



Research

Standardisation for Packaging machines

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Date 14.06.2016

Agenda



- ▶ Nestlé Packaging Objectives
- ▶ Nestlé – PackML
- ▶ Current Condition
- ▶ What is PackML
- ▶ Visual Management
- ▶ PackML Challenges
- ▶ HMI

Nestlé Packaging Objectives

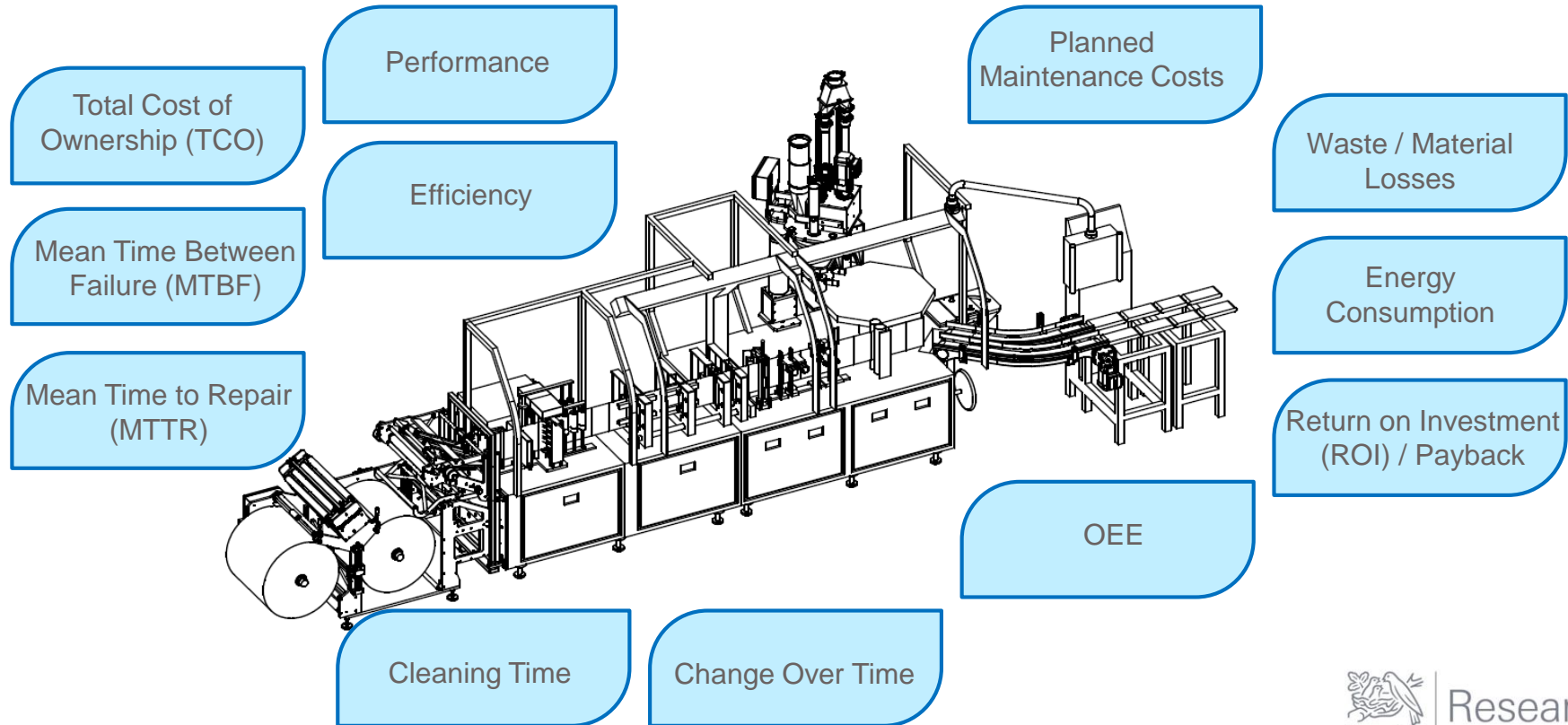
- Standardization of URS for typical machine types
- Standardization of URS for Line Integration by System integrators considering horizontal and vertical communication
- Standardization on equipment level
- Requirements for OEE- and energy data
- Standardization for OMAC PackML and HMI

PackML
an **OMAC** standard

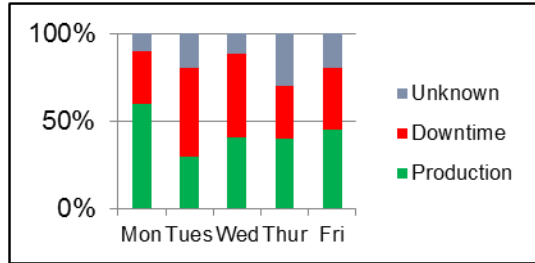


Research

Typical Machine Purchase Specification



Current Condition



I know we could solve the problems, if we knew where to start

So what's been the problem Joe?

LINE 1

Pre - PackML

So what is this
PACKML?

If only i can find
out what the
problem is ..



Definition / Explanation

OMAC:

(**O**rganization for **M**achine **A**utomation and **C**ontrol)

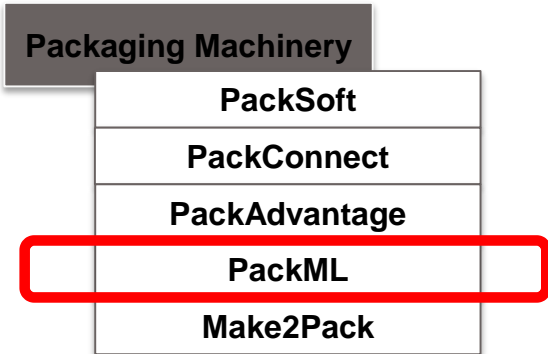
The OMAC is a user organization the members of which comprise **End users, OEMs, System Integrators and Technology Providers.**

The majority of these members is working in the food and beverage industries as well as the packaging sector.

The objective of this organization is to define the necessary harmonized regulations and standard guidelines in order to reduce the development and delivery times, use the existing resources more efficiently and at the same time increase the profitability.



OMAC is working on different topics for Standardization of Packaging Machinery:



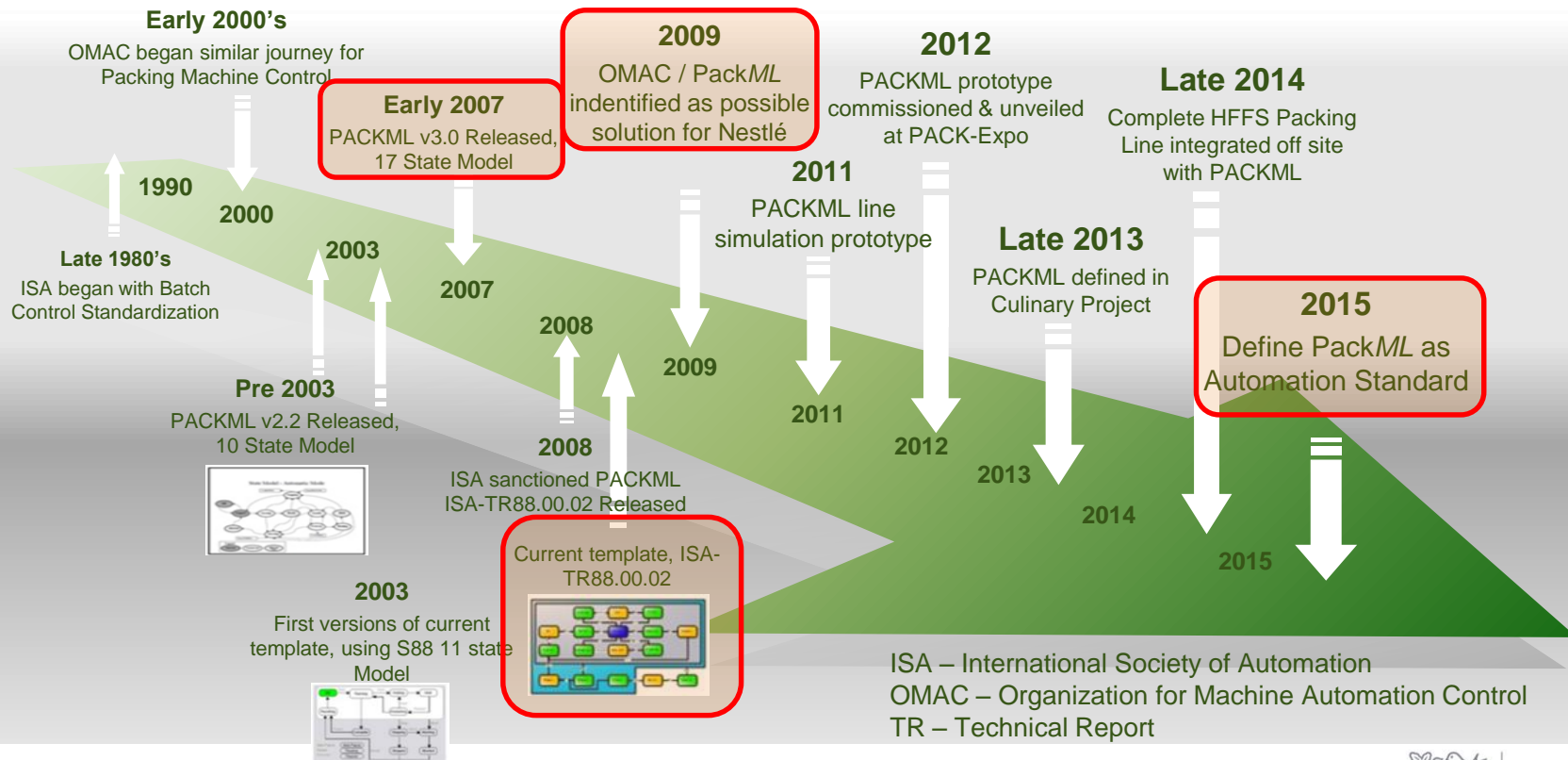
Research

OMAC brought together ..

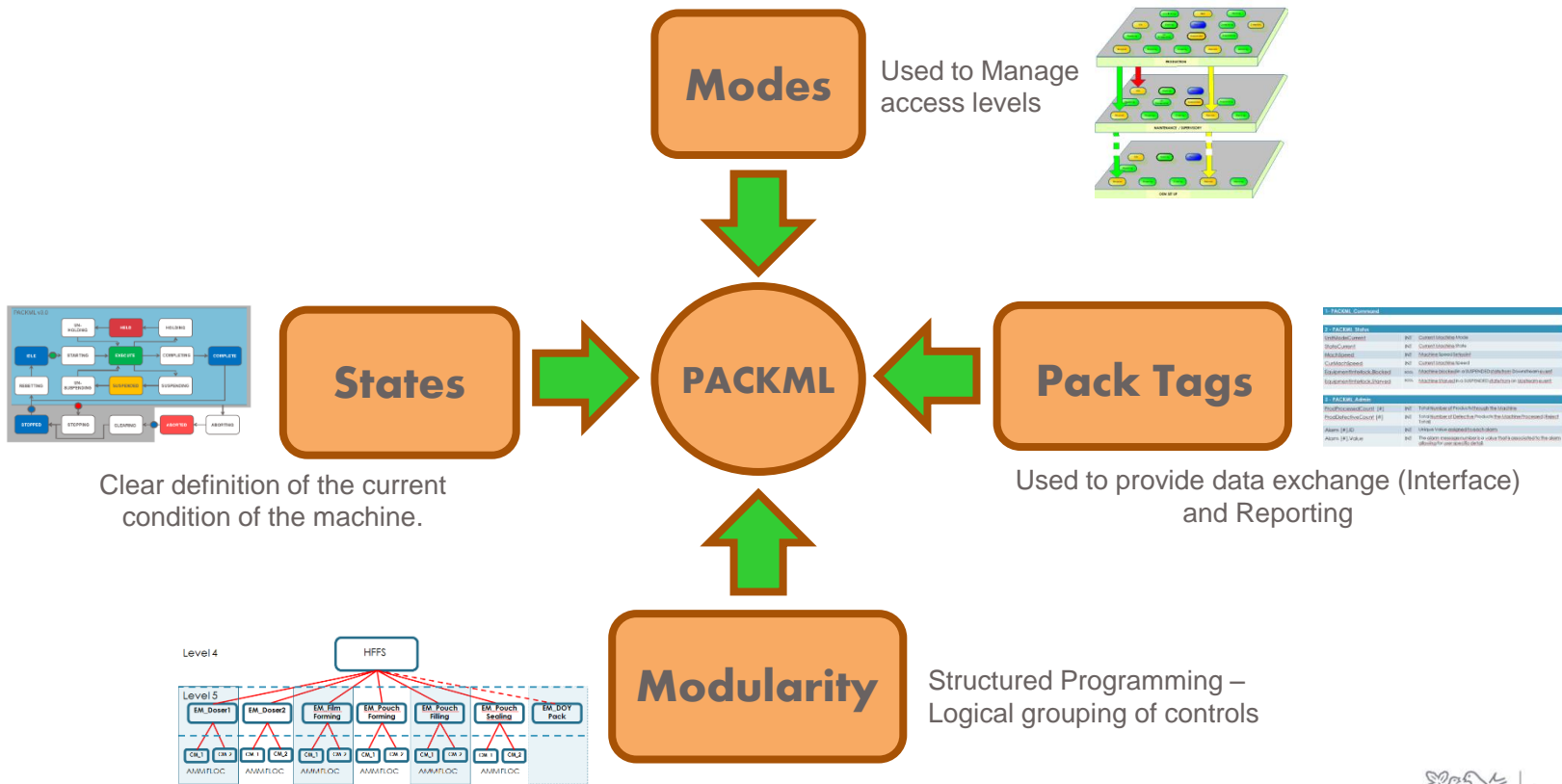
End-Users, # Manufacturers, # OEMs, # System Integrators,
Technology Providers and # Non-Profit / Government Agency organizations



Where did PackML come from?



The Four parts of PackML - v3.0 TR88.00.02-2015



PackML PackTags - Nestlé Requirement Min. 12 Tags

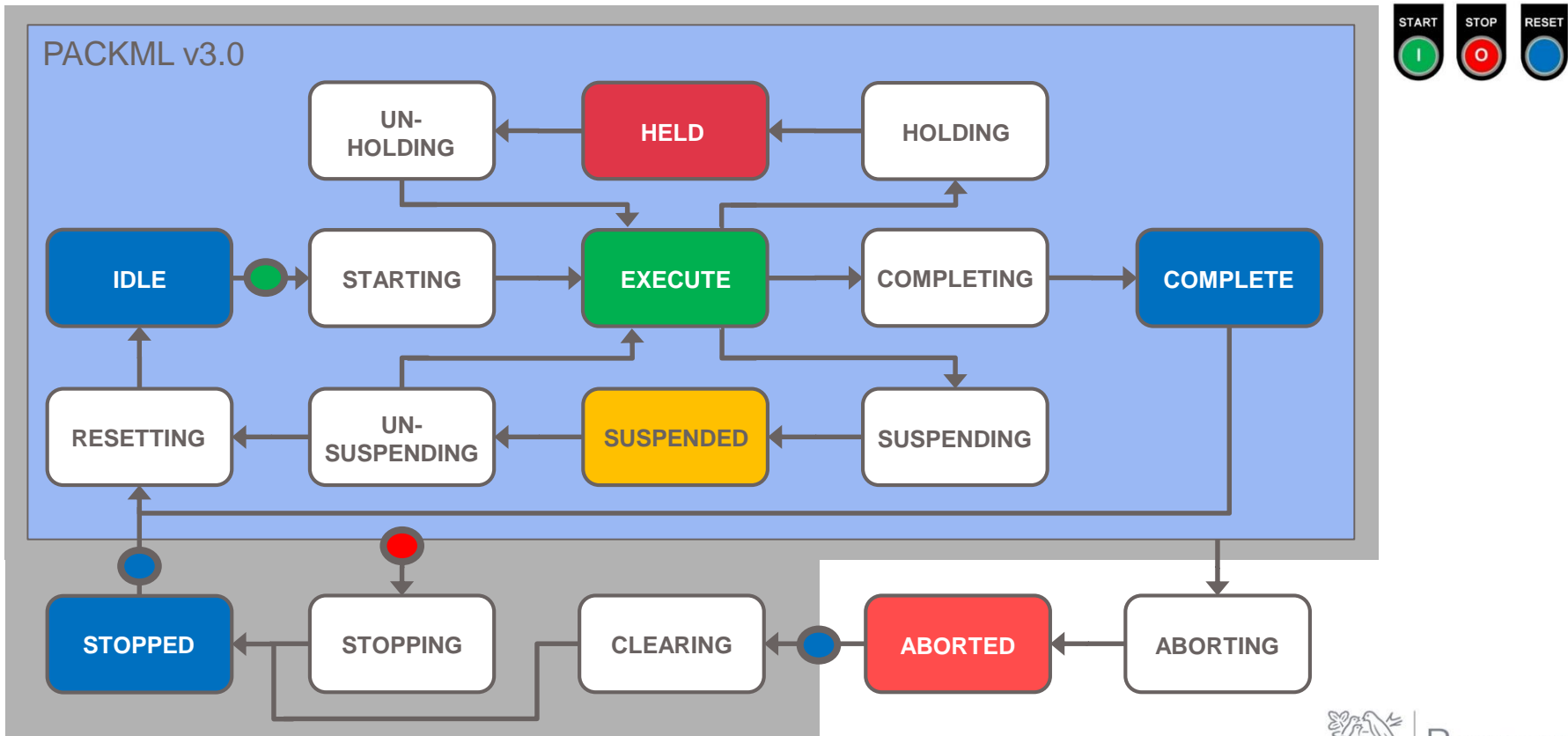
PackML_Status

UnitModeCurrent	DINT		Number of Current Unit Mode in use
StateCurrent	DINT		Number of Current Model State in use
MachSpeed	REAL	1/min	Current Machine Speed Setpoint
CurMachSpeed	REAL	1/min	Current value Machine Speed
EquipmentInterlock.Blocked	BOOL		Machine blocked in a SUSPENDED state from Downstream event
EquipmentInterlock.Starved	BOOL		Machine Starved in a SUSPENDED state from an Upstream event

PackML_Admin

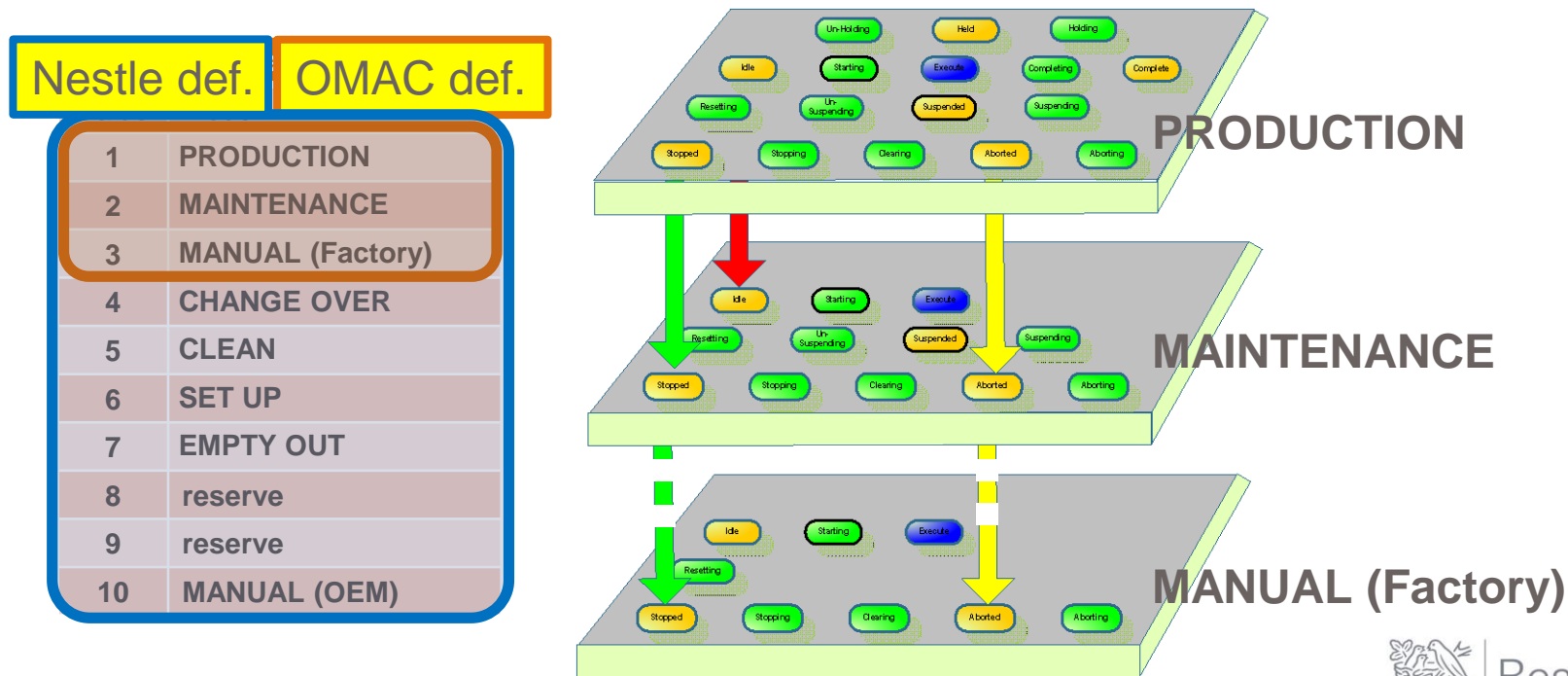
ProdProcessedCount[0].Count	DINT	pcs	Total Number of Products through the Machine
ProdProcessedCount[0].AccCount	DINT	pcs	Accumulated total Number of Products through the Machine
ProdDefectiveCount[0].Count	DINT	pcs	Total Number of Defective Products the Machine Processed (Reject Total)
ProdDefectiveCount[0].AccCount	DINT	pcs	Accumulated Total Number of Defective Products the Machine Processed
Alarm[0].ID	DINT		Unique Value assigned to each alarm, [0] for 1st fault detection,
Alarm[0].Value	DINT		The alarm message number is a value that is associated to the alarm allowing for user specific detail.

PackML Model States – Nestlé Requirement 17 States



PackML Modes — Nestlé Requirement 1-10

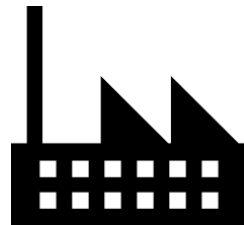
MODES are defined to handle the **interlocks or accessibility** to specific states.



PackML Modularity — Nestlé Requirement

Factory

Level



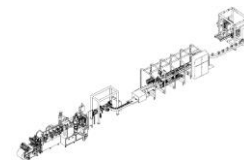
Packing Hall

Level



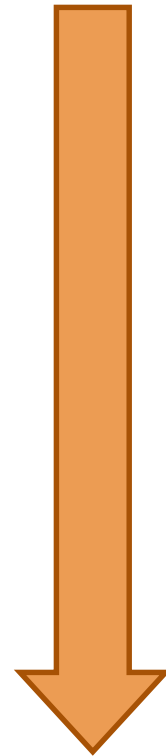
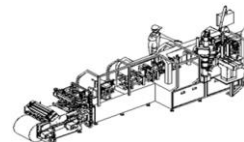
Packing Line

Level

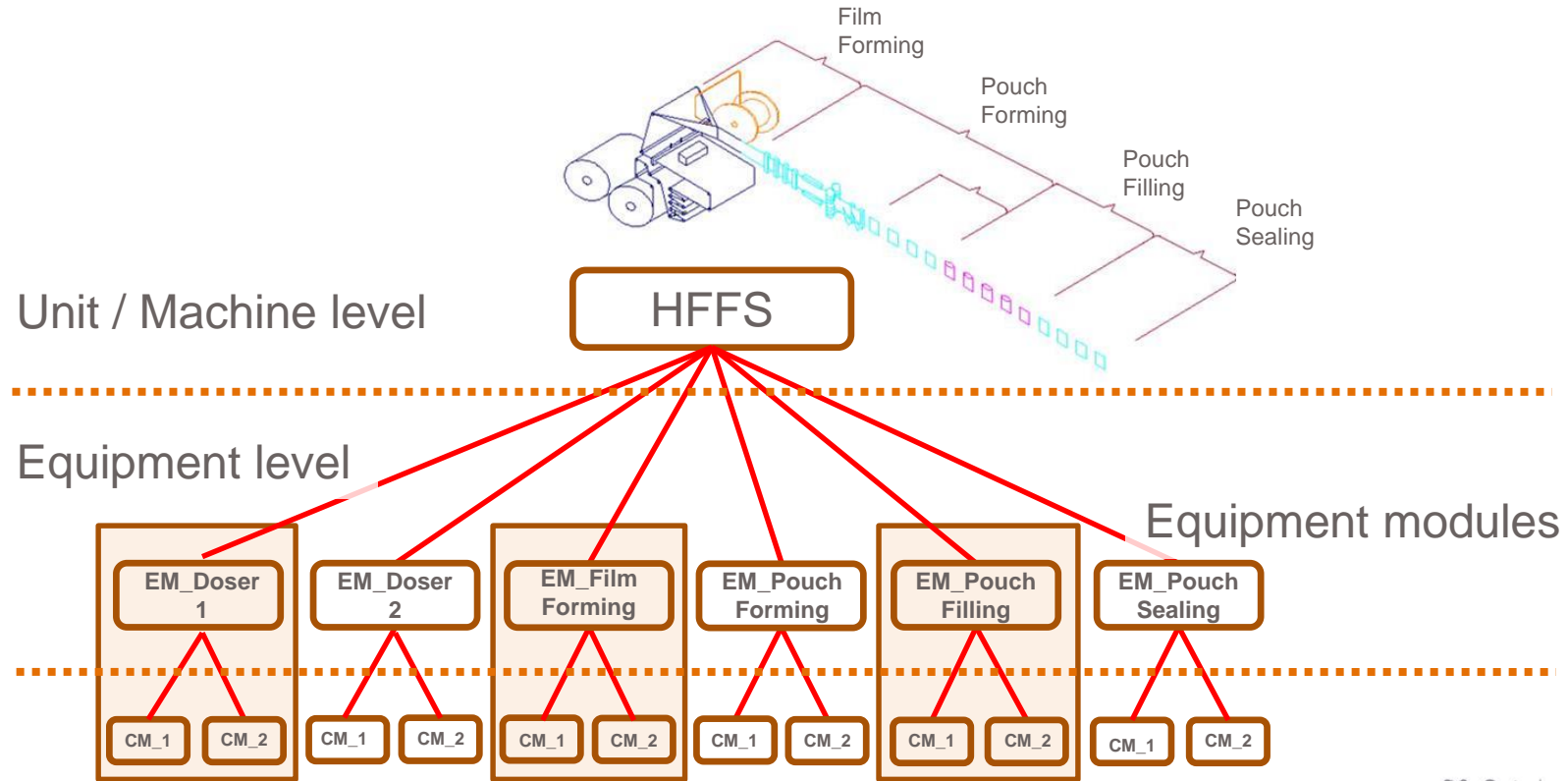


Machine

Level

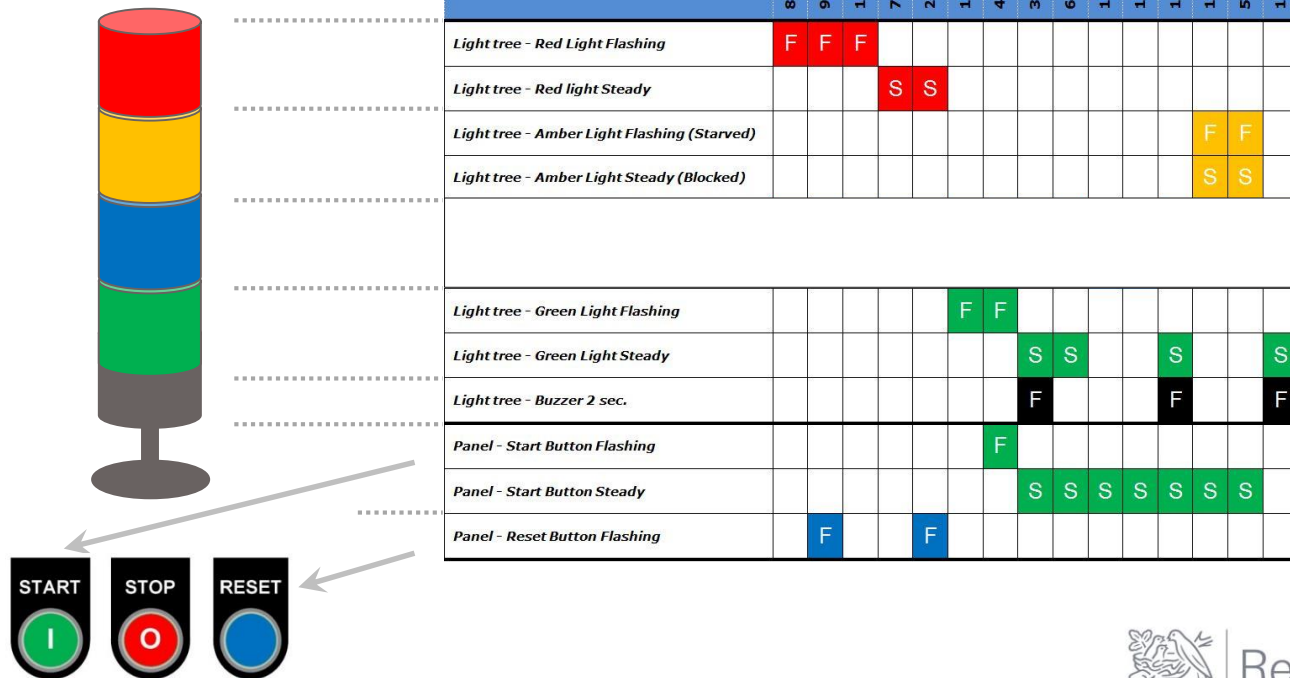


PackML Modularity – Nestlé Requirement



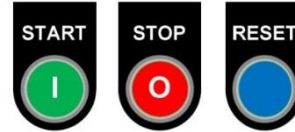
Visual Management – Light tree

The light tree shall be four Lamps and a buzzer as shown, with the following links applied to the PACKML Machine states.



Basic physical Operating elements

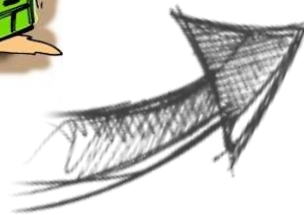
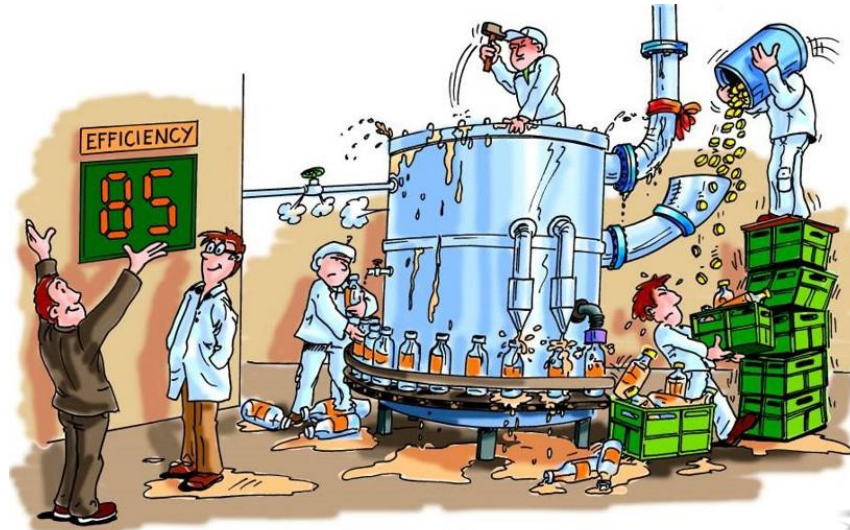
- Light tree:
4 lights + buzzer
- 3 Buttons:
Start – Stop – Reset
- Key – Switch: (Password level)
Access level management
Alternative: RFID
- Emergency button:



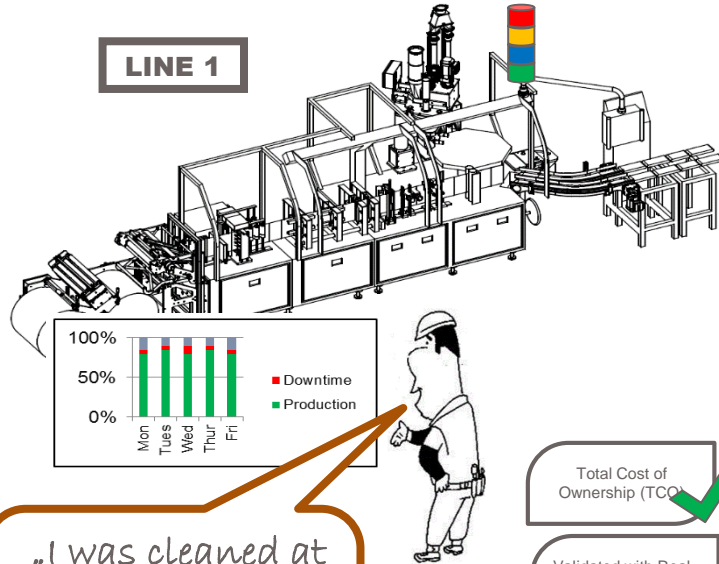
Data capture in a transparent way



Data capture in a traceability way

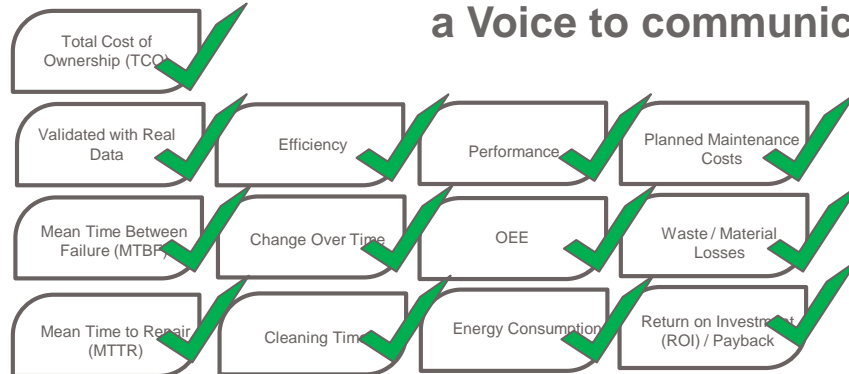


Post – PackML



- Consistent Look and Feel
- Real / actual data directly from machine
- Defines standard information in / out of a machine
- Common behavior for “Plug & Play” line integration
- Modularity for quicker future development
- Decreases debug time
- Share data with OEM for feedback to Design
- Decrease MTTR
- Focused improvement opportunities

✓ **Provides the machines with a Voice to communicate ..**



Question..

So, why not implement
PACKML?

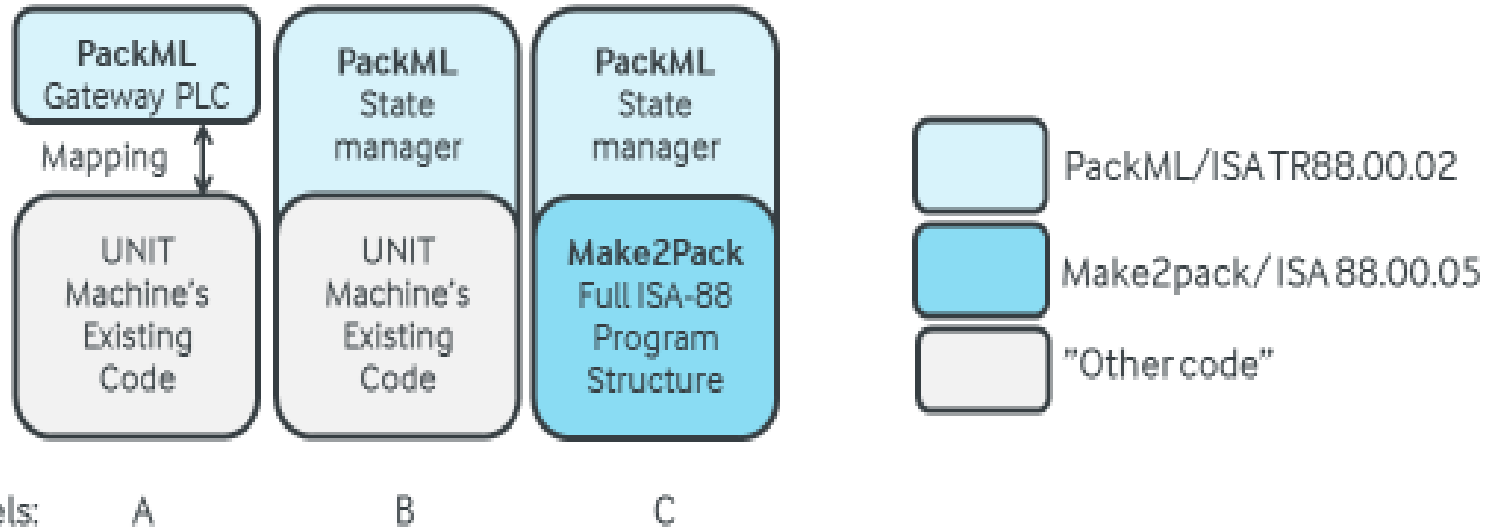


PackML provides a standardized way of operation and collects uniform data from machines, which will give us real data of machine stoppages with the actual error or reason code of every stoppage, helping us to improve machine analysis, problem solving and ultimately improve Efficiency.



Challenges of PackML

Which is my best Integration Level?



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HMI's today

Actual status of individual HMI's for one packaging line...



Metal detector



Coding filing bag



Bag filler
VFFS



Check-weigher



Cartoner (CAMA)



Ink-Jet
cartons



Metal detector
finish carton



X-ray
detector



Bar code reader



Bar code
check



Case
r



Ink-Jet
case



Elevato
r

HMIs today, background, challenges



- Nestlé has around **450 factories** in more than 85 countries.
- More than **200,000 HMIs** are currently used in Nestlé factories.
- More than **70,000 people** involved in packaging operations worldwide.
- Each screen has **different aspects**, and this creates confusion.
- A **specific training** is required for each equipment, this costs money and takes too much time.

Nestlé-HMI-Application Example

HMI Implementation based on Nestle-Template creates a common Look & Feel.

The screenshot displays the Nestlé HMI application interface, which is divided into several sections:

- Top Header:** Includes the Nestlé logo, date/time (4/12/2016 2:58:30 PM), PLC status (PLC ✓), and system information (RID 3X2 doble, 3121 / Alarm & Events / History Messages, Undefined Production).
- Left Panel:** Contains the Nestlé logo, date/time (4/12/2016 2:54:05 PM), PLC status (PLC ✓), and a red banner indicating "025: Door Open Request - Machine ground floor". Below this is a 3D isometric view of the machine with a red box highlighting a specific area. To the left of the 3D view are three buttons: "Enable Infeed Packs" (ON), "Pad Store Load Request", and "Top Store Load Request".
- Right Panel:** Displays a table of alarm and event messages. The table has columns for Date, Time, Text, and Status. The messages are listed in chronological order, with some highlighted in red and others in orange. The messages include errors like "Error no screen '4001_General'", "Date/time could not be set", and "Robot: Program Not Running".
- Bottom Panel:** Contains a navigation bar with icons for Machine control, Setting, Alarm & Events, Statistics, Mode, Diagnostics, Formats, Back, and Logon.

Date	Time	Text	Status
4/12/2016	2:56:46 PM	Error no screen '4001_General', either the screen is not displayed currently or the name is misspelle...	I
4/12/2016	2:56:44 PM	Error no screen '4001_General', either the screen is not displayed currently or the name is misspelle...	I
4/12/2016	2:56:40 PM	Error no screen '4001_General', either the screen is not displayed currently or the name is misspelle...	I
2:56:20 PM		Date/time could not be set, error code: 1314,1.	I
2:55:20 PM		Date/time could not be set, error code: 1314,1.	I
2:55:05 PM		636: Robot: Program Not Running	I
2:55:03 PM		637: Robot: System Not Ready	(I)O
2:55:03 PM		634: Robot: Fault	(I)O
2:54:55 PM		256: Safety Area Not Restored - Machine	(I)O
2:54:53 PM		025: Door Open Request - Machine ground floor	(I)O
2:54:28 PM		039: Door Open - Machine SQ1355 (ground floor)	(I)O
2:54:20 PM		Date/time could not be set, error code: 1314,1.	I
2:54:00 PM		039: Door Open - Machine SQ1355 (ground floor)	I
2:53:53 PM		637: Robot: System Not Ready	I
2:53:53 PM		634: Robot: Fault	I
2:53:53 PM		256: Safety Area Not Restored - Machine	I
2:53:53 PM		025: Door Open Request - Machine ground floor	I
2:53:20 PM		Date/time could not be set, error code: 1314,1.	I
2:52:35 PM		Too many tags (PowerTags) have been configured.	I
2:52:24 PM		610: Lubrication Grease Low Level	I
2:52:24 PM		590: No Product At Infeed	I
2:52:24 PM		Connection established: PLC-HMI Connection, Station 192.168.0.100, Rack 0, Slot 2.	I
2:52:20 PM		Change to operating mode 'online'.	I
2:52:20 PM		User administration imported successfully.	I
2:52:20 PM		User administration import started.	I
2:52:20 PM		Log initialization ended. All logs OK.	I

Benefits out of HMI standardisation

- HMI harmonization will **simplify** machine operations.
- Screen diagnostics will **reduce downtime** and **improve efficiency**.
- **Reduction of training** for Operators, Supervisor and Maintenance.
- **Easier to operate** and more clarity due to **harmonized**: style, wording, navigation, alarm handling, ...
- Benefits of **HMI template**:
 - Will help to understand HMI specification.
 - Will guide the programmer to use the prepared structure.
 - Will reduce implementation time.
 - Easier to maintain the software by using common structure.
 - Will lead to a common Look & Feel.





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Product Technology Centre
Singen



THANK YOU



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