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**Mapping Experiment Results to Operational
Capabilities**

by

Gordon Schacher
Wayne E. Meyer Institute of Systems Engineering

1 Nov 2007

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Prepared for: Naval Network Warfare Command

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Daniel T. Oliver
President

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Provost/Vice President

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This report was prepared by:

Gordon Schacher
Professor Emeritus

Reviewed by:

Paul Shebalin, Director
Wayne E. Meyer Institute of
Systems Engineering

Released by:

Dan Boger
Acting Associate Provost
and Dean of Research

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REPORT DOCUMENTATION PAGE			Form approved OMB No 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 1 Nov 2007		3. REPORT TYPE AND DATES COVERED Technical Report FY07
4. TITLE AND SUBTITLE Mapping Experimental Results to Operational Capabilities			5. FUNDING	
6. AUTHOR(S) Gordon Schacher				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Wayne E. Meyer Institute of Systems Engineering 777 Dyer Rd. Rm 100D Naval Postgraduate School Monterey CA 93943			8. PERFORMING ORGANIZATION REPORT NUMBER NPS-97 -08-001	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NAVNETWARCOM Norfolk, VA			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words.) Operational experimentation often focuses on a set of technical objectives. Results obtained apply to a wide range of military capability areas and it is important to report those results to all areas to which they apply. The work reported here has produced a structure and schema for mapping operational experiment results to JCIDS and other capability areas. This enables reporting to areas of interest other than only to the specific experiment objectives.				
14. SUBJECT TERMS JCIDS, Experimentation, knowledge management			15. NUMBER OF PAGES 47	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASS	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASS	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASS	20. LIMITATION OF ABSTRACT UU	

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1.0 BACKGROUND

This work described here addresses the reporting of results from military operational experiments. These experiments are designed to examine a defined set of specific objectives, goals, and metrics, and results are developed for those objectives and goals. The results often apply to a fairly broad range of interests in addition to the experiment and its direct objectives. We refer to these as Areas of Interest (AoI). The purpose of the work reported here is to develop a structure and methodology, a schema, for mapping experiment results to these AoI. Figure 1 illustrates the basic mapping structure, showing that results mapping is done at the objective level.

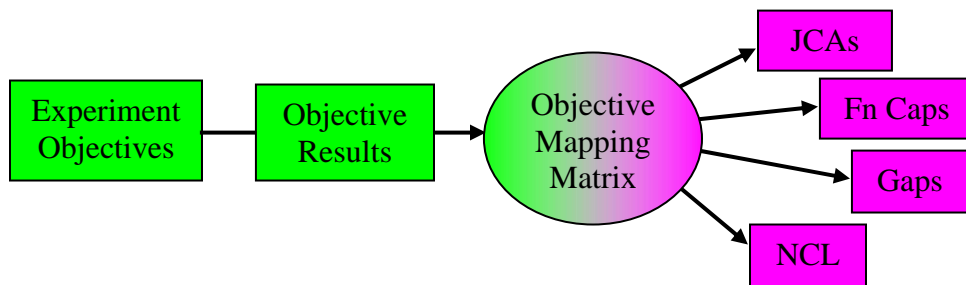


Figure 1. Mapping of experiment results to Areas-of-Interest (AoI).

The structure developed can be used for mapping experiment results to any military AoI. Initial work in this project has been mapping from Trident Warrior experiments to the following:

- JCIDS Joint Capability Areas (JCA)
- FORCEnet Capabilities
- NNFE Capabilities List (NCL)
- Operational Capability Gaps

The mapping described here focuses mainly on net-centric warfare: on information development, information flow, and decision-making. Force application activities are included but less extensively. The structure does accommodate supported JCAs but its use to do a good mapping of operational effectiveness results to them would require some expansion of the structure.

2.0 EXPERIMENTATION and AoI STRUCTURES

2.1 Experimentation Structure

As noted above, an operational experiment has a well-defined structure. An experiment will often be segmented into a logical set of Areas, e.g., Trident Warriors contain Networks, C2, Cross-Domain Solutions, Fires, ISR, etc. Each Area contains several Objectives, each of which contain one or more specific Goals. Details of the vignette/situation and the metrics are at the goal level. The elements of this structure are shown in Figure 1.

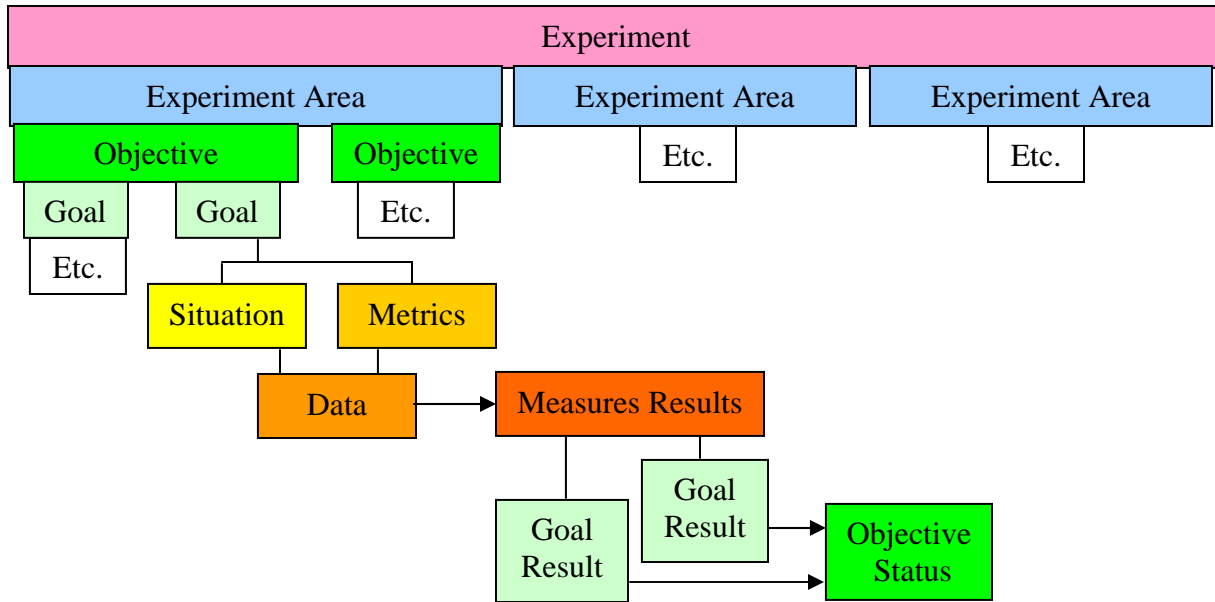


Figure 2. Experiment planning and reporting elements.

The components of this 3-level experimentation objective structure are briefly described below.

Area – is a high-level, logical grouping of objectives.

Objective – is a desired product from the experiment. Often included are:

- Capabilities that are to be developed and provided to operating forces.
- Determination of the capability level of current operational activities/processes.
- Determination of the quality of directives such as CONOPS or TTP.

Goal – is something specific that is to be learned from the experiment that supports achieving the Objective. It is narrow enough that it leads directly to a small number of metrics. There may be several Goals for a given Objective.

Metrics

Metrics are

- Attributes
- Measures associated with each Goal and Attribute
- Any applicable standards for Measures

Attributes

- Single word descriptors of the characteristics of systems, people, or processes
- Groups assigned at the Area level, specific Attributes at the Goal level

Measures

- Attribute quantification
- More than one measure can be specified for an attribute.
- Assigned at the Goal level

Standards

- Pre-determined levels for measures
- Can be specified requirements
- Can be desired achievement levels that describe successful experiment outcome

Experiment Thread

An experiment thread is a complete set of planning and reporting elements at the lowest level of definition (most often at the goal-level). The thread designation is used to track experiment requirements at the metrics and data level.

Vignette / Situations

In order to obtain the appropriate data to produce the required measures, specific physical situations (or conditions) must be set up. A set of situations is often referred to as a vignette. An experiment can contain several vignettes. A single vignette can support several experiment threads. For military operations experiments, the pertinent situations are:

- Status of operating forces
- System's configurations
- Information flow.

Results Structure

There are three levels of experiment results.

- Measures values and answers to survey questions
- Goal results
- Objective status

It will be seen below that mapping experiment results to AoI is done at the objectives level.

2.2 AoI Structure

A mapping difficulty is that there is not a consistent AoI structure. Some representative structures follow.

JCIDS:	JCA Area	Tier-2	Tier-2a
NCL:	Level-2	Level-3	Level-4
Fn Caps:	Capability	Major Task	Task
<u>Gaps</u>	<u>No structure</u>		
Experiment	Focus Area	Objective	Goal

Experiment objectives may or may not address specific AoI concerns, such as a particular JCA Tier-2 or Tier-2a activity, or a particular NCL Level-3 or Level-4 task. Even so, one expects that the experiment results will be applicable to those AoI. Applying results to an AoI will not be a one-to-one mapping.

3.0 MAPPING STRUCTURE

3.1 Structure Basics

A basic difficulty with mapping experiment results to an AoI is that nothing is stable. Experiment objectives change from experiment to experiment, the structures of different AoI are different, and even the structure within an AoI changes with time.

Another difficulty is that experiment objectives and AoI interests are different “types”. Experiment objectives are often the behavior of systems, or the quality of support they provide to operational activities. AoIs often deal with operational tasks. Of course, systems support these tasks, there is a relationship between them, but they aren’t the same thing.

These difficulties are dealt with by establishing “intermediaries” between experiment and AoI. Figure 3 illustrates this structure with a JCA as the example.

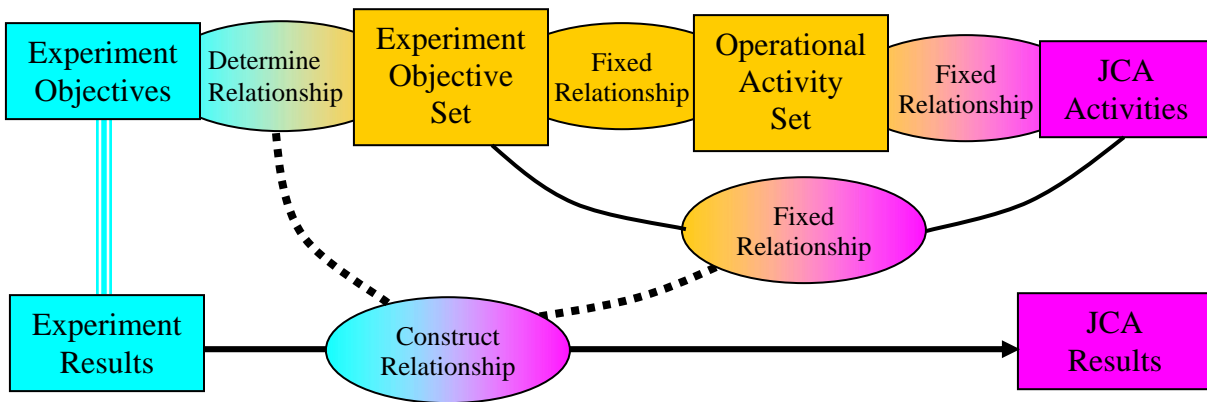


Figure 3. Experiment to AoI mapping structure (JCA example).

The intermediaries are the “Experiment Objective Set” and the “Operational Activity Set”. They are described in detail in subsequent sections. These sets have the following general characteristics:

3.2 Experimentation Objective Set

There are three levels in the Set:

- Investigation Area
 - Hardware-Software Systems
 - Knowledge Processes
 - Human Performance
 - Operational Activities
 - Guidance Evaluation
 - Services Evaluation

- **Category** under each of these Areas
- **Type** of Objective under each Category

Explanations of the Objective Set Areas:

Hardware-Software Systems – Determine the ability of hardware-software systems to perform their stated purpose.

Knowledge Process – Determine whether processes utilized support the execution of assigned operational activities.

Operational Activities Performance – Determine the capability to execute assigned operational activities. This capability will be dependent on the hardware system, process, and human performance.

Human Performance & Human-System Interaction – Determine the capability of humans, and organizations, to perform assigned tasks. Determine the capability of humans, and organizations, to perform assigned tasks.

Guidance Evaluation – Determine whether various types of guidance provide needed support and direction for operational activities.

Services Management Evaluation – Determine the capability of management procedures for networks, communications, installed applications, and services provided through the network.

3.3 Operational Activities Set

The top level, Level-1, identifies the general operational Area, such as Battlespace Awareness, Land Operations, Logistics (the JCAs). Under each there are:

- Level-2, Activity Category
 - Observe
 - Orient
 - Decide
 - Act
 - Service
- Level-3 is an Activity Type under each of these Categories
- Level-4 is a task under each Activity Type

3.4 Experiment, AoI, and Set Alignment

Rational mapping depends on understanding the levels of the various areas and the relationships between them. Table 1 shows the levels and semantics for the two Sets (colored orange), experiments, and three AoI.

Structure Semantics and Alignment						
Areas of Interest			Operational Activity Set	Experiment Objective Set	Experiment Structure	Attribute Level
FORCEnet Concept	JCA	NCL				
	Area	Level-1	Area	Area		
Capability	Tier 2	Level-2	Category	Category	Focus Area	
Major Task	Tier 2a	Level-3	Type	Type	Objective	<<<
Task		Level-4	Task		Goal	

Table 1. Set alignment and attribute assignment.

The main features shown in Table 1 are:

- Alignment between three AoI and the Operational Activity Set
- Alignment between experiment structure and the Experiment Objective Set
- The level at which attributes and example measures are assigned (colored pink)

In one sense the table is misleading: it makes it appear that those things in the two Sets that have the same level and title are the same type. They aren't. For example, Categories for the Activity Set are one of the OODA components or Service. Categories for the Objective Set are knowledge processes, hardware-software systems, etc. Actually, the Objective Set Categories are "support" for the Activities Set Categories.

Mapping between the two Sets is shown in Section 7.

An important aspect of mapping experiment results to AoI is attributes and measures. Because of the logical groupings in the Sets (similar activities being grouped together) it is possible to assign attributes and example measures at the third level, as shown in Table1.

4.0 EXPERIMENTATION OBJECTIVE SET CATEGORIES

The three levels of the Set were presented and the Areas described in Section 2. Table 2 lists the Categories for each Area.

Area	Category	Area	Category
HS Hardware-Software System		OA Operational Activities	
HS-Net	Networks	OA-CoA	SU and CoA Development
HS-Com	Communications Systems	OA-ISR	ISR
HS-IS	Information Systems	OA-C2	C2
HS-Coll	Collaboration Systems	OA-Fire	Fires & Strike
HS-ISR	ISR Systems	OA-IO	IO
HS-C2	C2 Systems	OA-Log	Logistics
HS-Fire	Fires and Strike Systems	OA-FP	Force Protection
HS-IO	IO Systems	OA-MDA	Maritime Domain Awareness
HS-Bus	Business Services Systems	OA-Guide	Guidance Development
HS-CD	Cross- and Multi-Domain		
HS-Train	Training Systems		
KP Knowledge Processes		Hu Human Performance	
KP-Plan	Plan & Install Info Structure	Hu-Org	Organization
KP-AcqD	Data Acquisition	Hu-Grp	Group
KP-Arch	Archive Data & Information	Hu-Ind	Individual
KP-ProcD	Data Processing	Hu-Trn	Training
KP-Assur	Assure Archive Integrity	Hu-HSI	HSI
KP-Dist	Distribute Data & Information		
KP-Auth	Authorize Users		
KP-DevSA	SA Development		
KP-ShrSA	SA Sharing		
S Support Activities		G Guidance	
S-Appl	Applications Management	G-CON	CONOPS
S-Serv	Services Management	G-TTP	TTP
		G-Ord	Standing Orders
		G-CG	Commander's Guidance

Table 2. Experiment Objective Set Level-2 Categories.

A listing of the Objective-Types for each Category is in Appendix A.

5.0 OPERATIONAL ACTIVITY SET CATEGORIES and TYPES

The three levels of the Set were presented and the Areas described in Section 2. The top level, Level-1, identifies the general operational Area, the AoI, such as Battlespace Awareness, Land Operations, Logistics (the JCAs). Under each AoI are:

Two views are shown for the Level-3 Activity Types. The first, Table 3, lists the activities in chronological order. This view is used to provide a visual understanding of the normal time flow of the five categories (operations phases) and the activities within them. E.g., acquisition of information in the Orient phase follows processing of data and distribution of information in the Observe phase.

Observe	Orient	Decide	Act	Service	
Ob-Plan				<i>Continuous</i>	
Ob-AcqD					
Ob-ProcD				S-Plan	
Ob-DisI	Or-AcqI				
	Or-Procl			S-Acquire	
	Or-DevSA				
	Or-ShrSA			S-Manage	
	Or-PntSA	D-AcqK			
	Or-Guide	D-DevSU		S-Assure	
		D-ShrSU			
		D-DevCoA		S-Authorize	
		D-PntCoA			
		D-CoA		S-Distribute	
		D-DevT			
		D-DisT	A-AcqT	S-Instruct	
			A-DisUT		
			A-Ex		
			A-ExMon		
			A-ExRprt		

D = Data
 I = Information
 K = Knowledge
 SA = Sit. Aware.
 SU = Sit. Under.
 T = Tasking
 Mon = Monitor
 Rprt = Report
 Ex = Execute

Table 3. Category and operational activities in chronological order.

Table 4 shows Activity-Types grouped together in rows. This is done to illustrate that there are similar activities in all operation phases and that they will have the same Tasks. Recognizing this similarity greatly simplifies the structure, such as assigning metrics at this level.

Activity Type	Category				Service
	Observe	Orient	Decide	Act	
Plan	Ob-Plan				
Acquire	Ob-AcqD	Or-AcqI	D-AcqK	A-AcqT	Plan
Process	Ob-ProcD	Or-Procl			
Develop		Or-DevSA	D-DevSU D-DevCoA		Acquire
Distribute	Ob-DisI	Or-ShrSA	D-DisT	A-DisT	Manage
Present		Or-PntSA	D-PntSU D-PntCoA		Assure
Execute				A-Ex A-ExMon A-ExRprt	Authorize
Guidance		Or-Guide	D-CoA D-DevT		Distribute
					Instruct

Table 4. Category and operational activities sorted by Activity-Type.

Note that Service has its own unique Tasks.

A listing of the tasks under each Activity Type is in Appendix B.

6.0 ATTRIBUTES and MEASURES

Definitions of terms:

- Metrics – the set of Attributes and Measures associated with a network-centric operational or support activity.
- Attributes – single-word expressions of the characteristics of people, things, or processes.
- Measures – provide attribute quantification.
- Standards – measures values that specify a satisfactory performance boundary.

Attributes and measures are intimately linked; they are different ways of expressing the same thing. In what follows, the terms attribute and measure are used almost interchangeably.

The terms MOFE, MOE, and MOP are in common use and we introduce the additional measure, MOU. They are:

- MOFE = Measure of Force Effectiveness
- MOU = Measure of Utility
- MOE = Measure of Effectiveness
- MOP = Measure of Performance

For military operations performance, Metrics are utilized to express levels of performance of:

- Force Application
- Organizations
- Humans
- Processes
- Activities (including Tasks)
- Hardware/Software Systems

6.1 Measures Discussion

MOFE are evaluations of the effectiveness of the conduct of military operations, measures of the degree of success. Evaluation requires establishment of a Force and an adversary engaged in execution of the operation. Estimates of effectiveness and sensitivity analyses are often done through simulation. This measure will not be discussed further here.

MOU are measures of the effectiveness of organizations, humans, processes, or systems for supporting operational activities, or for guidance in directing those activities.

MOE Effective is used as an attribute when the overall effectiveness of system, people, or process to perform its **stated mission** is to be evaluated. There are specific effectiveness measures that are **components** of performance effectiveness.

MOP are direct measures of a specific **performance parameter** of people, process, or system.

Table 5 shows the attributes for the MOU and MOE/MOP structures.

Effective				<u>Type</u>
Accessible	Reliable	Capable	Usable	< MOE
Capacity	Robust	Sufficient	Clear	< MOP
Available	Secure	Flexible	Trusted	< MOP
Compatible	Assured	Accurate	Manageable	< MOP
Extensive		Timely	Relevant	< MOP
Efficient			Compliant	< MOP
Military Utility				
Improved	Needed	Applicable	Wanted	< MOU

Table 5. Attribute structure for MOE, MOP, and MOU.

- Effectiveness is an “internal” attribute. It has to do with how well something performs its function.
- Utility is an “external” attribute. It has to do with how well something contributes to another function, in this case to a military activity.

The four components of effectiveness and their definitions are:

- Accessible **You can get to it.**
- Reliable **It is there when needed.**
- Capable **It/he/she/they can do the defined job.**
- Usable **You can use it.**

Each effectiveness attribute has listed under it its associated performance measure attributes. E.g., Robust, Persistent, Secure, and Assured are the MOE attributes for Reliable.

The four components of utility and their definitions are:

- Improved **Improves the performance of operational activities.**
- Needed **Fills a gap in current capabilities.**
- Applicable **Can be applied to activity performance.**
- Wanted **Operational personnel want, will use, the capability.**

No MOP equivalents have been defined for Military Utility. This is because currently most utility determinations are subjective. Objective determinations can be made, e.g., the number of times a capability is used as a measure for Wanted. When dealing with the supporting JCAs (JNCO, JBA, and JC2) MOP level attributes for the MOUs are not required. They will be required for the supported JCAs.

6.2 Task / Attribute / Measure Relationships

Attributes and measures do not stand alone. They have meaning only when associated with an activity or task. E.g., consider the attribute timely.

Attribute = Timely MOP = Timeliness
 Task = RFI response
 Measures = a. Time from submission of RFI to receipt of information.
 b. Time information waits in queue for transmission.
 c. RFI processing time.

Task = network management
 Measures = a. Time to switch channels.
 b. Time from request to receipt of access.

Task = information processing
 Measures = a. Average time to develop aim-point.
 b. Fraction of mensurated targets that meet MAAP cut-off.

Figure 4 illustrates the various types of attributes and measures. Not everything can be shown on the diagram, e.g., collaboration system performance is not shown associated with human decision processes.

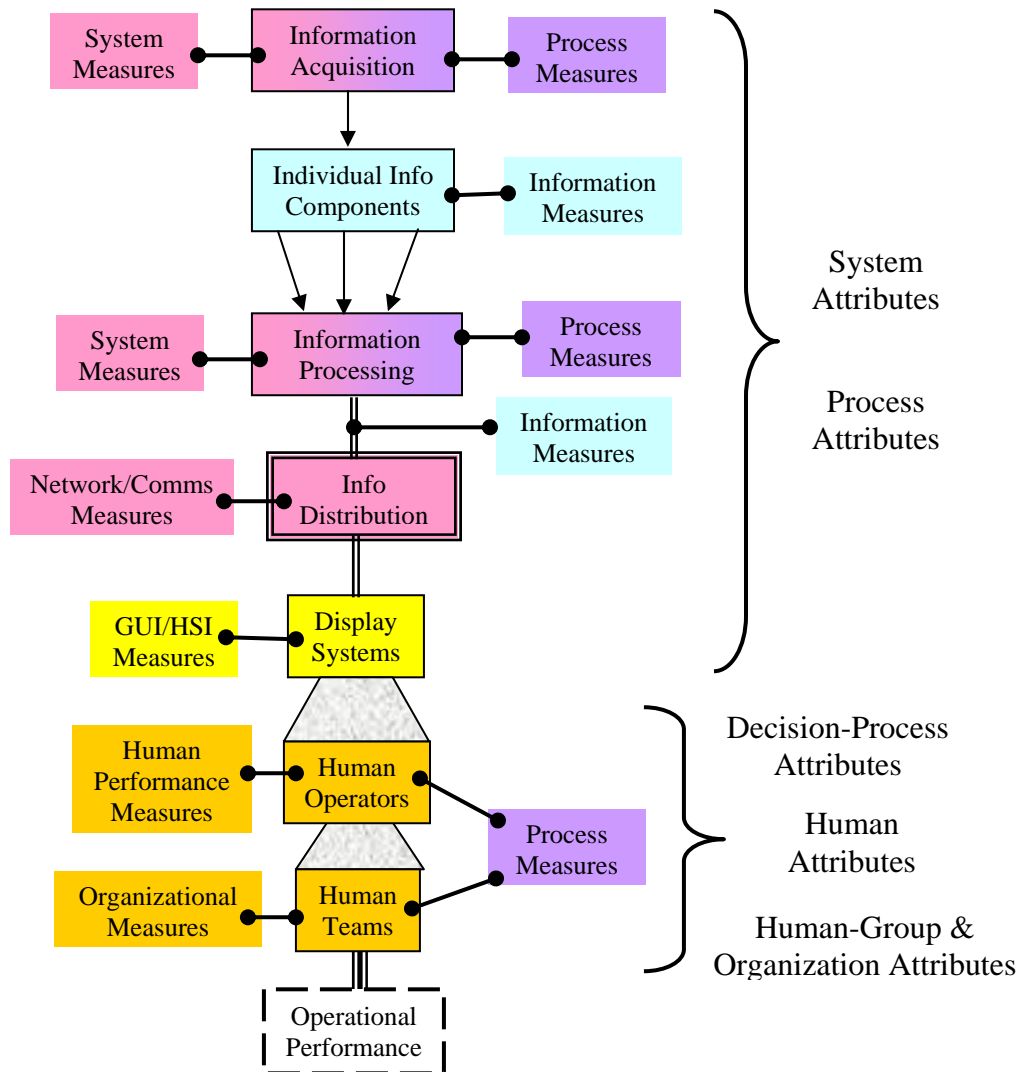


Figure 4. Attribute and measure types and their relationships to systems and activities.

6.3 Attribute Descriptions

Attributes are one-word indications of characteristics. Attribute descriptions containing other attributes is normal, even unavoidable, to insure that they convey the desired concepts. The following descriptions are indicative, not all-inclusive.

Effective – Effective is an overarching attribute. It refers to how well systems, people, and processes meet their stated purposes. This attribute has meaning only in reference to that purpose. E.g., it is not sufficient to state that a system is effective without also stating at what.

Accessible – Users have access to needed capabilities and information. This includes access to communication means, data and processed information, systems, software, support, etc. Access will often be through a network. This attribute is one of the four MOE; its component MOP follow.

Capacity – Number of users that can have access; number of services that can be provided; capacity of other systems required for its function, primarily bandwidth. Included is information or service throughput.

Available – System or capability is ready for use, can be used, when needed. It is possible that a capability can be accessed but cannot used at that time.

Compatible – The system or capability can function with other elements external to it without modification to either. It can be integrated with other systems or capabilities. This can also refer to processes or organizations being compatible or integrated.

Extensive – The system or capability is capable of servicing a large number of users, covers a large geographical area, services a large number of user types, provides a number of different types of service.

Efficient – The number of steps or effort needed to access and use the service is acceptable. This attribute is inherently comparative. Acceptable normally refers to a standard, or an improvement over what was formerly required. Efficiency can be a ratio, a judgment of (result obtained)/(effort required).

Reliable –The capability or information is there when needed, can be depended on. Human and organization reliability is included. This attribute is one of the four MOE; its component MOP follow.

Robust – The system or process is able to withstand stress or attack. Changes in environment are managed with minimal loss of functionality or effectiveness.

Persistent – The system maintains its status over long periods of time (primarily ISR capabilities). Information maintains its content and meaning across processing and distribution means (e.g., tracks).

Secure – The system, process, information, has provisions that prevent unauthorized use, intrusion, or tampering.

Assured – Information is warranted to be correct, the source identified, and non-repudiation in effect. The process is warranted to produce the desired result.

Capable – The system, capability, person, or organization provides the needed services. This attribute is one of the four MOE; its component MOP follow.

Sufficient – What has been provided/received is adequate for the recipient to perform their function. For humans and organizations, the skills available are adequate for task performance. Sufficiency can refer to either quantity or level.

Flexible – The system, process, human, or organization responds easily to the situation or to changing requirements. It is adaptable, can handle/utilize a wide range of types. It is tailorable/customizable to user needs and/or users can make modifications to suite their needs.

Accurate – Information provided is correct, matches reality within acceptable limits. Determinations of accuracy normally require definition of acceptable error limits.

Timely – The occurrence or delivery is within acceptable time limits. This can refer to an elapsed time or to meeting a schedule.

Usable – The system, capability, information, or process can be used. This attribute is one of the four MOE; its component MOP follow.

Clear – How the system or process is to be used is easily understood. Meaning of the information is easily comprehended. Instructions, guidelines, definitions are complete and meaningful.

Trusted – Users believe that the information, process, system, organization, will perform their function in a manner that supports current needs.

Manageable – The system or process can be easily modified or manipulated as needs dictate, often in response to changes in the environment. Included is insuring that the required level of performance is maintained. This includes installation of capabilities.

Relevant – Information provided applies to the current situation. System capabilities are what is needed for current tasks. Processes provide the actions required for current operations.

Compliant – The system or information complies with standards or defined structure and formats. Activities are in conformance with existing CONOPS and TTP.

Military Utility – Military utility is a faux attribute (not actually a description of characteristics), used to express that something contributes to the performance of military operations. It is an overarching attribute. The four measures of utility follow.

Improved – The system, organization, or process improves the conduct of military operations for which they were designed.

Needed – The system, organization, or process fills a gap an identified gap.

Applicable – The system, organization, or process is pertinent to conduct of the operation. Its capabilities match the needs and conduct of the operation.

Wanted – Operational personnel want the capability and utilize it. They do not currently have the capability or would rather use it vice other available capabilities.

6.4 Example Effectiveness Measures

Table 6 provides some example measures for some activities for each of the effective attributes. They are presented to illustrate they types that are applicable. Synonyms for the attributes are shown because of the large number of different attributes in current use.

Attributes, Tasks, and Example Measures	
MOE Attribute	
<i>MOP Attribute</i>	<i>Synonyms</i>
Task	Example Measure
Accessible	
Network Services	Fraction of nodes that can access all network services.
Capacity	<i>Reach, Size, Range, Bandwidth</i>
Network Services	Number of users that can be provided service; Number of services provided.
ISR UAV	Number of different sensor types that can be carried.
Information Processing	Number of targets that can be simultaneously processed and analyzed.
Available	<i>Networked, Integrated, Automatic</i>
Communications	Percent of time communications channels are available.
Network Services	Percent of required services available on the network.
Compatible	<i>Interoperable, Sharable, Collaborative, Correlated</i>
Information Access	Number of different types of nodes that can publish or subscribe to information.
Communications	Number of different types of units that can seamlessly communicate.
Collaboration	Number of different types of units that can collaborate.
Network Services	Number of services that can be provided or accessed across domains.

<p>Extensive OTH Communications Network Services</p>	<p>Pervasive, Diverse Area over which communications can be maintained. Number of different types of nodes that can access the network.</p>
<p>Efficient Network Log-In Information Retrieval</p>	<p>Seamless, Easy, Improved, Enhanced Amount of time required to log in and have access to network; Number of steps required to log into the network. Number of steps required to access information.</p>
<p>Reliable Robust Network Services</p>	<p>Dependable Self-Annealing, Survivable, Redundant, Autonomous Fraction of applications available, by time, after service disruption; Fraction of nodes that have connectivity, by time, after network disruption.</p>
<p>Secure Network Services Network Access</p>	<p>Safe Fraction of network attacks that result in no loss of service or services. Number of instances of unauthorized use.</p>
<p>Assured Authentication Information Assurance Information Storage Track Processing</p>	<p>Authenticated, non-repudiated, Uncompromized Percent of reports for which unit identity can be confirmed as correct. Percent of information for which source cannot be identified; % of information that is linked to its source data. Number of instances of information placed in wrong category. Percent of instances correlated tracks preserve original ID.</p>
<p>Capable Sufficient Info Transmission TTP Network Services ISR Info Storage</p>	<p>Competent, Confident, Experienced, Willing Complete, Adequate Percentage of collected information transmitted/received/posted; number of information fields that are blank. Number of activities that are not covered by TTP. Fraction of nodes requesting information that receive it; % of required services available on the network. Percentage of targets located within allocated on-location time. % of input information that is categorized and archived.</p>
<p>Flexible Network Management CoA Development Information Fusion Information Acquisition Info Transmission Info Presentation User Services</p>	<p>Adaptable, Responsive, Tailorable, Innovative, Scalable Number of available network configurations. Number of CoAs considered, forwarded. Number of different types of information that can be fused. Number of different types of search that can be used to locate information. Number of different information profiles that can be pushed. Number of different types of information presentation available. Number of user profiles that can be used/stored/managed.</p>
<p>Accurate</p>	<p>Correct, Authentic</p>

Target Reporting	Target location error.
Target Fusion	Fraction of tracks with the correct ID; Fraction of duplicate tracks; Fraction of tracks dropped.
Network Status	% of status determinations that report correct status.
Timely	Frequent, Continuous, Synchronized, Rapid
ISR	Amount of time required after request to locate target; Fraction of instances surveillance is successful within the required time.
Information Pull	Time lapse from request to receipt of information
Network Services	Time lapse network services requested to received.
Usable	
Clear	Intuitive, Unambiguous, User Friendly
GUI Use	Time required to digest information.
Information Processing	Number of requests for information input clarification.
Decision Support Info	Amount of time information is examined before decision can be made.
Trusted	
Info Transport	Fraction of packets lost; Fraction of information fields corrupted.
Manageable	Deployable, Controlable, Maintainable, Repairable, Transportable.
Network Configuration	Amount of time required to deploy the network; Amount of time required to reconfigure the network; Number of redundant paths/servers available.
Communications	Number of communication paths available; Amount of time required to switch communication channels; Number of permissions required to change communication channels.
Network Services	Number of steps required to add a new user and grant access.
Relevant	Pertinent, Applicable
Information Access	% of information acquired that is pertinent to search parameters.
TTP	Adequacy of TTP elements to direct activities.
Compliant	
CoA Development	Fraction of components of CoA in compliance with guidance.
ISR	Percent of reconnaissance/surveillance missions conducted in accordance with assigned parameters.
Information Processing	Fraction of processed information that contains required metadata.

Table 6. Example measures and synonymous attributes for the effectiveness attributes.

6.5 NNF E Capabilities List Attributes and Measures

Attributes and example measures have been assigned to the NCL. Table 7 shows the structure of this assignment, not the final assignments, and only a small portion of the NCL. The assignments are at NCL Level-3. Attributes and measures are shown in light yellow.

NCL with Level-3 Attributes & Measures

Level-2

Level-3	Level-3 Title	Level-4	Level-4 Title
<i>MOE Attribute</i>			
	MOP Attrib.		Example Measure
NCO-IT	Information Transport		
NCO-IT.1	Transmit/Receive/Relay		
	NCO-IT.1.1	Provide Assured Transport	
	NCO-IT.1.2	Provide Robust Connectivity	
	NCO-IT.1.3	Provide Protected Connectivity	
	NCO-IT.1.4	Provide Transport Services	
<i>Reliable</i>			
	Robust	Fraction of attacks that succeed in interrupting transmission.	
	Persistent		
	Secure	Fraction of intrusions that succeed in intercepting transmission.	
	Assured	Percent of reports for which unit identity can be confirmed as correct. % of information that is linked to its source data.	
NCO-IT.2	Manage Information Transport Systems		
	NCO-IT.2.1	Monitor And Control Information Transport Operations	
	NCO-IT.2.2	Assess Information Transport Performance	
	NCO-IT.2.3	Plan Information Transport	
	NCO-IT.2.4	Execute Information Transport Plans	
<i>Capable</i>			
	Sufficient	% of forces requiring information to which it can be pushed. Percentage of collected information transmitted/received/posted; number of information fields that are blank.	
	Flexible	Number of different information profiles that can be pushed. Number of different types of nodes that can publish or subscribe to information. Number of different types of channels that can be utilized.	
	Accurate	Fraction of packets lost; Fraction of information fields corrupted.	
	Timely	Time lapse from request to receipt of information (RFI).	
<i>Usable</i>			
	Clear		
	Trusted		
	Manageable	Time required to switch distribution channel.	
	Relevant		
	Compliant	% of distributed information that follows established priorities. % of information to be distributed that is formatted correctly.	

NCO-IT.3 Deploy Scalable and Modular Networks		
	NCO-IT.3.1	Provide Gateway / Relay Services To Extend Services to Mission Partners
	NCO-IT.3.2	Acquire Scalable Systems
	NCO-IT.3.3	Enable Rapid Connectivity Extensions for Region / Theater / Global Operations
Accessible	Capacity	Number of units to which information can be simultaneously pushed. Number of channels available for information distribution.
	Available	
	Compatible	Fraction of channels that can distribute each information type.
	Extensive	Geographical area over which information can be distributed. % of AOR to which information can be pushed. % of command to which information can be pushed.
	Efficient	Number of steps required to assign distribution means. Number of steps required to load and distribute information.
NCO-NM Network Management		

Table 7. Example NCL attributes and measures.

7.0 Operational Activities Set to Experiment Objectives Set Mapping

The central component in mapping experiment results to AoI is the mapping between the Operational Activities and Experimentation Objectives sets. These two sets are static as is the mapping matrix. Figure 7 is a small section from the mapping matrix.

HS Objectives to Activity Set Mapping		Observe				Orient				Decide				Act				Service													
Category	Type Name	Plan Data Acq	Acquire Data	Process Data	Distribute Info	Acquire Info	Process Info	Develop SA	Share SA	Present SA	Guidance	Acquire	Develop SU	Share SU	Develop CoA	Present CoA	CoA	Develop Task	Distribute Task	Acquire Task	Dist Unit Task	Execute	Monitor Exec	Execution Report	Plan	Acquire	Manage	Assure	Authorize	Distribute	Instruct
HS-Net	Networks																														
HS-Net.1	Deployment																								X					X	
HS-Net.2	Management																										X			X	
HS-Net.3	Access																											X		X	
HS-Net.4	Assurance																											X			
HS-Net.5	Security																										X	X			
HS-Com	Communication Systems																														
HS-Com.1	Deployment																								X				X		
HS-Com.2	Management																										X			X	
HS-Com.3	Access																												X		X
HS-Com.4	Assurance																											X			
HS-Com.5	Security																										X	X			
HS-Com.6	Auto Translation				X				X					X													X	X			
HS-IS	Information Systems																														

Table 8. Example section from the Experimentation Objective to Operational Activity mapping matrix.

8.0 MAPPING to the NCL

The NCL is one of the important AoI. Mapping to it, and to all AoI, is done to the Operational Activities Set. Table 9 shows the NCL mapping matrix for a two small segments of the NCL. Two Level-3s for Information Technology and one Level-3 for Enterprise Services are shown. The full mapping matrix is not included in this report.

NCL to Activity Set Mapping		Observe				Orient			Decide					Act			Service													
		Plan Data Acq	Acquire Data	Process Data	Distribute Info	Acquire Info	Process Info	Develop SA	Share SA	Present SA	Guidance	Acquire	Develop SU	Share SU	Develop CoA	Present CoA	CoA	Develop Task	Distribute Task	Acquire Task	Dist Unit Task	Execute	Monitor Exec	Execution Report	Plan	Acquire	Manage	Assure	Authorize	Distribute
Level-3	Level-4																													
NCO-IT.1 Transmit, Receive and Relay																														
	NCO-IT.1.1	Assured Transport																												X
	NCO-IT.1.2	Robust Connectivity																									X	X		
	NCO-IT.1.3	Provide Protected Connectivity																									X	X		
	NCO-IT.1.4	Provide Transport Services																									X		X	X
NCO-IT.2 Manage IT Systems																														
	NCO-IT.2.1	Monitor And Control IT Operations	X																								X			
	NCO-IT.2.2	Assess IT Performance	X	X																							X			
	NCO-IT.2.3	Plan Information Transport																							X					
	NCO-IT.2.4	Execute Information Transport Plans																									X			

NCO-ES.6 The Ability of Mediation																
NCO-ES.6.1	Data Correlation		X													
NCO-ES.6.2	Data Fusion		X													
NCO-ES.6.3	Data Transformation		X													
NCO-ES.6.4	Negotiation / Orchestration / Choreography		X	X										X		
NCO-ES.6.5	Subscription Services														X	

Table 9. Mapping of NCL to Operational Activity Set.

9.0 TRIDENT WARRIOR EXPERIMENT OBJECTIVES MAPPING

Mapping to experiment objectivities is done to the Experimentation Objectives Set. Most of TW objectives deal with hardware-software system performance and the mapping will be to the HS objectives. Table 10 shows the TW-06 mapping matrix for a small number of that experiment's objectives. The full mapping matrix is not included in this report.

TW-06 Mapping to Experimentation Objective Set			
TW Thread		Objective	
Code	Abbreviated TW Objective Statement	Set Code	Set Objective Name
NET.01	Demonstrate IP based ship network status on a single workstation.	HS-Net.3	Network Management
NET.04	Demonstrate the utility of optical communications for Navy ships, small boats and shore sites.	HS-Com.2 HS-Com.5	Communications Capacity Communications Assurance
C2.03	Provide a means for an afloat vLCS to manage surface, sub-surface, and air tracks.	KP-ProcD.1 KP-ProcD.2 HS-C2.2	De-conflict and correlate data Fuse data from different sources Track Management
IO.01	Deploy a spyware detection and eradication tool.	HS-Net.6 HS-IS.7	Network Security Information Security
COP.01	Integrate technical capabilities of AIS into GCCS-M.	HS-IS.3 HS-IS.4 HS-C2.7	Information Access Interoperability Interoperability
COP.05	Provide a COP data integration tool.	HS-C2.3	Automated COP Production
CDS.01	Improve SOP/TTP for use of a translation tool.	HS-Com.7	Automated Translation
ISR.01	Provide netted sensor fusion composite air picture.	HS-IS.8 HS-C2.3	Automated Processing Automated COP Production
ISR.03	Provide long-endurance surveillance information.	HS-ISR.5 HS-ISR.6	Area Access Platform & Sensor Characteristics
Fires.01	Move NTISR targeting information between ground/surface C2 nodes and tactical aircraft.	HS-IS.6 HS-Fire.1	Information Distribution Targeting Information Exchange
SW.01	Provide continuously updated, automated databases to make SWA content readily available.	HS-IS.1 HS-IS.3	Information Storage Information Access

Table 10. Examples of Mapping of TW-06 objectives to Experimentation Objective Set.

Note that Table 10 contains some mapping that is not to HS, Hardware Systems. This is because that Objective directly supported objectives from other categories. It is the case that almost all hardware/software developments support many operational activities. If all of these were shown the mapping matrix would be very large, and difficult to use. Only direct correlations are shown in the mapping matrix.

The columns for the Thread Code and the Set Code are colored. This is because they are used to provide mapping in the FIRE KM system. The Thread Code provides access to all information about that Thread, including results. The Set Code provides mapping to the appropriate place in the AoI. FIRE will contain code-to-code mapping matrices as the means to map whatever information is to be transferred to the AoI.

Appendix A. Experimentation Objective Set Level-3 Objective Types

There is one table for each of the Level-2 Categories

Hardware-Software System Evaluation Objective Types		
Level-2	System Category	
L-3 Code	Objective Type	
HS-Net	Networks	
HS-Net.1	Network Deployment	
HS-Net.2	Network Capacity	
HS-Net.3	Network Management	
HS-Net.4	Network Access	
HS-Net.5	Network Assurance	
HS-Net.6	Network Security	
HS-Com	Communication Systems	
HS-Com.1	Communications Deployment	
HS-Com.2	Communications Capacity	
HS-Com.3	Communications Systems Management	
HS-Com.4	Communications Access	
HS-Com.5	Communications Assurance	
HS-Com.6	Communications Security	
HS-Com.7	Automated Translation	
HS-IS	Information Systems	
HS-IS.1	Information Storage	
HS-IS.2	Information Systems Management	
HS-IS.3	Information Access	
HS-IS.4	Interoperability	
HS-IS.5	Information Assurance	
HS-IS.6	Information Distribution	
HS-IS.7	Information Security	
HS-IS.8	Automated/Machine Processing	
HS-IS.9	SOA Systems Management	
HS-Coll	Collaboration Systems	
HS-Coll.1	Collaboration Systems Management	
HS-Coll.2	Access	
HS-Coll.3	COI Support	
HS-Coll.4	Application Sharing	
HS-Coll.5	Information Sharing	
HS-Coll.6	Collaboration Tools	
HS-ISR	ISR Systems	
HS-ISR.1	Info Access	
HS-ISR.2	Planning Tools	
HS-ISR.3	Info Assurance	
HS-ISR.4	Info Distribution	
HS-ISR.5	Area Access	
HS-ISR.6	Platform and Sensor Characteristics	

HS-ISR.7	Asset Control / Management
HS-C2 C2 Systems	
HS-C2.1	COP Management
HS-C2.2	Track Management
HS-C2.3	Automated/Machine COP Production
HS-C2.4	COP Display
HS-C2.5	COP Distribution
HS-C2.6	COP Synchronization
HS-C2.7	Interoperability
HS-C2.8	Decision Support
HS-C2.9	Simulation
HS-C2.10	Planning Tools
HS-Fire Fires and Strike Systems	
HS-Fire.1	Targeting Information Exchange
HS-Fire.2	Targeting Planning Tools
HS-Fire.3	Asset Management
HS-IO IO Systems	
HS-IO.1	Planning Support Systems
HS-IO.2	IO Execution
HS-IO.3	IO Assessment
HS-IO.4	Blue Status Assessment
HS-IO.5	Red Status Assessment
HS-Bus Business Services Systems	
HS-Bus.1	Business Systems Deployment
HS-Bus.2	Business Systems Management
HS-Bus.3	Business Systems Access
HS-Bus.4	Business Systems Assurance
HS-Bus.5	Business Systems Security Security
HS-CD Cross- and Multi-Domain Systems	
HS-CD.1	Info Access
HS-CD.2	Info Assurance
HS-CD.3	Info Distribution
HS-CD.4	M2M Sharing
HS-CD.5	Information Security
HS-T Training Systems	
HS-Train.1	Network-Based Training
HS-Train.2	Local Training

Table 11. Hardware-Software system evaluation Objective Types.

Knowledge Processes Performance Objective Types	
Level-2	System Category
L-3 Code	Objective Type
KP-Plan Plan & Install Information Structure	
KP-Plan.1	Archive requirements.
KP-Plan.2	Access requirements
KP-Plan.3	Management requirements.
KP-Plan.4	Installation.
KP-AcqD Data Acquisition	
KP-AcqD.1	ISR collection to create new data.
KP-AcqD.2	Search /find specific existing data by any means.
KP-AcqD.3	Find data as a result of advanced search, discovery, pattern search, etc.
KP-AcqD.4	Retrieve found data (pull).
KP-AcqD.5	Receive data from another activity, requested or not (push).
KP-Arch Archive and Authenticate Data & Information	
KP-Arch.1	Identify categorize and classify data.
KP-Arch.2	Authenticate data source.
KP-Arch.3	Attach meta-data, mark, data and information.
KP-Arch.4	Archive data and information.
KP-Arch.5	Prepare and distribute archive catalog.
KP-ProcD Data and Information Processing	
KP-ProcD.1	De-conflict and correlate data.
KP-ProcD.2	Fuse data from different sources to produce information.
KP-ProcD.3	Assess situation to determine information production needs.
KP-ProcD.4	Distill and synthesize to produce information, attach metadata.
KP-ProcD.5	Utilize reach-back services as needed.
KP-ProcD.6	Authenticate information sources and processing.
KP-ProcD.7	Assure accuracy of data processing methodologies.
KP-Assur Assure Archive Integrity	
KP-Assur.1	Monitor archives status
KP-Assur.2	Protect archives.
KP-Assur.3	Detect unauthorized use and attacks.
KP-Assur.4	Detect data/information defects.
KP-Assur.5	Assess archives status.
KP-Assur.6	Alert users of archive defects/down time.
KP-Assur.7	Repair archive defects
KP-Dist Distribute Data & Information	
KP-Dist.1	Profile users information use and needs.
KP-Dist.2	Profile tactical situation for information needs.
KP-Dist.3	Correlate available information with user and situation profiles.
KP-Dist.4	Receive and process user's requests for information.
KP-Dist.5	Determine distribution means.
KP-Dist.6	Configure information for distribution means.
KP-Dist.7	Attach meta-data, mark information for user.
KP-Dist.8	Transmit information

KP-Dist.9	Alert/inform users of information availability.
KP-Auth	Authorize Users
KP-Auth.1	Receive access requests.
KP-Auth.2	Determine user type, needs, clearance, appropriate access.
KP-Auth.3	Assign user group, access control, passwords, grant access.
KP-DevSA	SA Development
KP-DevSA.1	Determine Blue status.
KP-DevSA.2	Determine Red status.
KP-DevSA.3	Determine White status.
KP-DevSA.4	Determine Commanders intent.
KP-DevSA.5	Determine applicable regulations/ROE.
KP-DevSA.6	Correlate status, intent, rules, assess tactical situation.
KP-ShrSA	SA Sharing
KP-ShrSA.1	Prepare SA information for collaboration and briefings.
KP-ShrSA.2	Share SA information during collaboration sessions.

Table 12. Knowledge processes performance Objective Types.

Operational Activity Performance Objective Types	
Level-2	System Category
L-3 Code	Objective Type
OA-CoA Situational Understanding and Course-of-Action Development	
OA-CoA.1	Acquire SA Information
OA-CoA.3	Acquire Guidance
OA-CoA.3	Assess Red, Blue, White Tactical Status
OA-CoA.4	Infer Red Intent
OA-CoA.5	Evaluate Guidance and Situation, Develop Intent
OA-CoA.6	Correlate Intent and Status with ROE, Instructions
OA-CoA.7	Collaborate to Develop SU and Alternative CoA
OA-CoA.8	Simulate CoA Outcomes
OA-CoA.9	Present CoAs
OA-CoA.10	Correlate CoAs with Intent and ROE
OA-CoA.11	CoA Rework
OA-CoA.12	Select CoA
OA-ISR ISR Activities	
OA-ISR.1	Receive RFIs
OA-ISR.2	Acquire Asset Status
OA-ISR.3	Research Existing Intelligence Data
OA-ISR.4	RFI Response and collection nominations
OA-ISR.5	Develop Collection Plan (RSTA)
OA-ISR.6	Develop Own Collection
OA-ISR.7	Distribute Collection Plan (RSTA)
OA-ISR.8	Develop PED Plan
OA-ISR.9	Asset Control and Collection
OA-ISR.10	Ad-Hoc Collection
OA-ISR.11	Level-1 Processing
OA-ISR.12	Distribute Collection Reports
OA-ISR.13	BDA
OA-ISR.14	Levels 2 and 3 Processing
OA-ISR.15	Exploitation
OA-ISR.16	Disseminate Products
OA-ISR.17	Update Intelligence Data
OA-C2 C2 Activities	
OA-C2.1	Acquire Asset Status
OA-C2.2	Acquire CoA
OA-C2.3	Correlate CoA with Assets
OA-C2.4	Collaborate with Partners
OA-C2.5	Develop Tasking Orders (ATO)
OA-C2.6	Develop Own Tasks
OA-C2.7	Distribute Tasking
OA-C2.8	Monitor Execution
OA-C2.9	Assess Execution
OA-C2.10	Re-Task
OA-FS Fires & Strike Activities	

OA-Fire.1	Receive Target Nominations
OA-Fire.2	Acquire Asset Status
OA-Fire.3	Research Targets (MIDB)
OA-Fire.4	CDE Authorization
OA-Fire.5	Develop CMAP
OA-Fire.6	Develop MAAP
OA-Fire.7	Develop Own Fires
OA-Fire.8	Request BDA
OA-Fire.9	Execute ATO and Own Fires
OA-Fire.10	Monitor Execution
OA-Fire.11	Develop Mission Reports
OA-Fire.12	Dynamic Re-Tasking
OA-IO IO Activities	
OA-IO.1	Develop IO Plan
OA-IO.2	Distribute IO Plan
OA-IO.3	Assess Red Intent
OA-IO.4	Determine Blue Vulnerabilities
OA-IO.5	Assess Red Vulnerabilities
OA-IO.6	Develop Communications Attack Plan
OA-IO.7	Develop Network Attack Plan
OA-IO.8	Develop PSYOPS Plan
OA-IO.9	Simulate Effects
OA-IO.10	Simulate IO Outcomes
OA-IO.11	Develop IO POD
OA-IO.12	Execute IO Plan
OA-Log Logistics Activities	
OA-Log.1	Planning
OA-Log.2	Information Acquisition
OA-Log.3	Assign Distribution
OA-Log.4	Monitor Distribution
OA-FP Force Protection Activities	
OA-FP.1	Acquire Standing FP Plan
OA-FP.2	Develop Threat Assessment
OA-FP.3	Acquire Applicable ROE
OA-FP.4	Assess Local Threat
OA-FP.5	Develop FP Plans
OA-FP.6	Collaborate to Select FP Plan
OA-FP.7	Assign Watch and Assets
OA-FP.8	Execute FP Plan
OA-MDA Maritime Domain Awareness Activities	
OA-MDA.1	Data Acquisition
OA-MDA.2	Data Repository
OA-MDA.3	Track Processing
OA-MDA.4	Situation Analysis
OA-MDA.5	Information Distribution
OA-MDA.6	Tactical Decision-Making
OA-MDA.7	Execution
OA-MDA.8	MDA Workflow

OA-Guide	Guidance Development
OA-Guide.1	Daily
OA-Guide.2	Instructions
OA-Guide.3	Procedures

Table 13. Operational Activity performance Objective Types.

Human and HSI Capabilities Evaluation Objective Types		
Level-2	System Category	
L-3 Code	Objective Type	
Hu-Org	Organization Effectiveness	
Hu-Org.1	Organization Structure	
Hu-Org.2	Task Distribution	
Hu-Org.3	Situation/Organ. Match	
Hu-Org.4	Work Flow	
Hu-Org.5	Command Relations	
Hu-Org.6	Organization Dynamics	
Hu-Org.7	Dynamic Structures	
Hu-Grp	Group Effectiveness	
Hu-Grp.1	Group Competence	
Hu-Grp.2	Performance Level	
Hu-Grp.3	Task Understanding	
Hu-Grp.4	Workload Effects	
Hu-Grp.5	Skills/Task Match	
Hu-Grp.6	Dynamic Tasking	
Hu-Ind	Individual Effectiveness	
Hu-Ind.1	Personnel Competence	
Hu-Ind.2	Performance Level	
Hu-Ind.3	Task Understanding	
Hu-Ind.4	Workload Effects	
Hu-Ind.5	Skills/Task Match	
Hu-Ind.6	Dynamic Tasking	
Hu-Trn	Training Effectiveness	
Hu-Trn.1	Task Training	
Hu-Trn.2	System Training	
Hu-Trn.3	Just-In-Time Training	
Hu-Trn.4	On-the-Job Training	
Hu-Trn.5	Reach-back Training	
Hu-HSI	HSI Effectiveness	
Hu-HSI.1	Displays	
Hu-HSI.2	Controls	
Hu-HSI.3	Prompts and Alerts	
Hu-HSI.4	Directions	
Hu-HSI.5	Help Systems	
Hu-HSI.6	Information Access	
Hu-HSI.7	Applications Access	
Hu-HSI.8	User Defined Configuration	

Table 14. Human and HSI Capabilities Objective Types.

Guidance Evaluation Objective Types	
Level-2	System Category
L-3 Code	Objective Type
G-CON	CONOPS
G-CON.1	Command Relationships
G-CON.2	Operations Coverage
G-CON.3	Situation Coverage
G-CON.4	Threads
G-CON.5	Technology Inclusion
G-TTP	TTP
G-TTP.1	Distribution
G-TTP.2	Operations Coverage
G-TTP.3	Situation Coverage
G-TTP.4	Technology Inclusion
G-Ord	Standing Orders (ROE,NSL, etc.)
G-Ord.1	Distribution
G-Ord.2	Match to Situation
G-Ord.3	Updating
G-CG	Commander's Guidance
G-CG.1	Distribution
G-CG.2	Match to Situation
G-CG.3	Conformity to Higher Command Intent
G-CG.4	Conformity to Standing Orders

Table 15. Guidance Evaluation Objective Types.

Services Evaluation Objective Types	
Level-2	Services Category
L-3 Code	Objective Type
S-Appl	Applications Management
S-Appl.1	Plan and Install Applications
S-Appl.2	Manage Applications
S-Appl.3	Assure Applications
S-Appl.4	Protect Applications
S-Appl.5	Authorize Customer Use of Applications
S-Serv	Enterprise Services Management
S-Serv.1	Plan and Install Services Systems
S-Serv.2	Plan and Install Customer Services
S-Serv.3	Manage Customer Services
S-Serv.4	Assure Customer Services
S-Serv.5	Protect Customer Services
S-Serv.6	Authorize Customer Use of Services
S-Serv.7	Instruct Customers on Services Use
S-Serv.8	Profile Customers
S-Serv.9	Provide Services Based on Customer Profiles

Table 16. Services Evaluation Objective Types.

Some aspects of the above layout of Categories and Types merit note.

- Enterprise Services Management is a relatively new experimentation topic. The Objective Types will probably be modified with time.
- Many Operational Activities are not included. Force Protection and MDA are new to this list and Logistics is the only business-like activity.
- Systems Management is under the individual systems. Some AoI have network and communications systems management as a separate service activities.

It is anticipated that there will be some modification of this structure as experimentation emphasis evolves. This should be minimal because the current structure has fairly general categories.

Appendix B. Operational Activities Set Activity-Type and Tasks

The following tables show the Tasks associated with each Activity-Type. There is one table for each Category.

Category		
Type	Task	
Task	Designation	Description
OBSERVE		
Ob-Plan	Identify Information Needs	
Plan.1	Evaluate	Evaluate situation to determine information needs.
Plan.2	Type	Determine type, data search or intelligence collection.
Plan.3	Request	Develop and forward RFI.
Plan.4	Parameters	Develop parameters for database search.
Ob-AcqD	Acquire Data	
AcqD.1	Collect	ISR collection to create new data.
AcqD.2	Search	Search for specific existing data by any means.
AcqD.3	Find	Find data as a result of search.
AcqD.4	Retrieve	Retrieve found data (pull).
AcqD.5	Receive	Receive data from another activity, requested or not (push).
Ob-ProcD	Process Data Into Information	
ProcD.1	ID	Identify data.
ProcD.2	Categorize	Categorize and classify data.
ProcD.3	Correlate	De-conflict and correlate data.
ProcD.4	Fuse	Fuse data from different sources to produce information
ProcD.5	Distill	Distill and synthesize to produce information, attach metadata.
ProcD.6	Authenticate	Authenticate data and information source.
ProcD.7	Assure	Assure accuracy of data processing methodologies.
Ob-DisI	Distribute Information	
DisI.1	Needs	Assess customers' information needs.
DisI.2	Situation	Assess situation to determine information priorities.
DisI.3	Prioritize	Match information to needs and situation, prioritize distribution.
DisI.4	Means	Select means for information distribution.
DisI.5	Configure	Configure information for distribution means.
DisI.6	Transmit	Transmit information.
DisI.7	Relay	Relay information.
DisI.8	Alert	Alert recipient of information availability.
DisI.9	Col	Determine Col information needs
DisI.10	Prepare	Prepare information for Col collaboration.
DisI.11	Format	Format information for collaboration.
DisI.12	Share	Share information during collaboration sessions.

Table 17. Observe Category Activity-Types and Tasks

Category		
Type	Task	
Task	Designation	Description
ORIENT		
Or-Acql	Acquire Information	
Acql.1	Determine	Evaluate and determine information needs.
Acql.2	Request	Submit Request for Information (RFI)
Acql.3	Search	Search for specific existing information by any means.
Acql.4	Find	Find information as a result of search.
Acql.5	Retrieve	Retrieve found information (pull).
Acql.6	Receive	Receive information from another activity, requested or not (push).
Acql.7	Guidance	Receive/retrieve guidance and directives.
Acql.8	Discover	Discover unanticipated information through intelligent search.
Acql.9	Adv Search	Advanced search, context search, pattern search.
Or-Procl	Process Information	
Procl.1	ID	Identify information.
Procl.2	Categorize	Categorize and classify information.
Procl.3	Correlate	Correlate information with needs and situation.
Procl.4	Fuse	Fuse information from different sources
Procl.5	Distill	Distill and synthesize correlated information, attach metadata.
Procl.6	Assure	Assure accuracy of information processing methodologies.
Or-DevSA	Develop Situational Awareness	
DevSA.1	Blue	Develop Blue Force status.
DevSA.2	White	Develop White Force status.
DevSA.3	Red	Develop Red Force status.
DevSA.4	Environment	Assess tactical environment.
Or-ShrSA	Share Situational Awareness	
ShrSA.1	Needs	Determine units' SA information needs.
ShrSA.2	Means	Select means for SA information distribution.
ShrSA.3	Configure	Configure SA information for distribution means.
ShrSA.4	Transmit	Transmit SA information.
ShrSA.5	Collaboration	Present SA information during collaboration.
ShrSA.6	Alert	Alert recipient to availability of SA information.
Or-PntSA	Present Situational Awareness	
PntSA.1	Means	Select means for SA information presentation.
PntSA.2	Visual	Display SA information visually.
PntSA.3	Aural	Present SA information aurally.
PntSA.4	Text	Present textual SA information.
PntSA.5	Alert	Alert customer to SA information availability.
Or-Guide	Provide Guidance	
Guide.1	Daily	Develop and provide Commanders daily guidance
Guide.2	Instructions	Develop and provide rules and instructions (ROE, NSL, etc.)
Guide.3	Procedures	Develop and provide operating procedures (CONOPS, TTP, SOP)

Table 18. Orient Category Activity-Types and Tasks.

Category		
Type	Task	Description
Task	Designation	Description
DECIDE		
D-AcqK Acquire SA Knowledge		
AcqK.1	Determine	Evaluate and determine SA information needs.
AcqK.2	Request	Request SA information from another activity.
AcqK.3	Retrieve	Retrieve SA information (pull).
AcqK.4	Receive	Receive SA information from another activity, requested or not (push).
AcqK.5	Guidance	Receive/retrieve guidance and directives.
D-DevSU Develop Situation Understanding		
DevSU.1	Correlate	Correlate Blue, White, and Red status to develop tactical SU.
DevSU.2	Red Intent	Infer Red intent.
DevSU.3	Blue Intent	Evaluate guidance and situation to develop intent.
DevSU.4	ROE	Correlate intent with Rules-of-Engagement.
D-ShrSU Share Situation Understanding		
ShrSU.1	Distribute	Distribute SU information to decision-making units.
ShrSU.2	Collaborate	Present SU information during collaboration.
ShrSU.3	Alert	Alert recipient to availability of SU information.
D-DevCoA Develop Courses-of-Action		
DevCoA.1	Develop CoA	Develop alternate Courses-of-Action
DevCoA.2	Simulate	Simulate CoA outcomes
DevCoA.3	Collaborate	Collaborate to choose CoAs for presentation.
D-PntCoA Present Courses-of-Action		
PntCoA.1	Develop	Develop CoA presentation to display alternatives for command decision-making
PntCoA.2	Present	Present CoA briefing.
PntCoA.3	Correlate	Correlate CoAs with intent and ROE.
D-CoA Choose Course-of-Action		
D-Coa.1	Evaluate	Determine CoA sufficiency, reworks if needed.
D-Coa.2	Choose	Choose CoA for execution.
D-DevT Develop Tasking		
DevT.1	Correlate	Correlate CoA requirements with available assets.
DevT.2	Develop	Develop Unit/Wing/Group tasking to execute CoA.
D-DisT Distribute Tasking		
DisT.1	Distribute	Distribute tasking to execution commands.
DisT.2	Collaborate	Collaborate to clarify tasking requirements, intent, and asset status.
DisT.3	Alert	Alert recipient to tasking transmission.

Table 19. Decide Category Activity-Types and Tasks.

Category		
Type	Task	
Task	Designation	Description
ACT		
A-AcqT	Acquire Tasking	
AcqT.1	Receipt	Receive tasking.
AcqT.2	Status	Obtain asset status reports.
AcqT.3	ROE	Obtain pertinent ROE, guidance, intent.
A-DisUT	Distribute Unit Tasking	
DisUT.1	Correlate	Correlate tasking, assets, rules.
DisUT.2	Non-Execute	Report tasking that cannot be executed.
DisUT.3	Assign	Assign tasks to individual assets.
DisUT.4	Re-Task	Evaluate and assign time sensitive re-tasking.
A-Ex	Execute Tasking	
Ex.1	Execute	Execute assigned tasks.
Ex.2	Non-Execute	Report tasks that could not be prosecuted in real-time.
Ex.3	Re-Task	Accept and execute re-tasking.
A-ExMon	Monitor Execution	
ExMon.1	Monitor	Monitor asset prosecution of tasks in real-time.
ExMon.2	Down	Report asset failures to prosecute, for whatever reason, in real-time.
A-ExRprt	Execution Reporting	
ExRprt.1	Report	Formulate and provide MISREPS.
ExRprt.2	Status	Determine end-of-mission unit asset status.
ExRprt.3	Evaluate	Determine end-of-mission prosecution status.
ExRprt.4	Mission	Provide end-of-day execution reports.

Table 20. Act Category Activity-Types and Tasks.

Category		
Type	Task	
Task	Designation	Description
SERVICE		
S-PlanN	Plan and Install Network and Communications Systems	
S-PlanN.1	Plan Net	Plan network architecture and protection.
S-PlanN.2	Plan Comms	Plan communication systems architecture and protection.
S-PlanN.3	Install Net	Install network.
S-PlanN.4	Install Comms	Install communications.
S-PlanN.5	Net Protect	Install and implement network protection.
S-PlanN.6	Comm Protect	Install and implement Communications protection.
S-PlanS	Plan and Install Customer Services	
S-PlanS.1	Plan Appl	Plan applications.
S-PlanS.2	Plan Services	Plan enterprise services architecture and protection.
S-PlanS.3	Plan SoA	Plan SoA services and configuration.
S-PlanS.4	Install Appl	Install applications.
S-PlanS.5	Install Serv	Install enterprise services.
S-PlanS.6	Serv Protect	Install enterprise services protection.
S-Acquire	Acquire and Archive Information	
S-Acq.1	Acquire Info	Acquire data and information for archival.
S-Acq.2	Authenticate	Authenticate information validity and source.
S-Acq.3	Archive	Categorize, mark, and archive data and information.
S-Acq.4	Config Archive	Configure/optimize data and information archives for current use.
S-Acq.5	Tactical Data	Acquire and install tactical databases (MIDB, NSL, etc.)
S-Manage	Manage Network and Communications	
S-MngN.1	Monitor Net	Monitor network use.
S-MngN.2	Assess Net	Assess network use.
S-MngN.3	Monitor Comm	Monitor communications use.
S-MngN.4	Assess Comm	Assess communications use.
S-MngN.5	Config Net	Configure/optimize/re-configure network for current use.
S-MngN.6	Config Comms	Configure/optimize/re-configure communications for current use.
S-MngN.7	Manage Net	Manage network to optimize throughput.
S-MngN.8	Mng Comms	Manage communications to optimize throughput.
S-Manage	Manage Customer Services	
S-MngC.1	Monitor Apps	Monitor applications use.
S-MngC.2	Assess Apps	Assess applications use.
S-MngC.3	Monitor Serv.	Monitor services use.
S-MngC.4	Profile Serv	Assess services use and construct user profiles.
S-MngC.5	Maintain Apps	Insure full customer availability of applications through server management.
S-MngC.6	Maintain Serv	Insure full customer availability of services through configuration management.
S-MngC.7	Config Service	Configure/optimize enterprise services for current use and profiles.
S-MngC.8	Alert Service	Alert users to service availability and changes.
S-MngC.9	Acquire Apps	Acquire and install updates/patches to applications.
S-MngC.10	Acquire Serv	Acquire and install updates to enterprise services.
S-MngC.11	Info Use	Monitor use of archive information.

S-MngC.12	Profile Info	Construct user information use profiles.
S-MngC.13	Config Archive	Configure/optimize data and information archives for current use.
S-MngC.14	Alert Info	Alert users to information availability.
S-Assure Assure Network and Communications		
S-AssN.1	Monitor Net	Monitor network status.
S-AssN.2	Monitor Comm	Monitor communications status.
S-AssN.3	Assess Net	Assess network status.
S-AssN.4	Assess Comm	Assess communications status.
S-AssN.5	Detect Net	Detect network intrusion/attack.
S-AssN.6	Net Attack	Determine source and status of network attack/intrusion.
S-AssN.7	Comm Attack	Determine source and status of communications attack/intrusion.
S-AssN.8	Insure Net	Insure network services through failover/path switching.
S-AssN.9	Insure Comm	Insure communications through failover/switching.
S-AssN.10	Repair Net	Repair network after failure or degradation.
S-AssN.11	Repair Comm	Repair communications after failure or degradation.
S-Assure Assure Information		
S-IA.1	Source	Identify and assure data/information source.
S-IA.2	Validity	Validate information in the archive.
S-IA.3	Monitor Info	Monitor status and use of the data/information archives.
S-IA.4	Assess Info	Assess status data/information archives for faults and content compromise.
S-IA.5	Protect Apps	Protect information archive from unauthorized use or corruption.
S-IA.6	Detect Info	Detect information archive intrusion/attack.
S-IA.7	Info Attack	Determine source and status of information archive attack/intrusion.
S-IA.8	Info Available	Insure information availability through backup/failover.
S-IA.9	Repair Info	Repair/backup archive information.
S-Assure Assure Customer Services		
S-AssC.1	Monitor Apps	Monitor applications status.
S-AssC.2	Monitor Serv	Monitor enterprise services status.
S-AssC.3	Assess Apps	Assess applications status for faults.
S-AssC.4	Assess Serv	Assess status of enterprise services.
S-AssC.5	Protect Apps	Protect applications from unauthorized use or corruption.
S-AssC.6	Detect Apps	Detect applications intrusion/attack.
S-AssC.7	Apps Attack	Determine source and status of applications attack/intrusion.
S-AssC.8	Apps Available	Insure applications availability through backup/failover.
S-AssC.9	Protect Serv	Protect enterprise services from disruption and unauthorized use.
S-AssC.10	Detect Serv	Detect enterprise services intrusion/attack.
S-AssC.11	Serv Attack	Determine source and status of enterprise services attack/intrusion.
S-AssC.12	Serv Available	Insure enterprise services availability through backup/failover.
S-AssC.10	Repair Apps	Repair applications after failure or degradation.
S-AssC.11	Repair Serv	Repair enterprise services after failure or degradation.
S-Authorize Authorize Users		
S-Auth.1	Auth Net	Authorize users for network/communication systems.
S-Auth.2	Auth Apps	Authorize applications users.
S-Auth.3	Auth Serv	Authorize enterprise service users.
S-Auth.4	Auth Info	Authorize users access to specified data/information.
S-Distribute Distribute Information		
S-Dist.1	Situation	Prioritize information distribution based on situation.

S-Dist.2	Profile	Determine information distribution based on customer profiles.
S-Dist.3	Need	Push data/information to users based on identified need (profile/situation).
S-Dist.4	Request	Distribute data/information to users upon request.
S-Dist.5	Means	Determine information distribution means.
S-Dist.6	Format	Format information for distribution means.
S-Dist.7	Metadata	Attach metadata as needed.
S-Dist.8	Distribute	Distribute information.
S-Dist.9	Alert Info	Alert users to information availability.
S-Instruct Instruct Users		
S-Inst.1	Instruct Net	Develop guidelines and instruct users on network/communications system.
S-Inst.2	Instruct Serv.	Develop guidelines and instruct enterprise services users.
S-Inst.3	Instruct Arch.	Develop guidelines and instruct data/information archive users.

Table 21. Service Category Activity-Types and Tasks

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