

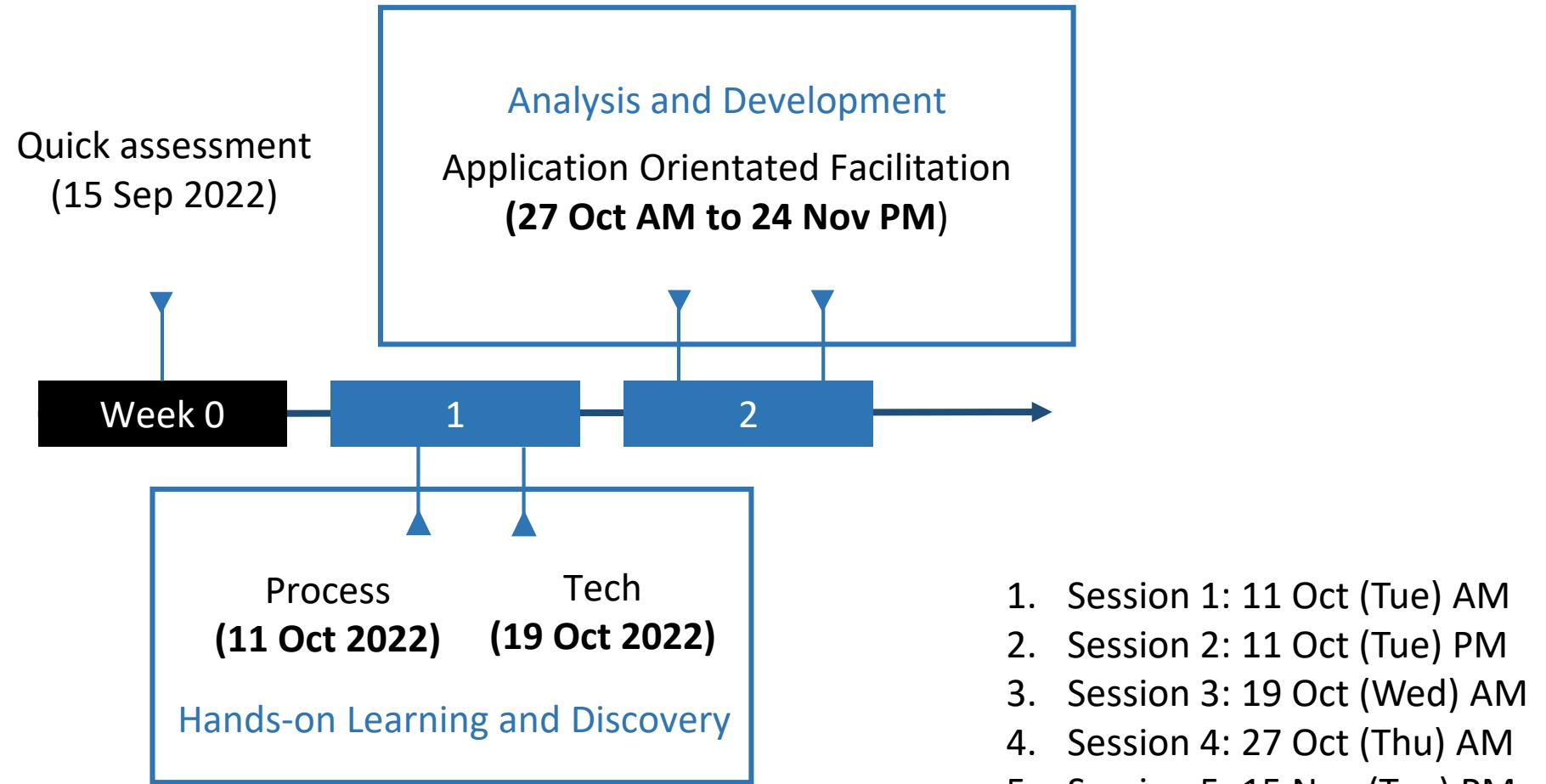
Skills & Tech Enablement Program

STEP-INA (Intelligent No-code Apps)

For Kaimay Trading Pte Ltd

Oct 2022

2 to 3 weeks program



Note : Minimum 2 pax on the same application

Company & Project Info

1	<u>UEN</u>	198502422N							
2	Company Name	KAIMAY TRADING PTE. LTD.							
3	Revenue Band	<\$1M, \$1M-\$10M, \$10M-\$100M, \$100M-\$200M, >\$100M							
4	Company Headcount	<50							
5	Project Title	STEP-INA on container loading/unloading job verification and warehouse stock taking							
6	Short Project Description	<p>This STEP-INA course will focus on developing 2 apps to digitalize 2 different processes</p> <ol style="list-style-type: none"> 1) Job entry and verification for container loading and unloading 2) Concurrent stock taking by several staff in warehouse 							
7	Key Capabilities to be Built	1. No-code mobile App design using AppSheet platform							
8	Project Categories	N	Process Improvement	N	Solution/Design	N	Skills Deepening	Y	New Staff Capabilities
		N	Tech Feasibility Study	Y	Tech Application	N	Tech Licensing	N	Others

STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

STEP-INA Course Objective

Objective

Enable participants to develop AppSheet mobile App

Format

- Face to face or online
- Hands-on
- Participant to develop a workable app

Introduction

Name?

Job Responsibilities?

Any AppSheet Experience ?

Expectation of this course?

STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

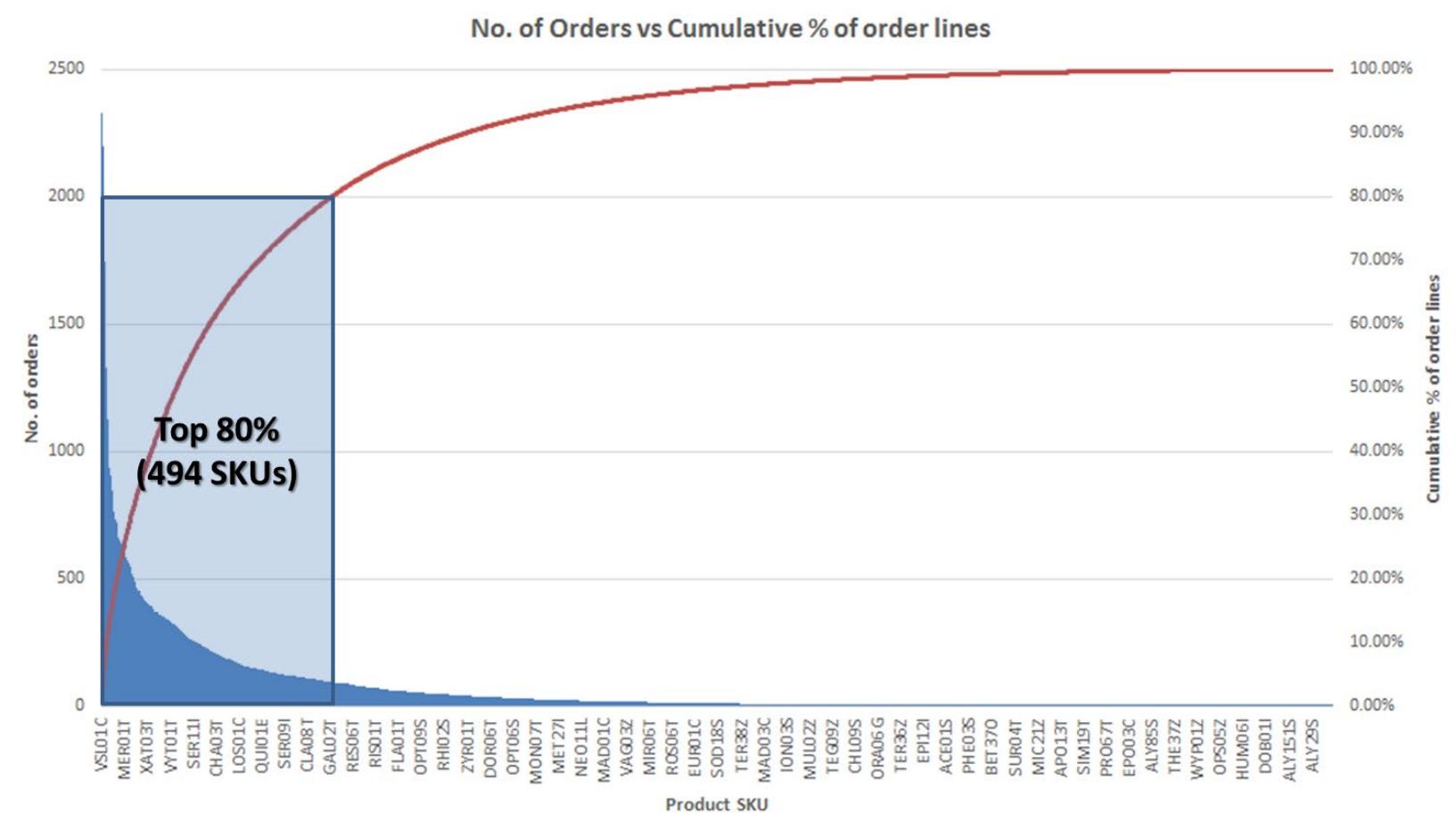
8 Classic Types of Waste – TIMWOOD & I

TRANSPORT	INVENTORY	MOTION	WAITING
			
Unnecessarily moving things, equipment, parts, tools and materials from one location to another	Making more than customer demand, building up unnecessary stocks	Unnecessary movement; people walking to get things which should be located closer to the point of use	Delays between operations because parts are missing. Stopped work: waiting for parts, machines, or people
OVER PROCESSING	OVER PRODUCTION	DEFECTS	INTELLECT
			
Duplicate or redundant operations, performing wasteful steps that are not required. Often because “we do it this way”	Making too much or too many. Completing a task before it is needed. Making products that the customer hasn’t ordered	Failing to produce a quality part for the first time generating rework or scrap. Not delivering the product of service ‘right the first time’	Failing to use skills and capabilities of the workforce. Not listening to people, using their knowledge or learning from past mistakes/issues

Transport Waste

- 20% of product SKUs meet 80% of orders and orderliness
- Place these 20% of product SKUs in the forward picking area

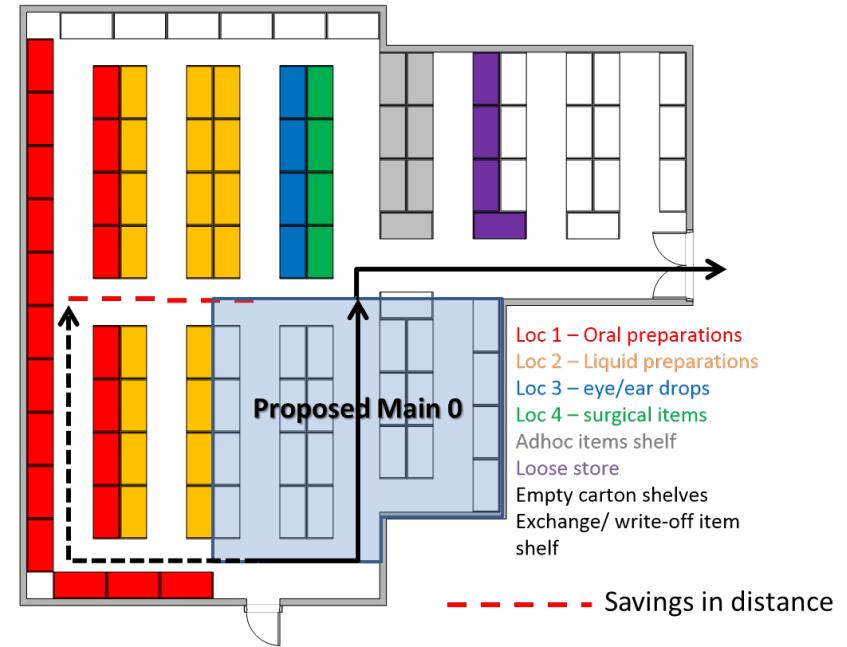
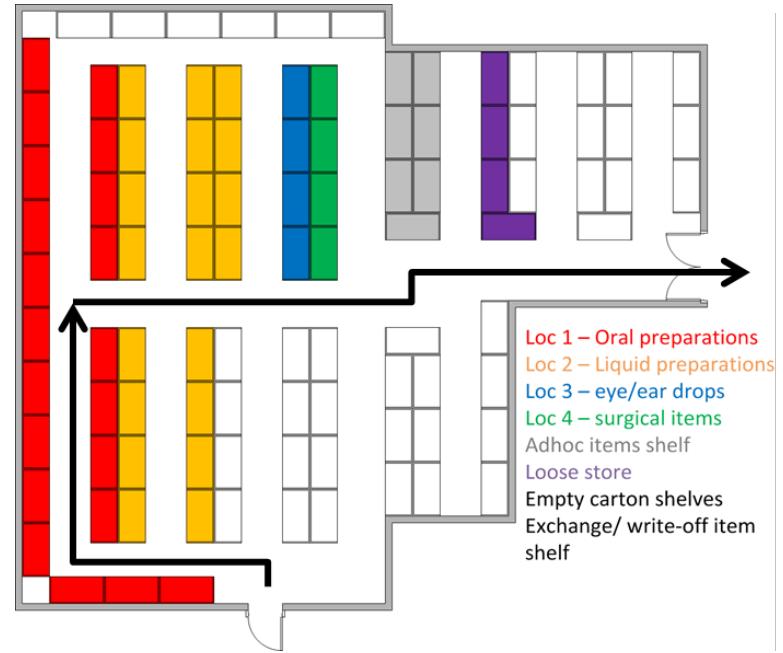
Unnecessarily moving things,
equipment, parts, tools and
materials from one location to
another



T - Transport



Unnecessarily moving things,
equipment, parts, tools and
materials from one location to
another

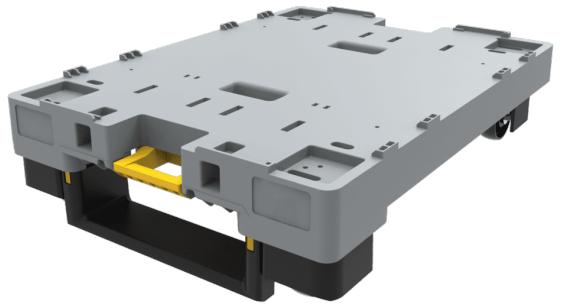
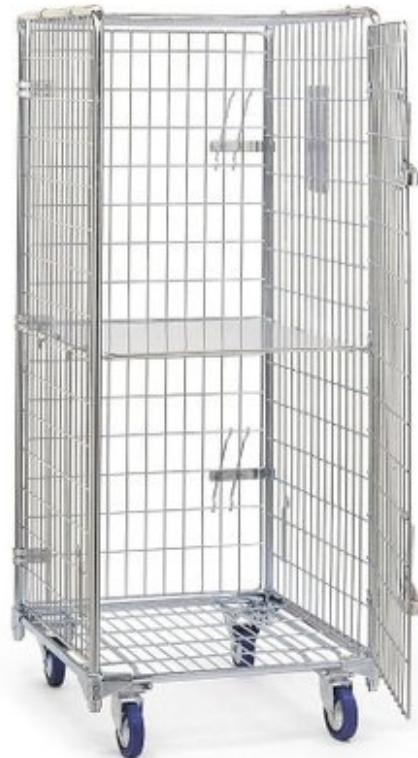


Transport Waste

- Better storage and material handling to reduce transport waste



Unnecessarily moving things,
equipment, parts, tools and
materials from one location to
another

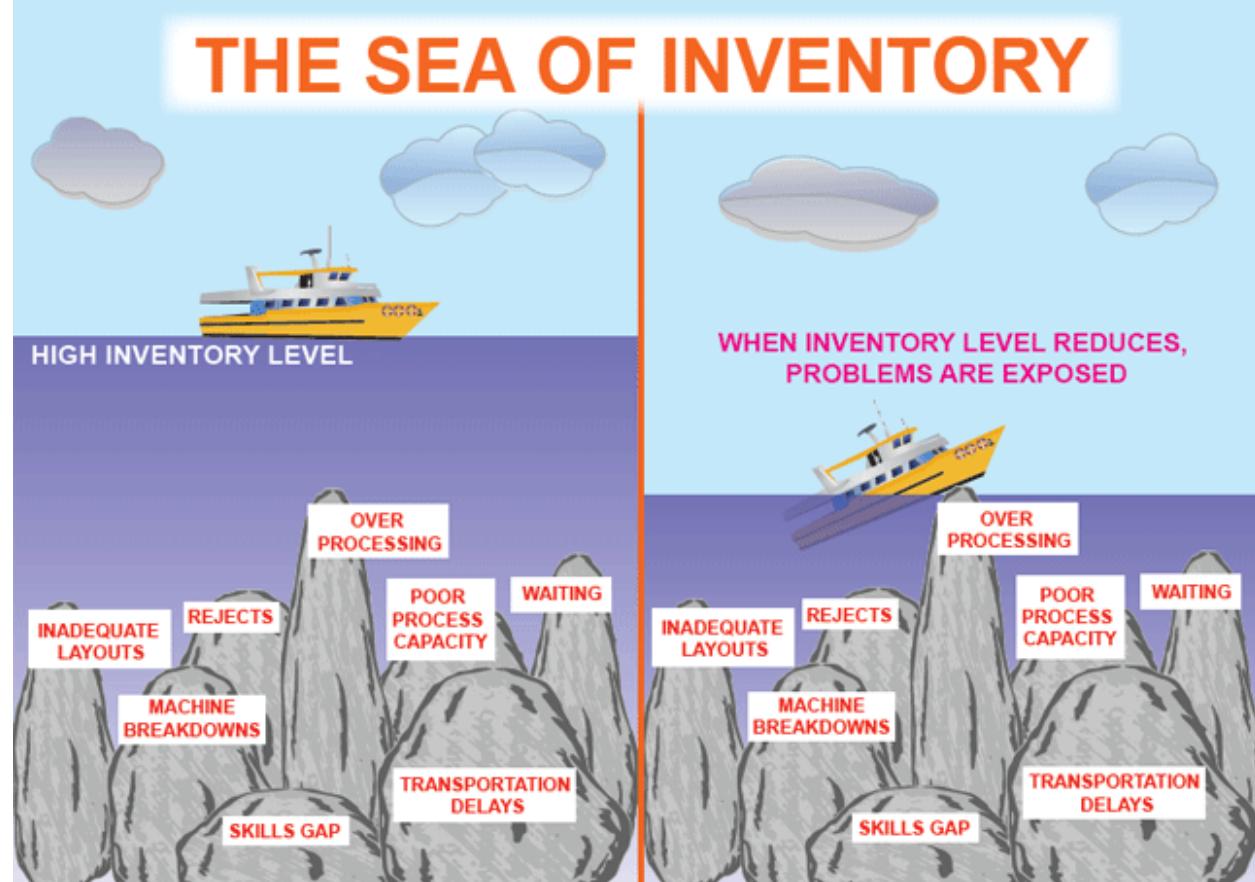


Palley

I - Inventory



Making more than customer demand, building up unnecessary stocks



- Ordering too much just to store
- Also includes :
 - too much office supplies
 - unnecessary hard copies stored

Motion Waste

- Putting even number on the left side of the shelf, and odd on the right side
- Personal rubber stamp and signature



VS



Motion Waste



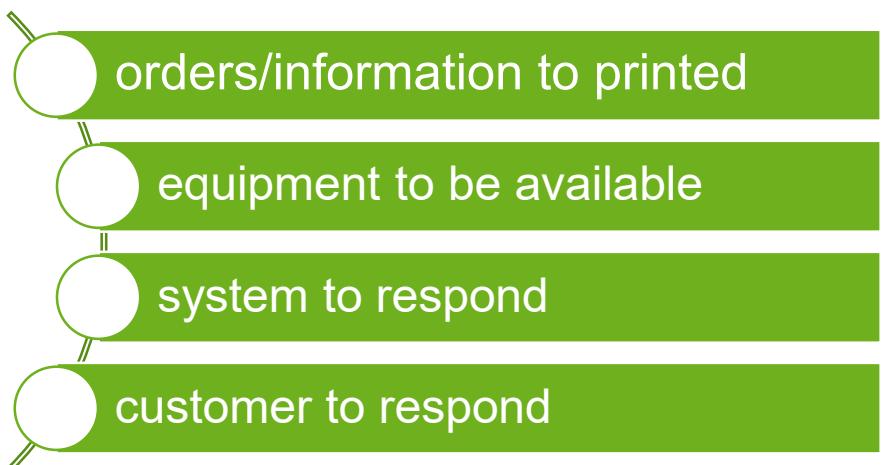
VS



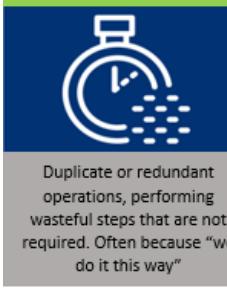
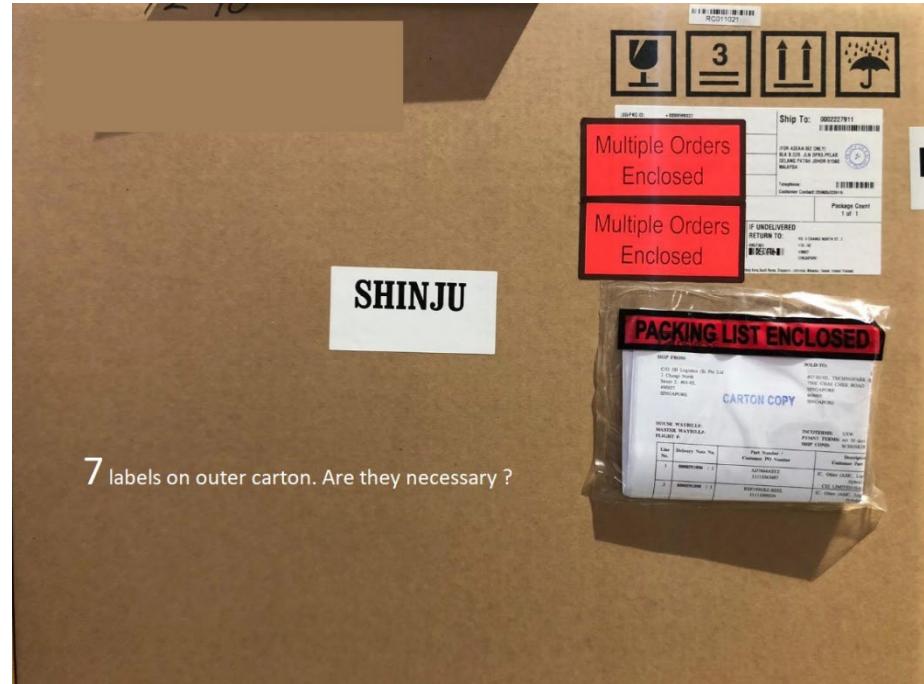
W - Waiting



Delays between operations because parts are missing. Stopped work: waiting for parts, machines, or people



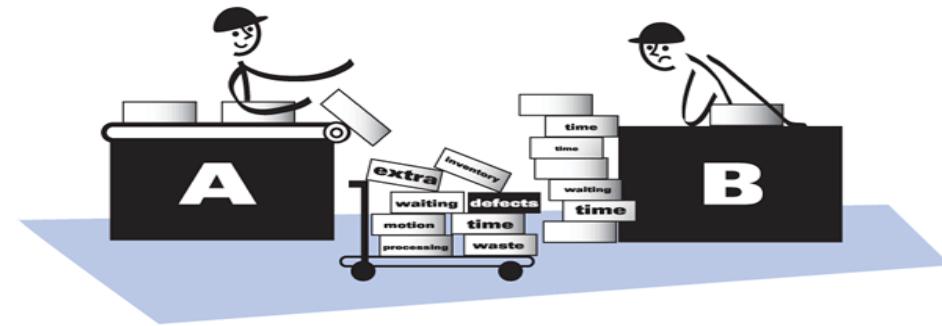
O - Overprocessing





Overproduction

- Overproduction is making too many products or before it is actually needed, leading to excessive inventory.



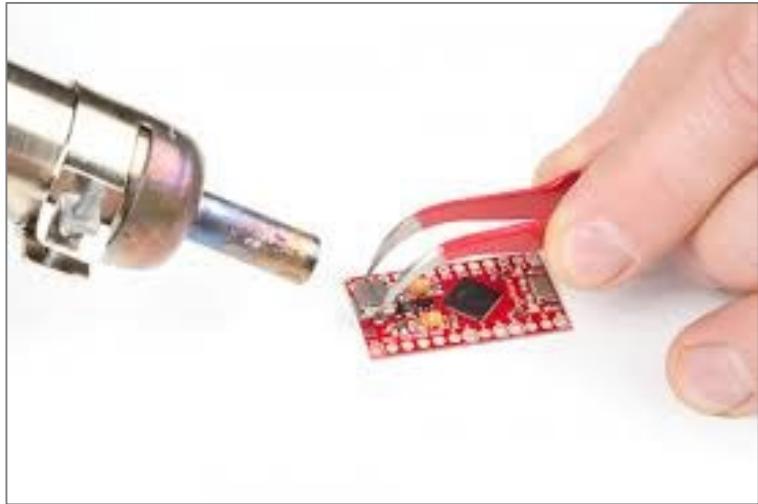
Examples

- lots of cartons in advance, only to have motion and transport waste taking it later
- picking orders in advance to store it, only for orders from the same shipper to be added nearer to the outgoing date
- to many pre-printed forms and paper that takes up space, and need to finish using it before we can reprint.

Defects



Failing to produce a quality part for the first time generating rework or scrap. Not delivering the product of service 'right the first time'



Rework

- Receiving and Picking Error. Need to reconfirm and QC
- Errors in transferring information

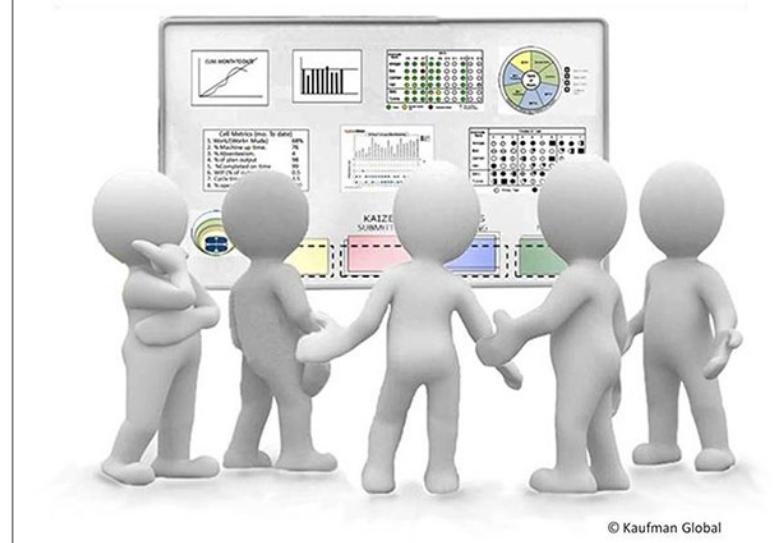
Failing to produce a quality part for the first time generating rework or scrap. Not delivering the product of service 'right the first time'

ABCDEFG T20 Tablet 28's

ABCDEFG T20 *Tablet* 28's



I - Intellect



Under utilise human resource **capabilities**
Employees are not involved
 Team **skills**



STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

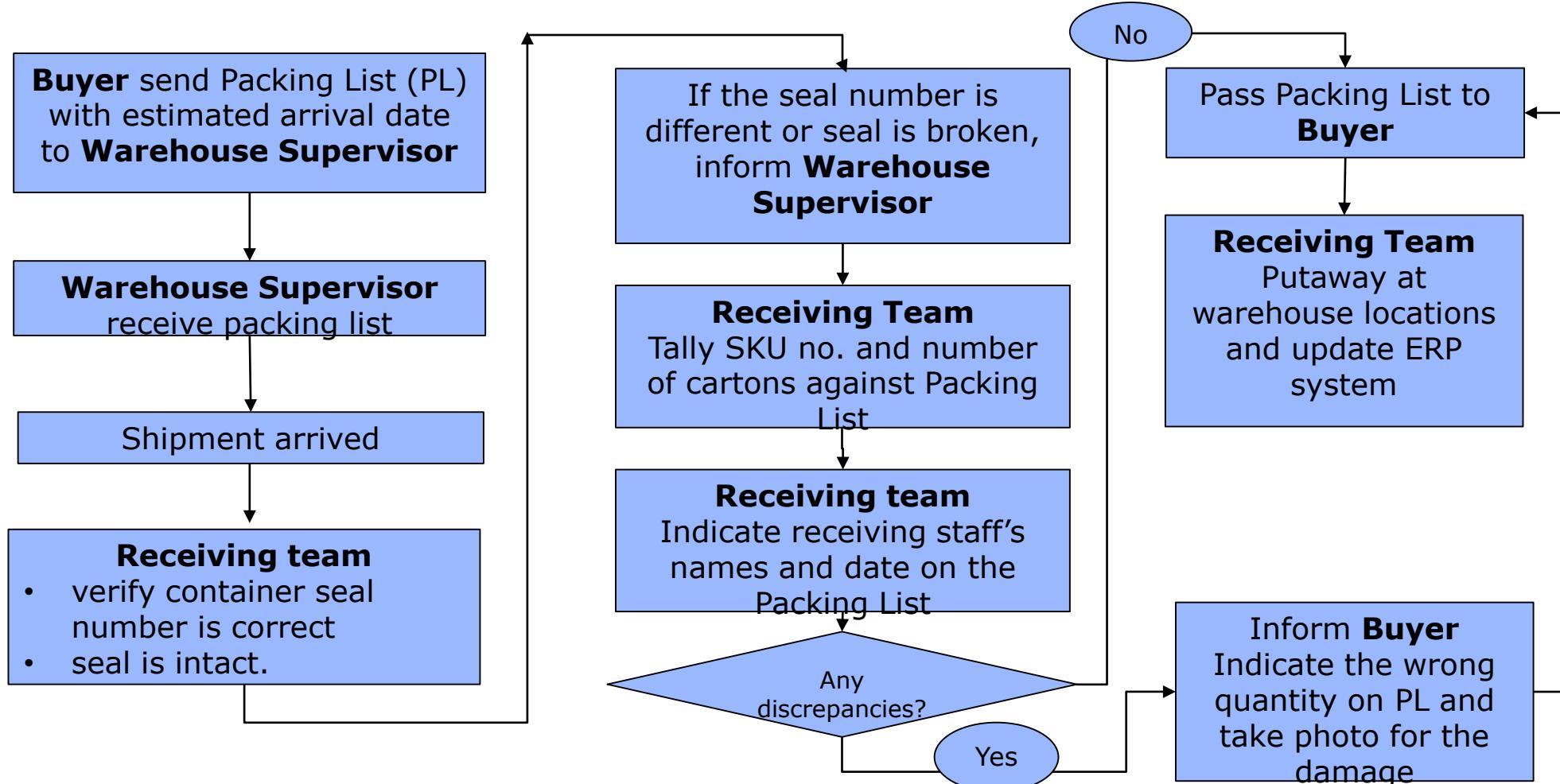
Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

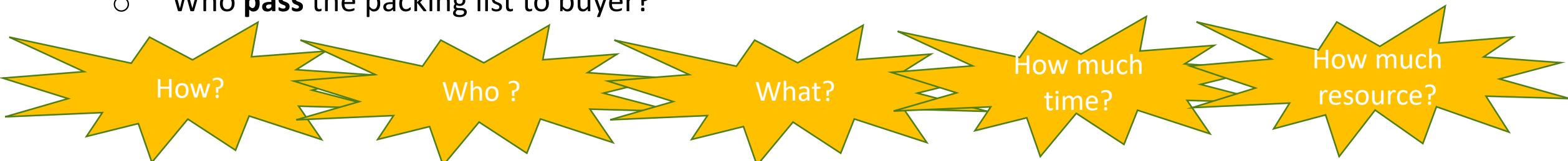
Process Mapping using flowchart

The following flowchart was developed by observation and interviews with stakeholders



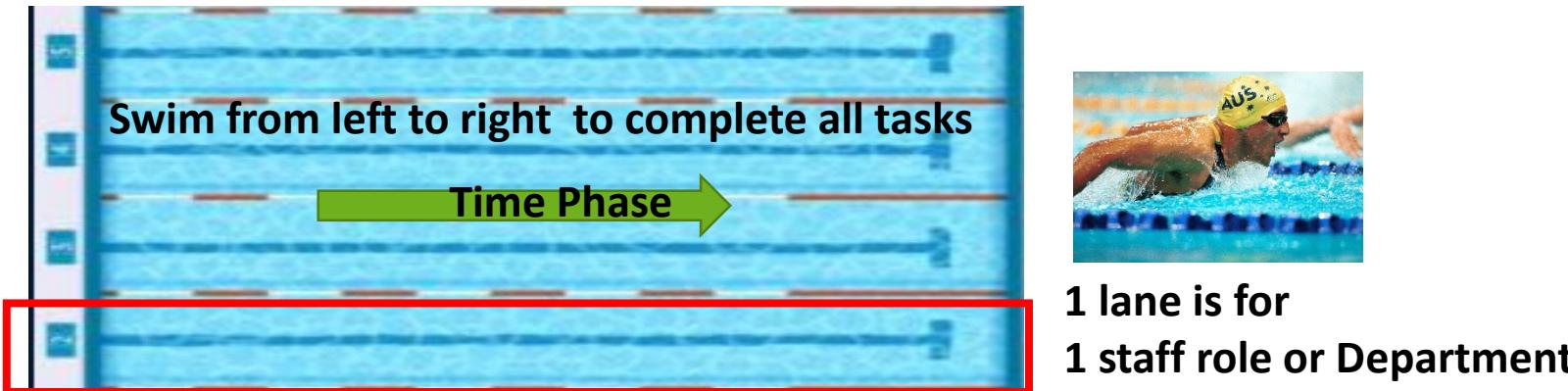
Necessary Information for Process Improvement

- **Number of Staff involved** in each tasks are not clear eg receiving team
- **Time required** for each step is not clear
- No clarity on the way of **communication** eg how the “Warehouse supervisor receive the Packing List?”
- No clarity on **accountability** eg what if Warehouse supervisor did not receive the Packing List and failed to plan the resource in advance?
- Consists of steps with different levels eg “putaway and update ERP system” is of higher/broader level compared to “pass packing list to buyer”.
- Who is **responsible** for “Shipment Arrived”?
- Is there a **delay** between steps?
- Who **pass** the packing list to buyer?



Introduction to Swimlane

- A Swimlane diagram (also known as '**Cross-Functional Flowcharts**' or '**Opportunity Flowcharts**') visually clarifies job roles for workflow of a business process through the use of container boxes called swimlanes.



- Use during **process discovery** to visualize how things currently operate. It provides the foundation for the future state. (Who, What, When, How)
- It shows the tasks in sequence from start to end, from left to right, including **roles, flow, decision and tasks**.

Purpose of Swimlane

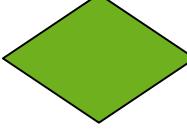
- A swimlane diagram provides **clarity and accountability** by placing **time-phased** process steps within the horizontal or vertical “swimlanes” of a staff or department.
- Shows **connections, communication and handoffs** between these lanes, and it can serve to highlight waste, redundancy and inefficiency in a process.
- Used for many different purposes including identifying **value vs non-value** processes, roles and responsibilities among departments in an organization.

How to Create a Swimlane

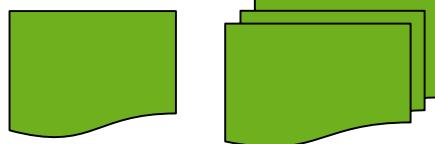
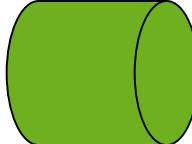
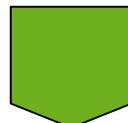
- **Identify the lanes.** Decide what divisions you need represented by swimlanes and label them.
- Start your chart. **Define the starting point of the process.** Add a rounded rectangle to the top of the appropriate swim lane to indicate its starting point and label it.
- **Add steps.** Next add more steps to your chart. Each step should be connected to the one before it with a line. To draw steps in the same swimlane, draw from **left to right**. To add a step in another function, go from **top to bottom**.
- With each step, describe what it represents until you reach the end of the process. The arrows between the steps indicate the **transfer of information** or flow.

Source: <https://www.smartdraw.com/swim-lane-diagram/>

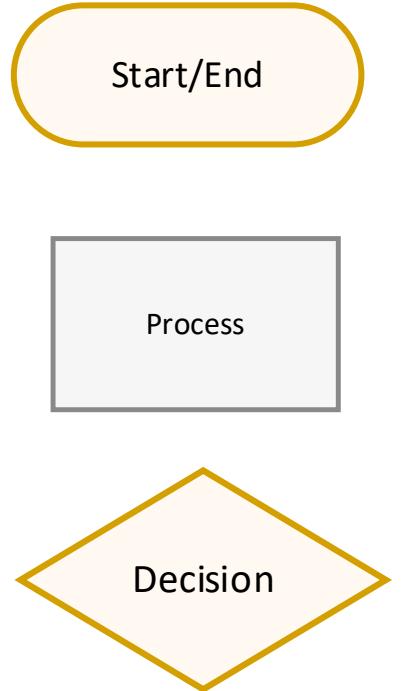
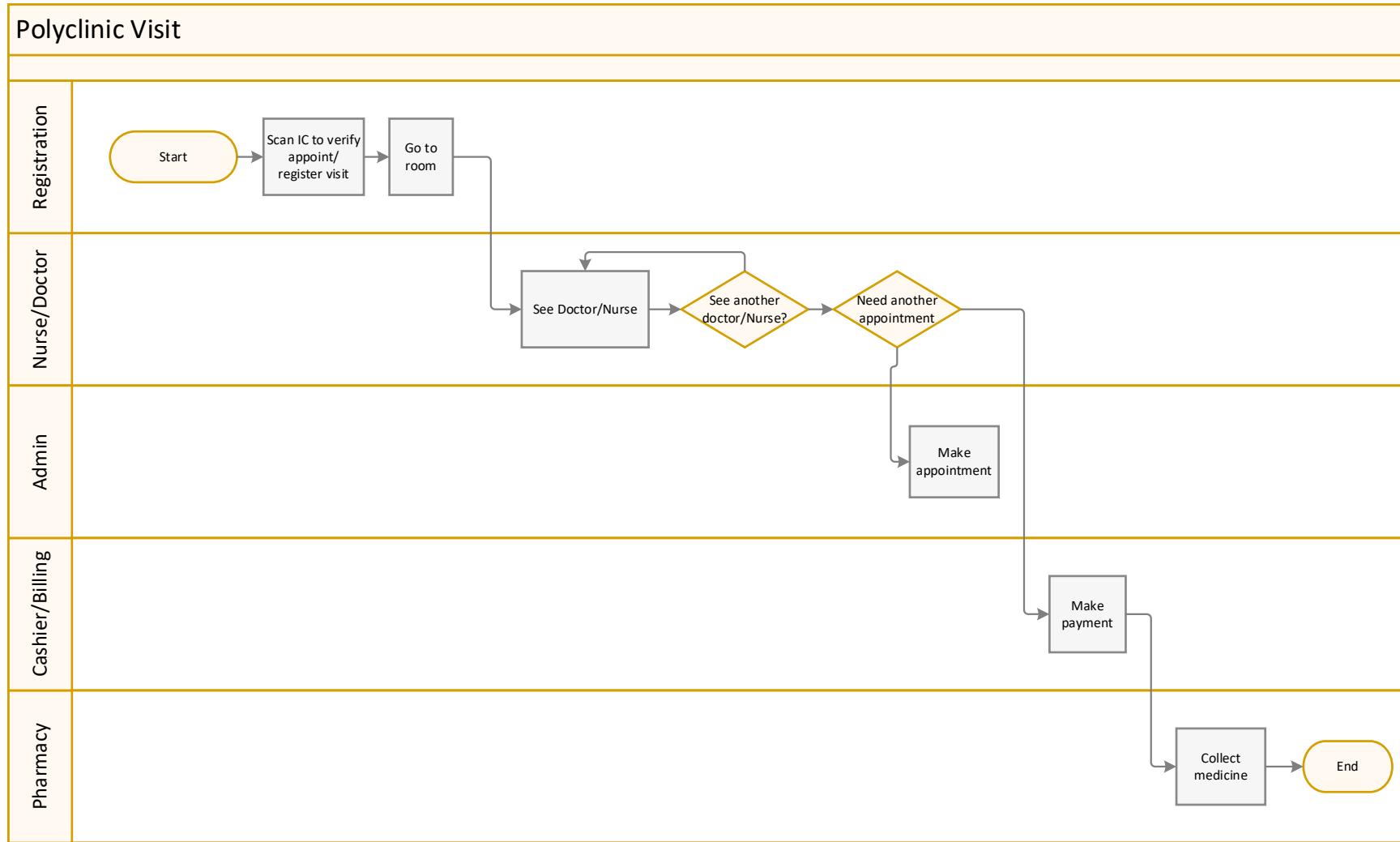
Basic Symbols (Part 1)

Symbol	Meaning
	Process or Action Step
	Decision Point
	Start/End Point (Usually 1 entry Point, and can have few exits points) (Optional)
	Direction of Flow
	Connector to different section when a line is not allowed. Circle labelled with same letter where the flow continues.

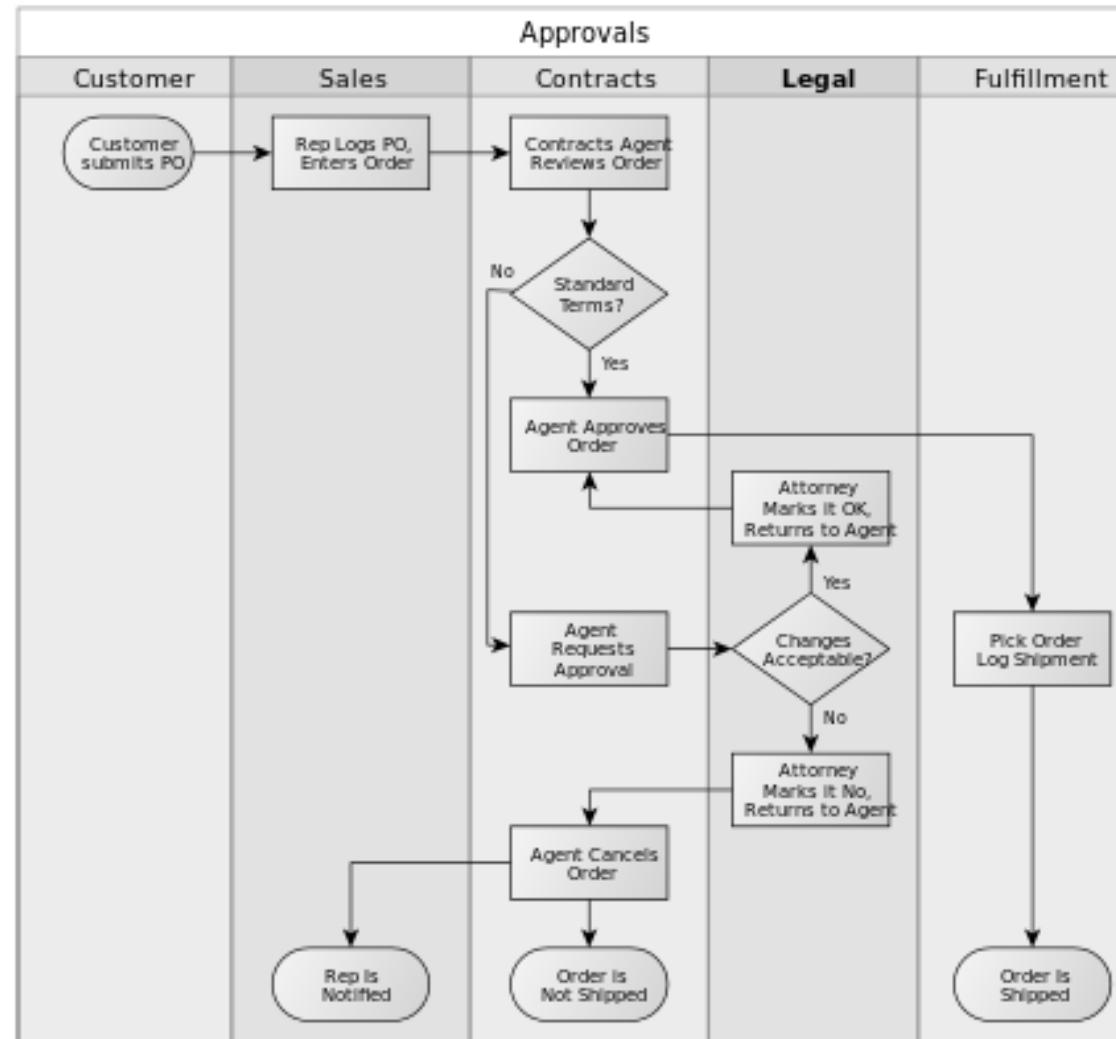
Basic Symbols (Part 2)

Symbol	Meaning
	Documents; Multi-documents
	Direct Access Storage for files
	Data
	Pre-defined Process
	Off-page Connector - labelled with same letter where the flow continues.

Swimlane Example with Standardized Symbols

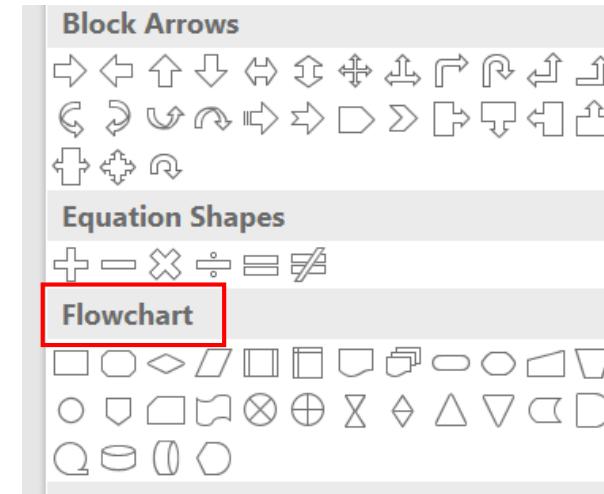
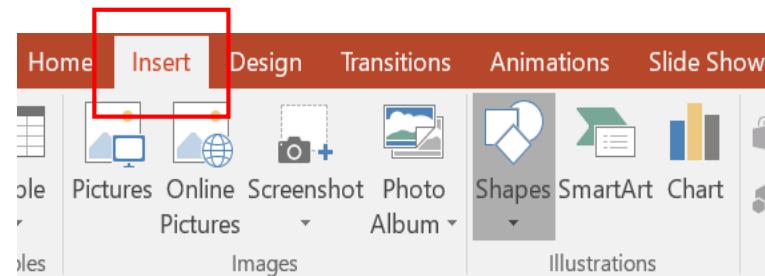


Swim Lanes can be Vertical

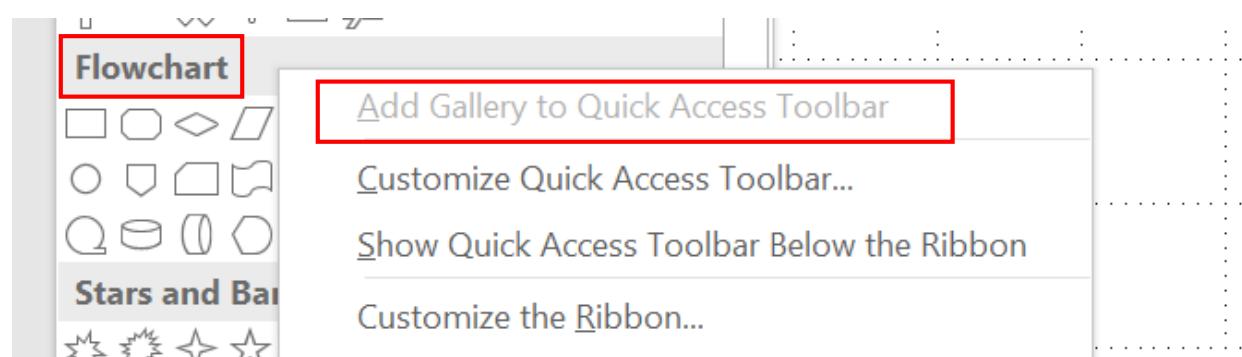


MS Office Software Tools

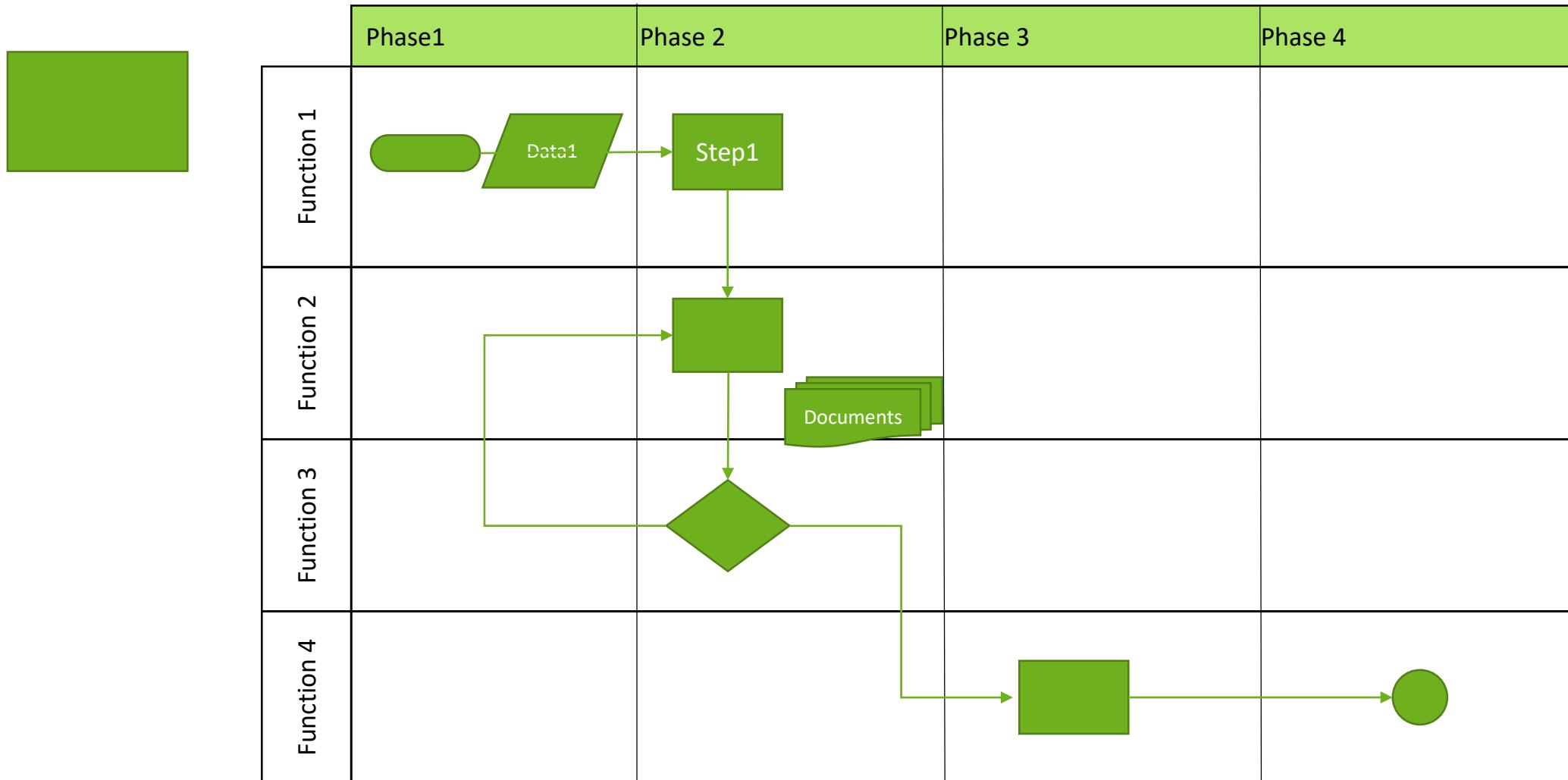
- PowerPoint: Insert Shapes and Flowchart Shapes can be selected.



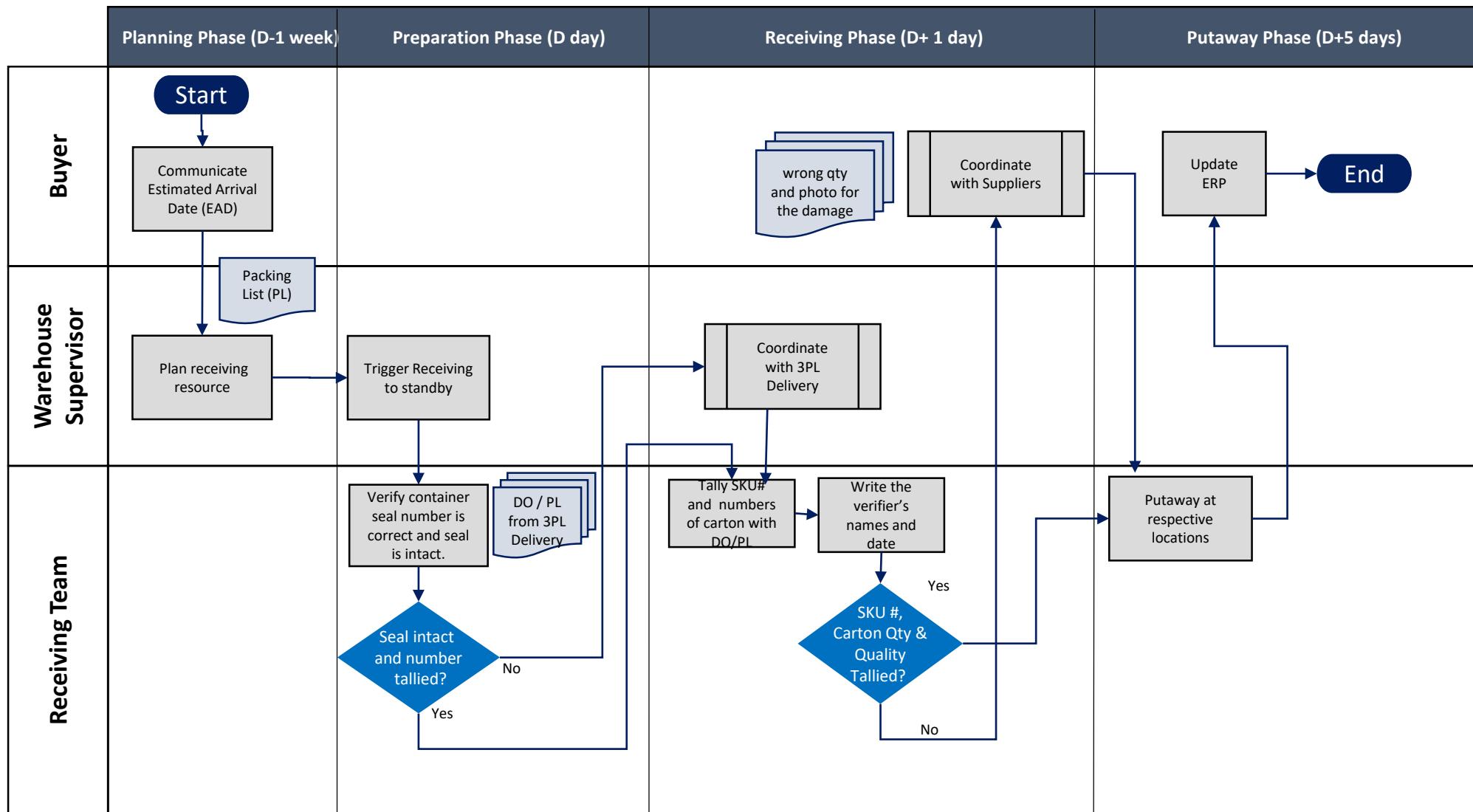
- Right Click on Flowchart to Add Gallery to Quick Access Toolbar



MS PowerPoint Swimlane Diagram



Resource Requirement by Role and by Time Window





STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Introduction to Swimlane	Swimlane, symbols	30
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Break	Break	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

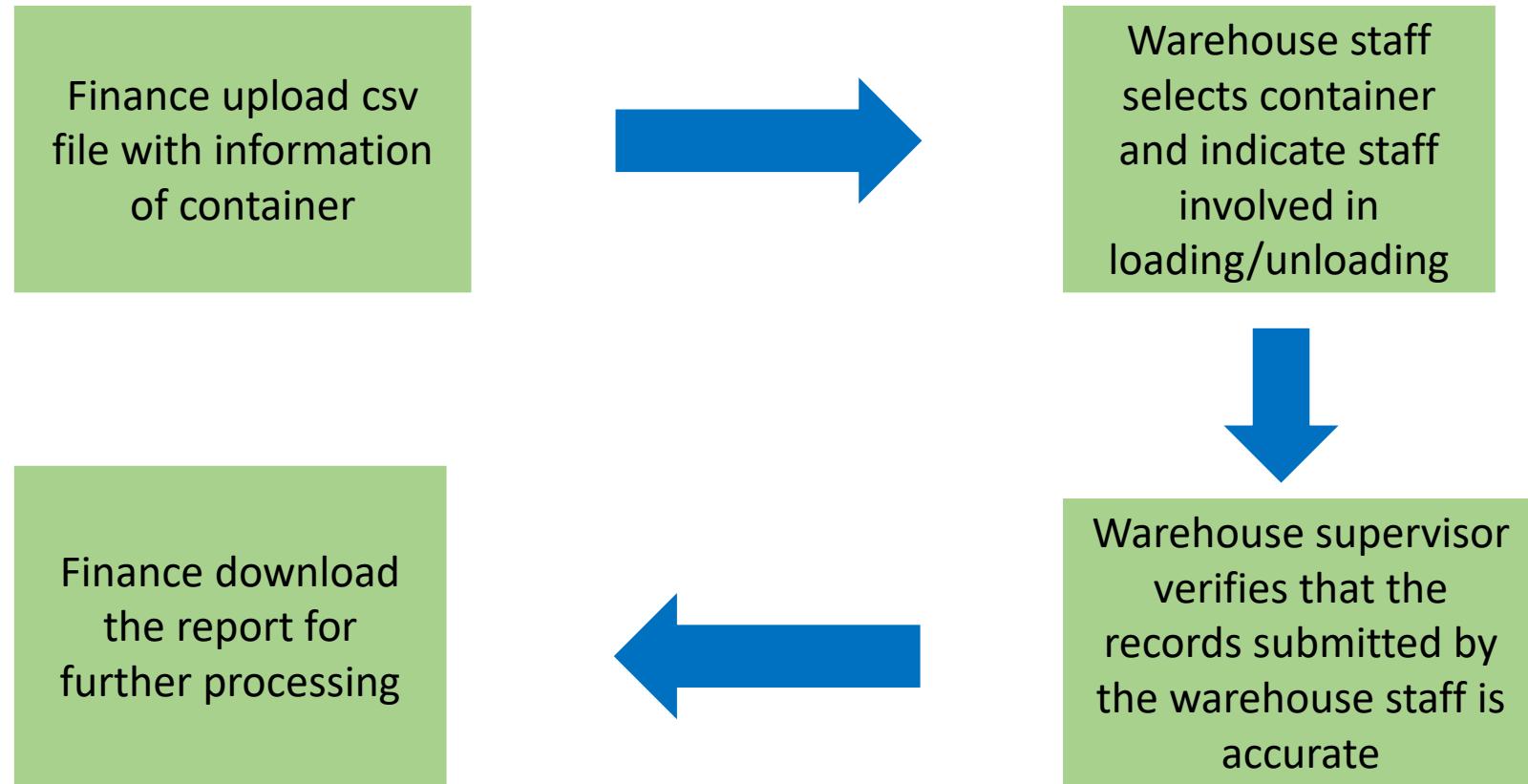
Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	60
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	60
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template Set up and link Google Sheets to Apps	60
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	45

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

Hands-on to Draw Swimlane

- Use Paper/Online file
- Use Whiteboard with POST-IT notes
- Use PowerPoint Template

1) Container Loading and Unloading Workflow



Roles of the Container Loading/Unloading Stakeholders

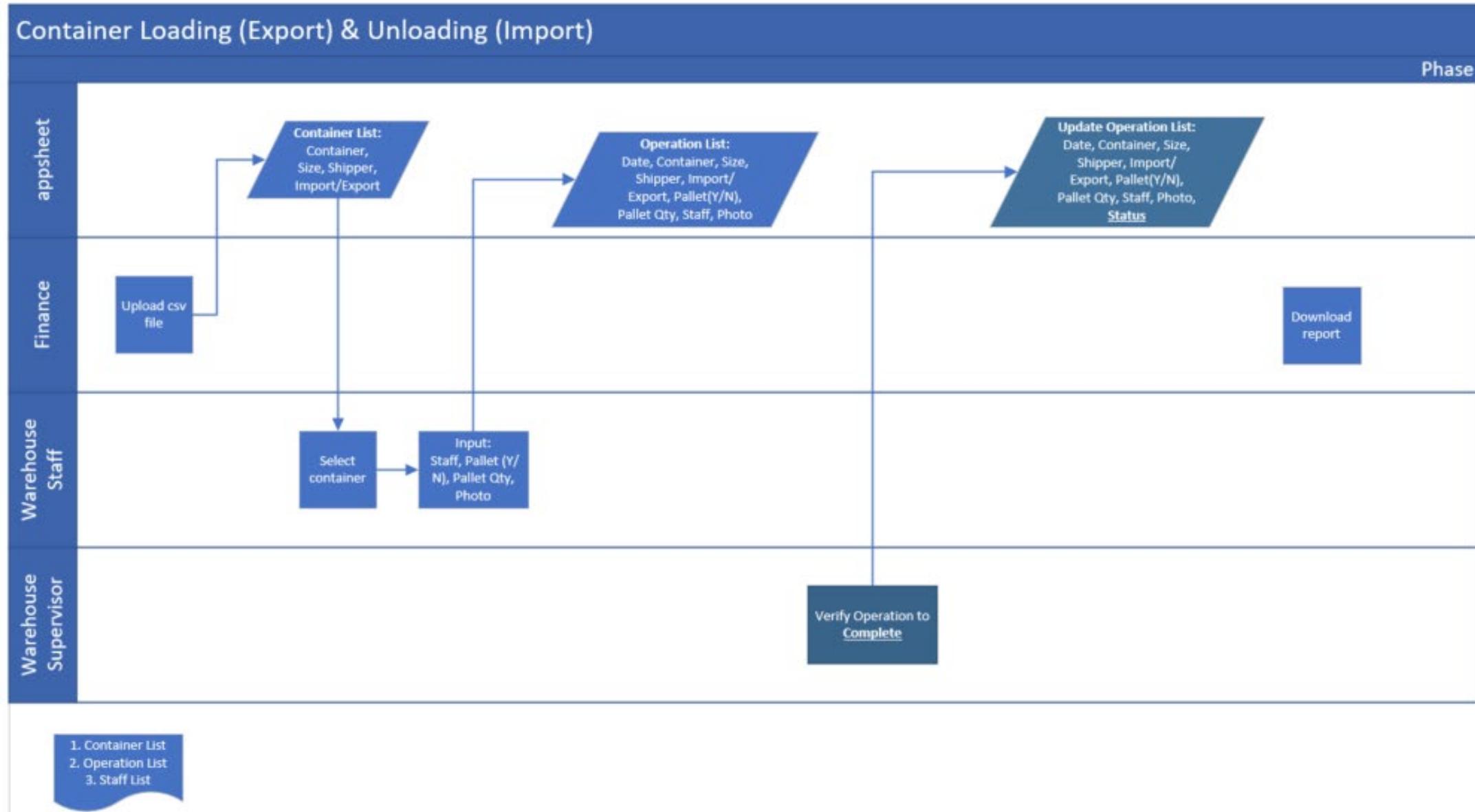
Role	Job Scope	Objective
Finance	<ol style="list-style-type: none"> 1. Upload csv with information of the container loading and unloading jobs 2. Download report for salary/allowance processing 	Process payment for staff who have completed the container loading and unloading job
Warehouse Staff	<ol style="list-style-type: none"> 1. Provide input on staff who are involved in the container loading and unloading work 	Get paid for the work done for loading and unloading the containers
Warehouse Supervisor	<ol style="list-style-type: none"> 1. Verify that the staff have performed their duties in loading and unloading the containers 	Ensure that record submitted by the warehouse staff is accurate

Drawing the Swimlane: Container Loading and Unloading Workflow

Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TRHn89676	OED	Zn	/V	ZT	Ak				
26.04.22	40	TRHn7536414	Tachikawa	Zx	/V	ZT	Ak	Xiaoh			
27.04.22	20	Odn131592	J.D	Zx	/V	ZT	YJ				
28.04.22	40	Fsu5830680	i9/96	Zm	/V	ZT	Part Time				
28.04.22	40	Odn0190459	J.D	Zx	/V	ZT	YJ				



Company Case 1 – Swimlane (draft)



Redraw Swimlane for Container Loading/Unloading Process

Things to Look Out for In Processes from SwimLane...

- What is the customer need and how are we doing in serving this need?
- Any bottlenecks or inefficiencies or delays?
- Any constraints within a specific swimlane?
- Which steps create value and which are waste?
- Any duplicative or unnecessary steps in a process, such as different departments performing the same task?
- How can we control interruptions and **handoffs**? Will scheduling or technology helps?



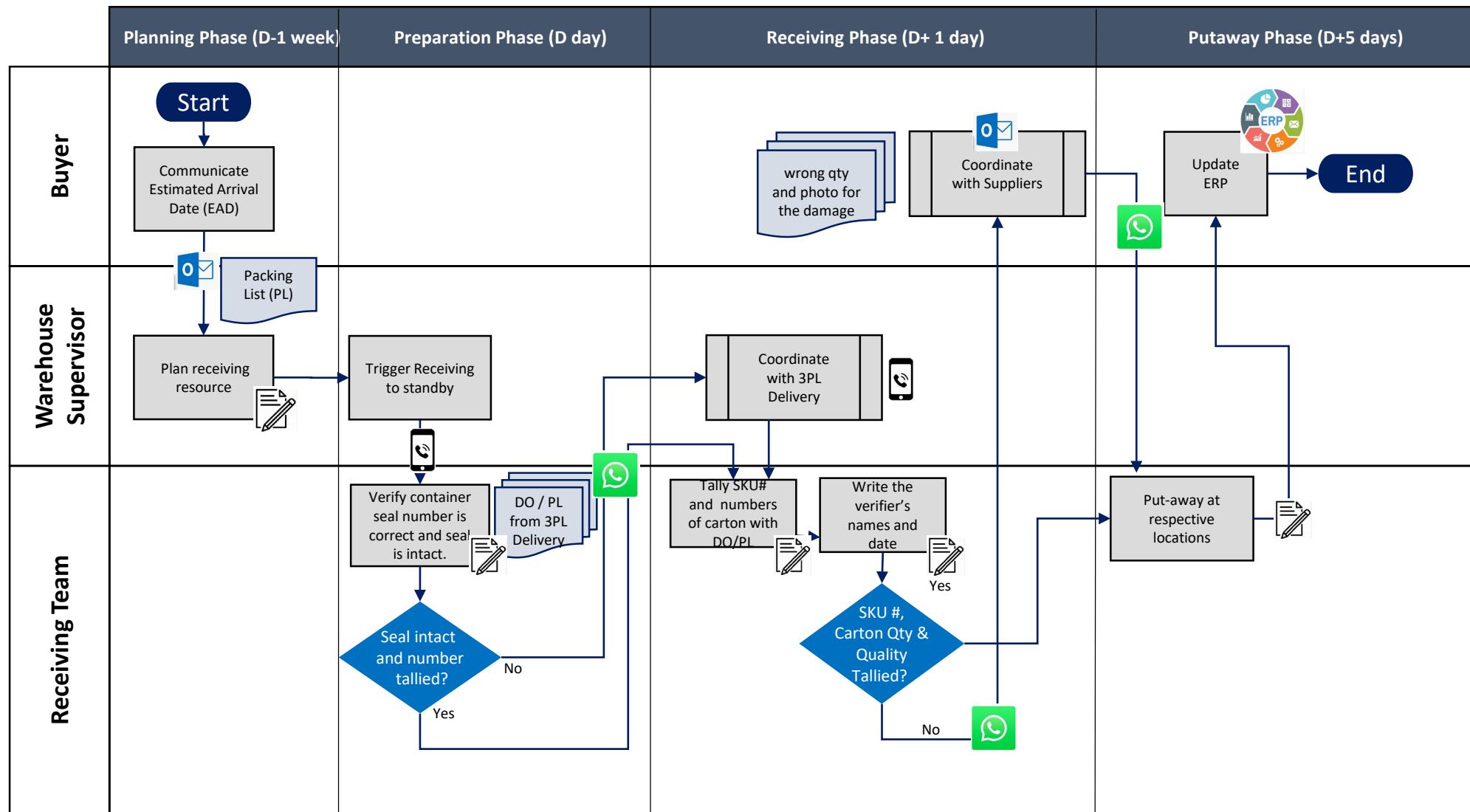
Hands-off

- ❑ **Hand-off** When staff "hands off" a task to another staff, it's useful to look at how that procedure takes place (fax, email, phone call, etc.) and how much time elapses during the hand off. Is the hand off the most efficient way to transfer the information?

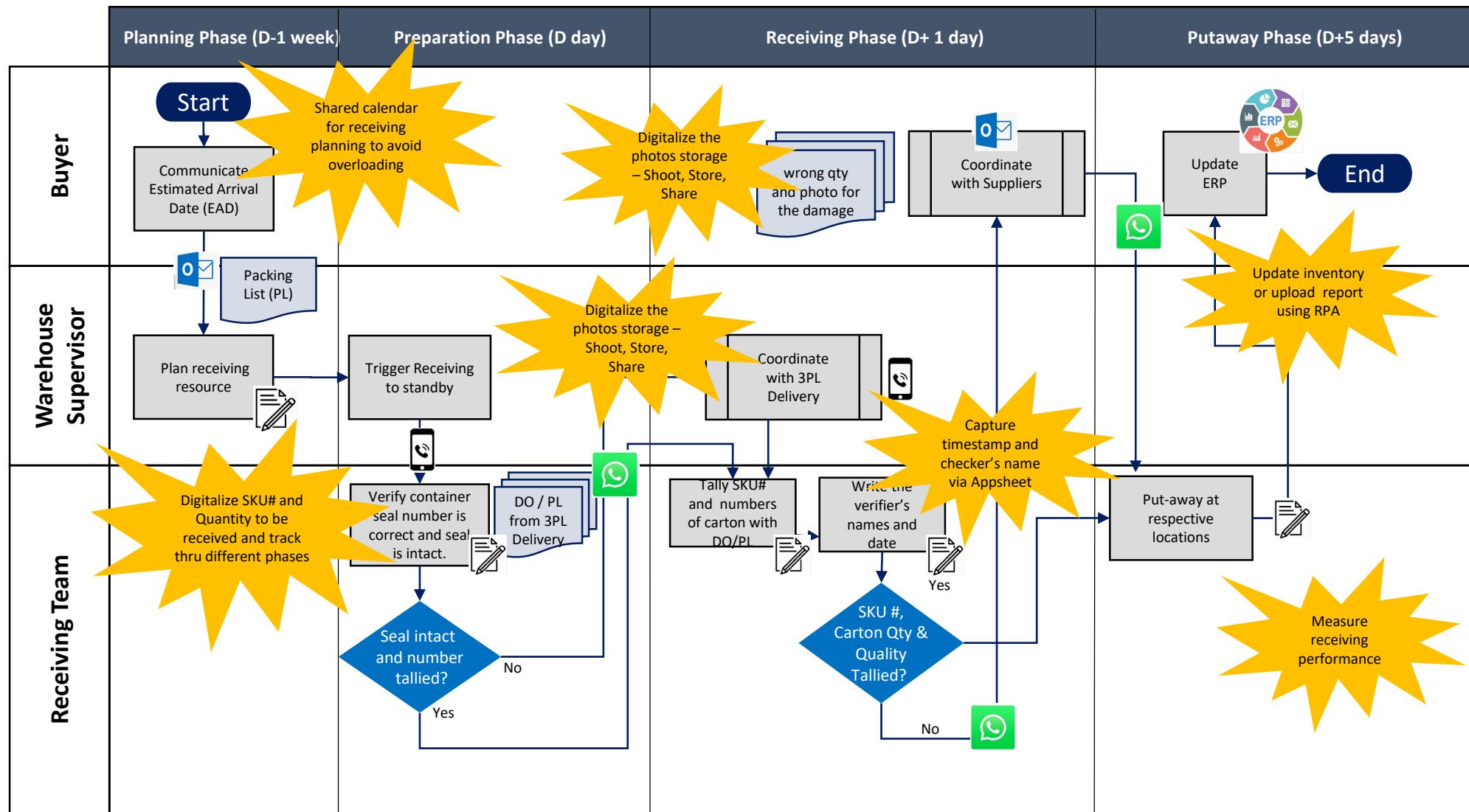


- ❑ How can we maintain work flow with **fewer** interruptions and hands-off?
Better information sharing?

Hand-Offs Mapping



Opportunities



STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Introduction to Swimlane	Swimlane, symbols	30
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Break	Break	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	60
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	60
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template Set up and link Google Sheets to Apps	60
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	45

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

Classify Waste Using the TIMWOOD & I (company process)

T <small>RANSPORT</small>	I <small>NVENTORY</small>	M <small>OOTION</small>	W <small>AITING</small>
			
Unnecessarily moving things, equipment, parts, tools and materials from one location to another	Making more than customer demand, building up unnecessary stocks	Unnecessary movement; people walking to get things which should be located closer to the point of use	Delays between operations because parts are missing. Stopped work: waiting for parts, machines, or people
O <small>VER PROCESSING</small>	O <small>VER PRODUCTION</small>	D <small>EFFECTS</small>	I <small>NTELLECT</small>
			
Duplicate or redundant operations, performing wasteful steps that are not required. Often because "we do it this way"	Making too much or too many. Completing a task before it is needed. Making products that the customer hasn't ordered	Failing to produce a quality part for the first time generating rework or scrap. Not delivering the product of service 'right the first time'	Failing to use skills and capabilities of the workforce. Not listening to people, using their knowledge or learning from past mistakes/issues

End of session



STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

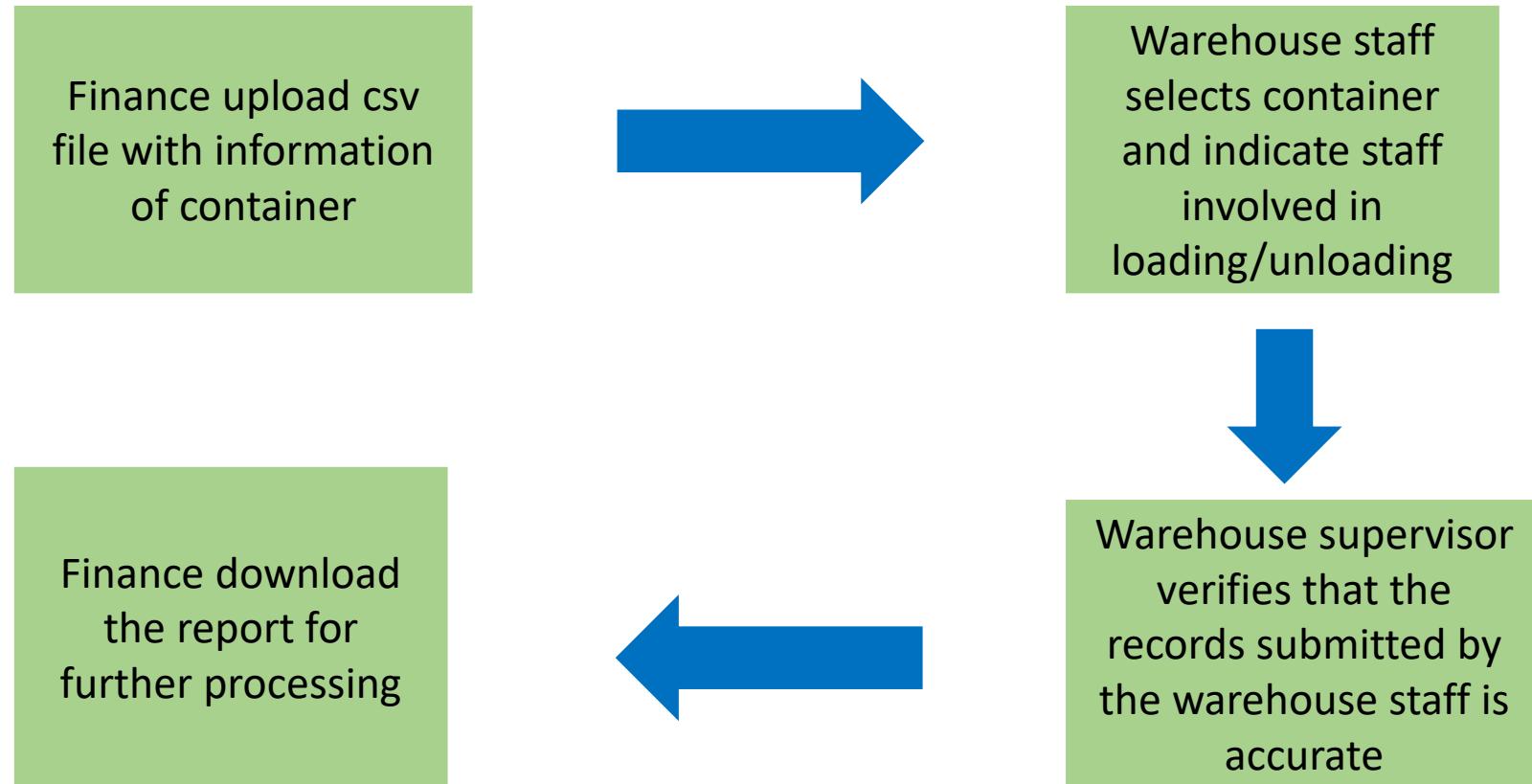
Discuss Data to be Collected Based on Swimlane

- Finance
- Warehouse Staff
- Warehouse Supervisor



1) Container Loading and Unloading Workflow

Data to be Collected



Data to be Collected

Container Info

- Container Number
- Shipper
- Import/Export
- Pallet
- ???



More Info

Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TR/Hu89676	0100	2m	/	✓	32T	Akl			
26.04.22	40	TR/Hu7536414	Tachiklik	1Q	2x	/	32T	Akl	Xiaoh		
27.04.22	20	00Lu131592	J.D	2x	Y	7	32T	YU			
28.04.22	40	Fsu5830680	igges	2m	/	/	32T	Part time			
28.04.22	40	00Lu0190459	J.D	2x	Y	9	32T	YU			

STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

8 Steps in Developing Appsheet App

1. Prepare your data
2. Connect your data to AppSheet to create an app
3. Define how your app use your data
4. Define how your app presents your data
5. Add actions, workflows, and reports to your app
6. Define your app's security settings
7. Test your app with real users
8. Get feedback and improve app



STEP 1. Prepare Your Data

- Which field is a unique identifier, or key, for all records?
- Which is compulsory and which is optional
- What are the data types?
- Which can be auto-captured? Who, when

Possible App Opportunities

Pre-app use/Process

- Use Google Sheets directly to update data instead of using MS Excel file
- Google Sheet is faster in data synchronization
- Set up a Google account for different users, use the Google account for AppSheet login
 - Improve accountability and data accuracy from syncing
 - Security consideration. A user can only view/edit the data with granted access
 - Try to separate personal gmail account from **company gmail account**

Transfer Excel Template to Google Sheet

1. Set up Gmail account
2. Login Google Drive
3. Drag excel file to the Google Drive respective folder
4. Save Excel sheet as Google Sheet

Google Account for Work

<https://www.google.com/account/about/>

The screenshot shows the 'Overview' page of a Google Account for Work. At the top right, there are 'Create an account' and 'Go to Google Account' buttons. A large heading 'All of Google, working for you' is centered above a paragraph about the benefits of signing in. Below this, three main sections are shown: 'Helps you', 'Built for you', and 'Protects you'. Each section has a brief description and a downward arrow indicating more content is available.

All of Google, working for you

Sign in to your Google Account, and get the most out of all the Google services you use. Your account helps you do more by personalizing your Google experience and offering easy access to your most important information from anywhere.

Helps you

When you're signed in, all of the Google services you use work together seamlessly to offer help

Built for you

No matter which device or Google service you're using, your account gives you a consistent

Protects you

Your Google Account is protected by industry-leading security that automatically helps detect

<https://www.google.com/account/about/>

Google Account for Work

accounts.google.com/signup/v2/webcreateaccount?continue=https%3A%2F%2Fmyaccount.google.com%3Futm_source%3Daccount-marketing-page%26utm_...

The screenshot shows the 'Create your Google Account' page. A red oval highlights the input fields for First name, Last name, Username, Password, and Confirm. To the right is a graphic of a blue hexagon containing a white person icon, with various Google services like YouTube, Google Photos, and Google Maps shown below it. Text next to the graphic reads 'One account. All of Google working for you.' At the bottom, there are links for English (United States), Help, Privacy, and Terms.

First name

Last name

Username @gmail.com

You can use letters, numbers & periods

Use my current email address instead

Password

Confirm

Use 8 or more characters with a mix of letters, numbers & symbols

Sign in instead [Next](#)

English (United States) ▾ Help Privacy Terms

Google Drive

The screenshot shows the Google Drive web interface. On the left, there's a sidebar with navigation links: New, My Drive (which is selected and highlighted in blue), Shared with me, Recent, Starred, and Trash. Below that is a Storage section showing 10 KB of 15 GB used and a link to Buy storage. The main area is titled "My Drive" and contains a single folder named "Appsheet Data". The top right features a search bar, a help icon, settings, a grid icon, and a user initials icon ("cs"). A vertical sidebar on the far right displays icons for 31 files, a search function, a refresh button, and a plus sign.



STEP – INA Training Program Outline

Session 1		
Module	Activities	Duration
Introduction to program	Objective, Format, Introduce yourself	15
Waste	Introduction to TIMWOOD & I (8 wastes) in LEAN	30
Introduction to Swimlane	Swimlane, symbols	30
Break	Break	15
Company's case Exercise	Draw swimlane Discuss opportunity + analysis	60
Lunch	Lunch	60

Session 3		
Module	Activities	Duration
8-Step Tech Application	1. Prepare data to create AppSheet apps - Recap key and data types	15
8-Step Tech Application	2. Connect data to AppSheet 3. Define how your app use your data, - Column, Slice	45
Break	Break	15
8-Step Tech Application	4. Define how your app presents your data - Views, Format Rules	30
Hands-on Exercise	Connect and refine your app	60
Lunch	Lunch	60

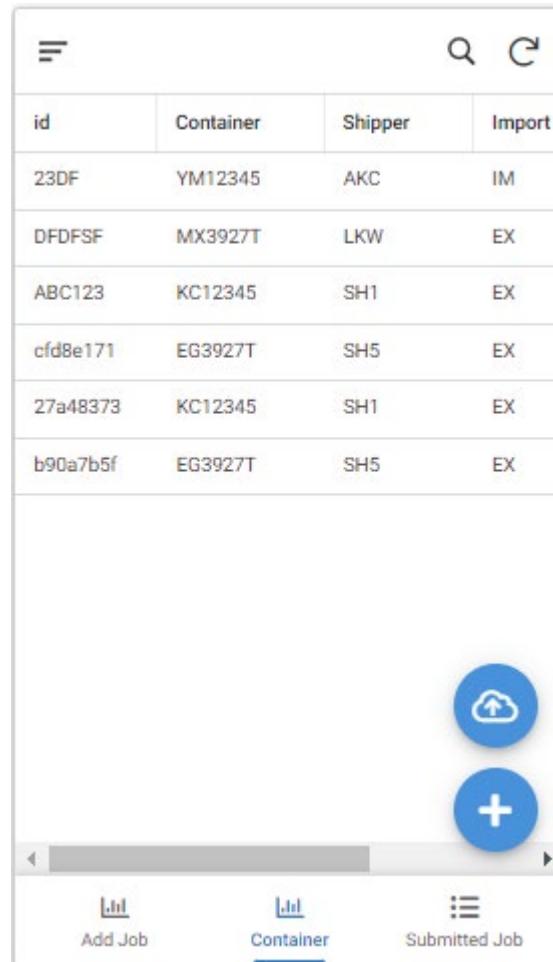
Session 2		
Module	Activities	Duration
Waste Activity	Company case study Use swimlane to look for wastes Classify using the TIMWOOD & I (company process)	30
Data Collection	Data to be collected for the intended process - Discussion of what data needed to set for the apps - Create the template in Google sheet	30
Exercise	1. Prepare data to create AppSheet apps - Formalise excel template to Google Sheets template - Set up and link Google Sheets to Apps	15
Break	Break	15
8-Step Tech Application	1. Prepare data to create AppSheet apps - Explain key and data types - Use case exercise	60

Session 4		
Module	Activities	Duration
Hands-on Exercise	Refine how your app presents your data	120
Break	Break	15
8-Step Tech Application	5. Add action to your app	15
8-Step Tech Application	6. Define your app's security setting - Use case exercise	15
8-Step Tech Application	7. Test your app with users	15
8-Step Tech Application	8. Get feedback and improve app	15
8-Step Tech Application	Continue refinement of Apps	30
Wrap up	Feedback from participant, Course Evaluation, Confirm next facilitation session, Summary	15

Objectives of No-code App Platform

1. Help operations become agile by creating and refining their own work apps
2. Data collected at the source as much as possible, and used by different business functions
3. Foundation for digital operations and support company's business model evolution

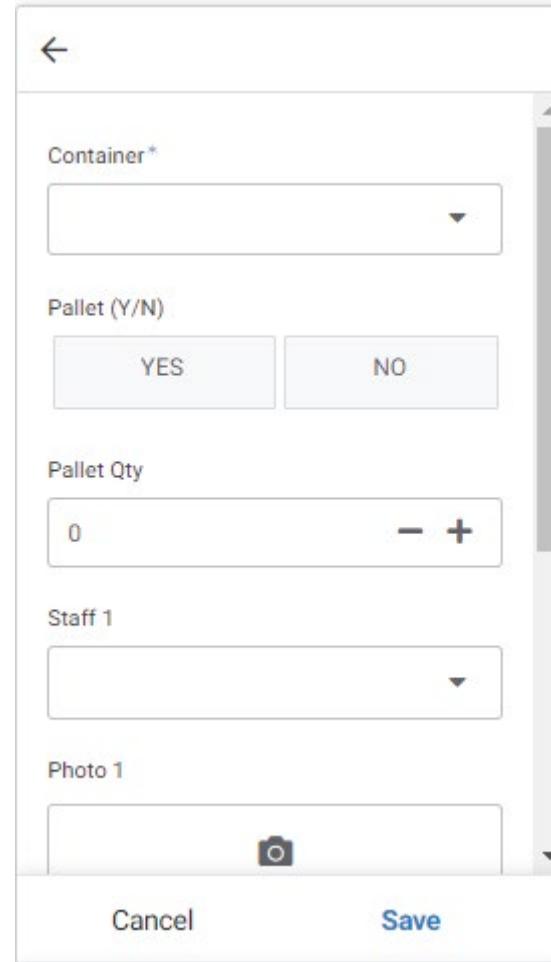
Preview of the Container Loading/Unloading App



A screenshot of the app's main interface. It shows a table with columns: id, Container, Shipper, and Import. The table contains several rows of data. At the bottom right of the screen are two large blue circular buttons, one with a cloud icon and another with a plus sign.

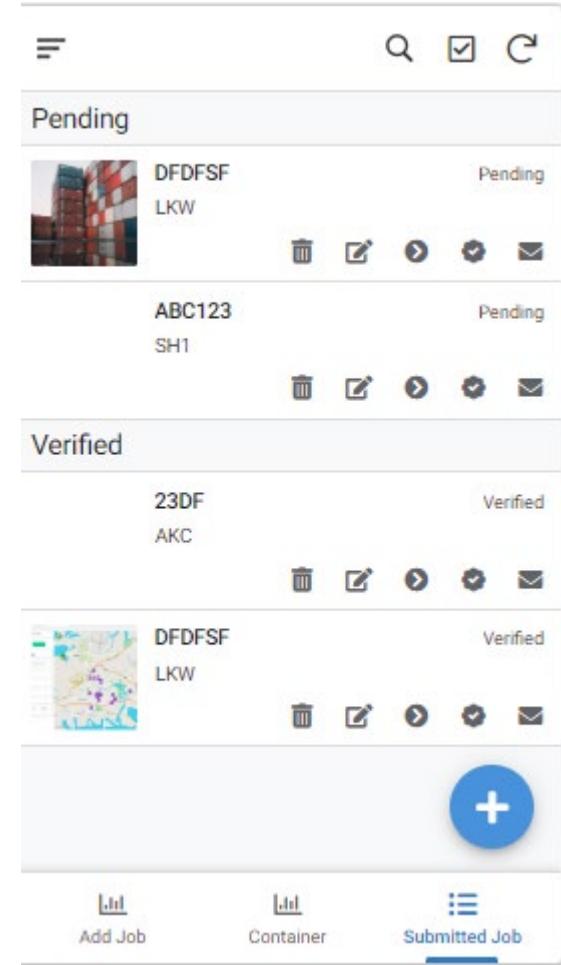
1) Finance upload the container information

10/10/2022



A screenshot of a modal dialog box for entering a job. It has fields for 'Container*', 'Pallet (Y/N)' (with 'YES' and 'NO' buttons), 'Pallet Qty' (with a numeric input field containing '0' and minus/plus buttons), 'Staff 1' (with a dropdown menu), and 'Photo 1' (with a camera icon). At the bottom are 'Cancel' and 'Save' buttons.

2) Warehouse staff submitting the job entry



A screenshot of the app's dashboard. It shows two sections: 'Pending' and 'Verified'. The 'Pending' section lists a job for 'DFDFSF LKW' with status 'Pending'. The 'Verified' section lists a job for '23DF AKC' with status 'Verified'. Each listing includes a small thumbnail image, the job ID and description, and a set of five action buttons.

3) Warehouse supervisor reviews and verify the submission

COI-SCM @RP

70

Prepare Your Data

1. Your data will be stored in google sheet
2. The information shown in the table below may need to be re-organized into more than 1 table to reduce data duplication
 - The additional table is usually some master list for the purpose of looking up of additional information (e.g. staff list)



Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TRHn839676	OED	In		Y		J2T Akil			
26.04.22	40	TRHn7536414	Tachibana	200		Y	7	J2T Akil	Xiaoyi		
27.04.22	20	02Ln1315192	J.D	20x		Y	7	J2T YU			
28.04.22	40	Fsuu5830680	igreks	2m		Y		J2T part time			
28.04.22	40	02Ln0190459	J.D	20x		Y	9	J2T YU			

Prepare Your Data: Container Info

Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TR/Hu89676	OED	In	N	J2T	Akl				
26.04.22	40	TR/Hu7536414	Tachikawa	Ex	N	J2T	Akl	Xiaohu			
27.04.22	20	00Lu131592	J.D	Ex	Y	J2T	Yu				
28.04.22	40	ESu5830680	Faffer	In	N	J2T		Partime			
28.04.22	40	00Lu0190459	J.D	Ex	Y	J2T	Yu				

A	B	C	D
id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3927T	LKW	EX
ABC123	KC12345	SH1	EX
cf8e171	EG3927T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3927T	SH5	EX

Prepare Your Data: Job Info

Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TR/Hu89676	OKEO	In		✓		J2T	Akl		
26.04.22	40	TR/Hu7536414	Tachikawa	Out		✓		J2T	Akl	Xiaohu	
27.04.22	20	02Lu1315192	J.D	Out		✓	7	J2T	YU		
28.04.22	40	TR/Hu5830680	iQ/KS	In		✓		J2T		Part time	
28.04.22	40	02Lu0190459	J.D	Out		✓	9	J2T	YU		

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Job ID	Container	Shipper	Import	Pallet (Y/N)	Pallet Qty	Staff 1	Staff 2	Photo 1	Photo 2	Verification	Submission Date Time	Submitted By	
5895bedf	23DF	AKC	IM	NO		2 John	Peter			Verified	20/09/2022 17:04:27	tkokchen@gmail.com	
f993fae1	DFDFSF	LKW	EX			Andy	John	Job_Images/f993fae1.Photo 1.08		Pending	20/09/2022 17:04:03	tkokchen@gmail.com	
be18a9fc	DFDFSF	LKW	EX	YES		Peter	Andy	Job_Images/be18a9fc.Photo 1.06		Verified	21/09/2022 14:21:23	liu_shubin@rp.edu.sg	
9ab7422c	ABC123	SH1	EX	YES		1 John				Pending	21/09/2022 14:23:55	liu_shubin@rp.edu.sg	

Additional data can
be captured

Prepare Your Data: Staff Info

Date	Size	Container	Shipper / Customer	Import (IM) Export (EX)	Start Complete	Pallet (Y/N)	Pallet Qty	Staff Name 1	Staff Name 2	Staff Name 3	Staff Name 4
26.04.22	40	TR/Hu89676	OED	In		N		J2T	Akl		
26.04.22	40	TR/Hu7536414	Tachikawa	Out		N		J2T	Akl	Xiaohu	
27.04.22	20	02Lu131592	J.D	Out		Y	7	J2T	Yu		
28.04.22	40	ESu5830680	Japan	In		N		J2T	Partime		
28.04.22	40	02Lu0190459	J.D	Out		Y	9	J2T	Yu		

A	B	C	D	E	F	G
UniqueId	Staff Name	Staff Email	Role	Updated Date	Updated by	Remarks
1	KC	tkokchen@gmail.com	Admin	1-Jun-05		
2	Sheryl	Sheryl@gmail.com	Warehouse	24-Aug-02		
3	Nick	Nick@gmail.com	Finance	25-Jan-97		
3	John	John@gmail.com	Finance	25-Jan-97		

Used for look-up of staff name and checking for the Job Role

Create Google Sheet

1. Go to Google Drive to create a New Google Sheet
2. By default, the name of the Google Sheet will be used as the name of the AppSheet App
3. Create 3 tabs
 - Container
 - Job
 - Staff



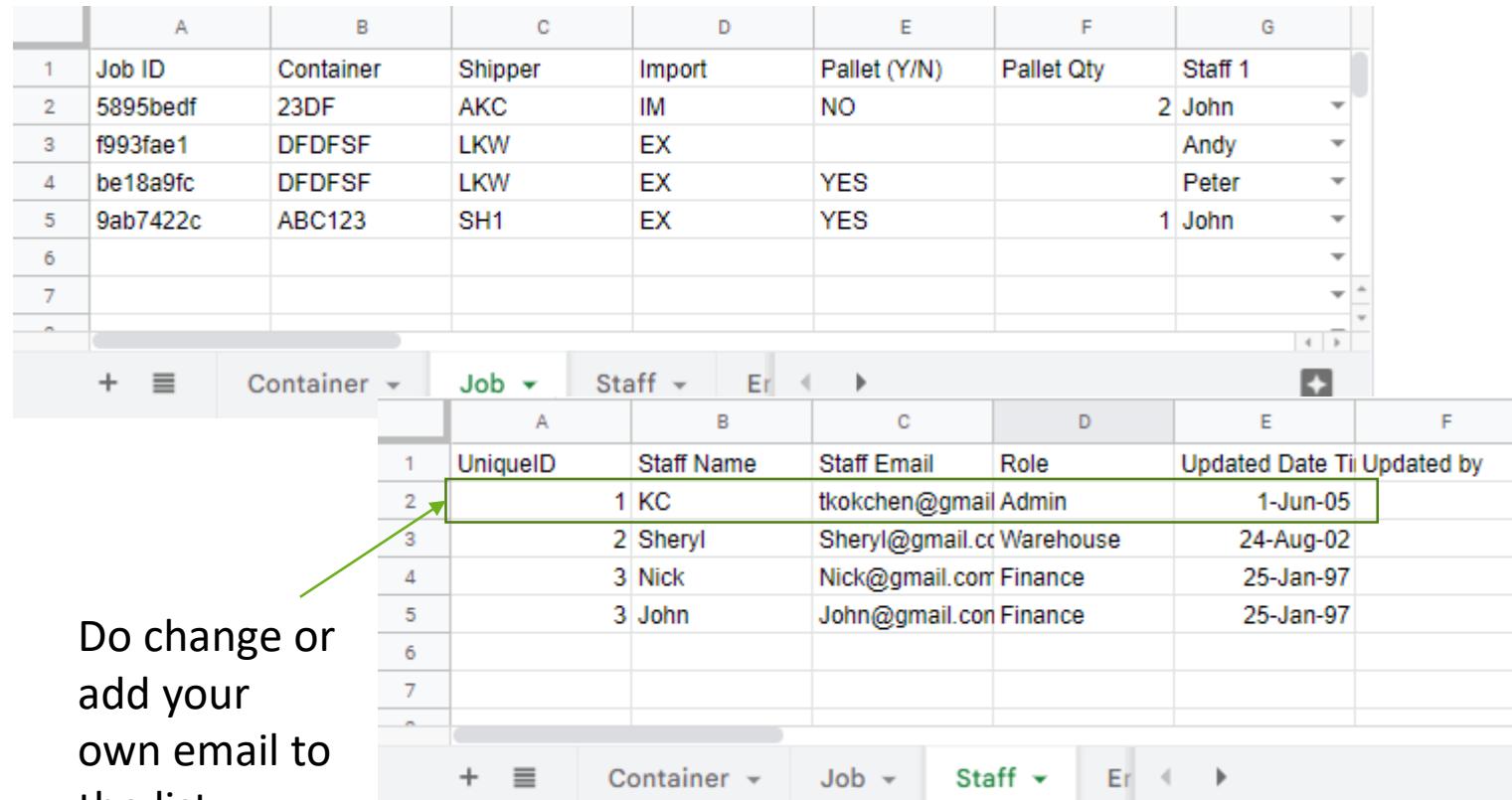
Create AppSheet App from Google Sheet

1. We will prepare some sample data in Google Sheet

- Refer to the next 2 slides on changing the Locale and date/time format in Google Sheet before you proceed further

	A	B	C	D
1	id	Container	Shipper	Import
2	23DF	YM12345	AKC	IM
3	DFDFSF	MX3927T	LKW	EX
4	ABC123	KC12345	SH1	EX
5	cf8e171	EG3927T	SH5	EX
6	27a48373	KC12345	SH1	EX
7	b90a7b5f	EG3927T	SH5	EX

+ ⚙️ Container ▾ Job ▾



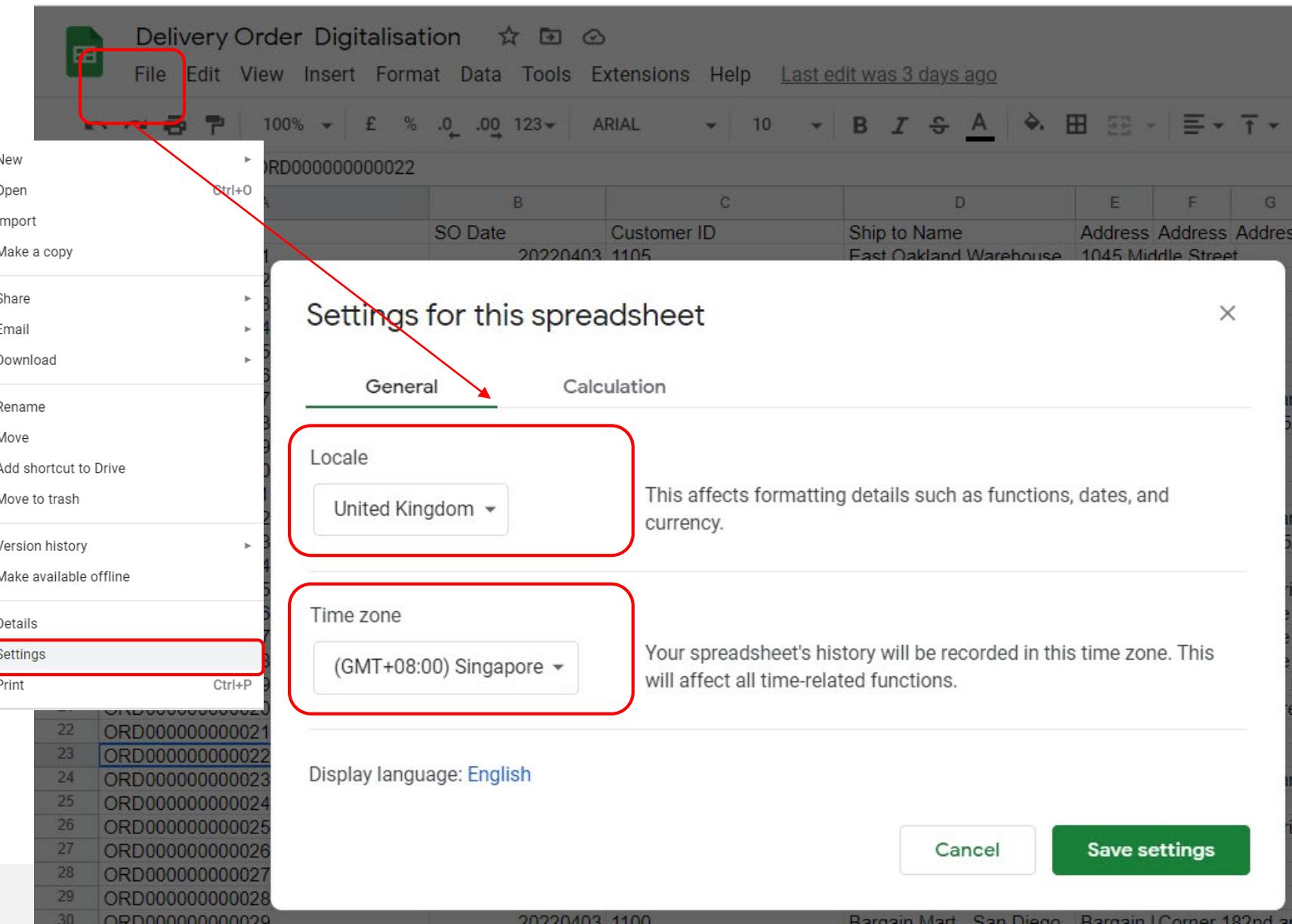
The diagram illustrates three Google Sheets tabs: Container, Job, and Staff. A green arrow points from the 'Container' tab to the 'Staff' tab, specifically highlighting the second row of the 'Staff' sheet.

	A	B	C	D	E	F
1	UniqueId	Staff Name	Staff Email	Role	Updated Date	Updated by
2	1	KC	tkokchen@gmail.com	Admin	1-Jun-05	
3	2	Sheryl	Sheryl@gmail.com	Warehouse	24-Aug-02	
4	3	Nick	Nick@gmail.com	Finance	25-Jan-97	
5	3	John	John@gmail.com	Finance	25-Jan-97	

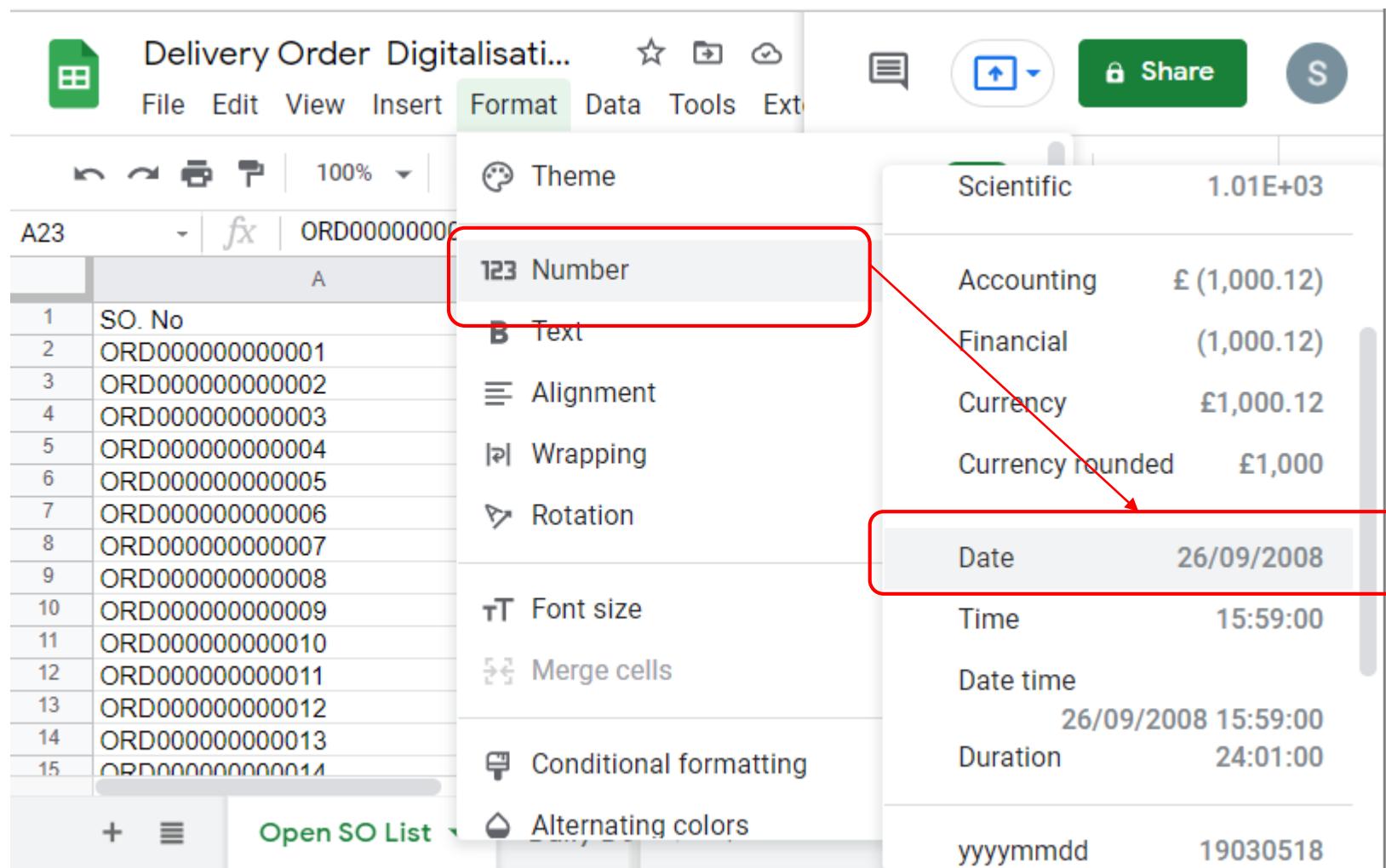
Do change or add your own email to the list

+ ⚙️ Container ▾ Job ▾ Staff ▾

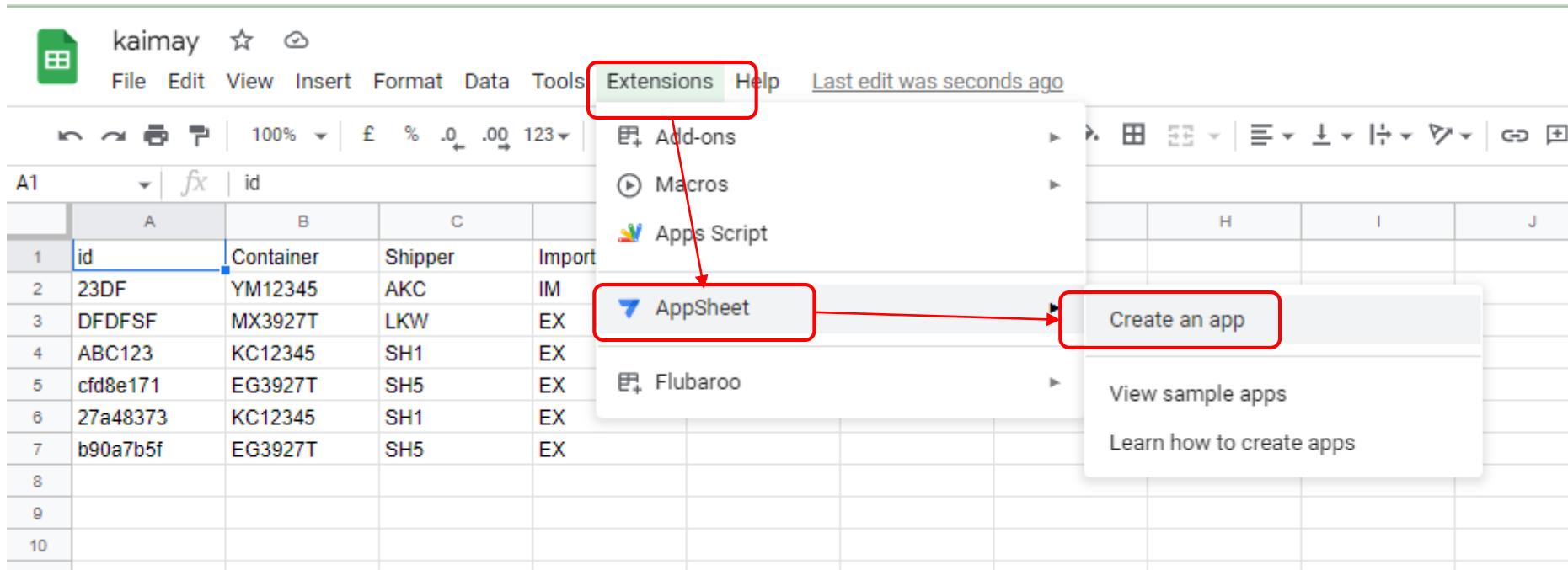
Change Locale in Google Sheet



Change Date time Format in Google Sheet



Start from Google Sheet



Data transferred from Google Sheet to AppSheet

The screenshot shows the AppSheet interface for the 'kaimay' project. The top navigation bar includes 'Not Deployed', 'Tables' (which is selected and highlighted with a red box), 'Columns', 'Slices', 'User Settings', and 'Options'. On the left, a sidebar lists 'Home', 'Info' (with 'Data' selected and highlighted with a red box), 'UX', 'Behavior', 'Automation', 'Security', 'Intelligence', and 'Manage'. The main content area is titled 'Data' and contains a message: 'Add new tables and modify table properties in this pane.' Below this are three cards: 'New Table' (with a plus icon), 'Add Table "Job" From "kaimay"' (with an 'X' icon), and 'Add Table "Staff" From "kaimay"' (with an 'X' icon). A third card, 'Add Table "Enum" From "kaimay"', is partially visible on the right. A search bar labeled 'Search tables' is located below the cards. At the bottom, there is a 'Container' section with the configuration: 'source: kaimay qualifier: Container datasource: google'.

We will add the other 2 tables later

A table is added to the App automatically

AppSheet Data Table and Columns

Data Tables

The screenshot shows the AppSheet interface for managing a data table. The top navigation bar includes tabs for Not Deployed, Tables, Columns (which is selected and highlighted with a red box), Slices, User Settings, and Options.

The left sidebar under the Info section has a red box around the Data tab, which is currently selected. Other tabs include UX, Behavior, Automation, Security, Intelligence, and Manage.

The main area displays a table structure for a "Container" table with 5 columns. A green arrow points from the "Container" label to a blue button labeled "View Column".

The table columns are:

NAME	TYPE	KEY?	LABEL?	FORMULA	SHOW?	EDITABLE?	REQUIRED?
_RowNumber	Number	<input type="checkbox"/>	<input type="checkbox"/>	=	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
id	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Container	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shipper	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Import	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

A large red box highlights the entire column configuration table.

Default User Interface (UI) Generated

The screenshot shows the Appsheets interface for creating a new view. On the left, under 'Views', there's a 'New View' button and a search bar. A red box highlights the 'UX' icon in the sidebar. Below it, the 'Primary Views' section contains a 'Container' item, also highlighted with a red box. A 'Show system views' button is at the bottom. On the right, a generated list view is shown with a red border around its content area. It displays six rows of data with columns for ID, Name, and actions (trash, edit). A blue '+' button is at the bottom right of the list view.

ID	Name	Action
23DF	YM12345	trash edit
DFDFSF	MX3927T	trash edit
ABC123	KC12345	trash edit
cfd8e171	EG3927T	trash edit
27a48373	KC12345	trash edit
b90a7b5f	EG3927T	trash edit

- A view is automatically generated based on the data that is imported into Appsheets from Google Sheet.



Data and Data Type

Some commonly used Data Types and Functions

1. *UniqueID*
2. Text
3. Number
4. Enum
5. Image
6. Date, Datetime, ChangeTimestamp
7. Email
8. *Lookup*
9. *Select*

Key Definition

A key uniquely identifies each row in a table.

When you add a row to a table, that row must have a unique key value. The row's key value must remain constant for the life of the row.

When you update or delete a row through an AppSheet app, the key is used to find the row to update or delete.

If two or more rows are inadvertently assigned the same key value, we say the table contains "duplicate keys". This is a serious problem. If someone attempts to update or delete one of these rows, the wrong row may be updated or deleted.

Key vs Label

Key - Unique identifier eg **NRIC**

Label

- **Name in NRIC**
- AppSheet will decide for you if you have too many labels thus leading to errors

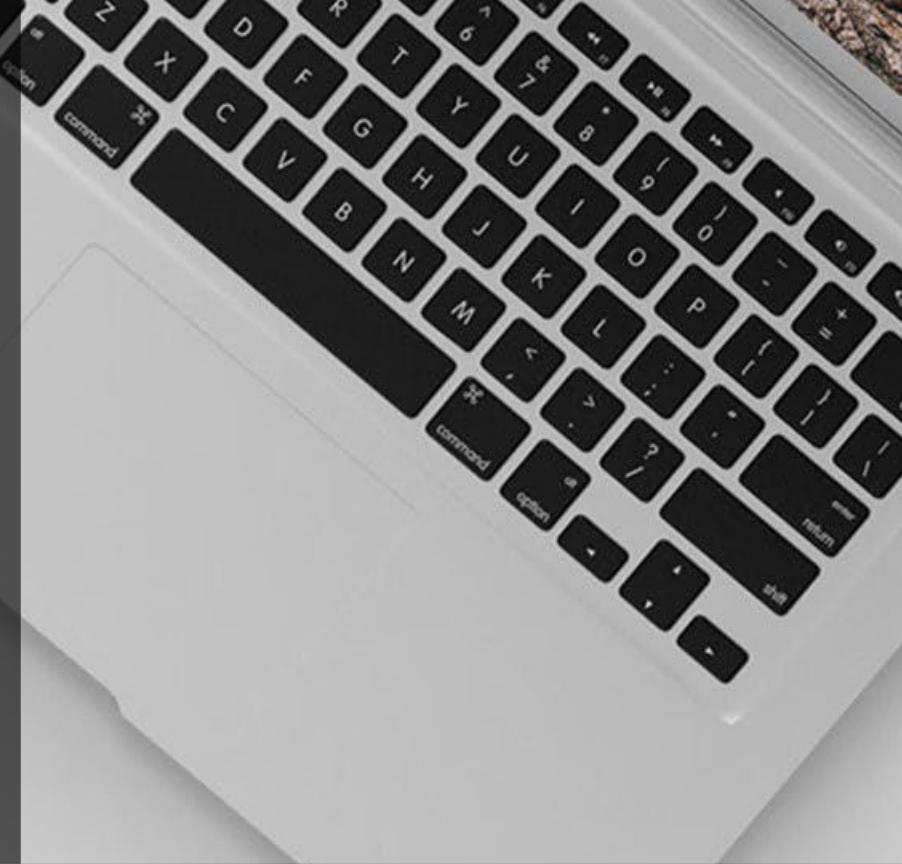
Column Types and Properties

One image column and one non-image column can be used as **labels**. All tables have a non-image **label**... Row **Labels** allow you to choose the most important columns in a table... The row **labels** are used to display references to rows in other tables



Written by Santiago Uribe Montoya
Updated over a week ago

- Eg **S1234567/A John Tan, S1234566/B John Tan**
- **Recommend 1 key and 1 label**



UNIQUE ID

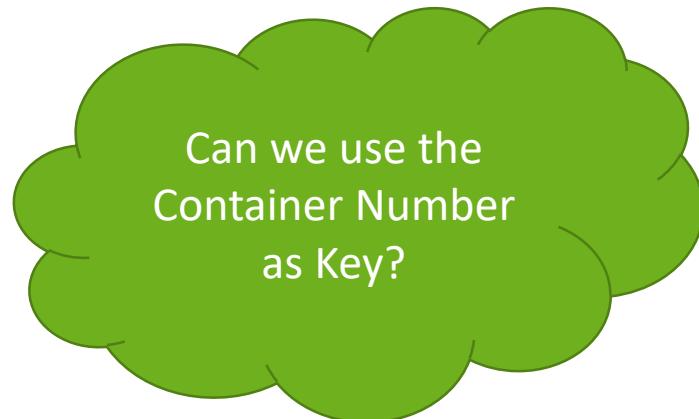
UNIQUE ID

UNIQUEID() can be the key for the table as it generates a sequence of eight random digits and letters suitable for use as a unique identifier within the app, such as a row key.

The generated ID is not strictly unique. The chance of a duplicate ID being generated is virtually zero: just 1 in over 28 trillion.

Example of UNIQUEID – abc12345

Refer to the Table For Container



A	B	C	D
id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3927T	LKW	EX
ABC123	KC12345	SH1	EX
cf8e171	EG3927T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3927T	SH5	EX

Id is automatically chosen by AppSheet to be both the Key and the Label

NAME	TYPE	KEY?	LABEL?	FORMULA	SHOW?	EDITABLE?	REQUI.
_RowNumber	Number			=			
id	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Container	Text			=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Shipper	Text			=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Import	Text			=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

All the fields are automatically assigned the Data Type of **Text**. We will need to change the Data Type if the default option is not appropriate.

Where and How to set unique key value?

NAME	TYPE	KEY?	LABEL?	FORMULA	SHOW?	EDITABLE?	REQUIRED?	INITIAL VALUE
1 _RowNumber	Number	<input type="checkbox"/>	<input type="checkbox"/>	=	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	=
2 id	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	= UNIQUEID()

Auto Compute

App formula
Compute the value for this column instead of allowing user input.

Initial value
The default starting value for this column.

= UNIQUEID()

UNIQUEID() is a function that is commonly used to generate a random value to be used as key.

You can input the unique id formula under “Initial Value”

Or

Click on the pencil icon on the left and input the unique id formula in the auto compute section under initial value.

What you will get?

The image shows two screenshots of an AppSheet application. On the left, a list view displays six items with columns for ID, Container, and Shipper. The first item has ID '23DF', Container 'YM12345', and Shipper 'DFDFSF'. The second item has ID 'ABC123', Container 'KC12345', and Shipper 'EG3927T'. The third item has ID 'cfdb8e171', Container 'EG3927T', and Shipper '27a48373'. The fourth item has ID '27a48373', Container 'KC12345', and Shipper 'b90a7b5f'. The fifth item has ID 'b90a7b5f', Container 'EG3927T', and Shipper '27a48373'. The bottom of the list view shows a blue button with a white plus sign, indicating a new item can be added. A red box highlights this button. A green arrow points from this button to a detailed view modal on the right.

The right screenshot shows a modal dialog with a back arrow at the top left. It contains fields for 'id*' (with value 'f904c91e'), 'Container' (empty), 'Shipper' (empty), and 'Import' (empty). At the bottom are 'Cancel' and 'Save' buttons. A red box highlights the 'id*' input field.

When UNIQUEID()
formula is inputted,
AppSheet will
automatically
generate a random
alphanumeric key.



ENUM

ENUM

Data type “Enum” allows the user to select one **Option** from multiple options from buttons or dropdown box.

The image displays two screenshots of a database configuration interface, separated by a large blue arrow pointing from left to right.

Left Screenshot: Shows a table named "Container" with 6 columns. The "Import" column is currently set to "Text". A red box highlights the "Import" row in the configuration table below.

A	B	C	D
id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3027T	LKW	EX
ABC123	KC12345	SH1	EX
cfdb171	EG3027T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3027T	SH5	EX

Right Screenshot: Shows the same "Container" table. The "Import" column has been changed to "Enum". A red box highlights the "Import" row in the configuration table below.

A	B	C	D
id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3027T	LKW	EX
ABC123	KC12345	SH1	EX
cfdb171	EG3027T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3027T	SH5	EX

Import only has 2 values: **IM** or **EX**. By changing the TYPE to **Enum**, user will choose from either of the 2 values instead of typing in the value themselves

ENUM

Click on the Pencil next to Import field

Container : Import
type: Enum

Column name: Import

Show? Is this column visible in the app?
You can also provide a 'Show_If' expression to decide.

Type: Enum

Type Details

Values:

- IM
- EX

Add

Allow other values

Auto-complete other values

Base type

Input mode: Auto Buttons Stack Dropdown

Import

Enum

←

id*: ddb0a64c

Container

Shipper

Import

IM EX

Cancel Save

Review additional properties for Container table

NAME	TYPE	KEY?	LABEL?	FORMULA	SHOW?	EDITABLE?	REQUIRE?
1 _RowNumber	Number	<input type="checkbox"/>	<input type="checkbox"/>	=	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 id	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3 Container	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Shipper	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 Import	Text	<input type="checkbox"/>	<input type="checkbox"/>	=	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- **SHOW?** → Do we want the id value to be shown?
- **EDITABLE?** → Do we allow user to make change to the data?
- **REQUIRE?** → Is the Container number required?



Add Additional Table/Data

Add the Job Table

- App Sheet only add the container table by default. In developing App Sheet app, we will add more tables when we add more features to the app

The screenshot shows the Google AppSheet interface with two main sections: a left sidebar and a central workspace.

Left Sidebar:

- Header: Not Deployed
- Navigation tabs: Home, Info, Data (highlighted with a red box), UX, Behavior, Automation, Security, Intelligence.
- Central area: Add new tables and modify table properties in this pane.
- Buttons: New Table (highlighted with a red box), Add Table "Job" From 'kaimay' (highlighted with a red box), Add Table "Staff" From 'kaimay', Add Table "Enum" From 'kaimay'.
- Search bar: Search tables.
- Container section: Container source: kaimay qualifier: Container datasource: google.

Central Workspace:

- Header: Tables (highlighted with a red box), Columns, Slices, User Settings, Options.
- Text: Add new tables and modify table properties in this pane.
- Buttons: New Table, Add Table "Staff" From 'kaimay', Add Table "Enum" From 'kaimay'.
- Search bar: Search tables.
- Table list:
 - Container source: kaimay qualifier: Container datasource: google
 - Job source: kaimay qualifier: Job datasource: google (highlighted with a red box)

Job Table added

Review the Data Type for the Job Table

	NAME	TYPE	KEY?	LABEL?
1	_RowNumber	Number	<input type="checkbox"/>	<input type="checkbox"/>
2	Job ID	Text	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Container	Ref	<input type="checkbox"/>	<input type="checkbox"/>
4	Shipper	Text	<input type="checkbox"/>	<input type="checkbox"/>
5	Import	Text	<input type="checkbox"/>	<input type="checkbox"/>
6	Pallet (Y/N)	Yes/No	<input type="checkbox"/>	<input type="checkbox"/>
7	Pallet Qty	Number	<input type="checkbox"/>	<input type="checkbox"/>
8	Staff 1	Text	<input type="checkbox"/>	<input type="checkbox"/>
9	Staff 2	Text	<input type="checkbox"/>	<input type="checkbox"/>
10	Photo 1	Image	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11	Photo 2	Image	<input type="checkbox"/>	<input type="checkbox"/>

- App Sheet will make an attempt to choose the most appropriate Data type based on the name and/or value of the data that is imported
- Change the TYPE if the one chosen by AppSheet is not the most appropriate option

Quick look at some special Data Type

Ref: For connecting data in other table

Yes/No: For data containing only Yes/No value

Image: For storing photo captured from phone

Add a New View for the Job Table

- AppSheet did not automatically create a View for the newly added **Job** Table

The screenshot shows the AppSheet interface for managing views. On the left, the navigation bar includes 'Not Deployed', 'Views' (selected), 'Brand', 'Format Rules', 'Options', and 'Localize'. The 'Views' tab has sub-options: 'Home', 'Info', 'Data', 'UX' (highlighted with a red box), 'Behavior', 'Automation', 'Security', 'Intelligence', and 'Manage'. A 'New View' button is highlighted with a red box. Below it, a search bar says 'Search views'. Under 'Primary Views', there is a 'Container' view. On the right, a detailed view configuration panel is open for 'Add Job'. It shows the view name 'Add Job' and the data source 'Job'. The 'View type' section shows various options like calendar, deck, table, gallery, detail, map, chart, dashboard, onboarding, and card, with 'form' selected and highlighted with a red box. The 'Position' section shows options for where the view is located, with 'center' selected and highlighted with a blue box.

“Add Job” View for the Job Table



The “Add Job” view created can be accessed from the Toolbar at the bottom of the app

“Add Job” view is a form for user to enter data

A screenshot of the "Add Job" view, which is a form for entering data. The form has fields for "id*" (containing "4d7cccd05"), "Container" (empty), "Shipper" (empty), and "Import" (with options "IM" and "EX"). At the bottom are "Cancel" and "Save" buttons.

Data Types – text, number

A screenshot of an AppSheet interface. On the left, there is a form with a "PO#" input field and a dropdown menu set to "Number". A large green arrow points from this section to the right side of the screen. On the right side, the data is displayed in two rows: one row for the number "12,344,566" and another for the text "apple". Each data row has a small trash can icon and a blue edit icon.

A screenshot of an AppSheet interface. On the left, there is a form with a "PO#" input field and a dropdown menu set to "Text". A large green arrow points from this section to the right side of the screen. On the right side, the data is displayed in two rows: one row for the number "12344566" and another for the text "apple". Each data row has a small trash can icon and a blue edit icon.

Text - for alphanumeric input

Number - for numeric input. AppSheet automatically creates a "," separator for every thousandth

Data Types – image

Image – allow user to take photo or use existing image

- Image can be seen on mobile devices but need special tweak in the Google Sheets
- When downloaded to excel, image cannot be displayed unless you run a VBA code. See this link for more info ->
 - Source : <https://www.extendoffice.com/documents/excel/4212-excel-insert-image-from-url.html>

10	Photo 1	Image	<input type="button" value=""/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11	Photo 2	Image	<input type="button" value=""/>	<input type="checkbox"/>	<input type="checkbox"/>

There are 2 Image type
in the Job table

Photo 1*

Photo 2

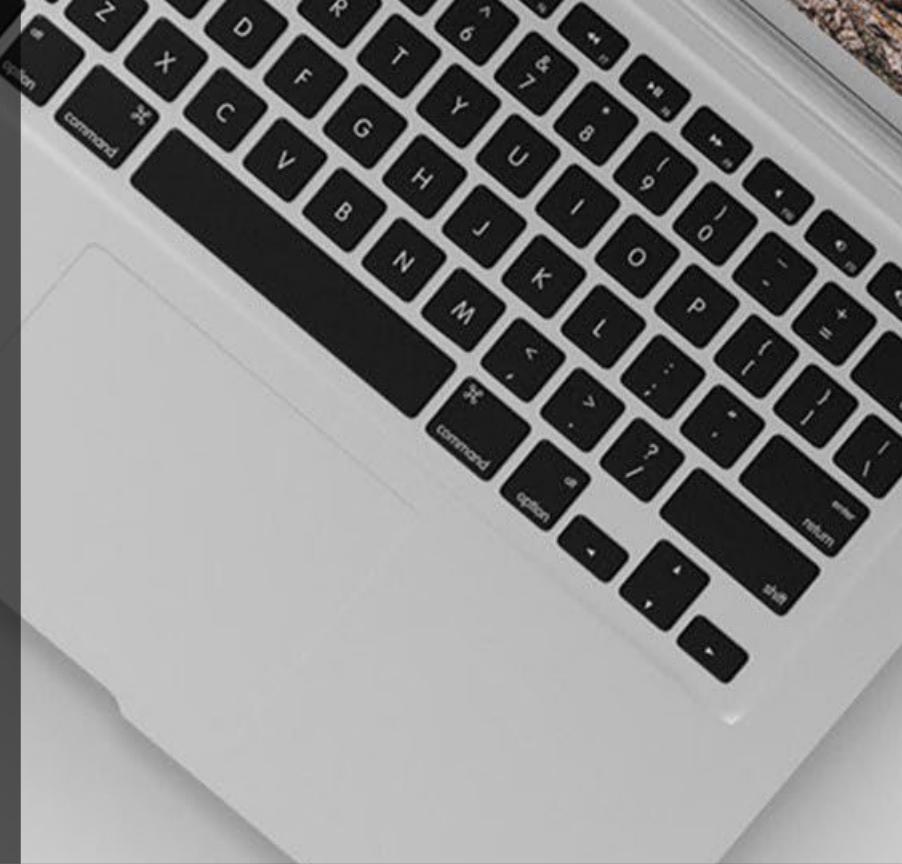
Verification

Submission Date Time*

10/02/2022 05:34:14 PM

Submitted By*

Cancel Save



USEREMAIL()

USEREMAIL()

USEREMAIL() captures the email address of the current user. However, the email address is only available for logged-in users.

Using the useremail() function

Submitted By field
in the Job table
has **Email** Data
type

10	Photo 1	Image
11	Photo 2	Image
12	Verification	Text
13	Submission Date Time	DateTime
14	Submitted By	Email

Auto Compute

App formula
Compute the value for this column instead of allowing user input.
= USEREMAIL()

Initial value
The default starting value for this column.
=

Suggested values
An optional expression with a list of suggested values for this column.
=

You can input the user email formula under “FORMULA”

Or

Click on the pencil icon on the left and input the user email formula in the auto compute section under App formula.

What happens?

The screenshot shows a mobile-style form interface. At the top is a back arrow. Below it are two photo upload fields, each with a camera icon. The second field is labeled "Photo 2". Underneath is a dropdown menu labeled "Verification". The next section is "Submission Date Time*" with a date and time picker showing "10/02/2022 05:49:53 PM". The final section is "Submitted By*" with a text input field containing "tkokchen@gmail.com". This last field is highlighted with a red rectangular border. At the bottom are "Cancel" and "Save" buttons.

When `USEREMAIL()` formula is inputted, AppSheet will automatically generate the email of the user that log in.



Date and DateTime

Data Types – Date, Datetime

Using now() vs today() on datetime

Container_No	Product_Description	Customer_Name	QR	Date_Arrival
CTR 6666	Chairs_RED	Scanteak	CTR 6666 Chairs_RED Scanteak	19/8/2020
CTR 9898	Tissue Paper	NTUC	CTR 9898 Tissue Paper NTUC	20/08/2020 17:18:47
CTR 6767	Tissue Paper	NTUC	CTR 6767 Tissue Paper NTUC	20/08/2020 00:00:00

1st row – Date with now()

2nd row – datetime with now ()

3rd row – datetime with today()

Remember – **DO NOT** use datetime with today()

Datetime

The screenshot shows the Expression Assistant dialog for a column named "Submission Date Time". The formula bar contains the expression `= NOW()`. The "Time" tab is selected in the ribbon. A red arrow points from the "NOW()" entry in the Examples section to the formula bar. Another red box highlights the "NOW()" entry in the examples table.

Pattern	Result	Example	Insert
"{HH:MM:SS}"	Time	"07:15:33"	Insert
"{MM/DD/YYYY HH:MM:SS}"	DateTime	"04/22/1970 12:15:44"	Insert
"{MM/DD/YYYY}"	Date	"04/22/1970"	Insert
"{HHH:MM:SS}"	Duration	"002:00:00"	Insert
NOW()	DateTime	NOW()	Insert
UTCNOW()	DateTime	UTCNOW()	Insert

Help me with expressions Cancel Save COI-SCM @RP

Data Types – ChangeTimestamp

Before

A	B	C	D	J	K
Container_No	Product_Description	Customer_Name	QR	TimeStamp_IN	UserEmail_IN
CTR 6767	Tissue Paper	NTUC	CTR 6767 Tissue Paper NTUC	20/08/2020 17:20:46	csrp919@gmail.com



After

A	B	C	D	J	K
Container_No	Product_Description	Customer_Name	QR	TimeStamp_IN	UserEmail_IN
CTR 6767	Tissue Paper	NTUC	CTR 6767 Tissue Paper NTUC	02/09/2020 14:18:04	csrp919@gmail.com

Allow you to keep track of when data is
changed in your app

Jurong	UOM	Pallets
QTY_IN	5	
TimeStamp_IN	8/20/2020 5:20:46 PM	
UserEmail_IN	csrp919@gmail.com	
Calculated_Inventory	5	

Jurong	UOM	Pallets
QTY_IN	50	
TimeStamp_IN	9/2/2020 2:18:04 PM	
UserEmail_IN	csrp919@gmail.com	
Calculated_Inventory	50	

Ref

Data Types – Ref

When we add the **Job** Table, an additional column: “**Related Jobs**” is automatically added to the **Container** table.

- This helps to define a relationship between the 2 tables

The screenshot shows two tables: **Job** and **Container**.

Job Table: Contains columns: _RowNumber (Number), Job ID (Text), Container (Ref), and Shipper (Text). The **Container** column is highlighted with a red box.

Container Table: Contains columns: _RowNumber (Number), id (Text), Container (Text), Shipper (Text), Import (Text), and Related Jobs (List). The **Related Jobs** column is highlighted with a red box.

A green arrow points from the **Container** column in the **Job** table to the **Related Jobs** column in the **Container** table, indicating the relationship.

For example, you can find all the jobs that are associated with a particular container.

Data Types – Ref

The screenshot shows a software interface for managing containers. At the top, there are standard toolbar icons: back, delete, search, copy, and more. Below this, a container record is displayed with the following fields:

- Id:** DFDFSF
- Container:** MX3927T
- Shipper:** LKW
- Import:** EX

Below the record, a section titled "Related Jobs" shows two items:

- f993fae1 (with a warning icon)
- be18a9fc (with a warning icon)

Each job item has a set of actions: delete, edit, view, and add. A red box highlights the "Related Jobs" section, and a green arrow points from the text "We are able to see all the jobs that are associated with a particular container." to the "View" button of the first job item.

We are able to see all the jobs that are associated with a particular container.



Add Additional Table/Data

Add the Staff Table

We will use the Staff table to store information of valid staff and their roles

The screenshot shows the Data Management interface with the 'Tables' tab selected. A red box highlights the 'Tables' tab. Another red box highlights the 'Add Table "Staff"' button, which is currently active, showing 'From "kaimay"'. Other tabs like 'Columns', 'Slices', 'User Settings', and 'Options' are visible.

A	B	C	D	E	F	G
UniqueId	Staff Name	Staff Email	Role	Updated Date Ti	Updated by	Remarks
1	KC	tkokchen@gmail	Admin	1-Jun-05		
2	Sheryl	Sheryl@gmail.co	Warehouse	24-Aug-02		
3	Nick	Nick@gmail.com	Finance	25-Jan-97		
3	John	John@gmail.con	Finance	25-Jan-97		

The screenshot shows the Data Management interface with the 'Data' tab selected. A red box highlights the 'Staff' entry under the 'Container' section. Other entries include 'Container' and 'Job'. The 'Staff' entry has a detailed description: source: kaimay, qualifier: Staff, datasource: google.

Staff Table added

Review the Data Type for the Staff Table

	NAME	TYPE	KEY?	LABEL?
1	_RowNumber	Number	<input type="checkbox"/>	<input type="checkbox"/>
2	UniqueID	Number	<input type="checkbox"/>	<input type="checkbox"/>
3	Staff Name	Name	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Staff Email	Email	<input type="checkbox"/>	<input type="checkbox"/>
5	Role	Text	<input type="checkbox"/>	<input type="checkbox"/>
6	Updated Date Time	Date	<input type="checkbox"/>	<input type="checkbox"/>
7	Updated by	Text	<input type="checkbox"/>	<input type="checkbox"/>
8	Remarks	Text	<input type="checkbox"/>	<input type="checkbox"/>

Review the Field and the Assigned Data Type

- Staff name is chosen as the Key, which is not suitable. Staff Email or UniqueID should be used as key
- Update Date Time should have a Data Type of DateTime instead of Date

3	Staff Name	Name	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Staff Email	Email	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Role	Text	<input type="checkbox"/>	<input type="checkbox"/>
6	Updated Date Time	DateTime	<input type="checkbox"/>	<input type="checkbox"/>



Data Validation

Validate Staff Data

In the “Add Job” form, we can make sure that only valid staff are entered by selecting the staff from the **Staff** table.

The screenshot shows the 'Add Job' form. It includes fields for 'Pallet Qty*' (0), 'Staff 1' (empty), and 'Staff 2' (empty). A red box highlights both the 'Staff 1' and 'Staff 2' input fields. A green arrow points from the text 'User may enter any staff name with no validation' to this red box.

User may enter any staff name with no validation

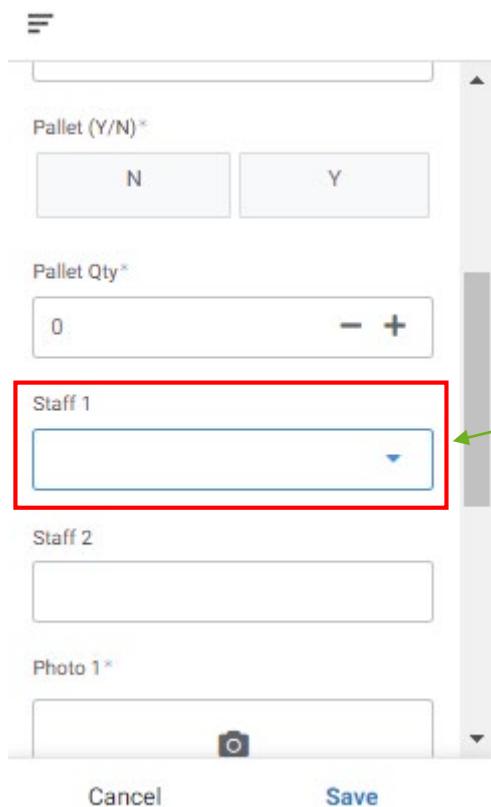
The screenshot shows the 'Data Validation' settings for the 'Staff 1' field. The 'Valid If' condition is set to '= Staff[Staff Name]'. A red box highlights this condition. Below it, the 'Invalid value error' message is shown as an empty field. The 'Require?' checkbox is unchecked.

Click on the pencil next to staff 1

App Sheet will check that the name is chosen from the **“Staff Name”** column in **Staff** table

Validate Staff Data

In the “Add Job” form, we can make sure that only valid staff are entered by selecting the staff from the **Staff** table.



The screenshot shows the 'Add Job' form with several fields: 'Pallet (Y/N)' (radio buttons N and Y), 'Pallet Qty*' (input field with value 0 and minus/plus buttons), 'Staff 1' (dropdown menu highlighted with a red border), 'Staff 2' (empty input field), and 'Photo 1*' (input field with camera icon). At the bottom are 'Cancel' and 'Save' buttons.

Staff 1 will now appear as a dropdown

Repeat the same step for Staff 2



The name shown will be picked from the data in the **Staff** table

A	B	C	D
UniqueID	Staff Name	Staff Email	Role
1	KC	tkokchen@gmail.com	Admin
2	Sheryl	Sheryl@gmail.com	Warehouse
3	Nick	Nick@gmail.com	Finance
3	John	John@gmail.com	Finance



Show/Hide View

Show View based on the User Role

Show the “Add Job” view only for the Warehouse Staff

Look under UX → Display → Show If

Add Job

center data:Job type:form

View name
The unique name for this view.

For this data
Which table or slice to display.
 [View Definition](#)

View type
What kind of view this is.

Position
Where the button to access this view is located.
 left most left center right right most menu ref

View Options

Display

Icon
The icon to use for this view.
 [Icon Catalog](#)
All Solid Regular Light

Display name
The name shown for this view in the app. Leave this empty to just use the view name. Or give it a text value (double-quoted) or a formula.
 [T](#) [A](#)

Show If
Optional Yes/No formula to decide whether this view should be shown.

```
IN(
USEREMAIL(),
SELECT(Staff[Staff Email],[Role])="Warehouse"
)
```

Check that the logged-in user has the Role of Warehouse

Show View based on the User Role

Show the “Add Job” view only for the Warehouse Staff

This screenshot shows a list of items with a 'Container' view at the bottom.

- 23DF YM12345
- DFDFSF MX3927T
- ABC123 KC12345
- cfdBc171 EG3927T
- 27a48373 KC12345
- b90a7b5f EG3927T

Container

Preview app as [tkokchen@gmail.com](#) [Apply](#)

View: Container | Table: Container

Only container view
is shown

I logged in as [tkokchen@gmail.com](#),
and my role is Admin. Therefore, I
am not able to see the Add Job view

2 views are
shown

This screenshot shows a list of items with both 'Container' and 'Add Job' views available.

- 23DF YM12345
- DFDFSF MX3927T
- ABC123 KC12345
- cfdBc171 EG3927T
- 27a48373 KC12345
- b90a7b5f EG3927T

Container **Add Job**

Preview app as [Sheryl@gmail.com](#) [Apply](#)

View: Container | Table: Container

Changed the logged-in user to
[Sheryl@gmail.com](#). Her role is
Warehouse, and she is able to see
both views.

Show View based on the User Role

Show the “Container” view only for the Admin Staff

Look under UX → Display → Show If

The screenshot shows the SAP Fiori View Configuration interface. On the left, a sidebar lists navigation options: Info, Data, UX (highlighted with a red box), Behavior, Automation, Security, Intelligence, and Manage. The main area is titled 'Container' and shows the following configuration:

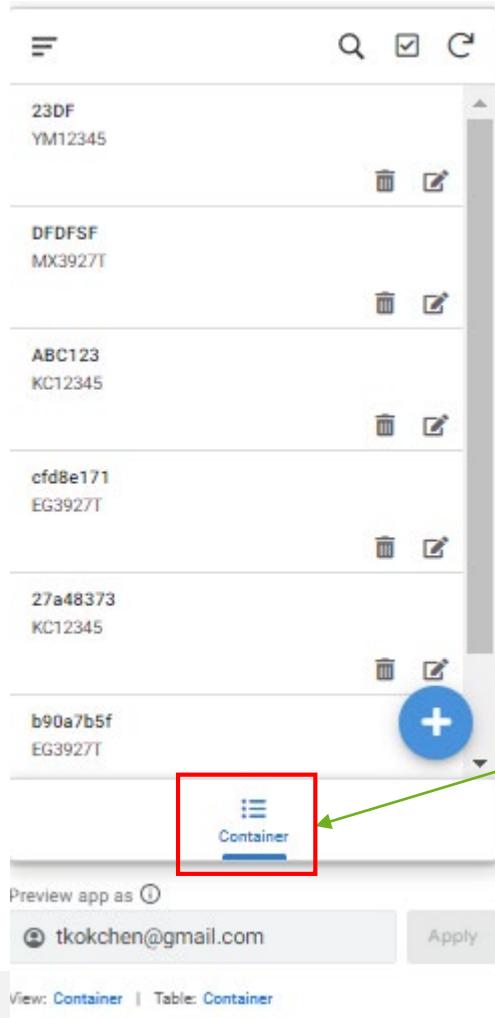
- View name:** Container
- For this data:** Container (selected from a dropdown)
- View type:** deck (selected from a grid of icons)
- Position:** center (selected from a horizontal list)
- Display Options:** A section with a red box around the 'Display' tab, which is currently selected.
- Show if:** A text input field containing the formula: `= IN(USEREMAIL(), SELECT(Staff[Staff Email], [Role]="Admin"))`

A callout box highlights the formula in the 'Show if' field, and a green arrow points from it to the text: "Check that the logged-in user has the Role of Admin".

Check that the logged-in user
has the Role of **Admin**

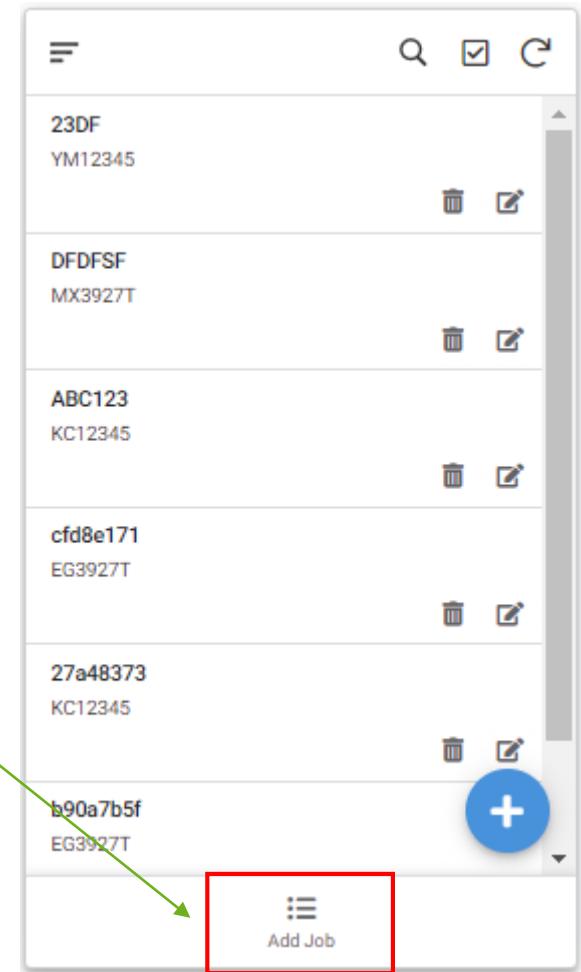
Show View based on the User Role

Show the “Add Job” view only for the Warehouse Staff



User with Admin role can see the container view

User with Warehouse role can see the Add Job view





Changing View Type

Change View Type from Deck to Table

Change the View Type from Deck to Table

The screenshot illustrates the steps to change the view type from 'Deck' to 'Table'. On the left, a list of data rows is shown with a 'Container' button at the bottom. In the center, a configuration panel shows the 'View name' and 'For this data' fields, and a 'View type' section where 'deck' is selected. A green arrow points from the 'Container' button to the 'deck' icon. On the right, the final state shows a table view with columns 'id', 'Container', 'Shipper', and 'Import', and a 'Table' button at the bottom.

id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3927T	LKW	EX
ABC123	KC12345	SH1	EX
cf8e171	EG3927T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3927T	SH5	EX

View: Container | Table: Container

COI-SCM @RP



Import Container Information

Import Container Data

Import Container Data
effect: App: import a CSV file for this view (not a row-level action)

Action name
A unique name for this action

For a record of this table
This action applies to rows of which table? [View Definition](#)

Do this
The type of action to perform

CSV file locale
The locale of the imported CSV file or an expression yielding the locale [T](#) [Δ](#)

Prominence
Some actions are used often and should be prominently displayed.

A screenshot of a table interface showing data for 'Container' records. The columns are labeled: id, Container, Shipper, and Import.

id	Container	Shipper	Import
23DF	YM12345	AKC	IM
DFDFSF	MX3927T	LKW	EX
ABC123	KC12345	SH1	EX
cfdb8e171	EG3927T	SH5	EX
27a48373	KC12345	SH1	EX
b90a7b5f	EG3927T	SH5	

At the bottom, there are three buttons: Add Job, Container (which is highlighted in blue), and Submitted Job.

Import Container Data

1) Prepare a CSV file with the same heading as the data in the Google Sheet

	A	B	C	D
1	id	Container	Shipper	Import
2	ABC123	KC12345	SH1	EX
3	XYZ123	EG3927T1	SH3	IM
4	AZY112	EG3927T	SH5	EX

2) Click on the Import button to import the data

The screenshot shows a table with columns: id, Container, Shipper, and Import. The data rows correspond to the CSV data provided above. At the bottom right of the table, there is a blue circular button with a white cloud icon, which is the 'Import' button. This button is highlighted with a red rectangular box.

	id	Container	Shipper	Import
23DF	YM12345	AKC	IM	
DFDFSF	MX3927T	LKW	EX	
ABC123	KC12345	SH1	EX	
cfde171	EG3927T	SH5	EX	
27a48373	KC12345	SH1	EX	
b90a7b5f	EG3927T	SH5	EX	

Add Job Container Submitted Job

3) App Sheet will show the number of record inserted (New Key) or updated (Existing key)

The screenshot shows a modal dialog box with the title 'Import CSV Succeeded'. Inside the dialog, it displays the following information:

- Table: 'Container'
- CSV Locale: 'English (Singapore)'
- Input Records: 3
- Inserted Records: 2
- Updated Existing Records: 1
- Elapsed Time: 00:02.601

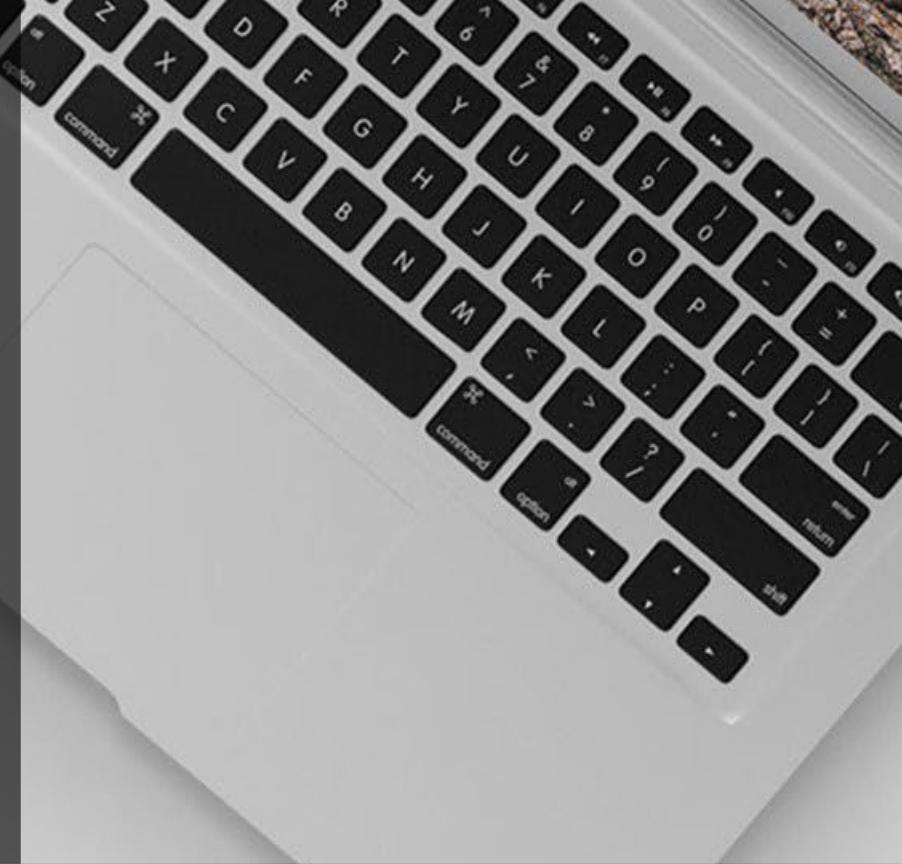
At the bottom right of the dialog is a blue 'OK' button. Below the dialog, the main App Sheet interface is visible, showing the same table and import button.

Import CSV Succeeded

Table: 'Container'
CSV Locale: 'English (Singapore)'
Input Records: 3
Inserted Records: 2
Updated Existing Records: 1
Elapsed Time: 00:02.601

OK

Add Job Container Submitted Job



Add New View

Create the Submitted Job View

View name
The unique name for this view.

Submitted Job

For this data
Which table or slice to display.

Job

Use slices to filter your data

View type
What kind of view this is.

deck

calendar **table** **gallery** **detail** **map** **chart**

dashboard **form** **onboarding** **card**

Position
Where the button to access this view is located.

left most **left** **center** **right** **right most** **menu** **ref**

View Options

Sort by
Sort the rows by one or more columns.

Add

Group by
Group rows by the values in one or more of their columns.

Verification **Ascending**

Add

Group aggregate
Display a numeric summary of the rows in each group.

NONE

Main image
The image column to display for each row.

Photo 1

Primary header
The top text for each row.

Container

Secondary header
The bottom text for each row.

Shipper

Summary column
The top-right text for each row.

Verification

1) Create a New View, name it as “Submitted Job”

2) Choose the Job Table

3) Choose the Deck View Type

4) Customize the view

Which user role
should have
access to this
view?

The screenshot shows a user interface for managing job submissions. It features two main sections: "Pending" and "Verified".

- Pending:** Contains entries for "DFDFSF LKW" and "ABC123 SH1". Each entry includes a small thumbnail image, the job ID, the container number, and a status indicator (Pending).
- Verified:** Contains entries for "23DF AKC" and "DFDFSF LKW". Each entry includes a small thumbnail image, the job ID, the container number, and a status indicator (Verified).
- Action Buttons:** Each row in both sections has a set of standard CRUD (Create, Read, Update, Delete) and other management icons.
- Bottom Navigation:** A large blue circular button with a white plus sign is located at the bottom right of the main content area.
- Footer:** At the very bottom, there are three navigation links: "Add Job", "Container", and "Submitted Job".

Verify the Submitted Job

Verify Job
effect: Data: set the values of some columns in this row

Action name
A unique name for this action
Verify Job

For a record of this table
This action applies to rows of which table?
Job

Do this
The type of action to perform
Set these columns
To the constant or expression values defined
Data: set the values of some columns in this row

Verification **= Verified**

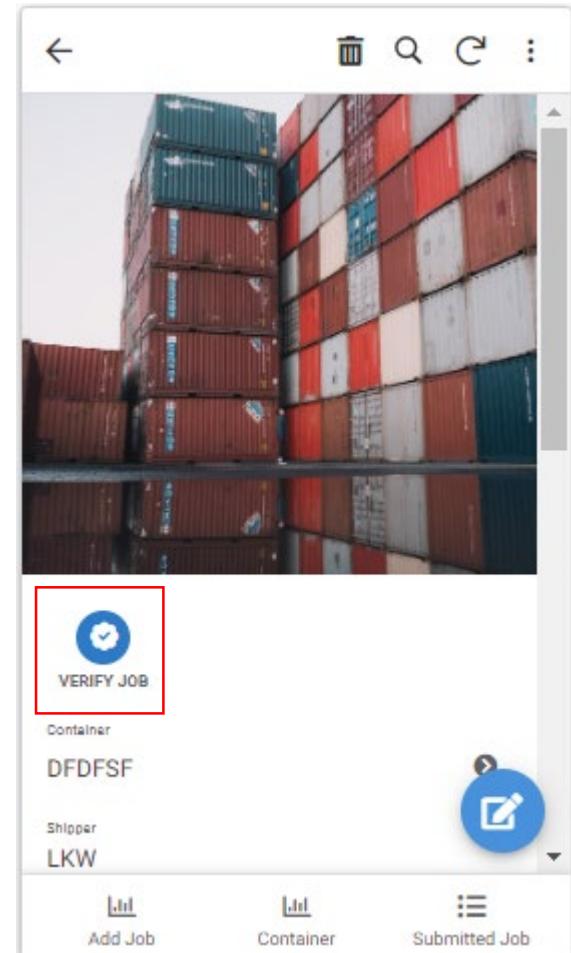
Prominence
Some actions are used often and should be prominently displayed.
Display prominently

1) Create a new action, name it as **Verify Job**

2) Choose the **Job Table**

3) Choose **Set the values of some columns in this row**

4) State the value to change



Verify the Multiple Jobs

X 2 items

Pending

	DFDFSF LKW	Pending
	ABC123 SH1	Pending

Verified

23DF AKC	Verified
-------------	----------

Add Job Container Submitted Job

2) Click on the icon to verify all the selected jobs

1) Select multiple items

3) All jobs are verified

Verified

23DF AKC	Verified	
	DFDFSF LKW	Verified
	DFDFSF LKW	Verified
	ABC123 SH1	Verified

Add Job Container Submitted Job

What Have You Learnt

- ✓ Set up Data for the App
- ✓ Use different Data Type
- ✓ Create new views
- ✓ Create new actions



Thank You

-
- 👤 Liu Shubin ,Tan Chay Siam
 - 📞 91163938, 9139 8773
 - ✉️ Liu_Shubin@rp.edu.sg
 - ✉️ Tan_chay_siam@rp.edu.sg
 - 🌐 <https://www.rp.edu.sg/coi-scm/>