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Architecting Command and Control Capability in the Networked Era

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Outline

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- Background
  - Previous work on a hybrid C2 architecture development methodology
- Representing C2 architectures
- Integrating components of a hybrid methodology
- A common UML model for mapping component methodologies to DoDAF products
- Implementing a hybrid methodology
- Summary

Background

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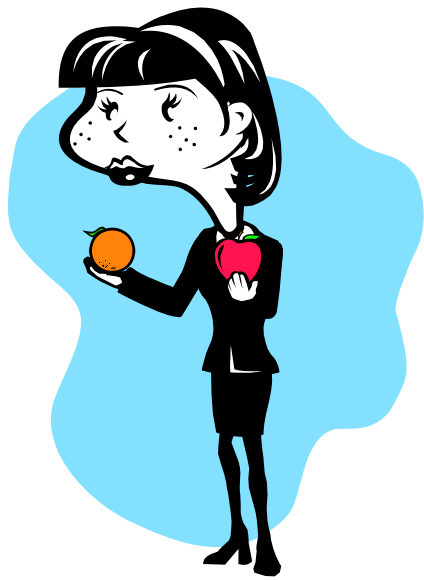
- Previous work: provided a reasoned, rational and traceable process for assembling a hybrid methodology
- Paper: *On Identifying a Methodology for Land C2 Architecture Development*.
- Adapted Avison and Fitzgerald's framework to evaluate 13 candidate methodologies across a wide range of criteria



Summary of Development of a Hybrid Methodology

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Phases	Methodologies and their Focus Areas												
	Process			Blended			Object-oriented		People	Organisational			RAD
	STRADIS	YSM	JSD	SSADM	Merise	IE	OOA	RUP	ETHICS	SSM	PI	ISAC	DSDM
Strategy													
Feasibility													
Analysis													
Logical Design													
Evaluation													
Overall													

IE has the highest score of 66.

Possible hybrid options (score 72):

- IE+SSADM - ‘hard’ system focus
- SSM+RUP+SSADM – ‘soft’ systems and object-oriented

Phases and Components of a Hybrid C2 Methodology

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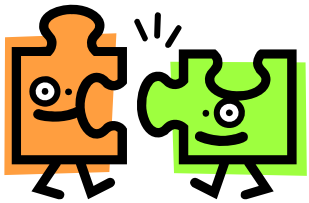
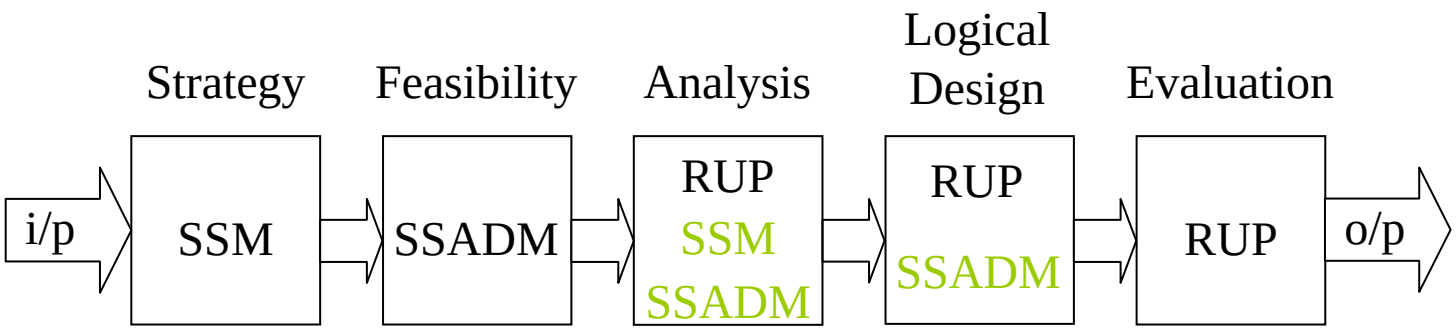
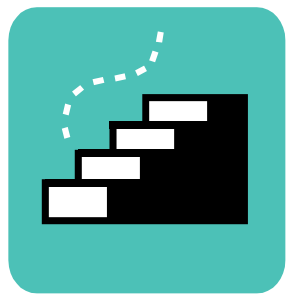




SSM – Soft Systems Methodology
RUP – Rational Unified Process
SSADM – Structured Systems Analysis and Design Method



Representing C2 Architectures

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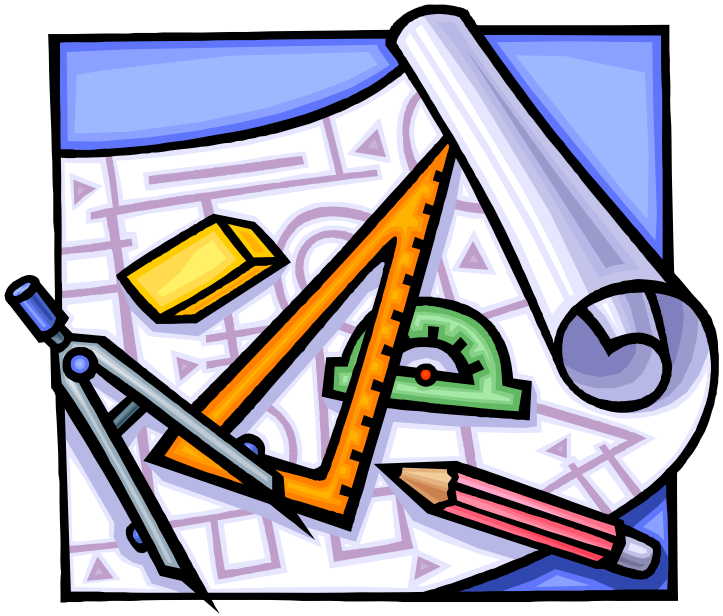

- C2 architecture is represented by a collection of design artefacts.
- Need to identify a ‘vehicle’ for C2 architecture representation that can unite elements of a hybrid methodology.
- Solution = DoDAF products.

Architectures, Architecture Frameworks and Tools

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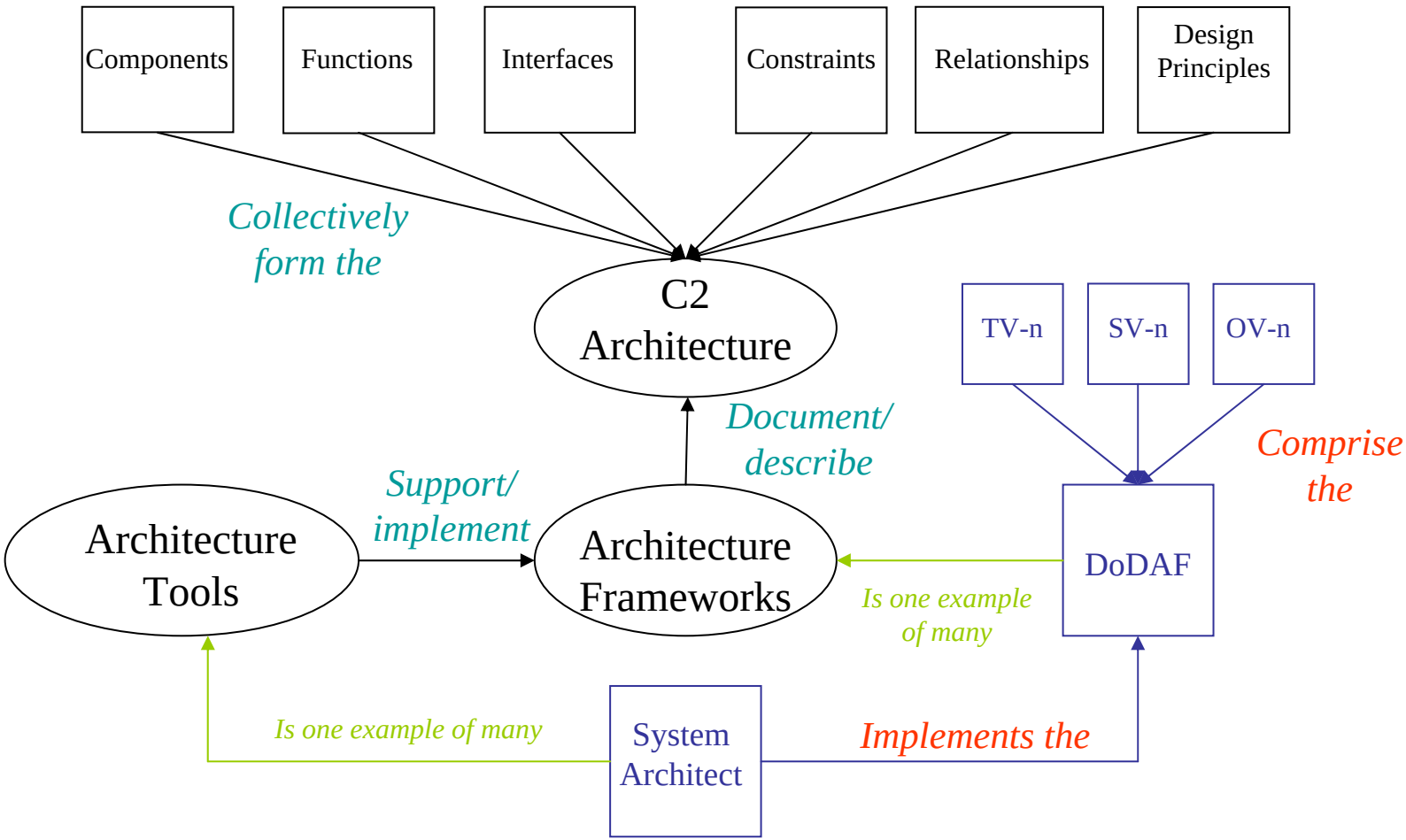

Integrating components of a Hybrid Methodology

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- Before a hybrid methodology can be used to populate DoDAF products and thus create a C2 architecture, there is a "missing link".
- Issue is: not all components of a hybrid generate outputs that immediately fit into DoDAF. Therefore need an interface between Hybrid and DoDAF products.
- Solution = Common UML model.
  - Methodology stage CAN output something in UML compatible form.

An Integrated Hybrid C2 Methodology

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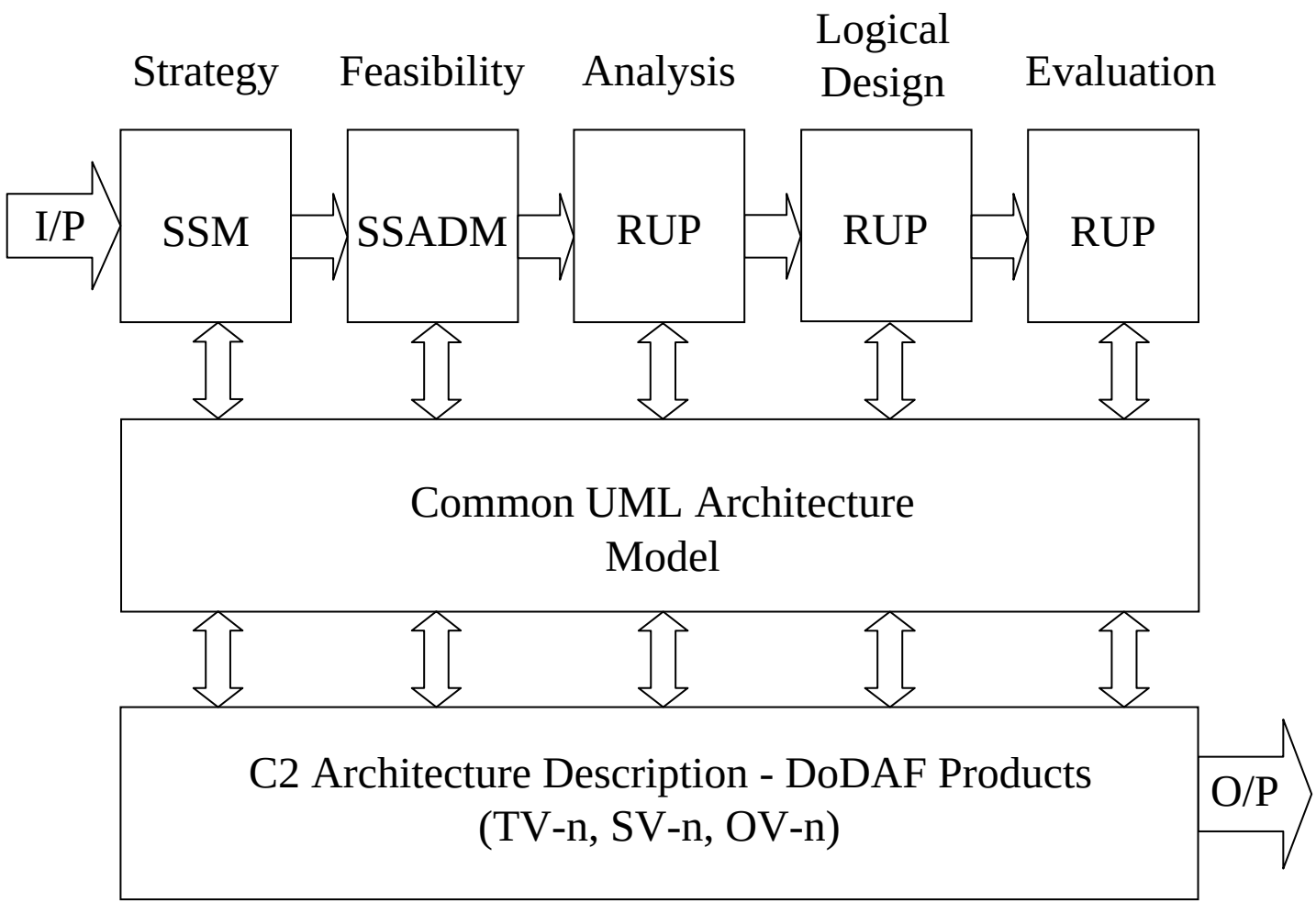

A Common UML Model for C2 Architecture Development

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- Common UML model provides a language for linking the inputs and outputs of the different components of the hybrid and evolves as the hybrid methodology is executed.
- As UML model evolves, the DoDAF representation of the architecture can grow in parallel, fed by the UML model.
- The input is processed through a methodology selected as most suited to C2 development, the output is that C2 architecture in DoDAF product form.
- We think this addresses the DoDAF issue of “how” to implement DoDAF in practice (not specified in DoDAF).

Evolving a Common UML Model

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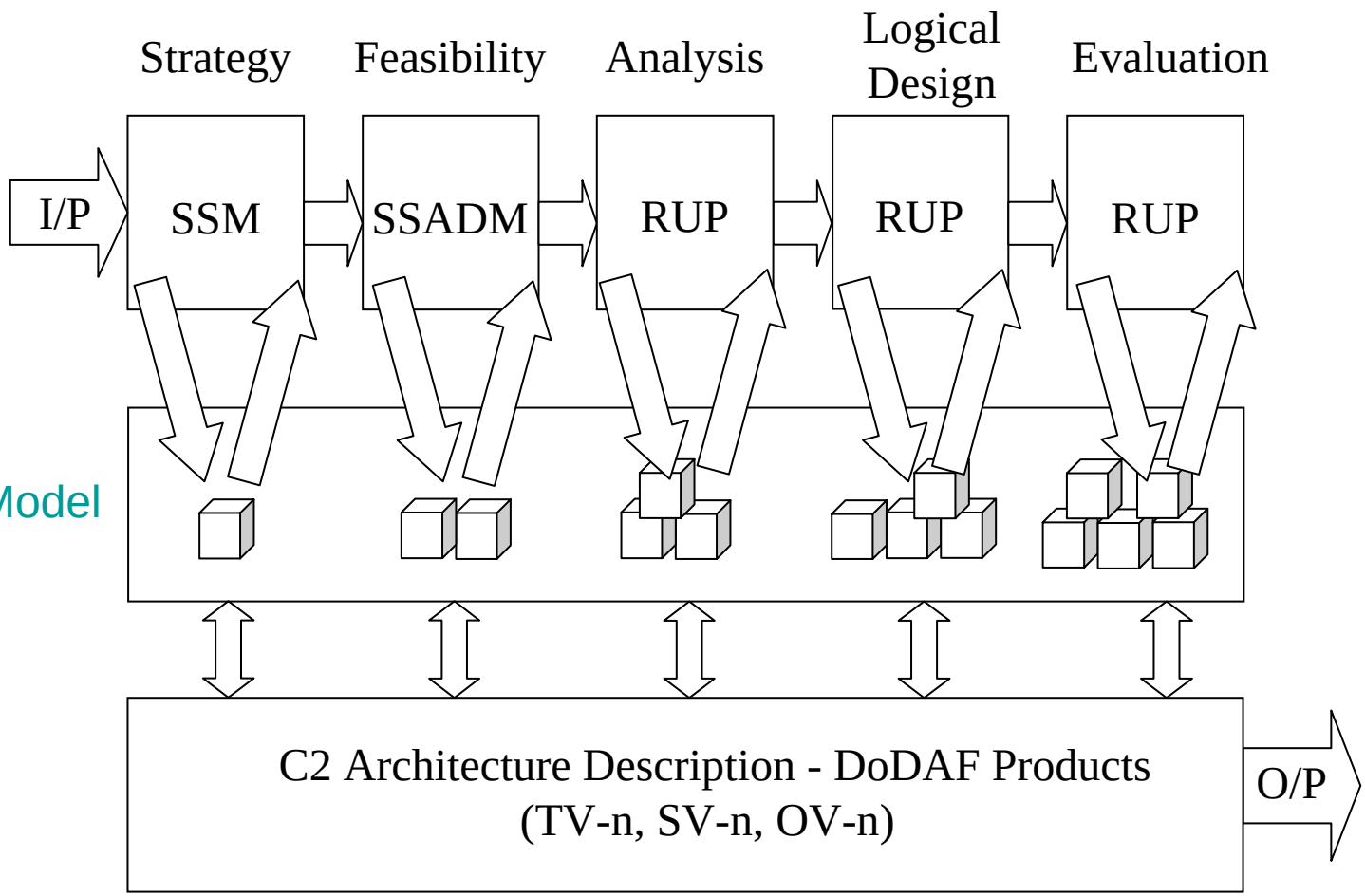
Common UML Model



Implementing a Hybrid Methodology

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- RUP to UML mapping is firmly established, but no immediately apparent link between SSM and SSADM components and UML.
- Hybrid phases can be mapped to a generic SE lifecycle model and UML diagrams are derived from the lifecycle, hence mapping between hybrid methodology phases and UML products.
- Specific UML products are created in the process (GRAPPLE).
- Reinforces link between methodology components, UML and then to DoDAF.

Lifecycle Model of C2 Architecture Development

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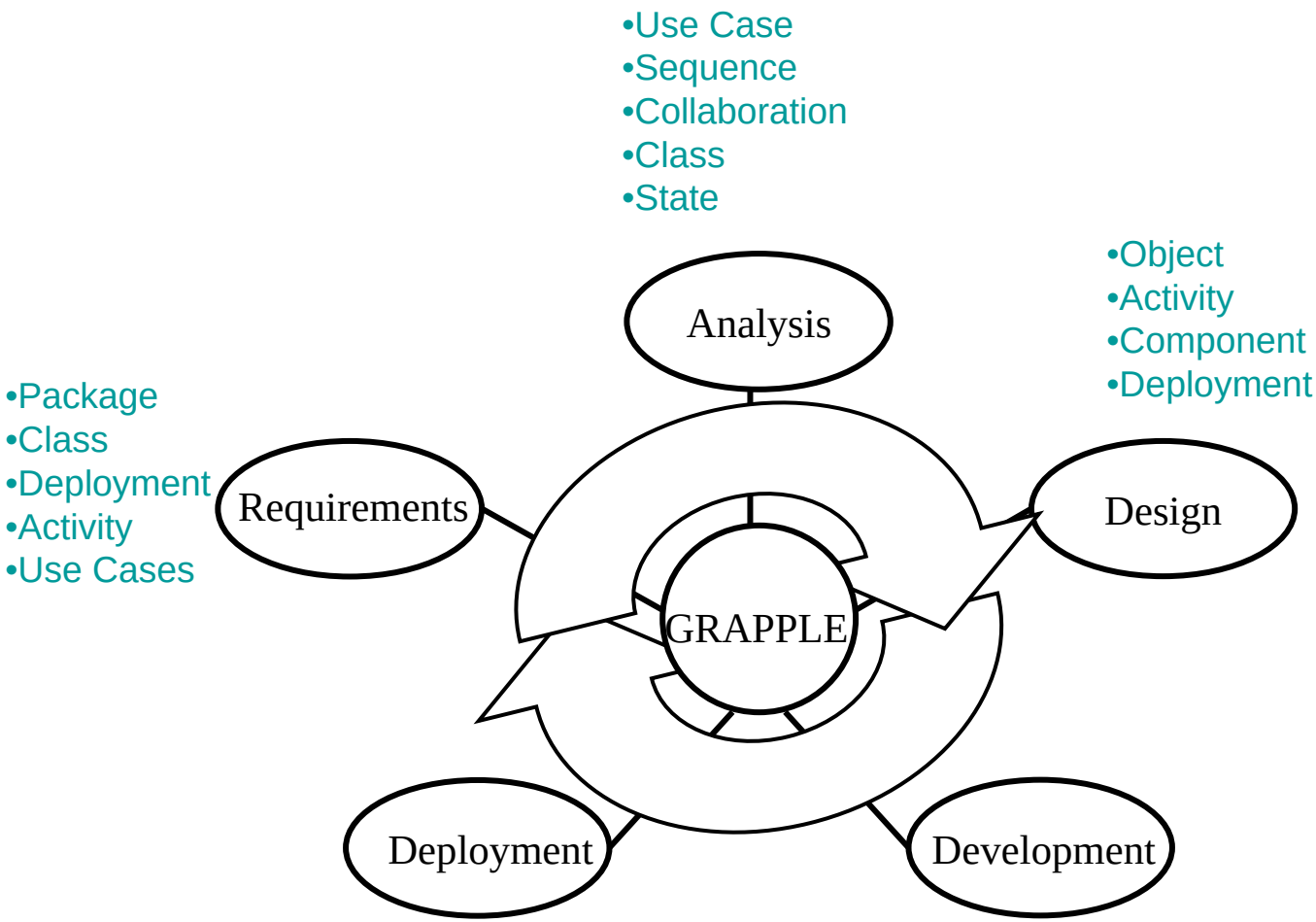

Populating the Common UML Model

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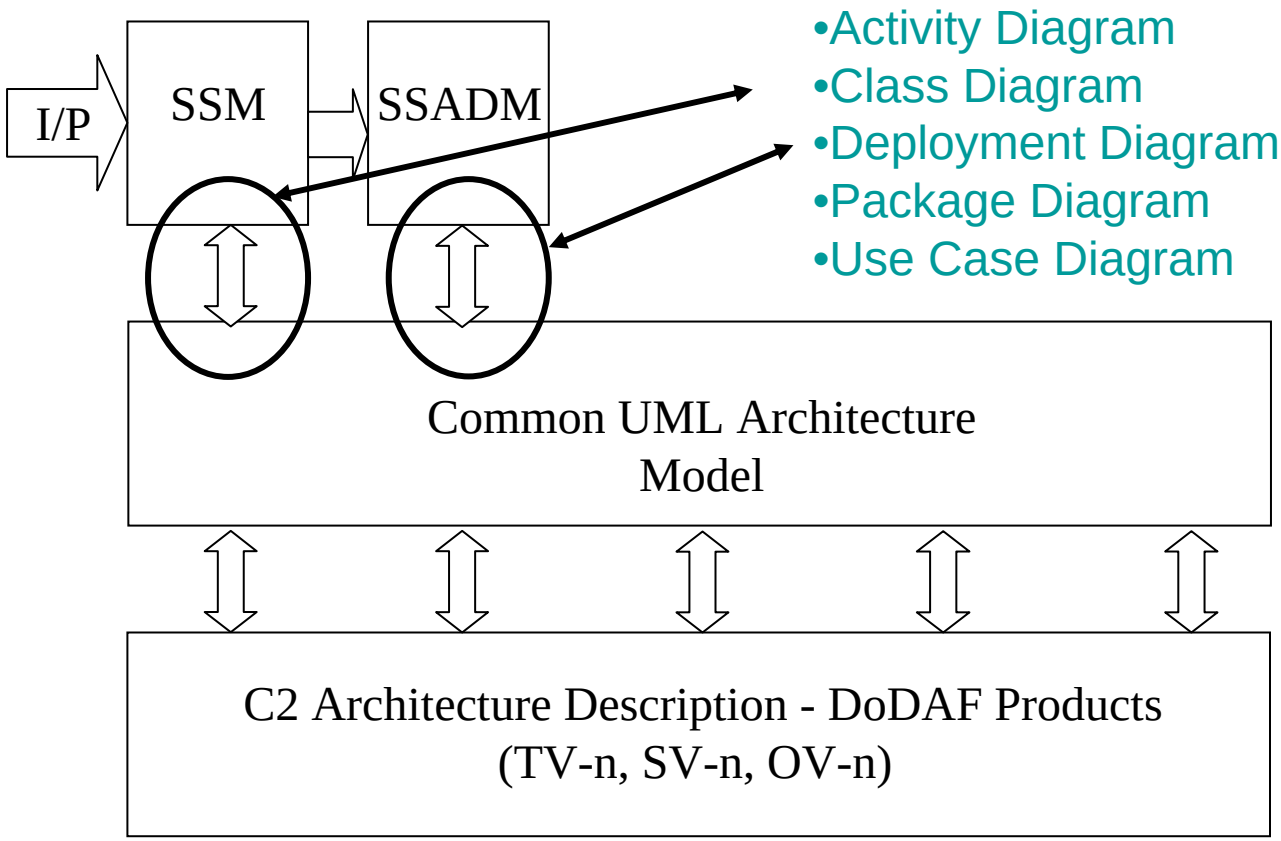

Summary

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- Redress the deficiency of a lack of a systematic comparison and evaluation of approaches for architecting C2 systems.
- Key idea: a way to actually create the DoDAF representation of a C2 architecture.
- DoDAF says ‘what’ the products are, but not ‘how’ to generate them (although a few techniques are presented in the Deskbook).
- We try to show ‘how’ to generate them.

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