



Plant continuous improvement: the WCM experience

04/05/20234

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1.1 - WCM Principles and system









World Class Manufacturing



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WORKPLACE
ORGANIZATION

QUALITY

MAINTENANCE

LOGISTICS

METHOD AND TOOLS

TOTAL INDUSTRIAL
ENGINEERING

TOTAL QUALITY
CONTROL

TOTAL PRODUCTIVE
MAINTENANCE

JUST IN TIME

ZERO
WASTES

ZERO
DEFECTS

ZERO
BREAKDOWNS

ZERO
INVENTORY

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LONG LASTING IMPROVEMENT

STANDARDS AND METHODS

WASTES AND LOSSES

ALL EMPLOYEES

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World Class Manufacturing IS NOT



World Class Manufacturing (WCM)

IS NOT:

a check list (ok/nok)

a procedure

a handbook of lean systems

plug and play approach

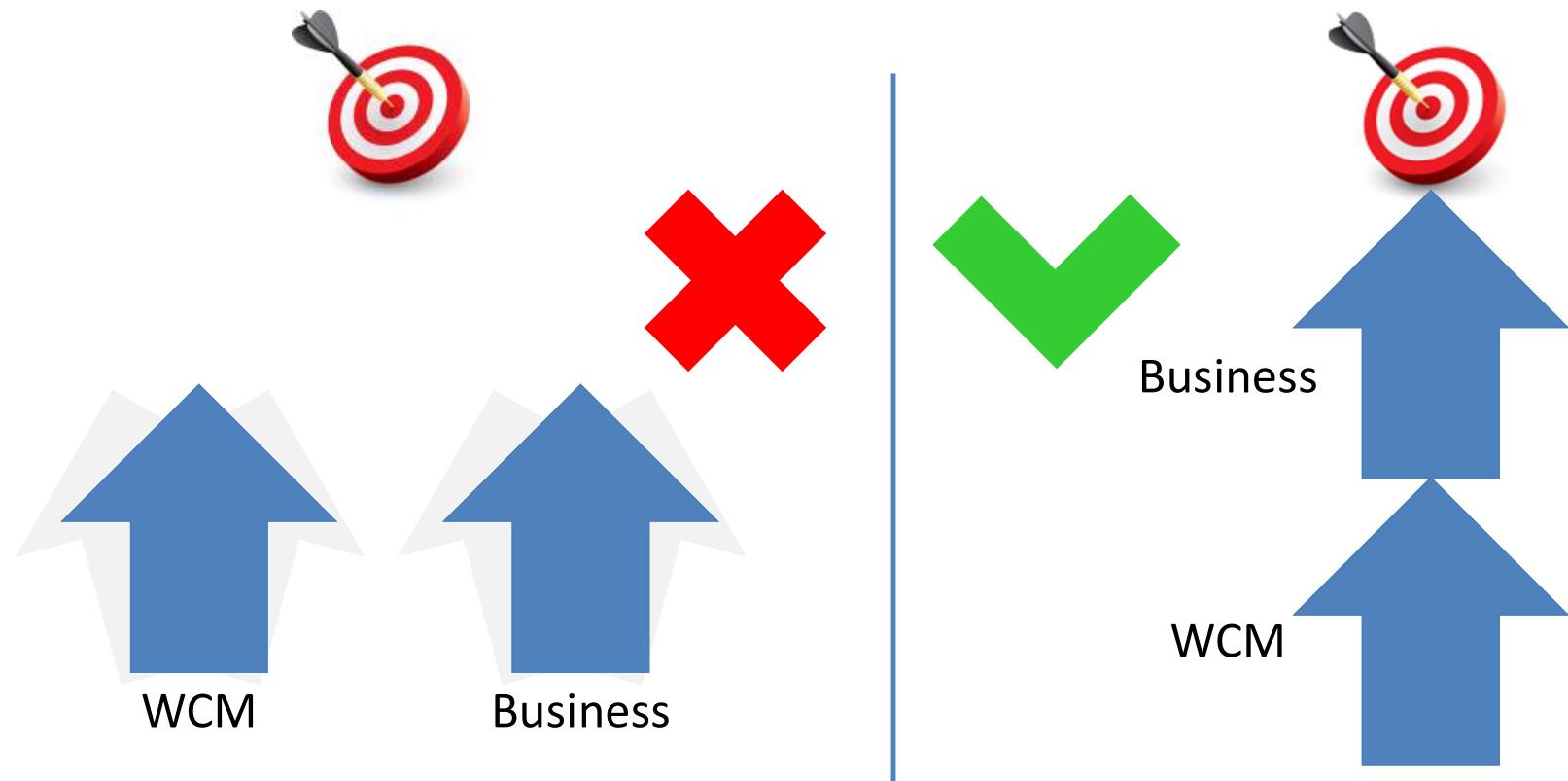
one shot task force

AND:

it needs basic conditions to be implemented

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Responsibility



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World Class Manufacturing: the system key points

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WCM Methodology

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10 TECHNICAL PILLARS



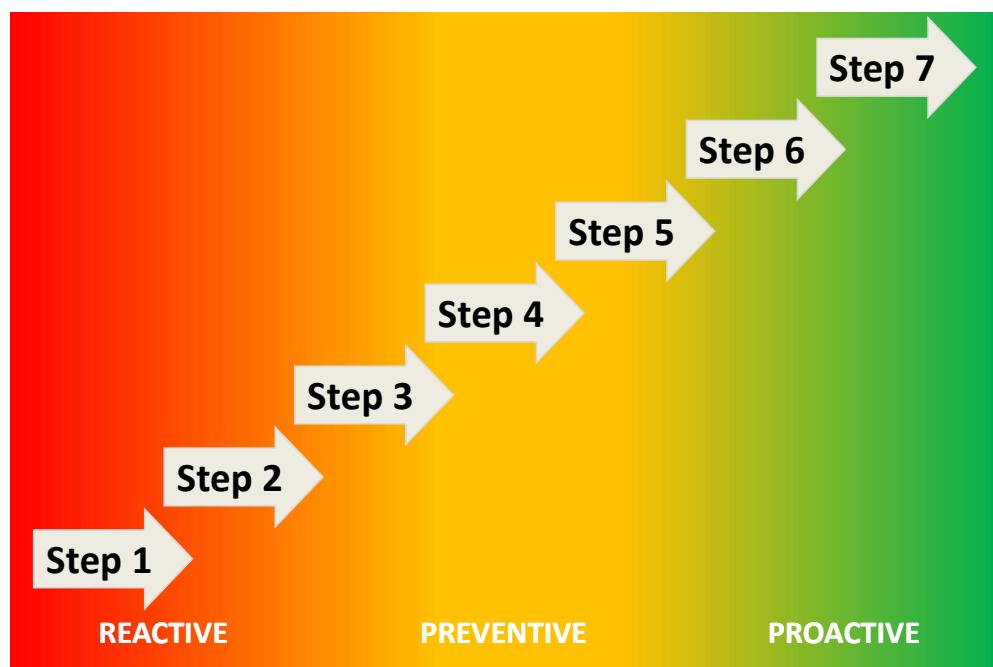
10 MANAGERIAL PILLARS



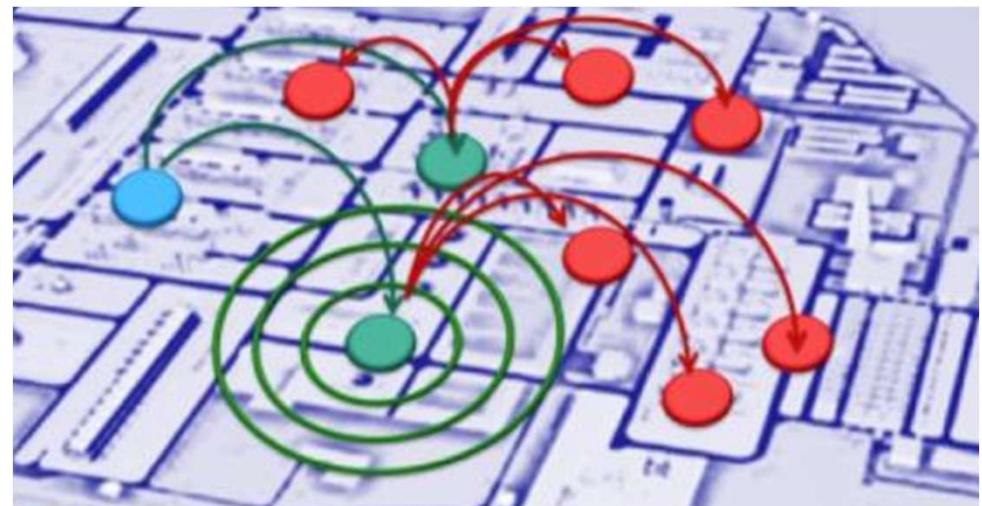
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WCM Approach

A 7 STEPS APPROACH GUIDES REACTIVE TO PROACTIVE ACTIONS FOR EACH TECHNICAL PILLAR



INCREMENTALLY IMPLEMENTATION OF THE METHODOLOGY, FROM MODEL AREA TO PLANT WIDE



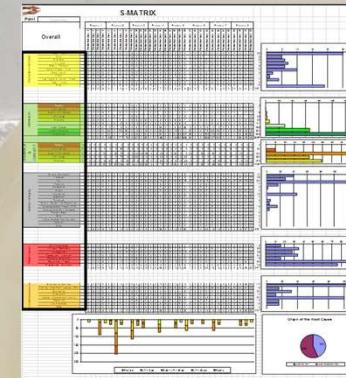
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Health and Safety

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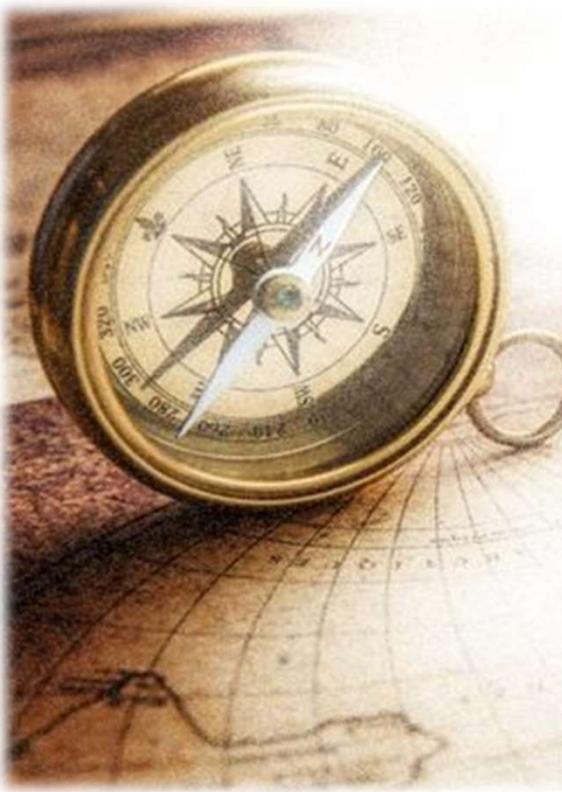


Best plant
with 0 accidents
since 10 years

A screenshot of the MS-205 Safety Audit Root Cause Analysis form, which includes sections for hazard identification, root cause analysis, and corrective actions.

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Cost Deployment



Cost Deployment is a methodology to establish scientifically and systematically a cost reduction program with the effort of Production and Finance people.

The excess of the amount of input is a **WASTE**.



Not effectively use of input is a **LOSS**.



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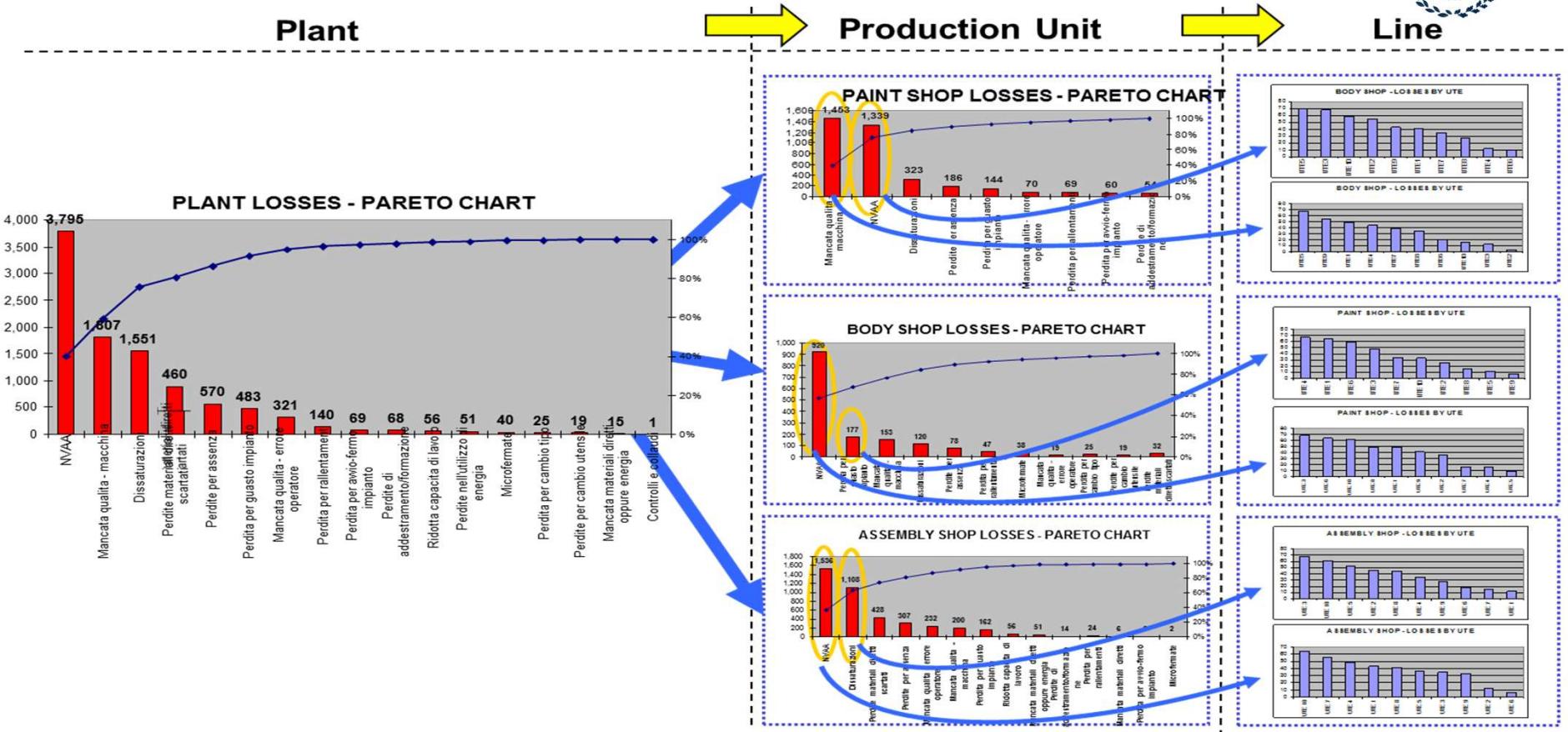


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Example of Losses Stratification

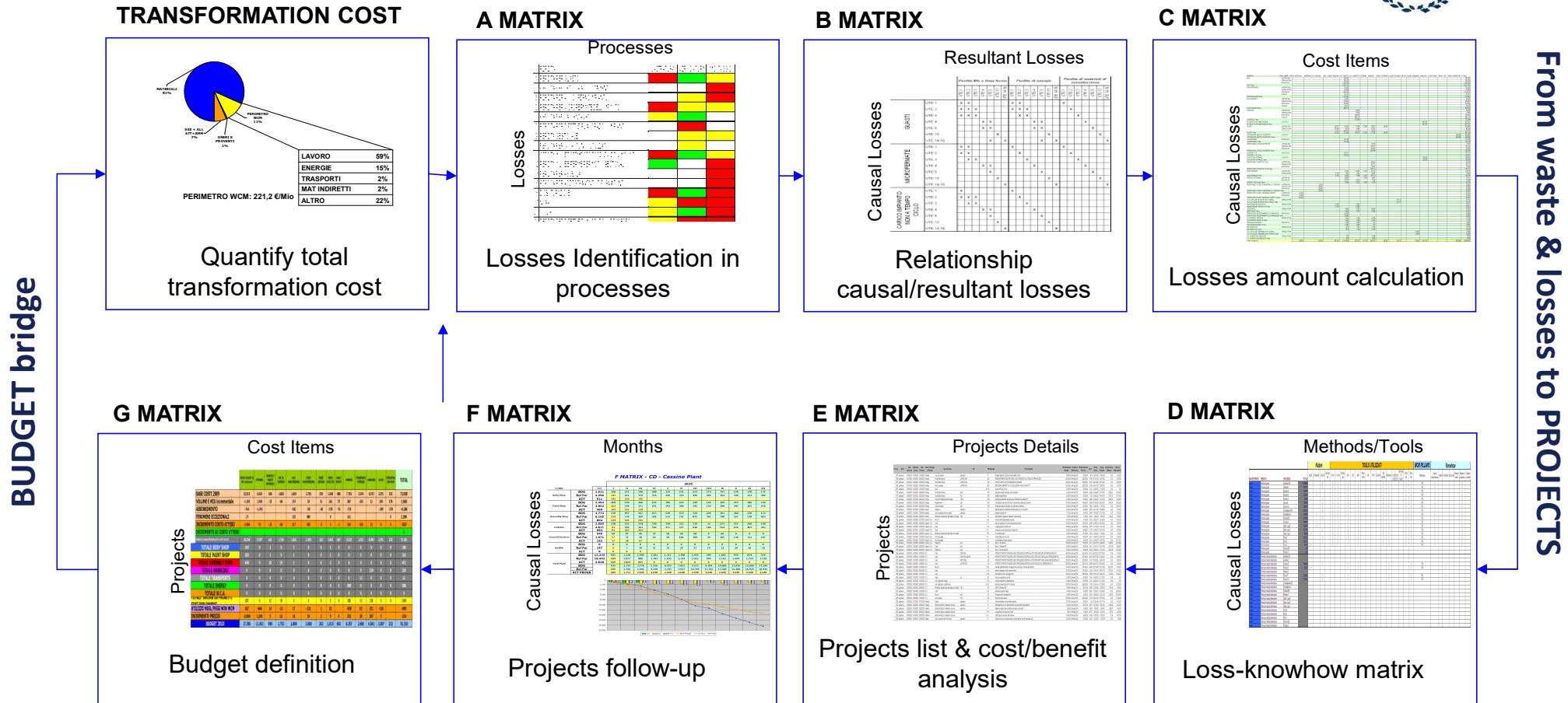


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Structured approach





EYES TO RECOGNIZE WASTE AND LOSSES

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Cost Deployment



■ 2006 (baseline) ■ 2011

IMPROVED WASTE IDENTIFICATION WITH
GREATER PROJECT COVERAGE AND SAVINGS



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Cost Deployment

	BASE COSTI	INFLAZIONE	IND. PERF.
FREIGHT OUT COSTS	9.454	0	0
MATERIAL CONSUMPTION	11.246.407	0	45.595
CONTRACTED WORKS	471.198	0	0
DIRECT MANPOWER	1.474.684	0	-27.805
UTILITIES	805.991	122.864	-18.755
AUXILIAR MATERIAL	391.739	0	-11.000
VARIABLE MAINTENANCE AND REPAIRS	348.135	0	0
VARIABLE PRODUCTION COSTS	14.738.154	122.864	-11.965
CONTRIBUTION MARGIN	-14.747.608	-122.864	11.965
INDIRECT MANPOWER	1.942.608	0	-31.701
DEPRECIATION/AMORTIZATION	879.613	0	-103.680
MAINTENANCE AND REPAIRS	19.186	0	15.539
RENTAL	69.972	0	-30.478
SUNDY PRODUCTION COSTS	226.900	0	5.186
FIXED PRODUCTION COSTS	3.138.280	0	-145.134
GROSS MANUFACTURING MARGIN	-17.885.888	-122.864	157.099
	5.750.414	122.864	-53.419
	gross productivity YoY %		0,9%
	net productivity YoY %		-1,2%

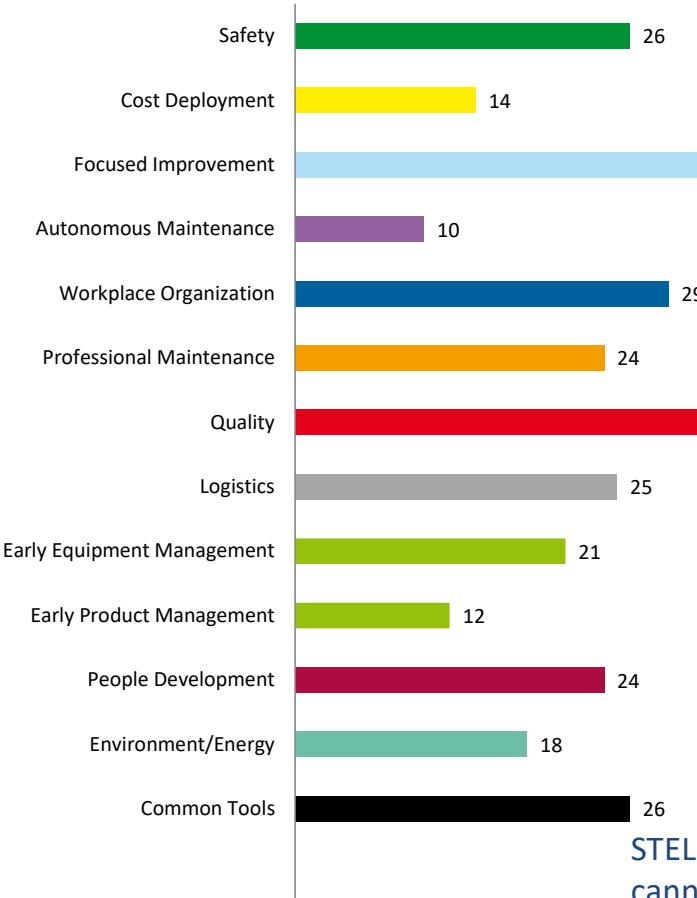
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Tools



WCM Tools per Pillars



341 WCM Tools

Examples

Heinrich Pyramid
Safety Management Audit Training

A, B, C,.. Matrix
5 Years CD

Quick Kaizen
Major Kaizen

AM Calendar
Breakdown map

Muri, Mura,Muda
Golden Zone

Machine Ledger
Standard Maintenance Procedure

Quality Assurance Matrix
Poke Yoke

Part classification
5T

Life Cycle Cost
Front loading concept

Design FMEA
Payback Period

Learn Use Teach Inspect method
Radar Chart

Environmental Management Audit Training
Environmental risk assessment
Energy CD

4M Analysis
5 Why's

- 1. Basic Tools
- 2. Intermediate Tools
- 3. Advanced Tools
- 4. Tools development

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Labor Intensive Processes

Workplace Organization and Logistics



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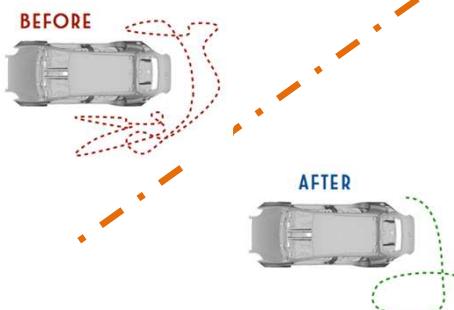


Before



REDUCING
NON VALUE ADDED
ACTIVITIES

After



TARGET:
70% VALUE ADDED

Capital Intensive Processes

Autonomous and Professional Maintenance



ASSEMBLY SHOP



PAINT SHOP



BODY SHOP



Autonomous Maintenance:
Operator is the owner of the machine

Professional Maintenance,
NOT Repair but Improve reliability and reduce costs

- Objectives:**
- Durability
 - Reliability
 - Maintainability



Build in Quality



LINE STOPPAGE



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1859

Fast feedback

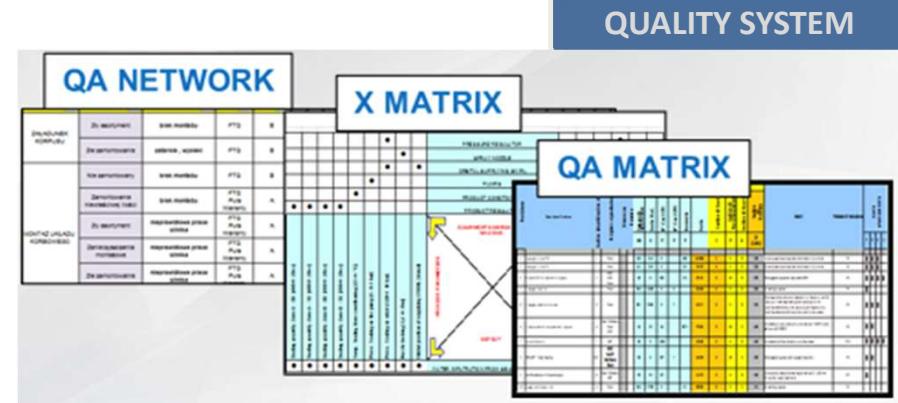
Quality
Gate

APPROACH:

Preventive implementation of ERROR-PROOF SOLUTIONS in each work station.

Extensive use of specific QUALITY TOOLS:

- QA Matrix to define quality issues priority
- X Matrix relates problem with control parameters
- QA Network for defect detection and earlier resolution/elimination in the process



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Sustainability

Energy and Environment



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ELECTRICAL ENERGY

- Electric motors controlled by inverter
- Substitution of old motors
- High efficiency lighting systems



COMPRESSED AIR

- Leakage elimination
- Installation of variable speed air compressors



HEATING - COOLING

- Free cooling systems
- Reducing the use of electric air-conditioners



GREEN ENERGY

- Purchase of green-certified electrical energy
- Photovoltaic generation
- Use of other green energy sources such as landfill gas



WASTES

- Hazardous wastes reduction activities
- 5R wastes management methodology application



WATER MANAGEMENT

- Water reuse in production cycles
- Reuse of rainwater



VOC EMISSIONS

- Introduction of equipment upgrades to reduce paint use



BIODIVERSITY CONSERVATION

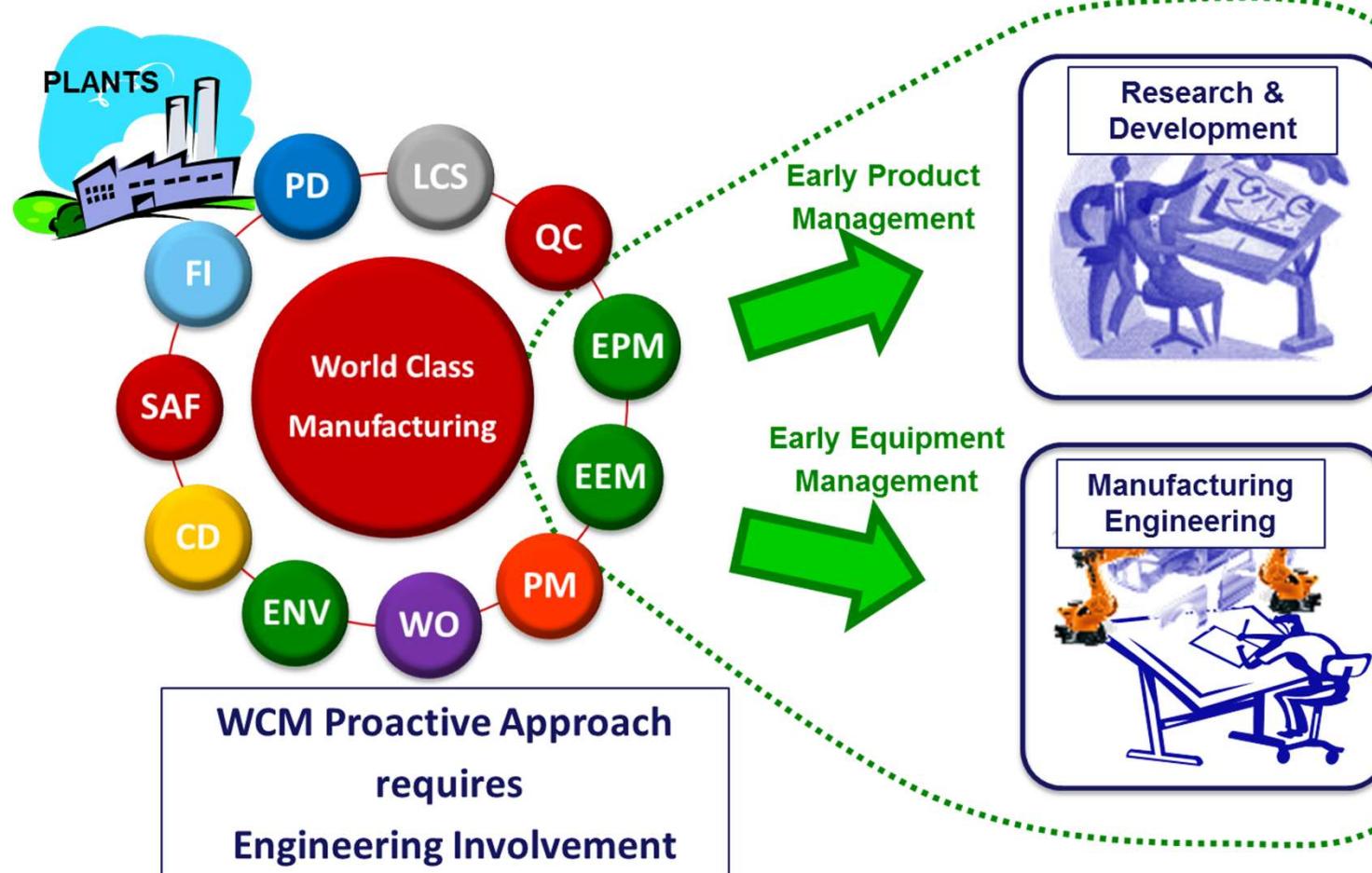
- Fiat Biodiversity Value Index
- Trees donations

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Engineering Involvement

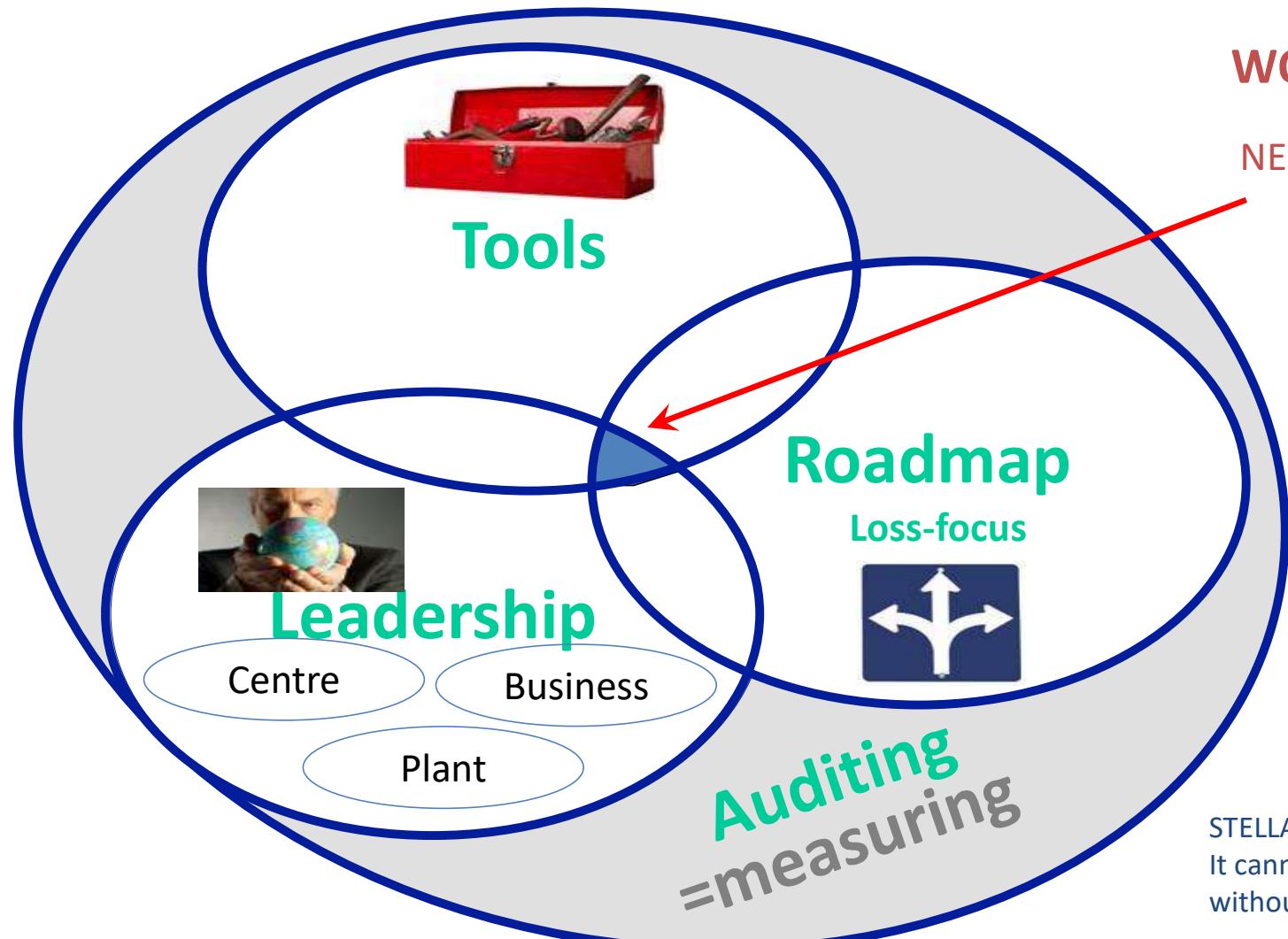
Early Equipment and Product Management

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KEY ELEMENTS IN WCM



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WORLD CLASS OPERATIONS

NEED A PROPER COMBINATION OF

LEADERSHIP

ROADMAP

TOOLS

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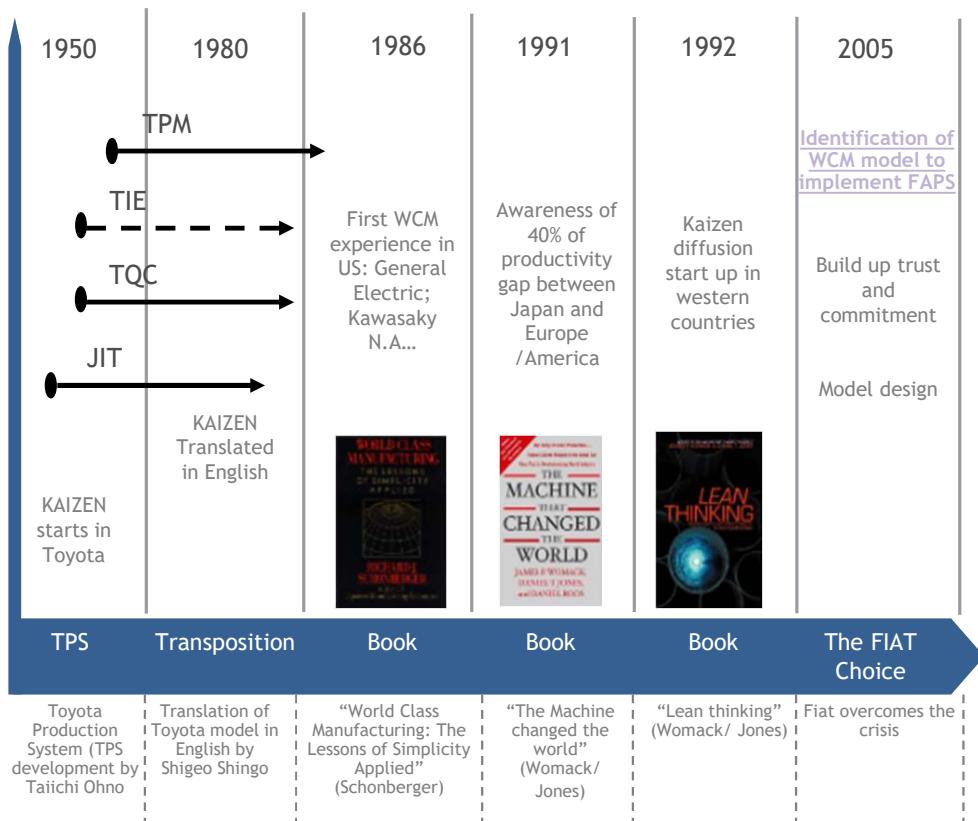
1.2 – Use case : WCM in FCA

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Back in 2005 - WCM in FCA Start up



Benchmark and learning



Japan Study Missions

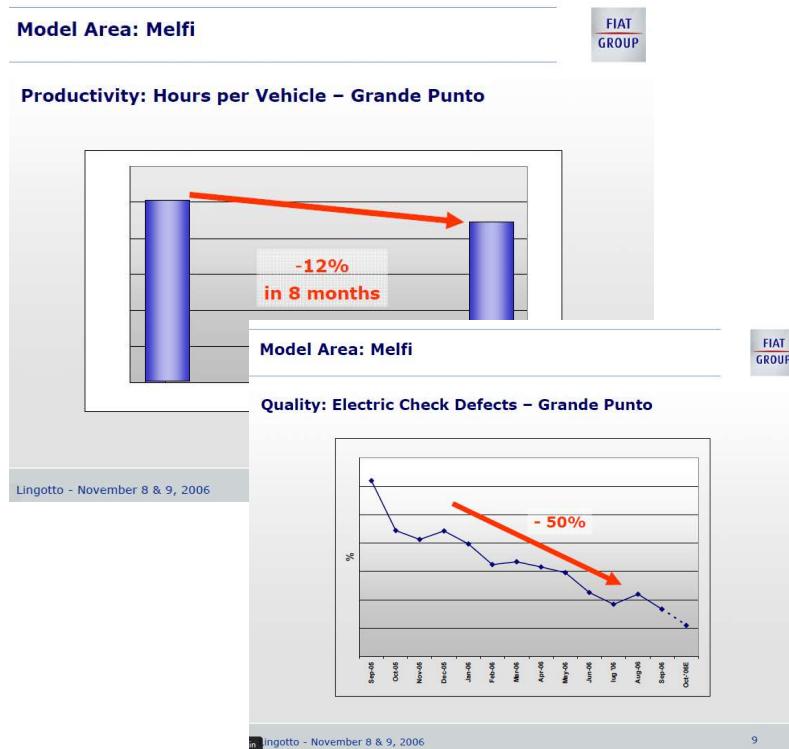


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First Pilot projects



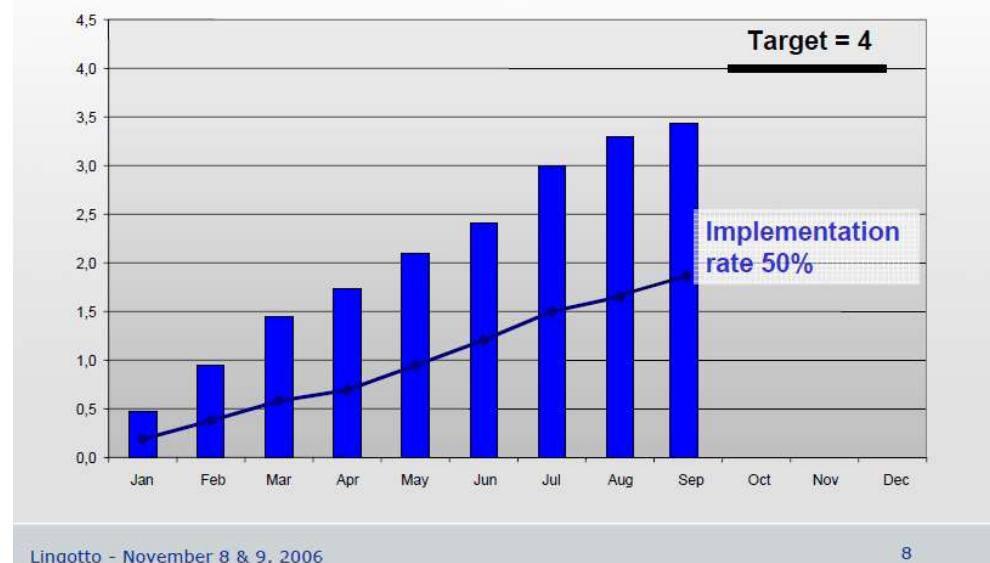
Melfi plant



Tychy plant

Model Area: Tychy/Poland

People Involvement: Proposals/Employee/Year



The development comes through...



Communication and Involvement

Commitment

Daily Improvement Meeting

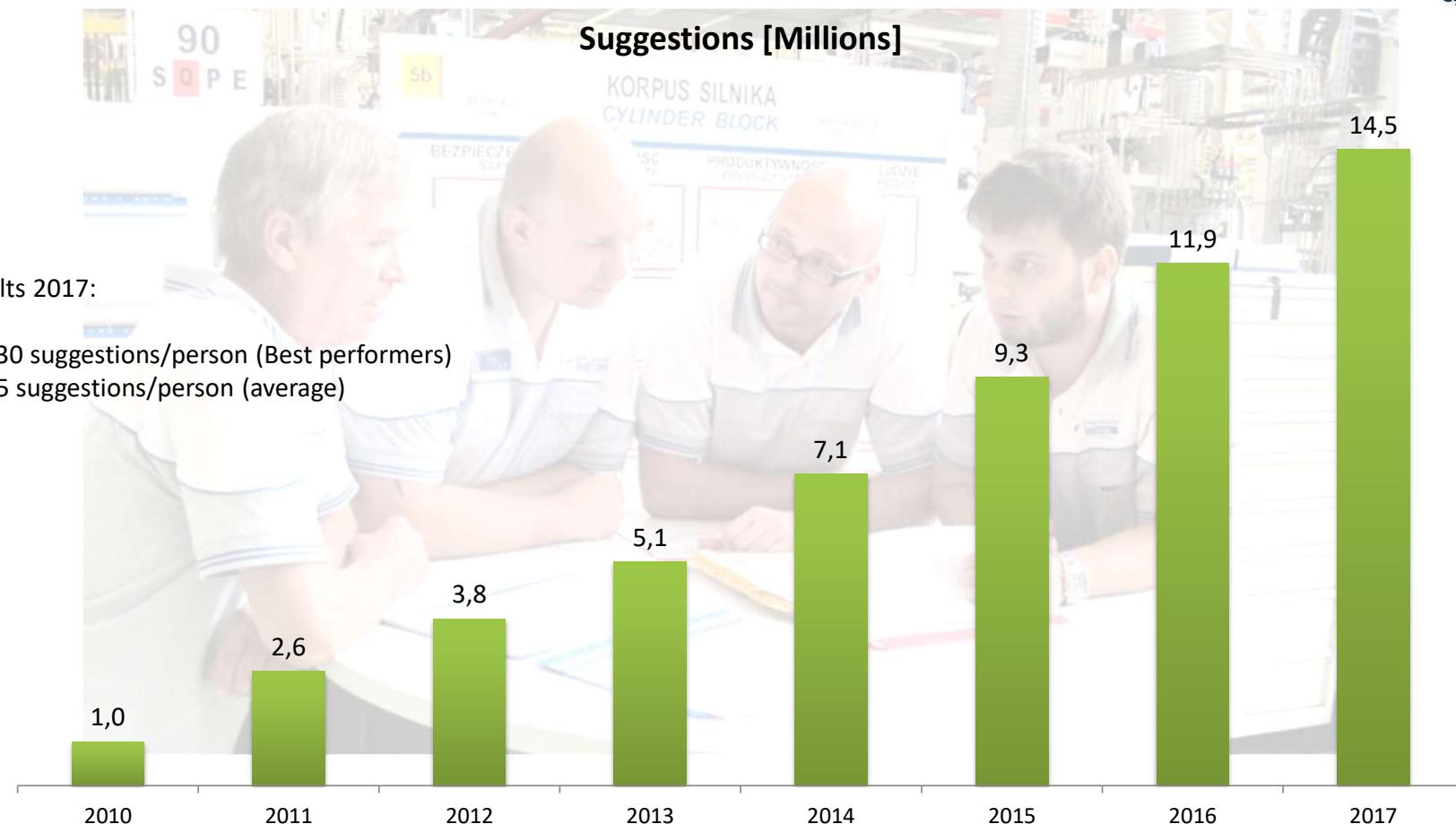
Knowledge

and then...

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Suggestions

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Results 2017:

- ~30 suggestions/person (Best performers)
- 15 suggestions/person (average)

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Best Practices



Best Practices [Thousands]



BP approved at 31/12/2017	Implemented by other plants	% Implemented by other plants	# of replications	Avg of replications
19.568	16944	86,6%	65298	3,9

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Best Practice standard form

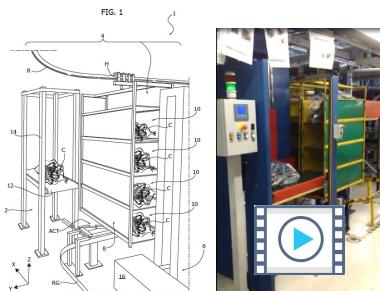
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ERGONOMIC IMPROVEMENT

Melfi plant (Trim Line)

Attachment for detailed descriptions



FCA FIAT CHRYSLER AUTOMOBILES	Best Practice Information		Plant FGA Melfi	Process TRIMMING LINE		
			Date 10/14/2015	Main Pillar LCS	Co-Pillars WO	Step 2
Best Practice Number :	Wiring harnesses feeding system					
Keywords						
Best Practice Description :	Automatic feeding system to reduce NVAA					
 BEFORE		 AFTER				
Manual unloading system cables from container		Automatic unloading system cables from container				
Attachments	Attach1 ATTACH1	Description1 Summary	Attach2 ATTACH2	Description2 video Before	Attach3 ATTACH3	Description3 video After
Suggestions to implement solution:	Automatic system pushes the cables on motorized belt that moves always at same height					
Benefit (Euro)	56000.00	B/C (Euro)	Contact name FIATAUTO/fmu5417 / TARTARISCO Antonio	Contact Phone		
Cost (Euro)	30000.00	1.87	Validator name FIATAUTO/fmu5417 / Simone Massimo 2 (FCA)	Contact Email sergio.crocco@fcagroup.com		
FILENAMING Best Practice Title: Automatic feeding system cables Full Filename: EMEA_MEL_LCS_2_Automatic feeding system cables						
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Benefit and Cost evaluation



WCM Central team validation



Owner information



Low Cost Automation to reduce achieve Ergonomic condition and reduce Not Value Added Activities

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WCM has evolved to a common language



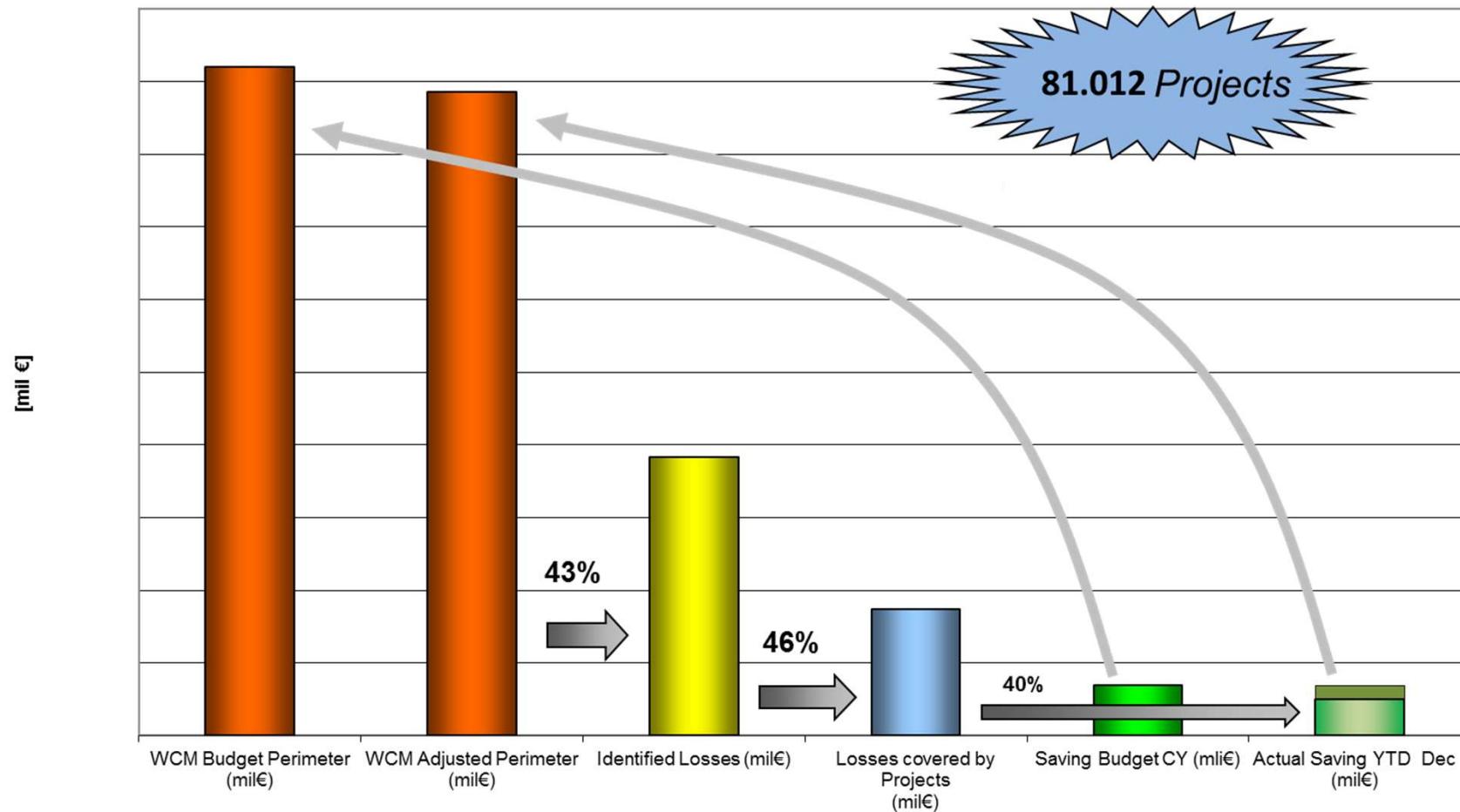
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Yearly Evolution Chart

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