# Enterprise Systems Architectures

Erik Proper, iSee, TSS, ITIS

Essentials

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY
LIST

# Agenda

Systems engineering & architecting

Enterprise architecture

Research challenges

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Systems engineering & architecting

Enterprise architecture

Research challenges

# Systems …









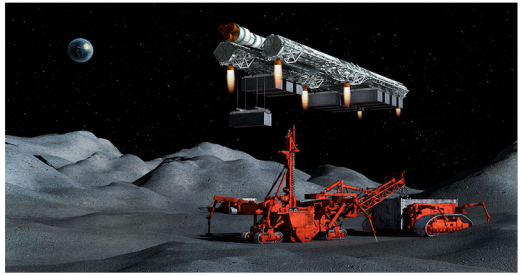
# Systems …

Complex webs of actors and resources, with a need to function as a whole

# Increasingly data intensive …









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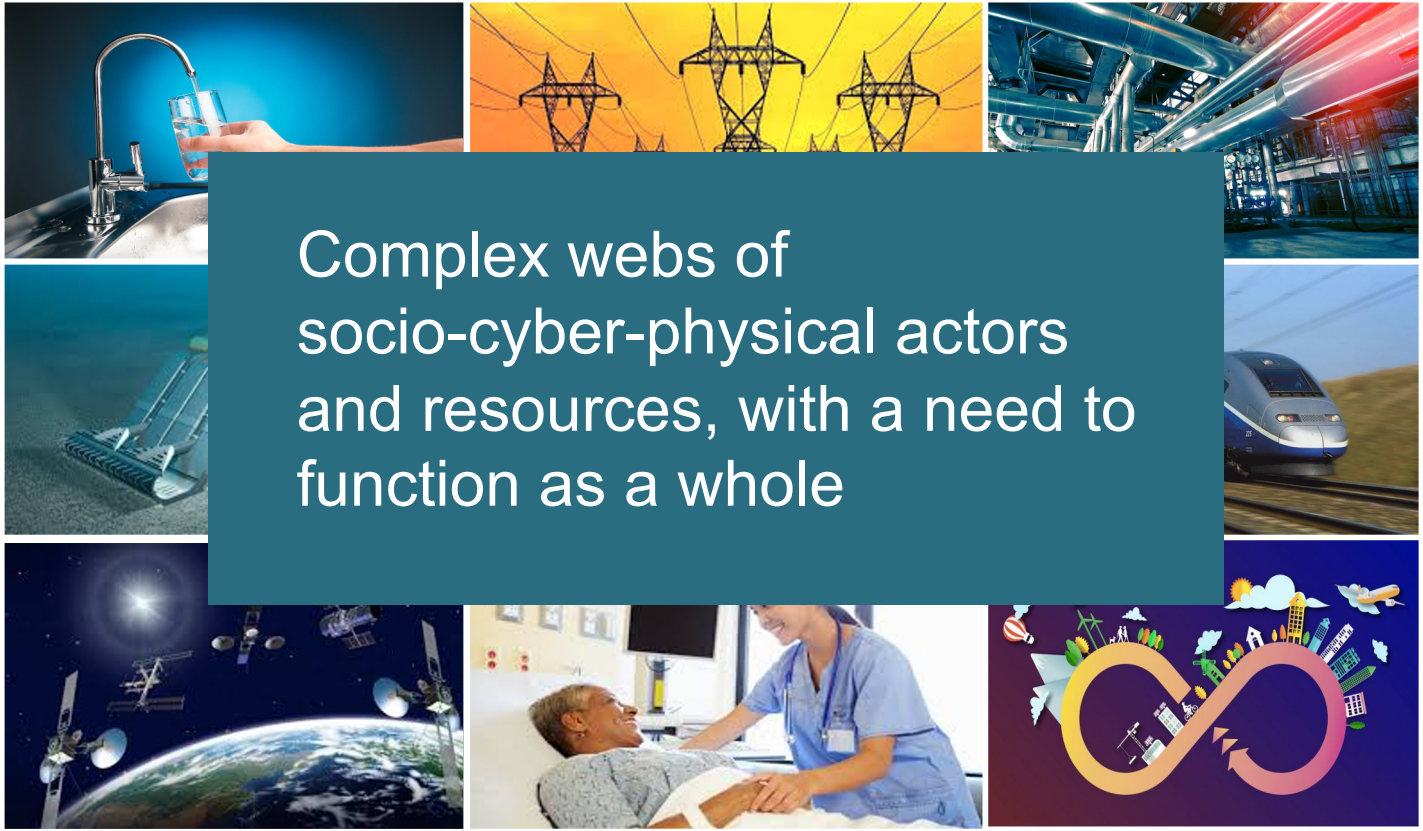

Complex webs of socio-cyber-physical actors and resources, with a need to function as a whole

# Challenges …


Security
Compliance
Anti-fragility
Resillience
Privacy
Complex webs of socio-cyber-physical actors and resources, with a need to function as a whole
. . . . .
Performance
Sustainability
Risks

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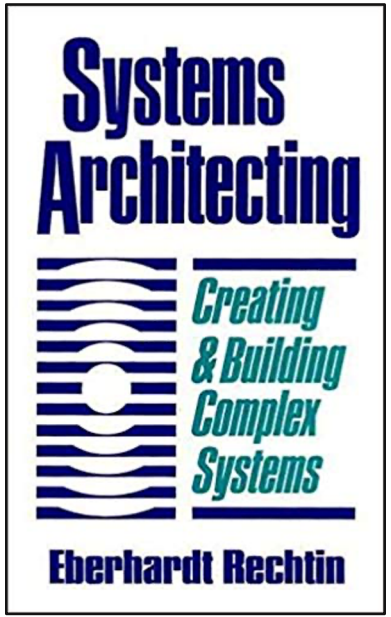
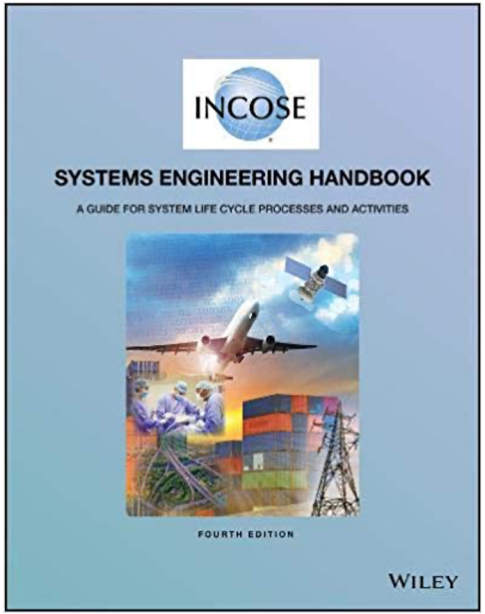
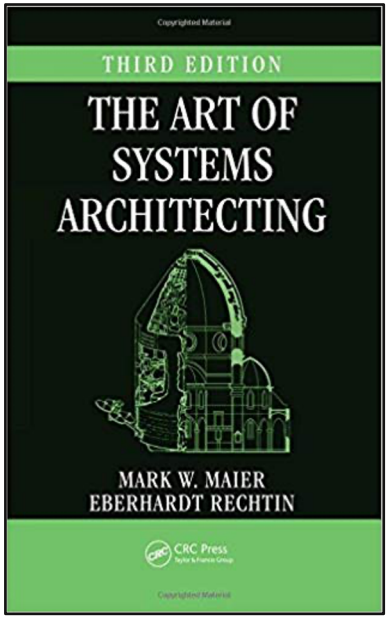
Coherence

# Systems engineering & architecting



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*System architecture*:
Those properties of a system that are necessary and sufficient to meet its essential requirements

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Security

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Performance

Robustness

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Sustainability

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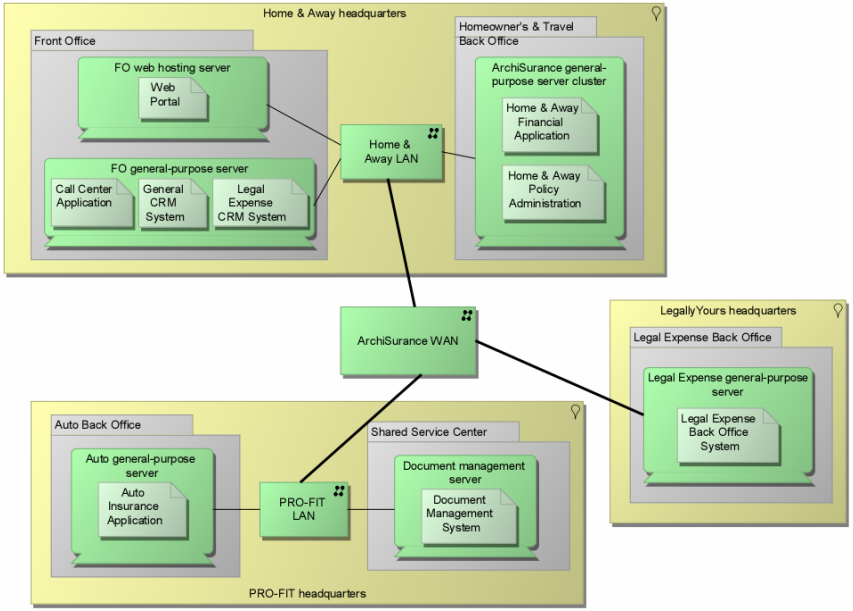
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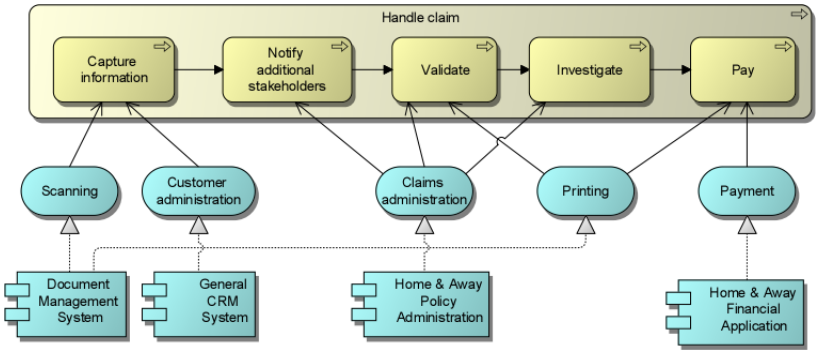
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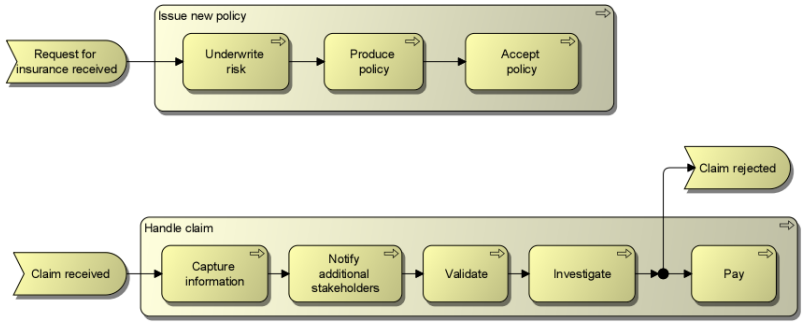
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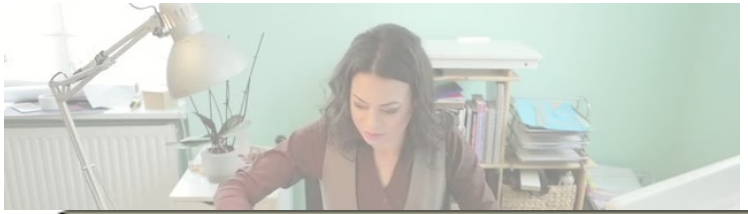

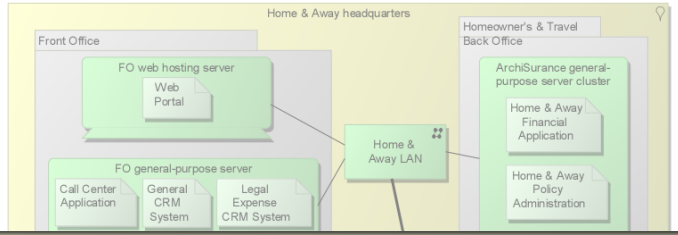
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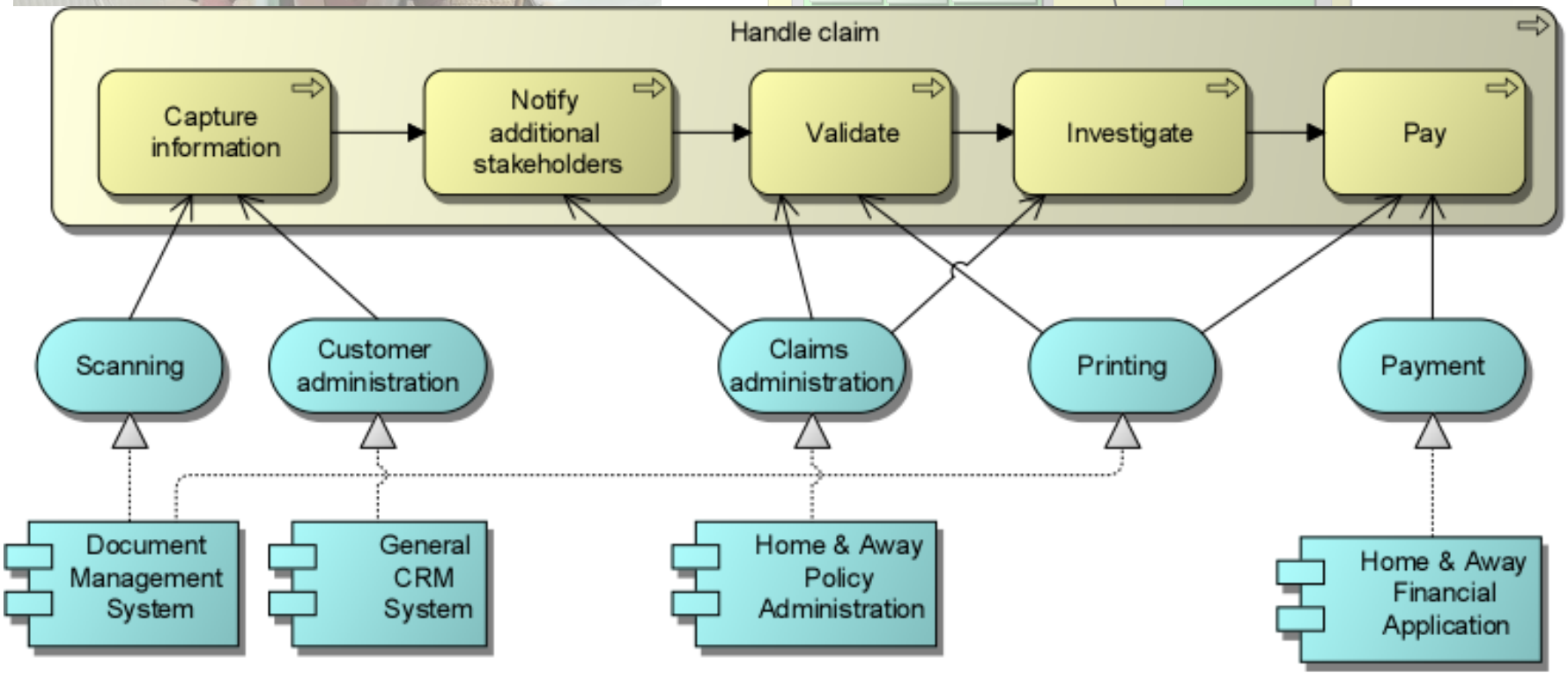
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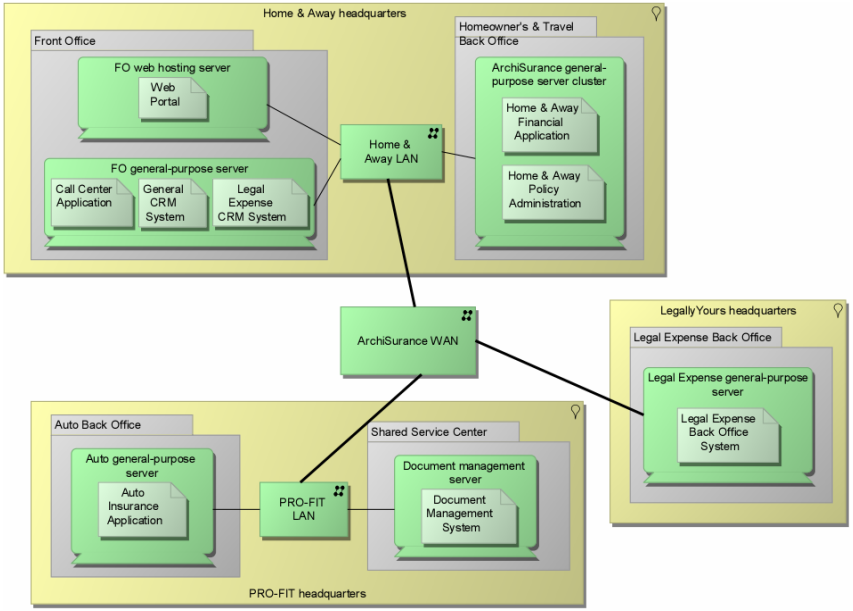
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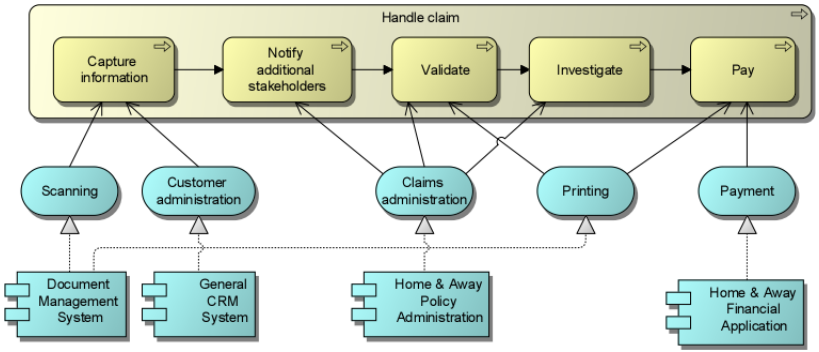
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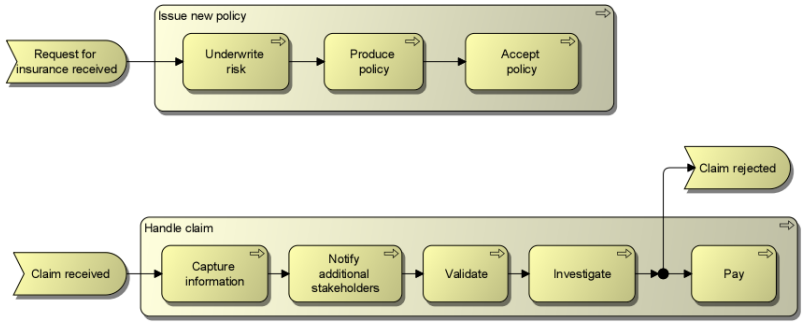
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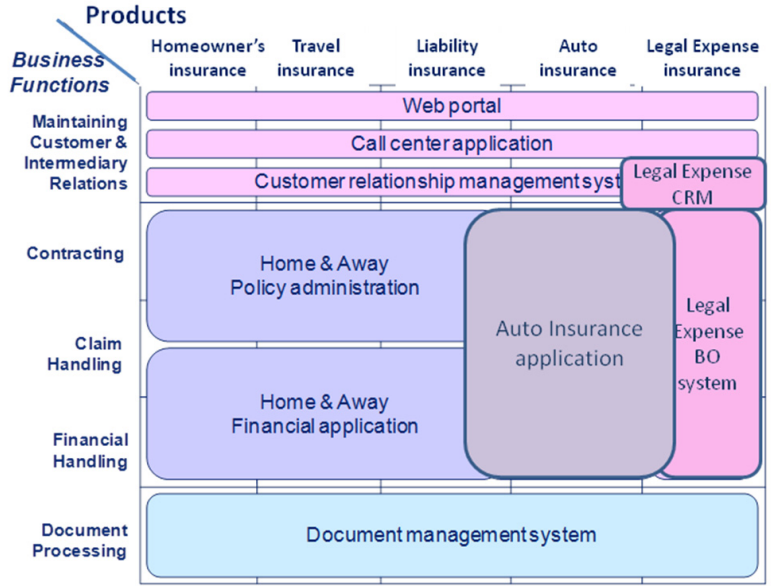
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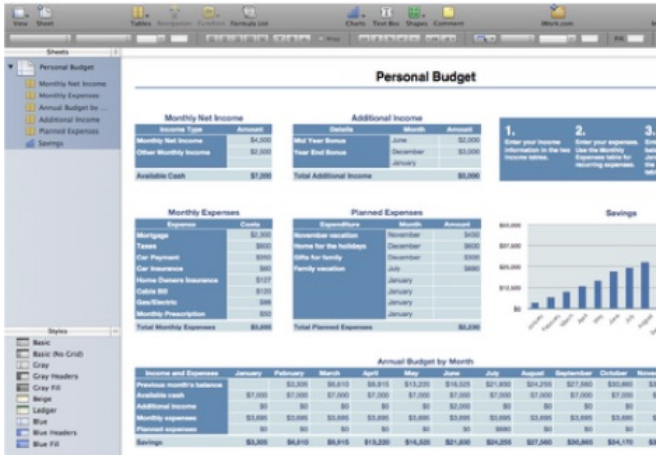
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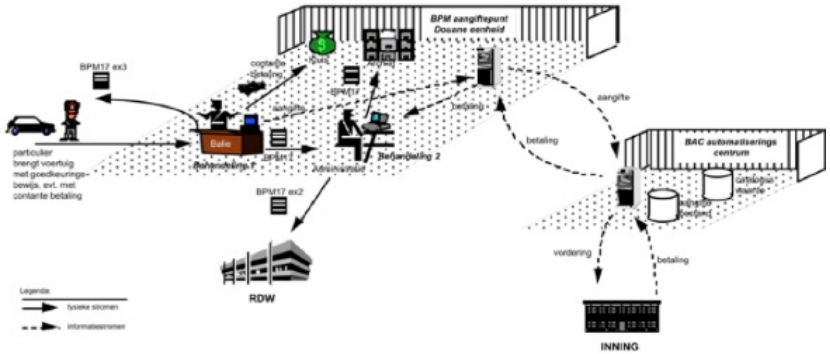
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BPM17 ex3
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Balie
Behandeling 1
Behandeling 2
aangifte
betaling
BAC automatiserings centrum
BPM17 ex2
RDW
vordering
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INNING
Legenda
fysieke stromen
informatiestromen

## A.16 Data is captured once

**Type of information:** data, application

**Quality attributes:** usability, efficiency

**Rationale:**

- It is inefficient and user-unfriendly to ask for the same data twice or more.

**Implications:**

- Before acquiring data it is first determined whether the data is already available.
- Data that is already available is pre-filled in forms.
- Applications expose shared data for reuse by other applications.

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- IT contributes significantly to to the polution of the Earth due to energy consumption and the generation of waste.
- There is a general awareness that measures need to be taken to protect our natural resources and prevent global warming as much as we can.

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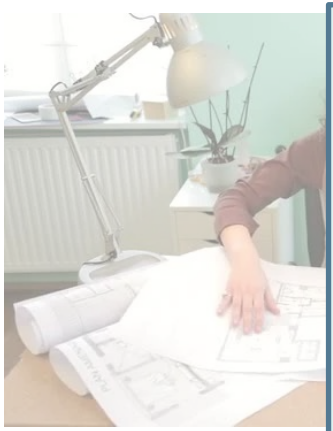
- Energy consumption and the usage of environment-friendly materials are criteria in the acquisition of new IT systems.
- Energy consumption is explicitly taken into account in the design of IT environments such as data centers.



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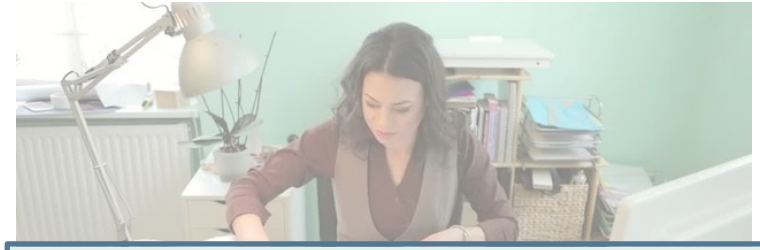

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# Supporting systems architecting & engineering

Need for *system design* technologies

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Need for *system design* technologies

ENCYCLOPÆDIA BRITANNICA

## Technology

Technology, the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment. The subject of technology is treated in a number of articles. For general treatment, see technology, history of; hand...

# Supporting systems architecting & engineering

Need for *system design* technologies

- Process frameworks — *How to do it?*
- Engagement frameworks — *Who / how to involve?*
- Design frameworks — *What to consider?*
- Modelling frameworks — *How to capture it?*
- Reference models — *What is wise / proven?*

# Supporting systems architecting & engineering

Need for *system design* technologies

- Process frameworks
- Engagement frameworks
- Design frameworks
- Modelling frameworks
- Reference models

Opportunities for IT support

# Agenda

Systems engineering & architecting

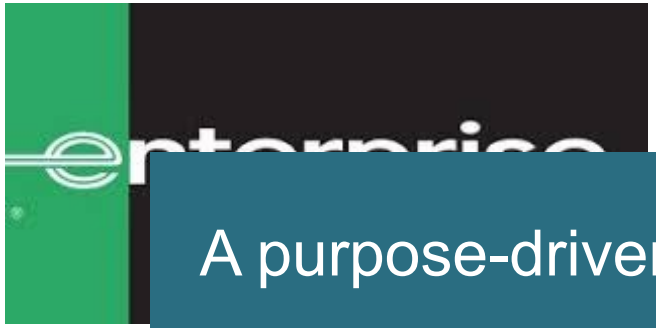
Enterprise architecture

Research challenges

# Enterprises

enterprise
rent-a-car

# Enterprises




A purpose-driven system

The purpose being its enterprise

**Enterprises**

Companies

Agencies

Universities

Hospitals

Factories

A purpose-driven system

The purpose being its enterprise

**Systems** …

Digital platforms

Supply chains

Mobility networks

Smart cities

# The increasing role of IT in enterprises

ING

'We want to be a tech company with a banking license' – Ralph Hamers

*ocessing*

*siness enabler*

to being an

*integral part of the business model*

# Emergence of enterprise architecture

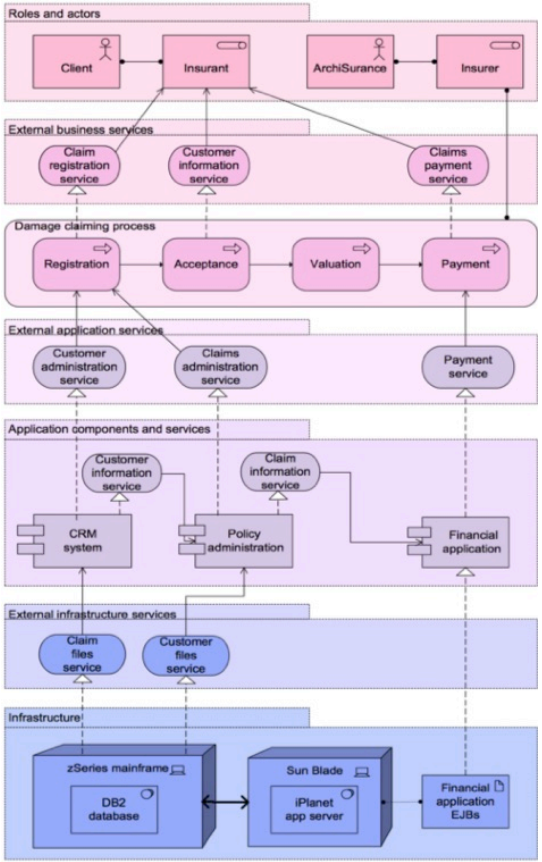
Business

Information

IT Applications

IT Infrastructure

Business-to-IT stack



# Body of research

Luxembourg National Research Fund

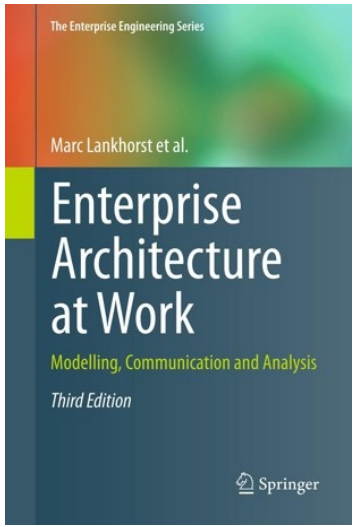
Radboud Universiteit

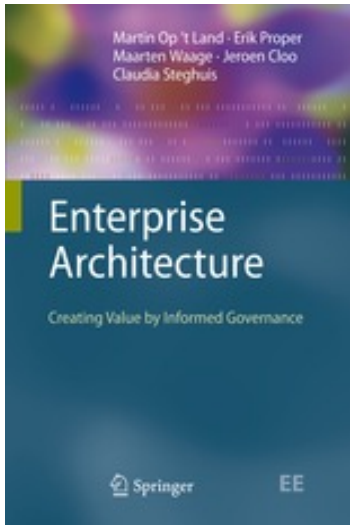
Telematica Instituut

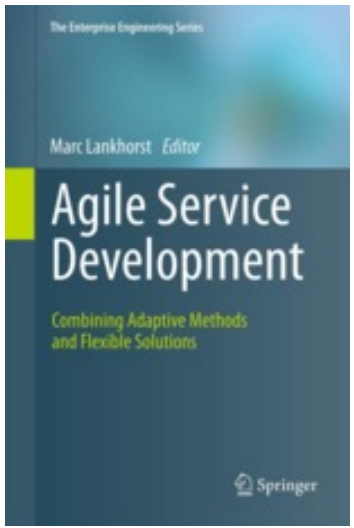
University of St.Gallen

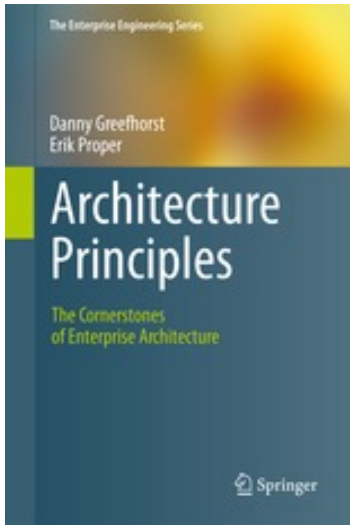
LIST

uni.lu





ORDINA

Capgemini

Naf

THE Open GROUP

# EA design technologies

| | |
|---|---|
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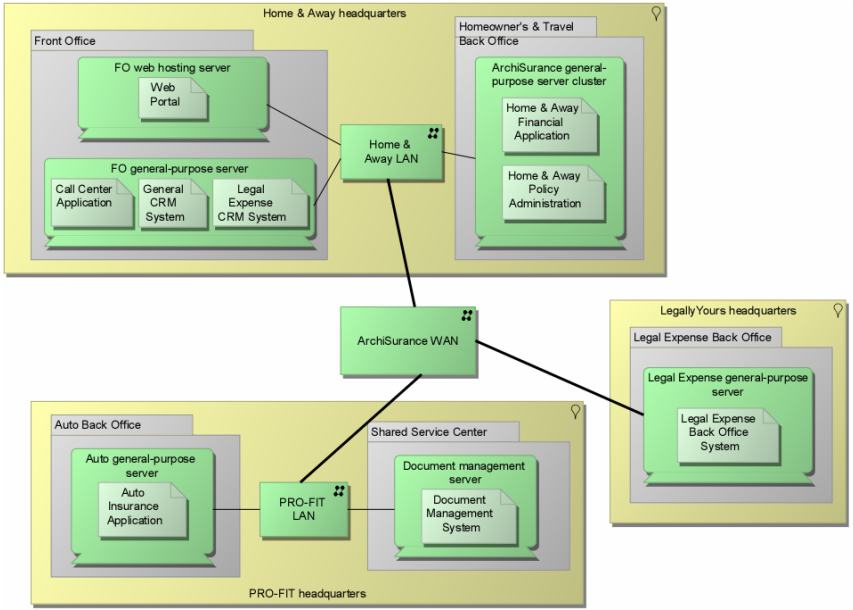
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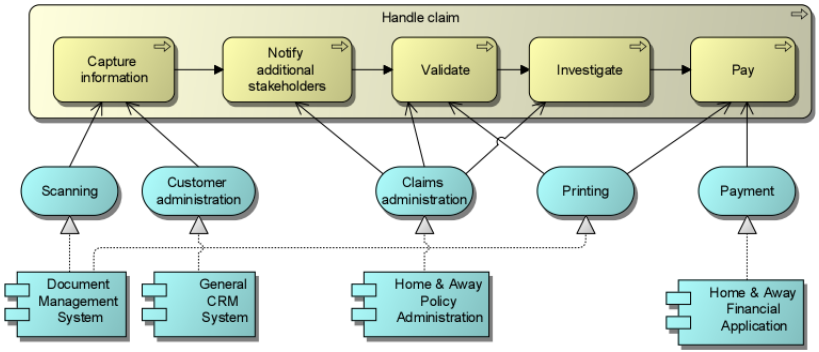
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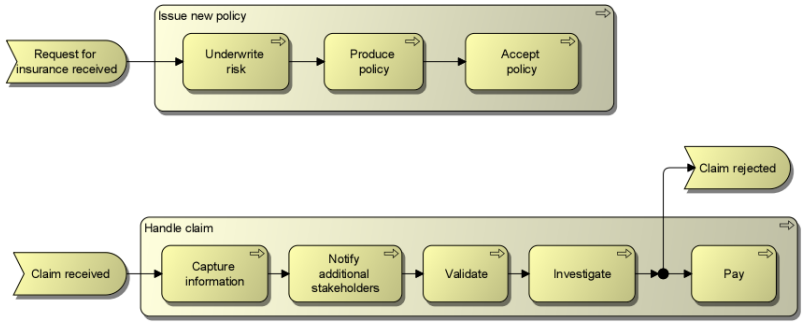
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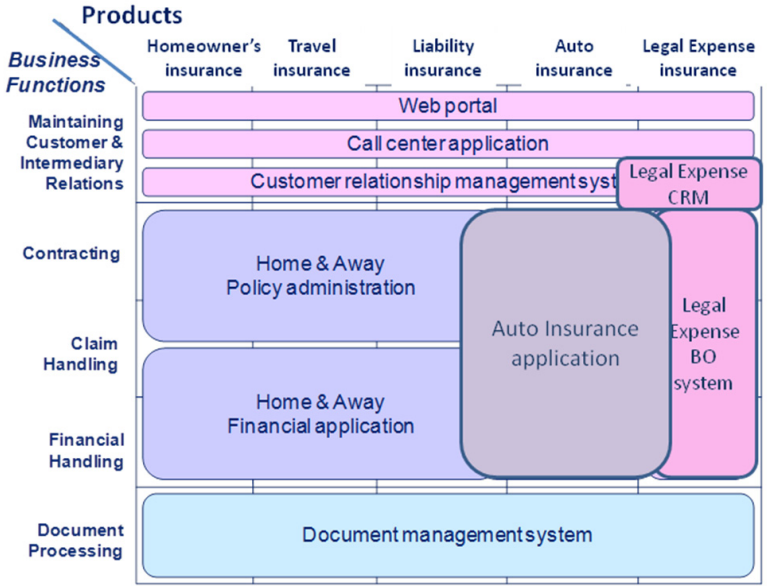
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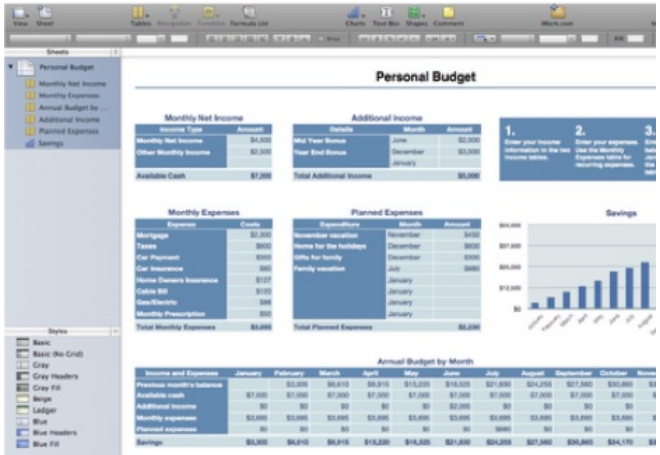
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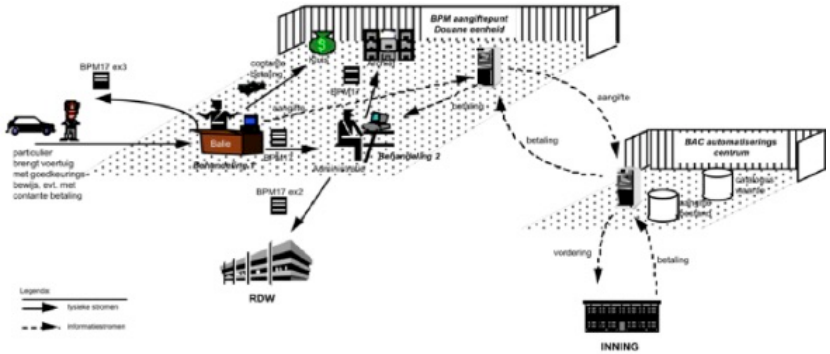
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# Research challenges

Overall interest (DKE 4 SE):

- IT-powered model-driven design technologies to support enterprise / systems architecting and engineering

More specifically …

1. Infrastructures for systems modelling
2. Concern / domain-specific extensions / refinements

# Infrastructures for systems modelling

IT-powered:

- Model management
- Model mining & validation
- Human-model interaction & boundary models
- Modelling language management

# Concern / domain specificity

1. Regulation management
2. Process management
3. Circular economy
4. Cyber-risk management
5. Data as a key resource
6. …

Coherence!

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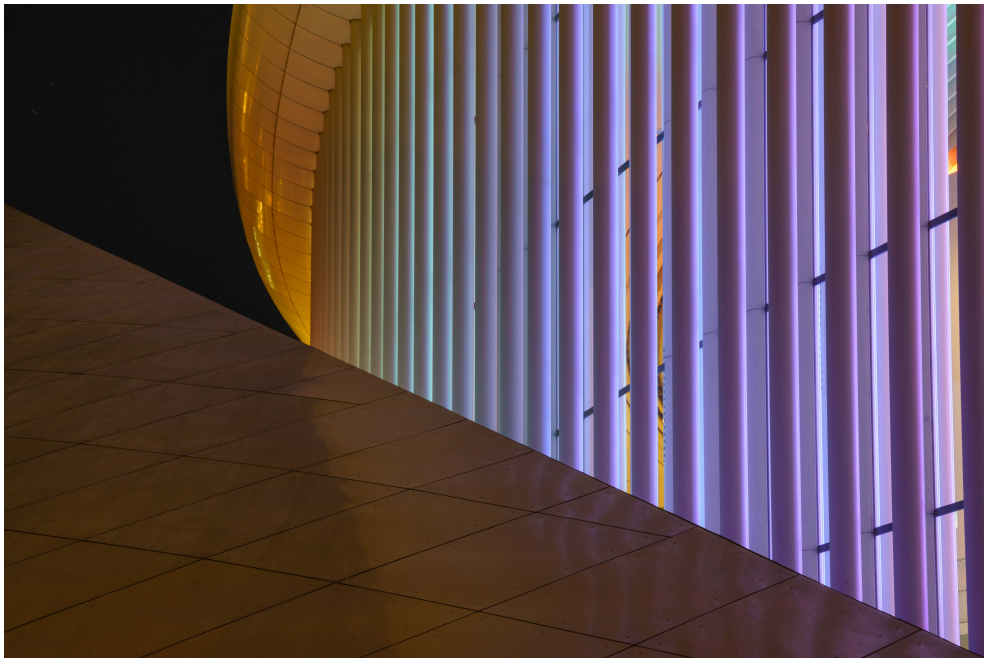
Enterprise architecture

Research challenges

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