Australian Government
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Architecture-Based SCMILE Service Framework for systems' integration

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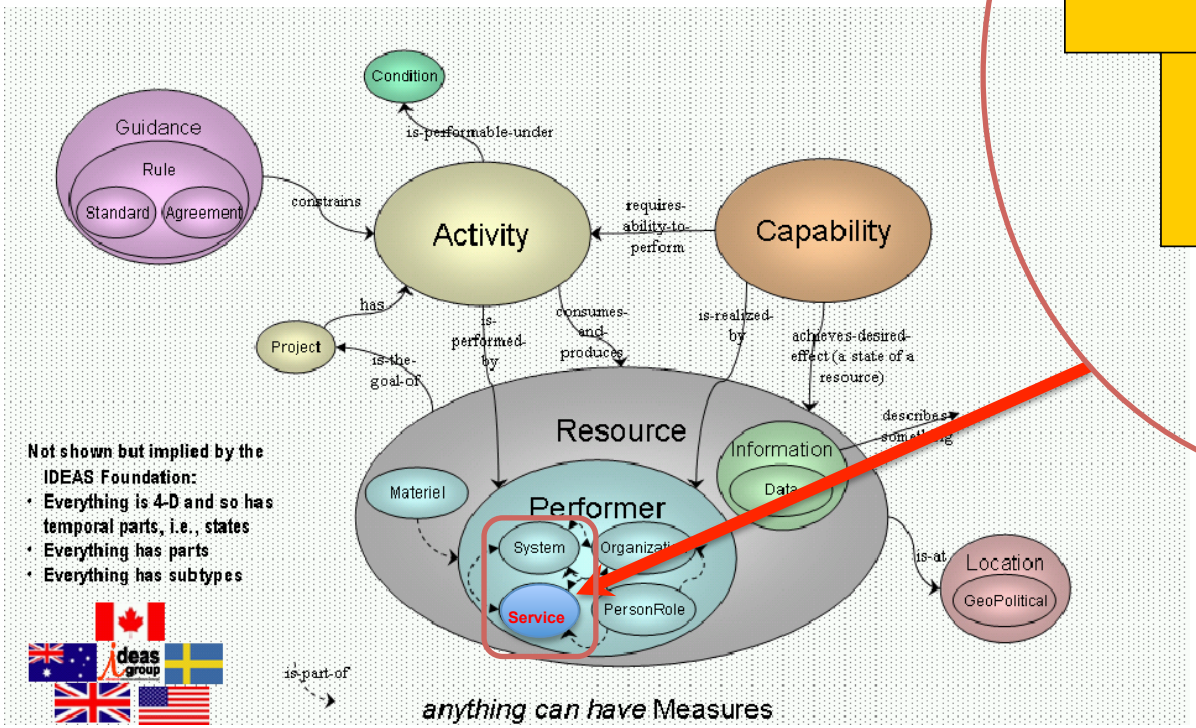
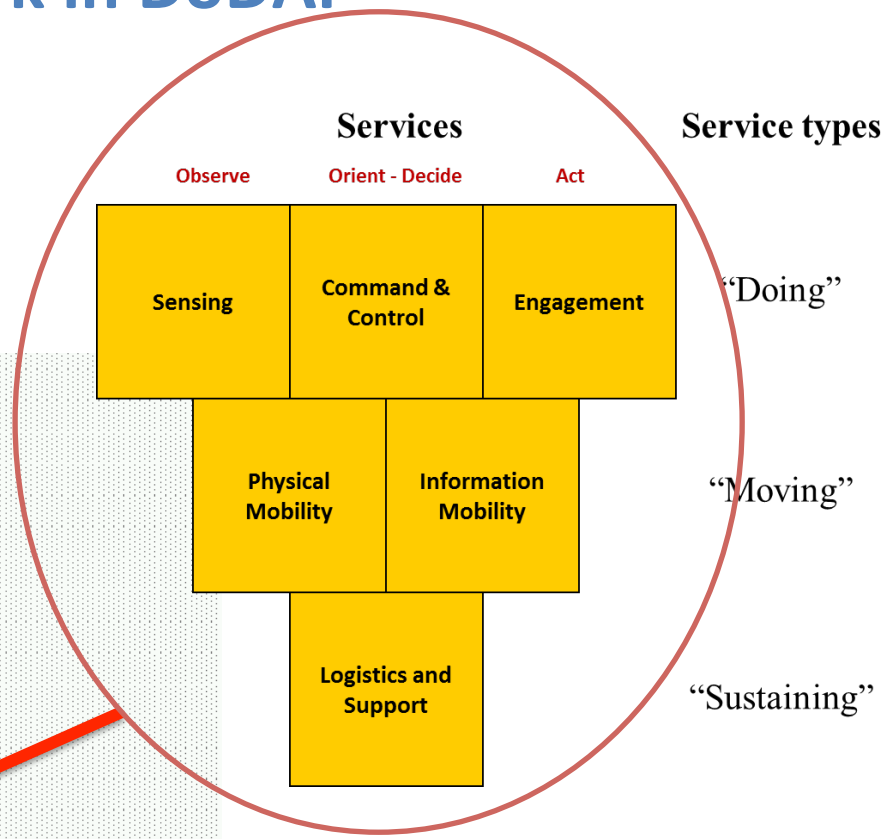
Overview

- The SCMILE Services Framework (SSF)
- DODAF compliant Service-Oriented Thinking
- Using SSF for system dependency analysis

Adopting SCMILE Framework in DoDAF





SCMILE Services' definitions

	Definitions
S	Sensing (provision of awareness/perception)
C	C2 (provision of decisions)
M	Physical Movement (provision of movement and mobility services)
I	Information Movement (provision of information transfer and manipulation)
L	Logistics and Supply (provision of Logistics; provision of supplies and sustenance)
E	Engagement (Engaging with the affected areas operationally, functionally, social-technologically or technically.)

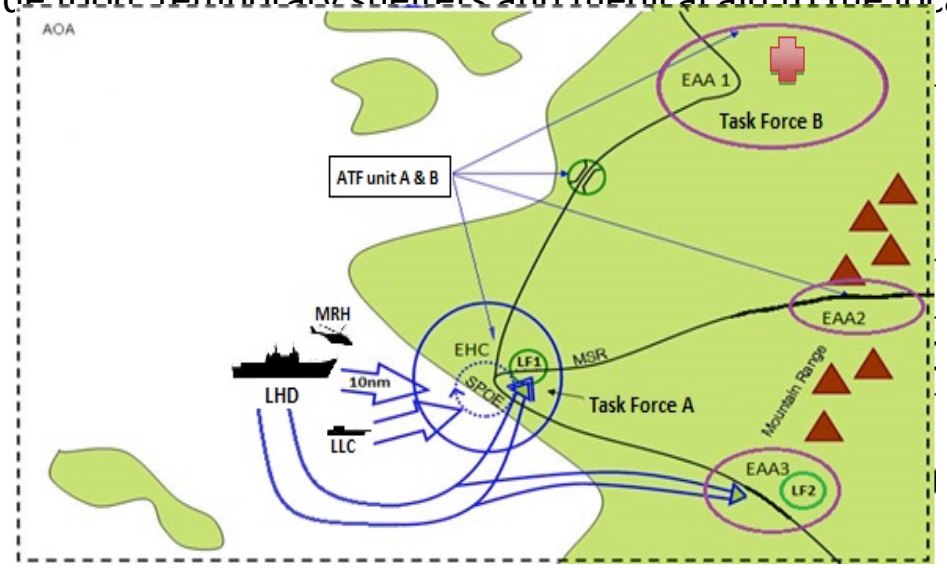
DoDAF 2.0 viewpoints

- We are using the following DoDAF viewpoints
- Test case
  - Employment of Australia Amphibious Capability for Humanitarian Assistance

DoDAF 2.0 viewpoints	Viewpoint descriptions	Architecture features
OV-1	Operational concept Description	Diagram
OV-5b	Operational Activity model: Tree diagram or BMPN	Diagram
SvcV-1	Service Composition and Taxonomic	Diagram
SvcV-3a	Services and Systems relationships	Ad-hoc report
SV-1	System resource flows and their composition	Diagram
SV-3	The interface relationships among systems	Matrix
SV-5b	Systems to Capabilities or Operational Activities	Matrix

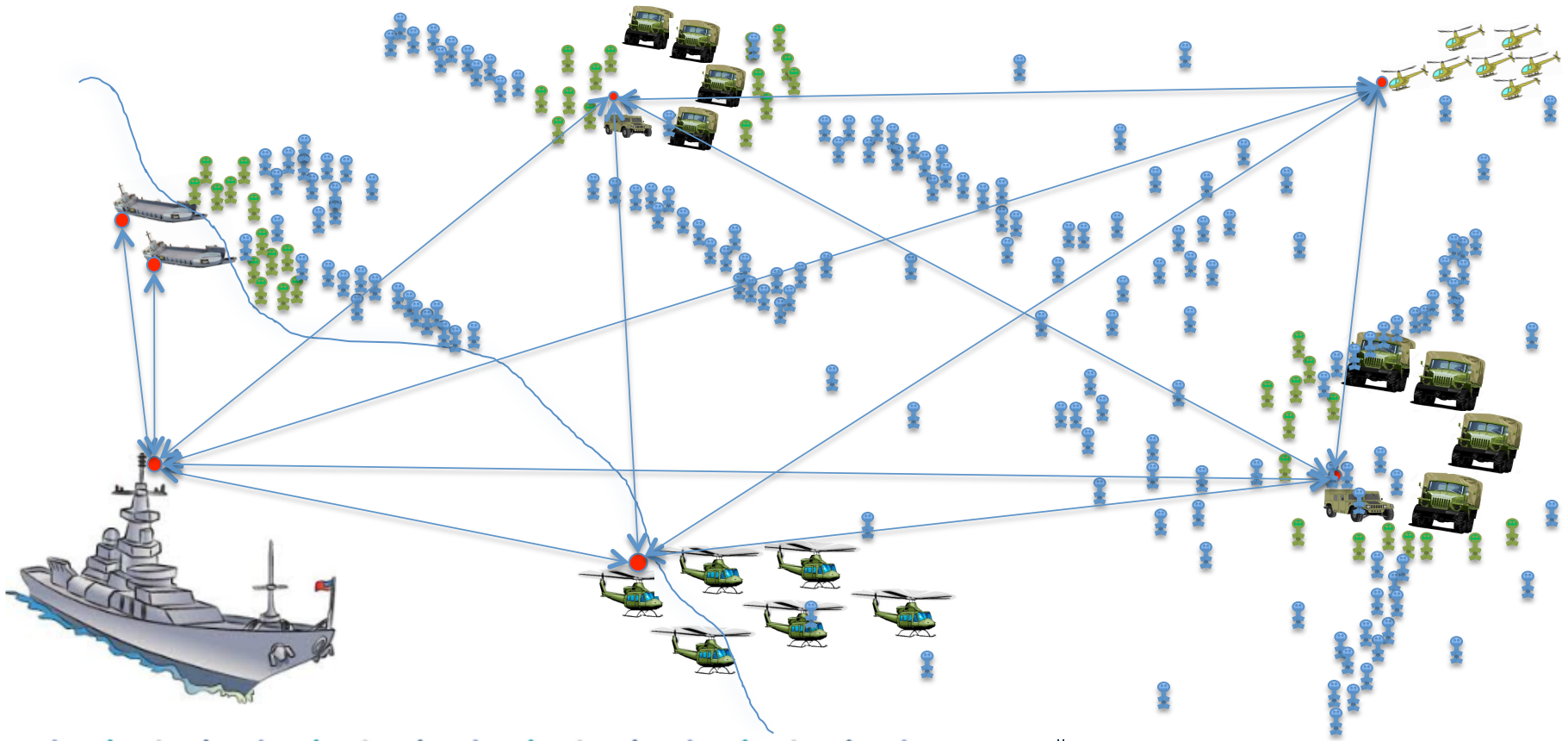
OV-1: Scenario

- A scenario based on Humanitarian Assistance
- A country is affected by a disaster
- The Australian Amphibious capability is called upon to perform three tasks:
  - To recover as many Australian Nationals as possible
  - To provide a reconstruction task force to help repair a local hospital in a township
  - To provide food, temporary shelters and medical aid to the local people in need



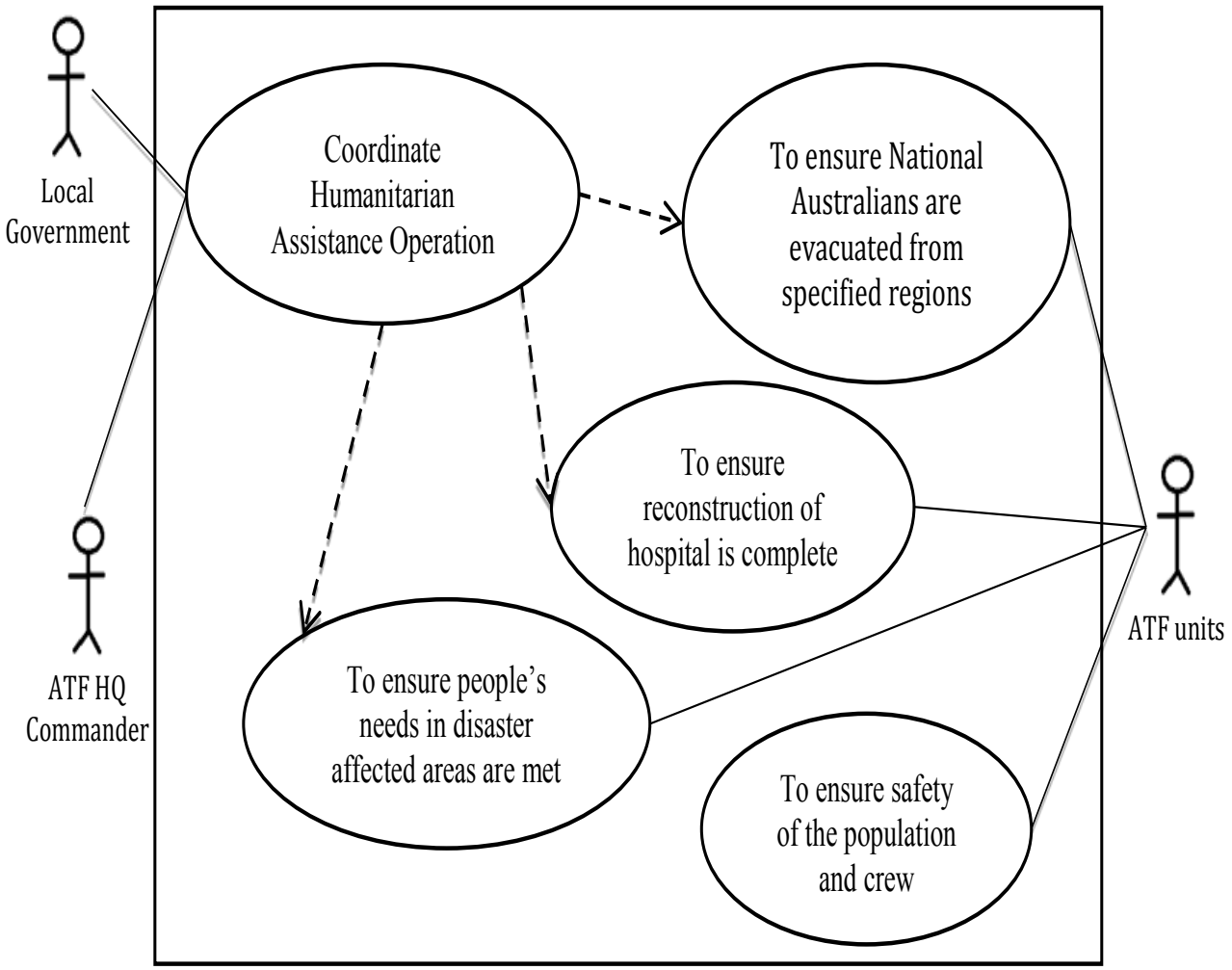
Scenario Based Dependency Analysis

- There are multiple and interdependent systems-of-systems (SoSs)
- These interact with each other at different levels
- Adopting the SCMILE Services Framework will help facilitate discussions



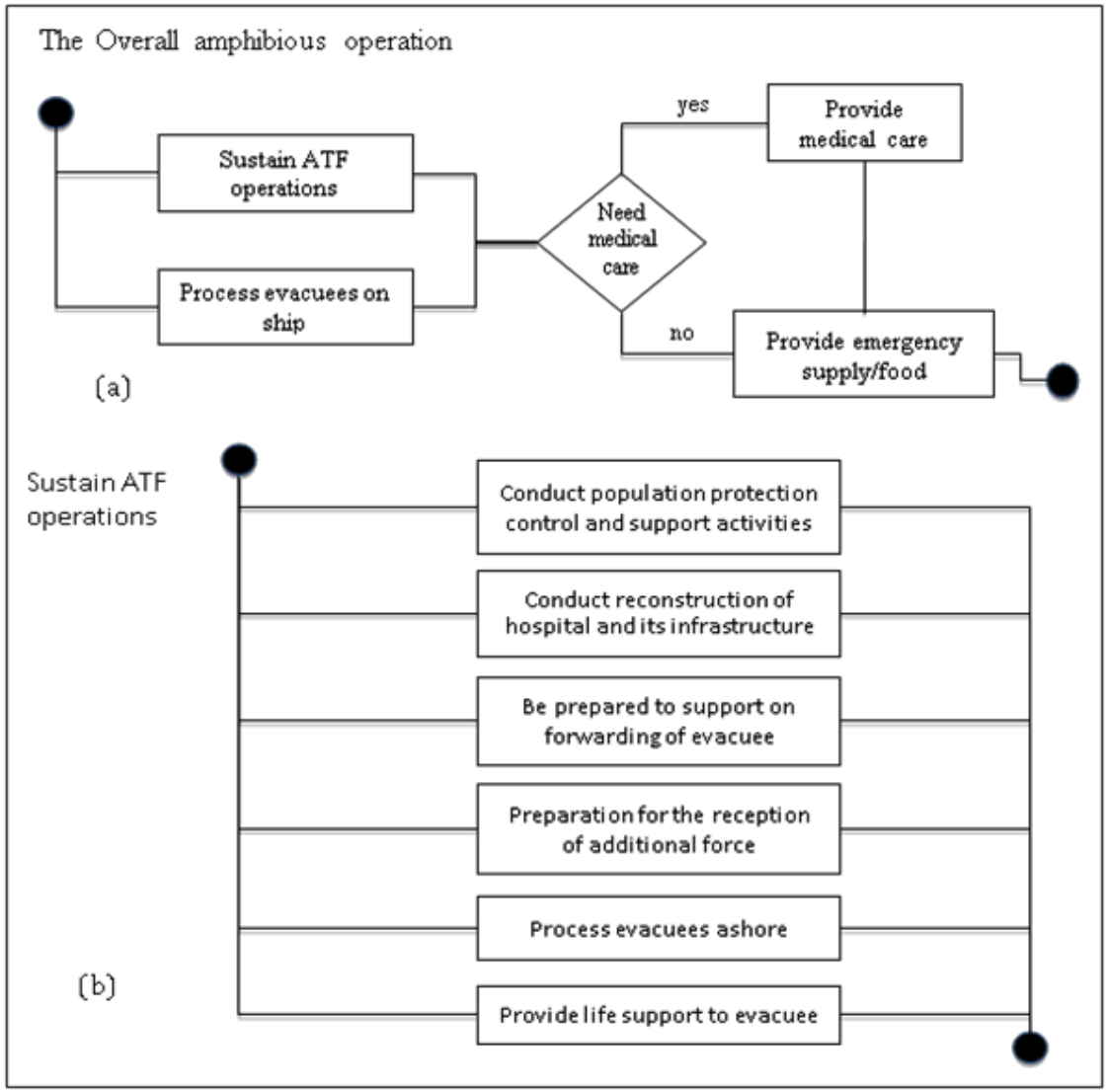
OV-1: Purpose using Use Case Diagram

Why do we do it?



OV-5b: Operational Activities using BPMN

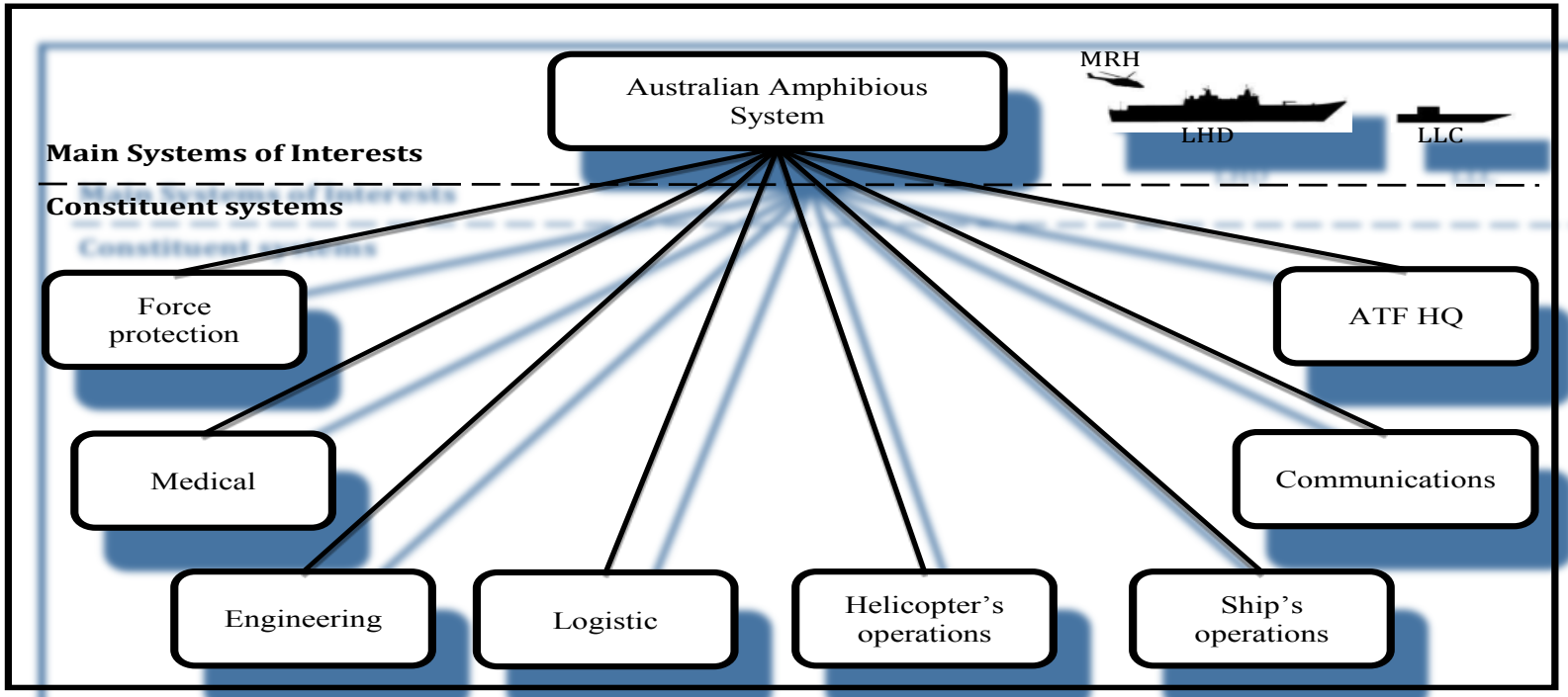
What do we do?



SV-1: The Australian Amphibious System

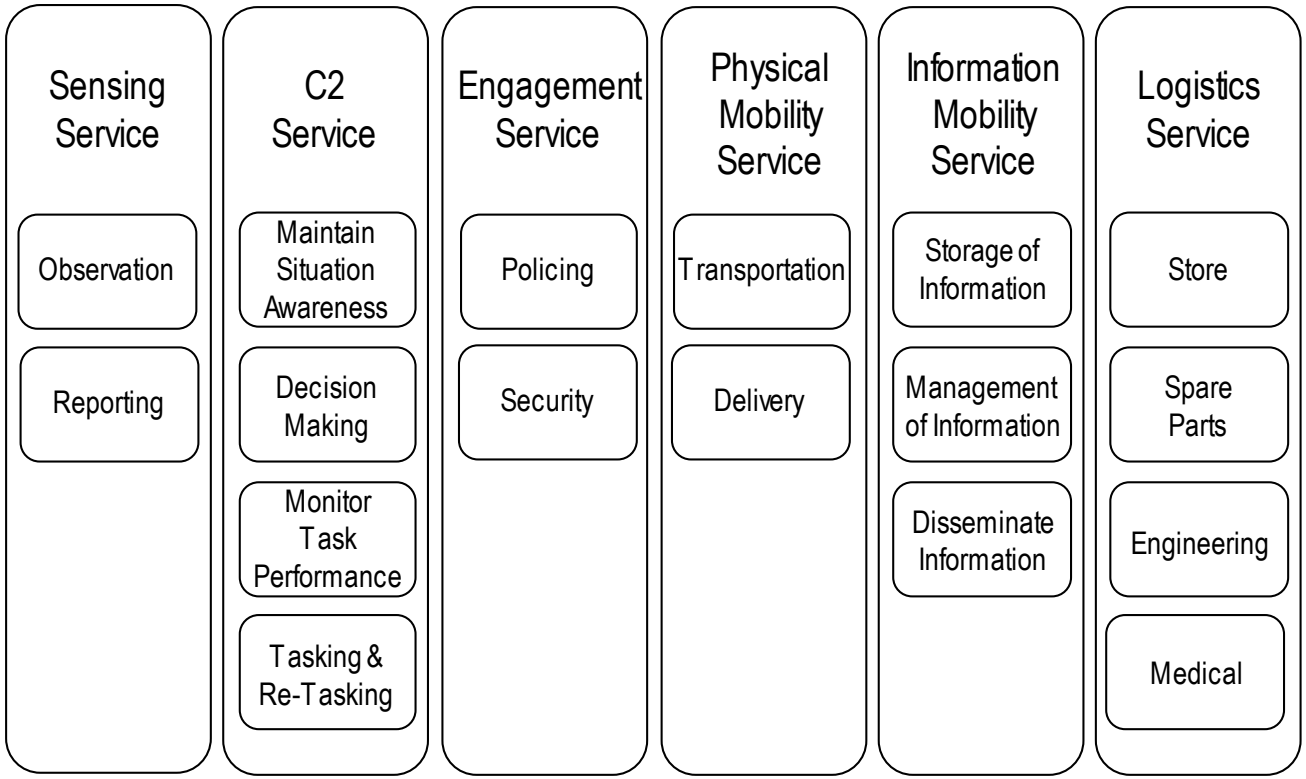
- The Australian Amphibious System consists of a number of constituent Systems of Systems (SoSs)

- Each of the constituent systems also exhibits the characteristics of a SoS:
  - Unique individual organisations;
  - Own governances;
  - Distributed geographically; and
  - New behaviours emerge over time.



SvcV-1: Service Composition

- Construct a taxonomic structure for the SCMILE Services Framework that complies with DoDAF 2.0



SvcV-3a: Service to System mapping

- Identify each of the SCMILE services that each system delivers:

- Sensing;
- C2;
- physical Mobility;
- Information mobility;
- Logistics and
- Engagement.

Systems	SCMILE Services	Service descriptions
ATF HQ	C	C2: Planning, C2: Situation awareness, C2: Tasking and re-tasking.
Communications	I	Communication systems
Ships' operation	SCM	Networked Sensors Systems C2 and Physical Mobility services
Helicopters' operation	SCM	Networked Sensors Systems C2 and Physical Mobility services
Logistics	L	L: Resupply L: Maintenance & Repair
Engineering	L	L: Reconstruct roads, buildings and infrastructures
Medical	L	L: Medical support
Force protection	E	E: Military police E: Force protection units

Measures of effectiveness

- Measure the effectiveness of the ATF given:
  - Time frames; and
  - Physical conditions;
  - Workload; etc.

Purpose	Op Activities	MOEs
Provide Humanitarian assistant to a disaster affect area	Overall HA operation	**Satisfy the needs of the local people affected by a natural disaster…**
	Sustain ATF operations	**Maintain law and order…** **Sustain force operation…**
	Conduct population protection control and support activities	**Provide aids…** **Medical support and food pack…**
	Conduct reconstruction of hospital and its infrastructure	**Reconstruct damaged hospital…**
	Be prepared to support on forwarding of evacuee	**Forwarding evacuee to another location…**
	Preparation for the reception of additional force	**Receive additional force…**
	Process evacuee ashore and on ship	**Process movement of evacuees…**
	Provide life support to evacuee	**Provide temporary lodges…**

SV-5b: Operational Activity to Systems Map

- Understand why systems exist
  - By Mapping Operational Activities to Systems
  - "x" represents a SoS has responsibilities in a particular Op-activity

Systems / Op -Activities	ATF HQ	Comms	Ships' operation	Helicopters' operation	Logistics	Engineering	Medical	Force protection
Sustain the ATF operations	X	X			X		X	X
Conduct population protection control and support activities	X	X						X
Conduct reconstruction of hospital and its infrastructure	X	X	X	X	X	X		X
Be prepared to support on forwarding of evacuee	X	X	X	X				
Preparation for the reception of additional force	X	X	X	X				
Process evacuee ashore and on ship	X	X						X
Provide life support to evacuee	X	X			X		X	

Using SSF for system dependency analysis: SV-3+:

Enhanced Systems to Systems Map

- Understand the dependencies between systems
  - By Mapping Systems to Systems
  - Looking from "provider's" and "consumer's" perspectives
  - "S,C,M,I,L,E" represents a SOS has interactions with other SoSs.
- Elicit integration requirement

Provider Systems \ Consumer Systems	ATF HQ	Comms	Ships' operation	Helicopters' operation	Logistics	Engineering	Medical	Force protection
ATF HQ	C	C	C	C	C	C	C	
Comms	I	I	I	I	I	I	I	I
Ships' operation	S	M	SCM	S	M	M	SM	SM
Helicopters' operation	S	M	SM	SC	M	M	SM	SM
Logistics		L	L	L		L	L	L
Engineering	L						L	
Medical	L					L	L	L
Force protection	E				E	E	E	

Using SSF for system dependency analysis:
Ascertain Integration Requirements (IR) of Ship's Operations

- Based on our understanding of all viewpoints, we
  - give rationale to each of the SCMILE Services
  - state the dependencies between provider and consumers
  - may ask "How much detail is enough in stating the IRs?"

ID	System dependency	IR/Rationale
IR.001	Ships' ops – ATF HQ	**ATF HQ needs to…**
IR.002	Ships' ops – Comms	**Ships' operations should …**
IR.003	Ships' ops – ship's ops	**Ships' operations should …**
IR.004	Ships' ops – Helos' ops	**Helicopters should …**
IR.005	Ships' ops – Logistics	**Logistic units should …**

Concluding remarks

- We demonstrated how **SCMILE Service Framework** can be adapted into Service Viewpoints of DoDAF 2.0.
- Objective is to **facilitate discussions** for project managers and engineers with sufficient depth operationally, functionally and systematically
- Aim is to **introduce SSF into system engineering processes** as part of the Defence Capability Life Cycle (CLC).
- Amphibious Capability was used as a pilot project for concept demonstration. This has shown how the SSF may be used to **ascertain system integration needs and a set of requirements** at early stages of the CLC.
- Using this approach, **project managers** should be able to **maintain a consistent model of a mission system's dependencies throughout the CLC** using the DoDAF viewpoints, OV, SV and SvcV.