

A large, glowing green sphere composed of many small particles, resembling a nebula or a digital globe, is centered in the background. The sphere has a bright green ring of light around its equator. The background is a solid dark blue.

RDVELHO

SSF

creating
an intelligent
world

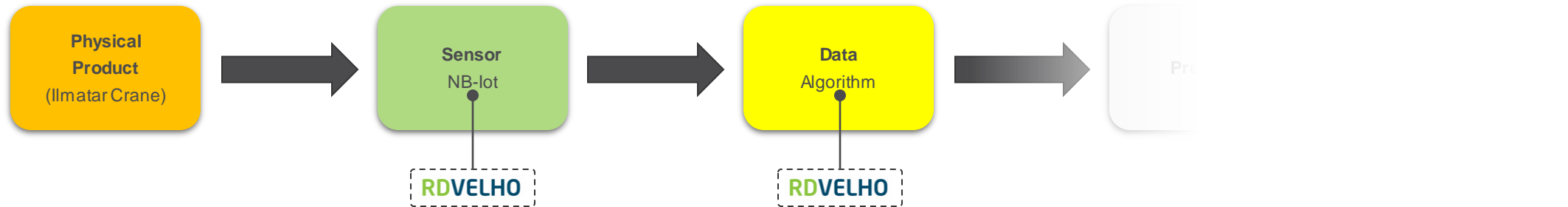
Digital twin loop using Rule Based System Design Automation

Lassi Sutela

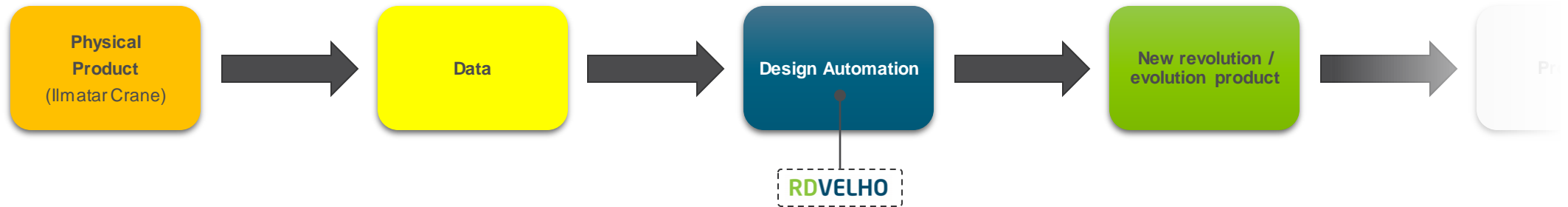
20.11.2019

RD Velho at Digitwin project

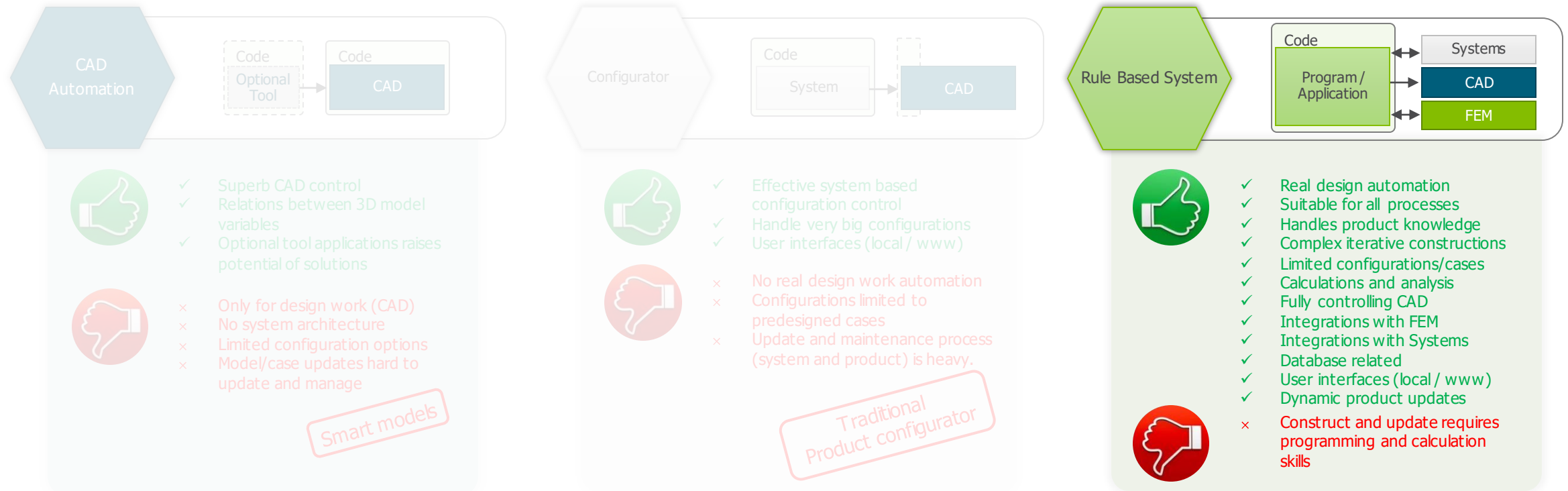
- Data : NB-IoT + Algorithm development



- Design Automation : New revolution/evolution product from usage data

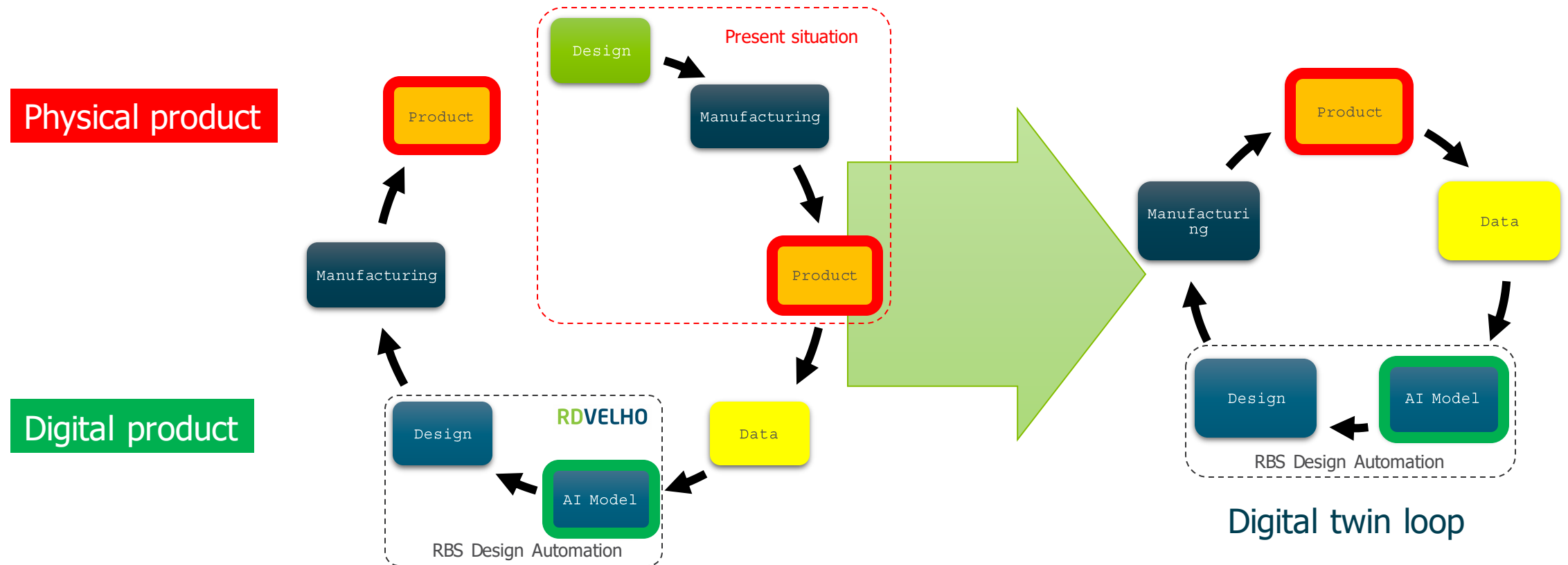


RBS Design Automation



- RBS (=“Rule Based System”) Design Automation handle product’s knowledge via independent software/application.
- RBS Design Automation holds all the information: *how the product is designed* (= “**AI Model**”)

Forward to Digital twin loop using RBS Design Automation



Demo

Design automation demo

- Product: Aalto University “Ilmatar”
- Usage data: Aalto University “Ilmatar”
- Part: Sheave
- Important part in whole construction
- Traditional way to design sheave lean on iterative process, witch include various phases and actions
- Design based on represent scenarios and cases.
- Customer requirements are fitted to previous cases



Design automation demo - Functions

2. Data from Aalto "ilmatar" crane



1. Original design

Input:

- Specs/values of "Ilmatar" crane

Output:

- Material/structural analysis
- Calculated geometry
- Selected component information

3. Data analysis

Input:

- Data from Aalto "Ilmatar" crane

Output:

- Usage analysis
- Result; estimation of usage years

4. New design

Input:

- Data analysis result
- Design base

Output:

- Material/structural analysis
- Calculated new geometry
- Selected component information

RBS Design Automation

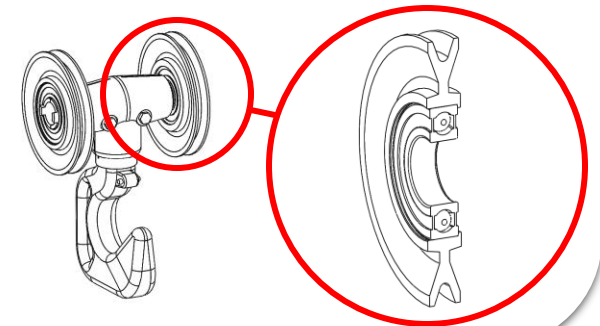
5. Design work (Solidworks)

Input:

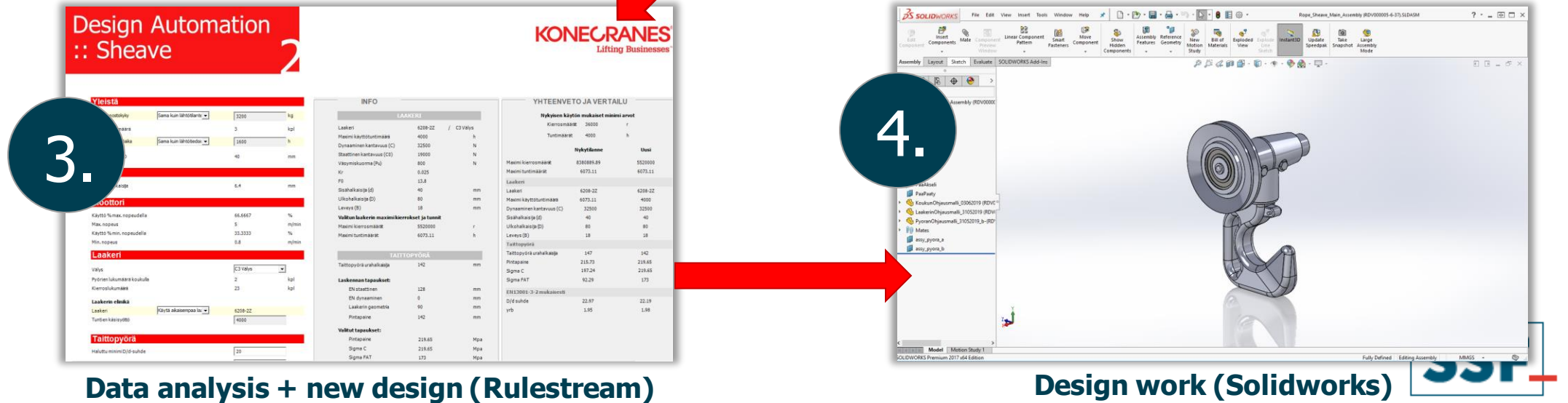
- Geometry variables/values
- Design base

Output:

- 3D models (Sheave, Bearing)
- 2D documents



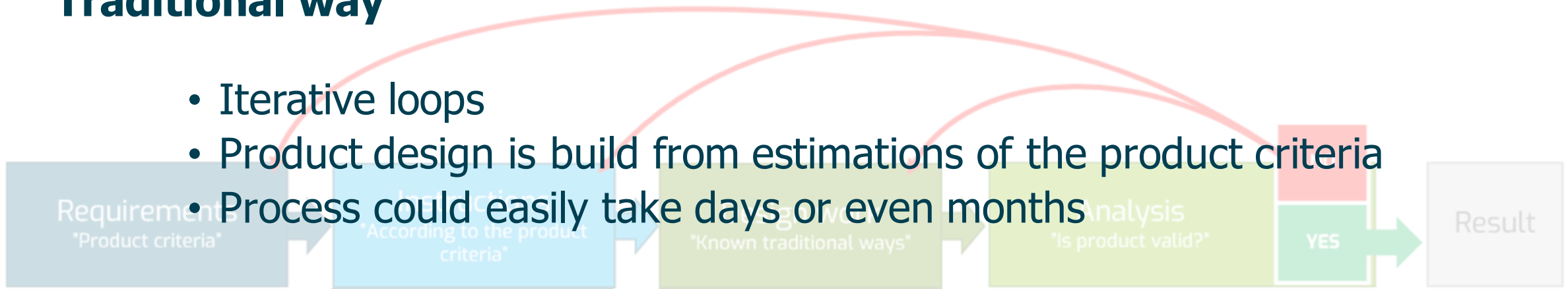
Design automation demo - UI



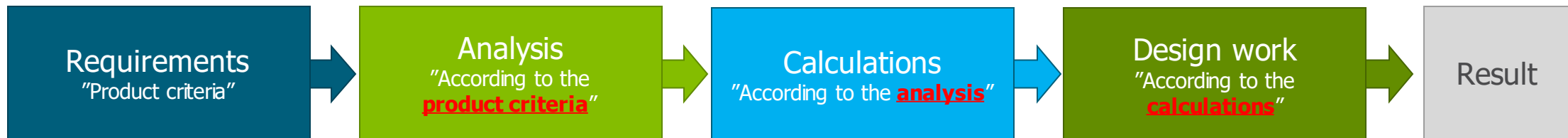
Two changes : 1.) work process

Traditional way

- Iterative loops
- Product design is build from estimations of the product criteria
- Process could easily take days or even months



Design Automation (RBS/AI)



- No iterative loops
- Product design is build exact from the product criteria
- Whole process is done only in couple of minutes

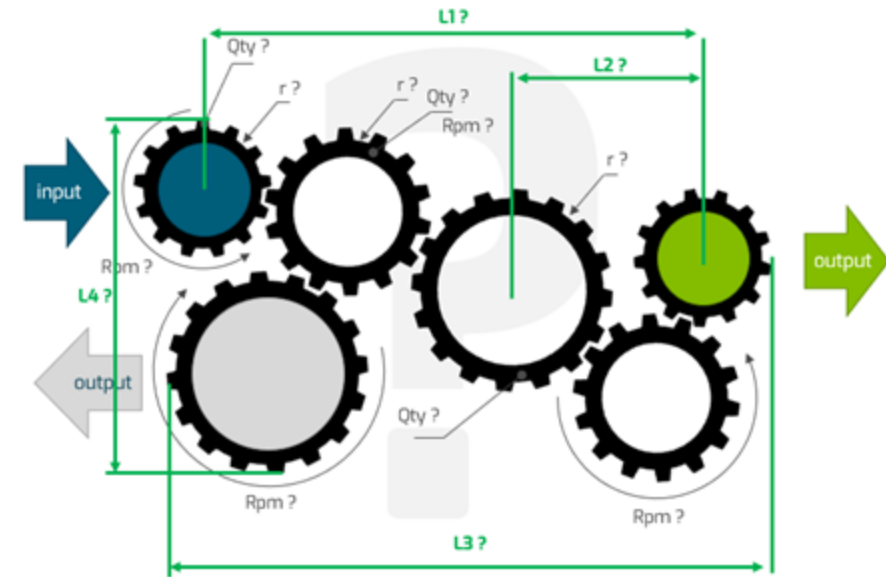
Two changes : 2.) product optimizing

Traditional way

- Iterative constructions are VERY challenging, time consuming and expensive to do in traditional way ("manually").
- It is very rare to achieve optimal result in high level iterative product via traditional way.

Design Automation (RBS/AI)

- Every component in product is calculated. Also every component has relations to each other, so iterative construction is solved via calculating on top level of the components.
- To solve very complex iterative construction using RBS –based Design Automation is done in seconds.



Technology's effects at different areas

Designer work/skill requirements

- Work focuses more and more to handle products knowledge and product development
- Most of the formal design work is done by automation
- More meaningful challenges
- Calculations and programming skills raises more important requirement than 3D modelling

Business and company

- Most important thing: *knowledge* transfer from people to company's asset (to the system)
- Pricing and business models changes
- Possibility to offer custom product at bulk products price *
- Totally new and advanced positions in global market

(* = related to manufacturing costs)

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