

1983

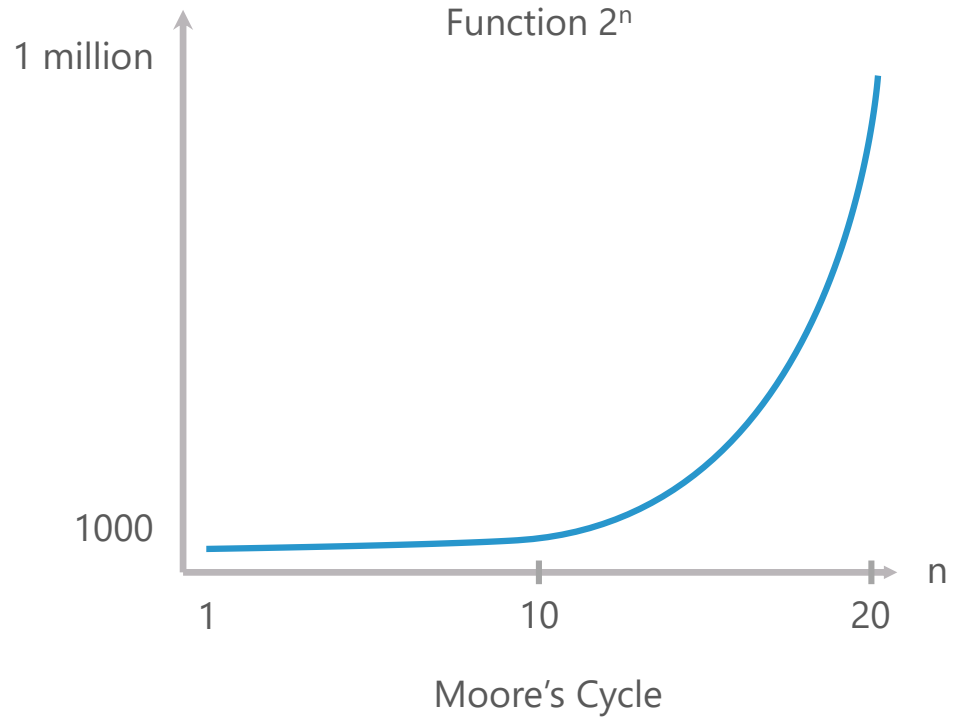


Figure 1.01: Time Magazine 1983 and Moore's Cycles

- Analog:

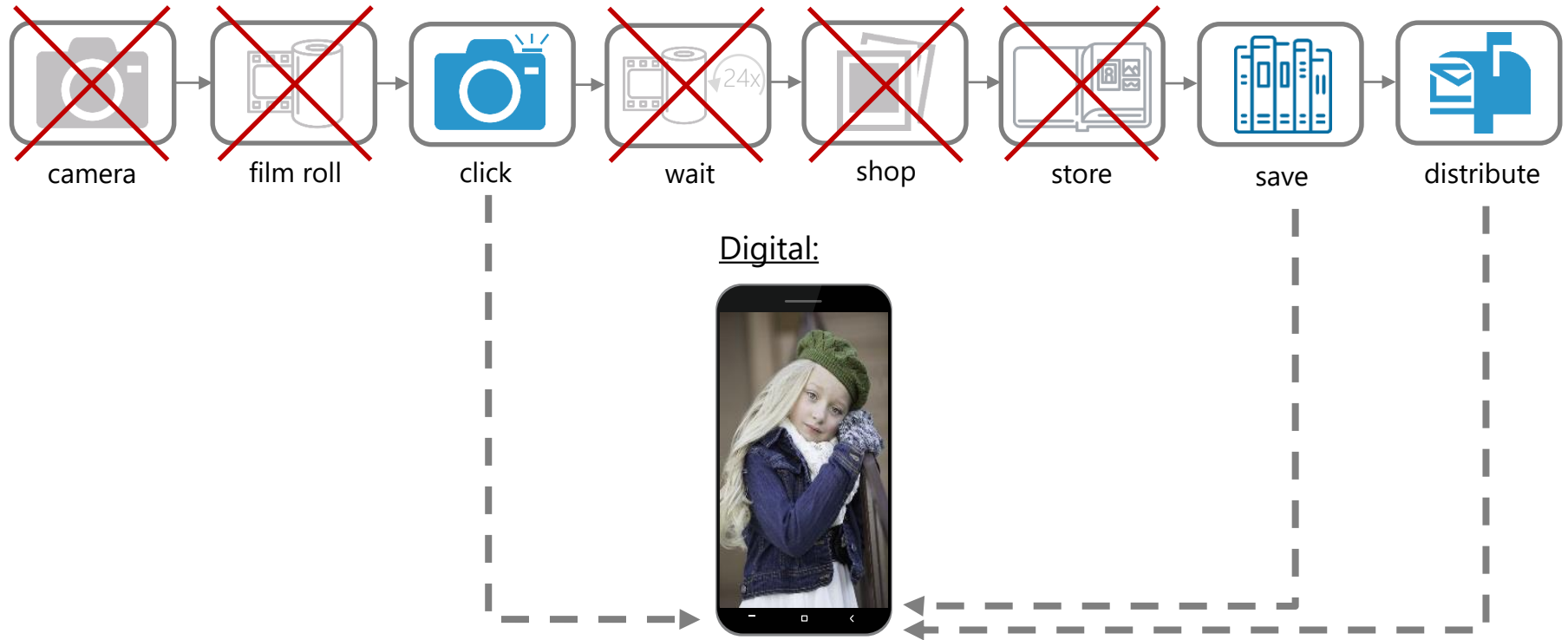


Figure 1.A.01: Disruptive Innovation: Photography-process



Kodak



HYATT



QUELLE.



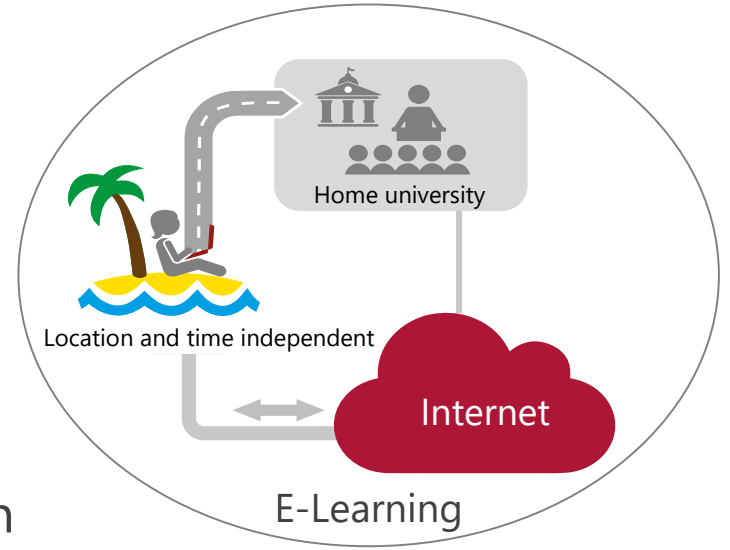
Combustion engine



Electric engine



Figure 1.A.02: Disruptive Innovations/Innovator's Dilemma



Personalization

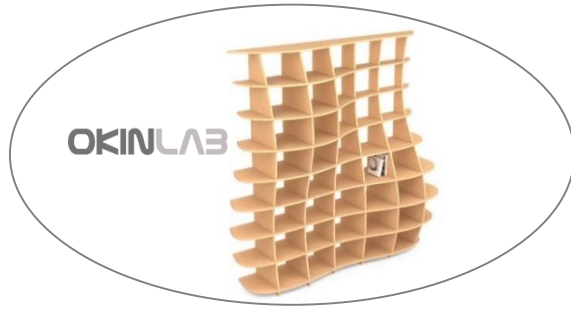


Figure 1.A.03: Personalization



© SmartFactory KL



© Samsung AG

Self-control



© Google, Inc.



© Apple, Inc.



Figure 1.A.04: Self-control



Telephony



Photography



Figure 1.A.05: Zero marginal cost products

Property



Sharing



© car2go GmbH

Classic maintenance



Predictive Maintenance

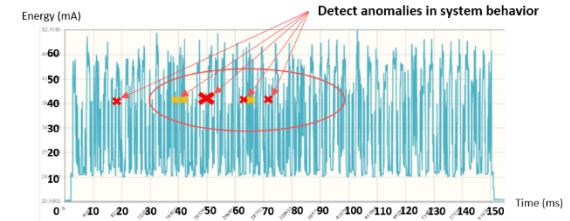


Figure 1.A.06: Smart Services

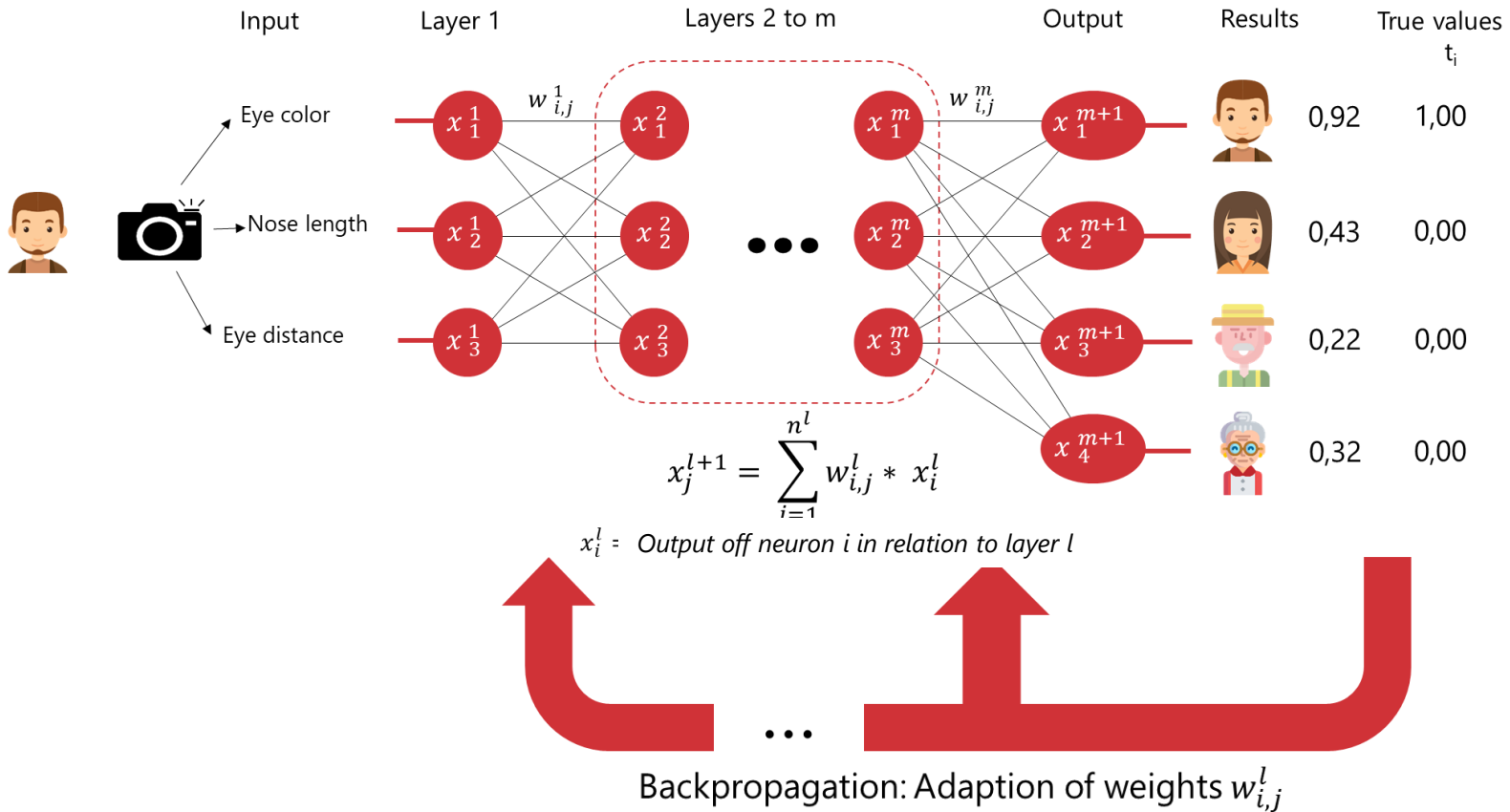


Figure 1.A.07: Artificial Neural Network

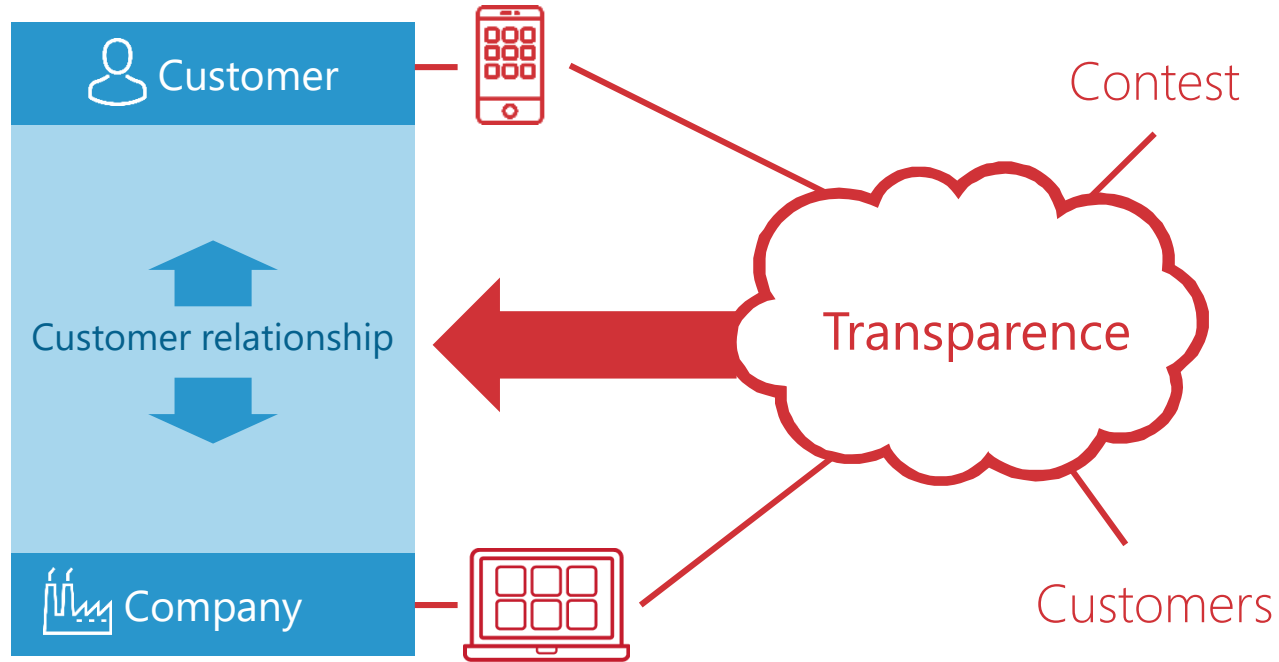
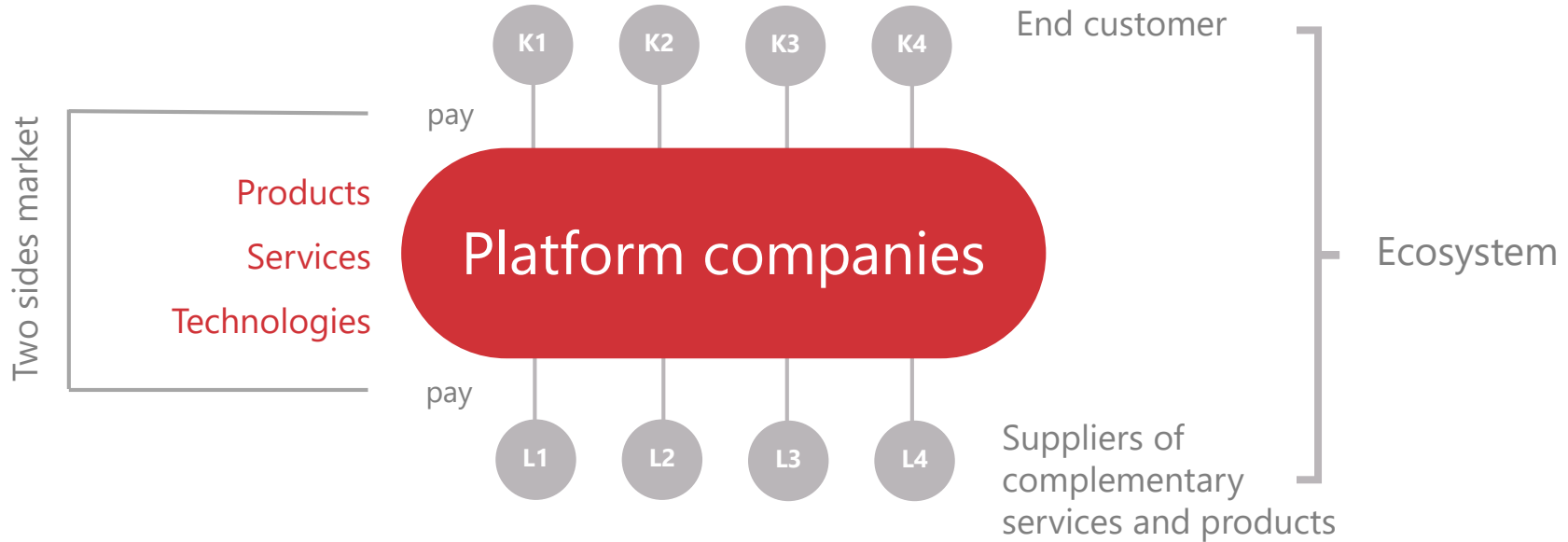


Figure 1.A.08: Platform companies push themselves between customers and suppliers



Platform: The greater the number of customers and suppliers (ecosystem), the more powerful the platform

Figure 1.A.09: Platform markets

Driver	Analysis	Importance
a. Personalization	Customer-oriented project structure	important
b. Self-control	Self-consulting, freelancer, Internet nomads	very important
c. Marginal free services	Knowledge databases, evaluation algorithms	important
d. Smart Services	Data analysis, combination of industry- and problem competence with algorithms	important to very important
e. Community / Swarm	Flexible involvement of internal and external experts, broadening of competencies at low fixed costs	important to very important
f. Lean organization and exponential growth	Reduction of the number of branches, tendency towards virtual enterprises, less travel costs; knowledge databases, virtual employees	very important
g. Artificial intelligence	Pattern recognition, prognosis, decisions	important to very important
h. Platform companies	Core competencies, project management, industry expertise, algorithms, monitoring	very important
i. Infrastructure	Communication, methods and knowledge database	very important

Figure 1.B.01: Drivers of success of digital consulting

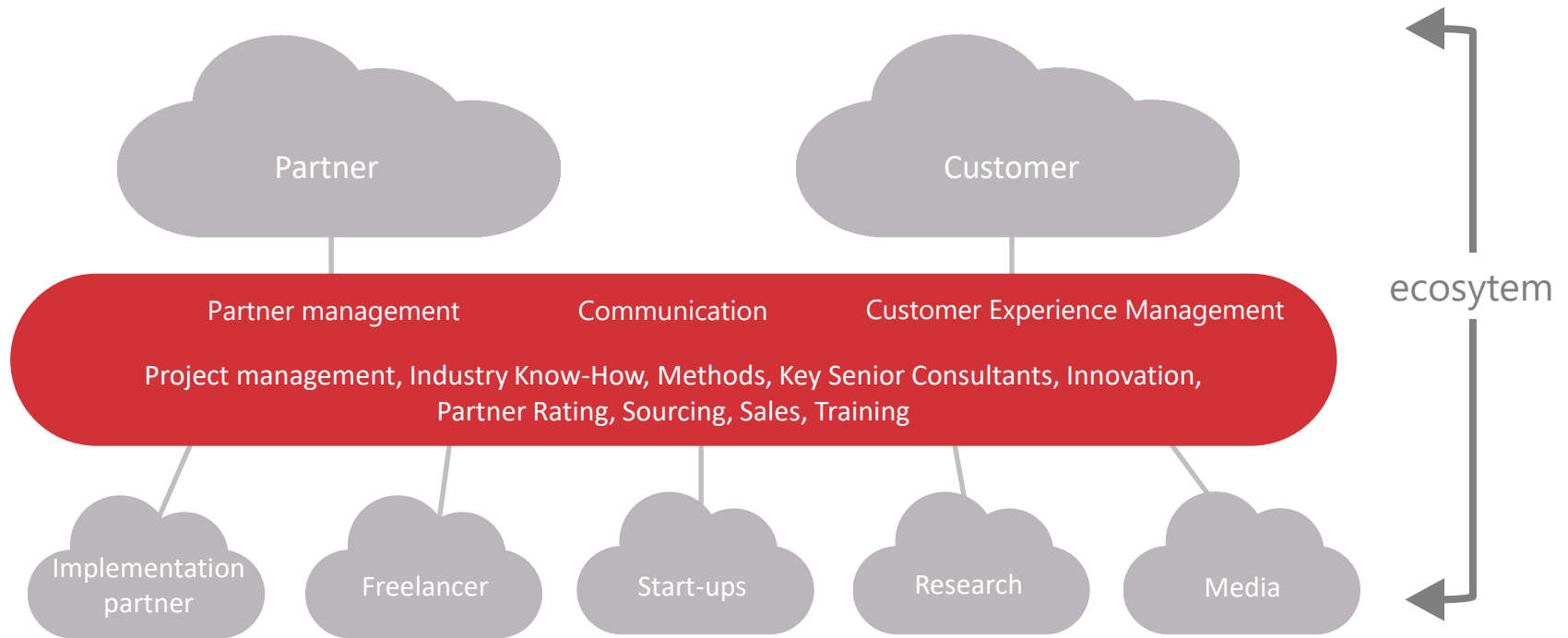


Figure 1.B.02: Consulting platform architecture

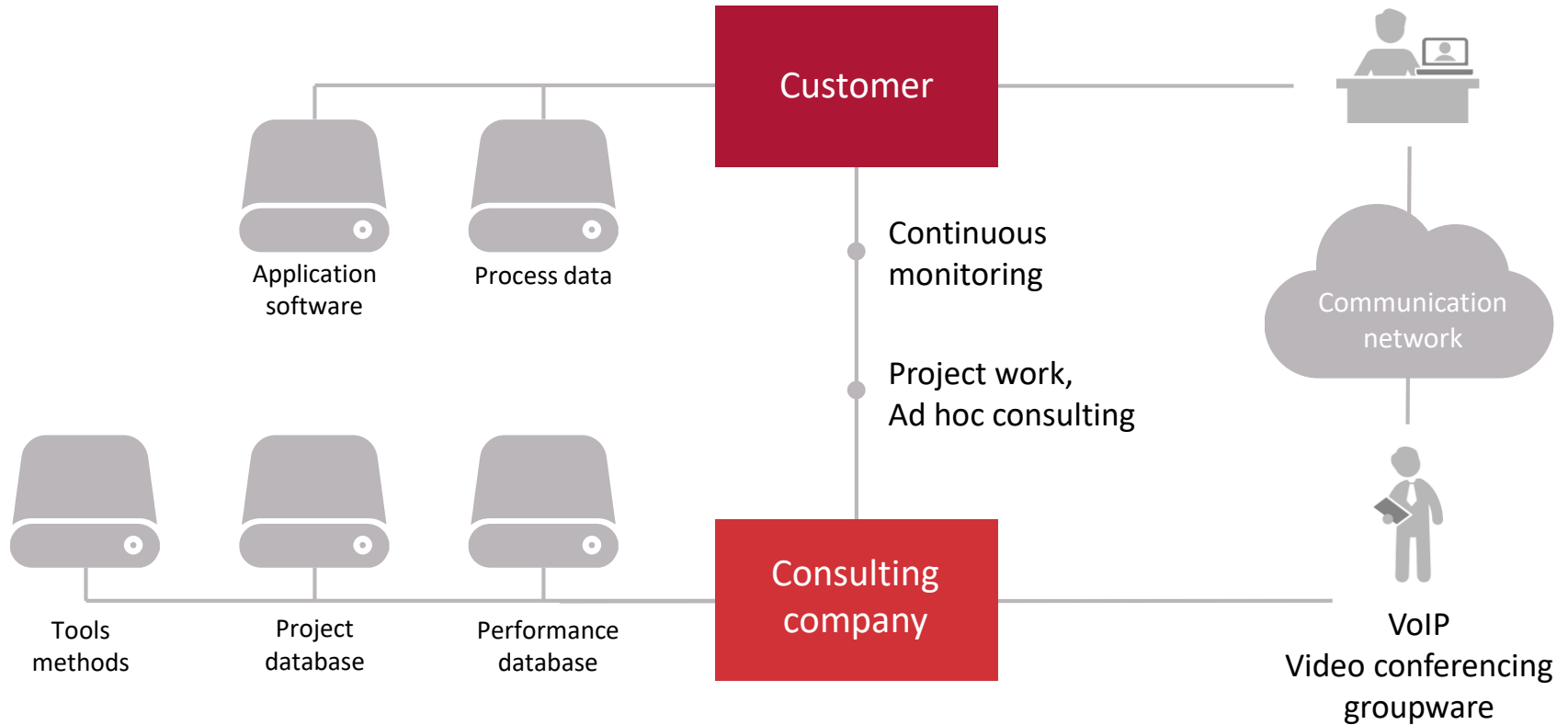


Figure 1.B.03: Digital consulting infrastructure

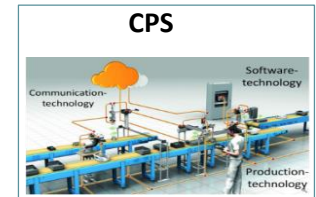
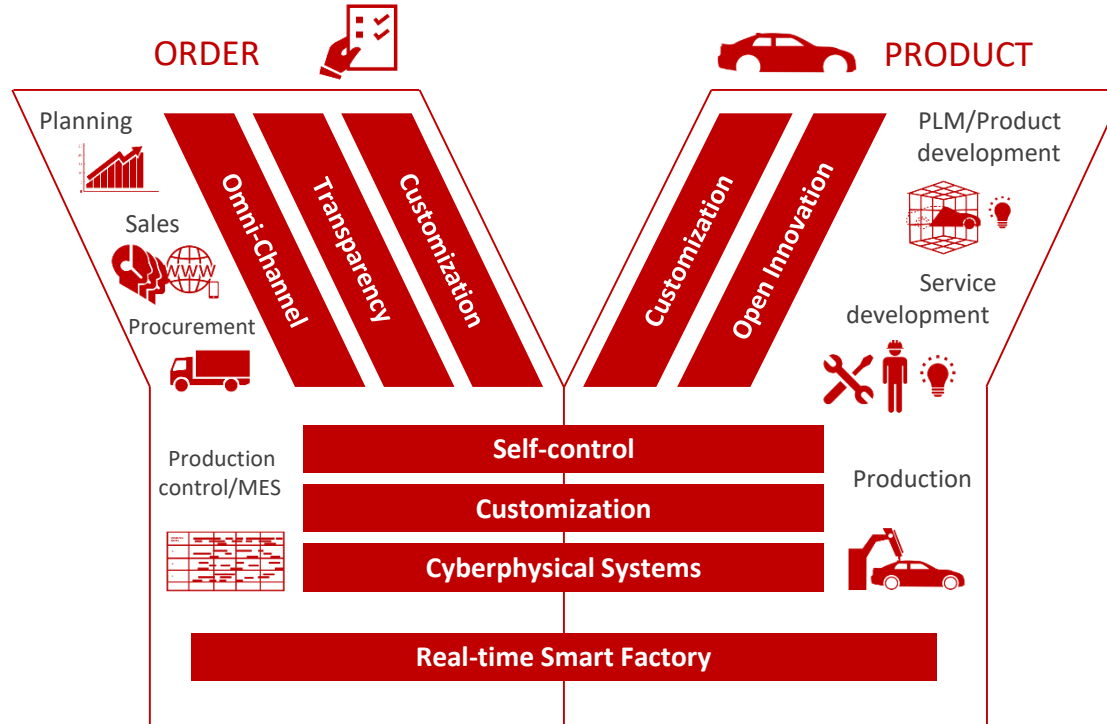
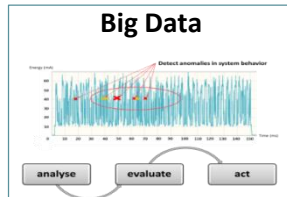
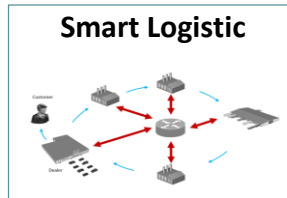


Figure 1.B.04: Industry 4.0: The Big Change

Augmented Reality:
Loading quantity, Order quantity...

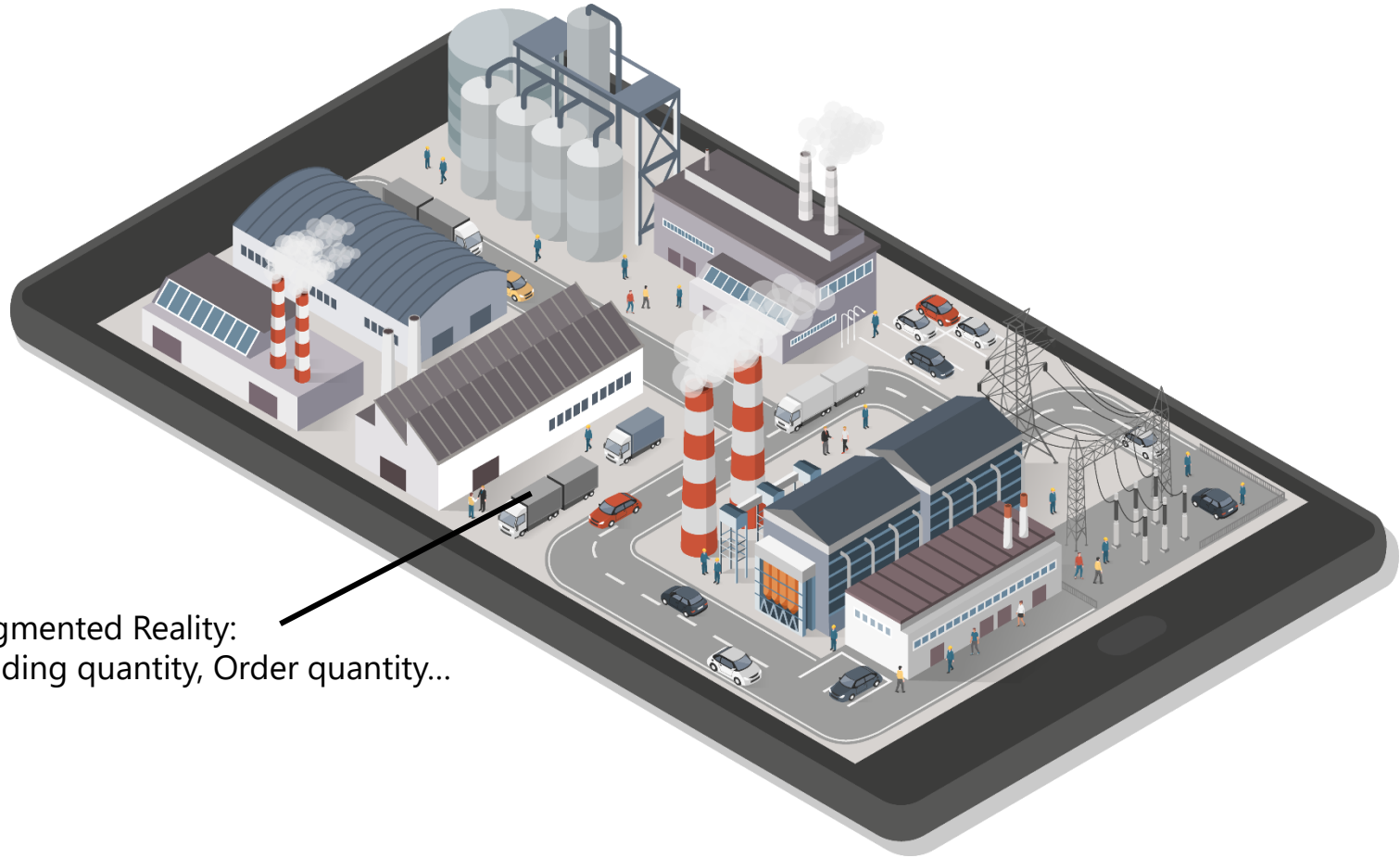
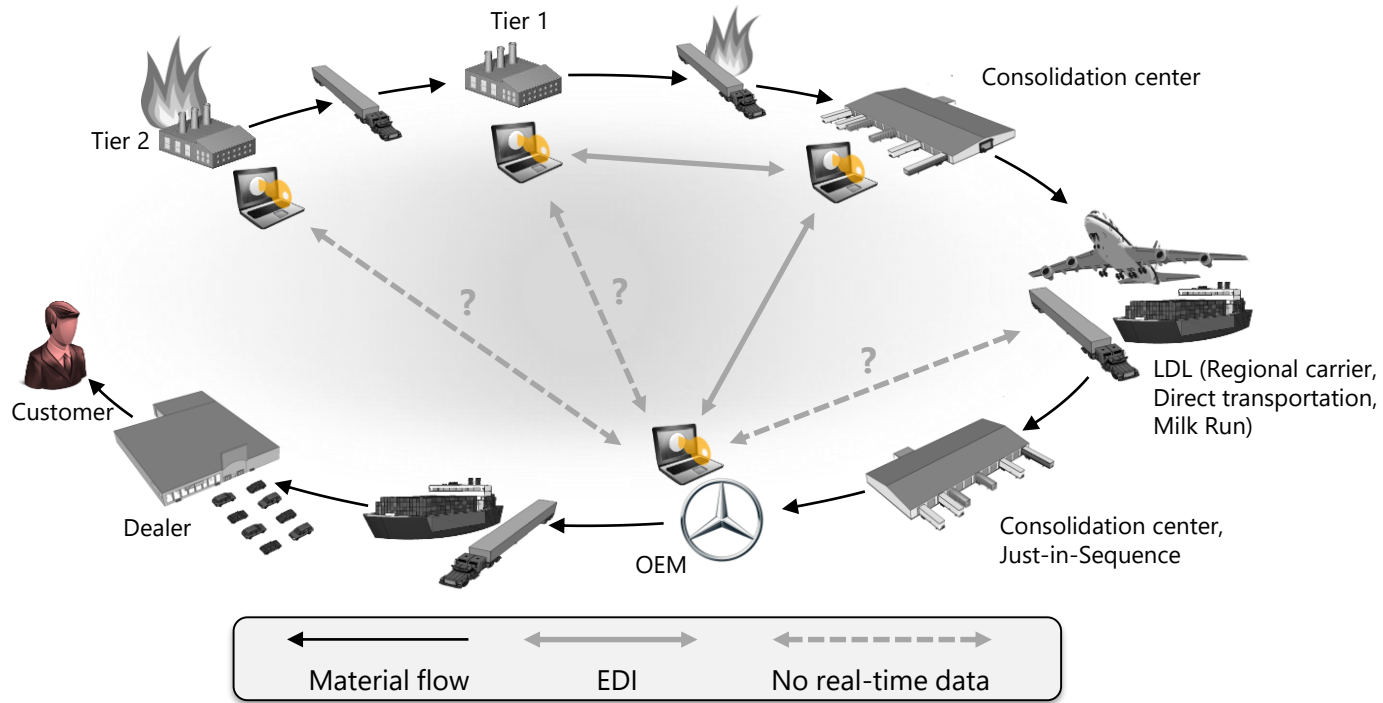
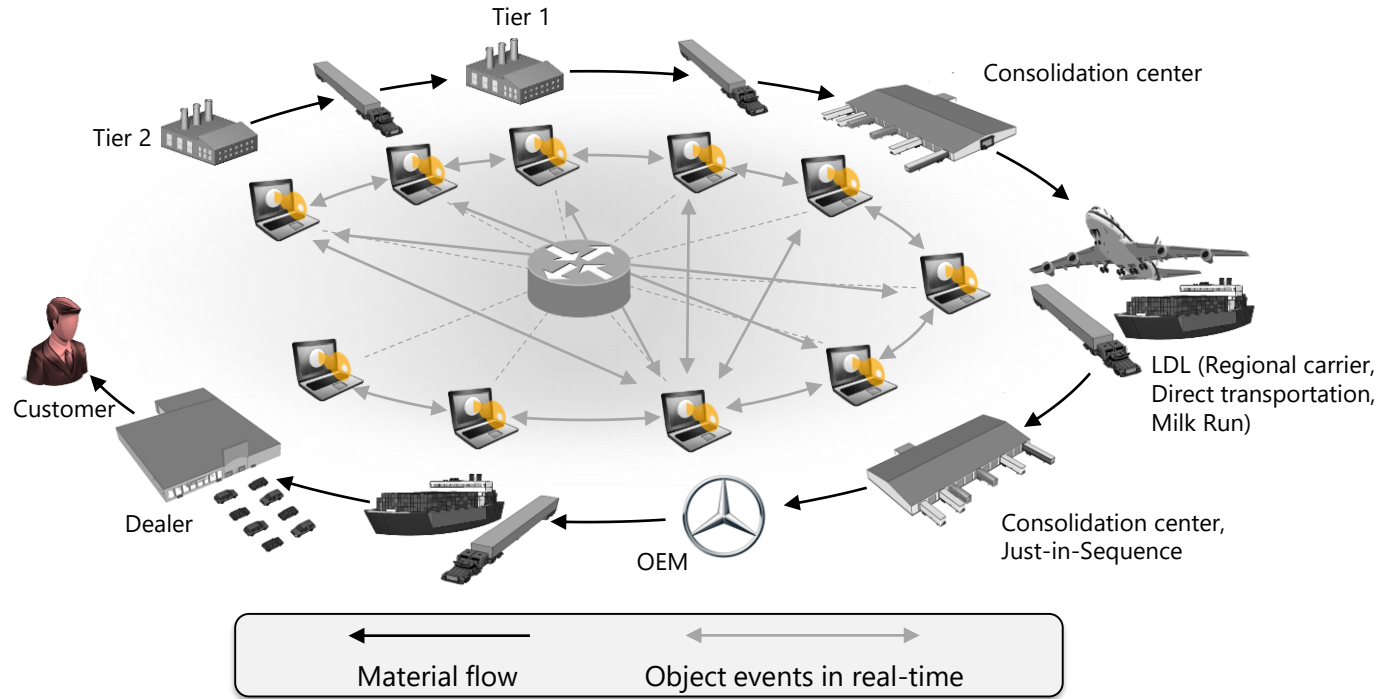


Figure 1.B.05: Digital factory as a digital twin



Source: Lepratti, R., Lamparter S., Schröder, R. (2014): Transparenz in globalen Lieferketten, Publicis Verlag, Erlangen, S.21

Figure 1.B.06a: Previous flow of information in the logistics network of the automotive industry



Source: Lepratti, R., Lamparter S., Schröder, R. (2014): Transparenz in globalen Lieferketten, Publicis Verlag, Erlangen, S.22

Figure 1.B.06b: Vision of the transparent flow of information using RFID technologies and a central virtual database

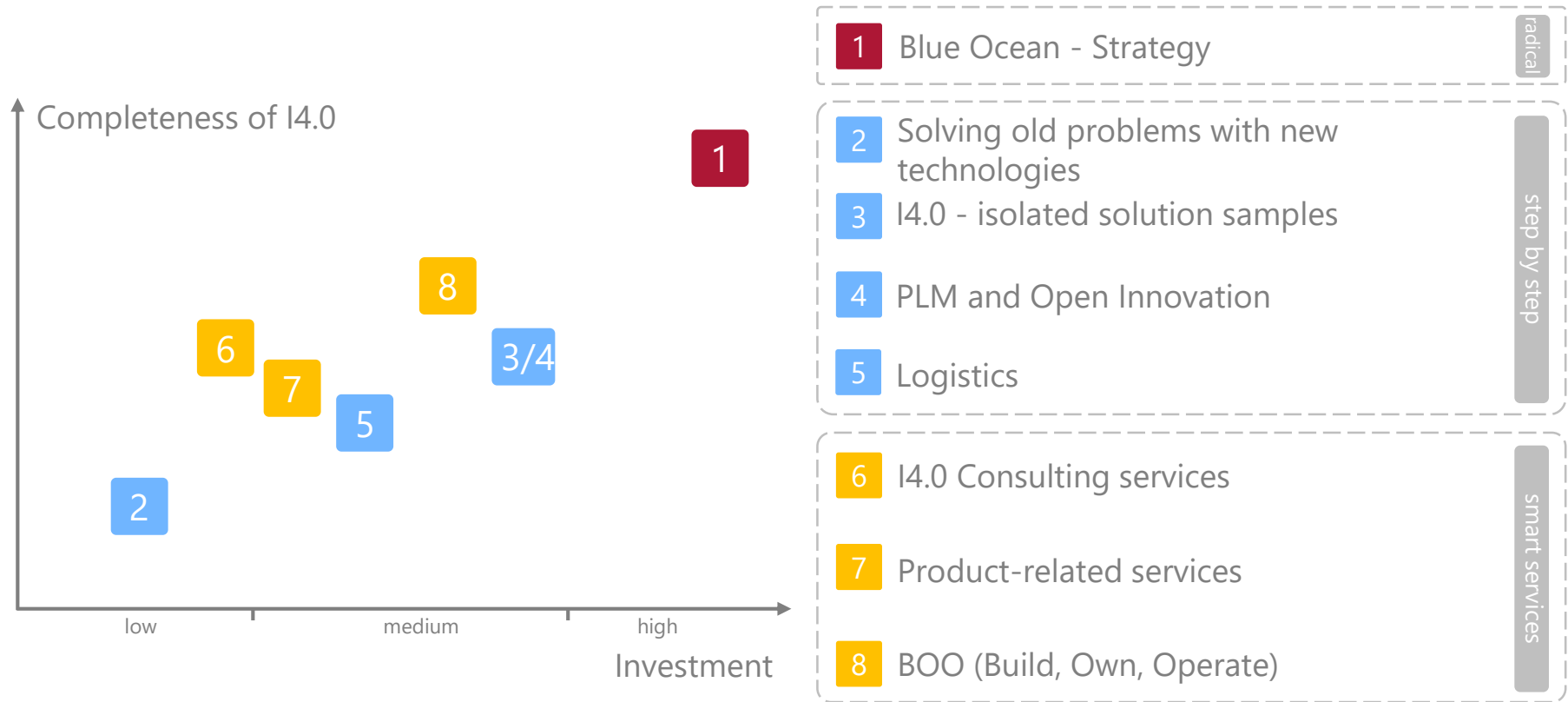


Figure 1.B.07: Strategic Approaches for I4.0

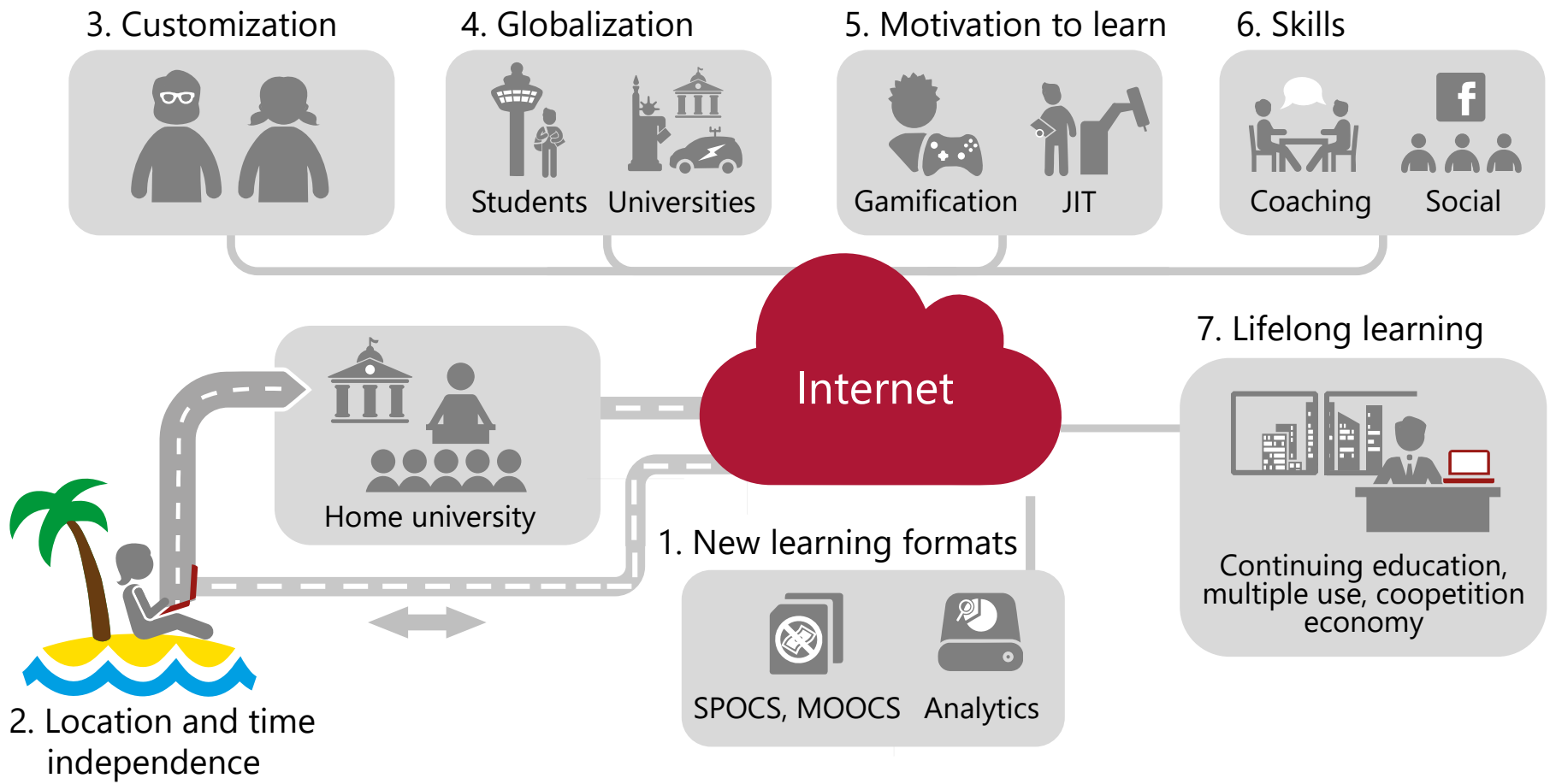
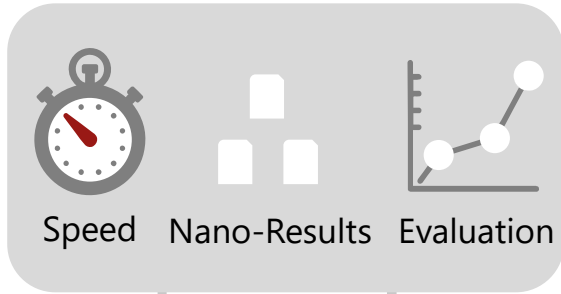


Figure 1.B.08: Teaching 4.0

1. New research formats



2. Virtual research groups



3. Data

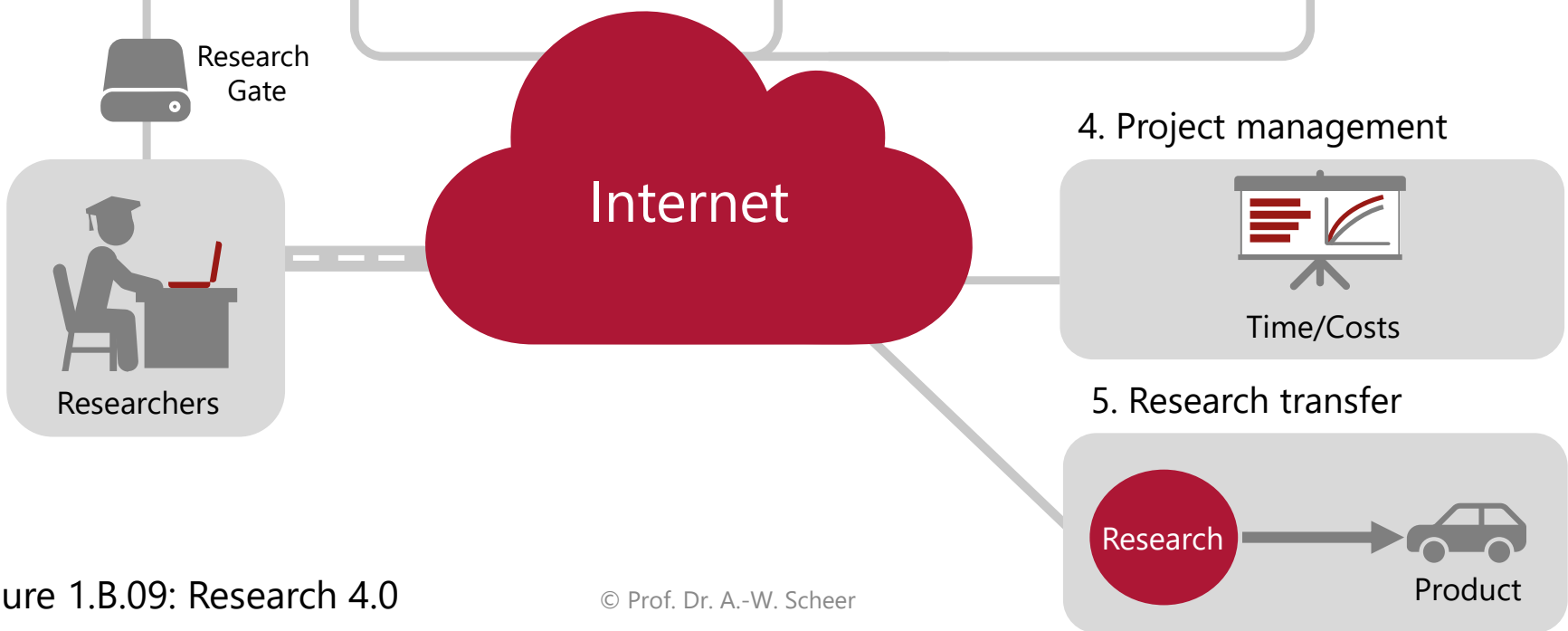
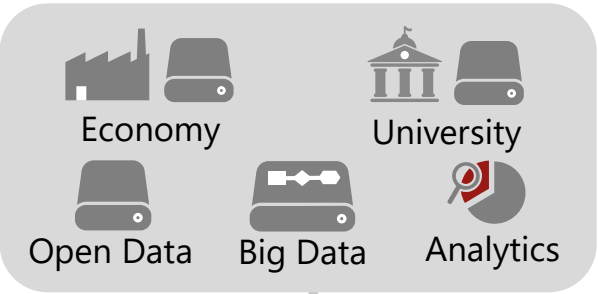


Figure 1.B.09: Research 4.0

CIO



CDO

Teaching



- Software platform (LMS)
- Tools
- Course information system

Research



- Research information system
- Project management

Campus Management



- Students secretary
- Student lifecycle management
- Alumni management
- Sponsoring

Back office



- Finance/Controlling
- Staff
- Procurement
- Facility management
- ERP system

Figure 1.B.09: Administration 4.0

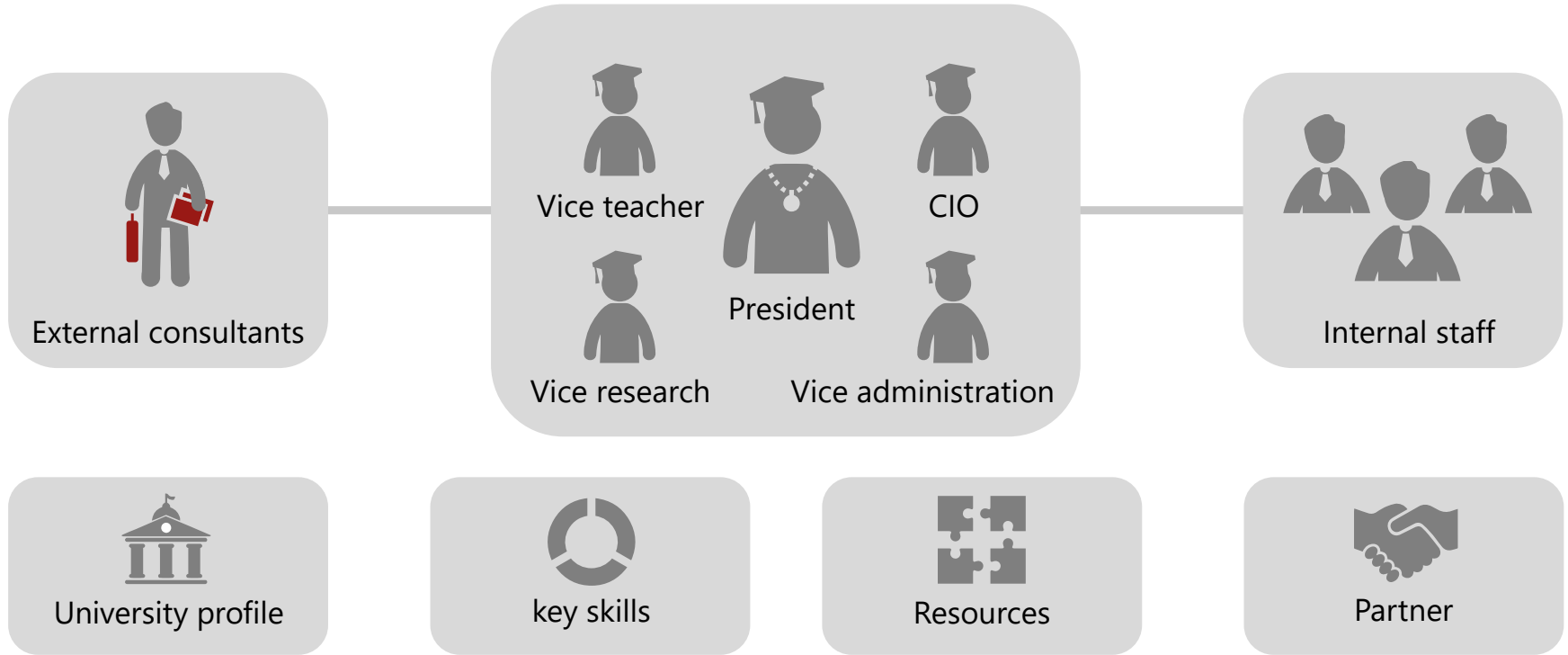


Figure 1.B.11: Strategy development for universities

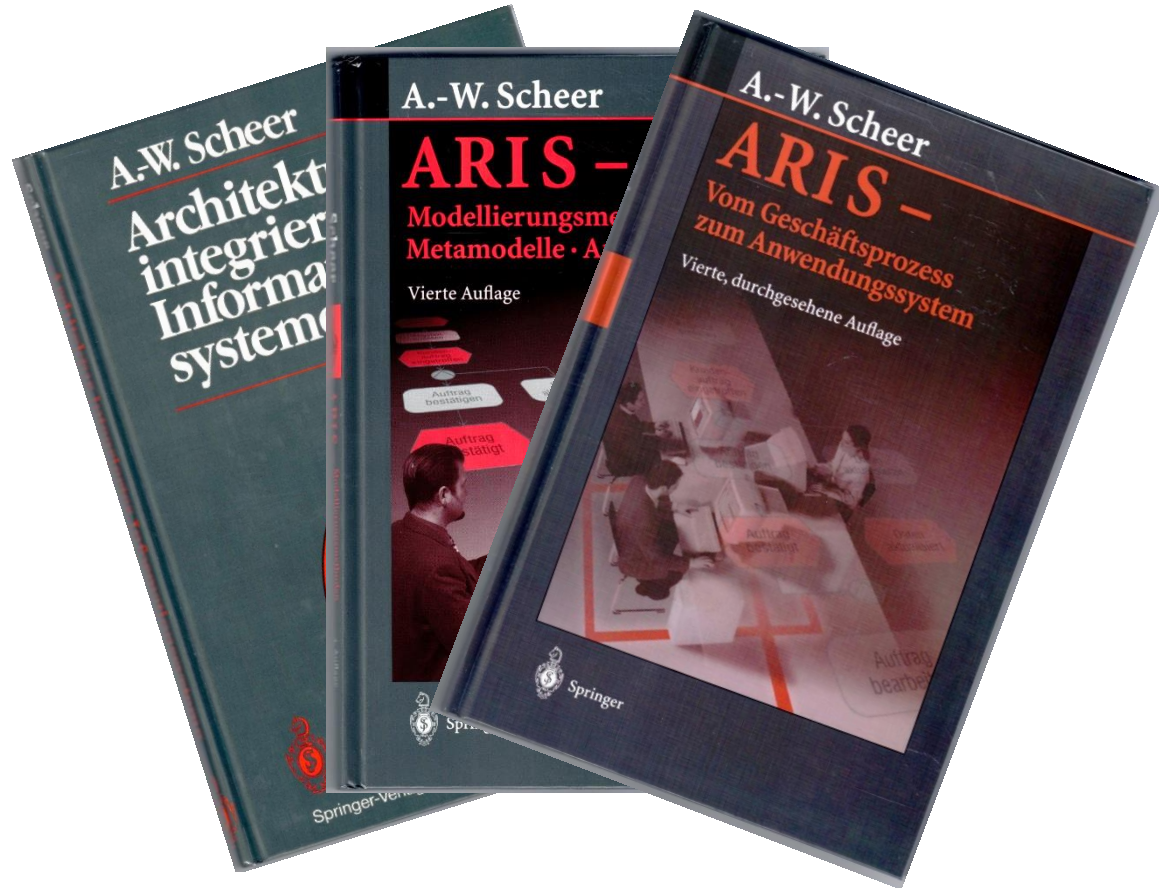


Figure 2.A.01: ARIS Books; 1st Edition 1991; 4th Edition 2002

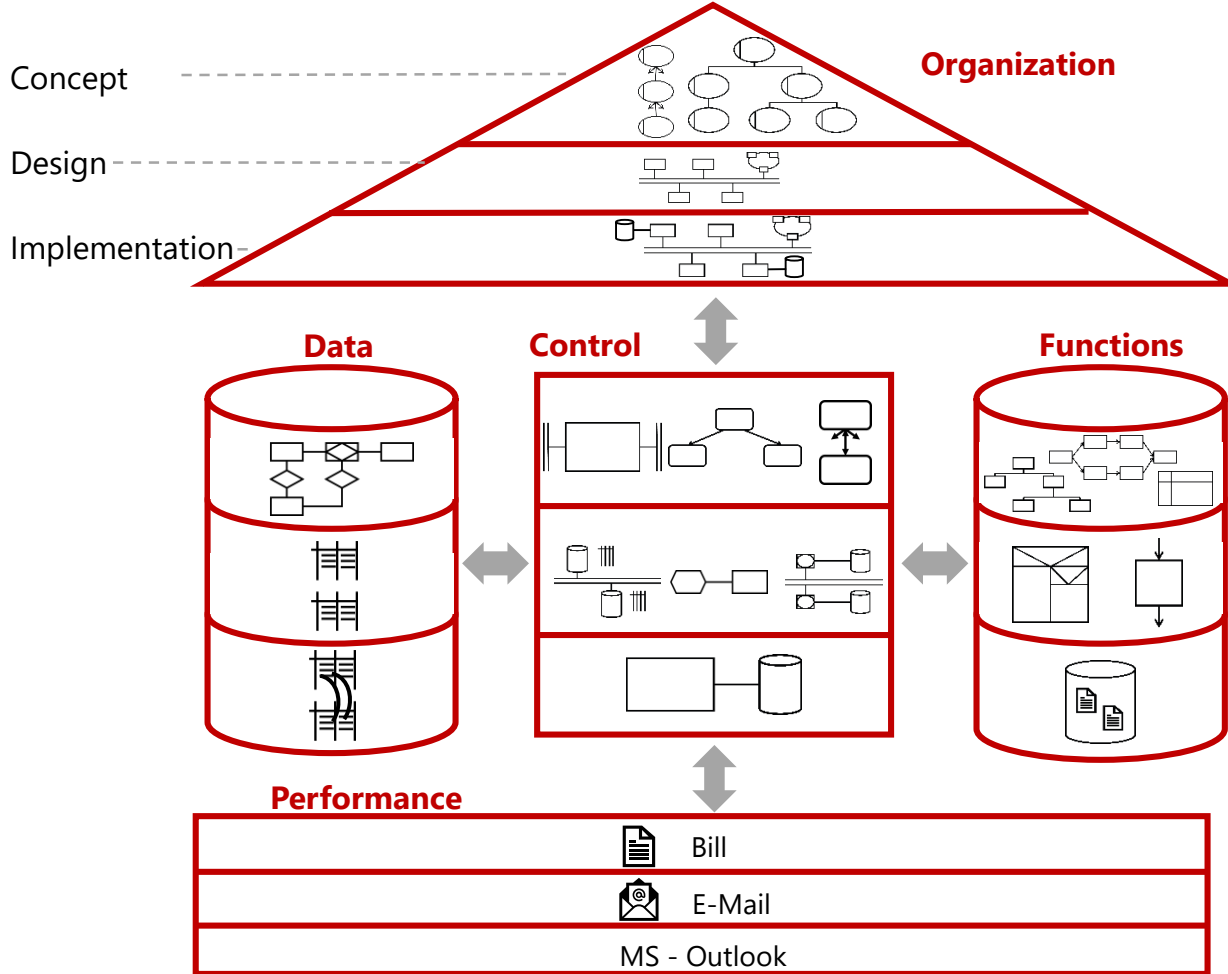


Figure 2.A.02: ARIS – Concept for modeling business processes (Scheer, 1992, 2001, 2002)

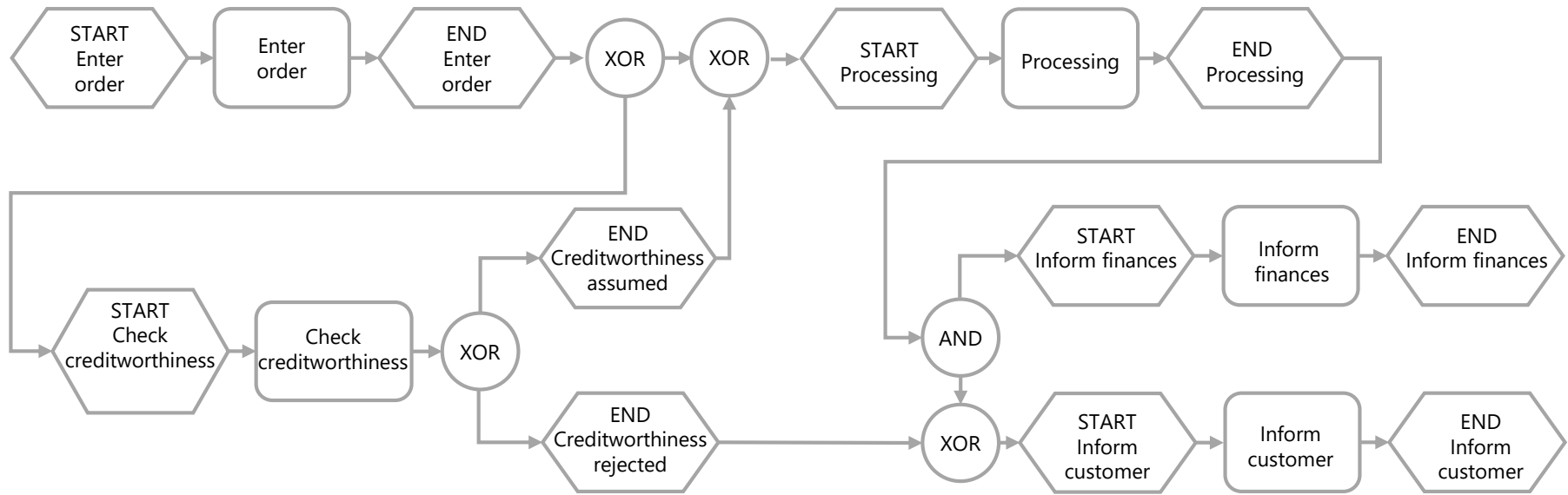


Figure 2.A.03: Process model of a simple order process

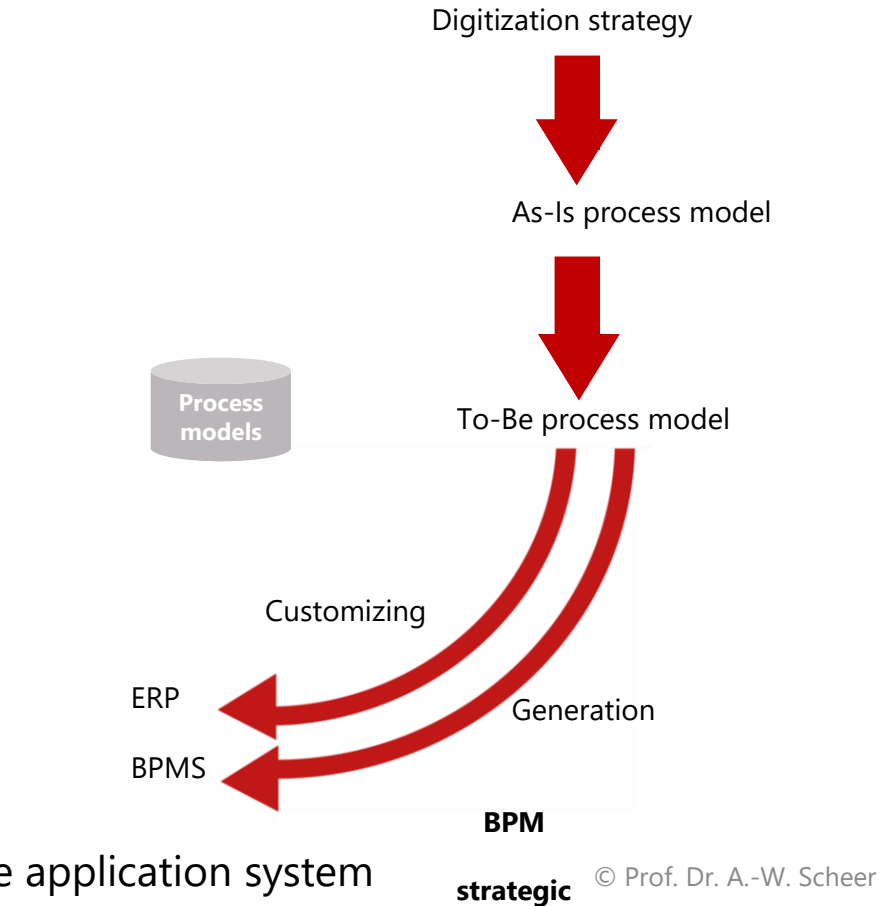


Figure 2.B.01: From the digital process model to the application system

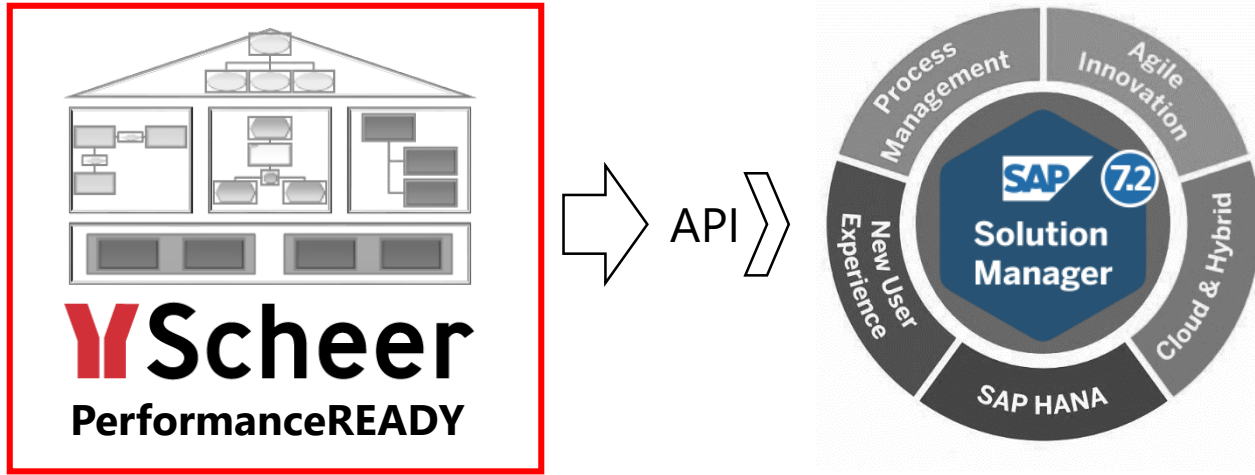


Figure 2.B.02: Connecting Scheer reference model with Solution Manager SAP AG

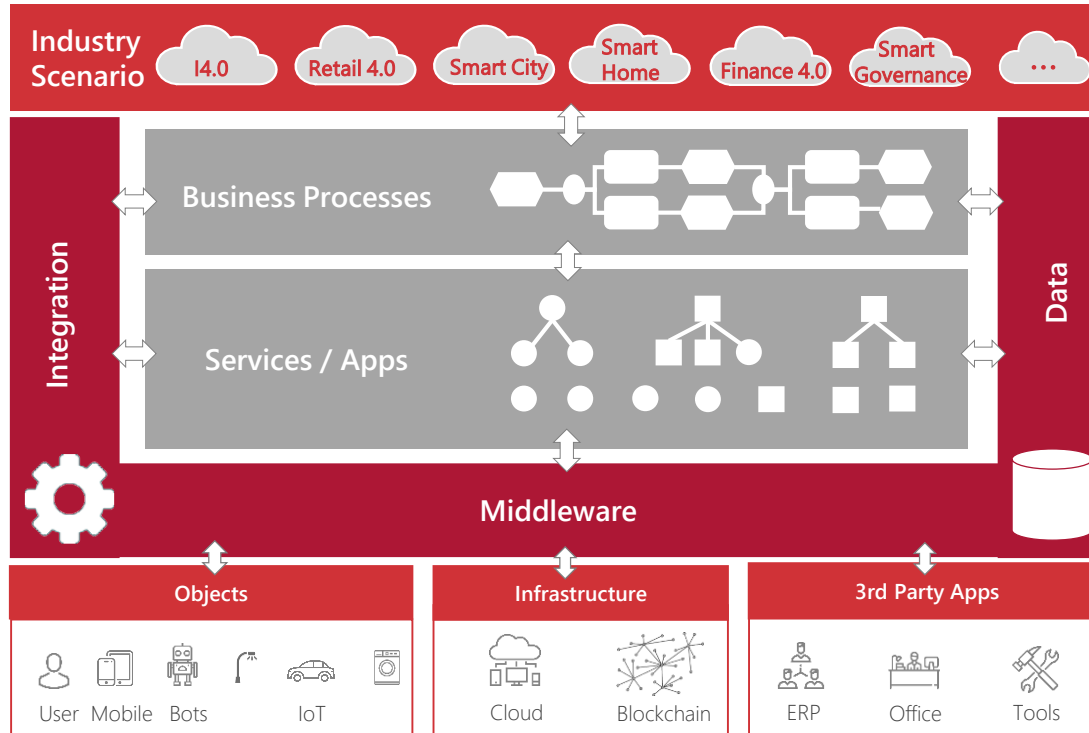


Figure 2.B.03: Digitization Architecture

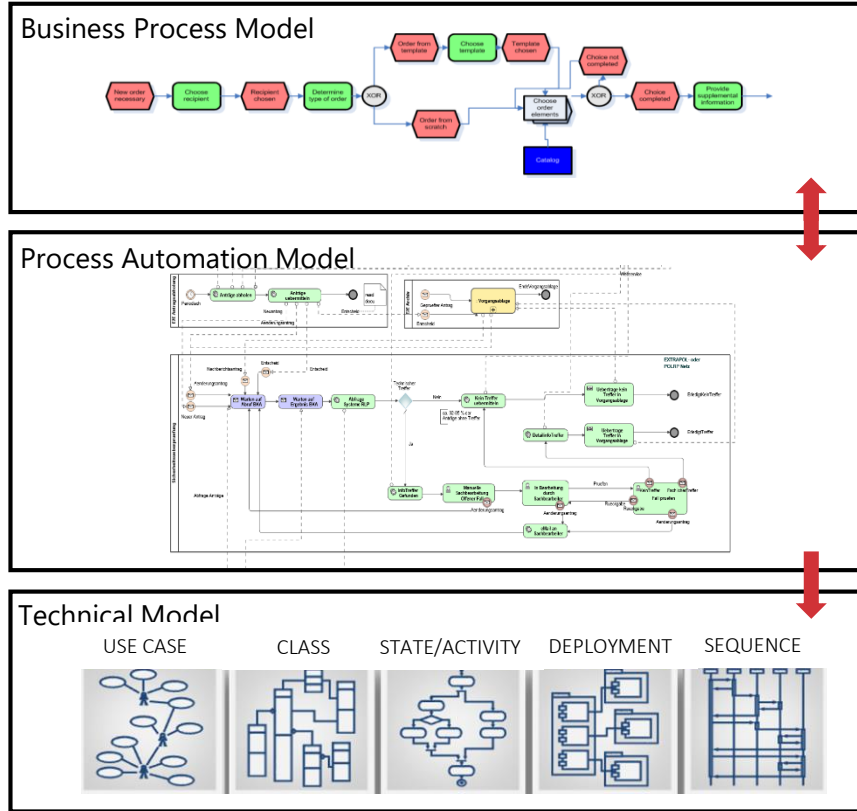


Figure 2.B.04: Model-supported software generation with Scheer Digitization Platform

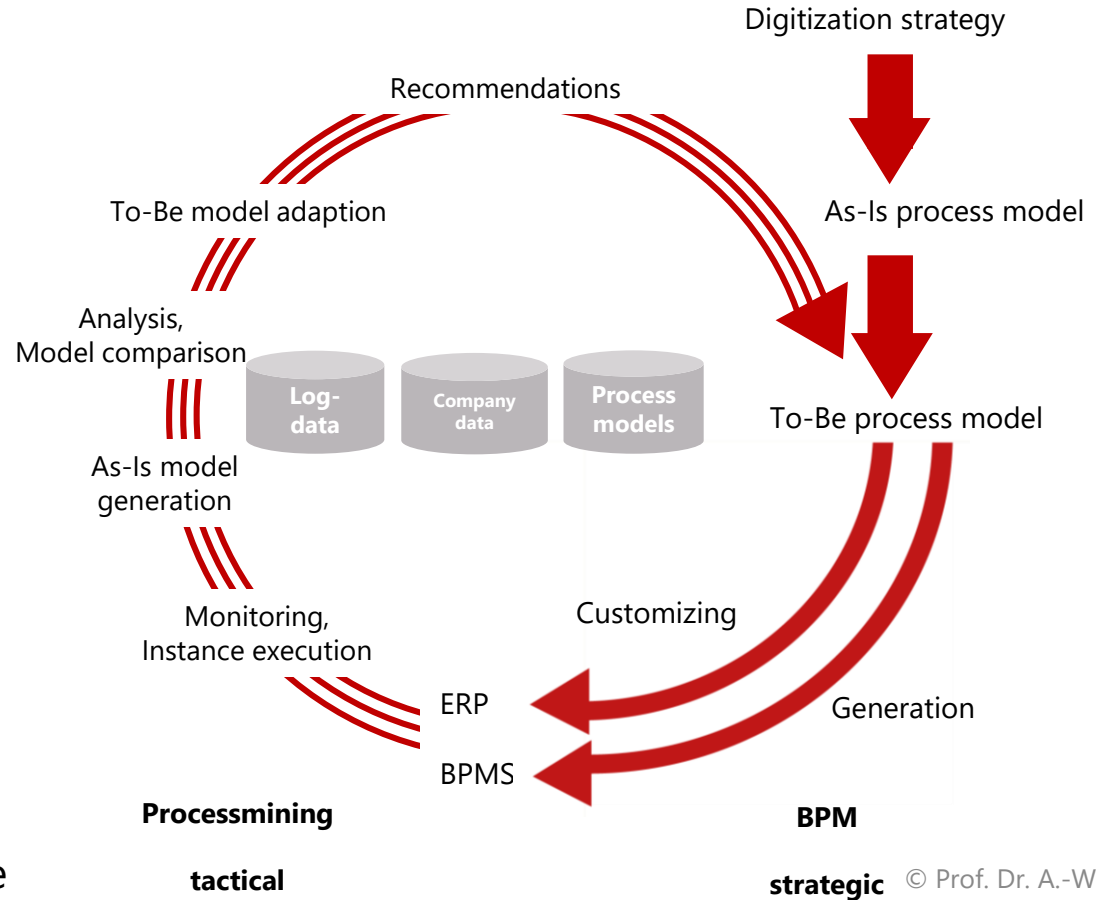
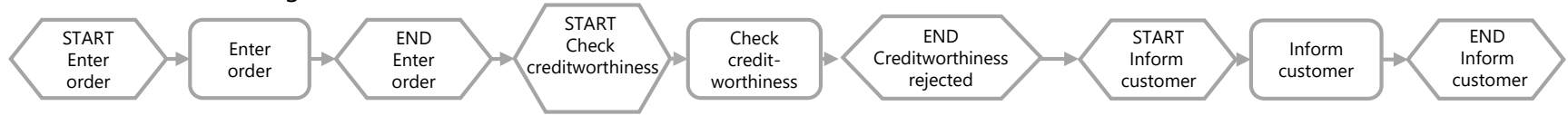
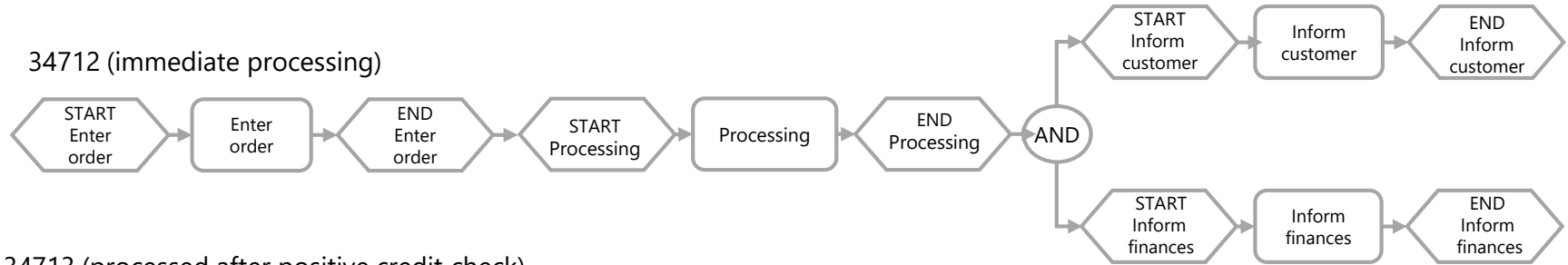


Figure 2.C.01: Process mining cycle

34711 (credit check negative)



34712 (immediate processing)



34713 (processed after positive credit check)

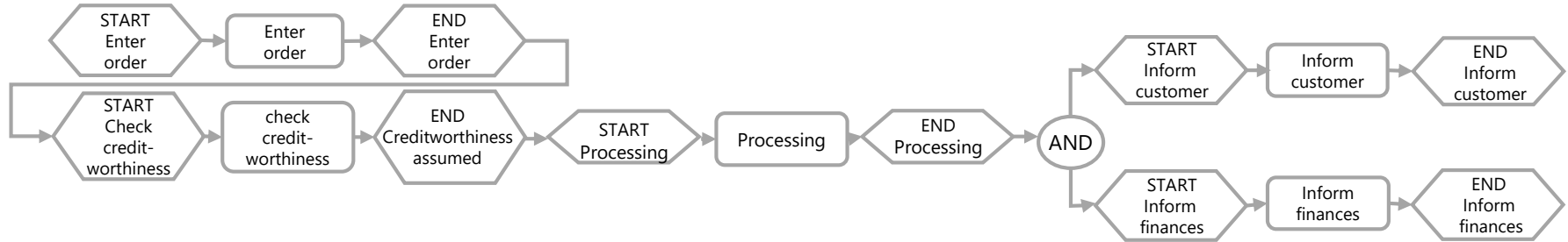


Figure 2.C.02: Instance models of order processing pursuant to Fig. 2.A.03

Instance ID	Event ID	START Function Day, month, time	END Function Day, month, time	Name Function	Organization/ Agent	Further Attributes
34711	...1	5.4.8.02	-	Enter order	M	XX
	2	-	5.4.8.10	Enter order	M	YY
	3	5.4.9.03	-	Check creditworthiness	S	BB
	4	-	5.4.9.40	Check creditworthiness	S	ZZ
	5	5.4.9.45	-	Inform customer	K	LL
	6	-	5.4.9.46	Inform customer	K	MM
34712	9	5.4.8.12	-	Enter order	M	ZZ
	12	-	5.4.8.14	Enter order	M	XX
	13	5.4.8.27	-	Processing	L	XX
	15	-	6.4.10.03	Processing	L	BB
	17	6.4.11.02	-	Inform customer	K	AA
	18	-	6.4.11.14	Inform customer	K	KK
	20	6.4.11.02	-	Inform finances	F	FF
	21	-	6.4.11.05	Inform finances	F	
34713	25	5.4.8.20	-	Enter order	M	LL
	26	-	5.4.8.25	Enter order	M	HH
	27	5.4.9.45	-	Check creditworthiness	S	JJ
	30	-	6.4.11.25	Check creditworthiness	S	FF
	31	6.4.15.03	-	Processing	L	GG
	33	-	7.4.9.28	Processing	L	ZZ
	34	7.4.10.02	-	Inform customer	K	RR
	35	-	7.4.10.08	Inform customer	K	SS
	37	7.4.10.02	-	Inform finances	F	CC
	38	-	7.4.10.15	Inform finances	F	DD

Figure 2.C.03: Log file of order processing

Process instances

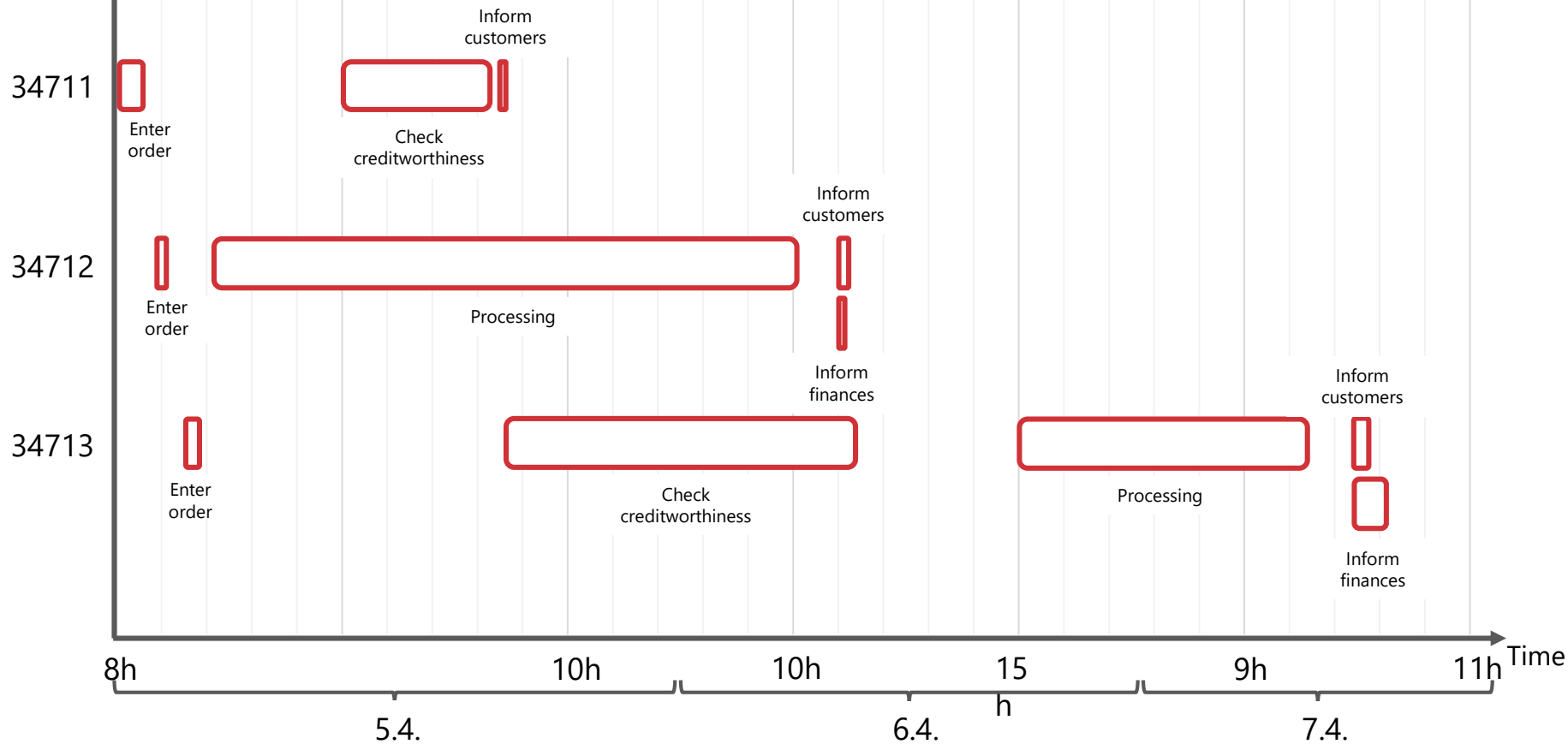


Figure 2.C.04: Temporal sequence of the three example instances

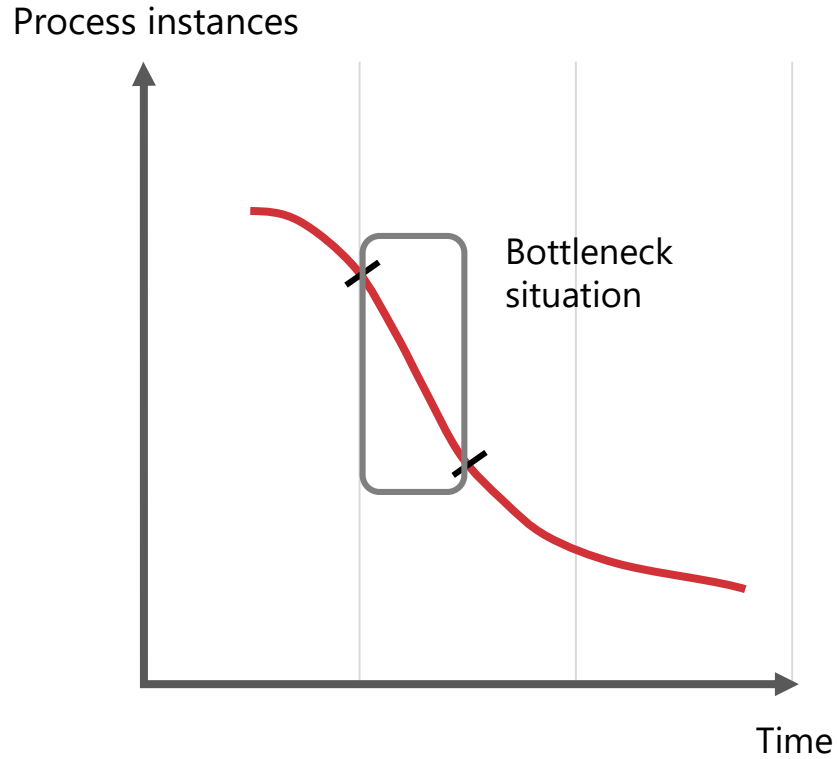


Figure 2.C.05: Starting lines of the instances of a larger log file

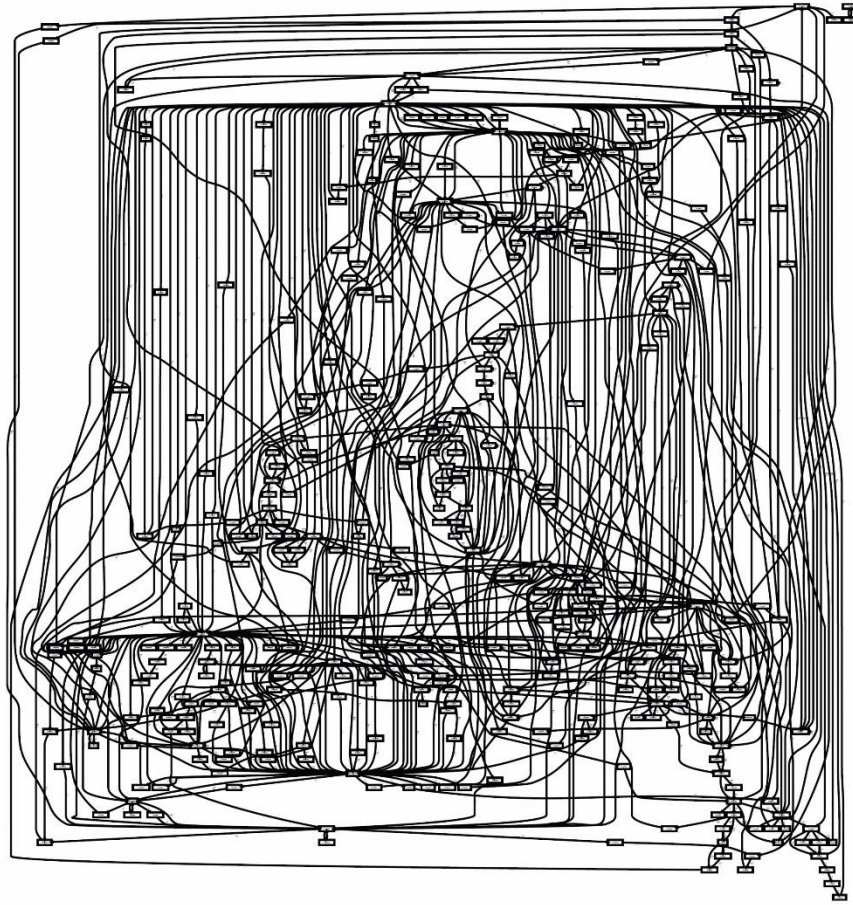


Figure 2.C.06: Generated spaghetti model van der Aalst, 2011

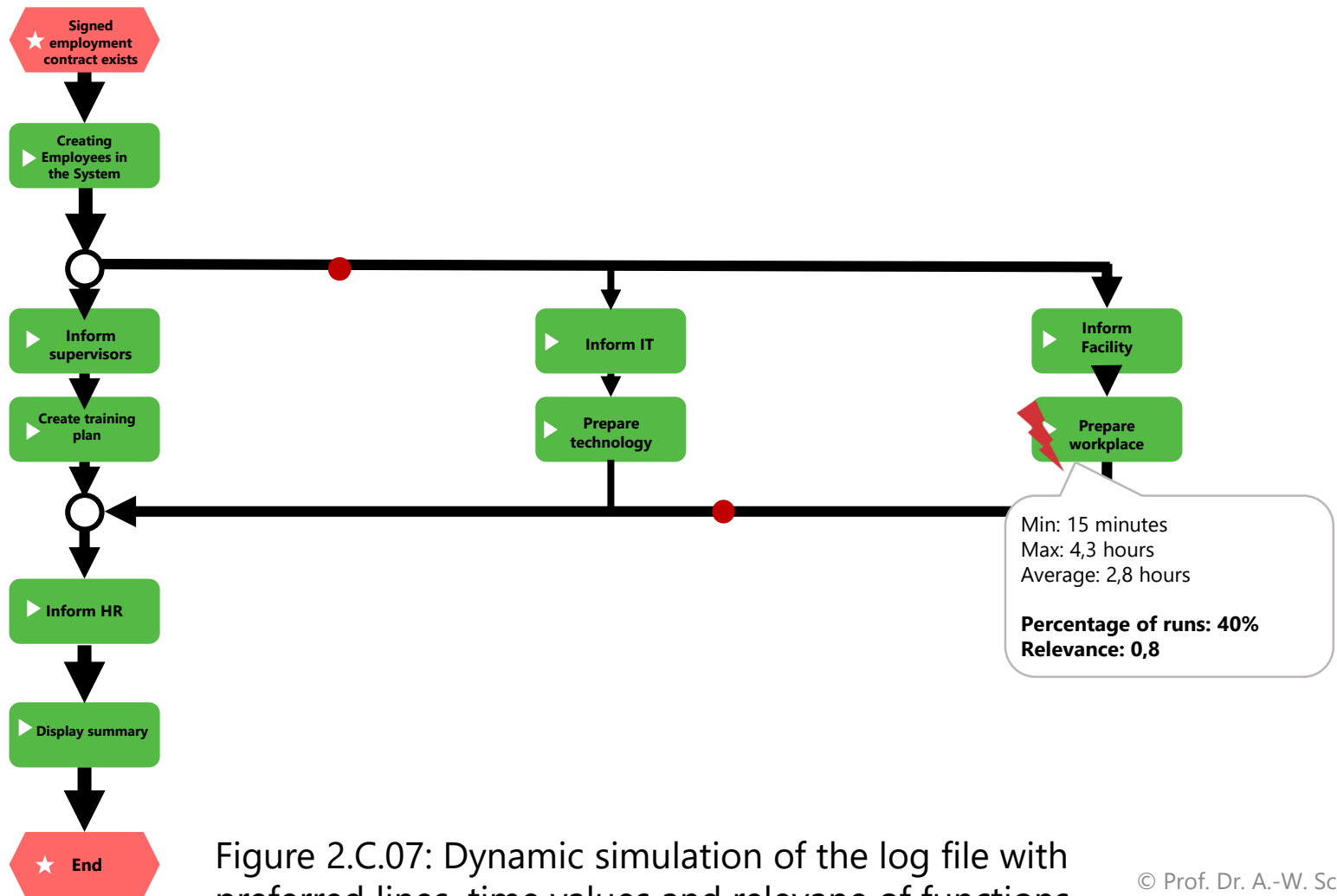


Figure 2.C.07: Dynamic simulation of the log file with preferred lines, time values and relevance of functions

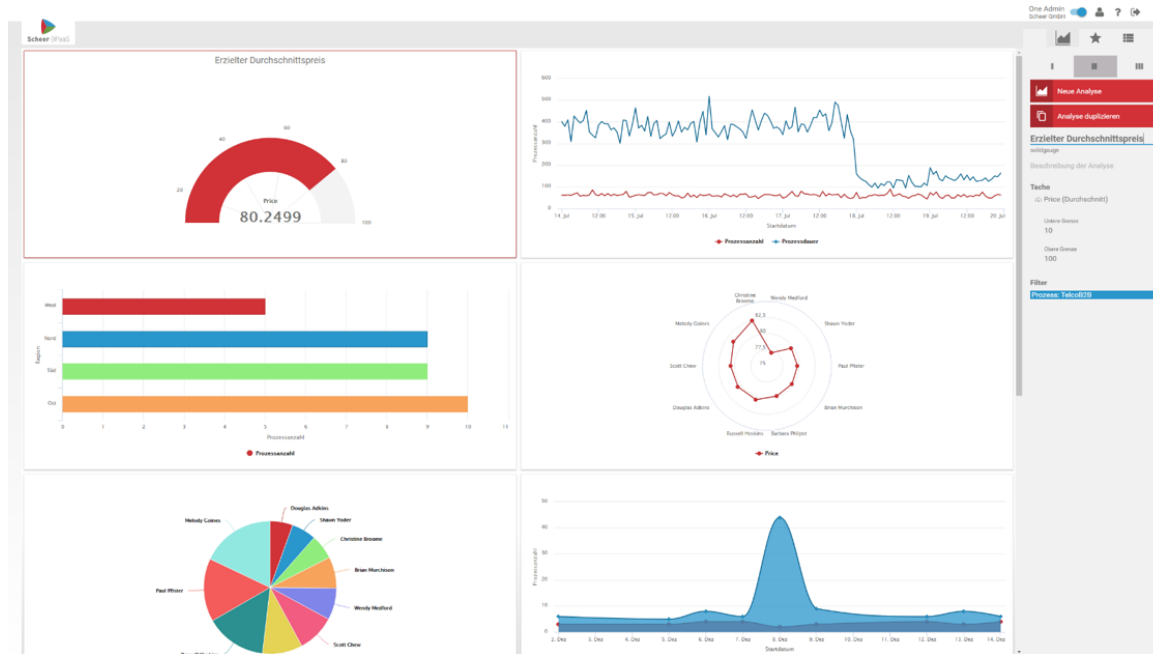


Figure 2.C.08: Process Mining dashboard

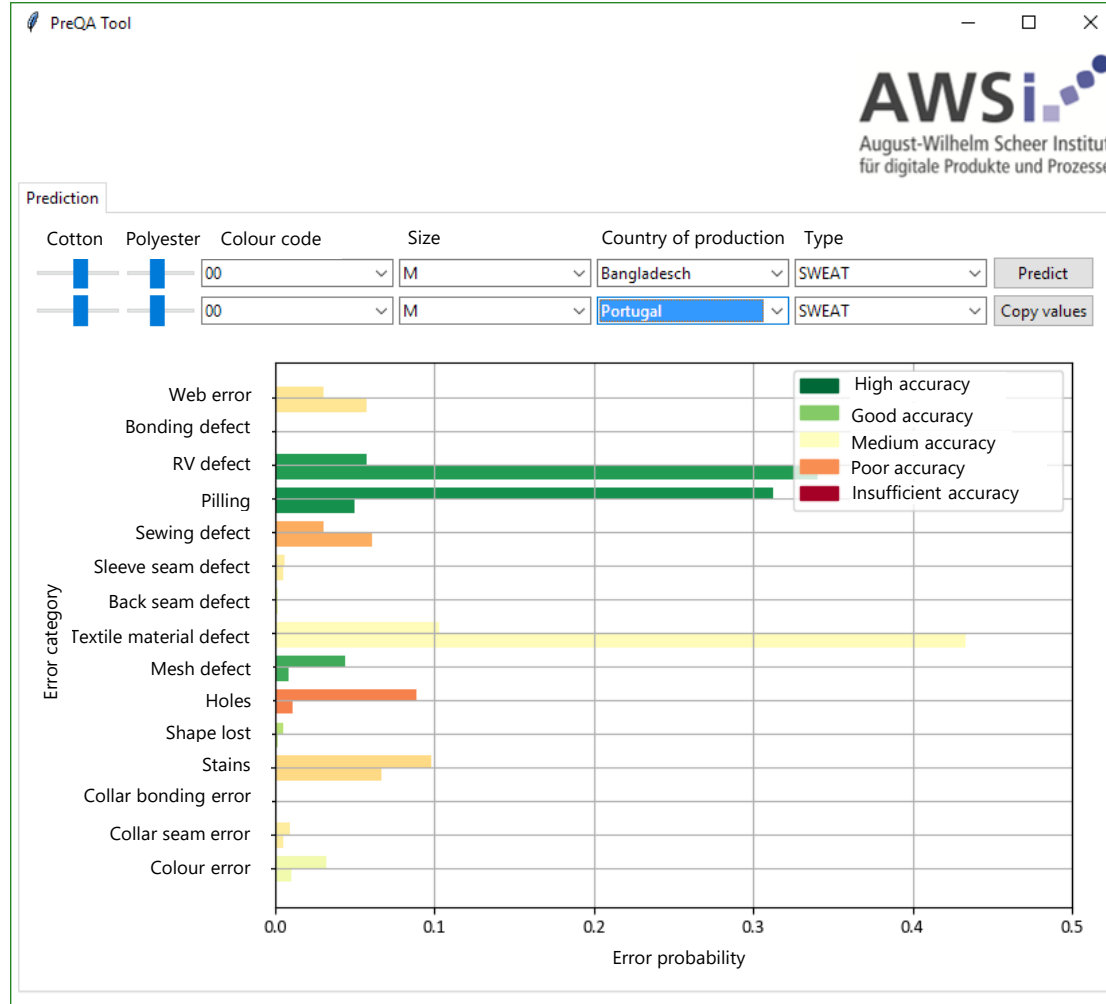


Figure 2.C.09: Combining Process and Product Mining

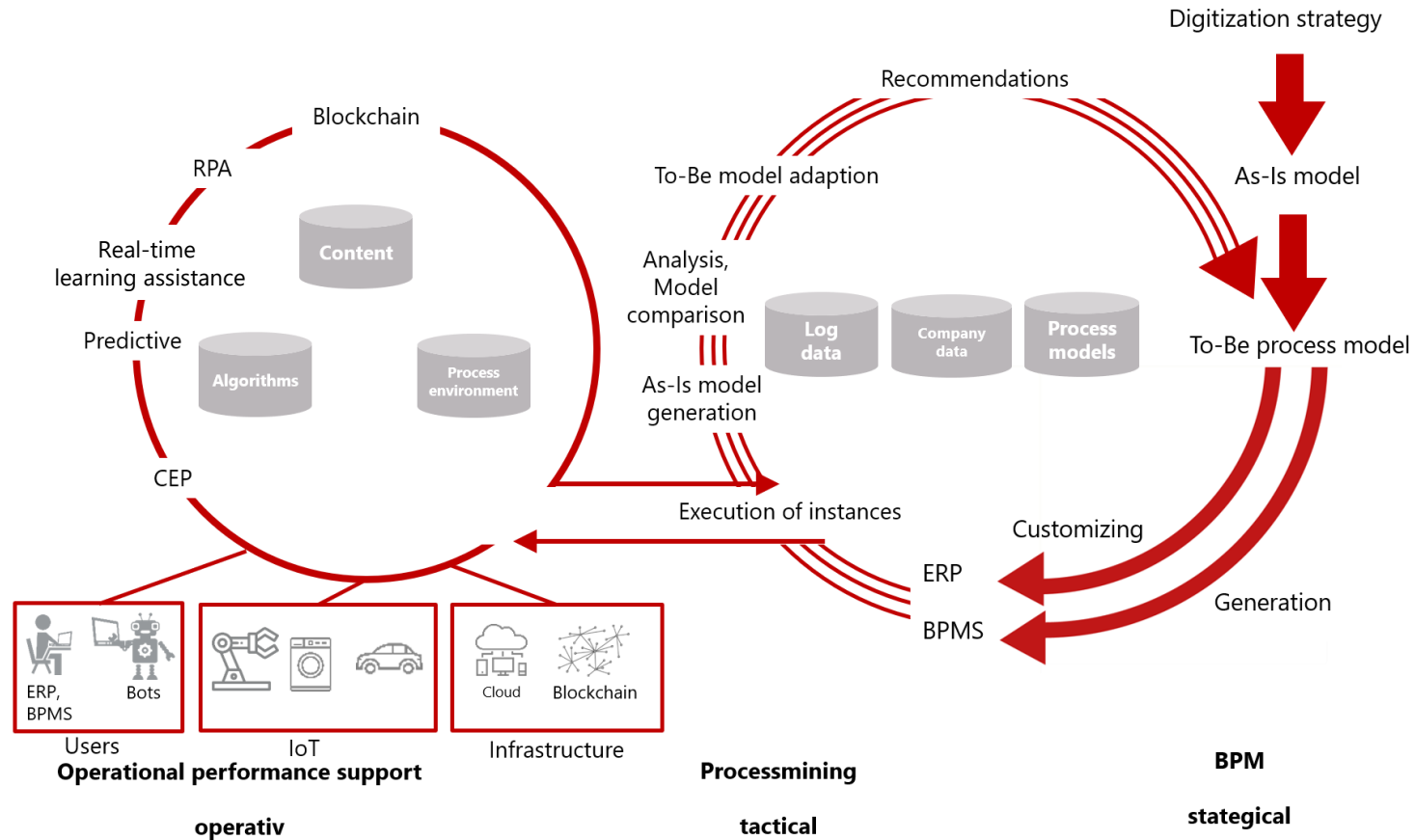


Figure 2.D.01: Entire process loop from strategy to real-time implementation

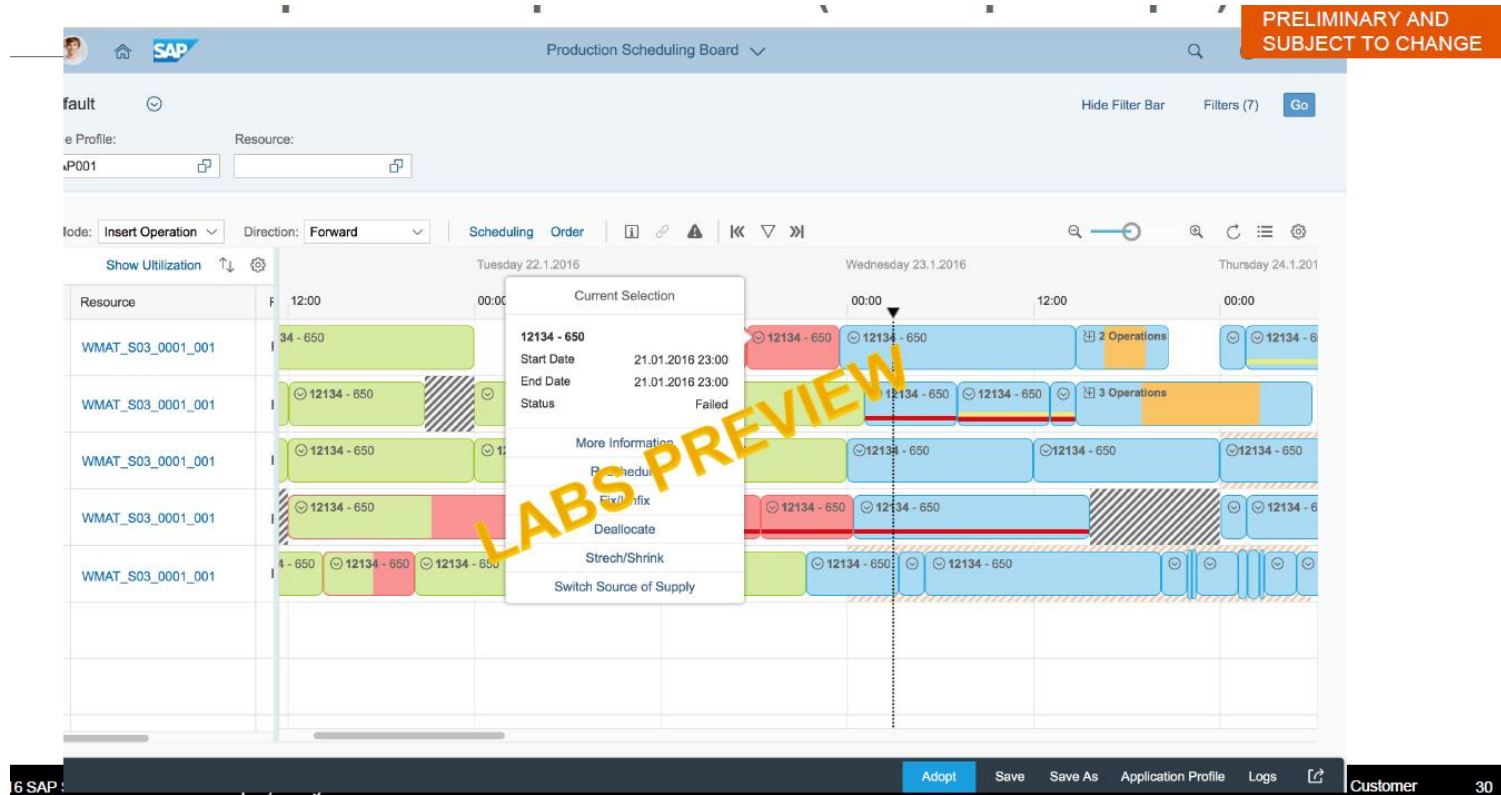


Figure 2.D.02: Control station surface for production management (SAP AG)

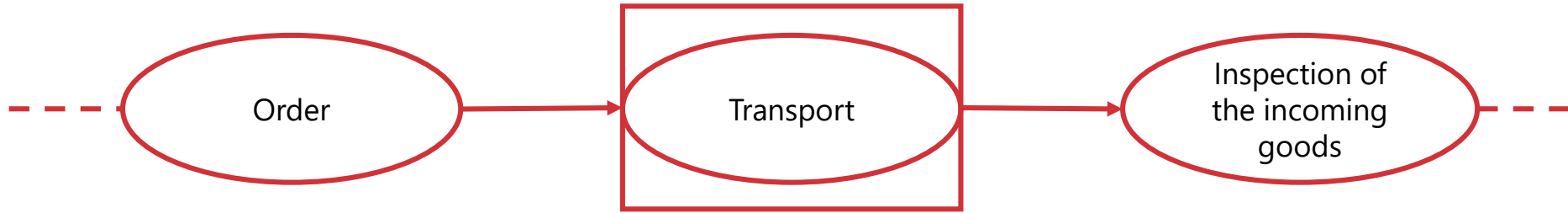


Figure 2.D.03: Business transport model

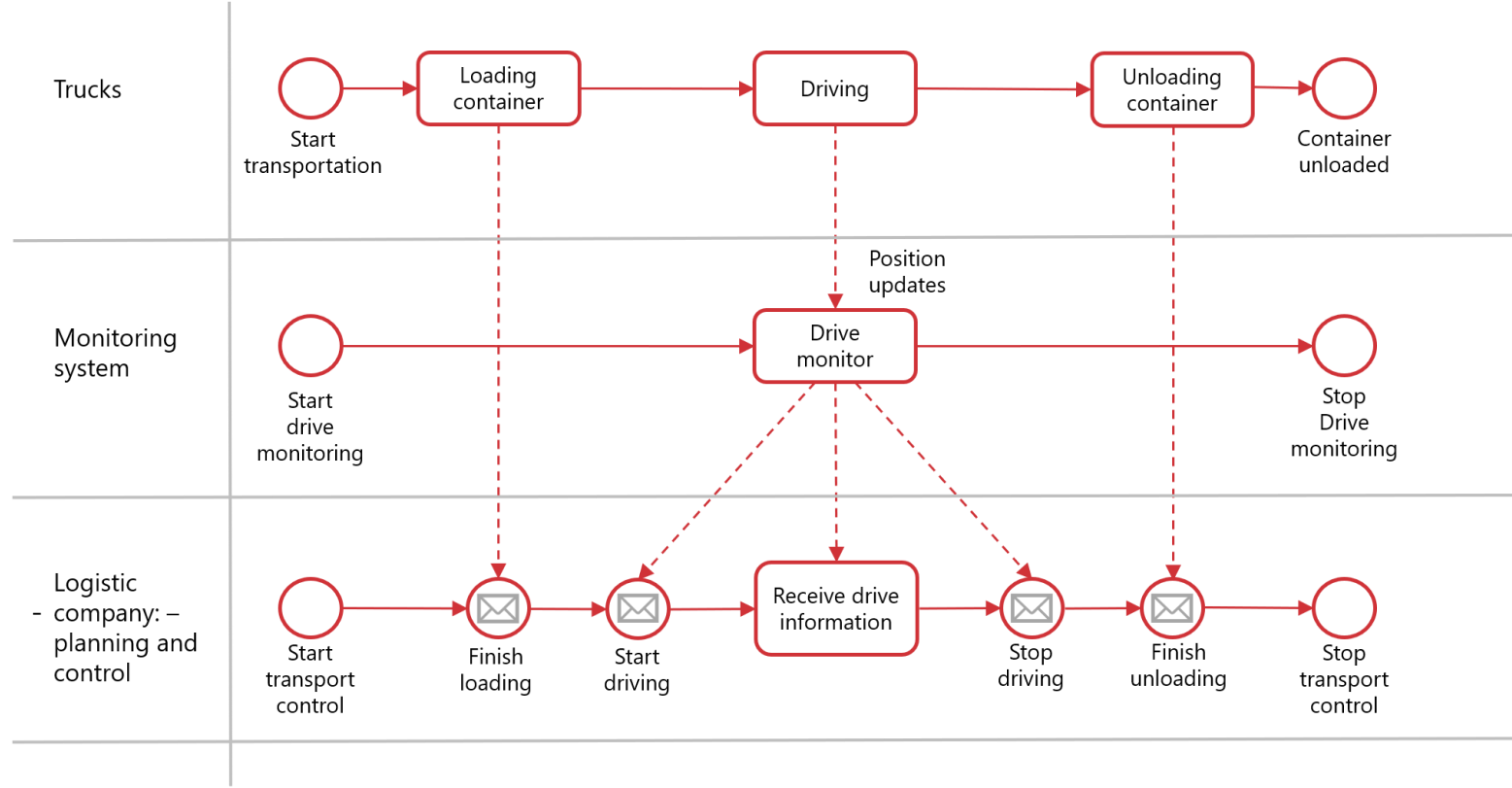


Figure 2.D.04: Refined transport process (according to Soffer et al., 2017)



Quality is good!

Quality characteristic

good okay warning error bad

KPI No.1

KPI No.2

KPI No.3

KPI No.4

KPI No.5



Work step:

1
2
3
4
5

5 seconds

60 seconds

www.ispredict.com | Copyright

Figure 2.D.05a: Quality forecast after 5 seconds



Quality is still ok, but warning!

Quality characteristic

okay warning error
good  bad

KPI No.1

KPI No.2

KPI No.3

KPI No.4

KPI No.5



Work step:

1
2
3
4
5

37 seconds

60 seconds

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Figure 2.D.05b: Quality forecast after 37 seconds

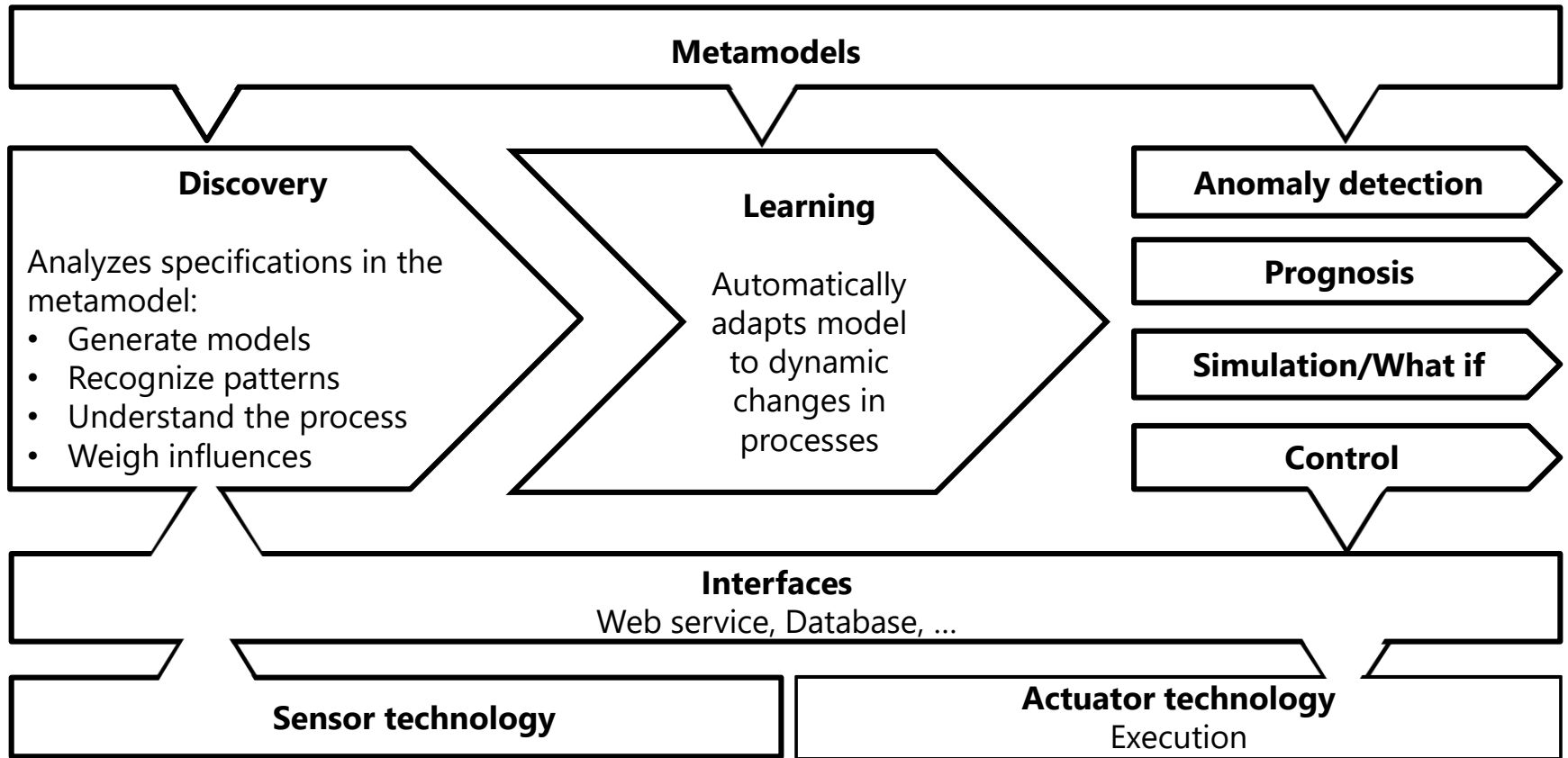


Figure 2.D.06: Software system architecture for pro-active management by IS Predict GmbH

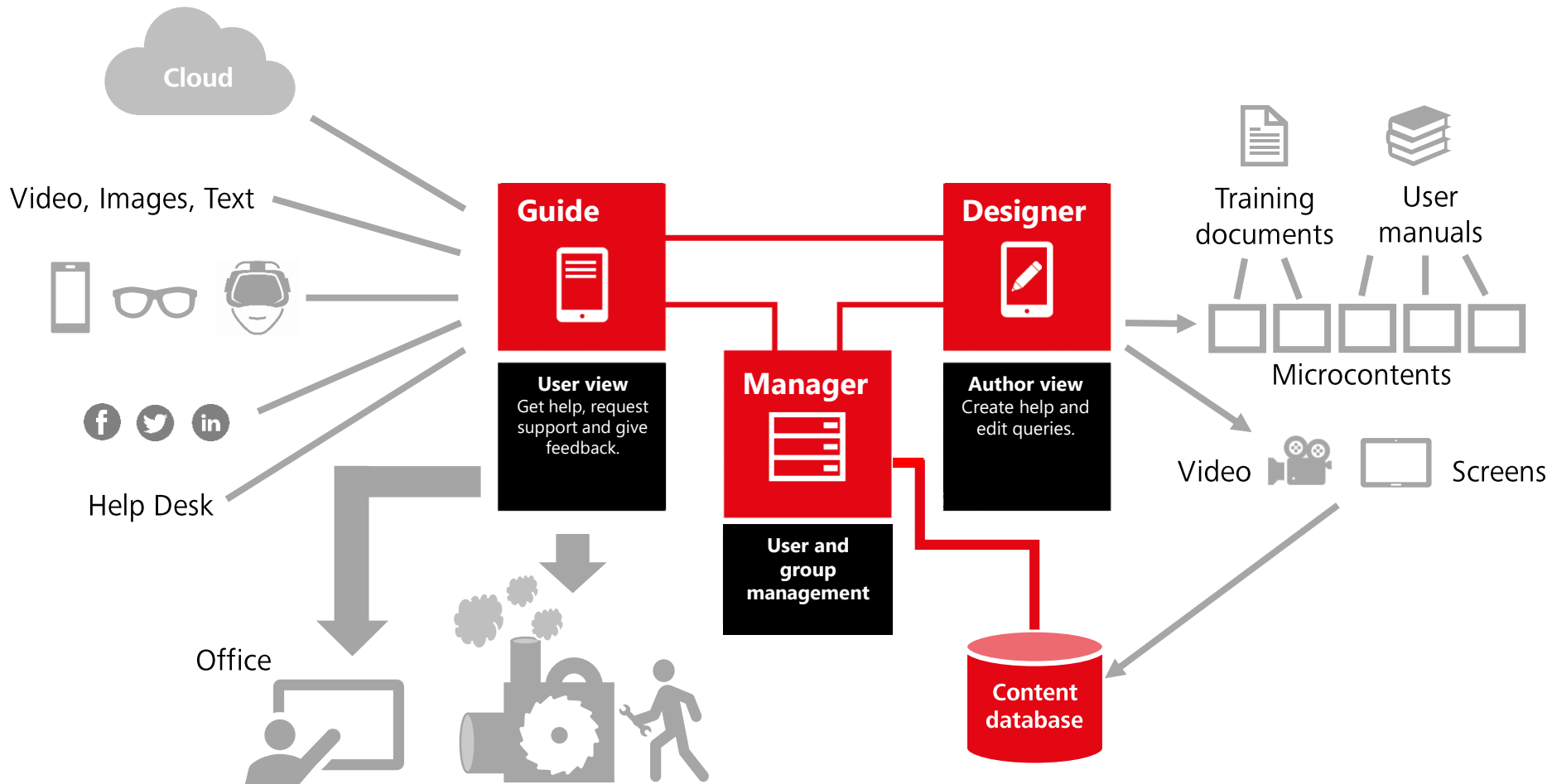


Figure 2.D.07: System architecture of „Process Guide“ from imc AG



Figure 2.D.08: Instructions on a smartphone or AR data glasses (imc AG, 2017c)



Figure 2.D.09: VR glasses looking at a drive in operation



Figure 2.E.01: Robots dominate entire production lines (source: Audi AG)



Figure 2.E.02: Substantive work by humans is still required for the operation of ERP and BPMS systems. (source: Competence Call Centre GmbH)



Figure 2.E.03: With the aid of software robots (bots), more work stages can be automated. (source: NDR)

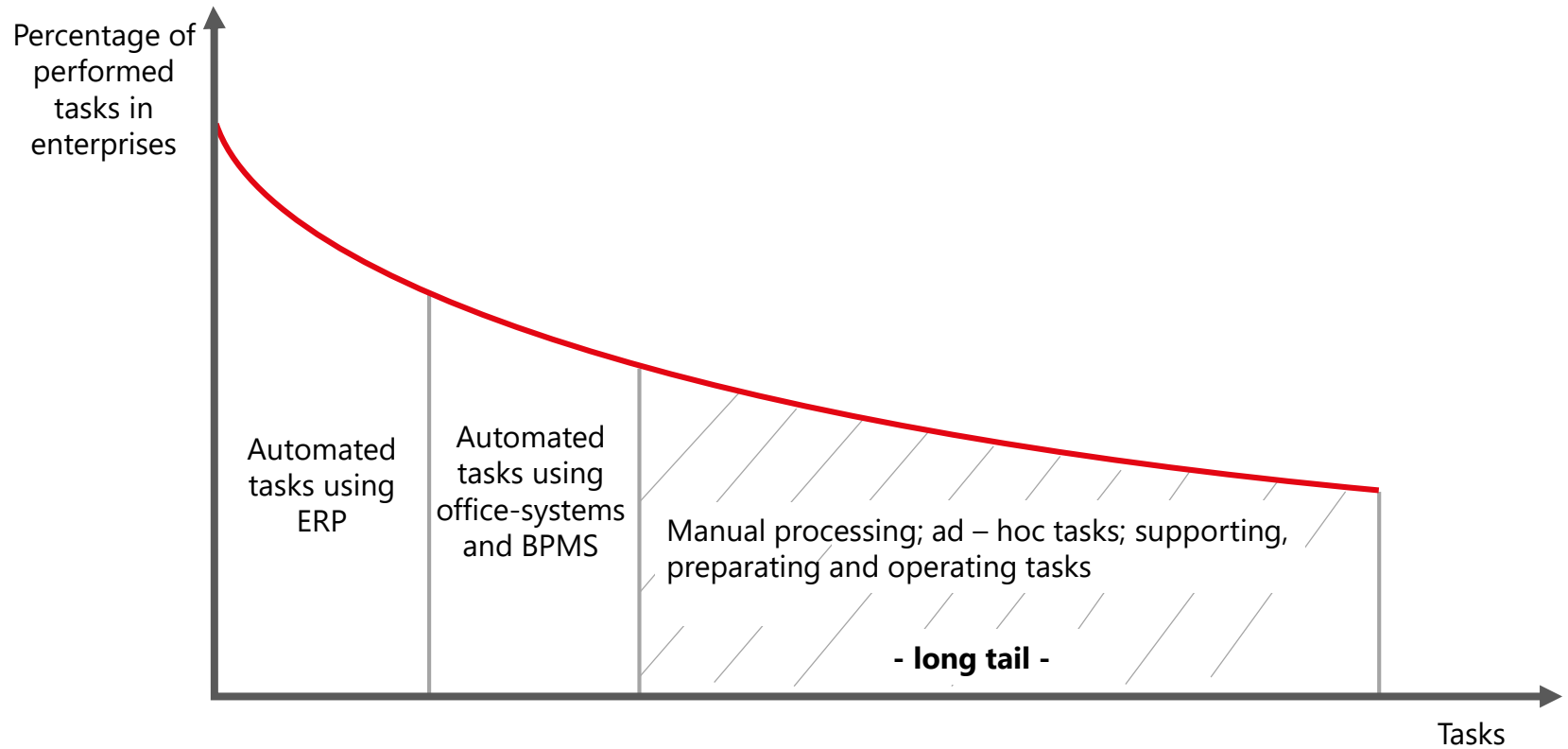
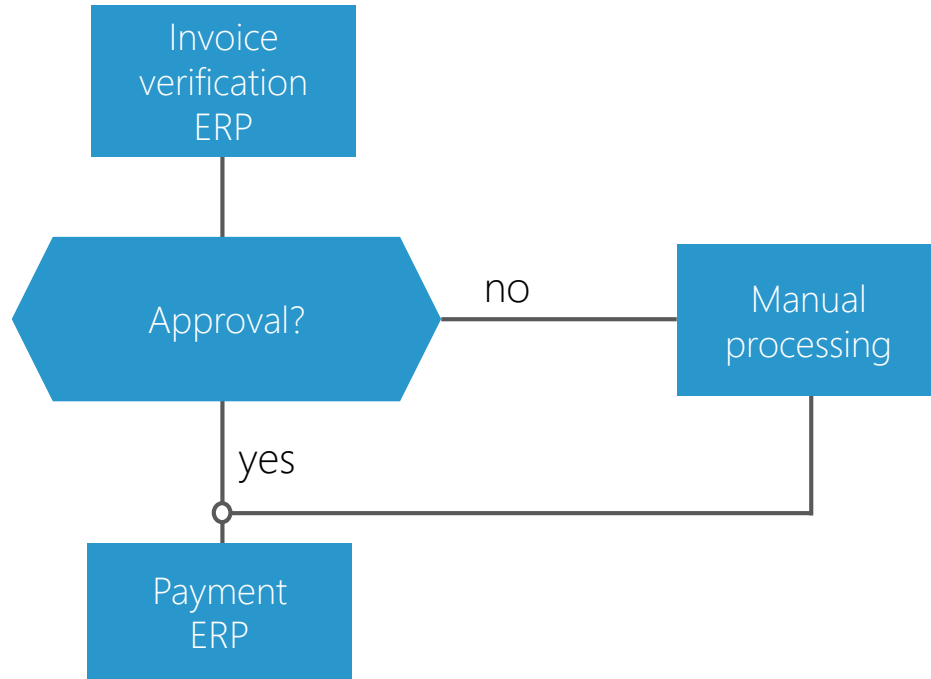


Figure 2.E.04: Long tail of IT application



Processing of all special cases
determined by the ERP

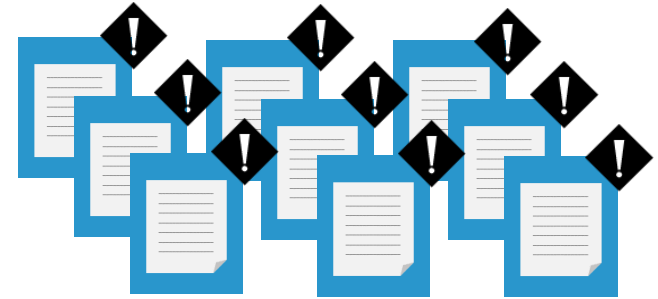


Figure 2.E.05a: Checking the accompanying supplier invoices – manual.

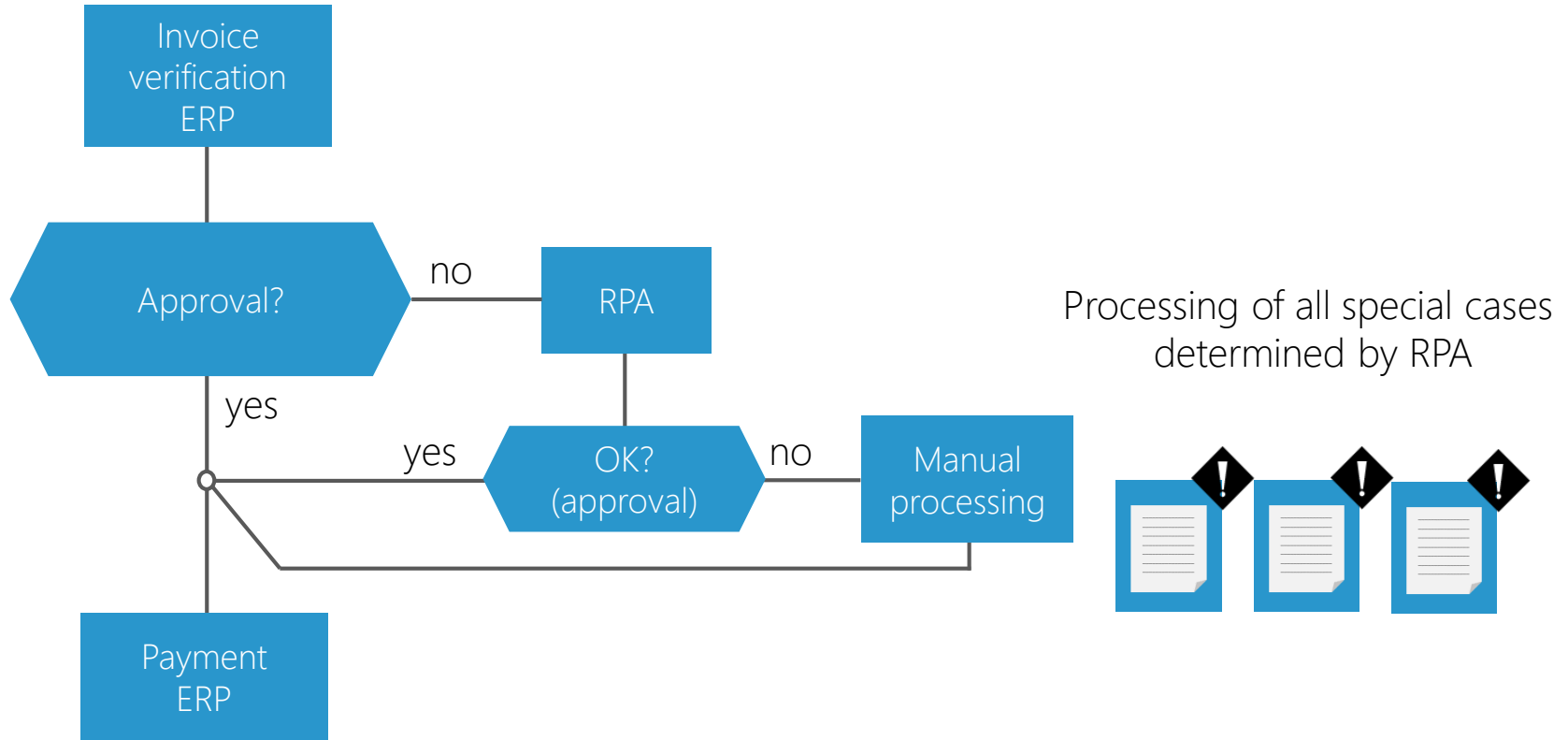
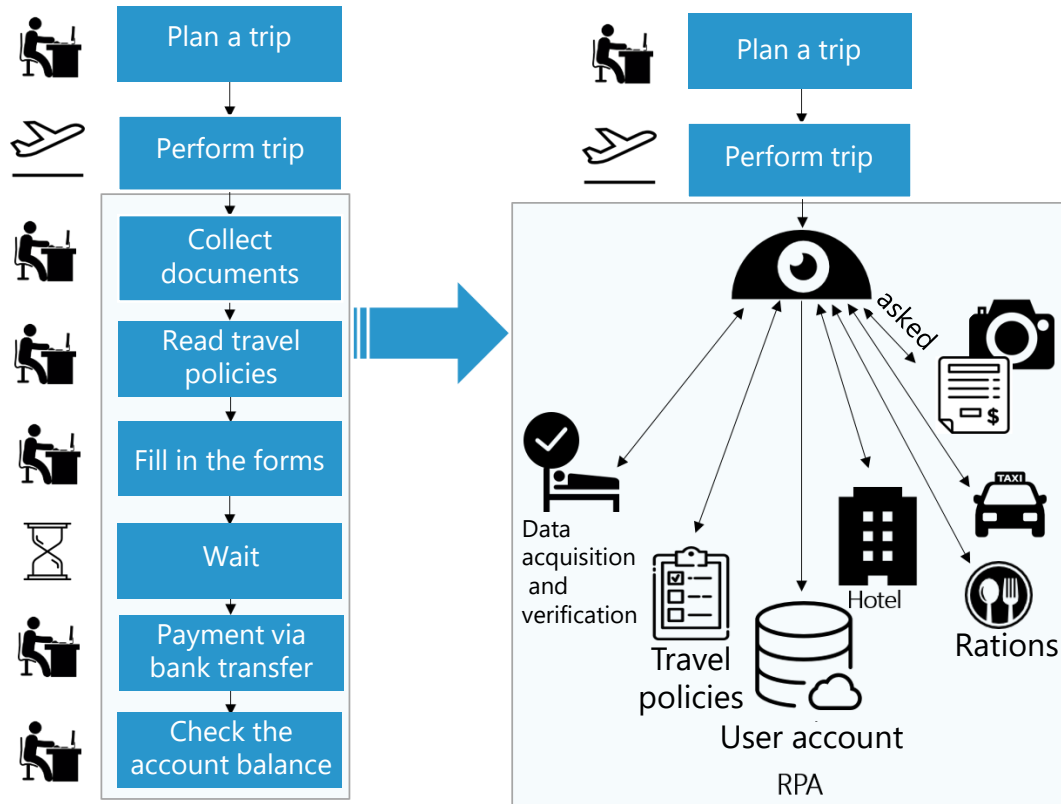


Figure 2.E.05b: Checking the accompanying supplier invoices – RPA supported.



The robot...

- Asks for documents and photos
- Analyzes the travel documents
- Observes the travel policy
- Records the data of the trip segments
- Calculates the total costs
- Updates the user account

➡ No manual work!

➡ No waiting time!

Figure 2.E.06: Automatic calculation of travel costs using RPA.

sales_orders_2010-15							
Home Insert Page Layout Formulas Data Review View							
A1 fx OrderDate							
	A	B	C	D	E	F	G
1	OrderDate	Country	Rep	Item	Units	Unit Cost	Total
2	1/5/10	Poland	Jones	Pencil	146	1,99 €	290,54 €
3	1/5/10	Poland	Jones	Pencil	148	1,99 €	294,52 €
4	1/6/10	Poland	Jones	Pencil	134	1,99 €	266,66 €
5	1/6/10	Poland	Jones	Pencil	139	1,99 €	276,61 €
6	1/6/10	Poland	Jones	Pencil	154	1,99 €	306,46 €
7	1/7/10	Poland	Jones	Pencil	146	1,99 €	290,54 €
8	1/7/10	Poland	Jones	Pencil	151	1,99 €	300,49 €
9	1/8/10	Poland	Jones	Pencil	146	1,99 €	290,54 €
10	1/8/10	Poland	Jones	Pencil	148	1,99 €	294,52 €
11	1/11/10	Poland	Jones	Pencil	151	1,99 €	300,49 €
12	1/22/10	Germany	Kivell	Binder	151	19,99 €	3.018,45 €
13	1/23/10	Germany	Kivell	Binder	121	19,99 €	2.418,79 €
14	1/23/10	Germany	Kivell	Binder	140	19,99 €	2.798,60 €
15	1/23/10	Germany	Kivell	Binder	143	19,99 €	2.858,57 €
16	1/24/10	Germany	Kivell	Binder	118	19,99 €	2.358,82 €
17	1/24/10	Germany	Kivell	Binder	121	19,99 €	2.418,79 €
18	1/25/10	Germany	Kivell	Binder	128	19,99 €	2.558,72 €
19	1/25/10	Germany	Kivell	Binder	140	19,99 €	2.798,60 €
20	1/26/10	Germany	Kivell	Binder	118	19,99 €	2.358,82 €

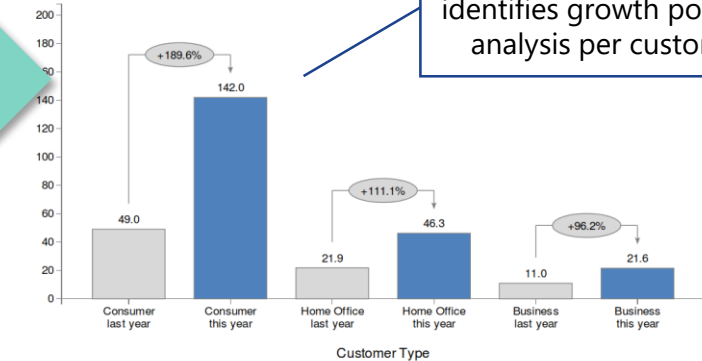
inspirient

AI-driven data analysis

Example: Sales data in Excel format

Customer Type 'Consumer' with greatest growth of average order size between last year and this year at 189.6%

Average Order Size (thousands)



Example: Inspirient automatically identifies growth pockets with YoY¹ analysis per customer segment

Note: 'Average Order Size' data with unspecified 'Customer Type' omitted as proportion < 0.1%

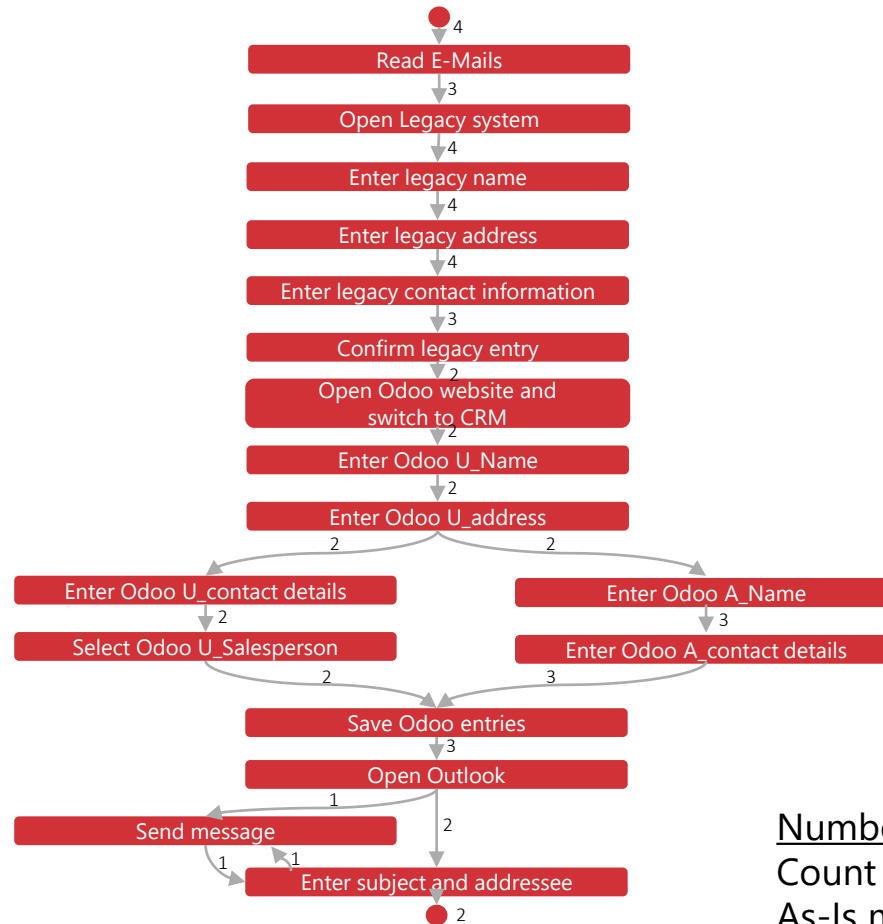
Created by Inspirient in Berlin. Calculated in the Cloud. © 2016 Inspirient GmbH

Management Slides

Figure 2.E.07: Automatic data analysis with RPA (Inspirient, 2017)



Figure 2.E.08: Predictive Maintenance with RPA from company IS-Predict (IS Predict, 2017)



Numbers:

Count of executed instances of the As-Is model

Figure 2.E.09: Desktop activity mining – Process model

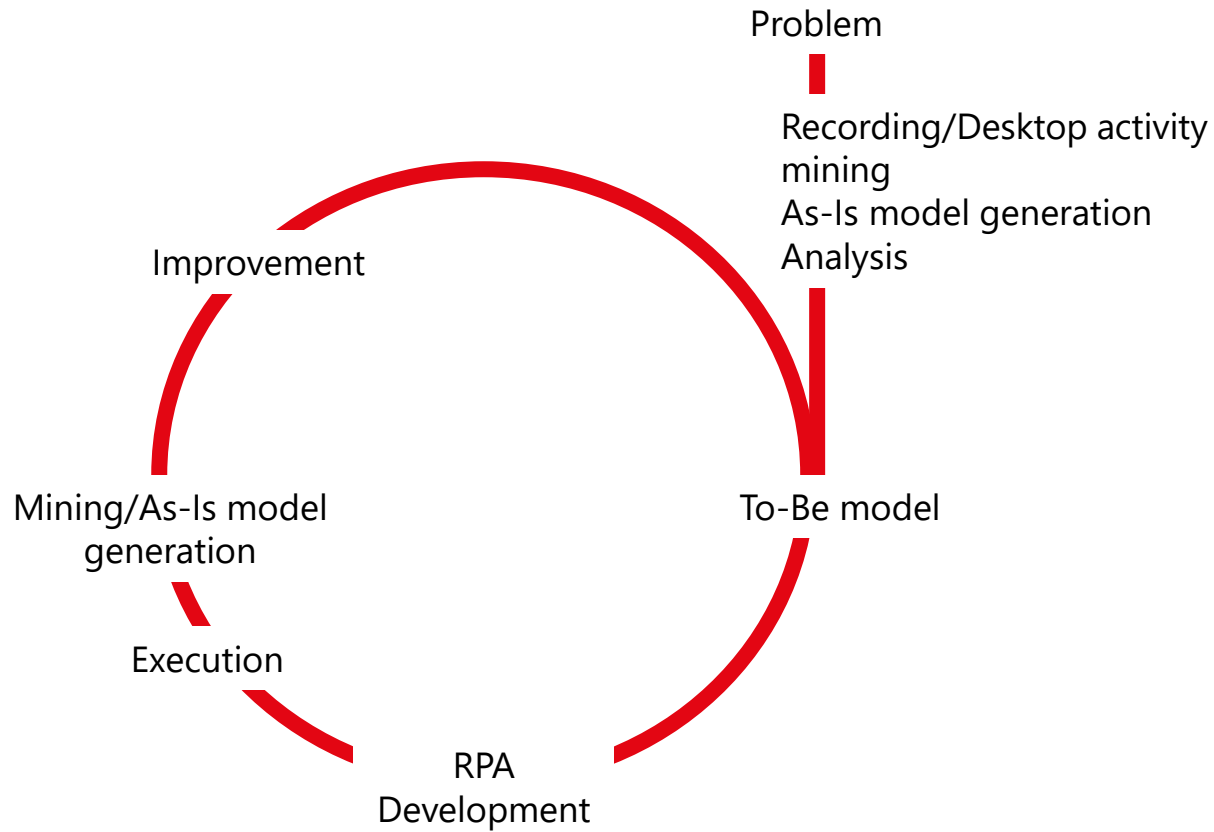


Figure 2.E.11: Development cycle of a software robot

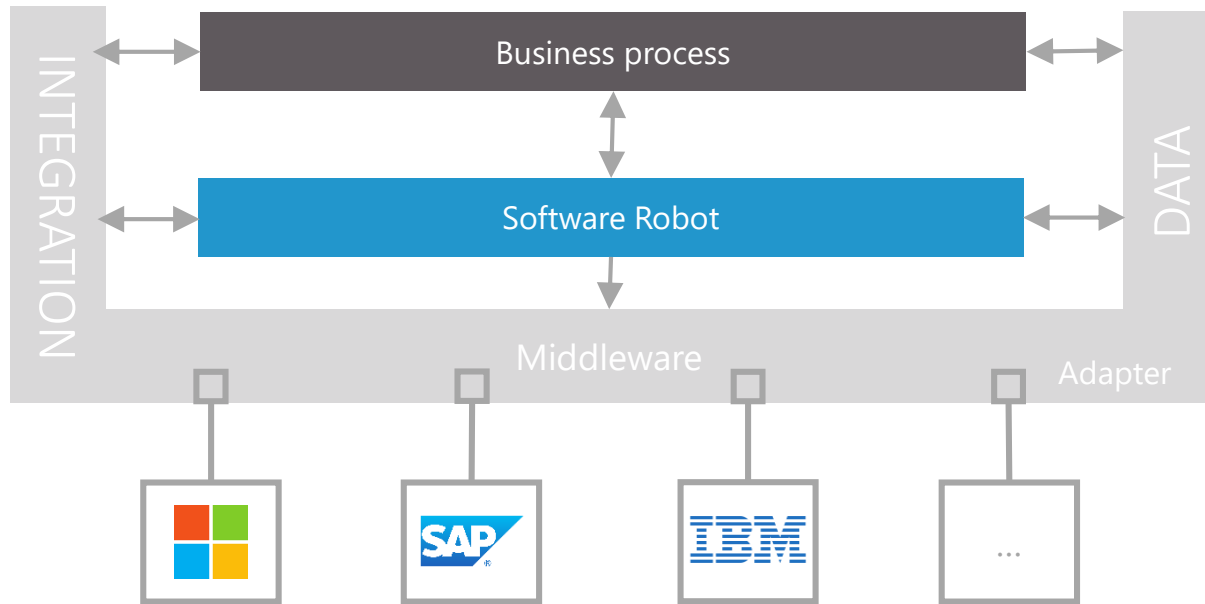


Figure 2.E.12: RPA – Software architecture

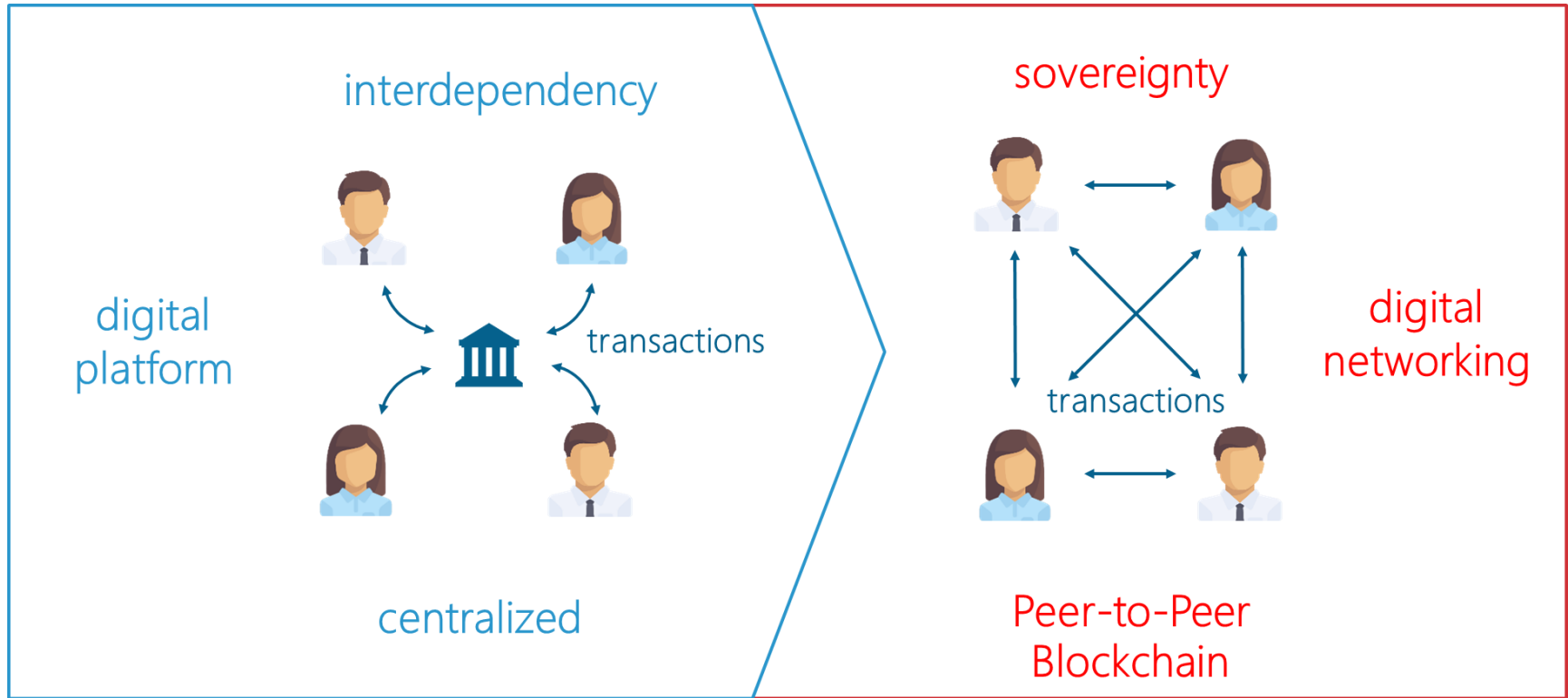


Figure 2.F.01: Paradigm shift of blockchain

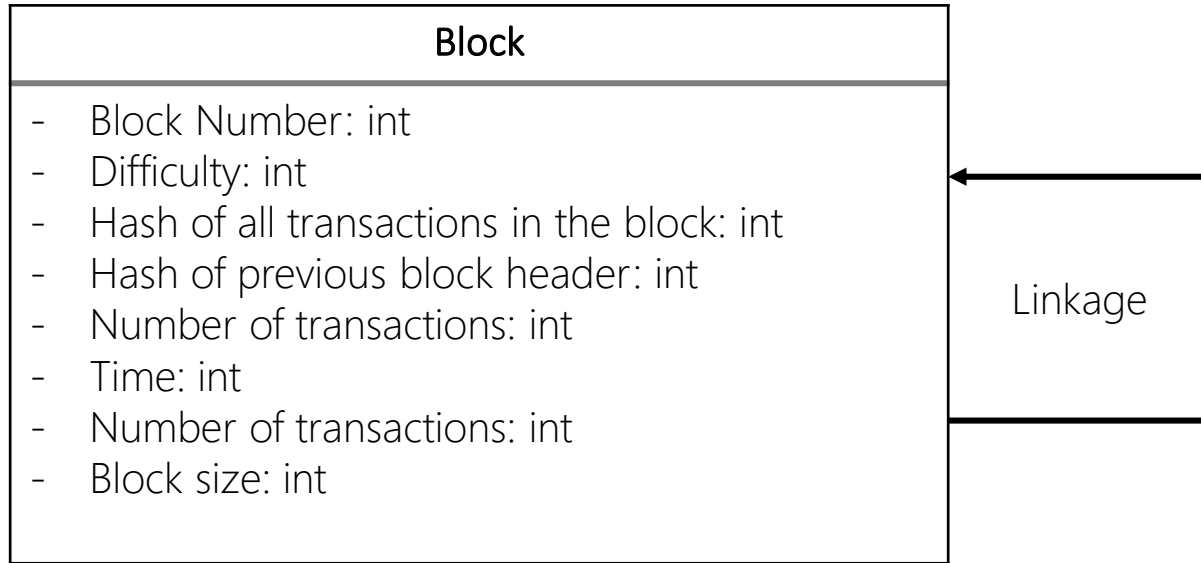


Figure 2.F.02: Simplified UML diagram from the Bitcoin blockchain

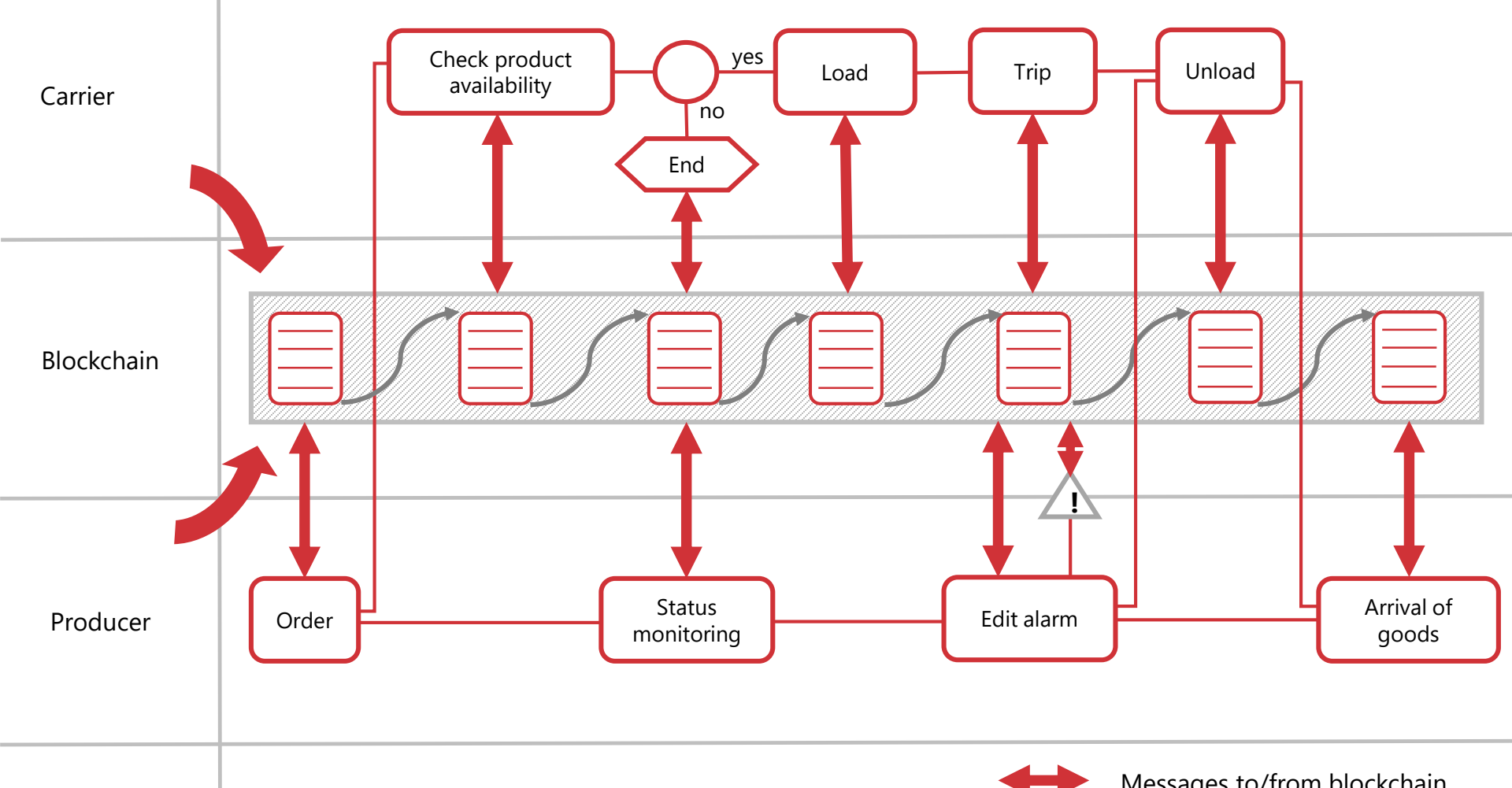


Figure 2.F.03: Logistics process using blockchain



Messages to/from blockchain

control flow

© Prof. Dr. A.-W. Scheer

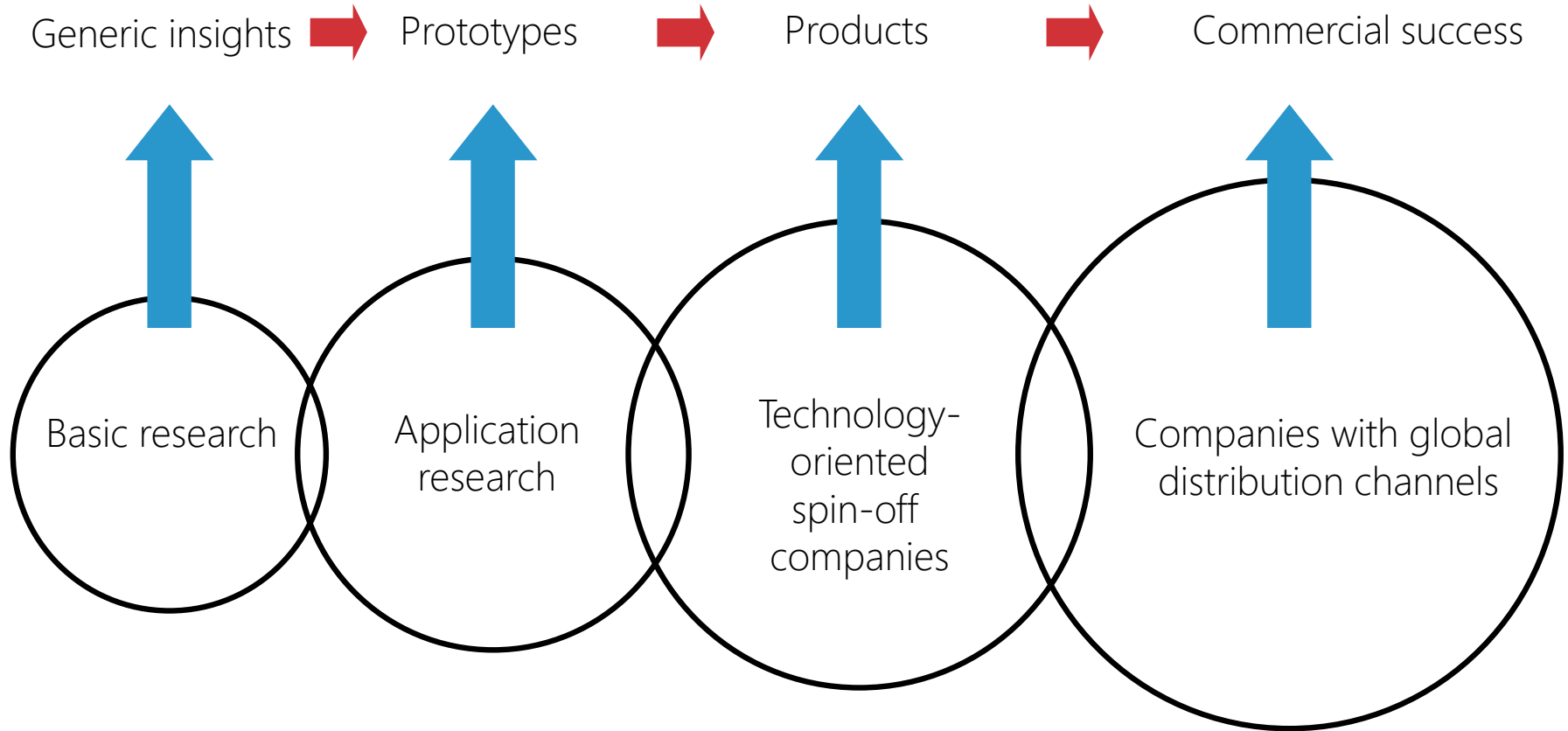


Figure 2.G.01: Sequential innovation process

<u>Research:</u>	<ul style="list-style-type: none"> + variety of topics + commitment + prototypes + networks - resources - mainstream
<u>Start – Up:</u>	<ul style="list-style-type: none"> + disruptive + outside-in + fast fail - fragil - sales
<u>Large companies:</u>	<ul style="list-style-type: none"> + sales + resources - Innovator's Dilemma - not disruptive - inside-out

Figure 2.G.02: Promoters of the innovation process

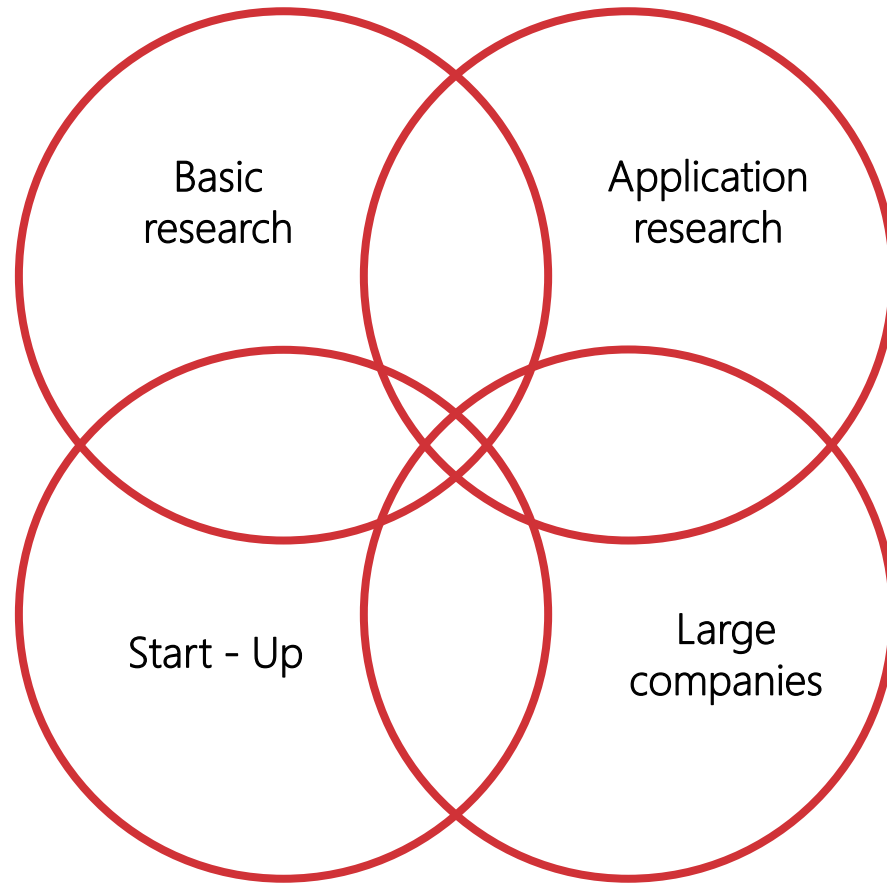


Figure 2.G.03: Simultaneous innovation process

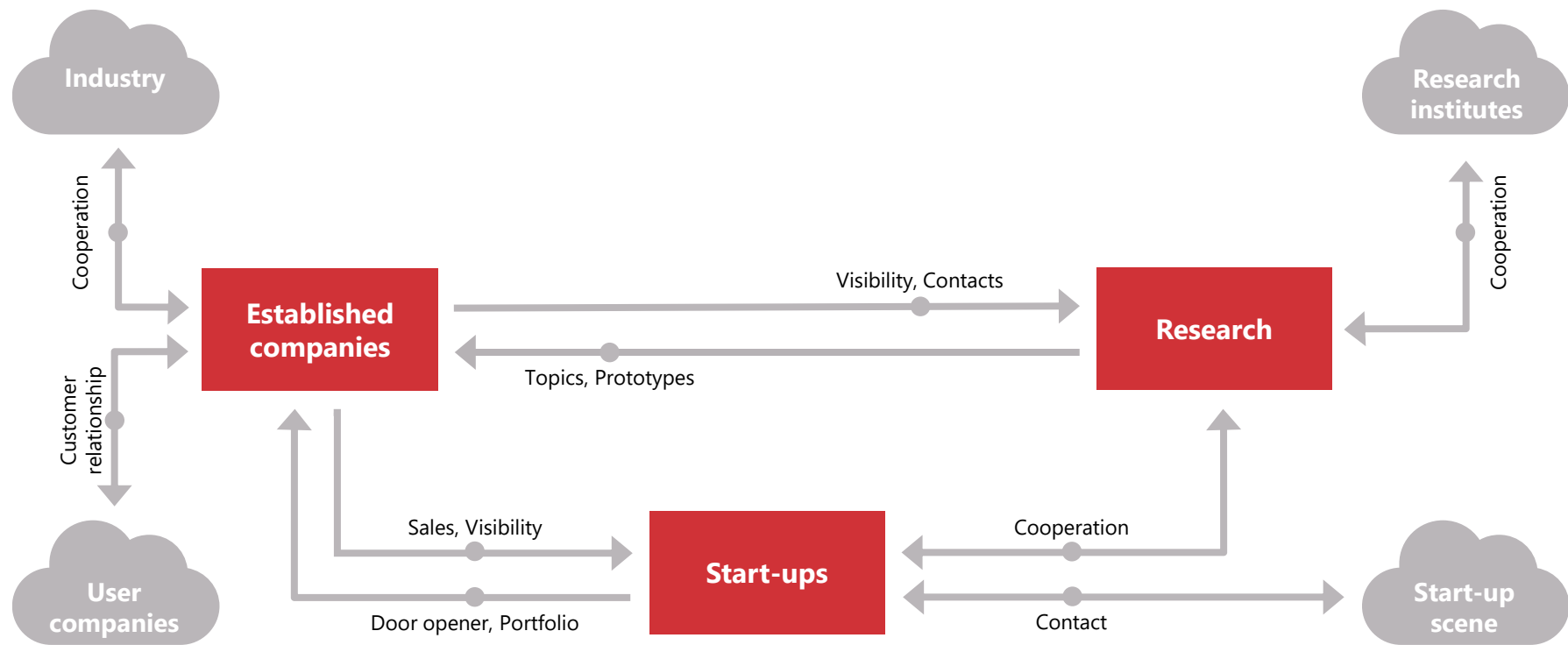


Figure 2.G.04: Significant relationships within an innovation network

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research

Figure 2.G.05: Organigram of the Scheer Innovation Network

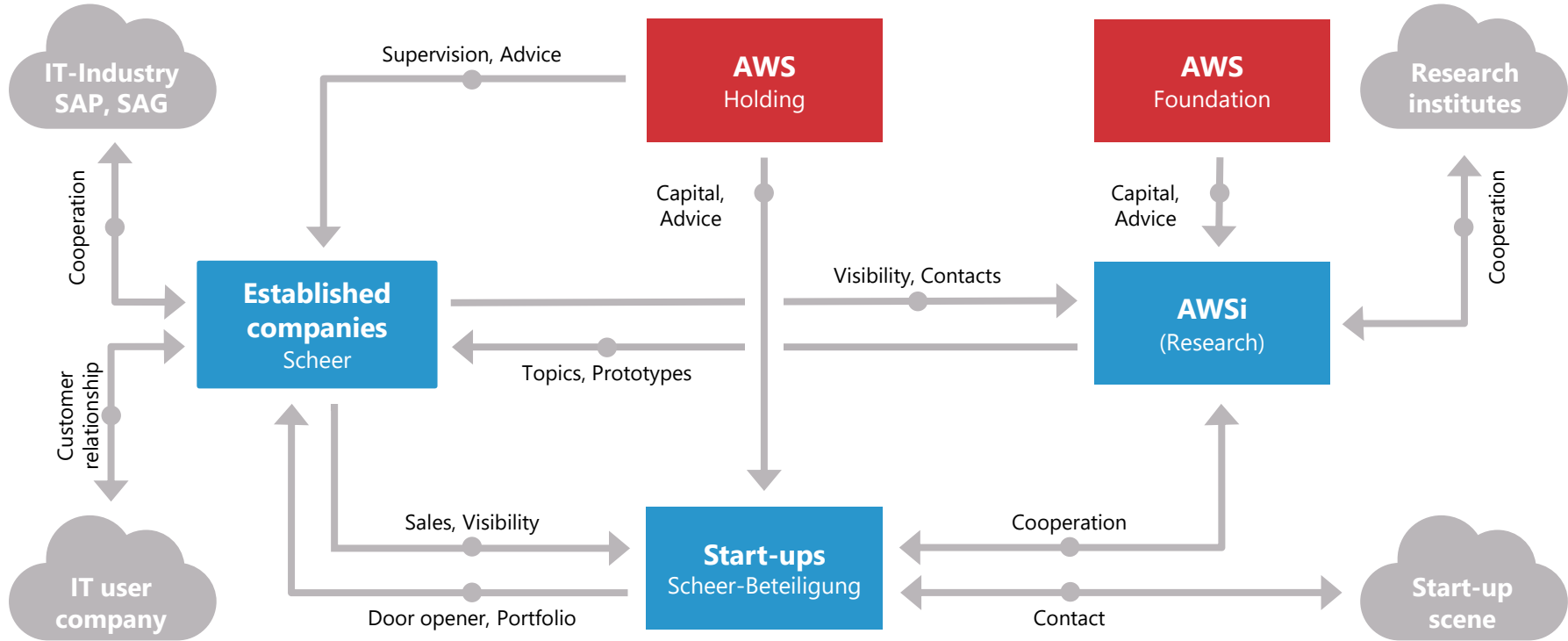


Figure 2.G.06: Significant relationships within the Scheer Innovation Network