

PPG Aerospace HMM Redesign

User Research Outcomes

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Background

About User Research

Overview

Project Exploration and Scoping

This is where everyone involved with the project comes together to learn about and discuss key issues, often during a kick-off workshop or initial research.

Research

This is when Summa gathers as much information about the project as possible. This often involves interviewing or shadowing users of a product to deeply comprehend user’s needs and desires.

Synthesis

Here, the HCD team condenses all of the research notes into key findings for analysis. Therefore, the Research and Synthesis phases usually accompany each other.

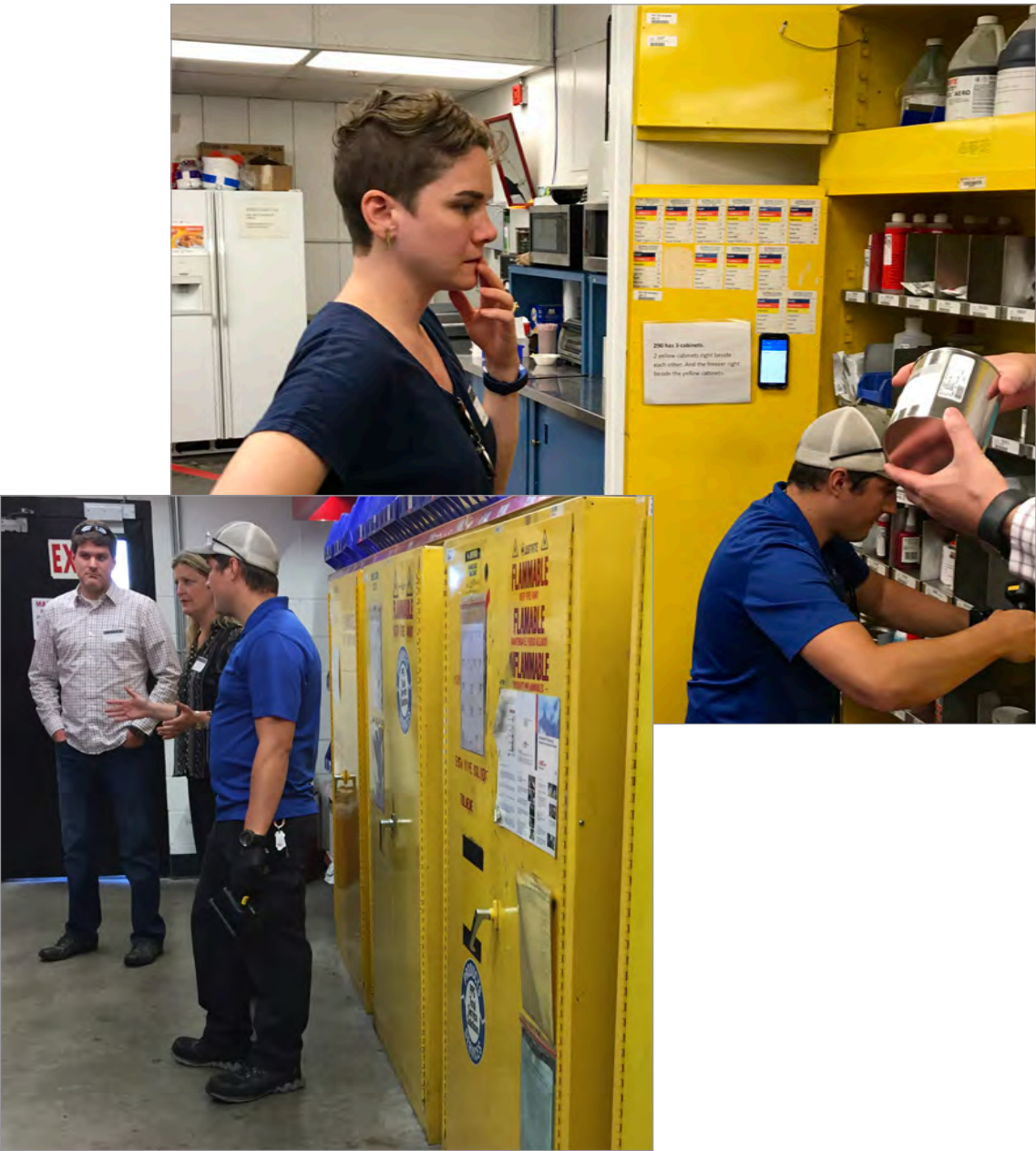
What is Contextual Inquiry?

Designing a product without understanding the context in which the product will be used leads to critical failures. Contextual Inquiry is a research technique that combines interview with observation to generate a more accurate view of how a person conducts their work, performs a task, and uses a system.

Often, there are differences between how a person describes what they do and how they actually do it. Summa experts will learn from users first-hand to inspire ideas and guide design choices, both through one-on-one interviews to get details about how they use a system, and with ride-a-longs to observe how users go about their workday.

How it works

A single interviewer or observer leads the research activity. A second researcher is present to facilitate note-taking or video capture, identify and schedule participants, develop and structured interview questions, create note-capture sheets and setup the recording equipment (video/audio).



Interviewers observe a user’s daily activities at a Delta facility in Atlanta, GA.

Key Themes from Research

Key Themes from Research *For full notes, see Appendix, page 22*

Employees rely on tribal knowledge to get through their day-to-day

- No consistent way to differentiate between customers at a facility, some keep material to one side of the warehouse, some use colored labels to identify
- Products are identified by long alphanumeric IDs (no “friendly names”), so on-boarding a new employee is a long, frustrating process
- No way in HMM to see where a stocking location is on-site, or what Material Handler “owns” it
- Freezer storage adds a layer of complexity, and each site handles this a little differently

Accomplishing a task is not a connected experience in HMM

- Users navigate through separate screens in HMM to accomplish a task (ex: one screen to view a product ID, another screen to enter the product ID to progress)
- Navigation is difficult to use, so many users bookmark frequently used pages or add favorites on their home screen
- When switching between instances, it is difficult to be sure the system has switched
- Users must populate the home screen for each instance individually, creating an inconsistent sense of place when switching between them.

Mins/Max management is manual and tedious

- Users print out reports of mins/maxes and match products up with a custom spreadsheet that compares year over year data to predict future usage
- Users download data from several different reports and combine into Excel to monitor mins/maxes

Relying on Counts (vs serial scans) allows room for human error

- Locations that scan by serial have a much more accurate view of their inventory than locations that assume FIFO and only count (not scan) their inventory daily (or every other day).
- When walking through a cabinet with the new App and hand scanner, many products were out of place or expired in the short time we spent watching.

- Customer do not always take the first product in the cabinet, and sometimes return old product that has already been depleted in the system. Scanning serials daily catches these mistakes but counting does not.

No way to track product sourcing in HMM. Sourcing is tracked in Chemical Coordinator’s heads, “sorted” by lead time and price, or in local spreadsheets.

QC Hold is virtually unaccounted for in the system

- There is no consistent process for QC hold in HMM, so these requests are handled manually and users must keep spreadsheets that define where each product must go to be tested
- In some cases, product is received into the warehouse, but not labeled until after QC process is complete

Users use Excel to manually create and filter their own customized reports using parts of multiple HMM reports.

HMM’s outdated interface is frustrating for users

- Slow response times
- System can hang during a cabinet scan, causing a user to lose progress
- No consistent use of loaders/spinners
- Not mobile/tablet friendly (hit areas)
- No breadcrumbs or sense of place
- Users are very frustrated by the limitations of HMM

Improvements are limited by QAD

- Because QAD pushes to HMM (not HMM to QAD), the inventory must be managed in two systems, so double work is often done to make sure they match
- Since HMM is a small customer of QAD, it will be difficult to motivate QAD to update on their end to make improvements on the HMM side

User Research Trip 1: Atlanta

Atlanta, GA Schedule

7/31, Atlanta
Jan, Cabinet Scanning, tour of Delta Airport Facility

8/1, Kennesaw
Crystal, Receiving
Todd, Labeling
Stacy, Part Number Management
Tammy, Invoicing
Sherie, Dana, Chemical Coordinators

8/2, Savannah
Amy, Receiving, QC
Dylan, Pick Tickets, Material Flow + Labeling
John, POU Cabinet Management

Photos from Delta's Atlanta Site

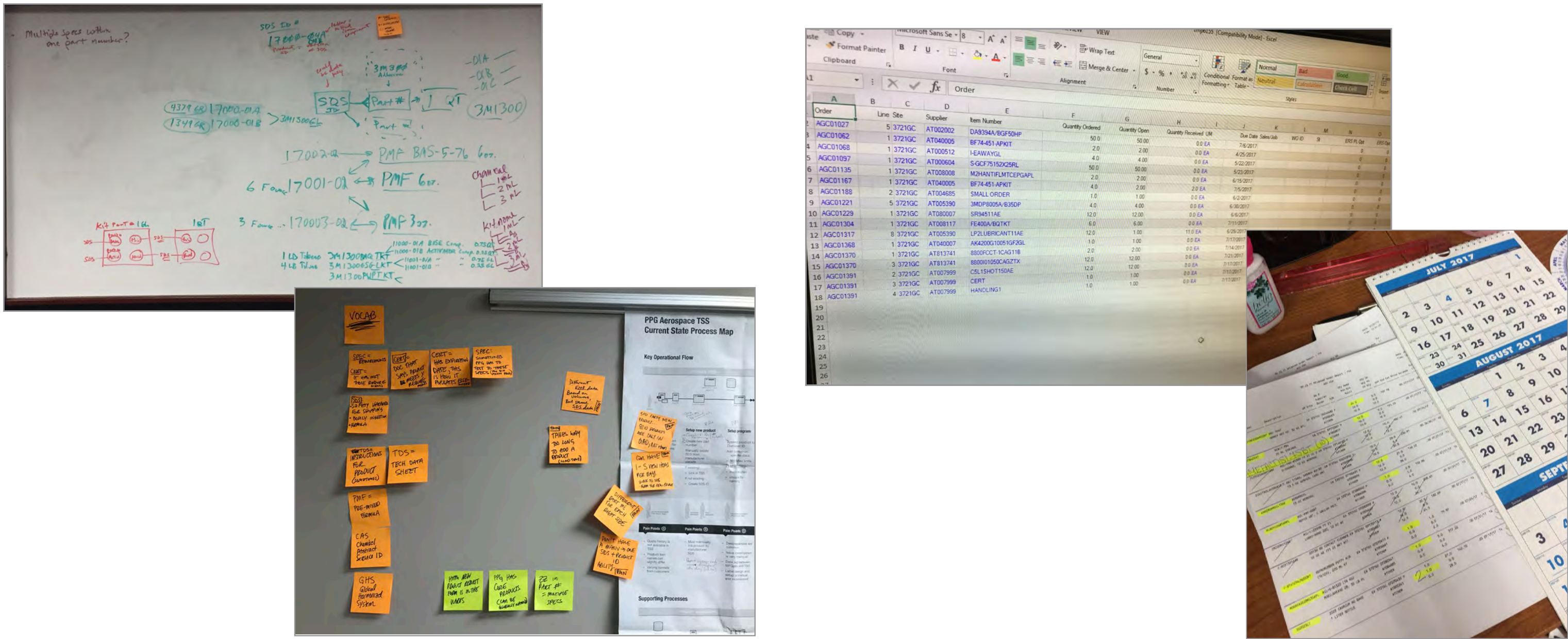


Two examples of Stocking Locations at Delta.



Jan scanning serials with the new beta app.

Photos from Kennesaw ASC



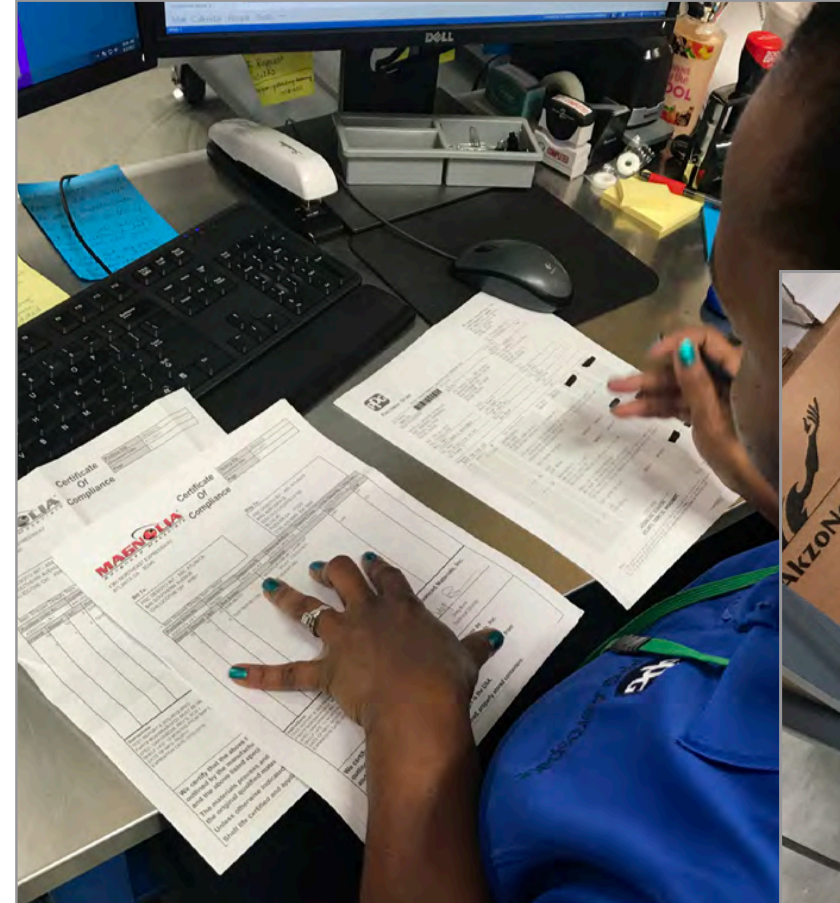
Alan and Stacy explain their process and pains with the current HMM system.

Sherie shows us her method for monitoring and updating mins/maxes at the customer site.

Photos from Savannah ASC: Receiving



Amy shows us her process for receiving a shipment into the warehouse.



Amy redacts pricing information before scanning and uploading to the I-Drive.

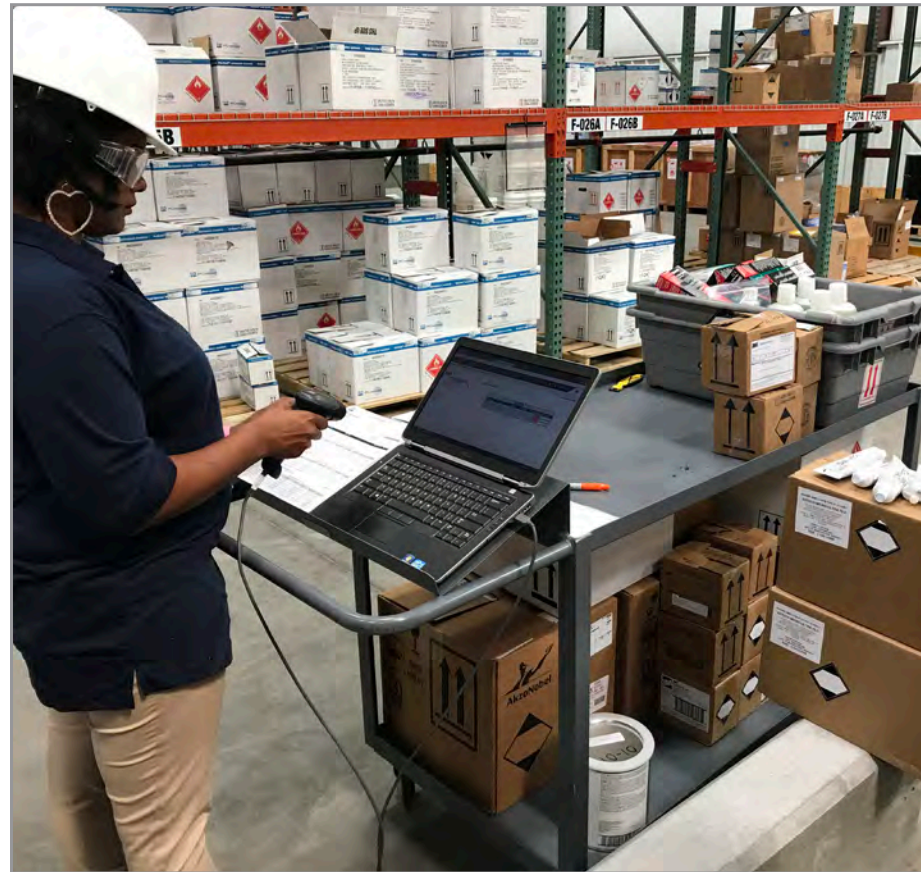


Items are labeled at receiving, then repacked, and each box labeled with beginning and ending codes handwritten on the outside of the box.

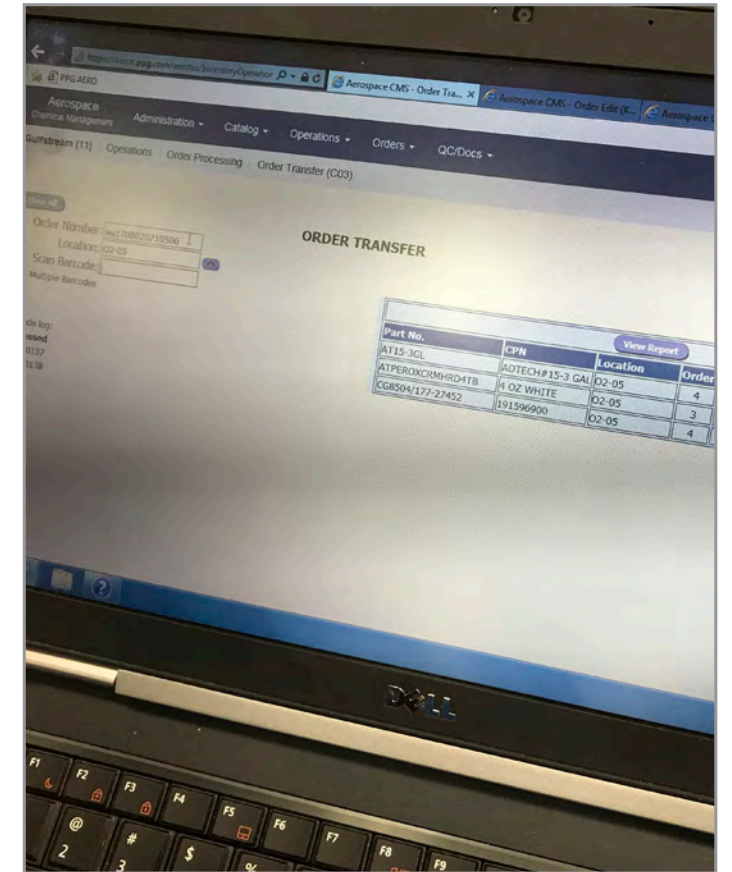
Photos from Savannah ASC: Picking



Warehouse shelves in Savannah. The 3d shelf from the bottom is labeled “C” and is reserved for items in QC hold.



A Material Handler gets an order ready for shipment. She scans each barcode to add it to the order.



Order Transfer screen that a Material Handler uses to update HMM when fulfilling an order.

User Research Trip 2: Mt. Laurel

Mt. Laurel, NJ Schedule

8/15

- Tim**, On-site coordinator
- Christine**, Invoicing
- Lucas**, Global Program Manager

8/16

- Harshil**, Supply Chain
- Jeremy**, Supply Chain
- Paul**, Chemical Manager
- Ajka**, Receiving, QC

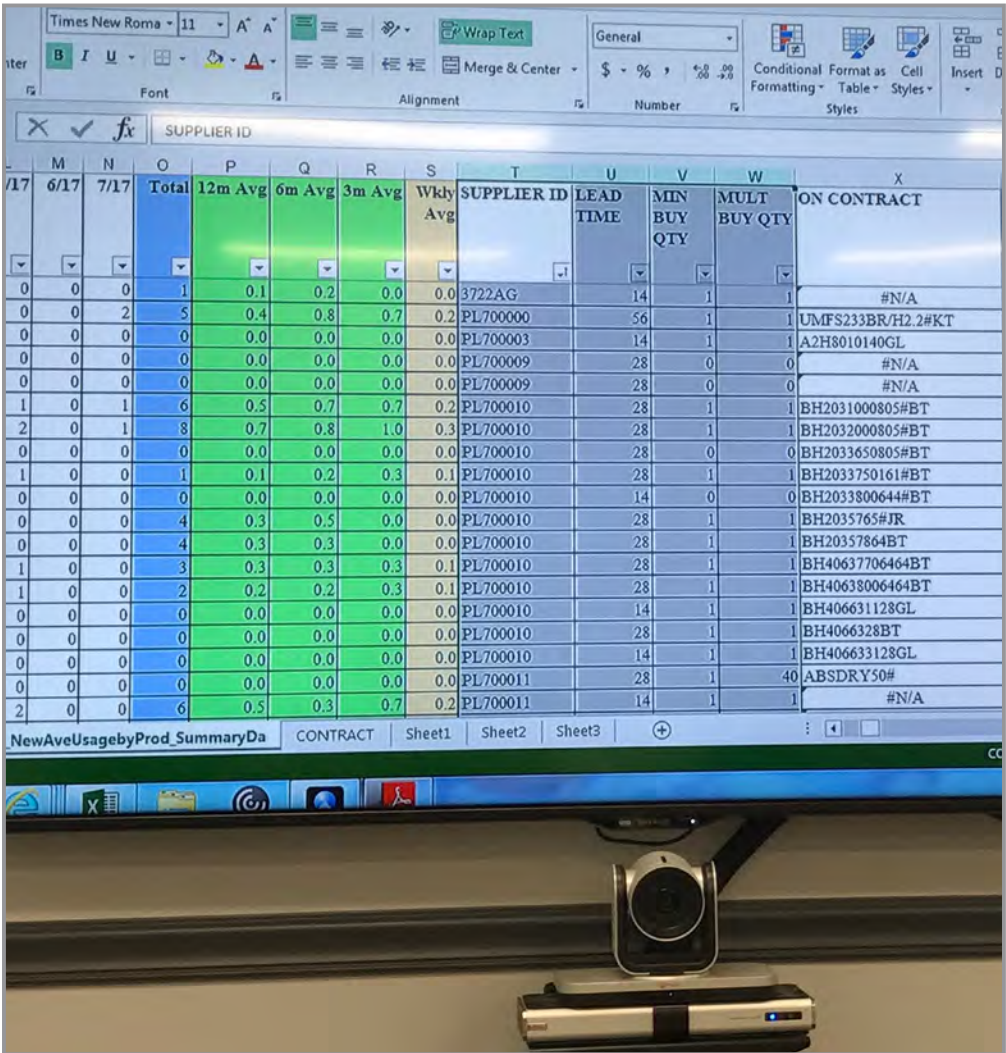
Photos from Mt. Laurel ASC



The Mt. Laurel warehouse uses different colored labels for each customer.



Material in a holding area in receiving.



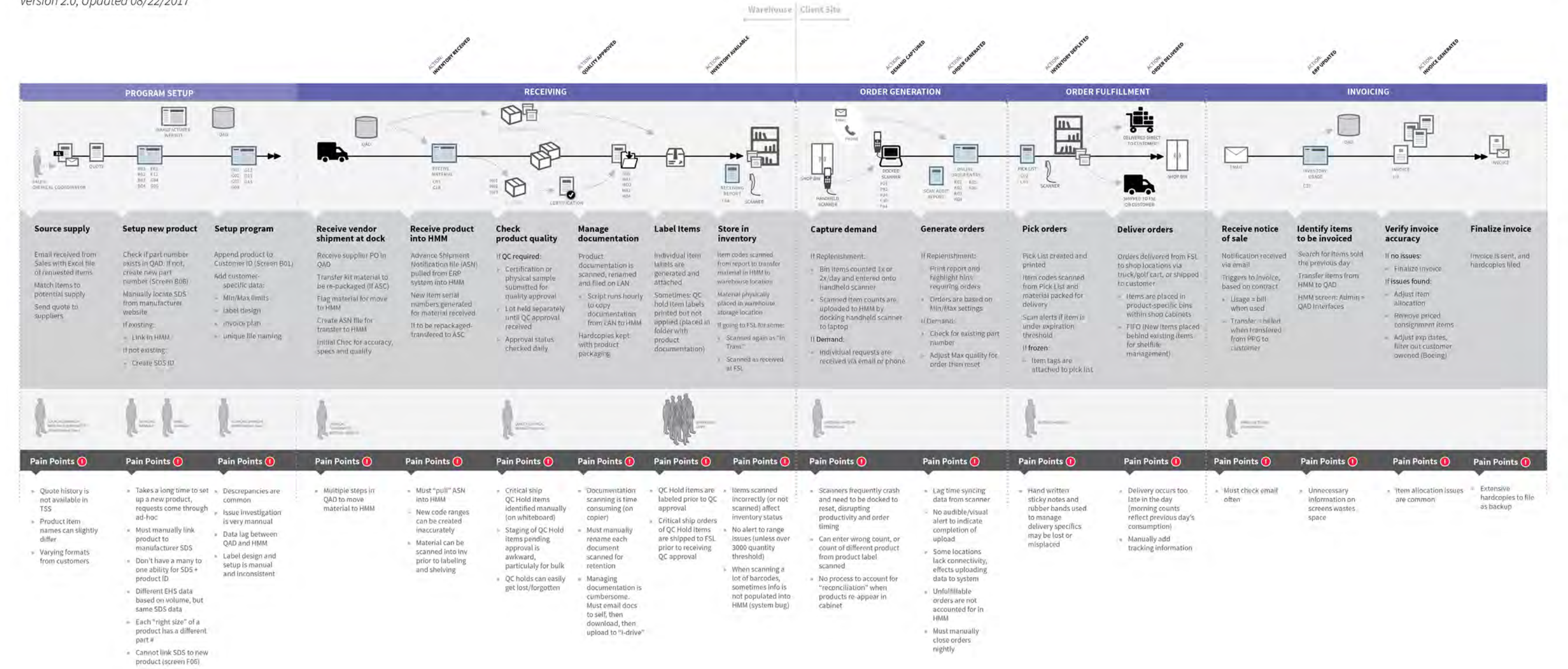
Harshil, Sourcing Coordinator, shows us how he monitors mins/maxes by using an Excel spreadsheet that combines parts of the 130, 164 and 174 reports in HMM.

Current State Process Map

Process Map: Key Operational Flow

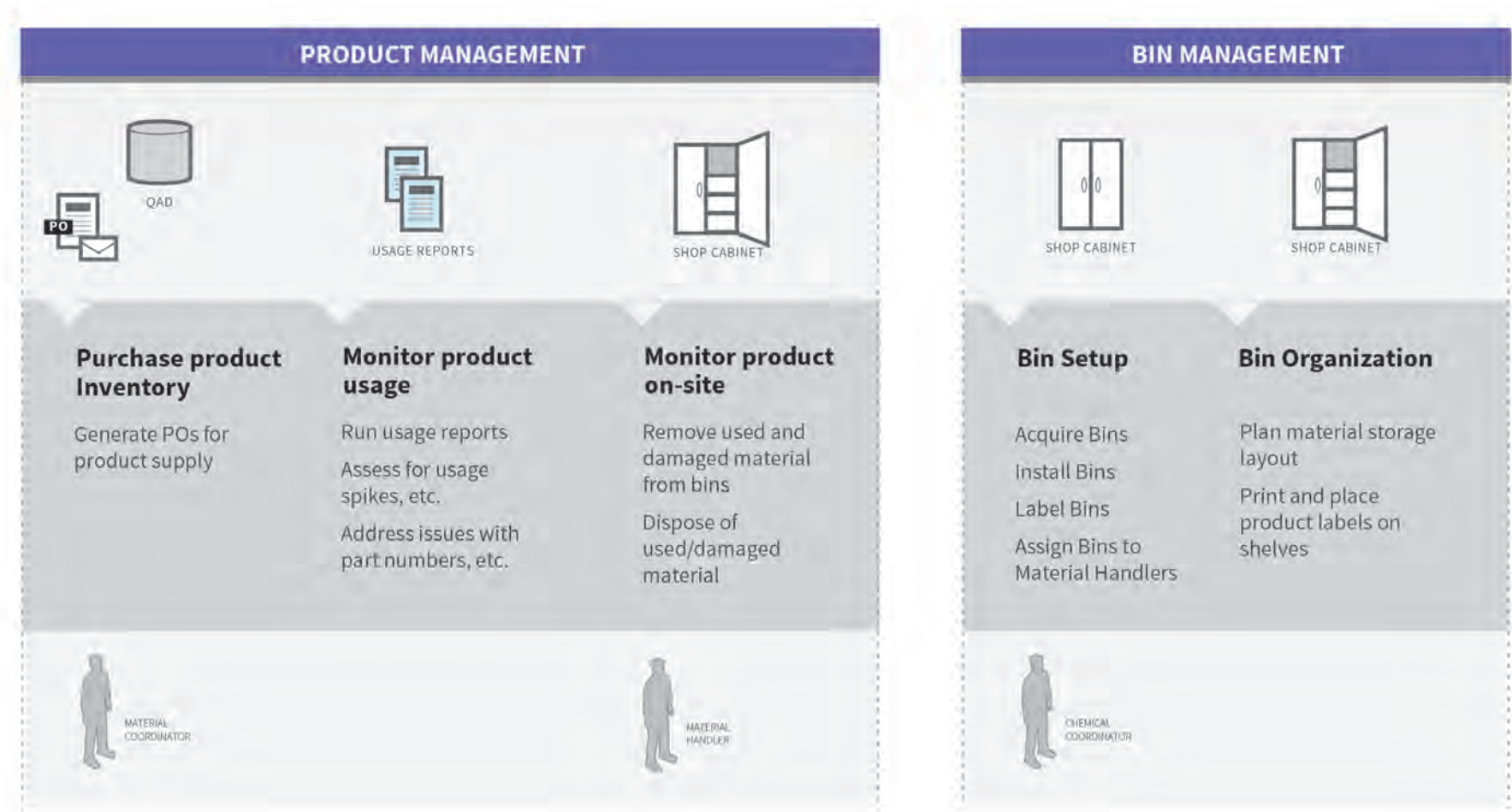
Summa created a Process Map based on our 2014 Strategy engagement, and updated it to reflect our most recent 2017 trips and interviews with PPG employees who use the system for program setup, receiving, order generation, order fulfillment and invoicing.

Version 2.0, Updated 08/22/2017



Supporting Processes for Material Flow

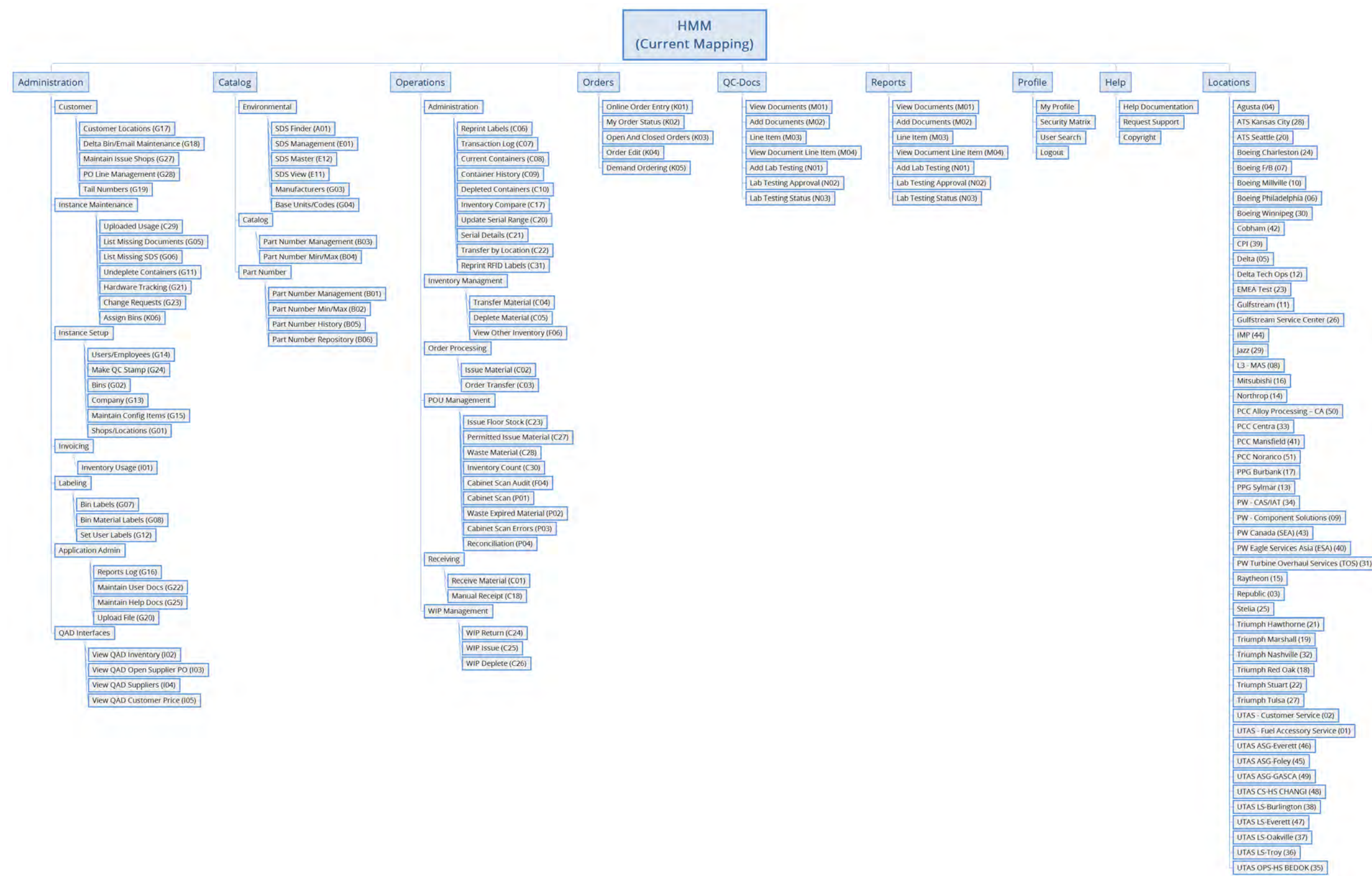
These processes are not part of the main material flow, but are important to the current state processes.



Current State Product Map

CURRENT STATE

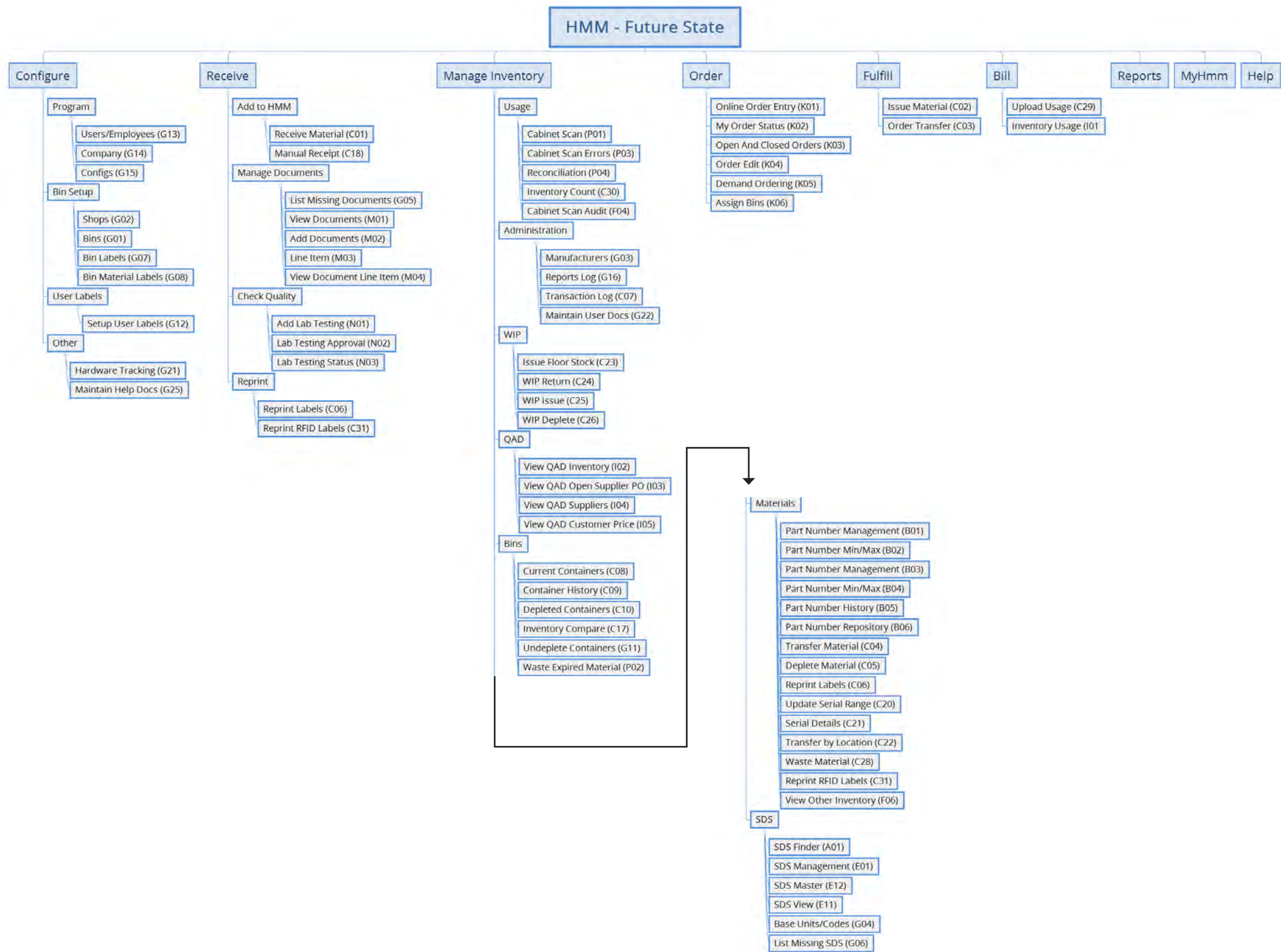
Product Map



Future State Product Map

FUTURE STATE

Product Map



Appendix: Synthesized and Raw Notes

Task Orientation	Process / Feature	Interviewee	Role / Title	Experience	Good or Bad Experience	Source (Screen/url)	Detailed Description	Initial Recommendation	Potential Affinity Category	Include in Final Design?	COMMENTS / CONSIDERATIONS
Administrative	EHS (Environmental Health and Safety)	Alan Dean	EHS Director	Unique SDSs are linked to unique part numbers (at product size level). There is no concept of a "parent product ID"	Bad		Because SDS's have to be linked to each individual part number (= size of a product), any time an SDS updates, each product number and associated SDS ID must be updated individually	Associate a single SDS ID at parent product level per customer. The SDS ID could possibly be used as the data key to identify products at this level, with multiple part numbers associated to it.		Yes	Data architecture impact
Administrative	Part Number Setup	Stacy Taylor		manual, email-based process to set up new part numbers	Bad		sometimes parts are already in the system, just inactive, sometimes they are new to the market basket and have to be fully added into the system	create a formal process for customer to request new part numbers into system themselves via HMM, work together with Chemical Manager to get ahead of new products on the way			
Administrative	Part Number Setup	Stacy Taylor		multiple specs within a single part number ??	Neutral		currently a QAD limitation. Individual spec ID numbers are included within part number IDs, creating many different part numbers for the same product.				Data architecture impact
Administrative	Part Number Setup	Stacy Taylor		Some clients now proactively provide plans to PPG (via email)	Good		Supervisors are more informed on potential changes in need and are able to tell Buyers what to buy.	Provide capability to capture customer plans within the system, or at least capture provided documentation and associate to client ID.			
Administrative	Part Number Setup	Stacy Taylor		New Part Request process			New, separate application developed onto Sharepoint to streamline requests	discuss options with Chris V. - may be specific to QAD only			
Administrative	Invoicing	Tammy Mitchell		hard to see details of problems with PO without several clicks	Bad			Create a logical workflow for invoicing that makes it easy to dive into problems to resolve before finalizing the invoice. Be able to see errors by part number		Yes	
Administrative	Reporting	Jason Daley	Regional Chemical Manager	Trend reporting/dashboard			Would love to have a dashboard that displays trend across locations (scrap, sales/spend, usage)				
Material Handling	Receiving	Crystal Sharp	Material Handler	No way to see if something is AOG	Bad		Relies solely on email or verbal communication	Integrate AOG or hot orders into HMM so it is easy for the team to see they need to address something right away		Yes	
Material Handling	Labeling	Crystal Sharp	Material Handler	2 print screens - ASN (what product to label), and Labels (have to print)	Bad	Receive Material screen		if nothing is needed for process, then should just automatically go to the Print screen.			
Material Handling	Labeling	Crystal Sharp	Material Handler	Time lost entering material location into the system	Bad	Transfer material screen	Once material is placed on warehouse shelves, the material handlers bring the report back to Crystal to enter into the system the fact that the material has made it to the warehouse location .	Enable material handlers to acknowledge having placed material in location			
Material Handling	Order Processing	Todd	Material Handler	manual cursor moving wastes time	Bad		Todd must move the cursor back to the initial PO entry field when finished with scanning the required qty of a product. This causes wasted time before moving on to the next item	Picking/scanning items to an order needs to be a streamlined workflow that keeps in mind using the scanner vs cursor		Yes	
Material Handling	Shipping	Todd	Material Handler								
Material Handling	Material Flow (put-away)	Dylan McCandless	Material Handler	has 3 tabs of different screens open when doing "put away" in the warehouse	Bad			create a hybrid of the 3 tabs Dylan keeps open when picking as a base to create a "Picking an order" workflow		Yes	
Material Handling	Demand Capture (material count)	Okisha??	Material Handler	Scanning a cabinet problems	Bad		Saves her progress on a cabinet scan halfway through, incase the application times out and loses all of her progress				
Material Handling	Demand Capture (material count)	Okisha??	Material Handler	Consignment process	Bad		If not scanning every item in the cabinet every day, HMM assumes the oldest product has been depleted first. This causes issues with having expired material in the cabinet.				
Material Handling	Receiving	Amy Barber	Material Handler								
Program Mgmt	Reporting	Kelvin Sells	Chemical Manager (Gulfstream)								
Program Mgmt	Reporting	John Mckowen	Warehouse Manager (Gulfstream)	Lack of dashboard view	Neutral		Would love to have a dashboard view of trends across locations (scrap, spend, usage)	explore options			
Program Mgmt	Purchasing	Sherie Roman-Sanchez	Chemical Coordinator	keeps a list of vendors in her head	Bad		Sherie has a mental list of vendors she likes to work with, in a hierarchy according to lead time and price. She admits this is not ideal, and other managers may have other criteria to sort by	Create a workflow for potential vendors. That way, when the vendor becomes active with PPG, it is easy to transfer the lead over. Additionally, chemical managers across PPG will be able to see what vendors people use		Yes	
Program Mgmt	Purchasing	Sherie Roman-Sanchez	Chemical Coordinator	Safety Stock min/max not in HMM	Bad			add a way to see safety stock in HMM		Yes	
Quality Control	Quality Control	John Mckowen	Warehouse Manager (Gulfstream)	QC hold process	Bad			Create a better way to integrate QC into HMM, and an appropriate workflow for it		Yes	

Task Orientation	Process / Feature	Interviewee	Role / Title	Experience	Good or Bad Experience	Source (Screen/url)	Detailed Description	Initial Recommendation	Potential Affinity Category	Include in Final Design?	COMMENTS / CONSIDERATIONS
Quality Control	Quality Control	Jason Daley	Regional Chemical Manager	QC hold process	Bad		QC hold is a big problem. Item will show that it has been on QC hold for 2 weeks	Set a reminder to check on a QC hold after 48 hours. DO NOT AUTOMATE. Jason likes the customer interaction			
Quality Control	Quality Control	Amy Barber	Material Handler								
Material Handling	Maintaing Min/Maxes	Harshil	Sourcing Coordinator	min/max maintenance is difficult	Bad		Because Boeing's usage is so varied, it is a monumental task to ensure the min/maxes are correct. Harshil spends a lot of time monitoring usage and adjusting min/maxes. PPG has been "burned" before because they missed a spike in usage	system should proactively update mins/maxes and human can override if needed		Yes	
Managing Multiple Instances	Switching between instances	Paul	Chemical Manager (Boeing)	home screen is different for each instance	Bad	home	The home screen/ "dashboard" is not consistent across all instances, so the user feels lost when using an instance thats only accessed ocassionally	have 1 dashboard that is the same across all instances		Yes	
Reporting	Reports are not customizable	Harshil	Sourcing Coordinator	Harshil creates custom reports in Excel to get the information he needs	Bad	130/164/174 reports	Harshil needs to see usage for every part number, supplier ID, lead time, Min buy qty, multiple qty, current cost	Create a way to make customized views of data that can be saved as presets for easy future reference. Keep the data manipulation in HMM so it can always be up to date and accurate		Yes	
Closing Unfulfillable Orders	Closing Orders	Paul	Chemical Manager (Boeing)	Must manually close unfulfillable orders each night, so scans can come in the next day	Bad		HMM does not gracefully handle partial orders (backorders), so the user must manually close unfulfillable orders each night so the next morning's scans can come through	Create a process for backorders			
Optimization ideas from Paul	HMM improvements	Paul	Chemical Manager (Boeing)		Good		Customer Maps that show where cabinets are, "News" screen that highlights new features (and then has an archive of whats updated), Accept a customer's PO in HMM, create a hierarchy chart for a customer location,				

ASC Warehouse & Delta TOC, Atlanta

Jason, Regional Chemical Manager

PAIN: QC hold is a big problem. Item will show that it has been on QC hold for 2 weeks

SOLVE: Set a reminder to check after 48h, do not want it to be automated, as a phone call is key to customer interactions

“The last thing you ever want is for the customer to have expired material.”

PAIN: Certs can take 2-3 days.

PAIN: Deciding to right-size is tribal knowledge

“I would love to see a dashboard that shows me trends across locations”

- Scrap
- Sales (spend)
- Usage

Alan Dean (EHS):

SDS Pain: Have to update all sizes of the same product when the SDS updates

Unique SDS IDs are created for each unique part number

Check out the new application being built to support Part Number Setup requests (called NPR)

Are we now having multiple specs within a single part number??

Crystal, Receiving, Labeling

“I receive an Eagle” - notification via a system that stores the order #s (??)

Checks that the product meets Delta standard criteria before receiving into the system

PAIN: validation and processing at the same time

PAIN: 2 print screens, ASN (what product to label), and Labels (have to print)

Post-labeling, Once material is placed on warehouse shelves, the material handlers bring the report back to Crystal to enter the fact that the material has made it to the warehouse location into the system. (go to Transfer material screen and move it to the shelf)

PAIN: Receive Material screen - if nothing is needed for process, then should just automatically go to the Print screen.

Printed hardcopy receiving report and labels go into colored folders for each day of the week that the material was received.

Manual Receipt: could be outside of contract. Have to set up part number before processing can begin.

PAIN: can't do anything without a serial #

Solve: separate screen to generate a barcode

PAIN: no way to see AOG in system, or a Hot order

PAIN: Part Number needs to exist first or will have to make a generic label without putting it into the system completely. Then will delete it from the system once labels are printed.

Solve: Have a screen to print generic labels directly without having to "Receive" the product formally into HMM

Labels need to be reprinted for PFM when they are taken out of the freezer. Once product leaves the freezer the expiration date resets.

Todd, Order Processing

Picking an Item

1. Find product ID
2. Verify Lot #
3. DOM verify
4. Expiration verify

Checks the expiration date if being filled from more than one storage location; picks the oldest first.

When done with order...

Add in tracking barcode

PAIN: when scanning is complete, have to manually move the cursor to scan out PO #

Need to go online to see:

- Time of print
- Quantity
- Inventory

Prioritizes work as follows:

1. AOG (within 3 hrs)
2. Shop (Delta TOC)
3. Station (UPS, any other Delta location)

Stacy, Product Number Setup:

PAIN: email based way to add part numbers, not easy to transfer to QAD

Emails are color coded to help manage work

Part Number Management Screen (B01)

Checks customer and PPG notes fields for info - typically blank!

- PPG Notes follow the Part Number throughout the system, but are not customer-specific!
- Customer Notes are customer-specific (like Chatter)

PAIN: have to manually click to see if there are notes from PPG, or notes from customer
Adds EHS team address to email responses to alert, ensures that customer name and part number are in the subject line.

PAIN: time spent locating SDS, but that is not even her job

Would like SDS ID be a link to the SDS info screen (F06)

Tammy, Invoicing:

PAIN: have to manually override exp date in QAD if the product expires the day of invoicing

PAIN: hard to see error details without diving in

Solve: see error details by part number

PAIN: compare inventory screen is not helpful (need more info on this)

Simplify the Invoice Details screen view

Prices are never updated in HMM (a good thing) However, it's a pain point when the price changes after depletion because we can't update it in HMM

Sherie, Dana, Material Coordinators (Purchasing - buying material for different clients):

Receives RFQ from the client via email

- Spec code, product description and amount

Process and format varies from client to client

Email response to client contains marked up pricing and leadtime

PAIN: keeps "list" of good vendors in her head

SOLVE: add in a module of potential vendors, parts, where PPG is already buying that part in the system, price, other info about the vendor

PAIN: gets a cryptic part number + description from client, has to google to find it

Screen I04 = View QAD Suppliers -- Maybe use as a link (pivot table style?)

Vendor quote responses are only kept in email, nowhere else in system

Only the Senior Material Coordinator can enter pricing into QAD and HMM (not Sherie or Dana)

PAIN: mental list of preferred vendors, "filtered" by Lead time and price, but other material coordinators probably want to filter by other categories

PAIN: safety stock min/max is not in HMM, so they use Excel spreadsheet calculation to determine replenishment. (reflects breakdown in communication between Managers on site and Purchasing)

Colors: red = replenish, not red = demand, yellow highlight = safety stock has changed recently, so keep an eye on it

PAIN: has to manually run a late order report (replenishment)

- Look in QAD,
- browse POs, filtered by site/due date/quantity,
- export to Excel
- Check HMM for stock status
- Resolve with the manager on site

Bulk ordering from a vendor (product for more than 1 client) would affect the Receiving process

Pooler Warehouse, Savannah

Amy, Receiving and QC

PAIN: ASC mislabels things, incorrect in QAD, so it imports into HMM incorrectly. Items can sit in labeling for way too long

Solve: one-off QC requests are done directly in system?

Idea: auto-populate QC lab request form in HMM from serial number (N01 - Add Lab Testing) -- Notes = QAD PDF document number

PAIN: online order entry > transfer material to QC

Idea: make it easier to attach manufacturer PO and PPG PO and packing slip to HMM

PAIN: can't override exp soon in that page, have to go somewhere else

Dylan, Labeling and Material Flow

Currently, colored cones indicate when material is ready to be labeled and stocked. - Better to move material right away.

"Try to find" and label QC Hold product first, then set aside in designated area with paperwork on top of box.

Verify match before moving material -

- Part number
- Lot number
- Expiration date

Put away as FIFO (first in/first out)

Idea: Order Transfer/Issue Material screen warns if lot # is in QC Hold

PAIN: customers have different expiration dates

Idea: be able to see all serials, dates, lots, bins under 1 product number

Kelvin Sells, Chemical Manager

John McKowen, Warehouse Supervisor

PAIN: hold off on systematic move, tell after product has been stocked

PAIN: have been using workarounds so long that they are “use to the way things used to be done”

Scanning a cabinet:

PAIN: system is unreliable, so person will submit a scan halfway through so she doesn't lose all the data if the system freezes

PAIN: consignment: HMM automatically scans out oldest item first, not always the product people grab

Idea: “put away” screen, like the Transfer Materials screen, but juhzted up

Idea: soft warning for product on QC hold

Want: history of a material, by serial and product level, when it's been moved, depleted. “133 report”

Want: 183 report, would want to see if QC has inventory vs in-stock vs point-of-use location

Want: pick ticket, ant to see home bin location. Issual Material and Order Transfer screens already shows counts

Mt. Laurel ASC, New Jersey

Tim, On-site Mgr at Boeing

Constantly reviewing min/max levels, uses 171 report
Keeps a 1 month usage of material at the ASC
Someone runs the 006 report daily (material expiring report)
Boeing Philly has 87 Chemical Locations, 200 cabinets
2 Material handlers spend 2-3 hours counting material, 2-3 hours putting away material in cabinet
Chem Center: Corrosive, Flammable, MRO in one location
PAIN: maintains mins/maxes to just in time, "skinny teeth"
118 report: looks for anomalies (scan/audit report)
PAIN: has to update baselines manually
PAIN: min quantities to order is larger than the customer can use before it expires. Expired product is on PPG's dime
PAIN: have to manually close all open orders each evening, so the next morning's scans are recorded

Christine, Invoicing

Uses "inventory compare" before and after invoicing to keep the data as clean as possible
Exports the inventory compare data to Excel. First sorts by "all match- NO" then gets rid of "Pack" and "Haz Charge". Any material with "all match- YES" can be removed from the list
IDEA: "cheat sheet" for invoicing payment match up
104/105 report is the invoice that is sent to the customer
PAIN: expiration mismatch if you override (?)

Paul, Chemical Manager

Top ideas: 1. Milkrun for picking orders. 2. 164/183 Report improvements ("Harshil report"). 3. Auto-ordering, don't have to place open orders, they are placed automatically
PAIN: HMM doesn't understand other people's accounts
PAIN: dashboard is different for each instance
IDEA: each instance should have the same dashboard setup
IDEA: Hierarchy chart for customer in HMM
IDEA: Customer map that shows cabinet location + owners
IDEA: CFCs, test reports uploaded to HMM
IDEA: Accept a customer's PO in HMM. Sub customer for one-off orders. Take a 3rd party person faster so ASC doesn't get the credit for the sale

Harshil, Sourcing Coordinator

Paul, Material Coordinator

Non-contract items are ordered, have to get a PO from Boeing for each order
PAIN: Constantly adjusting min/max levels. Uses a combo of the 164/174/130 report

PAIN: Combo Excel sheet: the 130 report does not include supplier ID, lead time, min buy qty, multiple qty or Current cost

PAIN: does not connect to current inventory/exp date

PAIN: 164 report does not show partial fills of demand orders. Has to go to open orders to see actual fill amts

PAIN: 164 report: no need to see location here, in warehouse 1 product goes to 1 location.

IDEA: would love to see 3 month usage data.

Jeremy, Supply Chain

“We have trouble labeling product in a timely fashion.”

Stuff is sitting in labeling, 164 report is inaccurate

IDEA: add a flag for usage variance, e.g. “10% higher usage this month, take a look and adjust mins/maxes

PAIN: PPG has been burned with not recognizing big spikes in usage

Ajka, Receiving

Goes to truck, and looks for PLB, PLB/PLC (open POs)

Check for Corrosive vs PMG, fridge, MRO, Flam, regular

PAIN no place that shows what QC lab to use

Any product on QC hold is not in HMM yet

Lablog on label, need to have this field (meaning the lab returned the sample) in order to label it