

A Semi-formal Evaluation of Architecture Design Based on Architecture Principles

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About us

Sepideh

- 5 years of industry experience
- Assistant Professor at Texas Tech University, TX, USA
- <http://www.myweb.ttu.edu/sghanava/index.html>



Diana

- Member of the Enterprise Engineering Network in Benelux
- PhD Candidate at Radboud University Nijmegen, NL
- Currently working as test analyst in Luxembourg



Outline

- Definitions on Enterprise Architecture and definitions on Enterprise Architecture Principles
- Motivation
- Our previous work
 - Framework overview
 - Formalism of architecture principles
- Our current contribution
 - Translating architecture models to UCM scenarios
 - Analysis
- Conclusions and future work



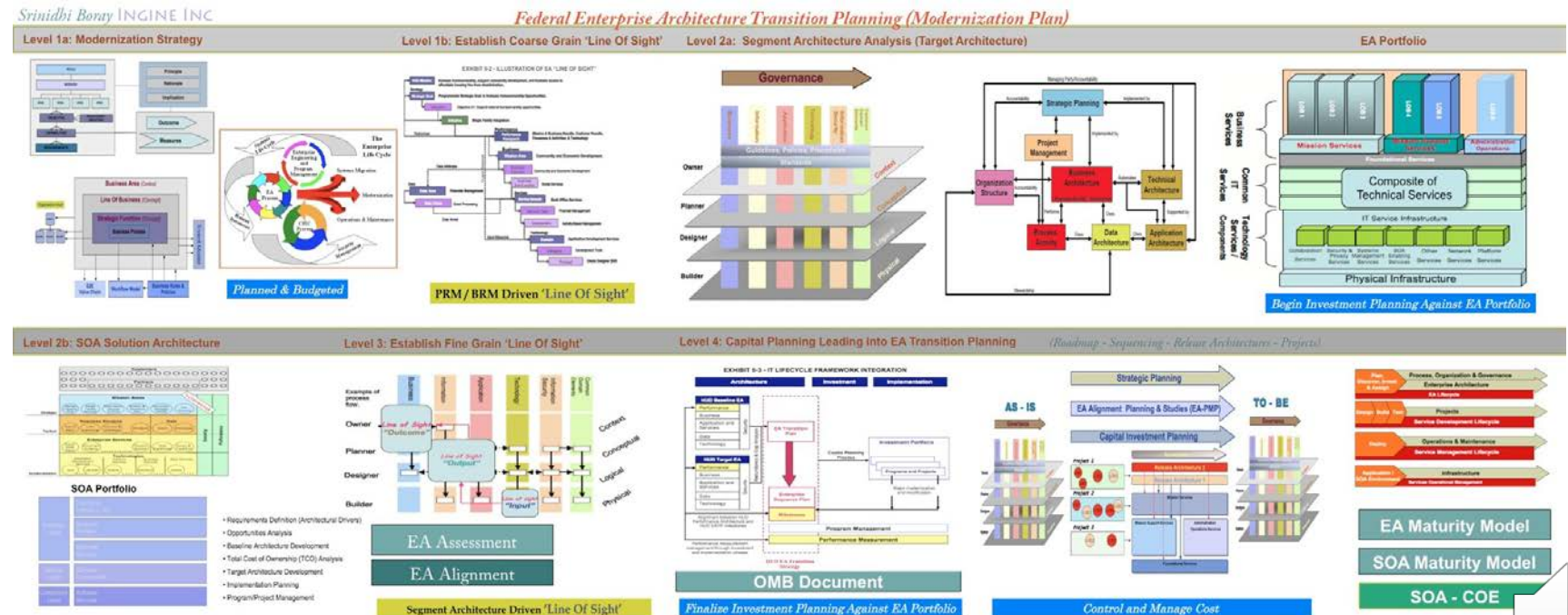
What is Enterprise Architecture?

Our view on Enterprise Architecture:

Enterprise Architecture (EA): a holistic view of the company; incorporates all levels from the strategy, goals and concerns of stakeholders, down to business processes, IT and infrastructure

EA Models

- ❑ Multiple EA frameworks
- ❑ Multiple modeling languages / styles
- Not having a clear structure and terminology
- ❑ Company specific



EA Principles Definition and Representation I

Our view on EA Principles:

EA Principles: “declarative statements that normatively restrict the design freedom” → have a regulation-oriented perspective, are derived from strategy and goals of the organization, define the frame where architects create the EA models, new projects and initiatives have to be in-line with the principles

EA Principles

- Company specific
- Natural language
- representation
- Ambiguous
- Do not contain a clear plan for future use and implementation

EA principle: **We have an exclusively digital administration.**

The information that come forth out of our interactions with citizens and companies and other chain partners are recorded exclusively in a digital administration. A digital administration is designed based on specific laws and legislation and also contains standardized processing.

- Digitalization contributes to fast processes
- The mass processes are maximally efficient standardized and automatized
- Digitalization of administration makes room for human work, that we use where human insight is necessary
- Digital administrations support the digitalization of customer processes and in this way decrease the use of paper

This means that:

- The information in digital administrations are fast and trustworthy accessible where and when necessary for the work
- We make applications either specific for mass, automatized administrative processes or specific for activities that are focused on human interaction
- Where we administer digitally we also archive digitally
- We take measures so that the safety of our information is ensured.



EA Principles Definition and Representation II

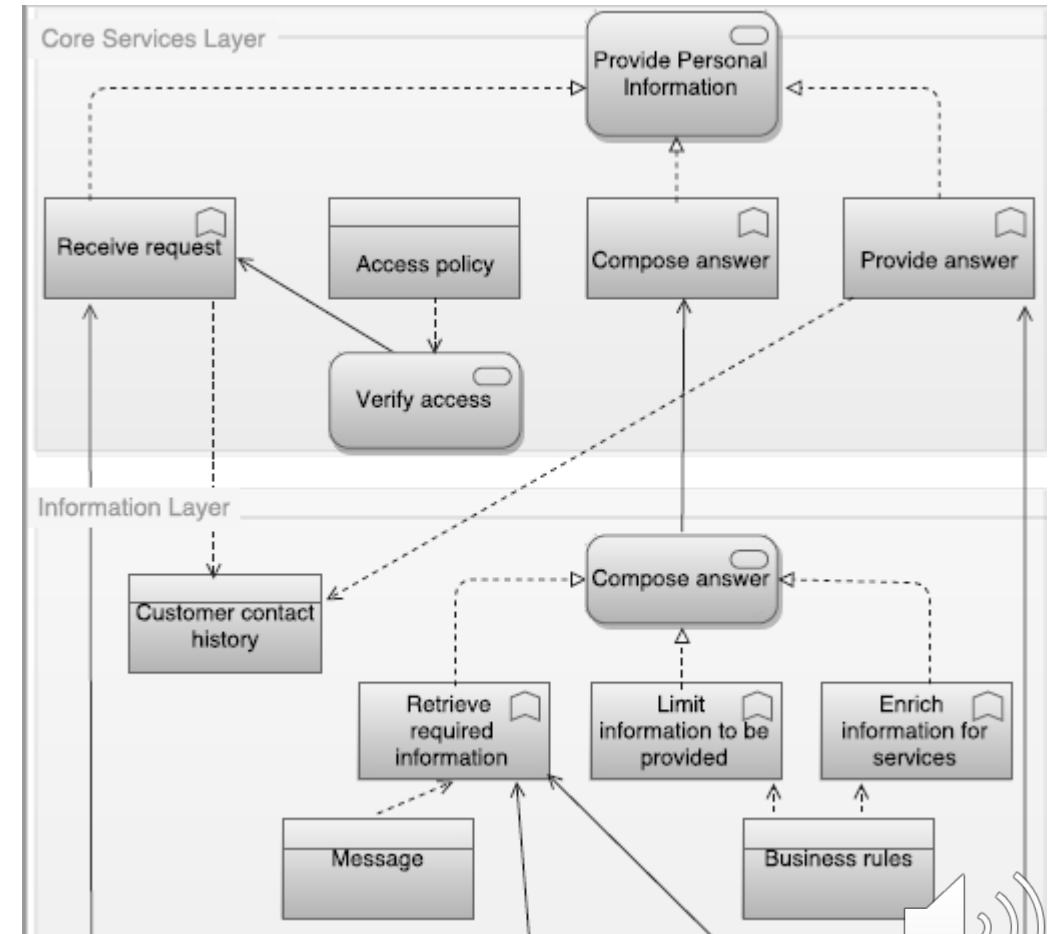
Example of a (partial) model in

ArchiMate

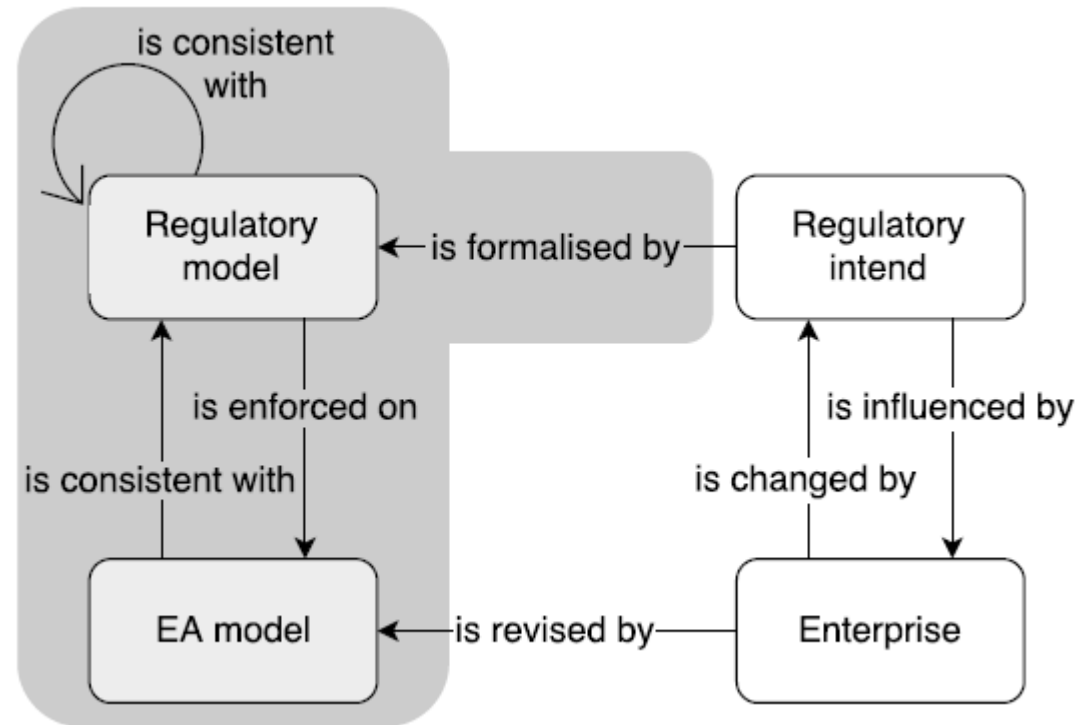
- Static
- Cannot run analysis
- Doesn't provide any traceability to principles

Research question

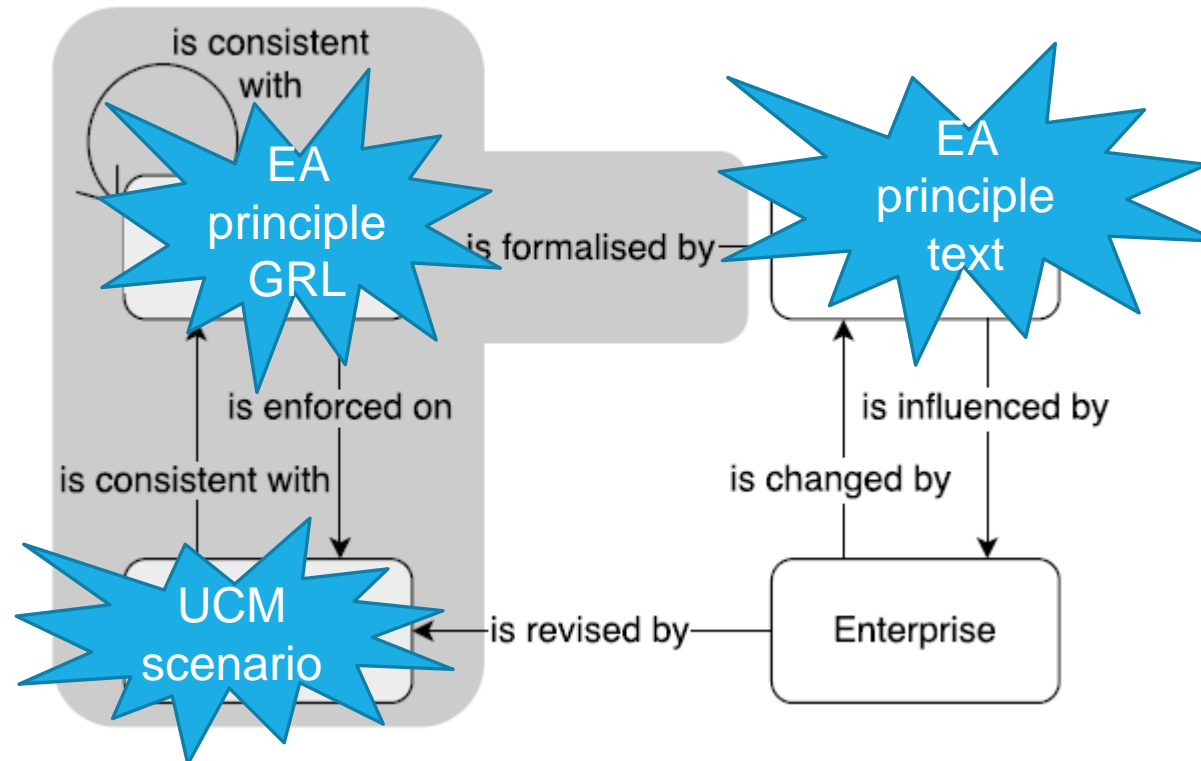
How to manage and evaluate the consistency between architecture principles and architecture design models?



Our Proposed Framework (RELAW 2015) I



Our Proposed Framework (RELAW 2015) II



Our Framework is based on Case Studies!

- Schiphol Group (iStar 2014), XBRL Assurance (RELAW 2015)
- TaxAdministration (CAiSE 2016 and current work)
 - ✓ Documents and models <https://github.com/RationalArchitecture/eGovernment>
 - ✓ Minister of Finances of an European country
 - ✓ Span of documents over multiple years (2011-2015)
 - ✓ Principle based architecture
 - ✓ Uses TOGAF (The Open Group architecture framework) and ArchiMate (EA representation language)
 - ✓ Skype interviews with a Chief Architect and a Multidisciplinary/ IT architect from *TaxAdministration*



EA Principle GRL (CAiSE 2016) I



EA principle element	Stereotype value <<ST_Principle>>	GRL element
Name	<<Principle>>	Softgoal
Statement		Comment
Added value	<<AddedValue>>	Softgoal, goal
Impact / restrictions		GRL link
Key actions	<<KeyActions>>	Task
Precondition	<<Precondition>>	Softgoal, goal, task, resource
Architecture domain		Actor

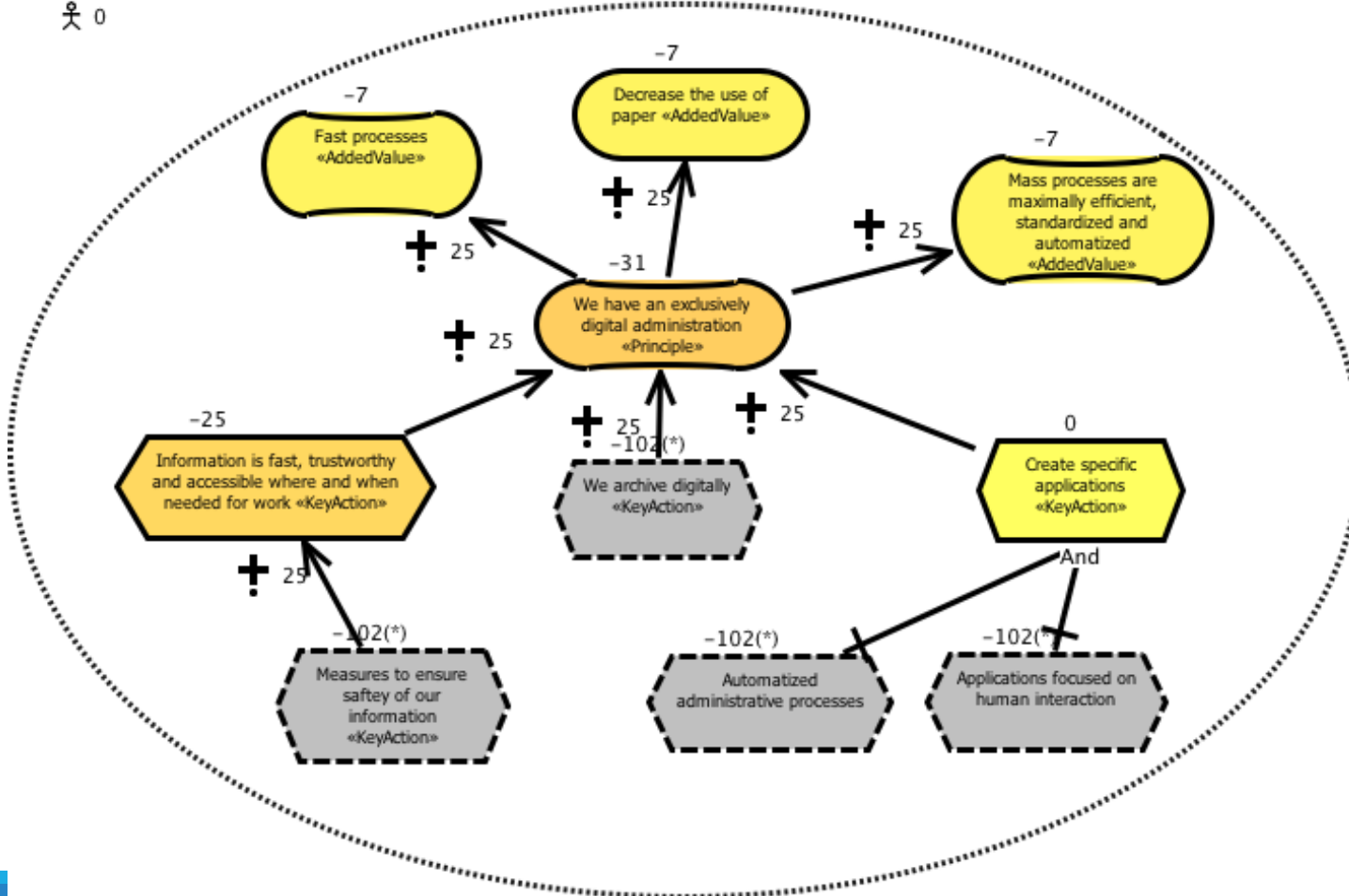


EA Principle GRL (CAiSE 2016) II



Information layer

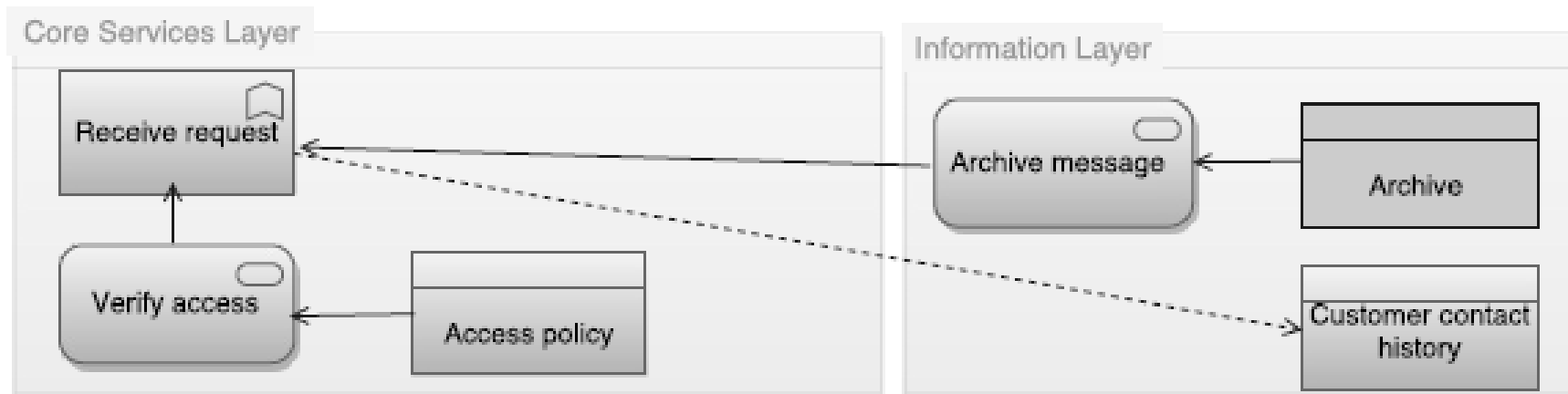
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TaxAdministration's EA Model in ArchiMate



Partial analysis



Focused on a limited set of concepts



8 Rules – Translating ArchiMate to UCM Scenarios I

□ Traversing the EA model and visiting all its constitutive elements

[R1] Choose an element from ArchiMate model and add it to the UCM scenario as a start-point.

[R2] Concurrent behaviors retrieved from ArchiMate models are represented using UCM AND-fork.

[R3] The mapping is complete when all elements and relations from ArchiMate were handled. Mark in UCM with end-point.

[R4] Unite all paths resulted in the UCM scenario with an AND-joint.



8 Rules – Translating ArchiMate to UCM Scenarios II

- Mapping of ArchiMate relations to UCM directed paths

[R5] Create directed paths in UCM.



used by relation in ArchiMate



<<uses>> relation in UCM



8 Rules – Translating ArchiMate to UCM Scenarios III

❑ Translating ArchiMate objects, functions, services to UCM elements

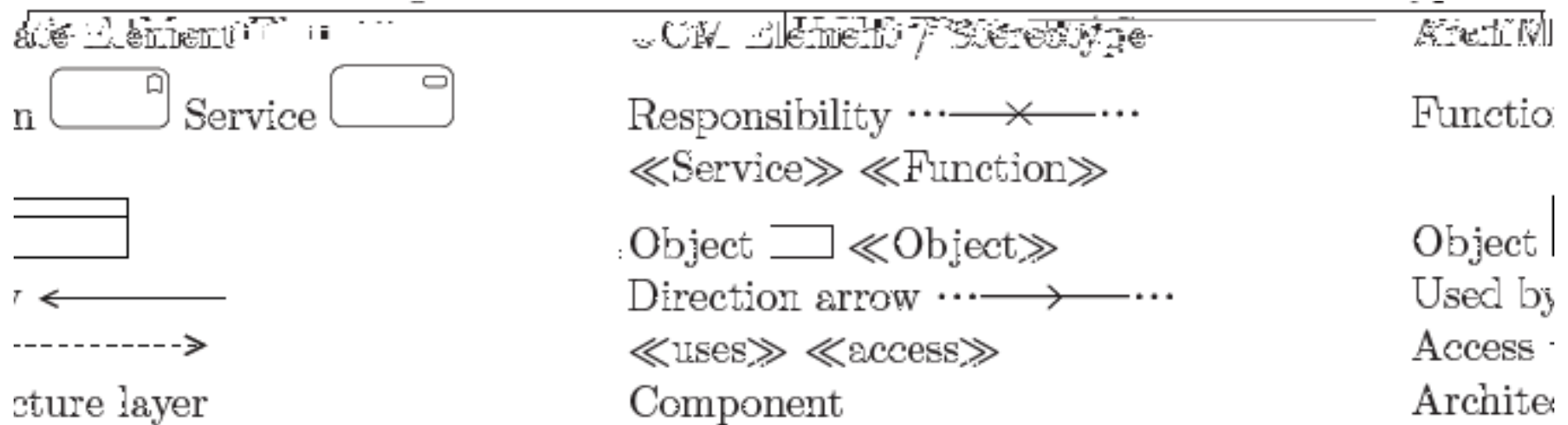
[R6] Functions and services from ArchiMate are modeled as responsibilities in UCM.

[R7] Objects in ArchiMate are translated to objects in UCM.

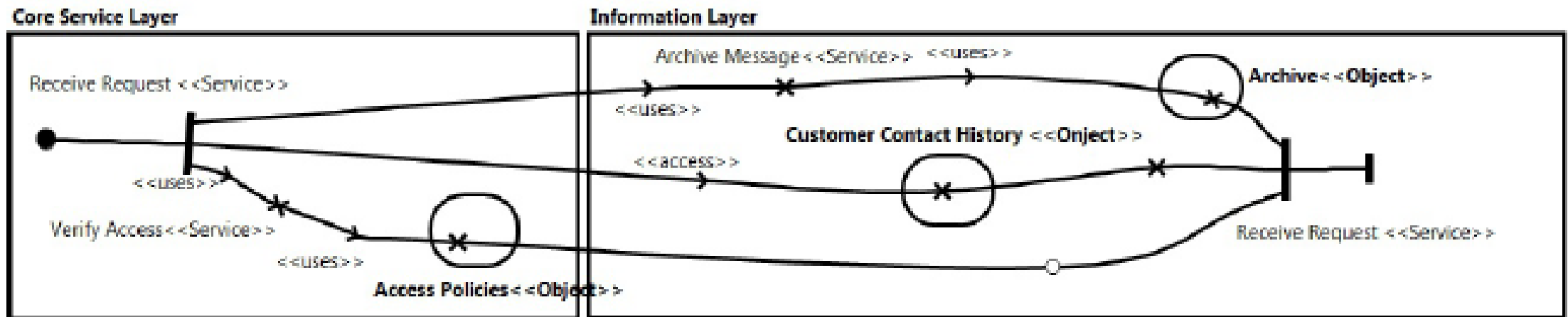
[R8] Each architecture layer is represented by a UCM component.



Adding Stereotypes



Resulted UCM Scenarios

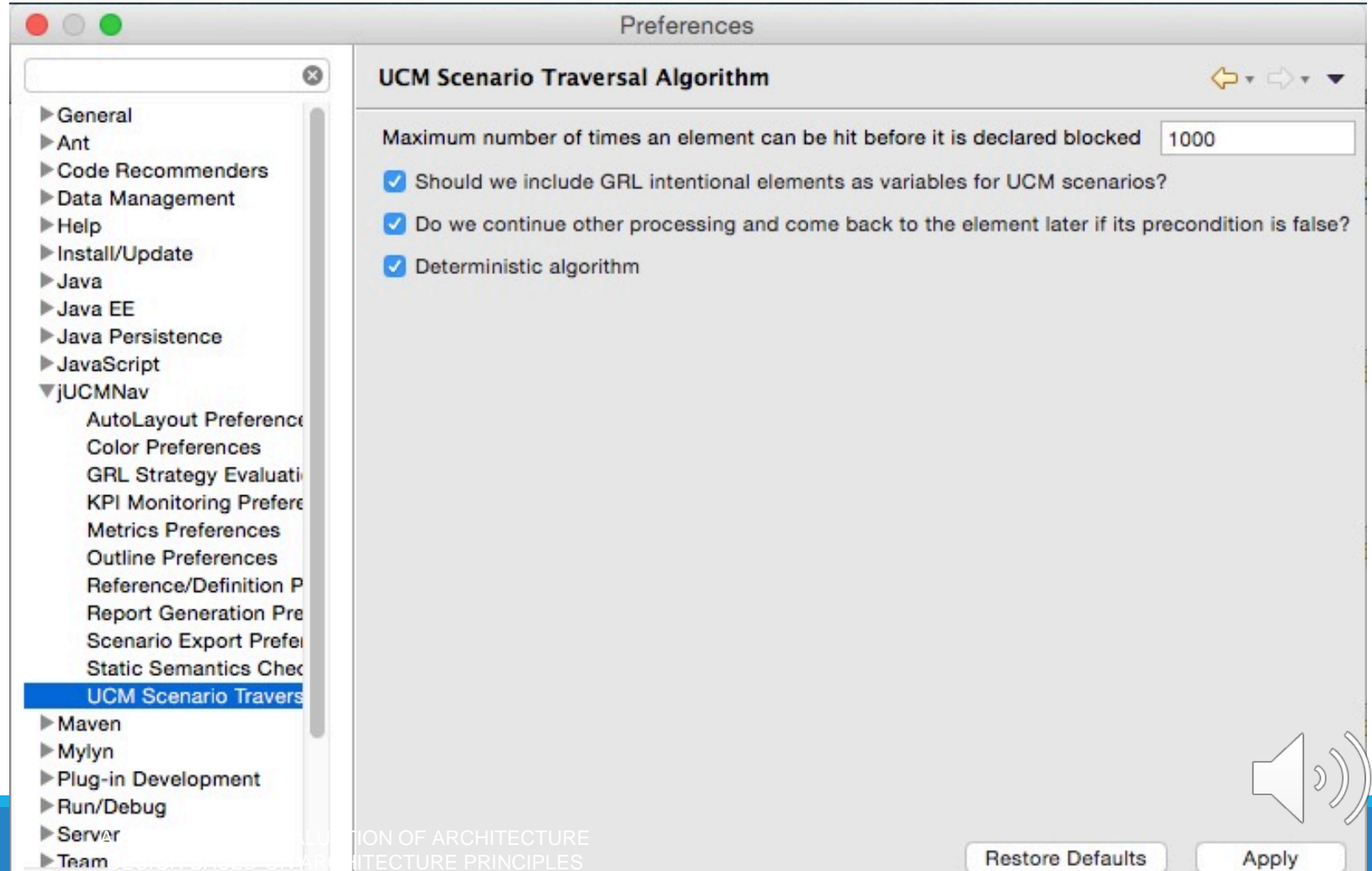


How to Analyze? I

- ✓ Leverage GRL links to UCM
- ✓ Use jUCMNav

Step 1: Include GRL IEs as variables for UCM

Step 2: Update GRL IE values

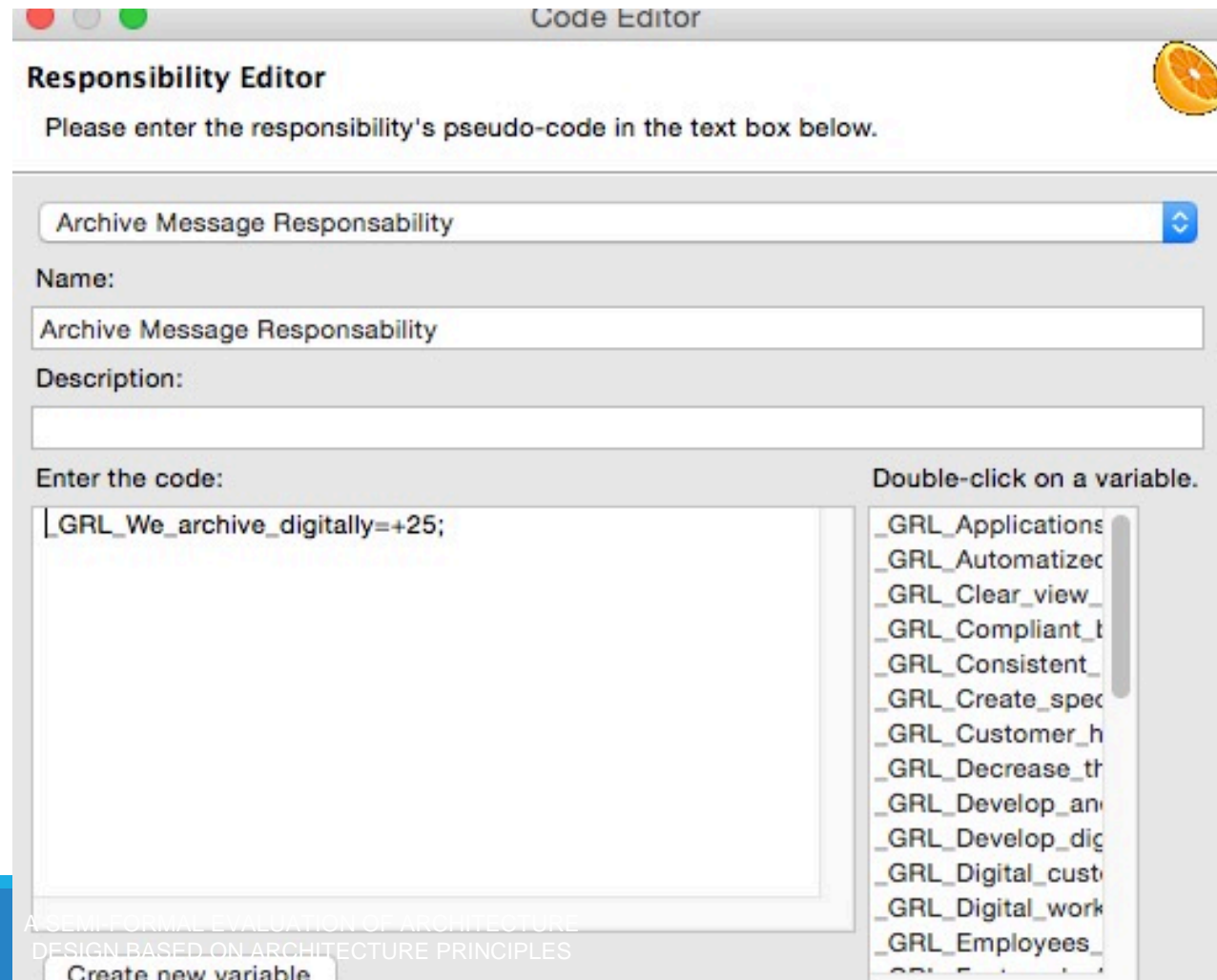


How to Analyze? II

- ✓ Leverage GRL links to UCM
- ✓ Use jUCMNav

Step 1: Include GRL IEs as variables for UCM

Step 2: Update GRL IE values



The screenshot shows a 'Code Editor' window with a 'Responsibility Editor' tab. The interface includes a search bar with 'Archive Message Responsibility' selected, a 'Name' field with the same text, and an empty 'Description' field. Below these is a code editor with the text '_GRL_We_archive_digitally=+25;'. To the right is a list of GRL variables for selection, including '_GRL_Applications', '_GRL_Automatized', '_GRL_Clear_view_', '_GRL_Compliant_t', '_GRL_Consistent_', '_GRL_Create_spec', '_GRL_Customer_h', '_GRL_Decrease_th', '_GRL_Develop_an', '_GRL_Develop_dig', '_GRL_Digital_cust', '_GRL_Digital_work', and '_GRL_Employees_'. A 'Create new variable' button is at the bottom left of the code editor.

Code Editor

Responsibility Editor

Please enter the responsibility's pseudo-code in the text box below.

Archive Message Responsibility

Name:
Archive Message Responsibility

Description:

Enter the code:
_GRL_We_archive_digitally=+25;

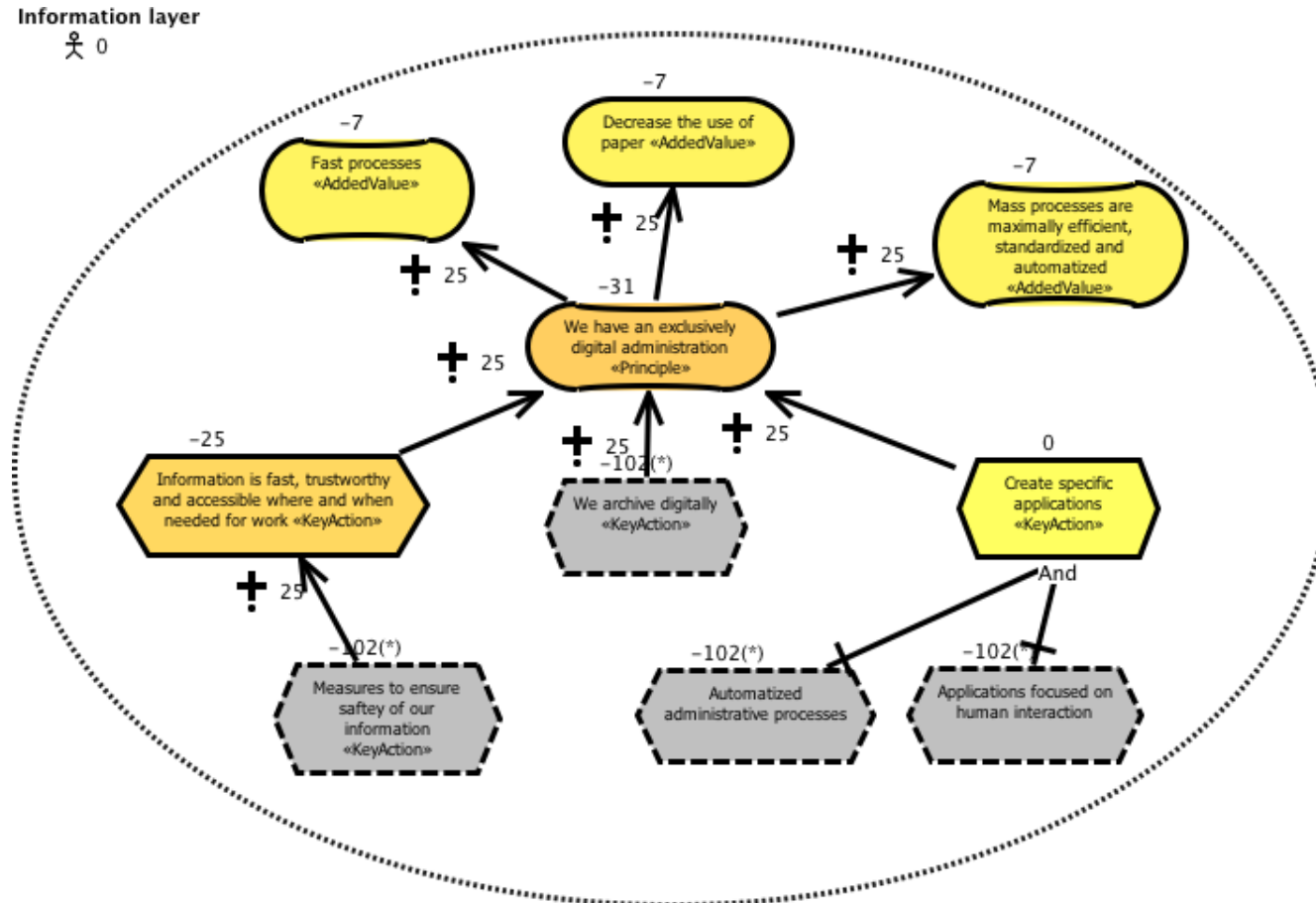
Double-click on a variable.

- _GRL_Applications
- _GRL_Automatized
- _GRL_Clear_view_
- _GRL_Compliant_t
- _GRL_Consistent_
- _GRL_Create_spec
- _GRL_Customer_h
- _GRL_Decrease_th
- _GRL_Develop_an
- _GRL_Develop_dig
- _GRL_Digital_cust
- _GRL_Digital_work
- _GRL_Employees_

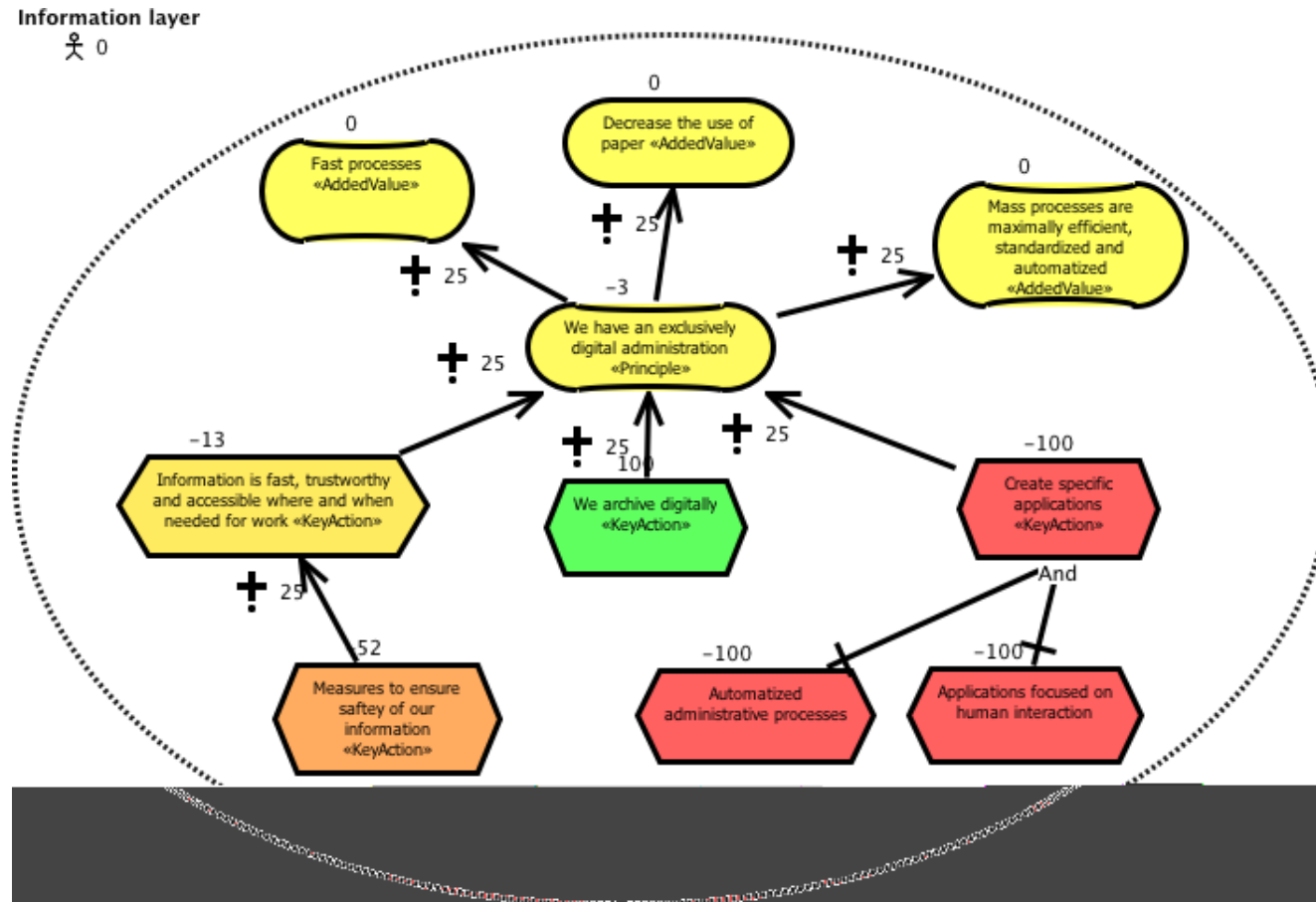
Create new variable



EA Principle without Any Evaluation



Update Only Elements that can be Traced in UCM Scenarios!



Conclusion and Future Work

- We propose an evaluation tool, contrary to the static representation of models.
- Evaluation of impact is purely based on experience and intuition
 - A larger discussion (and possible a full research project) is needed to investigate and define coherent metrics
 - Tool-support can enable analysis and provide meaningful result to practitioners
- The complexity of models has to be evaluated keeping in mind the added value of the new models.



Thank You!

We would be honored to answer all your questions and provide additional clarifications and references.

Please email us 😊



References to our previous work

- ❑ Diana Marosin, Sepideh Ghanavati: Measuring and managing the design restriction of enterprise architecture (EA) principles on EA models. Proceedings of Eighth IEEE International Workshop on Requirements Engineering and Law (RELAW) 2015, Ottawa, ON, Canada.
- ❑ Diana Marosin, Marc van Zee, Sepideh Ghanavati: Formalizing and Modeling Enterprise Architecture (EA) Principles with Goal-Oriented Requirements Language (GRL). Proceedings of the 28th International Conference on Advanced Information System Engineering (CAiSE) 2016, Ljubljana, Slovenia.
- ❑ Models and case study documents:
<https://github.com/RationalArchitecture/eGovernment>

