

Capability Driven Development of Context-aware Enterprise Applications – Challenges, Approach and Experiences

Janis Stirna

based on FP7 project CaaS:



Universität
Rostock



Traditio et Innovatio



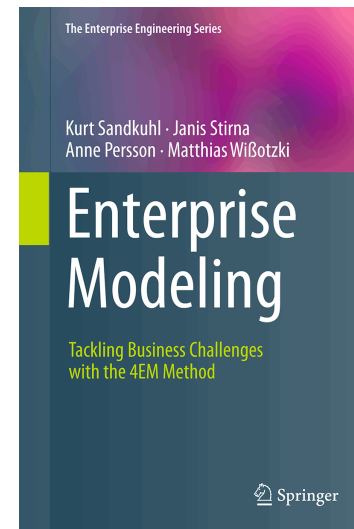
UNIVERSIDAD
POLITECNICA
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Short info about Janis



- PhD from KTH, 2001
- Prof at SU, 2015
- Teaching UML to 500 students
- Research interests: EM, EA, EE, RE



Outline

The general need for capability

Overview of the CaaS project

Overview of the application cases at SIV (Germany) and
Everis (Spain)

Overview of the CaaS methodology and development
environment

Other work done

Reflection on challenges and the work ahead



Motivation: *context changes, businesses need to adapt*



Nov 22, 2011 3:10pm

Groupon Deal Burns Small Bakery With Orders for 102,000 Cupcakes

Like 653 Tweet 204 +1 8 15 Text



Bakery

Factory

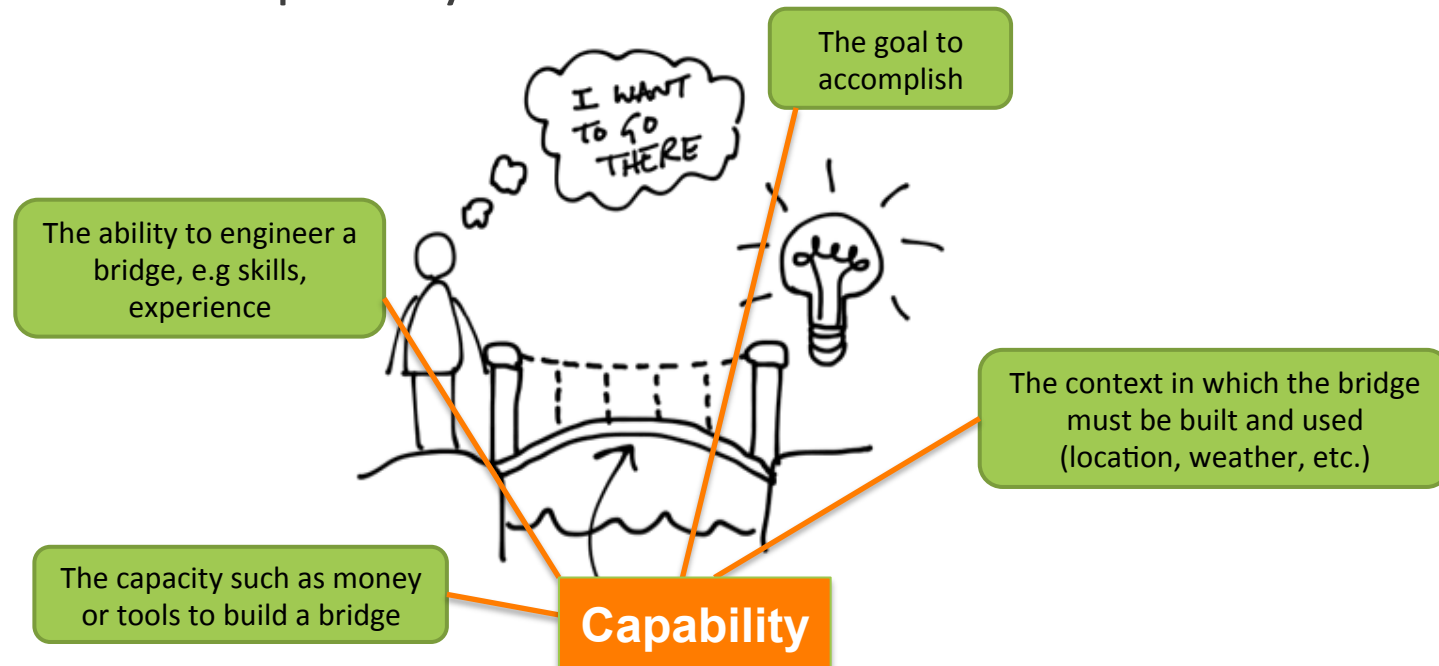
Tamara Lackey/Getty Images

Stockholm Arlanda has a goal not to shut down the flight operations due to snow



Capability as a Concept

- Enterprises must focus on their capabilities: *the ability and capacity that enables an enterprise to achieve a business goal in a certain operational context*
- What is a Capability?



Key Concepts: Capability & Context



- *Capability is the ability and capacity that enable an enterprise to achieve a business goal in a certain context.*
- *Context refers to situational properties relevant to capability delivery.*
- The company wants to *sell ice creams on streets* as long as it is sunny and the temperature is within a given range.
- Context influences: rain, public events, season



Solution

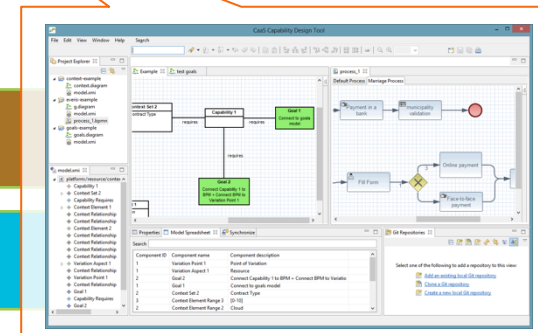
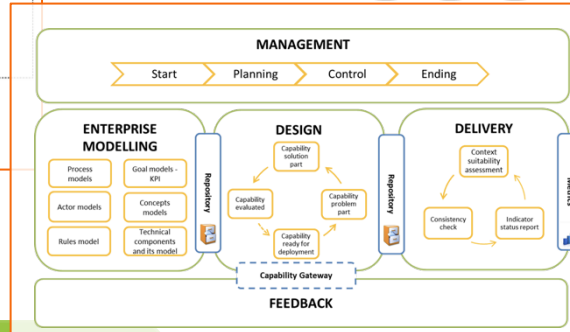
- **Capability as a Service**
- A (reasonably) novel paradigm supported by four cornerstones

Defined Best
Enterprise Practices as
Patterns

Capability-driven
Development (CDD)
Methodology

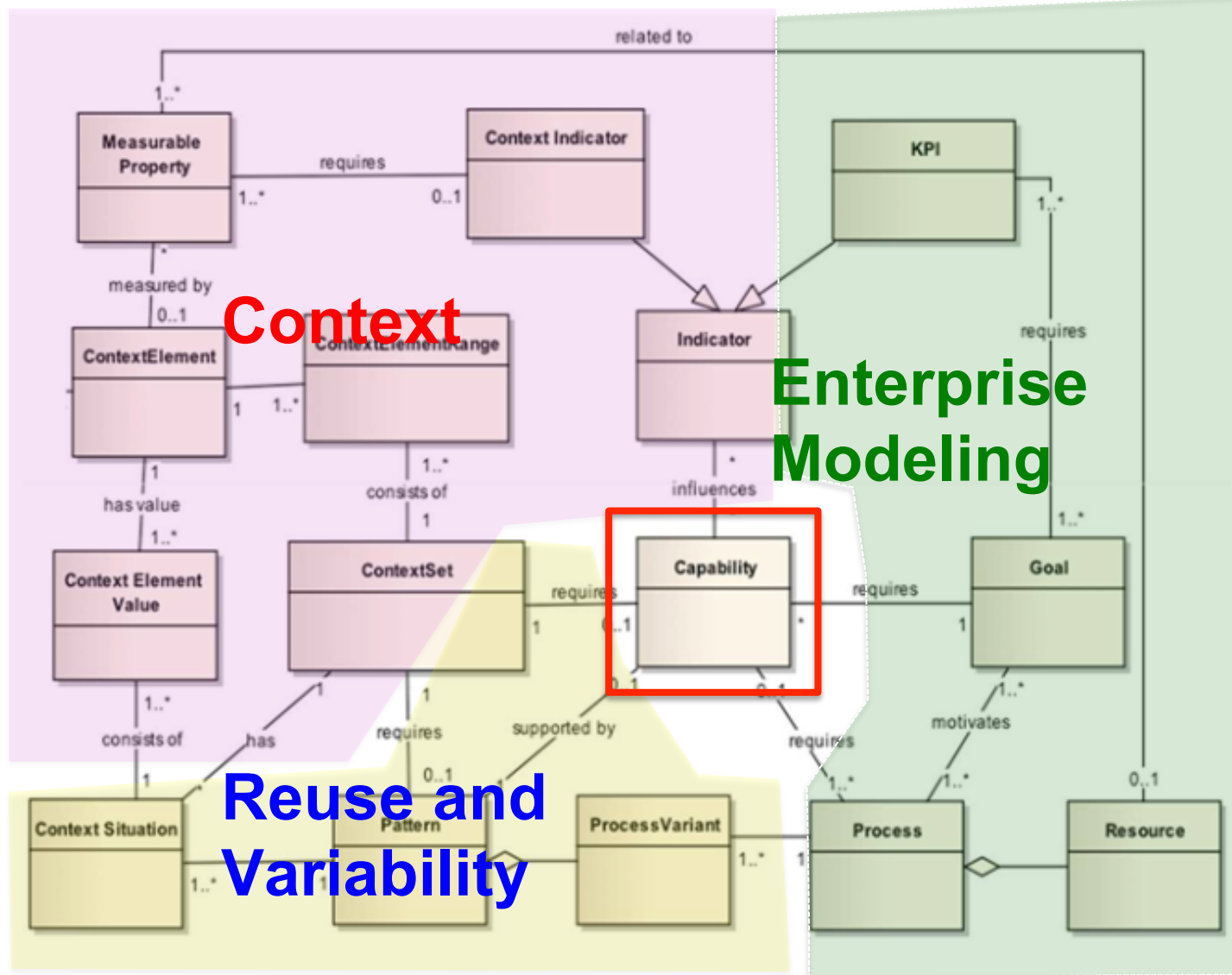
Capability Delivery
Adjustments According
to Context

Capability Design and
Delivery Environment



Capability Driven Development

- overall meta-model -



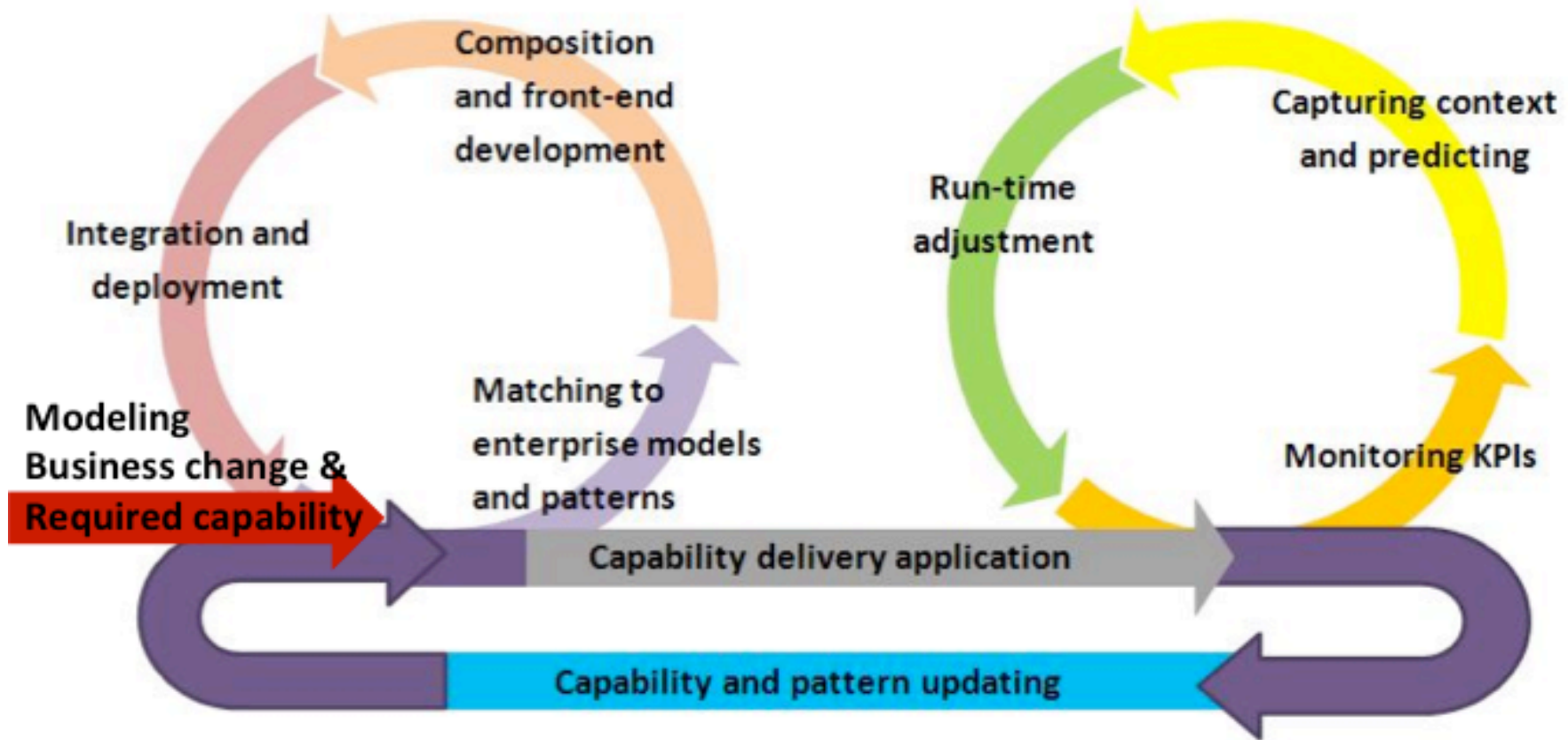
Context

Enterprise
Modeling

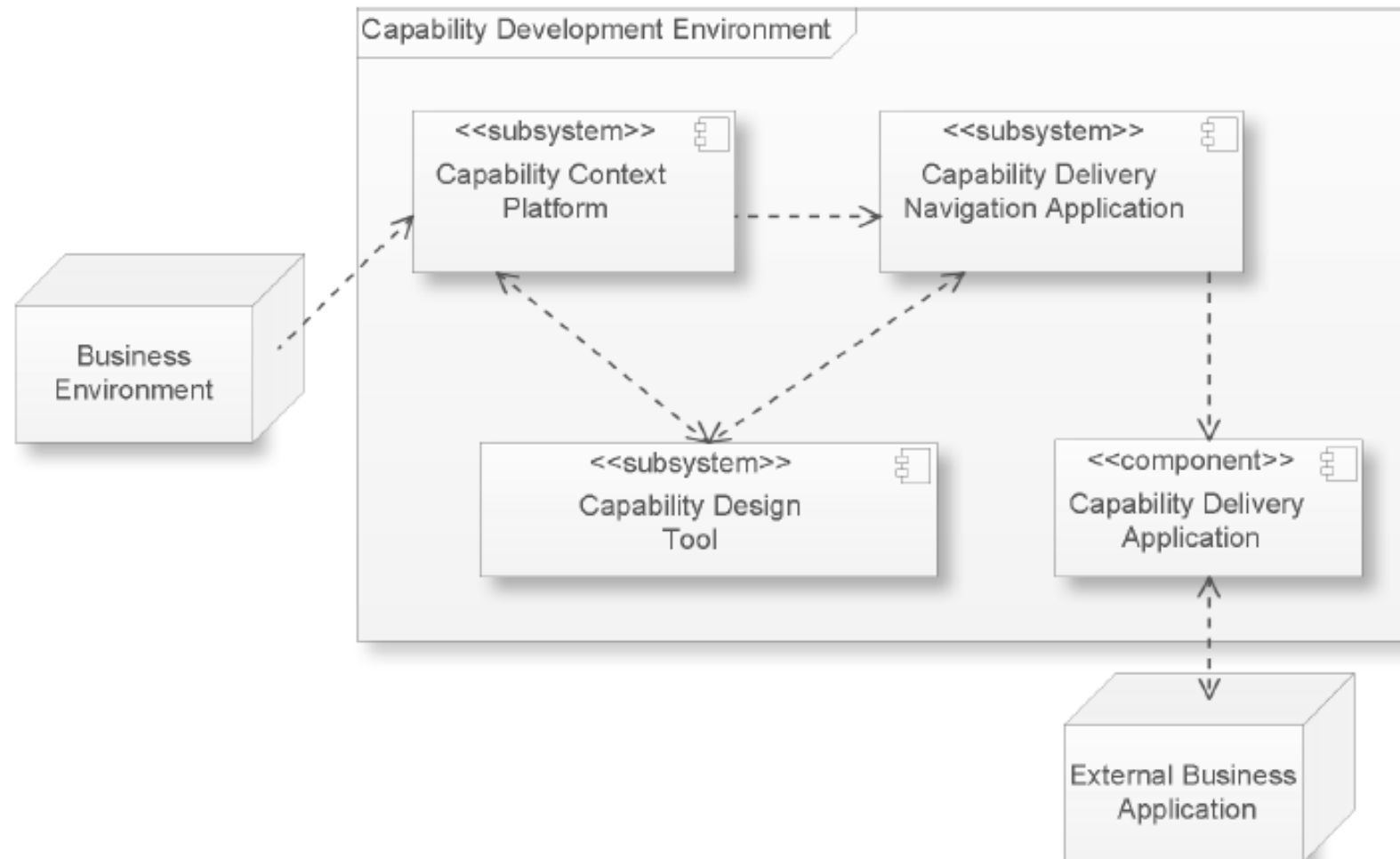
Reuse and
Variability

Capability Driven Development

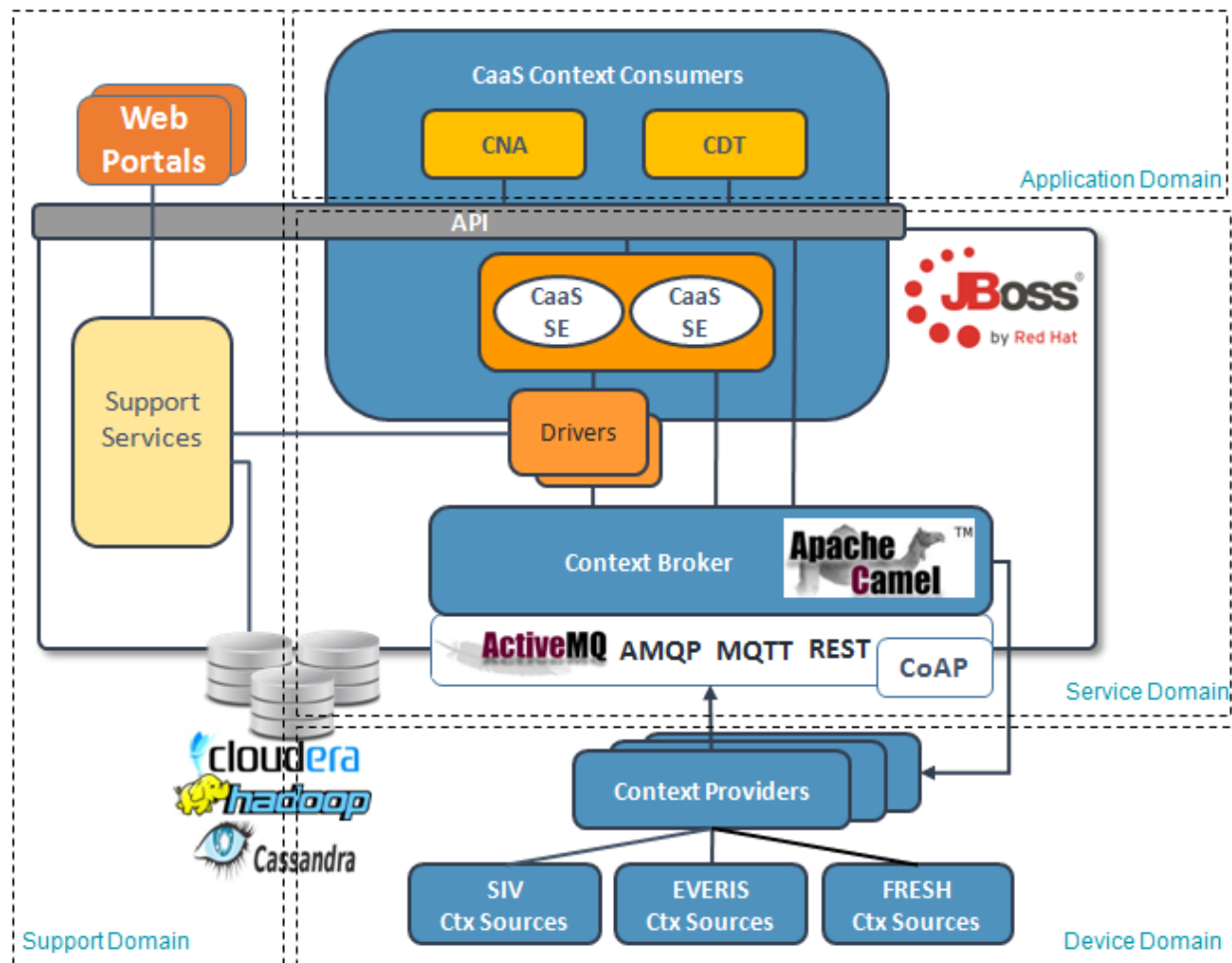
- life-cycle process -



CDD Development Environment Architecture Overview







Architecture Overview of Capability Context Platform (CCP)



Capability Driven Development

life-cycle process, navigation and adjustment at run-time



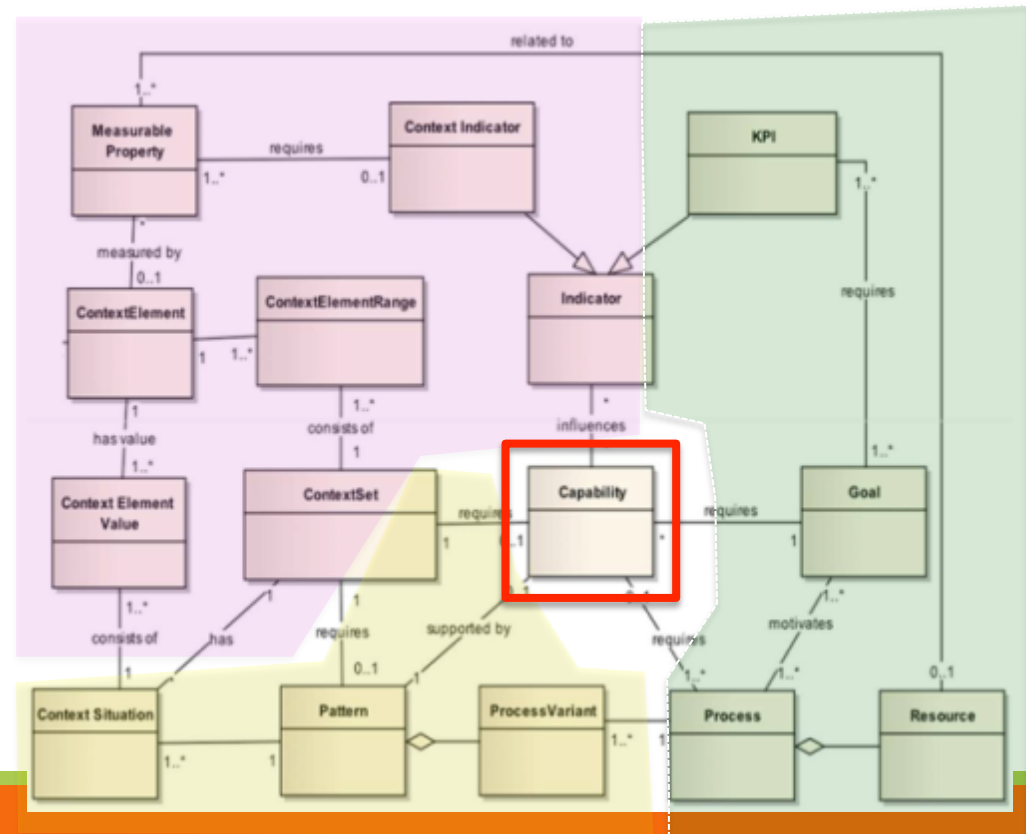
| Travel management dashboard | | |
|--|--|---|
| Trip #849-2014 | | |
| Current Context Situation | | |
| Travel conditions=Normal, Regulatory requirements=Comliant, Calendar=Significant conflict, Weather=Normal, Traffic=Low | | |
| KPI | Value | Adjustments |
| Total cost |  650 | Travel day earlier to reduce scheduling conflicts by 6 hours (click for more details) |
| Days late |  0 | |
| Accommodation cost |  300 | |
| Severity of scheduling conflicts |  8 | |
| Context indicators | Value | Patterns suggested |
| Hours scheduled | 8 | Apply Costs justification pattern to justify accomodation costs (click for more details) |
| Temperature | 25 | |
| Travel conditions | Normal | |
| Accommodation cost limit | 200 | |

Capability Elicitation



Capability elicitation, starting perspective:

- *Goal-first*: business strategy
- *Service-first* customer needs
- *Context-first*: business conditions

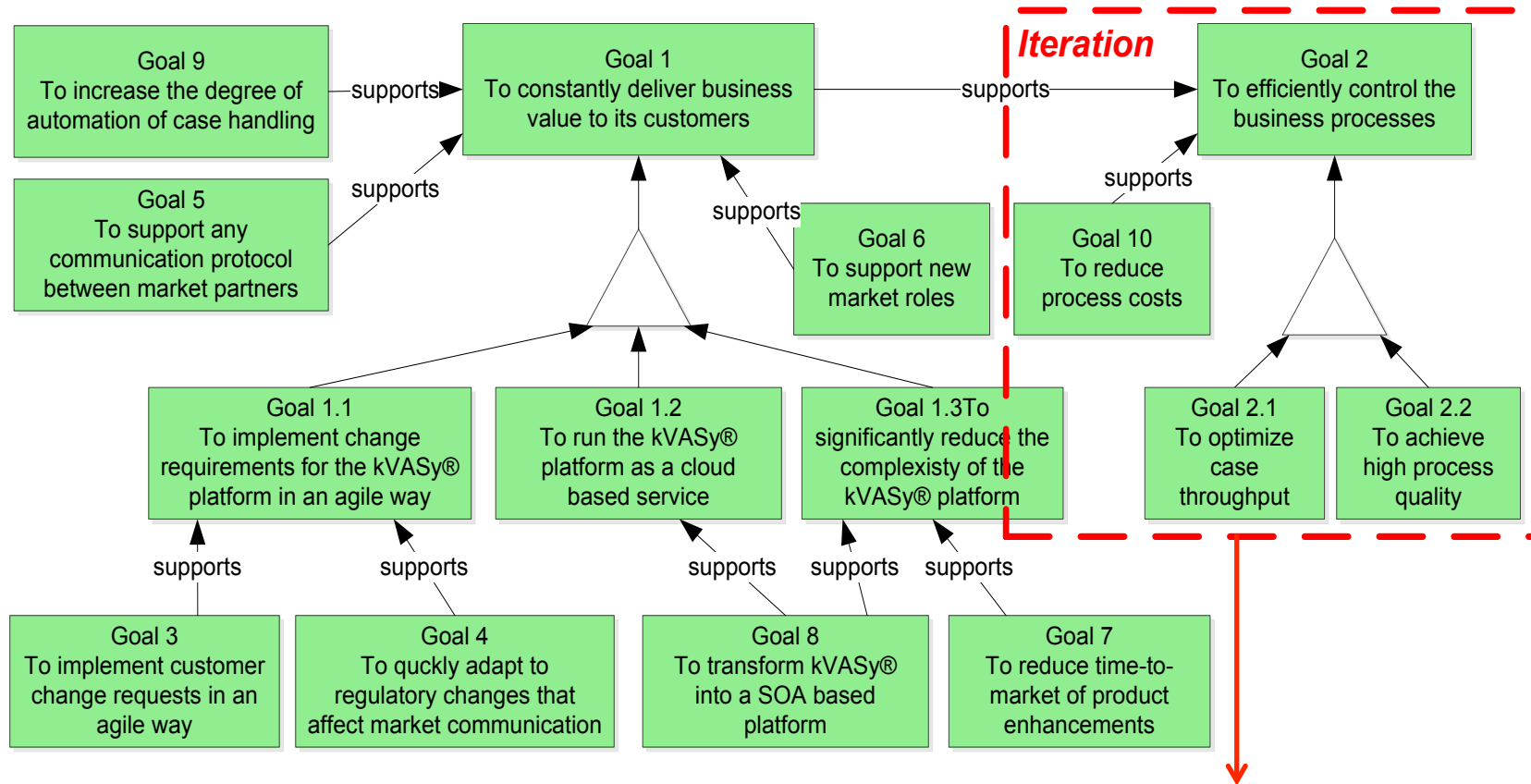


Elicitation – A Case at SIV



- The CaaS partner SIV is a Germany-based independent software vendor (ISV) and a business process outsourcing (BPO) provider for the utilities industry.
- SIV has developed a domain-specific ERP platform kVASy® that supports all relevant value-added processes of market players.
- All BPO services offered to SIV's customers – mostly grid access providers and balance suppliers – are based on the functionalities of kVASy®.
- SIV's business goal is to deliver a maximum of business value to its customers by combining best practice business processes with compliance to the market's ever changing business rules and regulatory requirements.

Elicitation – A Case at SIV

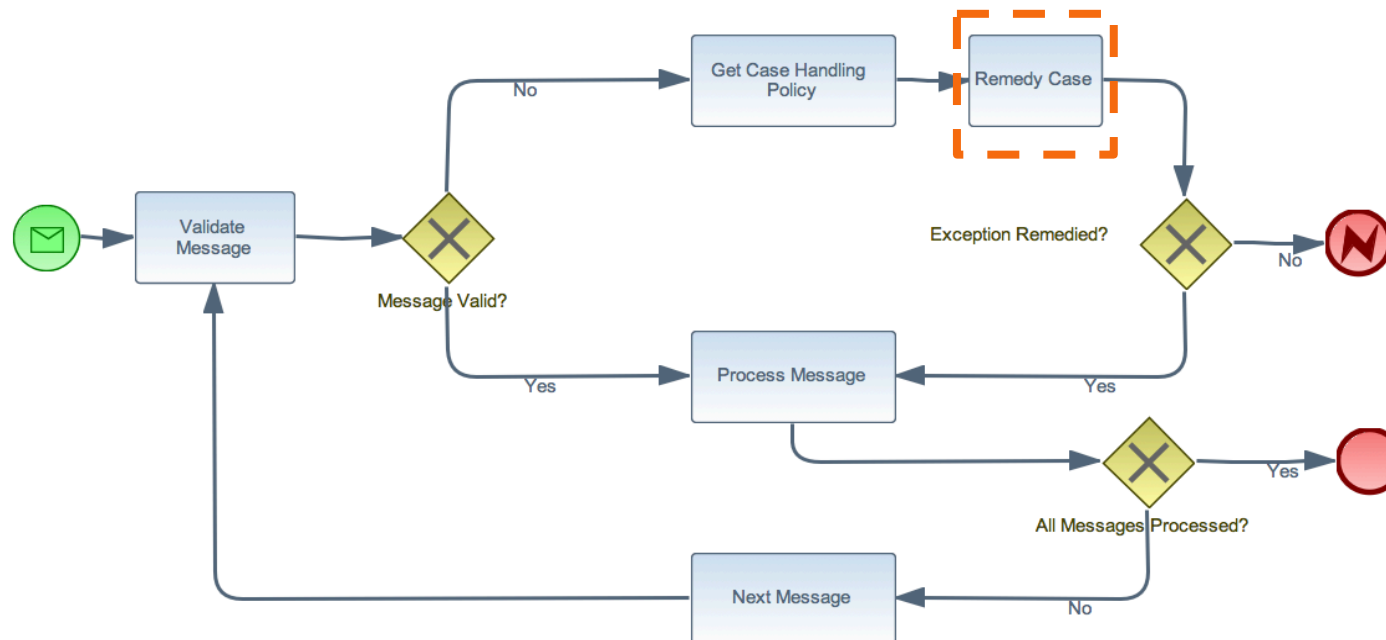


Elicitation – A Case at SIV



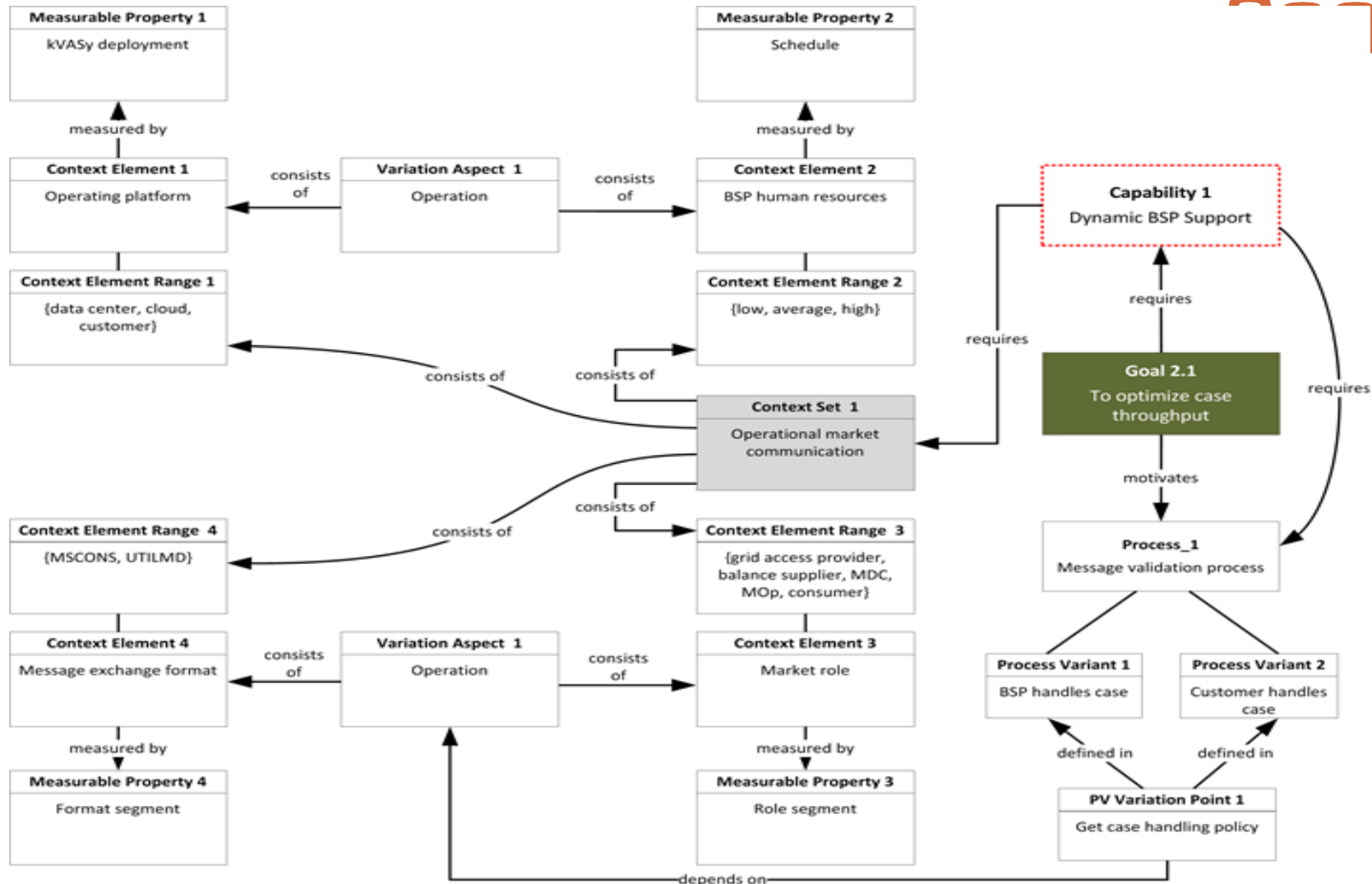
“Message Validation” business process:

...the recipient is supposed to validate each message (such as “energy consumption data”) against the underlying message specification. The sender is to be notified about any invalid message within a deadline specified by the regulatory authority



Given the large number of messages to be processed, there are usually many concurrent cases that need some clearing. Hence, the size of the backlog can grow considerably over time leading to missed deadlines and/or overtime work. Thus - customer's workload, the current backlog size, message type, exception types, and other, are represented by (different) context models, and (different) capabilities are elicited to handle those contexts.

Elicitation – A case at SIV

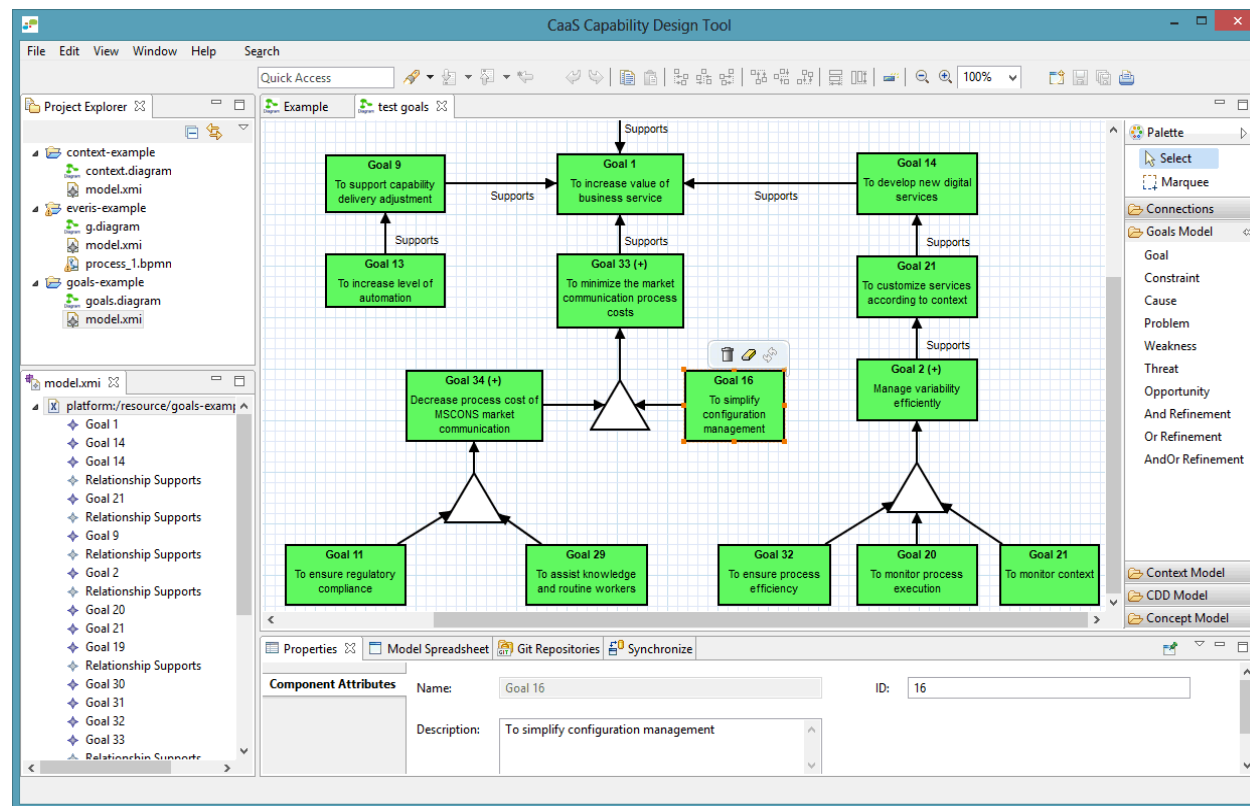


Depending on the concrete context situation, the task “Remedy case” can be dynamically routed to the external business service provider (BSP), or left with the customer.

Documentation in the CDT



- Model-oriented, with natural language for annotations
- Open to different modeling languages
- Intra- and inter-model links can be defined for traceability



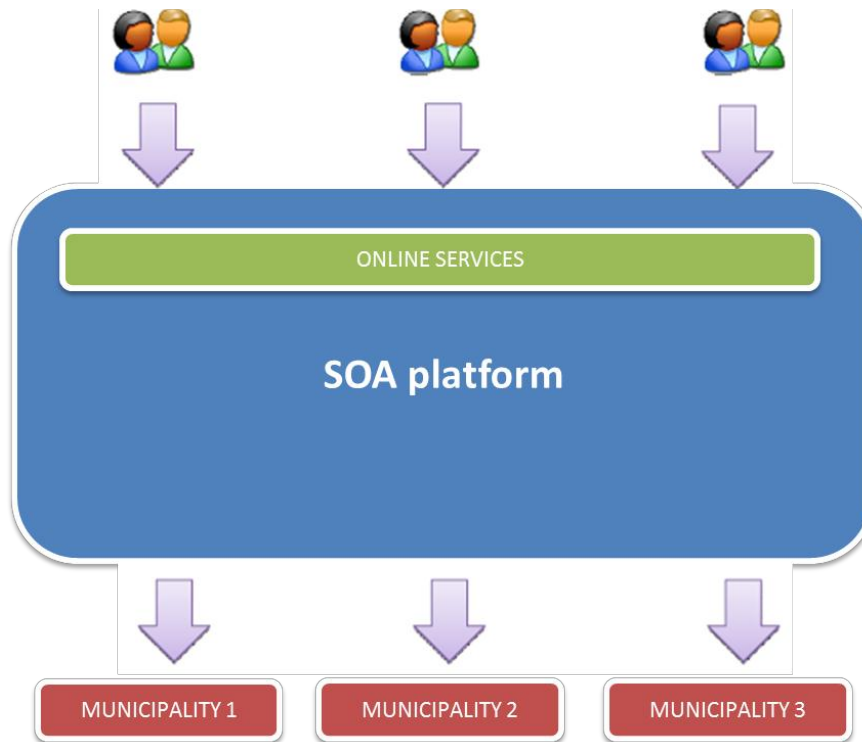
Summary of experiences at SIV



- The main objective of the process is to facilitate the specification for capability requirements in an integrated way following the multi-perspective views defined in the CMM to facilitate further application development.
- Where to start - from business goals, services, or from relevant business contexts. In any of these strategies, both the functionality and the quality aspects of capability are captured, where the first are dictated by the CM, and latter by the setting of the goals and KPIs.

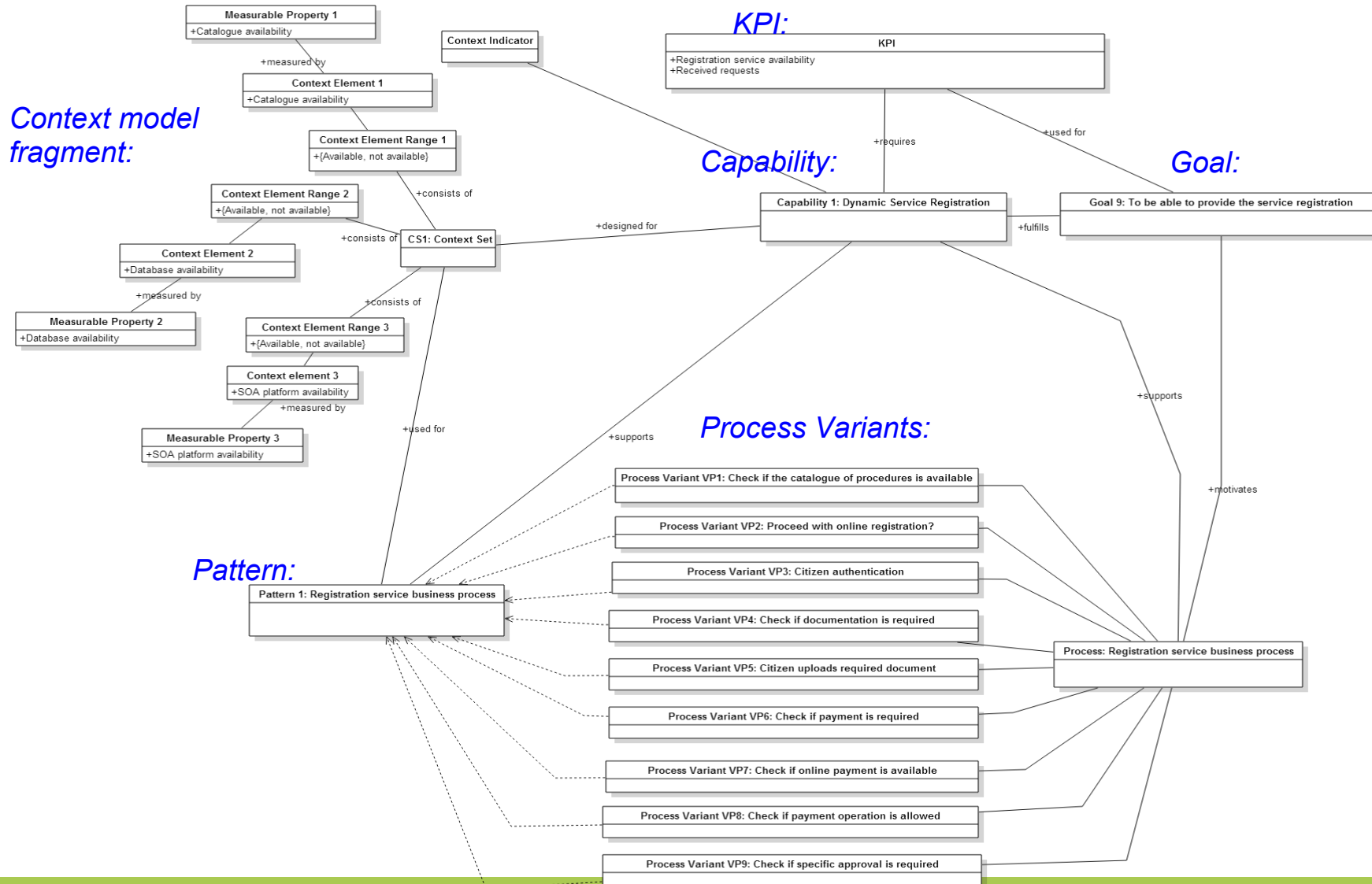


eGovernment SOA Platform at Everis

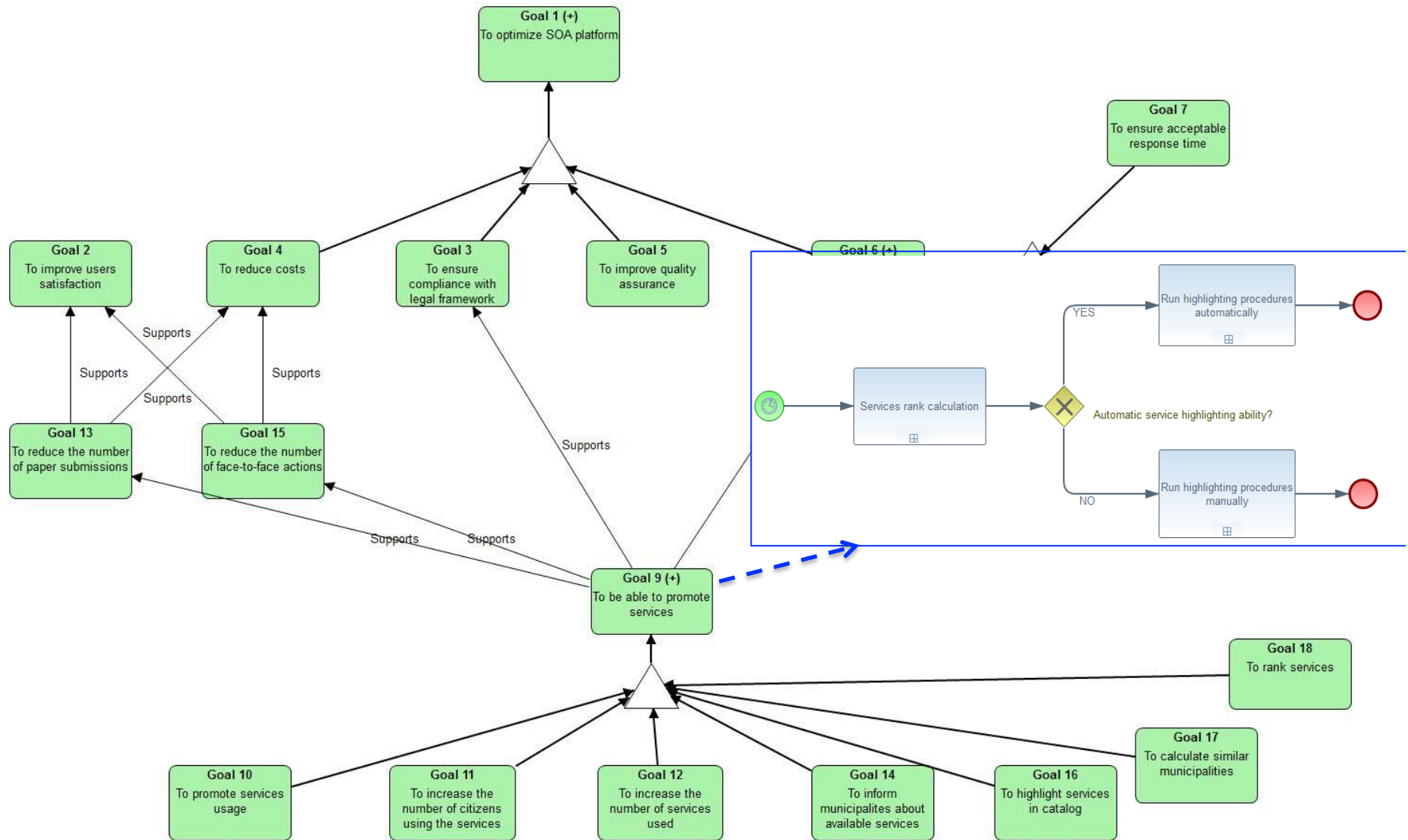


Ca 100 municipalities
Varying contexts
Ca 10000 services running
Many external providers
Manual activation and maintenance

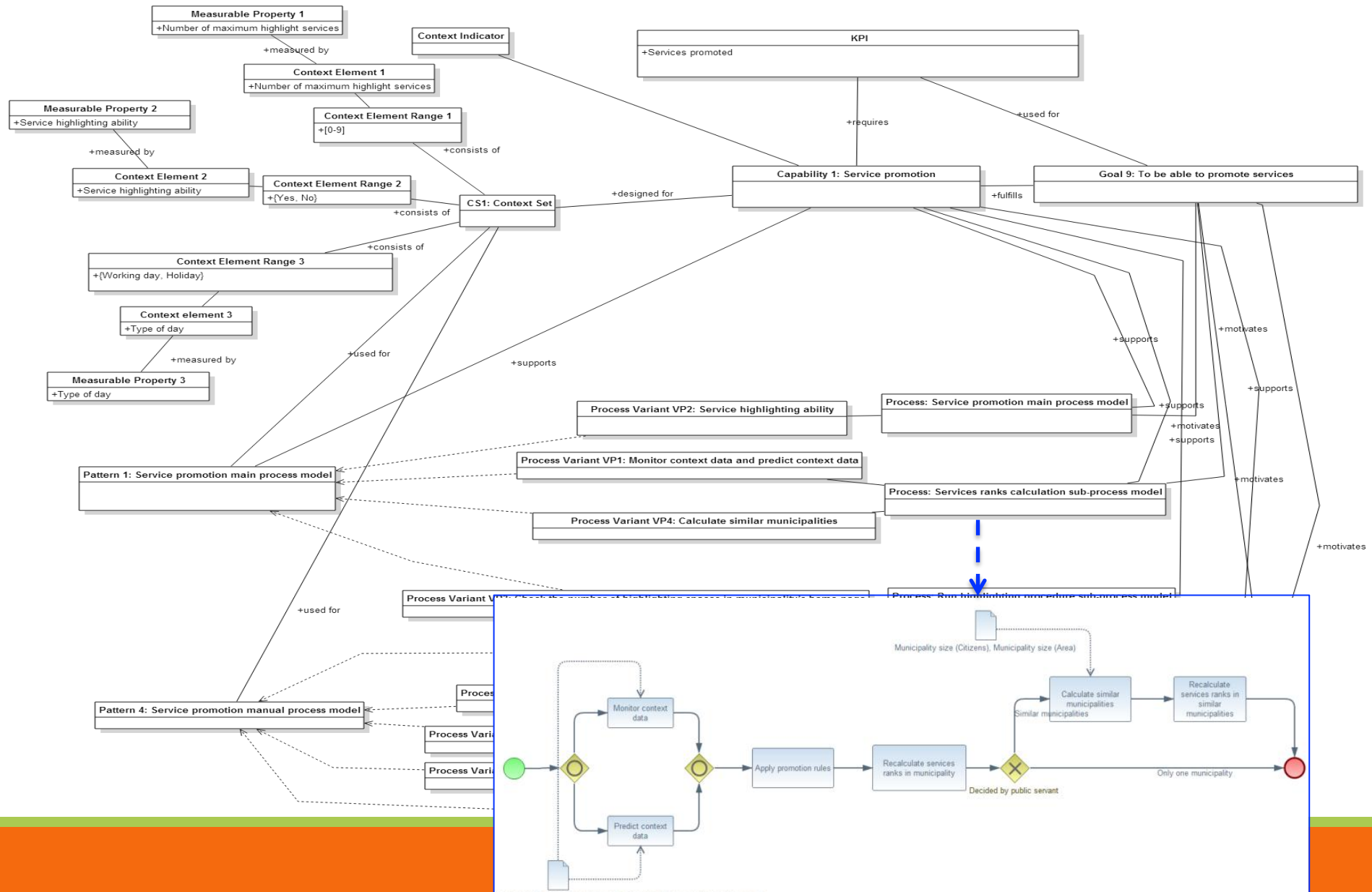
Capability Design Model for Dynamic Service Registration



Service Promotion Goals Model



Capability design for automatic service promotion

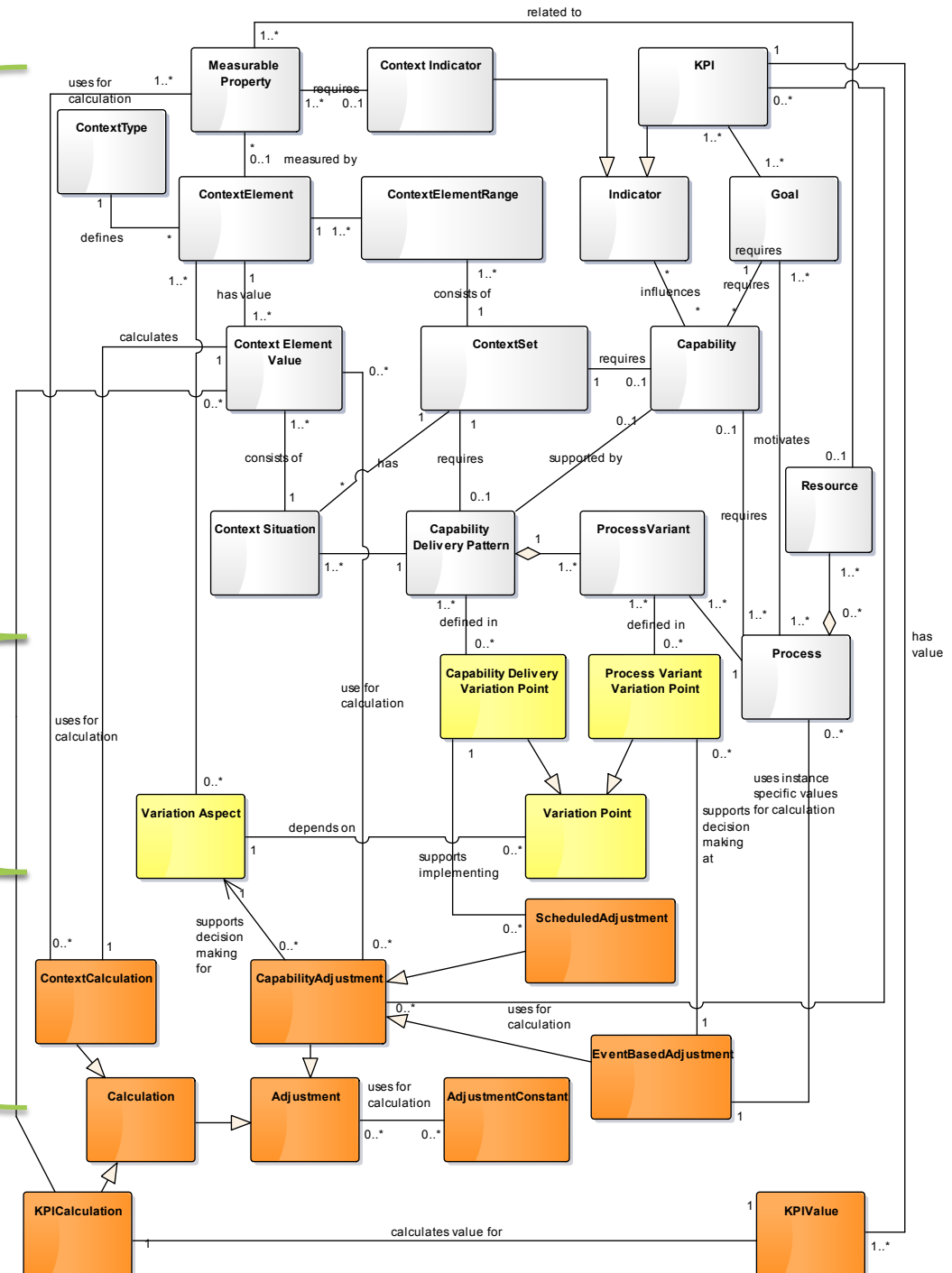


Meta-model (current version)

For capability design,
incl. goals, KPIs,
context, measurable
properties, etc.

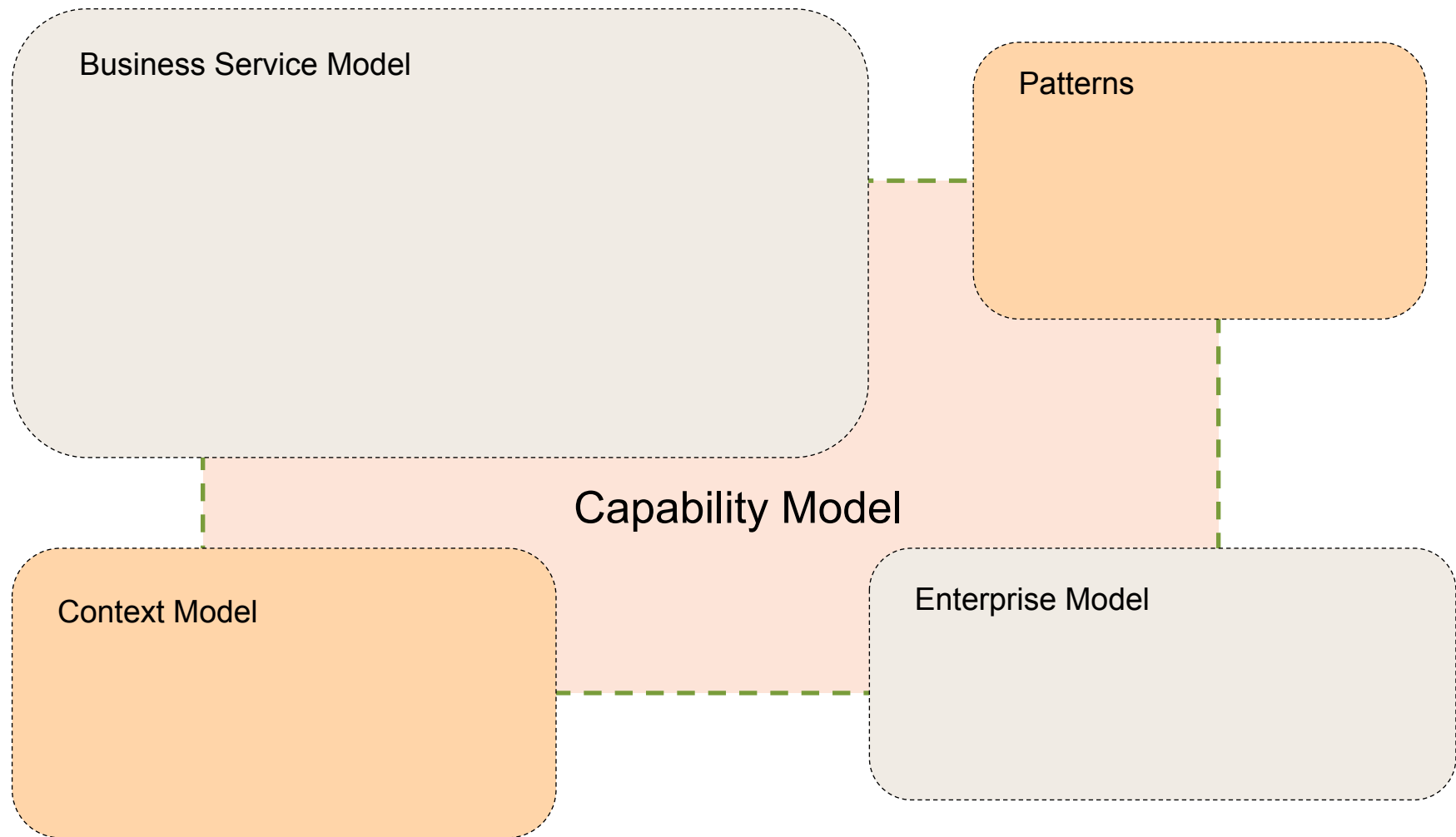
For variability design

For specifying
adjustment algorithms



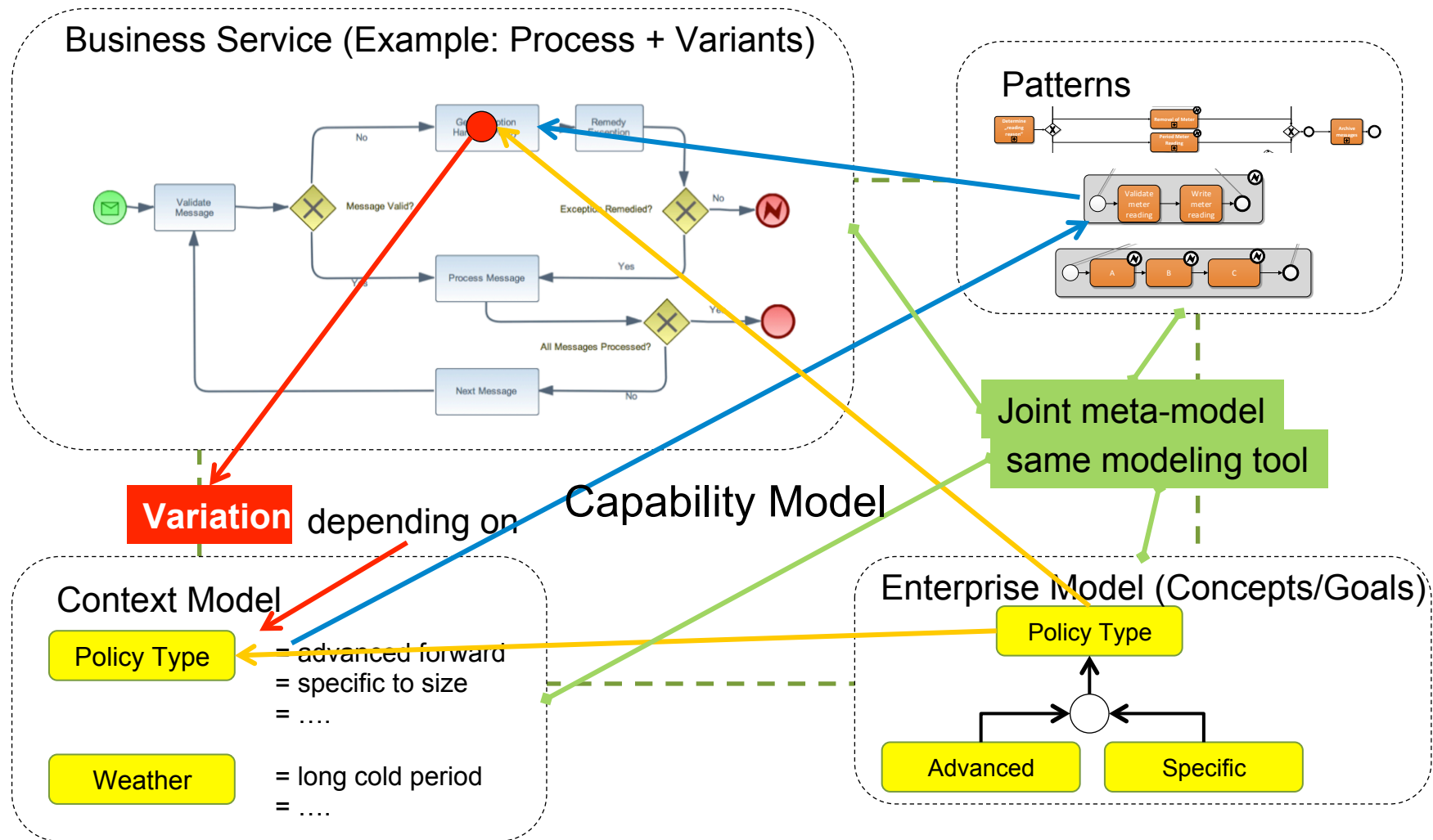
How should this work?

Elements of a Capability Model

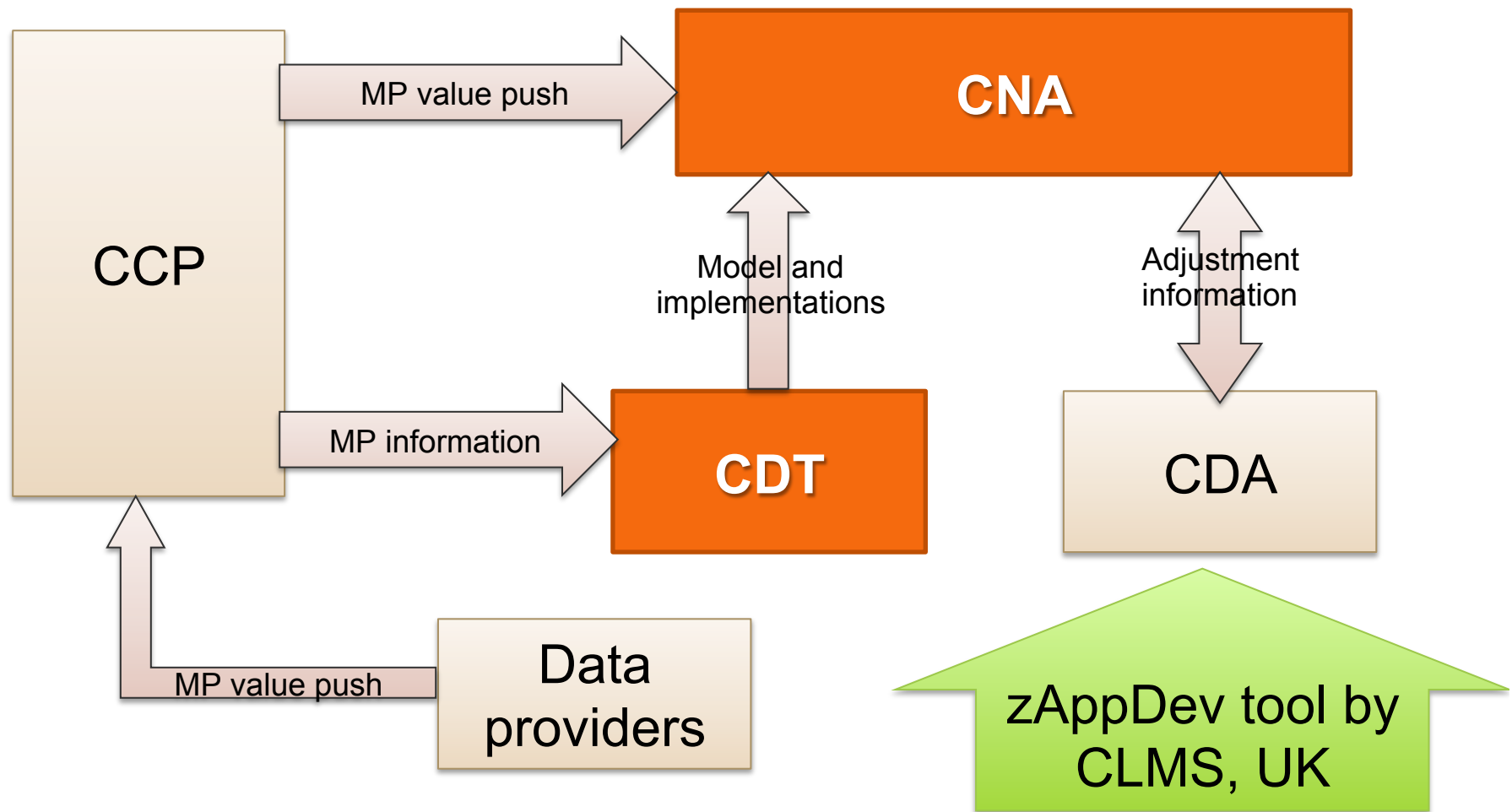


How should this work?

Elements of a Capability Model



The third use case: Model Driven Development of CDAs



Other work done

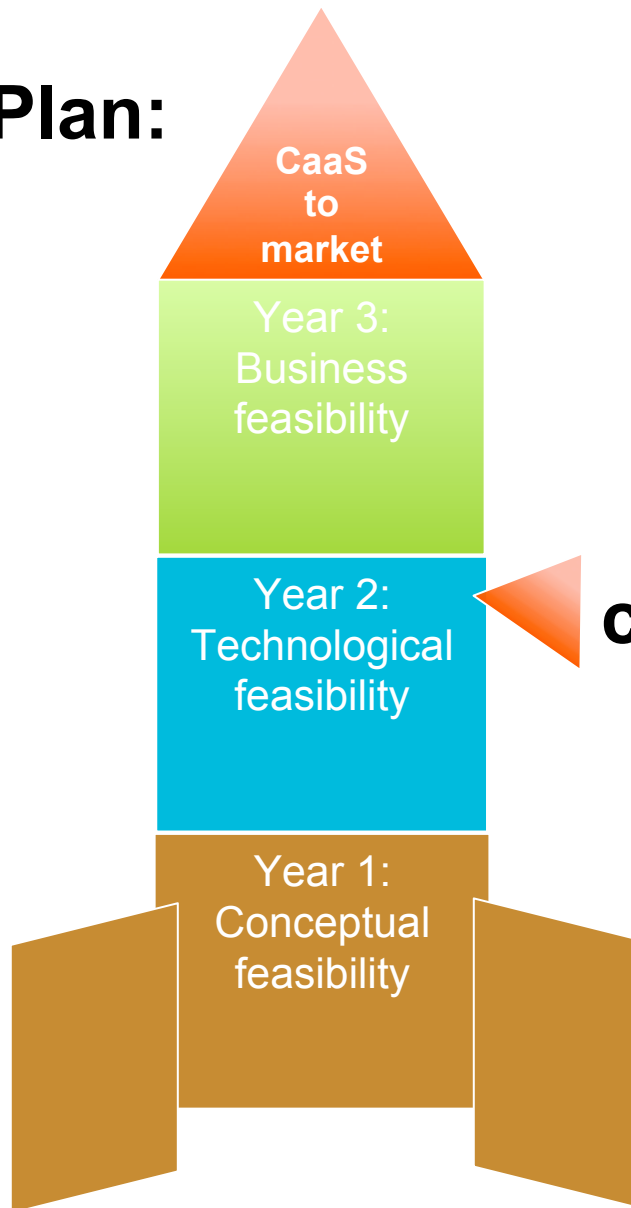
- Requirements for the CDD methodology and CDD environment
- Pattern repository
- CDD methodology for designing capabilities and solutions (1st version)
- Application of the CDD methodology at three industrial companies
- CDD environment (two releases)
- Market and exploitation plan
- Dissemination: (1 journal paper, 10+ conference and workshop papers, 2 workshops organized)

Where would we use this approach?

| | Capability |
|---------------|------------|
| Goal | ✓ |
| Context | ✓ |
| Capacity | ✓ |
| Ability | ✓ |
| Best practice | ✓ |

- Strategic planning and organizational design
 - Assessing the impact of context on the business design
- Operational running of business
 - Monitoring the KPIs, adjusting the business delivery
- Making use of emerging theories and technologies
 - E.g. consumer values and preferences, sensors, and big data
- Addressing cross-sectorial challenges
 - E.g. energy efficiency, sustainability, cyber resilience

Plan:



current state:

Contacts

- <http://caas-project.eu/>
- Papers (among many):
 - Solvita Berzisa, George Bravos, Tania Cardona González, Ulrich Czubayko, Sergio España, Janis Grabis, Martin Henkel, Lauma Jokste, Janis Kampars, Hasan Koç, Jan-Christian Kuhr, Carlos Llorca, Pericles Loucopoulos, Raúl Juanes Pascual, Oscar Pastor, Kurt Sandkuhl, Hrvoje Simic, Janis Stirna, Francisco Giromé Valverde, Jelena Zdravkovic: *Capability Driven Development: An Approach to Designing Digital Enterprises*. Business & Information Systems Engineering 57(1): 15-25 (2015)
- Workshops: ASDENCA 2014, CoBI 2014, ASDENCA 2015, CoBI 2015, ASDENCA 2016
- PoEM 2015 in Valencia, paper deadline July 17
- Janis Stirna, js@dsv.su.se