SESAM-WORLD
DIGITAL GOLD NUGGETS IN MANUFACTURING?

Professor Charles Møller
Aalborg University

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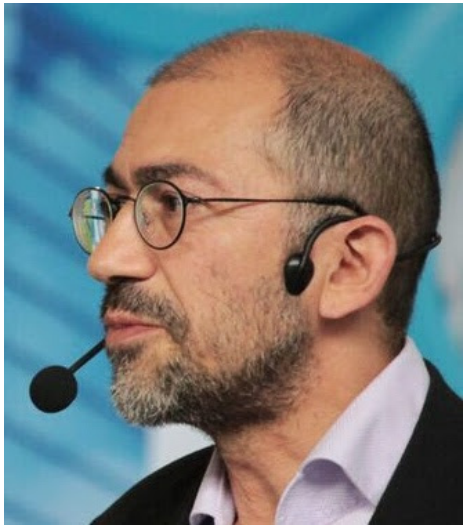
Professor, Charles Møller, Aalborg University, DK



- Chair
  - Department of Materials and Production
  - Enterprise Systems and Business Process Innovation
- Research
  - Operations and Supply Chain Management
  - Business Process Management
  - Enterprise Information Systems
  - Smart Production…
- Teaching
  - B.Sc. & M.Sc. Industrial Engineering
  - B.Sc. & M.Sc. Information Technology
  - e-MBA, Management of Technology (MMT)
- Education
  - Ph.D. degree (Industrial Engineering), Aalborg University
  - M.Sc. (Electrical Engineering), Technical University of Denmark
- Employment
  - Professor in-residence, Center for Electronic Business, San Francisco State University
  - Associate Professor, Aarhus School of Business, University of Aarhus
  - Associate Professor, Department of Production, Aalborg University
  - Consultant, Interconsult Management A/S (now EG)
  - Programmer & Analyst, Brüel & Kjær A/S
  - Programmer, IBM Denmark A/S

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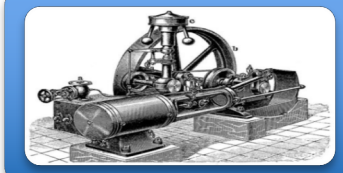
The Fourth Industrial Revolution



FIRST Industrial Revolution

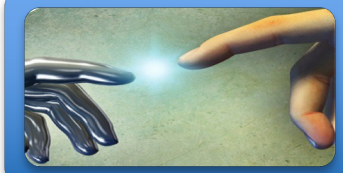
- Introduction of mechanical production facilities with the help of water and steam power

SECOND Industrial Revolution

- Introduction of division of labor and mass production with the help of electrical energy

THIRD Industrial Revolution

- Use of electronic and IT systems that further automate production



FOURTH Industrial Revolution

- Convergent physical, bio and digital systems

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Is Your Company Ready for a Digital Future?

Weill & Woerner, 2018

- There are four different pathways that businesses can take to become top performers in the digital economy. Leadership's role is to determine which pathway to pursue — and how aggressively to move.

- PATHWAYS
  - 1: Standardize first.
  - 2: Improve customer experience first.
  - 3: Take stair steps.
  - 4: Create a new organization.

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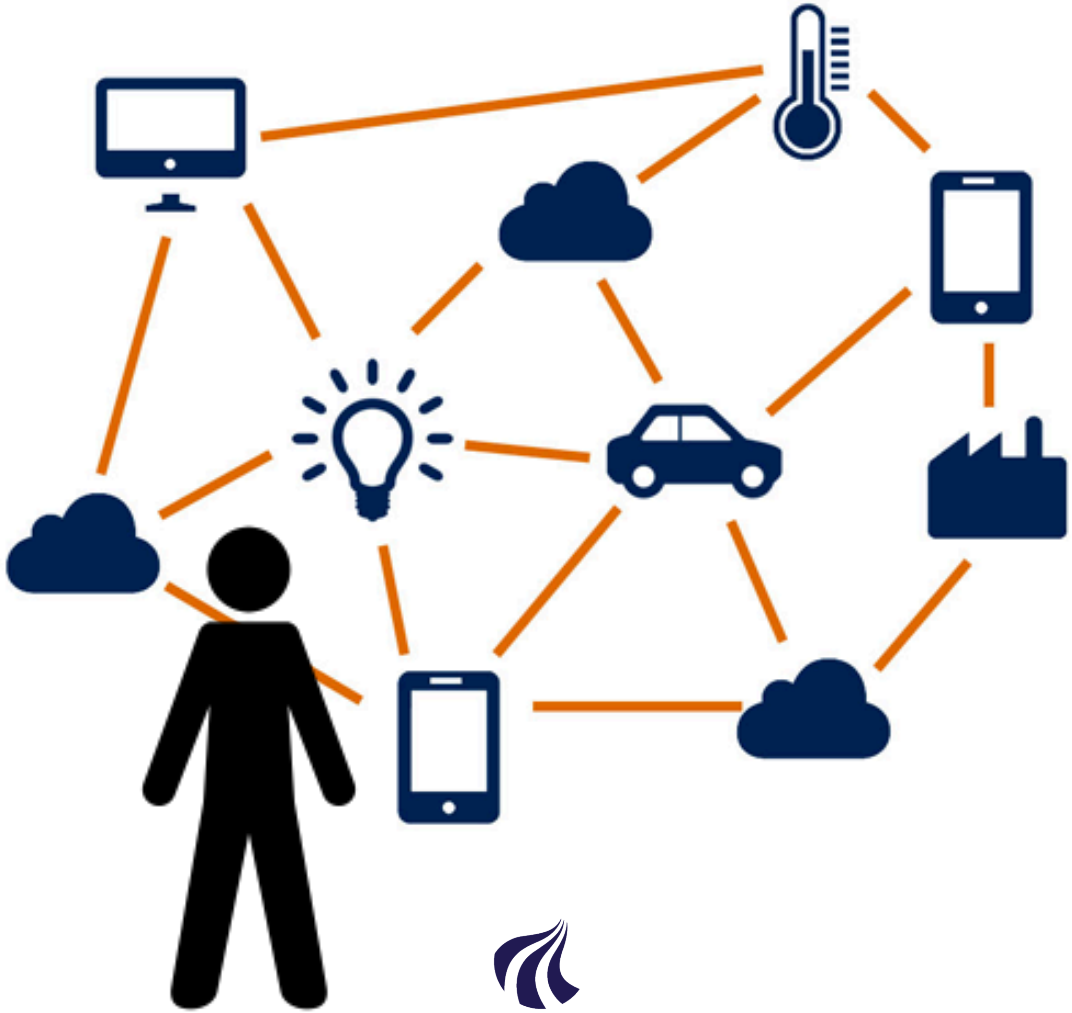
Making Sense of Smart Production



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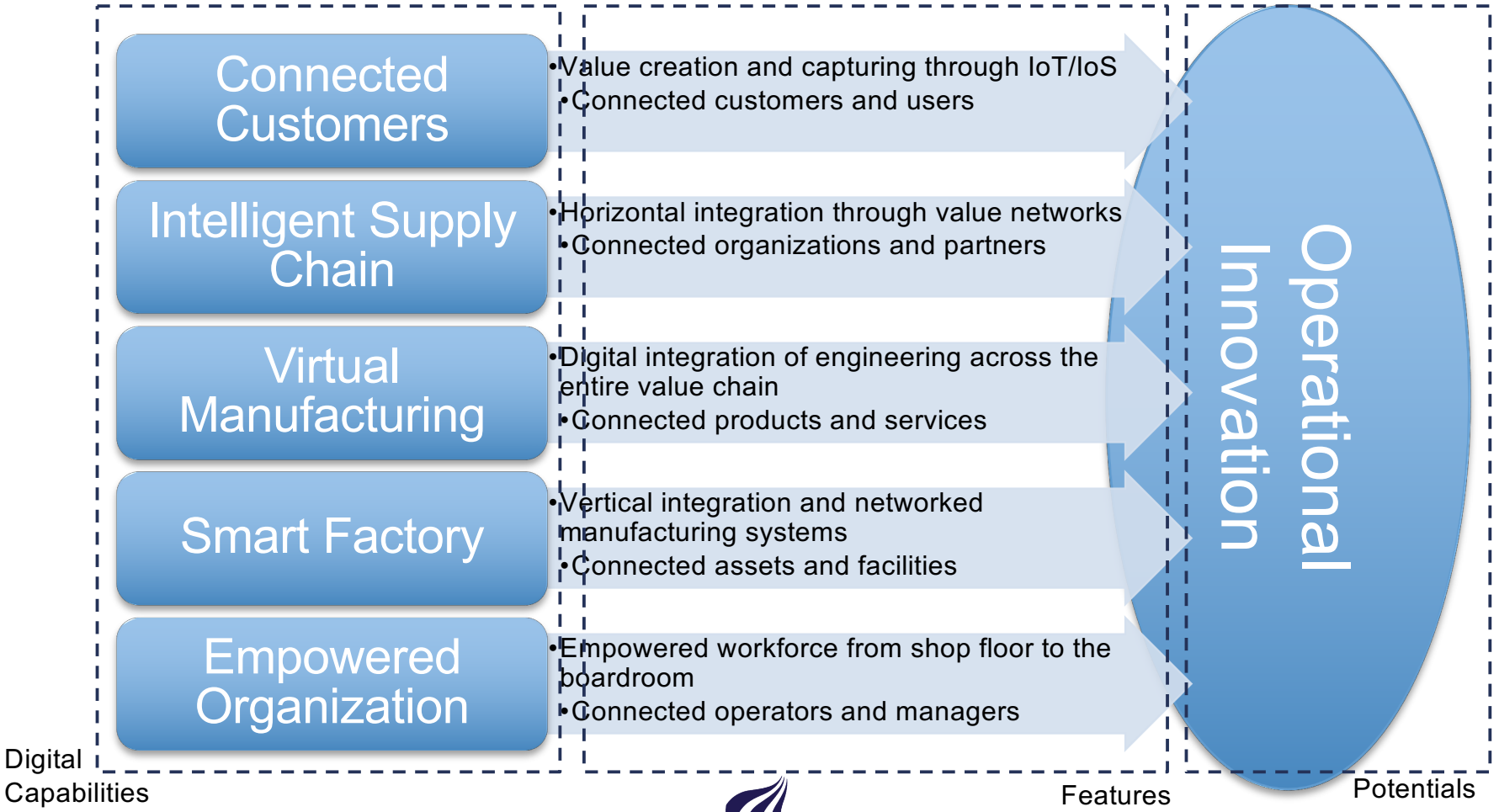
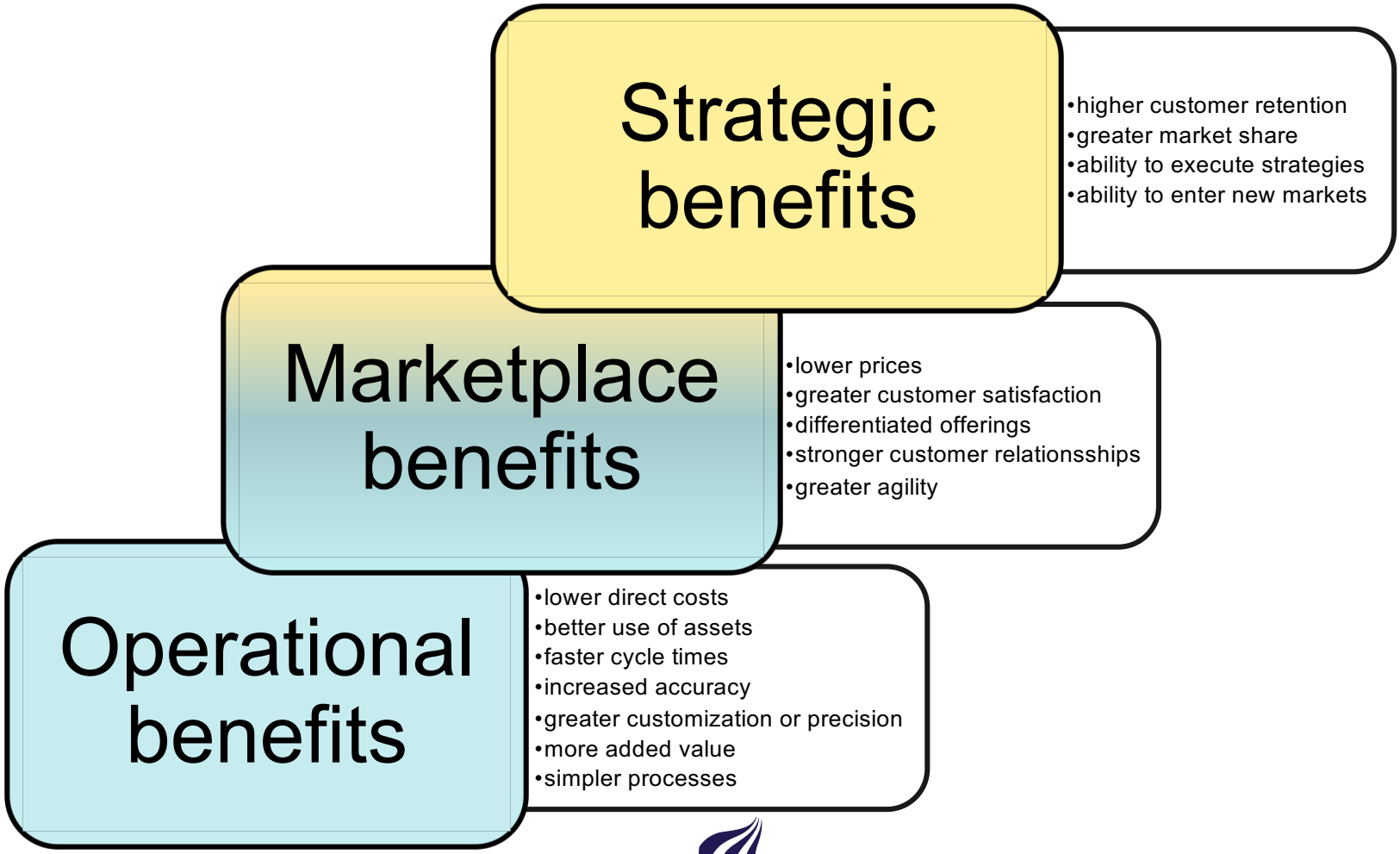
How to Make Production Smarter

Møller, 2020



Operational Innovation

Adapted from: Hammer, 2004



Evolution of Data Management Concepts in Operations

- From Scientific Management to AI
  - Time and Motion Study
  - Statistical Quality Control
  - Operations Research
  - Machine Learning

- From transactions to AI
  - Management Information Systems
  - Decision Support Systems
  - Business Intelligence
  - Big Data and Analytics

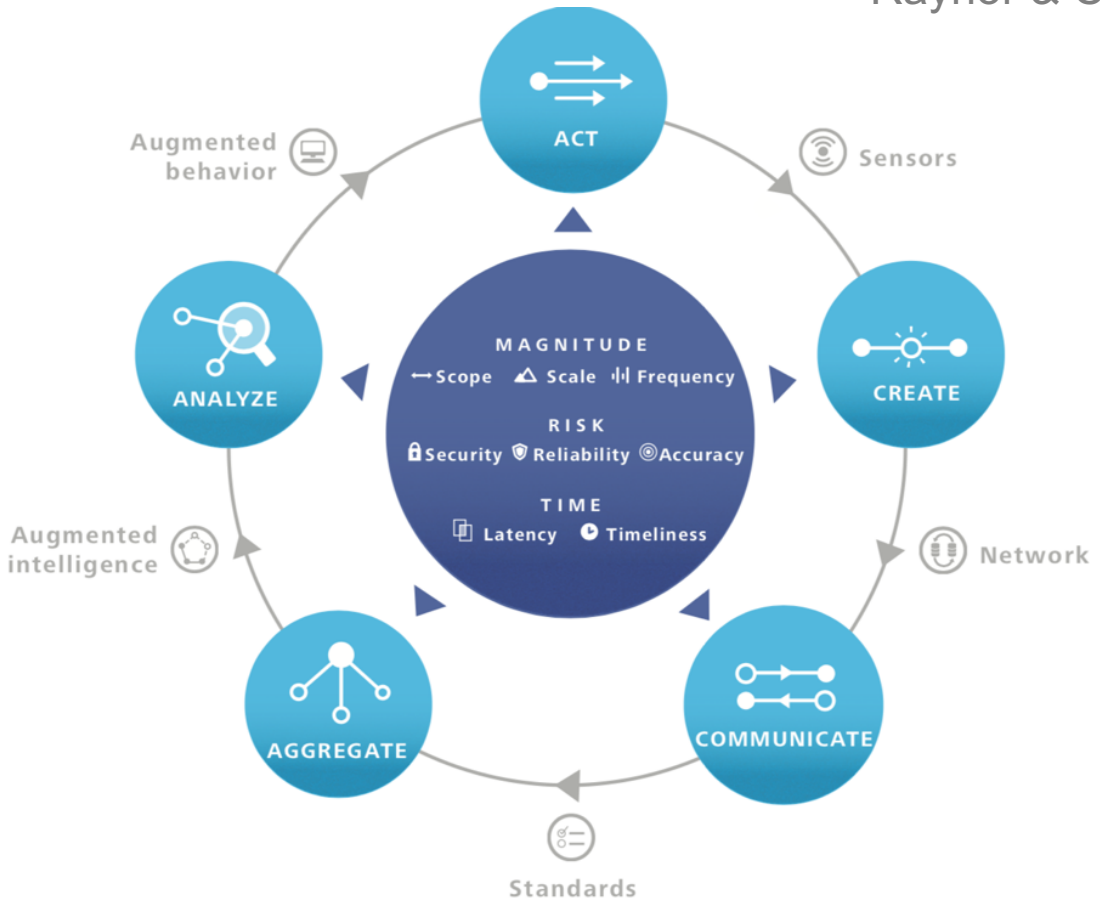
”In God we trust, all others must bring data”

W. Edwards Demming (1900-93)

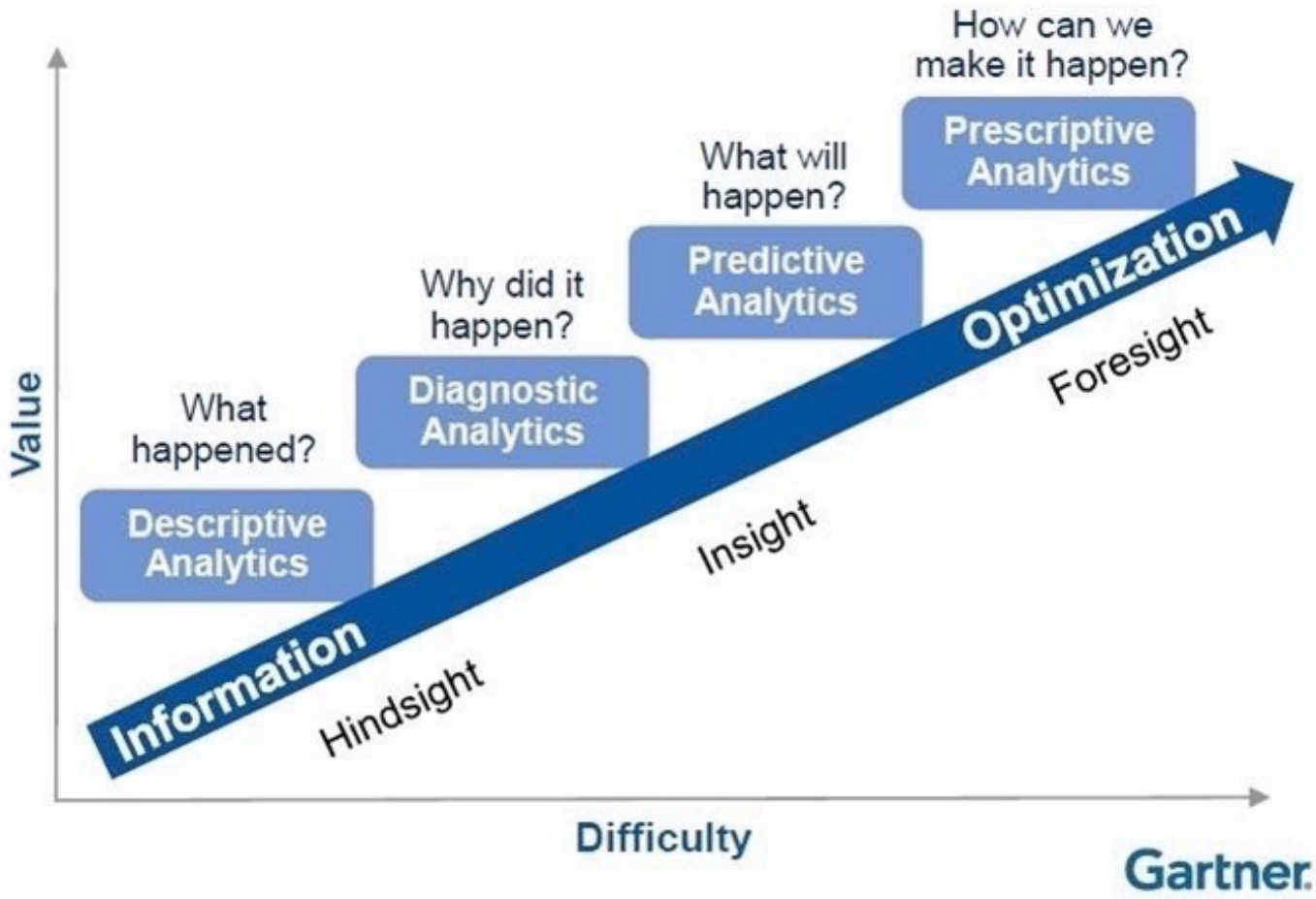
VALUE EXPLOITATION
INDUSTRIAL PERSPECTIVE

The Information Value Loop

Raynor & Cotteleer, 2015

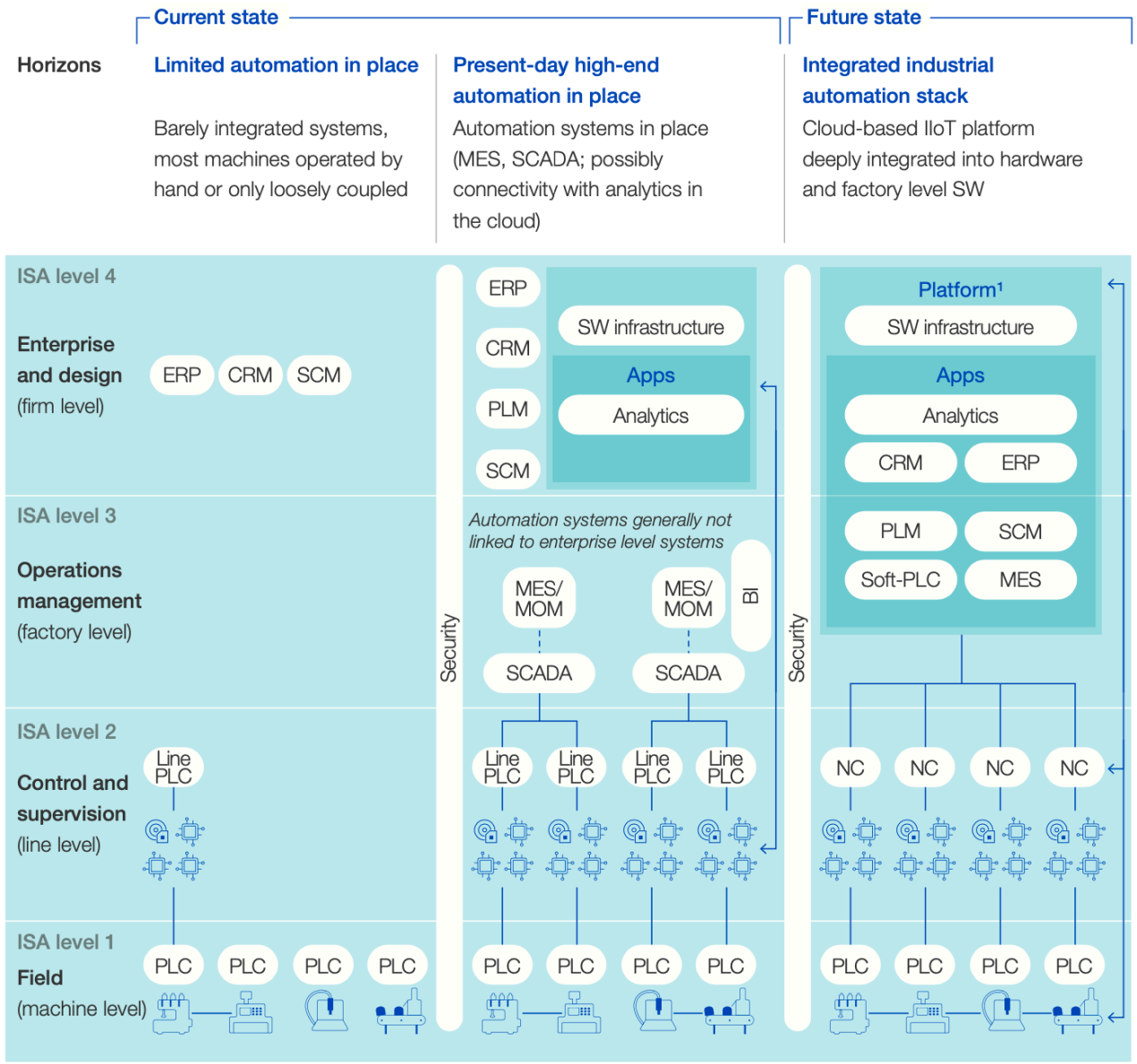


Maturity of Analytical Capabilities



IIoT Platform

McKinsey, 2018



VALUE
EXPLORATION
SPIRIT OF THE
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Mode 1: Data-driven Value Exploration

- Starting point
  - Abundance of data
- Value proposition
  - To be investigated
- Cases
  - Business Process Mining, Customer Insight

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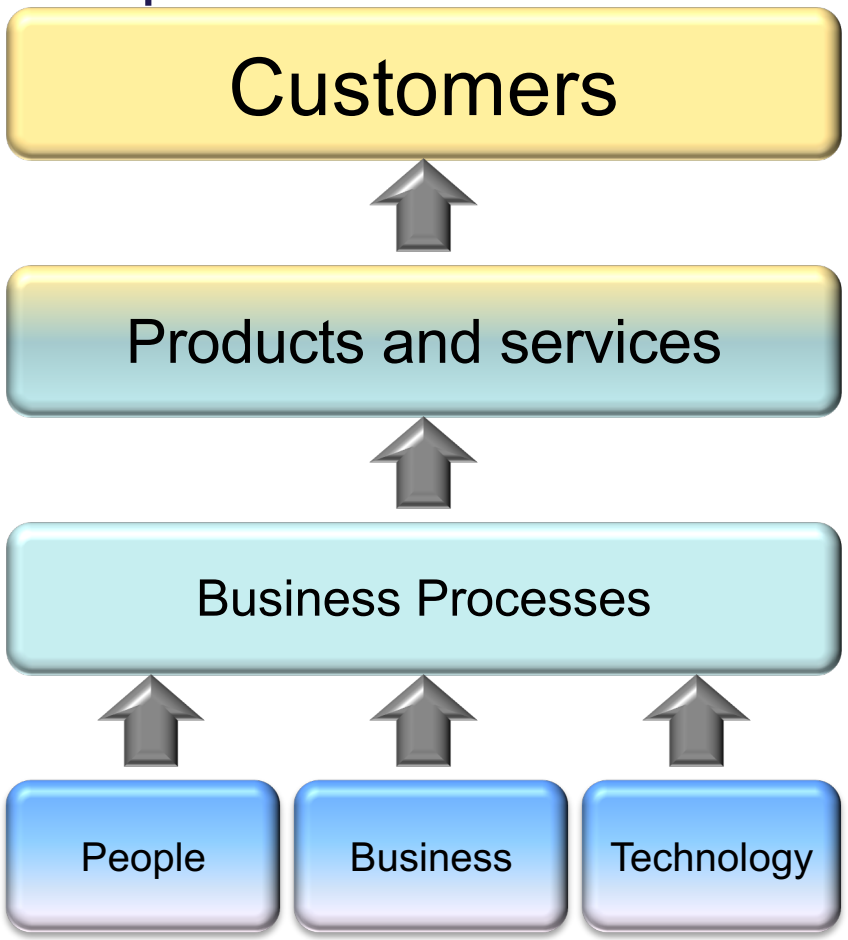
Mode 2: Business-driven Value Exploration

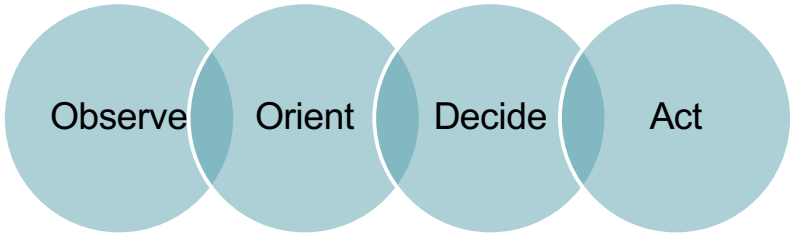
- Starting Point
  - Business Problem/Issues
- Value Proposition
  - Optimal resource utilization
- Cases
  - Business Process Management
  - End-to-end value chain optimization



Mode 3: Opportunity-driven Value Exploration

- Starting Point
  - Customer and Competitors
- Value Creation
  - “Getting inside opponents OODA loop”
- Cases
  - Business Process Innovation
  - Lean Startup

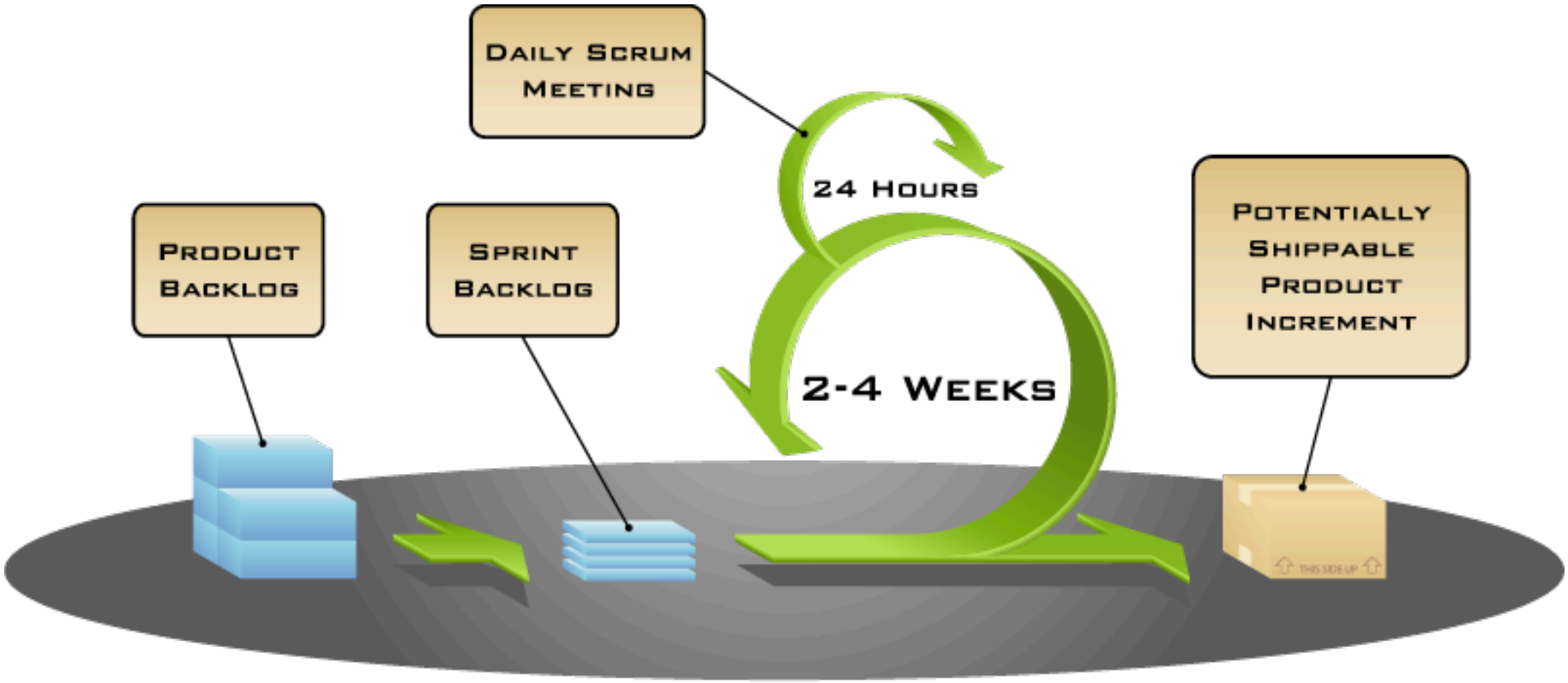
The Essence of Winning and Loosing



The OODA loop is the cycle observe–orient–decide–act, developed by military strategist and United States Air Force Colonel John Boyd.

Boyd applied the concept to the combat operations process, often at the operational level during military campaigns.

Agile Value Exploration Process



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Digital Compass

McKinsey, 2016

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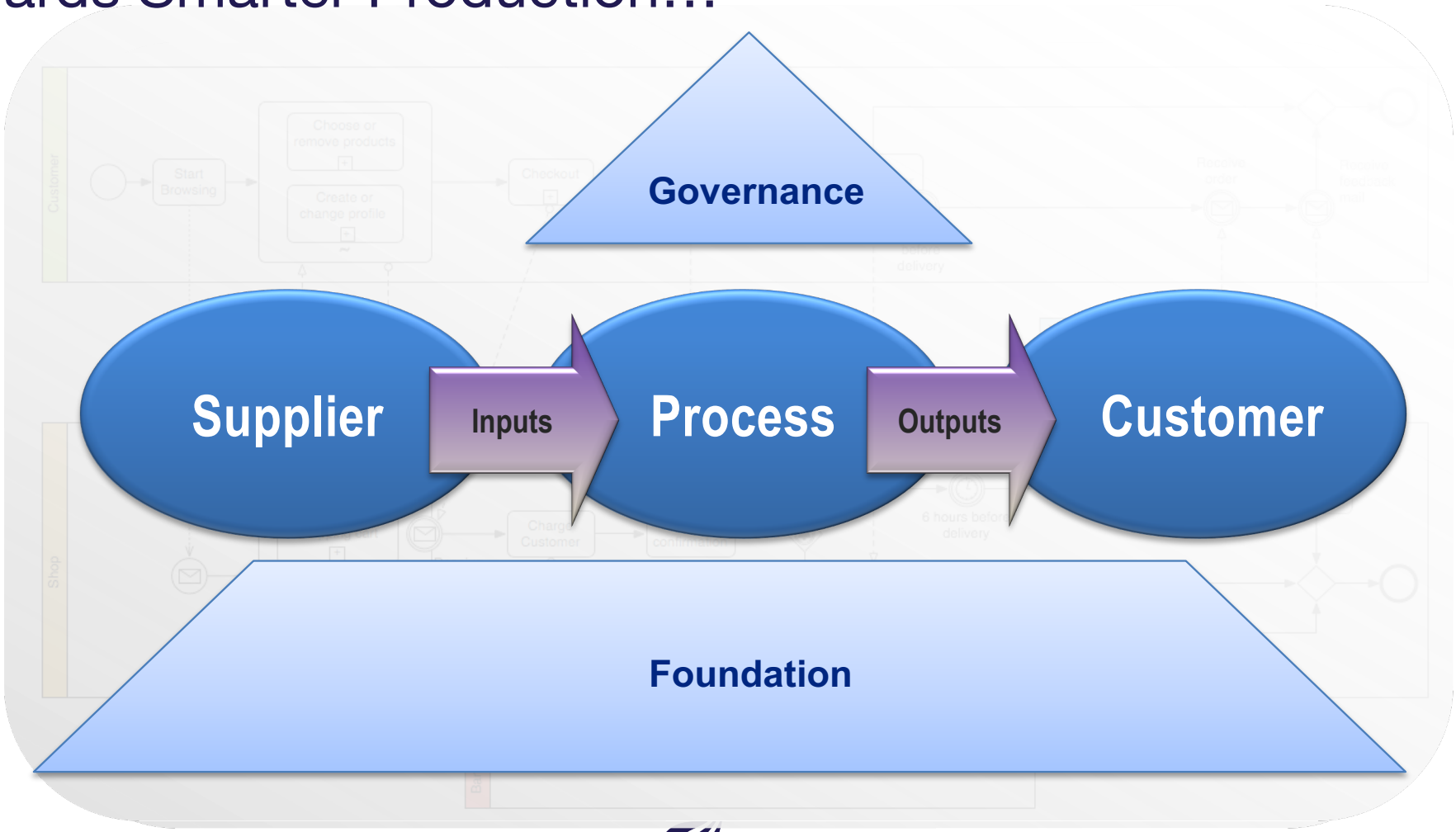
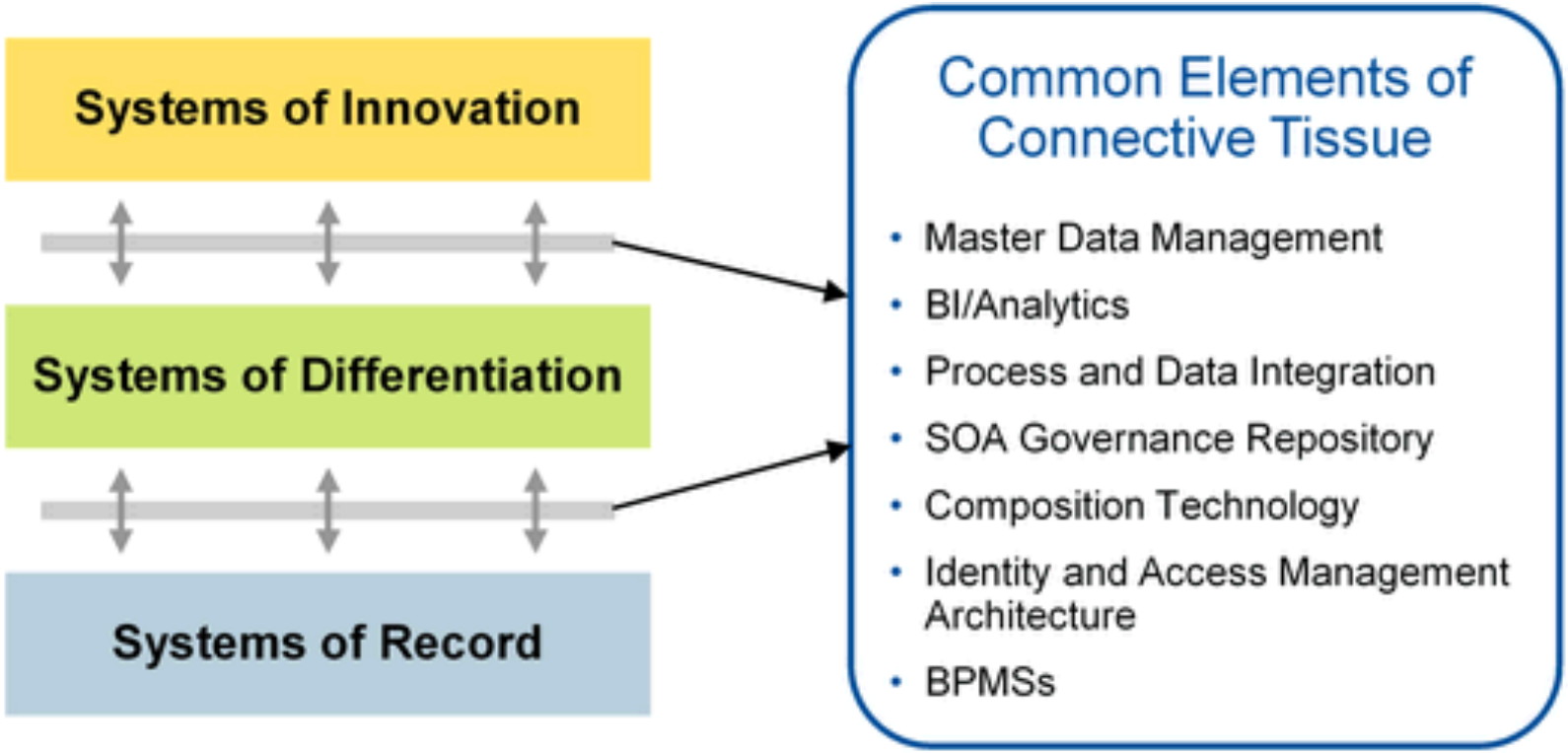
Towards Smarter Production…



Pace Layered Architecture (Gartner, 2012)



Summary and Conclusions

- Organizations need to embrace all the three modes of value exploration as well as value exploitation
- This require a proactive and differentiated approach to management
- To capture the gold nuggets require scaling and this comprise a challenge

Reflections from the back of the theater

- Digital transformation is ubiquitous
- Organizational transformations is a prerequisite
- From managing change towards staging change
- We don’t want to talk about
  - Failed IT projects
  - Security and trust

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