



ROYAL NETHERLANDS MILITARY ACADEMY

Comparing OODA and Other Models as Operational View C2 Architecture

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Outline

- Introduction
- Boyd's (1996) OODA
- OODA as Operational View
- Comparison with other models
- OODA's shortcomings
- Re-engineering OODA
- Further work



Introduction

“Beyond SA: closing OODA loop”

- **Authors:**
 - Tim Grant: Professor, Operational ICT**
 - Bas Kooter: Independent consultant**
- **Royal Netherlands Military Academy:**
 - Faculty of Military Science, MOD (NL)**
- **Faculty’s research themes:**
 - Optimising operational resources**
 - Future wars**
 - Intelligent support for decision-making**
 - Technology-induced transformation**
 - Partnerships**
 - Availability**



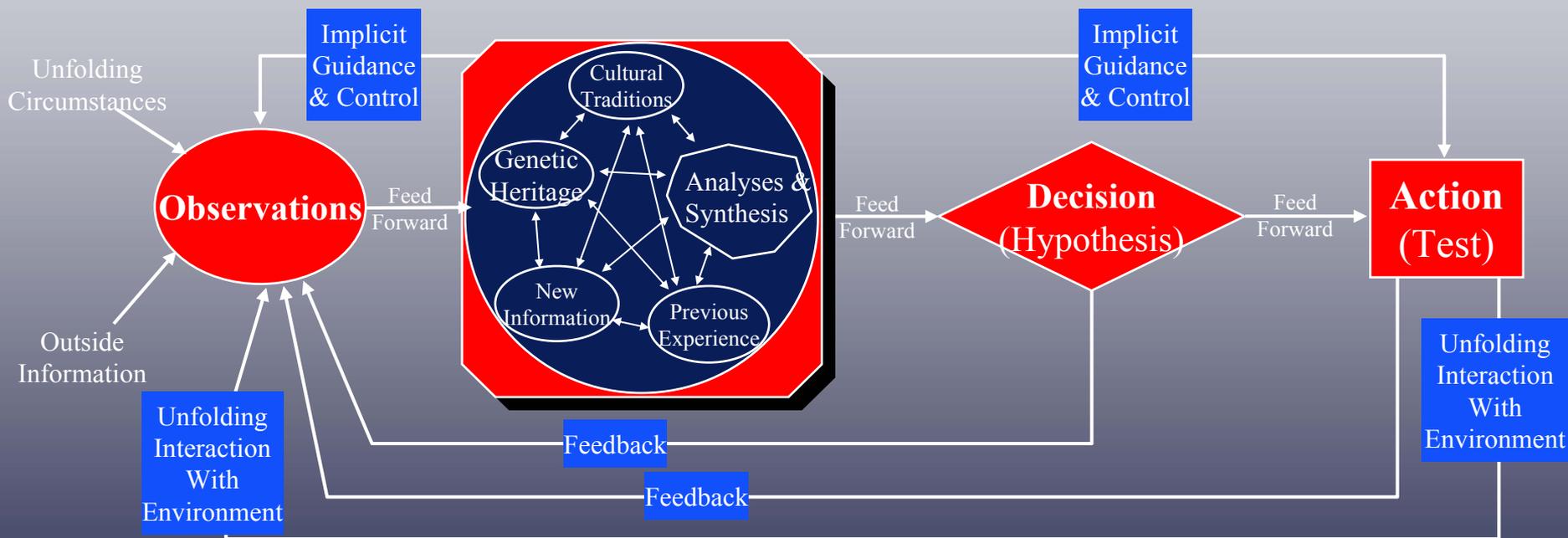
Boyd's (1996) OODA model

Observe

Orient

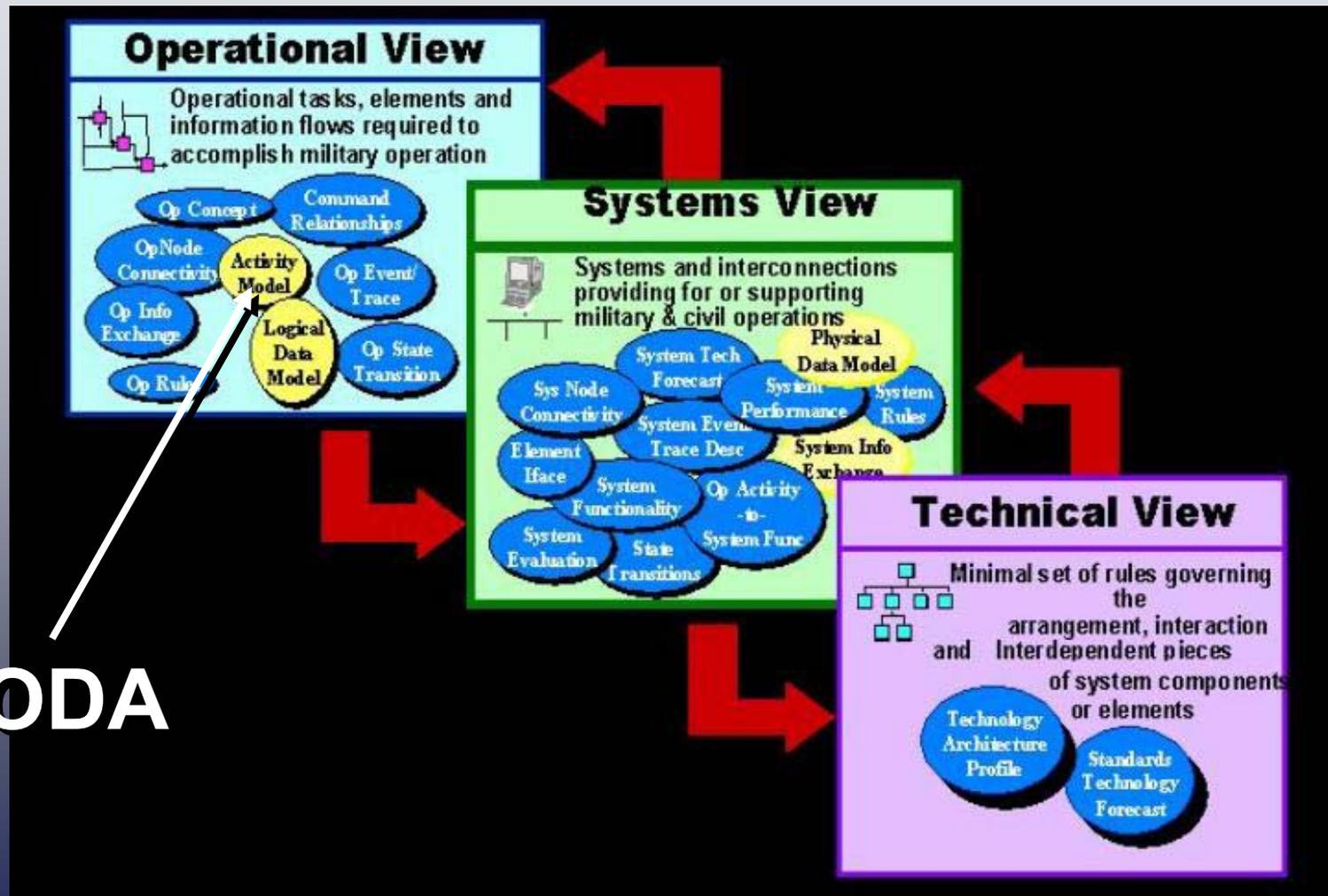
Decide

Act





OODA as Operational View



OODA



Comparisons (1)

- **OODA compared with:**
 - Wohl's (1981) SHOR model**
 - Rasmussen (1983) three-level model**
 - Mayk & Rubin's (1988) review of 15 models**
 - Klein's (1998) RPDM model**
 - Endsley's (2000) SA model**
 - Demming's (1951) Plan-Do-Check-Act**



Comparisons (2)

	OODA	SHOR	Rasmussen	Mayk	RPDM	SA	PDCA
Control loop?	√	√	√	√	√	√	√
Detailed?		√			√	√	√
Tempo?	√						
Planning?		√ (1)	√		(2)	(3)	√ (4)
Learning?							√
Interaction?	√	√		√	?		
Peer review?	√	√	√	?	√	√	√



OODA's shortcomings

- Neither detailed nor formalised
- No guarantee of scalability
- Other agents not modelled explicitly
- Competitive interactions only
- Lacks psychological validity:
 - No domain state or world model
 - No concept of attention or memory
- Lacks deliberative planning process
- Lacks learning process



Re-engineering OODA (1)

■ Re-engineering process:

Define requirements:

“Rational reconstruction” of OODA

Apply use-cases

Formalise using SADT:

-> Operational View architecture

Object-oriented analysis using UML:

-> Systems View architecture

Implement in Java, C# or Smalltalk:

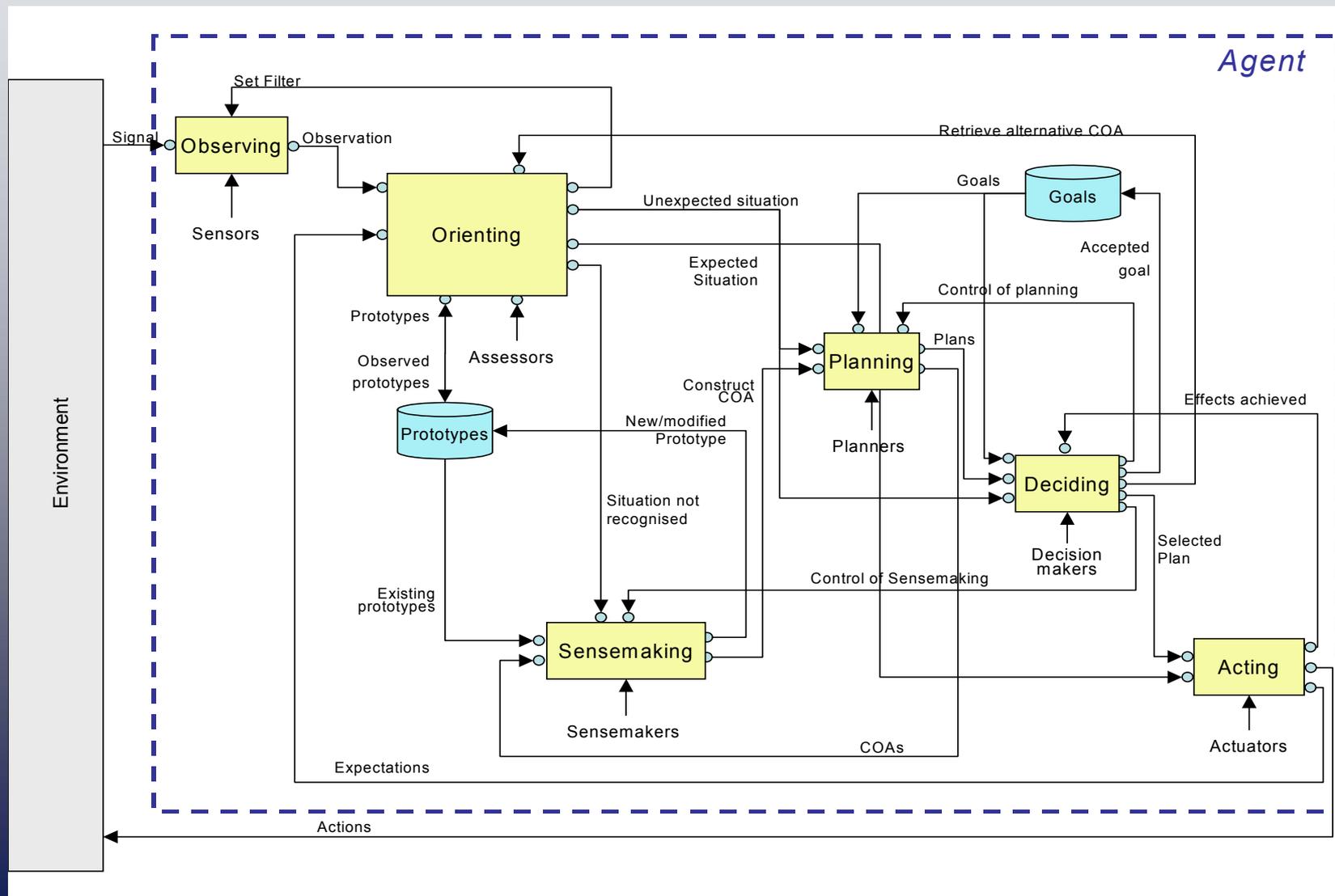
For verification of Operational View

Real-time performance NOT optimised





Re-engineering OODA (2)





Further work

- UML analysis (in progress)
- Implement & test demonstrator
- Incorporate lessons learned in:
 - Operational View architecture**
 - Systems View architecture**
- Publish further papers:
 - Rational reconstruction (submitted)**
 - Validation against 9/11 timeline**
 - Planning niche**



Any questions?