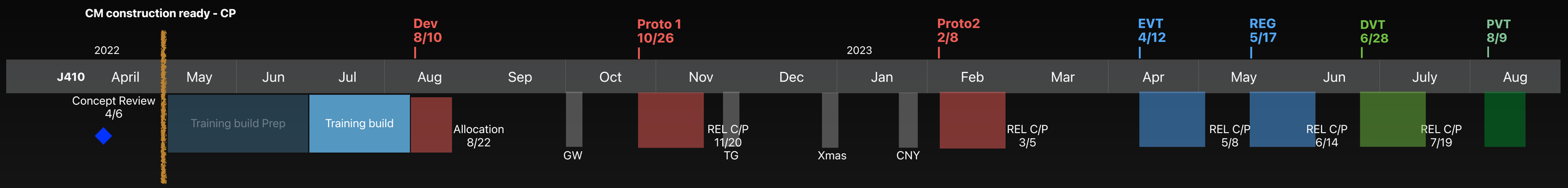
iPad | Training Build planning



Schedule:

- Bring up build schedule should be on B/7 2022. To build with Jxxx model with MP/NPI materials.
- JAMET team confirmed should be ok to update to support Jxxx if needed.
- IST confirmed Wifi secure readiness CP is at the end of April.
- CM construction for both FATP /SMT will be done on XX

Training build Scope :

- Validate the overall IT system either on the line or in the labs form end to end @CM **(High priority)**
- Validate the NPI process @CM **(High priority)**
- To Simulate actual NPI build to train CM member understand what the fundamental requirement from engineering team
    - How CM to report the build status with report template
    - How CM to perform issue status with FA process in correct report formate
    - How CM Engineers from each function to summarize the data to report the information accurately to each Apple DRI.
    - CM should be trained to familiar with Jxxx system to mitigate the risk or concerns while performing Jxxx NPI
    - Apple team can take this chance to evaluate capability of CM team.

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iPad | Training build plan

- **The build qty is base on the allocation and DOE planning discussed with each function team**
- **UPH setup up is similar as P1, UPH 30x FATP**
- **The main allocation are used for training and equipment bring up.**

Preliminary build duration & Qty

- FATP Duration : 17days
- FATP Qty : 484 (DOE/PD/REL)
- MLB Duration : 15 days
- MLB Qty : 770(2x REL configs as allocation)

Line Setup

- One line 2 sides,
- UPH :
  - FATP Assembly line 30, Post line 30(2xshifts)
  - MLB SMA 30, SMT 20

	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun	Mon	Tue	We	Thu	Fri	Sat	Sun
	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14
																R1	R2																									
MLB	STK	PF	PF	DFM	BU	RF PD	OFF	BU	Mini	Mini	Mini	Mini	Mini	OFF	Main	Main	Main	Main	Main	Main	OFF	WIP	WIP	WIP	WIP	WIP	WIP	OFF														
Planned FF															SFL	PD FC	PD FC	PD FC	OFF	OFF	SOP	SOP	Mini	Mini	Main	Main	OFF	Main	Main	Main	DOE	DOE	DOE	OFF	DOE	DOE	DOE	WIP	WIP	WIP	
															1	10	10	20			24	24	48	48	37	37		37	37	37	19	19	19		19	19	19				
Cum															1	11	21	41	41	41	65	89	137	185	222	259	259	296	333	370	389	408	427	427	446	465	484				

Appendix | Cross LOB IDL Training Build Plan

- Watch Engineering Team

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CM Bring up | Outline & overview - Apple Watch

- **In this case, team drive training build (CMRB) close to P1. Training build is running with P1 readiness together.**

CM RB

Critical path

Goals

Success parameter

Post-Mortem Review

CM (RB) Readiness build

- **Full mock build**
  Exercise to validate factory build event
  Final test for factory readiness
  Execute XX DOE
  - ~500 Each size. Aluminum only.
  - Allocation : HWTE, TPM, Rel & Engineering teams
  - Test equipment and assembly fixtures
  - Stress infrastructure FDR/JMET/Groundhog running

P1 readiness

Ongoing Team Training

Weekly Drills

High Volume Exercises

Lab Setup and collaboration

P1 Readiness

- **Ongoing factory drills & Exercises**
  - Repetitive practice for the factory by all teams
  - Ongoing FA drills
  - Process work flows
  - Transfer time audit and reduction
  - Units available for training
  - Shopfloor Work Order Trails
  - Automatic Radar Creation
  - Insight setup and testing
  - Lab setup ready

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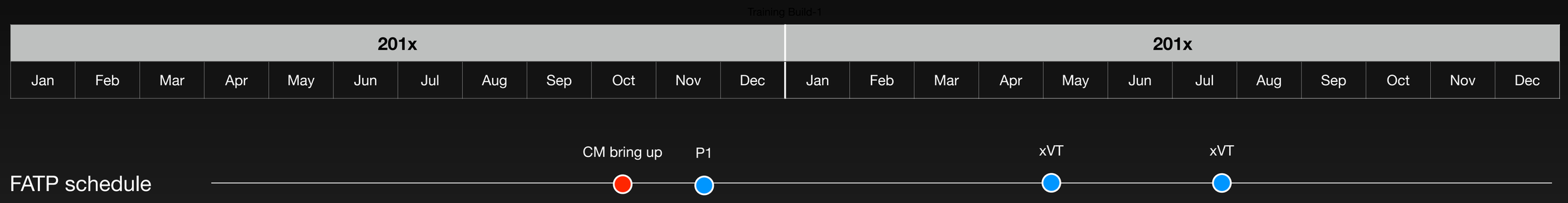
CM Bring up | Training Build Goal - Apple Watch

- **Similar goal setup with iPhone and iPad team to bring up NPI related process and system.**



CM RB Goals

- Build previous generation Units
- Quantity ~500 Each size. Aluminum only.
- Bring up & Stress test factory infrastructure
- FDR/JMET/Groundhog/Shopfloor/Wifi
- Nimbus/Radar/Insight
- Process training (FA / REL / Test)
- Exercise build and factory process with defined metrics by team
- DOEs (~100 units)

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CM Bring up | Training Build Goal - Apple Watch

- **Input Qty planned from allocation. Plan 100x DOE to practice DOE process in CM**

PDFC	Mini	General	Reliability	DOE

		10/7	10/8	10/9	10/10	10/11	10/12
SM	Daily input	10	36	94	115	325	
	Cum input	**10**	**46**	**140**	**255**	**580**	
LG	Daily input	10	36	307	147		
	Cum input	**10**	**46**	**353**	**500**	**500**	

Table 1

Config	Input Date	Input Qty	Purpose	Input to output duration	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
	Total input Qty per day				10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19	10/20
	Total configs per day				20	72	401	262	325									
			Small		10	36	94	115	325									
PD01	10/7	5	Eng allocation	4														
M01	10/8	18	Eng allocation	4														
G01	10/9	94	Eng allocation	5														
.....	10/11	89	Eng allocation	5														
.....	10/11	112	OPs Qty Quality/Ops TE	6														
.....	10/7	5	Ops Qty REL /Quality	4														
.....	10/8	16	Ops Qty REL /Quality	4														
.....	10/11	124	Ops Qty REL /Quality	6														
.....	10/10	10	DOE configs	3														
.....	10/10	10	DOE configs	3														
.....	10/10	10	DOE configs	3														
.....	10/10	29	DOE configs	9														
.....	10/10	28	DOE configs	9														
.....	10/10	28	DOE configs	9														
			Large															
PD01	10/7	5	Eng allocation	4														
M01	10/8	18	Eng allocation	4														
G01	10/9	94	Eng allocation	5														
.....	10/9	89	Eng allocation	5														
.....	10/10	147	Ops Qty REL /Quality	6														
.....	10/7	5	OPs Qty Quality/Ops TE	4														
.....	10/8	18	OPs Qty Quality/Ops TE	4														
.....	10/9	124	OPs Qty Quality/Ops TE	6														

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Appendix | Cross LOB IDL Training Build Post Mortem

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Appendix | Cross LOB IDL Training Build Post Mortem

- iPhone Engineering Core Team

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CM Playbook | P1 Post mortem - PD

#	Category	Description	ICT Actions	Status	ETC	DRI
1	Process	Oversights in basic SOP enforcement and auditing raises concerns for what else is missing in the factory. -BG flex damaged by fixture	- Added the microscope on BG flex bending station and training Op to check flex cosmetic after bending - Defined the inspection rule for the first 3x at the line beginning and implement to other lines.	Closed	9/24	Miller Zhang
2	Execution	The NG incoming material can not be returned to vendor in time and get the FACA report from vendor.	- Screen the RTV process and define the LT for each point - Implement the “Relay Baton” rule in RTV to pass the information to next DRI. - Work with vendor to define the FACA Leading time and implement - Highlight to Allie team once vendor can’t provide the FACA on time	Closed	10/4	ICT
3	Process	Last minutes Heads-up the glean units quantity risky can not meet the build goal	- Added the “Glean units status review” in APD daily sync. - Assessed the P1 Minimize glean goal for P1. (62x >>>40x) ETC:10/7 Done - Aligned with Testing EPM team to add the glean units request to P2 test rule.	Closed	10/30	Miller Zhang

CM Playbook | P1 Post mortem - HWTE

#	Category	Description	ICT Actions	Status	ETC	DRI
1	Process	**New material which didn't validate before input:** 1. Hynix Nand FF hit ANS2 panic issue during reboot with high FR 2. BOE DOE Display DUTs 100% fail at "LCM_Vendor_Name" on CG sensor / CG install / QT0 stations	1.**MLB:** ICT MLB EPM share the input information to FATP Commodity EPM & HWTE when have new SOC / NAND input, arrange 2x MLB for restore validation; 2.**FATP:** Once new key part arrived, need allocate 2x for HWTE validation, and FT 2x DUT for validation	On-going	P2	ICT MLB EPM Achilles Li ICT Commodity EPM Harvey Qu
2	Process	**Waived MLB units from SMT side, no information shared to FATP in advance:** 1. CG Install: 5AFR6P Cfg 100% fail RF Baseband SIM_SKU_ID_DUAL_PSIM Out of limit, value: 2, [1, 1] 2. BG Install 6G24ET Cfg 100% fail System LDCM Loop_Back_Test_Resistance Out of limit, value: 168523, [40000, 60000]	1.ICT MLB EPM make a COF list by MLB Cfg, share with ICT FATP commodity EPM and RD team 2.ICT FATP Commodity EPM make a remark at key part list based on COF List	On-going	P2	ICT MLB EPM Achilles Li ICT Commodity EPM Susan Yang
3	Process	P1 Build did not try run SFC link before build, AAE station did not ready for build at CMFC build	Need EPM arrange team link material to DUT Web SN at CSA / Sub / Main line and provide the SN for HWTE validation	On-going	P2	EPM
4	Process	CT Scan damage NAND and Display driver, no record as FA reference	Initial CT Scan overlay crated done, EE validating ongoing	On-going	P2	EPM

CM Playbook | P1 Post mortem - EE

#	Categ	Description	ICT Actions	Status	ETC	DRI
1	FA	Misunderstanding FA true root cause: Checklist for Trace short and then do LIT check, found hot spot focusing on Cap, but the true root cause is interposer short	1.Employ TDR to judge whether Cap hot spot is true root cause or not 2.Double check Interposer whether hot spot occur or not	On-going	11/15	ICT EE
2	Process	FATP lab Ipad certification expire and takes long time(3days) to resolve it during the P1 build	1.Short term: Set contact name list of Ipad in offline lab for backup 2.Long term: ICT EPM will prepare backup Ipad for each function in case of emergency before fixed certification expire issue	On-going	11/15	ICT EE/ EPM
3	FA	Not familiar with IO test(New E85 test function)	1.Deep Dive study test command about IO test station 2.Compare bench test with online IO test station	On-going	11/15	ICT EE
4	FA	Not familiar with laser cut shielding	1.Practice on more MLB units and create a SOP of laser cut shielding 2.Assign dedicated DRI as a specialist for Laser cut machine	Closed	11/15	ICT EE

CM Playbook | P1 Post mortem - RF

#	Category	Description	ICT Actions	Status	ETC	DRI
1	Process	Project which already MPed shipping process - Allie have a request 1 month ago which to ship 1x D28 units to CPTO, haven't been shipped yet - Will have more and more previous build units(such as DR allocation/FA units), some of them need ship back to CPTO per Allie instruction	- Suggest to have a convenient and official process which need to announce to whole Allie team. - Suggest to do cut flex and ship out by shipping team	Ongoing	Before P2	EPM/ Allie/RF
2	Material	- Offline units Q'ty is small and time is limited 1, only have 8x units whole RF offline at the 2nd week main build, but whole offline have ~180x units(RF already to return the most of onhand units) 2, Only have ~45x units whole RF offline during WIP, but whole offline have ~380x units 3, 160x units to RF offline at the last week of offline WIP but the time is limited for RF to finish target. - No plan for units daily arrangement and team onhand units DOE finish ETA share	- RF EPM counter will try to write down all RF demand in nimbus - Suggest to plan ~40%-50% offline units to RF offline in further build since RF have hundreds offline stations and several chamber need data collection during WIP - Suggest to have a tracker which mark the ETA on each group's config finish ETA and daily units arrangement plan, so function team can track the risk based on it. - Suggest to have a system tool which can locate all the offline SN location	Ongoing	Before P2	EPM/ RF PM/ Allie
3	GU selection process	Arrow UWB/NB GU process not clearly - Change the Arrow GU process 2x times on NB if need diamond station.	Need Allie help to make a SOP of clear GU selection process before build. Will internal training all engineers with the SOP after get it to get everyone on the same page.	Ongoing	Before P2	RF Allie/ RF Testing
4	Testing process	DOE config have not much data of OTA Station for break down - DOE config with same recipe compare to the other config Q'ty is small, only have ~10x-15x and most of them are be checked in/loan	- Suggest to input more Q'ty with sister config method - Suggest to fast track to OTA and 3x from them to Chamber	Ongoing	Before P2	Allie/RF

CM Playbook | P1 Post mortem - Rel

#	Category	Description	ICT Actions	Status	ETC	DRI
1	SW	REL parametric stations implementation	•All station DRIs daily check SW list to survey overlay versions change •Follow main line to validate new overly and update validation report to DRI in time •Keep checking with rel on new overlay cut into mini line, as yet. AP stations follow main line at p1, OTA station maintain T0 version. as to p2,insist to keep the same page with rel	On-going	P2	Kiven Wang
2	Operation	E85 receptacle damage	•Hang more detailed sop to all stations to tell Ops how to run units at pre and post rel--Done •Zoom in significant labels to critical stations to remind Ops to pay more attention --Done •Aiming at known risky and potential risk, such as black box and ITx stations, arranged dedicated Ops to carry out.--Done •Arranged station DRIs to daily audit stations status and operation method, assigned stations technicians to standby risky station to monitor, and timely correct once find any abnormality—on track	On-going	P2	Kiven Wang

CM Playbook | Post mortem - iPhone FRB1

Good Meet Needs improvement

Area	Description	Overall Assessment
Build Readiness	Facility/ Equipment	- Construction completed on time. Equipments were ready with Covid-19 challenge
	Resources	- **DL:** Enough DL(60% experienced) to meet build input - **IDL:** Key person(xxx%) in position to support the build; xxx% got trained in FRB1 Build, xxx% need bring-up during FRB2 - **OSS:** Sufficient OSS arranged to support the Build
	Equipment	- 100% online equipment/fixture EIH meet build schedule - 20x IQC station not ready by FC build and 3x of them miss FRB1 whole build; 18x REL mini line EQ not ready in main build
	Material driving	- Timely LBU material driving and daily input always get CTB
	Dry run	- No dry run planed in FRB1 - CRB bundle and self GU selection process got trained during the build
	Factory infrastructure	- Conference Room not ready to use in B1 before STK build, office supplies(white board, canteen, etc.) not ready to use - AVCN network not stable and took several days to root cause the issue, still need to monitor
Line Efficiency	Equipment instability	- Machine and tester are stabilized, no serious EQ down time occurred
	Line/process management	- Be able to hit first snap target since Mini - Team got trained with the key NPI processes (test rule, repair process, etc.)
	Issue debug/resolving	- Handle station issues effectively and get remote program collaboration training - Be able to resolve assembly issues with reasonable L/T, need more proactively to do cross check for other fixture/station to prevent same issue happen again - seen HWTE/RF team struggling on station bring-up and GU selection due to lack sufficient support and time
Eng Capabilty	FA	- Seen long L/T to root cause the issue due to FA resource not sufficient to support quick response on FA (CTs, Chambers, Display/Cameral FA EQ, etc.) - FA system online & ENG team's FA ability got trained to fit NPI build, need more practice during FRB2 build
	Offline validation	- Online non POR stations meet data collection's target - No offline DOE and Validation performed during FRB1

CM Playbook | Post mortem - iPhone FRB2

High risk - Not on track to be ready for P1
Medium risk - Additional effort to get to P1
Low risk - On Track

Key Takeaway

- Significant improvement seen for teams that received feedback in FRB1 performance review
- Key outstanding concern is FRB2 does not represent Proto complexity and FA quantity. Teams not able to be properly exercised
- Significant new concerns from teams on-boarding with ICT for first time in FRB2

Team	P1 Risk	FRB2 Post build feedback	FRB2 Mid build feedback	CM comments
PD	↘	Continue to see improved FA quality/efficiency with experienced folks. More training needed for rest of the team regarding FA skill, CT scan data interpretation and NPI build mentality. Some issue observed as a result of incomplete fit check including error in AE machine algorithm as well as ME fixture out of spec.	FA reporting greatly improved in verbal/ visual. Opportunities in driving multiple FA actions in parallel and strengthening cross-functional collaboration/ relationship.	-For FA related: 1.Internal training is ongoing, train more FA DRI to improve their FA ability (FA logic / data analysis / reporting skills) 2.Invite APD Rex and Andy for 2nd round external training for IPD team members before P1 - For AE assembly: ICT PD will check AE assemble status with 3D stack during Shasta fit check to make sure AE assembly status and 3D is matched.
System EE	↘	1.Need to continue the deep dive effort on FCT/QTx/Wildfire tests and corresponding source code 2.Need to fill the 12% IDL gap for SysEE before P1 3.Practice with new lab equipments(LiT/Ultra-Prep/Laser Cutter/TDR with probe station 4.English communication skillset to be further improved	FA report quality improved after FRB1, key leads are comprehensively trained; Station test break down and deep diving expected, first line engineer need to catch up.	1.1 From FRB2 to now, already finish source code study: - 5x QTx; 8x smokey, 8x Burn-in Wildfire 1.2 Keep conducting weekly training with counter part- 2 times for SMT and 2 times for FATP per Week 1.3 Knowledge sharing to first line engineers by daily internal training 2.1 Plan HC 115, On hand HC 103x,TBO 5x, HC Gap: 7x; 7x will be ready before the end of Aug 3.1 Work with Vendor to quickly familiar with new equipments 3.2 Keep practicing lab equipment with the units on hands 4.1 Perform daily English training for key leaders and keep improving 4.2 Recruited experienced engineers in English reporting with good technique background: - 1x for FATP , on board on 7/19; - 1x for SMT, will be on board 8/25
DFM	↘	1). ICT team showed progress in taking proactive measures to improve issues from recurring, 2). Three CSA senior engineers had on board, need to prioritize their engineering exposure to real FA cases and DOEs	Expect ICT to pro-actively provide improvement proposal with less input dependency from Apple team	1. ICT are promoting the results-oriented performance management to drive the key development of the MIL and lesson learn tracking system, also we created SOP to standardize FACA flow to improve the efficiency of resolving issues, that will make ICT team stronger to face more complex PP1&P1 build. 2. Talked with DFM Isaias about CSA part and provided the schedule of new employee bring up - For DOEs, has practiced for different modules in advance - For Shasta build, prepare and review the P1 readiness with DFM from next week - Offline talk and align with customer for Shasta build concern
TechOps	↘	Assigned the dedicated DRI to drive cross function team to come out overall solutions.	Online issue needs more driving/ colaborative action with other function team	ICT to continue enhance capability
Quality	↘	For IQC, Op need to enhanced training plan to improvement the cosmetic escape rate. For engineer and PM, need to be more confidence for presentation. Need to proactively perform data collection and analysis. For IPQC/OQC, need enhance the process audit for non-compliance issue.	Need to enhance the capability to be self-starter, collect and summary all relative information. To show clear whole pic of the case in logic way.	1.Planning P1 resource for material management,TTL 58x gap 3x, Ready 9/B 2.Optimized training plan for inspection skill improvement and Engineer need training for part knowledge 2.1 Collected the difference defect physical samples for inspector training and need pass repetitive examination 2.2 For engineer who will incharge of parts DRI ,need cross training and fully understand the parts process knowledge 3. Work with PD to summarize the IPQC special check list base on FA MIL(Top issue for the major FATP yield lost)and quality/ Rel/ORT Issue. 4. Use data analysis tool well, such as Jump, can dig potential risk for process control .
System REL	↘	Great improvement on lab env control/test execution and FA x-functional team communication & timely updates. Expect more on miniline stations familiarity to avoid station tests handling issues; Manpower for FA is still shortage.	Manpower still shortage in FRB2, FRB1 Testing underway, training on-going, Need to improve XF communication	1.1 learn from ICT HWTE and station vendor to handle station issue when meeting abnormality 1.2 through training course to enhance rel Ops operation skills to decrease error ratio, hang station sop to be as guideline and paste announcements 1.3 define dedicated DRI to monitor mini line running progress, and double check data effectiveness, timely update to allie team as reference 2.open multiple channels to hire candidate to achieve 80% HC low limit by the end of August. 3.discussed with ict kpd team to create FA co-work mode, also aligned with counter-part to obtain agreement, meanwhile, use d28 FRB1/FRB2 to involve more in depth FA with KPD and PD. learn how to do FA and follow up their FA status

CM Playbook | Post mortem - iPhone FRB2

High risk - Not on track to be ready for P1
Medium risk - Additional effort to get to P1
Low risk - On Track

Team	P1 Risk	FRB2 Post build feedback	FRB2 Mid build feedback	CM comments
RFSAC Cell		Need to focus on the hiring for senior engineers with RF background or iPhone NPI experience. ICT team is showing good attitude on the post build training and SOP maintaining.	Need more experience for trouble shooting work, High risk to be able to train without Proto build exposure	1x Senior engineers with iPhone NPI experience onboard in July, Will hiring more before P1 build. Keep working on SOPs generation and team training.
RFSAC WiFi		1. Need more experience on log analysis. 2. Work hard on recording lesson learn and SOP	need more experience on FIRE chipset and deep dive for log analysis	Will accumulate more experience by practice, and take more time on logs study. Generate SOPs for all cases we encountered and pass the knowledge to new team members
RFEPM		More familiar with NPI process and meeting/report quality improved. Efforts still needed to understand and catch all the details in meetings and respond with their own suggestions/evaluations quickly and thoughtfully for execution.	Able to do basic trouble-shooting, but complex FA capability and capacity to be evaluated. Need to be more proactive on risk identitfy and resolutions	Need to be more familiar with the whole meeting materials. Practicing in the internal training meeting and be able to have an execution after catching all the details and actions
Antenna		Need qualified FA leader with good English communication to monitor whole FA progress and provide clear logic for major issues highlight, need better cross function coordination ability to come out overall solution as well	Need to enhance iPhone antenna architecture understanding to improve FA efficiency ,FA logic shortage as well, deep dive root cause capability under evaluation	1. For FA leader, 1x candidate with high suitability has reached preliminary consensus and will be available in early September at the earliest 2. For the capability and efficiency improvement of whole FA team, we made weekly training plans with 2x on-site customers and recorded the assessment for each team members, special emphasis is placed on the cultivation and investigation of key leaders 3. Continue to search for talent with iPhone NPI experience，target the percentage of people with iPhone NPI experience to be the RD cross-functional team average
Desense		1. Need to expedite hiring for more candidates with RF background. 2. Need to strengthen internal sharing processes to pass information to entire team. 3. All team members should be more proactive in getting familiar with Desense stations, testing, data and FA.	Need to hire engineers with RF background/experience, expect deeper understanding of antenna&desense, need to deliver more hands-on training to improve FA/DOE capability	1. A manager with rich technical and managerial experience has been hired on August 4th 2. Worked out the training plan for NPI build together with the customer and is in progress 3. Continue to search for talent with iPhone NPI experience，target the percentage of people with 4. iPhone NPI experience to be the RD cross-functional team average
RFHW Cell		1. Need to complete FR2 hiring soon. 2. Senior staff to prioritize training junior ones while working with us to complete FA SOPs - on track. 3. Senior staff to create FA scenarios for team to learn real FA - on Track. 4 Rework engineers less experienced, need to become more skillful and proficient soon.	1. Need to complete FR2 hiring ASAP.. 2. Senior staff to prioritize training junior ones while working with us to complete FA SOPs - on track. 3. Senior staff expected to create FA scenarios for team to learn real FA.	1. For FR2 GAP 4x, 2x guys TBO at middle of Aug, 2x continue hiring before P1 2. The FA SOPs and FA case practice training for junior Engineer by Senior Engineer is ongoing weekly update 3. One qualified rework engineers will onboard on 8/15
RFHW Connectivity		1. Keep practicing on RF matching skills and FA testing, focusing on improving efficiency. 2. Team get to know cross functional teams (RFSAC/Regulatory/EE/DFM/SQE/etc.) to understand collaboration process. 3. Need to finish SOPs creation and team internal knowledge inter-pollination before P1.	Expect LXSZ to proactively collaborate with Apple DRI on following up FA and bench characterization tasks. Stick with all the process pre-defined in FRB. Keep practicing and creating SOPs before P1 to make knowledge sharing scalable.	1. The matching practice is continue practice for all members 2. Internal cross team training for RF SAC /RFHW/RF Coex is ongoing daily 3. SOPs continue updating by team member and will review with DRI before P1
RF-CoEx		1. Bad handover in the team, taught one engineer how to do the FA, but once the engineer is OOO, the other engineers would make the mistake. 2. Need to pay attention on routine, they gave me the wrong unit to do the study. 3. Bad presentation, need to improve the meeting representation skill.	Better use FA equipments/tools to execute various FA requests. Exercise offline testing/check-in/FA process before P1. LXSZ could follow FA SOP well, but need to improve the meeting representation skill.	1. Establish routine work handover mechanism. Person-to-person and day to night shift communication via email or whiteboard recoding. Meanwhile, face-to-face clarification of details is also required. 2. Enhance management, all FA or DoE tasks have a clear tracker recording all progress and machine status and corresponding DRI.So that customers can accurately locate the requirements 3. Organize daily internal English training and conduct simulation discussion on common issues in work 4. Enhance FA related training, Includes basic knowledge understanding, instrument operation, report generation and presentation

Appendix | Cross LOB IDL Training Build Post Mortem

- iPad Engineering Core Team

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iPad | Training Build planning

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
MPM/ EPM	FATP Material	P10DAU4-6*40 C4 Speaker Mixed Input 5x Hole Config Issue P10DAU4-6 plan to input normal speaker (config is blank), but actually input speaker with hole(config is not blank), TTL 5x mixed input hole C4 speaker	1. WH release the wrong material to line base on the first in fist out rule if there is no special config requested 2. IPQC team have not check as no special config requested 3. CM Flames System will not check the config information if the config column is blank	1. Per aligned with Alpha EPM, Alpha module teams need to fill in "config" column on Nimbus DRP. 2. CM MPM will highlight to Alpha module teams in CTB report if there is any lack of config info.	Before P2	MPM/ EPM	Ruphin Rong/ Lucky Zhou	Ongoing
EPM	FATP Material	P1WCAU4-R2A*48 Peninsula Flex(Cell) Mixed Input Issue P1WCAU4-R2A*48 plan to input MLB with post-SMT baseline(P1B_L_R2) but mixed input 11x R1 MLB post-SMT baseline(P1B_L_R1) , it's also resulted in peninsula flex(cell) mixed.	1. MLB APN/Config are same but post-SMT baseline are different for FATP R1 and R2 config 2. FATP Matrix stuffing& BOM maintain& Kitting material& IPQC&Flames check all by APN/Config to control 3. CM SMT & FATP communication gap, FATP didn't catch that one MLB has two baseline for R1/R2 configs	1. Suggest to create different config for special post-SMT baseline request. 2. Leverage function to link post-SMT WO and FATP WO, validation OK on 3/24	3/24	EPM/IT	Eagle Li/Lucky Zhou/Shu Chen	Closed
EPM	FATP Material	P10DAU3-PD2*5 Strobe Flex Materials Wrong Issue P10DAU3-PD2*5 PDFC units wrongly used wrong strobe flex. Correct Strobe Flex(APN 632-06031 EEEE 2524): P1CASB4 (Strobe Module C5051, Nichia) Wrong Strobe Flex(APN 632-06031 EEEE 2524): P1CASB2 (Strobe Module C5003, Lumileds)	1. IPQC team could not check config information as no config information on DID label on material. 2. CM Flames System fool proof not ready during PDFC, can't catch this mistake by system	1. RM-WH add DID label (have config information) on material in P1 Done. 2. Leverage the CMFlames system fool-proof function to control the materials	2/9	WH/IT/ EPM	Shu Chen/ Lucky Zhou	Closed
EPM	FATP Line	3x Cosmetic NG units COF by CM line EPM without aligned with Alpha team on 2/22	1. EPM DRI who wrongly gave the COF instructions are temporarily support from Ops team, do not familiar with NPI rules. 2. COF process are not well-aligned and executed.	1. Optimized the COF process. 2. Re-trained EPM team about the COF rules.	2/25	EPM	Cecil Huang	Closed
EPM	FATP Line	R2B 4x Units out of 8H HSG primer time control	1. QE hold 4x until day shift for SQE re-judging 2. Line EPM did not catch info in time resulting in late notification to CM& Alpha team 3. MFG team did not HL this critical issue for REL config in time	1. Strictly follow issue highlight process and send fail details to execution group within 30min. 2. Daily collect & check config/units information, heads up to Alpha team end of D/S with pending snap WIP if special config with 8H primer control.	3/12	MFG/ EPM	Kevin Zhang/ Cecil Huang	Closed
EPM	FATP Shipping	1. Ship2File/shipping tracker w/ wrong date&missing tracking number 2. Email not straight to the topic 3. Special shipping w/o pre-notice	1. W/o the read proof 2. W/o leader review	1. W/ the proof check of the document review process 2. Email need to straight to the topic, and set up the email format 3. Share the background of the shipment and CM/ Alpha EPM before the shipment arrangement 4. Email send need Leader review	3/22	EPM/ Logistic	Meredith/ Emily	Closed

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iPad | iPad | Postmortem & Good point - EPM/MPM

Function	Description	Positive Area	ETA	Team	DRI	Status
EPM	1. Better collaboration and line control at PDFC/SOP/Mini 2. Actions from Alpha team responded and executed quickly.	1. Proposed all the PDFC units snap then to down selected for Rel which expedite the Rel demand fullfillment 2. Compared with TB, PDFC have been snapped at the 3rd day which pull in 2x days. 3. Line issues are reported within 15~20 minutes during PDFC/SOP/Mini build w/ clear and data 4. Well target plan of GU delivery to made the GU fulfillment on schedule 5. P1 REL delivery takes 4 days, pull in 2 days than training build.	2/18	EPM/PD EPM	Mark/Cecil/ Noora	Closed
FATP MPM	Cowork with Alpha & CM internal team on driving materials in time to fulfill build demand.	1. Follow driving guideline & Nimbus DRP to drive all materials. 2. Key part: use long term CTB & check leftover compared with future input plan. 3. PD part: check leftover compared with future input plan. 4. eg: TM: During Main build, daily reviewed CTB & checked SP with Alpha EPM & EPS. For urgent deliveries, confirmed shipment 1 day in advance, updated status timely on ETA day to team including EPM, WH, IQC to get ready for input the next day.	3/11	MPM	Ruphin/Jane	Closed

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iPad | Postmortem & Good point - PD EPM

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
PD EPM	FATP	CG PSA / CG Magnet vendor mixed stuff in the build matrix	Right CG PSA NG but have not fully align with PD need to replace all the CG PSAs	1. Need to align with PD which material need to be same vendor before the build 2. Follow the guidance to stuff the build strictly	Before P2	PD EPM	Noora/ victoria	Ongoing
PD EPM	FATP	Peach P1 Mahi NC PSA Use Wrong Material	1. Free sample w/o APN/Rev on the package 2. MFG have not used the latest version of material requisition when prepare the material as the BOM updated after material kitting 3. Old version material didn't return to WH and mixed with new one	1. Free sample/special material control: APN/Rev or label were needed 2. Information pass to Line EPM & MFG & IPQC / PD when update BM/BOM 3. MFG/IPQC double confirm the latest BOM/BM when prepare the material 4. Line EPM emphasize the updating to PD/MFG in the production online meeting 5. Separate old material if material changed	Before P2	PD EPM	Noora/ victoria	Ongoing
PD EPM	FATP	P1 DPR missed 3x A version PD parts before the DRP locked down	Have not fully check the training build DRP/ assembly sequence	1. While Alpha initial DRP was received, need to check build DRP/assembly sequence/3D Drawing/control list 2. Any new added and item deleted need to confirm with PD	Before P2	PD EPM	Noora	Ongoing

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iPad | Postmortem & Good point - PD

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
PD	FATP	FA process is not solid -Mic sealing issue, didn't check CAD design to figure out mic tunnel structure. -Few failed units wasn't retest at first time.	FA process need to be optimized	1. Before FA, need to check CAD design. 2. Go through the issue root cause suspection and corresponding action with Alpha PD. 3. Optimize FA process, and do training for all PD FA team member.	P2	PD	Alan	Ongoing
PD	FATP	P1 build have 4 kinds of hardpad on FATP line, it's not friendly for assembly process.	CM PD&cross function team haven't reviewed hardpad carefully before kick off.	1. Will co-work with cross function team to review hardpad design, ensure the design ok before kick off sample.	P2	PD/AME/TE	Beck	Ongoing

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iPad | Postmortem & Good point - EE

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
EE	FATP	EE first time bring up the Mahi Coex stations and the progress of set up & bring up is very slow, these stations not ok2use when FATP Main build kick off, delay one week	1. Didn't rework pollux board timely when got the design change message. Just wait for Main line's validation result 2. Didn't measure air gap and K value first when station HW set up,no align with HWTE team how to set up the station 3. Leader and DRI have less sensitivity to station bring up and risk management	1. Reworked Pollux board on 2/28 2. Got help from HWTE, finished the air gap and K value measurement and adjustment. Done 3. Daily review the test data and do loop test or FA. Keep Tracking 4. Leader and DRI should quickly heads up to Alpha team or align with inner team when met issue. 5. Leader should understand the station test principle and theory and give right instruction to team members.also need improve the risk management sense CP: P2	P2	EE	Sys EE	Monitor
EE	FATP	Mahi2Gyro/Als station test data discrete and unstable	Surrounding environment impact the testing caused the data discrete and unstable	1. raining OP, don't touch or hit the test fixture and unit. 3/3 Done 2. Training OP, don't moving when ALS testing. 3/6 Done 3. Add a dedicate switch to control light source. 3/7 Done 4. Set a roadblock and no enter when testing. 3/8 Done 5. Set a black fabric around Mahi2Gyro/ALS station. 3/15 16:00 Done Long Term: 1. Tune the test fixture and add a black box cover with lighting source. CP: P2 2. Moving this station to 1F Lab. CP: P2	P2	EE	Sys EE	Ongoing

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
EE	USBC DOE stations ok2use in advance and smoothly for the data collection	1.Know how to bring up the test sequence and co-work with HWTE bring up the overlay in advance 2.USBC DOE stations ok2use in PDFC build before FATP mini kick off 3.Quickly respone for the testing issue,and no gating the line,aslo Compelte the test target perfectly	2023/3/21	Sys EE	Kavan	Closed

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iPad | Postmortem & Good point -HWTE

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
HWTE	SMT	Coll B0 V05A fuse with Baku OTP-KPD failure at FCT	Communication gap between Sys EE and HWTE for new material combination input.	Proactively sync with station DRI and internal Sys EE on critical parts input plan before build start and update overlay to matching.	P2	Sys EE & HWTE	Sky Luo & Maggie Chen	Ongoing
HWTE	FATP	FATP SOP units can't one-time upgrade to latest bundle 0u at pre-SWDL station.	1. Units' MLB tested (bundle 0h) 2 months earlier before FATP input. 2. Critical feature (NAND format change) updated in Bundle 0m.	1. Sync up with cross function team about HW feature dependency before input. 2. Heads up proactively for potential risk of units flow process. 3. Update MLB to the suitable bundle before ship to FATP.	P2	HWTE & EPM	Maggie Chen & Alicia Lin & Anco Xu	Ongoing
HWTE	FATP	Low efficiency for touch station data collection of feature confirmation during SOP and early mini build.	Limited units flow to postburn station during SOP and early mini.	Sync up with EPM and touch EE team about data collection requirement.	P2	HWTE & EPM &Touch EE	Maggie Chen & Anco Xu	Ongoing
HWTE	FATP	Some station REL GRR units not same as main line cause long time to run mini line GRR.	40% main line units were returned for EPM allocation.	1. Review detailed GRR sample plan with EPM/ HWTE/REL to align both main line and mini line requirement. 2. Setup mitigation plan for limited sample case in proto build and make sure all team on the same page.	P2	HWTE & EPM & REL	Maggie Chen & Anco Xu & Celia Cao	Ongoing
HWTE	FATP	DOE magnet-hall station fixture have iron material cause units scratch	1. No dedicate owner for fixture daily audit and maintenance 2. DOE special test requirement not notify TDL	1. Aligned with team that station type that is same as HWTE station owner is HWTE team. 2. All DOE test process and special testing requirement need to align with Alpha and CM TDL.	3/6/25	HWTE & Sensor EE	Maggie Chen & Baocheng Tuo	Closed
HWTE	FATP	Low efficiency for 105HZ timing display validation at early stage	1. Communication gap between CM internal HWTE and Sys EE team. 2. Proceed validation on partical info, did not ask for the full story and real requirement	1. Setup iMessage group and email thread for Sys EE and HWTE team for info sharing and confirmation. 2. Enhance DRI mindset to not hesitate to ask for support of unclear instruction or action.	2/27/23	HWTE & Sys EE	Maggie Chen & Sky Luo	Closed

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iPad | Postmortem & Good point -HWTE

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
HWTE	Mahi FCT fixture HW rework and bring up to match MLB BOM2 change 2 days before main input	1. Quick response for the urgent change: bring up 3 slots (UPH12) within 3 days, 5x slots (UPH21) within 6 days, lead time is much shorter than normal bring up time (2 weeks). 2. Professional data analysis and procatively sync up with Mahi EE team.	2/26	HWTE	Maggie Chen	Done
HWTE	Touch and Hover feature bring up completed on 2/27 one week earlier than planed 3/3.	1. Proactive attitude to support Alpha for station validation and correctly feedback result. 2. Better communication and collabration with cross function team.	2/27	HWTE	Maggie Chen	Done

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iPad | Postmortem & Good point -RF

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
RF	FATP	Conflicting online test rule from multiple functions causing confusion among CM team	Process without clear contact window to identify	1. Online test policy/checkin rule of RF stations need inform Apple and CM RF EPM. 2. Aligned among team that EPM will send combined online test rule from related teams to MFG to avoid confusion for all input.	P2	All	All	Ongoing
RF	FATP	No enough mini database of WIFI SKU STATS module (26x) for WIFI BT OTA & WIFI OTA 6E GU selection	Planning without considering enough yield loss	1. To input more units of each GU combination considering the yield loss for RF GU selection with at least 30/combination units for both RAT and OTA stations, (will also enable the feasibility of unplanned unit loan such as SOP units have to switch to mini ones in the case of MLB-FATP incompatibility.)	P2	EPM	Lawrence	Ongoing

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
RF	Achieved the GU selection and station cal in time in the complicated scenario without fast track	1. Consolidated planning and close tracking to include the whole process of GU database, selection and reflow with clear defined ETC 2. Great collaboration among RF/EPM/MFG team.	P1	RF/ EPM/ MFG	Rebecca/ Frayman/ Mark/ Kevin	Closed
RF	Achieved bringup with half day for late requested Omnia RF-Compass Coex station	Close communication and fast reaction on Alpha's request.	P1	RF	Rebecca/ Nelson/Levi	Closed

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iPad | Postmortem & Good point -AME

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
AME	FATP	Station Name: Auto Battery The tails of battery PSA were rolled to PSA after removing PSA liner, it led to battery tossing. Tossing rate: 6.122% (3F/49T).	There was an angle between battery PSA and the direction of removing PSA liner, so that the tails may be rolled to PSA when removing PSA liner.	Adjusted the method of removing PSA liner, changed the angle between direction of removing PSA liner and battery from 45 degrees to 0 degree, so that the 4 tails can be synchronously separated from PSA liner. After optimization, tossing rate: 0% (0F/1119T)	1/11	AME	Goderlove Zhong	Closed
AME	FATP	Station Name: WF7&8 Shimming There was WF7&8 Shimming tested Fail issue, checked CT image found that the WF7 carrier was not pressed in place. Fail rate: 3.64% (2F/55T).	The time between glue dispensing and WF7 carrier PnP was too long, resulting in the glue solidifying before WF7 carrier assembly.	1. Added fool-proof that equipment will alarm if the material picking head doesn't pick WF7 carrier within 30s during automatically picking material mode. 2. Add MES system time control (120s). After optimization, fail rate: 0 (0F/225T).	3/6	AME	Kiven Haung	Closed

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
AME	Station Name: HSG Primer Due to C2-ALS assembly station moved to be in front of HSG primer, after C2-ALS assembly, it was too close to HSG glue path and higher than HSG datum-A, so that it had interference with HSG Primer brush.	Optimized glue path to keep away from C2-ALS area at the beginning of dispensing, and turn back to dispense C2-ALS area separately at the end of dispensing. After optimization, input 920 pcs all passed.	2/27	AME	Wu Yanxiong	Closed
AME	Station Name: All Added one button production mode function for all AE machines.	Added one button production mode function for all AE machine, ensure only click one button can restore all the parameters to POR.	2/1	AME	All DRI	Closed
AME	Station Name: ALT-HSG During the ALT-HSG test, need to seal the HSG, but the ALT-HSG sealing ring covered HSG primer glue path. There was high risk to damage the HSG primer path.	After AME finding this issue, we immediately gave out our improvement proposal and got Alpha AME approval, then aligned with PD/IE/TPM cross-function, Alpha PD approved proposal, Alpha TPM approved process, CM IE finished relayout the ALT-HSG to be in front of the HSG primer, CM AME finished re-qualify. Eliminated the risk of ALT-HSG damaging the primer path.	2/27	AME IE TPM PD	Austin Zhu Anthony Wang Alan Zhao	Closed
AME	Station Name: ANT Glue After the WIFI antenna design changed, ANT5 and ANT2 were close to each other, one visual area is enough to cover both of them when ANT Glue CCD taking pictures.	Combined the ANT Glue second and third visual area to be one. Changed CCD picture taking action from 2 to 1, reduced machine CT from 13s to 12s（UPH 280 improve to UPH 300）.	2/2	AME	Geng yutao	Closed

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iPad | Postmortem & Good point -TPM

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
TPM	FATP	TM line fail units can not check in to repair for FA which lead to TM WIP data need manual maintain in MES system.	No check in FA record for TM line failure in MES system.	ST: 1. Manual maintain the MIL quantity and review daily during P1. LT: 1. Optimize IT system for TM failure check in process. CP: 4/20 2. Validate the check in process with dummy SN. CP: 4/30 3. Dry run with on line units to validate and monitor the process. CP: P2	P2	TPM	Luke Guan	Ongoing

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
TPM	MIL meeting management	1. Well cross function alignment for each action and FA step before external meeting. 2. Well organized the meeting agenda for each portion. 3. Well meeting time control within 1hr.	P1	TPM	Terry Wei	Closed
TPM	FA Units WIP management	Track WIP units status to drive X-function to accelerate FA process.	P1	TPM	Haoda Liu	Closed

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iPad | Postmortem & Good point -IE

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
IE	FATP	Screw driver damage unit issue There are 5x units were damaged by the screw driver bit in P1, causing cosmetic issue. Risk station:2in1/Fasten WF8 screw/Install Ant3A/Fasten WF7 screw	No protection cover when fasten screw.	Short Term: 1. Add temporary protection cover, such as IO flex protection cover at '2in1' station. Long Term: 1. Check the risk station that screw driver bit is easy to damage unit,TTL 15x stations. Done 2. IE study with PD to add protection cover to fasten screw station before P2. CP:P2	Before P2	IE/PD	Anthony Lin/ Beck Zou	Ongoing

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
IE	Coaxial connector buckled issue Coaxial conn is too small to be buckled.OP can only press the conn with fingernail. 1.It has a risk that conn is not buckled well.(Training build 1F/500T) 2.It will damage finger if OP press the conn with fingernail in a long time.	Add 'Coex conn install tool' to buckle conn, reduce the risk of conn buckled not well.(0F/1120T)	P1	IE/PD	Anthony Wang/Beck Zou	Closed
IE	SPK damage issue SPK is uncovered in the whole process.It has a high risk that SPK will be damaged by tweezer or other fixture.MP fail rate is 0.11%.	Add SPK protection film to protect SPK, reduce the risk of SPK damage.(0F/1120T)	P1	IE/PD	Anthony Wang/Beck Zou	Closed

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iPad | Postmortem & Good point -DFM

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
DFM	SMT	Foreign material caused the solder open feedback from the test station.	Foreign material	1. .All SMT members must follow ESD clothes requirement, cant touch board without gloves. 2. clean the workshop daily, deep cleaning weekly. 3. basic P&P machine required by shift before input.deep cleaning monthly. 4. measure the cleanliness weekly(particle count). 5. IPQC audit above items.	P2	MFG&EQ &IPQC	Dolf & Easy &Fanny	Ongoing
DFM	SMT	Failed MLB escape AOI to test station	Failed alarm (~80x/panel) in AOI station causing OP to look over and escape to the next station	1. Added AOI engineers to optimize the AOI program to reduce the false alarm, achieved 60x/panel. 3/2 Done 2. OP handed-up and asked AOI engineer to rejudge the uncertain alarm. Done 2/28 3. AOI engineers used the DFM lab microscopes to double check the uncertain alarms. Done 2/28 4. Introduce the Machine Learning in AOI to reduce the over-kill rate, target failed alarm is 30x/panel. DRI Vince Yu CP 4/30	P2	MFG&EQ &IPQC	Wang Daofeng Vince Yu Xu Hong	Ongoing
DFM	SMT	FATP RF Desense Cell SKU WiFi ant5T 5230 PER issue failed 13x caused by AP fence solder open Sorting MLB WIP: F/R 5.89% (31F/526T) TTL F/R: 2.56% (44F/1716T)	Jig fixture insufficient press force in reflow station cause AP fence solder open	1. Added AP fence VI action in Post-AOI VI, UF VI and FQC VI. DRI: Yujie Zhang Done 2. Optimize the Jig fixture design, added 9x pogo pins on the AP fence area and increase the lock catch torsion from 5N to 9N. DRI: Wilson Xu Done 3. Validate the optimized Jig fixture in new input build DRI: Yujie Zhang CP: 5/25	P2	ME	Zhan Qingchun Zhang Yujie	Ongoing
DFM	SMT	Wrong PnP station BOM caused the wrong material stuffed, because there is no APN stuffed for R3705 in build matrix of P1WDKS3-M1.	the BOM & Matrix &PnP programming comparing tool need to be optimized	1. IT Optimize the tool, make sure it can capture the control material even without APN in matrix. - 2. DoneEnsure all control materials in BM have PN in APN column - Done 3. IPQC should highlight to internal team if any blank in APN column in BM during material audit.	2/8	IT & EPM & EQ	Sky& Eagle& Yuanyong	Closed

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iPad | Postmortem & Good point -MFG

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
MFG	SMT	2x Capacitor Mix in Config P1WDKS4-D3	131S0893 & 131S00289 got mixed up during OP split material, and the materials were sent to line without IPQC measurement and confirmation	1. Update material split SOP: materials should be split one by one, no multiple materials split allowed at the same time. Any material split should have IPQC confirmation before sending to line. Done 3/12 2. To upgrade material split system, new added IPQC control function, only after IPQC unlock, can kitting room print new material label. CP 4/11 3. Help needed: Drive 2x MPQ for LCR materials to reduce material split times.	4/11	MFG/ IPQC	Dolf Wang/ Hong Xu	Ongoing

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iPad | Postmortem & Good point -REL

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
REL	SMT	REL found 1x MLB has fingerprint issue on 3/6 before REL stress	MFG/QC did not check MLB cosmetic carefully before transfer to REL	1. MFG and QC need to train OP to check cosmetic (VI) more carefully for all REL allocation MLBs. 2. MFG need to strengthen online management, get everyone who involved online activities well noted to wear fingertips/gloves rules when touch MLB 3. IPQC will regular audit online MLB handling method and HL anyone against the rule.	P2	MFG/QC/ IPQC	Dolf Wang/ Huatang Yan/ Xingwei Xie	Ongoing
REL	FATP	1m granite side drop didn't double check the equipment status before execution.	The engineers were negligent to confirm equipment status before test execution.	1. Add test check list to ensure that all equipments' technical parameters and devices are OK2Test before testing. 2. Specify drop DRI Feng buy-off the entire confirmation process.	3/18	REL	Robert Feng	Closed
REL	FATP	Cross function cooperation is not close enough	When need assistance, the other functions do not evaluate whether on hand resources can assist them, but usually reject and ask the needed-help functions to confirm with their counterpart, so lead to unsmooth.	1. Relevant functions should assess whether their resources are sufficient when receiving assistance requests from other functions. 2. Be more initiative and communicate closely with function teams. 3. Establish a mutual assistance rule internally to more effectively address the proposed assistance needs.	3/31	REL	Celia Cao	Ongoing
REL	SMT& FATP	Spend extra OT(around 2wks) to catch mini line stations bring up schedule	REL had no dedicated bring up MLBs&units to ensure enough time to bring up & debug mini line stations.	1. In P2, we intend to apply 16x MLBs (8x Cell, 8x WiFi) and 4x units[2x WiFi (1x STATS, 1x USI), 2x Cell(1x STATS, 1x USI)] to bring up REL stations.	P2	REL	Jayce Wu	Ongoing
REL	FATP	REL ML AME stations data abnormal: 1. Top-AIM ALS related test data were wrong 2. HSG BOWING missed uploading partial items to insight	1. Vendor Cognex edited REL Top-AIM OPT light source parameters in wrong status without notifying REL. 2. Vendor JQS didn't select the function of uploading all items, and REL didn't check insight every item in insight	1. We will strengthen management of vendor, don't allow anyone to touch our equipment without our approval; 2. Record the reason, purpose, and impact of each time vendor adjust equipment; 3. Check test both local/insight data and compare with pervious data once vendor adjust equipment 4. Daily audit and check test stations status, drawing curve of all AME station items	P1	REL	Jayce Wu	Ongoing

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iPad | Postmortem & Good point -REL

- **Good points**

Function	Description	Positive Area	ETA	Team	DRI	Status
REL	AXI new function development support: 1. Pre/Post mode switch automatically 2. Pre/Post(REL T0/Post REL) image difference compare automatically 3. Multi-region zoom-in function development	Fully understand Alpha requirement for the new function development. 1. Rapid response to Alpha requirements 2. Strong cooperation & push with the vendor to optimize HW & SW 3. Problem feedback efficiently and verification timely.	P1	REL	Jayce Wu	Closed
REL	Support cross function team to deliver kinds of DOE, data collection and other requests; Respond to Alpha urgent request timely and make high-quality deliverables.	Quickly respond and strong support to new requirements from Alpha and cross function. Flexible management and good control of internal resource and schedule, smooth communication with cross function team or Alpha.	P1	REL	Celia Cao	Closed

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iPad | Postmortem & Good point -Quality

- **Postmortem**

Team	Category	Issue Description	Root Cause	Corrective Plan	ETA	Team	DRI	Status
IQC/ SQE	FATP	FATP found 3xHSG RC window dirty issue	1. Because peeling off RC window PF may cause secondary cosmetic defect, IQC Inspection SIP did not define to peel off PF and inspect RC window in P1. 2. FATP have no HSG RC cleaning SOP.	1. Per Alpha MQE&PQM align, SQE will collect P1 online RC window dirty F/R, and in P2 IQC will start inspection for RC window for 1k qty and then see online F/R performance. 2. Need to standardize HSG RC window online cleaning SOP, HSG RC cleaning SOP provided by vendor, Alpha PQM /TPM approve. 3. Vendor improve automatic protective film process to improve HSG RC window contamination issue.	P2	IQC/ SQE	IQC/SQE	Ongoing
IQC/ SQE	SMT	CHIN Can 2x FAI93/FAI94 dimension measurement method and judgement issue	1. IQC/Vendor site dimension measurement methods are different, SQE sync with vendor and rejudge pass 2. MTD not include FAI dimension measurement method, IQC measurement lab did not double confirm measurement conditions(MTD/Fixture/Drawing) before measurement 3. initial measurement data was passed to cross functional team during SQE/vendor FAE confirmation.	1. SQE drive vendor to provide full dimension(all SPC and FAIs) MTD for IQC measurement lab to follow 2. IQC/SQE standardize data reporting process flow: 2.1 IQC measurement lab must confirm measurement conditions before measurement. 2.2 All measurement data need to be confirmed by SQE/MQE before sharing results to cross function.	P2	IQC/ SQE	IQC/SQE	Ongoing
SQE	FATP	SQE request 10x HSG correlation samples for second time correlation without PD EPM approved email	1. SQE released requirement to vendor directly 2. Both CM SQE/Vendor did not sync and get approved email from PD EPM in advanced.	1. Retrain SQE correlation samples request process flow, SQE sync with MQE/PD EPM in advanced. 2. CM SQE/Vendor must get MQE/PD EPM approved email before arranging shipment.	P2	SQE	SQE	Closed
SQE	FATP	WF5T GND Tape sorting method mis-alignment	1. SQE/Vendor urgently arrange sorting once got FATP feedback issue. 2. SQE/PD not sync sorting method in advanced.	1. Retrain SQE/Vendor need to sync sorting method with PD/MQE before sorting. 2. Standardize sorting request handle process: need Cross Function inform sorting request by email including sorting SOP: criteria/APN/vendor/defect pic/sorting qty; need sync sorting method with PD team.	P2	All	All	Ongoing
QA	FATP	TM Mura Rejudgement Issue	1. For Rel config units, did not realize to prioritize the disposition. 2. PQE/SQE follow sustaining Limit sample to judge, but not sync clearly with ALPHA PQM/MQE at first time.	1. Internally emphasis / Re-training to improve disposition efficiency, to judge within 1hr. 2. Will sync with ALPHA counterpart for limit sample usage in advance and inform ALPHA PQM/MQE if any misalignment.	P1	QA	QA	Ongoing

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iPad | Postmortem & Good point -Quality

- **Good points**

<table>
<tr><th>Function</th><th>Description</th><th>Positive Area</th><th>ETA</th><th>Team</th><th>DRI</th><th>Status</th></tr>
<tr><td>SQE</td><td>Incoming materials packing method improvement:
1. Mahi stiffener (vendor: CR) stack up issue, change packing method from bag storage to tray storage.
2. Cover film of WF5T GND tape (vendor: LS) change from electrostatic fllm to Paper coverage.</td><td>SQE drive vendor optimize packing ways and vendor cut in quickly, improve FATP online operation.</td><td>P2</td><td>SQE</td><td>Winnie Zhang</td><td>Ongoing</td></tr>
<tr><td>IQC/SQE</td><td>Timely fulfill urgent material inspection&materials sorting request:
1. TM incoming materials arrive late at night, need IQC do inspection in urgency.
2. Need IQC sorting materials.</td><td>1. SQE confirm DRP and inform IQC to arrange materials inspection quickly.
2. IQC arranged materials inspection quickly for night shift, and return materials to WH in time, no impact on fresh input.
<table>
<tr><th colspan="5">Incoming Material TM Urgent Inspection</th></tr>
<tr><th>Date</th><th>Config</th><th>FATP Input unit</th><th>IQC Qty</th><th>Pass Qty</th></tr>
<tr><td rowspan="2">2/14</td><td>LM4</td><td>70</td><td>90</td><td>70</td></tr>
<tr><td>LM3</td><td>70</td><td>90</td><td>70</td></tr>
<tr><td>2/24</td><td>LP1</td><td>69</td><td>100</td><td>69</td></tr>
<tr><td rowspan="2">2/28</td><td>LR4</td><td>60</td><td>90</td><td>60</td></tr>
<tr><td>LP1</td><td>40</td><td>100</td><td>40</td></tr>
<tr><td>3/1</td><td>LR2</td><td>5</td><td>90</td><td>90</td></tr>
<tr><td>3/7</td><td>LP2</td><td>77</td><td>210</td><td>80</td></tr>
<tr><td>3/8</td><td>LP3</td><td>32</td><td>150</td><td>40</td></tr>
</table>
3. SQE timely support FATP material issue, IQC sorting HSG BVC magnet measurement/Ant2 cable z-height/C4 SPK glue overflow issue.
4. SQPM daily tracking sorting progress and keep update sorting result.</td><td>P1</td><td>IQC/ SQE/ SQPM</td><td>IQC/SQE/ SQPM</td><td>Closed</td></tr>
<tr><td>IPQC/PQE</td><td>P1 Addtional Inspection / DOE Support, based on cross function's requirement to add IPQC check.</td><td>1. IPQC add 6x addtional inspection, which helps design and process optimization.
2. Mahi Hot bar / Gluing, found Mahi hot bar exceed Mahi coil flex solder pad / flex solder overflow issue, etc, which helps for data collection / spec setup.
3. IPQC/PQE to support pooling DOE (310/410 format) inspection / analysis, which provides finding / suggestion for ALPHA PQM /PD further decision, plan to cut in 410 format in P2.</td><td>P1</td><td>QA</td><td>IPQC/PQE</td><td>Closed</td></tr>
</table>

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iPad | P1 Postmortem & Good point - EPM

- **Postmortem**

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
System	System improvement: 1.System WIP improvement adding the OFF Line and station range from GB to packing 2.Material &unit pick up/transfer process improvement by Online approval 3. BOM divide and differ function 4.Repair process w/o new work order created 5.NPI FA transfer system	M	System development to expedite the working efficiency.	- CM Tiger team have been setup to focus on special process for the fast response at P1 Build. - Tiger team for fast turn around with quickly identifying the critical IT&MES process issues and proposing solutions and implementing fix in 2~3days cycle - Set up the item Alpha DRI to review all the items to monitor the progress twice a week.	Terry	P1	Ongoing
Process	Process improvement: 1.Units transfer time too long 2.LRB process LT too long(take at least 5h) 3.Unit loaning and searching 4. Repair check in&check out process set up too late	M	Process set up and validation before build	- IE will work with Security to get the elevator and green channel - On line approval to expedite the process - Loan system development to tack the unit in off line test - Process defined need to do the try run to validate the workable and efficiency. - Process locked down need to have the SOP and broadcast to x-functions by a meeting.	Anco	P1	Ongoing
Build Plan	Build Plan improvement: 1.SOP build Q'ty too small for OP training. 2.Not enough units(only 24x) of each sku for RF GU selection purpose. 3.REL Config Buffer Qty not enough 4.SMT PDFC Config output qty cannot fulfill FATP demand, cause FATP split PDFC configs into multiple ones	M	Build planing need to add more buffer	- Align with team to collect the SOP,GU, Rel config buffer to propose the Build Q'ty to Alpha EPM before P1 - Come out the more clearly WIP to monitor the risk if any allocation shortage to come out the mitigation in time - For all configs, Planning EPM will check if any buffer reserved for FATP demand, if no, will propose to Alpha EPM to increase SMT input qty	Mark	P1	Ongoing

iPad | P1 Postmortem & Good point - EPM

- **Good points**

Category	Summary	Risk	Positive area	DRI	Status
Schedule	“CM Build”-Sand Table Excerise	L	Before PDFC build, EPM propose to run a “CM Build”, which will validate the CM system, identify the blockers and issues in advance. And also will train engineer in advance to avoid future process issue. More scope need to deep dive with Alpha PD/TPM/EPM team.	Terry	Ongoing

iPad | Postmortem & Good point - PD EPM

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Training	iPad technical study	L	Need to deep dive more technical of iPAD project	- Be familiar with iPad assembly sequence and PD parts list before P1 - Understand the PD related common defects at AIM, MMI, SSS, LB, TM buzz and so on station before P1	All	Before P1	Daily tracking
	iPad line process study	L	Need to deep dive line process	- Be familiar with process flow and SOP before P1	All	Before P1	Daily tracking
Communication	Internal Team co-work	L	Communication between PD EPM and PD, cross function need to be more closer	- Create internal cross function contact list - Internal cross function line meeting 8:50am daily @P1 - PD and PD EPM sync meeting daily - PD and PD EPM sync info by iMessage or mail or telephone in time	All	P1	On-going
	External Team cooperation	L	Communication rule between PD EPM and Alpha PD EPM more clearly	- Any non-POR change need to notify Alpha before implement@P1 - Information sharing is must during NPI build between PD EPM and Alpha PD EPM	All	P1	On-going

iPad | Postmortem & Good point - PD EPM

Category	Summary	Risk	Positive area	DRI	Status
Process	Initiate material pick up process	L	- Co-work with planning EPM to initiate material request/pick-up process - Optimize the process: Reduce signers from 5x to 3x; Urgent case can take materials first & provide file paper later. Target to get material within 2hrs - Pull through the electronic signature process @P1	Bob	Closed
Report	Unit tracking by SN	L	Tracking 228x PDFC/DOE/REL units, such as COF list, HSG primer control, TAIM Testing result, etc. REL*74x DOE*114x PDFC*40x	Noora	Closed

iPad | Postmortem & Good point - PD

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Fixture	Couldn't insert dummy SIM tray (1.08+0/-0.05 in thickness) into SIM opening of HSG (width 1.08+/-0.05) in training build.	L	Need consider about the opening tolerance like I/O, SIM, etc. when designing fixture.	1.Grind 1x additional dummy SIM tray to 1.03 thickness. 2.Use 1.07 thickness dummy SIM tray first, then use 1.03 thickness dummy SIM tray if 1.07 one can't insert in.	PD	P1	Tracking
T/A	Hotbar cracked when T/A unit or transfer to CT	L	Need optimize method of T/A and transport for FA units.	1.Need be careful to not contact MLB peninsula hotbar area when T/A MLB. 2.Fix hotbar area to cardboard with yellow tape before transfer to CT, reduce sharking risk.	PD	P1	Tracking
FA	IO gap issue FA -After fine-tune IO alignment fixture, cell units get more IO gap failures. Check IO gap data distribution, found IO gap distribution difference between cell/WF.	L	1.Checking distributions in critical test station like AIM, side AIM and housing bowing, etc., when we have more than 3x failure. 2.Running material inspection and commonality study before having further action.	1.Fine-tune 2x IO alignment fixtures,1x for Cell units and 1x for WF units. 2.Optimize IO alignment fixture design in P1.	PD	P1	Tracking
Communication	PD line DRI only informed Alpha PD w/o informing CM PD lead in the 4x IO gap failed @side AIM station and it showed lack of communication.	L	Need share issue information to CM. &Alpha all PD team member quickly	Informing both Alpha and CM lead in the first place when issue comes and update the detail in iMessage within 10 mins to make sure we are all on the same page.	PD	-	Closed
New solution validation process	ANT3A cable GNG gauge for RC PNP -Passed offline trial (0F/5T) with 0.12mm interference GNG gauge but failed at online control run with 1F/10T failure rate.	L	Need Follow STD process (offline and then online trial with a certain quantity) before cutting in POR.	Use new GNG gauge(interference 3A cable 0.15mm) offline trail 0F/30T, online control run 0F/54T, cut in POR.	PD	-	Closed

iPad | Postmortem & Good point - PD

Category	Summary	Risk	Positive area	DRI	Status
FA	Line down issue quick respond	L	-FC scratch Do offline trail, station by station check, found risk station is CGA station quickly, co-work with AME to fine-tune CGA ok. No FC scratch failure happen after fine-tune CGA. -ANT4 slop screw proud CT, found copper ring stack by screw. Co-work with IE, studied SOP to align copper ring center to screw hole center, then fasten screw. No screw proud issue after SOP update.	PD	Closed

iPad | Postmortem - RF

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Process 流程	EQ moving process not safety enough. (Lost 6x HPF when moved to the requested lab from the warehouse.) 设备运输流程缺乏安全性。（设备从仓库运输到需求Lab时丢失了6x 高频滤波器）	H	Equipments moving process control, especially for small parts. 设备移动流程管控，特别是针对小型设备运输	1. Keep dedicated people to work on the moving around process and avoid to move in bad weather condition. 2. Make sure good package for each equipment when moving. 3. Audit and record all EQ before and after moving from one place to another. 1. 确保有专门固定的人员进行设备的移动运输，并避免在恶劣的天气情况下进行运输。 2. 运输时确保做好设备的打包，防止设备遗漏。 3. 从一个地方转移到另一个地方前后都要核对好设备并做好记录。	RF	P1	Tracking
Process 流程	RF FATP offline stations data collection can not fulfill the target RF FATP offline工站数据收集无法达成测试目标	M	Offline Test Process Optimization Offline测试流程优化	1. More closely to align test plan with Alpha and CM System EPM. 2. CM Sys EPM provide offline station units delivery plan. 3. CM RF DRI update test plan and offline test status to RF PM/ EPM and MFG in time, any issue or delay need to highlight. 4. Optimize issue such as long test time and low UPH (P1 will increase the station qty). 5. MFG need to send units SN which finishes RF Desense, CoEx and WiPAS offline stations to RF PM and DRI, units can only be released from offline after DRI confirmed the units' data OK. 1. 密切与Alpha/CM Sys EPM串接测试计划。 2. CM Sys EPM提供offline工站送机计划。 3. CM RF DRI及时更新test plan和offline测试情况给RF PM / EPM和MFG，任何问题或延时需及时反馈。 4. 针对测试时间长，UPH等问题进行优化(P1会增加工站数量)。 5. 需要MFG发送测试完成RF Desense, CoEx和WiPAS Offline工站的SN给RF PM和DRI确认数据后才能往后流线。	RF / EPM/ MFG	P1	Tracking
Meeting 会议	CM RF SMT EPM can not effective respond some technical/FA related questions in the meeting. CM RF EPM 没办法在会议中及时针对一些专业的或FA相关的问题做出有效回应。	M	RF FA related technology, Meeting communication skill RF FA 相关知识，会议沟通技巧	1. Improve RF PM's RF FA basic technology. 2. Improve RF PM's meeting communication skill in English. 3. Technical/FA DRIs or Leads who are familiar with the issues will stand by in the meeting. 1. 提升RF PM 对RF FA基础知识的认知度。 2. 提升RF PM 英文会议的沟通能力。 3. 熟悉问题的专业DRI或者lead会参会给予支持。	RF EPM	P1	Tracking

iPad | Postmortem & Good point - AME

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Machine	RCAM assembled shift at RCAM PnP station RCAM 组装偏位 1. Suction nozzle center and RCAM center shift, leaded to the material picking shift 吸嘴中心与 RCAM 中心偏位，导致取料偏移 2. The R axis angle was variational, leaded to the assembly coordinate deviation R轴角度实时变化，导致贴合坐标存在偏差	L	Process	1. Optimized the material picking method, to coincide the suction nozzle and the RCAM center —— Done 优化吸嘴取料方式，使吸嘴与RCAM 中心重合， 2. Optimized SW to change the R axis angle from variational value to fixed value —— Done 优化软件，联合标定的R轴角度由实时变化值变为固定值	AME	TB	Closed
Machine	The front camera was scratched after assembly at CGA station 产品在CGA工站组装后，前摄像头有刮痕 1. Checked the location and recheck picture, found that the locating picture was normal, but the recheck picture showed FC scratched 查看定位与复检照片，发现定位照片无异常，复检照片 FC 刮伤 2. It was found that there was interference between the AR bracket and the FC during the alignment 分解设备组装动作，发现在对位时，AR 支架与 FC 存在干涉	L	Process	1. Adjusted the alignment Z height from 3mm to 3.5mm —— Done 调整 Z 方向 对位高度，由 3mm 调整到 3.5mm 2. Verified with 32x debugging materials, found no scratch on FC —— Done 用32x 调机料验证，FC 无刮伤	AME	TB	Closed
OSS	OSS Management 1. SR OSS fine-tuned the PnP head during doing the pressure paper and not feedback to CM AME in time. SR 在做压印时动了 PnP 压头，没有及时反馈给 CM AME； 2. BZ OSS handles the WF8 material throwing, OSS wrongly paste the old barcode to the material, leading to the misunderstanding of using the wrong material; BZ 处理 WF8 的抛料时，厂商将旧 barcode 贴到了 物料上，造成误解：以为用错物料；	L	OSS Management	1. Make the Vendor OSS site management regulations（Detailed scoring rules for vendors' performance and punishment rules）, will follow it in P1; 制定了 OSS 现场管理条例（包含详细的打分机制和惩罚措施), P1 开始实施； 2. Make the material throwing handle process with EPM/Quality/MFG（Vendor OSS cannot do any processing on the thrown material and keep the material in its original state. AME DRI will take out the thrown material, and AME/MFG/Quality will jointly confirm the defect;）and all auto PNP station will follow up it in P1; 和相关部门一起制定了 AME 设备抛料处理流程，P1 阶段所有的 PnP 设备都会 follow；	AME	P1	Keep Monitoring

iPad | Postmortem & Good point - AME

Category	Summary	Risk	Positive area	DRI	Status
LBU	Due to the epidemic, some machine ETA delayed（JST CG primer delayed for 22 days）, AME pushed vendor to meet LBU schedule 由于疫情，部分设备交期delay (JST CG primer 交期 delay 了22天)，但 AME 仍推动厂商按时完成了 LBU，保证 TB 顺利进行	L	1. Drive JST to arrange the experienced OSS to support the CG primer bring up； Push JST 安排有经验的 OSS 支持 set up； 2. Arrange the day/night shift HC for machine bring up to shorten the bring up time to meet the schedule; 安排了白晚班人力进行设备架设，以缩短设备 bring up 时长，来 meet schedule；	AME	Closed
Machine	TM light bleed tape damaged after Plasma due to tape unwrapped, AME optimized the Plasma path to solve this issue with DOEs 由于一些 TM 的 light bleed tape 有翘起，在 Plasma 设备出现 Tape damaged 不良，AME 通过优化 Plasma 的路径，解决了这个 issue；	L	1. Double check Plasma path and temperature, all in Spec; 2. Do DOE with the tape tightly touched LCD, tape no damaged after Plasma; 3. Do DOE with the tape is unwrapped, tape shrinked and damaged after Plasma; 4. Do more DOEs to study an optimal Plasma path to cover the phenomenon of tape unwrapped ; 5. Redo the Plasma buyoff with the optimized path； 6. Co-work with PD and Quality to sorting the TM and sorting out tape unwrapped specifications； 7. Do DOE with 5pcs worst TM from Bin-B, all pass, (No damage, PD & Quality check pass) 8. Proposal the optimized Plasma path to alpha team and successfully introduced it after got the customer's approval； 9. No TM light bleed tape damaged happened with the optimized path；	AME	Closed

iPad | Postmortem & Good point - AP

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Test	CM build Cell MLB FAI failed at updating baseband, and test pass after setting IP address of fusing server.		Station sanity check list validation	- Informed CM PDCA to check with Alpha GH team for all sever setting before each build. - Monitor CM PDCA sever setting validation report.	HWTE	P1 Build	Ongoing
Yield	For Training Build, test stations yield data are manually collected.		Accuracy and compiling speed of yield report	Develop Yield report tool to auto collect yield data.	HWTE	9/15	Ongoing
Station	"1x unit failed at Compass Sensitivity VA_Magnetometer_NMS_Z and test distribution close to LSL at QT1 station.		1. Station ERS study and familiarity 2. Test data review	- Consolidate all test station requirement into check list and reviewed with Alpha station DRI. - Daily audit fixture setting during build. - Review test data and distribution for each phase to monitor fixture health and stability.	HWTE	P1 Build	Ongoing
Station Set-up	FCT SG raw data was lost due to security check with new plug-in installed when SG equipment take out from factory line and take one more day to re-run SG.		1. Data maintenance 2. Equipment transfer process management	- Upload project data to Radar for backup. - DRI and vendor to be trained to be more familiar with security process.	HWTE	Training build	Closed
Test	ICT station can not scan matrix config label that CM build MLB label rules is not the match with test overlay.		Cross-function data requirement alignment	- Add data requirement alignment into station check list and audit before each build. - Check data discrepancy between build HW change and station testing logic before build.	HWTE	Training build	Closed

iPad | Postmortem & Good point - MFG

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Process issues 制程问题反馈流程	Standardize employee problem feedback mechanism Example: 1x R2 Config unit HSG scratches are detected only after the employee fails to detect and feedback in time. 规范员工问题反馈机制 例子： 1x R2 Config unit HSG刮伤员工未及时发现并反馈，机台到Cosmetic1才被检出；	M	1.OP fails to raise hands and feedback timely when finding abnormal process operation or incoming materials; ; 2.OP does not understand the role and purpose of NPI stage; 1.OP发现制程操作或来料异常未及时举手反馈; ; 2.OP不了解NPI阶段的作用和目的;	1. Feedback to the team leader /QE/IE for judgment and next action in time when finding defective incoming materials or manufacturing process; train all staff and sign for confirmation before P1. 2. Retrain the control requirements of special station before P1, such as glue time control, WIP quantity control, etc., and strictly comply with IE, quality training and examination before starting the job; 3. Feedback reward and punishment measures for process problems in Stage P1: If the problem is found at the station and the DRI of the station is not confirmed in time, the line will be directly streamlined, and the employee will directly DQ. If the rear station finds the problems of the front station in time, 5% performance reward will be given for each problem found 1.发现来料或制程不良及时反馈班组长/QE/IE进行判定及下一步动作，P1之前全员培训并签名确认. 2.P1之前再次培训特殊工位的管控要求，如胶水时间管控，WIP数量管控等，并严格遵守，IE,品质培训并考试后方可上岗; 3.P1阶段针对制程问题反馈奖惩措施：如果当工位发现问题未及时找当站DRI确认，直接流线，此员工直接DQ. 如果后工位及时发现前工位的问题点，每发现一次问题给予5%绩效奖励	MFG	P1	Ongoing

iPad | Postmortem & Good point - MFG

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
OP Reward and Punishment OP考核与奖惩	Use appraisal to manage employees, We will strictly implement the system of rewards and punishments Example: OP found that the front camera could not pass the Goiden Eye station, OP did not let the product pass the station until the number of times of the station was limited, OP inserted paper in the front camera to adjust the position, and manually pass it. 用考核管理员工， 严格落实奖惩制度 例子： OP发现前摄像头无法过Goiden Eye 工站，OP直到该工站有次数限制，未了让产品过站，OP在前摄像头出塞了纸调整位置，人为进行过站；	M	Reinforce rewards and punishments for OP operations 强化OP操作的奖励和惩罚措施	1. Reward: OP will give feedback and intercept major anomalies in time when it finds them, or self-check each other to find major and batch anomalies in other stations, and award 50 points for performance; 80 yuan will be awarded to outstanding employees after continuous discovery for 3 times or more, and the post coefficient will be increased; A. Reward performance award of 50 points for abnormal feedback found at the workstation; B. 50 points will be awarded for the performance of finding defects and abnormalities in the upper process or incoming materials; C. 100 points for awarding performance awards to engineers of other departments for finding illegal operations; 2. Punitive measures A. OP who fails to follow SOP and performs operations without permission shall directly DQ, and 5% performance penalty shall be deducted from the direct team leader simultaneously; B. In case of two consecutive unauthorized operations in the same working section, the line team leader DQ will deduct the performance of the whole month, and the direct supervisor will deduct 5% of the performance of the month; C. The staff who fail to test or operate according to the normal test process and use other means to pass the station or jump the station without feedback will be given the third-level punishment and transferred from the post and the workshop, and the team leader will be punished with the first-level punishment and deduct 10% of the performance. Supervisor level penalty deducted 5% of performance. 全员开会进行宣导私自作业的惩罚措施，以及相关做的好的奖励措施，在P1前全部导入以下奖惩方案 1.惩罚措施 a.未按照SOP、私自作业的OP直接DQ，同步给与直属班组长扣除5%绩效处罚； b.同一作业段连续发生两次私自作业行为，当线班组长DQ，扣除整月的绩效，直属主管扣除当月5%的绩效； c.未按照正常测试流程作业，利用其它手段过站、跳站未反馈的该岗位员工DQ，班组长连带一级处罚扣除绩效10%。主管一级处罚扣除绩效5% 1.奖励：OP发现异常及时反馈并拦截重大异常或自检互检到其它工站重大、批量异常给予奖励表现奖50分，持续发现3次或以上给予优秀员工奖励80元，并提升岗位系数； a.针对当工位发现异常反馈的奖励表现奖50分； b.针对发现上工序或来料不良异常的奖励表现奖50分； c.针对发现其它部门工程师违规作业的奖励表现奖100分；	MFG	P1	Ongoing

iPad | Postmortem & Good point - DFM

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Process	non-functional profile/SG board failed in functional testing verification.	L	Need separate functional & non-functional boards for engineering team verification.	1. All non-functional DFM boards will be marked by label or laser marking 2. All boards (functional &non-functional) build must strictly follow functional board build process	Mindy	/	Closed
Process	In the beginning of build, PnP station cant meet run WIFI & CELL lines in parallel	L	Improve PnP engineering skill & add resources.	1. Re-training PnP program team on matrix 2. Input more resources, like special nozzles, experienced engineers from ops team.	Jinqi.M	P1	Tracking
Process	BOM &Matrix mismatching	L	Improve the efficiency & accuracy of BOM & Matrix comparing	1. Re-training PnP program team on matrix 2. Developed tools to compare the matrix comparing automatically.	Yuan Yong	P1	Tracking
Process	encapsulation glue overflow cosmetic issue due to wrong dispense program	L	Improve machine program management	1.Verify it by engineering board or FAI after for any change/ calibration at the station 2.New SMT engineering team should bring up with engineering logic & responsibility	Linfei	/	Closed

iPad | Postmortem & Good point - DFM

Category	Summary	Risk	Positive area	DRI	Status
Process	DFM FA capability keep being improved	L	1. Quick-response: closed cooperation with other FA function ,preliminary analysis within 2H; completed One page MIL for each failure release within 24H 2. Professional analysis equipment: high resolution CT for solder abnormal; FTIR/EDS for FM analysis; DSC for glue/dispense curing rate; C-SAM for void issue & PCB de-lamination ; shadow more for simulating warpage in certain high temperature 3. Setting up FTIR/EDS FM database from SMT to FATP process, like flux tape, glue etc.	Xander	Ongoing

iPad | Postmortem & Good point - REL

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Plan/Schedule	REL units delivery late caused testing resource stand by idle 2 weeks and schedule postpone	L	1.To improve Rel units delivery efficiency after FATP output 2.Priority to Rel config input in plan as possible	1. Rel team will follow up closely Rel config each CP and due day alert with team closely. 2. Based on the TB learning, will have first priority to Rel config input in build plan as possible. 3. Rel team drive more resource and increase work time to speed up the training build testing	Terry/ Yaphet	P1	Ongoing
Management/ Process	Low efficiency on testing performed and report Example as below, Early phase need take 1.5 Hours to prepare before KO test; 2x HSV video cases not clearly, repeats to re-taken video after clients dig out	L	1.To optimize the on site execution process and reduce handling time, in case that control preparation times into 30 mins before kick off test 2.Key station DRI training and retain 3.Improved report output efficiency and data accuration	1.Adjusted the execution layout and take test actions improvement during the stress test 2.identify the skilled Op and key station during REL build, and re-trained the un-skilled OP 3.Re-difined the each function report R&R in details, and trail run on going, no found any critical issue so far.	Yaphet	P1	Ongoing
Process	Test report update not sending to requested mail group after alpha rel several as Alpha REL and Alpha PD group as net policy issue in early phase, And then DRI missed it in 2 days after later	L	1.To fix email net policy issue in CM site 2.External email rule knowledge improvement	1.Added request grp into white list and then all with apple site grp will pack into whiter list by IT team 2.Re-train the all engineers for email rule as alpha needed, and manager check email out after that case happen	Yaphet/IT		Ongoing
Process	Other alpha cross function entry into the REL lab without aligned with alpha Rel and get approval	L	1.lab security control for apple visitor	1. Anounce this Rel rule with all internal cross function 2.Did the access control process and dedicated DRI monitor the excution. 3. Did an clearly apple visitor process for rel lab.	Yaphet		Closed
Process	partial post rel main line test data not uploading to insight as internal confirm with DFx team then do the off-line TOP AIM test for 10x PDFC units	L	1.REl test rule knowledge improvement and cross function communication	1.Return to line then retest the top AIM in on line model. 1.Re-train all the engineers with testing rule must confirm with Alpha rel and first time report to alpha Rel if any conflict 2.ML Leaders will buy off all insight data, ensure no any missing	Yaphet		Closed

iPad | Postmortem & Good point - REL

Category	Summary	Risk	Positive area	DRI	Status
Management	Enough and skilled resource for CT and X-ray	L	1.Bring up the CT and X-ray machine before training build 2.Kick off the skilled CT operators to support TB 3. Already efficiency completed CT 81 times till 8/31	Bruce Li	Closed
Process	REL Process capability improved	L	1.Have the intact function resource ready and workable 2.Have a quick dry run process before kick off test 3.Built multiple communication channel, what can quick reaction to alpha team, as iMessage, core group, on site phone	Yaphet liao	Closed

iPad | Postmortem & Good point - Quality

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
EF Calibration	CQA report 9x TM buzz failure which most of them caused by pressure force fixture calibration issue. Rejudged the 7x TM buzz samples after vendor recalibrated the equipment with force gauge actual data. The final result is 1x true failure. For other 2x samples, TA 1x no abnormal found and 1x COF. CQA 反馈9x TM buzz issue，经确认主要因设备压力调试校准原因误判，重新校准设备压力后重测结果1F/7T.	M	Equipment calibration and maintain 设备的校准和维护	1. Re-calibrated TM buzz pressure head force with force gauge. Done 8/25 2.Improve the process of equipment calibration and verification. Add Strong OQC and CM CQA actual pressure force measurement action before OK 2 test. Done 8/26 3.Add weekly check for actual pressure force after OK2 test. Monitor 4.Retrain the CQA to do the station setup check if found continue issue at first time. Done. 8/25 5.Deep dive with Strong for equipment calibration issue and improvement. CP 9/3 1. 根据测力计实际测量数据重新校准设备 Done 8/25 2. 改善设备校准和确认的流程，增加Vendor OQC和CQA 用测力计实测步骤要求。Done 8/26 3. 设备OK2 test 后增加每周力值点检确认 Monitor 4. 培训CQA 第一时间做工站设备自检如果有发现连续性问题，8/25 5.进一步和Strong 调查确认设备校准问题和改善 CP 9/3	CQA	P1	Ongoing

iPad | Postmortem & Good point - IE

Category	Summary	Risk	Areas to Improve	Action	DRI	CP	Status
Process	FC dirty -- the top issue.	M	Process	Short term: 1.Check the risk in the warehouse and transport. --done 2.Inspect FC before FC installation. --done 3.Add the clean booth at Key station(Scan TM). --done (Before **6F**/75T; After **4F**/381T) Long term： 1.Study moving FC installation station as far back as possible with PD during P1 build. --Keep monitor 2.Study methods and protective fixture to prevent FC cap drop during P1 build. --Keep monitor	IE/PD/ MFG	P1	Keep monitor
MES	No department provide system control requirement to IE before Training Build,lead to MES system change frequently at the beginning of Build. For example: 1.Test station MES system change frequently,resulting in missed test.	M	MES	1.EPM will collect and provide system control requirement to IE. 2.IE create and release MES process flow to IT.	All	-	Done

iPad | Postmortem & Good point - IE

Category	Summary	Risk	Positive area	DRI	Status
FA	Add and improve fixture to prevent process issue,not just training OP.	L	**--Transfer conn damaged** Transfer flex PSA often stick on the WF8 when engage Transfer conn.There is a risk that transfer conn damage. **Action:**Add oilpaper to prevent PSA stick on the WF8. (Before **2F**/93T; After **0F**/149T) **--FC cap drop** OP take FC out of the tary with tweezer in the warehouse.There is a risk that FC cap drop out. **Action:**Add vacuum pen to against FC cap drop.	IE/PD	Closed

Appendix | Cross LOB IDL Training Build Post Mortem

- Watch Engineering Core Team

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CM Playbook | Post mortem - Watch CMRB

Issue summary from watch CMRB

Table 1

Team	Top issue	Next Steps	DRI
EPS	• **Kitting**: Kitting at CMRB was slow and required additional resources from other areas in the factory to complete. Parts were packaged improperly due to lack of proper kitting material. • **CTB**: ICT CTB team needs to communicate clearly and more efficiently with both BUD teams and other ICT teams to ensure proper action is taken during CTB meetings. • **Urgent Changes**: TipTop is a major bottleneck to urgent changes. Current process takes multiple hours to make any updates. • **Communication**: Overall EPS resources at ICT have little to no understanding of English. Communication with BUD EPS teams at CMRB was lacking due to ICT Team not understanding instructions/questions being asked of them.	Kitting needs to be started based off of Nimbus instead of waiting for a TipTop work order. • Kitting team **needs more resources** to more efficiently create kits moving into P1. • Material being kitted needs to be properly packaged into trays. Risk of damaging parts due to improper packaging if this is not fixed. • Urgent changes need to be reacted to immediately, based off of information in Nimbus, as opposed to waiting for TipTop to be updated. • ICT EPS teams need at least 2 DRIs per team with better English skills to help communicate with all BUD teams.	
EE	**Radar for FA** • Radar APPROVED remains non-functional. DRI's are using RadarWeb. • Escalation needed.	EPM/EE **working with PAC NCS and ICT IT team** with open ticket to CST. CP 8/6	
PD	• **Equipment**: CT scanner installation has not started, 1st floor building modifications still being scoped • **Security**: Policy for ICT PD still in-work, photo watermark process for FA images, inter-floor material movement and security cameras capturing confidential projected content in meeting rooms	• **Equipment**: Need Apple CT team and ICT team to agree on solution and implement ASAP • **Security**: Need Apple security to provide clear and actionable security direction to ICT	
Wireless	**Antenna Chamber/CT Scanner** • **Antenna Chamber and CT scanner bringup ongoing**, not yet fully exercised setups at ICT • Need to ensure sufficient training for antenna chambers and CT scanners as well as associated reports are done prior to Proto 1 start	• Align with vendors and for equipment handoff and readiness at ICT for chamber calibration • Align with OTA/Antenna teams for training plan for Antenna DRIs to exercise chambers and CT scanners as well as provide sample reporting with take apart FA units	
EPM	• **Input Plan**: Factory was able to split and pull in configs. However the speed at which this was done needs improvement. It needs to be quick and accurate with questions ready (if needed) and clear communication if more time is required. • **IO Report**: Needs improvement in the consistency of report. There are colors that are sometimes not updated and numbers that don't make sense. Find these mistakes early so Apple team doesn't ask.	• Deliver early read on P1 input plan for ICT to study and prepare. • Continue WO exercises based on CM RB Input Plan and audit change times. Drive for quick change and communication.	
TPM	• **Yield Report**: Daily yield presentation needs work. Speaker needs to deliver details on the issues at hand and require deep knowledge from the line to answer Apple questions. Automated report details needs work in accuracy and when changes are requested.	• Continue auditing and reviewing the factory Yield Reports	
HWTE	Test Station Interface with MES • MES not up to Apple spec, was fixed for what was needed at CMRB but not everything is ready for P1 • Mapping of material types, MPNs, region codes all rely on proper communication between MES/SFC and test stations which needs to be standardized	• Review expected Attributes with ICT team to ensure they are input correctly and formatted as expected. Automatic import and mapping expected, manual mapping cannot scale. • Validation of the 4 expected interfaces between test stations and MES system (Add Record, Query Record, Query History, Server Version). **Will require faster turnaround from ICT IT Team**	
Quality	• **IQC Fixture UPH**: Higher cycle times for SPC measurements on enclosures (~4 hours for BCM and housing) • **IQC Process** Flow: Waived parts sorting and binning process needs to be stress tested	Align with incoming vendor OQC MSOP for C.T optimization and part holding fixtures • Process setup towards end of the CMRB build, will test with more waived parts for P1	
Shipping/ Logistic	**Process Refinements/Improvements** • **Ship2File and FDR Seal Data Automation - ckpt 8/5 for initial update** • **Packaging Line formatting/controls improvement - ongoing, weekly updates** • **Stress test larger scale Work Orders/Shipments - target end of August**	• IT Teams building automated data links for critical FDR Seal data into a Ship2File application that will automate the Ship2File process (new improved process compared to other CMs) • Leading up to Proto 1, looks to ship larger qty's of CMRB units once internal training activities are completed; team has CA plans for Packaging Line improvements	

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CM Playbook | Post mortem - Watch CMRB

Complete list from watch CMRB - High risk items

Table 1

Item #	Function	Issue Description	Status	Next steps	ICT DRI	BUD DRI	Due date/ Check point
1	EPS	Kitting: Kitting at CMRB was slow and required additional resources from other areas in the factory to complete.	Kitting needs to be started based off of Nimbus instead of waiting for a TipTop work order.	First round Dry-run finish in 8/8, kitting material based on simulated B/M, finish kitting 4 configs(about 90x items of material) within 4hrs. Will continue to improve.	CY Zhao	Kelly	Complete and keep monitor
2			Kitting team needs more resources to more efficiently create kits moving into P1.	Enhance kitting team resource from 10x to 30x in P1 stage, target kit 1 config within 3hr. *- Now having 17 on board.*	CY Zhao	Kelly	Sep 1wk
3		Urgent Changes: TipTop is a major bottleneck to urgent changes. Current process takes multiple hours to make any updates.	Urgent changes need to be reacted to immediately, based off of information in Nimbus, as opposed to waiting for TipTop to be updated.	Improve work efficiency, target to kit material on line within 1hr if change items less than 5x at one time: *- Process: BM team email to all > BM team call Audit in MC > MC kitting & labeling > Audit ok > Line get and double check with onLine EPM if ok2go.*	Dominic	Kelly	8/24
4		Communication: Overall EPS resources at ICT have little to no understanding of English. Communication with BUD EPS teams at CMRB was lacking due to ICT Team not understanding instructions/questions being asked of them.	ICT EPS teams need at least 2 DRIs per team with better English skills to help communicate with all BUD teams.	Cross function information communication can be improved through dry-run before P1. 2. Arrange/hire better English-skill DRIs in each team: *- Lisa (USA BU graduated) & Miya (CET6, iMac PM) joined CTB, and Moon (CET6, Pega PM) joined Audit.*	Dominic	Kelly	Before P1
5	EE	Radar for FA • Radar APP remains non-functional. DRI's are using RadarWeb. • Escalation needed.	Still can't access to radar app with different WIFI setting, even with 4G hotspot. ICT IT has sent these status to BUD team.	Tested radar app with BUD's suggestion Need to check Apple Connect permission by BUD Bharath	Chester Lin/ Tonny Liu/ Moon Shen	Alan Chern Bharath Nigel Cheung	CP 8/13
6	PD	CT Scan	Apple CT scan machine expert will come to ICT check if second floor is ok to place the other one MP units is tansfer to ICT and will arrived within this week, ETA? And report template 20x MP full units (10x passing, 10x Failling)	1.1F CT room Security audit CP 8/16 2. 20x MP Units ETA? (already in ICT WH) - Total will need to allocate 200x pass units and 110x fail units to PD LAB for PD exercise - Already inform EPM May to pass 200x MP good units and below 70x failed units allocated to PD lab - For the rest of 40x fail units, waiting on Ops team to confirmed the failure symptom, CP 8/14	PD Jacky	PD EPM Laila	P1
7	HWTE	Test Station Interface with MES	-MES not up to Apple spec, was fixed for what was needed at CMRB but not everything is ready for P1 '-Mapping of material types, MPNs, region codes all rely on proper communication between MES/SFC and test stations which needs to be standardized	QT DRI works with IT Team： - Samwise sends the Dmin table to MES at 8/6, wait for validation - Query Function validation is ok(looped 400x at QT0)	IT MES	Peter R Carter Hsu	CP 9/2

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CM Playbook | Post mortem - Watch CMRB

Complete list from watch CMRB - Medium risk items (Part 1)

Item #	Function	Issue Decription	Status	Next steps	ICT DRI	BUD DRI	Due date/ Check point
1	EPS	Parts were packaged improperly due to lack of proper kitting material.	Material being kitted needs to be properly packaged into trays. Risk of damaging parts due to improper packaging if this is not fixed.	1. Ask vendor to provide more trays for material kitting 2. Design a common tray for material kitting-->kitting tray design finished, sample MIH 8/11.	IQC-Sunny Cao PD-Smith Chen EPS-Dominic	Kelly	8/14
2		CTB: ICT CTB team needs to communicate clearly and more efficiently with both BUD teams and other ICT teams to ensure proper action is taken during CTB meetings.	1. Hiring experianced person for EPS CTB team to solve communication issue between ICT and BUD 2. Review process flow with cross function team to efficient the communication.	1. Experianced member with good English skill already on board in 8/4 2. Material change process had reviewed with MC and Production team 3. Plan several Dry-run with P1's DRP and simulated B/M before P1	Dominic CY Adam	Kelly	9/9
3	TPM	Auto yield report： Generate daily yield reports	8/6: through CMDR, no issue. Yield performs good. (Automated yield reports sent during CMRB build; still have some issues with COF/Waive/Fail)	8/6: Monitoring for last 3 days during CMDR,if no new issue, close it 8/9 no issue with COF/Waive/Fail items, keep monitor	John Xie	Ed	CP 9/9
4		Insight & IO tracking： 1. Verify station data upload to shop floor and Insight 2. Verify input/output, fails, and WIP tracking	AME and air leak fixtures uploading data to shopfloor and Insight during CMRB	According to P1 LBU schedule,we will take every chance to check during P1 LBU.Follow LBU schedule MES/PDCA 9/2 setup, MES dry run 9/9	John Xie	Ed	CP 9/9
5	IQC EQ&Fixture Bring Up	GRR and correlation of dimensional measurement tools	1. On time completion of the GRR and correlation of dimensional measurement tools at CM RB. (CMM *1, OMM*2 for CMRB) 2. For P1 build, Total demand Qtys are 27x(CMM575*5, CMM443*3, OMM*19). 9x had been received(CMM575*4, CMM443*3, OMM*2).	1. 7x will be consigned(OMM*7 PO released, ETA: TBD) 2. 11x will be transferred from QSMC(CMM 575*1, OMM*10), ETA 9/10. 3. ICT plan to start GRR/Correlation from W1, Sep, and complete at W3 of Sep. 4. Continue correlation between OQC and IQC on key parts at P1.	EE SQE: Allan	Raj	9/12

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CM Playbook | Post mortem - Watch CMRB

Complete list from watch CMRB - Medium risk items (Part 2)

Item #	Function	Issue Decription	Status	Next steps	ICT DRI	BUD DRI	Due date/ Check point
7	IQC Fixture UPH	Housing IQC dimensional UPH was 6 (lower than target of 10)	IQC's capability can meet dimensional inspection UPH requirements.	Follow CM RB process, to align MSOP and holding fixtures with vender OQC ahead of Material receiving. Keep optimizing the CMM/OMM programing for quick turn around.	IQC: KK Liu	Raj	P1
8	FATP failure rejudgement process	1. Re-validation of in-line failures at IQC , turn around time (Goal: Less than 24 hours) 2. Setup process flow for line failures focused on root cause of incoming material quality 3. Measure correlation between IQC vs FATP pass/Fail status	1. Assign one engineer who will join FATP FA team at P1, together with FA team to figure out the RC of the failure, response at first time in line. 2. Dimension failure re-judgement had been verified in CMRB, no gating.	Will follow CMRB Dry Run process to verify functional failure re-judge process in P1 since IQC will have functional EQ set up in P1.	SQM: Connor	Raj	P1
9	IQC Process Stress Test	Waived parts sorting and binning process needs to be stress tested	1. Most of Materials was waived for CMRB build, no chance to do the test at earlier of CMRB. 2. IQC was practiced by Sensor MLB binning(Bin A: 35x, Bin B: 66x) and Dummy Alert sorting(Flex Peel Off: 6x, Copper Exposed: 6x, Over Glue: 25x) druing CMRB build.	Wil continue follow CMRB sorting/binning process to handle material issue at P1 and further NPI stage.	SQM: Connor	Raj	P1
10	RF	CT-Scan/OTA chamber	• Dry run X-ray/CT-Scan flow • Material movement in expected timeframe • Radar update	• 2x light CTs decided to be placed in the antenna lab, first EIH 8/22,second EIH 9/10 • 2x chambers for P1, one calibration is completed on 8/1, one waiting for some parts delivery, the completion data is 9/20 • Training on CT and Chamber operations during build readiness	Will Xu	JJ/ Christian	CP 9/10
11		Antenna Lab Team Training	• Lab Team • Data analysis and presentation • Product build and tear up • FA SOP & Radar Update	• Continue the lab construction • Ensure EnF and consumables which for P1 build are arrived • Perform chamber bringup , calibration and run sample data collection prior to P1 • Train staffs from different functional teams during build readiness	Nelson Chen	JJ/ Christian	CP 9/10

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CM Performance Review

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NPI CM Playbook | CM Performance Review

- Motivation & Principle
- Competency
- Evaluation
- Implementation
- Incentive

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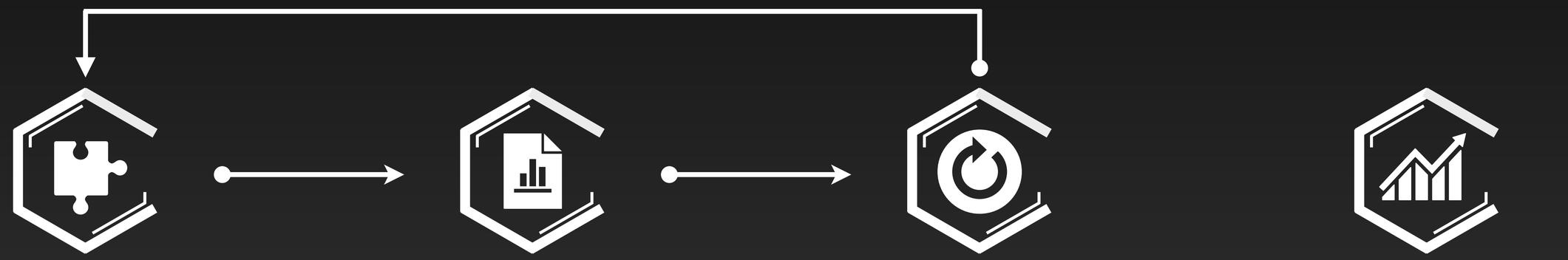
Performance Review | Motivation & Principle

The ***Motivation*** of conducting performance review with CMs is to help them better understand desired competency architecture, clearly identify rooms of improvements, and continuously drive themselves towards Apple Standard.

The ***Principle*** of a successful performance review is to construct a holistic evaluation process all the way from improvement ideation to implementation, which is comprehensive, effective, recursive.

Postmortem Process Overview



Competency

- **S**pecific
- **M**easurable
- **A**chievable
- **R**elevant
- **T**ime-Bounded

Evaluation

- Scorecard
- Feedback Alignment
- Improvement Items
- Review w/ Executives
- Performance Trend

Implementation

- **W**hat
- **W**hy
- **H**ow
- **W**ho
- **W**hen

Incentives

- Encouragement
- New Project Consideration

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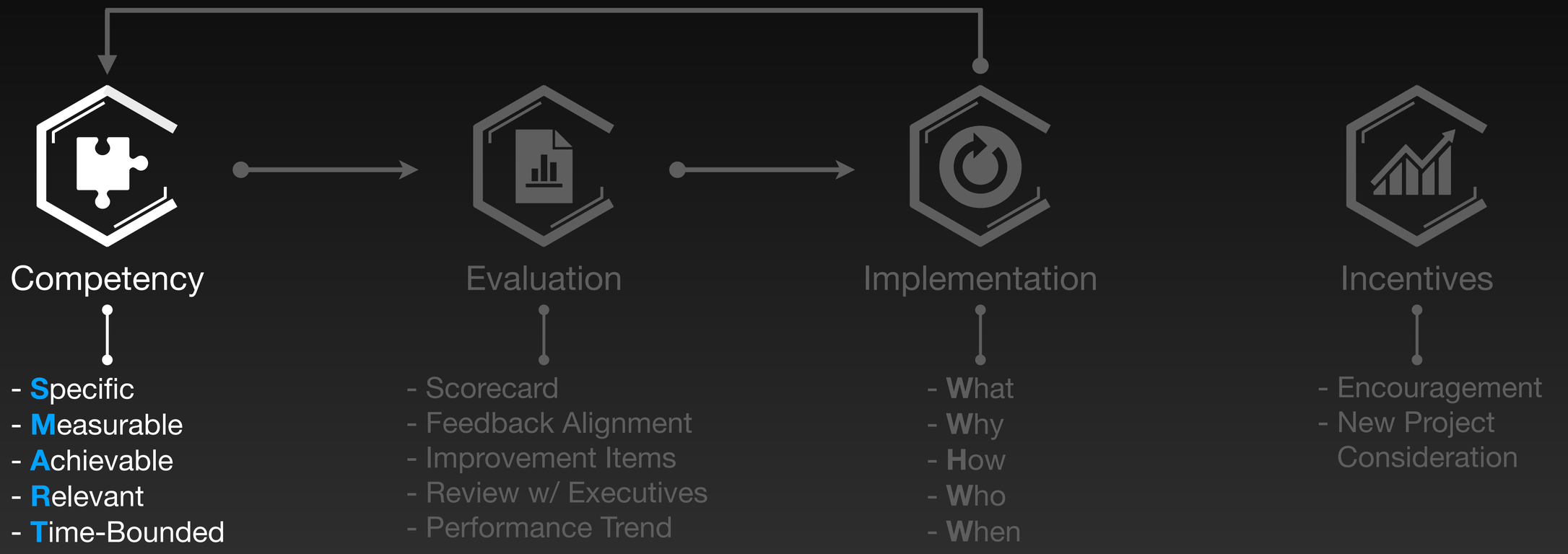
Postmortem Process Overview



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Performance Review | Core Competency Defined

CM EPM Key Competency									
#	Management	#	Planning	#	Execution	#	Reporting	#	Result
1	Leadership	5	Schedule planning	9	Meeting Running	13	Internal sharing	17	Validation Purpose Fulfillment
2	Team Integrity	6	Decision making	10	Platform / System Knowledge	14	Reporting - written & verbal	18	Build Schedule Timliness
3	Resource Securing	7	Prioritization Capability	11	Problem Solving / Resolution	15	Influence	19	Cost Management
4	Effective communication	8	Preventative Mitigation	12	Initiative / Responsiveness	16	Escalation	20	Project Goal Orientation

** Competencies from 5 perspectives with 20 sub-items in total are defined for CM team members' competency evaluation*

Demonstration

Note:

- This competency table should be the main justification of final quantitative evaluation results on CM performance
- This competency table serves as a reference purpose. Items might be subjected to substitution based on real situations
- Definitions of each item should be clearly explained to CM to prevent from any misunderstanding
- This competency table is more applicable for functional team evaluations compared to individual assessment based on R&R scope

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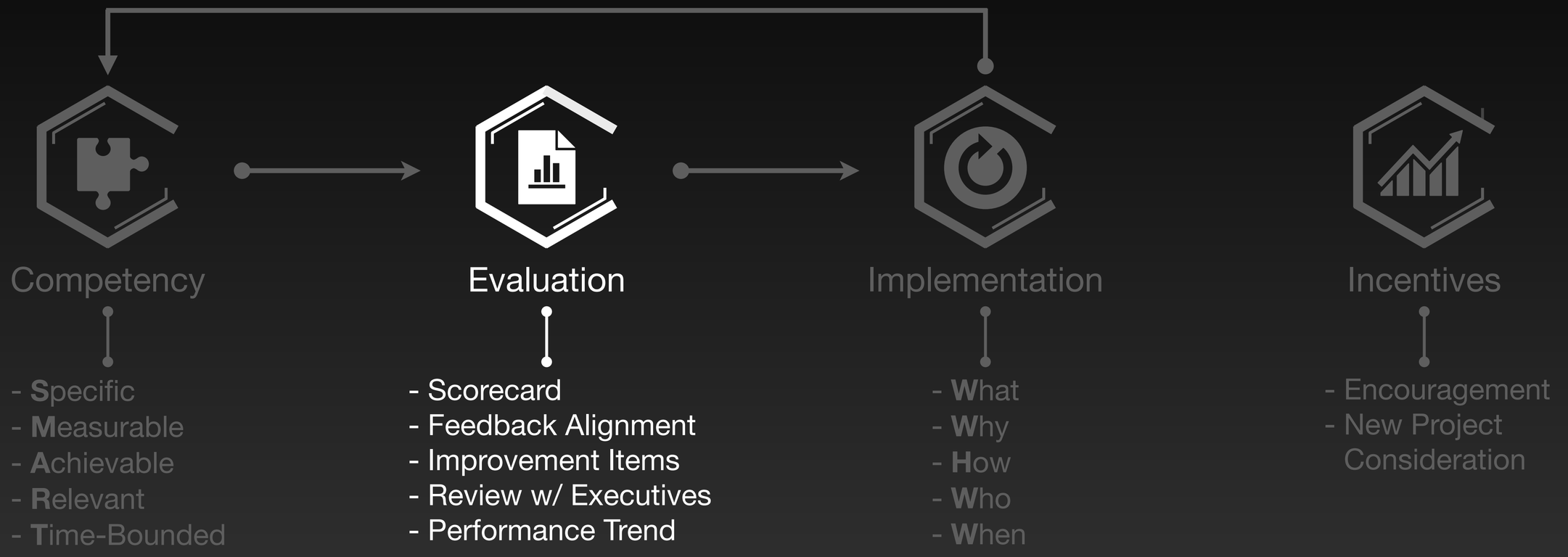
Postmortem Process Overview



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Performance Review | Evaluation Scorecard

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM EPM Key Competency

	Management	#	Planning	#	Execution	#	Reporting	#	Result
1	Leadership	5	Schedule planning	9	Meeting Running	13	Internal sharing	17	Validation Purpose Fulfillment
2	Team Integrity	6	Decision making	10	Platform / System Knowledge	14	Reporting - written & verbal	18	Build Schedule Timliness
3	Stakeholder Management	7	Planning Accuracy	11	Problem Solving Skills	15	Issue Escalation	19	Risk Management
4	Effective communication	8	Preventative Mitigation	12	Initiative / Responsiveness	16	Escalation	20	Project Goal Orientation

Note:

- Rating (1~4) on each competency sub-item should be aligned between CM and Apple team members
- Weightings of each sub-item are subjected to adjustment based on project execution goals
- Ratings for previous Engineering build are recommended to be included for quantitative comparison on performance tracking
- Justifications of rating on each sub-item are the feedback / key lessons learnt consolidated [Next Slide as Demonstration]

Evaluation Results

Items	Management				Planning				Execution				Reporting				Result				Remark			
Period / #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
DVT Q2 2022	3	3	3	3	3	3	3	3	3	3	4	4	4	3	4	4	3	4	3	4	67	3.4	35%	0%
	3.00				3.00				3.50				3.75				3.50							
EVT Q1 2022	2	2	3	3	3	3	2	3	3	2	3	4	2	3	4	2	3	3	3	4	57	2.9	15%	30%
	2.50				2.75				3.00				2.75				3.25							

Demonstration

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Performance Review | Detailed Feedback Alignment

Function	Category	Key Highlights / Issues	Root Cause	Key Learnings
EPM	Planning Preventative Mitigation	- Material shortage during post EVT build to fulfill DOE requirements from x-function team	- COVID impacts material L/T, especially for those vendors suffering from lock down	• Dynamic adjustment on DRP vs. DOE demand projection • Closer monitoring on balance of materials w/ long lead time • Proposal of material buffer for contingency purpose in advance
EPM	Management Resource Securing	- 2 PMs rolled-off the project due to resignation, causing DOEs control and production line control with low effectiveness and efficiency for 3 weeks	- Overlooked the potential resource risks - Limited backup resource - Sophisticated hiring process	• Setting 1-month alert in advance for employee resignation • Escalate to leadership at earliest possible for substitution • More frequent CM internal sync on each member's status, thus better enable potential work hand-over

Demonstration

Note:

- Each issue is supposed to be categorized into a specific competency sub-item, which will justify the associated scoring
- Issues should be based on real cases instead of one's own discretion with project impacts clearly listed out
- Root cause should be objectively aligned with CM team members for buy-in
- Key learnings should include specific actions that address the corresponding root causes

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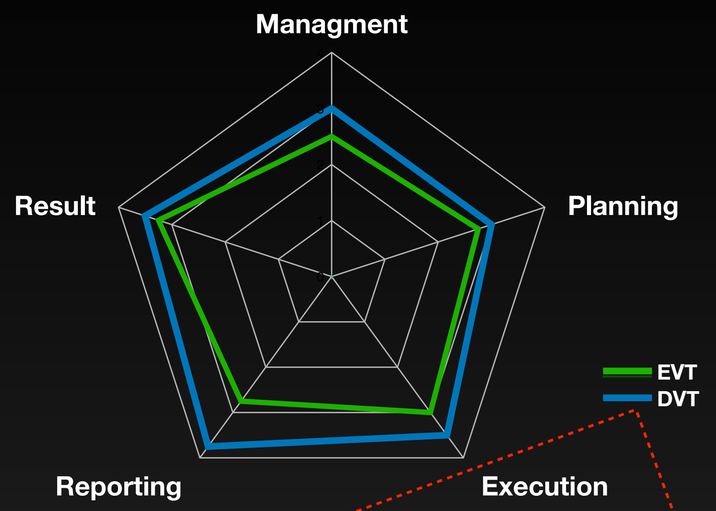
Performance Review | Improvement Items & Performance Trend

*[Once **Evaluation Scorecard & Feedback Alignment** are completed, we will review with executives for official build summary and improvement actions]*



Summary :

- Well understanding on factory resource and operation. Good CM x-functional internal management and insight consolidation
- Able to heads up and coordinate to solve urgencies in good attitude, secure deliverables per schedule under COVID-19 impact
- Acceptable reporting and issue clarification skills

Exceed Expectation | Meet Expectation | Meet but not consistent | Cannot Meet Expectation

Category		Rating	Observations in DVT	Room for Improvement
Management		3	• Good leadership to lead Xxx x-function team to ensure NPI activities go smoothly as planned to meet target build orientation, including build management, resource securing, data collection with efficient communication	• Better control on engineering resource dedicated to problem solving • More consistent FACA driving across x-functional team
Planning		3	• Proactive on planning arrangement especially when team has to wait for the last minute decide on the material down selection (such as 4.3pF/ 3pF capacitor down selection for SMT build, and cosmetic waiver for stamped end cap for FAP build) • Always be flexible to prioritize the important builds, to adjust process control along with the communication with ABC team	
Execution		3.5	• Smooth communication in daily basis open close meeting to cover all critical items as well as risk assessment, mutual discussion for better arrangement and problem solving • Prompt response and preventive actions were in place as soon as issues were identified during builds	
Reporting		3.75	• Able to share info and report with ABC defined template and escalate timely thru proper path	• Xxx EPM tried to hand out most of the regular reports required by ABC EPM to x-functional DRIs for daily basis update, but it has not been implemented completely due to fast pace for DVT build, continue to bring up team for reports maintenance on new projects
Result		3.5	• Show strong ability to lead team to deliver result to pull in overall schedule, achieve target yield, fulfill validation purpose with most cost efficiency solution	

Demonstration

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NPI CM Playbook | Recommended Performance ReviewReview

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Agenda :

- **Opening** *(Oral Update)*
- **Scoring & Feedbacks**
- **Collaboration and Efficiency Tracking** *(CM's Feedback)*
- **Attrition & Key Talent Retention**
- **Exec Wrap Up** *(Oral Update)*

Demonstration

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CM Playbook | 2023 Spring Overall Score

Summary :

- Data scoring by different area to indicate which area CM do better job.
- Will explain more detail for expect more with detail slide later
- At overall score bar, we can measure the overall performance, normally link to bonus.

Performance target:

Level-1:"Exceed" >40% "Expected more"<=10%

Level-2: "Exceed" >55% "Expected more"<=5%

Demonstration

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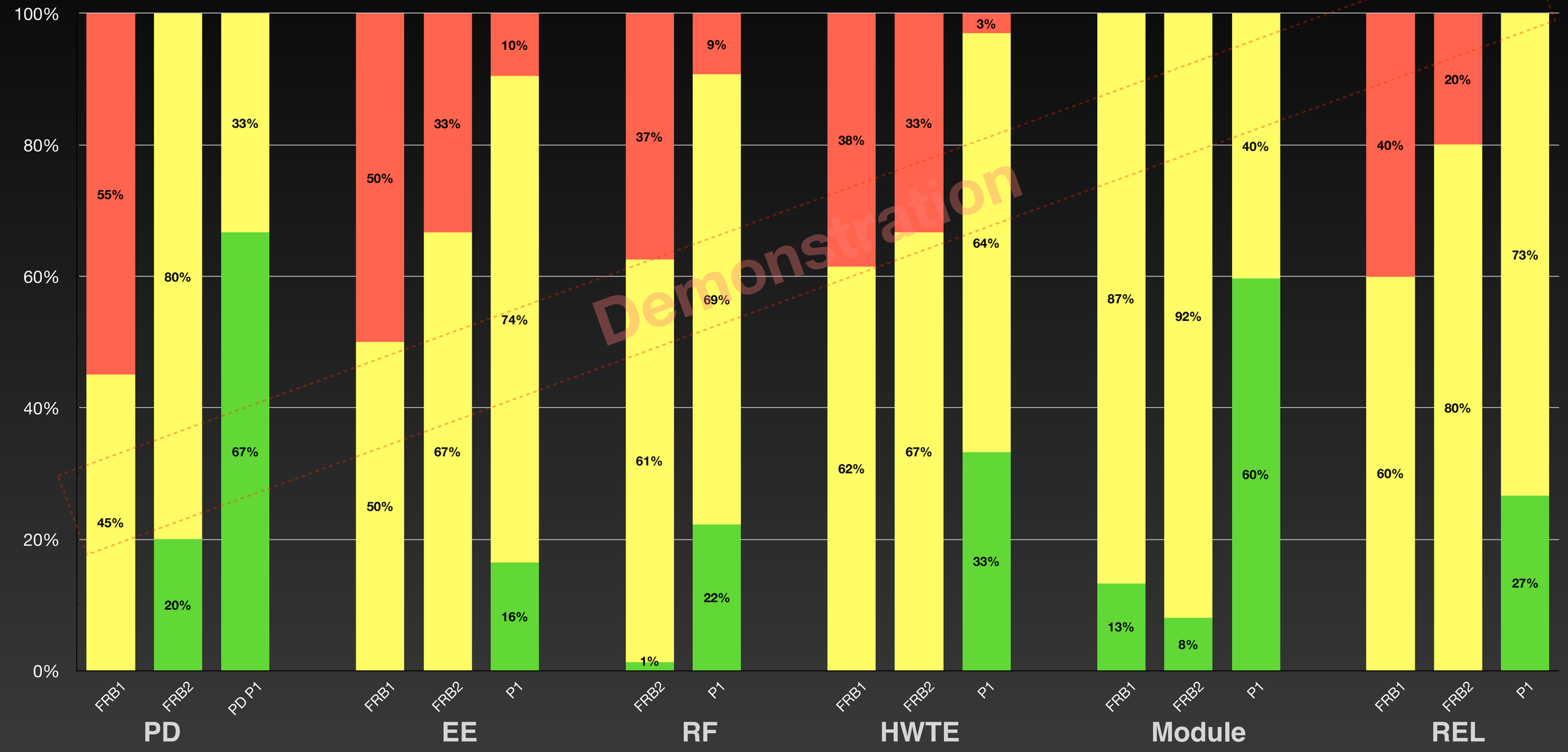
CM Playbook | 2023 Spring Overall Score - Team Breakdown

Summary :

- Score by different functional team to see the performance trend build over build



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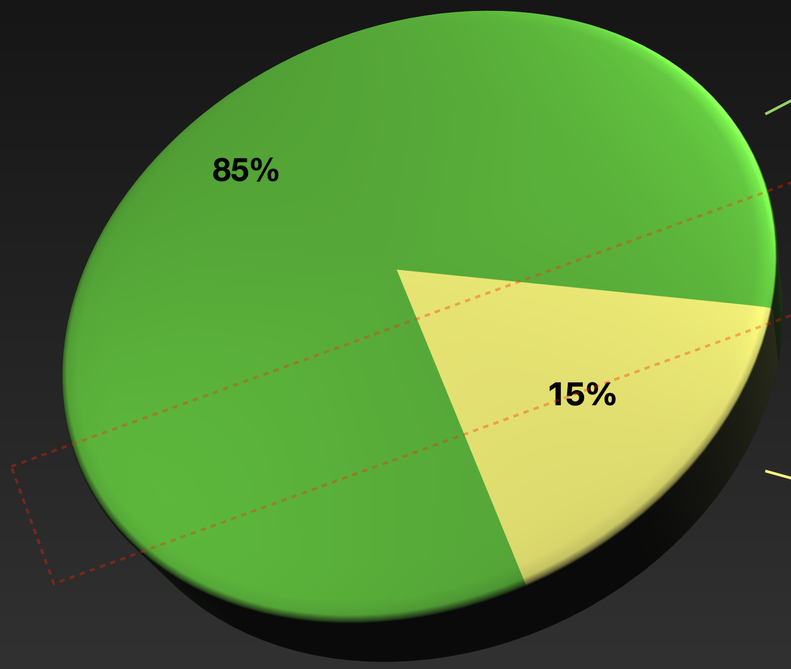
CM Playbook | 2023 Spring Performance Feedback - Teamwork

Overall Result

Above Expectations Meets Expectations Expectations More



"Quickly bridged the resource gap by leveraging resources from other LoBs in the first 6 months to ensure the proper coverage on two programs. which gave each function teams additional time to hire dedicated and qualified resources on Watch"

- System EPM

"Seamless communication with Apple team during build execution"

- System EPM/EPS

Demonstration

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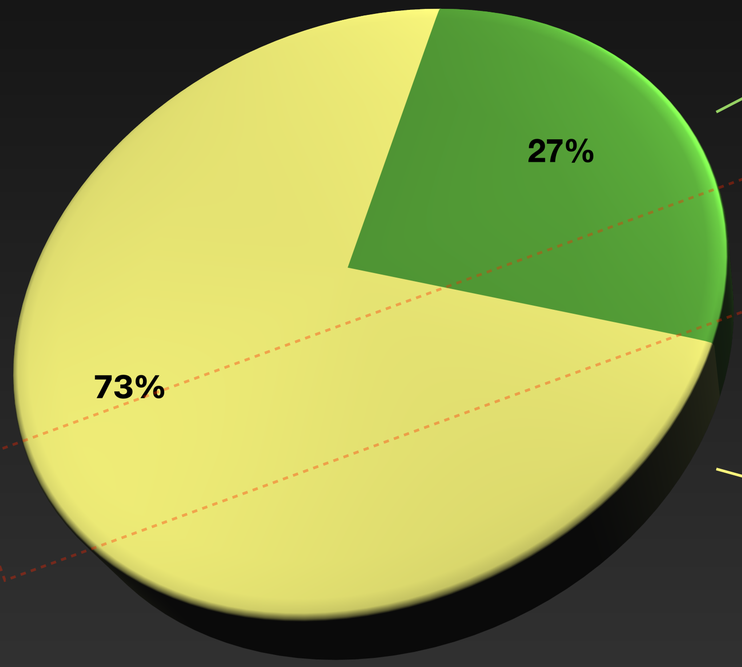
CM Playbook | 2023 Spring Performance Feedback - Innovation

Overall Result

Above Expectations Meets Expectations Expectations More



"Team demonstrated extraordinary logistic management during COVID lockdown in terms of material delivery and system shipment, navigating new and challenging technologies along with working through a Covid lockdown, Innovate from all the possible way to mitigate Covid impact, and actually no any delay to build and program"

- System EPM/EPS

"Team explored special instruction into shop floor system control, to eliminate mistake from manual check and ensure proper process being followed."

- System/PD EPM

Demonstration

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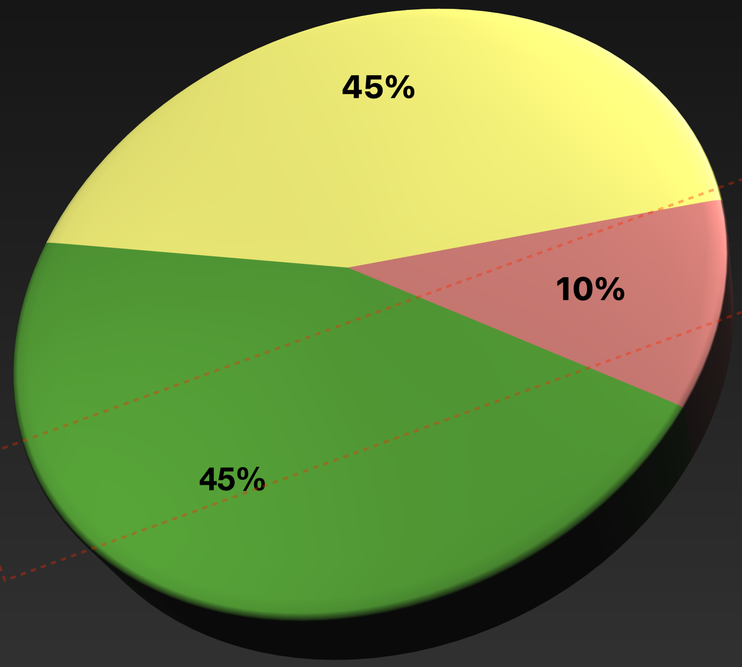
CM Playbook | 2023 Spring Performance Feedback - Execution

Overall Result

Above Expectations Meets Expectations Expectations More



Demonstration

"The good units have been take apart without proper communication and EPM approval, as the result, other teams data collection on the specific config have been impacted significantly and not recovered. "

- System EPM

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CM Playbook | iDL Performance Review - Top “Expected More” Items

Med-High Critical

Area	Apple Comments	CM feedback	Team
People	Resource arrangement to cover 2023 projects and overlap schedule. & Bring up more new talents from new hire engineers to show their contribution	Raymond/Katherine to provide 2023 hiring plan and bring up plan	All
Process	Need to improve on systemic monitoring of process integrity & workmanship issues (like unauthorized rework, generate fake label), which are critical challenges for manufacturing compliance	To prepare one pager	AME/PE/TPM/PQM
Process	RTV and RTC schedule following up between x-team	Katherine/Kenny to work out the improved process considering current process/LT and improvement opportunity	Display Eng
Leadership	Need better Influence to Quanta/Apple cross function team, to enable further collaboration and improve work efficiency.	Peter to prepare one pager after aligning with PD team	PD/HID/Thermal
Leadership	Lack of experienced/mature individuals who could take leadership and ownership in issue FA with cross functional team, leading DOE execution and data analysis.	Kelvin to update	HWTE/SFD
Process	New SMT process development and automation	Riggs to prepare one pager	DFM/MLB/PE

Demonstration

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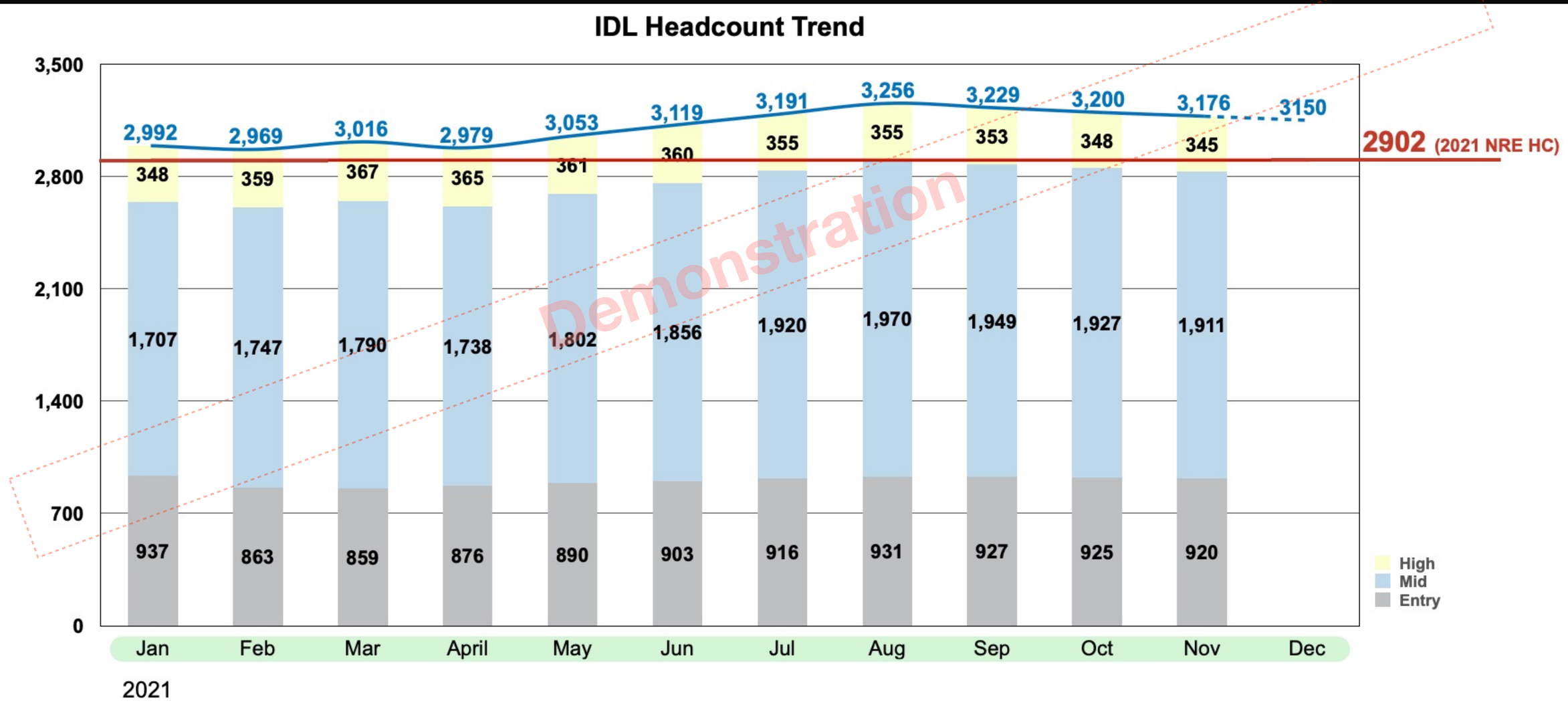
CM Playbook | iDL Hiring Status

Key takeaways :

- Fixed & New Hiring IDL HC, reach to Ave 3,100 HCs
- New hiring channels & methodology implemented



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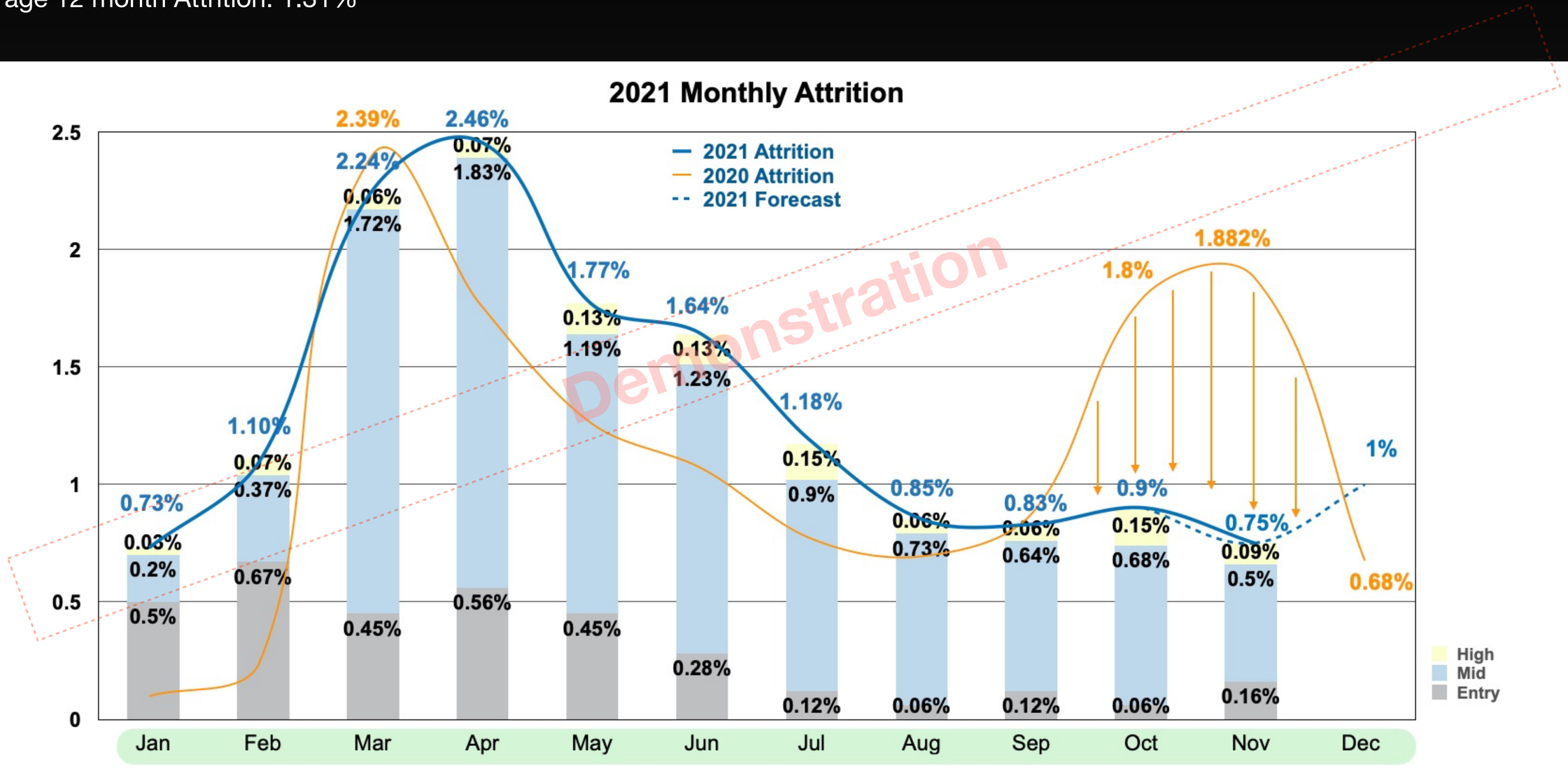
CM Playbook | iDL Attrition Rate

Key takeaways :

- Average 12 month Attrition: 1.31%



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NPI CM Playbook | x-Func Feedback & Comments

(Data collection, will not show in the meeting)

Demonstration

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CM Playbook | Team Eval Template

Apple DRI :
CM DRI:

Updated: xx.xx.2020

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)					
Area of Evaluations					
Area of Evaluations					
Area of Evaluations					

Demonstration

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Apple DRI :
CM DRI:

Updated: xx.xx.2020

Individual with Outstanding Performance:

Name	Achievement & Key Talent	CM Comments

Demonstration

Individual has improvement opportunity:

Name	Achievement & Key Talent	CM Comments

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Apple DRI :
CM DRI:

Updated: xx.xx.2020

Non Scoring Section - Growth, Opportunities, New expectation

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	CM's comments
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)	Comments about goals for upcoming build/year, area for improvements (Not Rating)			
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)				
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)				
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)				
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)				
Area of Evaluations (Ex: FA/Repair, DOE/Offline, Shipping, Build mgmt, Material mgmt)				

Demonstration

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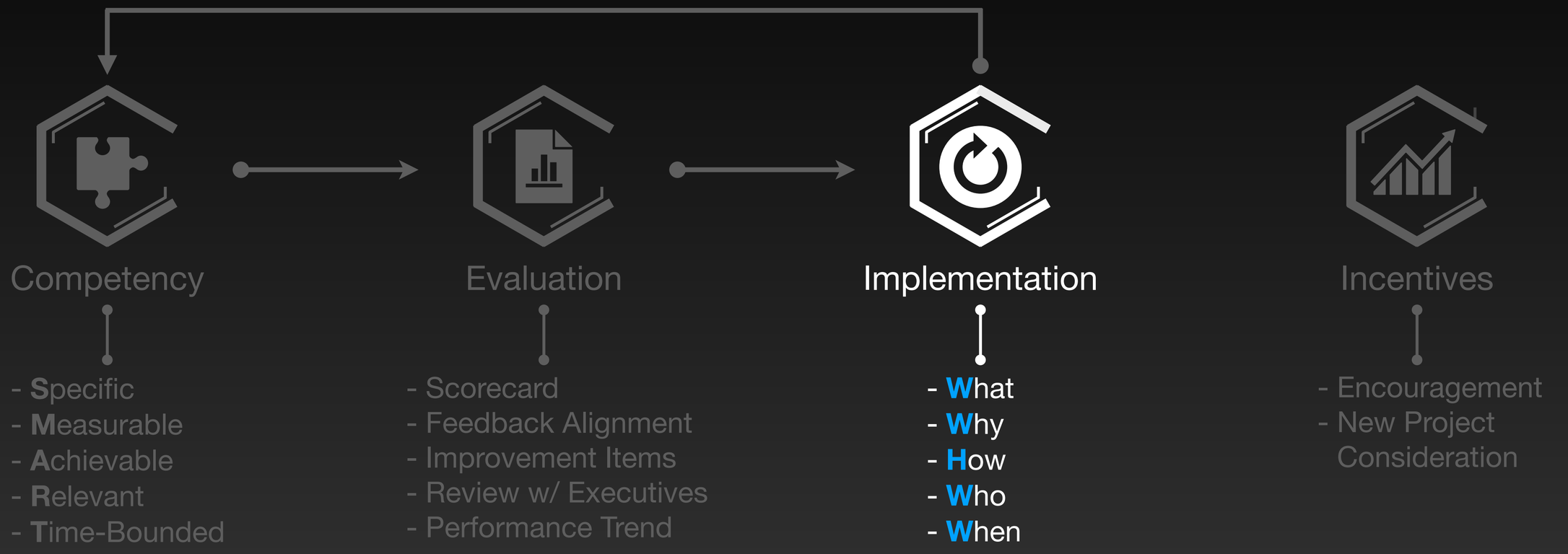
Postmortem Process Overview



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Performance Review | Implementation

[Quick Recap on previous demonstrated feedback aligned with CM team members]

		What	Why	How
Function	**Category**	**Key Highlights / Issues**	**Root Cause**	**Key Learnings**
EPM	Planning Preventative Mitigation	- Material shortage during post EVT build to fulfill DOE requirements from x-function team	- COVID impacts material ETA especially for those vendors suffering from lock down	• Dynamic adjustment on DRP vs. DOE demand projection • Closer monitoring on balance of materials w/ long lead time • Proposal of material buffer for contingency purpose in advance
EPM	Management Resource Securing	- 2 PMs rolled-off the project due to resignation, causing DOEs control and production line control with low effectiveness and efficiency for 3 weeks	- Overlooked the potential resource risks - Limited backup resource - Sophisticated hiring process	• Setting 1-month alert in advance for employee resignation • Escalate to leadership at earliest possible for substitution • More frequent CM internal sync on each member's status, thus better enable potential work hand-over

Demonstration

** Implementation stage will further specify on Who, When of the previously defined actions*

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Performance Review | Implementation

[Quick Recap on previous demonstrated feedback aligned with CM team members]

What	Why	How	Who		When
Key Highlights / Issues	**Root Cause**	**Improvement Actions**	**Apple DRI**	**CM DRI**	**Check Point**
- Material shortage during post EVT build to fulfill DOE requirements from x-function team	- COVID impacts material L/T, especially for those vendors suffering from lock down	• Dynamic adjustment on DRP vs. DOE demand projection • Closer monitoring on balance of materials w/ long lead time • Proposal of material buffer for contingency purpose in advance	• YuAn • YuAn • YuAn	• Helen • Vivian • N / A	• Daily during next build • Daily during next build • 11/8
- 2 PMs rolled-off the project due to resignation, causing DOEs control and production line control with low effectiveness and efficiency for 3 weeks	- Overlooked the potential resource risks - Limited backup resource - Sophisticated hiring process	• Setting 1-month alert in advance for employee resignation • Escalate to leadership at earliest possible for substitution • More frequent CM internal sync on each member's status, thus better enable potential work hand-over	• N / A • YuAn • N / A	• Vivian • Vivian • Helen	• Whenever applicable • Whenever applicable • Daily during next build

Demonstration

Note:

- **Who:** Apple / CM DRIs for the specific actions, RASCI illustration if needed
- **When:** Within specific time frame, or clear check point, or certain frequency

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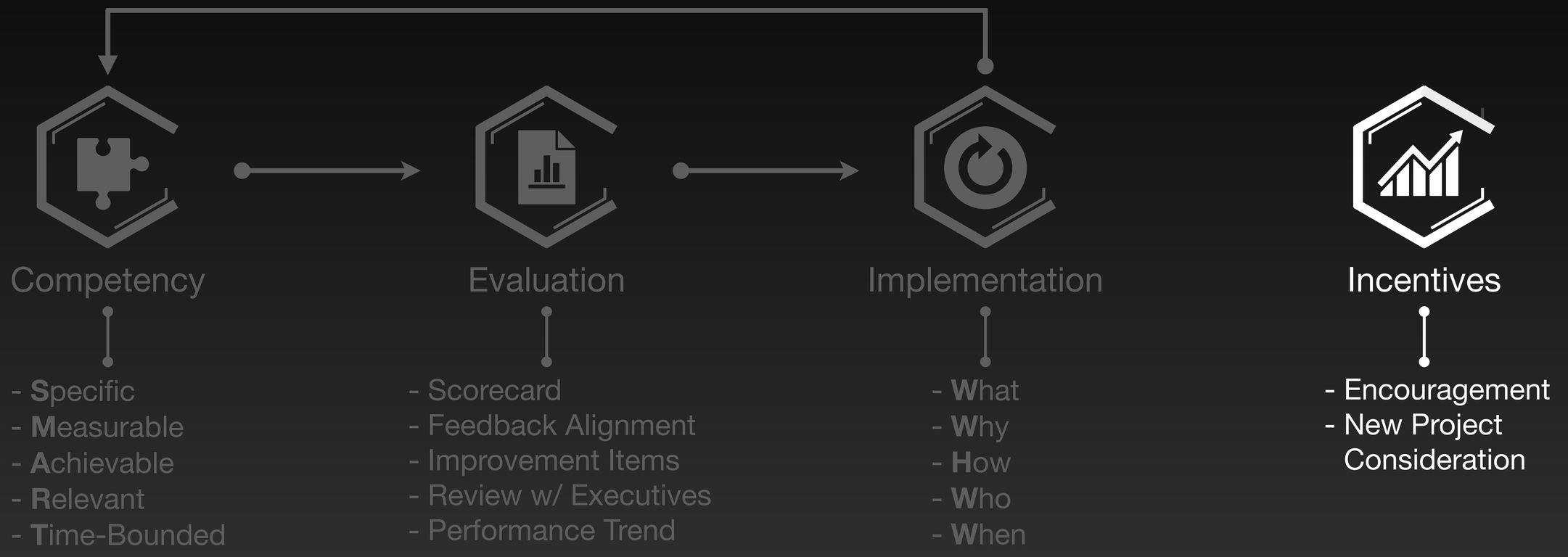
Postmortem Process Overview



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Performance Review | Incentives

Summary :

- Regularly review CM IDL performance and drive continuous improvements
- Motivate CM IDL engineers and keep key talents on program
- Evaluate performance and give the score by X-functions
- NRE incentive plan setup based on CM score

Example

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM Score	Ranking	Bonus / Penalty	NRE Percentage
Avg < 3	Unacceptable	Penalty	-10%
3 ≤ Avg < 3.4	Acceptable	N/A	0%
3.4 ≤ Avg < 3.6	Outstanding	Bonus	5%
Avg ≥ 3.6	Exceptional	Bonus	10%

Demonstration

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Appendix | CM Performance Review

- Cross LOB Performance Review
- Recommended Performance Review Format

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Appendix | CM Performance Review

- Mac (18 pages)
- iPhone (19 pages)
- iPad (14 pages)
- Watch (12 pages)
- VPG (12 pages)
- Audio/Package/Softgoods (19 pages)
- Home (15 pages)

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Performance Review | Cross LOBs Summary

	MAC	iPhone	iPad	Watch	VPG	Audio Packing Softgoods	Home
Event	iDL Performance Review	iDL Performance Review	iDL Performance Review	iDL Performance Review	iDL Performance Review	iDL Performance Review	Postmortem
Frequency & Review Criteria	Current CM : • Half year New CM : • Just started and under discussion	Current CM : • Half year New CM : • After each training build & half year • Criteria no change	Current CM : • Half year New CM : • After each build • Criteria under discussion	Current CM : • Annual New CM : • After each build	Current CM : • Half year New CM : • Under discussion	Current CM : • Twice per project duration (Post P1 & build completion) New CM : • Twice per project duration • Criteria no change	Current CM : • After each build New CM : • After each build • Criteria no change
Incentive	Yes	Yes	No	Yes	Yes	Yes	No

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Appendix | CM Performance Review

- Mac Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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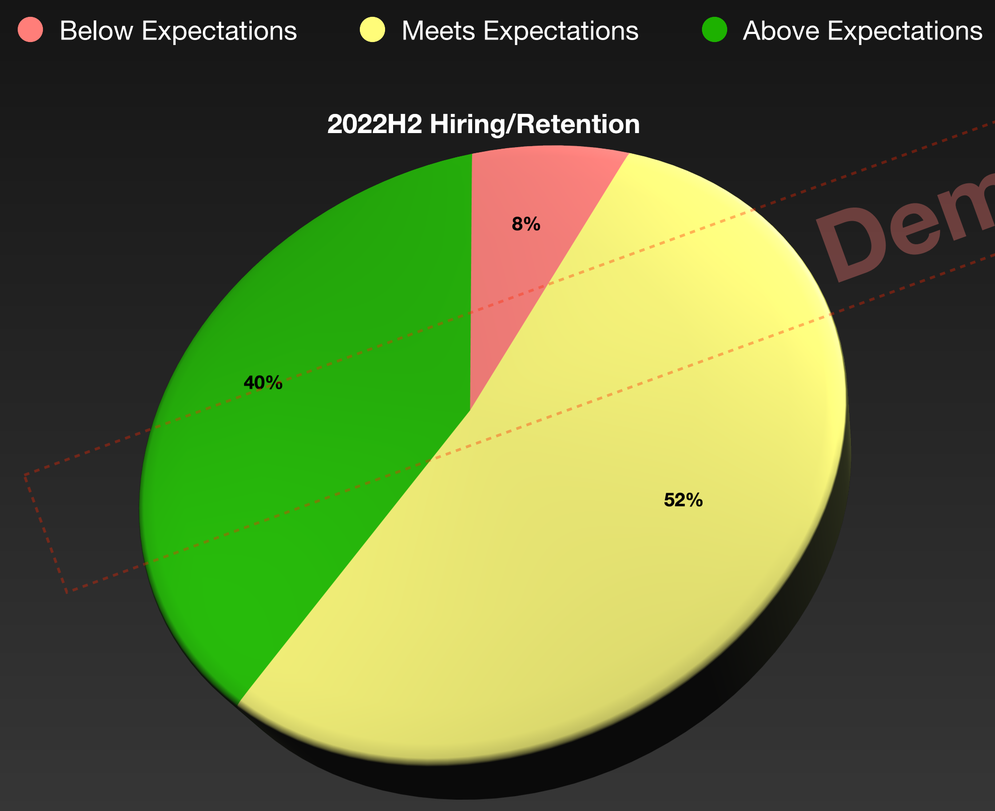
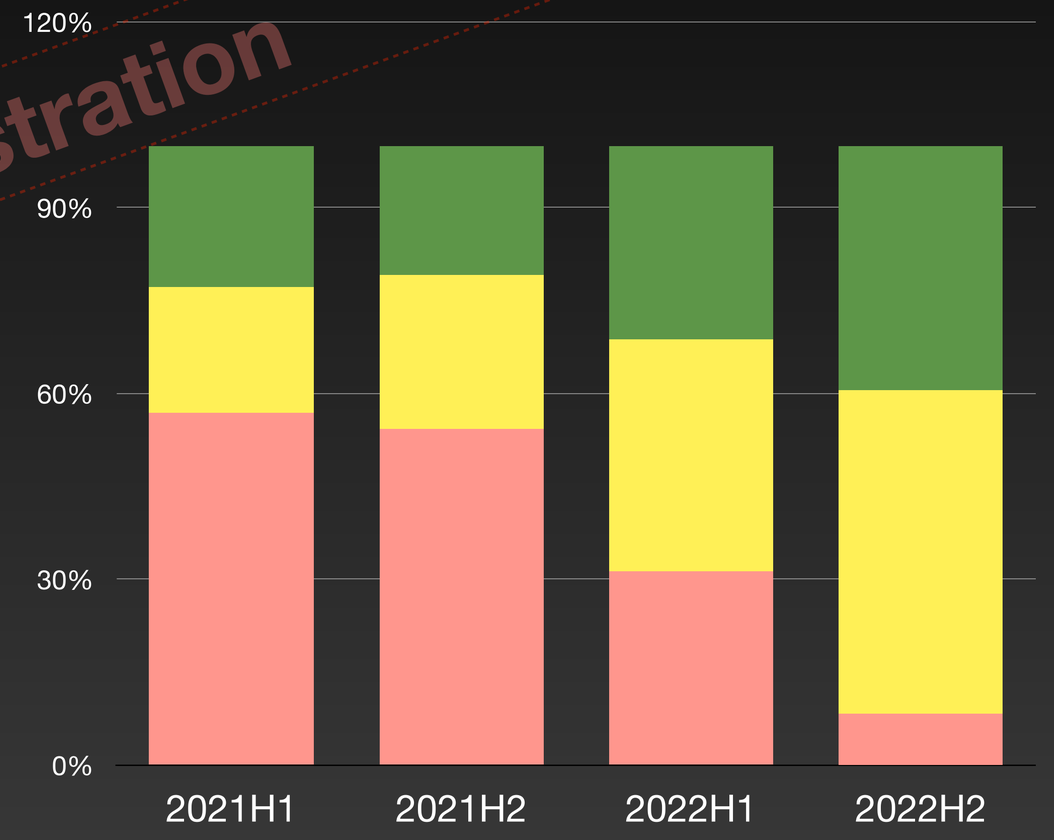
Mac | 2022-H2- QSMC ENG QBR Summary - Hiring & Retention

Overall Summary

- Showed significant improvements from 2021 to 2022 and keep the momentum in 2022H2 further
- “Below” category further dropped to 8% from 31% in 2022H1
- “Above” increased to 40% from 31% in 2022H1





Demonstration

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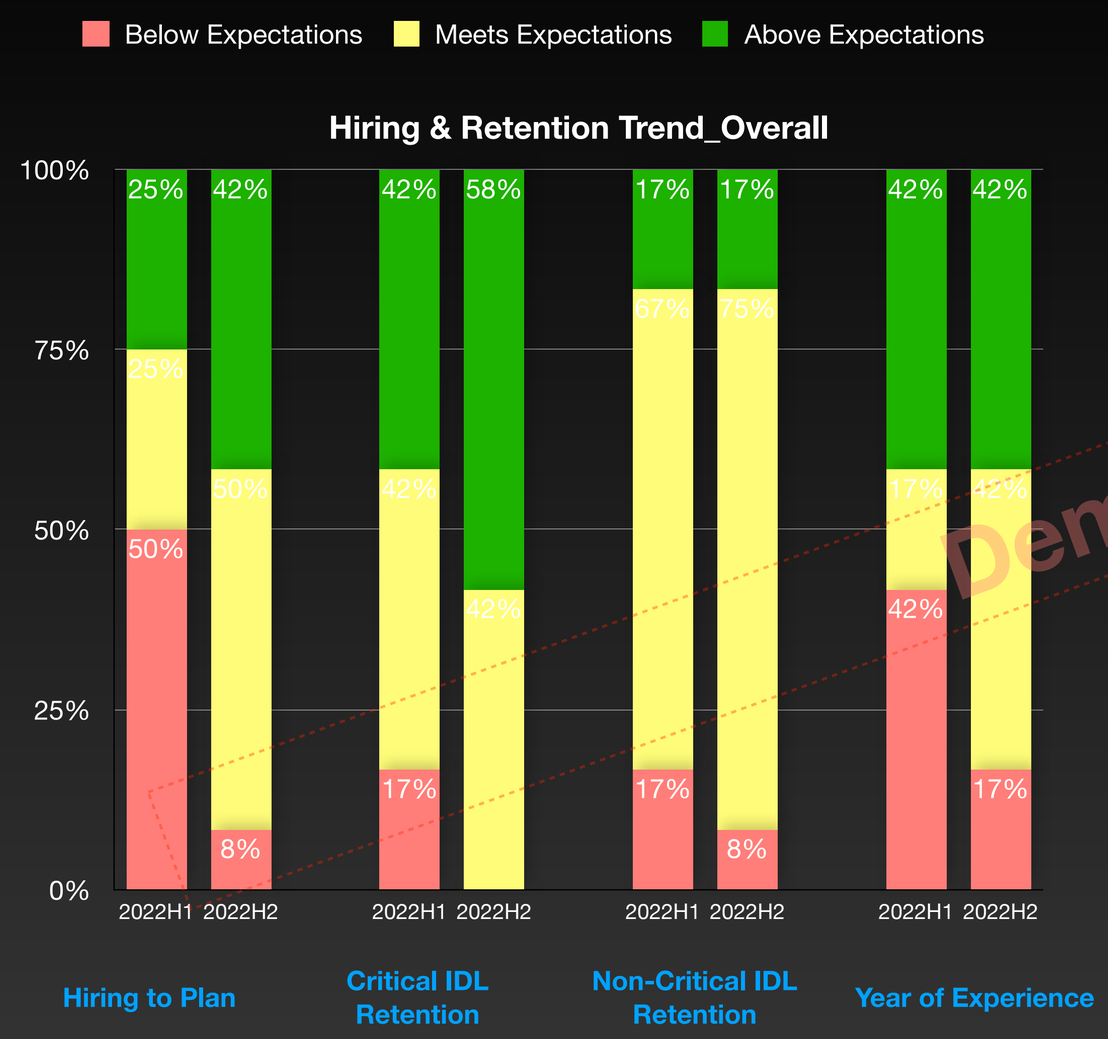
Mac | 2022-H2- QSMC ENG QBR: Hiring&Retention Breakdown



Area	Apple Comments	Team
Hiring	Significant improvement on hiring and meet NPI demand	All
IDL retention	- Improvement on both critical IDL and non-critical IDL - Non-critical IDL retention of wireless is below expectations - 88.2% vs 90% meet	All Wireless
Bring up	- Improvement on bring up with 42% meet vs 17% meet - AME/PE/TPM - 64.5% >1year, and wireless - 74.5% > 1year are still below expectations vs 75% meet	All AME/PE/TPM & Wireless

Demonstration

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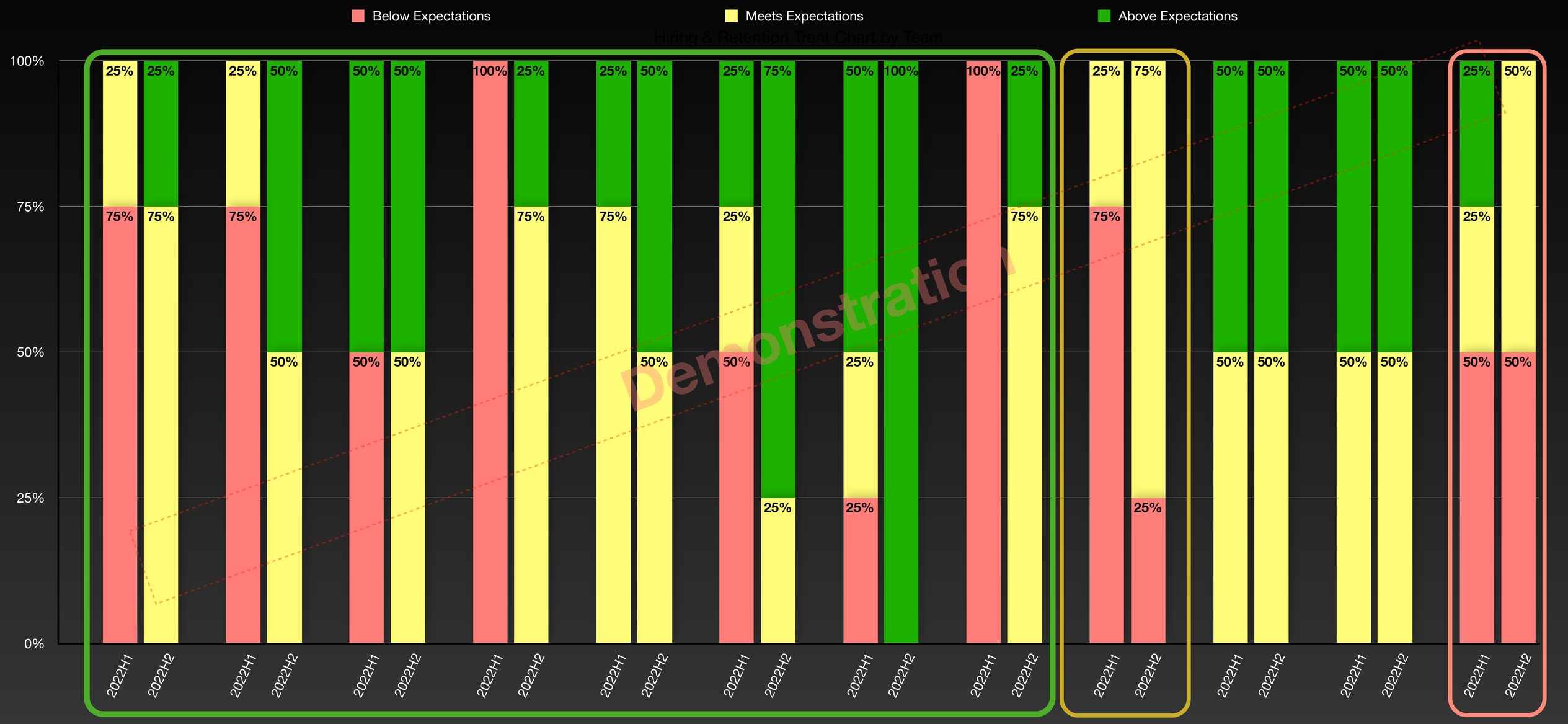
Mac | 2022-H2- QSMC ENG QBR: Hiring&Retention by Team



Significant improved

Expecting More

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Mac | 2022-H1- QSMC ENG QBR: Key Achievements

Area	Apple Comments	Team
Performance	– Quick responses & Leadership of NPI resumption by joining close loop after lock down – Take ownership on QT stations for test coverage review, ERS tracking etc – Good work on new WiFi6e chipset bring up, J414/416 Ok2Ship with new WiFi module which support WiFi6E	All HWTE/SFD Wireless/Audio
Development	– Thermal team developed data parsing tool to enhance data processing efficiency – Implemented new technical capability (LCF, DIC etc) under Rel team's instruction. Co-work with other teams closely and successfully enlarge SDA lab for 1200x sqrm to enhance Rel test capacity for more new projects. – Expanded logistic/allocation working scope with 3x additional HC new hired – Enable signal validation team and re-model a smart Chartz lab, delivered high quality chartz results for MBP this year.	PD REL/SDA EMC EE

Demonstration

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Mac | 2022-H1- QSMC ENG QBR: Key Challenges

Area	Apple Comments	QSMC feedback	Team
People	Resource arrangement to cover 2023 projects and overlap schedule. & Bring up more new talents from new hire engineers to show their contribution	Raymond/Katherine to provide 2023 hiring plan and bring up plan	All
Process	Need to improve on systemic monitoring of process integrity & workmanship issues (like unauthorized rework, generate fake label), which are critical challenges for manufacturing compliance	To prepare one pager	AME/PE/TPM/PQM
Process	RTV and RTC schedule following up between x-team	Katherine/Kenny to work out the improved process considering current process/LT and improvement opportunity	Display Eng
Leadership	Need better Influence to Quanta/Apple cross function team, to enable further collaboration and improve work efficiency.	Peter to prepare one pager after aligning with PD team	PD/HID/Thermal
Leadership	Lack of experienced/mature individuals who could take leadership and ownership in issue FA with cross functional team, leading DOE execution and data analysis.	Kelvin to update	HWTE/SFD
Process	New SMT process development and automation	Riggs to prepare one pager	DFM/MLB/PE

Demonstration

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Appendix | CM performance review

- Mac Engineering Team - EPM

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Mac | 2022 H2 QBR - EPM/EPS

Level 1	"Meets" or "Above" Expectations in at least 75% of Hiring and Performance categories "Above" in 40% of categories REL Operator support, 60x DL per line
Level 2	"Meets" or "Above" Expectations in at least 90% of Hiring and Performance categories "Above" in 55% of categories REL Operator support, 60x DL per line

Standard Criteria

Criteria set by Group

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above	Above 97.73%
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above	Above 100%
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above	Meet 93.7%
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	Above 89.7%>1YR 58.9%>3 YR 46.6%>5YR

Performance					
EPM/EPS support resource for each program	Above	EPM/EPS capability to manage complex build activity	Meet	Drive vendor to provide clear and accurate material ETA	Meet
Immediately escalate on CTB issue require Apple support before the build	Above	Proper manage material to avoid material mix	Below	WIP accuracy and FA units management	Meet
EPM/EPS communication skill	Meet	Nimbus information maintain and update	Above	DOE status tracking and schedule control	Meet
Line down information delivery and escalation for support.	Below	Build Readiness check list and Blocker tracking	Meet	Packout plan and execution	Meet
Leadership for engineering and operation resource for support	Below	Review and provide build config input sequence proposal	Meet	Shipment on time and notice for delay	Meet

Demonstration

Key Achievement

- Meet IDL resource plan by consistent hiring and incentive plan to retain critical IDLs
- Most of the projects maintain high qualify of CTB and Nimbus BM management
- Quick responses & Leadership of NPI resumption by joining close loop after lock down

Key Challenge

- EPMs accountability and leadership on project management, require more trainings by EPx management.
- Request EPx to deep dive into critical issues and drive efficiency, keep team in sync in regular bases.
- Require a solid process to avoid material mixing for same APN but different flow/bin/lot etc.

Evaluation Summary

Above Expectations	**20.00%**
Meets Expectations	**60.00%**
Below Expectations	**20.00%**

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Appendix | CM performance review

- Mac Engineering Team - PD

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Mac | 2022 H2 QBR - PD

Level 1	"Meets" or "Above" Expectations in at least 75% of Hiring and Performance categories "Above" in 40% of categories REL Operator support, 60x DL per line
Level 2	"Meets" or "Above" Expectations in at least 90% of Hiring and Performance categories "Above" in 55% of categories REL Operator support, 60x DL per line

Standard Criteria

Criteria set by Group

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above (Monthly Average)	Meets 96.3%
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above (Leaving IDL/Critical IDL) Every half year	Above 0/47 100%
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above Every half year	Meets 7/137 94.9%
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	Meets 82% (151/184) 45.6% (84/184) 29.3% (54/184)

Performance					
Communicate with vendors/ factory team: coordinate materials/provide DFMs from vendors or factory to APD, request samples, arrange for FA	Above	Create component designs that are feasible, manufacturable, accomplish the goals of the part, fit in the system, etc.	Meet	Manage part releases and track deliveries for builds, make sure all parts on BOM are released/ on track	Meet
Enhance communication between APD, OEM cross-functional teams, and Apple IR cross-functional teams. Keep all parties up to date and coordinate effort on FA, DOEs, design changes, etc	Meet	Watch for potential issues and risks and provide proposals for fixes	Meet	Create documentation (drawings, specs) that are achievable and properly note requirements	Meet
Share learnings across programs within QPD	Meet	Encourage growth and learning on the team, spread knowledge	Meet	Monitor the line and notify APD of any issues or risks	Meet
Help scrub and refine APD designs in CAD (tolerance stacks, interference checks)	Meet	Propose alternative designs, assembly processes, FA methods , or validation plan which is new to Apple.	Meet	Validate parts design: run DOEs, test prototypes	Above
Manage team travel schedules to support builds and design activities. Lead projects and teams effectively	Meet	Develop a process which can improve the work (reporting, FA, or communication) efficiency.	Meet	Manage the MIL, perform the FA for build and rel issue and propose solutions.	Meet

Demonstration

Key Achievement

- Project lead can well lead PD MIL with APD, also well maintain MIL document.
- Have seen examples of improved quality of FA plan(CGT/LL/system cos,etc), summary report and design change proposal from QPD/thermal team.
- Have seen example of cross functional communication driven by QPD/thermal team.
- Improved knowledge sharing across different project teams.
- Thermal team developed data parsing tool to enhance data processing efficiency.

Key Challenge

- Need continuous improvement on in-depth FA, PD skill(GD&T, MTD, TA, etc), solution proposal and report quality from overall QPD team.
- Need better Influence to Quanta/Apple cross function team, to enable further collaboration and improve work efficiency.
- PD resource of iMac Rel FA and fractography analysis is not sufficient, need dedicated person to oversee Rel FA status as well.

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Appendix | CM performance review

- Mac Engineering Team - EE

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Mac | 2022 H2 QBR - EE

Level 1	"Meets" or "Above" Expectations in at least 75% of Hiring and Performance categories "Above" in 40% of categories REL Operator support, 60x DL per line
Level 2	"Meets" or "Above" Expectations in at least 90% of Hiring and Performance categories "Above" in 55% of categories REL Operator support, 60x DL per line

Standard Criteria

Criteria set by Group

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above (Monthly Average)	Below (93%)
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above (Leaving IDL/Critical IDL) Every half year	Above (98%)
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above Every half year	Below (85%)
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	Meet (86.3%> 1Yr 39.2%> 3Yr 25.5%> 5Yr)

Performance					
BOM / Build Matrix review	Meet	**New engineer bring up plan and new technology sharing**	Meet	**NPI build support—FA capability**	Meet
Characterization support	Meet	**Retention for overall and key talents**	Above	**NPI build support—Daily report , build summary and critical issue summary**	Meet
MP and PRQ support	Above	**Equipments logistics , maintenance, calibration and upgrade**	Meet	**NPI build support—Communication**	Meet
Handover SOP/Training	Meets	**Taking incentives/ proactiveness**	Meets	**NPI build support—Bringup and SoC Test Plan Validation**	Above

Demonstration

Key Achievement

- Keep improving critical IDL retention rate.
- Successfully complete all P1/P2 category characterization items for four MBP boards before critical EVT fab RTV checkpoint, expect to achieve same result on othe portable programs.
- Significant improvement on lab management including access control, equipments maintainance and usage planning/tracking.
- Continue to track critical component failure RTV status on MBP programs and drive vendor to identify root cause.

Key Challenge

- Need improve non-critical IDL retention rate.
- Need tech leaders pro-actively communicate with Apple DRI to deep dive into new product feature and technology then share basic FA knowledge with other junior members, to help team improve FA quality and efficiency during builds.
- Need BOM DRI be more careful to review all BOM change and deviations, take the responsibility to compare change across mulitple programs.

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Appendix | CM performance review

- Mac Engineering Team - HWTE

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Mac | 2022 H2 QBR - HWTE

Standard Criteria
Criteria set by Group

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above (Monthly Average)	**Above** H2 (97.6%)
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above (Leaving IDL/Critical IDL) Every half year	**Above** H2 97.1%
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above Every half year	**Meets** H2 90.5%
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	**Meets** 75.6% > 1yr 39.7% > 3yr 18.2% > 5yr

Planning		Coordination & Initiatives		Communication		Reporting		Expertise	
Resource allocation	Meets	Lead/Host the dry run, testing meetings	Meets	Communicate clearly with internal/external team	Above	Provide daily report following standard format	Meets	Factory process: Test, fixtures shipping, assembly, process control	Above
Test Line readiness	Above	Coordinate the cross functional team for station bring up, SW/ FW validation, handover	Above	Test leadership representation in meeting	Below	Yield bridge documentation for each build	Above	End to end test solutions, eco-system, station technology/coverage	Below
Material/Fixture/EQ validation	Above	Perform data analysis, DOE, first level issue triage	Below	Spontaneous respond to Apple DRIs	Above	Test readiness/ Issues tracking	Meets		
Milestone/Objective definition	Meets					Test documentation: Coverage, syscfg, attribute	Meets		

Demonstration

Above Expectations	**43..75%**
Meets Expectations	**37.50%**
Below Expectations	**18.75%**

Key Achievement

- Good Collaboration with internal and cross functional teams to support products more smoothly, improve test process and work efficiency.
- More ownership and station SW integration from CMSW, 130% increased.
- Work on most of fixture design, 1page FA report, ERS document and evaluate fixture retrofitting for MP.

Key Challenge

- Lack of experienced/mature individuals who could take leadership and ownership in issue FA with cross functional team, leading DOE execution and data analysis.
- Need improve technical expertise in order to be able to design DOEs, triage issues, provide issue statements and updates accurately and in depth.

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Appendix | CM performance review

- Mac Engineering Team - RF

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Mac | 2022 H2 QBR - RF

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above	**Above** **98.7%**
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above	**Above** **100.0%**
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above	**Meets** **91.4%**
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	**Below** **79.1% > 1 Yr.** **20.9% > 3 Yr.** **14.0% > 5 Yr.**

Performance					
QSMC Desense Engineers worked collaboratively with Apple Desense DRIs	Meet	*Proposal&validation good solution to fix desense issues*	Meet	*High efficiency Daily Desense FA support*	Meet
QSMC Desense Engineers Collaboration with internal to backup each other	Above	*Optimize test process to improve working efficiency*	Above	*Good build management from test station setup,dry run ,command validation,chamber calibration,WiPAS validation ,test resource arrangement and so on*	Above
QSMC Desense Engineers Collaboration with other QSMC teams like PE,TE,PD,EE,PMs to get necessary support	Above	*Simplify data process and format to easily showing meaningful data*	Above	*Clearly,accurately,timely comprehensively data Report and continuity keep issue update*	Meet
Communicate & Writing mails to deliver message clearly,accurately,timely & effectively	Meet	*Keep learning and training to improve desense skills*	Meet	*Be able to independently support MP products, such as PRQ ,DOE...*	Above

Demonstration

Key Achievement

- Successfully build support for new MBPs Ok2ship;
- Better Collaboration with both internal team members and other function teams;
- Prompt monitor and response to station related issue and highlight to correct DRIs

Key Challenge

- To take more initiatives of monitoring and ensuring Desense DOEs going forward smoothly
- To be more positive to train new employees with more deep understanding of what is our working scope and what is our working target

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Appendix | CM performance review

- Mac Engineering Team - REL

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Mac | 2022 H2 QBR - REL

Standard Criteria
Criteria set by Group

Hiring & Retention	
Hiring to Plan 95% - Meets 97.5% - Above (Monthly Average)	Below 92.6%
Critical IDL Retention 95% (93% H1, 97% H2) - Meets 97% - Above (Leaving IDL/Critical IDL) Every half year	Meets 95%
Non-Critical IDL Retention 90% (88% H1, 92% H2) - Meets 95% - Above Every half year	Below 86.9%
Years of Experience: Meets: 75% > 1 Yr. 25% > 3 Yr. 10% > 5 Yr. Above: 75% > 1 Yr. 50% > 3 Yr. 20% > 5 Yr.	Above 100% > 1 Yr. 54.5% > 3 Yr. 34.5% > 5 Yr.

Collaboration	
Communication with Apple REs - Clarity of communication, - Understanding & interpreting requests	**Above**
Miniline Definition & Procurement - -Collab w/ HWTE & procurement teams - -Miniline Process Standardization and Imporvement	Meets
System Allocation & Transfer - Collab w/ EPM/S and security teams on unit allocation and transfer b/w buildings	Meets
Collaboration within Quanta - Cross functional collaboration internal to QSMC	Meets

Creativity & Innovation	
Resource management -	Meets
Test Capacity&Capability Enhancement	**Above**
Test consistency across labs -	**Above**
Development and Improvement	**Above**

Delivery & Execution	
Rel Test Plan Execution : - Execution of build-specific test plans - Timely detection & reporting of all failure modes	**Above**
DOE Tracking - Efficient execution and tracking of DOEs and non-build related activity	**Above**
Test Data Integrity - Error-free reporting of data - No missed failure modes	Meets
Schedule management - Providing clear test CPs - Forecasting & minimizing delays - Timely reporting of schedule deviations	**Above**

Demonstration

Key Achievements

- Recon setup for data integration
- J415 support with huge test sample size

Key Challenges

- Need to close the hiring gap quickly
- More new product & new technology implementation
- Continuously improve the team training & management.

Evaluation Summary	
Above Expectations	%
Meets Expectations	%
Below Expectations	%

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Appendix | CM Performance Review

- iPhone Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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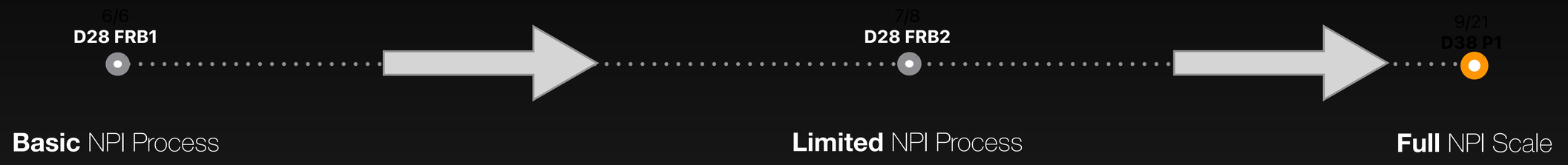
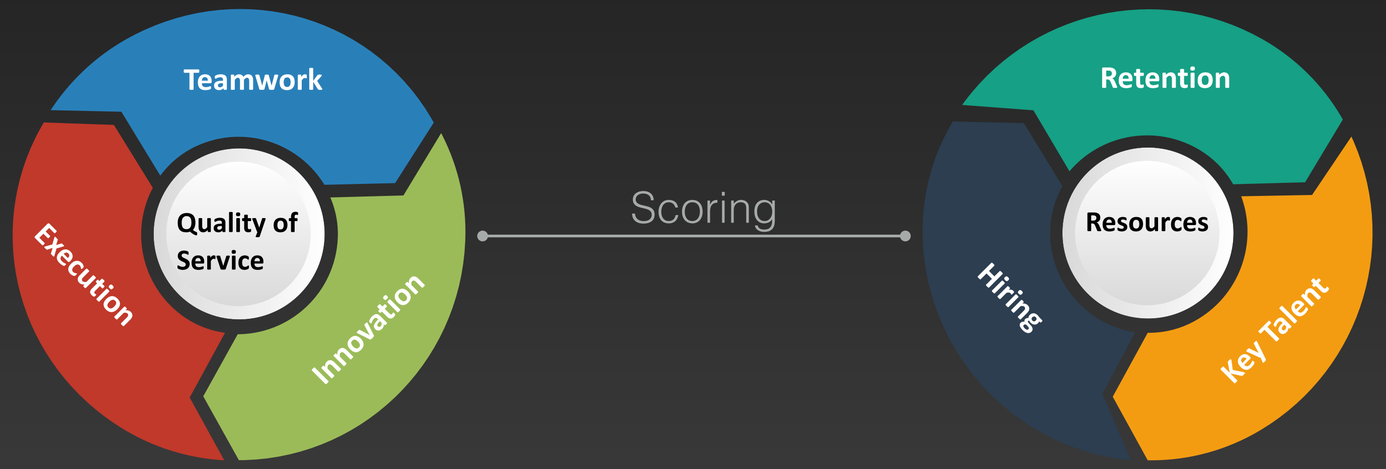
iPhone | Review duration and Methodology



Methodology



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iPhone | Review guidelines align with all CMs

Summary :

- Making sure entire Apple team use same guideline to review performance, and let CM knows what't their level using final score

	Exceeded	Achieved	Expected More
Teamwork with Apple	• Took proactive efforts to enhance relationships and collaboration with Apple Team • Significantly improved performance of Apple/CM cross functional teams • Enhanced how CM functions as extended team improving support and tools • Provided leadership on given deliverables at factory and inspiration to others teams • Team leadership - has leadership characteristics such as being proactive and taking ownership among many members of the team	• Cultivated relationships and worked collaboratively with Apple Team • Communicated clearly, openly and effectively. Brings issues to the forefront to get broader support • Positively influenced the performance of Apple/CM cross-functional teams • Provided leadership on given deliverables at factory • Effectively work as extended team, shared FA workload while Apple team is supporting remotely • Establishes proper training for CM employees • CM team retention stays consistent year on year	• Working relationship often strained or stressed, requiring regular escalation • Not showing up prepared • Details are often confusing and lacking suitable content to support next steps • Regularly blocks significant project efforts unnecessarily • Unwilling to take on standard requests or execute requests poorly • Assigns minimally trained team members to leading roles without guidance or support
Innovation & Creativity	• Developed processes or tools which made significant contributions to the program • Proactively identified a meaningful risk and developed an effective solution	• Applied expertise to find better ways to do things including new processes and methodologies • Focused on the details that produce excellence • Took smart, courageous risks • Proactively took initiative to come up with new ideas	• Did not apply best practices • Did not improve any processes or standard tasks
Build Execution & Results	• Build executed in a very efficient and streamlined manner • Proactively raised design and process concerns, and offered solutions where appropriate • Foresight and wisdom to see issues before they happen and lead effectively to help mitigate risk • Self-driven to report on issues and propose next steps or corrective actions • Documentation all very clear, easy to understand and effective • Improves best practices and operating procedures	• Prepared well for build and executed as planned • Produced high-quality outcomes • Accomplished goals and objectives on time and with quality work • Exercised good judgment and took responsibility for decisions • Did not hesitate to raise design and process concerns during build • Documented and shared issue detail, root cause, next steps • Utilizes best practices and well established standard operating procedures	• Unprepared for the build, significant execution challenges • Regularly misunderstands goals and objectives, executing incorrectly • Created unnecessary distracting challenges • Exercised poor judgement and didn't take responsibility for decisions • Did not highlight issues that needed support or attention until the last minute • Poor quality documentation about issues, limited detail around root cause, next steps • Lack of communication between CM cross functional teams results in poor execution/inefficient FA • Doesn't utilize well established processes/best practices

Demonstration

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iPhone | Collecting feedback and place actions to CM

Summary :

- Review all function team's feedback with CM one by one, and make sure CM place corrective action and improve plan
- Checking with team CM's improvement status between builds, making sure CM is on the right path

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)	Achieved	Achieved	Achieved	- Need to continue to improve highlighting issues to line efficiency	
Tracking FA/Repair & Top Issues	Achieved	Achieved	Achieved	- Issue tracking was good - Need to improve on issue presentation and guiding the team to be concise	
Material Management	Exceeded	Achieved	Expected More	- Kitting material issue in the beginning of the build, it got improved in mini & main build - CM A iMES system is able to control key parts (with barcode and SN) **by config**. Need CM A to increase flexibility for NPI build.	
Input and Line Management	Exceeded	Achieved	Achieved	- Routing instructions missed multiple times - Line flowed smoothly most days	
DOE/Shipping/Allocations	Expected More	Achieved	Achieved	- Keep busy policies not well executed - Need to better prepare ahead of build - Discuss details with DRIs ahead of sync meetings and highlight DOE risks after thorough scrub - Need to track shipment targets closely and provide recovery plan when targets missed	

Demonstration

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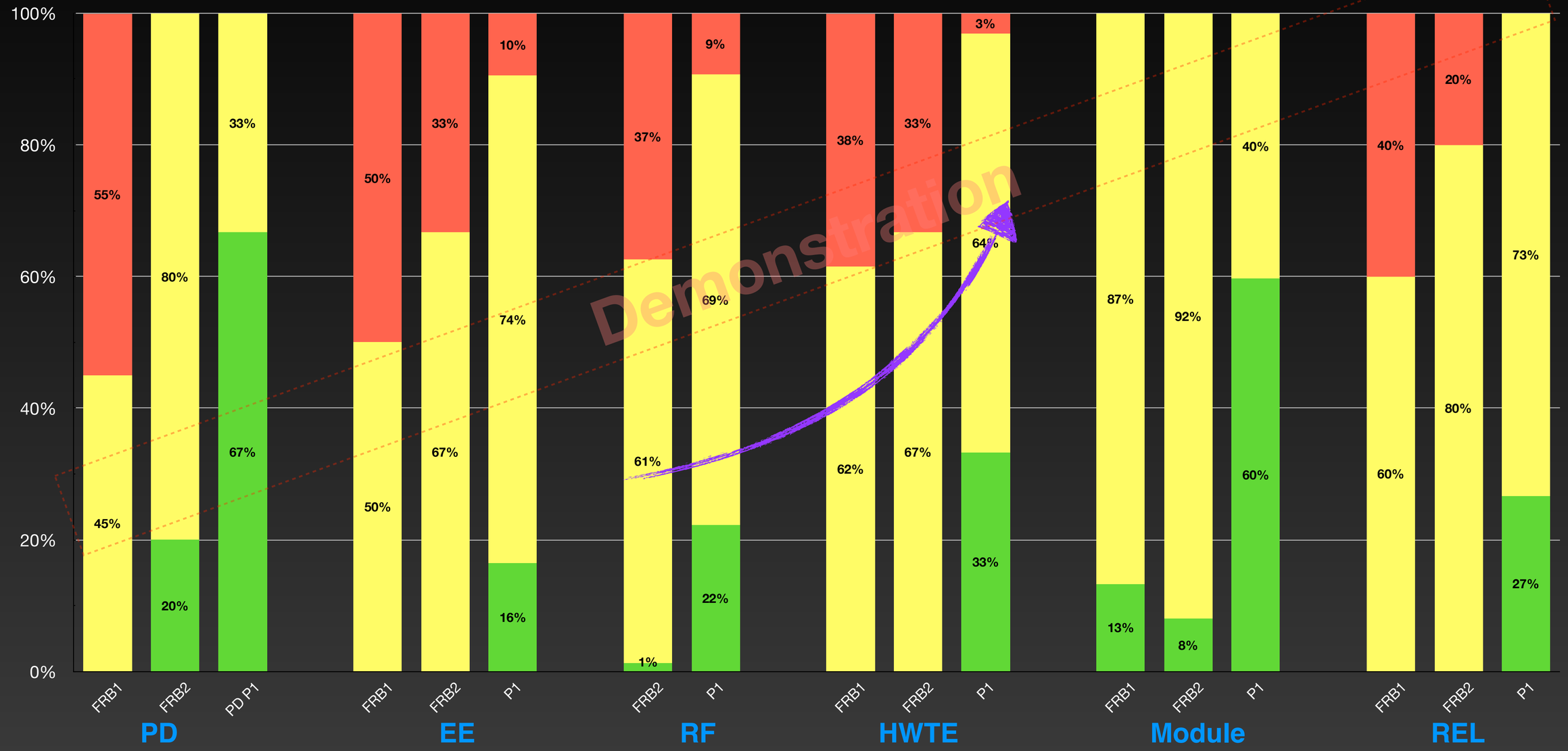
iPhone | Performance across teams from FRB to P1

Summary :

- Using teams feedback to push CM growth up from training build to real NPI, and all team has no risk to get into real NPI



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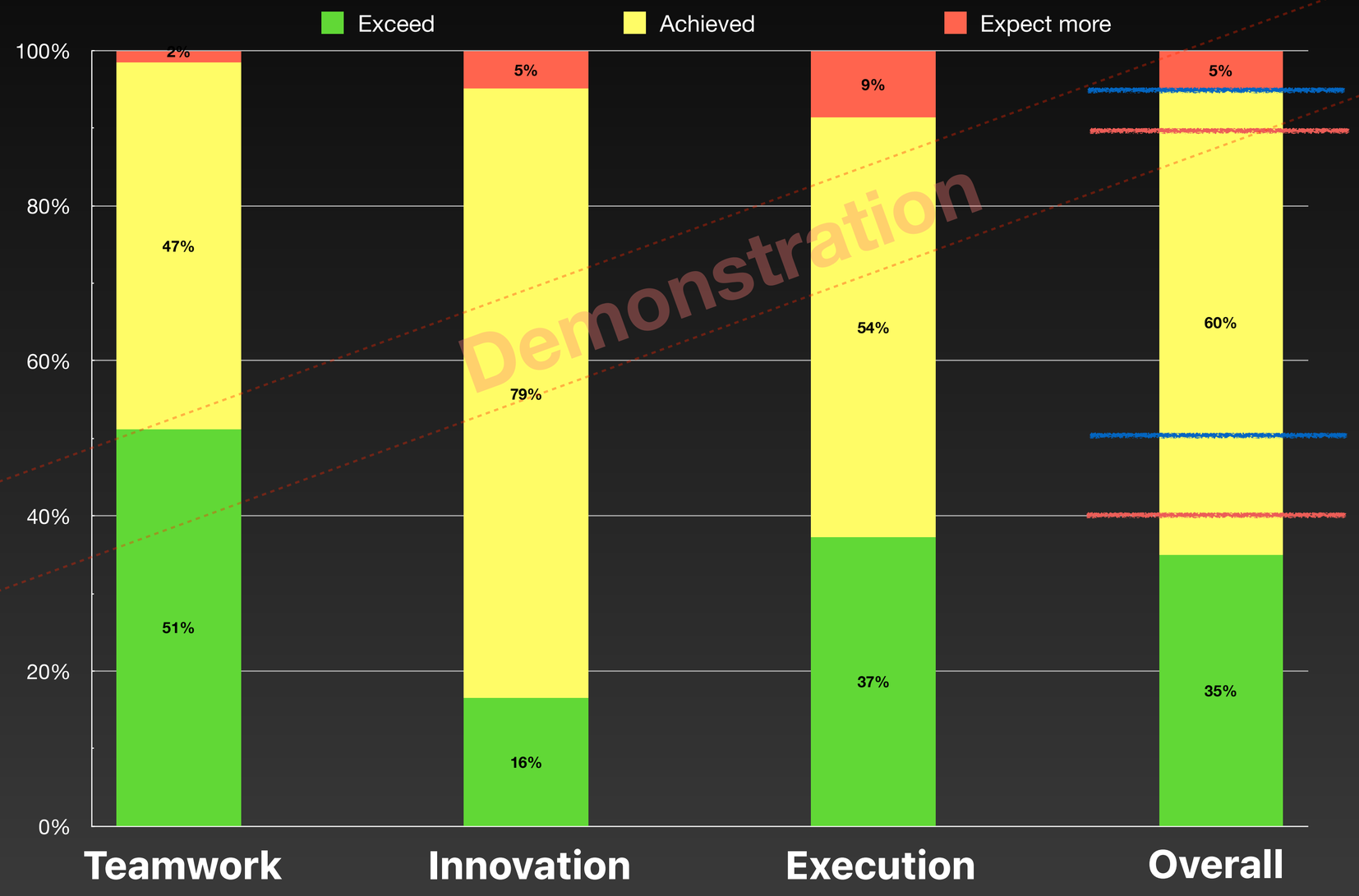
iPhone | Formal IDL review for NPI build

Summary :

- Setting up performance criterial and pushing CM to be mature, and encourage them to reach higher score in next review



Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - EPM

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iPhone | Collecting feedback and place actions to CM - EPM

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)	Achieved	Achieved	Achieved	- Need to continue to improve highlighting issues to line efficiency	
Tracking FA/Repair & Top Issues	Achieved	Achieved	Achieved	- Issue tracking was good - Need to improve on issue presentation and guiding the team to be concise	
Material Management	Exceeded	Achieved	Expected More	- Kitting material issue in the beginning of the build, it got improved in mini & main build - CM A iMES system is able to control key parts (with barcode and SN) **by config**. Need CM A to increase flexibility for NPI build.	
Input and Line Management	Exceeded	Achieved	Achieved	- Routing instructions missed multiple times - Line flowed smoothly most days	
DOE/Shipping/Allocations	Expected More	Achieved	Achieved	- Keep busy policies not well executed - Need to better prepare ahead of build - Discuss details with DRIs ahead of sync meetings and highlight DOE risks after thorough scrub - Need to track shipment targets closely and provide recovery plan when targets missed	

Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - PD

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iPhone | Collecting feedback and place actions to CM - PD

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)	Exceeded	Exceeded	Exceeded	- Good meeting control, efficient when reporting - Clear reports with proper content and clean summary. - Easy to connect to DRIs, set up a specific person as communication hub to connect DRIs to remote teams. - Shared daily information/data in time with tools like Radar, iPad, email.	
Design Collaboration and Feedback	Exceeded	Achieved	Exceeded	- Diligently provided design DFMs to each DRI and pushed to close items. - Thorough and detailed interference check before build to avoid potential risks. - Provided design improvement proposals in time based on issues found in build.	
Failure Analysis and Reporting	Exceeded	Achieved	Exceeded	- Qualified FA reports with clear hypothesis and findings. - Provided short term and long term actions with ETA. - Quick and high quality result from CT, FTIR. - Team worked hard to provide daily FACA.	
Line Setup and Control	Exceeded	Exceeded	Exceeded	- Smooth line flow control, PD and fixture DRIs always standby on line. - Quick feedback and response on unexpected line issues. - Efficient fixture issue FACA, short lead time for urgent fixture parts' fabrication. - Good flow control for DoEs which require 100% inspection or measurement on line or in labs.	

Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - EE

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iPhone | Collecting feedback and place actions to CM - EE

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments of **P2**	Apple's comments of P1
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)	Exceeded	Achieved	Achieved	- Good daily sync with Apple on-ground team; - Good daily summary of FA cases with whiteboard including FA status and key actions in message group; - Obvious improvement with more clear and frequent reporting for FA progress. - Worked hard to follow up with Apple team's requests especially when there is Covid impact at early of build. - Timely response to questions/FA requests with factory iPad. - Need to improve SOC related report readability and issue characterization.	- Good daily sync with Apple on-ground team; - Good daily summary of FA cases with whiteboard including FA status and key actions in message group; - Followed up the request from apple team well, hard working; - Response to questions/FA requests with factory iPad not quite in time sometimes. - Expect more accurate, clear, and frequent reporting of overall status and FA.
FA Quality/Technical Depth	Achieved	Achieved	Achieved	- Failures are well triaged and root caused; - Solid technical depth seen from key leaders; - Hands on and hardworking, email response usually with own thought on the FA; - More familiar with FA tools and test scripts in P2 with a lot of study before build started. - Encourage to study how the station overlay communicate/ interaction to FF.	- Failures are well triaged and root caused; - Solid technical depth seen from key leaders; - Hands on and hardworking, email response usually with own thought on the FA; - Make sure always have backup EE resource to use FA tools, like laser cut; - Expect to be more familiar and creative in using FA tools and independently take initiative on next steps where applicable. CT scan image review skill need to be improved. - Ensure FAs are carried through until RC/CA identified, like the issues sent to other team.
DOEs/Validations	Achieved	Achieved	Exceeded	- DOEs and validations tasks were well followed up, data being collected and shared with Apple in time, special at E85 desense and Sphinx DOEs - Well co-works with other teams for helping bring up DOE dock flex. - Timely update with Apple on Sphinx DOEs progress at stress rack station. - Encourage deep dive and understand the purpose of the DOEs and what Apple team want to achieve.	- DOEs and validations tasks were well followed up, data are being collected and shared with Apple side in time; - Helped to bring up offline DOE stations, like SUB6_FCAM_BER, A149 Wide Coex. - Encourage to deep dive in the DOEs.
Cross function co-work	Achieved	Achieved	Achieved	- Well co-work with other function teams to finish FA/DOE; - Close cooperation with HWTE on test coverage validation, station bringup; - Shipping process is a little bit slow for Desense DOE FFs. - Expect to follow up with x-func FA status more frequently. I.e. follow up with SA-TX module team for Sphinx brick issue	- Well co-work with other function teams to finish FA/DOE; - Close cooperation with HWTE on test coverage validation, station bringup; - Encourage to express more on cross-functional sync up meeting.

Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - HWTE

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iPhone | Collecting feedback and place actions to CM - TDL

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication (Example: measures against COVID 19 - Radar, FA report provide with expectation. Instruction given with timely, feedback,)	Exceeded	Achieved	Achieved	- On-time sync with Apple team - Hard-working with quick response	
FA Quality/Technical Depth	Achieved	Expected More	Achieved	- Solid technical depth seen from key leaders - improvement observed on new joins - Kept seeking for solutions with different approaches; - Need get more familiarity/knowledge of test station and normal failure phenomenon/RC	
DOEs/Validations	Achieved	Achieved	Exceeded	- DOEs were followed up correctly with timely response on status update and data collection; - Owned offline DOE stations bringup and showed feasibility upon reasonable alignments	
Cross function co-work	Achieved	Achieved	Exceeded	- Good collaboration with other function teams on FA/DOE; - Close cooperation with EE on station maturity of QTx/offline DOEs; - Communication with Apple DRIs for P2 planing is underway with improvement seen	
Reporting	Achieved	Achieved	Expected More	- Can follow up Apple's format - Daily summary needs be more comprehensive and accurate with clearer build status update and risk highlights	
Dry run	Achieved	Achieved	Achieved	- Organized dry run plan/arrangement - Fixture delivery on-time - Efficient meeting handling	

Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - RF

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iPhone | Collecting feedback and place actions to CM - RF EPM

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Build Management	Exceeded	Achieved	Expected More	The teamwork with Allie RF EPM team have been productive, though with some missed communication and consideration at the bring up stage, which is understandable given the lack of experience. After developing familiarity with all the process during P1, we do hope the team has learnt how to plan ahead and drive effectively from bring up to WIP stages, including integrating all the information and resources in an efficient and comprehensive way.	
Communication (Remote build)	Exceeded	Expected More	Achieved	Communications between the CM A FATP RF EPM and Allie RF EPM is extremely tight, from text channels to outside of meeting huddles. The expected more part is for more of the CM A RF EPM to actively create those new channels of communications beyond the framework Allie RF EPM team has helped formed initially, sensing issues or discussions needed internally and quickly forming innovative and new channels to drive threads efficiently and effectively.	
RF Meeting	Exceeded	Achieved	Exceeded	Very happy with the two major FATP RF daily meetings (RF morning sync and afternoon sync) in terms of the CM A RF team putting care into having each functional leads present their work and coordinated like a tight team, combined with active engagement by Allie DRI teams with constant discussions through entire meetings. Feedback were recorded well and adjustments made quickly, exhibiting a purely constructive, effective, and constantly improving environment.	
Report	Achieved	Achieved	Expected More	Reports have been a challenge to CM A RF EPM team since the expectation is to be crystal clear about the overall situation and careful about what and how to deliver the information before sending out. There have been multiple trials to make them more readable and informative, and progress has been made with Allie guidance. With the practice in P1, we hope the reports become a truly indispensable information window of the build to the wide audience.	
Offline / DOE data collection	Achieved	Expected More	Exceeded	Presented an extraordinary task of hitting high data collection qty targets through large number of FATP RF stations, sandwiched by a low count of general units in P1, frequent obstacles in requesting for needed amount of units, and cutoff shipment deadlines, at the final days RF team were able to complete the targets and exceeded most of our expectations. This process in P1 requirement much help from Allie RF EPM guiding the through process of how to plan, strategize, make requests with clear asks and context and options, which is something we expect and hope CM A RF EPM team can pro-actively strive for and come with their own ideas more.	
Cross-functional management	Achieved	Expected More	Achieved	This is a complex task but one where RF EPMs have the challenge and responsibility to deal with and excel at. Cross-functional management includes being the go-to and trusted person by all your RF DRIs and leads, as well as be the front face and productive working partner with all external teams. Relationships are depend on both sides, but a skilled RF EPM should be diplomatic, sensible, have the creativity to work with people of all characters and find the way to move things forward in a positive path.	

Demonstration

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iPhone | Collecting feedback and place actions to CM - RF EPM

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Build Management	Achieved	Achieved	Expected More	The improvement of internal coordination has been seen compared to P1, but with P2 complexity increased, intense communication with Allie team and proactive reaction to build management become more necessary, i.e. a more robust and thoughtful planning/follow-up on station readiness and FA management(e.g. limit update and FA units check in progress had been one of the pain points)	
Communication (Remote build)	Achieved	Expected More	Achieved	Communications between the CM A FATP RF EPM and Allie RF EPM is extremely tight, from text channels to outside of meeting huddles. The expected more part is for more of the CM A RF EPM to actively create new channels of communications beyond the framework Allie RF EPM team has helped formed initially, sensing issues or discussions needed internally and quickly forming innovative and new channels to drive things efficiently and effectively, RAT station readiness for R1 is one example of the necessity of the active and creative making of communication channels; and regarding action items, follow up during meetings is not enough, a lot more in between meeting check in and followup with Allie team is needed to as much as possible make progress through proactive communications methodology and habit.	
Meeting	Achieved	Expected More	Expected More	RF meeting efficiency needs to be enhanced. For example, a lot of time spent on action item recap, for which offline follow up and update before meeting is suggested. Also, a more accurate and comprehensive presentation of station status, issue update pinpoints at both RF meeting and system meetings is highly expected.	
Report	Achieved	Achieved	Achieved	Reports have been a challenge to CM A RF EPM team since the expectation is to be crystal clear about the overall situation and careful about what and how to deliver the information before sending out. There have been multiple trials to make them more readable and informative, and progress has been made with Allie guidance. With the practice in P1, we hope the reports become a truly indispensable information window of the build to the wide audience.	
Offline / DOE data collection	Achieved	Achieved	Exceeded	General offline data collection complete timely, and special request like E85 desense and sphinx data collection is tracked and completed in a very good manner. DOE efforts in chamber had been creatively executed (well aligned with DOE tracker)	
Cross-functional management	Achieved	Achieved	Achieved	This is a complex task but one where RF EPMs have the challenge and responsibility to deal with and excel at. Cross-functional management includes being the go-to and trusted person by all your RF DRIs and leads, as well as be the front face and productive working partner with all external teams. Relationships are depend on both sides, but a skilled RF EPM should be diplomatic, sensible, have the creativity to work with people of all characters and find the way to move things forward in a positive path.	

Demonstration

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Appendix | CM Performance Review

- iPhone Engineering Team - REL

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iPhone | Collecting feedback and place actions to CM - REL

Team Performance:

	Teamwork with Apple	Innovation & Creativity	Build Exec & Results	Apple's comments	CM's comments
Remote Build - Communication	Exceeded	Achieved	Exceeded	good communication at the Covid remote support.	
REL test	Exceeded	Achieved	Achieved	• good communication and sync on rel issue highlight and rel test next step confirmation. • highlight to apple DRI potential risks on rel execution	
Station test	Achieved	Achieved	Achieved	• smooth station bring up • good at keep tracking of station test progress.	
FA	Exceeded	Achieved	Achieved	Timely communication and sync up with Apple x-function teams for FA findings and next step confirmation.	
equipment and calibration	Achieved	Exceeded	Achieved	• creatively find way to calibrate the Instron and force tester. • setup checker board for drop tower and tumble tester	

Demonstration

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Appendix | CM Performance Review

- iPad Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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iPad | Engineering Overall Review

CY'22 2H Engineering Review

	Functional Areas	FXLH Eng HC	FXLH Tech HC	Total HC
Group 1	EPM / EPS	162	5	167
Group 2	PD	185	15	200
Group 3	EE / HW Module	156	5	161
Group 4	Wireless / Desense / CoEx / EMC	477	34	511
Group 5	HWTE	529	49	578
Group 6	REL / Thermal / Eco-REL / WGT / AQA	268	700	968
Group 7	QA / Package Validation	85	26	111
Group 8	AME / Automation / IE / DFM	203	3	206
Group 9	Input Team	259	74	333
Total		**2065**	**837**	**2902**

	Hiring & Retention			Performance		
	'Below' Expectations	'Meets' Expectations	'Above' Expectations	'Below' Expectations	'Meets' Expectations	'Above' Expectations
				0.0%	45.8%	54.2%
				0.0%	50.0%	50.0%
				4.2%	58.3%	33.3%
				0.0%	70.8%	29.2%
				0.0%	53.3%	46.7%
Average				0.8%	55.6%	42.7%

Demonstration

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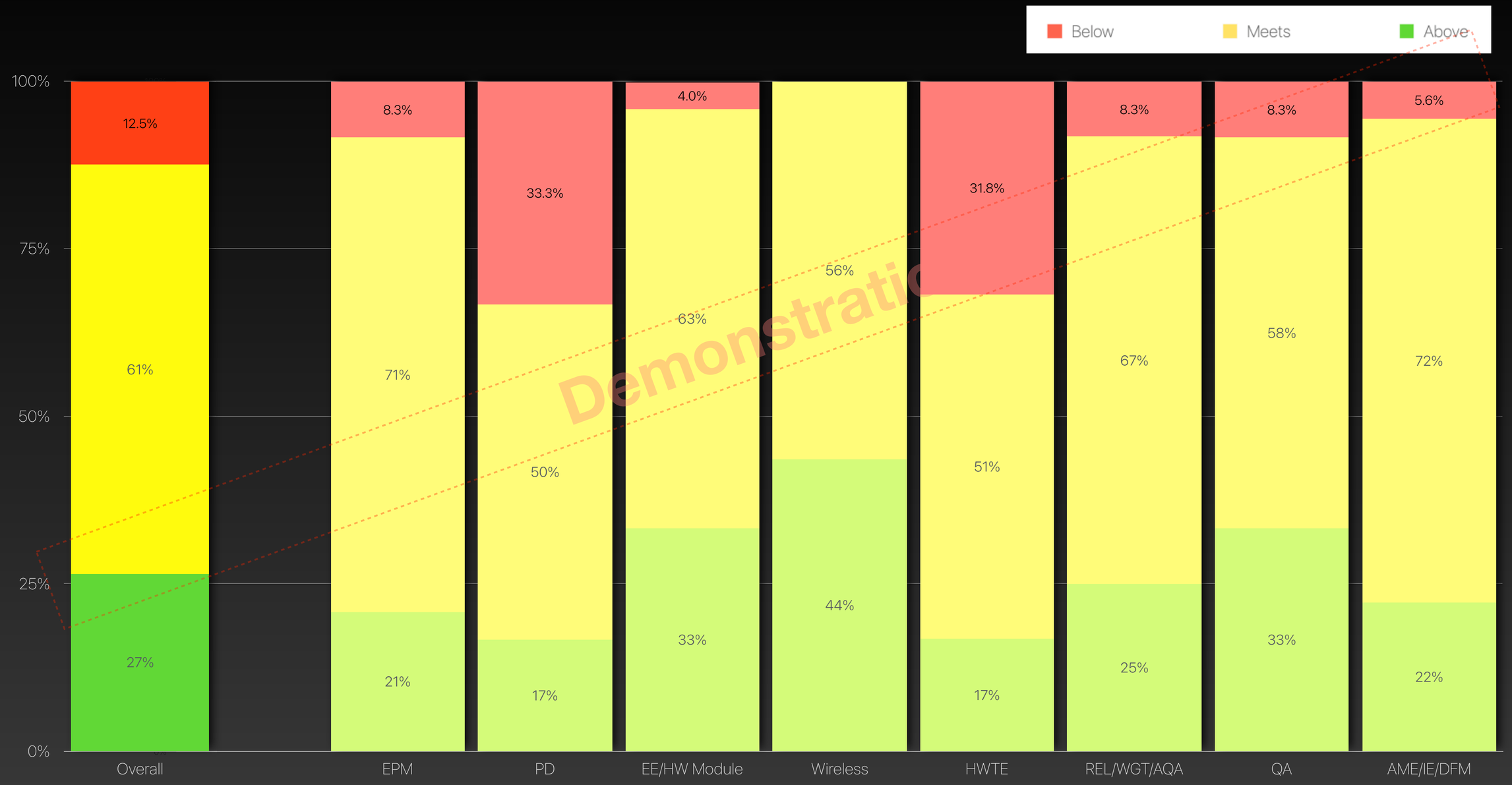
iPad | Engineering Overall Review



Demonstratio

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Appendix | CM Performance Review

- iPad Engineering Team - EPM

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iPad | Engineering EPM/EPS

DRI: XXX

Below	Meet	Above

Performance					
Build readiness review Actively review and highlight resources / materials/ facility gaps.		**Material management** CTB highlight, build material management		**FA Management** Understand and drive internal teams to provide FA for top issues and highlight	
Build Management and Execution Build matrix, input & output management/execution and material transfers.		**DOE management and reporting** Handle DOE assembly, processes, materials and data collection		**Leadership and Ownership** Inspire, motivate, and direct cross functional team while taking responsibility for the program.	
Meeting and reports Daily build meeting, build reports, allocation ship to file		**Innovation in factory processes** Develop new factory processes to increase efficiency within the factory		**Allocation fulfilment** Fulfill allocation target including REL. Highlight gaps and provide alternative plan	
Escalation on issues / potential risks Escalation on line down issue, high fallout, potential input risks		**Support for urgent and special needs** Able to support special process change and urgent/ special logistics.		**Achieved build goals** Complete targeted design validation, DOEs, data collections	

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- iPad Engineering Team - PD

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iPad | Engineering PD

DRI: XXX

Below	Meet	Above

Performance					
W/ Apple PD Good communication and action follow up		**Design feedback & Problem solving** Assembly sequence review for design feedback and proposal of solutions		**Line activity & DOE execution** Prompt action and task follow-up in time	
W/ X-function team & 2nd tier vendor Good communication and vendor management		**Risk assessment & PD documentation** Find risk in advance and build up PD issues library		**FA report & Data analysis** Report quality and accuracy	
Leadership & ownership Team activity management and DRI ownership		**Process/fixture/material Innovation** Improve performance and efficiency through innovative ideas		**2D/3D CAD work & T/A** CAD skills and tolerance analysis	
Proactive and positive Positive thinking and attitude		**New tool & skill Introduction** Bring new things to improve performance and efficiency		**Fixture design & Quick mockup** Line fixture bring up and quick sample making by CNC &3D printer	

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- iPad Engineering Team - EE

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iPad | Engineering System EE

DRI: XXX

Below	Meet	Above

Performance					
EE FA report and MIL High quality FA report Efficient MIL meetings		**FA/DOE fixture design** design fixtures to solve problems or DOE needs		**Daily FA execution** clear and effective FA good follow up	
Close collaborate with Apple EE collaboration between FX EE and Apple EE		**FA SW/script development** SW to facilitate FA SW to improve process		**Online/DOE station bring up** online coverage leadership also DOE coverage	
Cross function team collaboration cross FX internal teams Vendor collaboration		**Process innovation** create/improve process to facilitate FA and debug		**Critical FA/DOE support** good support on critical issues	
Proactive and positive collaboration positive attitude ownership		**New Tech exploration** early involvement in new tech development, master new tech, design creative tests and FA methods, grow up tech experts		**SOP and Trainings** summarize good learnings generate SOP and deliver trainings to teams	

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- iPad Engineering Team - HWTE

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iPad | Engineering HWTE

DRI: XXX

Below	Meet	Above

Performance			
Sub Teams	**'Below' Expectations**	**'Meets' Expectations**	**'Above' Expectations**
TDL			
QT			
DCSD			
USBC			
Acoustic			
Wireless Charging			
ALS			
Burnin			
Display			
Touch			
Mesa			
Camera			
Pearl			
Jasper			
SMT			
ME			
LPM			
QTSW			
Pearl Compliance			
Jasper Compliance			
Prox			
IMU			
CoreOS			
Average			

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- iPad Engineering Team - RF

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iPad | Engineering Wireless

DRI: XXX

Below	Meet	Above

Performance			
Sub Teams	**'Below' Expectations**	**'Meets' Expectations**	**'Above' Expectations**
RF EPM			
RF SAC/Productization			
RFHW			
WSCE/EMC			
Desense			
Antenna			

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- iPad Engineering Team - REL

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iPad | Engineering REL

DRI: XXX

Below	Meet	Above

Performance					
REL waterfall report and critical DRIs(PM) retention High quality REL waterfall report and critical DRIs resigned during NPI		**Testing jigs/ fixtures design** design jigs/fixtures to fix issues and optimize/improve test execution		**REL-FA team grow and development** key talents stability, engineering capability development	
Collaborate with Apple REL collaboration and communication between FXN REL and Apple REL in working level		**Flexible resources plan** flexible resources arrangement for urgent test/ DOEs and peak time when required		**REL readiness bring up** REL readiness and miniline stations bring up, maintenance and development	
Cross function teams collaboration FXN internal functional teams collaboration and teams work		**Labs utilization, maintenance and efficiency** labs space, equipments utilization and maintenance with efficiency		**critical DOEs and technique investigations** Good support and deliverable for critical DOEs and tasks when needed	
Independent work competence proactively driving tasks/ requests with less apple REL hands on		**New test method and equipment exploration** Good engagement and concept study for new test method, equipment and work model setup		**Tech knowledge and experience development** Good deliverable on REL knowledge and FA experience sharing inside of team	

Demonstration

Achievements Please fill in and limit to 3 or less key achievements

Areas to Improve Please fill in and limit to 3 or less key areas to improve

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Appendix | CM Performance Review

- Watch Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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Review Methodology

Overall Engineering Scoring Summary

Deep Dive - Each Team

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Scorecard

Quality of Services

- Account Support
- Technical Competency/ Innovation
- Execution Results
- Collaborations

Grade

- [4.0] A Exceptional
- [3.7] A-
- [3.3] B+
- [3.0] B Good
- [2.7] B-
- [2.3] C+
- [2.0] C Average
- [1.7] C-
- [1.0] D Needs improvement

Demonstration

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Watch | Engineering

Engineering
B+ -> B+

1st time to develop two programs in parallel, great team work and dedication demonstrated under the pandemic situation.

Key Achievements

1. Leveraging resource cross LOB in the first 6 month to fill the gap supporting two programs development
2. Quick react to Night Shift request on Program A, enabled from P1 and deployed onto N19x at staggered schedule
3. Great execution - met all the key milestones and deliverables for each builds
4. Innovation - extraordinary Logistic support during COVID lockdowns, continuous soft tools development to improve work efficiency & build accuracy
5. New hire development - systematic training, centralized training course, role experiences trial before final assignment
6. Factory management during Covid - Zero case, close-loop management, excellent CSR support

Improvement Opportunities / Expectations

1. Expect better collaborations to expedite FA progress, and continue to pursue optimized solution through the entire NPI stage and early ramp
2. Expect more creativity on offline test management, maintain healthy in/out status for units, pro-actively communicate with any delays or constraints
3. Key talents retention and advanced 2nd tier development
4. Quotation & Invoicing process improvement - Post-build activities and Rel Labor
5. Team maturity and resources balance (quality vs. quantity) assessment for future programs
6. Better vertical supplier management

Demonstration

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Watch | Engineering - EPM

EPM
B+ -> B+

Managed two NPI programs in parallel, while delivering high quality build support through a challenging schedule.

Enabled greater build efficiency with night shift assembly for both programs.

Maintained stable team growth and developed strong new hires.

Demonstration

Improvement Opportunities

1. **Leadership development** - Expect lead EPMs to think more proactively, hold the overall pCM Aure and play as gatekeeper to improve build quality.
2. **Blocking issue follow up** - Require better control for critical DOEs of build blocker to triage issue and root cause investigation.
3. **DOE process improvement** - Need better thought of DOE completion vs. allocation/ shipment target. Requesting to assign additional DOE EPM resources and for lead EPM to be more engaged in DOE process.
4. **Shipping overview improvement** - Greater proactivity in shipping units out. This requires aggressive push for battery CSTCG certifications and to be vocal about delays. Additional shipping reports and notifications can be sent out to communicate shipping timeline, duration, and arrival.

CM A Feedback

1. Strengthened the ability of lead EPMs to drive top issues through conclusion while reflecting from frontend input to backend allocation, and immediately discuss/propose with BUD EPM on identifying gaps; meanwhile also identify opportunity of process/ system optimization to cover unexpected issue in FATP.
2. Reinforced the EPM R&R to drive CM A DRI strictly following fixture/SOP/test OVL change process to avoid noise of issue triage and root cause.
3. Polished return status with internal teams w extra resource added for units transition, to make sure individual teams monitor daily return status of units for shipment. Additional suggestions also under discussion with BUD to help improve DOE execution.
4. Shipping plan will call out projected timeline of specific fulfillment rate, along with modified S2F which added the ETA/ETD for shipment. And for battery CSTCG as seeing the gap which cannot meet FATP shipping timeline will propose the expedited way proactively.

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Watch | Engineering - EPS

EPS
B+ -> B+

CM A EPS team managed two NPI programs in parallel and further demonstrated extraordinary material management expertise and innovations to mitigate COVID impact

Demonstration

Improvement Opportunities

1. **Leadership enhancement** - team and functional leaders are expected to more proactively engage in build activities and to effectively communicate build issues and follow through on all lessons learned
2. **Key talent retention** - find effective ways to retain key talents and identify and bring up new talents. Give a heads up for any personnel changes.
3. **Smooth transition of roles** - systematic training and development plan to enhance smooth and quick transition to new roles
4. **Strengthen components knowledge** - enhance the understanding of all parts, with a special focus on key modules, in order to provide better suggestions and identify issues for CTB and verification reports

CM A Feedback

1. Dedicated project lead fully engage - lead team understand previous lesson learned before builds start, take quick actions for issues or requirements during builds, and update new lesson learned with L/T actions after builds.
2. Actions for better retention -
   - Function lead talks with BUD for improvement opportunities after build;
   - Lead & team member 1:1 talk with guidance after build, let team member understand their merit and demerit;
   - Personalize training/promotion plan for talents, inform BUD at same day if any personal changes will be.
3. Make sure there is the strong mentor in place for role transition, take rehearsals between builds, hold the transition until get qualified.
4. Activities to strengthen components knowledge -
   - Create “Material Tree” before builds start, let team understand materials needed and assembly sequence of each line to assist BUD for the changes decision;
   - Identify key modules list, pre-alert the modules with insufficient supply cross functions, group functions for information interaction;
   - Encourage team to attend PD change list review meeting and go to the lines for physically learning, understand differences from last builds as many as possible.

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Watch | Engineering - PD

PD
B+ -> B+

CM A PDs are able to dual drive 2 NPI programs and allocating limited resources with flexibility. The senior leaders and engineers are playing important roles to execute tasks timely with good quality

Demonstration

Improvement Opportunities

1. **Communication transparency** - communicate with Apple counterparts regarding to personnel or resources arrangement with background information sharing, so we understand the constraints and why
2. **New hires bring up** - still seeing a big gap between new hires and experienced people on engineering capability. Hope there can be more or better training programs to the new hires on the fundamental PD tools and FA skills
3. **Supplier management** - Develop better synergy between CM A JS (FATP) with CM A KS (Crown module) to provide better support and quick action within CM A
4. **Hiring improvement** - shortage on head-counts before August which induce a lot of impacts especially in the “closed loop management” period because of COVID control

CM A Feedback

1. Resource plan will be shared and adjusted with clear job arrangement to BUD side during build in order to give more resource support for critical section. Adding bi-weekly call to discuss strategy of the resource arrangement with BUD counterparts.
2. IPD knowledge database were established and own 3 different level of courses to fulfill new hire/junior/senior PD training requirement. Once new one is assigned to section, section lead will be the mentor for practical experience teaching.
3. CM A JS (FATP) will assign IPD DRI to co-work with KS (Crown) for any DOE support/quality improvement/inspection method sync-up. Also will set up specific IPD contact window to communicate with KS site for issue/FA information sharing.
4. The COVID impact hiring status in first half year, there is only 10% achievement rate before June. In last few month, most of areas are gradually lifting lockdown so our achievement rate increase to 45% in July. Will keep working on recruiting to achieve target.

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Watch | Engineering - PD EPM

PD EPM
B -> B+

Great improvements recognized this year, especially for PD meeting management, special process follow up, PD DOE support, PD lab equipment and material management.

Demonstration

Improvement Opportunities

1. **Training** - To provide proper trainings to help the new comer to adapt. Especially for accuracy of the build data collection, which is quite critical for Apple team's reference to make decision
2. **Ownership** - To take more ownership for tasks driven by PD EPM, including special process instruction audit, PD DOE management
3. **Involvement** - To be more actively involved into the critical PD topics in the build and proactively follow up and drive the tasks

CM A Feedback

1. Established orientation for new comer and also organize the on-job training. Not only making junior PD EPM can be able to get started quickly but also let the senior PD EPM may correct/improve the sill of collecting data and information more accurately.
2. Gathering and discussing special process during sync meeting with PD and coordinate with BUD for further decision on Build or DOE. And also sync with factory team for preparing fixture/process change in advanced.
3. Focusing more on top issues. For PD internal, prioritizing top issues's tasks like CT scanning, material/units allocation, module or die-cut sampling. For external, involving communication cross functional team like with other RD team, process team and vendor, etc.

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Watch | Engineering - EE

EE
B+ B+

Overall, the EE team continues to develop and delivered good results on multiple Watch projects, provided great support during critical COVID lockdown with limited onsite Apple people

Improvement Opportunities

1. **Team stability -** Hiring, Identifying, retain key talents and high growth potential individuals. Identify and bring up 2nd tier leaders.
2. **Technical depth -** Continuously strengthen EE technical capabilities and technical depth.
3. **FA efficiency -** Enhance FA capability, speed, and accuracy,
4. **Ownership -** Developing ownership and drive build issues from end to end to close.

CM A Feedback

1. Planning for improving team stability:
   - Customize development plans for key talents and high growth
   - Set up clear working target for key person with equal opportunity
   - Encourage team members to take more responsibilities with overview
   - Improve information sharing within team and bridge the information gap
2. Planning for EE technical capabilities and depth improvement:
   - Keep optimizing training plans to strengthen EE team
   - Weekly EE sharing with EE key capabilities before each build start
3. FA capability, speed, and accuracy improvement plan:
   - Identify product/assembly/test potential risk and review with related functional teams before build start
   - Continuously review and optimize FA SOP before build start
   - More flexibly arrange FA resource based on FA loading
   - X-function review the FA result before sending to BUD for review
   - Improve issue feedback loop to guarantee FA accuracy
4. Ownership improvement:
   - Request leaders to be more proactively think and propose solutions on issues
   - Assign DRI to take in charge of build issues and drive issue from end to end.

Demonstration

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Watch | Engineering - WD

WD
B+ -> A-

CM A WD Team successfully supported N19x and Program A NPI programs in parallel with the following achievements:

- Good DOE tracking, comparison and down-selection process
- Strong ability to take initiatives in FA investigation and propose corrective actions
- Good report with data processing and highlighting issues in a timely manner
- Great support during COVID-19 shutdown without Apple DRIs onsite

Improvement Opportunities

1. **Retention -** Ensure lower attrition of key talents. Provide career growth opportunities and better training for high growth individuals.
2. **Communication -** Continue to improve English communication and presentation skills.
3. **Technical Enhancement** - Document lesson learned from issues seen in N19x and Program A projects. Document FA experience and effective debug method for future reference.

CM A Feedback

1. Managers/Leads should know the characteristic and requirement of team members clearly, provide better career development orientation, job rotation chance and higher grade of KPI for the talents.
2. Arrange more potential DRIs to present MIL in RF daily sync up meeting and external meetings with BUD. In addition, plan training courses to improve English oral and written skill, e.g. how to write clear email to BUD; set up offline English meeting to encourage/instruct DRIs to present issues internally.
3. At the end of each Build, arrange team members take turns summarizing the critical DOE/FA/Testing issues to make sure team has a complete understanding of the issues. Also upload issue documents to a dedicated radar as a better reference for future build, utilize those materials to train new hiring/junior engineers.

Demonstration

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Watch | Engineering - HWTE

HWTE
B+ -> B+

Team met expectation on execution quality with proper resourcing managed.

- Enhanced SW support beyond QT also OS across tech on request.
- MP readiness mindset with team cleaning up NPI deviation over builds and get ready prior to production.
- **Key Contributor**: Glenn, Griffin, Haimeng, Andy, James, Clifford, Alan

Demonstration

Improvement Opportunities

1. **Issue traceability over builds** : Early builds low % fallout issue missed in following stage that caused last minute engineering effort on mitigation plan. (MMI patten flicking over NFC FW lading)
2. **Enhanced issue triaging process**: CM A has enhanced issue reporting from last year, looking for further comprehensive factory commonality data/log that would speed up issue resolving turn around time.
3. **SW HC Dithering**: ~58% of senior SW DRIs left through builds brought concern on team support quality also force sharp learning curve on new-hired. Looking for key talent % monitoring mechanism to prevent it.

CM A Feedback

1. All HWTE related bugs should be identified and sorted, impact/priority distinguished, and ensuring traceability in TDL tracking system until the issue close to prevent in entire 2023 project.
2. Establishing systematic FA approach/methods that comprises of DOE matrix specifying actions, regression point and graphical data plots. Implementation ongoing in P1 for any hard failures.
3. Step by step training (buddy system) for freshman's probation period and post build's evaluation to identify experience/deputy's key talent driven by leads to ensure no dip in build support as common practices .

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Watch | Engineering - REL

REL
A- -> A-

CM A Rel team continued strong support on Program A, showed high flexibility and dedication under complex situations (massive DOEs, tight schedule, Covid impact). Well maintained talented team, successfully supported HVWS test development for LE1, matured mini-line bring up and maintenance.

The team has always been 1x step ahead: anticipating fixture needs, capturing new cosmetic failure modes, flagging critical/new issues, and streamlining overall lab efficiency, Our success directly ties to the great ITJS Rel team and their strong performance.

Demonstration

Improvement Opportunities

1. **Working efficiency** - continue online system and tools development to optimize lab management process and better visualize Rel test/lab resource/issue FA/equipment status, etc.
2. **Problem solving** - need to set up more systematic and close-loop problem solving and lessons learn process, enhance skills not only on CA but also preventions.
3. **Team/talent management** - keep the key talents, further integrate strong talents together to better utilize team resource and enhance internal corporation.

CM A Feedback

1. REL Online System(R.I.B) has completed the development and we're planning to have 1st official trial on LA4x Proto build. Also we have introduced the Tableau app, key team members will utilize this tool for a better visualization on our testing progress, EQ running status, Miniline readiness to help the team better manage the whole testing process
2. We have regular lessons learn summary for each build. And will establish the systematic audit process to ensure the issues be closed and under monitor.
3. We'll increase the communication frequency and transparency by regular face to face review w/ REL internal leaders to make the team more integrated. Also, hold more team building activities to let all members can better understand their colleagues thoughts and know how to co-operate w/ each other.

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Appendix | CM Performance Review

- VPG Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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Review Methodology

Overall Engineering Scoring Summary

Engineering Highlights and CM Come-Back

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VPG | iDL Review - Methodology

Teamwork w/ Apple

- Cultivated relationships and worked collaboratively with Apple Team
- Communicated clearly, openly and effectively
- Positively influenced the performance of Apple/CM cross-functional teams
- Provided leadership on given deliverables at factory and inspiration to others teams
- Effectively work as extended team, shared FA workload while Apple team is supporting remotely

Innovation & Creativity

- Approached problems with creativity and new ideas
- Applied expertise to find better ways to do things
- Focused on the details that produce excellence
- Took smart, courageous risks

Build Execution & Results

- Prepared well for build and executed as planned
- Produced high-quality outcomes
- Accomplished goals and objectives on time and with quality work
- Exercised good judgment and took responsibility for decisions
- Not hesitated to raise design and process concern during build
- Documented and shared issue detail, root cause, next steps

Demonstration

Rating

Exceed Expectations

Achieve Expectations

Expected More

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VPG | iDL Review - Methodology

Area of Evaluation

- Pick specific areas you feel are relevant to evaluate the effectiveness of your CM Team
- Evaluate these areas based on the three criteria from previous slide
  - Teamwork
  - Innovation and Creativity
  - Execution and Results

Some Possible Examples (will leave to teams to decide)

- Remote Build
  - Communication
  - Efficiency and Effectiveness
  - Facility equipment
- PD Areas of Evaluation
  - Failure Analysis
  - Line training and monitoring
  - Assembly Fixture FA and SOP creation
- EPM Areas of Evaluation
  - FA/repair/Top Issues
  - DOE & Offline Data Collection
  - Shipping and Allocations
  - Material Mangement
- HWTE Areas of Evaluation
  - Fixture bringup and issues debug
  - Bundle validation
  - Fixture vendor management

Rating

- Exceed Expectations
- Achieve Expectations
- Expected More

Demonstration

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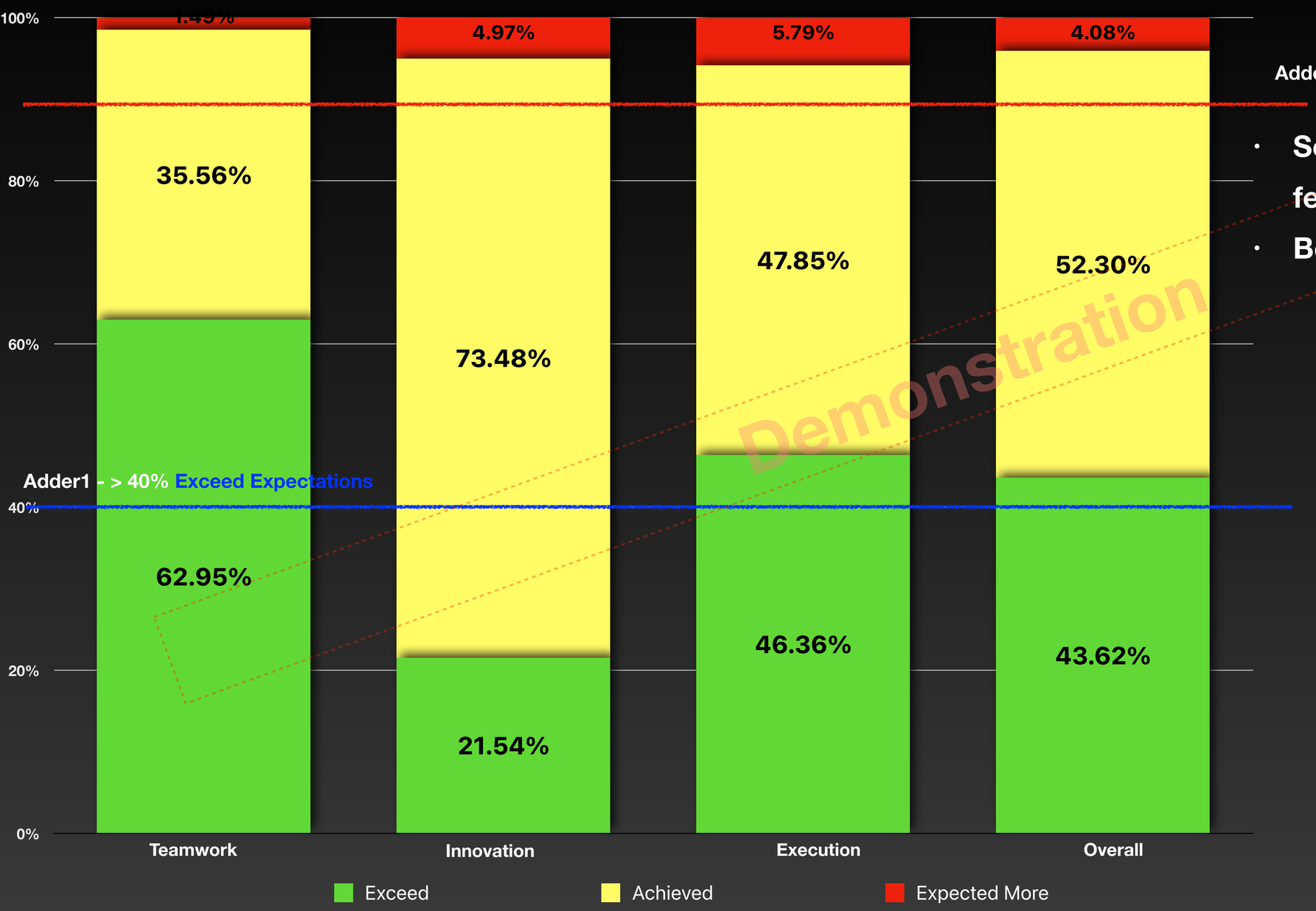
VPG | 2022 Spring - Overall Score



- Score is based on PreEVT Build relevant feedback.
- Both adder criteria have been fulfilled.

Demonstration

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VPG | 2021 Fall vs 2022 Spring Performance Team weight

Key Facts:

- Improvements in Y22 Spring:
  - Teamwork | "Exceeds" ~9%
  - Execution | "Exceeds" ~7%
- Degradations in Y22 Spring:
  - Execution | "Expected More" ~2%

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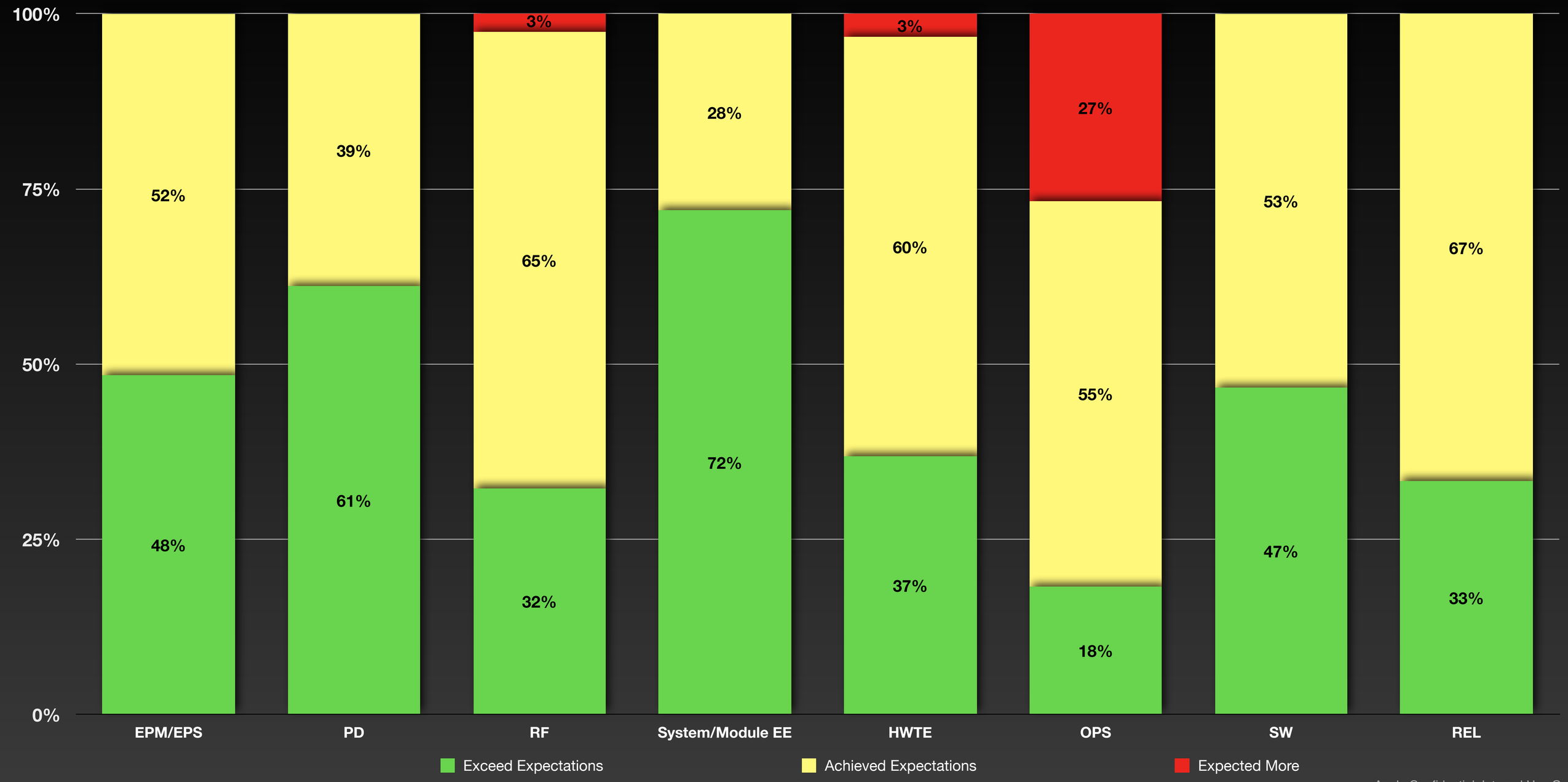
VPG | 2022 Spring Performance - Team Breakdown



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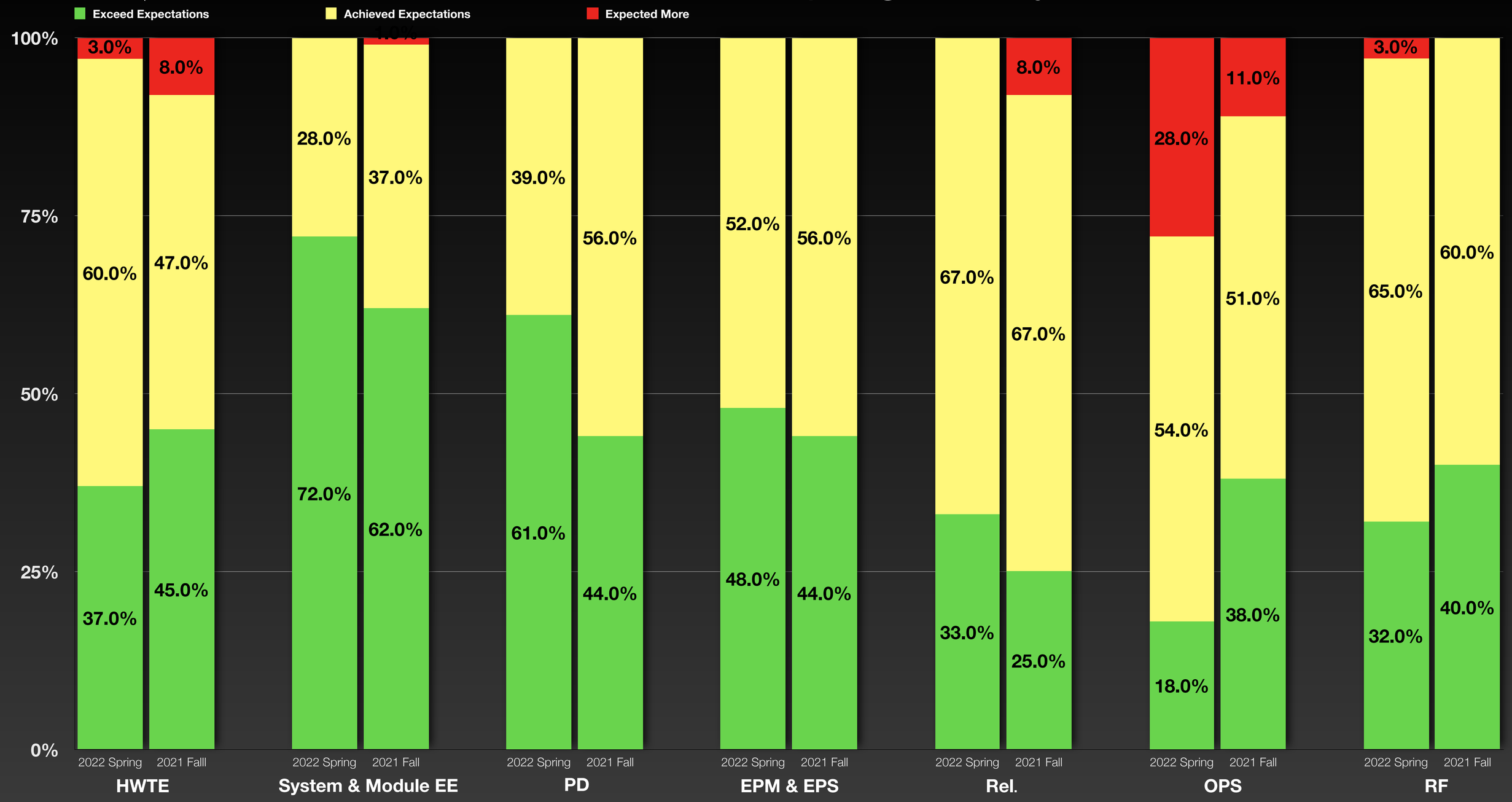
VPG | Performance across teams: 202x Spring vs 202y Fall



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VPG | Engineering Highlights - HWTE Top “Expected More” items

Team	Issue	Apple Comments	Pega Feedback
HWTE TDL	Escalation Path Effectiveness		
HWTE TDL	FATP/REL mini-Line Execution		
HWTE xF	Talent retention and long term resource plan		
HWTE iPD	Fixture Design		

Demonstration

Critical	High	Medium	Improved

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VPG | Engineering Highlights - RF Top “Expected More” items

Team	Issue	Apple Comments	Pega Feedback
Product RF	Talent retention and FA skill impartment		
Product RF	Resource Gap		
RF HW	Talent retention		

Demonstration

Critical	High	Medium	Improved

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VPG | iDL Review - Methodology

PGKS Spring 2021 Team Scorecard

Pegatron Team	DRI	Team	Special Tracking	Evaluation Item	Teamwork with Apple	Innovation and Creativity	Build Execution & Results
System EPM (FATP)		EPM	1	Remote Build			
		EPM	6	Build and Line Management			
		EPM	2	DOE and Offline Data Collection			
		EPM	6	Shipping and Allocation			
		EPM	7	Resource Management			
System EPM (SMT)		EPM	6	Build Management			
		EPM	6	Shipping and Allocation			
		EPM	4	Top Issue and Report			
		EPM	1	Remote Build (COVID shut-down)			
		EPM	6	Materian Management			
EPS and Material Team		EPM	6	DRP Management			
		EPM	1	Remote Build (Ex: communication, meetings, feedback, equipments, measures against COVID-19)			
		EPM	6	BM Management			
		EPM	6	Raw material allocation			
		EPM	6	Allocation and Fulfillment			
		EPM	4	Reporting			
		EPM	6	Process			
PD EPM		EPM	6	Build Management			
		EPM	2	DOE and Data Collection			
		EPM	6	Line Monitoring			
PD		PD	4	Team Management			
		PD	3	Failure Analysis			
		PD	6	Task Execution			
System EE		EE	1	General Build Support (FA and DOE)			
		EE	3	Build FA and BU			
		EE	3	Validation & DOE			
		EE	3	REL FA			
		EE	7	Hiring Training and Retention			

Demonstration

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VPG | iDL Review - Methodology

Pegatron Team	DRI	Team	Special Tracking	Evaluation Item	Teamwork with Apple	Innovation and Creativity	Build Execution & Results
System REL		REL	7	Team Bring Up			
		REL	5	REL Lab and fixture readiness			
		REL	5	REL mini-line bring up			
		REL	2	REL test and DOE result			
HWTE TDL		HWTE	7	Leadership			
		HWTE	7	Resource Management			
		HWTE	1	Remote Build			
		HWTE	4	Report Communication			
		HWTE	6	Driving Line Issues			
		HWTE	2	DOE / Unit Management			
WD - RFHW		WD	1	Remote Build			
		WD	2	RF Matching and DOE			
		WD	4	DOE			
		WD	3	FA			
		WD	3	Test			
		WD	4	SOP and new talents training			
		WD	7	Hiring			
WD - RF Desense		WD	5	Station BU			
		WD	1	Remote Build			
		WD	3	FA			
		WD	3	Test Execution			
		WD	2	Documentation			
		WD	4	Data Processing and Report			
WD - RFSAC		WD	1	Remote Build			
		WD	2	WIPAS Validation			
		WD	2	Station Audit			
		WD	2	DOE Result			
		WD	3	Issue debug			
WD - Antenna		WD	4	Report (I/O, FA, Repair, Top Issues)			
		WD	3	Station Setup			
		WD	3	FA			
		WD	3	Chamber Test			
		WD	1	Remote Build			

Demonstration

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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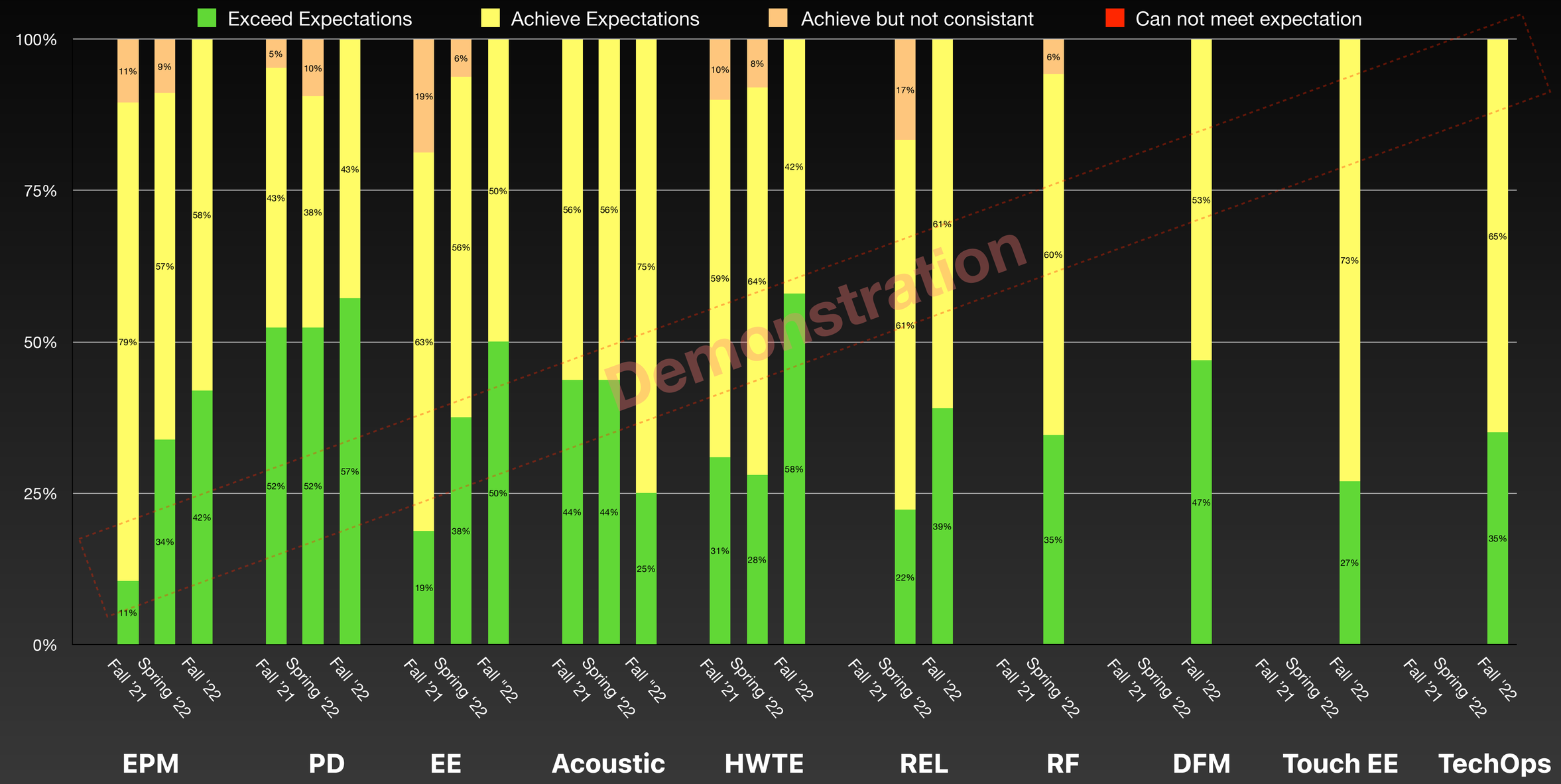
Audio/Packing/SG | Cross Functions Score



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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - EPM

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Audio/Packing/SG | Score Card Example - EPM/EPS function

	CM EPM Key Competency						
Items	**Competency**	**Item**	**Competency**	**Item**	**Competency**	**Item**	**Competency**
1	Effective communication	6	Initiative / Responsiveness	11	Attention to detail	16	Drive best practice
2	Schedule planning	7	Confidence	12	Flexibility / Creativity	17	Leadership
3	Run meeting	8	Escalation	13	Platform / System Knowledge	18	Influence
4	Build prep/execution	9	Able to prioritize	14	Problem Solving/Resolution	19	Preventative Mitigation
5	Reporting - written & verbal	10	Decision making	15	Internal sharing		

Demonstration

Exceed Expectation	Meet Expectation	Meet but not Consistent	Can Not Meet Expectation
Score 4	Score 3	Score 2	Score 1

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - PD

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Audio/Packing/SG | Score Card Example - PD

CM PD Key Competency							
Items	**Design**	**Item**	**Validation**	**Item**	**Analysis**	**Item**	**Soft skills**
1	CAD	8	Technical issue management(MIL)	14	Tolerance stacks (TA)	19	Communication (customer)
2	Detailed 2D and 3D review	9	Execute DOEs/Trials	15	JMP/Data analysis	20	Communication (internal)
3	Understand product requirement/ design intention	10	DOE/Trial proposals	16	Dimensional data/Cpk/FAI	21	Leadership
4	Design concept generation	11	FACA (FATP)	17	Functional data (EE/HWTE/AE)		
5	Part/Assembly DFM	12	FACA (REL)	18	ME analysis		
6	IQC data review	13	Process/fixture modification				
7	IPQC data review/setting						

Exceed Expectation	Meet Expectation	Meet but not Consistent	Can Not Meet Expectation
Score 4	Score 3	Score 2	Score 1

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - EE

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Audio/Packing/SG | Score Card Example - EE

	CM EE Key Competency						
Items	**EE FA**	**Item**	**Design/Validation**	**Item**	**Management**	**Item**	**Communication**
1	EE Common Skill	4	HW DOE	9	Critical Issue Management	14	Report and Summary
2	HW Experience	5	HW Validation	10	Lab management/Supply	15	English Skill
3	FA/CA	6	Test fixture/board Design	11	Training	16	Support to other team
		7	Contribute on EE design	12	EE task management		
		8	Script Coding	13	Self-improvement		

Demonstration

Exceed Expectation	Meet Expectation	Meet but not Consistent	Can Not Meet Expectation
Score 4	Score 3	Score 2	Score 1

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - HWTE

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Audio/Packing/SG | Score Card Example - HWTE TDL

	CM HWTE TDL Key Competency								
Items	**Planning**	**Item**	**Coordination & Initiatives**	**Item**	**Communication**	**Item**	**Reporting**	**Item**	**Expertise**
1	Resource allocation	5	Lead/Host the dry run, testing meetings	7	Communicate clearly with internal/external team	10	Provide daily report following standard format	14	Factory process: Test, shipping, assembly, SW validation
2	Test Line readiness	6	Coordinate the cross functional team for station bring up, SW/FW validation, data analysis, DOE, FA, handover	8	Test leadership representation in meeting	11	Yield bridge documentation for each build	15	End to end test solutions, eco-system, station technology/coverage
3	Material/Fixture/EQ validation			9	Spontaneous respond to Apple TDLs	12	Test readiness/Issues tracking	16	Data analysis ability: CPK. GRR, correlation..etc
4	Milestone/Objective definition					13	Test documentation: Coverage, syscfg, attribute		

Demonstration

Exceed Expectation	Meet Expectation	Meet but not Consistent	Can Not Meet Expectation
Score 4	Score 3	Score 2	Score 1

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Audio/Packing/SG | Score Card Example - HWTE FATP

	CM HWTE FATP DRIs Key Competency						
Items	**Expertise**	**Item**	**Process**	**Item**	**Communication**	**Item**	**Reporting**
1	Technology knowledge and skills	6	Station bring up, calibration and debug	9	Communicate clearly with internal/ external team	11	Daily build report
2	Triage on the testing issue	7	Drive dry run	10	Spontaneous respond to Apple DRIs	12	Build summary report
3	Data analysis: CPK, GRR, audit, distribution drift or variation between different testers	8	Execute SOP, DOE instructions				
4	iOS Bundle Validation						
5	Overlay Validation						

Demonstration

Exceed Expectation	Meet Expectation	Meet but not Consistent	Can Not Meet Expectation
Score 4	Score 3	Score 2	Score 1

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - RF

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Audio/Packing/SG | Score Card Example - RF EPM

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM RF Key Competency

	Project and Team Management	Score		Build Execution	Score		Design and Validation	Score		Communication	Score
1	Leadership / Influence	3	4	Station bring up, calibration and debug	4	7	DOE/Trial proposals	2	10	Effective communication	3
2	Planning / Execution	3	5	Wipas validation	3	8	FACA	3	11	Meeting	4
3	Team development	3	6	Build operation	4	9	RF Design (Ant&HW tuning)	3	12	Reporting - written & verbal	3

Demonstration

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Audio/Packing/SG | Score Card Example - RF SAC

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM RF Key Competency

	Items	Score		Items	Score		Items	Score
1	Collaboration with Apple RFSAC DRI	3	5	Dryrun/Build Support (improve the communication efficiency and effectiveness during current remote support situation)	3	9	Reliable station bring-up, calibration and maintenance.	4
2	Collaboration with X-functional team:RFHW/ Antenna/Desense/Coex/Diags/CoreOS/RF EPM	3	6	DOE design to isolate issue/Problem Solving/ Debug skill	2	10	Follow request, feedback DOE/Validation result in a timely manner	4
3	Collaboration between GTK SMT and GTK FATP	3	7	Data Analysis and Visualization	3	11	Clearly and concisely write status daily reports and build summary	4
4	Communication skills/tools	3	8	Learning Wireless test spec and Study WiPAS log and train new team members effectively	2	12	Apply past learnings to identify and diagnose new issues more systematically and effectively.	3

Demonstration

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Audio/Packing/SG | Score Card Example - Antenna

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM RF Key Competency

	Project and Team Management	Score		Build Execution	Score		Design and Validation	Score		Communication	Score
1	Leadership / Influence	2	4	Station bring up, calibration and debug	4	7	DOE/Trial proposals	3	10	Effective communication	3
2	Planning / Execution	3	5	Wipas validation	3	8	FACA	3	11	Meeting	3
3	Team development	4	6	Build operation	4	9	RF Design (Ant&HW tuning)	3	12	Reporting - written & verbal	3

Demonstration

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Audio/Packing/SG | Score Card Example - Desense

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM RF Key Competency

	Project and Team Management	Score		Build Execution	Score		Design and Validation	Score		Communication	Score
1	Leadership / Influence	4	4	Station bring up, calibration and debug	3	7	DOE/Trial proposals	3	10	Effective communication	4
2	Planning / Execution	4	5	Wipas validation	3	8	Data sharing	4	11	Meeting	3
3	Team development	3	6	Critical issue follow-up	4	9	Desense troubleshooting	4	12	Reporting - written & verbal	3

Demonstration

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Audio/Packing/SG | Score Card Example - OTA / SAR

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM RF Key Competency

Project and Team Management		Score	Build Execution		Score	Design and Validation		Score	Communication		Score
1	Leadership / Influence	4	4	Station bring up, calibration and debug	3	7	DOE/Trial proposals	3	10	Effective communication	3
2	Planning / Execution	4	5	Wipas validation	3	8	FACA	3	11	Meeting	3
3	Team development	3	6	Build operation	4	9	RF Design (Ant&HW tuning)	3	12	Reporting - written & verbal	4

Demonstration

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Appendix | CM Performance Review

- AudioAudio/Packing/SG Engineering Team - REL

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Audio/Packing/SG | Score Card Example - REL

	CM REL Key Competency						
Items	**Lab and Team**	**Item**	**Rel Test Execution**	**Item**	**FACA**	**Item**	**Rel Miniline**
1	Leadership and Management	7	Rel report	11	FA Process	15	Rel Miniline Working model
2	Lab Resource	8	Test flow and SOP	12	FA Report	16	Tester bringup and maintain
3	Rel DRI Capability	9	Communication	13	FACA Meeting	17	Rel overlay/WiPas
4	Layout/Safety/Security	10	Data transparency	14	FACA Tracker	18	Rel miniline operation
5	Equipments and Fixtures						
6	Logistics (Purchase, unit transfer)						

Demonstration

Exceed Expectation Score 4	Meet Expectation Score 3	Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

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Appendix | CM Performance Review

- Home Engineering Core Team
  - EPM
  - PD
  - EE
  - RF
  - HWTE
  - Rel

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Home | Postmortem CM Performance Review Summary

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

Summary Table :

Quarter/ Stage	Q3'21 Program A POC	Q4'21 Program A P1	Q1'22 Program A EVT	**Q2'22 Program A DVT**	Trend
EPM	1.8	2.6	2.8	3.2	↗
PD	1.9	2.4	2.7	3.1	↗
EE	1.6	2.3	2.8	3.1	↗
HWTE	2.4	2.7	3.2	3.3	↗
RF	/	/	3	3.1	↗
REL	/	2.8	3.1	3.1	→

Demonstration

Performance Summary :

- Overall CM A performance is trending up and can meet expectation for Program A DVT build in Q2'22
- CM A need to continue improving internal system mapping to Apple NPI process/culture
- Provided tremendous support for assisting Ops team and solving ramp blocking issues even with limited resource
- All engineering team leaders at all levels need to continue improve managing skills and enhance team engineering and coordination capability, and also need to fulfill key engineer position vacancy ASAP

Resource Assessment :

- **EPM:** No big concern so far
- **PD:** A PDEPM with outstanding english communication skill is needed, otherwise current DRI needs to be trained properly
- **EE:** A manger with solid EE background is needed to support technical management and planning
- **HWTE:** 1x SDRI Lead & 1x TDL Lead gap need to be closed
- **CapEx/LPM:** 2x CapEx tend to leave after NPI, WT management need stabilize team resource for project sustainability

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Appendix | CM Performance Review

- Home Engineering Team - EPM

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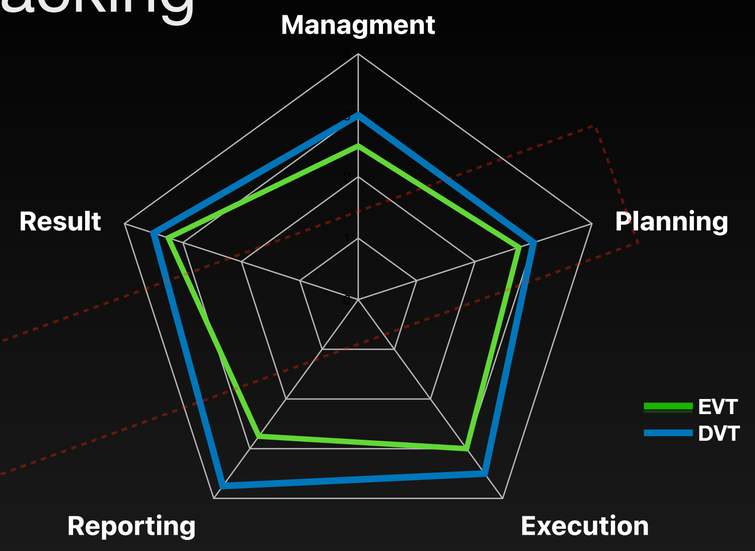
Home | CM EPM Evaluation Scorecard & Performance Tracking

Summary :

- Well understanding on factory resource and operation. Good CM x-functional internal management and insight consolidation
- Able to heads up and coordinate to solve urgencies in good attitude, secure deliverables per schedule under COVID-19 impact
- Acceptable reporting and issue clarification skills



Exceed Expectation | Meet Expectation | Meet but not consistent | Cannot Meet Expectation

Demonstration

Category		Rating	Observations in DVT	Room for Improvement
Management		3	Good leadership to lead Xxx x-function team to ensure NPI activities go smoothly as planned to meet target build orientation, including build management, resource securing, data collection with efficient communication	• Better control on engineering resource dedicated to problem solving • More consistent FACA driving across x-functional team
Planning		3	• Proactive on planning arrangement especially when team has to wait for the last minute decide on the material down selection (such as 4.3pF/ 3pF capacitor down selection for SMT build, and cosmetic waiver for stamped end cap for FATP build) • Always be flexible to prioritize the important builds, to adjust process control along with the communication with ABC team	
Execution		3.5	• Smooth communication in daily basis open/close meeting to cover all critical items as well as risk assessment, mutual discussion for better arrangement and problem solving • Prompt response and preventive actions were in place as soon as issues were identified during builds	
Reporting		3.75	Able to share info and report with ABC defined template and escalate timely thru proper path	Xxx EPM tried to hand out most of the regular reports required by ABC EPM to x-functional DRIs for daily basis update, but it has not been implemented completely due to fast pace for DVT build, continue to bring up team for reports maintenance on new projects
Result		3.5	Show strong ability to lead team to deliver result to pull in overall schedule, achieve target yield, fulfill validation purpose with most cost efficiency solution	

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Home | CM EPM Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM EPM Key Competency

#	Management	#	Planning	#	Execution	#	Reporting	#	Result
1	Leadership	5	Schedule planning	9	Meeting Running	13	Internal sharing	17	Validation Purpose Fulfillment
2	Team Integrity	6	Decision making	10	Platform / System Knowledge	14	Reporting - written & verbal	18	Build Schedule Timliness
3	Resource Securing	7	Prioritization Capability	11	Problem Solving / Resolution	15	Influence	19	Cost Management
4	Effective communication	8	Preventative Mitigation	12	Initiative / Responsiveness	16	Escalation	20	Project Goal Orientation

Demonstration

Evaluation Results

Items	Management				Planning				Execution				Reporting				Result				Remark			
Period / #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
DVT Q2 2022	3	3	3	3	3	3	3	3	3	3	4	4	4	3	4	4	3	4	3	4	67	3.4	35%	0%
	3.00				3.00				3.50				3.75				3.50							
EVT Q1 2022	2	2	3	3	3	3	2	3	3	2	3	4	2	3	4	2	3	3	3	4	57	2.9	15%	30%
	2.50				2.75				3.00				2.75				3.25							

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Appendix | CM Performance Review

- Home Engineering Team - PD

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Home | CM PD Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM PD Key Competency

#	Work ethic	#	Design expertise	#	Engineering analysis	#	Collobration	#	Reporting
1	Proactivity & Spontaneous	4	Design review & proposal	7	FACA logic	10	Leadership	13	Tracker maintain
2	Sense of responsibility	5	Tolerance analysis	8	DOE plan & Execution	11	Coordination	14	Engineering report
3	Resilience	6	Design proposal	9	Data analysis	12	English capability	15	Presentation

Demonstration

Evaluation Results

Items	Work ethic			Design expertise			Engineering analysis			Collobration			Reporting			Remark			
Period / #	1	2	3	5	6	7	9	10	11	13	14	15	17	18	19	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
DVT Q2 2022	3	4	4	4	4	3	4	3	4	3	3	3	4	3	3	52	2.6	35%	0%
	3.67			3.67			3.67			3.00			3.33						
EVT Q1 2022	2	2	3	3	3	2	3	2	3	2	3	4	3	3	3	41	2.1	5%	25%
	2.33			2.67			2.67			3.00			3.00						

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Appendix | CM Performance Review

- Home Engineering Team - EE

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Home | CM EE Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM EE Key Competency

#	Management	#	Communication	#	Reporting	#	HW Knowledge	#	Execution
1	Manager leadership	4	Effective communication	7	FA report	11	EE Common Skill	15	Issue traige
2	Manager resource	5	Information sharing with intenal x-function team	8	Reporting - written & verbal	12	System architecture	16	Validation / DOE
3	Engineer resource	6	Issue next step coordination with x-function	9	Critical Issue escalation	13	Bench test principle	17	BOM / MLB assembly check
				10	leadership representation in meeting	14	Log analysis	18	Equipment operatetion

Demonstration

Evaluation Results

Items	Work ethic			Design expertise			Engineering analysis				Collobration				Reporting				Remark			
Period / #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
DVT Q2 2022	1.8	2	1.8	2	3	2.5	2	2	3	2.5	3	3.4	3	2.5	2.5	3	3.4	3.5	43.4	2.2	0%	50%
	1.87			2.50			2.33				3.13				2.97							
EVT Q1 2022	1.8	2	1.2	1.4	2	1.4	1.3	1.4	2	2	2	1.4	1.4	1.6	2	1.8	2.8	2.8	29.5	1.5	0%	85%
	1.67			1.60			1.57				1.60				2.20							

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Appendix | CM Performance Review

- Home Engineering Team - HWTE

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Home | CM HWTE Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM EPM Key Competency

#	Planning	#	Coordination & Initiatives	#	Communication	#	Reporting	#	Expertise	#	Process
1	Resource allocation	5	Lead/Host the dry run, testing meetings	7	Communicate clearly with internal/external team	10	Provide daily report following standard format	14	Factory process: Test, shipping, assembly, SW validation	17	Station bring up, calibration and debug
2	Test Line readiness	6	Coordinate the cross functional team for station bring up, SW/FW validation, data analysis, DOE, FA, handover	8	Test leadership representation in meeting	11	Yield bridge documentation for each build	15	End to end test solutions, eco-system, station technology/coverage	18	Drive dry run
3	Material/Fixture/EQ validation			9	Spontaneous respond to Apple TDLs	12	Test readiness/Issues tracking	16	Data analysis ability: CPK. GRR, correlation..etc	19	Execute SOP, DOE instructions
4	Milestone/Objective definition					13	Test documentation: Coverage, syscfg, attribute				

Demonstration

Evaluation Result

Items	Planning				C & I		Communication			Reporting				Expertise			Process			Remark			
Period / #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
21Q3 / Program A POC	2	3	3	2	3	2	2	2	2	2	2	3	2	3	2	3	2	3	3	46	2.4	0%	55%
	2.50				2.50		2.00			2.25				2.67			2.67						
21Q4 / Program A P1	2	3	3	3	3	2	2	3	3	2	3	3	3	3	2	3	3	3	3	52	2.7	0%	25%
	2.75				2.50		2.67			2.75				2.67			3.00						
22Q1 / Program A EVT	3	4	3	3	3	3	3	3	4	3	4	3	3	4	3	3	3	3	4	62	3.3	26%	0%
	3.25				3.00		3.33			3.25				3.33			3.33						
22Q2/ Program A DVT	3	4	3	3	3	3.6	3	3	3.6	3	4	3	3	4	3	3	3	3.6	4	62.8	3.3	21%	0%
	3.25				3.30		3.20			3.25				3.33			3.53						

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Appendix | CM Performance Review

- Home Engineering Team - RF

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Home | CM RF Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

Note

- Rating (1~4) on each competency sub-item should be aligned between CM and Apple team members
- Justifications of rating on each sub-item are the feedback / key lessons learnt consolidated [Next Slide as Demonstration]

Demonstration

CM EPM Key Competency

#	Management	#	Execution	#	Design and Validation	#	Communication
1	Leadership / Influence	4	Station bring up, calibration and debug	7	DOE/Trial proposals	10	Effective communication
2	Planning / Execution	5	Wipas validation	8	FACA	11	Meeting
3	Team development	6	Build operation	9	RF Design (Ant&HW tuning)	12	Reporting - written & verbal

Evaluation Results

Items	Management			Execution			Design Validation			Communication			Remark			
Period / #	1	2	3	4	5	6	7	8	9	10	11	12	Score	Average	% of Exceed Expectation(=4)	% of Not Meeting Expectation(<3)
DVT Q2 2022	3.5	4	3.5	4	4	3.5	3.5	3.5	4	3.5	3.5	3.5	44	3.7	33%	0%
	3.67			3.83			3.67			3.50						

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Appendix | CM Performance Review

- Home Engineering Team - REL

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Home | CM REL Core Competency

Exceed Expectation Score 4	Meet Expectation Score 3
Meet but not Consistent Score 2	Can Not Meet Expectation Score 1

CM REL Key Competency

Items	Competency	Item	Competency	Item	Competency
1	Management Leadership and Ownership	6	Proactive	11	Schedule Planning
2	Lab Bringup	7	Results Orientation	12	Reliability Profession
3	Effective Communication	8	Deep to detail	13	FA Drive Capability
4	Rel Team Work	9	Delivery Capability	14	Reporting - Written & Verbal
5	Talent Retention	10	Problem Solving/Resolution	15	Data Analysis

Demonstration

Evaluation Result

CM GTK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average	Score	% of Exceed Expectation(>=4)	% of Not Meeting Expectation(<3)
REL Q1 2022	3.5	4	3.5	4	3.5	4	3.5	3.5	3.5	3.5	4	4	2.5	3	4	3.6	54	37.50%	6.25%
REL Q4 2022	3.5	4	3	4	3	4	3.5	4	4	3.5	4	4	3	3	4	3.6	54.5	50.00%	0.00%

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