Digitalization and data exploitation: opportunities and challenges for the European steel sector

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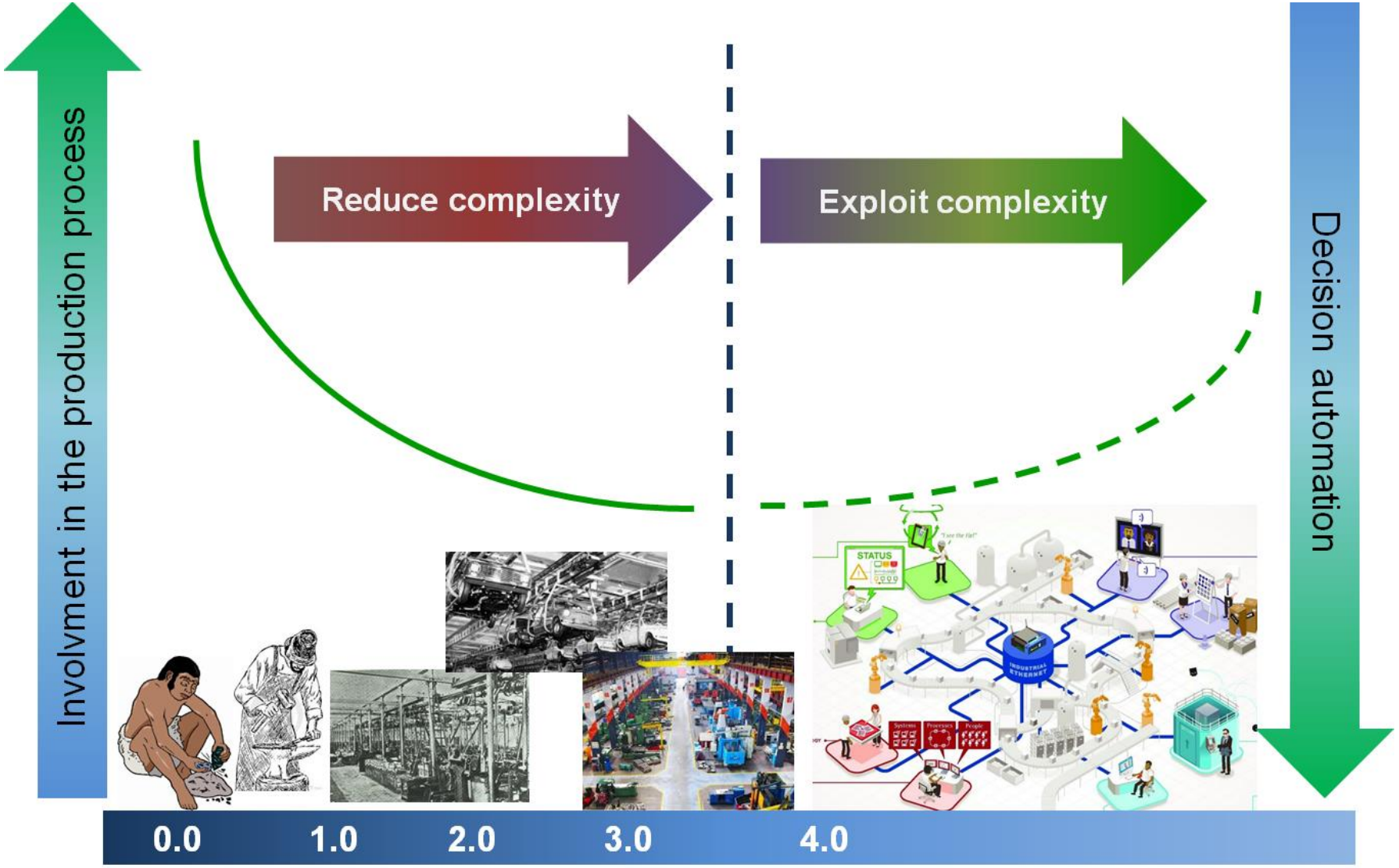
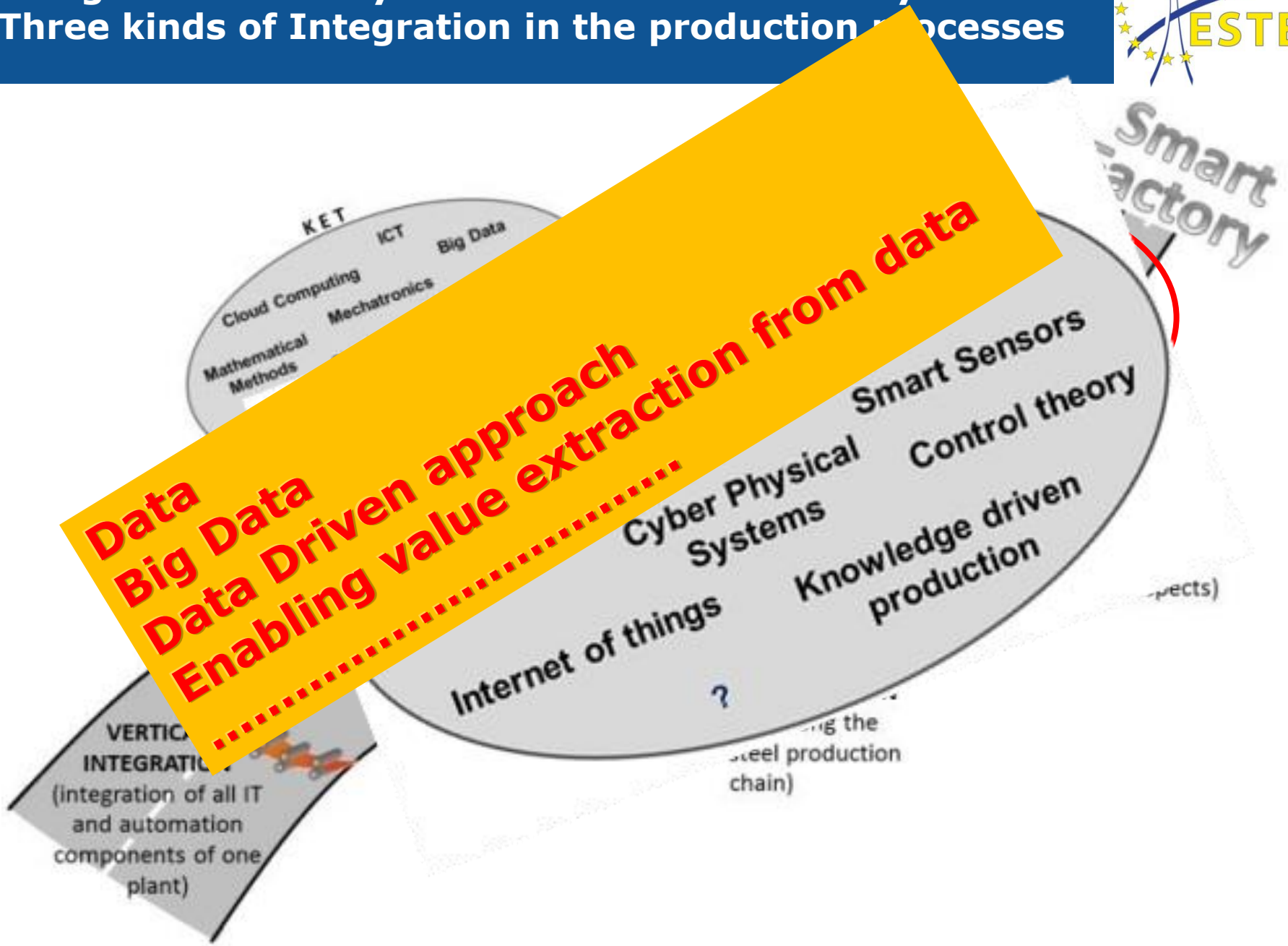
The impact of Industry 4.0
from reducing complexity to exploiting complexity



Integration as a keyword for the future factory. Three kinds of Integration in the production processes



Enabling full data exploitation while preserving our systems

Data: a source of value, a key to improve our knowledge and to develop/refine our process models in order to implement a predictive approach to process control

Traditional hie
Automation in
environments

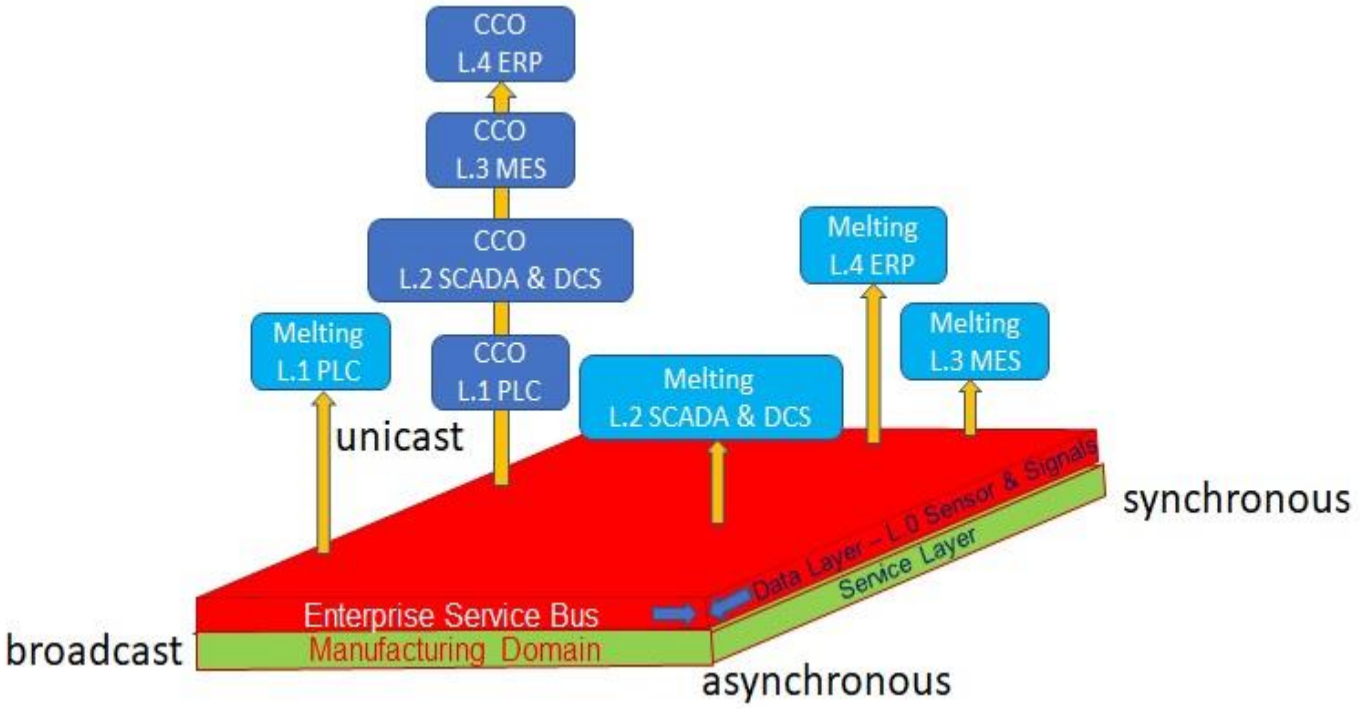
Level 4 – basic plant schedule, production, raw materials, deliv shipping, inventory
Time frame: month, week, d

Level 3 – workflow/recipe contro targeting desired products process performance and optimi
Time frame: d, shifts, h,min, s

Level 2 – monitoring
supervisory control
automated control
Time frame: h, min, sec, msec

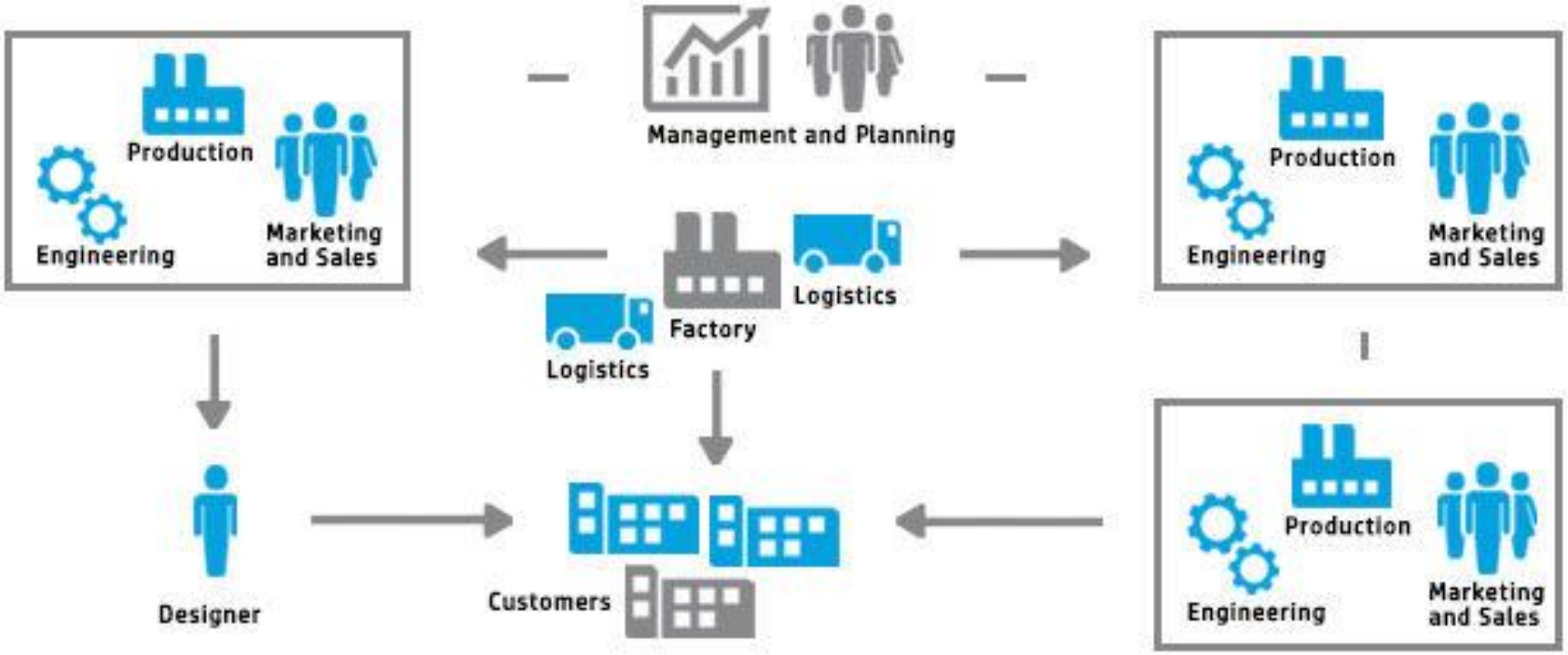
Level 1 – sensors, actuators, PL

Level 0 – production process



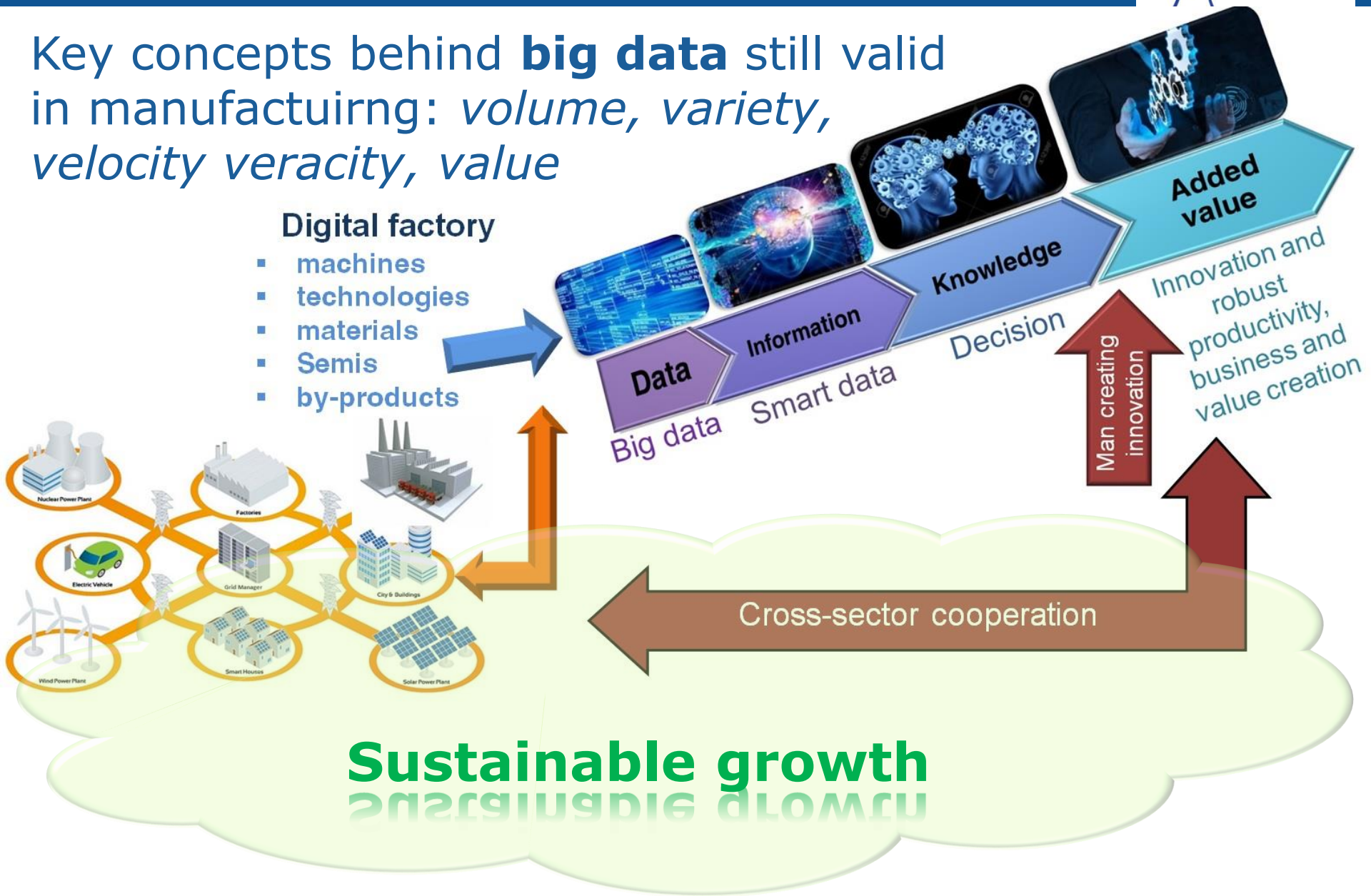
Evolution toward a multilayer architecture based on data

A totally connected and seamless production model



Big Data and data mining

Key concepts behind **big data** still valid in manufactuirng: *volume, variety, velocity veracity, value*



Big Data Challenges

The challenges in handling big-data include:

- **capturing "good" data**, i.e. trustable: this involves both sensing and measuring tools but also data cleansing and filtering
- Data **transfer**, which need fast, trustable and secure communication technologies
- Data **storage**, quering and updating
- Data **analysis** and interpretation for extracting information and knowledge via massively parallel software running on a relevant number of servers
- Data **visualization**
- Data **sharing**, information privacy and protection of data sources (**cyber-security**).

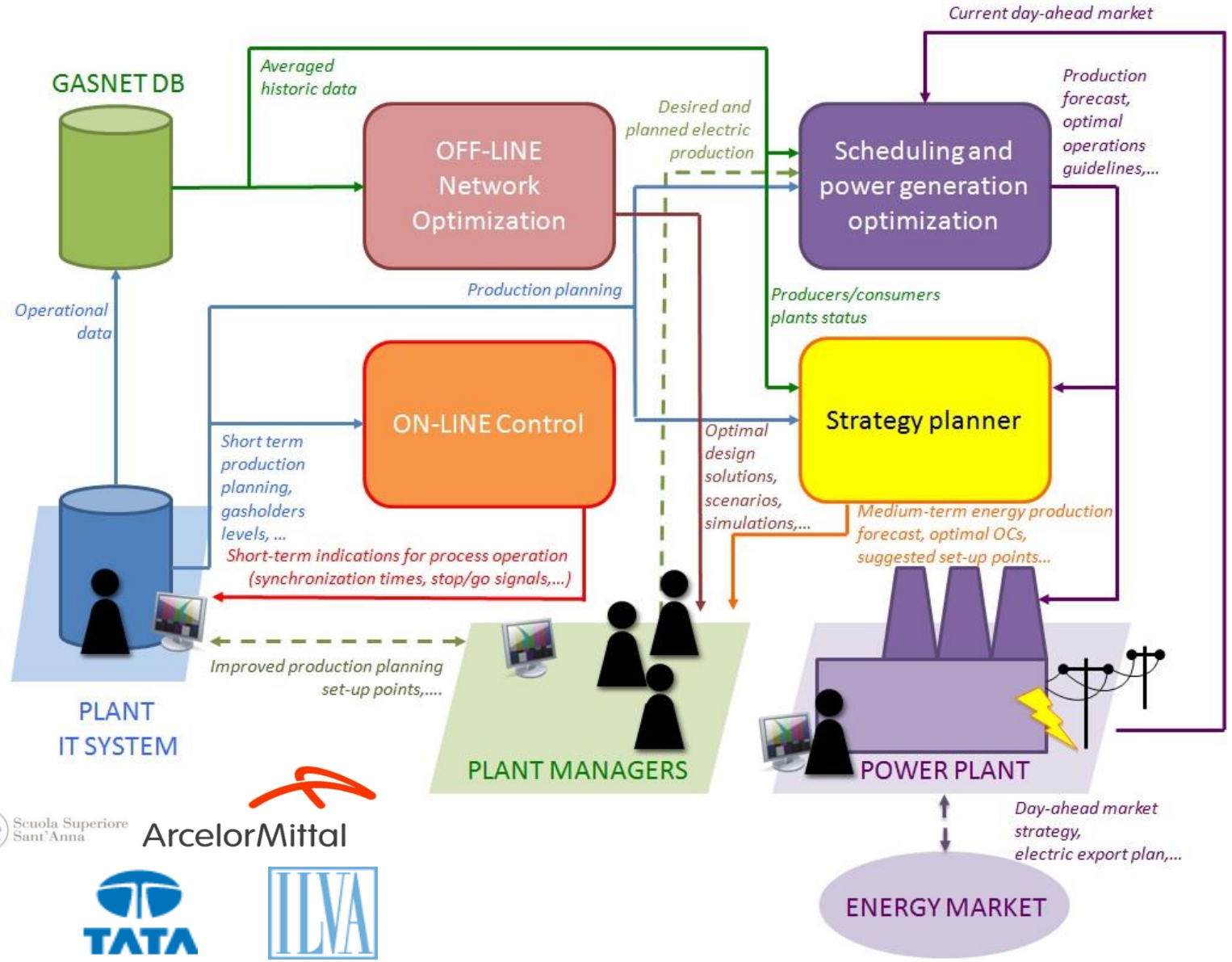
The efforts of the steel sector

The Steel sector is investing great efforts in order to face such challenge, by considering trustable and efficient data exploitation as a major enabler for improving its competitiveness on the global market and promoting a sustainable growth.

The **Research Fund for Coal and Steel** co-funds several projects devoted to topics like:

- Big-data processing for total product quality control, capillary monitoring of all the processes and smart maintenance;
- Application of Artificial Intelligence and Machine Learning-based approach for process optimization targeted to energy and resource efficiency and emissions reduction
- Promoting the evolution of all the different components of the process toward Cyber-Physical Systems
- Improving Cyber-security.

Optimization of the management of the process gases network within the integrated steelworks: GASNET



Interacting with the energy distribution system: DynergySteel

Offers

OPPORTUNITIES

Exploit

LONG TERM (Day)
FORECASTING
Day ahead planning according to lower energy cost

MEDIUM/SHORT TERM
(Minutes/seconds)
PRODUCTION REDEFINITION
Production rescheduling to take advantage from electricity market

ENERGY DEMAND FLEXIBILITY
Online devices to react on electric grid events

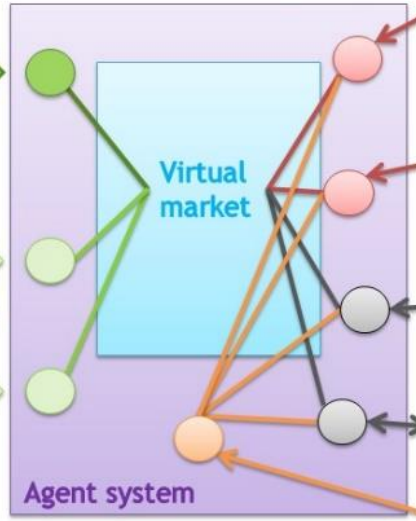
Agent System aimed to support the Decision Makers

Development of methods and tools devoted to the dynamical and optimized access to the electrical energy market in the present and future energy scenario

Day ahead & Intra Day with fluctuating prices

Balancing markets

Interruptible Loads



CSM Centro Sviluppo Materiali

BFI

ORI MARTIN

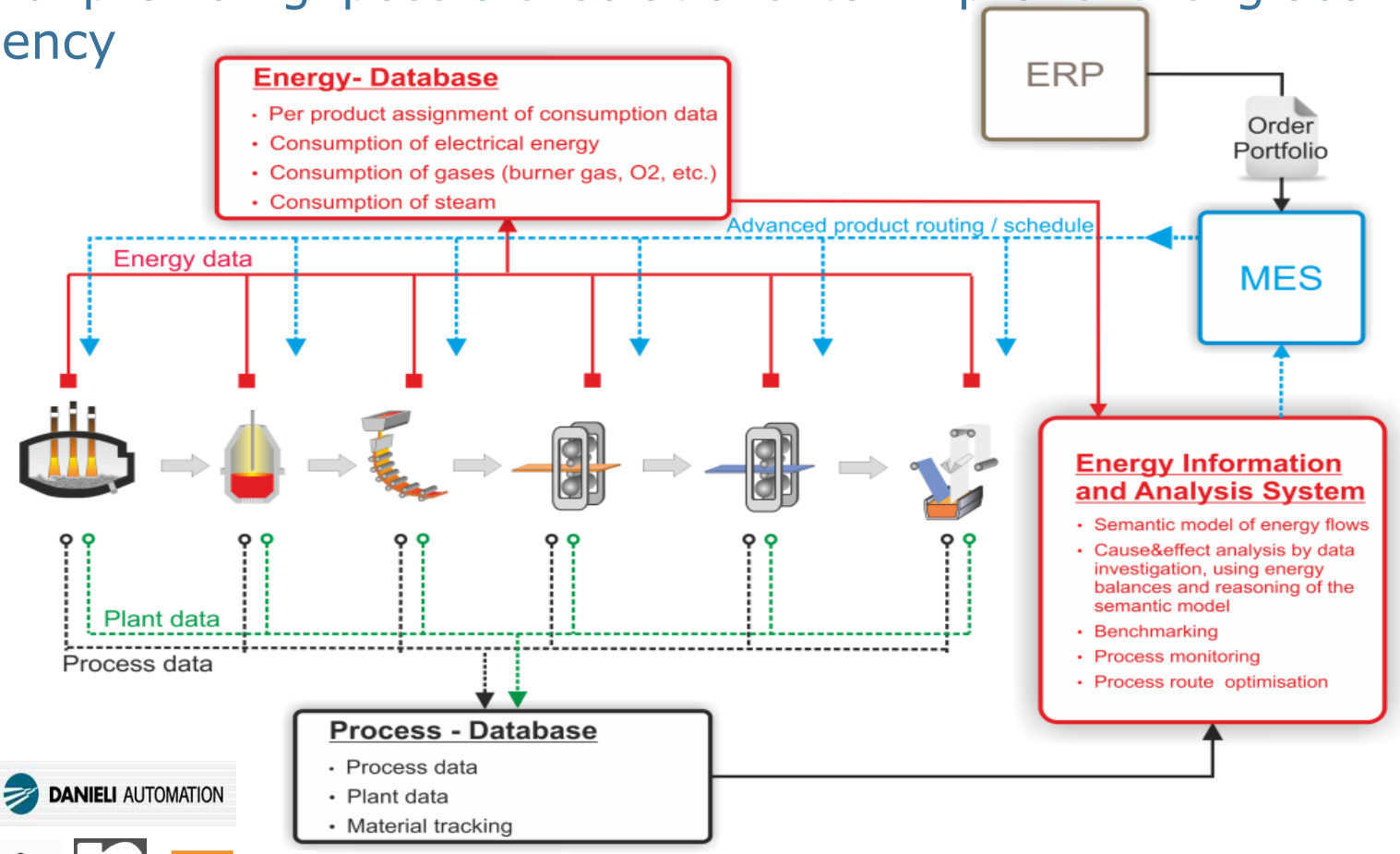
Scuola Superiore Sant'Anna

RSE Ricerca Sistema Energetico

TERNI ACCIAI SPECIALI TERNI

A factory-wide energy database to improve energy efficiency: EnergyDB

A factory-wide energy database connected to process DBs and development + tools with user-friendly interfaces for querying, analyzing and providing possible solutions to improve the global energy efficiency



Training for the digital future

The Steel sector has also launched a project funded under the Erasmus+ Programme (Key Action 2) for a Blueprint "New Skills Agenda Steel" entitled **Industry-driven sustainable European Steel Skills Agenda and Strategy (ESSA)** which aims at:

- Proactive identification of skill needs and demands for building appropriate training and curricula
- Identification, development and promotion of successful sectoral recruitment and upskilling schemes

A particular emphasis is given in this project on **digital, green and blue skills.**

European Steel Technology Platform – ESTEP

Strategic Research Agenda (SRA)

(This is an electronic version of the SRA, last updated on 5th September 2017)

Thank you for your attention!

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