FFI Forsvarets forskningsinstitutt

Guiding Experimentation Efforts in Support of Transformation

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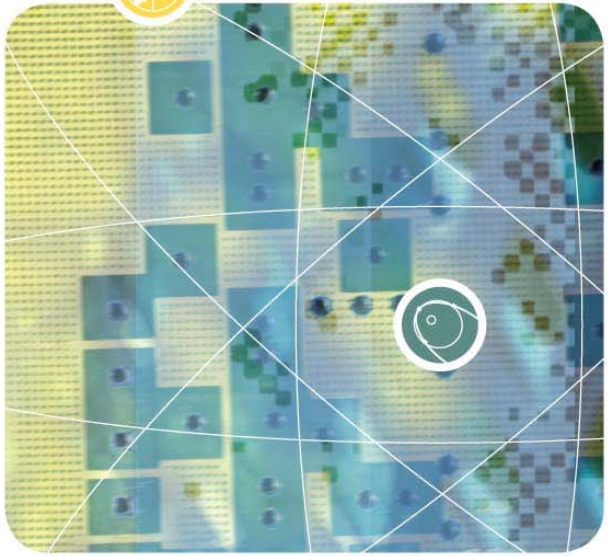


Transformation and CD&E

CD&E

- Concept Development and Experimentation (CD&E) is paramount to the success of transformation efforts.

- Top-down initiatives: Generation of CD&E activities based on identification of capability gaps.

- Bottom-up initiatives (shortfalls and “good ideas”): Generation of CD&E activities from communities concerned with e.g. operations, R&D or training.

- Prioritization of proposed experiments is essential.

CD&E in Norway

- The Joint Operational Headquarter in Norway is responsible for coordinating all national operationally related CD&E
  - This differs from some other countries, where dedicated centers have been given the responsibility for CD&E.

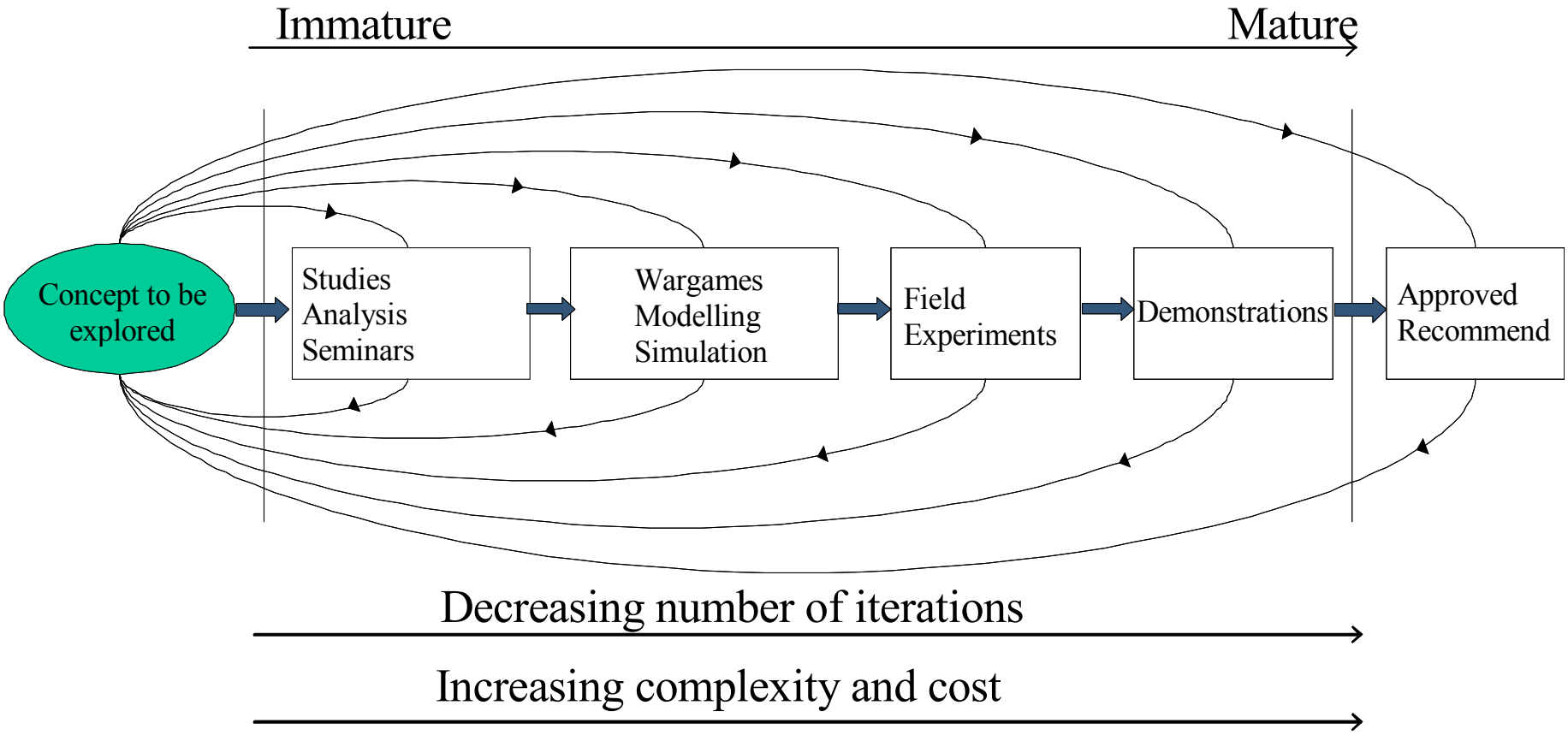
METEX (METhod for EXperimentation): The framework is currently under final development and evaluation by the Norwegian Defence Research Establishment (FFI) and Teleplan AS.

Presentation Outline

- The CD&E Process.
- A framework and a decision support tool for prioritizing experimental activities.
- A Web-based process framework guiding prioritization of CD&E activities.

The CD&E Process

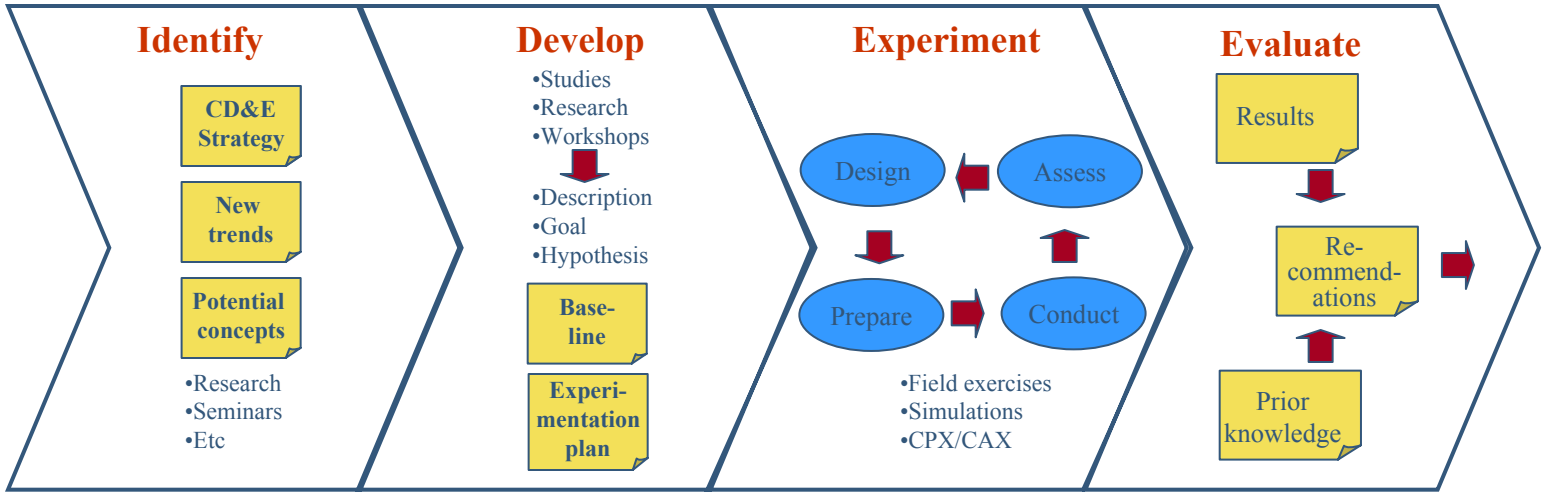
Tools Supporting Maturation and Development of Concepts*



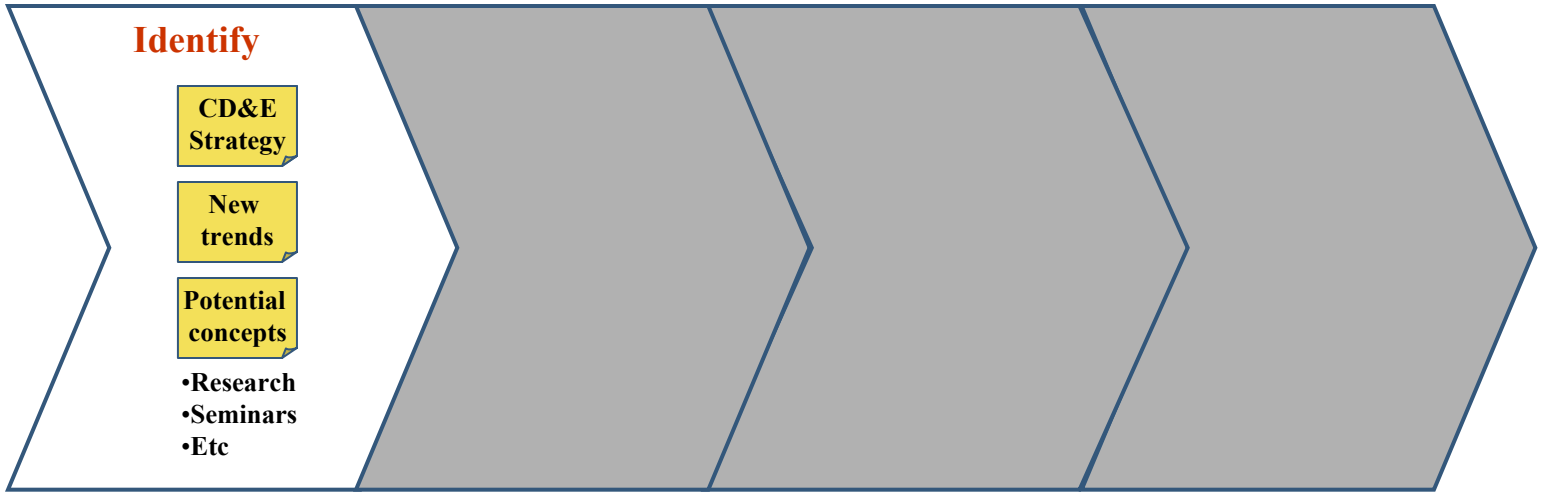
* Based on ideas from UK Command and Battlespace Management and Canadian Forces Experimentation Centre (Plan Pegasus).

The CD&E Process

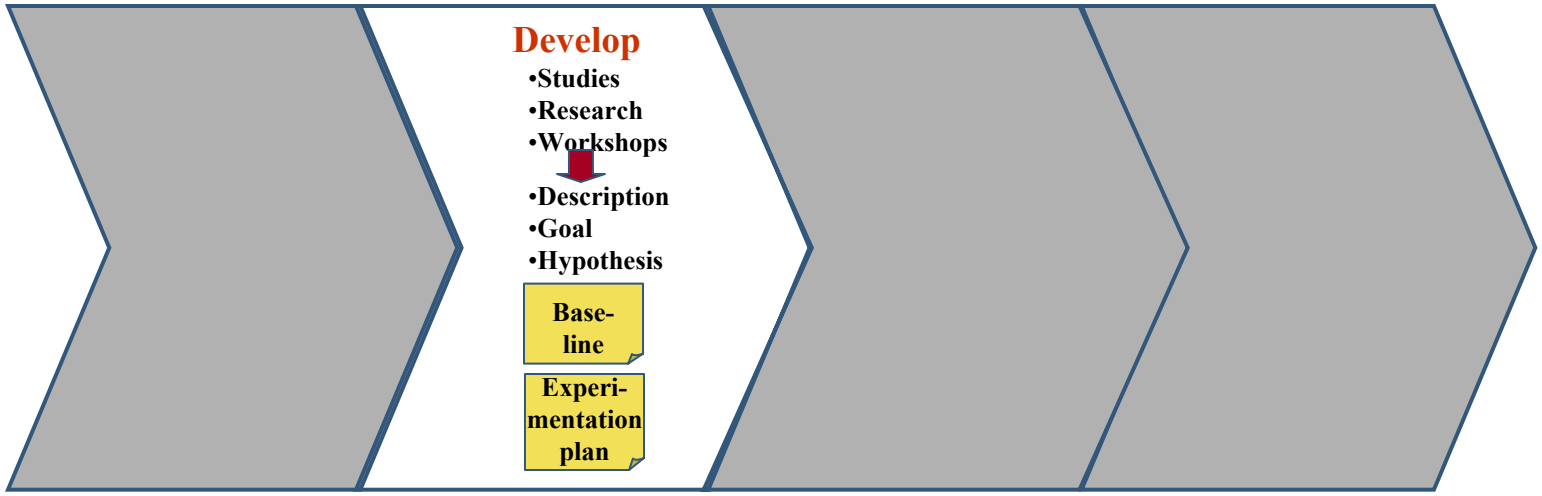
The CD&E process is divided into 4 sub-processes:



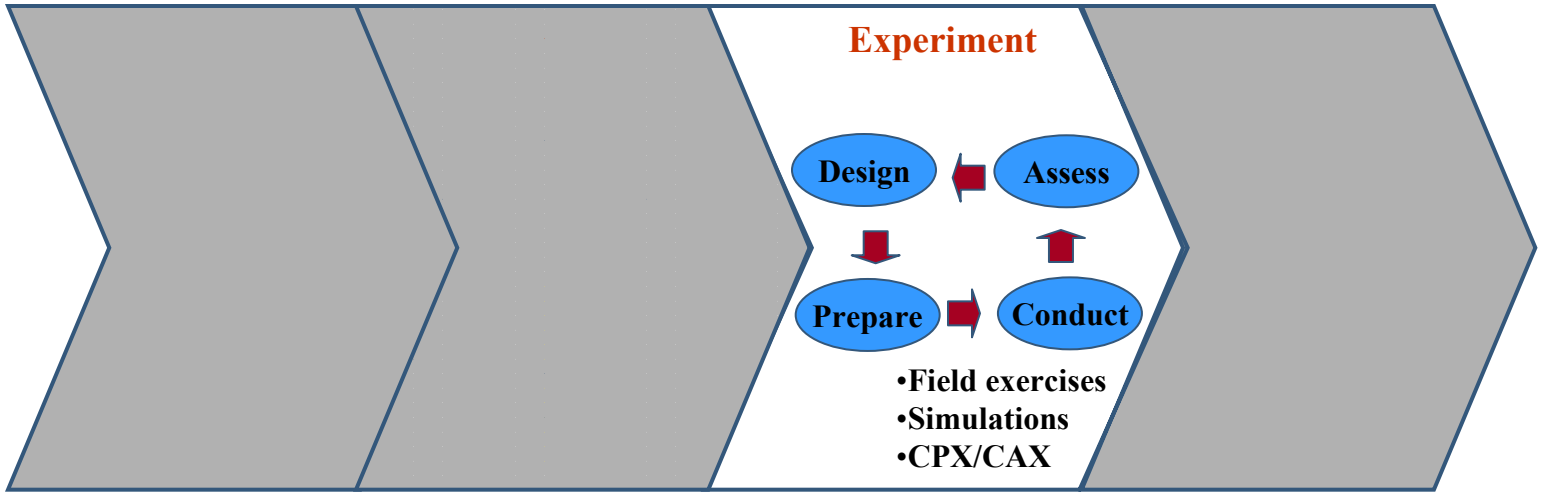
The CD&E Process: *Identify*



The CD&E Process: *Develop*

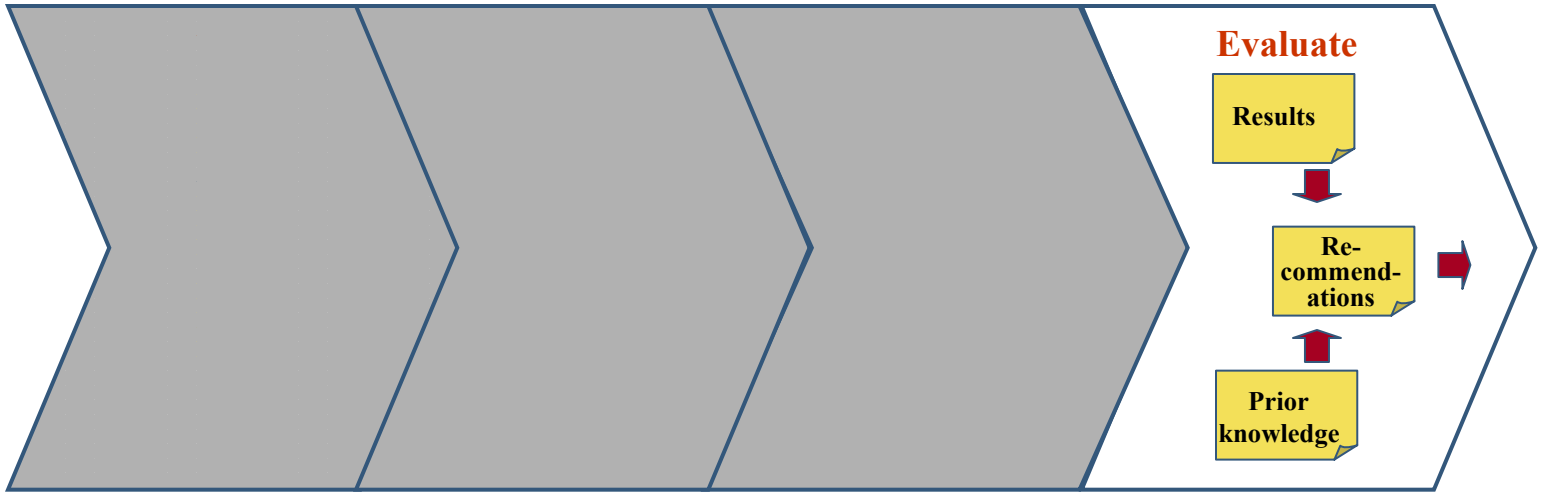


The CD&E Process: *Experiment*

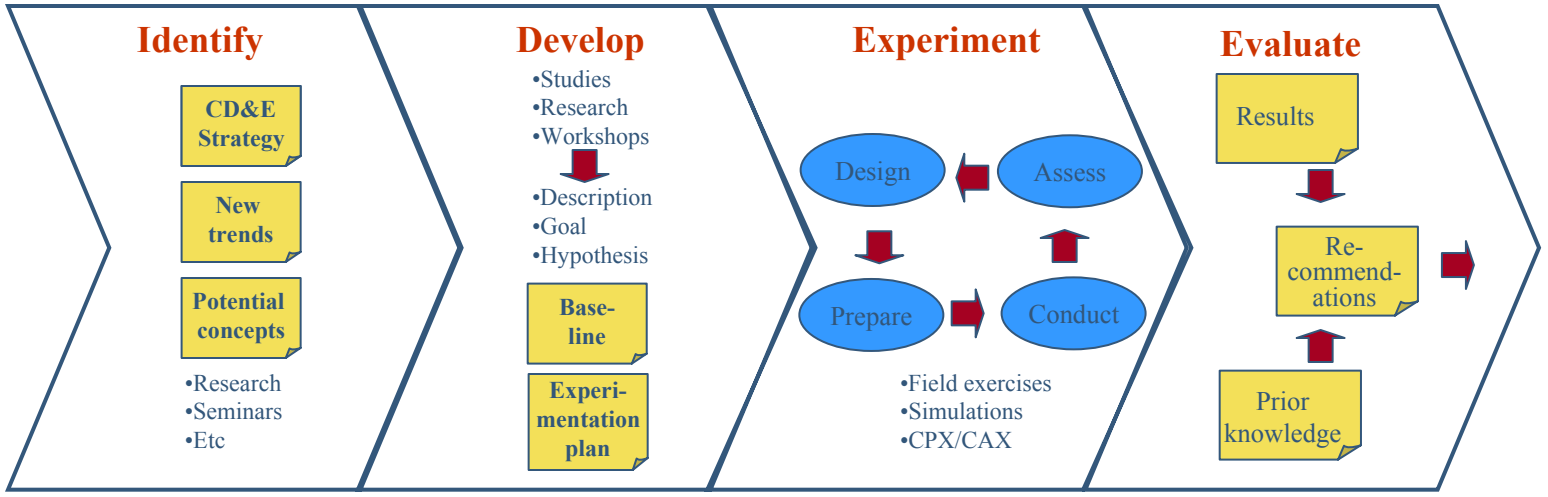


*: US DoD Command and Control Research Program – Code of Best Practice for Experimentation.

The CD&E Process: *Evaluate*



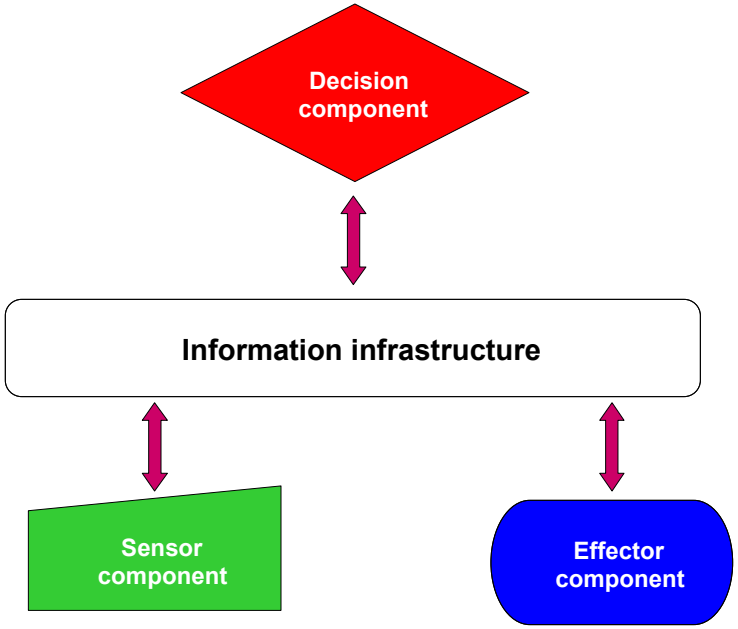
The CD&E Process



A framework and a decision support tool for prioritization of experimental activities

Network Centric Component Model (NCCM)

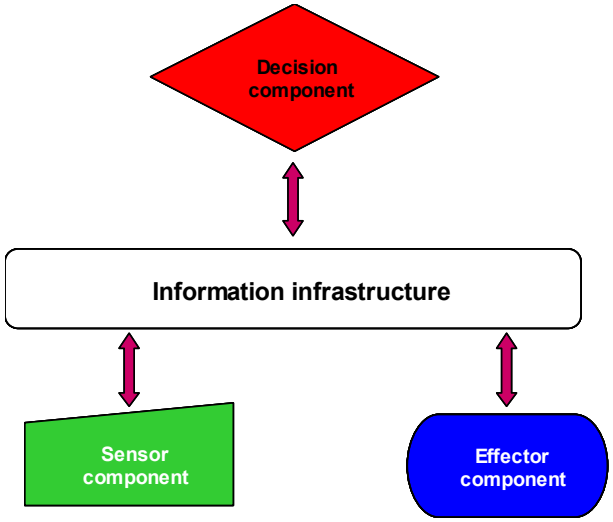
- The NCCM has been developed in connection with the recent national Defense Requirement Review:



- A decision component, which consists of decision support and “decision-making” and which deliver decisions.
- A sensor component, which delivers data and information from sensors.
- An effector component, which delivers “effects” in operations.
- An information infrastructure (INI), which delivers connectivity and distribution capacity for data and information.

Components Properties(1)

Properties are used to characterize NCCM components.



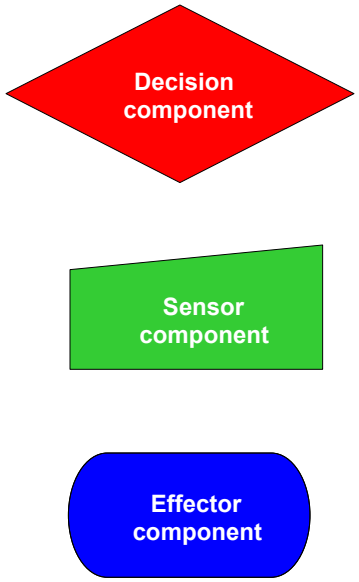
Common properties (for all components)

- *Robustness*
- *Interoperability*
- *Speed and flexibility*
- *Responsiveness and strategic deployability*

Components Properties (2)

Component specific properties

- *Decision effectiveness* for the decision component
- *Coverage and data quality* for the sensor component
- *Effect* for the effector component
- *Connectivity and distribution capacity* for the INI



Gaps in the Force Structure Based on Components and Properties

	Component specific properties			Common properties			
Decision component	Decision effectivness			Robustness	Inter-operability	Speed and flexibility	Responsiveness and strategic deployability
	Establish situational picture (T)	Knowledge and experience	Culture				
Operational level	2	1	3	2	3	3	2
Tactical level	2	3	1	3	3	1	2
Sensor component	**Coverage and data quality**						
Psyops	2			3	3	1	1
CNO	2			3	2	3	3
EW	1			2	2	1	2
Land	2			2	3	3	1
Surface	2			2	1	2	1
Sub sea	1			2	1	2	1
Air	2			3	1	2	2
Space	1			2	2	1	3
Effector component	**Effect**						
Psyops	2			2	2	1	3
CNO	1			3	3	2	3
EW	3			3	2	2	1
Land	2			2	2	2	2
Surface	2			2	2	2	2
Sub sea	1			2	3	2	2
Air	1			1	2	1	2
Space	3			3	3	1	2
Information infrastructure, INI	**Connectivity and distribution capacity**						
INI	2			1	3	2	2

- Red: Critical gaps
- Yellow: Substantial gaps
- Green: Satisfactory status.

The colors are given by the current situation.

Assessing the Operational Value of a Concept

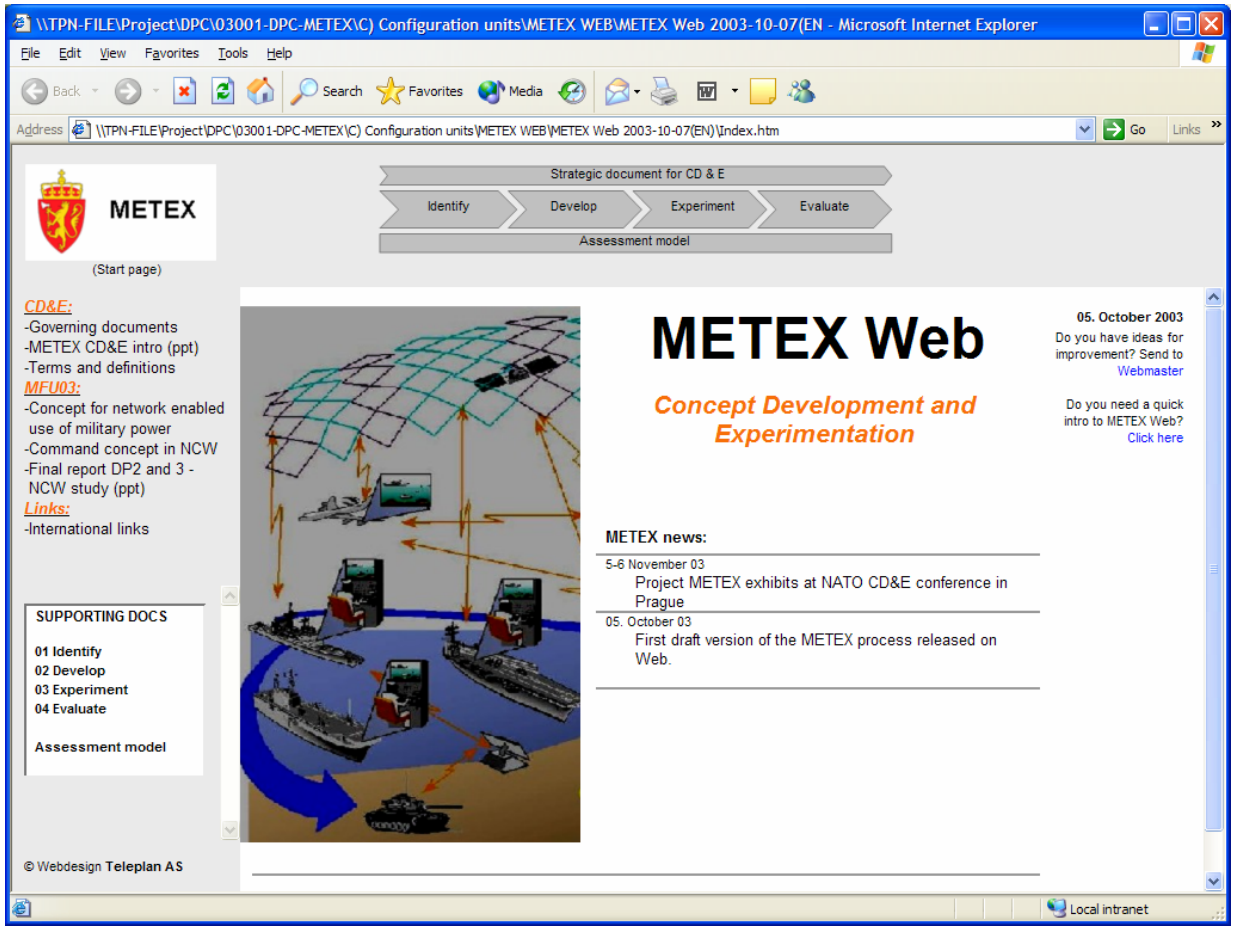
	Component specific properties						Common properties										
	Decision effectiveness																
Decision Component	Establish situational picture		Knwledge and experience		Culture		Robustness		Interoperability		Speed and flexibility		Responsiveness and strategic deployability		Cost-/ Effectiveness		Score
Significance	3		3		3		3		3		3		3		3		
	Status	Score	Status	Score	Status	Score	Status	Score	Status	Score	Status	Score	Status	Score		Score	
Operational level	2		1		3		2		3		3		2				0
Tactical level	2		3		1		3		3		1		2				0
Sensor component	Coverage and data quality						Status	Score	Status	Score	Status	Score	Status	Score		Score	
Significance	3																
	Status		Score														
Psyops	2						3		3		1		1				0
CNO	2						3		2		3		3				0
EW	1						2		2		1		2				0
Land	2		3				2		3	2	3	2	1				54
Surface - Sea	2		2				2		1	2	2	2	1				30
Subsea	1						2		1		2		1				0
Air	2						3		1		2		2				0
Space	1						2		2		1		3				0
Effector component	Virkning						Status	Score	Status	Score	Status	Score	Status	Score		Score	
Sigificance	3																
	Status		Score														
Psyops	2						2		2		1		3				0
CNO	1						3		3		2		3				0
EW	3						3		2		2		1				0
Land	2						2		2		2		2				0
Surface - Sea	2						2		2		2		2				0
Subsea	1						2		3		2		2				0
Air	1						1		2		1		2				0
Space	0						0		0		0		0				0
Information Infrastructure (INI)	Connectivity and distribution capacity						Status	Score	Status	Score	Status	Score	Status	Score		Score	
Significance	3																
	Status		Score														
INI	2						1		3		2		2				0
															Total score		**84**

Decision Support Tool Modules

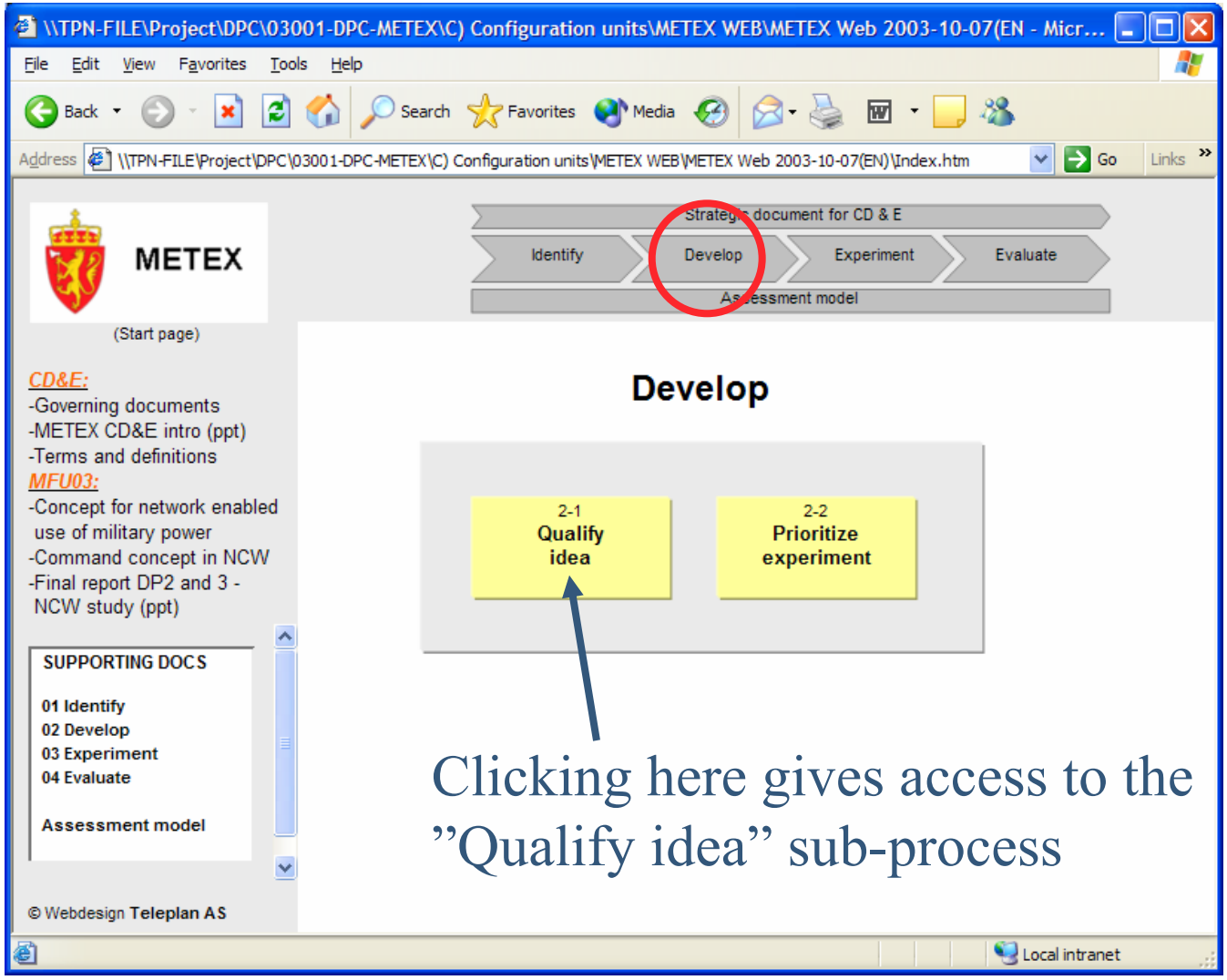
- The tool consists of four modules supporting each of the following tasks:
  - Assessing the operational value (benefit) of the experiment.
  - Calculating the costs of the experiment.
  - Calculating the benefit/cost ratio of the experiment.
  - Assessing the uncertainties associated with conducting the experiment.
- Going through the tasks for each experiment in a portfolio of experiments will give a basis for prioritization of which experiments to conduct (fund).

A Web-based Process Framework Guiding Prioritization of CD&E Activities

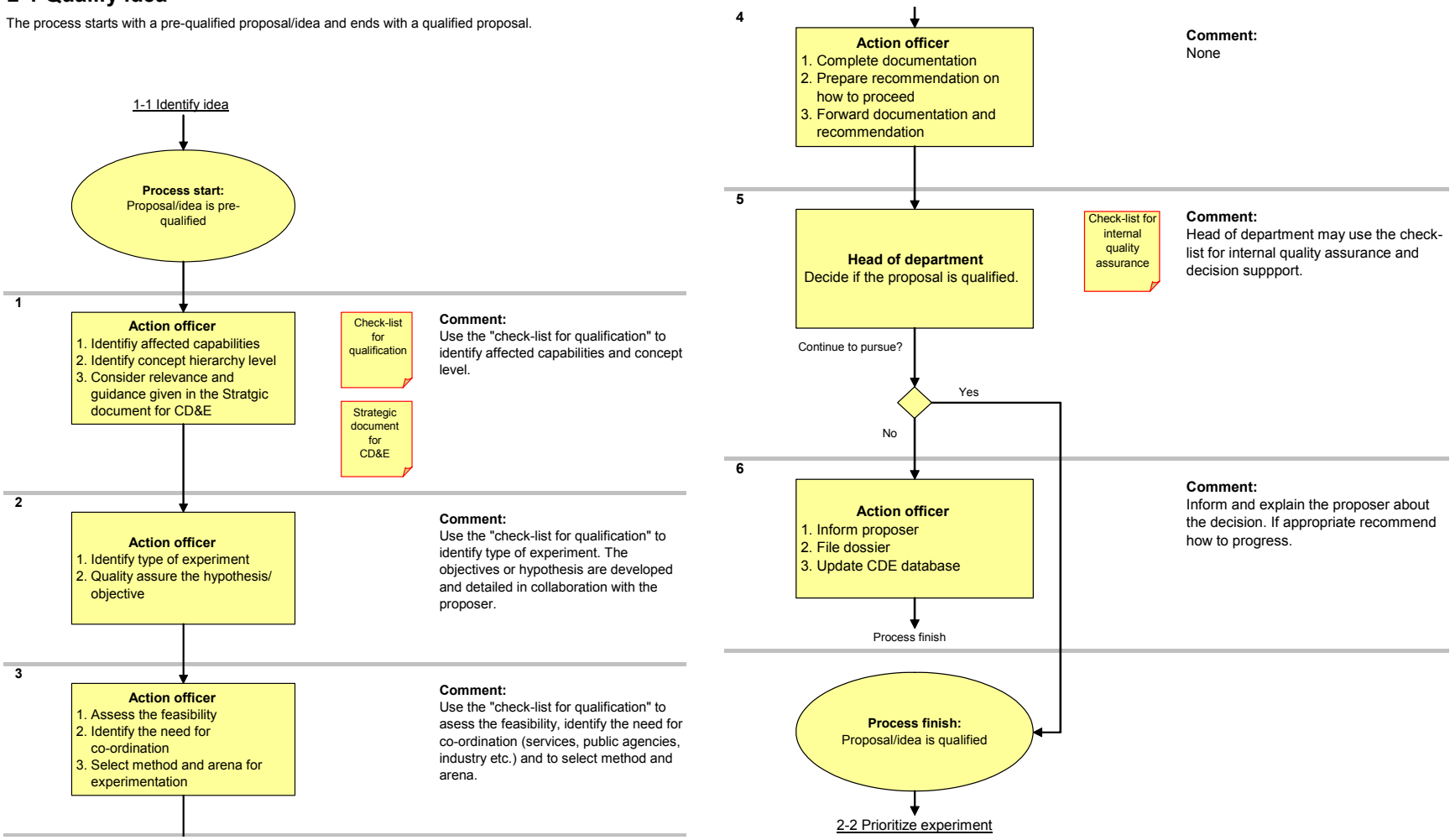
METEX Web Front Page



Sub-Processes are Accessed by Point-and-Click



The “Qualify Idea” Sub-Process Describes Tasks and Provides Check-Lists, Templates, etc



Final Remarks

The methodology is currently under final development and evaluation

- An early release is already in use by the Armed Forces

Final observations

- In order to make qualified decisions, interaction between decision makers and experimenters is critical
- The process web facilitates this interaction, helps the experimenter improve the experiment design, increases cost-benefit
- The quality of an actual experiment is improved