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Value Creation Flow

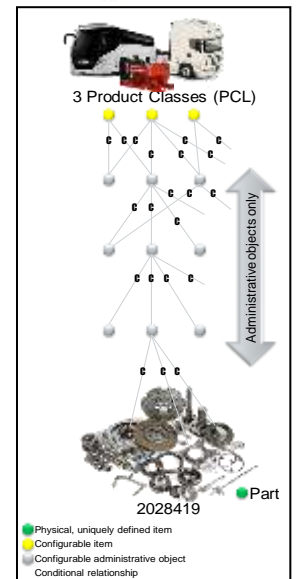


Question: what is the difference?



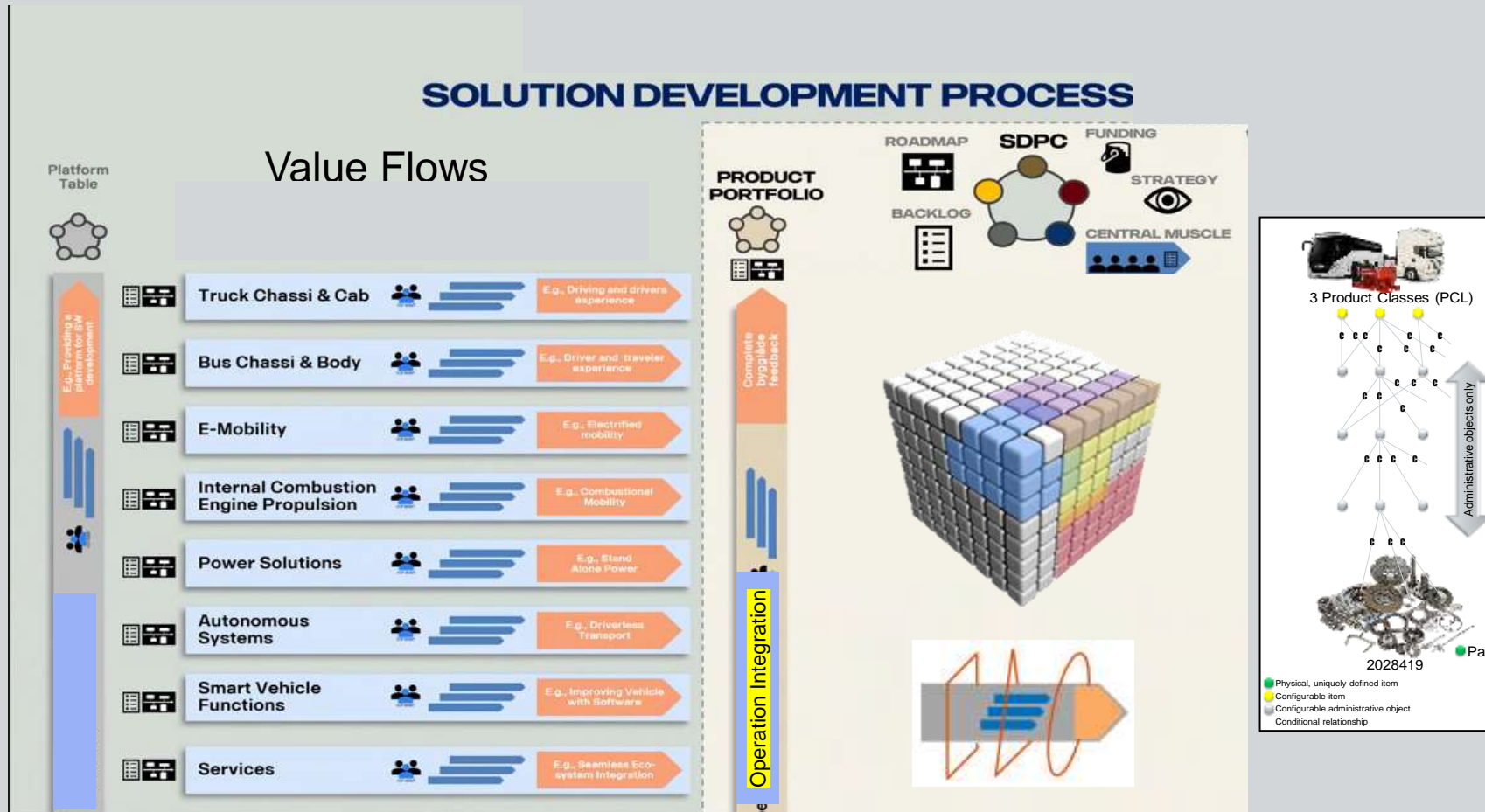
Knowledge work is invisible and abstract

Knowledge Worker





Value Creation Flow



LEADER IN SUSTAINABLE TRANSPORT



GLOBAL TRENDS

Urbanisation

Sustainability

Digitalisation

ECO SYSTEM
Transport & logistics

Connected

Electrified

Autonomous

INDUSTRY TRENDS

Focus & Ambition

WHY TRANSFORM?

WE NEED TO BE BETTER TO NAVIGATE UNCERTAINTY



DEVELOPMENT PREDICTABILITY MATRIX



The new operating model needs to strengthen four crucial capabilities across the company

SPEED & FLEXIBILITY

Quickly deploy new solutions and strategies while being able to react to changes and adapt as we go

DEVELOP & DELIVER SOLUTIONS

Understand, develop and deliver solutions that fully support the customers' needs

CUSTOMER COLLABORATION

Explore business opportunities and drive the shift in close interaction with the customers

PEOPLE ENGAGEMENT

Inspire, empower and unleash the will to drive the shift



MODULAR SYSTEM

TAILORED SOLUTIONS



TRUCKS



BUSES



POWER SOLUTIONS



Cabs



Charging interface



Axles



Frames



Batteries



Gearboxes



Engines



Electric machines



Handle variants to a competitive cost level

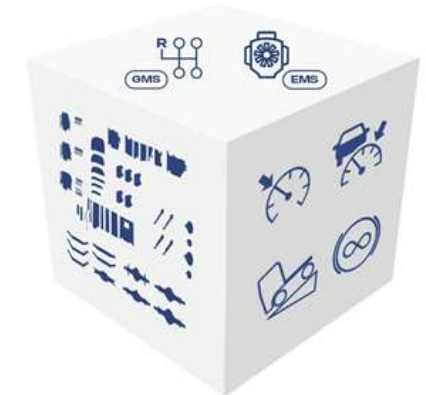
"In a modular thinking, the odd variants are the normal"



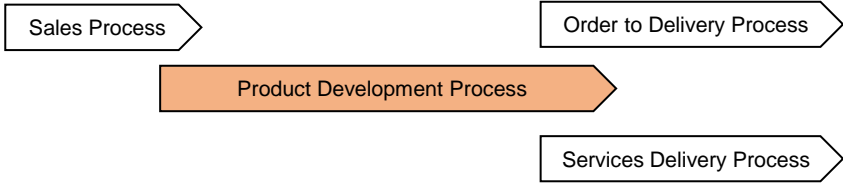
Scania Strategy
Profitable Customers give a profitable Scania in long term perspective



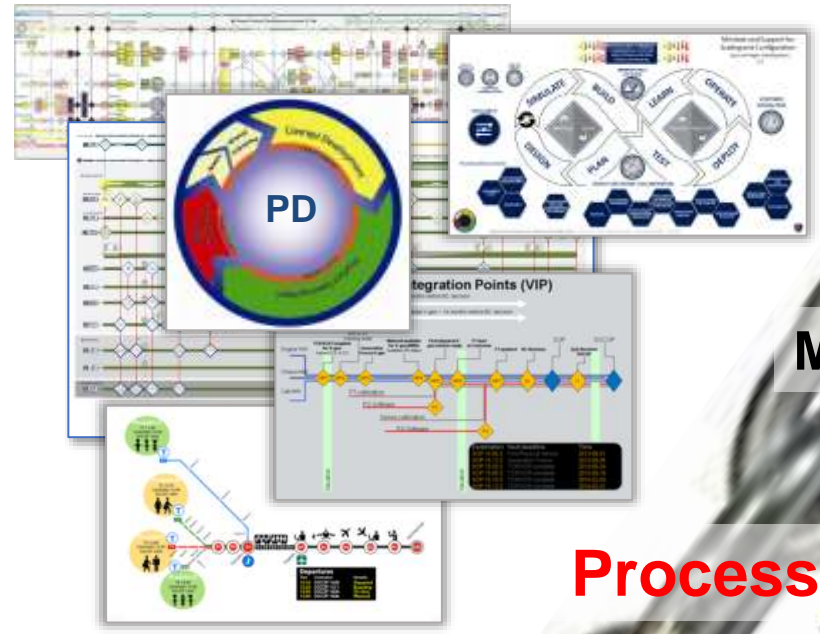
Modularisation
Starts and ends with the Customer



Scania DNA "The system" (Business Model / Modularisation)

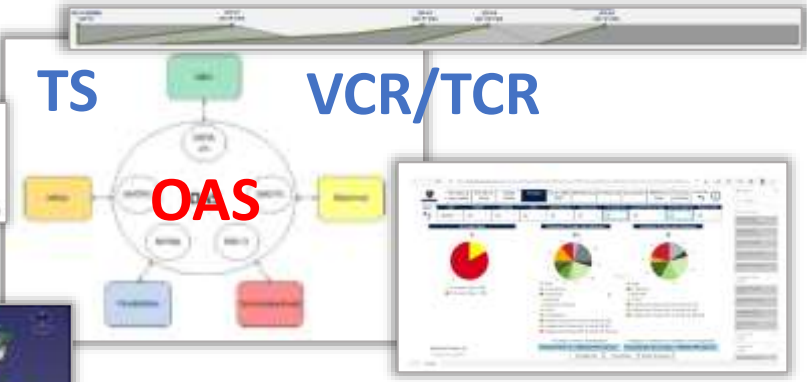


Results = The Product



IT-tools

ECO TA

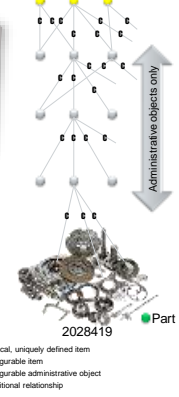


Methods



The Digital Thread

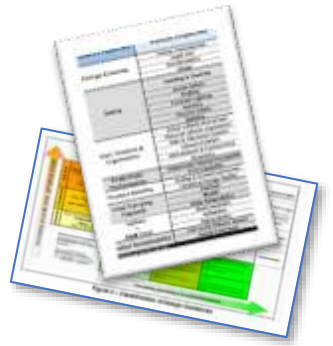
Processes



Scania Strategy Profitable Customers give a profitable Scania in long term perspective



Modularisation Starts and ends with the Customer



Leader in sustainable transport

Principles

Core Values



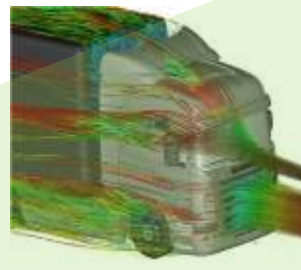
Simulation based product development

Learning organisation ...

Questions ...



Dialog



Knowledge

Physical Testing and Mesuring



Dialog



Analysis, simulation and optimization

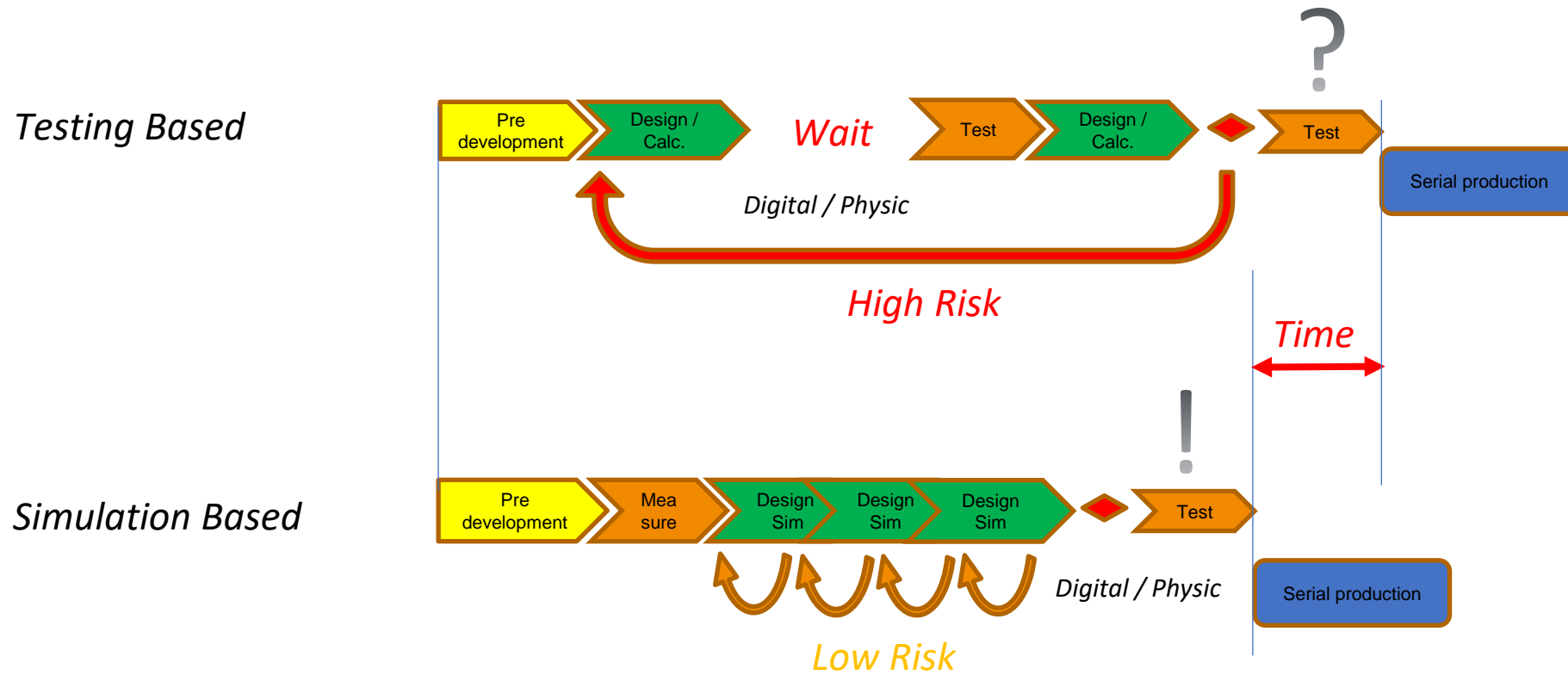
Knowledge

Design

(Analysis, simulation and optimization)

Synergies

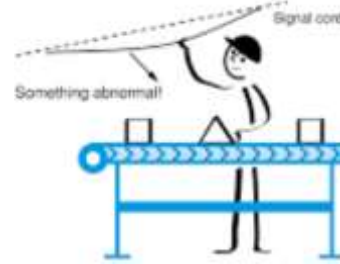
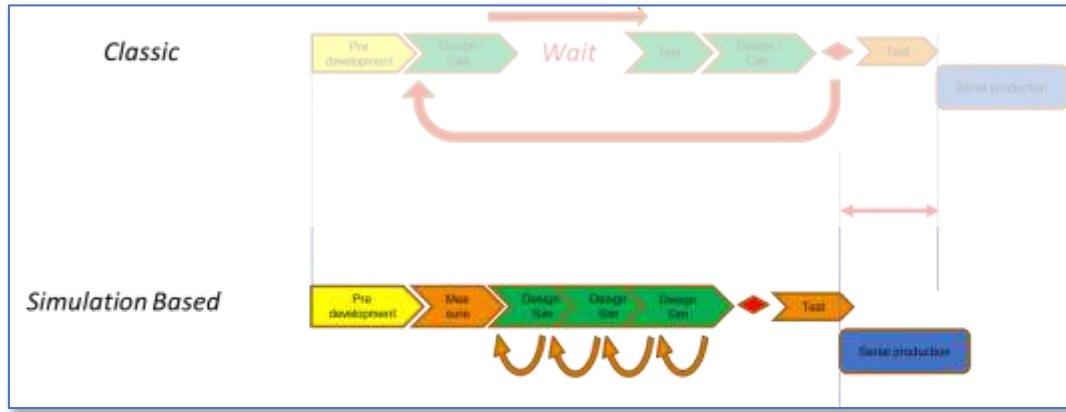
Lean - Simulation Based Product Development



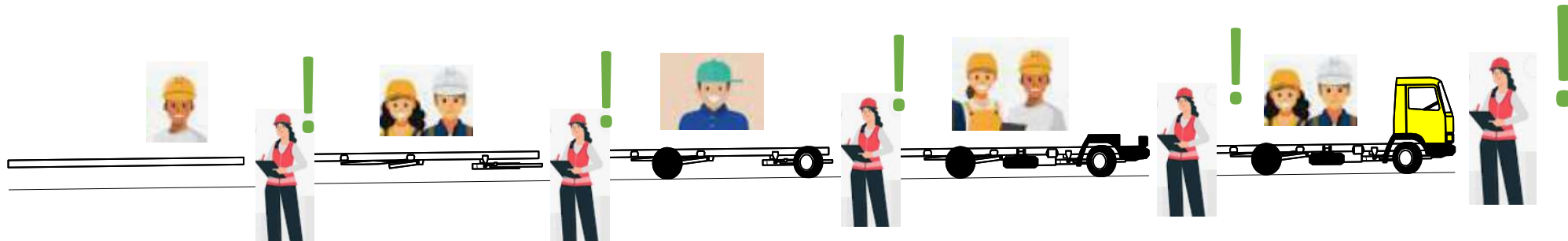
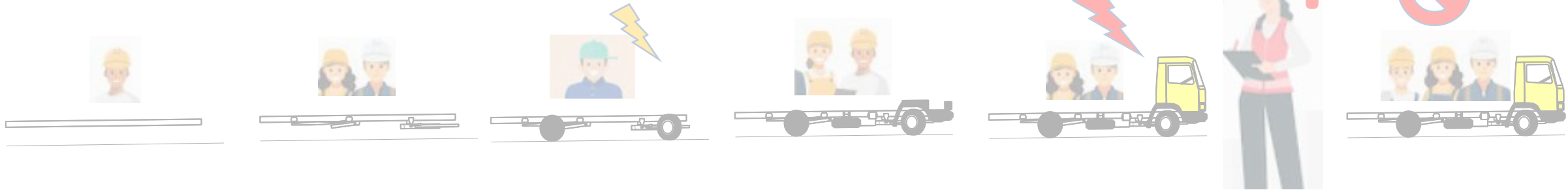
“Try fast, fail fast and learn fast”

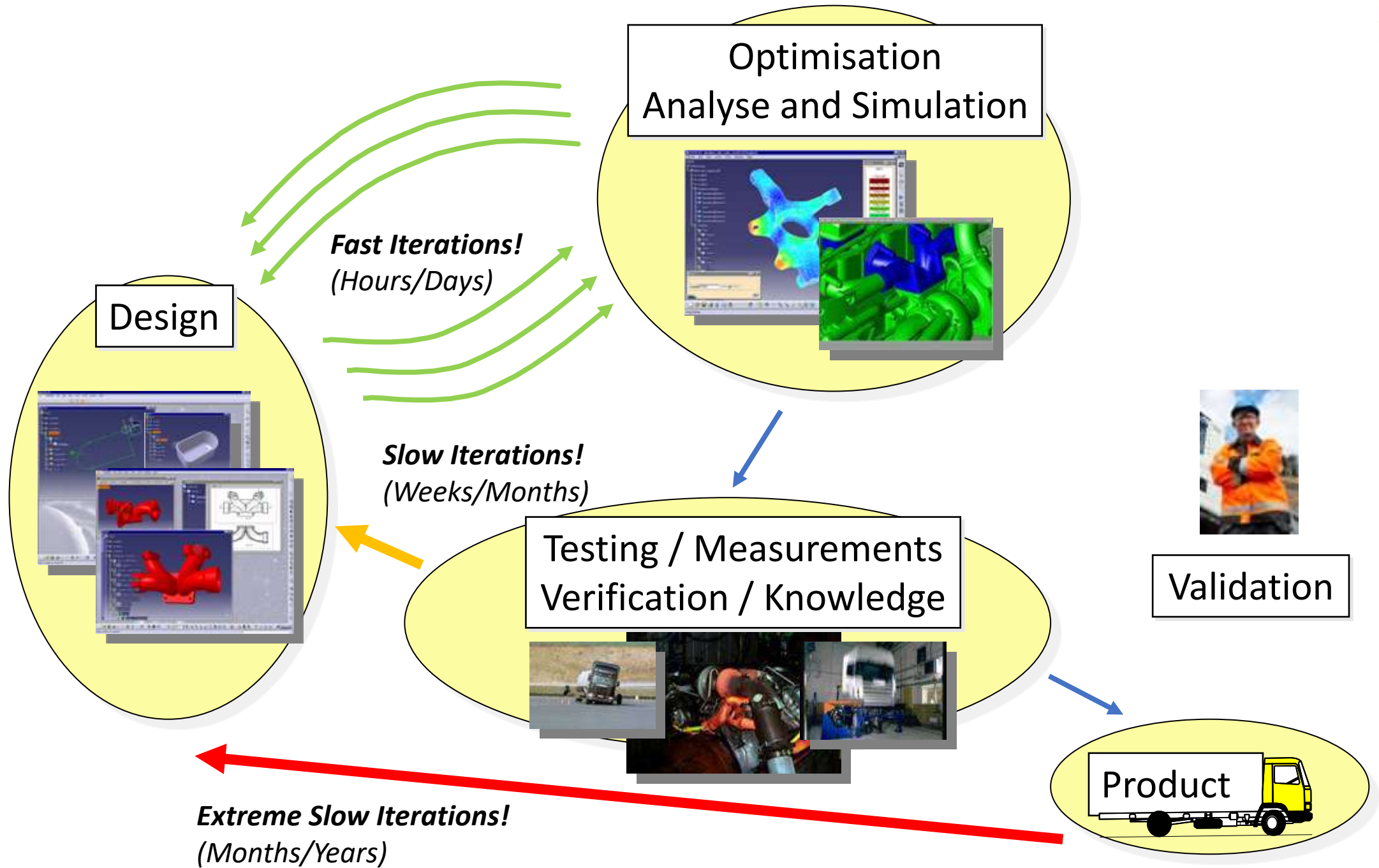


Lean - Simulation Based Product Development



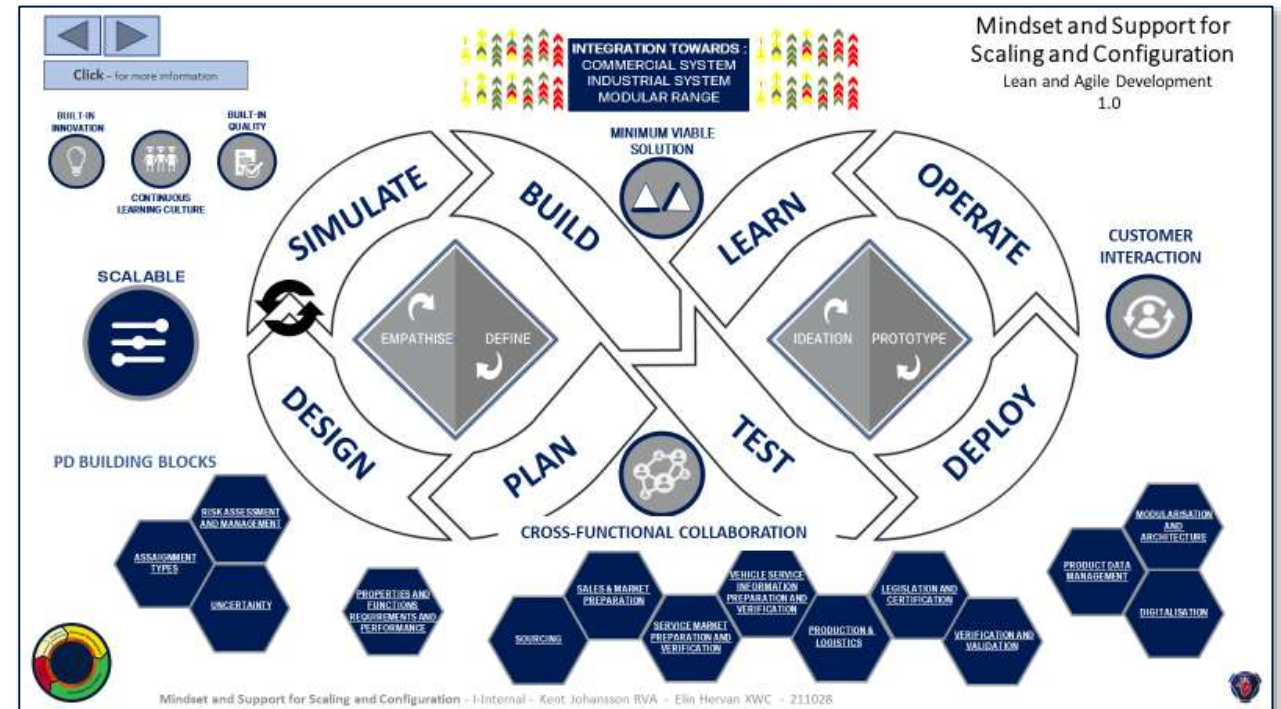
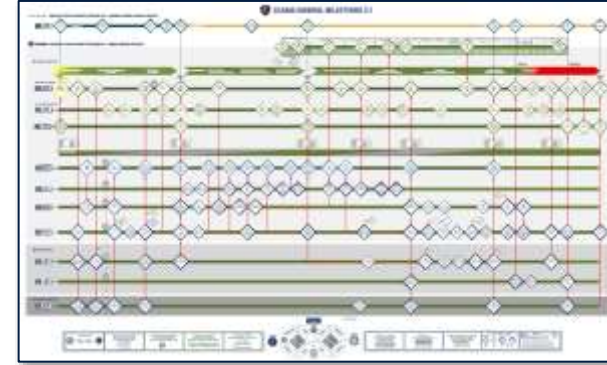
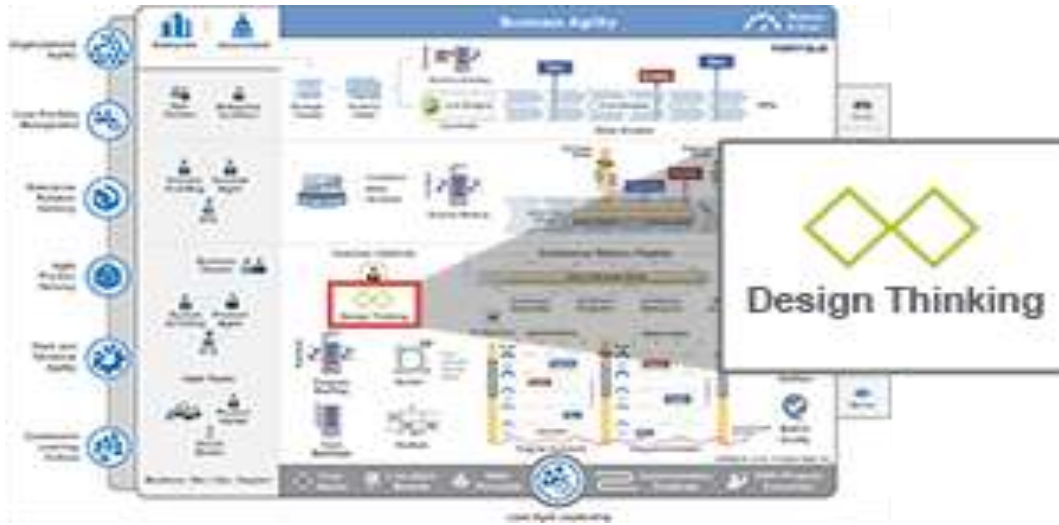
"Right From Me"







Lean and Agile, Inspired by SAFe



INTEGRATION?

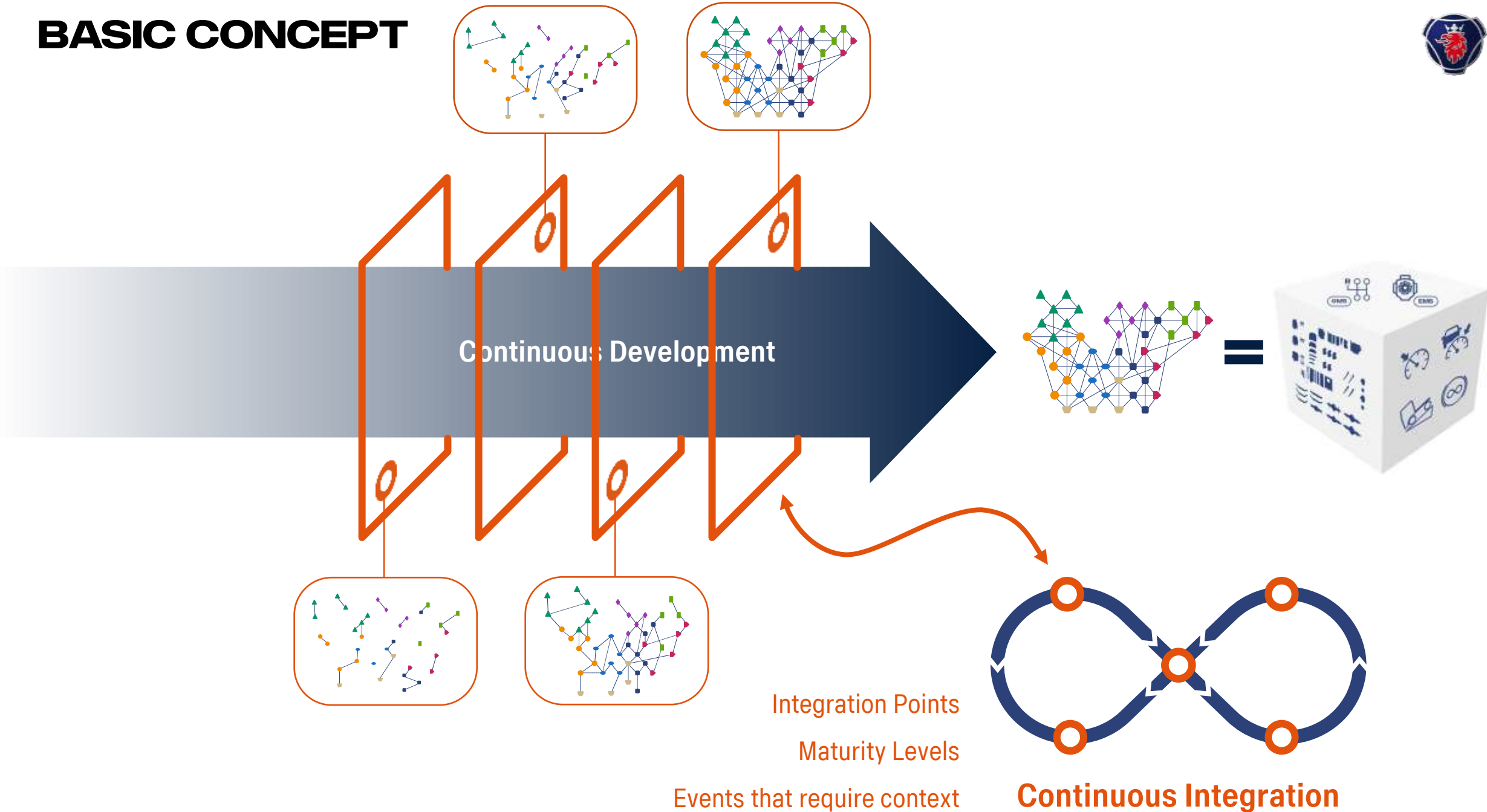


The act of bringing components and sub-systems together into a single product that functions as one

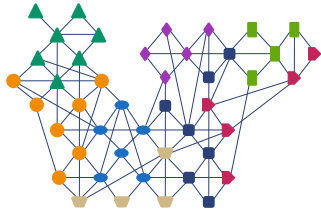


- Ensure modular system consistency
- Provide feedback loops and learning for product balancing

BASIC CONCEPT



Continuous Development



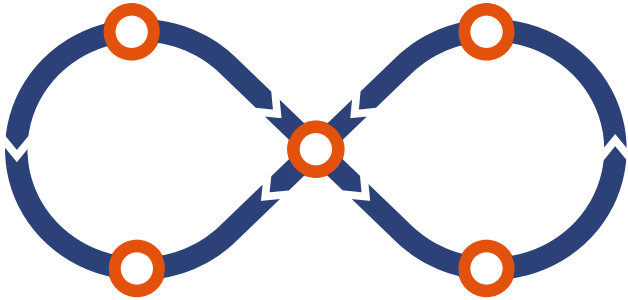
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Integration Points

Maturity Levels

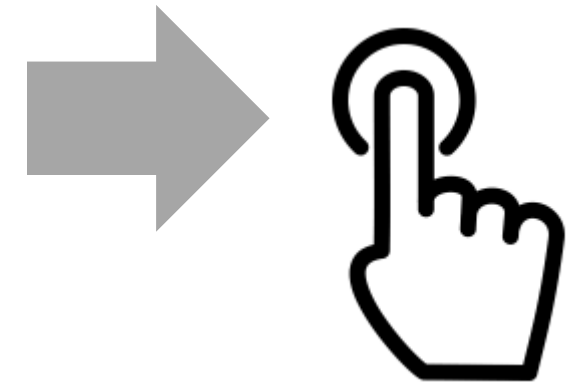
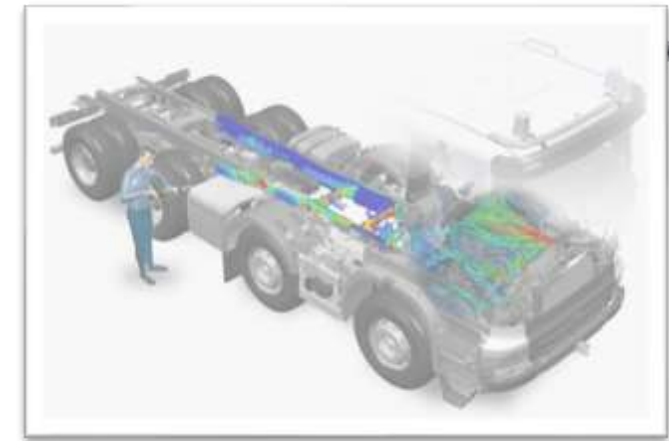
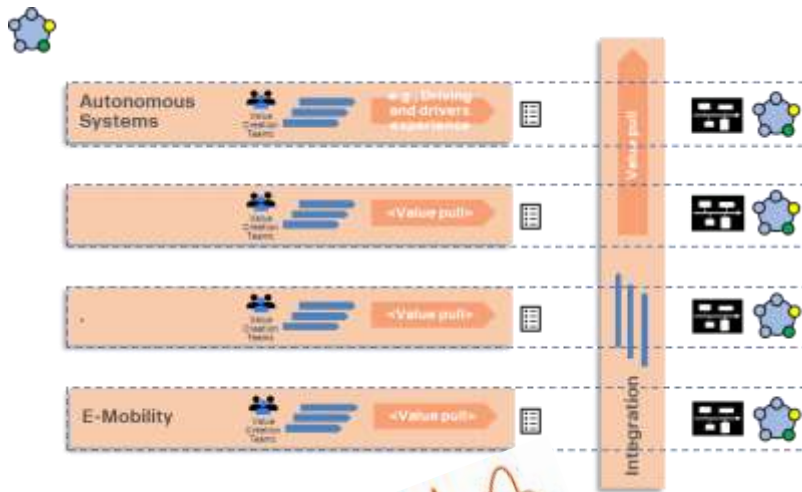
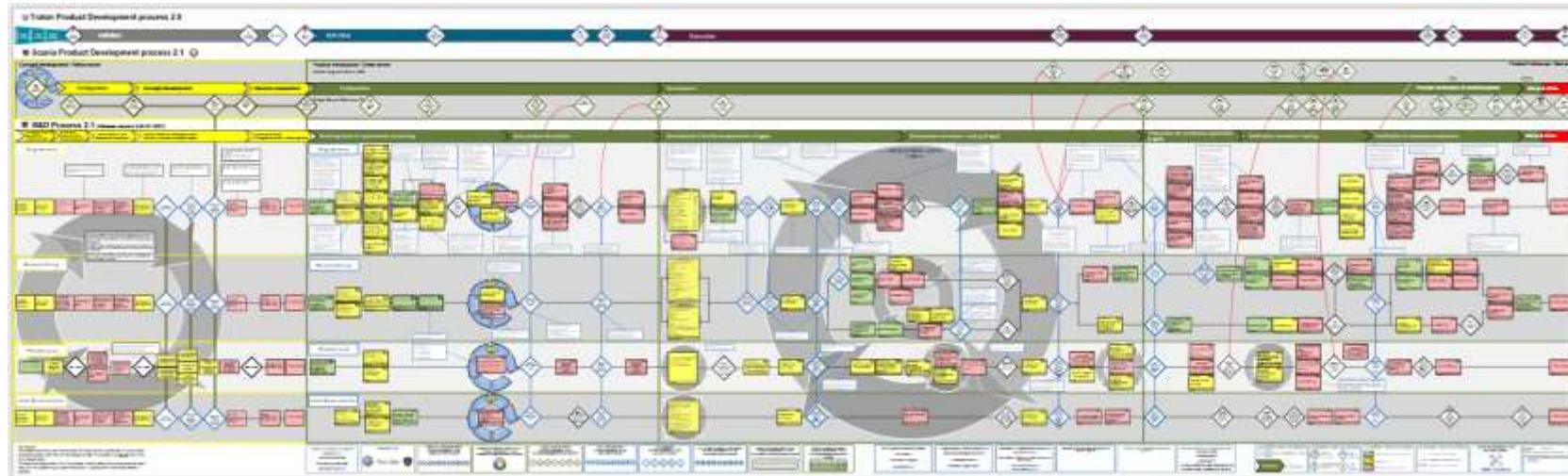
Events that require context



Continuous Integration

We have a dream

One-click Integration!



CI-Machine!



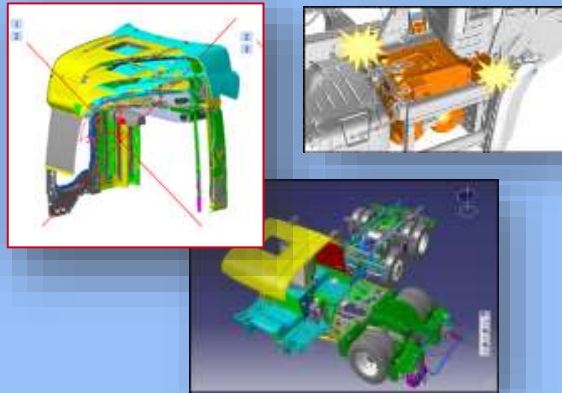


Simulations ...

Area examples

Geometrical ...

Interference and Tolerances



Digital Built and Service



Embedded ...



Designer ...

"GAS" – Simulation Driven Design
Performance & Topology Optimizing

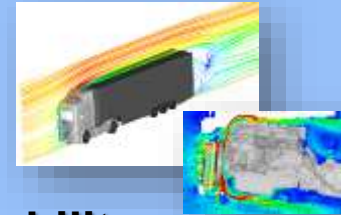


Technical ...

FEM - Finite Element (Strength)



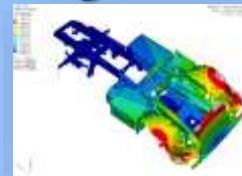
CFD - Fluid Dynamics



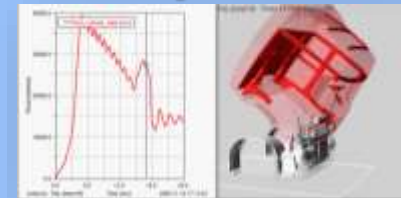
Acoustics



Fatigue



Durability



Dynamics



Collision



MBS - Multi Body Simulations



Ergonomics

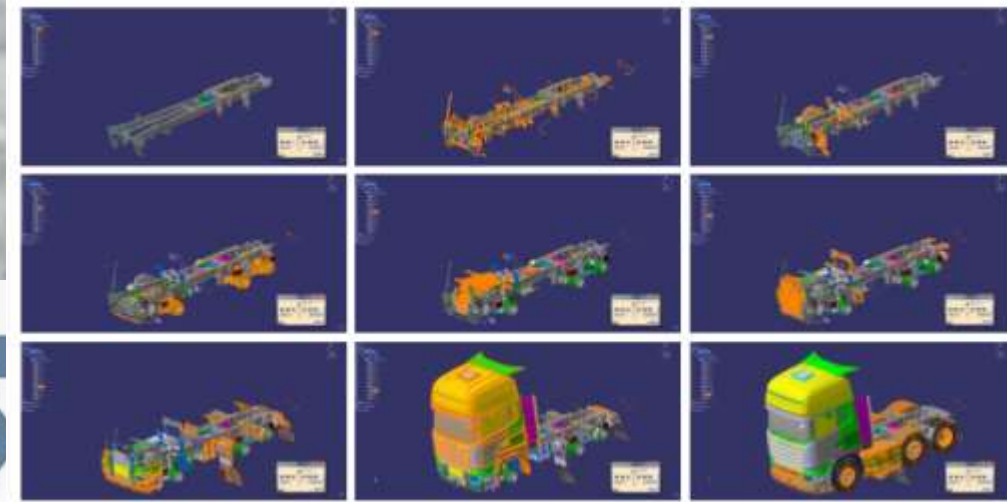
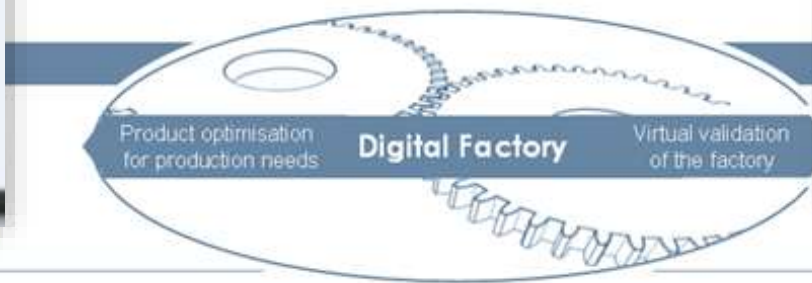


Simulations ...

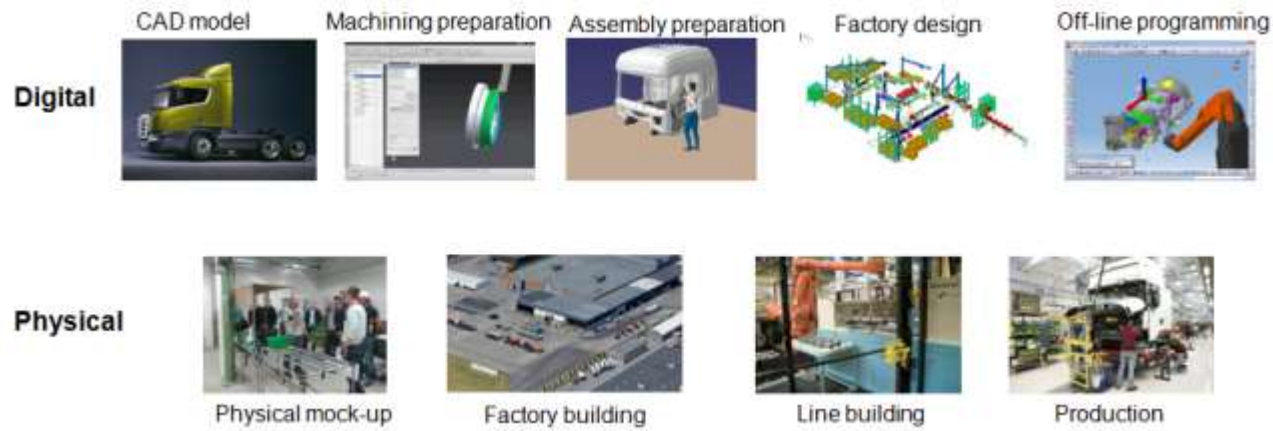
Production



Product



Factory



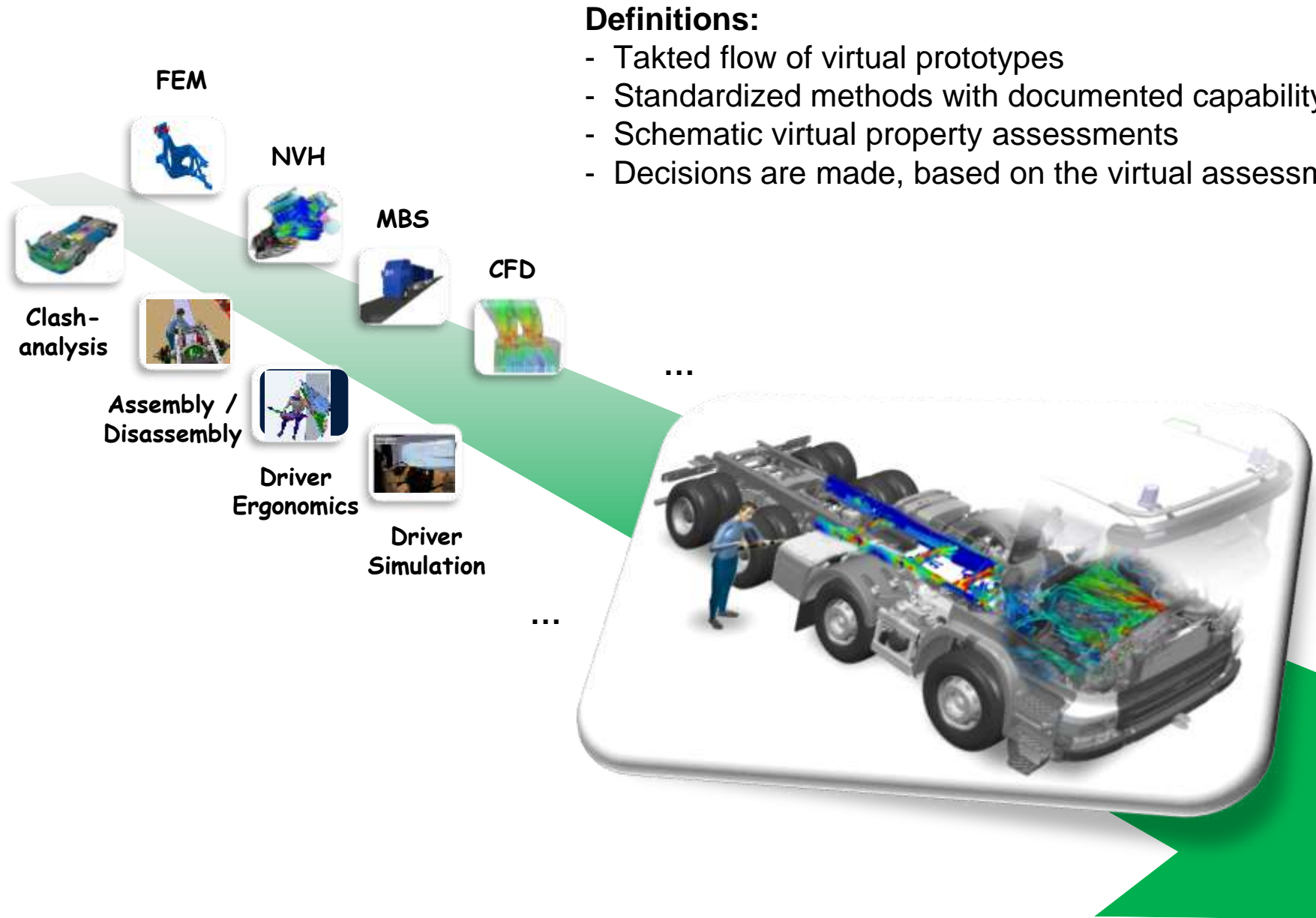
Visualisation Studio ...



Customer Experience ...



Simulation Based Product Development



Definitions:

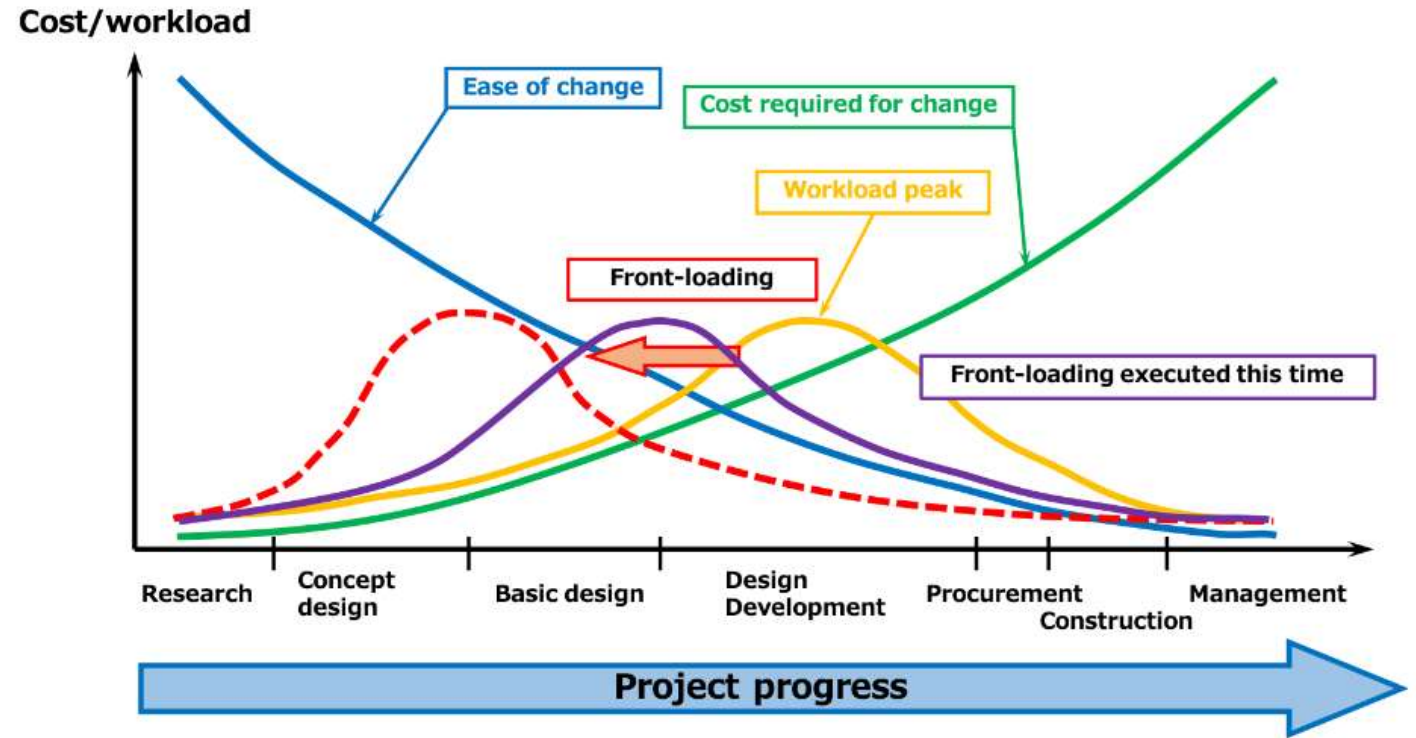
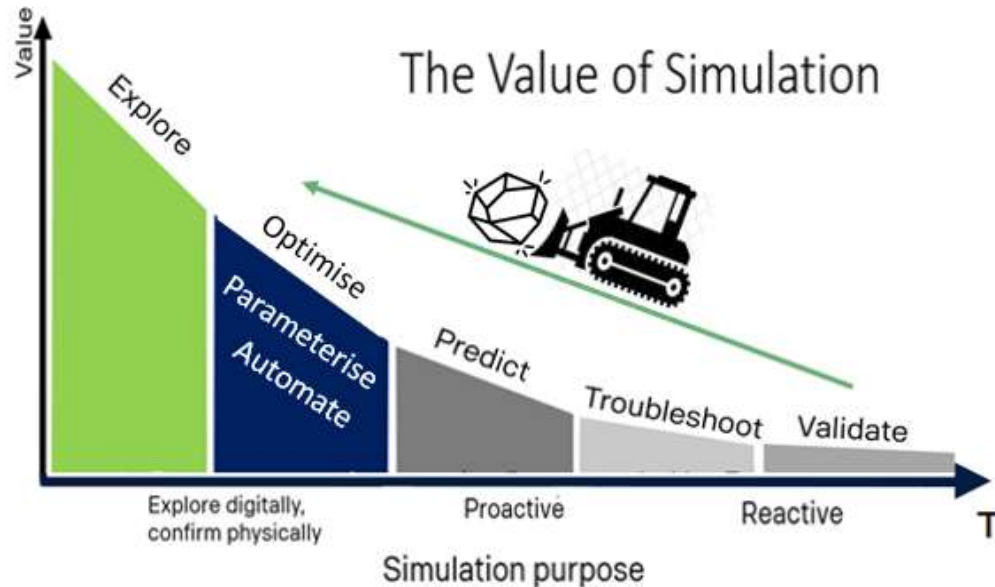
- Taked flow of virtual prototypes
- Standardized methods with documented capability
- Schematic virtual property assessments
- Decisions are made, based on the virtual assessments

Simulation and Digitalisation in the Transformation



In digitisation, like the transformation into more digital simulations, there is a great potential "to make a really big difference" for increased flexibility and speed.

- By using simulations early, and not just for verification, we can speed up and simulation gives unique possibilities to balance and optimise product properties during exploration and development.





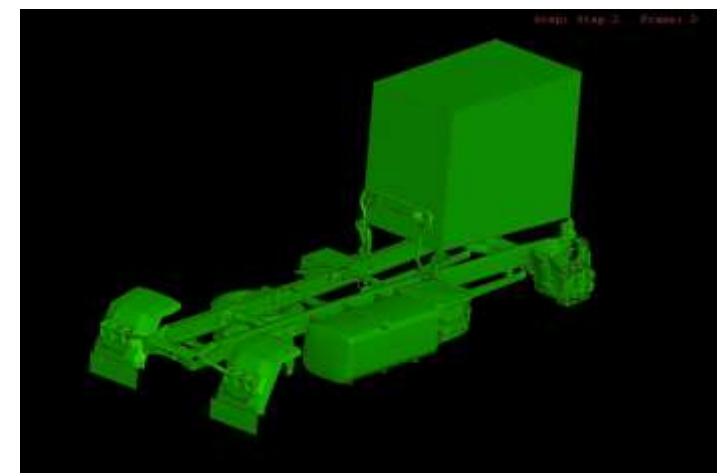
Our physical tests have historically served us well, with continuous improvements of a well-known product and market - at our own pace. Today's reputation for quality and our prestigious product clearly proves this success. But with the increased rate of change in our world with greater uncertainty and new competitors etc - then late physical tests are not enough to enhance quality by verifying our new product changes. As late changes are expensive and time consuming and cannot affect the result fast enough to a great extent.

Consider that physical testing also is in some way a simulation, as prototype items are often not manufactured using serial methods and the designs differ from the final ones. Maybe driven on a test track where try to force results with higher loads for a limited time...





Physical testing will still be an important cornerstone, but the demands is changing. With greater speed and flexibility in the development work, a conflict often arises with physical testing - when the test can be carried out much later than when the test-answer is desired the component or its context has changed - which affects the value of the test results negatively.

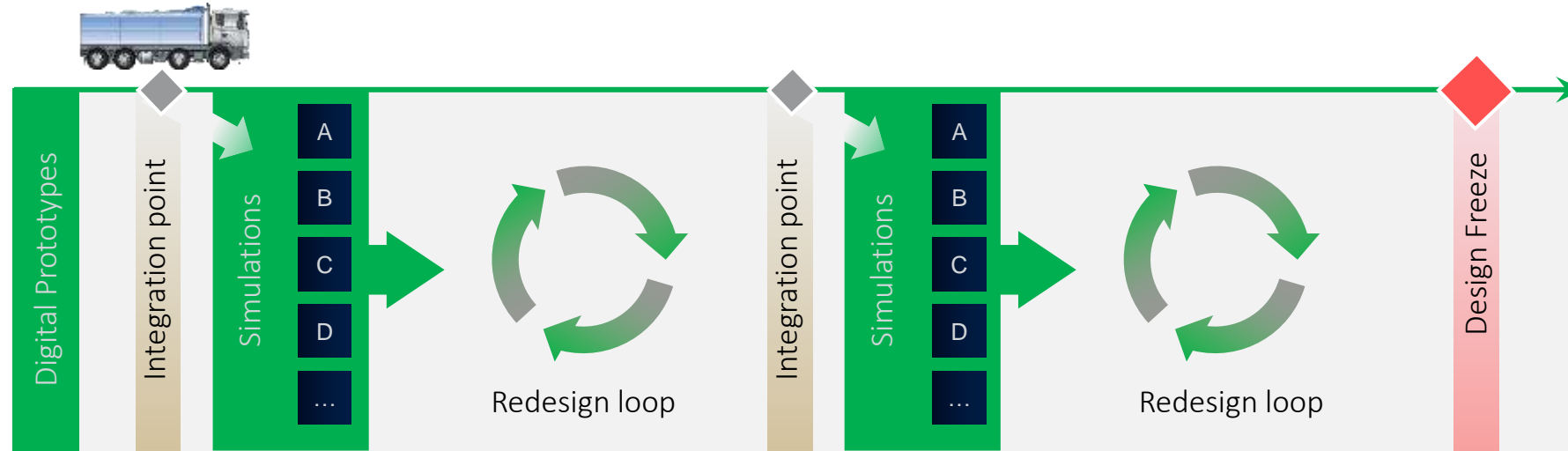


We need to work close together; design, simulations and testing, in this digitalisation journey. With the knowledge from physical testing, we can continuously improvement our simulation methods for increased capability, precision and speed – by corelation and methods improvements to enhance the speed and development of the product.



Simulation is a vital part of continuous integrations to examine if proposed solutions will work in a larger context for fast iterations to change. Our simulations give us fast feedback loops to iteratively explore and optimise innovative and customer-centric solutions and concepts.

- With the help of continuous integration and digital simulations, we challenge early and continuously how our various parts work as a system and whether our products and services get the properties and functions we and our customers want. This without the time, cost and natural resources consumed in manufacturing and physical testing.



An example is the BEVs simulation assessment to Verify the vehicles continually based on different simulations in the VCF Value Flow with a 10 week PI-cadence. This to aggregate deviations for fast feed-back loops and forecast to balancing and replanning during development.



Why digital acceleration at Scania

- Long term – Digital is heavily impacting our chosen positioning
- Short & mid term – Digital enables large potentials in our core processes
 - Productivity & quality improvements
 - Customer & employee value / experience



SCANIA STRATEGY 2025
STRATEGIC FOCUS AREA DIGITALISATION
PRODUCT REALISATION

Digitalisation

Digital Product Realisation

"A Digital, Automated and Simulation Based Research & Development Process"

Why and what

Digital improving our product realisation capability to deliver and react timely to capture business opportunities and realise 50% new competitive and sustainable products by 2030

Digital models and simulations enable us to work in a seamless value flow where all information used and stored is digital, resulting in shortened and predictable product deliveries to a significantly lower cost



Product Realisation

Digital Thread

Loop
Track
Real Time
Alerts/Events

Why and what – "Let's shape a seamless collaboration stream with a paced flow"

Companies around the world are going digital, removing paper and document processes and experiencing huge gains with a digital thread.

The digital thread refers to a framework for collaboration with a supporting data flow for the lifecycle across traditionally siloed functional perspectives. The digital thread concept delivering "the right information to the right place at the right time."

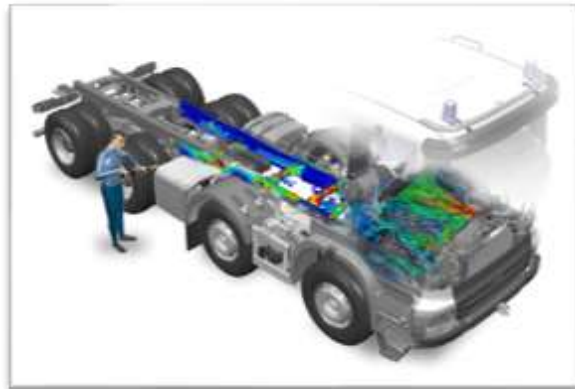
In Industry 4.0, a cyber-physical system (Mechatronics) refers to the digital twin of a physical system used to communicate properties and live status to other cyber-physical systems and applications in smart factory. Smart Manufacturing strives to orchestrate and optimize business processes across factories and the entire value chain. These initiatives makes sense when similar digital connectivity goals start converging into a single framework strategy especially for the product realisation within the same digital thread concept.

The digital thread provide a formal framework for collaboration on technical data with the ability to access, optimize, simulate and analyse from disparate systems throughout the product lifecycle and manual handovers are eliminated. The product lifecycle includes: Exploration/Innovation, Design, Procurement, Test & Evaluation, Production, Services, and Field Operation. The digital thread and digital twin include as-designed requirements, validation and inspection records, as-built data, as-floor data, and as-maintained data.

Digital Thread

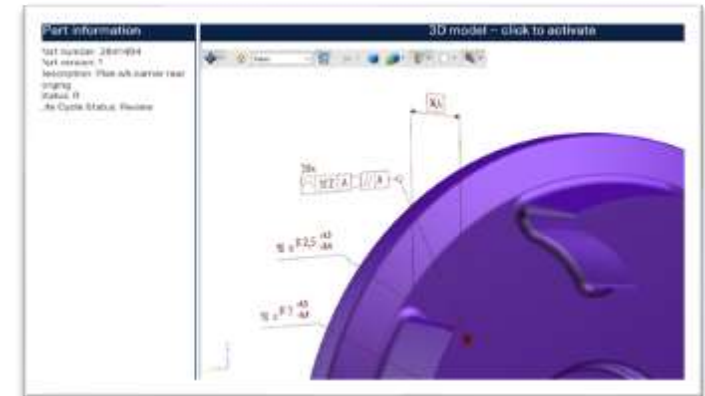
Simulation Based Product Development

Phased Agile Development
Shorten Lead-times
Raised Quality
Cut Costs



Model Based Definition

Machine Readable
Enables Automation
Single Source = One Truth
Reduce Waste



Physical Tests -> Simulations

Drawings -> 3D + Data

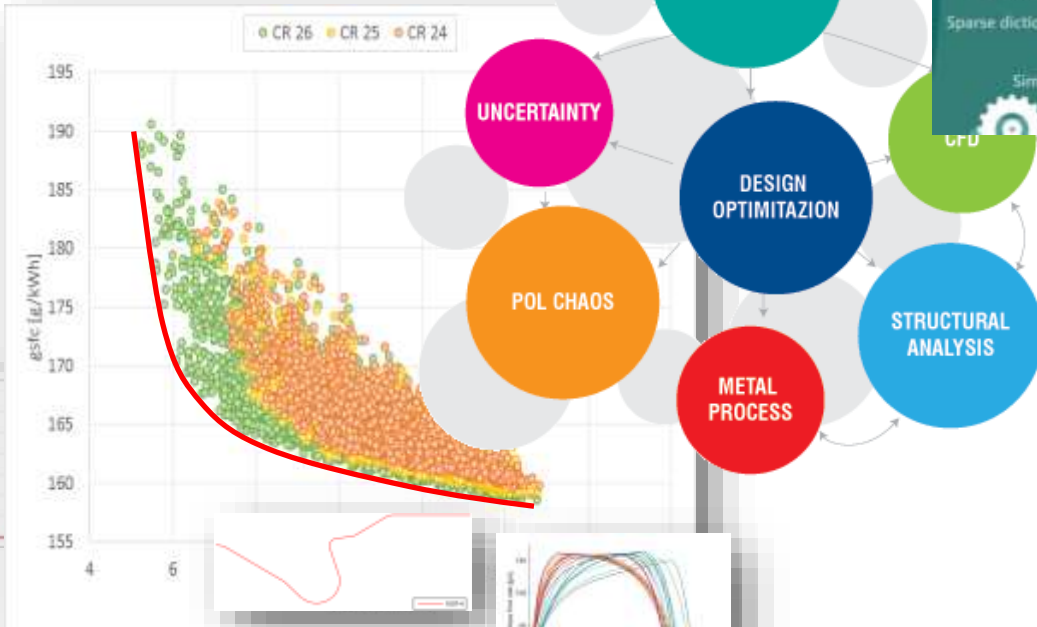
Technology advancement level ↑

Machine Learning
(Artificial Intelligence)



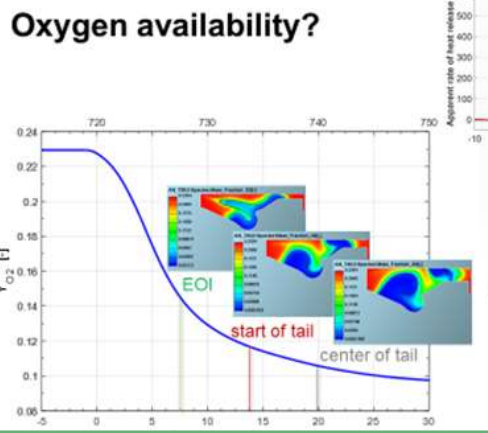
Multi Disciplinary Optimization (MDO)

DOE / Optimization



Predictive simulations / Phenomena understanding

Trial and error



A large data table with many columns and rows, representing simulation or experimental data.



Scania Today





If we all really want to be as fast as in software development we need to co-operate digitally. In the virtual environment we can combine mechanics, electronics and software. At the same time as we start to make, build and test physically in real-time – the speed and pace will be significantly slower. With the mechatronic virtual product model we can with simulations, data analytics and AI balance and optimise behaviours, functions and properties much earlier and faster

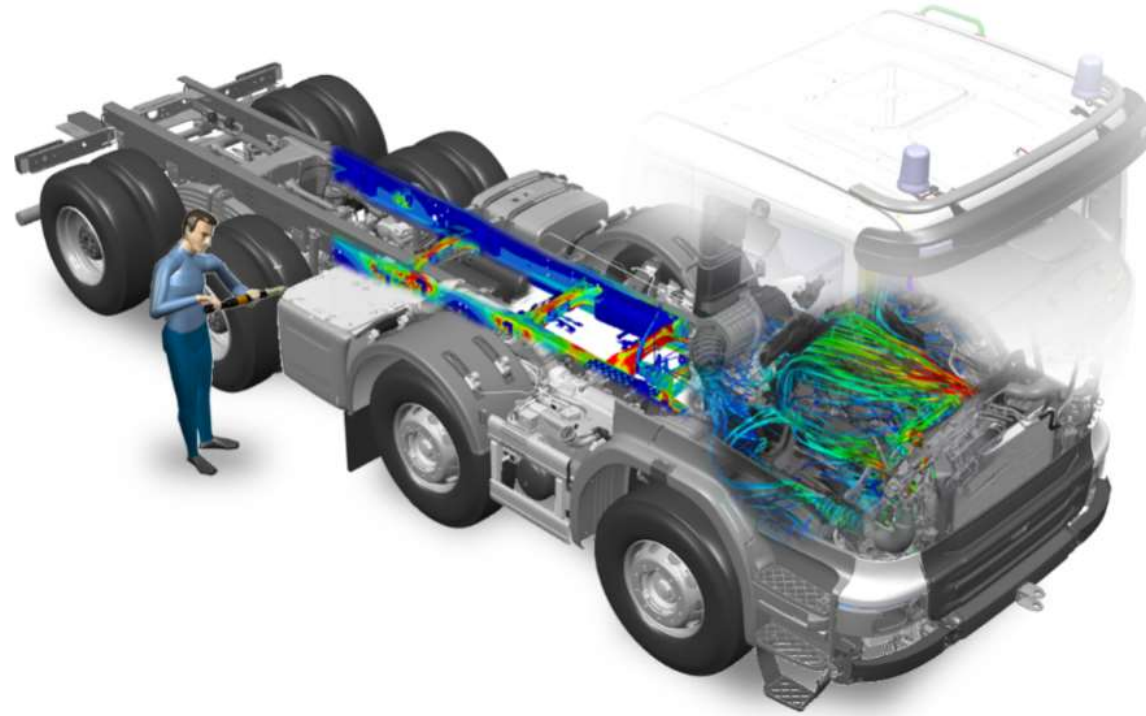
– and this is a much more lean work within the values-stream, with less waste and re-takes!



When we at the end finally integrate in physical verification tests we can then count on, and demand a lower amount of late deviations, high workloads peaks and costly changes.



There are many different digitisations that can help us in the integration activities to become more efficient, like to automate repetitive non-value-adding recurring administrative tasks. Alongside more simulation-based development, focus to use the existing common information systems for collaboration, now in our global context when we effectively must collaborate cross-functionally – together with all our sites (with Trust to Our Digital Thread).



Let's drive the shift, and digitalise and simulate instead of test physically, and contribute to a more digital and simulation-driven development for greater speed and flexibility. This is important in order to continue to be the sustainable leader in increasingly tougher competition, in an rapidly changing world.

So, Why is Speed and Flexibility so important ...

Iteration, Integration and Innovation



Fast Pay back



Fast Feedback



Fast Impact

***Digitisation and Virtualisation – the Enabler
of Agile and Lean mechatronic solution
development ...***

”Try fast, Fail fast, Learn fast and Change fast”