26th annual INCOSE international symposium
Edinburgh, UK
July 18 - 21, 2016

Enterprise Systems Engineering for Improving Cross-enterprise Effectiveness

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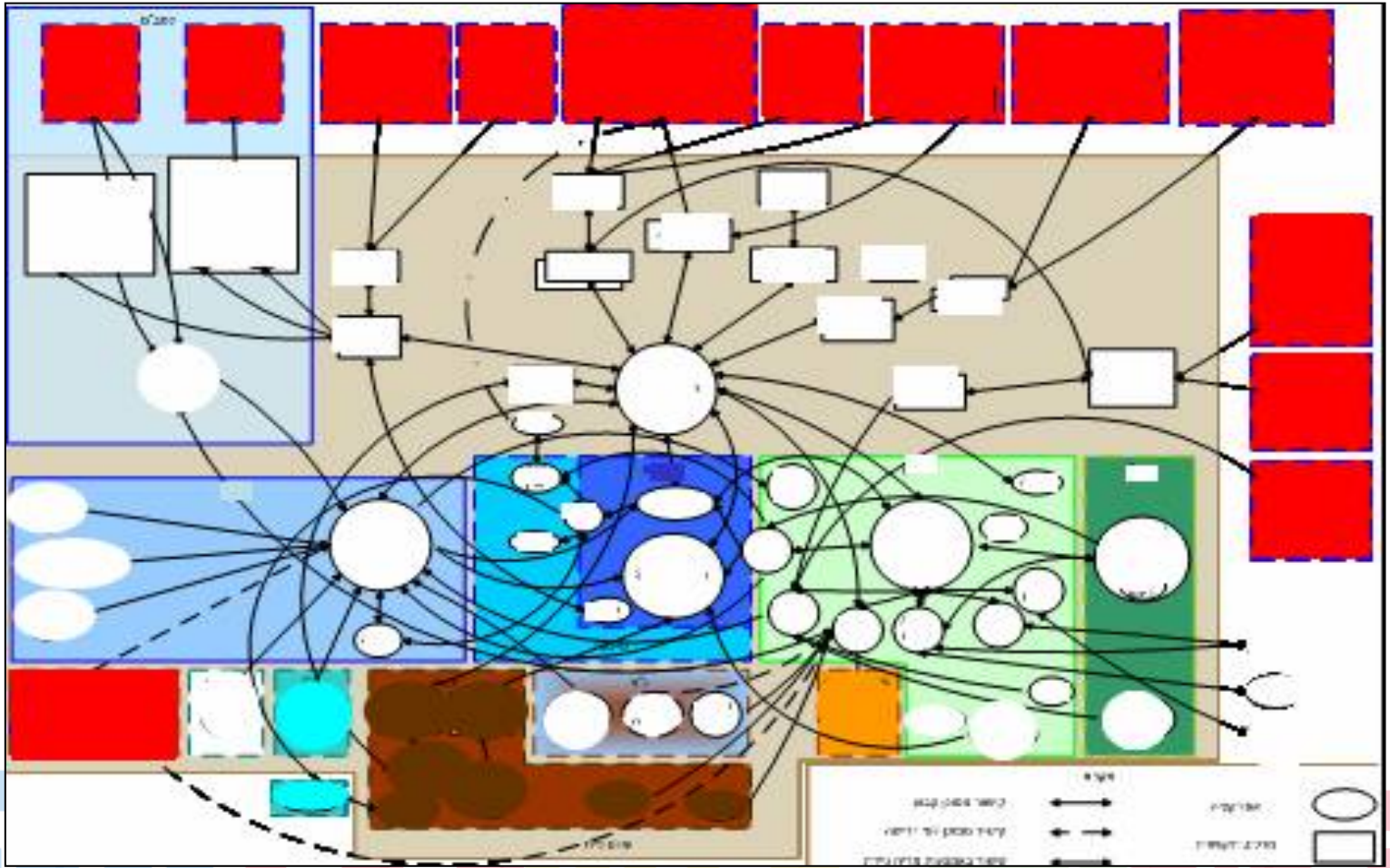
Realistic Architecture - Chaos



Outline

- Problem definition
- State of the art
- Enterprise System Engineering (ESE)
- EPIC model description
- Implementation
- Summary

Major Issues –

Effects of unmanaged enterprise architecture

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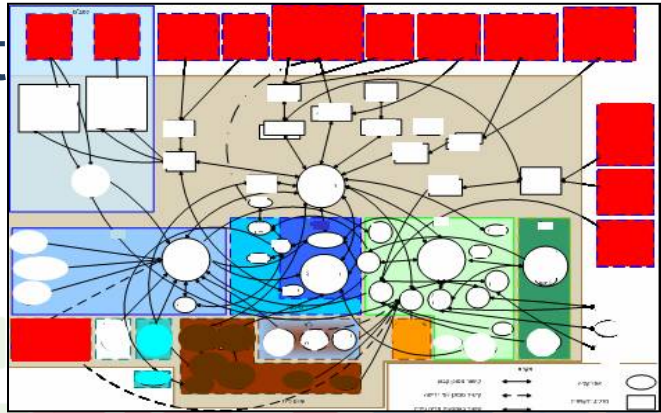
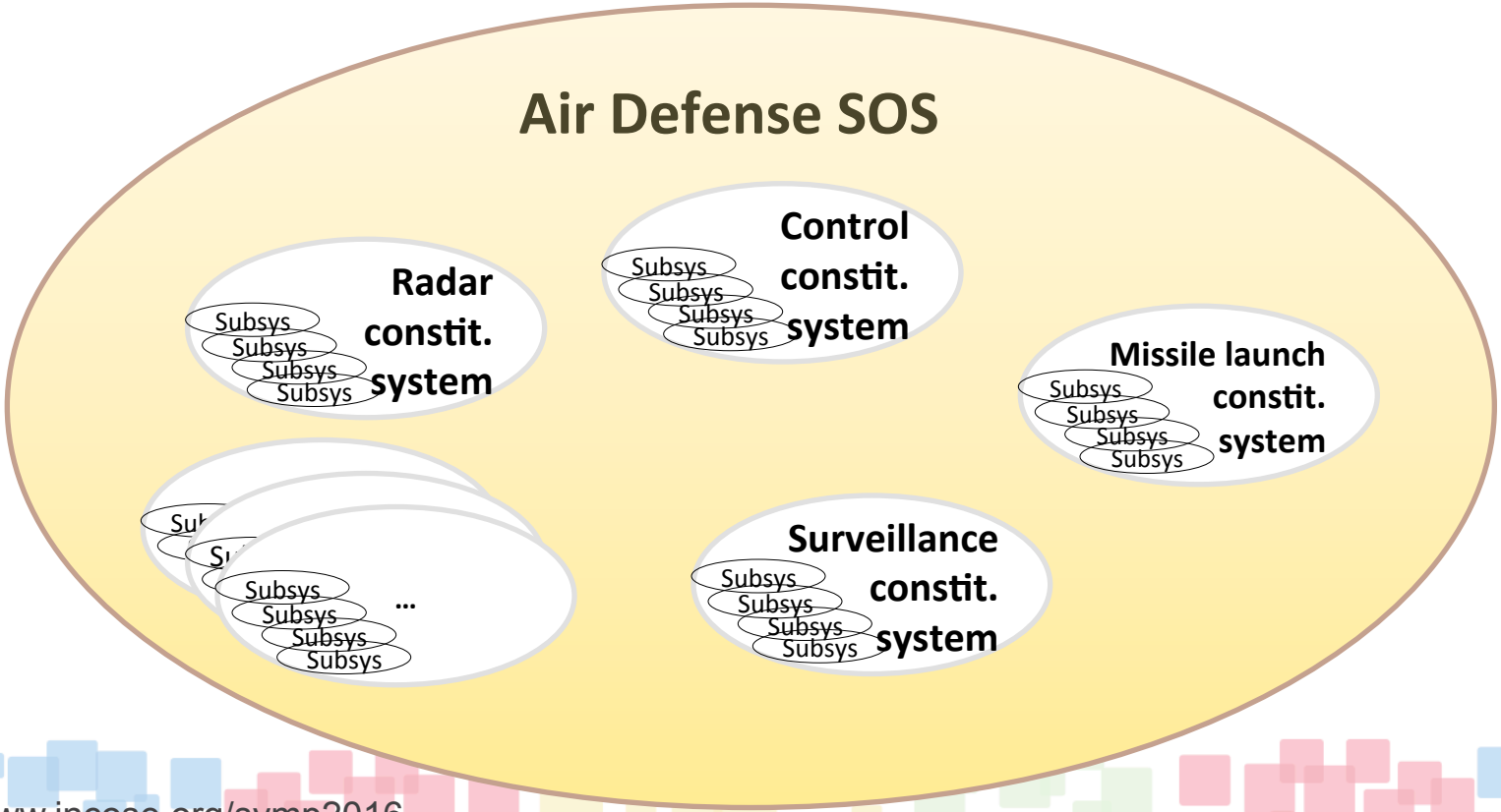
- Run time cross-wide systems failures
- Lack of information to support cross-enterprise decisions
- Overloading connectivity infrastructure
- Significant integration time & effort
- emergent behavior

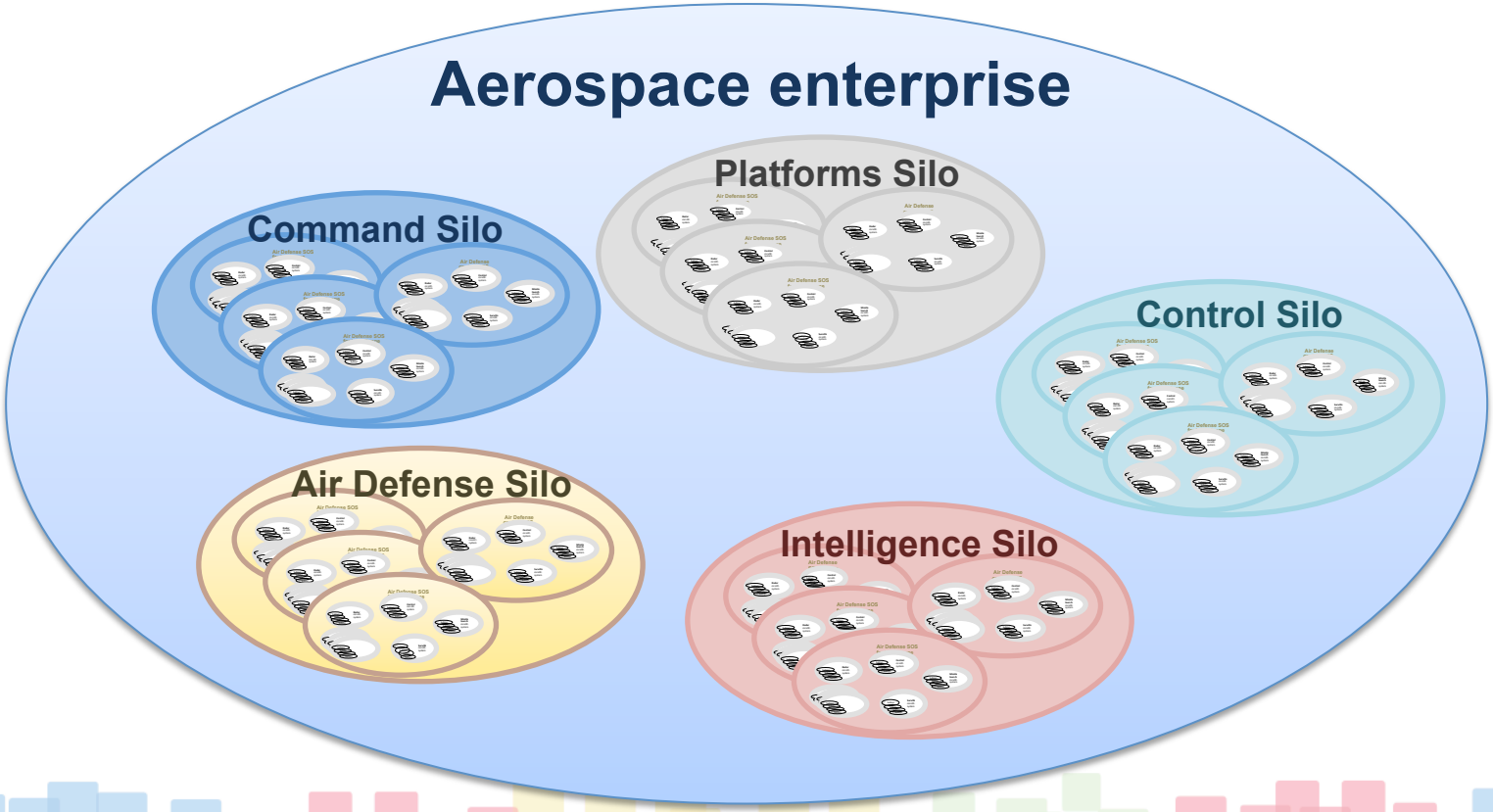


Example: SOS level



Example: Silo level

Example: Enterprise level



Major issues

- Run time cross-wide failures
- Lack of information
- Overloading infrastructure
- Significant integration time
- emergent behavior

Enterprise characteristics

- Arrays of systems
- Range of technologies
- Distributed development
- Numerous projects
- End users diversity

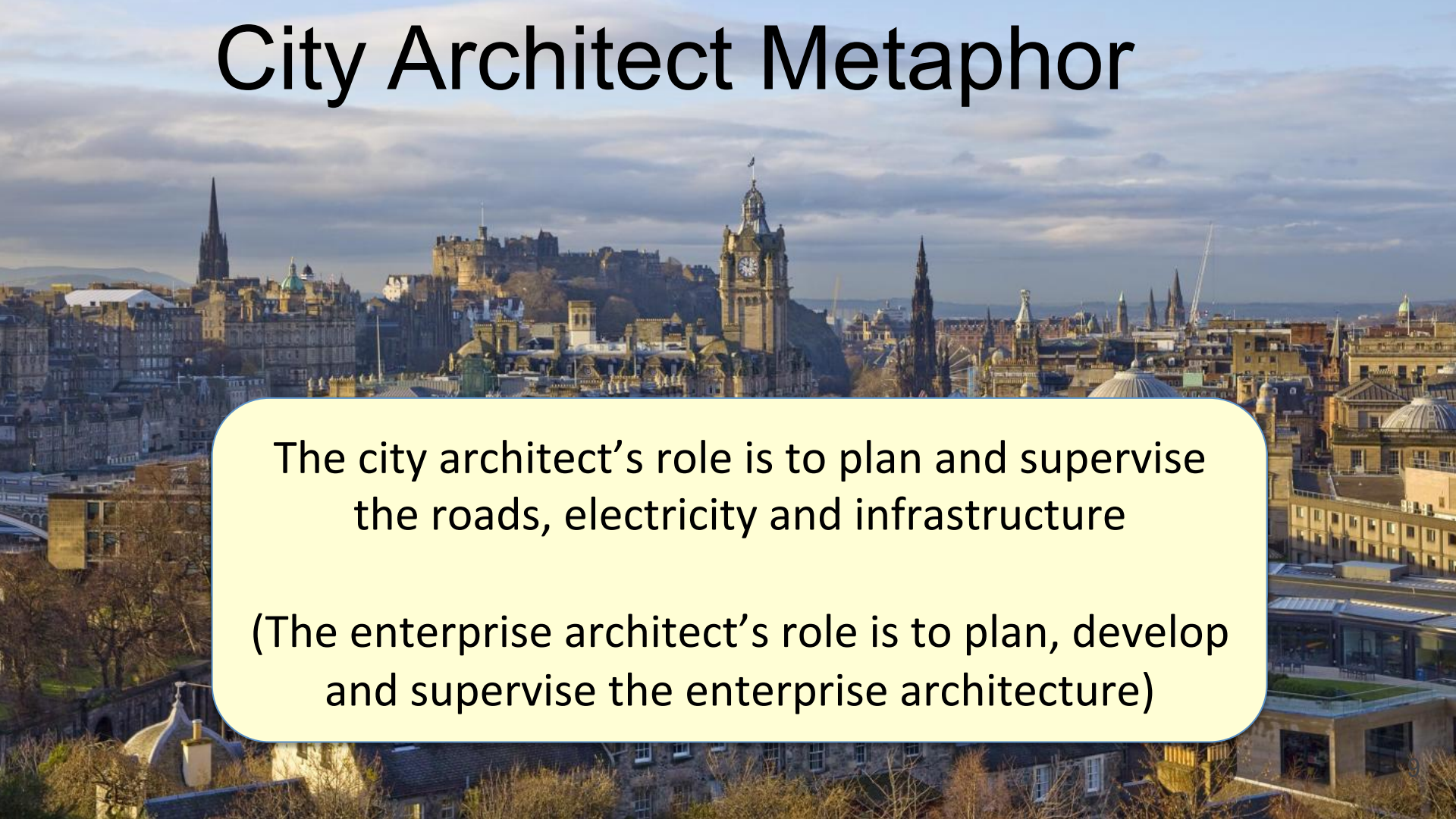
The root cause

Unsynchronized arrays of systems

The solution

- Enterprise system engineering
- Cross-enterprise operational processes perspective

City Architect Metaphor



The city architect's role is to plan and supervise the roads, electricity and infrastructure

(The enterprise architect's role is to plan, develop and supervise the enterprise architecture)

ESE state of the art (Gaps)

- Large effort
- No traceability between systems architecture and operational processes
- Lack of information flow representation in system architecture

- Major gap: No approach is tailored and driven from the enterprise's specific operational process

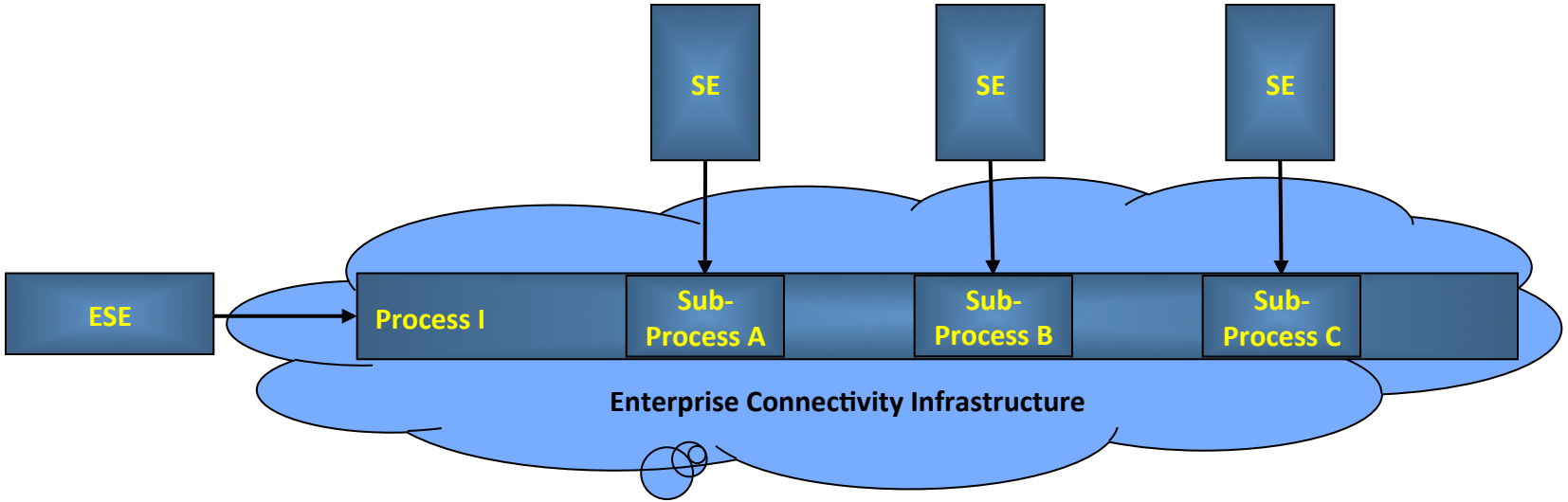
EPIC framework

Enterprise Processes Integrative Collaboration

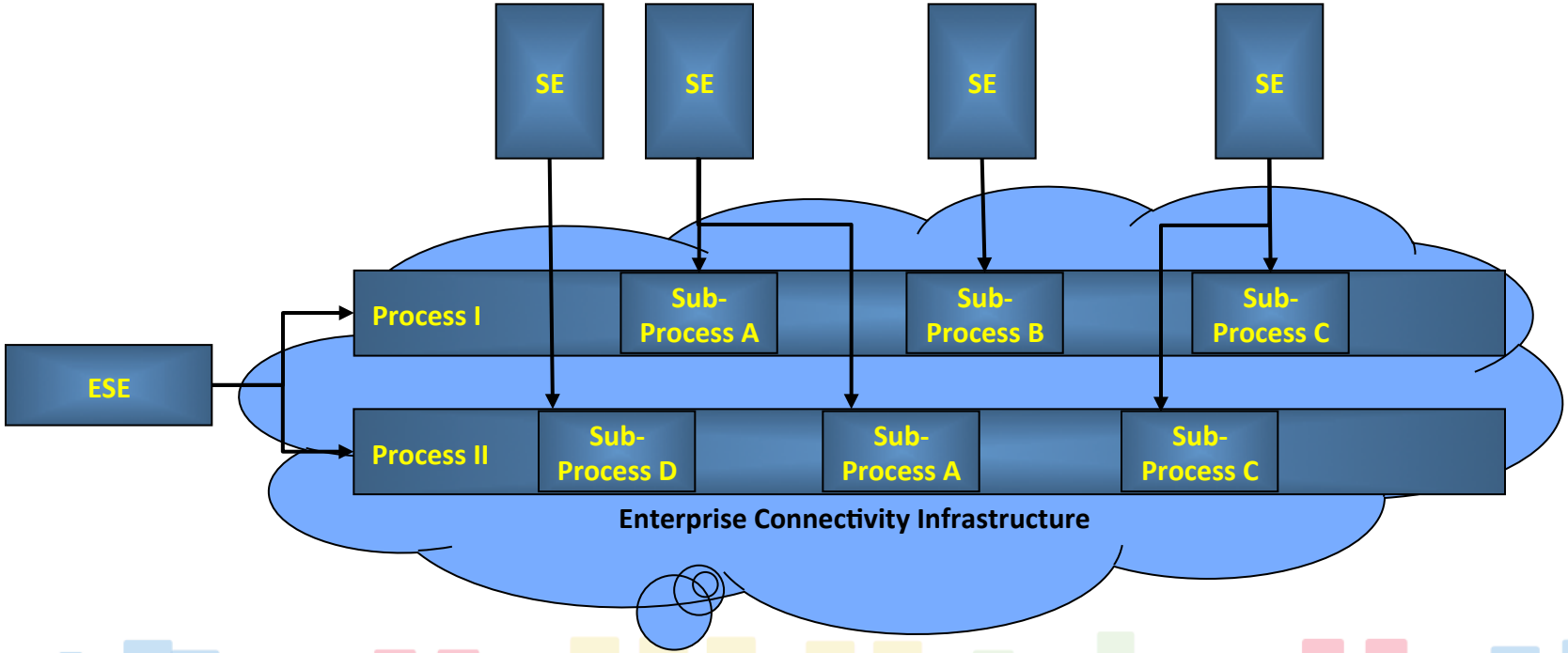
Model Objective

Defining an enterprise system engineering framework to improve operational processes for effectiveness and efficiency

ESE Framework for a single process



ESE Framework for two processes



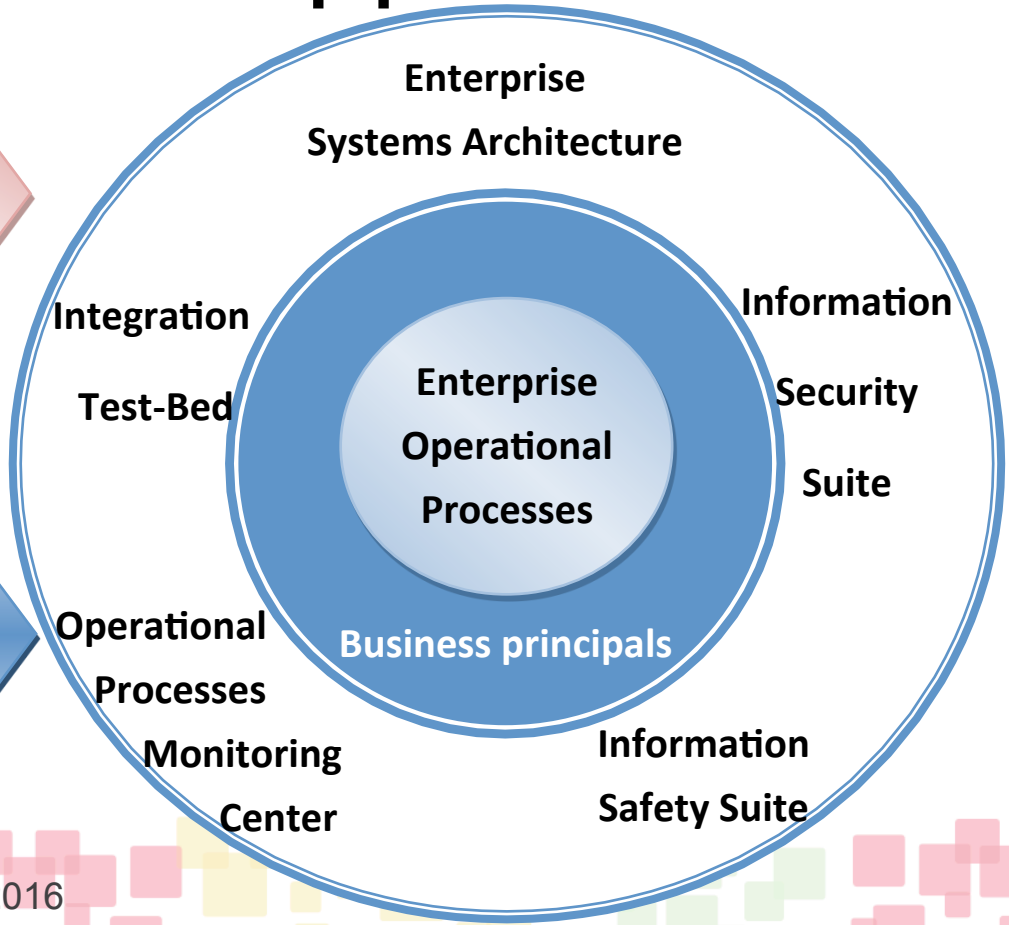
How to approach ESE ?

Constraints

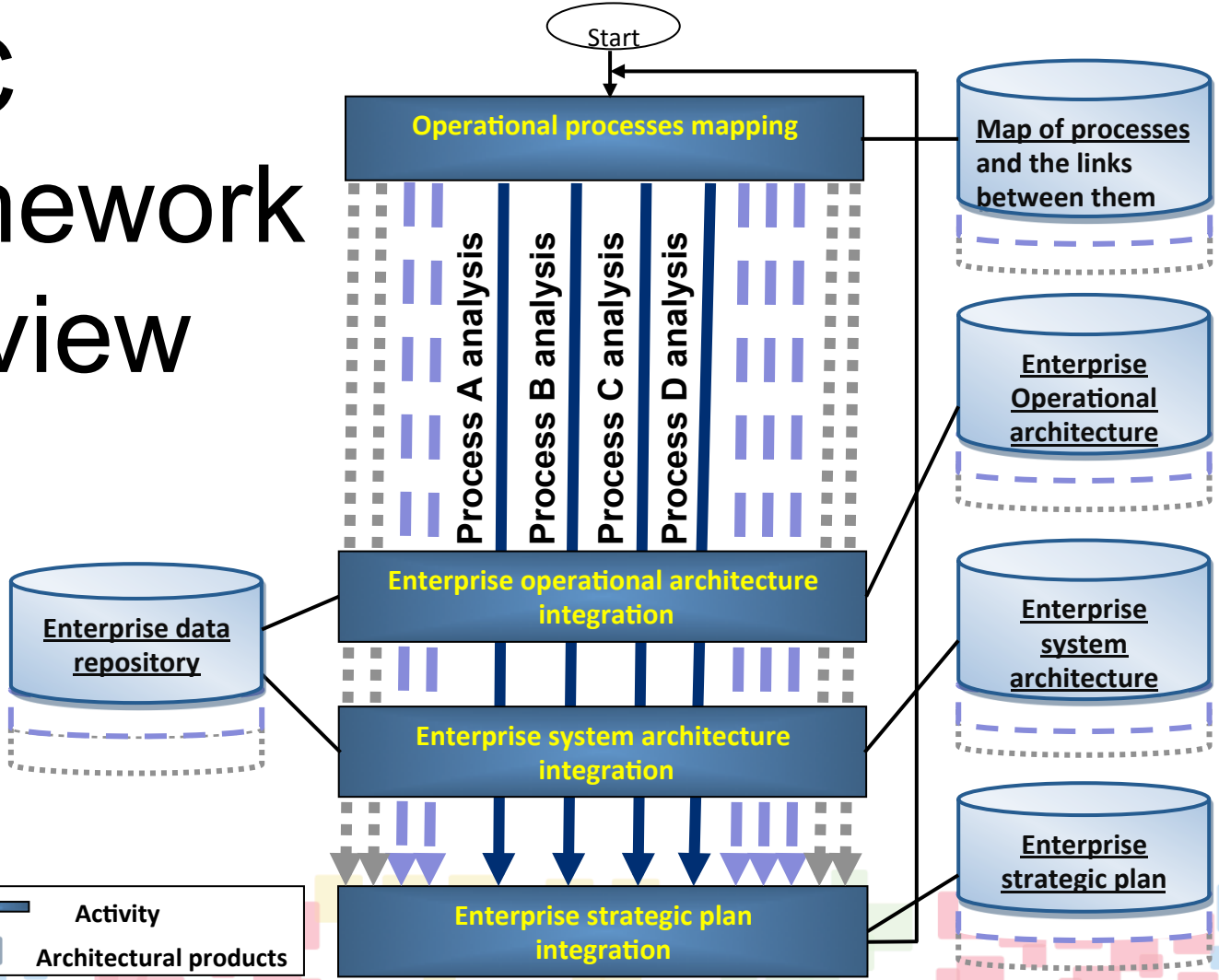
Unsynchronized
Arrays of systems,
Legacy systems

Opportunities

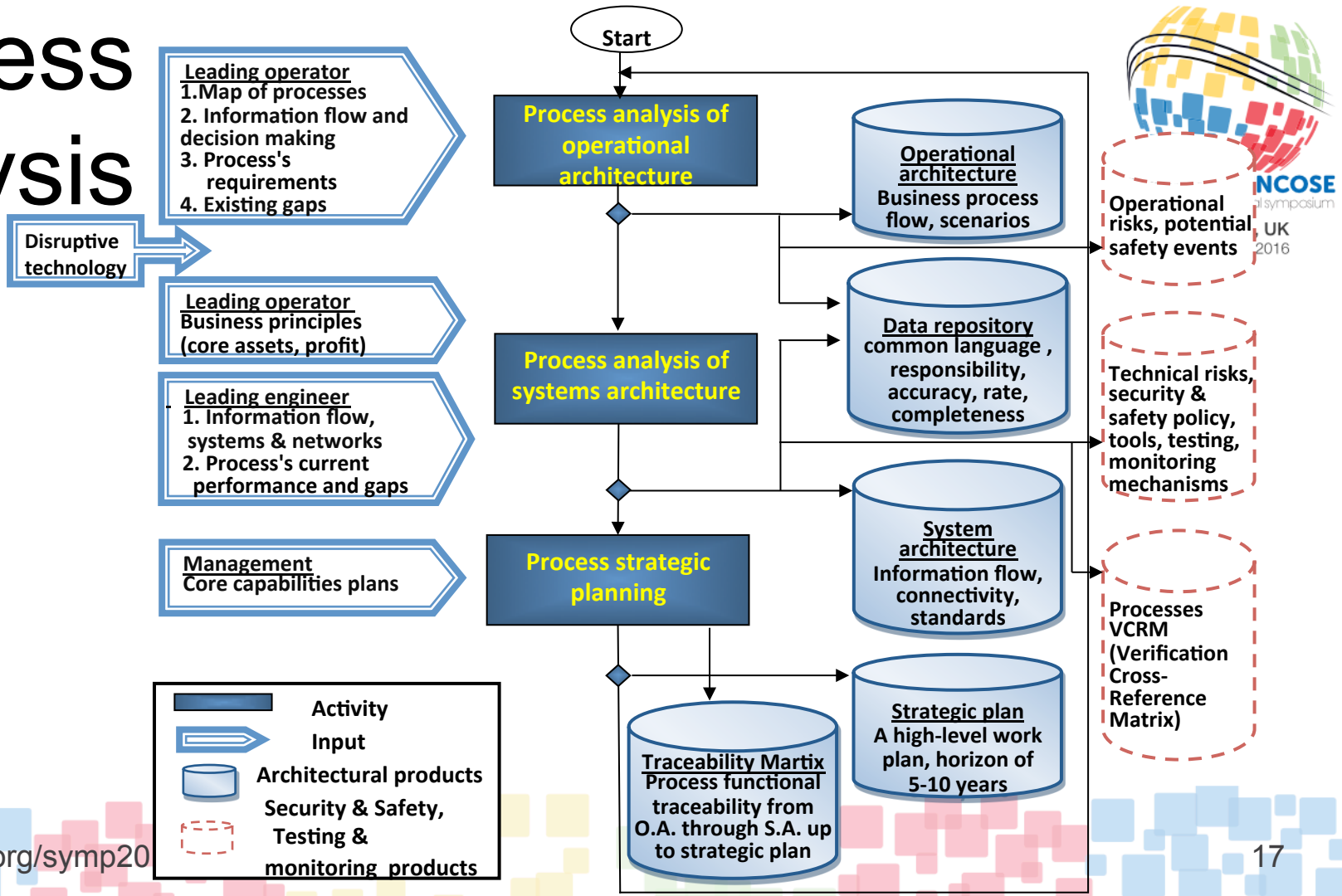
Information assets,
New technologies



EPIC Framework overview



Process analysis



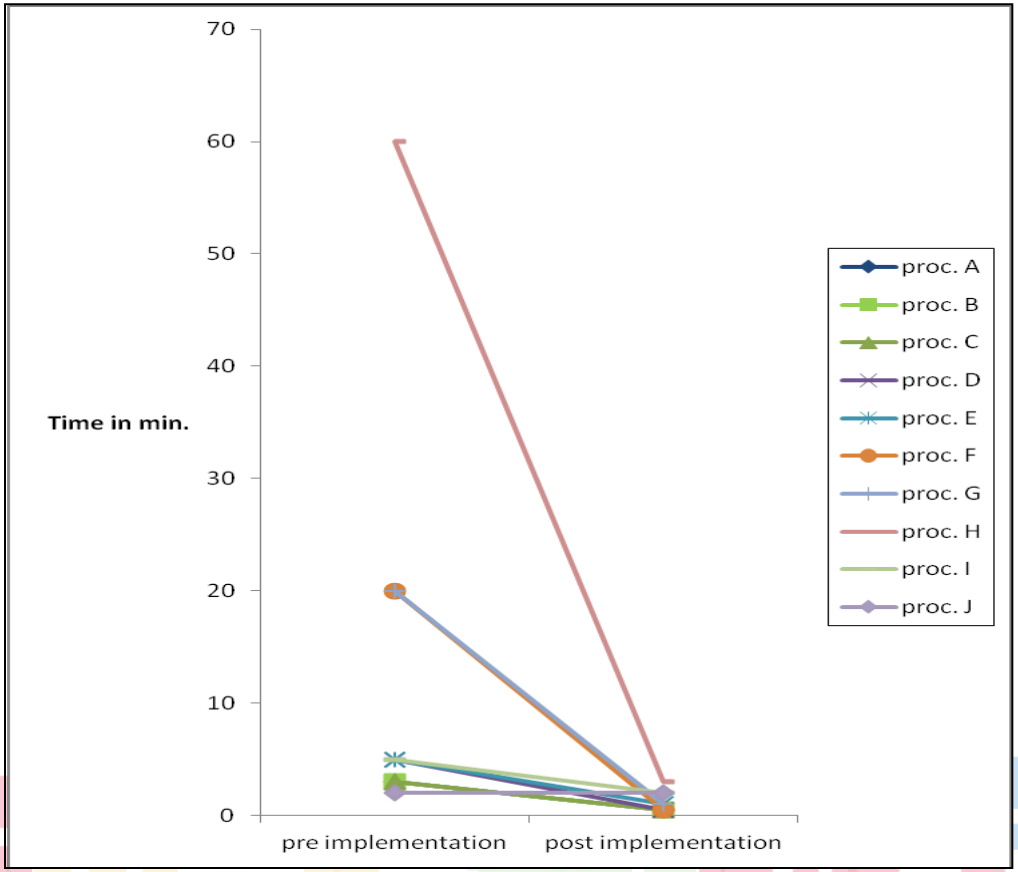
Major Contribution

Achieve enterprise goals effectively and efficiently by improving operational processes in a managed way

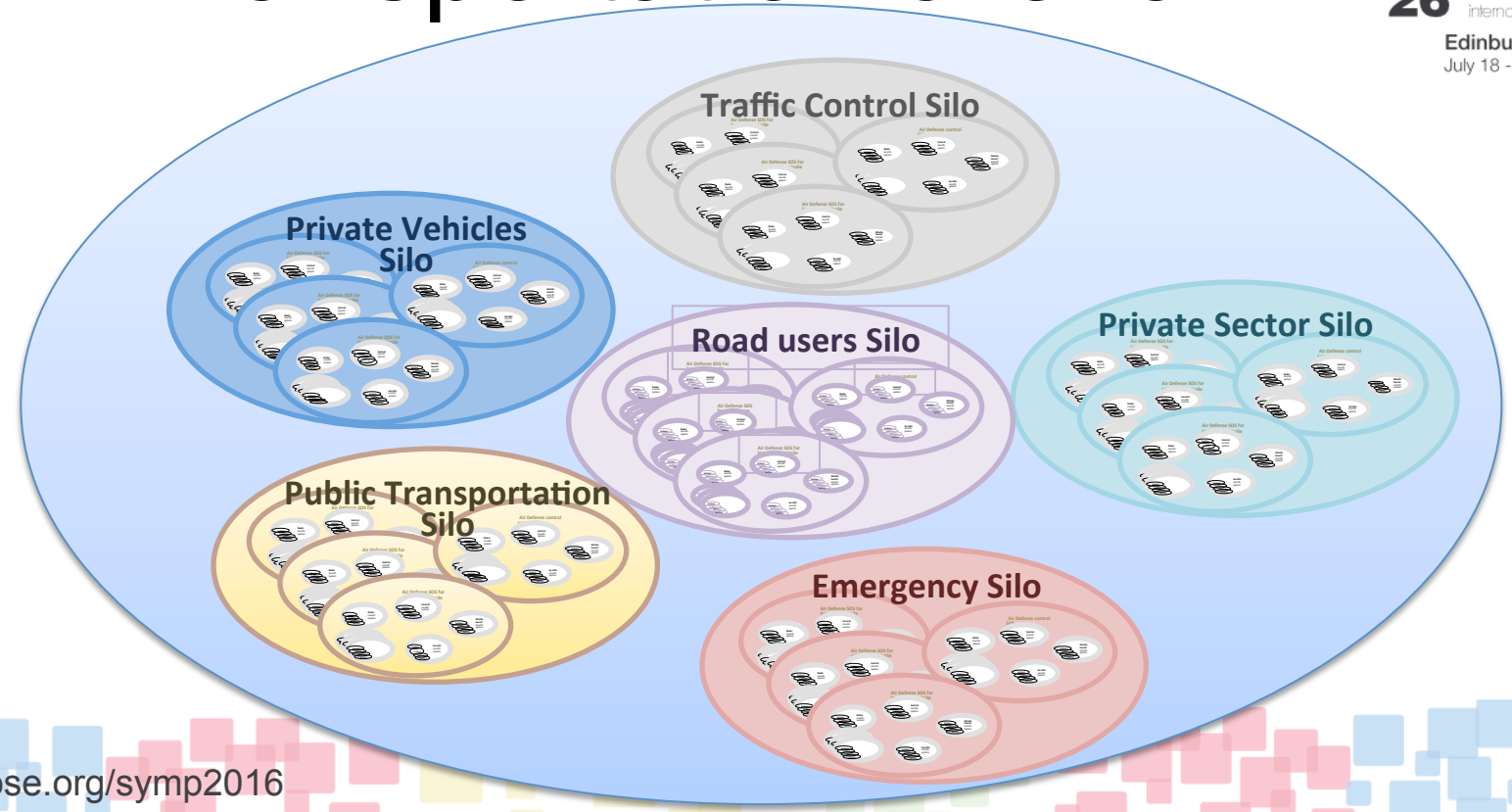
- Common language
- Accessible engineering data base
- Declaring operational vision
- Solving main conflicts within and between operational processes and systems
- Defining core principles & high level plan

First case study results (example)

processes time duration

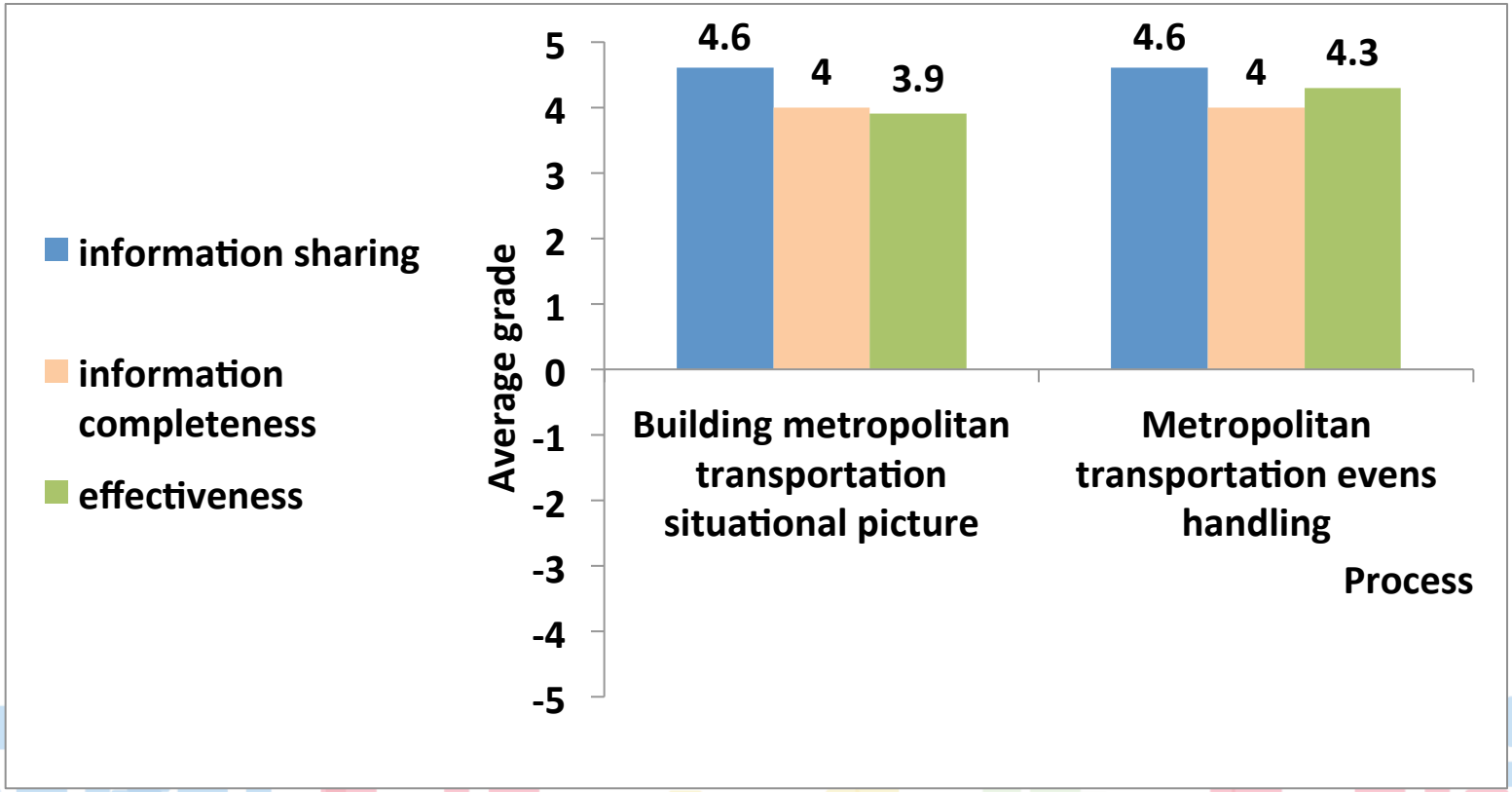


Second case study
Transportation arena



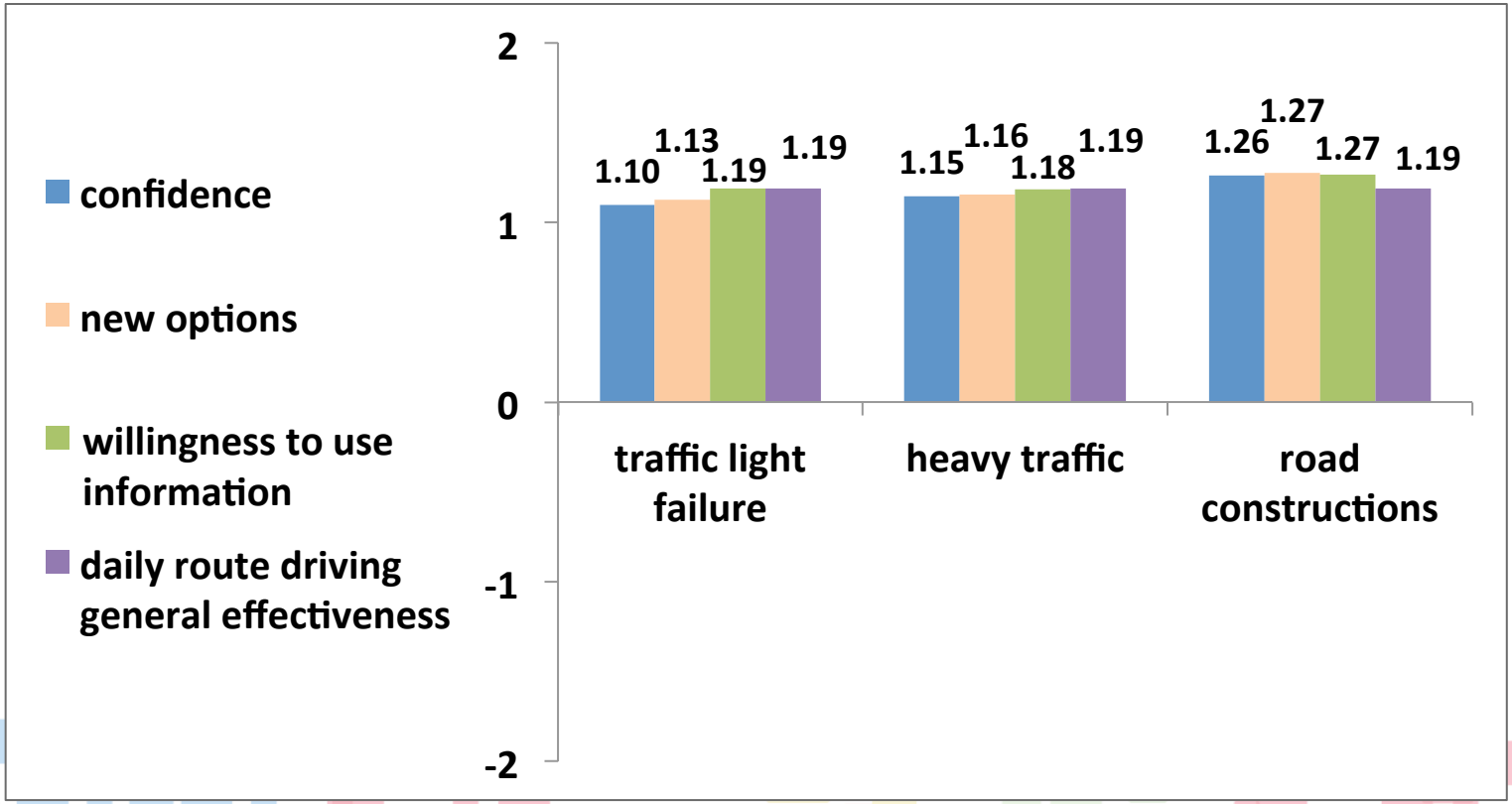
Second case study results

Operational users (example)



Second case study results

Road users (example)



Future Research

- Maturity model for ESE implementation by PSI analysis
- Enterprise cyber security
- Enterprise integration test to support cross-enterprise processes integration
- OPM (Objects-Process-Model) for ESE engineering

Summary

- Enterprise as a system of unsynchronized arrays of systems
- ESE for improving cross-enterprise processes effectiveness
- EPIC framework implementation
  - Improves cross-enterprises processes
  - Reduces enterprise cross-wide failures

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Thank you!