



## Simultaneous product and production development at Philips Turnhout

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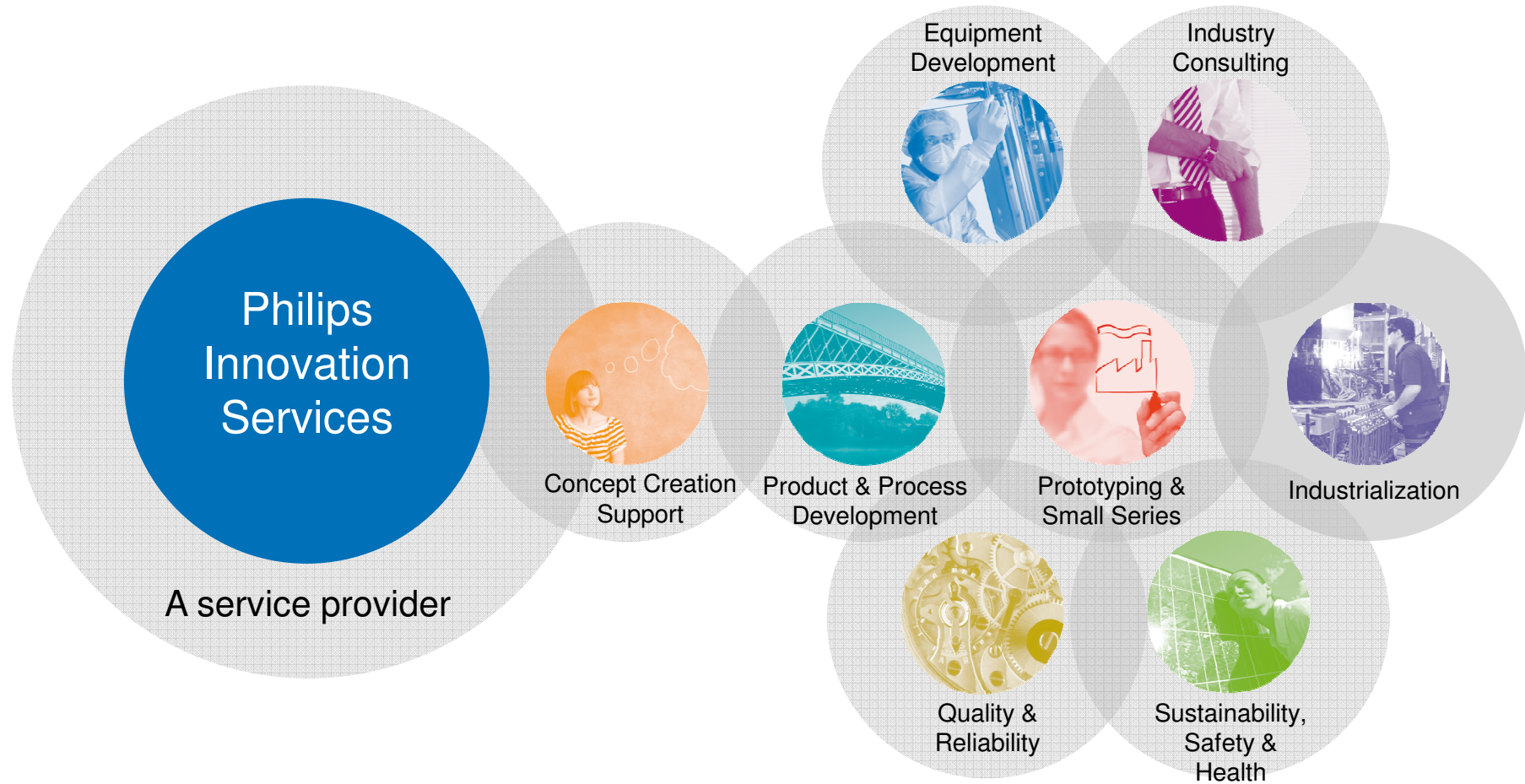
SIMULTANEOUS PRODUCT & PRODUCTION DEVELOPMENT

# Accelerate your innovation

Introducing Philips Innovation Services



# Accelerate your innovation

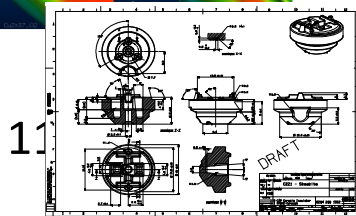
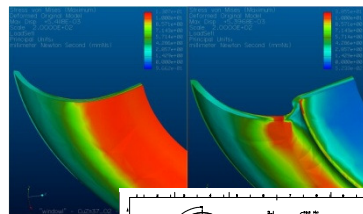
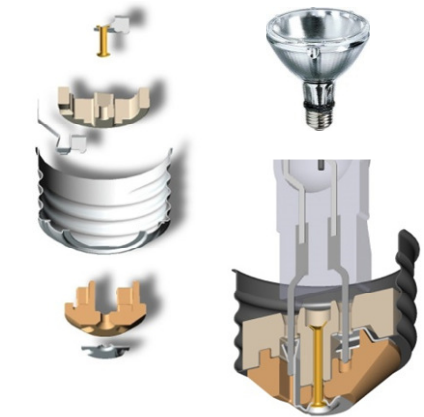


# Industrialization

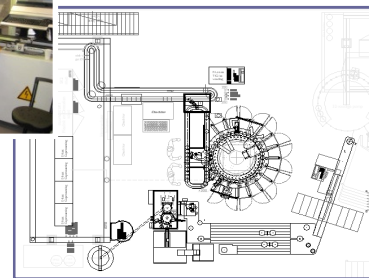
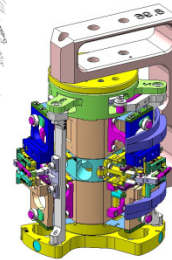
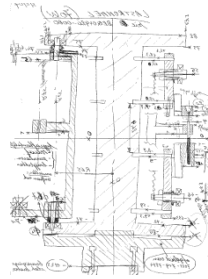
## The link between Product Development and Production



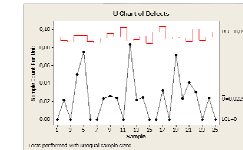
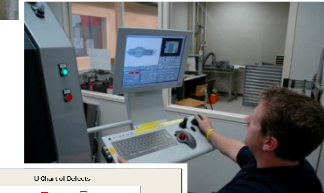
### PRODUCT DEVELOPMENT



### Philips Innovation Services GTDM



### PRODUCTION





# Industrialization Activities and Competences

Concept	Specification	Engineering	Realization	Service
<ul style="list-style-type: none"><li>▪ Product co-development</li><li>▪ Research</li><li>▪ Feasibility studies</li><li>▪ Concept creation</li><li>▪ Consulting</li><li>▪ Lean solutions</li></ul>	<ul style="list-style-type: none"><li>▪ Industrial Setup</li><li>▪ Manufacturing process development</li><li>▪ Design for Six Sigma</li><li>▪ Design for manufacturing</li><li>▪ Prototyping studies</li><li>▪ Concept freeze</li></ul>	<ul style="list-style-type: none"><li>▪ Mechanical, electrical and software design</li><li>▪ FEM analysis</li><li>▪ System integration</li><li>▪ Project management</li><li>▪ CE - Safety</li><li>▪ Ergonomics</li></ul>	<ul style="list-style-type: none"><li>▪ Global sourcing</li><li>▪ Assembly</li><li>▪ Start &amp; ramp up</li><li>▪ Training</li><li>▪ Repeats</li></ul>	<ul style="list-style-type: none"><li>▪ Product range &amp; capacity extension</li><li>▪ Productivity improvement</li><li>▪ Spare parts management</li><li>▪ Relocation</li></ul>

# A track record of successful innovations ...

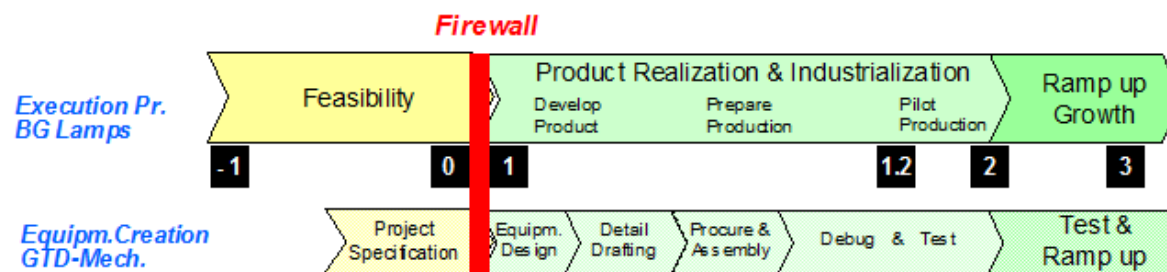
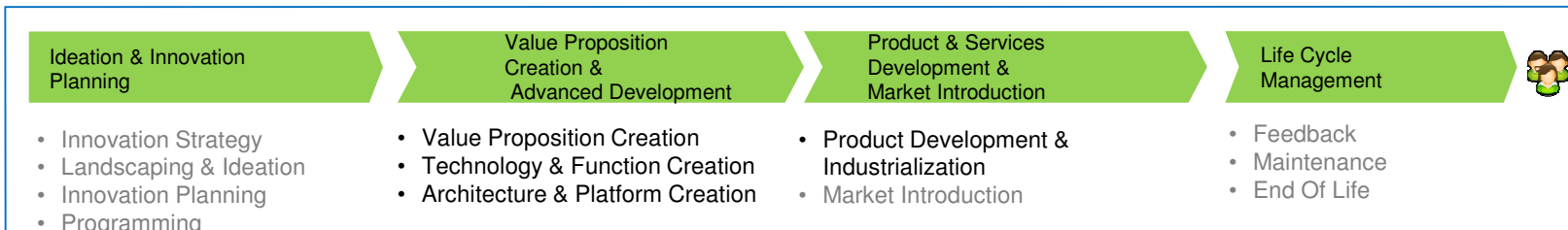


Figure 12: Alignment between Execution Process and Equipment Creation Process of Mechanization

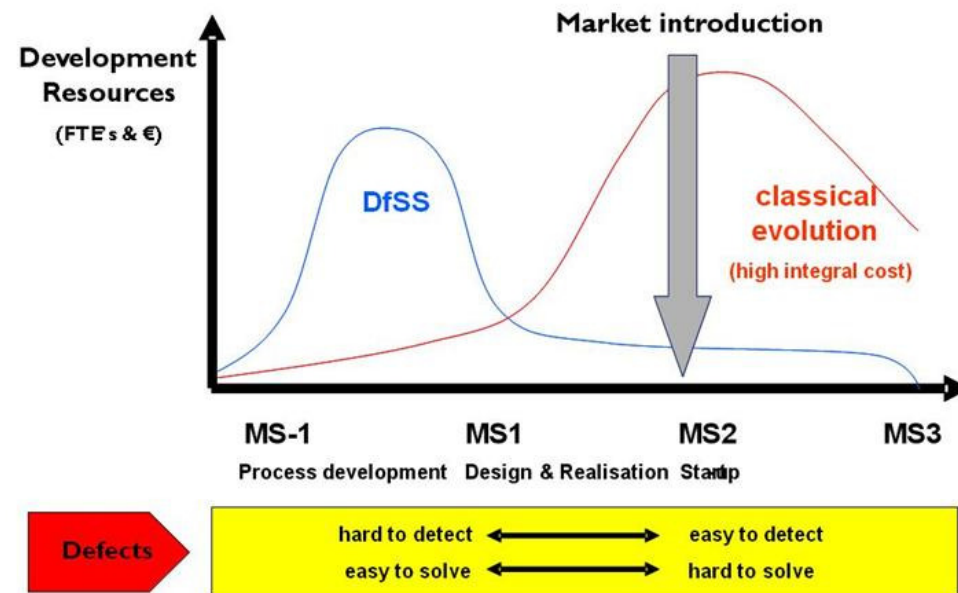
... aligning industrialization with the Philips Lighting Idea to Market process (I2M)



# Why product & manufacturing specialists should cooperate early on

- Product & process/manufacturing specialists together can find the **optimum balance between product performance and manufacturability**:
  - Materials selection => processability
  - Component design => production cost, ease of assembly
  - Testing strategy => how to monitor/control product quality
  - ...

- Early cooperation allows to **fix problems faster and at lower cost**

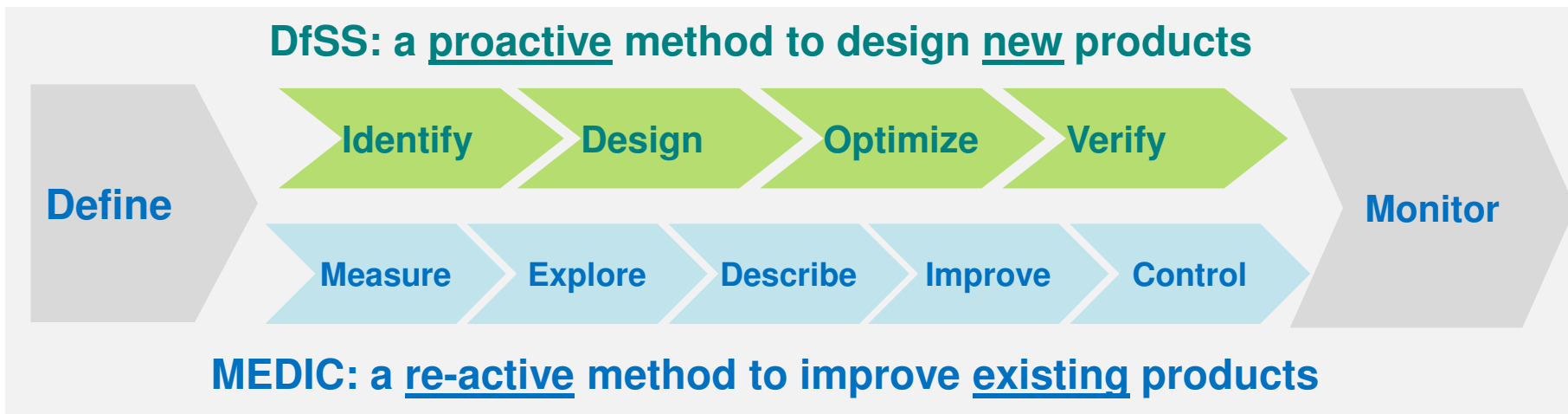




# Design for Six Sigma (DfSS) embedded in PRI

Design-for-Six-Sigma is: “Right-Design-Right”

- a **structured** method (D-I-D-O-V),
- to design **proactively** products and processes,
- of a **predictable** robust quality,
- based on **quantified** specifications,
- agreed with **customers** and **suppliers**.







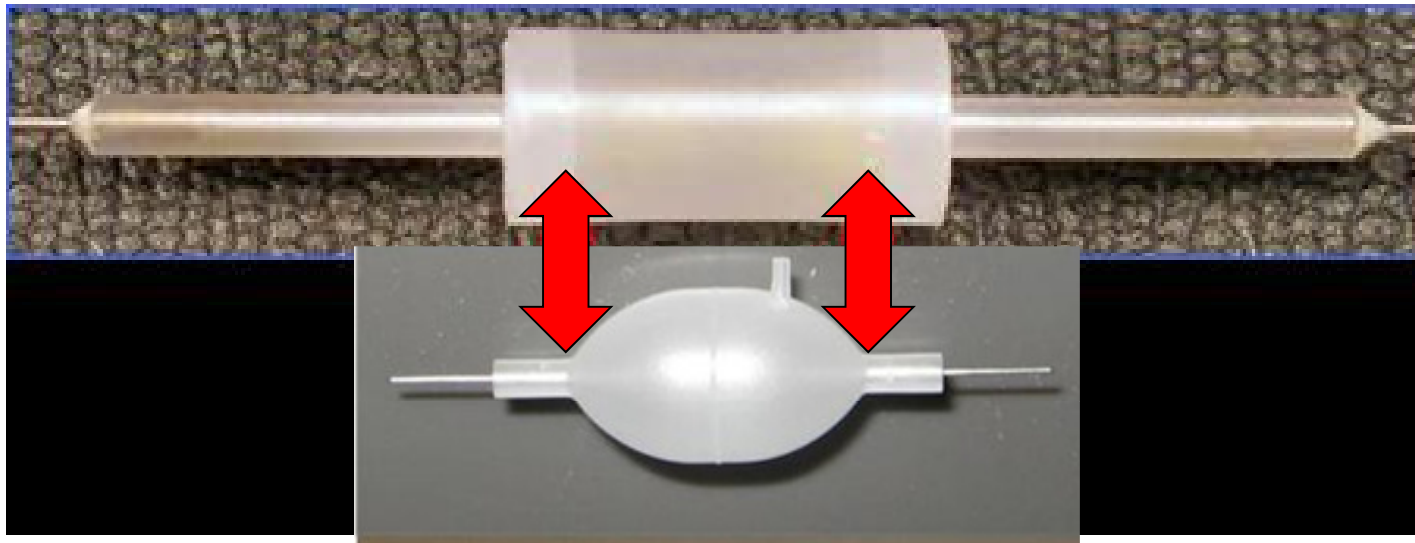
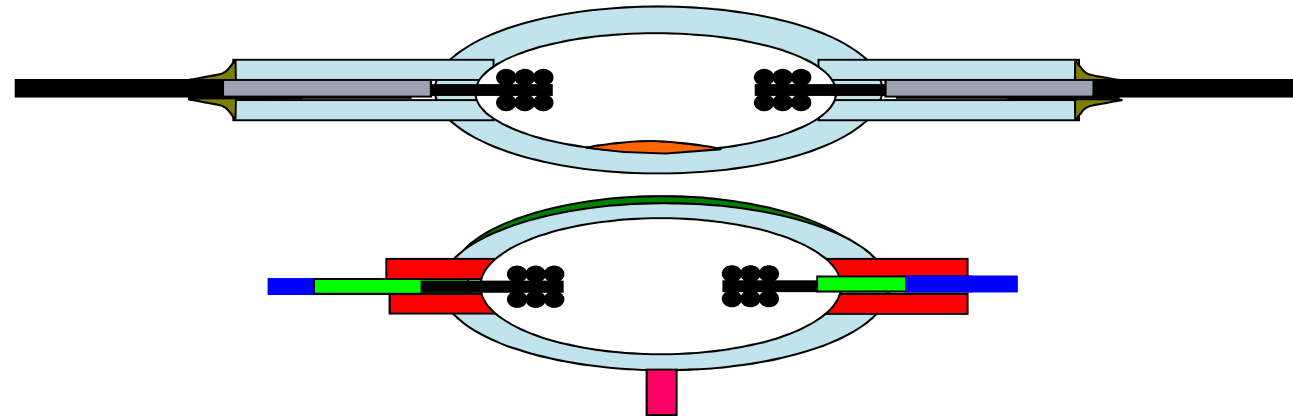
# Example Salt dosing new gen CDM





# GEN4 .... Complexity : Accent->Ultimo

1. Salt
2. Feedthrough
3. connection
4. Seal
5. ZUP
6. Antenna



# Case salt doser (Bart L)



- Breakthroughs needed
- Size
- Accuracy
- .....



# Industrialization

## MPCP: how?

Projectname	
MPCP Proje	
Project Plan	
MS-3	
MS-2	
MS-1	
MS0	
MS1	
MS2	
MS2+	
MS3	

- Define assignment
- Identify critical processes
- Evaluate multiple alternatives
- Create risk overview

- Make proces descriptions
- Set-up proces flow
- Set-up Qmap / critical parameter overview

SPD Preparation Phase	SPD Step 1-3 Describe and identify	SPD Step 4 - 6 Analyse and	SPD Step 7 - 8 Perform verification on test equipment (PMO)
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- Verify on final production set-up
- Define final settings
- Measure performance

- Monitor long term performance

• MPCP philosophy ingrained in our organization for over 10yrs

• MPCP philosophy crosses boundaries product development – machine creation

Processes
mercury dosing
salt dosing
plug dosing

- Extensive testing (DoE) of identified critical parameters
- Define proces windows
- Build tolerance analysis

- Validate chosen solution
- Define production & test equipment
- Update risk overview

SPD step finished? (yes = "ok")										
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Required %R&R achieved	Risk Maturity Grid up-to-	SPD report ready
ok	ok	95%
ok	ok	90%
	ok	ongoing

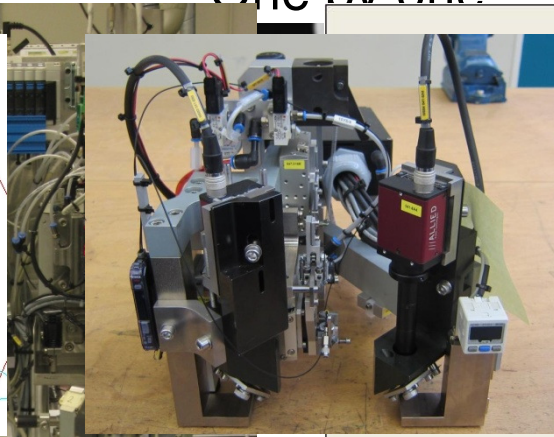
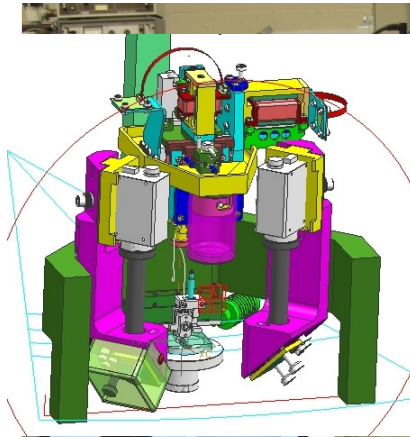


# Industrialization MPCP: example

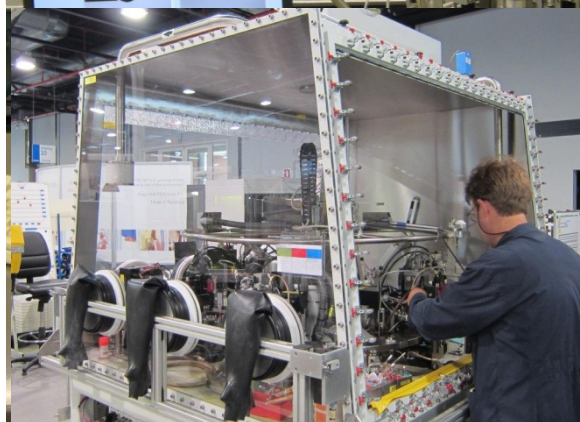
SPD Step 7 - 8 Perform verification on mechanised equipment					SPD Step 9 - 10 Assess control		
Verify parameter settings	Process FMEA	Control plan finished	Verify %R&R	Short term Cpk	Control charts available	Long-term Cpk	OCAP's available
ok	ready	ready	12%	1.45	ok	1.32	80%
ok	ready	ready	8%	2.13	ok	1.86	75%
ok	ready	ready	5.60%	1.89	ok	1.64	60%

Bulk

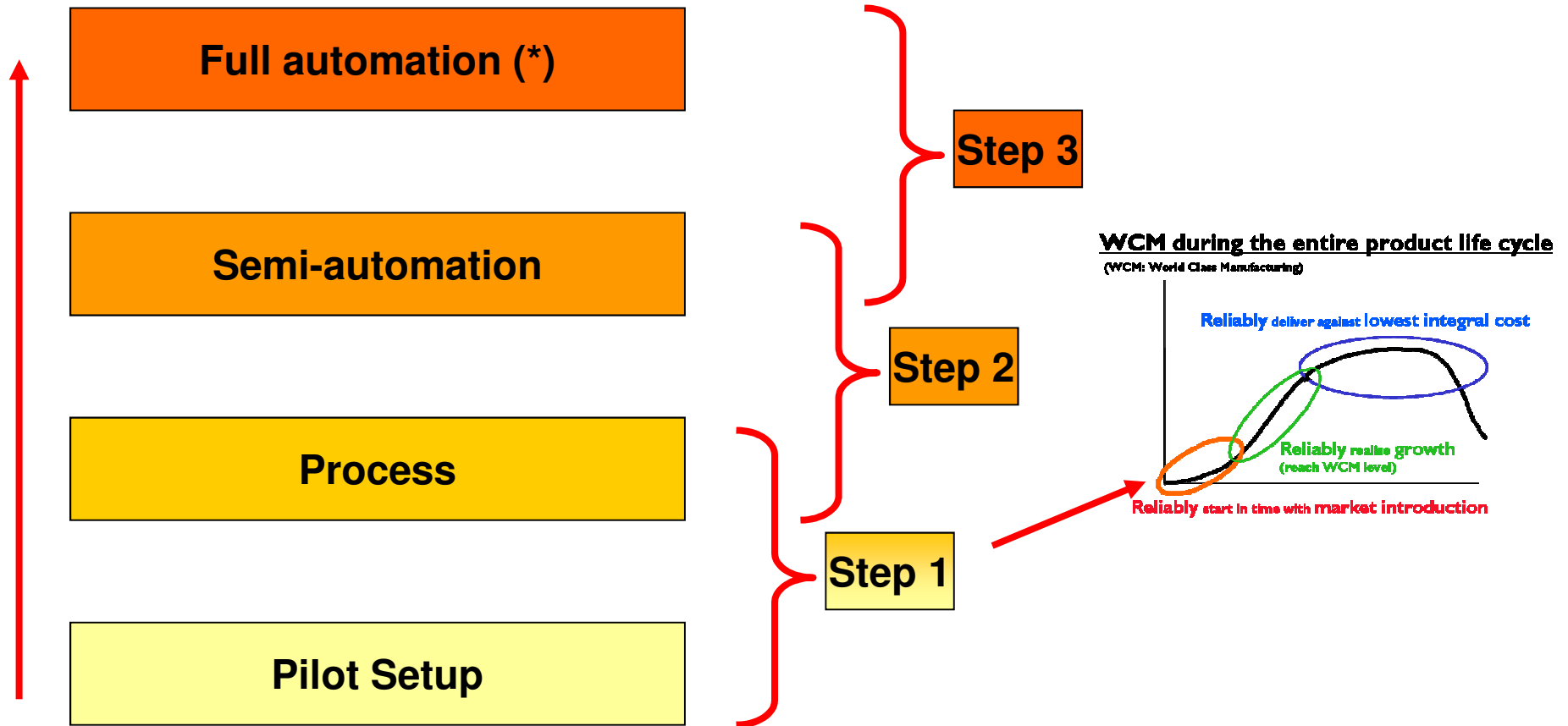
One by one



No.	Parameter description	Dimension unit	Upper specification limit (USL)	Lower specification limit (LSL)	Nominal value	Tolerance value	Lower specification limit (USL)	Standard deviation (sigma)	Process variation sources for P1	Process variation sources for P2	Process variation sources for P3	Process variation sources for P4	C <sub>p</sub>
<b>Product parameter(s)</b>													
	positioneren naast met concentrischalen ZUP get -naad spacing	mm	0.06	0.00				0.008		0.012			2.35
	positioneren naast zonder concentrischalen ZUP get -naad spacing	mm	0.06	0.00									1.57
	positioneren staafje met concentrischalen ZUP get -plug spacing	mm	0.02	0.00						0.007			0.71
	positioneren staafje zonder concentrischalen ZUP get -plug spacing	mm	0.02	0.00									0.42
<b>Component parameter(s)</b>													
C1	diamater ZUP get	mm	0.01	0.00	0.01	0.00	0.003						
C2	LUP diameter boortie	mm	0.01	0.00	0.01	0.00	0.003						
C3	LUP dia to=> schijbaar dia verlening voor ZUP anglek hoefout	mm	0	0	0	0	0.000						
C4	concentrisch LUP's	mm	0.05	0	-0.05	0.017							
C5	LUP coak dia schijbaar dia verlening voor ZUP anglek hoefout	mm	0	0	0	0.000							
C6	diamater staafje	mm	0.01	0.00	0.01	0.003							
C7	concentrisch ZUP boven-onder	mm	0.0001	0	0.0001	0.000							
C8	realigneerd ZUP - LUP's -> schijbare dia verlening	mm	0.03	0	0.03	0.010							
C9	concentrisch overloop, overloop diam ZUP	mm	0.02	0	-0.02	0.007							
C10	diam overloop ZUP	mm	0.02	0	-0.02	0.007							
<b>Process parameter(s)</b>													
P1	diamater naad	mm	0.005	0.00	0.005	0.002			0.002	0.002	0.000	0.000	
P2		mm	0	0	0	0.000							
P3		mm	0	0	0	0.000							
P4		mm	0	0	0	0.000							
P5		mm	0	0	0	0.000							
<b>Equipment parameter(s)</b>													
E1	positie productdrager	mm	0.02	0	-0.02	0.007			0.007	0.006	0.005	0.004	
E2	positie productdrager productdrager referentie	mm	0.02	0	-0.02	0.007							
E3	systematie - positioneren bij montagegemeentekeuringheid	mm	0.015	0	-0.015	0.005							
E4	positie op diameter ZUP get	mm	0.01	0	-0.01	0.003							
E5	positie camera stabiliteit	mm	0.01	0	-0.01	0.003							
E6	realigneerd ZUP - LUP's -> schijbare dia verlening	mm	0.015	0	-0.015	0.004							
E7	realigneerd naad positionering	mm	0.015	0	-0.015	0.005							
E8	realigneerd plug traaner positionering	mm	0.002	0	-0.002	0.001							
E9		mm	0	0	0	0.000							
E10		mm	0	0	0	0.000							
E11		mm	0	0	0	0.000							



# Process flow Ultimo: maturity processes & equipment should be in phase with product life cycle



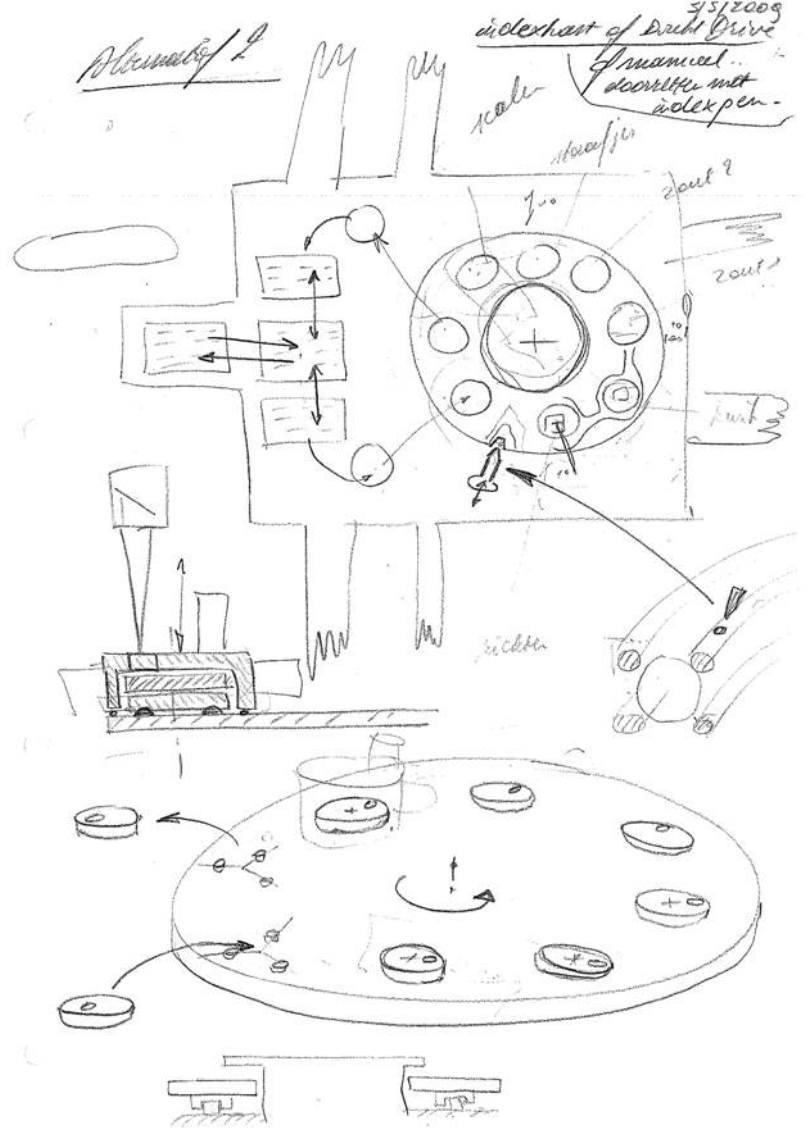
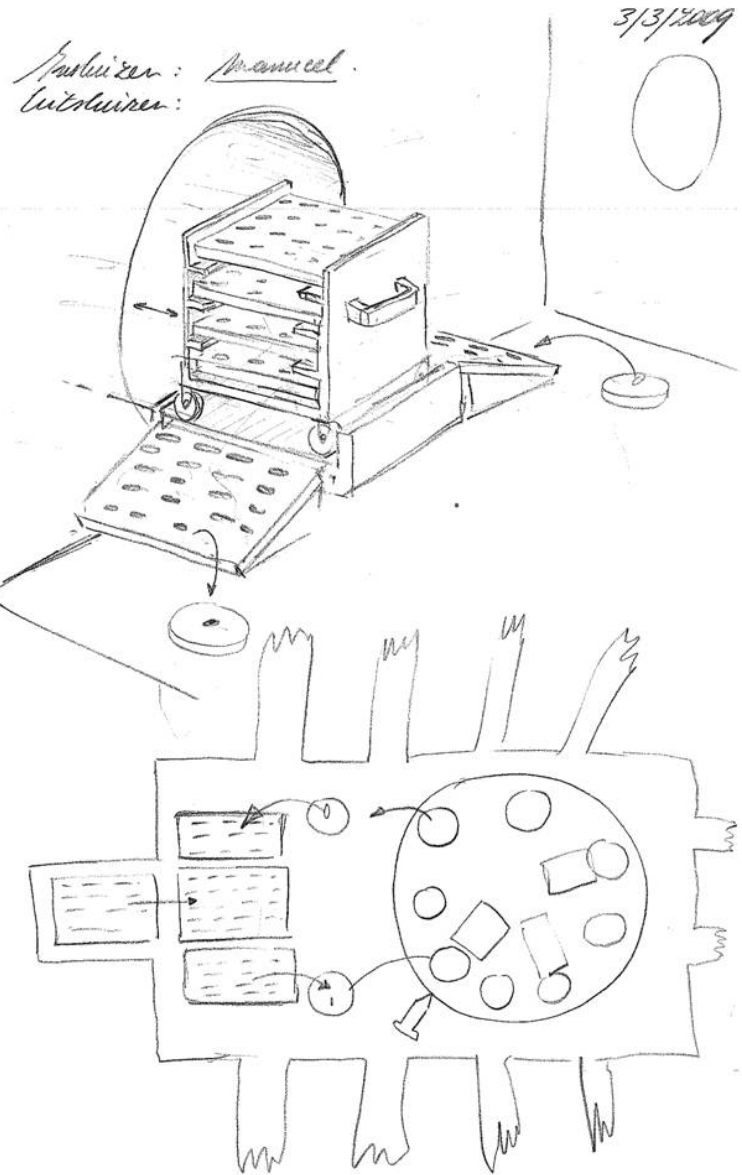
(\*) Level of automation = f(TCO)

Example Ramp up of the new platform





# Hoe het begon...





**GEN4 Dosing & Sealing Glove Box**





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