



Software Center

Why Digitalization Will Kill Your Company Too

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How many companies that were on the Fortune 500 list in 2000 are still on the list in 2014?



Disruption Is The New Normal

- Jim Collins (Built to last): Companies last, on average, ~~30~~ **15** **10** years on the Fortune 500 list. And that time period is decreasing
- Main cause: Companies fail to innovate and to build new core capabilities

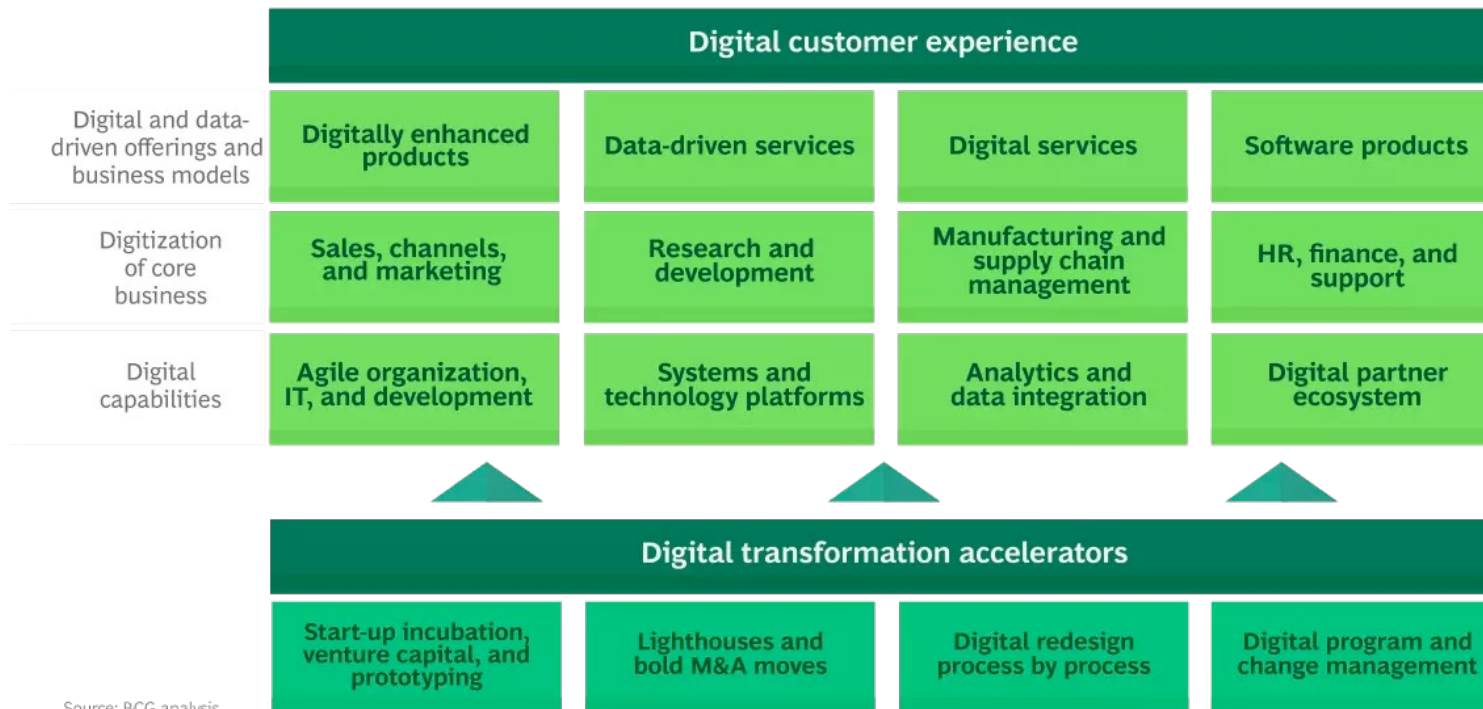
Digitalization Is The New Disruptor!

Digitalization

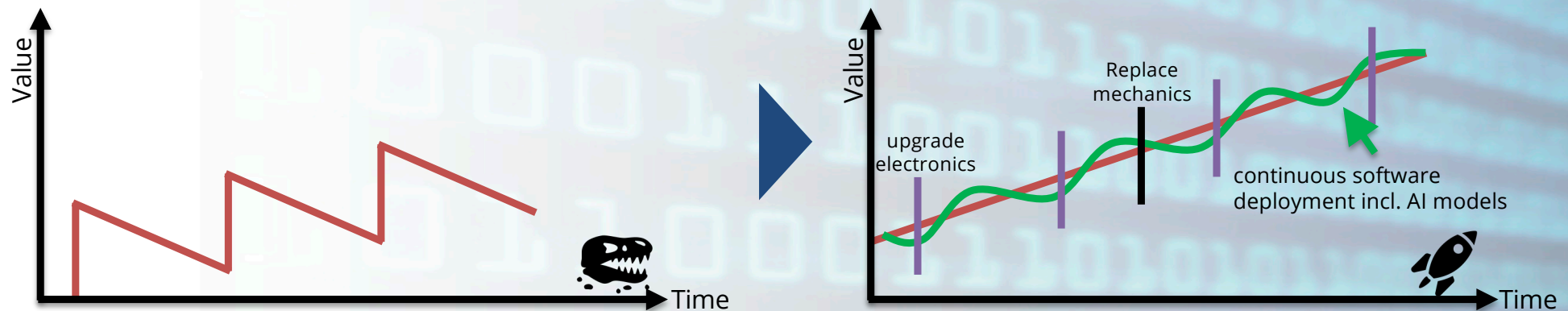


Digitalization

The Strategic Building Blocks of Digital Transformation



Why digitalization?



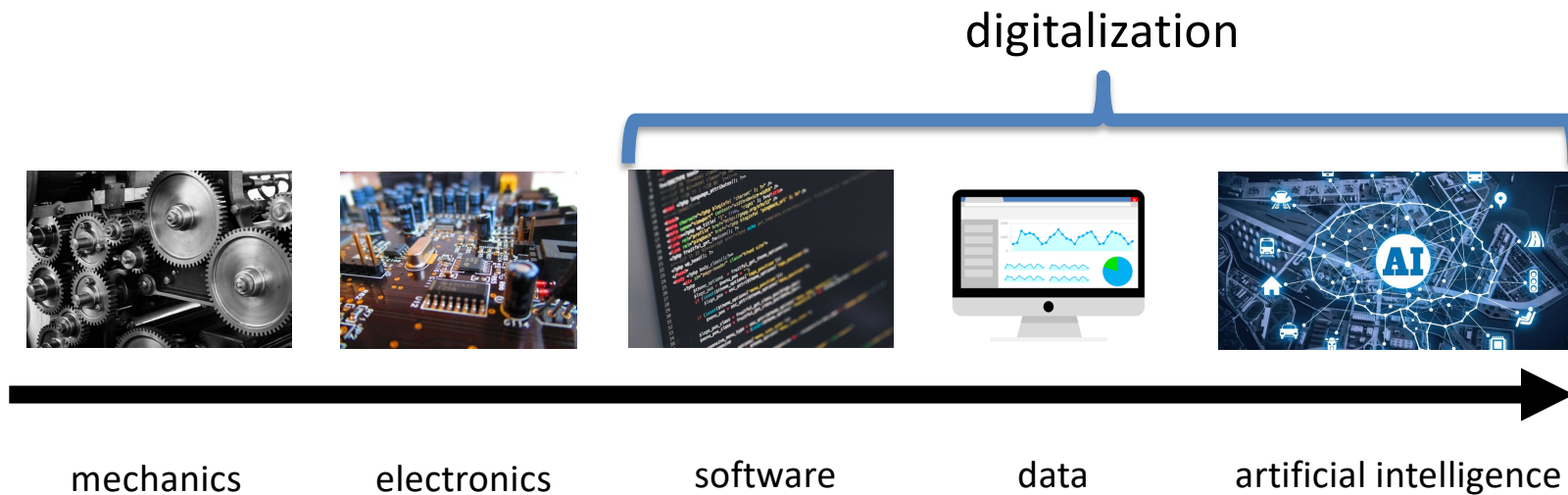
- Differentiation through mechanics and electronics is increasingly difficult
- To avoid commoditization, new solutions and services are required
- Digitalization of products, data from the field and changed business models can provide differentiation

Hypothesis: growing revenue through new, *continuous* business models based on a *digitalized* product portfolio is the most promising strategy to increase differentiation and avoid commoditization

What Makes A Digital Company?

- Using email?
 - Have a website?
 - Use social media?
 - Video conferencing?
 - Chatbots?
-
- Data-driven decision making
 - Relentless experimentation (e.g. A/B testing)
 - Short feedback cycles
 - Decision making pushed down in organization
 - Strategic data collection
 - Unified data warehouse
 - Pervasive use of AI and automation
 - New job descriptions

Technology Evolution



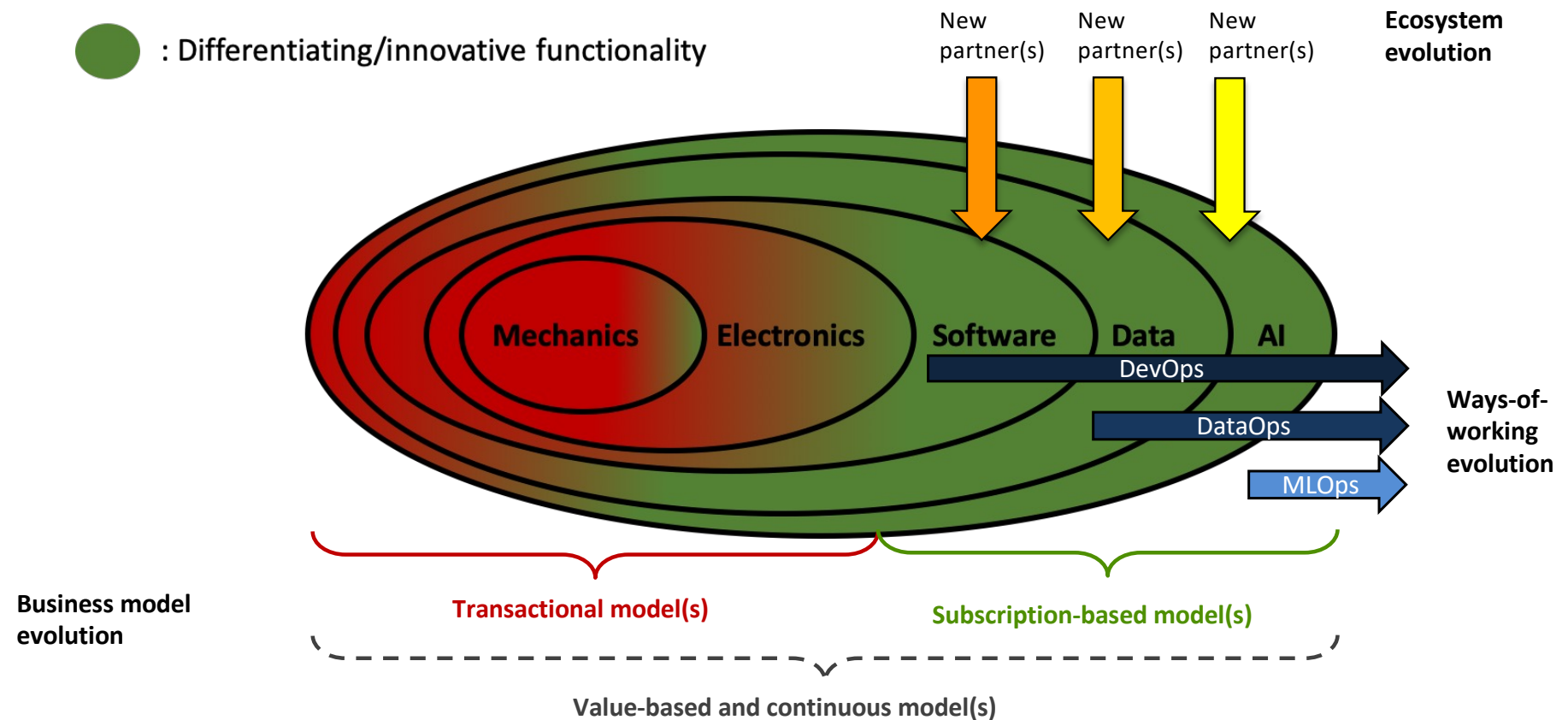
Business Evolution



: Commodity functionality



: Differentiating/innovative functionality



Systems Engineering 2.0

1. Build it in **software** unless you really, really can't
2. Build it in **hardware** and keep it flexible (FPGAs instead of ASICS) unless you really, really can't
3. Build it in **mechanics** if you HAVE to and keep it modular, easily replaceable and simple

Systems Engineering 2.0

From:

- Systems built to last
- Opinions-based decision making (experience)
- Deeply integrated architectures
- Hierarchical organizational model
- Satisfying the requirements
- Static certification



To:

- Systems built to evolve
- Data-driven decision making
- Modularized architectures
- Ecosystem of partners
- Constant experimentation and innovation
- Dynamic, continuous certification

Three Key Take-Aways

- Digitalization is disrupting industry and society to an extent that we have only seen the early beginnings of
- Digital companies need to be world class in :
 - Software (continuous deployment)** to continuously deliver value
 - Data** to increase the quality of decision making
 - Artificial Intelligence** to provide superior solutions to almost everything
- Transforming to become a digital company requires to adopt a **Digital Business Operating System**

Overview

- Software Center
- A software and data driven company ...
 - Software:** Fast feedback loops
 - Data:** Data-driven decision making
 - AI:** AI-driven development
- Conclusion



Academic
Research



TU/e



Software Center



Consultancy



Boards



Angel investing



Industry



Software Center

Mission: To significantly improve the *digitalization* capability of the European Software-Intensive industry

SIEMENS

ERICSSON 



GRUNDFOS 

AXIS 
COMMUNICATIONS



BOSCH



 **JEPPESSEN**
A BOEING COMPANY

 **qamcom**



**MÄLARDALEN UNIVERSITY
SWEDEN**



li.u LINKÖPING
UNIVERSITY

RESEARCH THEMES

Continuous
Delivery

Continuous
Architecture

Software

Metrics

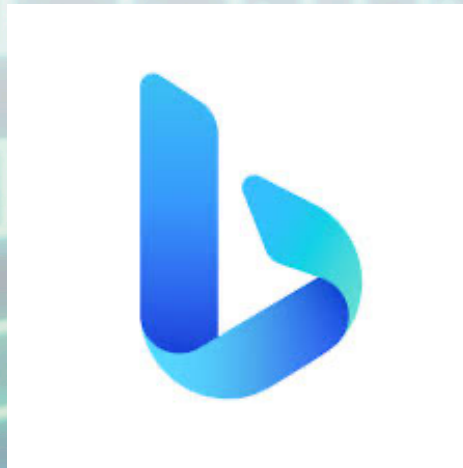
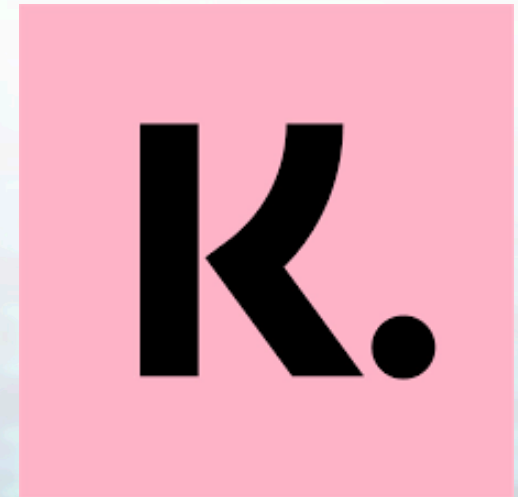
Customer
Data- and
Ecosystems

Data

AI
Engineering

AI

Some Online Companies



Overview

- Software Center
- A software and data driven company ...

Software: Fast feedback loops

Data: Data-driven decision making

AI: AI-driven development

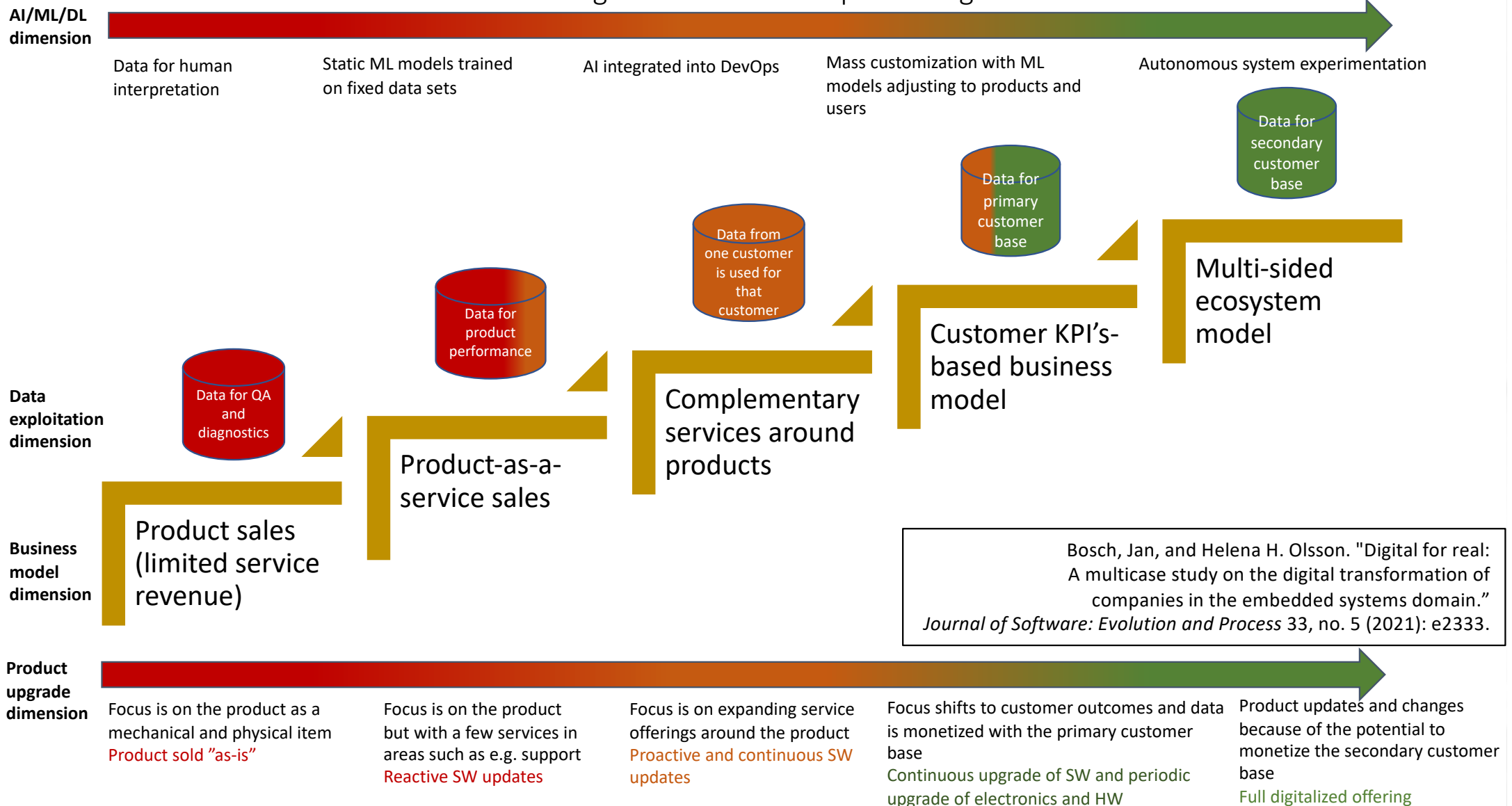
- Conclusion

How do we deliver value to customers?

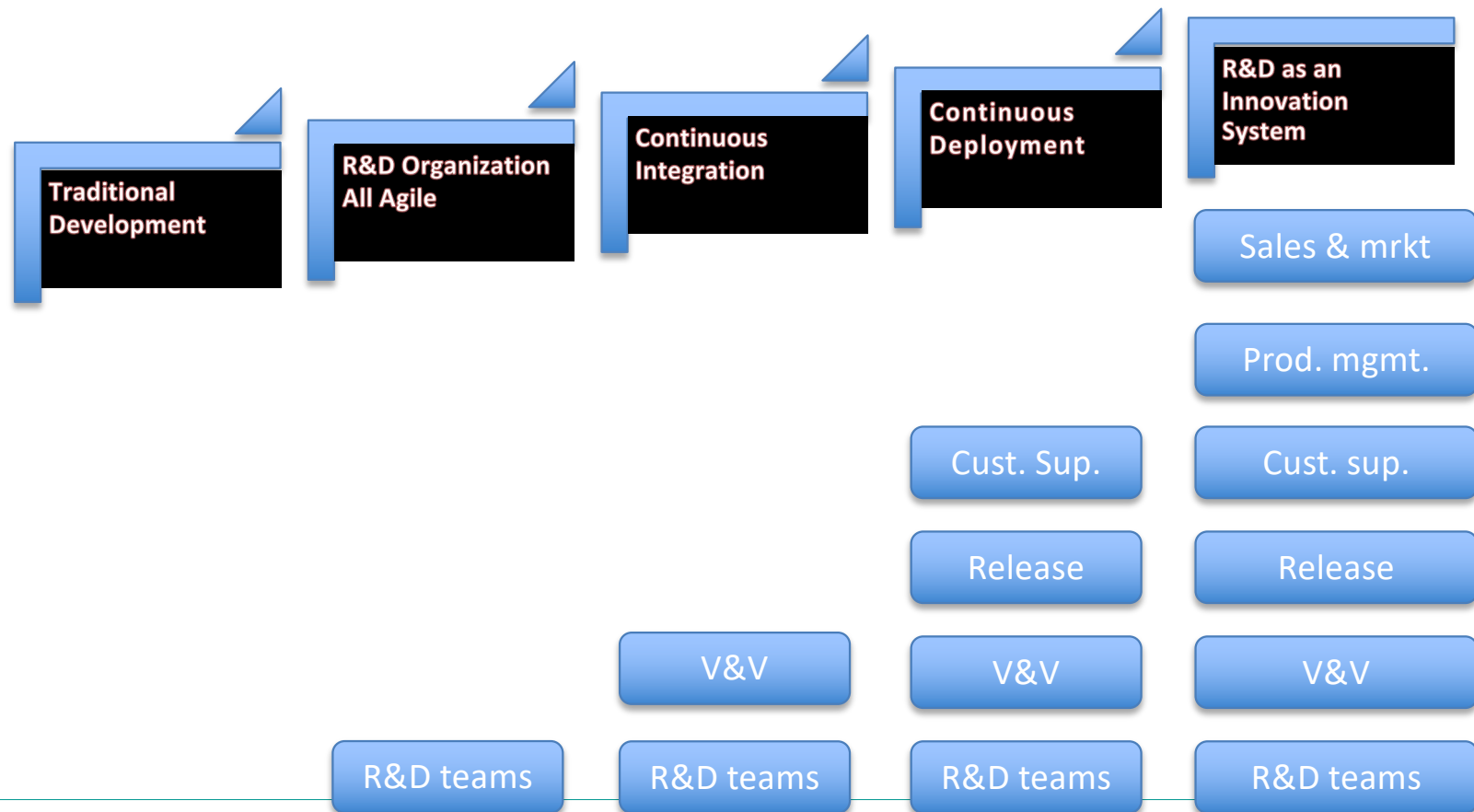
- Product generations
- Annual software updates
- DevOps, DataOps and AI/MLOps
- A/B testing
- Reinforcement learning

shortening of value delivery cycles

From Traditional to Digital: The evolution path along four dimensions



Stairway to Heaven: Speed



Feedback Cycles

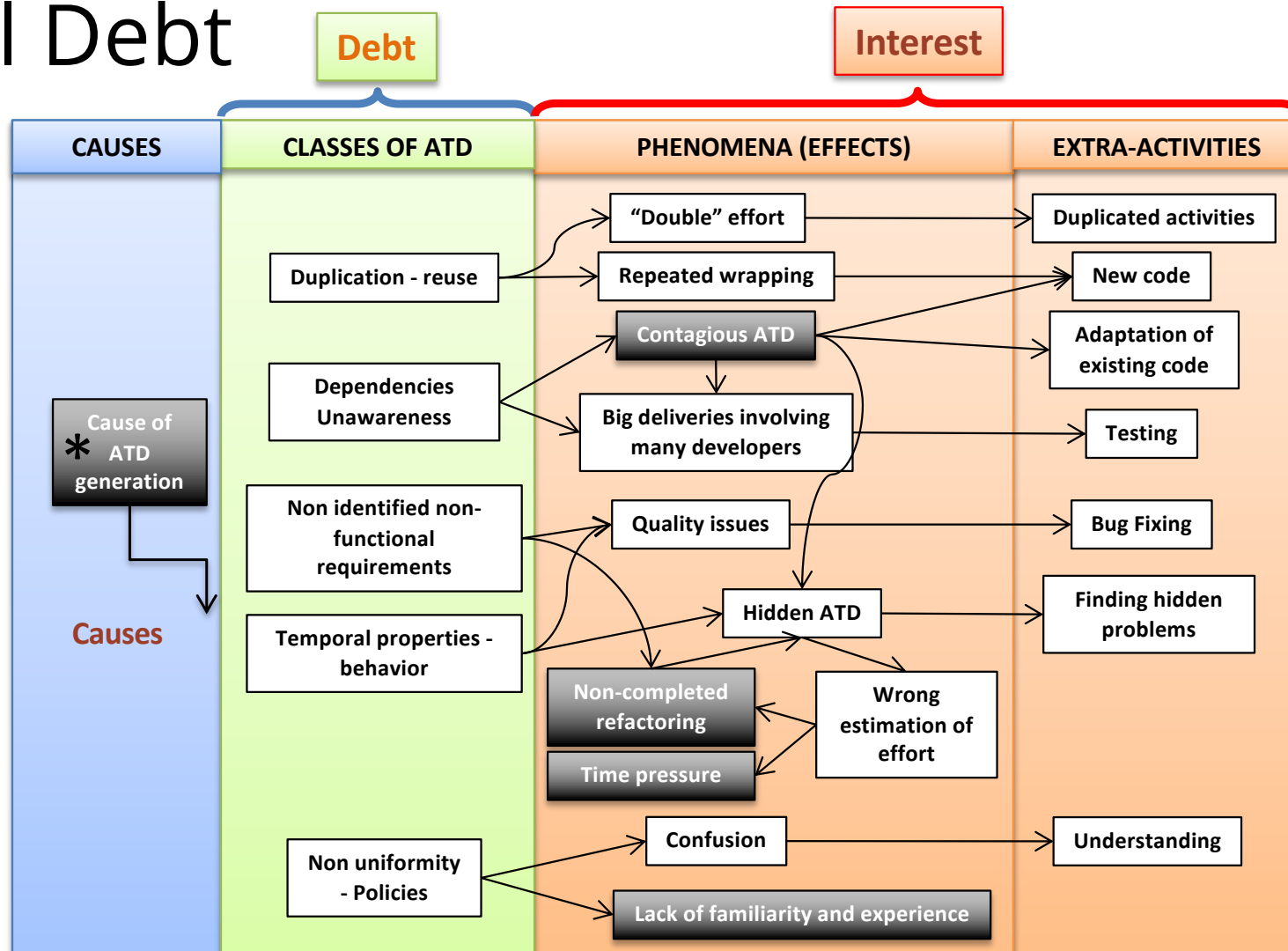
- Development cycle
- Requirements cycle
- Quality assurance cycle
- Governance cycle
- Deployment cycle
- Value creation cycle

Feedback Cycles and Speed

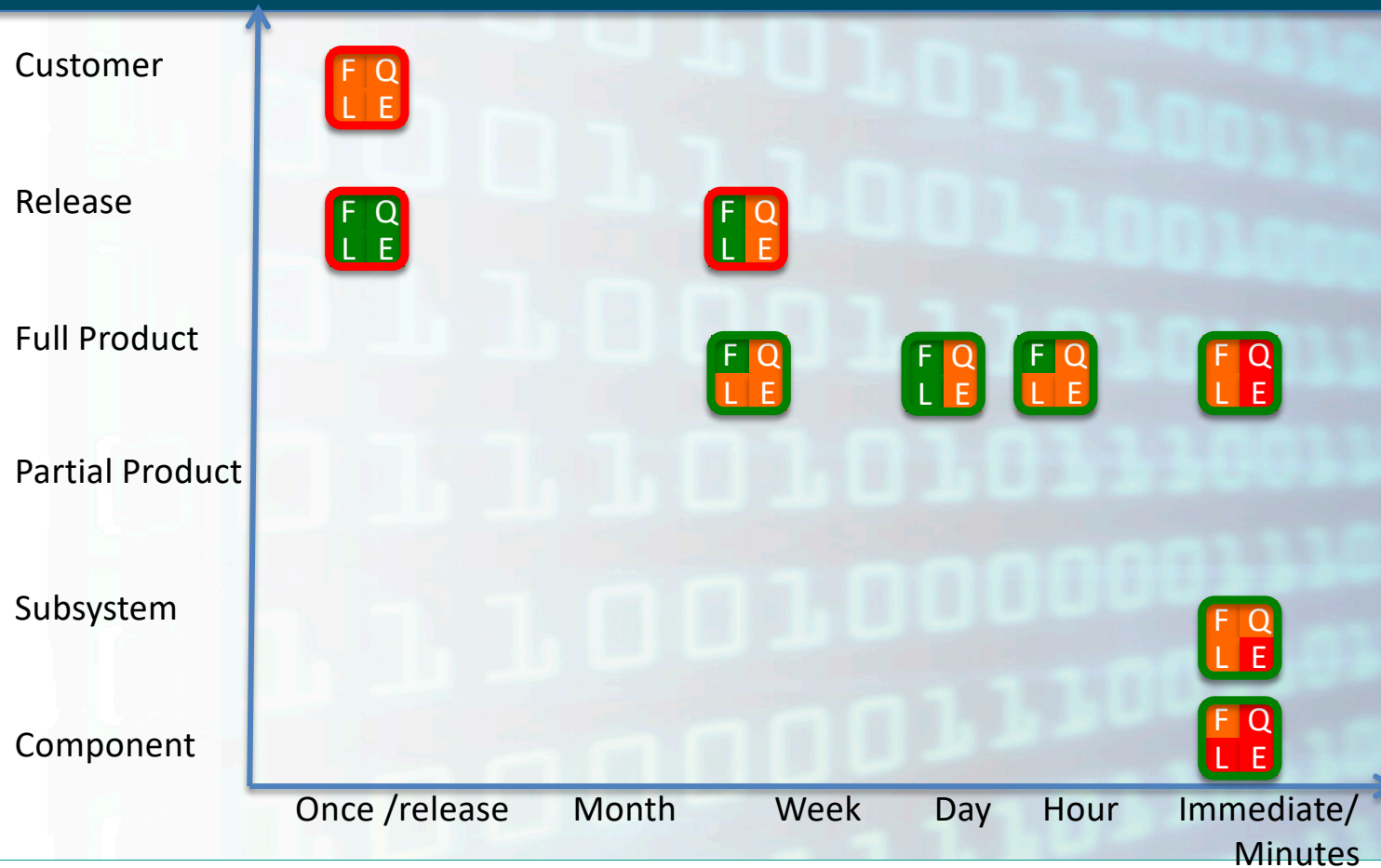
	Traditional	Agile	CI	CD	Inno System
Development	Long	Sprint	Sprint	Sprint	Sprint
Requirements	Long	Sprint	Sprint	Sprint	Sprint
Quality assurance	Long	Long	Sprint (internal)	Sprint (external)	Sprint (external)
Governance	Long	Long	Sprint	Sprint	Sprint
Deployment	Long	Long	Long	Sprint	Sprint
Value creation	Long	Long	Long	Long	Sprint

Slow: opinion-based; sprint: data-driven

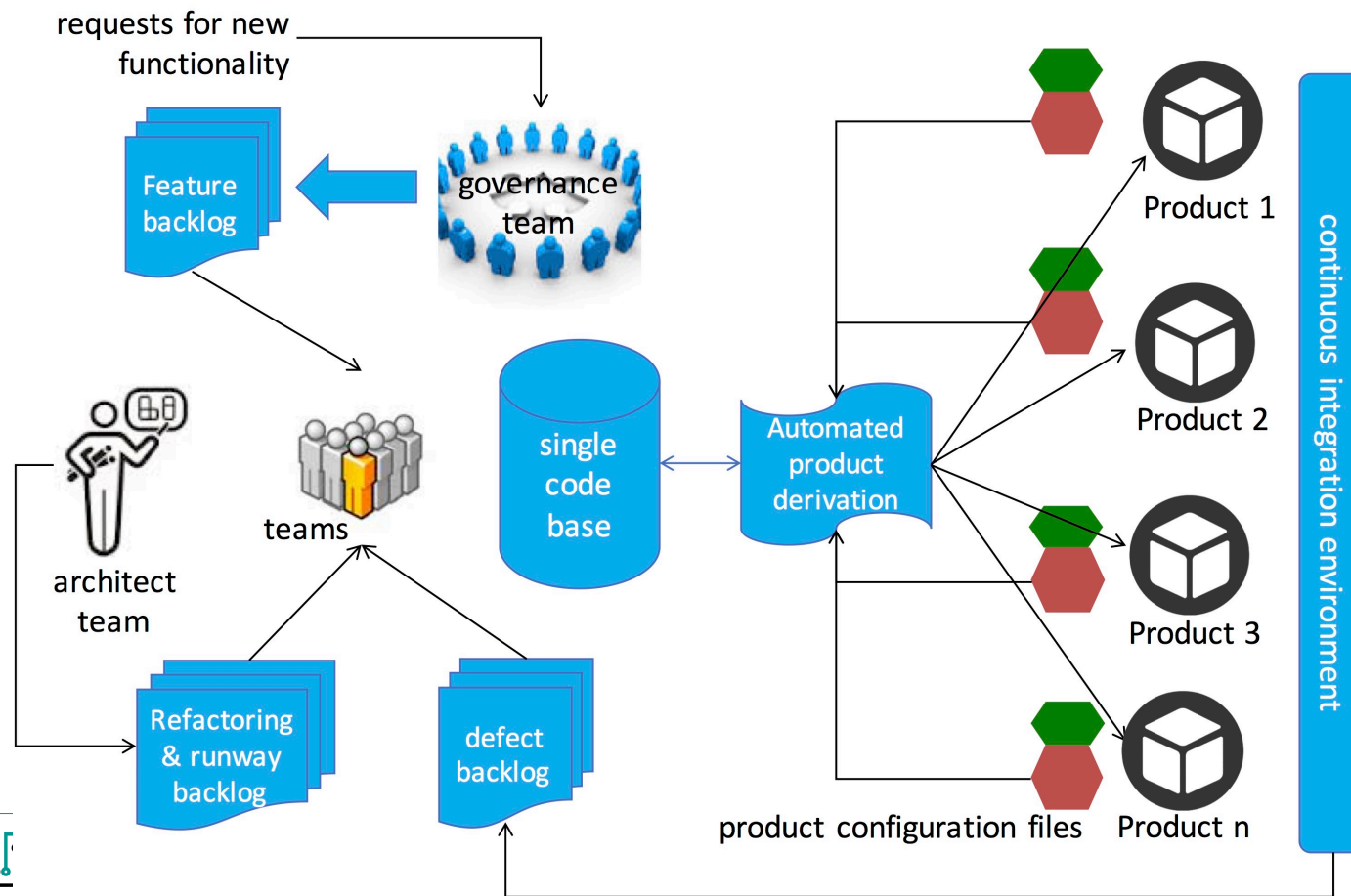
Technical Debt



CIVIT: Visualizing Continuous Integration And Test



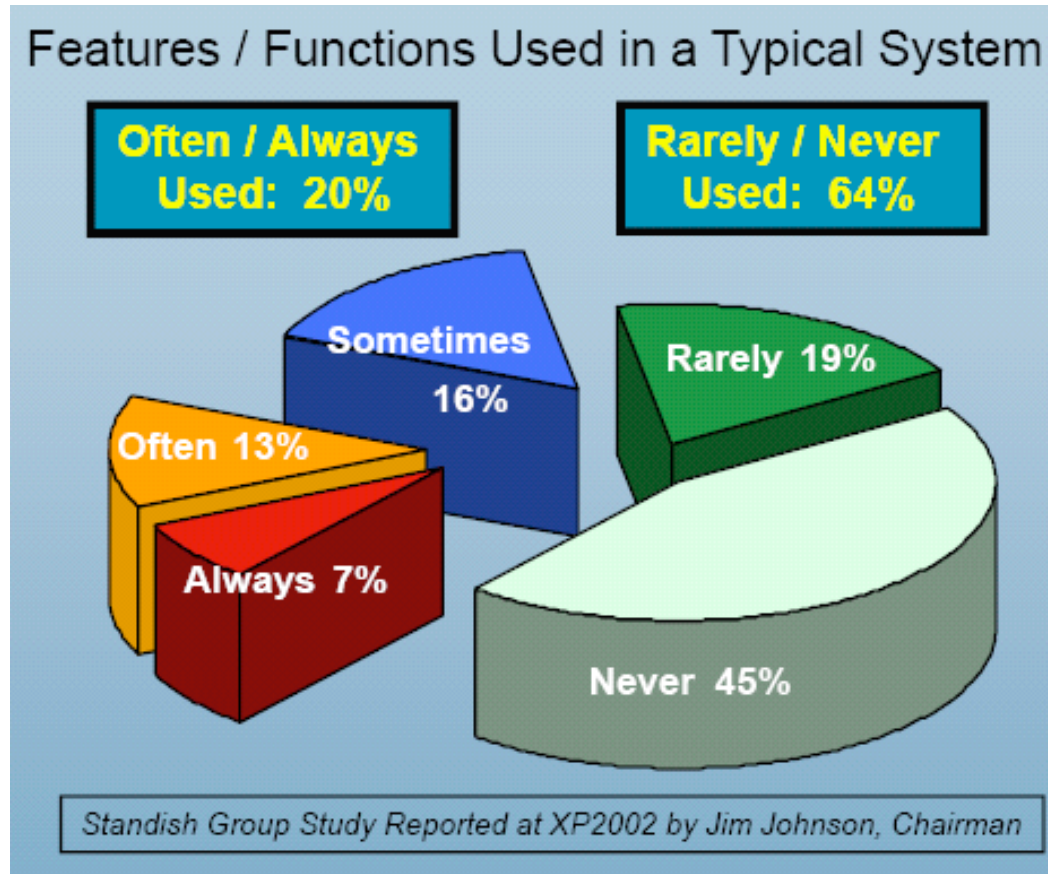
Continuous Delivery Model



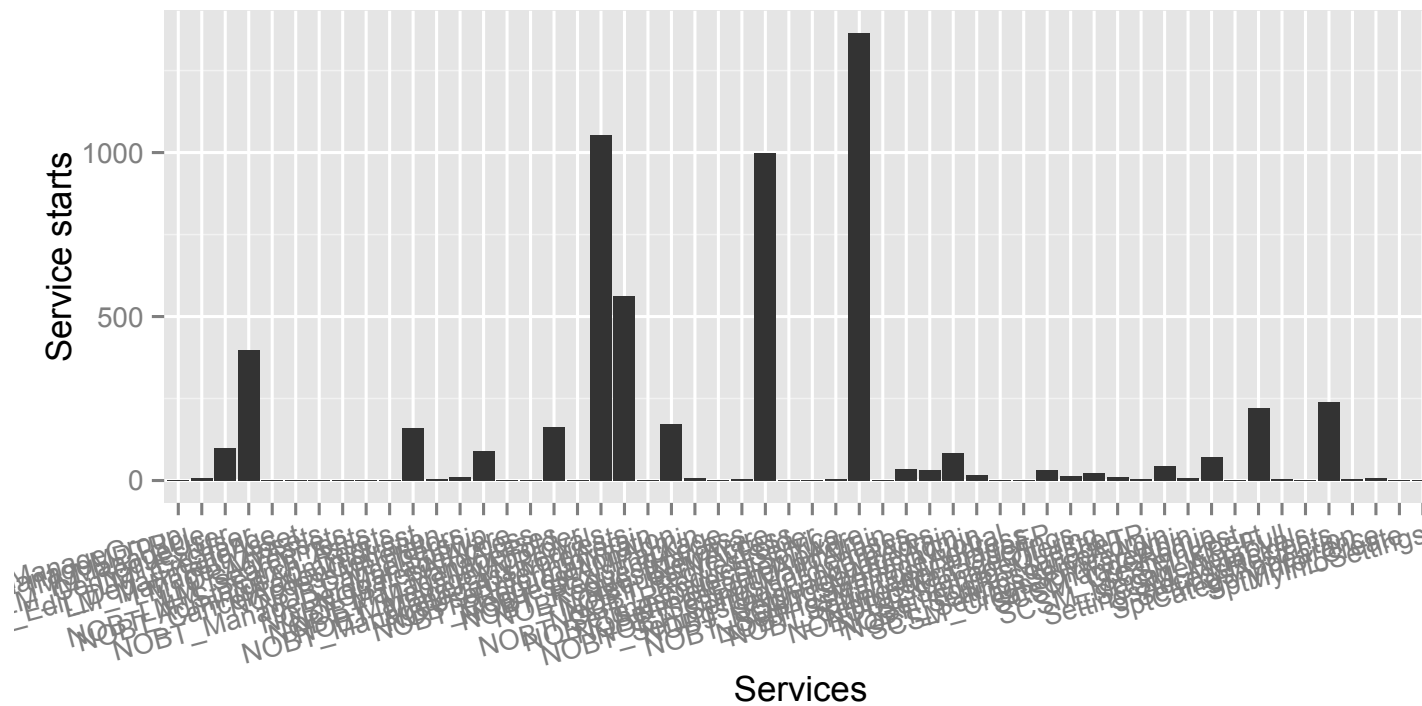


How do we
know that
we're actually
delivering
value
customers
care about?

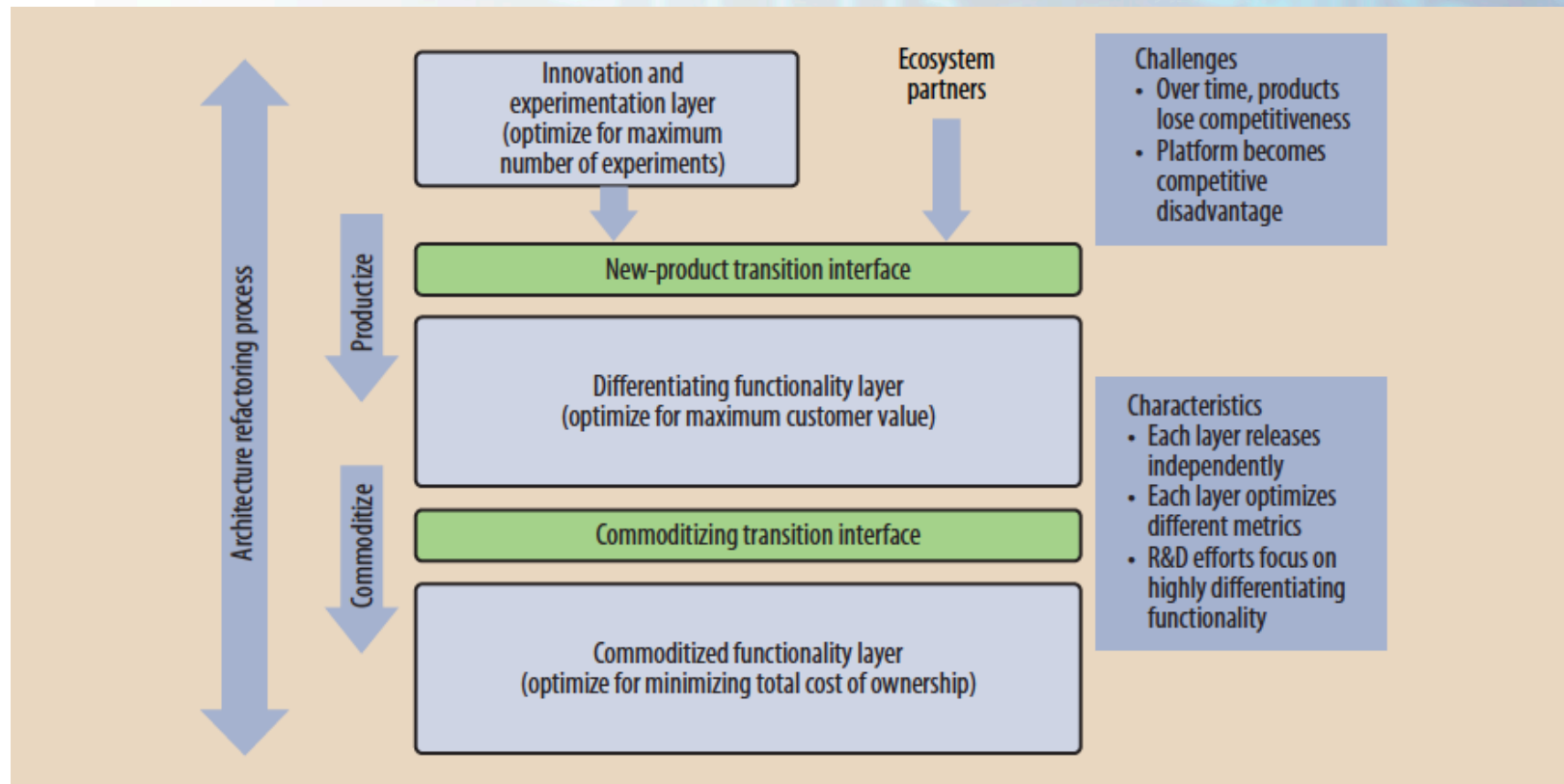
“Featuritis”



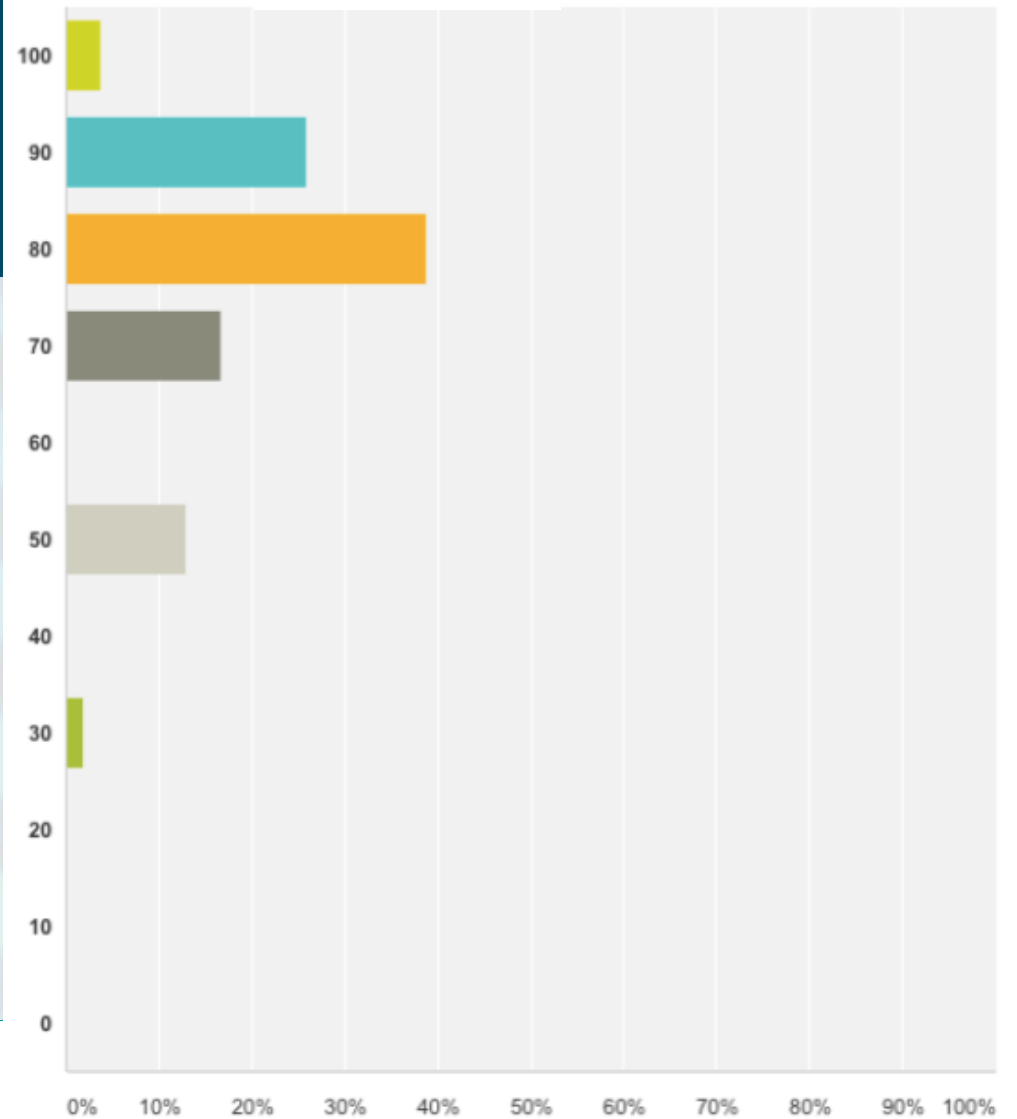
Our Research ...



Three Layer Product Model

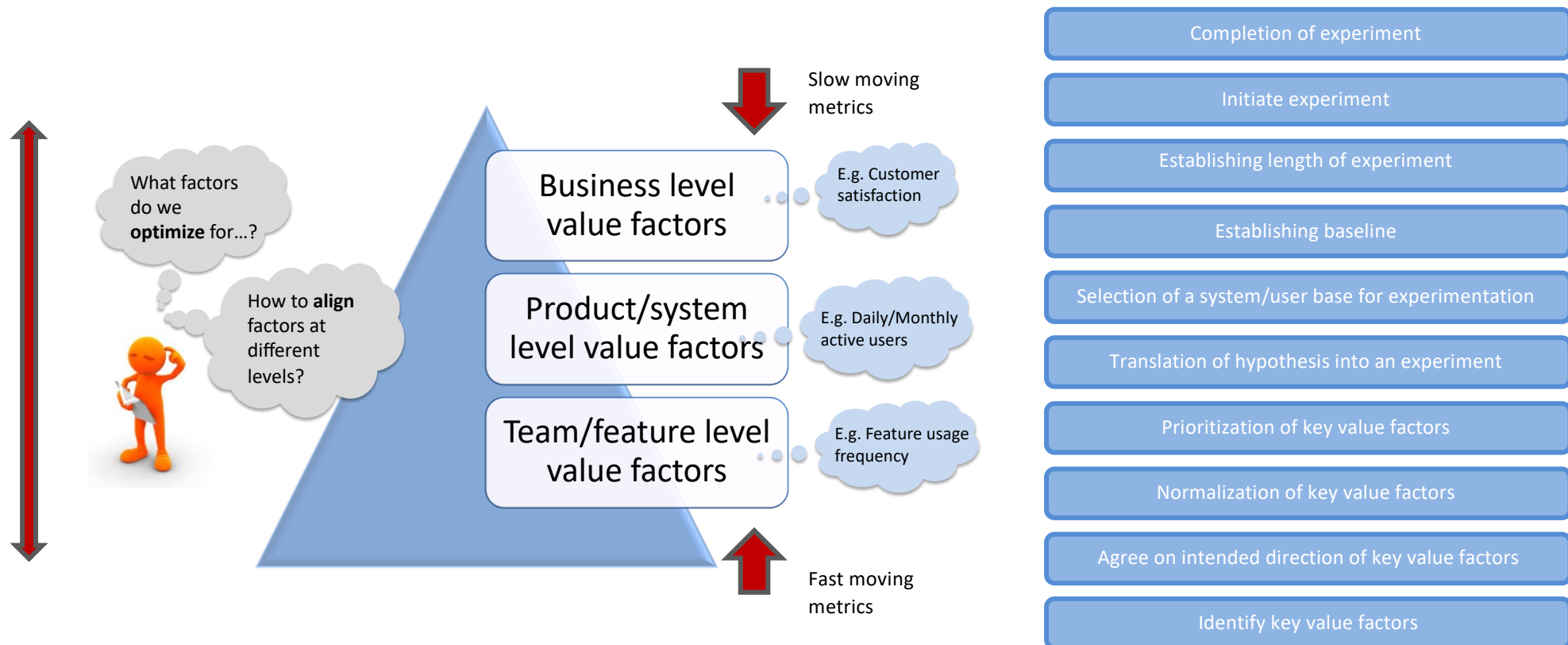


What % of R&D for Commodity?

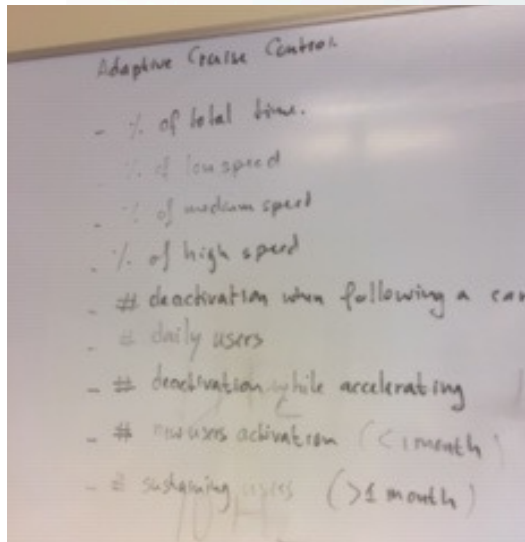


Value Design

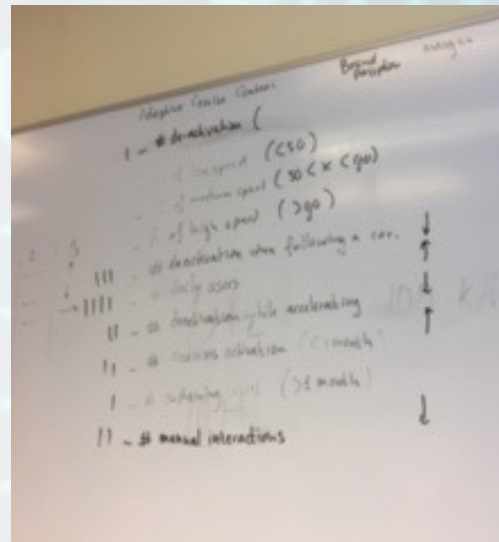
Value factors at different levels that need to align for an organization to benefit from data driven development practices and achieve the **outcomes** they look for.



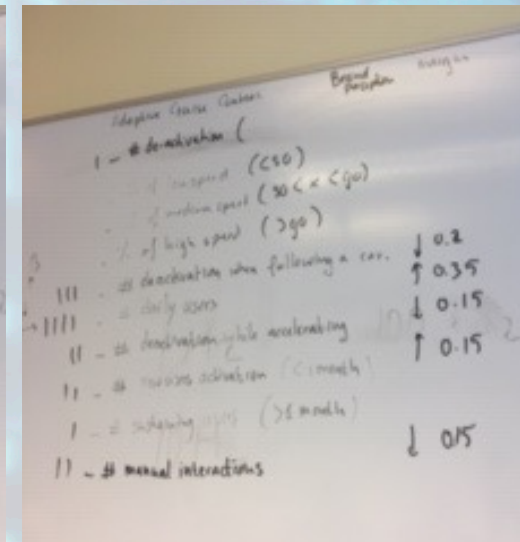
Case company example I: Key value factors



↑
Identify key
value factors

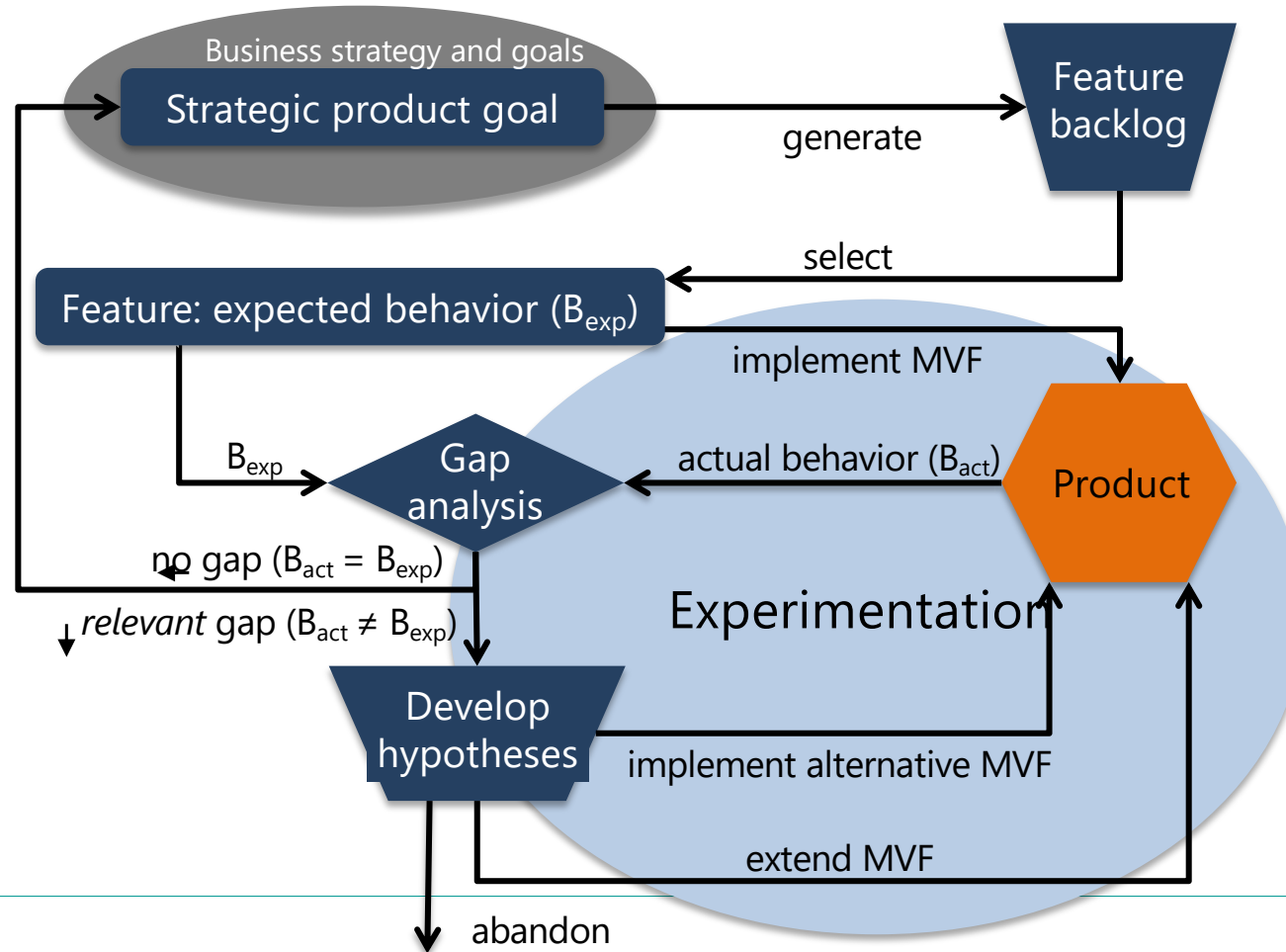


↑
Direction of key
value factors



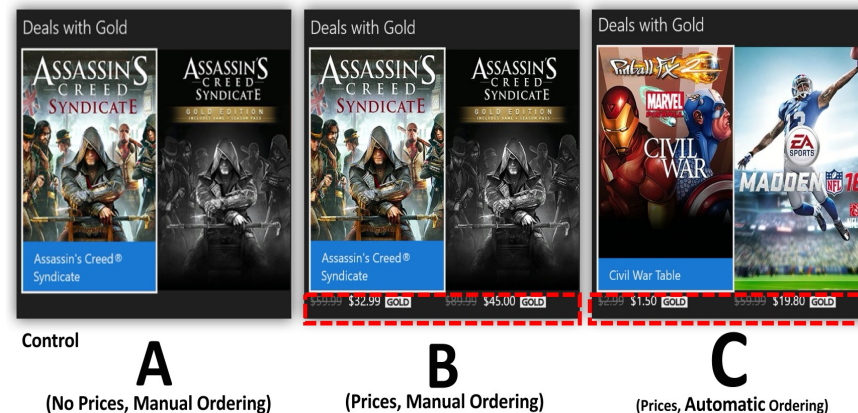
↑
Prioritization of
key value factors

The HYPEX Model

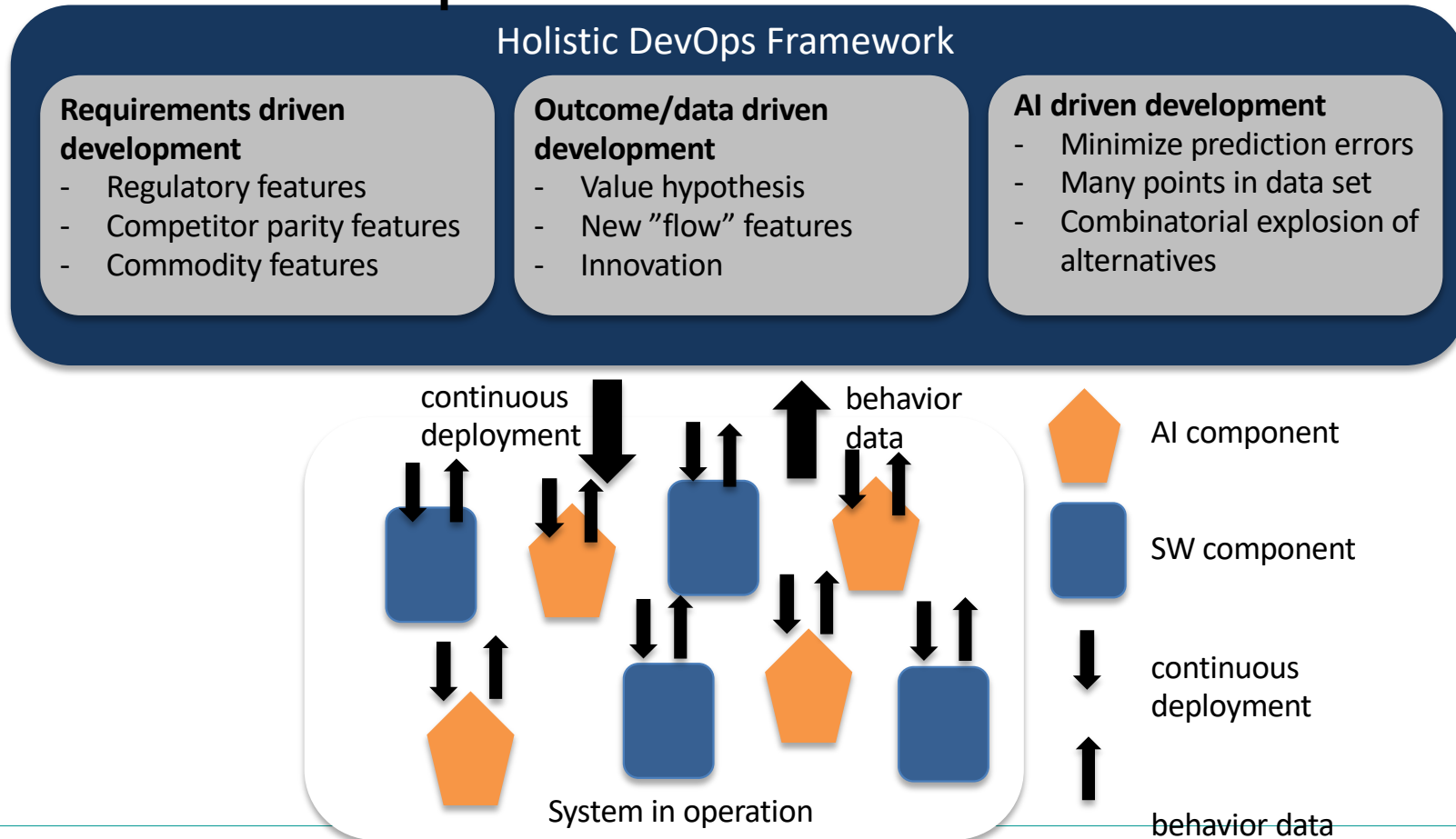


A/B testing: “Xbox deals” experiment

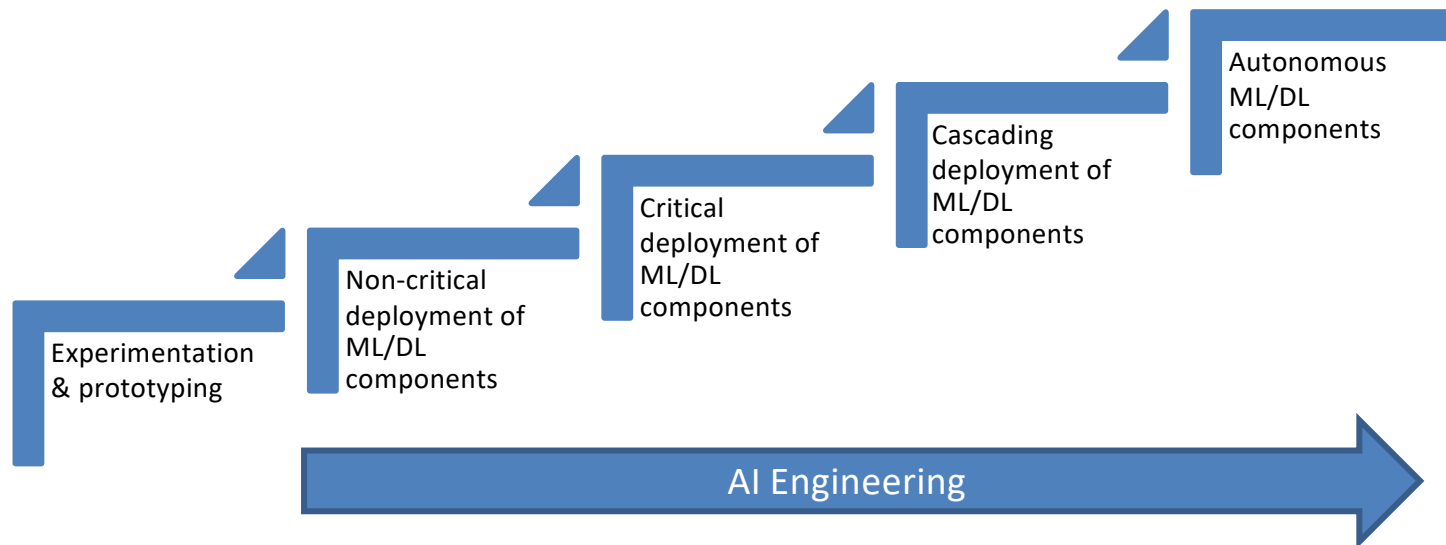
- **Experiment Goal:**
 - Identify the impact of showing the discount in the weekly deals stripe.
- **Value Hypotheses:**
 - (1) increased engagement with the stripe
 - (2) no decrease in purchases.
- **Outcome:**
 - Treatment B **decreased engagement** with the stripe **without** decreasing purchases.
 - Treatment C **increased** both **engagement** with the stripe **and purchases made**.



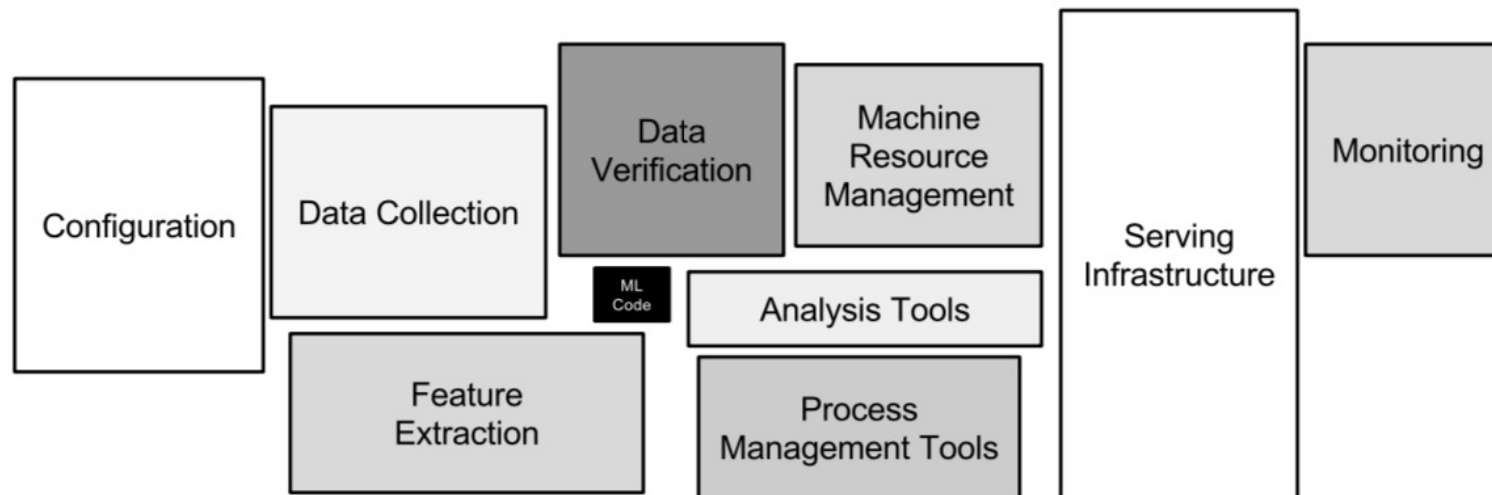
Holistic DevOps Framework



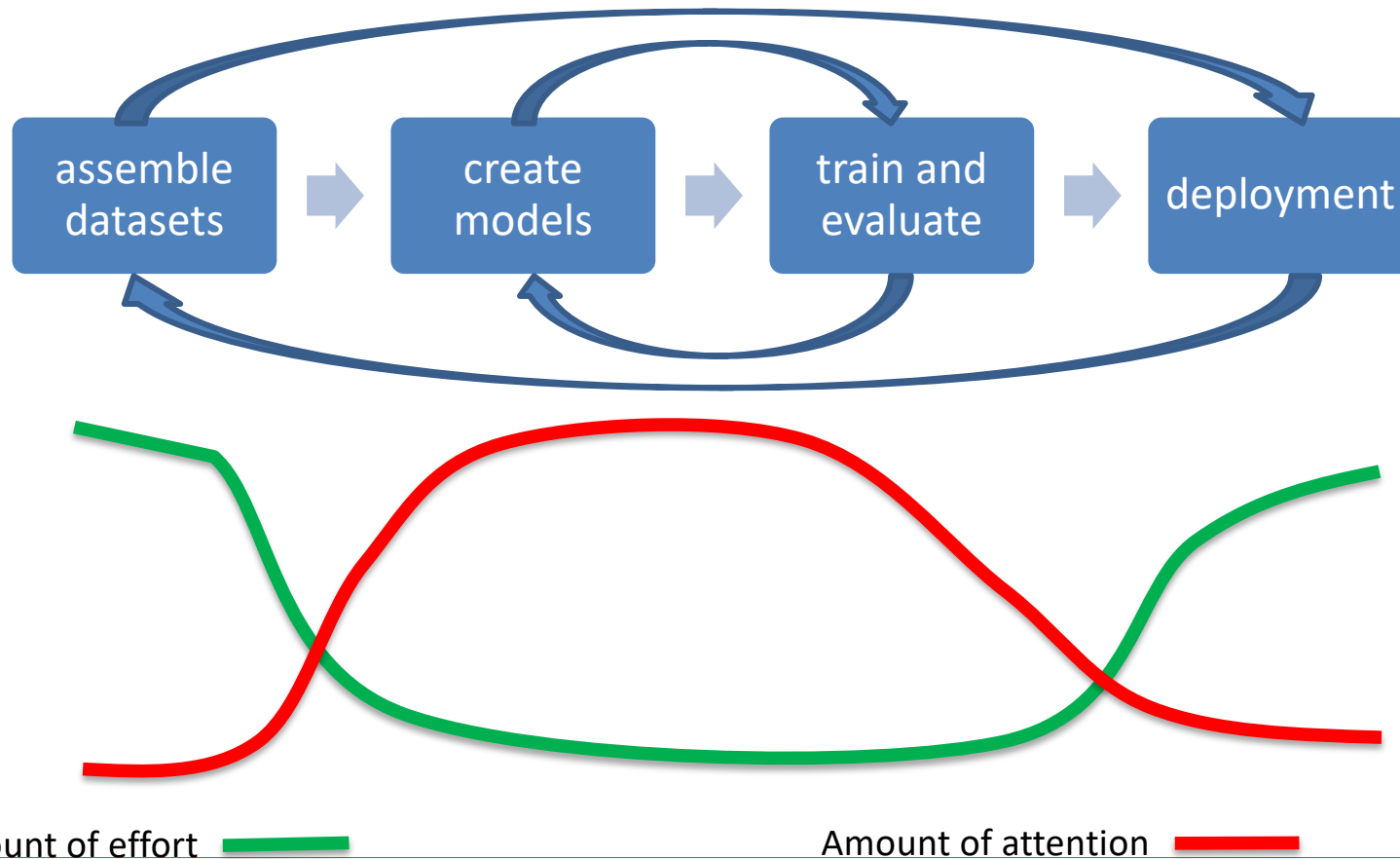
Artificial Intelligence



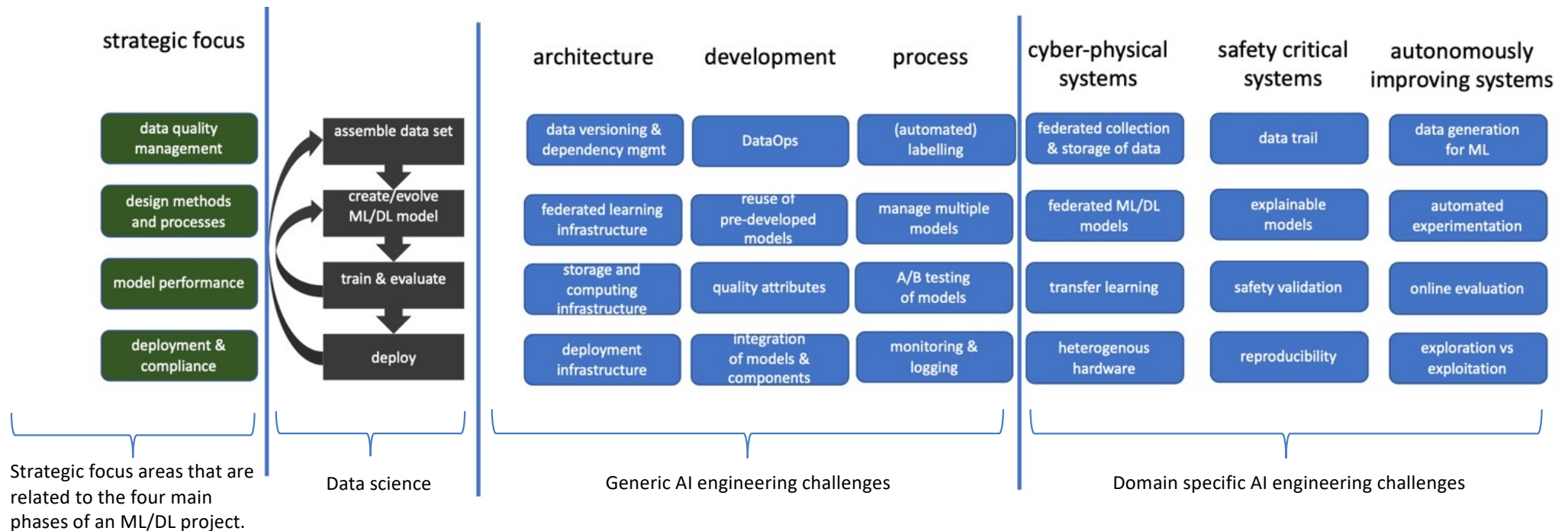
Why Software Engineering For Deep Learning?



Where The Effort Goes ...



AI engineering: Research agenda*



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A photograph of George F. Colony, CEO of Forrester Research, speaking at a podium. He is wearing a dark suit, a white shirt, and a blue patterned tie. His hands are clasped in front of him. The background is a dark blue wall with a faint, repeating pattern of the words "WORLD ECONOMIC FORUM".

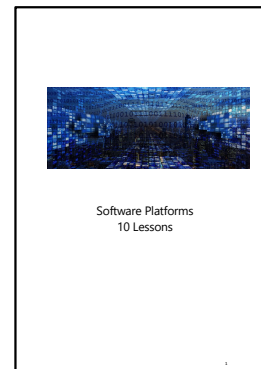
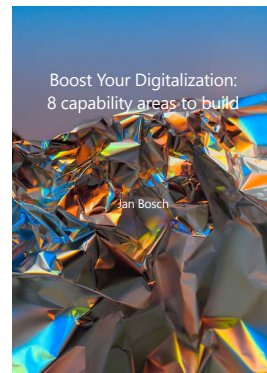
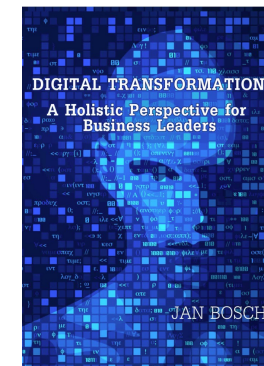
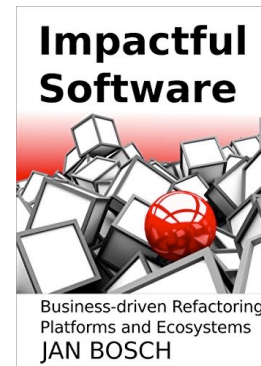
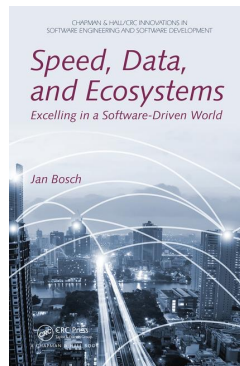
**“In the future, all companies
will be **Digital** companies”**
(Software, Data & AI)

George F. Colony (CEO Forrester Research)

Conclusion

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Learn More?





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