



University of St.Gallen

Institute of Information Management

Enterprise-level IS Research – Challenges and Potentials of Looking Beyond Enterprise Solutions

25th International Conference on
Enterprise Information Systems
Prague, 24 April 2023

From insight to impact

Enterprise-level IS Research

1. Enterprise Information Systems - Where it all Started
2. Enterprise IS Level vs. Org Level of Analysis
3. Unique Themes of Enterprise-level IS Research
 - Integration Management
 - Architectural Coordination
 - Harnessing Complexity
4. Exemplary Domains of Enterprise-level IS Research
 - Context Large Enterprise IS
 - Context Digital Platforms
5. IS Research Methodology on Enterprise-level



Enterprise Information Systems

- Where it all Started

Enterprise systems research & teaching have been successfully established

Unique and important IS phenomena such as

- Cross-functional **integration**, collaboration and coordination
- End-to-end business **processes**, process modelling support (EPC)
- **Large-scale** software solutions
- **Reference** solutions, **configuration**
- Large-scale **technochange**

Inspired by (and inspiring) ERP industry as well as user companies

- Meeting important **business needs**
- Relevant research **and** education contributions

Foundation / application field for quite a few methodological IS research innovations

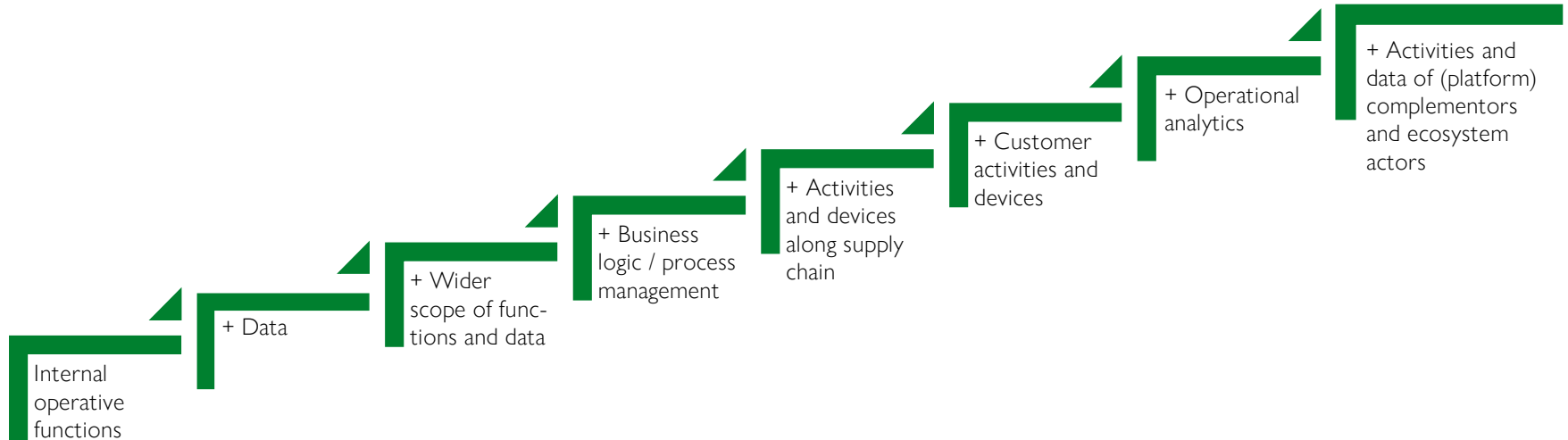
- Reference modelling
- Enterprise modelling
- Process modelling and mining
- IT enabled transformation management

However...the field became broader - and more diverse

From a **focus on ERP** functionalities, introduction and adoption, to...

- Extended enterprise, managing supply chains and customer relations
- Integration with supplier- and customer-side processes/devices
- Enterprise- (and even network- or industry-) wide data management
- Business analysis, business modelling
- Enterprise architecture and its management
- Business ecosystems and digital platforms
- Organizational routines, managing operational change and transformation
- Transforming from on-prem to cloud-based
- Technology-enabled business (model) innovation

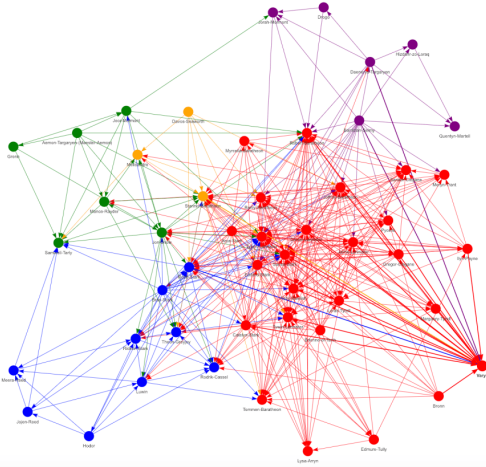
“To enterprise and beyond” - The integration journey



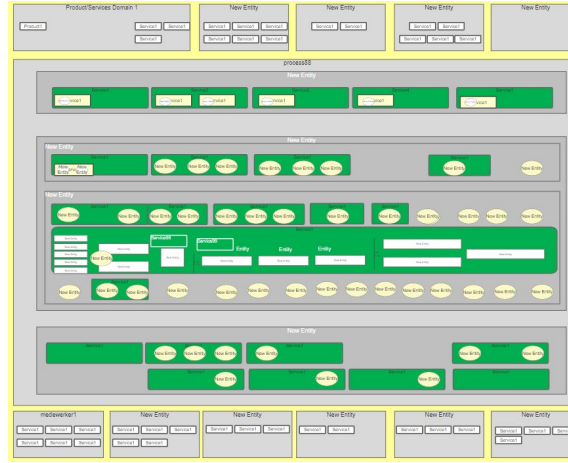


Enterprise Level vs. Org Level of Analysis

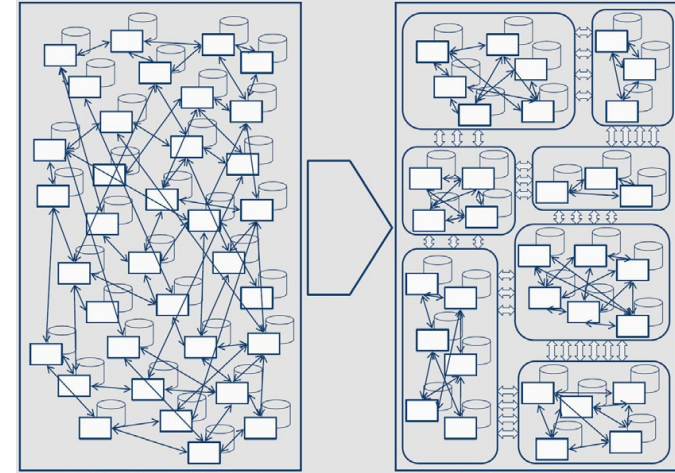
People vs. Organization vs. Business Technology



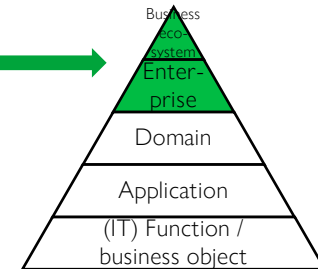
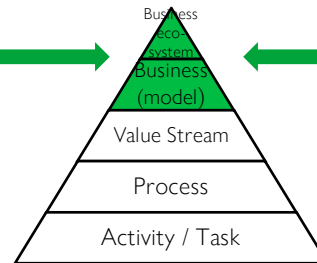
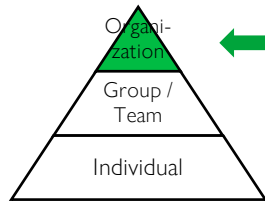
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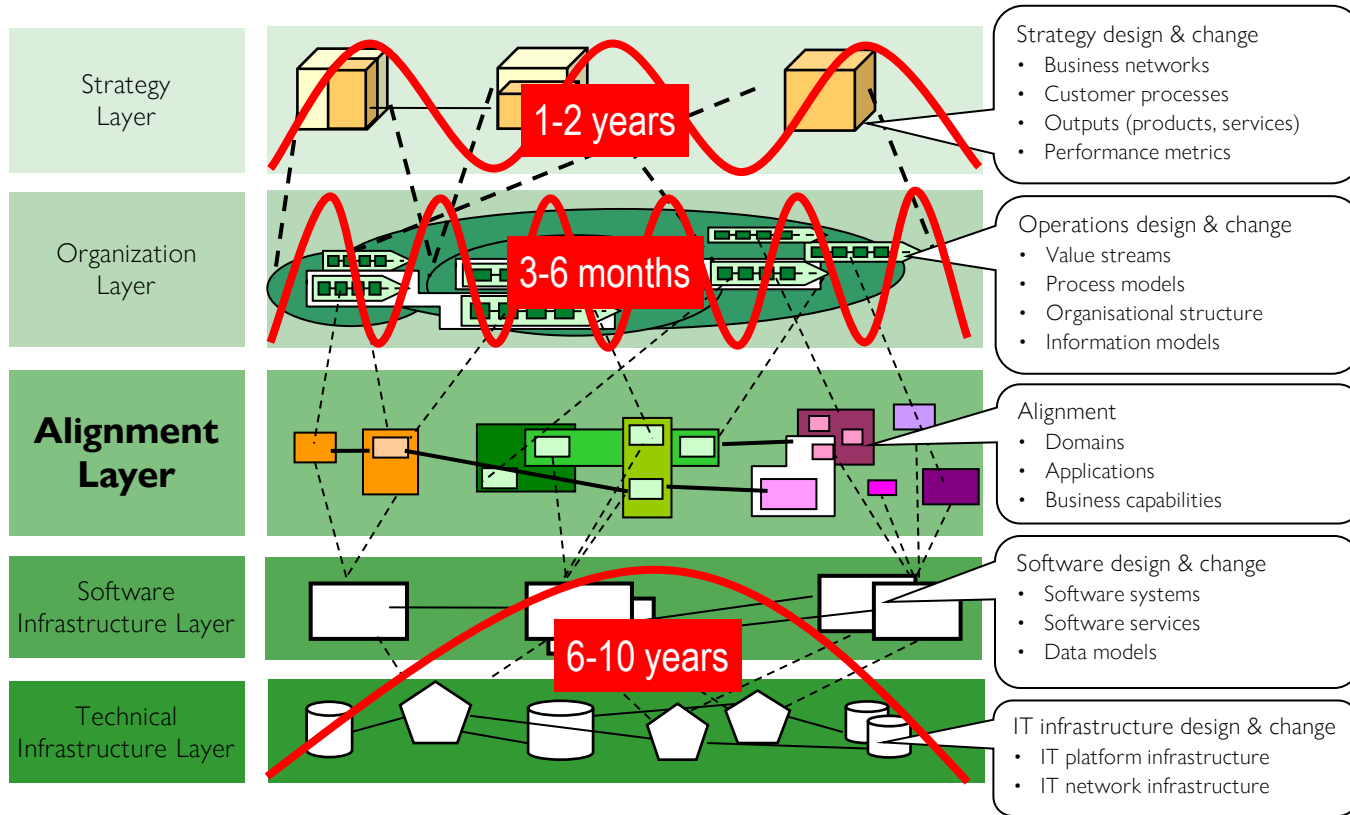
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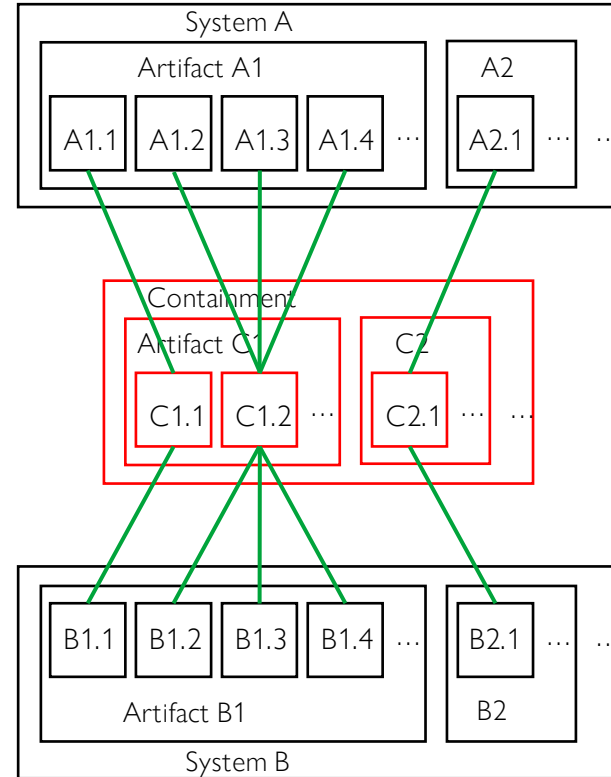
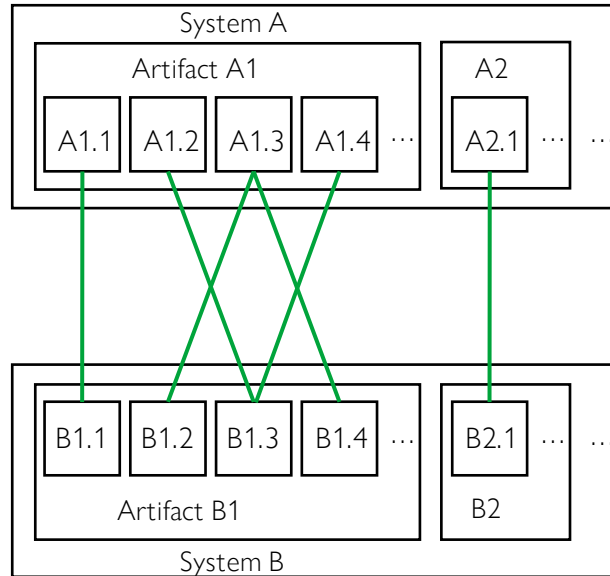
[Murer et al. 2010]



Strategic vs. operational vs. technical (fundamental) change cadences

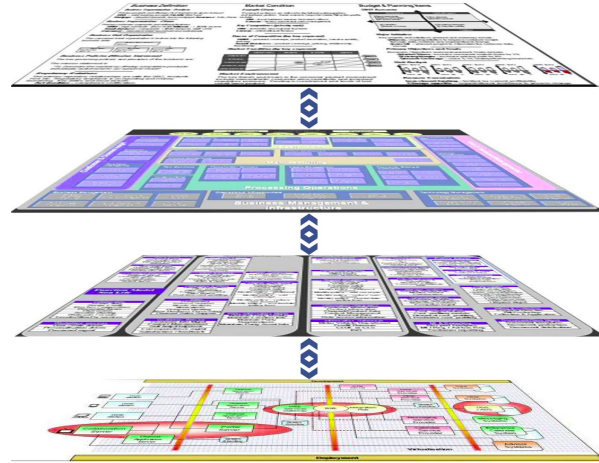


In complex, dynamic systems, alignment models are essential



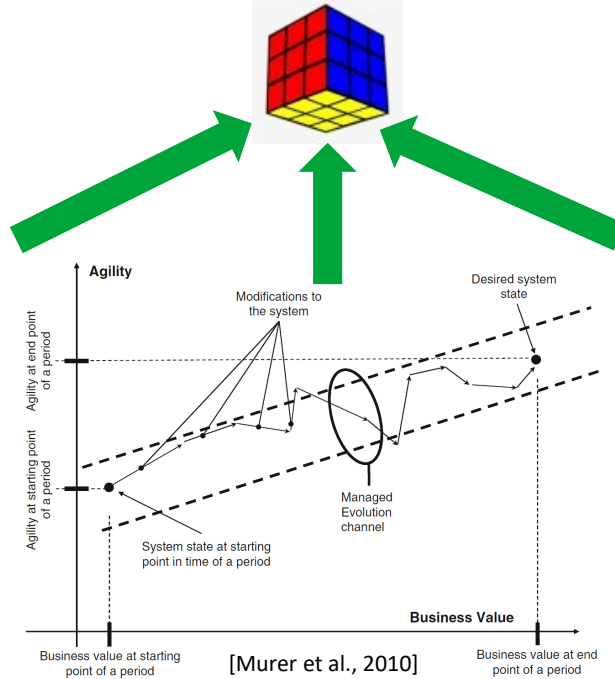
Enterprise-level characteristics in IS

AIS Special Interest Group
(& LinkedIn group) **Enterprise-level IS**



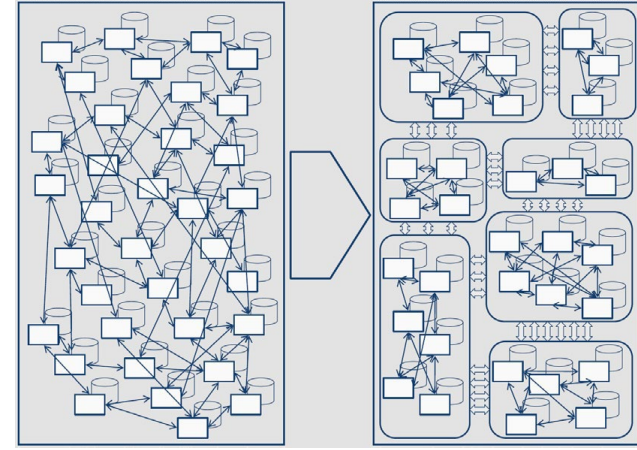
[Ernst, 2013]

All relevant **layers**
(Business-to-IT)



[Murer et al., 2010]

All relevant **evolution stages**
(managed evolution)



[Murer et al., 2010]

All relevant **components**
(system of systems)

A black and white photograph of a modern architectural structure. The image features large, angled concrete beams that create a sense of depth and perspective. The floor is made of light-colored tiles, possibly in a herringbone pattern. The overall aesthetic is clean and industrial.

Unique Themes of Enterprise-level IS Research

What **themes** are **unique** to the IS enterprise-level?

	(1) Integration management	(2) Architectural coordination	(3) Harnessing complexity (housekeeping)
<input type="checkbox"/> System of systems: Relevance for “global” perspective <ul style="list-style-type: none">– Coordination need for reaching enterprise-level objectives (flexibility, efficiency, ...)	<input checked="" type="checkbox"/> Leveraging synergies and alleviating redundancies	<input checked="" type="checkbox"/> Avoiding over-complexity, preserving flexibility	<input checked="" type="checkbox"/> Actively reducing overcomplexity, creating flexibility potentials
<input type="checkbox"/> Business-to-IT: Relevance for boundary spanning <ul style="list-style-type: none">– Coordination need for (re-)alignment	<input checked="" type="checkbox"/> Integration always covers all layers	<input checked="" type="checkbox"/> Providing stable foundation for decoupling	<input checked="" type="checkbox"/> Business and IT complexity interrelated
<input type="checkbox"/> Managed evolution: Relevance for managing dependencies and side effects <ul style="list-style-type: none">– Coordination need for managing innovation and change projects on portfolio level	<input checked="" type="checkbox"/> Complex projects, long lifecycle, intended to reduce dependencies and side effects	<input checked="" type="checkbox"/> Architectural principles, road-maps, project coordination	<input checked="" type="checkbox"/> Cleaning up damage created by “local” thinking



Exemplary Domains of Enterprise-level IS Research

Domain = Theme X Context

- **Large enterprise** context
 - Structural and dynamic complexity
 - Technical debt
 - Decentral decision making
 - Heterogeneity of outputs, channels, processes, platforms, ...
- **Digital platform** context
 - Orchestration of complementary resources
 - Transaction or innovation focus
 - Limited guidance due to novelty of model

– ...

(1) Integration management

1. Integration patterns and scoping

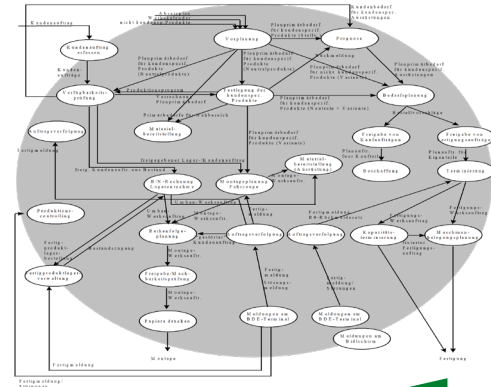
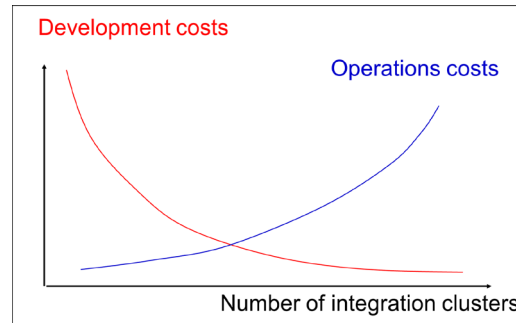
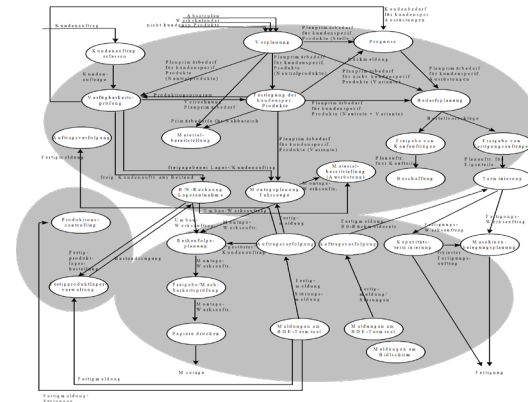
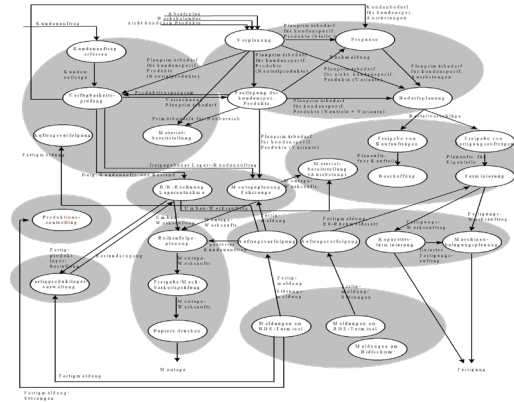
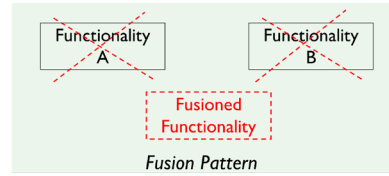
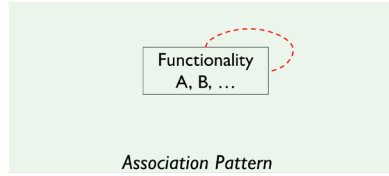
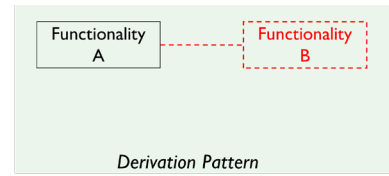
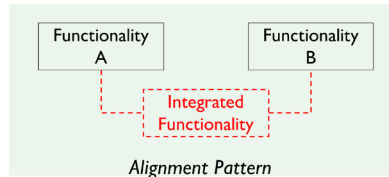
(2) Architectural coordination

2. Complementing formal with informal coordination interventions
3. Business/IT alignment models
6. Designing platform governance for ambidexterity (generativity & control)

(3) Harnessing complexity (housekeeping)

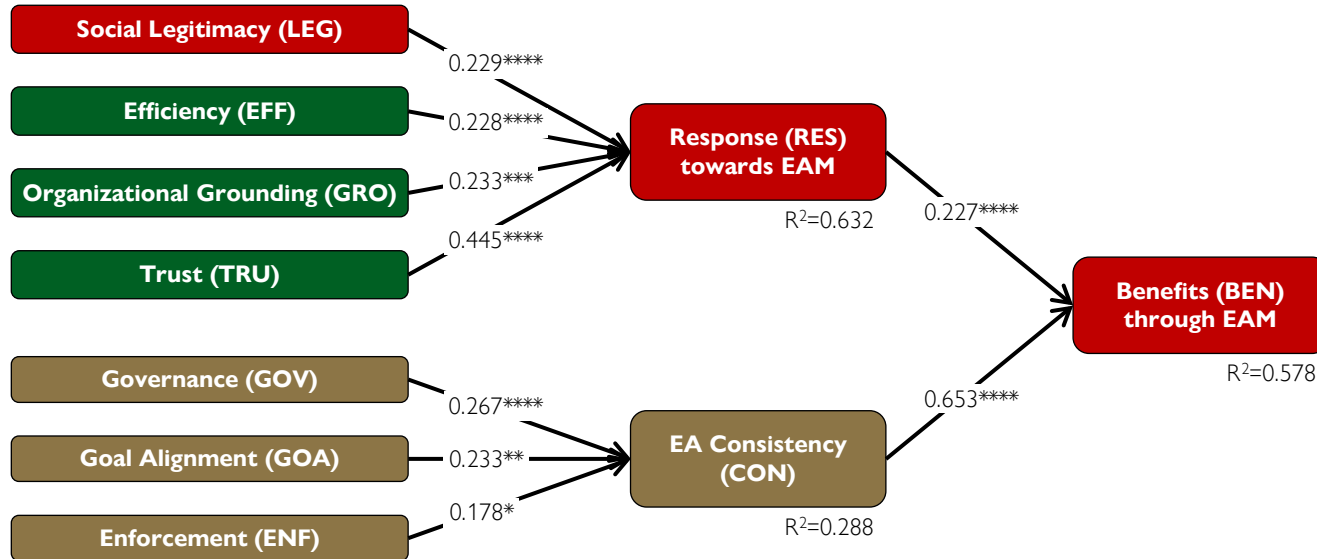
4. Transformation management (“Managed evolution”)
5. IS-related Org-level maturity models
7. Understanding complexity effects on platform performance

Example 1: Integration patterns and scoping



[Aier und Winter, 2010]

Example 2: Complementing formal with informal coordination interventions



[Weiss, Aier and Winter 2013]

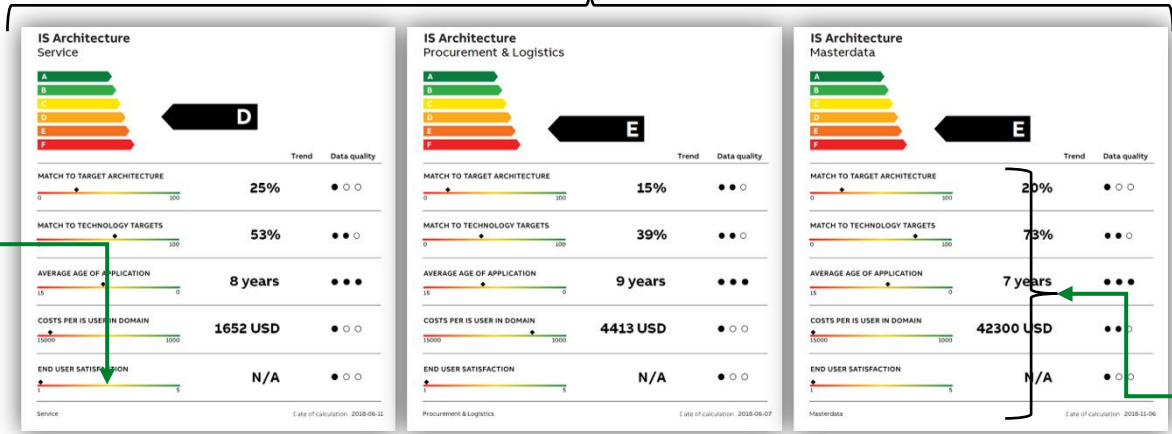
****: $\alpha < 0.001$
***: $\alpha < 0.01$
**: $\alpha < 0.05$
*: $\alpha < 0.1$

Example 2: Complementing formal with informal coordination interventions

Anchoring

In case of lacking information, estimation is done based on an individual starting point.

How frequently will you evaluate architectural conformance? ... On a monthly or quarterly basis?



Social Norms

Rules and standards that that guide and/or constrain social behavior without the force of laws.

X% of the BU heads have opted for adopting the existing system.

Decoupling

Not all costs or effects of decisions are considered when taking a decision.

Offering financing and deferred payment options for preferred solutions.

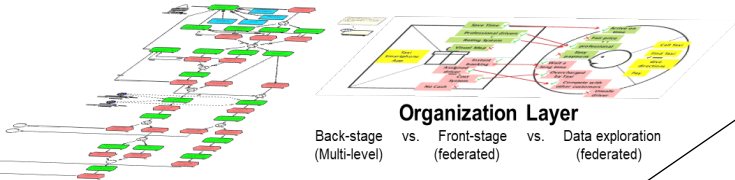
Example 3: Business/IT alignment models

Strategy Layer
(1-3 Levels)
e.g. Business models



Organization Layer

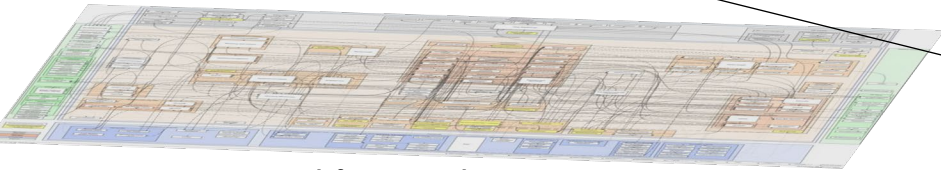
Back-stage (Multi-level) vs. Front-stage (federated) vs. Data exploration (federated)



Alignment Layer
(1-3 Levels)
e.g. Capability map



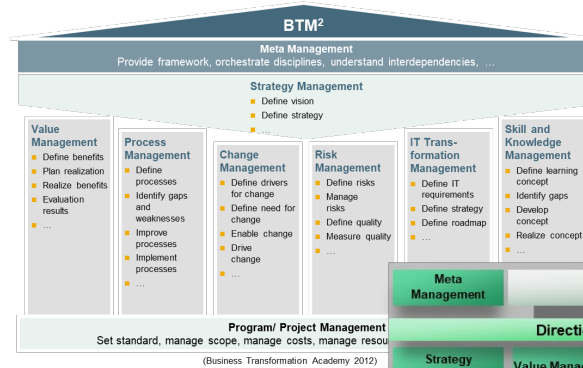
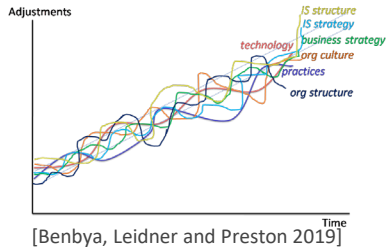
Infrastructure Layer
e.g. Application Map



Advisory Services Advice/Arbitration Advisory Report Management Advice Soliciting/Investment Services Financial Profile Management	Client Relationship Services Sales And Marketing Client Development Opportunities Management Electronic Marketing	Client Services Client Relationship Management Client Assets and Activities Reporting Funds Transitions	Client Individual Trading Client Life Cycle Management	Pre-trader/Trade Services Product Sales Trading Product Sales Deal Structuring	Trading/Execution Services Trading Strategy Management Order Management Order Execution Pre Trade Screening Trade Approval	Trading Risk Mgt. Trading Risk Mgmt. Trading Profit and Loss Attribution Order Mgmt. Trade Approval	Product Management & Research Services Product and Service Development Model Mgmt. Insurance and Reinsurance	Research Public Research Internal Portfolio Research Investment Seeking Research & Product
Position Data Services Position Valuation Operational Position Keeping (Asset Records) Trade Deal Secondary Issuance	Limit Mgmt Services Limit Monitoring Limit Setting and Mgt Management Credit Decision Management	Market Data Services Bankers Management Market Data Management	Reference data services Data Management Operational Database Asset Management Financial Instruments Management Organizational Hierarchy Business Management Support of Analytics Management	Portfolio Management Services Portfolio Rebalancing Portfolio Analytics Portfolio Construction Management	Invest Banking Services Deal Support Investment Banking Relationship Functions	Human Resources Recruitment and Talent Management Employee Performance Management Employee Learning and Development Workforce Management Large Market Management		
Control Services Financial Control Financial Planning Financial Reporting (Internal/External) Independent Risk Verification Operational Liquidity	Risk Control Operational Risk Control Credit Risk Control Risk Back Testing Risk Reporting for Internal/External Risk Quantification	Risk Control Risk Reporting for Internal/External Risk Quantification	Trade Services Trade Support Trade Booking, Execution and Confirmation Trade Life Cycle Management Operational Services Settlement Market Side Payments External Market Management	Inventory Management Services Market Side Deal Management Market Side Asset Management Lending and Financing Corporate Events Screening Document Management Service Price Calculation Investing and Collections Internal Control & Self-Auditing Tax and Reclaim Management Reconciliations Reconciliations	Global AM Boutique Services Global AM Boutique Functions	Performance Management Operational Performance Management Client Performance Management Global AM Boutique Functions Internal Auditing Financial Auditing Procurement Program and Change Management Management Reporting Task Management Workbooks Archiving and Backup Management		

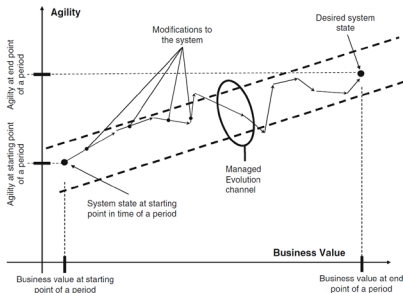
[Auerbach 2011]

Example 4: Transformation management (“Managed evolution”)



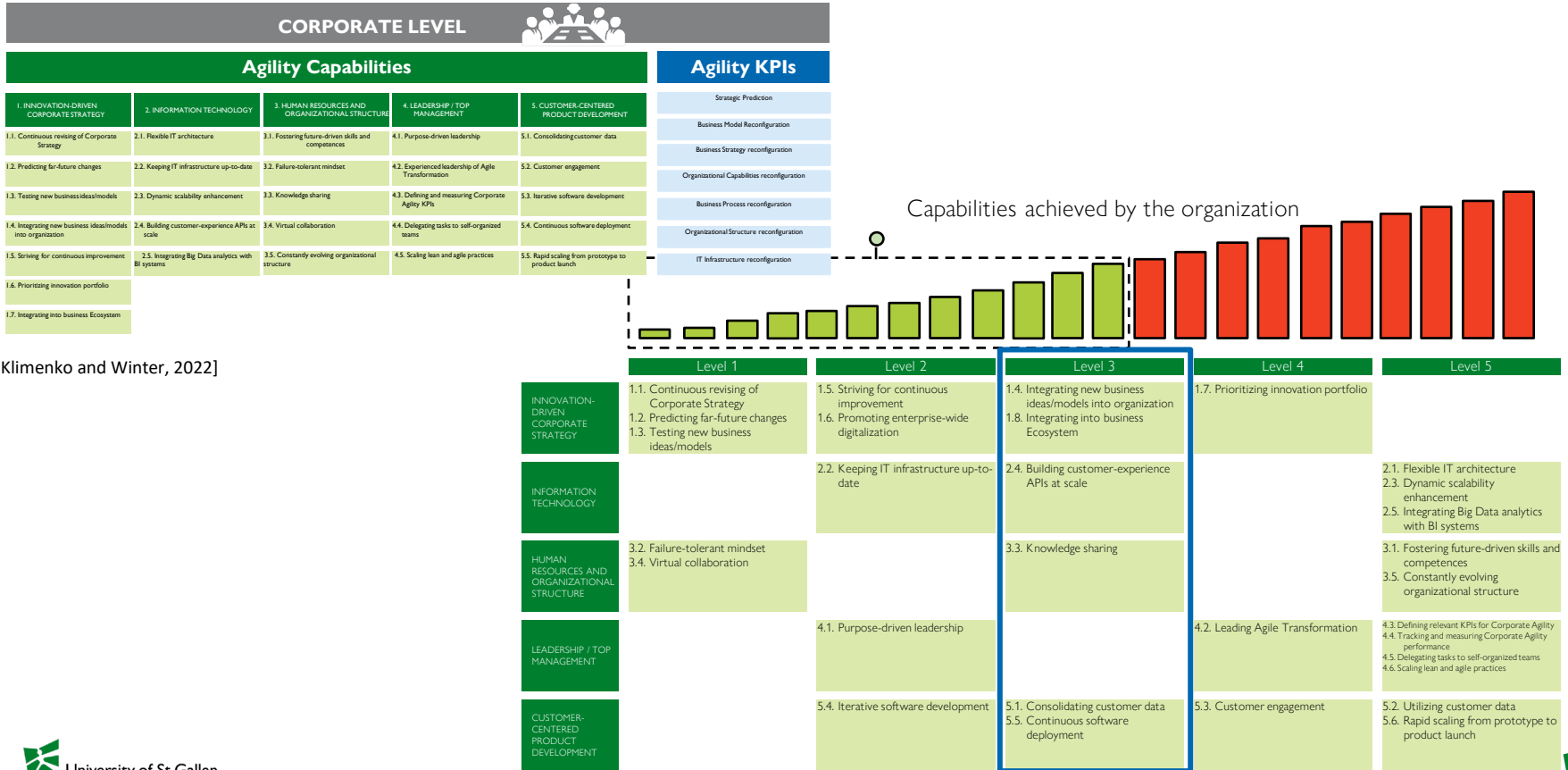
Orchestration of individual disciplines: Guidelines, Leadership, Culture, Values and Communication

Meta Management	Orchestration of individual disciplines: Guidelines, Leadership, Culture, Values and Communication						
	Direction			Enablement			
Strategy Management	Value Management	Risk Management	Processes Management	Program/Project Management	IT Transformation Management	Organizational Change Management	Competence & Training management
AS-IS/Data Collection	Baseline analysis	360° Strategic Risk Assessment	Determine scope of analysis	Program Planning and Governance	Business and IT Capability Assessment	Set-up & governance	Competence strategy
Analysis of needs & maturity level	Value estimation	Deep dives for strategic risk areas	From template to bespoke inventory	Program & Proj. Integration Mgmt	To-be analysis	Stakeholder management	Training need analysis
Design business vision	Detailed business case	Assess transformation business case	Identify improvements/add attributes	Program & Project Scope Mgmt	Gap analysis	Change agent network	As-is analysis
Design Business Model	Agree ownership for realization	Define risk strategy	Map selected processes	Program & Project Time & Cost Mgmt	IT roadmap plan	Communication management	Gap analysis
Integrated transformation plan	Plan benefit realization	Risk Management Execution	Plan process implementation	Program Quality Mgmt	Solution architecture design	Performance management - Project team	Curriculum development
Business Case	Execute benefit realization	Risk Monitoring	Implement processes	Program Human Resource Mgmt	IT Deployment plan	Performance management - Business	Training preparation
Organizational model	Review and evaluate results	Identify additional improvement	Evaluate processes	Program Procurement Mgmt	IT Operations & Service Optimization	Change readiness assessment	Training
Risk analysis	Establish potentials for further benefits	Risk Mgmt. as part of Board Governance	Establish CIP	Program Reporting	IT Lifecycle Management	Change monitoring	Evaluation & improvement



[Murer et al., 2010]

Example 5: IS-related Org-level maturity models



[Klimenko and Winter, 2022]

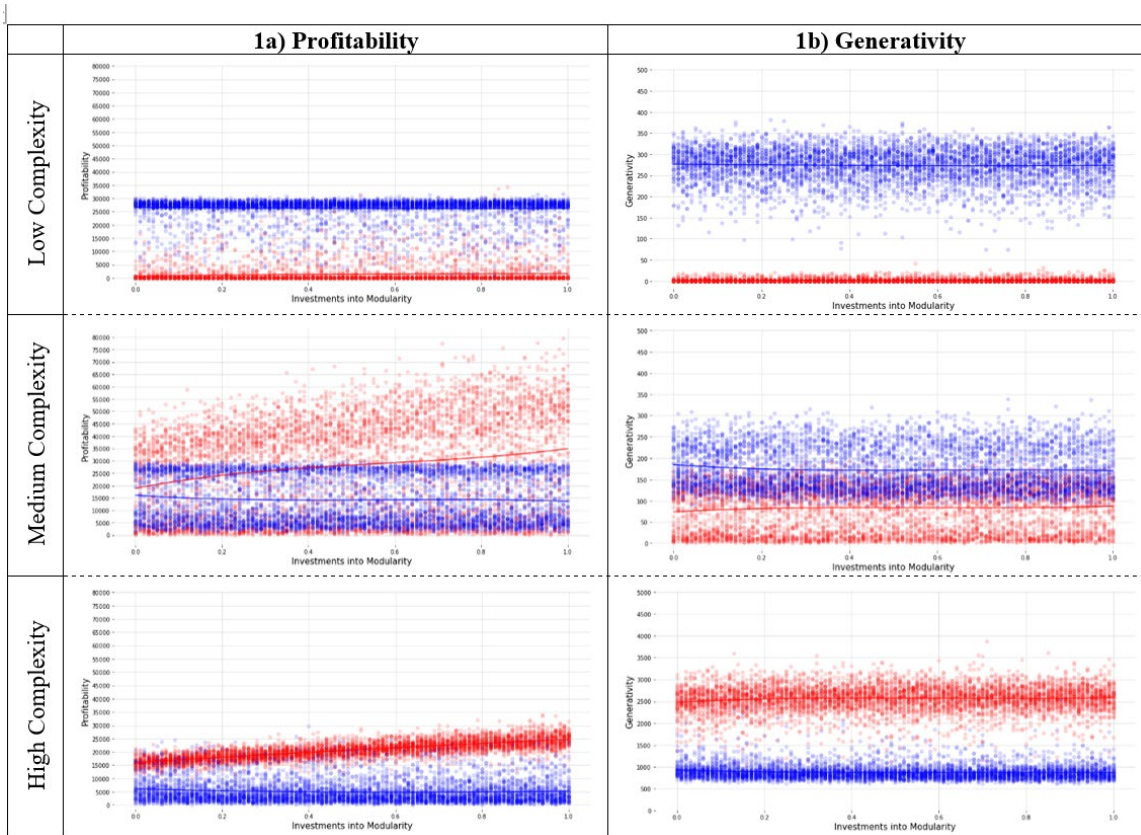
[Klimenko and Winter, 2022]

Example 6:

Designing platform governance for ambidexterity (generativity & control)

Pillar	Mechanism	Generativity	Control
Platform boundary resources	Interfaces	<ul style="list-style-type: none"> Standardize access and connection Facilitate data exchange 	<ul style="list-style-type: none"> Retain fine-grained control over complementor activities Influence community behavior Prevent platform exploitation
	Programming resources	<ul style="list-style-type: none"> Lower the threshold for complementor participation Support complementors with the provision of tools and knowledge Help complementors overcome knowledge boundaries 	<ul style="list-style-type: none"> Facilitate tight control over development quality through software tools and regulations Increase complementor focus on selected app functionalities
Platform rules	Gatekeeping	<ul style="list-style-type: none"> Facilitate connection of complementors to the platform Increase the diversity in offered apps and functionalities 	<ul style="list-style-type: none"> Restrict access to ensure quality and attractiveness for complementors and users (e.g., levels of access rights) Prevent uncontrolled variance in the platform's innovation output
	Decision rights	<ul style="list-style-type: none"> Ensure decision-making autonomy of complementors to increase their innovation output 	<ul style="list-style-type: none"> Define the complementors' amount of freedom (e.g., regarding their goals and task types)
	Intellectual property sharing	<ul style="list-style-type: none"> Attract more complementors by expanding their intellectual property rights (particularly important in early stages of platform evolution) 	<ul style="list-style-type: none"> Encourage complementors to not build a superior solution Increase control through agreements with different complementor groups Structure relations to complementors
	Pricing	<ul style="list-style-type: none"> Subsidize one side to reach critical mass of complementors and users Enhance platform adoption by complementors and users (particularly in platform markets with fierce competition) 	<ul style="list-style-type: none"> N/A
	Revenue sharing	<ul style="list-style-type: none"> Maintain complementor motivation while extracting an appropriate share of profits 	<ul style="list-style-type: none"> N/A
Ecosystem identity	Relational control	<ul style="list-style-type: none"> Increase complementor motivation and commitment through community building Facilitate clans to enhance complementor performance and minimize errors 	<ul style="list-style-type: none"> Align platform and complementor strategy Benefit from rather inexpensive, community-driven self-control

Example 7: Understanding complexity effects on platform performance



A black and white photograph of a modern architectural structure. The image features large, angled concrete beams and columns, creating a geometric pattern. The text is overlaid on the central part of the image.

IS Research Methodology on Enterprise-level

Beyond micro, meso, macro

- Specific practical and research challenges – and specific insights and designs.
- Relevant perspective in practice and teaching, increasingly found in research.
- **Looking at large, complex systems does not necessarily enforce taking a macroscopic perspective** – like much of traditional, descriptive IS research does.
- Legitimate approaches other than descriptive include
 - Design Science Research (models, methods, typologies, architectures, ...)
 - Simulation (e.g., agent-based)
 - and many others...

A photograph of a concrete structure, possibly a bridge or a large architectural element, with a large, dark, triangular shadow cast across it. The word "Conclusions" is overlaid in the center in a black, sans-serif font. The background shows the texture of the concrete and the geometric lines of the structure.

Conclusions

Enterprise systems focus should be extended to **Enterprise-level IS**

- Clear positioning on a “system of systems” level of analysis, integrating people, task and technology aspects
- **Unique themes** include “global” perspective, boundary spanning (business and technology) and managing dependencies / side effects
- Many relevant contexts such as **integration management, architectural coordination, transformation and complexity management**
- Suitable for methodological diversity (descriptive, design, data-driven)
- Embracing various “related” domains such as EAM, Enterprise Modelling, IS management / governance, ...
- Creation of (even more) relevant findings and skills, in particular in the context of platform economy, data sharing/sovereignty, customer self-service, IoT, cloud transformation, digital transformation, etc.

Q&A

Robert Winter

Director

robert.winter@unisg.ch



University of St.Gallen

Institute of Information Management

University of St.Gallen
Institute of Information Management
Müller-Friedberg-Strasse 8
9000 St.Gallen

iwi.unisg.ch



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