FFI Forsvarets forskningsinstitutt

10th ICCRTS

A Model to Identify Short-Term Efficiency Improvements of Network Organized Forces

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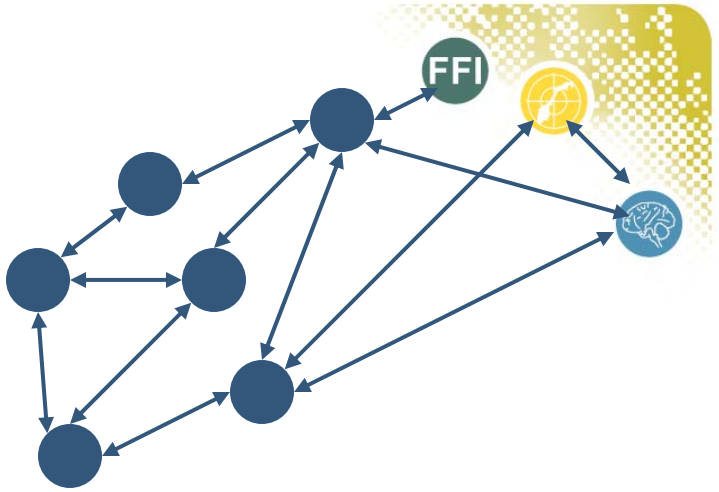
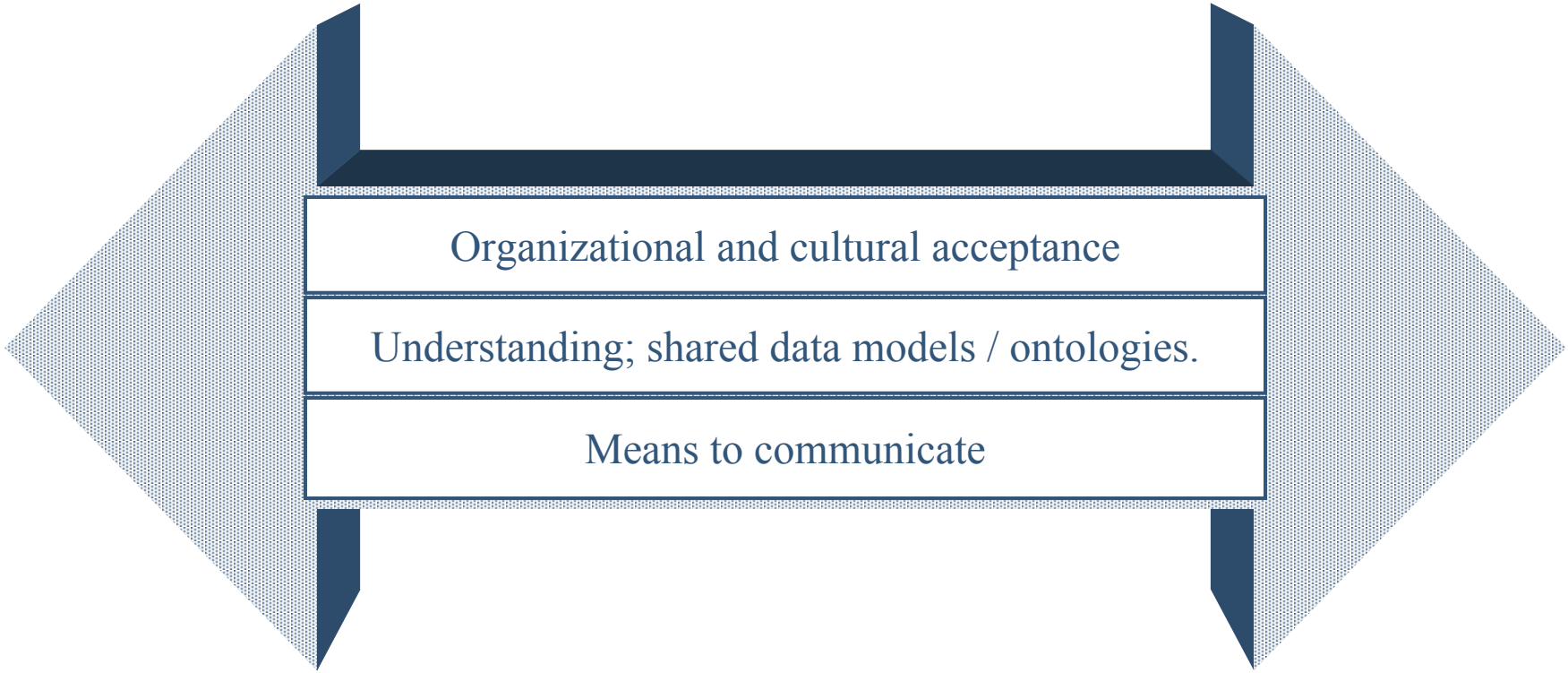
Network Organized Forces



- Idea:
  - Unnecessary organizational constraints removed
  - Components used freely as best serves the Purpose

- Promises:
  - Increased utilization → greater efficiency
  - Increased flexibility → robustness

Network Organized Forces = New Links



Links

..this does not imply that all actors will be linked to an actor network, or exclusively or primarlily to other actors. Rather that actors will have a far richer collection of links to other battlespace entities than they do with platform-centric operations.

(Alberts, Garstka Stein 1999, *NCW – Developing and Leveraging Information Superiority*)

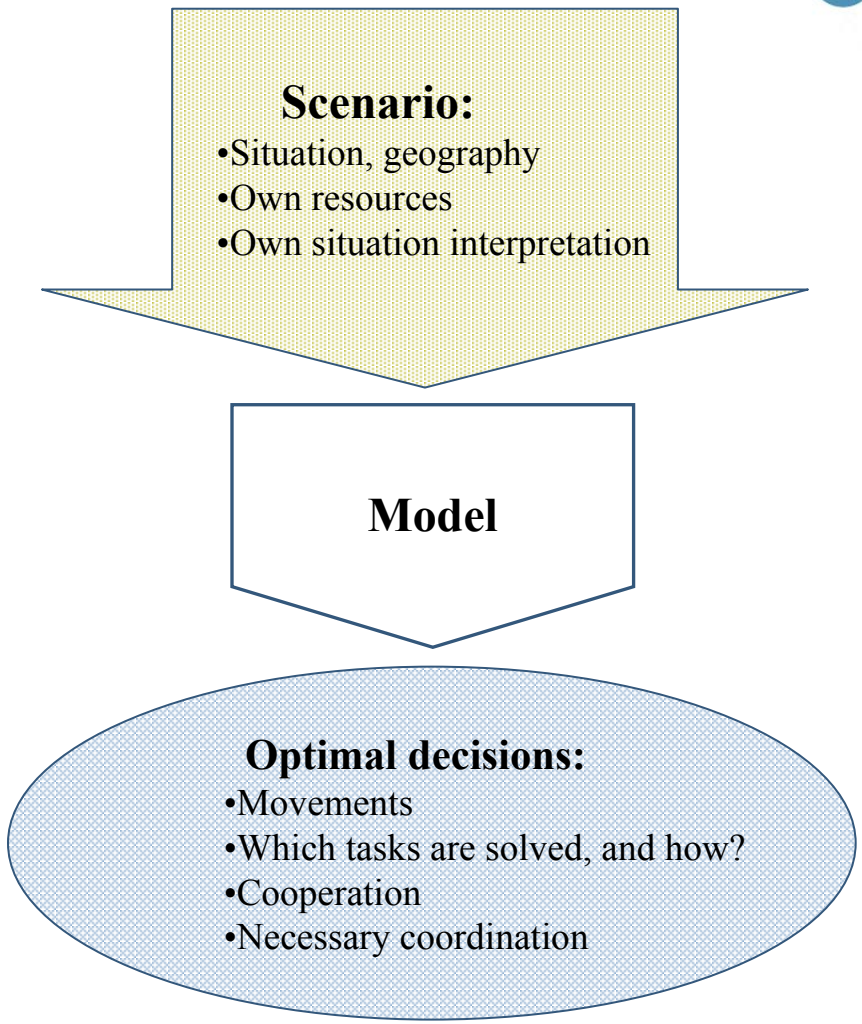
- Which entities should be linked?

- In the short-term:
  - How to be network organized with existing components?
  - Pragmatic approach; “picking low-hanging-fruits”.

A Model to Identify Short-Term Efficiency Improvements

The model:

- A stochastic resource allocation optimization model for the operational/tactical level.
- The model imitates the decisions of *network organized forces*.
- How will network organized forces behave in a given scenario?
- Which are the useful links?
- Implementation: A Stochastic Mixed Integer Program.

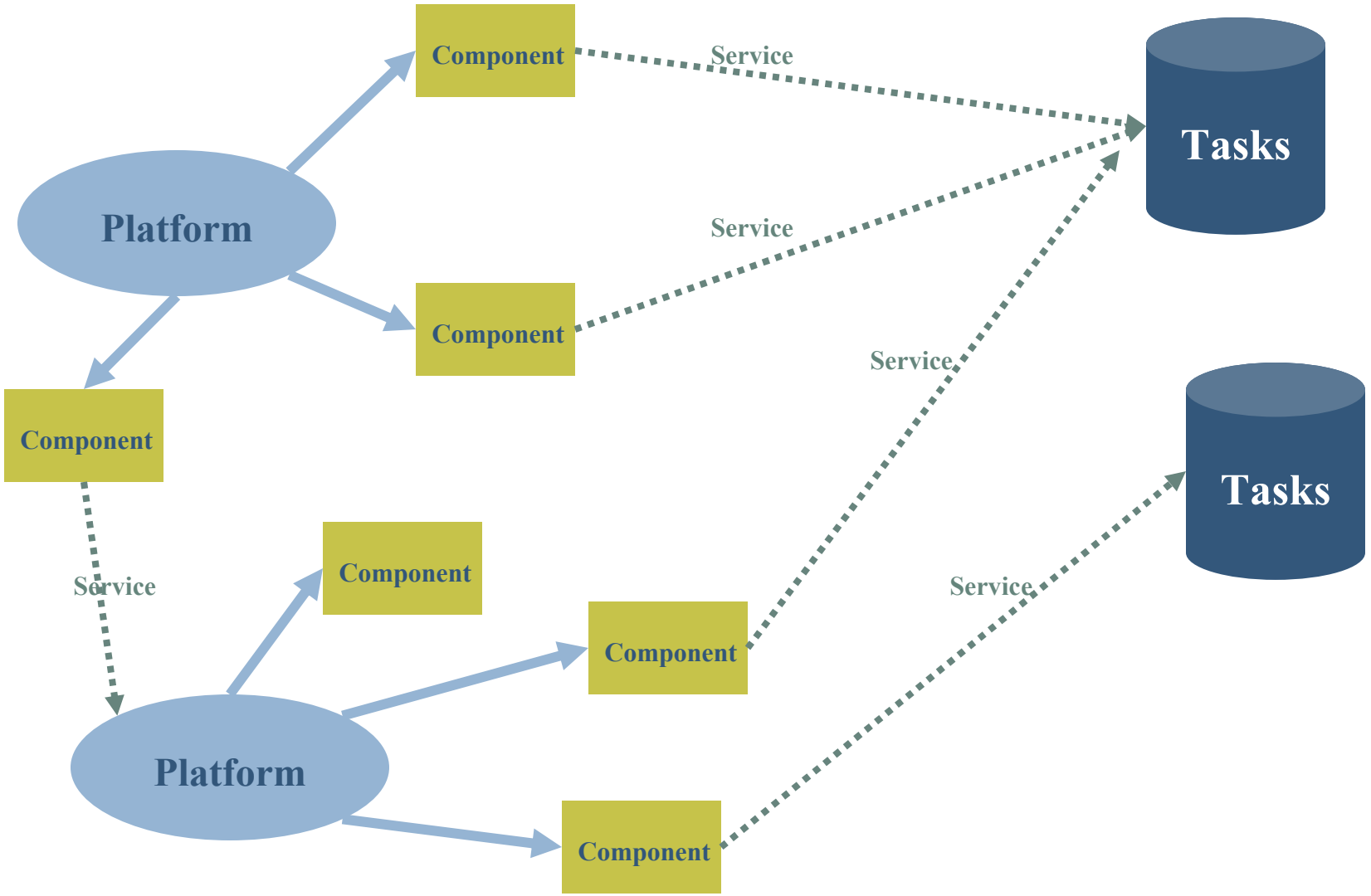


Two qualities included in the model:

- Implements a *service concept*:
  - Nodes in the network are service providers and/or service consumer. Delivery of services between entities.
  - Everybody is allowed to deliver services to everybody (no organizational constraints).

- Values *flexibility* in handling uncertain tasks:
  - Robustness.
  - How are components utilized when the situation does not turn out as planed?

A Service Concept



Example: Resources

Platform	Components	Services
Frigate	Helicopter	Effect ground Patrolling ground Patrolling sea
	Cannon	Anti-surface
	Frigate itself	Patrolling sea
Home Guard Unit	Unit itself	Effect ground Patrolling ground
Coast Guard Vessel	Helicopter	Effect ground Patrolling ground Patrolling sea
	Cannon	Anti surface Effect ground
	Vessel itself	Patrolling sea
Special Operations Unit	Unit itself	Anti-terror Anti-surface Effect ground Patrolling ground

Example: Scenario, Areas

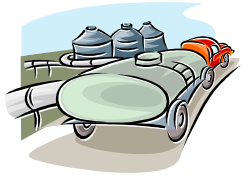
Geography:

Sea

Ground

Sea North

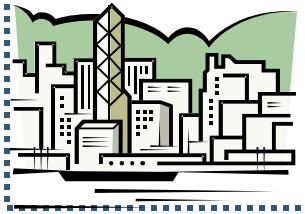
Ground North



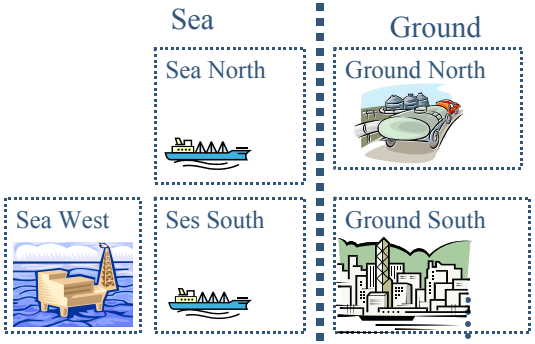
Sea West

Sea South

Ground South



Uncertain tasks



11
Current situation

p=0,5

21
Terrorists' focus area - Ground

p=0,5

22
Terrorists' focus area - Sea

p=0,5

31
Attack oil rafinery

p=0,5

32
Quiet

p=0,6

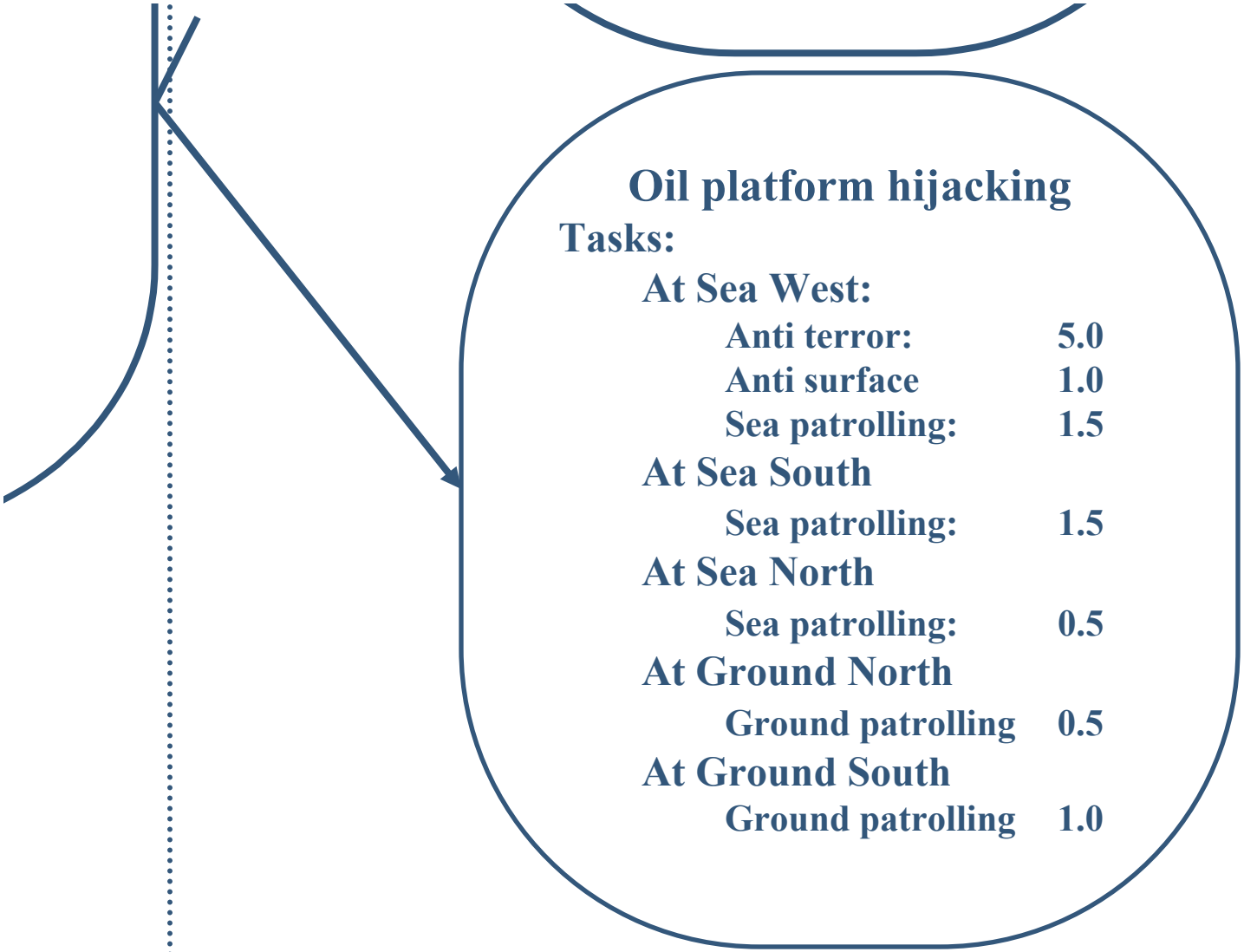
33
Attempt pipeline sabotage

p=0,4

34
Oil platform hijacking

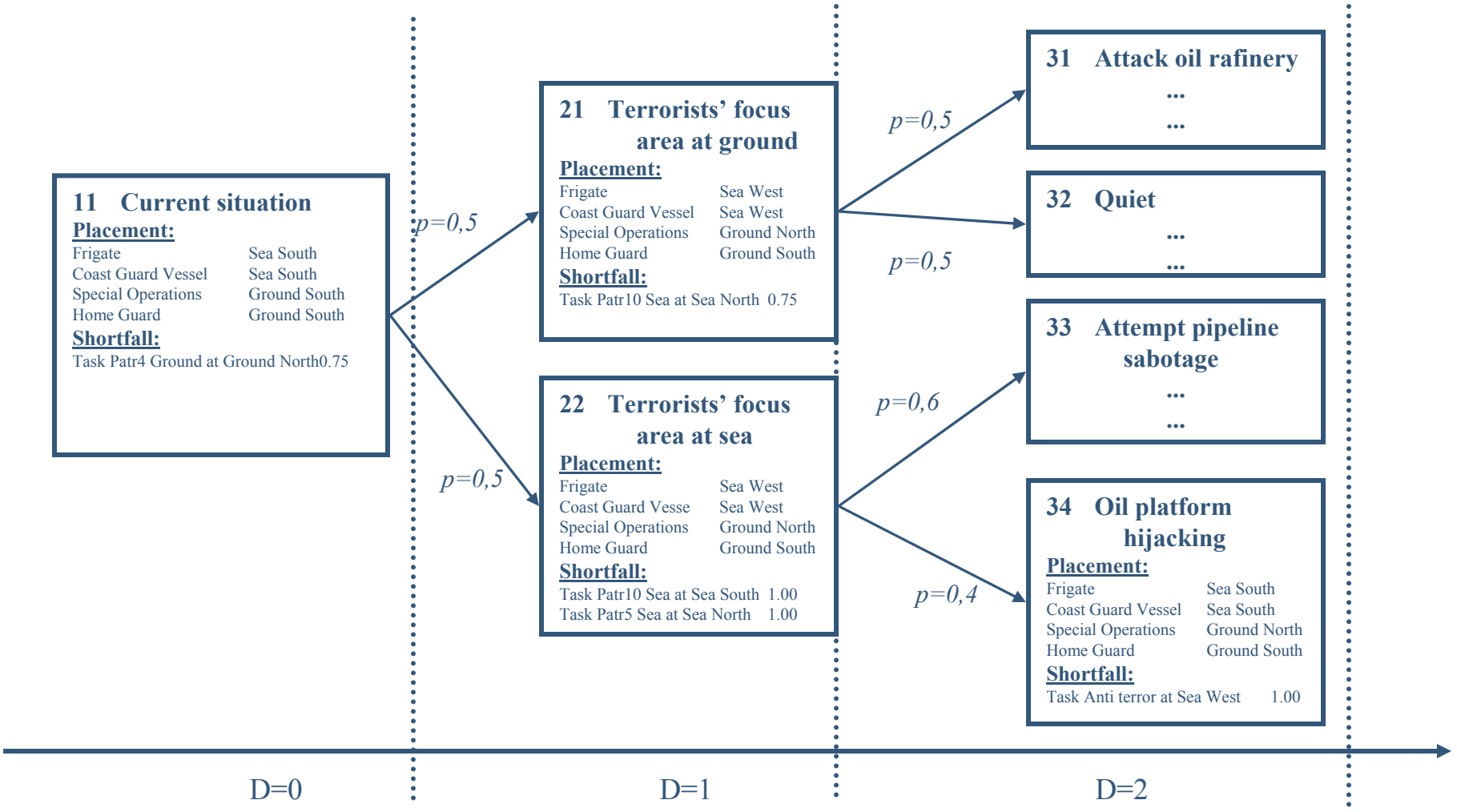
D=0 D=1 D=2

Example: detailed node from task tree



D=2

Example: Solution



Cooperation and Coordination

- From the solution:

Components delivering to same task:

....
In Node: 22, Task: PatrAS52
Cannon at Frigate delivers 0.3 Asu til PatrAS52_in_Sea West
CoastGuardVessel delivers 5 VP_S til PatrAS52_in_Sea West
Cannon at CoastGuard delivers 1.7 Asu til PatrAS52_in_Sea West
....

Components delivering same service to same task:

....
In Node: 22, Task: PatrAS52, Service Asu
Cannon at Frigate delivers 0.3 Asu to PatrAS52_in_Sea West
Cannon at CoastGuard delivers 1.7 Asu to PatrAS52_in_Sea West
....

- Conclusion: A new or improved link between the Coast Guard Vessel and the Frigate may be necessary to support such cooperation.

Summary

- Network organized forces = new and/or improved links
- A model to identify short term efficiency improvements of network organized forces.
- Important aspects: *services* and *uncertainty*.
- The model imitates the decisions of network organized forces.
- Cooperating platforms and components may need a new or a fortified link between them to realize network organized forces in the short term.

Example: utilization and robustness

- *Utilization*: look for unused capacity with the components.
- *Robustness:* Consider shortfall in the various states.