Developing a C4I Architecture for the Netherlands Armed Forces

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Presentation Structure

• Why a C4I Architecture?
  • Starting point
  • New approach
  • C4I Architecture Products
  • Process Model & Services Model
  • What we learned so far
Why a C4I Architecture?

To improve Agility,

defined as:

The ability to successfully cope with changes in the environment

(FACT Team paper, 18 April 2008)
Agility Challenge 1: Effective information sharing among dissimilar entities
Agility Challenge 2: maintaining the C2 chain

NL Army suite of C2 systems
Agility Challenge 3: information exchange with non-mil partners

- NATO partners
- Non-NATO partners
- Other Ministries
- Emergency Services
- Int. Organisations
- NGO’s
- Media
Presentation Structure

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### DIVA Architecture Model

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DIVA Architecture Hierarchie

Corporate Architecture (HDIO)

Sub Architectures
- C4I: CDS
- M&F: DMO/DFEZ
- P&O: HDP
- management: DIO

Aspect Architectures
- Security: BA
- Networks & Comms: DIO
- Integration: DIO

Project Architectures (DMO/IVENT)
- e.g. TITAAN, OMIS, MS Walrus, ISIS, BMS AFSIS etc.

C4I (sub) Architecture
C4I Architecture Scope

C4I (sub) Architecture

- P&O
- Comms & Networks
- MATLOG
- Security
Initial Operational Process Model

Execute operation

Command & Control of operation
- Decision making
- Issue OPORD
- Supervise execution
- Adjust execution
- Execute manoeuvre

Execute operational action
- Influence opponent’s C2
- Produce Intelligence
- Execute CIS support
- Influence infrastructure

Proces phases:
- Analyse Mission & Situation
- Develop opportunities & Courses of Action
- Select own Course of Action
- Work out Plan(s)
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Boyd’s OODA loop

Observe  Orient  Decide  Act

Observations  Feed Forward

Cultural Traditions
Genetic Heritage
Analyses & Synthesis
New Information
Previous Experience

Decision (Hypothesis)

Action (Test)

Unfolding Interaction With Environment

Note how orientation shapes observation, shapes decision, shapes action, and in turn is shaped by the feedback and other phenomena coming into our sensing or observing window.

Possible Process Hierarchie

- Observations
- Feed Forward
- Decision (Hypothesis)
- Action (Test)
- Feed Forward

- Cultural Traditions
- Genetic Heritage
- New Information
- Previous Experience
- Feed Forward

- Unfolding Interaction With Environment

- Recognized Air Picture
- Common Operational Picture

- Joint Air Defence
Air Defence Parallel Processes

- Is everybody informed of my assessment and intentions?
- What is the current Air Picture?
- What is the enemy's most likely course of action?
- What are my capabilities and possible courses of action?
- Do I need to adjust the alert state?
- What about the EMCON Plan?
- Do I need to reposition my units in view of the threat axis?
- What is the actual weapon and fuel state of my fighters?
- Do I need an adjustment of the Rules of Engagement?
- What is the enemy's most likely course of action?
Stakeholders & COIs

Primary Stakeholders:
• CDS
• HDIO
• DMO
• CAMS & C2SC
• Major Operational Commands

Predefined COIs:
• **Non-operational**: policy&doctrine, planning&budget, requirements, acquisition, R&D, HRM

• **Operational**: OPS-planning, -support, -security, C4I-planning & -management, weapon employment, sensor management, ISR/INTEL, education & training
Stakeholders, COIs and views

Stakeholders  Communities of Interest  Views

S1  COI1  V1
S2  COI2  V2
S3  COI3  V3
S4  COI4  V4
S5

V2
V3
V4
V5
V6
V7
Purpose C4I Architecture

• provide guidance for definition C4I requirements
• support better scoping of C4I projects
• provide better cohesion between C4I projects
• provide guidance for project architectures
• set standards & technical requirements for C4I projects
Presentation Structure

• Why a C4I Architecture?

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• **C4I Architecture Products**

• Process Model & Services Model

• Next Steps

• What we learned so far
C4I Architecture products

- C4I Basic Considerations & Principles
- C4I Standards & Technologies
- Checklist C4I Requirement Process
- Technical Requirements & Guidelines
- Operational Process Model
- Operational Information Services Model
### C4I Basic Considerations & Principles

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# Checklist C4I Requirement Process & Technical Requirements & Guidelines

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Development model

Development first architecture products

B1: Definition
C1: Development (iterative)

A: Stakeholder-analysis

Follow-on development (iterative)

Evolutinal development

B2: Definition
C2: Development (iterative)

Maintenance (iterative)

Version 1.0

Version 0.x

Version 1.x

D: Using & testing

Phase 2 (from April 2009)

Phase 3 (t.b.d.)

Time
Presentation Structure

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• **Process Model & Services Model**

• What we learned so far
Development Process & Services Models

- step 1: collect information at school / training center
- step 2: study material, develop 1st draft process model
- step 3: collect comments, develop 2nd draft
- step 4: test model by visits, observation, discussion
- step 5: correct, refine & amplify
- step 6: validate with all parties involved
Interdependencies

- Goals and Tasks
- Environment
- Concept of Operations
- Information Support Requirements
- Requirements for ICT Solutions
- Organisation
- Process Models
- Information Flow
- Information Services Model
- Information Systems
- Organisation-implementation
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Selection of processes to be modelled first

Criteria:
• Joint
• Combined
• Imperfect
• Complementary

Processes selected:
- Joint Air Defence
- Picture Compilation Ground Operations
- Close Air Support

Next: Peace Support Ops, CIMIC
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What we learned so far

• involve stakeholders early
• include non-operational information domains in scope
• show early, usable results
• build model bottom-up, using standardised format (e.g. OODA-Loop)
• model first joint & combined processes
• not all services are services ...
Further research

• Suitability of DIVA methods & tools

• Suitability of C4I Architecture to support NEC transition

• Suitability of Service-Oriented Architecture to support info exchange between military & civil partners
Any questions?