





DEFENCE R&D DÉFENSE

PACEM-RE  
Patterns and Agility for Capability engineering Methodology  
& Requirements Engineering  
Presentation to CFD  
January 2009  
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 Defence Research and Development Canada  Recherche et développement pour la défense Canada 



### January 21 meeting

- Objectives
  - Project presentation
  - Verify relevance of interests
  - Establish liaison strategy

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### Project Presentation – 10 BD - PACEM-RE

**Objective :**

- Explore ways to handle complexity associated with capability engineering
- Provide agility within the capability engineering process
- Elaborate a Requirement Engineering process to ensure tracability and correct conversion of user expectations toward well formed requirements


**Explore the potential of :**

- Patterns for agility
- Conceptual Graphs for requirement engineering.

**Outcome: an Agile Cap. eng. methodology**

- Self-adaptative process and workflow according to pattern identification
- A set of patterns organized in a patterns language
- A refined requirement engineering process
- A prototype of a requirement engineering tool


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### 'Patterns' for Complex Systems Design & Process

Sample Design pattern : BUILD PROTOTYPES

To reduce risk and missed expectations



"Patterns" from field of Architecture [Alexander 1977] Anthropology [Kroeber 1948], and Software [Coplien 2004]

Patterns as re-useable 'models', practices or principles for successful Complex Systems Engineering

'A solution to a recurring problem in context'

**Challenge: Develop Patterns and a Pattern Language for Defence Capability Engineering**

**Solution:** Build a prototype to understand req's, ENGAGE CUSTOMERS, explore interactions, costs and benefits. It allows you to assess knowledge, adapt design, see emergent properties

Related Patterns: EARLY/REGULAR DELIVERY, MICROCOSM

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## Vision

### Patterns

- Allows to play with generalization/specialization to handle and master a level of complexity

### Agility

- The Process becomes agile and dynamically auto-adapts itself according to the project environment.

### Versatility

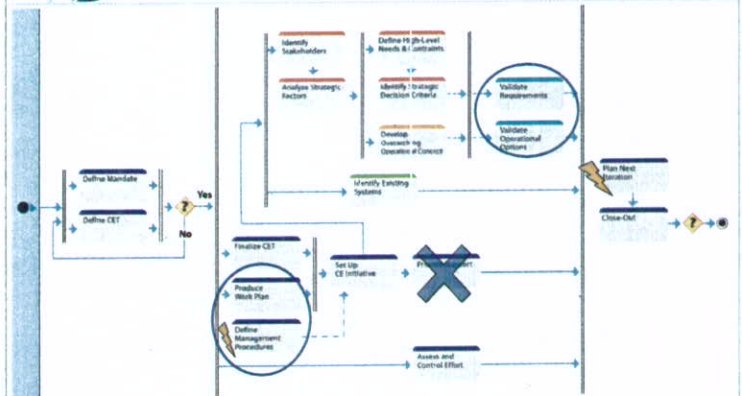
- Capability – Systems of system – System Engineering
- Decision Support and Solution elicitation

### Requirements and needs management

- Ensure the transition from expectations toward requirements
- Ensure tracability of requirements across the elicitation and the engineering of the capability/SoS.
- Conceptual Graph research domain seems promising



## Agilité



## Pattern

### Name

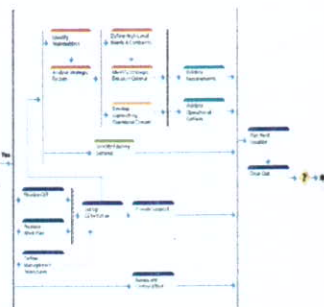
- Management Hammer

### Context:

- Applying CEP to research ARPs
- Actual ARP don't use formal management procedure
- A minimal management process helps keeping works on track.

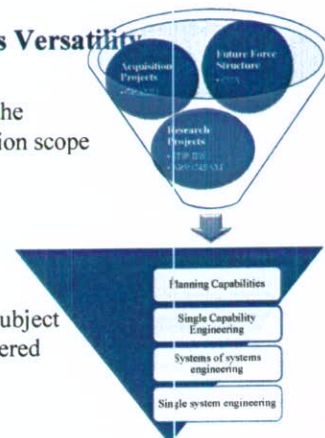
### Solution:

- Reduce and simplify Mahagement process;
- Suppress irrelevant tasks



## Process Versatility

- Within the Application scope



- Within the subject being engineered



## Timeline

- 2008-09
  - SOTAs & Background Exploration
  - Contractual support setup
  - Equipment acquisition
- 2009-10
  - Database Foundation Layer Establishment
  - Pattern collection
    - CapDem Exercises lessons learned
    - Current initiatives observation
    - CFD related initiative observation (?)
  - Requirement engineering process 1st Refinement
    - Validation of Conceptual Graph potential for support
  - Web & Database enabled documentation tool
- 2010-11
  - 2<sup>nd</sup> round (iteration) of the above activities with the following adjustments :
    - Patterns validation, possibly through experimentation
    - Prototype of a Conceptual-Graph tool for requirement tracability support
- 2011-12
  - Validation iteration of the above activities
  - Project findings report.



## Deliverables

- SOTAs
- Experience Report
- Validation Report
- Prototype RE
- Prototype PACEM
- Final Result



## Liaison Strategy

ARP are not TDPs	<ul style="list-style-type: none"> <li>• Close liaison is not needed</li> <li>• Higher Risk (Technology may be found inadequate)</li> </ul>
We understand that immediate CFD's priority are elsewhere	<ul style="list-style-type: none"> <li>• Cap. Management Process to be on the scope around 2012</li> <li>• CFD's personnel availability is low</li> <li>• Planned experimentations might be unrealistic</li> </ul>
We propose to:	<ul style="list-style-type: none"> <li>• Keep CFD informed of the project progress.</li> <li>• Inform CFD of our findings</li> <li>• Stay aware of CFD's orientations and vocabulary adjustments</li> <li>• Regularly Check CFD's interest in a closer collaboration</li> </ul>
We will need from CFD:	<ul style="list-style-type: none"> <li>• Access to CFD'S process documentation</li> <li>• Informations on CFD'S process evolution</li> </ul>



## Liaison Strategy /2

- Before June :
  - Meeting to « pass the handle » before rotation of CFD Rep.
- Suggestions for ensuring liaison ?



