



**Увеличение эффективности  
операционной деятельности на  
пищевом производстве за счет  
MES на примере компании  
Unifrost, Бельгия**

**MEScontrol enabling for Operational  
Excellence at Dujardin Foods**

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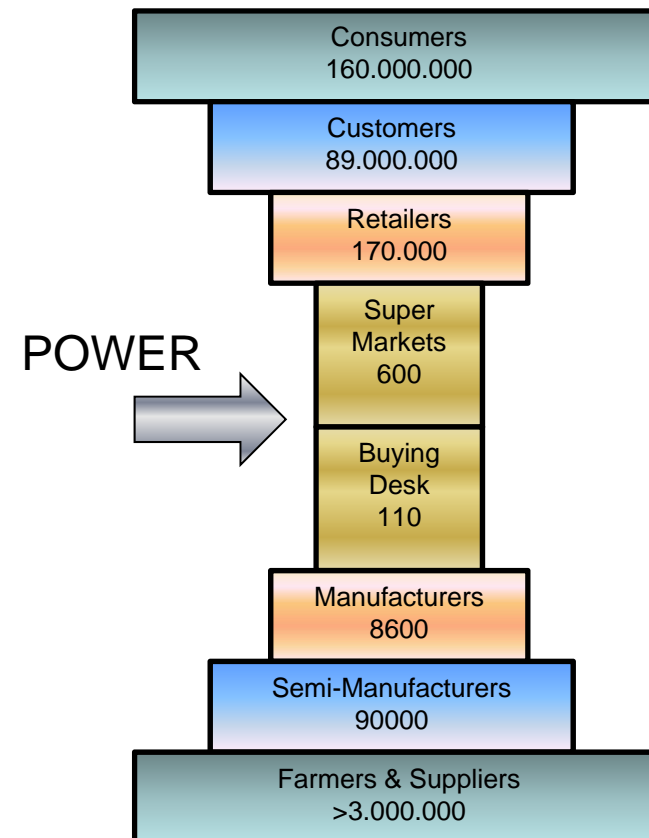


# Economic Challenges for a Belgian Food company

- Projection by 2050
    - Growth of world populations x2
    - Food Demand x3
  - Serious competition from
    - Globalisation
    - BRIC(\*)-Countries
  - Public Spending in EU ↓
  - Governmental support of market & prices ↓
  - € versus \$ versus p.
  - Product Differentiation ↑
- (\*) BRIC countries : **B**razil, **R**ussia, **I**ndia, **C**hina

# Challenges on Company Level

- High Volume – Low Margins
  - Bargaining power
    - Retailers / Distribution chains
    - Buying Desks
  - The paradigm of agricultural products
    - Unpredictable, seasonal dependent volume and quality of raw materials
    - Consumer expects quality consistent end-product
    - Consumer is used to a large variety in end-products
- Private Labels are doing well
- But: Need to structure for growth by better controlling production System



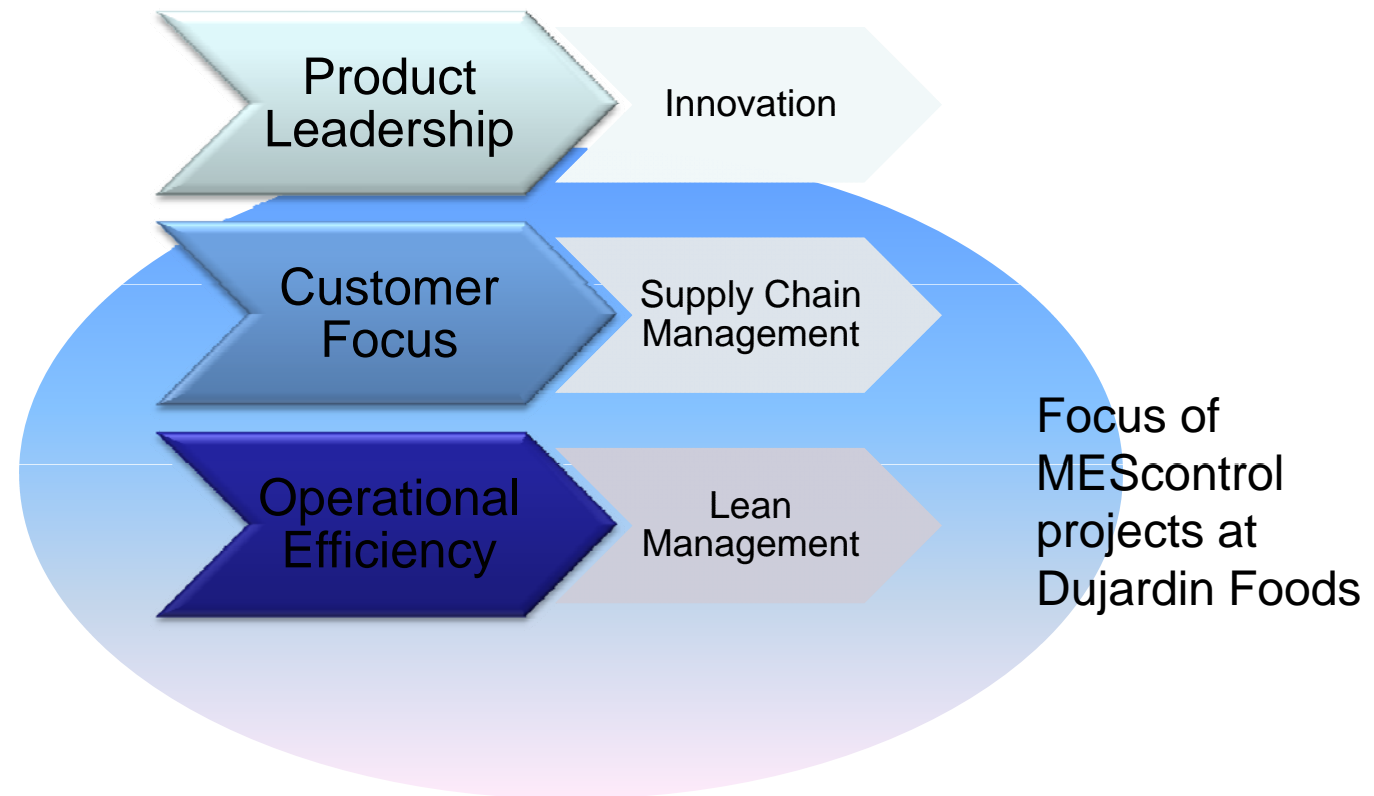
Prof.X. Gellynck  
University of Ghent  
Faculty Bioscience Engineering



# Challenges of a Food Company



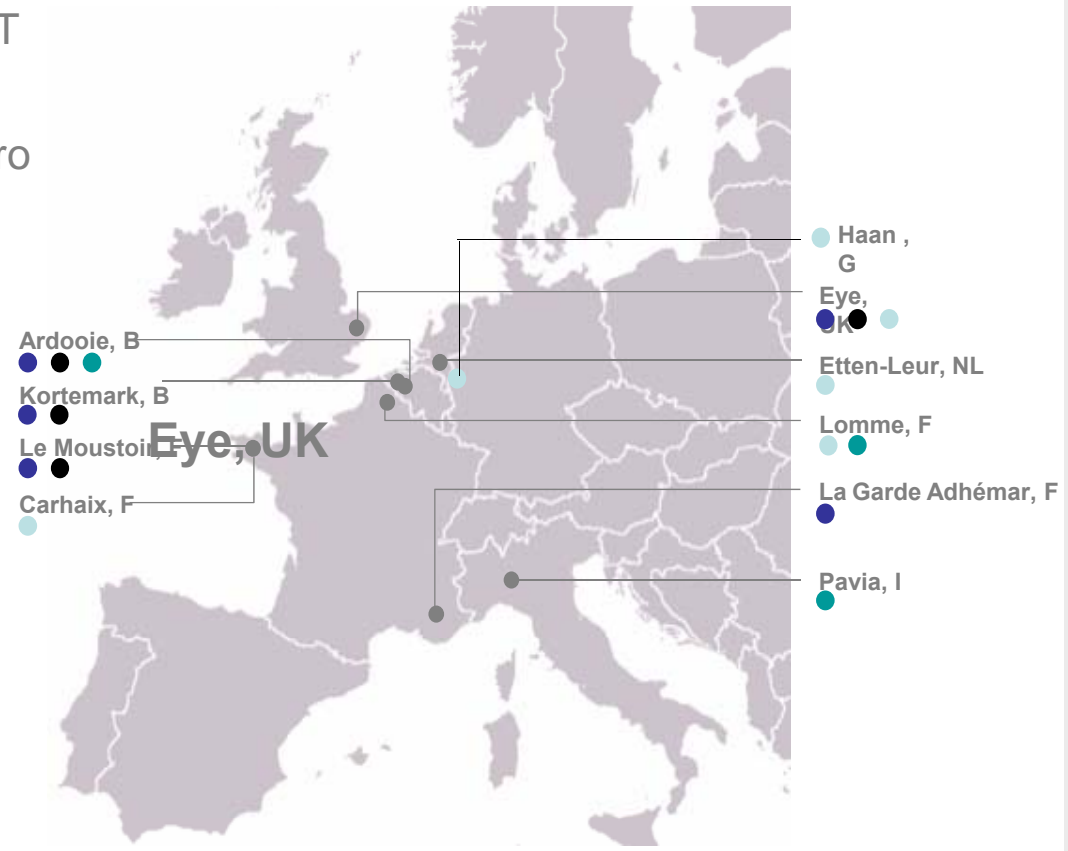
# Pathways to face the challenges





# Dujardin Business Overview

- Founded in 1974 (Unifrost)
- Turnover in Quantity: 178.000 T
  - With 120.000 T own production
- Turnover in Value: 195 Mio Euro
- Employees: 778
- Production Units: 5
- Storage Capacity: 660.000 m<sup>3</sup>  
(73.100 Pallets)



● processing sites ● logistics and cold storage facilities ● sales offices ● trading subsidiaries

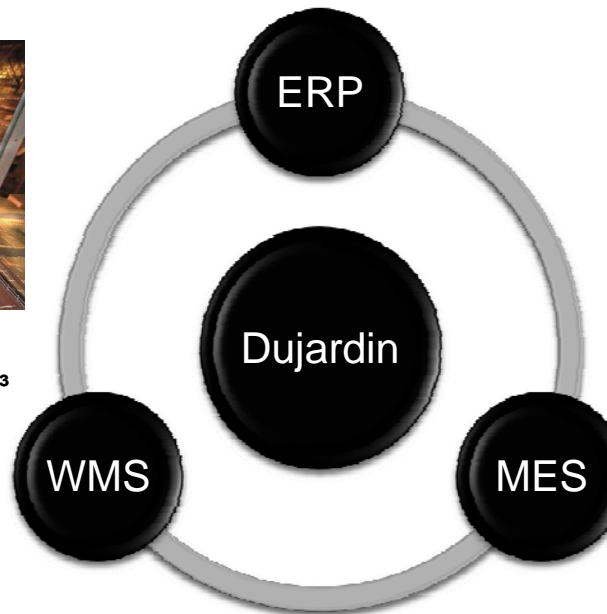


# The impact on the Information Management Systems



**FY 06/07 Cold storage capacity in M<sup>3</sup> and pallet places**

	M <sup>3</sup>	Of which pallet places
<b>Ardooie</b>	320.000	46.300
<b>Le Moustoir</b>	125.000	9.600
<b>Kortemark</b>	120.000	4.800
<b>La Garde Adhémar</b>	40.000	7.270
<b>Eye</b>	5.000	1.700
<b>Total</b>	<b>610.000</b>	<b>69.670</b>



## Dujardin Kortemark

<b>1 coating line</b>	<ul style="list-style-type: none"> <li>• year capacity of 15.000 tons</li> </ul>
<b>2 retail packaging lines</b>	<ul style="list-style-type: none"> <li>• each of 10.000 tons/year of which one specially equipped for the packaging of small quantities of herbs</li> </ul>

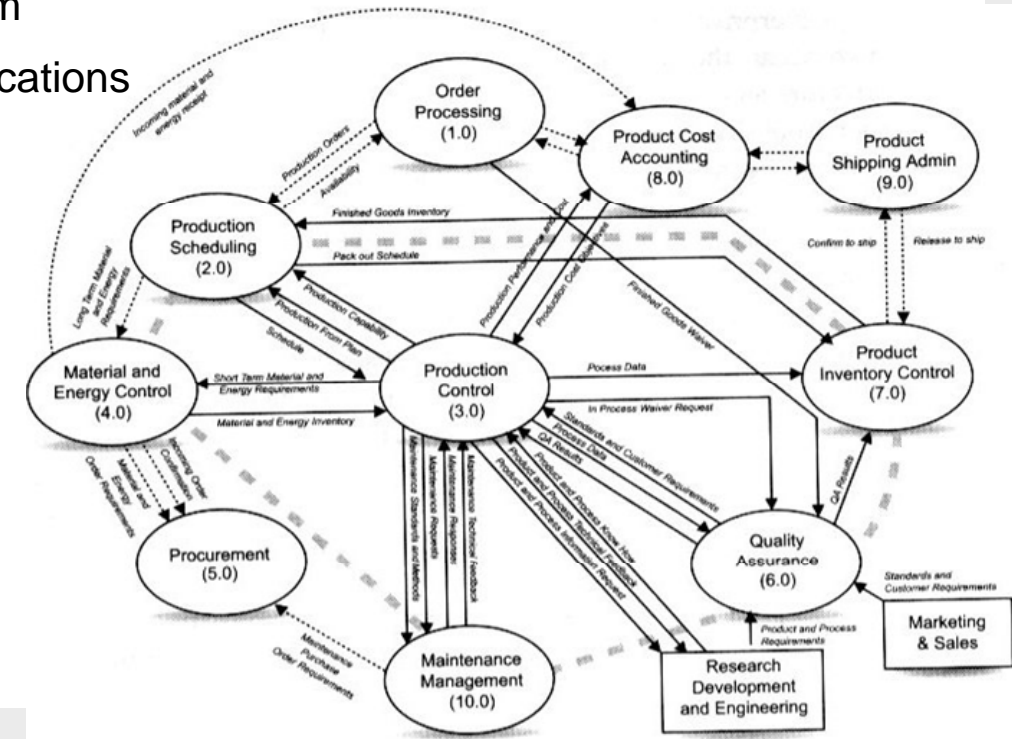
## Unifrost Koolskamp

<b>preparation lines</b>	<ul style="list-style-type: none"> <li>• 2 preparation lines for peas of 2x20 tons/hour</li> <li>• 2 preparation lines for beans of 2x6 tons/hour</li> <li>• 2 lines for peeling carrots of 1x20 tons/hour and 1x16 tons/hour</li> <li>• 3 preparation lines for spinach of 3x8 tons/hour</li> </ul>
<b>5 production lines</b>	<ul style="list-style-type: none"> <li>• 1x20 tons/hour – all products</li> <li>• 1x12 tons/hour – all products</li> <li>• 2x9 tons/hour – all products</li> <li>• 1x3 tons/hour – leaf vegetables in portion</li> </ul>
<b>2 mixing lines</b>	<ul style="list-style-type: none"> <li>• each of 2x15 tons/hour</li> </ul>
<b>packaging lines</b>	<ul style="list-style-type: none"> <li>• 8 retail packaging lines, each of 12.000 tons/line/year</li> <li>• 1 bulkline (10-20-25 kg cartons of bags) of 15.000 tons/year</li> <li>• 1 packaging line for carton boxes of 8.000 tons/year</li> <li>• 1 outer packaging line for several (different) steambags</li> </ul>



# The Project

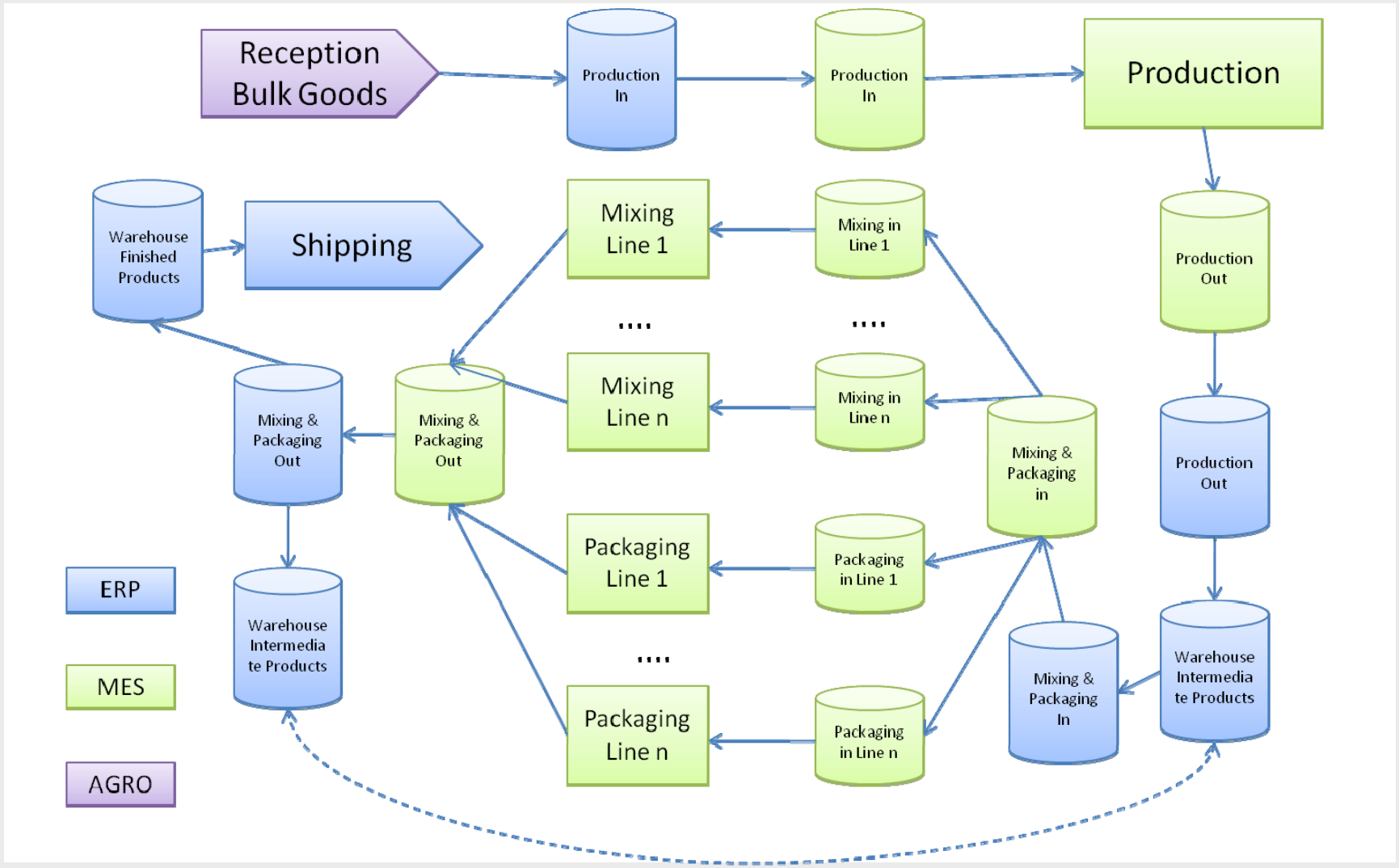
- The Need:
  - Better insight in Production and Logistical processes
  - Traceability
  - Warehousing of Bulk Products
  - Replacement old MES system
  - Take over and unify old applications





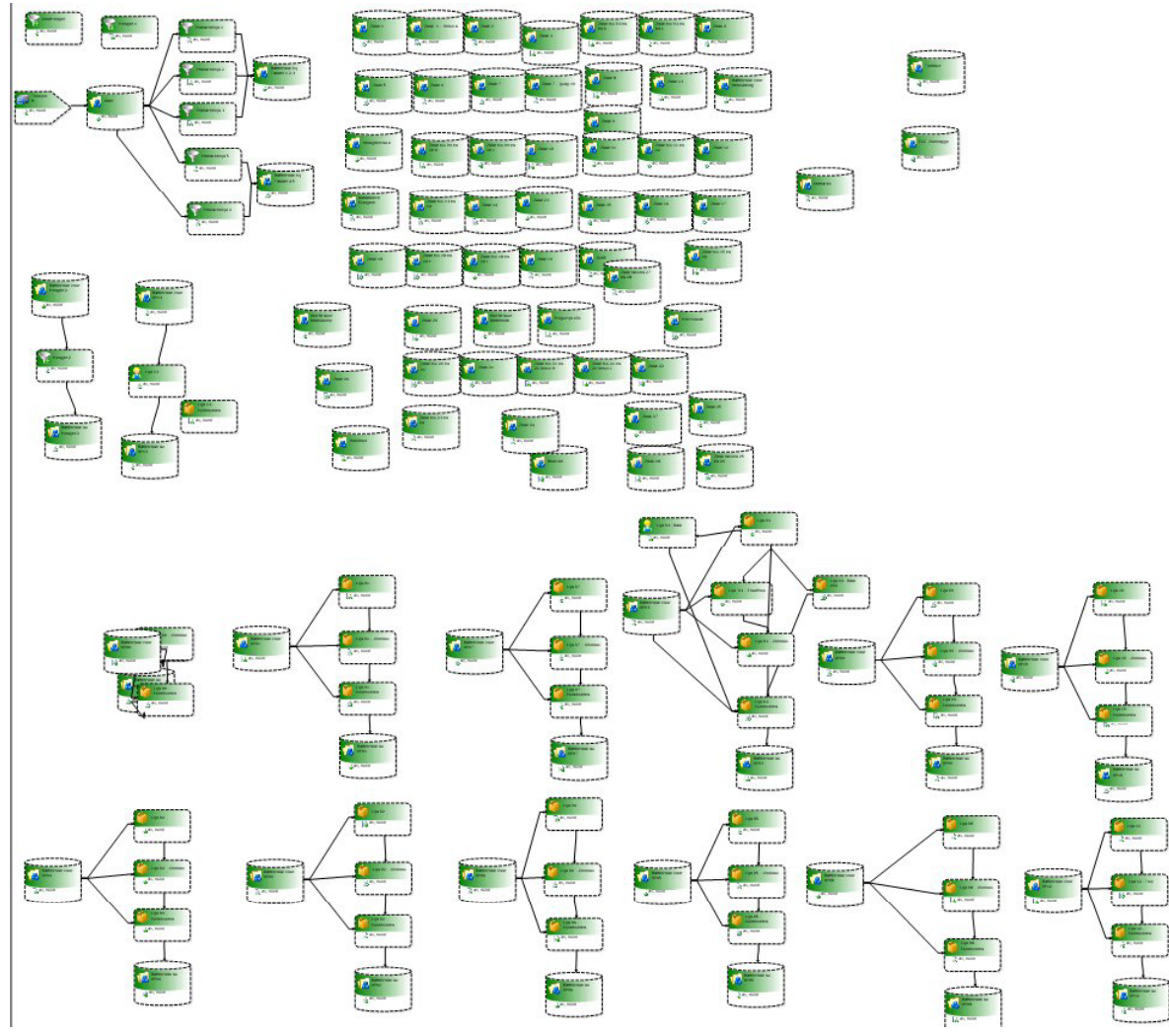


# General Process Overview





# Plant Layout in MEScontrol





# Major Steps

- Setting up and configuring MEScontrol for Line Control

- Packaging lines
- Mixing Processes
- Production Processes
- Personnel Registratio

- Modules implemented

- MEScontrol base
- Scheduling
- Track & Trace
- Label Management
- Personnel
- Operator
- OEE
- WMS

- Integration with other a

- IS-Food (current ERP)
- Penta
- Weighing bridge
- PLC / Scada
- ...

- OEE implementation

- Static OEE (first step)
- Improved OEE based upon Machine Learning

MEScontrol.net [2010.2.0.0]

Label Definition: 4449300100101.BJ

Printers: Test your Label

**Dujardin**  
• Food you can trust

(01)05411916007888(10)

**Mélange de 8 herbes (Tibu)**  
**8 Herb mix - 8 Kräutermischung**  
**Mix van 8 kruiden - Mix di 8 erbe**  
**Mezcla 8 especias - Örtmix 8 st**

Surgelé / Quick-frozen / Diepvries / Tiefgefroren / Surgelato / Ultracongelado / Djupfryst

Poids net / Net weight / Netto gewicht / Füllgewicht /  
 Peso netto / Peso neto / Nettovikt: **10 Kg**

A consommer de préférence avant fin / Best before end / Tenminste houdbaar tot einde /  
 Mindestens haltbar bis Ende / Da consumarsi preferibilmente entro fine /  
 Consumir preferente antes de finales de / Bäst före utgången av: **01-0005**

Conservation / Storage / Bewaring / Aufbewahrung / Conservazione / Conservación / Förvaring:  
 Lot / Lotto: **< -18°C**

U.S. English - Administrator - MESware M...

U.S. English - Administrator - Demovlog Integrator

**Work Centers & Equipment**  
Discrete, Batch, Continuous





## The current Implementation

- 3 Sites that can be controlled from 1 single user environment
  - Unifrost Ardoonie (B)
  - Unifrost Kortemark (B)
  - Dujardin Bretagne (FR)
- 20000 products in MEScontrol
- 80 Users defined
- 74 WorkCenters
- 115 StorageZones
- 9 Custom Reports
- > 900 Labels controlled and inline applied
- > 100 ReportingPoints



# Some examples

MEScontrol.net [1.19.2.0]  
File Database View Window Help

**Operator Scherm**

Vorige

## Lijn 01 Frida Dely

Orders Grafiek Stilstanden Operator

▶ ⓘ ↻ ▼

1	12 X 600 G wokmix classic HEMKÖP 101 03 9295	58410
	15744 / 15552 Count	Completed: 22/10/2009 18:47:03
2	12 X 600 G wokmix classic WILLY'S 101 04 9295	58410
	11928 / 20736 Count	Started: 22/10/2009 18:47:11
3	12 X 600 G wokmix classic WILLY'S	58410
	0 / 20736 Count	Scheduled : 23/10/2009 1:27:54

Operator input



# Integration with Level 2 and Level 4

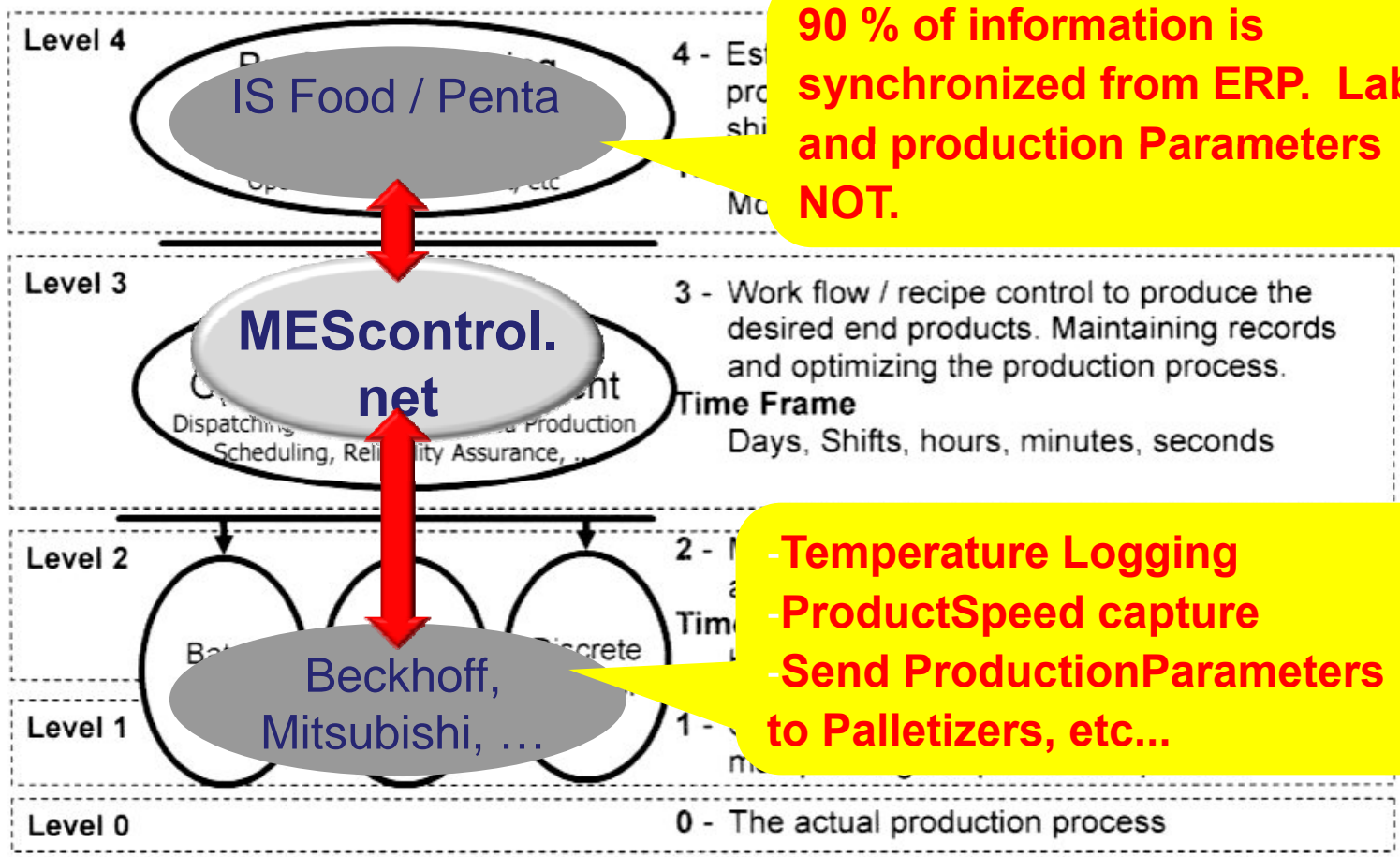


Figure 2 - Multi-level functional hierarchy of activities

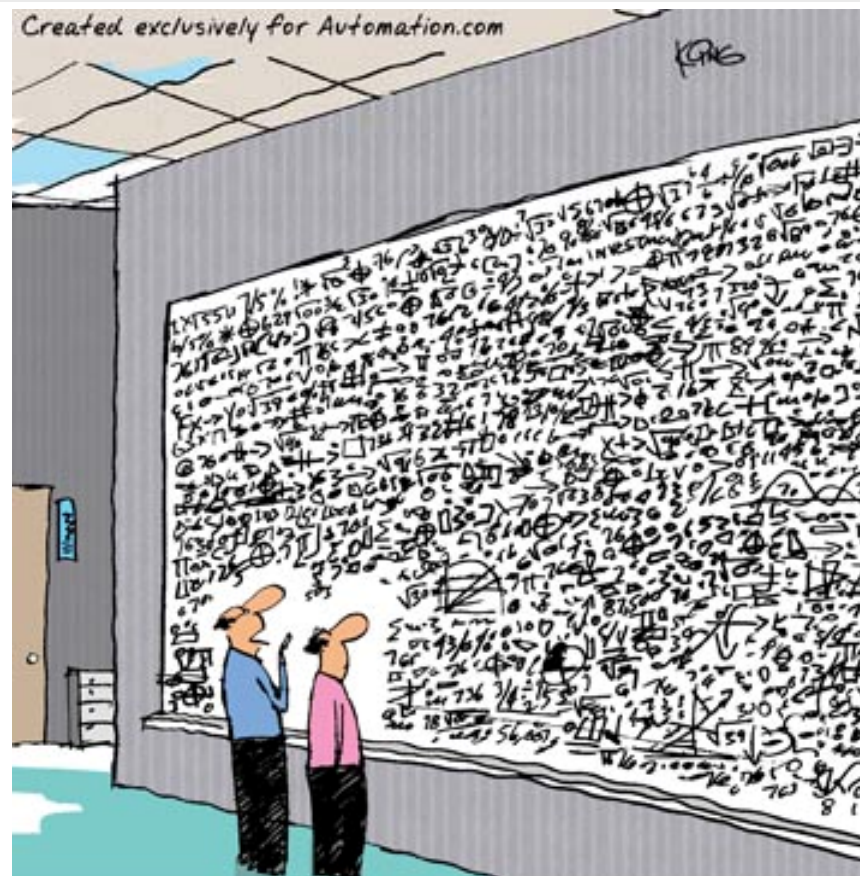




## Business Objective for doing these investments

- Reduce Downtime and Rate Loss
- Reduce Running Costs
- Reduce Operating Costs
- Improve Overall Equipment Effectiveness (OEE)  
*OEE = relation between scheduled & actual production*
- Improve Efficiency / Reliability
- **Improve Profitability**

OEE



*“...and that, in simple terms, is my idea on how to increase factory optimization. any questions?”*

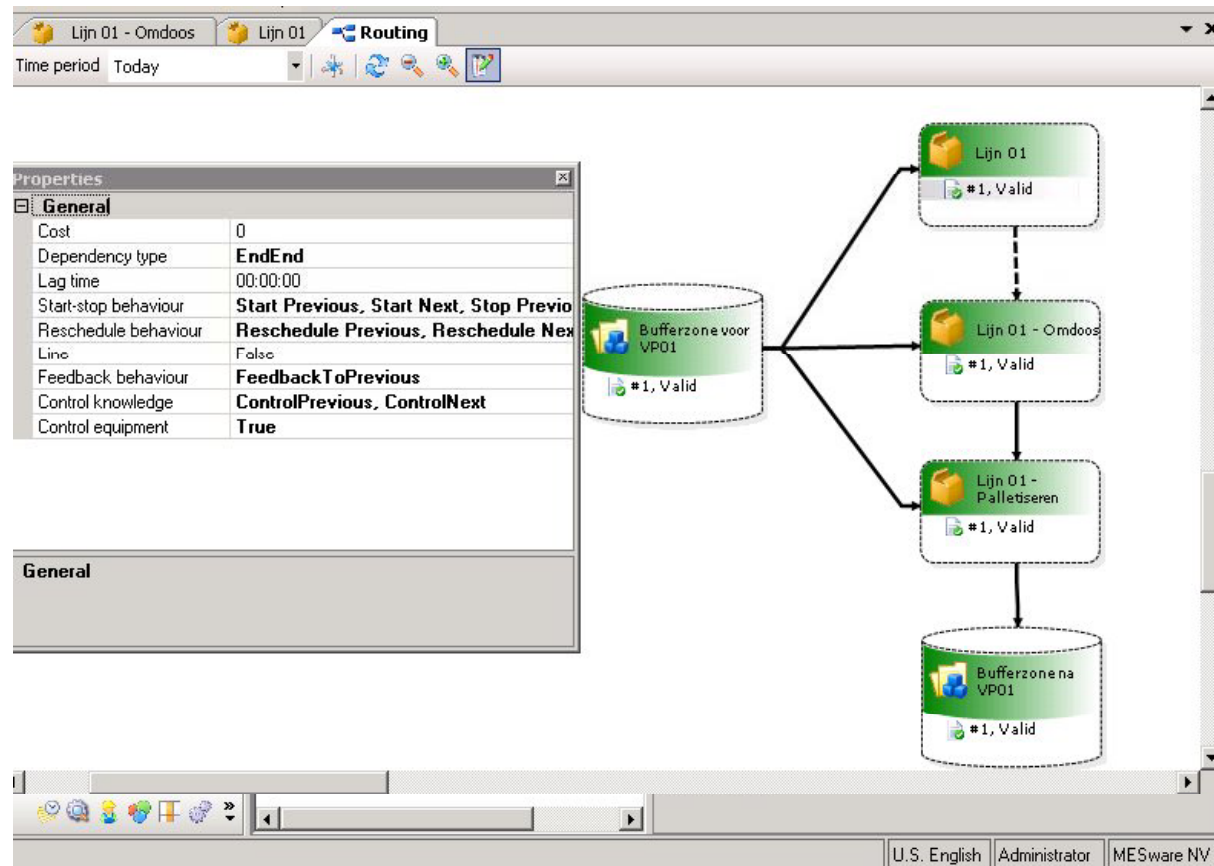


## The sense or non-sense of OEE

- What is OEE
  - Availability x Performance x Quality
- Measuring OEE is only as good as your measurements of the above 3 mentioned parameters
  - Availability:
    - Manual registration Vs. Inline, automatic registration
  - Performance
    - Do you know the real performance of your equipment?
    - Do you know the real performance of your equipment related to the product you are producing?
    - Is your performance of your equipment a static or dynamic known fact?
  - Quality:
    - How do you measure your quality
    - How does quality affect your routing in your production process?
    - ...



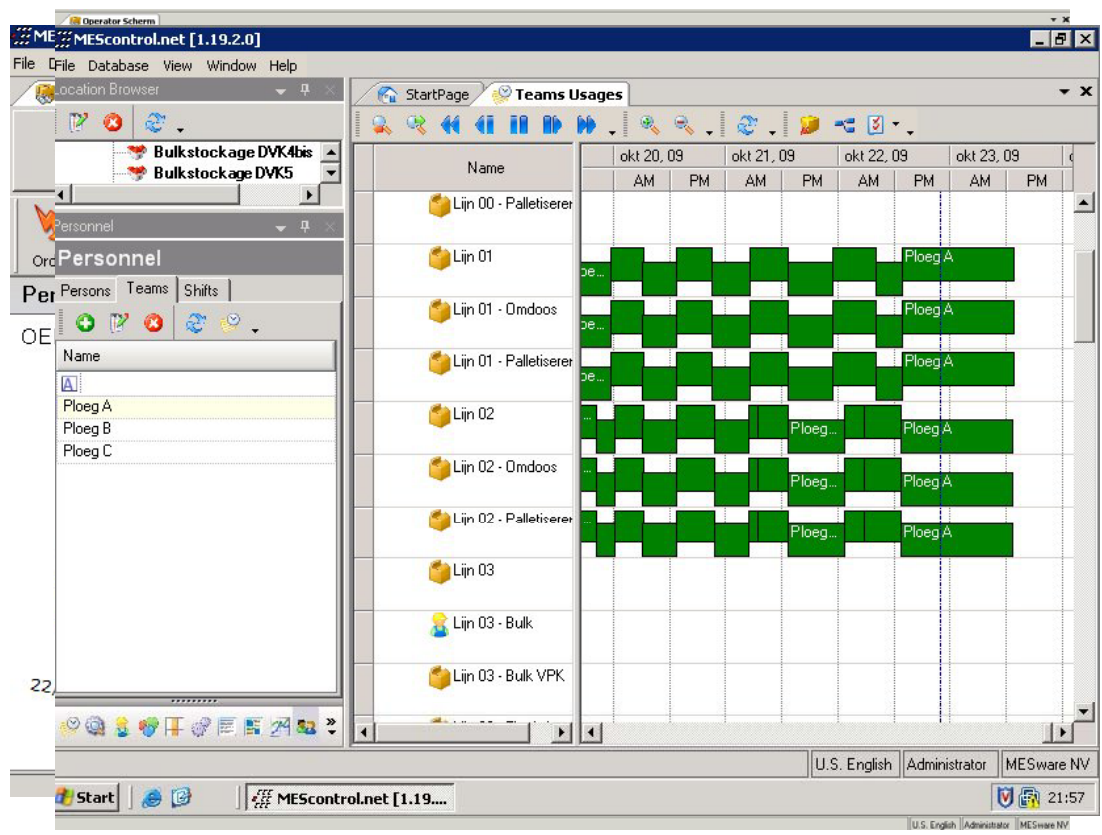
# Implementation of OEE at Dujardin



Configuring the OEE calculation for OEE version



# Impact on Operator



When Operator with persistent registrations reason



# Analyzing downtime

MEScontrol.net [1.19.2.0]

File Database View Window Help

Location Browser

- Bulkstockage DVK4bis
- Bulkstockage DVK5
- Bulkstockage DVK6
- Bulkstockage DVK6bis
- Bulkstockage DVK8
- ExterneStockage
- MengZone
- Productie

KPI

Verpakings-Zone

- Lijn 00
- Lijn 00 - Omdoos
- Lijn 00 - Palletiseren
- Lijn 01
- Lijn 01 - Omdoos
- Lijn 01 - Palletiseren
- Lijn 02
- Lijn 02 - Omdoos
- Lijn 02 - Palletiseren
- Lijn 03
- Lijn 03 - Bulk
- Lijn 03 - Bulk VPK
- Lijn 03 - FlowWrap
- Lijn 03 - Omdoos
- Lijn 03 - Palletiseren
- Lijn 04
- Lijn 04 - Omdoos
- Lijn 04 - Palletiseren
- Lijn 05
- Lijn 05 - Omdoos
- Lijn 05 - Palletiseren
- Lijn 06
- Lijn 06 - Omdoos
- Lijn 06 - Palletiseren
- Lijn 07
- Lijn 07 - Omdoos
- Lijn 07 - Palletiseren
- Lijn 08
- Lijn 08 - Omdoos
- Lijn 08 - Palletiseren
- Lijn 09
- Lijn 09 - Omdoos
- Lijn 09 - Palletiseren
- Lijn 10
- Lijn 10 - Omdoos
- Lijn 10 - Palletiseren
- Lijn 12

OEE of Lijn 01 Loss chart 1

Compare by: Count With Previous Week Product: all Team: none Exclude reason: none

Resource: Lijn 01

Filter:

Down time loss 114

Click on chart region to see details

Top 100 loss reasons (sorted by loss count)

Loss reason	Count	Duration
32.01 Verpak-kingsmachine foliewissel	21	00:54:59.8451250
11.03 Kipper (s)geen product	19	00:47:59.3468750
00.03 Ombouw.standaard ombouw zonder reinigen	8	02:36:00.8028125
32.03 Verpak-kingsmachine.dwarsnaad.lsbek herstellen	6	00:29:00.0258125
11.04 Kipper (s).harde kisten	3	00:04:59.9687500
40.05 Eindverpakker.doosopzet.dozen probleem	2	00:30:59.7968750
32.06 Verpak-kingsmachine.dwarsnaad.andere	2	00:39:00.0010000
00.04 Ombouw.ombouw + reinigen	1	00:00:00.0000000
33.01 Codeerapparaat.lintwissel	1	00:01:59.9843750
32.10 Verpak-kingsmachine.gaaljesprikken	1	00:02:59.9531250
30.02 Weger.weegbakjes reinigen	1	00:14:59.9531250
32.11 Verpak-kingsmachine.afregeling	1	00:00:59.9843750
33.04 Codeerapparaat.andere	1	00:03:59.9843750
32.05 Verpak-kingsmachine.dwarsnaad.parametrage	1	00:05:59.9675000
32.13 Verpak-kingsmachine.andere	1	00:11:00
00.00 Lijn op non-actief	1	20:20:52.4381250
40.01 Eindverpakker.metaaldetector	1	00:01:00
40.11 Eindverpakker.doosluiser + hotmelt of tape	1	00:00:59.9687500
30.03 Weger.weegbakjes sturing	1	00:03:00.0468750
31.02 Vulstelsysteem (VP12) elektrisch	1	00:07:59.9687500

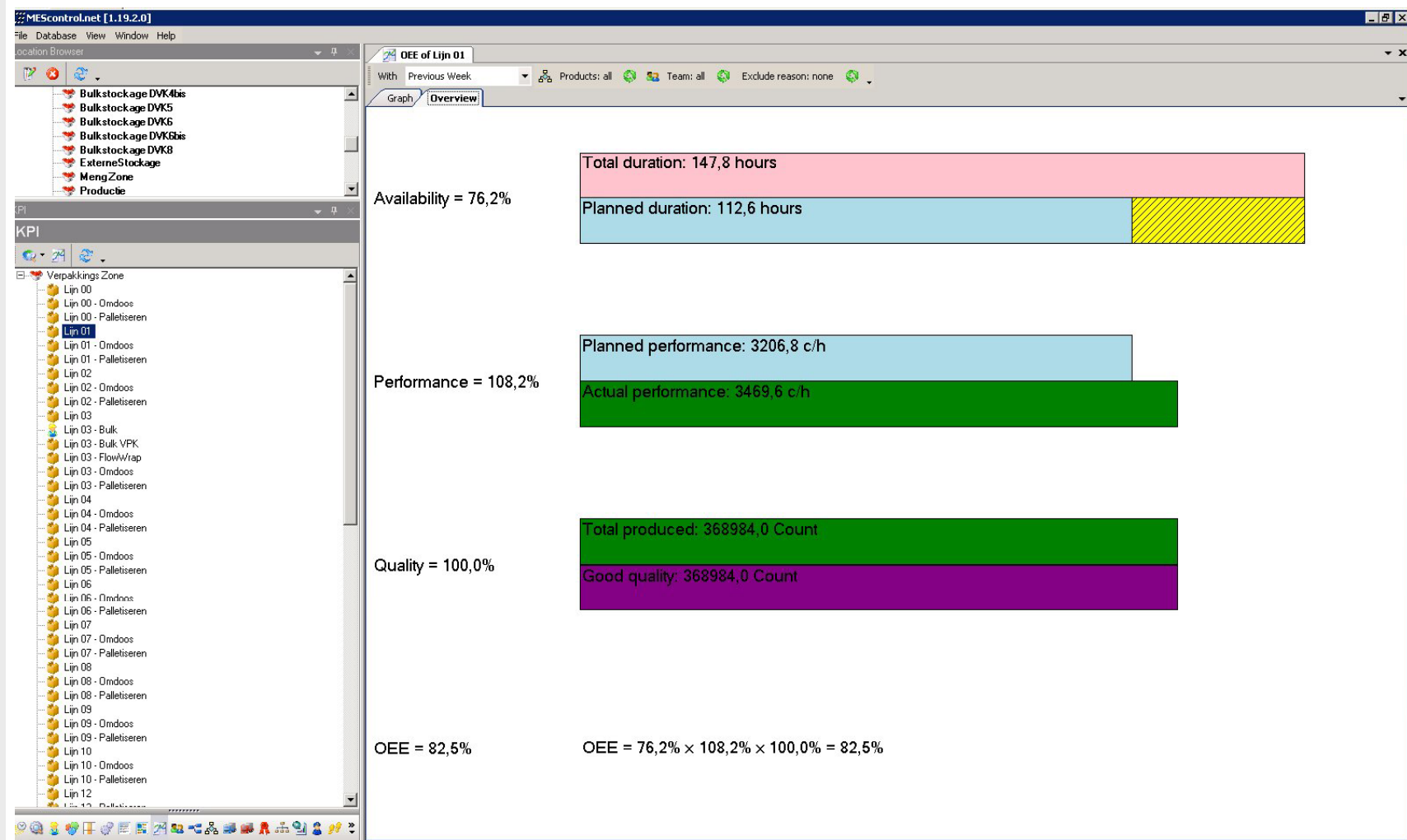
Top 100 validation loss reasons (sorted by loss count)

Loss reason	Count	Duration
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U.S. English Administrator MESware NV



# Analyzing OEE in Operator View





## What changed since first implementation?

- The standard OEE calculation doesn't always make sense
  - The absolute performance capacity of Equipment is often not known
  - The real performance capacity of Equipment related to a certain product version is certainly not known
  - Result:
    - OEE can be > 100%, due to incorrect knowledge about the performance capacity
    - So what does the number really say?
- How did we solve this?
  - Joint R&D between Dujardin and MESware to define correct OEE
  - Internal MESware R&D project around machine learning, based upon historical master data



- Main objective:
  - Correcting the performance capacity (product / equipment) by means of historical data
- Steps
  - Collecting of historical performance data for each line, shift and operation related to a product version running on the line / workcenter.
  - For each shift, teamleader can validate and/or change the information. In case of a change, a reason has to be entered
  - The historical data will then be used in MEScontrol.net through our machine learning algorithms to calculate best fit performance capacity for product / equipment
  - This will be used as input for setting the corrected values in MEScontrol
- The outcome
  - Correct OEE calculations
  - Improved scheduling possibility based upon real capacity





## What did we learn

- Improving your production efficiency is a continuous process. Consequently, implementing MES is too.
- Implementing MES should start from your business processes, not from your tool. Rubbish in = Rubbish out
- Define upfront your boundaries ERP – WMS – MES. Tools overlap, make sure you have a clear view on the overlap, and make the decisions convenient for your business.
- Success depends on commitment and involvement from
  - Management
  - IT-team (if present)
  - Key users on shopfloor
- Improving company efficiency is more than calculating OEE.



- **Short Term:**
  - Implementation and integration of a new ERP system in first site at Ardoonie - Belgium
- **Middle Long Term**
  - Roll-out of ERP – MES environment to all applicable production environment
  - Enhanced Reporting and Management Dashboards for better insight in production efficiency



Questions ???



[www.mescontrol.ru](http://www.mescontrol.ru)