

PODeST

Process Optimization and Development through SusTainability

How sustainability can become a parameter for process optimization and development

Florian Böss, **Dr. Martin Kirchner**, Bernd Schlüter (Process Technology & Engineering)

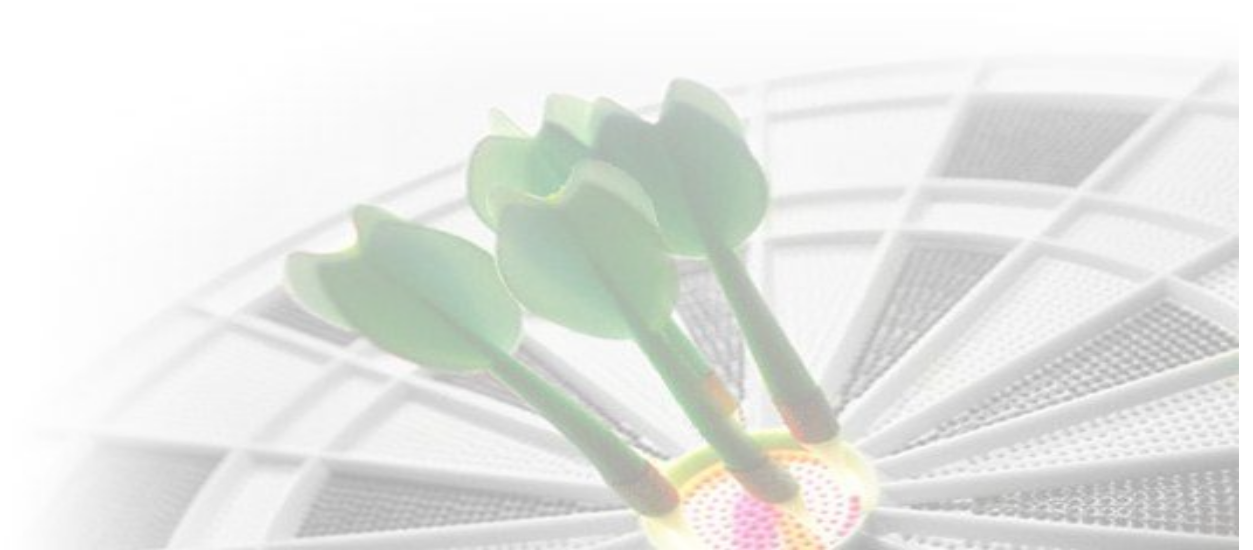
LCM2017 Conference, Luxembourg
Session: Sustainable Design of Complex Systems, Products and Services with Users integration into design

05.09.2017



Objectives of today

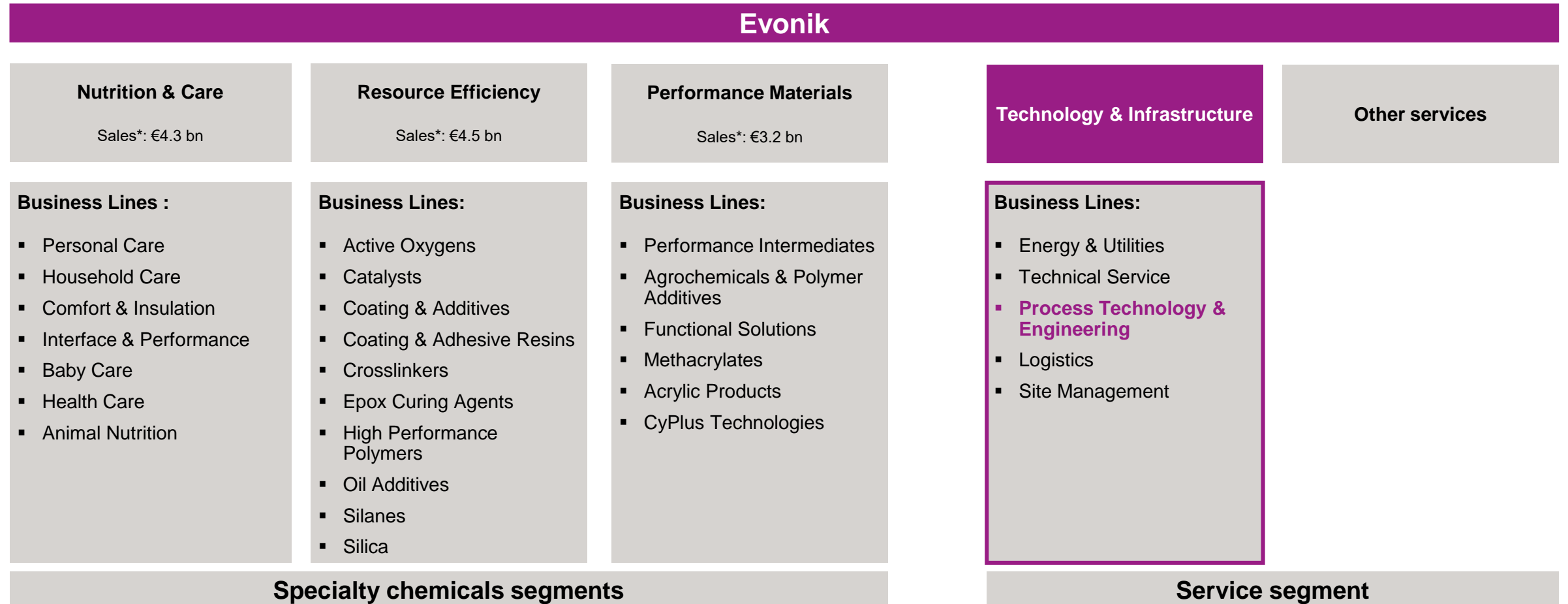
1. Setting the scene
2. Introduce the PODEST approach
3. Share insights regarding implementation
4. Summary



PODeST

Setting the scene

Evonik is the creative industrial group from Germany and one of the world's leading specialty chemicals companies



* Fiscal 2016

Consideration of sustainability in process development and optimization will strengthen our position as a technology service unit

Sustainability is becoming increasingly important for businesses

- Capital Markets
- Politics
- (Chemical) Industry
- Society
- Customers

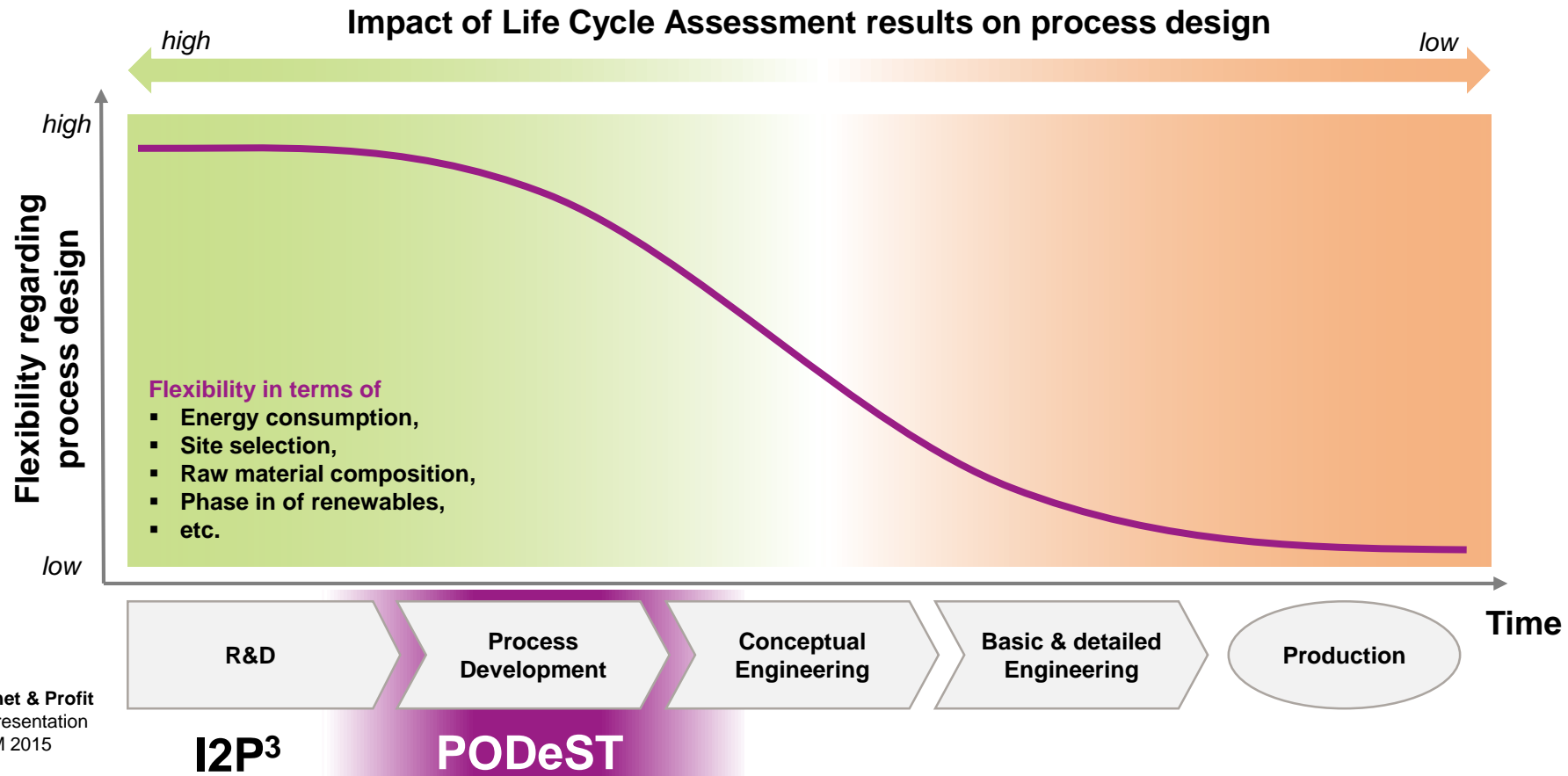
Process Technology community has great competence about Evonik's key processes, cost drivers and technological bottlenecks

Process Technology community has great influence on Evonik's sustainability performance

- Technology leadership holds the **keys to lever future trends**
 - More flexible processes regarding **energy consumption** and **raw material composition**
 - Phase in of **renewables**
 - Contribution to **circular economy**
 - etc.

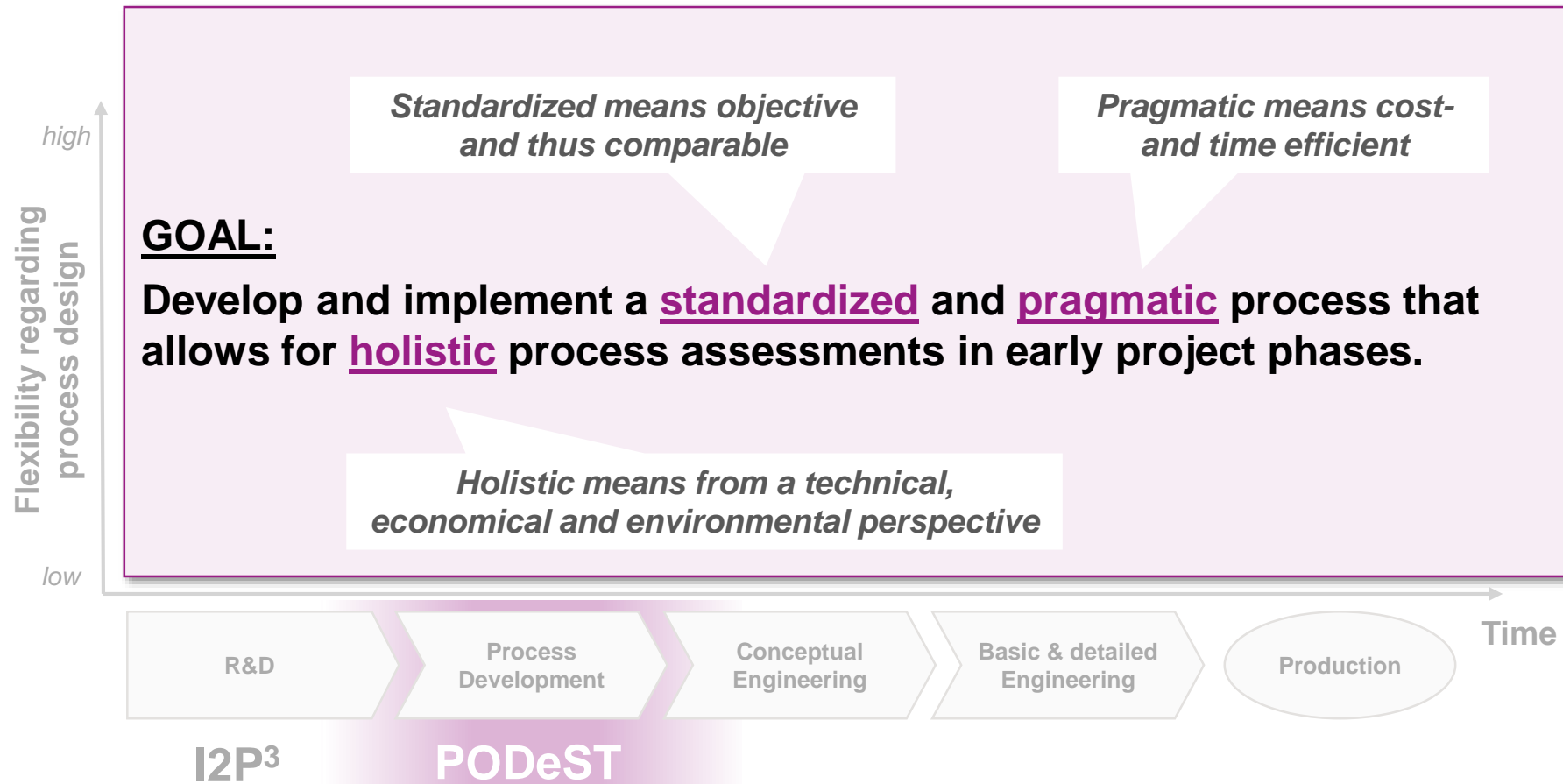
PODeST

The process technology community has great influence on Evonik's sustainability performance



I2P³ = Idea to People, Planet & Profit
For more information see presentation
of Martin Kirchner from LCM 2015
conference in Bordeaux

Evonik's Life Cycle Management (LCM) group, which is part of Process Technology, is leading the "PODeST" project



PODeST

Approach & Tool

Pragmatic means cost- and time efficient

- *What information are already available without any further effort?*
- *What level of accuracy should the results have?*
- *How should the procedure for an assessment look like?*

GOAL:

Develop and implement a standardized and pragmatic process that allows for holistic process assessments in early project phases.

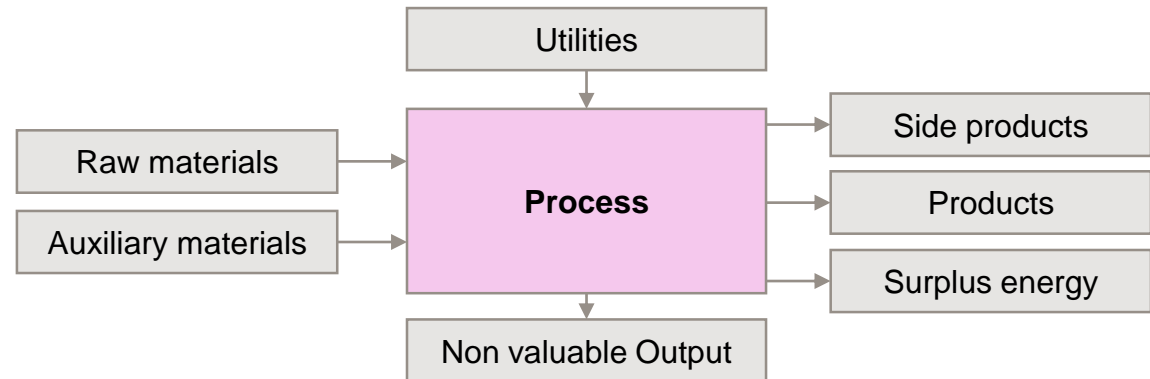
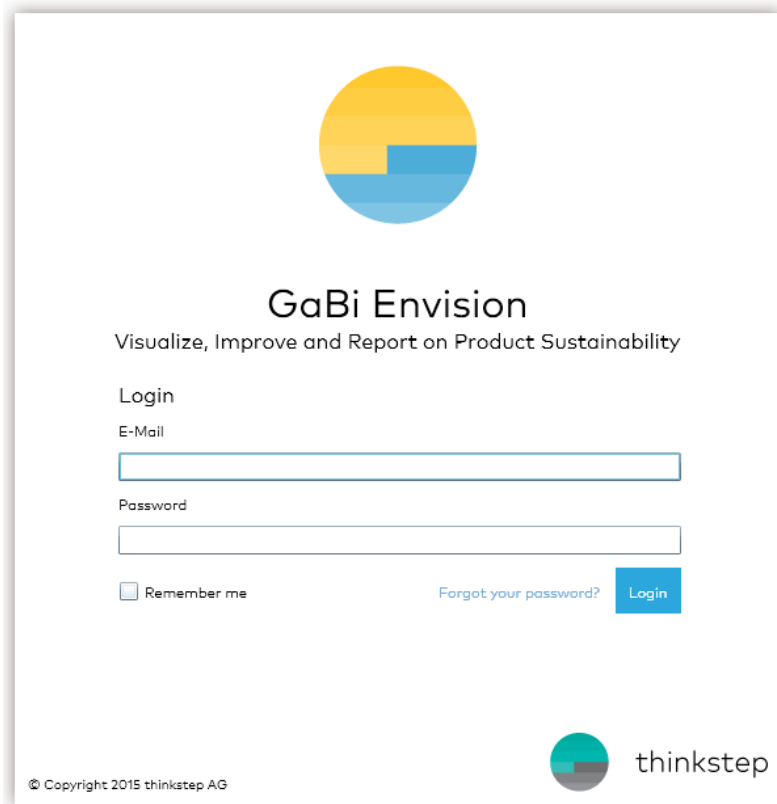
Pragmatic means cost- and time efficient

- *Information: Mass- and energy balances are available in general*
- *Accuracy: Rather robustness than accuracy (right order of magnitude)*
- *Procedure: Assessment can be carried out by process engineer itself (LCM team involvement not automatically required)*

GOAL:

Develop and implement a standardized and pragmatic process that allows for holistic process assessments in early project phases.

GaBi Envision enables every process engineer to perform a first rough estimation regarding the ecological performance of products and processes



With GaBi Envision we created a software tool with a simply parametrized process model for a first rough estimation!
This tool is called EvoCHEQ

All in- and outputs must refer to **1 kg product**

The EvoCHEQ tool supports process engineer by creating a report of the calculations and results automatically

The EvoCHEQ tool supports process engineer by creating a report of the calculations and results automatically. The workflow is shown in five stages:

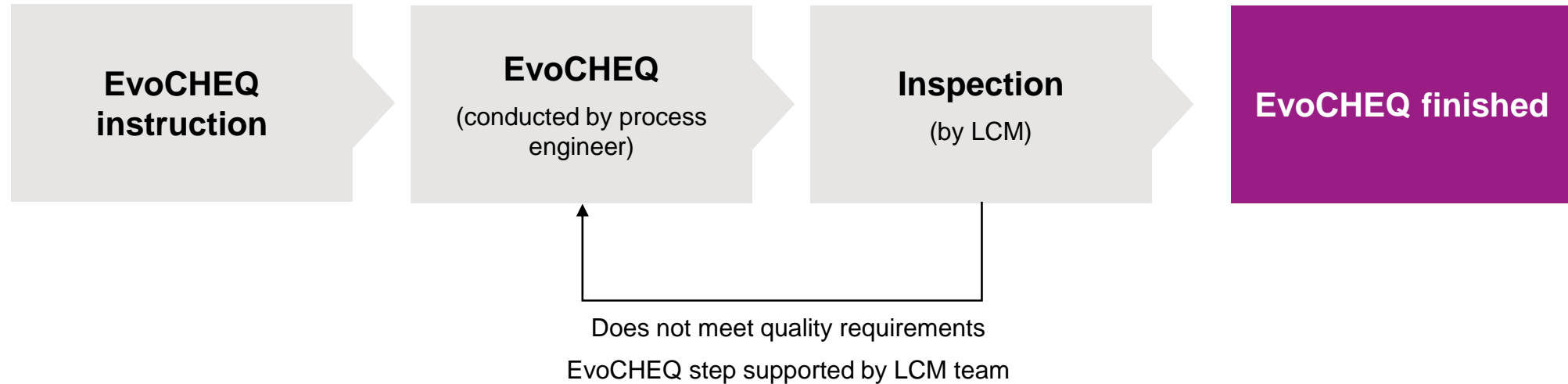
- Project overview:** Introduction and Project data sections. Includes a table for project data:

Material	Material	Material	Material
Material 1	Material 2	Material 3	Material 4
Material 5	Material 6	Material 7	Material 8
Material 9	Material 10	Material 11	Material 12
- Process flow:** A diagram showing the process flow with input and output streams.
- Input/Output data:** A table for input and output data, showing values for various materials and processes.
- Results:** A table showing results for various materials and processes, including a table for the Carbon Footprint results:

Material	Material	Material
Material 1	Material 2	Material 3
Material 4	Material 5	Material 6
- Results:** A detailed report showing the Carbon Footprint results, including a bar chart and a table for the Carbon Footprint results:

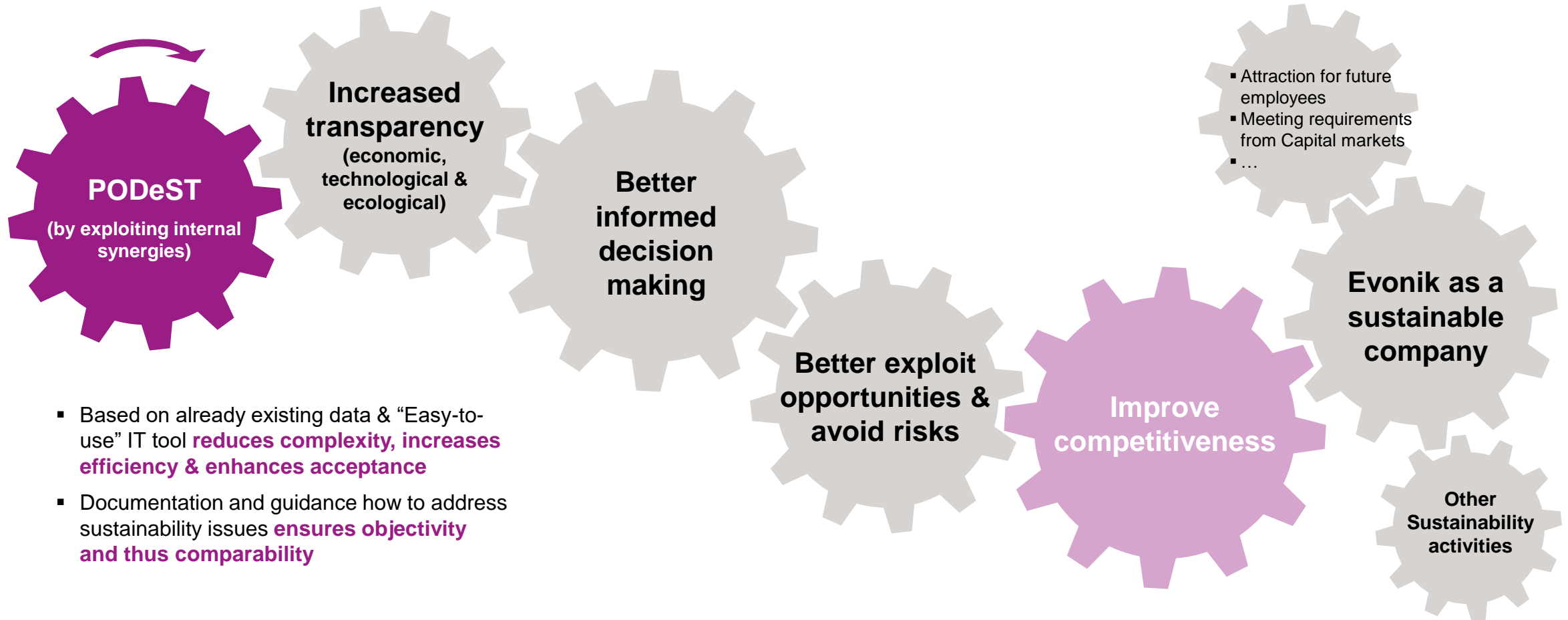
Material	Material	Material
Material 1	Material 2	Material 3
Material 4	Material 5	Material 6

Although a first rough estimation can be conducted by process engineer, results will always be checked by the Life Cycle Management (LCM) team



PODeST Summary

In the long run, PODeST is the basis for an improved competitiveness and supports Evonik on its way to become a sustainable company





EVONIK

POWER TO CREATE

The results of a sustainability assessment is heavily dependent on the availability of material and energy in- and outputs

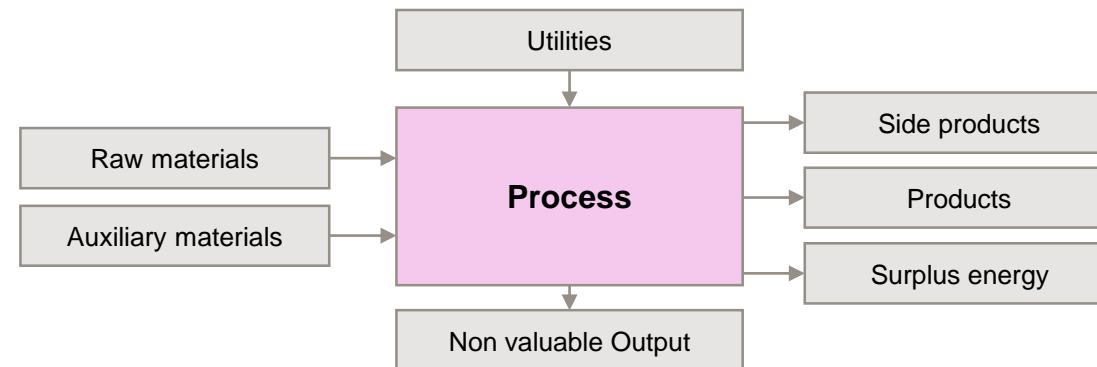
Complete mass- and energy balance

Inputs (product, material or energy flow that enters a unit process) comprise:

- **Raw materials** (primary material that is used to produce a product; in terms of renewable raw materials: source of renewable raw material [palm oil, palm kernel oil, sugar cane, sugar beet, etc.]),
- **auxiliary materials** (additives and other substances that are required making products saleable but play a minor role in comparison to the raw materials in terms of quantities or values),
- **utilities** (thermal & electric energy, compressed air, cooling water/other cooling agents, etc.).

Outputs (product, material or energy flow that leaves a unit process) comprise:

- **Products** (valuable output; any goods or service)
- **Side products**
- **Surplus energies**
- **Non-valuable output** (e.g. waste [substances or objects, which the holder intends or is required to dispose of], waste water, exhaust gas [e.g. biogenic CO₂-emissions]) including their further treatment



EvoCHEQ = Environmental Value Optimization by means of a Comparative and Holistic Evaluation that is based on Quantitative data

What is EvoCHEQ?

- **EvoCHEQ = Environmental Value Optimization by means of a Comparative and Holistic Evaluation that is based on Quantitative data**
- EvoCHEQ is a **software tool based on GaBi Envision** with a simply parametrized process model for a first rough estimation regarding the ecological performance of products and processes

What is needed to perform an EvoCHEQ?

- EvoCHEQ requires a (nearly) **complete mass and energy balance**, also including utilities like water, compressed air, etc. and transports for example
- All in- and outputs must **refer to 1 kg product**
- An EvoCHEQ does not require the LCM group to be involved. Instead: **Every process engineer will be able to perform a first rough estimation regarding the ecological performance of products and processes on his/her own.** However: As EvoCHEQ only provides a rough estimation it is recommended to request support by the LCM team when results will be used beyond internal communication.