

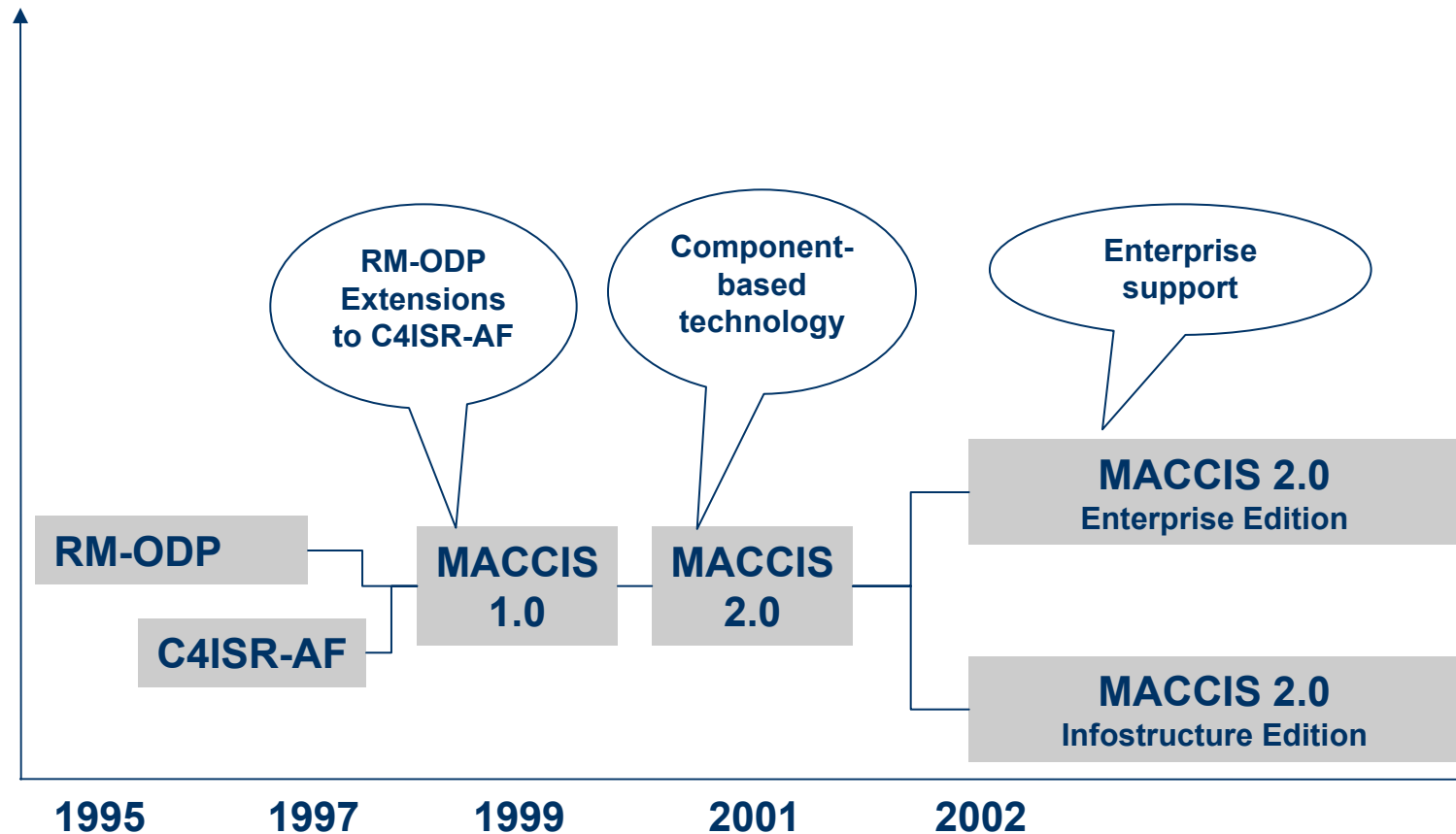
MACCIS 2.0 – An Architecture Description Framework for Technical Infostructures and their Enterprise Environment

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Problem area

- Defense increasingly changing
- Need flexible systems
- Assemblies from standard "components"
 - Must respond to requirements
 - Should capture relevant information
 - Should be standardised
- Common architectural description framework that prescribes component-based system models

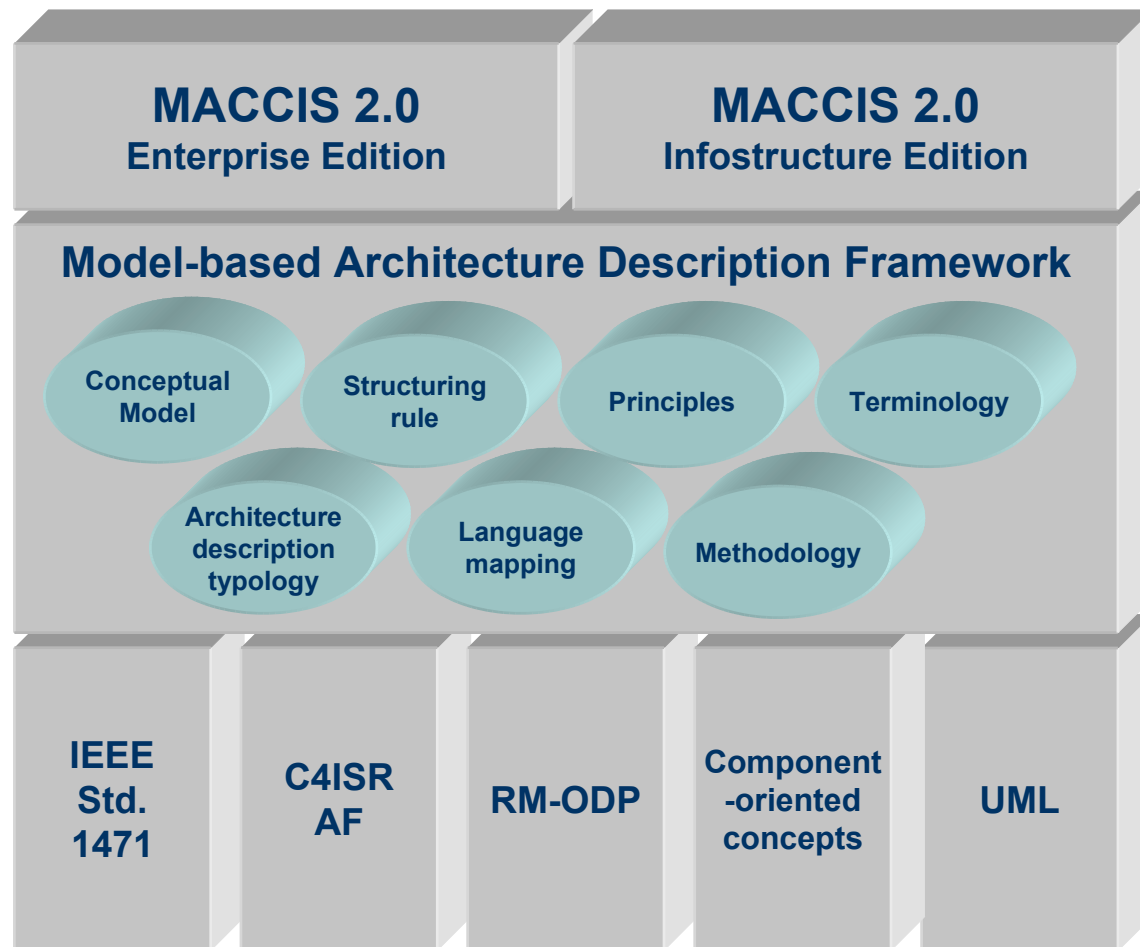
History



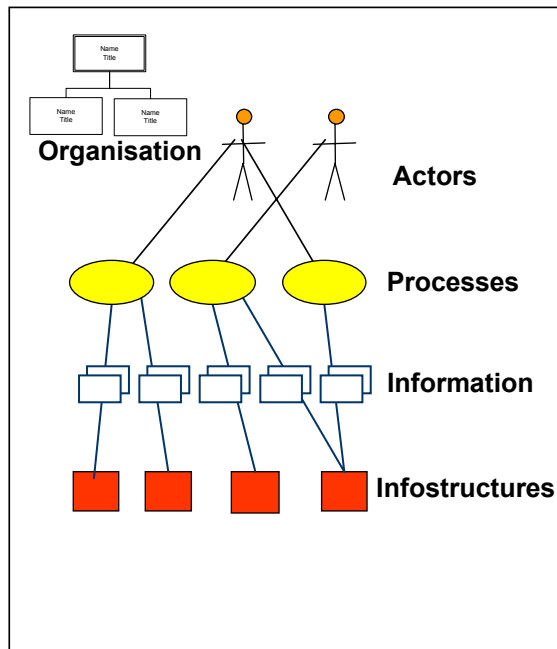
Objectives

- Create framework that allows users in different communities to create architecture descriptions using a common terminology and set of concepts.
 - The framework should provide means to describe the same as C4ISR AF (and later DoD AF [10-12]), but should add concepts to specifically describe distributed and component-based systems. Civilian and military standards should be used as the basis whenever possible.
 - The Unified Modeling Language (UML) should be used as the language for notation, in addition to structured text. Where more expression power is needed one should opt to utilise the standard extension mechanisms provided by UML.
 - The framework should be simple enough to actually be used, yet have enough expression power to be useful for describing C2IS and C2 architectures.
 - The framework should support both the process of defining and procuring a new system, and maintaining and extending existing systems.
 - The main focus of the framework is to be description of the architectures of information infrastructures and their enterprise environments.
 - The main problem domain is to be Command and Control, Communications, Computers and Intelligence (C4I).

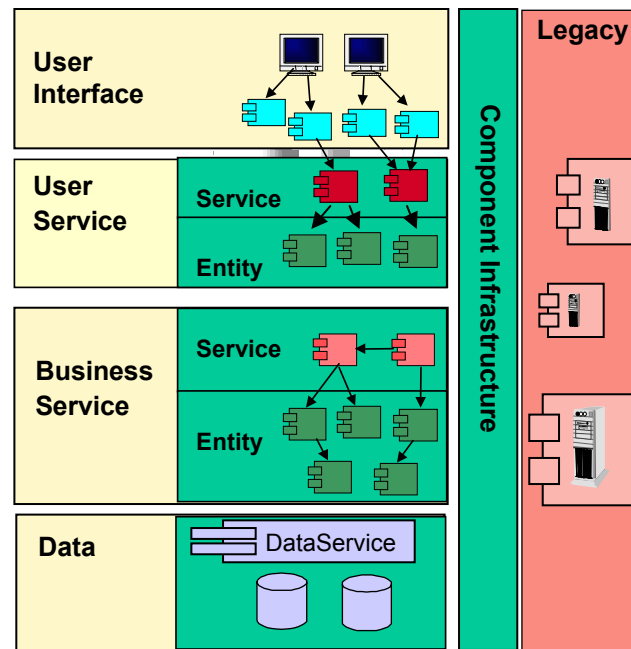
Foundations and content



Components everywhere



Components of the Enterprise



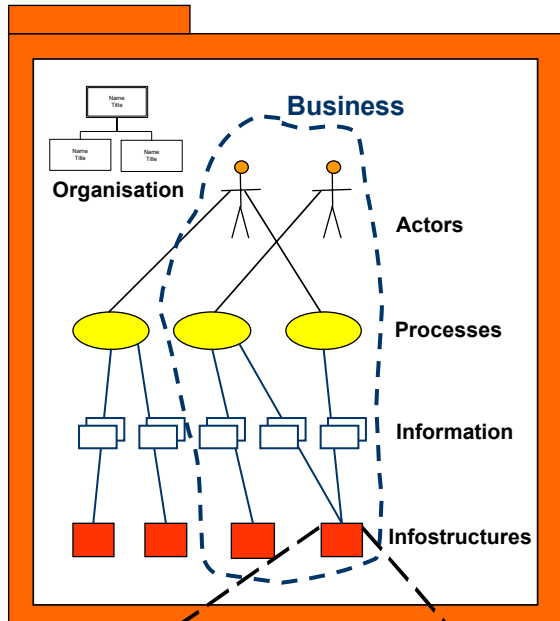
Components of the Infostructure

Model world

Real world

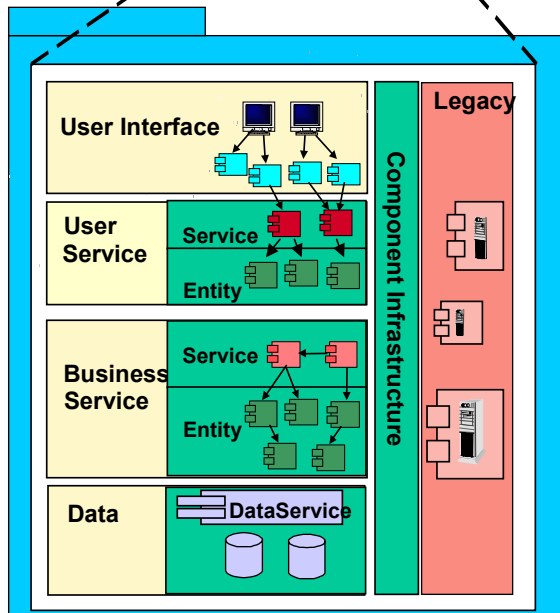
M2EE

Enterprise
Architecture Description



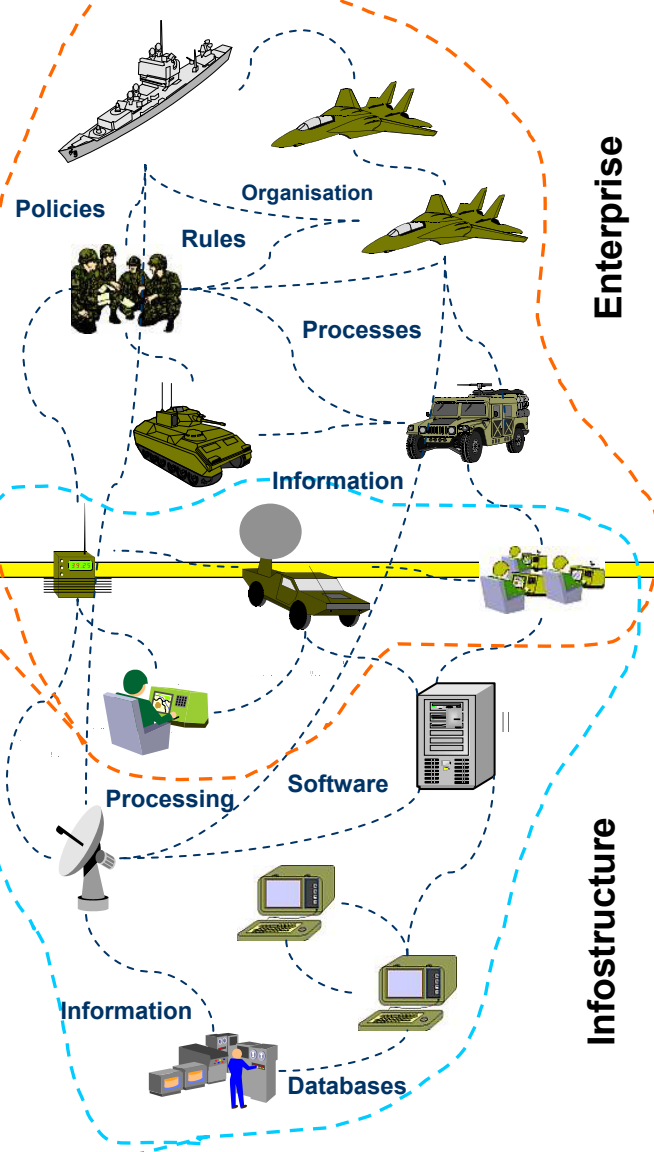
M2IE

Infostructure
Architecture Description

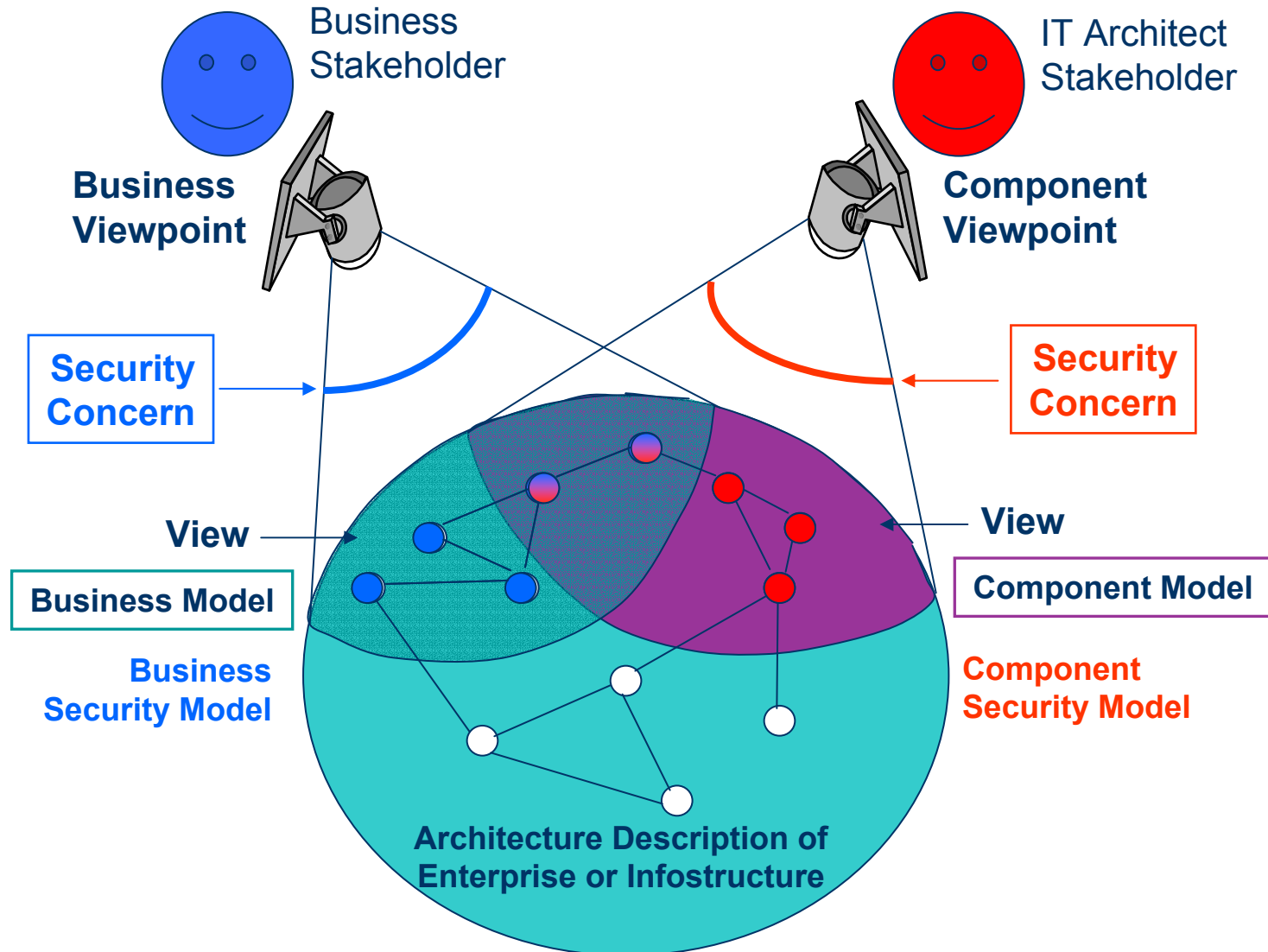


Enterprise

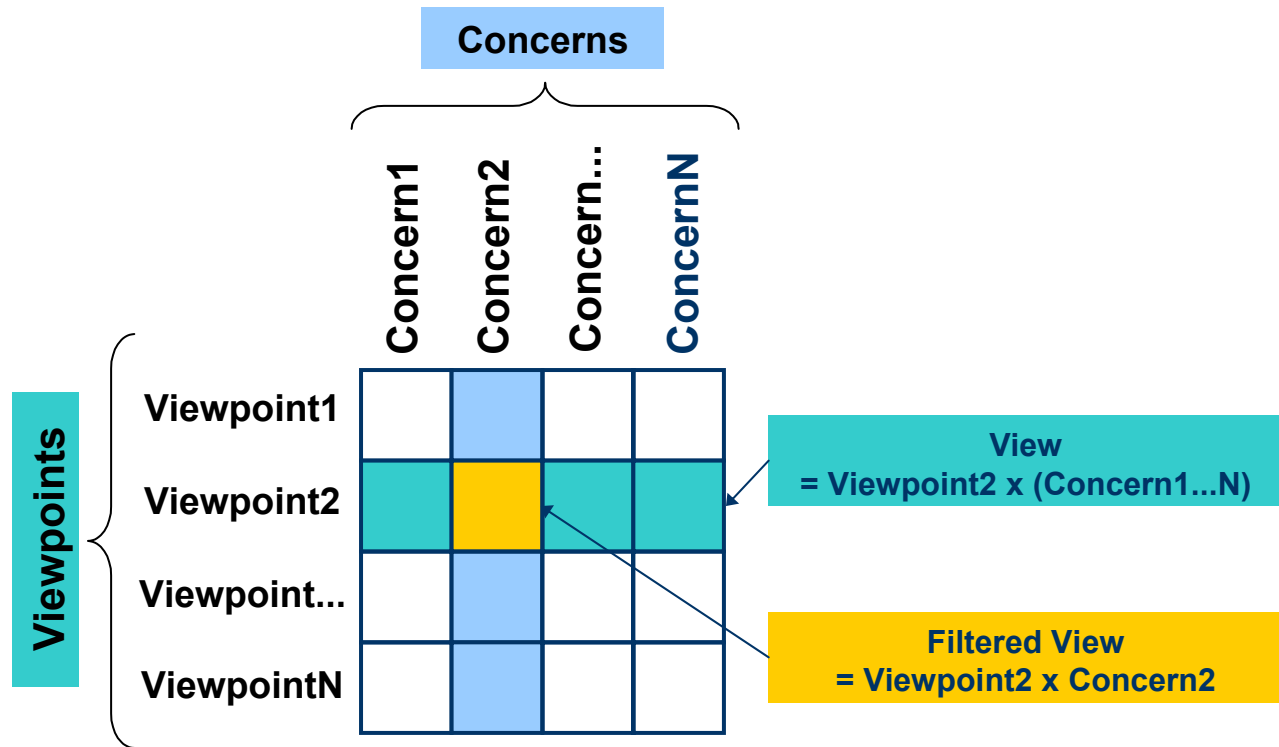
Infostructure



Integration by viewpoints & concerns



Generic structuring rule

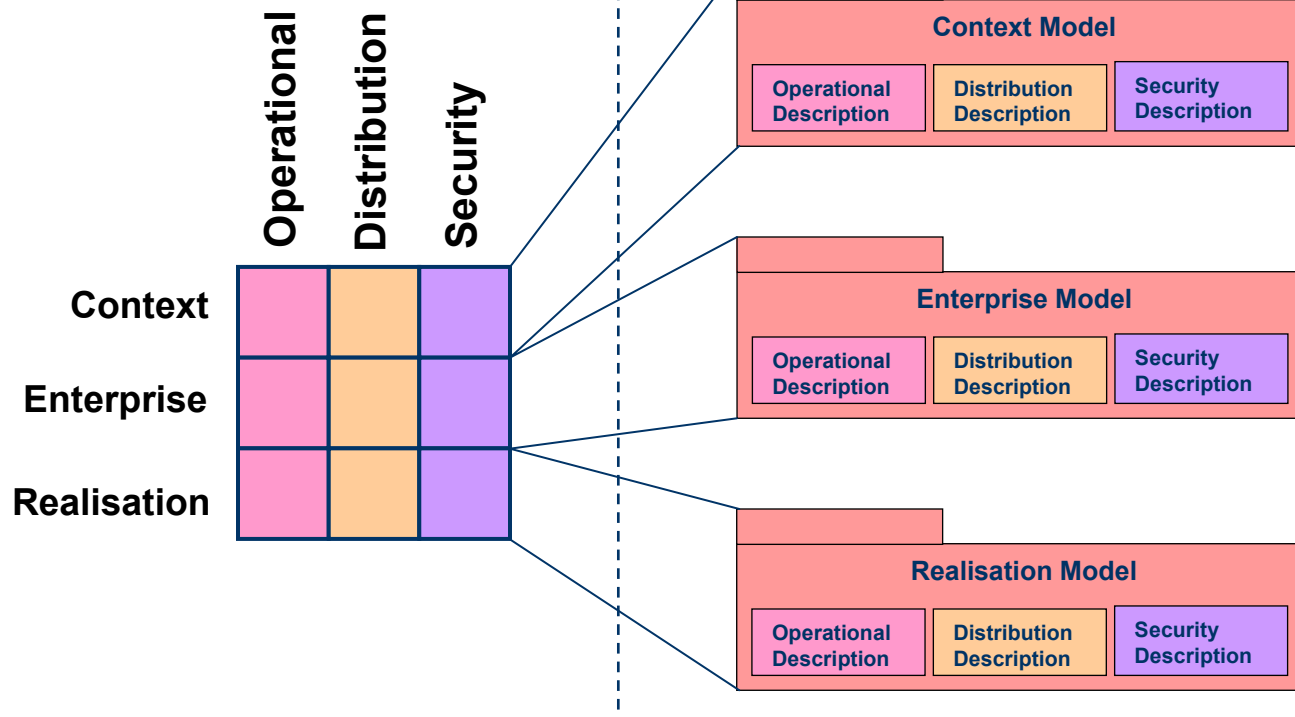


Enterprise Architecture Description

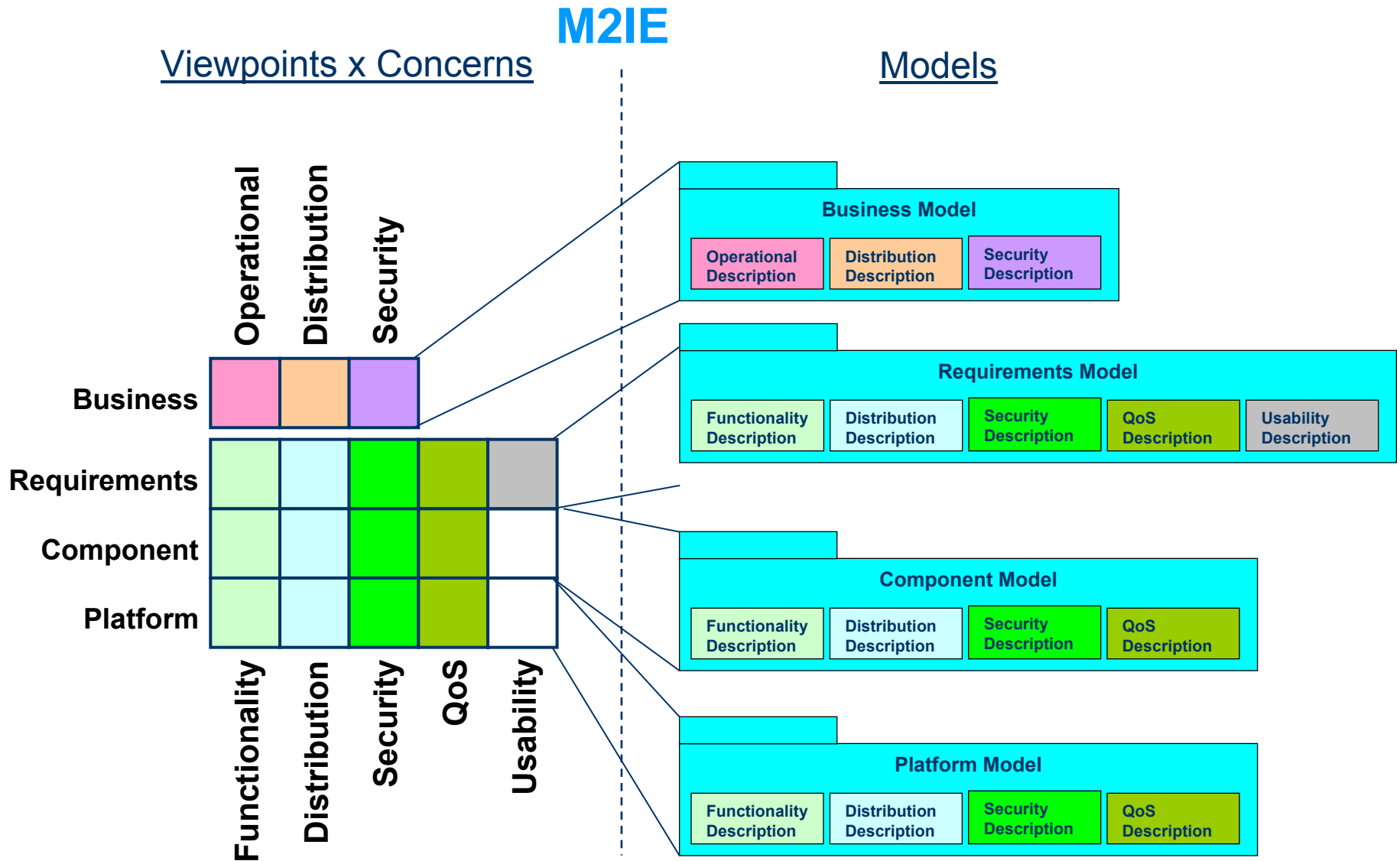
M2EE

Viewpoints x Concerns

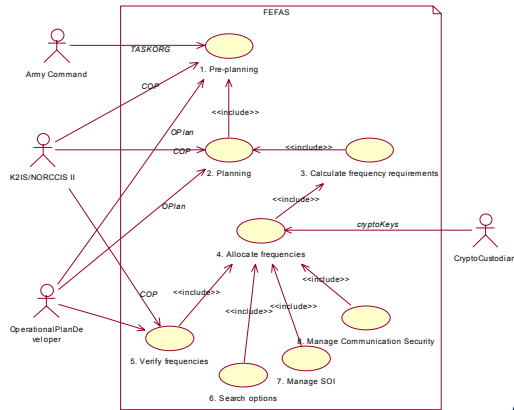
Models



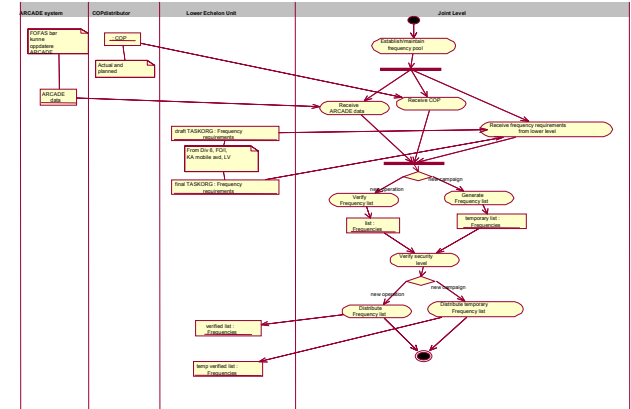
Infostructure Architecture Description



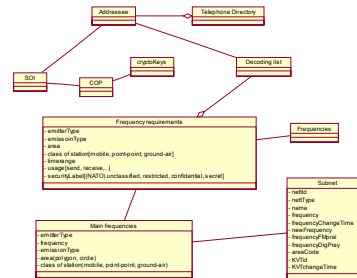
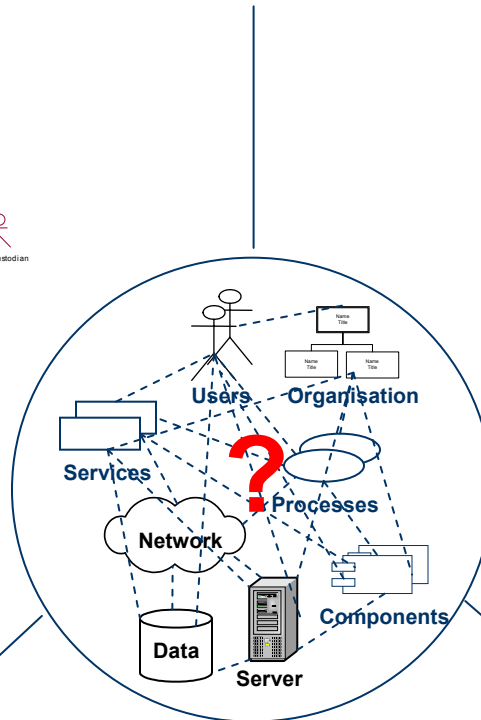
Use: C2IS procurement



UML Use Case Model
C2IS Functionality

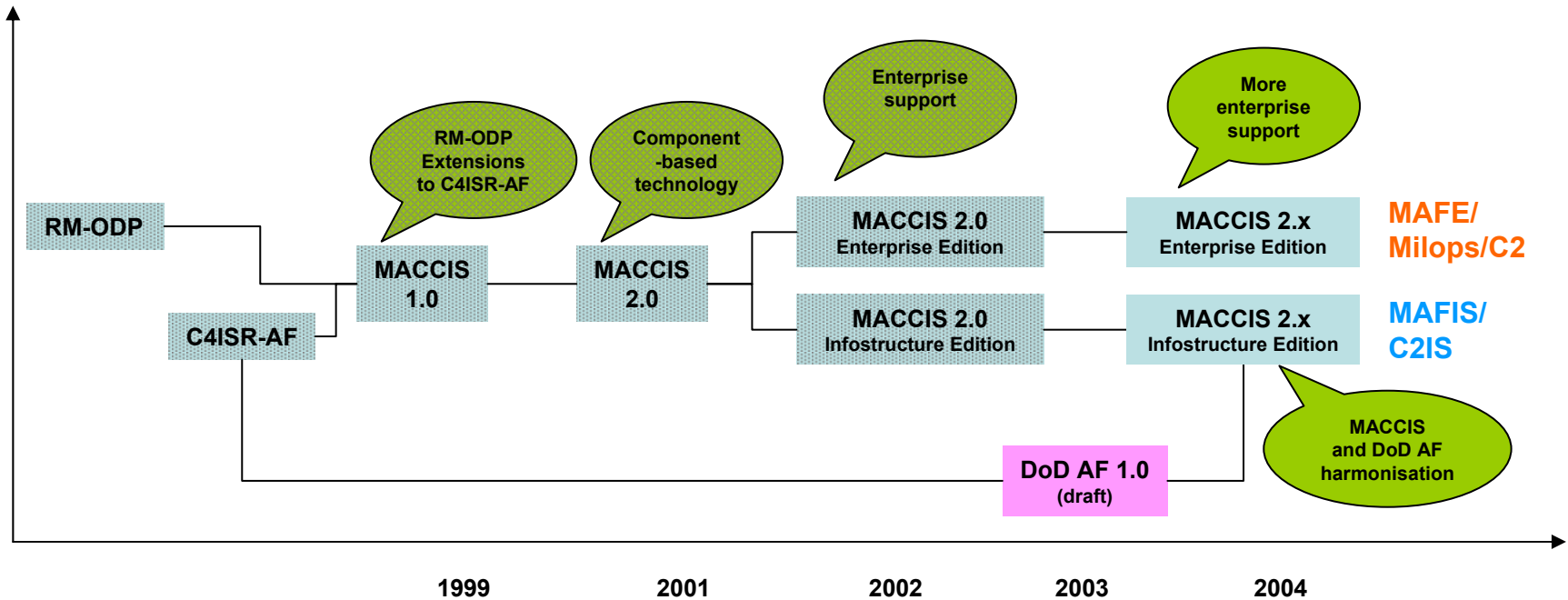


UML Activity Model
C2 Processes

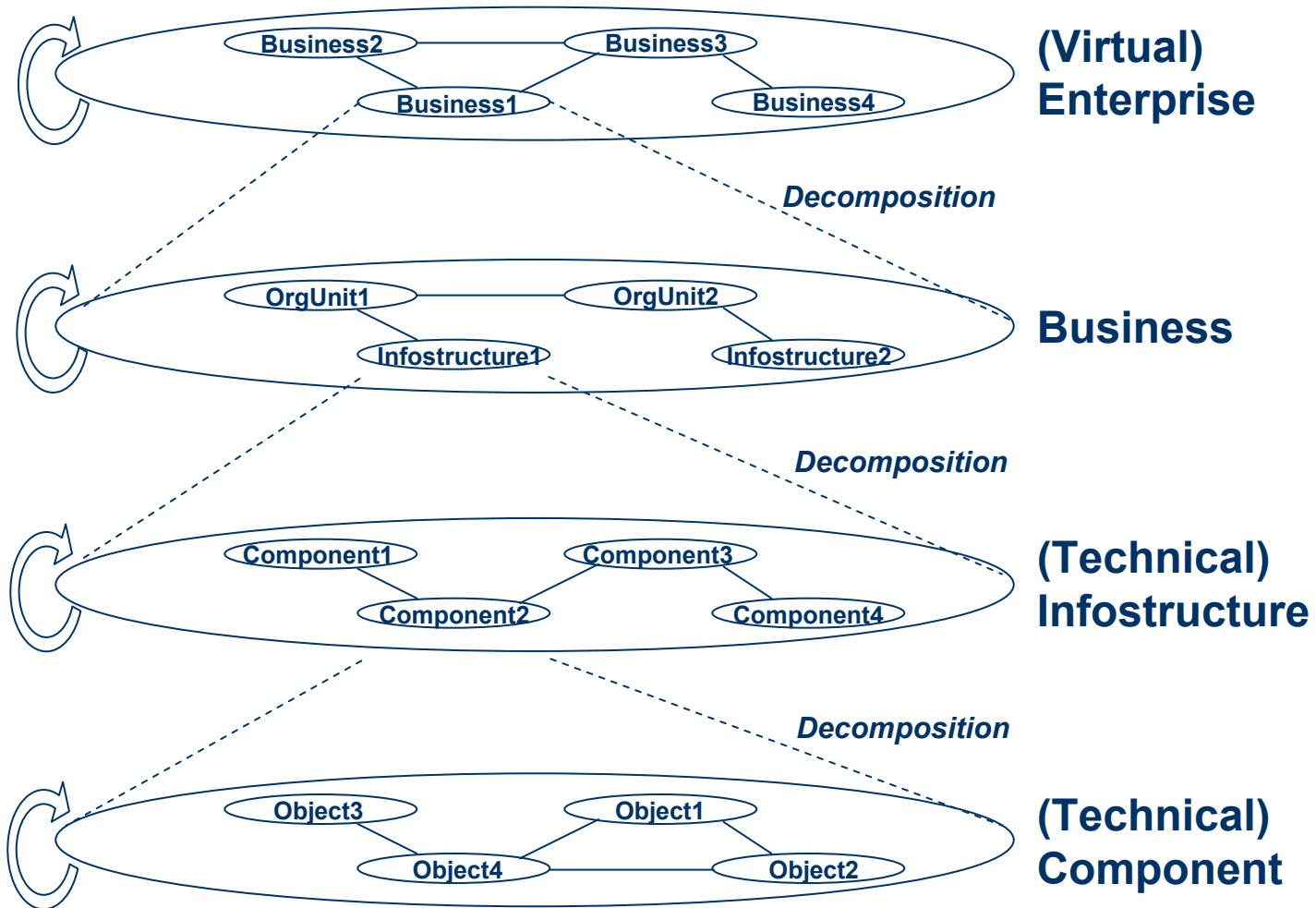


UML Class Model
C2IS Information Interfaces

Future work



System levels



Stakeholders and concerns

Stakeholders & Concerns

Model world

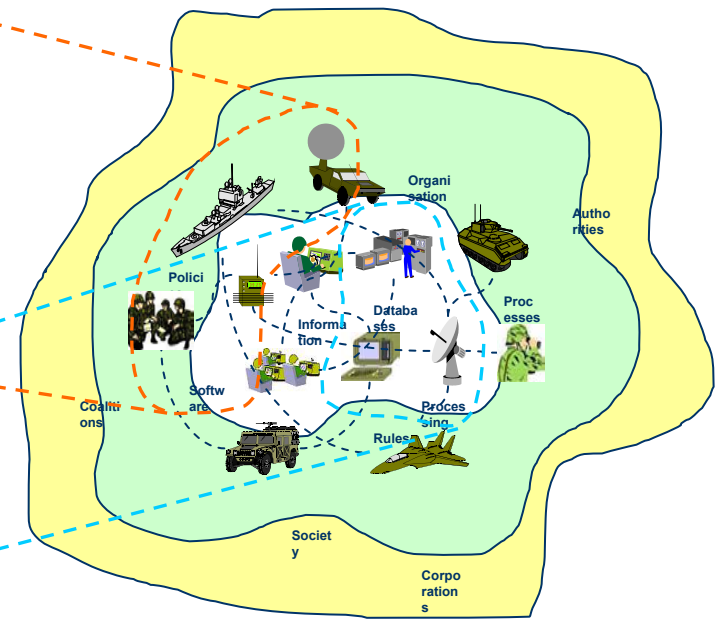
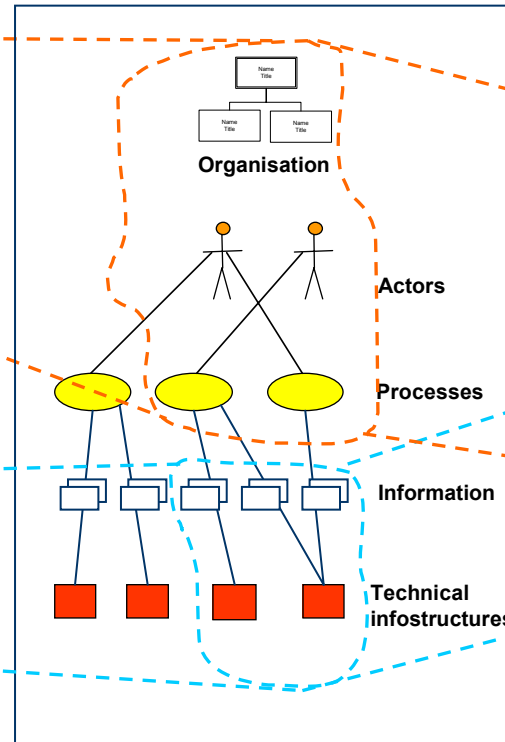
Real world



Enterprise Stakeholder #1



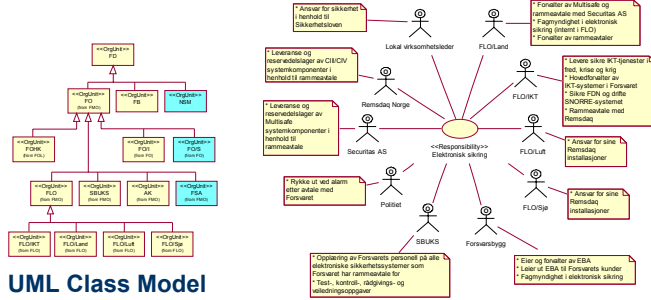
Enterprise Stakeholder #2



- C2 context (environment of C2)
- C2 enterprise (context of C2IS)
- C2IS infostructure (realisation of C2)

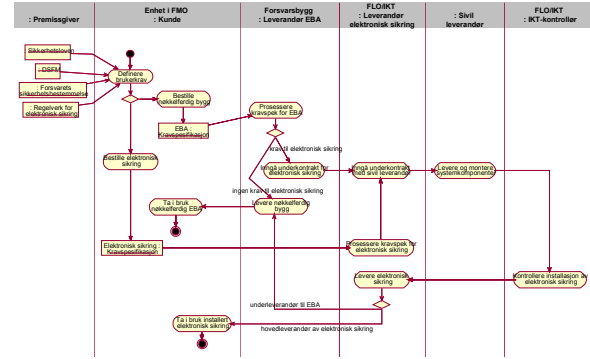


Use: Automatic protection



UML Class Model

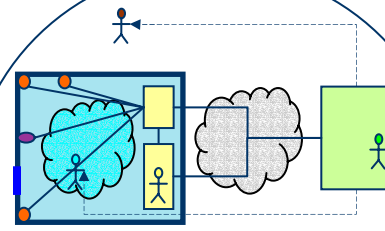
UML Use Case Model



UML Activity Model

1. Describe organisational structures, organisational roles and responsibilities.

2. Describe processes performed by organisations and organisational roles.



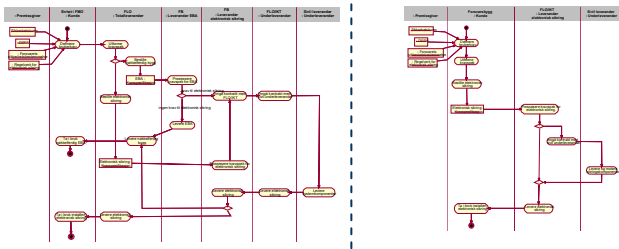
Electronic Security System

- Management
- Supply
- Operation

4. Assign process roles to performers and describe alternative/new processes.

3. Extract and define process roles for the processes described.

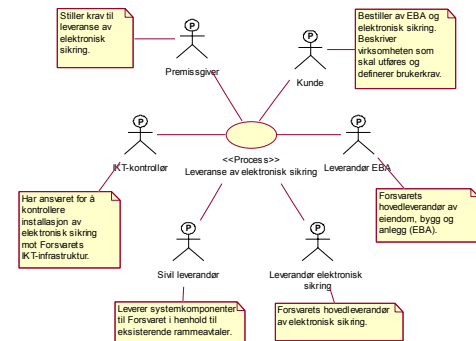
Alternative UML Activity Models



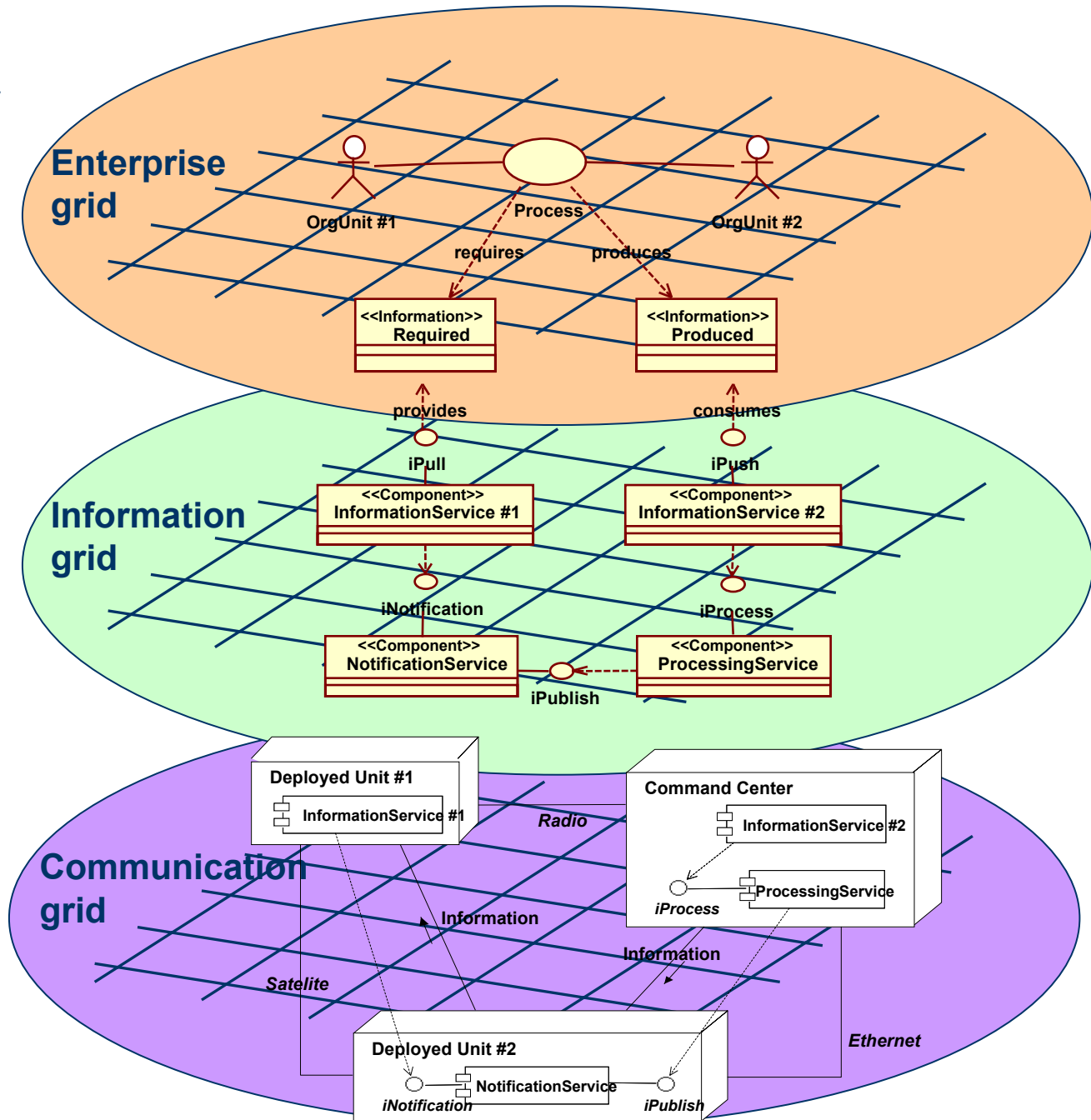
Alternative a

Alternative b

UML Use Case Model



Use: NCW



M2EE models: Context model

Model	Sub-model	Concern	Description
Context Model	Overview and Summary	O	The overview and summary model is an informal model that focuses on the purpose and scope of the enterprise, the actors and artefacts involved, and the operational concepts. This model may include descriptions of missions, products, society, authorities and corporations that are relevant to the enterprise.
	Distribution Context	D	The distribution context model describes the geographical locations and distribution of the enterprise.
	Security Context	S	The security context model describes security policies and regulations that enterprise must adhere to.

M2EE models: Enterprise model









Model	Sub-model	Concern	Description
Enterprise Model	Vision	O	The purpose of this model artefact is to identify and describe the enterprise vision.
	Enterprise Goals	O	The purpose of this model is to describe a hierarchical goal structure that can be agreed upon with the stakeholders so that a set of required high-level processes can be identified for further analysis in the areas of responsibility.
	Organisation Structure	O, D	The purpose of this model is to describe the organisation of the enterprise, both formal and informal structures.
	Stakeholders & Concerns	O	The purpose of this model is to identify the stakeholders and their concerns for the enterprise in order to clarify the scope of the enterprise and possibly resolve potential conflicts of interest.
	Organisation roles & Responsibilities	O	The purpose of this model is to describe organisation roles and corresponding areas of responsibilities in order to relate enterprise activities, enterprise goals, organisation structures and enterprise resources.
	Enterprise Processes & Process Roles	O	The purpose of this model is to describe the enterprise processes and the corresponding process roles required to perform the activities of the processes.
	Enterprise Resources	O, D, S	The purpose of this model is to describe enterprise resources such as information and equipment that are needed by the enterprise processes. This model can be extended with distribution and security descriptions of the resources.
	Role-Distribution	O, D	The purpose of this model is to describe physical distribution of the different business roles, e.g. organisation roles.
	Role-Activity-Distribution	O, D	The purpose of this model is to describe the distribution units with its roles and the activities in each of the units.
	Activity-Distribution	O, D	The purpose of this model is to describe the distribution units and the activities from each of the units.
	Security	S	The purpose of this model is to describe security constraints related to how actors carry out their duties and how information is treated.
Risk Assessment Model	S	The purpose of this model is to describe the strengths, weaknesses, opportunities, threats, unwanted incidents and risks related to the enterprise.	



M2EE models: Realisation model

Model	Sub-model	Concern	Description
Realisation Model	Work Analysis Refinement Model	O	The purpose of this model is to refine the enterprise processes and the enterprise resources in order to identify the activities where infostructures are used and what information objects they manage.
	Infostructure Distribution Model	D	The purpose of this model is to describe the distribution of the information systems and the communication infrastructure of the enterprise.
	Security Threatment Model	S	The purpose of this model is to describe the security measures and treatments that must be provided by the infostructure.

M2EE symbols

Concept	Description	UML mapping	Icon
Artillery	Ground Track Unit Combat Field Artillery	Class <<OrgUnit_Artillery>>	
Support Electronic Warfare	Ground Track Unit Combat Support Military Intelligence Electronic Warfare	Class <<OrgUnit_SupportEW>>	
Support Explosive Ordnance Disposal	Ground Track Unit Combat Support Explosive Ordnance Disposal	Class <<OrgUnit_SupportEOD>>	
Support Military Intelligence	Ground Track Unit Combat Support Military Intelligence	Class <<OrgUnit_SupportMI>>	
Infantry	Ground Track Unit Combat Infantry	Class <<OrgUnit_Infantry>>	
Support Information Warfare Unit	Ground Track Unit Combat Support Information Warfare Unit	Class <<OrgUnit_SupportIW>>	
Engineer	Ground Track Unit Combat Engineer	Class <<OrgUnit_Engineer>>	
Service Support Supply	Ground Track Unit Combat Service Support Supply	Class <<OrgUnit_ServiceSupply>>	
...

M2IE models: Business and requirements models

Model	Sub-model	Concern	Description
Business Model	Enterprise Processes, Enterprise Resources, Distribution, Security, Work Analysis	O, D, S	The business model contains the subset of model artefacts that are relevant to the infostructure we are describing the architecture of. The sub-models listed are those we have found relevant in most cases.
Requirements Model	Requirements	F, D, S, Q, U	The purpose of this model is to describe the system boundaries, the main actors and their responsibilities, and the main services offered by the system. Requirements related to distribution, security, QoS and usability can also be added to this model.
	User Interface Model	F, Q, U	The purpose of this model is to define the boundaries of the information system towards the user. This model can be extended with quality of service requirements put forward by the users and user interface sketches that addresses system usability.



M2IE models: Component model

Model	Sub-model	Concern	Description
Component Model	System Dependency Model	F, D	The purpose of this model is to describe how the system at hand fits into the set of existing systems that are currently in use.
	System Decomposition Model	F	The purpose of this model is to describe the system as divided into different subsystems or components, and how these are related to form a coherent whole.
	Interface Description Model	F, Q	The purpose of this model is to describe the interfaces of a component or subsystem in a manner that the software artefact can be understood and possibly reused. The interface descriptions can be annotated with QoS specifications.
	Structure Model	F, D, S	The purpose of this model is to specify relationships between information objects that must always be true (invariants). The structure model can also be used to describe the distribution and security classification of the information objects.
	Instance Model	F	The purpose of this model is to express assertions that must be true at a single point in time. Typically, an instance model is used to specify the states of information objects.
	Processing Model	F	The purpose of this model is to specify how the information can evolve as the system operates.
	System Security Model	S	The purpose of this model is to describe the different security mechanisms that are used in the system.
	Distribution Model	D, Q	The purpose of this model is to describe logical units consisting of a set of subsystems that must be distributed and deployed together. QoS requirements can be described for the communication links.
	Distribution Patterns	D	The purpose of this model is to describe general solutions to RM-ODP defined distribution transparencies or identified distribution concerns for the system.
	Distributed Component Profile	F, D	The purpose of this model is to describe the design specification for the implementation of the system components in a technology-independent manner.



M2IE models: Platform model

Model	Sub-model	Concern	Description
Platform Model	Standards	F, D, S, Q, U	The purpose of this model is to provide a normative reference list of the standards being used.
	Deployment Model	D, Q	The purpose of this model is to describe the physical relationships among software and hardware components in the system.
	Architecture Extension Model	F, D, S	The purpose of this model is to document non-standard technology-specific extensions that are used.
	Technology Component Profile Model	F, D, S	The purpose of this model is to give a detailed view of the design and implementation of the system components in the chosen component technologies.
	Data Storage Model	F, D, S	The purpose of this model is to describe the implementation of the data model at a level of detail that makes it possible to maintain and change the system implementation as the system evolves over time.