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Technology Transfer and Transition is the deliberate process of converting innovative concepts into usable, scalable and replicable capabilities. California State University Long Beach Foundation (CSULB) Center for Commercial Deployment of Transportation Technologies (CCDoTT) is in the process of transitioning concepts developed over a decade of partnership with the Office of Naval Research (ONR) into military and commercial user-validated deployable capabilities.

The functions of CCDoTT, through the Agile Port Systems (APS) and Strategic Mobility 21 (SM21) programs, have been both

15. SUBJECT TERMS

GTMS, Global Transportation Management System, Service-Oriented Architecture, Global Positioning Systems, Geographic Information System, Strategic Mobility 21, Supply Chain Management, Drayage, Inland Ports, Joint Capability Technology Demonstration, Agile Deployment, Automatic Identification Technology, AIT, Defense Transportation System, End-to-End,

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TRANSITION PLAN DEVELOPMENT AND FINAL REPORT

Agile Port System Transition Support

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July 29, 2013

Agile Port System Transition Support

California State University Research Foundation

Concepts and Technology Transition Plan

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Executive Summary

Technology Transfer and Transition is the deliberate process of converting innovative concepts into usable, scalable and replicable capabilities. California State University Long Beach Foundation (CSULB) Center for Commercial Deployment of Transportation Technologies (CCDoTT) is in the process of transitioning concepts developed over a decade of partnership with the Office of Naval Research (ONR) into military and commercial user-validated deployable capabilities.

Transition is an art and a science of converting concepts from imagination and vision to fielded capabilities, goods, and services. The art involves negotiating multiple independent (yet extremely interdependent) lines of development. There is the "I want" or acquisition line of development, and there is the "What if" or Science and Technology (S & T) Research line of development. In the middle are Program Managers (PM) charged with evolving concepts to deployed capabilities. Linking the two parallel processes is the need for military use evaluation to guide both Science and Technology (S&T) sponsors and Acquisition sponsors in their efforts.

While the processes for S & T development and acquisition development provide for orderly development of concepts, unless both processes are understood and integrated, then the "I want", that may not exist at the start of the acquisition process, cannot be acquired, because no one has asked the "What Ifs" necessary to develop the needed capability. Conversely, simply expending resources to answer "What if" without envisioning a useful product in the end is a waste of scarce resources.

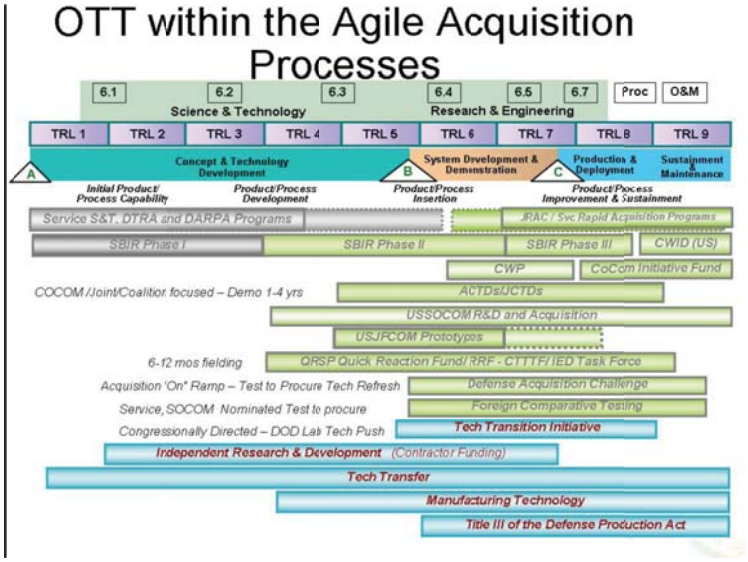


Figure 1 Transition: Navigating the Agile Acquisition Process[1]

The science and art of Transfer and Transition, therefore, is understanding the both the acquisition and S & T processes of development:

[1] Source Technology Transfer (T2) at USTRANSCOM David Cox Intellectual Property Counsel

1. Being able to identify the vehicles used at each stage, the milestone gates, funding vehicles, and validation processes,
2. Being able to move in an agile manner along both tracks,
3. Being able to recognize when traditional development strategies are appropriate,

   and

4. Being able to recognize when quick fielding/rapid deployment opportunities arise and are appropriate.

Figure 1 depicts the interrelationship between the acquisition and S & T processes of development, and when and where various project types and funding vehicles are appropriate. This holistic view to the acquisition and S & T processes allows for development of agile strategies to move concepts from ideas to validated capabilities.

The second portion of the art of the process, however, includes being able to align both the acquisition process and the S & T research communities with the ability to speak in terms each (and the other) community understands. This alignment must include an opportunity for the communities to incorporate simultaneous adequate opportunity for military use evaluation. And finally, the last portion of the art of the process is for both communities to hold equal the ability to recognize:

1. When the next step of development to fielded capability may need to appropriately transition from S & T to acquisition or from acquisition to S & T as appropriate, and
2. The array of funding vehicles available at each opportunity

Figure 2 illustrates where cross over points may occur between the acquisition and S & T processes of development, and at which points what types of technology transfer agreements (TTA) are appropriate for establishing relationships between the acquisition and S & T efforts.

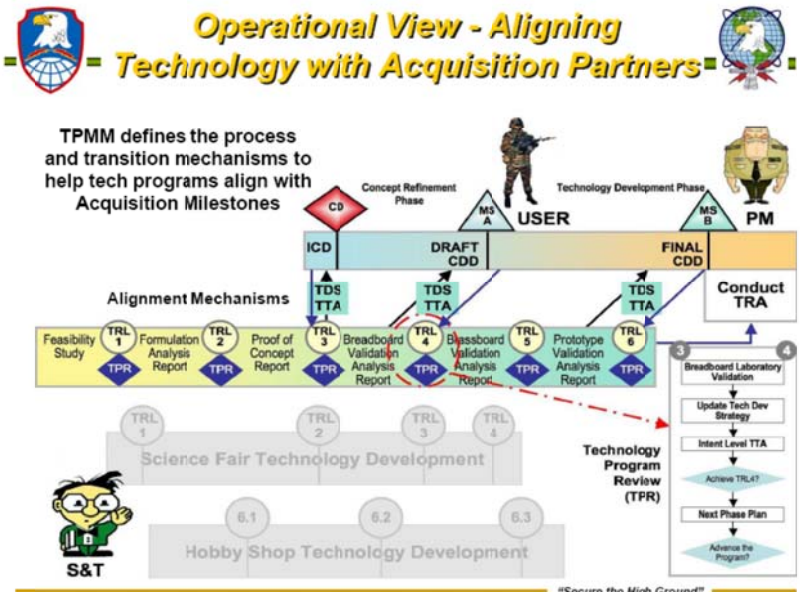


Figure 2 Aligning Science and Technology Development with Defense Acquisition

The functions of CCDoTT, through the Agile Port Systems (APS) and Strategic Mobility 21 (SM21) programs, have been both iterative and collaborative with regards to project development. CCDoTT has been charged to create a bigger pie and not to develop sole proprietary products. As such, CCDoTT was further charged to assure the use of concepts intended to involve cooperation between commercial and military communities, and through dual use design, to assure benefit both communities.

As the first step of a process to identify and develop transition technologies, this paper focuses initially on the identification of worthwhile technologies that the Office of Naval Research (ONR) has interest in developing. These technologies of interest have been identified as follows:

- The Transportation Internet Portal (TIP)
- Agile Port Node of Collaborative Visualization Software
- Sea Base / Advanced Base Concepts Modeling and Simulation
- SM21 (Global Transportation Management System)/ Drayage In-Transit Visibility (Connect-the Connectors)
- Real Time Location System (RTLS)
- Agile Port Systems (APS) Concepts
- Port Disruption Mitigation Strategies

As the second step of a process to identify and advance the development transition technologies, each of the identified technologies of interest to ONR is reviewed to ascertain characteristics and conditions holding worth or issue and to document the findings under pre-defined categories as itemized herein below:

- Description of the technology/capability
- Potential
- Operational Needs addressed
- Proposed Solutions
- Current Status
- Risk
- A Business Case for transition
- Appropriate Funding Sources
- Transition Requirements
- Recommendations for Funding Pathways
- Schedules and Tasks

The paper concludes with the transition process CCDoTT and SM21 Inc. will use to oversee the execution of the transition plans articulated in this plan.

1. Introduction

Innovative Concepts to Capabilities

Technology Transfer and Transition is the deliberate process of converting innovative concepts into usable, scalable and replicable capabilities. CCDoTT, at the California State University Long Beach Foundation, is in the process of transitioning concepts developed over a decade of partnership with the ONR into military and commercial user validated deployable capabilities. This process has been planned and executed in three phases.

- Phase 1, translated CCDoTT research tasks across the entire portfolio into their underlying concepts for comparative review and evaluation as nascent capabilities in order to identify with current transition potential (Deliverable 4.5.1);
- Phase 2, Identified the technical maturity and readiness level (TRL) of those selected concepts and technologies along with initial identification of transition pathways and programs with identified needs in the form of documented science and technology and combatant commander needs (expressed in terms of technology gaps and seams) for those selected maturing technologies;
- Phase 3, this current document, defines specific transition pathways in terms of candidate science and technology(S&T) sponsors; and acquisition sponsors; available tools, mechanisms and program for further S&T investment; opportunities for rapid military user evaluation and fielding; and acquisition sponsor engagement at appropriate technology insertion points for transition into fielded and maintained capabilities

In the first phase of this overall effort, the CCDoTT Capability Based Assessment Team (CBAT) reviewed discrete and related tasks over many program elements executed under the APS and SM21 programs. Concepts corresponding to indentified gaps and seams based upon CCDoTT program tasks were identified, and based upon ONR Code 30 staff input, were identified as areas of interest by ONR for further evaluation as potentially transitioning technologies and capabilities to meet warfighter needs.

The second step of the process, articulated in Deliverable 2 of this project, described the selected concepts and technologies in terms of level of maturity along the objective scale of TRL, with reference to the formal DoD acquisition process or equivalent level of maturity for technology insertion following military user evaluation in collaboration with S&T and candidate acquisition sponsors.

Indentifying maturity as expressed by TRL levels, and Business Activity (BA), used to finance technology development provides basis for negotiating ONR Technology Transfer Agreements (TTA) to transfer interests developed by CCDoTT research projects to commitments from acquisition program managers to guide the transition process. TRL and BA identification guides us to selecting for the employment of appropriate development vehicles. These include Small Business Innovative Research (SBIR), Small Business Technology Transfer (STTR), Cooperative Research and Development Agreements (CRADA), Joint Capability Technology Demonstrations (JCTD), as traditional paths for transition, as well as other forms for rapid transition, such as “proof of concept demonstrations”, or leveraging opportunities for user validation and testing to successfully complete the transition from concept to fielded and supported capability.

Phase 3 builds upon the provisionally assigned Technology Readiness Level and Budget Activity for each CCDoTT concept or technology as identified in Phase 2. This Phase further develops a notional transition

plan for each selected concept or technology that matches candidate S&T sponsors, tools and mechanisms for S&T investment, user evaluation, and candidate acquisition sponsors with ONR support.

Given the ground work research done in the first two phases, specific transition plans are created that provide strategic guidance for collaborative CCDoTT-ONR moving forward with the goal of transforming what were once "good ideas" in the mind's eye of an academic investigator into a fielded capability or commercial products/services that could still be acquired by DoD after being matured through development as commercial products/ or services.

Proposed alternative transition strategies will clearly identify

- a near term technology transfer and development strategy using further S & T investment programs and tools to best facilitate further technology maturity development to level four and level seven with considerations for insertion to rapid fielding programs at that level , where appropriate, for transition to end user testing following traditional acquisition
- concurrent engagement using ONR Level 1-3 TTA's to engage acquisition sponsors at any early stage of development
- conformance with the DoD acquisition process for Acquisition Category 2 (ACAT 2) or low cost capabilities in navigating from TRL 4 to 7 for technology insertion under the Joint Capabilities Integrated Development System (JCIDS) or through external development and insertion at the TRL 7 point requiring a Capabilities Document (CDD) with acquisition sponsor participation
- a developmental strategy focus on providing opportunities for field testing, use/end user evaluation, and testing programs and tools
- an acquisition strategy with transition into one or more existing programs of record for each concept and technology to navigate from TRL 7 to TRL 9 as a Program Operating Memorandum (POM) fielded capability maintained with operation and maintenance funds by the acquisition sponsor.

Regardless of the DoD transition path, a collaborative technology development strategy with industry with the potential for commercial application of technologies to provide a "third way" path for transition and continued refinement of the CCDoTT portfolio of technologies for eventual commercial sale to DoD and commercial markets.

2. Purpose

This document is meant to:

- demonstrate the relevance and potential transition paths for CCDoTT SM 21 applied research to current ONR efforts in support of expeditionary warfare and logistics; and
- serve as a primer and road map looking beyond the current CCDoTT SM 21 program for concepts or technologies with dual use potential to successfully navigate the technology transfer and transition processes, and identify potential insertion points without missing on key opportunities along the pathway.

3. Concepts and Technologies for Transition

Recently closed, but timely, ONR Broad Area Announcement (BAA) 13-4 contains a logistics thrust responsible for managing science and technology development to address what is described as a "tremendously diverse set (sic) of warfighter needs[2]" including hardware and software development. In our previous transition planning work, the following program concepts and technologies were identified as ONR Code 30 Areas of Interest for potential ONR S&T further investment and transition support.

3.1. Transportation Internet Portal (TIP)

3.1.1 Description

TIP is a prototype web portal in the form of a virtual private network (VPN) hosted by a third party logistics services provider. TIP provides a functional capability to match available commercial sealift capacity to transportation demand for response on short or no notice contingency operations, such as Humanitarian Assistance Disaster Response (HADR) response or military expeditionary operations. TIP has been successfully demonstrated to the Joint Planning and Analysis Group (JPAG) including the Joint staff, US Transportation Command (USTRANSCOM), and the Maritime Administration (MARAD) US Department of Transportation.

3.1.2 Potential Capability

This potential global air sea transportation planning and execution tool methodology broadens the aperture of transportation planners to include air sea surface naval and commercial strategic lift capacity from manual access to global and autonomic display in response to an emergency such as an HADR mission by an Expeditionary Support Group (ESG).

TIP provides a single sign on autonomic tool to display and match opportunistic lift demand with available military and commercial air and sea dynamic lift capacity. When combined with integration by way of the US Naval Supply Systems Command (NAVSUP) and Fleet Air Clearance Transportation System (FACTS) Program Executive Office supported Transportation Exploitation Tool (TET), TIP incorporates US fleet and naval air lift capacity.

3.1.3 Operational Need

Strategic sealift mobility is critical in support of Major Combat Operations (MCO), sustainment operations (including Sea Basing and resupply through Advanced Base), in support of HADR, and contingency missions on no or short notice. The hierarchy of strategic sealift capacity includes:

- NAVSEA organic maritime prepositioning (not mobilized in less than a Major Combat Operation (MCO), e.g. Operation Iraqi Freedom (OIF)),
- strategic sealift (e.g. Fast Sealift ships (FSS), Low Medium Speed Roll on Roll off (LMSR) vessels on call, the US Transportation Command (USTRANSCOM) Military Sealift Command (MSC) Ready Reserve Force (RRF) (as well as the inactive reserve fleet in process of scrapping and liquidation),
- MARAD Voluntary Intermodal Sealift Agreement (VISA) like the Civil Reserve Air Fleet (CRAF), and open market charter capacity.

[2] Expeditionary Maneuver Warfare Applied Research and Advanced Technology Development 13-004, pg 11

In those short or no notice situations –and over time in sustainment operations- matching available sealift capacity to transportation demand (emergency food supplies, water, power generation, portable shelter, heavy construction equipment etc) must all be done manually by telephone, message and facsimile by the Joint Planning Advisory Group (JPAG) (which includes MSC and MARAD). Transition from manual to autonomic operation improves organizational agility; collaboration; speed in data collection; analysis and response; the ability to conduct analysis of alternate COA; and dynamic re-planning in response to changed conditions in the battlespace and/or commander's intent.

As with the Transportation Exploitation Tool (TET) for naval air and sea opportunistic lift, so there is a manifest need for a Travelocity/Kayak type autonomic tool integrated with operational HADR planning and response for both domestic and foreign HADR stakeholders to match available capacity by vessel type, location, routing, scheduling, and load capacity to meet demand at the geolocation of the triggering event.

TIP fills this gap. The political sensitivities surrounding HADR response implies that a more neutral intermediary service provider, i.e. a non-profit such as Strategic Mobility 21 Inc, the better received the results may be, particularly in situations where there is a heightened sensitivity to DoD presence by a host state.

USTRANSCOM has documented S&T Research, Development, Test and Evaluation (RDT&E) capability gaps in In-Transit-Visibility (ITV), Distribution Systems Interoperability, Distribution Planning and Forecasting, Process Management, Distribution Performance Metrics, Container Management, and also gaps in Coalition Multi-national Interagency capabilities that all would directly benefit from TIP deployment to meet these expressed needs.

TIP falls into the category of an unfunded requirement (UFR) and S&T Integrated Projects List (STIPL) in the normal POM cycle, and lacks a primary designated acquisition sponsor.

3.1.4 Proposed Solution

In the larger context, TIP, and other CCDoTT SM 21 web services, provides a tangible tool to improve maritime domain awareness (situation awareness and understanding) thus providing more effective response to unanticipated natural disasters and manmade geopolitical events.

Maritime domain awareness is generally referred to as the effective understanding of anything associated with the global maritime environment that could adversely impact the security, safety, economy or environment of US. The real time geolocation of friendly usable maritime strategic mobility lift assets in response to unfolding events is a critical component and capability to that end. TIP merges the diverse set of information systems providing status of military as well as commercial lift assets.

TIP supports joint military-commercial container and other shipment planning, coordination, and execution monitoring requirements in both peacetime HADR situations and in wartime environments.

TIP is a demonstrated TRL 4 prototype software system capability that enhances maritime domain awareness in terms of location, routing, scheduling, and available sea (and potentially air) lift transportation, particularly for response to the initial post event port disruption phase

and later recovery operations phase of HADR crisis or short notice / no notice expeditionary operations.

3.1.5 Current Status

TIP is a demonstrated commercial off-the-shelf (COTS) TRL 6 unclassified commercial portal operating over a VPN. It provides near real time visibility into Voluntary Intermodal Sealift (VISA) contract US flag vessels for potential opportunistic lift capacity for HADR and other DoD missions; by US Navy and Marine Corps, US Transportation Command, regional Combatant Commanders, and US Maritime Administration (MARAD); through the Joint (staff) Planning and Analysis Group (JPAG).

TIP has been successfully demonstrated to JPAG operating in prototype form as a web portal deployed in a VPN hosted by a third party logistics services provider.

3.1.6 Risk Table

Risks	**Low**	**Medium**	**High**
Technical	**X**		
Based upon the prototype VPN demonstration and availability of data there is little technical risk to further development of a COTS system meeting applicable requirements			
Schedule	**X**		
There is little schedule risk that TIP cannot be deployed in an operational robust version within the two year RTT mission requirement.			
Cost	**X**		
Under the common conservative rule of thumb for software development of 1 architect, up to five software engineer or programmers, and 2 testers or approximately $1.5 M per year plus ongoing vessel data costs, deployment costs should not exceed $3M for two years of effort.			
Business	**X**		
SM 21 Inc collaborated with GT Nexus under the proprietary GTMS SEM SOA architecture successfully in the DOLE Foods experiment extended user evaluation. The web service should be deployed in an AnyLogic or similar distributed environment but CSULB computer scientists are familiar with migration to a distributed networked platform. Several cloud hosts have been identified for this combination public and hybrid cloud environment. Business risk of non-performance is therefore low.			

3.1.7 Business Case

Similar to TET and NAVSUP/NOLSC, the principal value proposition of TIP benefits may be expressed in :

- projected transportation cost savings and related administrative manual manpower cost avoidance
- speed to market of transported assets, or in the case of force deployment to Area of Responsibility (AOR), reflected in improved additional response time and reductions of delay in Required Delivery Date of units and equipment
- more efficient allocation of strategic lift capacity, thus reducing length and cost of operational deployment -- important considerations to USMC return to expeditionary warfare.

These include projected cost savings in manpower resources from a shift from manual to automated information processing, redundant effort to OPNAV 41, MARAD, USTRANSCOM MSC, and NAVSEA in matching HADR, Sea Base sustainment and other mission strategic sealift requirements with opportunistic lift capacity provided by VISA commercial contract vessels (and cost avoidance if these assets are used in lieu of organic sealift assets).

Indirect benefits include reduction in loss of life and property in host country from rapid institutional response capability (e.g. USMC USN NOLSC) to the current event and in the future from building resiliency and rapid recovery from future events.

TET, TIP's predecessor, has demonstrated accepted operational potential transportation cost savings on the order of hundreds of millions of dollars on an annualized basis.

3.1.8 Funding

TIP falls into the category of an unfunded requirement (UFR) and S&T Integrated Projects List (STIPL) in the normal Program Operating Memorandum (POM) Five Year Defense Plan (FYDP) budget cycle, and suffers from the absence of a primary designated acquisition sponsor (analogous originally to the case of TET until NOLSC championed the solution) to capture the economic benefits of deployment.

S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's

Alternate SBIR funding through SM 21 Inc

Alternate J7 JPAG, MARAD USDOT

Acquisition Sponsor(s): NAVSUP (FACTS PEO) for Naval Operational Support Logistics (NOLSC) deployment in HADR and other mission requirements

Alternate: J7 JPAG/ MARAD USDOT

3.1.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the TIP technology transition effort is the insertion at TRL 7 of a robust software web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of OPNAV 41, USMC Naval Supply Systems Command (NAVSUP), NOLSC, Naval Sea Systems Command (NAVSEA), US Transportation Command (USTRANSCOM), also MSC and MARAD through JPAG. This should occur at Q2 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance by the user community of interest.

3.1.10 Recommended S&T Investment and Transition Pathway

S&T investment sponsor should be ONR Code 30 under Expeditionary Warfare and Sea Base Future Naval Capabilities programs. Alternatively, TIP could be a SIBR candidate through Strategic Mobility 21 Inc.

Acquisition investment Sponsor should be Naval Supply Systems Command (NAVSUP) for Naval Operational Logistics Support Command (NOLSC) use and hosted by Fleet Air Clearance Transportation Systems (FACTS) PEO, in the case of TET for eventual Naval Logistics Integration, or by USMC PEO Ground Systems Logistics and Information Technology Division as part of Expeditionary Logistics capabilities.

With additional S&T investment, TIP can be deployed as standalone commercial off-the-shelf (COTS) web service capability hosted by SM 21 Inc non-profit or integrated with government off-the-shelf (GOTS) SIPRNET Transportation Exploitation Tool (TET) supported by Naval Supply Systems Command (NAVSUP) Fleet Air Clearance Transportation System (FACTS) as Program of Record (POR) acting on behalf of NAVSUP and MSC as a component service level capability in support of HADR operations in collaboration with MARAD. Ideally, If MARAD/USDOT had discretionary RDT&E funds, it could host TIP as part of its MARVIEW, a maritime common operating picture. Similarly, TIP could be deployed by USTRANSCOM on behalf of itself, as Distribution Process Owner (DPO) through Military Sealift Command (MSC), or integrated with Defense Logistics Agency (DLA) through its integrated data environment (IDE).

In either case JPAG should validate functional requirements and performance metrics. Department of Homeland Security (DHS/FEMA) and US Agency for International Development (USAID) should have role based interagency access to the system. A National Security Agency (NSA), Defense Information Systems Agency (DISA), Federal Information Security Management Act (FISMA) information assurance protocol should be employed as part of certification(such as OZONE widget protocol) for the web service as part of a semantically enabled service oriented architecture (SEM SOA); accessible to military, multinational coalition, interagency, commercial, and non-governmental organizations (NGO).

TET Transition Background:

TIP is a likely candidate to follow in the footsteps of NAVSUP and FACTS support for development of a SIPRNET military transportation demand and capacity matching tool called the Transportation Exploitation Tool (TET). TET, much like Travelocity or Kayak for commercial travel, was developed under the Technology Insertion Program for Savings (TIPS). A promising transition pathway of TIP would be to follow the same development and transition pathway as ONR Naval-USMC used for development of TET to a joint capability.

TET originated as a Naval Supply Systems Command (NAVSUP) Global Logistics Support (GLS) N 48.5 supported US Fleet Forces Lifts of Opportunity program.

TET was developed by the Oak Ridge National Laboratory (ORNL) with the Department of Energy (DOE) as a partner to develop a Travelocity unclassified version within the FACTS ONR Technology Insertion Program for Savings (TIPS). Feeds include the IGC Joint Air Logistics and USCG Aviation Log (MIS ALMIS) data bases.

Following this the 2011-2015 Naval Logistics Integration Plan (NLI) incorporated the TET initiative in a SIPRNET version under expansion to include UK MOD through the Volpe Center Remote Access Management Portal (RAMP) portal. The future intent is to make an expanded web service available to all component services as a joint capability.

3.1.11 Schedule and Tasks

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.2. APS Collaborative Visualization (LogCOP, LVC-G)

3.2.1 Description

The Agile Port System Collaborative Visualization Node is a next generation of the decade old CCDoTT MayaViz collaborative portal deployed as TransVIZ by US Transportation Command (USTRANSCOM). TransVIZ was successfully utilized in Operation Iraqi Freedom (OIF) joint force deployment planning. It functionally reduced traditional stove- piped planning under the Joint Operations Planning and Execution System (JOPES) to a common display of geo-referenced data using JFAST model for joint flow of units to theater, enabling collaborative visualization in a role based joint planning environment. However, in its current iteration TransVIZ does not reflect advances in geospatial visualization to permit dynamic analysis of alternate courses of action nor integration of data from multiple sources (i.e sensors, social media etc).

3.2.2 Potential Capability

TransVIZ is hopelessly outdated by today's standards in terms of collaboration capability, geospatial visualization, and analytical "back office" course of action analysis. This limits the potential to provide state of the art planning tools to a forward deployed, distributed joint task force ashore or at a Sea Base and advanced base and dispersed units ashore in the Area of Responsibility (AOR).

Adapting to newer technology, SM 21 has partnered with a state of the art secure collaborative planning environment under the name Virtual Agility. Virtual Agility has been introduced at the Naval Postgraduate School Joint Interagency Field Experiment (JIFX), Operation Relief, in the form of a Marine Air Ground Task Force (MAGTF) Operations Planning and Execution System (MAGTF). This capability integrated other data from unmanned aeronautical vehicles, social media, and mobile adaptive sensor networks to provide a common geo-referenced operating picture.

SM 21 is in the process of developing a smart node geospatial visualization common operating picture (GEOVIZ or GEOCOP) based upon COCOM and DHS S&T and 1 MEF warfighter community input as part of JIFX Operation Relief.

Most importantly, the vast potential of the deployable Humanitarian Assistance Disaster Response (HERO) Tactical Operations Center (LOGTOC), is its versatility as a smart node with global communications reach, network centric warfare modeling and simulation, end-to-end (E2E) dynamic planning and execution, and re-planning capability for deployment at a Sea or advanced base, or as part of a Joint Task Force Port Opening (JTFPO).

The resulting GEOVIZ-GEOCOP requires additional S&T investment in order to be integrated and interoperable with USN- USMC FORCENET and Expeditionary Support Group (ESG) sea basing operations from HADR to major combat operations.

Modern design should incorporate current geospatial visualization capabilities, mobile adaptive networks sensors, social media integration, and converted to distributed SEM SOA architecture to support expeditionary logistics operations through sea basing (USN USMC) and joint task force port opening (USA) in support of dispersed operations within AOR.

3.2.3 Operational Need

We live in a networked visual digital age in which the rapid fusion of data, information from multiple sources and context provide for:

- geospatial visualization,
- open source intelligence gathering
- adaptive planning,
- course of action analysis,
- mission rehearsal,
- dynamic re-planning,
- predictive analytics
- after action analysis,
- and education and training

These network centric agile enterprise attributes are increasingly important, if not critical, across the full spectrum of operations from HADR through Major Combat Operations (MCO).

Almost a decade ago in partnership with USTRANSCOM, MARAD, and USDOT, CCDoTT and its commercial partner, under the USTRANSCOM S&T program Advanced Technology for the 21st Century (AT 21), developed and deployed TransVIZ. TransVIZ is now maintained by the J6, in support of itself and multiple COCOMS. A decade later geospatial analysis (National Geospatial Agency, Google Earth etc), the rise of the internet and social media (and now crowdsourcing), mobile adaptive networks, ubiquitous sensor data feeds (e.g. UAS), mobile applications, and Big Data have opened up voluminous sources of data and information sources for data fusion and decision support.

TransVIZ was state of the art a decade ago. Its success was highlighted in the original run up to OIF in 2003. TransVIZ can now be updated through the migration to a secure cloud based semantically enabled service oriented architecture (SEM SOA) and web services to replace the obsolete current system. It can be a major enabler as the Navy transform itself into a Global Force for Good and the USMC returns to its primary mission of Expeditionary Warfare.

CCDoTT-SM 21 have continued to develop geospatial visualization around a paradigm of emergency management as a front end LOGCOP complement to other backbone modeling and simulation, global supply network management, and disaster response modeling, consequence management, and HADR integration of DoD, coalition-multinational interagency, civil, commercial and NGO's combined operations.

USTRANSCOM S&T validated gaps addressed by GEOVIZ, as successor to TransVIZ, include: E2E Visibility, Distribution System Interoperability (and data fusion), and Distribution Performance Metrics Strategy.

3.2.4 Proposed Solution

GEOVIZ is a state of the art dual use (military and commercial) combination. As expressed in the active Humanitarian Assistance and Disaster Response (HADR) Tactical Operations Center, HERO TOC, under development and experimentation (under NPS Cebrowski Center auspices at Camp Roberts CA entitled Joint Interagency Field Experiment (JIFX) Operation Relief), GEOVIZ combines a versatile artificial intelligence driven collaborative "to be" merged with the geospatial: LOGCOP as the functional and operational requirements are validated and the software integration completed.

The backbone will be the same CCDoTT- SM 21 regional supply network and multi-modal terminal model federated suite, originally under development with USJCOM, (for the G4 LIA initiated and JROC approved PEO Expeditionary Theater Opening (ETO) and now reincarnated as a deployable USTRANSCOM Joint Task Force Port Opening (JTFPO) I). This suite of capabilities was originally demonstrated when SM 21 participated in Operation New Dawn reset joint exercise in Port Canaveral under SDDC 832d Transportation Battalion in 2011.

The concepts initiated under TransVIZ have now merged with the back end adaptive planning and execution system, analysis of alternatives for operation planning course of action (COA) analysis, mission rehearsal, and dynamic re-planning for use in the MAGTFOPES system under discussion with 1 MEF S&T.

The same back office capability can serve as the Joint Deployment Analysis Center (JDAC) at USTRANSCOM and as a prototype Crisis Response and Integrated Simulation Science Laboratory (CRISIS) laboratory for running Homeland Security and Defense scenarios with DHS FEMA and State and regional Offices of Emergency Services and State National Guard and Reserve units.

On the joint training side, CRISIS, can serve as a model for Live Virtual Constructive and Gaming (LVC-G) student and team centered immersive education and training. It also provides a natural holistic synthetic immersive training laboratory and environment for Maritime Domain Awareness (MDA).

3.2.5 Current Status

GEOVIZ is the successor to CCDoTT developed COTS technology, fielded as a TRL 7-9 capability called MayaVIZ-Trans VIZ. These systems, used by USTRANSCOM pre-OIF, are now outdated by current technology, functionality, data fusion, and cloud architecture information technology advancements over the last decade.

GEOVIZ is a next generation TRL 4 proposed replacement under subsystem development and integration for a fielded capability.

GEOVIZ is a prime candidate for ONR Sea Base FNC development and after validation by MARCORSYCOM and/or SPAWAR,. GEOVIZ could be hosted as transition sponsor by PEO Ground Systems 1-MEF, PAC FLT, PACOM or migration to joint capability by USTRANSCOM as a TransVIZ replacement for themselves as JTFPO/JDAC and for deployment by other COCOMs.

GEOVIZ is prime candidate to augment or replace the current primary visualization tool for all Ship to Objective Maneuver (STOM) mission planning and execution in the form of the two dimensional Joint Mapping Toolkit (JMTK), which is already technologically outdated. Visualization tools, found within the Defense Information Structure Common Operating Environment Tactical decision aids, must adhere to established doctrine, but must also be sufficiently agile through open architecture to utilize emerging geospatial visualization tools and exploit Navy and USMC experience base fused within an overall SEM SOA Knowledge Management System (KMS) to support training and education as well as operational requirements.

3.2.6 Risk Table

Risks	Low	Medium	High
Technical		**X**	
Based upon lessons learned in software integration and through joint experimentation and USMC USA and DHS requirements generation at NPS JIFX Operation Relief, aside from integrating proprietary GIS and open architecture MSA systems in migration to AnyLogic as distributed web service for a collaboratory consortium collaborative deployment, most technical problems expected to be encountered can be managed over time.			
Schedule		**X**	
Based upon use of an integrated project team to mitigate risk, best of breed capability integration, and agile development evolutionary acquisition experience to date with adequate resources, there is little schedule risk that GEOVIZ cannot be deployed in an operational robust version within the two year RTT mission requirement.			
Cost		**X**	
Under the common conservative rule of thumb for software development of 1 architect, up to five software engineers or programmers, and 2 testers or approximately $1.5 M per year plus ongoing vessel data costs, deployment costs should not exceed $3M for two years of effort.			
Business	**X**		
SM 21 Inc has collaborated with Virtual Agility in collaboration with 1 MEF S&T at NPS JIFX Operation Relief. CSULB computer science personnel are familiar with MSA migration to AnyLogic and SEM SOA architecture Cloud environment migration may be a challenge at this time. Geospatial visualization geography domain knowledge and application is increasing along with computer science integration. Several cloud hosts have been identified for this combination public and hybrid cloud environment. Business risk of non-performance is therefore low.			

3.2.7 Business Case

The principal value proposition of GEOVIZ benefits may be expressed in improved readiness reflected in improved ability to execute core capabilities in terms of expeditionary warfare, elimination/reduction of unacceptable consequences through avoidance of mission failure, and indirect benefits measured in speed in decision making and agile response to changing conditions in the battlespace.

3.2.8 Funding

S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's

Alternate: GEOVIZ is a prime candidate for an ONR sponsored SIBR with SM 21 Inc.

Acquisition sponsor(s): USMC-USA PEO Ground Land Systems Logistics and Information Technology Division

Alternate: Marine Corps Systems Command (MARCORSYSCOM)

3.2.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the GEOVIZ technology transition effort is the insertion at TRL 7 of a robust software web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of MARCORSYSCOM and SPAWAR at PEO Ground Systems USMC or USTRANSCOM JTFPO/JDAC.

This should occur at Q2 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance by the user community of interest.

3.2.10 Recommended S&T Investment and Transition Pathway

Develop COTS concept with ONR FNC Expeditionary Logistics and Sea Basing S&T support, or SIBR/STTR, engage USN and USMC warfighting communities for user evaluation, and acquisition sponsors through Intent version TTA's.

Deploy a visualization center laboratory with geospatial reference, course of action analysis (COA) capability, and web applications for warfighters.

GEOVIZ is a prime candidate for an ONR Code 30 Expeditionary Warfare and Logistics and Sea basing Future Naval Capability SS&T investment in partnership with SM 21 Inc CCDoTT SM 21 transition execution agent as a MAGTF collaborative visualization adaptive planning suite or as a MAGTF Operations Planning and Execution System (MAGTFOPES).

Alternate: GEOVIZ would be an ideal candidate for an ONR, USTRANSCOM, and/or DHS/FEMA sponsored SBIR/STTR project in component parts S&T investment through FNC or SIBR RFI inclusion would develop COTS concept.

USMC USN military user evaluation could be conducted through USMC Combat Development Center (MCCDC) and the Marine Corps Warfighting Laboratory (MCWL) Quantico VA and the Naval Surface Warfare Center (NSWC) NAVSEA Expeditionary warfare Panama City FL.

GEOVIZ is also a transformational joint logistics education and training Live Virtual Constructive synthetic experiential learning system and training environment (LVC) capability for synthetic joint logistics advanced learning management, and replacement for the Joint Deployment Logistics Model (JDLM) and its progeny Distribution Environment Support System (DESS) systems combining geospatial analysis combined with virtual reality (Real World).

USMC and USN warfighting communities should conduct for user evaluation, and acquisition sponsors engaged through Intent level TTA's to deploy a visualization center laboratory with geospatial reference, course of action analysis (COA) capability, and distributed web applications for warfighters asymmetric training.

The collaborative data fusion platform and geospatial visualization components of GEOVIZ have been demonstrated to COCOMS, DHS and 1-MEF by SM 21 Inc at the Naval Postgraduate School Joint Interagency Field Experiment (JIFX) Operation Relief at Camp Roberts California National Guard base in partnership with Virtual Agility Inc with patented artificial intelligence technology to onboard data from multiple sources and formats in combination with CCDoTT Integration with Geospatial visualization technology supported by SM 21 global supply chain management modeling and simulation demonstrated capabilities would represent a quantum improvement over existing fielded technology.

The progressive collaborative visualization capability joint experimentation is referred to as Humanitarian Emergency Response Operations –Tactical Operations Center or HERO TOC.

ONR, USMC, USTRANSCOM JDAC, and other DoD elements must refine revised operational requirements to match current capabilities to move the combined technologies forward to TRL 4. A system engineering plan can be then be developed to meet those modified requirements. An Intent level TTA is warranted at this time to work with end users to develop generic and role based customized set of requirements and dashboard.

Other joint acquisition sponsors for Geo VIZ include USTRANSCOM Joint Deployment Analysis Center (JDAC) as TranSVIZ upgrade/replacement, Navy Space and Naval Warfare Systems Command (SPAWAR), Army Surface Deployment and Distribution Command (SDDC) as a Joint Deployment Logistics Model (JDLM) Distribution Environment Support System (DESS) upgrade replacement for Joint Logistics Education and Training, Army Program Executive Office for Simulation Training and Instrumentation (PEO STRI), and PEO Geographic Information Systems (PEO GIS).

GEOVIZ as a joint logistics education and training capability and as part of an advanced sense and respond based expeditionary logistics suite of capabilities.

Under USJFCOM auspices SM 21 wrote the Joint Logistics Education Training and Experimentation Transformation (JLETT) Roadmap as directed by Congress in HR 3222 FY 2008 DoD Appropriations Conference Report as well as a Sense and Respond Logistics Technology Road Map for USJFCOM as part of its JDDSP continuing doctrinal evaluation of expeditionary logistics.

SM 21 supported USJFCOM as the Joint Logistics representative and Joint Force Collaborative Toolkit developer under the Joint National Training Capability (JNTC) the Live Virtual Constructive (LVC) distance distributed learning capability (JKKDC) including blended classroom DL, M&S and Virtual Reality VR training, lab and field experimentation, experiential, reinforcement balance to accomplish skills, knowledge and competency requirements for joint force deployment.

The execution agent for the plan is the National Defense University (NDU) Center for Joint and Strategic Logistics. SM 21 Inc as a non-profit could support this transition effort.

3.2.11 Schedule and Tasks

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.3. Sea Base Advanced Base Expeditionary Logistics Concepts Modeling and Simulation

3.3.1 Description

Sea Base Advance Base Expeditionary Logistics is a dynamic federated suite of regional supply node arc network (Southern California Agile Supply Network o-- SCASN), and Multi-modal Terminal Model (MMTM) operating System adapted for use in scenario feasibility and optimization planning, mission rehearsal, alternative course of action analysis, and dynamic re-planning on the basis of changed conditions and commander's intent in the AOR for a distributed sea base joint task force planning group.

3.3.2 Potential Capability

Sea Base Advanced Base Expeditionary Logistics Concepts Modeling and Simulation, integrated with a collaborative distributed planning portal, a geospatial visualization common operating picture , provides a federated modeling suite deployed with real time data, and in this combination is the ultimate manifestation of an autonomic collaborative Marine Air Ground Task Force Operations Planning and Execution System (MAGTFOPES) for Sea Base operations to conduct adaptive concurrent (non stove-piped) agile planning, mission/plan rehearsal, dynamic re-planning based on real time data integration.

This agile enterprise adaptive planning capability would substitute for the current dependence upon excel spreadsheet in which separate functions (intelligence, logistics, fires etc) and mission operational feasibility, and the content of these spreadsheets are not validated until the mission rehearsal stage of mission planning.

3.3.3 Operational Need

Military readiness is the ability to execute core capabilities. Core capabilities, including Sea Basing and expeditionary warfare, the ability to execute true distributed (with widely dispersed staff elements and forces) collaborative planning for amphibious operations, including ship to objective maneuver and plan rehearsal, is critical in the dynamic littoral/expeditionary warfare AOR. As part of the ongoing series of newly developed Tactical Decision Aids (TDA's), for the Global Command and Control System (GCCS), ONR has sponsored the development of an expeditionary warfare planning segment for GCSS M. It is currently under experimental sea trial fleet use by deploying Amphibious Ready Groups (ARG) and their staffs.

Indicative of the ONR FNS and warfighter recognition of the necessity to move beyond rapidly obsolete technology is ONR FNC S&T investment in what are referred to as "spikes" or requirements for tools that provide autonomous operation and knowledge superiority to the warfighter.

Indicative of this growing gap recognition is the continued reliance upon an outmoded primary visualization tool for all Ship to Objective Maneuver (STOM) planning (a keystone of expeditionary warfare) in the form of the technologically outdated, two dimensional, Joint Mapping Toolkit (JMTK), found within the Defense Information Structure Common Operating Environment.

To be truly effective and efficient to the warfighter, tactical decision aids must not only adhere to doctrine, but must also exploit Navy and USMC experience base coupled with modern technology. This need cries out for a solution set in the form of a reusable SEM SOA Knowledge Management System (KMS) for education, training and readiness as well as an operational system under the proverbial "We Train as We Fight" maxim.

Under Sea Power 21 the Navy's vision is built upon the triad of Sea Strike, Sea Shield, and Sea Base. With 60% of the world's population and resources located in the littoral zone, sea based operations use revolutionary information superiority and dispersed networked force capabilities to deliver unprecedented offensive power, defensive assurance, and operational independence to joint force commanders.

The USMC Vision 2025 inter alia states that the USMC will "improve our ability to cross wide expanses of ocean and remain persistently offshore at the time and place of our choosing. Joint force commanders depend upon the sea as both maneuver space and a secure base of operations to overcome anti access capabilities. Our approach to both challenges is called Sea Basing.

Sea Basing provides an initial port and airfield afloat in the area of operations that minimizes reliance upon ports and airfields ashore in either a discrete or overt manner. This can be done in support of security cooperation activities, humanitarian assistance, adversary deterrence, or while executing major combat operations.

Operational Maneuver from the Sea (OMFTS) provides the Marine Corps vision for conducting 21st century naval expeditionary operations. This vision seeks to exploit the sea (and particularly littoral areas) as maneuver space. This allows power projection directly from the sea onto operational objectives well inland; obviating the traditional need to first seize and secure a beachhead, then build up a vulnerable support base ashore, before pushing out to accomplish to inland operational objectives.

Naval expeditionary logistics is about moving naval forces and sustaining operations in a broad array of environments. Maritime pre-positioning must expand from current at sea warehousing of USMC equipment, to include new capabilities for at sea arrival and assembly of forces, thereby, eliminating the need for seizing sea and air ports in the immediate vicinity of the AOR. To reduce the logistics footprint (like SM 21 demonstrated with Army force deployment at SPOE), many of the functions traditionally accomplished ashore in secure rear areas on land, such as command and control, aviation support, intermediate maintenance and logistics, must be based at sea.

The Sea Base itself, a combination of amphibious assault ships, prepositioning ships, mobile landing platforms, and auxiliary support ships, can remain over the horizon secure from anti access weapons. Here logistics and support functions can be performed under the security umbrella of the fleet. Under Sea Basing, rather than off loading large quantities of equipment and supplies ashore, tailored capability packages from the sea base, or through small detachments ashore, can support widely dispersed highly mobile combat forces operating up to 200 miles inland, with the bulk of the logistical support structure afloat on the Sea Base.

If Sea Basing versatility is at the core of 21st century naval and expeditionary warfare, then the Advanced Base, often an afterthought is a key enabler, and potential weak link, in the logistics

tail or global supply network supporting naval force projection. Many of the littoral AOR's have austere port and airport supporting infrastructure, and in the event of human or natural disaster, even this weak infrastructure may be damaged, as in Haiti, or require forcible entry presenting force protection problems ashore given instability with large footprint and dwell time.

The reliance on T-AKE shuttle ships to traverse back and forth between the Sea Base and the Advanced Base is sub-optimized, in that the T-AKEs cannot transport CONEX containers (nor can Sea Base assets accept CONEX containers), and a repacking of materials must occur to transfer goods from CONEX containers to pallets or other military loads for stowage on T-AKES (and transfer to Sea Base assets) -- further slowing down re-supply or underway replenishment and jeopardizing the persistent presence aspect of the Sea Basing strategy. Use of Sea Base Advanced Base Expeditionary Logistics Concepts Modeling and Simulation, helps expose the criticality of these linkages, and helps wargame effective ways to navigate this bottleneck.

This effectiveness of Advanced Base operations limits Sea Base operations to a single Sea Base operation at a time with a single vessel at the Sea Base, one in transit and one at the Advanced Base OPANV 41 recognized this dilemma and in lieu of more T-AKE's opted for a floating base and a software solution capable of being provided by CCDoTT SM 21.

The MPFF floating base will somewhat alleviate this bottleneck but the issue of just in time support tailored to demand generated by op tempo ashore remains.

The common need is for a logistics solution that is agile, scalable, and focused –meaning the right stuff at the right time and place in the right quantity from the right source depending upon the type of mission and level of effort.

According to LMI the USMC and USN did not have the adaptive modeling and simulation tools to ascertain Advanced Base and by inference Sea Base throughout requirements.

USTRANSCOM S&T validated gaps addressed by GDMS include: E2E Visibility, Distribution System Interoperability (and data fusion), Distribution System Planning and Forecasting, Process Management and Business Rules, Distribution Performance Metrics Strategy, Coalition/Multinational Interagency Capabilities, and Supply Chain Simulation Tools.

3.3.4 Proposed Solution

The ultimate sea base advance base logistics solution set has four major elements: (1) a collaborative planning portal; (2) a geospatial common operating picture; (3) a federated modeling and simulation solution comprising both E2E network based upon SCASN and SEASN regional supply chain models and smart node with end points of ashore footprint, i.e. a node arc network comprised of a Sea Base, Advanced Base, pre-positioned equipment, and CONUS backbone and the multi-modal terminal model (MMTM) substituting for the Advanced Base and (4) an E2E integrated transportation-(supply system dynamic inventory based) distribution system such as the proposed Global Distribution Management System (GDMS).

Toward this end state the CCDoTT SM 21 program provided support directly through OPNAV 41 strategic sealift and indirectly through LMI to develop realistic scenarios representing the full spectrum of operations from HADR and stability ops to Major Combat Operations (MCO) to prove the functionality and feasibility of the overall concept.

The program deployed a modified set of both simulation models to help develop a set of Advance Base requirements for the sustainment of different levels of mission dependent joint force capability packages through a Sea Base for ashore operational scenarios.

3.3.5 Current Status

Sea Base Advanced Base Expeditionary Logistics Concepts Modeling and Simulation, validated on the fly TRL level 6 COTS node arc federated suite of integrated discrete event simulation models (Regional Agile Supply Node Arc Network and high fidelity single node Multimodal Terminal Model). Together they form an E2E sea base network including dispersed units ashore, sea base, advanced base, and sea lanes of communication back to CONUS depots (MARLOGCOM Barstow, Albany, Blount Island JAXport) and one or more high fidelity smart nodes (i.e. in the form of an Advanced Base and Sea Base distributed task force using FORCEnet and Global Command Support System USMC) to interoperate with the geographic combatant commander.

The unified federated modeling, simulation and analysis capability (MSA) was previously under evaluation by the USJFCOM for inclusion in the Joint Force Deployment Collaborative Toolkit.

The Logistics Management Institute (LMI adapted) existing Strategic Mobility 21 COTS TRL level 6 modeling and simulation (Southern California Agile Supply Network or SCASN) and Multi-modal terminal model) to model throughput requirements for various scenarios (HADR, stability ops) through an advance base from CONUS and to the sea base to support a distributed network with dispersed ashore operations.

3.3.6 Risk Table

Risks	**Low**	**Medium**	**High**
Technical	**X**		
As the required evolutionary acquisition steps include migration to a distributed (AnyLogic) platform and to a cloud SEM SOA web service hosted environment are not particularly challenging in comparison to development of the models themselves, the technical risk of robust system deployment is low			
Schedule	**X**		
There is little schedule risk that SCASN/MMTM cannot be deployed in an operational robust version within the two year RTT mission requirement.			
Cost	**X**		
Under the common conservative rule of thumb for software development of 1 architect, up to five software engineers or programmers, and 2 testers or approximately $1.5 M per year plus ongoing vessel data costs, deployment costs should not exceed $3M for two years of effort.			
Business	**X**		
SM 21 developed the federated MSA solution set with the assistance of Transystems which unit is available for consultation or re-engagement if necessary. Several cloud hosts have been identified for this combination public and hybrid cloud environment. Business risk of non-performance is therefore low.			

3.3.7 Business Case

The principal value proposition of Sea Base Advance Base Expeditionary Logistics benefits may be expressed in improved readiness reflected in improved ability to execute core capabilities in terms of sea basing and expeditionary warfare in the urban littoral across the full spectrum of operations, elimination/reduction of unacceptable consequences through avoidance of mission failure, and indirect benefits measured in speed in decision making and agile response to changing conditions in the battlespace.

3.3.8 Funding

S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's.

Alternate: US Army PEO STRI for parallel development using common Advance Base with USN USMC using Sea Base and USA using onshore Joint Task Force Port Opening (JTFPO) with USTRANSCOM/Surface Deployment Distribution Command (SDDC) support.

Acquisition sponsor(s): USMC PEO Ground Systems Logistics and Information Technology Division and USA Ground Systems Logistics and Information Technology Division.

3.3.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the Sea Base Advanced Base Expeditionary Logistics suite technology transition effort is the insertion at TRL 7 of a robust software web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of MARCORSYSCOM and SPAWAR at PEO Ground Systems Advanced Technology Investment USMC This should occur at Q2 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance including sea trial by an Expeditionary Readmes Group by the user community of interest.

3.3.10 Recommended S&T Investment and Transition Pathway

Sea Base and Advanced Base modeling and simulation provides significant unique capabilities justifying S&T investment through the ONR Code 30 with Sea Basing and Expeditionary Warfare Future Naval Capabilities (FNC).

Both of these FNC's incorporate SM 21 developed capabilities in Sense and Respond Logistics (autonomic, intelligent multi-agents, Service oriented architecture, semantic web, optimization algorithms).

Alternatively, further development of this dual use COTS capability would be an excellent ONR SBIR/STTR or Rapid Technology Transfer (RTT) candidate.

This MSA federated suite of models is also a good candidate for S&T investment and inclusion in the ONR suite of newly developed Tactical Decision Aids (TDA's) for the Global Command and Control System (GCCS). These capabilities clearly correspond to FNC "spikes" of autonomous operation and knowledge superiority.

In light of the emergence of the HADR mission, and joint Army and USMC interest in the subject, a Joint Capabilities Technology Demonstration (JCTD) would represent a potential Technology Transfer Initiative (TTI) opportunity aligned with the OSD Office of Rapid Fielding current funding priorities.

Alternatively, an ONR sponsored Rapid Technology Transfer initiative reflecting the emergent urgent navy need for HADR capability with a two year $2M limit would seem ideal for this purpose for a Navy USMC led initiative through the Marine Corps Systems Command (MARCORSYSCOM) and the Marie Corps Logistics Command (MARLOGCOM).

In addition, these capabilities are prime candidate for S&T investment in modeling and simulation in USMC MAGTF adaptive planning and execution COTS capabilities in partnership with SM 21 Inc CCDoTT SM 21 transition execution agent.

Another joint transition pathway would be in partnership with the US Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) which specializes in Joint Force Deployment modeling and simulation software development.

In any event the current status and wide multiple COCOM, OSD, service component user interest would clearly warrant an Intent level TTA executed by the target acquisition sponsors functionally as an Integrated Project Team (IPT) Technology Rapid Transition Initiatives.

Following stakeholder evaluation by MARCORSYSCOM and SPAWAR, a target acquisition sponsor is USMC PEO Land Systems Advances Technology Investment.

Conduct extended user evaluation with 1 MEF, USMC warfighting laboratory and Marine Corps Combat Development Command (MCCDC), insert into Joint Air Land and Sea (JLASS) HADR wargaming at Naval War College in collaboration with Cebrowski Center at Naval Post graduate School, and in Talisman Saber biennial Pacific Area Command (PACOM) joint exercise with 48 other coalition-multinational partners (and non-governmental organizations or NGO's) or alternative Sea Basing. [3]

3.3.11 Schedule and Tasks

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

[3] SM 21 has developed this unique federated holistic graduated node arc supply network models including:

- regional Southern California Agile Supply Network (SCASN) and its Southeast Agile Supply Network (SEASN) counterpart augmented by
- a national CONUS model comprised of the entire Strategic Highway Network (STRANET) and Strategic Rail Corridor Network (STRACNET)
- OCONUS by major sea trade lanes for maritime domain awareness purposes;
- and node specific local multi-modal terminal model (MTMC) ideally suited to depict an Advanced Base, Sea Base itself or ashore units directed by a Joint Task Force Port Opening. In the latter case, before USJFCOM stood down, the JROC approved Expeditionary Theater Opening (ETO PEO) (now USTRANSCOM JTFPO) had slated the SCASN suite for modeling the E2E from CONUS SPOE to ashore joint force for use by SDDC

3.4. GDMS and Connect the Connectors Network Regional Drayage End Points and Legacy Systems Regional Dray

3.4.1 Description

Global Distribution Management System (GDMS) is the holy grail of distribution logistics, integrating transportation and warehouse management (supply) systems into a demand (sense and respond) driven end to end solution, on to the intractable problem of "where's my stuff", to the item or pick level six inventory visibility in stock (depot, theater, sea base, advanced base, in theater, pre-position), in process or in transit to the point of kinetic effect, the proverbial tip of the spear (for to foxhole) dreamt about since the time of Alexander the Great.

The current TRL 6 level COTS system lacking additional functional component integration, when completed, tracks freight movement by associating the shipment across modes, nodes, conveyances and the E2E user defined global supply network. GDMS closes identified physical and information gaps and seam within the network by monitoring network performance at the execution or delivery level. These gaps and seams are attributable to lack of shared data, business process deficiencies, input errors from multiple system requirements, supply chain friction, and disruptions. The system is built upon ten years of CCDoTT SM 21 experience with observing the joint force deployment cycle, and inbound and outbound commercial logistics through the mind's eye of E2E lean six sigma value stream analyses to National Institute of Standards (NIST) level scrutiny.

3.4.2 Potential Capability

Integration with Warehouse Management System (WMS) and connect the connector artificial intelligence into E2E transportation-distribution logistics demand driven lean inventory/supply system with real time E2E inventory visibility to the level six item/SKU level for critical components.

3.4.3 Operational Need

USTRANSCOM's Number 1 S&T priority need, validated by MITRE and GAO, is in transit visibility (ITV) at the item level presuming demonstrated capability integration of transportation and supply systems.

The current JOPES system as taught by the JDTC at Fort Eustis was a brainchild of USJFCOM, which owned joint force deployment, and USTRANSCOM DPO which inherited the responsibility along with the J7.

Although not many professional studies have addressed the problem, it was evident from SM 21's review of joint exercises as part of its Joint Logistics Education Training and Experimentation Transformation including a J7 survey of COCOMS and service components, that there was a reasons that joint logistics was never played in joint exercises and logistics support was assumed as planned. That misnomer was disabused by the experience of 1-MEF and the Third Infantry Division in the march on Baghdad in the opening phase of OIF. Unfortunately, the recognized disconnect between operational and logistics mission planning is soon to be replicated in the 2013 PACOM Talisman Saber joint exercise in expeditionary EX warfare joint exercise.

The gap between presumption of logistics planning and execution capability and the real world of the fog and friction of war –or in commercial terms global supply chain competition and strategic competitive advantage -is largely linguistic and cultural on its face. The seams, involving lack of collaboration and critical data sharing, are even more critical and not always self-evident to the untrained eye. Operational planners do not have sufficient knowledge of logistics to incorporate logistics in their mission plans or to stress test or conduct mission rehearsal.

The reverse is also somewhat true, as logisticians often do not see the big picture in mission planning and plan accordingly. Absent a single unifying vision of each other's perspective and relative importance to the big picture can lead to mission failure. That same lack of mutual understanding can lead to an individual and institutional resistance to change, a change that can potentially save millions and even billions of dollars in a resource in a constrained fiscal environment, as we are now entering. This gap can mean the difference between effectiveness or achieving mission success regardless of cost, or efficiency achieving the same result at the lowest cost and acceptable risk. As we painfully observed in OIF, sometimes, too little in terms of manpower may actually cost more in the long term, as in violating the time honored ratio of attacker to attacked to ensure victory.

Commercial C level executives, particularly retailers, often learn global supply chain management at their peril, and at the risk of the unrecoverable mistake, i.e. organizational extinction, as opposed to mission failure.

More prosaically, as CCDTT and SM 21 programs matured over time, the parallels between defense and commercial logistics continued to emerge from lessons learned, observation, and joint experimentation. While DoD sacrifices efficiency, at the expense of velocity and efficiency, by holding on to redundancy for example, in joint force deployment; or sacrificing institutional expertise and knowledge, at the expense of expediency and outsourcing in the case of reset. DoD never addresses the duality of having separate GTN transportation and supply systems for a single E2E inventory management system, evidenced in the incomprehensible bifurcation of TAV and ITV. Symptomatic, of this OIF universal experience, is that theater distribution and sustainment is irretrievably broken.

This duality, of viewing transportation and supply as separate systems, is replicated a hundredfold in the commercial sector, as different transportation modes have great difficulty achieving anything approaching interoperability for a host of reasons and openly resist virtual integration.

This phenomenon first manifested itself in the absence of integration or E2E network optimization at the expense of sub-optimization of the marine mode in marine terminal operations in transloading among ocean rail and truck modes, and integrating with shippers warehouse and distribution systems. When ERP, and then TMS and WMS systems, emerged, they inevitably institutionalized these areas of friction at points of interchange, or transload, or nodes on the E2E network.

The overarching transcendent operational need is to integrate transportation and supply systems at both the planning and execution level. But, this must be built upon an end to end system of systems engineering business process analysis from the ground up. Global

Transportation Management System (GTMS) represented a seminal if midway point in this effort –the holy grail of global supply network management and optimization.

From an evolutionary acquisition perspective, GDMS represents the ultimate manifestation, as well as be the next logical progression toward the end state of integrated supply and transportation systems. This is an achievable outcome for GDMS, by building upon lessons learned in the GTMS demonstration, and with the gift of reflection over time.

USTRANSCOM S&T validated gaps addressed by GDMS include:

- E2E Visibility,
- Distribution System Interoperability (and data fusion),
- Distribution System Planning and Forecasting,
- Process Management and Business Rules,
- Distribution Performance Metrics Strategy,
- Container Management,
- Coalition/Multinational Interagency Capabilities,
- Professional Joint Logistics Workforce Development,
- Supply Chain Simulation Tools.

3.4.4 Proposed Solution

GTMS is currently a TRL level 6 demonstrated and commercially validated COTS E2E transportation management system that integrates near real time ocean, marine terminal, rail, and warehouse inbound information; along with traditional track and trace, TMS booking and tender, payment, event management, auditing and other features; and demand driven algorithms adapted from domestic grocery chains for priority pickup of Customs cleared containers, synchronized to the order cycle; and with warehouse and distribution system operations and ERP systems.

As currently envisioned, GTMS will migrate to Global Distribution Management System (GDMS) and integration with a Regional Dray synchronization tool or “Connect the Connectors” (based upon artificial intelligence to close a universal gap in the form of lack of ITV between nodes) together form an inextricably linked and uninterrupted interoperable virtually integrated E2E global (CONUS and OCONUS) transportation and distribution logistics management system.

3.4.5 Current Status

GTMS is a validated TRL level 6 commercial software system prototype injecting both autonomic event management and E2E system optimization. GTMS has demonstrated agility through the introduction of additional carriers, relocation of intermediate transshipment centers, and concurrent ERP system migration and interoperability, all during the IOC deployment, while achieving virtual collaboration and interoperability though extended user acceptance testing and evaluation, at both the strategic and execution level.

In its current configuration, GTMS is a user validatedE2E global transportation management system (encompassing track and trace, planning and execution, booking/auditing, event/exception management functionality) based upon Dole Foods global distribution business process analysis, modeling and simulation, and user enterprise resource planning system

integration, using Dole Foods supply chain as a surrogate for DoD Global Transportation Network (GTN).

Connect the Connectors is a SBIR supported artificial intelligence capability that learns how to autonomically find legacy data sources and access data for integration with the primary host system, as in this case GDMS. The FY 10 CCDoTT project, Regional Dray Data Integration, was intended to fill an information technology and ITV "black hole". This is the gap, (common to all sea and airports of embarkation and debarkation, from the limitations of RFID, and absence of electronic data interchange), between dray truck dispatchers, both marine and air terminals, and warehouse and distribution (and depot) centers warehouse management systems.

A demonstration, of the functionality of this capability to fill a major regional and global supply chain gap and seam, was conducted under CCDoTT auspice. This demonstration was incorporated into a Technology Transfer Agreement executed between the California State University Foundation (CCDoTT academic and contractual sponsor), and SM 21 Inc non-profit, the successor in interest and designated execution agent for all SM 21 and Agile Port System related technology developed under ONR agreement.

The current design plan for the inventory supply oriented Global Distribution Management System (GDMS) moves beyond the current Global Transportation Management System (GTMS) as a necessary intermediate step by integrating SKU, or item level inventory visibility with TMS by associating a complete shipment, even across multiple bills of lading, with TMS based conveyances track and trace and demand algorithm through the connect the connectors artificial intelligence add on feature to create the first E2E combined global supply network from the shippers perspective.

Besides integrating transportation and supply systems as a holistic solution, GDMS addresses the J7 Analysis of Alternatives (AoA) study to develop and E2E In Logistics Education and Training Capability to replace JDLM and DESS fielded by TEA and USTRANSCOM respectively.

3.4.6 Risk Table

Risks	**Low**	**Medium**	**High**
Technical		**X**	
There is always medium technical risk associated both with the application of an Adapt Buy Create agile (scrum) development software solution and integration of existing system (here Instaknow) and migration to a cloud based SEM SOA architecture with assistance from Carnegie Mellon SEI FFRDC. One strategy to mitigate risk here is to divide the project into phases e.g. Phase I SIBR Scoping feasibility modified architecture development and sequence of effort and PMP Phase II WMS integration and cloud migration into prototype			
Schedule		**X**	
There is moderate schedule risk that a user validated acceptance test and extended user evaluation can be validated within the two year time window of RTT programs. However, by phasing and scoping project into two phases and aligning S&T and Acquisition sponsors and MUE evaluators lie an ACTD schedule risk can be attenuated			
Cost		**X**	
Based upon SM 1 experience with GTMS development and integration, and applying rule of thumb for software engineering and development, integration, and use testing and acceptance should be within a budget of $3M in a best approximation within the two year window.			

Business		**X**	
Based upon its experience with GTMS the key to minimizing business risk is to identify best of breed partners that are also collaborative as well as competent. One is reminded of the 4Ps of successful legislation: policy, politics, personality and parliamentary procedure. Only fair brokers need apply! Not all prospective partners can work within a virtual integrated project team. A major strategic partner player may be the ultimate solution. A beta tester is much more easily identified as in the case of Dole Foods.			

3.4.7 Business Case

Along with APS concepts, the concept of developing E2E sense and respond capabilities, were the centerpieces of the CSULB Foundation assignment to SM 21 Inc non-profit for further development and eventual transition to the military and commercial logistics sectors. Both the APS and E2E logistics capabilities should be logically and functionally developed together as an integrated package reflecting TRL 6 maturity.

Those capabilities are expressed with special emphasis on creativity and visibility of the black hole drayage, which represents the transshipment of items from one mode to another. Together with demand driven algorithms they present a true E2E sense and respond capability to ONR Code 30. They also provide the necessary operational capability to enable joint sea basing advance base FNC.

The principal value proposition of GDMS to the Navy and US Marine Corps is the ability to apply the same cohesion that typifies MAGTF, including close air support to logistics and operations planning for expeditionary warfare. It is no coincidence that the MAGTF center of excellence includes both disciplines. Although the Marine Corps depends heavily upon pre-positioning, over re-supply, its most recent experience in OIF and OEF has certainly validated its early conceptual embrace of sense (interpret) and responds logistics for which SM 21 wrote the roadmap for AUSDATL, which concept is also reflected in Code 30 FNC's Sea Basing and Expeditionary Warfare.

Also Navy Marine Corp and Coast Guard embrace of Naval Logistics Integration (NLI) suggests that the Marine Corps is open to a just in time approach to logistics support that also in consistent with the principle of "current battle" requiring either agile resupply and husbanding of sufficient water and ammunition to sustain engagement with the enemy or breaking off the engagement.

To that end, the benefits of GDMS can be measured in cost reduction and avoidance in excess inventory that is pre-positioned and continually replaced, that is required to be transported by amphibious vessel, or through a throughput constrained constricted Sea Base and Advanced Base and that enhances both effectiveness and efficiency and get the deployed MEU or MEB in and out as quickly as possible when forward deployed while maintaining a high state of readiness for the next deployment.

Indirect benefits include reduction in loss of life and property in CONUS and OCONUS host countries in AOR's from rapid institutional response capability (e.g. USMC USN NOLSC) to the current event and in the future from building resiliency and rapid recovery from future events.

3.4.8 Funding

S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's.

Alternate: SBIR with SM 21 Inc in combination with SIBR Phase III Other Transaction Authority (OTA) Indefinite Quantity Indefinite Delivery contract.

Rapid fielding: HADR JCTD or CWD coalition warfare demonstration.

Acquisition sponsor(s): USMC PEO Ground Systems Logistics and Information Technology Division.

Alternate: NAVSUP-Marine Corps Logistics Command (MARLOGCOM) for integration across NAVSUP, USCG through Naval Logistics Integration.

Alternate COCOM joint development: USTRANSCOM-DLA for COCOMs using Other Transaction Authority (OTA) agreement based upon US Transportation Command Defense Transportation Coordination Initiative.

Alternate: US Army G4 Logistics Innovation Agency (LIA) Fort Eustis VA.

3.4.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the GDMS technology transition effort is the insertion at TRL 7 of a robust asynchronous distributed solution set that meets testing requirements for functionality, information assurance and interoperability and extended user acceptance as well validated by MARCORSYSCOM and SPAWAR and by acquisition sponsors MARLOGCOM and Ground Systems and NAVSUP or other system command PEO.

3.4.10 Recommended S&T Investment and Transition Pathway

GDMS -Connect the connectors is a prime candidate for evolutionary acquisition beginning with an ONR Code 30 Expeditionary Warfare and Logistics and Sea basing Future Naval Capability S&T investment in partnership with SM 21 Inc as CCDoTT SM 21 transition execution agent.

GTMS aligns well with these Future Naval Capabilities threads because both of these FNC's incorporate SM 21 developed capabilities in Sense and Respond Logistics (autonomic, intelligent multi-agents, Service oriented architecture, semantic web, optimization algorithms).

An ideal alternate transition pathway would be with ONR acting as S&T sponsor through a SIBR encompassing integrating "connect the connectors" artificial intelligence (AI) capability) into an E2E logistics solutions .

Alternatively, if packaged correctly with cross-cutting themes of force deployment transformation and agility and SEM SOA architecture and web services, GMDS is a candidate for ONR Rapid Technology Transfer Initiative (RTT) in collaboration with NAVSUP and Marine Corps Logistics Command (MARLOGCOM) as acquisition sponsors. A mature GDMS should be threaded though Naval Logistics Integration (NLI) for use by USN, USMC and USCG and to institutionalize transformational expeditionary logistics into expeditionary warfare and sea basing doctrine.

GDMS is also a prime candidate for a Joint Capability Technology Demonstration (JCTD) or Coalition Warfare Demonstration (CWD) using HADR scenario for interagency coalition-multinational-NGO capability/capacity development with USTRANSCOM and OSD rapid fielding support.

The DOD Office of Rapid Fielding has recently realigned their JCTD areas of interest to include; Defend the Homeland and Provide Support to Civil Authorities an Build Partnership Security Capacity.

This represents opportunities for transformational military use evaluation and rapid transition under currently OSD favored HADR and Coalition multinational capacity development and Presidential Policy Directive 8 concerning "whole of government" emergency management response capabilities.

For acquisition purposes following a FNC, SBIR, RTT or JCTD S&T investment, with s so many potential transition threads and users it also could be pursued through the exercise of Other Transaction Agreement (OTA) authority.

In any case as part of military use evaluation Naval Space Air Systems Command (SPAWAR) and MARCORSYSCOM would be required to validate interoperability with Integrated Computerized Deployment System (ICODES), Global Air Transportation Execution System (GATES), Marine Corps Distribution Support System (MDSS) and Global Command Support System Marine Corps (GCSS MC).

Thereafter, being already interoperable with GATES and ICODES, the system could migrate to a joint capability with MITRE and USTRANSCOM S&T support as a JCTD in collaboration with Defense Logistics Agency (DLA) under its Integrated Data Environment (IDE) (with USTRANSCOM) and internal FLOW initiatives with USTRANSCOM DLA Total Asset Visibility (TAV) or IDE PMO DLA J 62 Ft Belvoir Logistics Electronic Data Interchange (EDI) (responsible for Log Data Gateway FLOW 2010) acting as co-acquisition sponsors and integration with USTRANSCOM Global Transportation Network (GTN) and GCSS Joint. DLA has already announced a merger of TAV GTN In Transit Visibility (ITV and) IDE as of May 2013.

Ultimately the system could be deployed as COTS or outsourced under a program such as an expanded USTRANSCOM Defense Transportation Coordination Initiative (DTCI) behind the current domestic load consolidation from CONUS surface to include OCONUS global freight movement with SM 21 Inc and its affiliates functioning as a fourth party logistics service provider (4PL) as in house COTS system and licensed to competing 3PLs delivering equipment and supplies E2E to all DODAAC addresses.

Early expeditionary logistics doctrinal acceptance could be affected through a Naval War College Joint Land Air Sea (JLASS) war game using an HADR scenario with NPS-SM21 Inc as participants.

The USMC Warfighting Laboratory (MCWL) should conduct a series of virtual desk top exercises with the FEMA Institute to integrate GDMS with DHS-NORTHCOM into the common S&T HADR thread.

For COCOM migration GDMS once matured should be seeded through a COCOM i.e. PACOM biennial joint exercise such as Talisman Saber 2015 to share and improve capacity of 48 multinational and coalition and NGO partners.

Finally, for joint logistics education and training purposes, GDMS network centric expeditionary logistics principles once adopted should be taught under the auspices of advanced logistics principles and concepts should be taught through the USMC MAGTF Logistics Training Center Quantico VA.

3.4.11 Schedule and Tasks

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.5. Real Time Location System (RTLS) Geolocation and Transportation Measurement System (TrAMS)

3.5.1 Description

Real Time Location System (RTLS) or geolocation system is a deployable transportable system based upon a phased array search radar unit, hardware, firmware and software in a current client server configuration capable of conversion to a cloud based semantically enabled service oriented architecture (SEM SOA) and deployed as a COTS web service.

3.5.2 Potential Capability

Demonstrated field tested TRL 4 concept deployable/transportable geospatial location system for austere outdoor environments built upon with or without complementary profilometry measurement system (Transportation Measurement System or TrAMS). When fielded with TrAMS, RTLS can provide precise locations for major end items and transport containers, as well as 3D measurements for load configuration, and identification of specific types of items.

3.5.3 Operational Need

USTRANSCOM's Number 1 S&T priority need validated by MITRE and GAO is ITV at the item level presuming demonstrated capability integration of transportation and supply systems.

The Sea Base paradigm, and the expeditionary logistics challenges getting equipment and supplies (using organic, opportunistic and commercial lift) to and from an Advance Base to the Sea Base, places an unprecedented premium on geolocation and measurement.

Geolocation is at the heart of all logistics based modern web services and applications. It shows the location of an object on a map by using an IP address, RFID, GPS, or LAT-LON coordinates. It applies to whether an object is in stock, in process, in transit, and, particularly, in austere situations, such as depots or terminals, in attempting to distinguish between multiple RFID signals.

OIF and OEF after action reports reflected a chronic loss of E2E ITV visibility of CONEX containers ad unit equipment at multiple consolidation points even though CENTCOM AOR required all inbound (but not outbound) moves use RFID tags (similar to Walmart requirement of vendors and suppliers).

3.5.4 Proposed Solution

Singly or in combination phase array radar based RTLS and portal magnetic imaging based TrAMS provide an executable single entry TPFDD data providing the exact three dimensional measurement and geolocation associated with multiple conveyances and modes while in transit as "slots" in support of a multi-modal load in lieu of stow plan or an imaginary pre-selected grid when at rest at a facility.

Each technology or both are readily convertible into web based services and applications.

Each is an ideal SBIR/STTR candidate that has dual use commercial utility in large scale construction projects world-wide in which precise measurement dictates the mode, cost, configuration, load capacity by weight or cube, and potential costly disassembly requirements.

Each is compatible and must be interoperable with ICODES and GATES. The systems could be fielded by USMC Ground Systems and US Army respectively as a joint capability for transmission through MDSS and TC AIMS II to GTN and GCSS after evaluation by MARCORSYSCOM, SPAWAR, and SDDC. Ultimately, RTLS/TrAMS could be fielded by PEO Land Systems USMC and USA or by PEO TC AIMS II or PMJ AIT.

3.5.5 Current Status

Real Time Location System (RTLS) or geolocation system is a TRL 6 proof of concept prototype. It is a field tested and deployable transportable system. RTLS is based upon a phased array search radar unit, hardware, firmware and software in a current client server configuration capable of conversion to a cloud based semantically enabled service oriented architecture (SEM SOA) and deployed as a COTS web service. The system requires military use evaluation for re-configuration and further development of COTS technology to deploy as a robust sustainable capability in austere environments.

Geolocation of indentified end items, unit equipment, or containers is the beginning data point of ITV, and along with profilometry, or measurement, is the beginning of individual convey stow and multi-modal load planning. RTLS and TrAMS can replace hit and miss manual operation; performed repeatedly at unit motor pool and rail ramp installations, sea and airports of embarkation and debarkation, depots, and forward operating bases; to locate items for load, properly size them for load planning, and configure loads to confined spaces.

Geolocation is an integrating capability. It is the key to current smart phone applications. Anyone capable of accessing geolocation information will appreciate its benefits in an austere environment, along with geo-fencing to maintain force protection and security.

RFID with its inherent limitations (signal strength, crossover, battery power etc) is not a one size fits all to geolocation The CCDoTT SM 21 approach to RTLS is based upon an application of proven weapons technology phased array radar within a defined geospace (scalable to a football field or larger) without external boundaries.

3.5.6 Risk Table

Risks	Low	Medium	High
Technical	**X**		
As each technology has been successfully demonstrated under controlled field conditions in its own right with excellent performance metrics, and as the required evolutionary acquisition steps include migration to a distributed (AnyLogic) platform and to a cloud SEM SOA web service hosted environment are not particularly challenging in comparison to development of the models themselves, the technical risk of robust system deployment is low in each case			
Schedule	**X**		
Give the amount of effort, documentation, and precision that has gone into each technology, there is little schedule risk that SCASN/MMTM cannot be deployed in an operational robust version within the two year RTT mission requirement.			
Cost	**X**		
Based upon SM 21 experience with GTMS development and integration, and applying rule of thumb for software engineering and development, integration, and use testing and acceptance should be within a budget of $3M in a best approximation within the two year window.			
Business		**X**	
RTLS technology is a COTS patented technology and TrAMS technology is owned by CSUOB Foundation. Neither is in a financial position to invest in further development of either technology but would presumably collaborate in that effort presenting a moderate risk from a business perspective			

3.5.7 Business Case

The principal value proposition of RTLS benefits may be expressed in projected cost savings and avoidance of redundant searching and measurement requiring additional manpower from a single entry of ground truth and precise measurement (including associated secondary loads with unit equipment), better identification of oversize and overweight equipment. This allows for avoidance of exceeding load factors and carrying capacity when allocating strategic and tactical lift capacity. In addition RTLS/TrAMS provides geolocation in an actual unit equipment list or shipment of equipment or supplies matched to strategic lift capacity thereby reducing unit transportation costs and overall cost of operational deployment and better advance planning allowing E2E synchronization of moves important to USMC return to expeditionary warfare especially from the often austere the Advanced Base and Sea Base locations.

These also include projected cost savings and avoidance in better use and avoiding redundant manpower resources as process shift from manual to automated information processing, This can reduce redundant effort to OPNAV 41, MARAD, USTRANSCOM MSC, and NAVSEA in matching HADR, Sea Base sustainment and other mission strategic sealift requirements with opportunistic lift capacity here provided by VISA commercial contract vessels (and cost avoidance if these assets are used in lieu of organic sealift assets).

3.5.8 Funding

Funding: S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's.

Acquisition sponsor(s): USMC PEO Ground Systems Logistics and Information Technology Division.

For appropriate acquisition sponsors RTLS should be partnered with, and sustained by MARCORSYSCOM Force Deployment and Execution (FDP&E) Marine Corps MAGTF Deployment Support System (MDSS II) and by NAVFAC for Naval Expeditionary Combat Command (NECC), USTRANSCOM JTFPO and JDDOC, and by the Army's Transportation Coordinator's Automated Information for Movement System (TC-AIMSII). It offers a single ground truth version of geolocation of ground combat and construction equipment, components, supplies and containers in an austere environment far better than RFID tags.

3.5.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the RTLS and TrAMS technology transition effort is the insertion at TRL 7 of a robust software web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of MARCORSYSCOM and SPAWAR at PEO Ground Systems Advanced Technology Investment USMC This should occur at Q2 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance including sea trial by an Expeditionary Readmes Group by the user community of interest.

3.5.10 Recommended S&T Investment and Transition Pathway

RTLS is a prime candidate for evolutionary acquisition beginning with an ONR Code 30 Expeditionary Warfare and Logistics and Sea basing Future Naval Capability S&T investment in partnership with SM 21 Inc CCDoTT SM 21 transition execution agent.

Similar to TIP, RTLS/TrAMS lacks the participation of an end user to refine operational requirement and a system engineering plan, as well as user input to a technology development strategy. It is clearly a candidate for an Intent level TTA between ONR and NECC or MARLOGCOM, and USTRANSCOM SDDC to meet all TRL 4 requirements.

S&T investment could seed extended military user evaluation for use in expeditionary logistics support by USMC Barstow and Albany GA, and Blount Island (JAXport) FL, Naval Expeditionary Combat Command (Seabees) Port Hueneme CA, Naval Surface e Warfare Command (Coastal) Panama City FL, and installation transportation office (ITO) Fort Stewart ONR, USMC, USTRANSCOM JDAC, and other DoD elements must refine revised operational requirements to match current capabilities to move the combined technologies forward to TRL 4.

A system engineering plan can be then be developed to meet those modified requirements. An Intent level TTA is warranted at this time to work with end users to develop generic and role based customized set of requirements and dashboard.

Extended military user evaluation for use in expeditionary logistics support by USMC Barstow and Albany GA, and Blount Island (JAXport) FL, Naval Expeditionary Combat Command (Seabees) Port Hueneme CA, Naval Surfac e Warfare Command (Coastal) Panama City FL, and installation transportation office (ITO) Fort Stewart GA.

3.5.11 Schedule and Tasks

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.6. Agile Port System Joint Deployment Distribution Support Platform (APS JDDSP) -- Agile Force Deployment and Expeditionary Logistics

3.6.1 Description

The Agile Port System (APS)- Joint Deployment Distribution Support Platform (JDDSP) is a Joint Integrating Concept for expeditionary warfare and logistics purposes. It employs a network centric warfare agile enterprise system of systems (SOS) methodology and approach to improving the efficiency of the joint force deployment cycle and import-export logistics operations while de-conflicting the two in the same physical and temporal space so that military operations do not degrade concurrent commercial port operations and the global supply chain upon which both depend for sustainability.

In its simplest form it is comprised of three elements: (1) an efficient air or marine terminal supply network gateway (2) a smart networked secure trade corridor from the gateway connected to (3) a smart inland or virtual node (and system operator like an energy grid only in this case a fourth party logistics services integrator) that virtually integrates data and physical flows and synchronizes the flows of goods and materials across the network.

The smart inland node within the DoD Joint Deployment Distribution Enterprise lexicon is called a Joint Deployment Distribution Support Platform (JDDSP). This virtual support platform executes the preferred rail method of unit train movement of unit equipment and containers to maintain unit integrity from a defense installation, referred to as a Power Projection Platform with a rail ramp, to a designated seaport/airport of embarkation (SPOE/APOE). The JDDSP is the military embodiment of the inland smart node within an agile port system.

The smart node concept can be extended through military doctrine to a former DoD Base Realignment and Closing (BRAC) facility such as the former George Air Force Base/Southern California Logistics Airport (SCLA), former NAS Cecil Field/Cecil Commerce Center FL, or former Fort Gillem Third Army logistics center Atlanta GA, or to an existing military installation Camp Pendleton, MARLOGCOM Albany GA, Blount Island JAXport FL, Fort Lewis WA, Fort Benning or Stewart GA, a temporary sea base, permanent advanced base, or an ad hoc joint task force port opening (JTFPO).

APS-JDDSP business rules and logic view transportation and distribution as a complex adaptive networked system as opposed to a functional linear supply chain. The network in turn constitutes a dynamic node arc network comprised of depots, warehouse and distribution facilities, connectors known as Strategic Highway (STAHNET) and rail corridor networks (STRACNET), air and seaports or embarkation and debarkation, intermediate nodes such as a sea and advanced base, and arcs composed of air and ocean surface routes, conveyances and schedules. Each node as a server-queue configuration has business or dispatch rules that may be modified through business process analysis and by automation through information technology to share data and close gaps and seams leading to inefficiency, loss of visibility, higher unit transportation or total landed costs, loss, and bottlenecks from excess inventory and clogged channels to market.

3.6.2 Potential Capability

With USN- USMC doctrinal development by Marine Corps Systems Command (MARCORSYSCOM) and Combat Development Command (MCCDC), Naval Expeditionary Combat Command (NECC), and Naval Surface Warfare Center Agile Force Deployment and expeditionary logistics doctrinal development, the APS/Joint Deployment Distribution Support Platform (JDDSP) is a game changer. It can enable 21st century expeditionary warfare and sea basing and transform the life cycle of joint force deployment through reset and retrograde into a just in time efficient adaptive capability enabling expeditionary logistics and warfare.

Just as the Joint Deployment and Distribution Operations Center (JDDOC) was developed during OIF-OEF to coordinate the multimodal inflow to theater, the JDDSP is ideally located to act in concert with the JDDOC as the central control point to coordinate the outgoing flow from CONUS. Combining the JDDSP with the JDDOC provides a powerful tool for providing unprecedented visibility of manpower and supplies transiting between CONUS and theater.

CCDoTT- SM 21 followed joint force deployment from CONUS to OIF-OEF for almost a decade demonstrating operational business process and information technology efficiencies. Most recently, the ASP JDDSP concept was validated as observer in the Army Surface Deployment Distribution Command (SDDC) Operation New Dawn Joint Task Force Port Opening (JTFPO) reset movement of unit equipment through Port Canaveral FL movement of unit equipment using commercial transportation from theater to depots through an ad hoc seaport of embarkation (SPOE).

3.6.3 Operational Need

Sea Power 21 is predicated upon agility and transformative expeditionary logistics. Operational Maneuver from the Sea (OMFTS) provides the Marine Corps vision for conducting 21st century naval expeditionary operations. This vision seeks to exploit the sea (and particularly littoral areas) as maneuver space. This allows power projection directly from the sea onto operational objectives well inland obviating the traditional need to first seize and secure a beachhead and build up a vulnerable support base ashore before pushing out to accomplish to inland operational objectives.

ONR in its BAA 13-4 summarized the warfighter's needs best. The Logistics Thrust established the following Technology Investment (TIA) areas in which to begin projects: (Logistics Information Technology (LogIT), Packaging, Handling, Shipping and Transportation (PSH&T), Expeditionary Utilities, and Logistics Operational Analysis. The list might have also included logistics command and control ($LogC^2$) given the organizational complexities of moving traditional ashore functions to a forward deployed mobile Sea Base. All these needs are closely related to Expeditionary Warfare, and all align nicely with the herein described CCDoTT SM 21 technology portfolio ripe for technology transfer and transition.

Logistics information technology is described in terms of efficiency of the expeditionary logistics. The supply system is hugely dependent upon information and information technology, from "item" level tagging and tracking systems, to worldwide transportation network modeling and analysis systems. Solutions are sought for monitoring and analysis systems capable of providing information on item or commodity condition, location, etc. and furthering providing:

> "Software solutions are sought for the collection, recognition, and integration of unstructured data, optimization of complex, multi-dimensional transportation problems and modeling and simulation of logistics movement within the expeditionary supply system."

If the DoD experience with OIF and OEF, and more recently New Dawn. With reverse logistics or reset and retrograde are any reliable indicator, visibility continues to be the number one logistics problem straddling the entire joint force deployment cycle. Sustainment logistics failures led to chronic redundant orders, over and under supply, waste and abuse over a decade. With retrenchment in government programs, reduction in military force structure, waste and inefficiencies cannot be tolerated in supply chain management.

Similarly, the Navy and USMC perspective falling back upon Army and DLA theater sustainment must have reinforced the gap between the "As s" and "To be" in terms of expeditionary logistics in general and Sea Basing in particular.

The CCDoTT-SM 21 team knows how navigate the rocks and shoals to get there safely, determinedly, and expeditiously. We wrote the road map for Sense and Respond Logistics for AUSDATL and the J7.

The differences between Navy-USMC and USA versions of expeditionary logistics are sufficiently different (beginning with the key distinction that the Army cannot self-deploy in contrast to the Navy-USMC Sea Basing strategy) that it will take divergent but parallel development between both services and eventually joint acceptance of the concept. It is unfortunate that USJFCOM (the former SACLANT) that it could not take the lead with Expedition Theater Opening (ETO) the smaller footprint and dwell time version (with Log IT and Log C2 afloat rather than ashore) instead of USTRANSCOM likely heavier version.

For the Navy USMC technology insertion through the tried and true sea trial method using for example PACOM joint exercise such as Talisman Saber (or Naval War College War Game such as JLASS) to inject first MSA tools for expeditionary logistics modeling and simulation (alternately planning a Sea Basing natural disaster or mass evacuation scenario involving coalition-multinational, interagency and NGO's with the same Amphibious Readiness Group) to define with fidelity the gaps and seams between rusty expeditionary warfare readiness and the desired future state.

Other DOTMLPF elements of doctrine and training should involve an IPT including: OPNAV 41, MCWL, USMC MAGTF center of excellence, MARCORSYSCOM, SPAWAR, NECC, and NAVSUP/NOLSC.

For the Army and USTRANSCOM, APS JDDSP is an opportunity to reverse the outsourcing evidenced most recently in Operation New Dawn reset that threatened to further erode SDDC (and reserve marine terminal battalions) third party logistics skills and knowledge in movement planning, vessel loading competency re-learned in Haiti and OEF-OIF.

The Army G4 LIA should take the lead supported by SMDC (excellent systems engineers), SDDC, Army Materiel Command (AMC) and DLA (as beneficial cargo owners), integrate with GTN IDE-FLOW and other DLA initiatives well intentioned to finally integrate transportation and supply systems in an E2E environment.

Instead of outsourcing critical transportation and distribution logistics functions to fragmented industry 3PLs, USTRANSCOM and DLA should develop or partner in the development –of a true 4PL capability to plan, execute, manage, and monitor its global Distribution network down to the critical item level as necessary –level six logistics as a new mantra.

A reconfigured Defense Transportation Coordination Initiative (DTCI) in partnership with DLA using Other Transactions Authority (OTA) might just represent a winning strategy to accomplish the necessary transformation.

3.6.4 Proposed Solution

Agile Port System (APS) is another name for expeditionary logistics. It was not coincidentally the first agile enterprise concept developed by CCDoTT SM21. APS is the epicenter of expeditionary logistics giving new meaning to the term strategic mobility –the smart node in the global supply networked military whether:

- the smart demand driven depot or direct vendor delivery fulfillment center monitoring action within the battlespace and anticipating the needs of the warfighter,
- the smart JDDSP de-conflicting concurrent operations at SPOE/APOEs –or scheduling and re-routing around delays or disruptions along the STRACNET or STRAHNET smart corridors
- the smart Power Projection Platform (PPP) such as Fort Stewart, Camp Pendleton, or Camp Roberts for HADR functioning as its own JDDSP deploying unit capability packages linked to individual mission requirements networked with other PPP's and using high speed rail proven with three day cold chain coast to coast movement to deploy from the most available and efficient SPOE in case of disruption or delay or
- forward deployed at the distributed task force and disposed unit level in the AOR using LogIT and LogC2 tools in the form of web services and applications to integrate and fuse information the tactical Harris radio with smart phones, social media and mobile adaptive sensor networks (MANET).

APS evolution eventually progressed from a proprietary, then generic, and eventually into the dual use JDDSP, as the smart transshipment node aggregating functions co-located on the network for a strategic competitive advantage through shared physical and information technology services and virtually integrating individual enterprise supply networks with other distributed nodes and transportation modes in the process thereby achieving economies of scale and market differentiation of self-selected collaborators at the same time. A perusal of the USTRANSCOM web site and IPL/STIP list reveals the liberal use of the term agile port like coca cola having migrated to the national lexicon in ubiquitous general usage.

For its part the JDDSP concept has evolved into a proven concept of a super demand driven fulfillment center and multi-modal transload- transshipment hub –the next generation supply chain management Walmart super center.

In its developmental path the dual use JDDSP commercial cold chain is the perfect proof of concept of next generation GDMS demand driven E2E fusion of TMS and WMS and infill at transshipment points along the national smart secure trade corridor (STRACNET STRAHNET corridor) critical infrastructure network knitted together by Connect the Connectors regional dray artificial intelligence drawing information from multiple sources as its brain.

The initial demonstration strategic venues are a SE Macon GA and Modesto CA intermodal facility integrating bilateral base load and seasonal movement to metric of one hour dual unit train turnaround and 3 plus days coast to coast safe secure alternate military route to Panama Canal.

To achieve full capability for JDDSP APS, a phased evolutionary acquisition demonstration is suggested.

Phase One: intermediate public storage and transshipment site, at former industrial plant site in Macon GA under SM 21 4PL supervision co-managed by 3PL like Americold. served by short haul rail line interconnecting with class one railroads shuttling daily cold chain unit trains of reefer cars from Port of Savannah to Macon or individual multi-cycle clean trucks both moving on integrated safe secure trade corridor SR 295 transloaded to line haul OTR truck or coast to coast unit train blocks interconnecting at class one intermodal rail ramps Facility FMCSA safe haven for military equipment and high value freight from theft and disruption recovery like GA snowstorm of 2011.

Phase Two: Commissioning of SM 21 transload facility at Fort Gillem (once BRAC plan environmental cleanup completed) as:

- High velocity secure transload facility
- Containers from Port of Savannah safe haven overnight for store door delivery
- Containers transloaded onto trailers for SE MW next day distribution 750 miles
- Long haul trailers blocked as TOFC for intermodal move by unit train

Waiver/exemption from load limits for short haul movement functioning as ICTF permits 20% plus overweight per container loading at point of origin prior to transload and integration with two alternate class one railroads nearby intermodal rail ramps.

DoD Proof of concept of coast to coast (and intermediate) movement through Columbus/Fort Benning, or Anniston Army Depot, for high wide movement and unit capability packages by high speed rail STRACNET in three days including Fort Bliss, Fort Hood, Fort Carson, For Lewis and Fort Irwin NTC also 29 Palms USMC MAGTF training facility.

3.6.5 Current Status

APS-JDDSP is a federated suite of advanced logistics modeling and simulation, business process re-engineering, and dynamic planning and execution (multi-modal operating) systems incorporated in a US Transportation Command (USTRANSCOM) and US Joint Forces Command vetted Initial Capabilities Document (ICD) for Joint Capabilities Integrated Development System (JCIDS) acquisition purposes as part of an intended Joint Force Collaborative Toolkit for joint force deployment and the backbone of an army G4 initiated Joint Requirements Oversight Council (JROC) approved Expeditionary Theater Opening (ETO) Program Executive Office (PEO) now designated as Joint Task Force Port Opening (JTFPO) under USTRANSCOM auspices.

The TRL 6 level DoD Functional Integrating Concept embodied in the APS JDDSP Concept has been validated in a commercial port demonstrating the capability to de-conflict concurrent joint force deployment (Stryker Brigade) and intermodal operations at the strategic Seaport of Embarkation (SPOE) Port of Tacoma WA. It was further validated in joint force deployment

sealift readiness type exercise demonstrating the use of a Power Projection Platform (PPP) functioning as a smart node for just in time inland marshaling and staging at rail ramp, unit train movement to SPOE Port of Savannah of brigade combat team of Third Infantry Division , and just in time last in first out loading of a Low Medium Speed Roll on Roll Off (LMSR) vessel dramatically, reducing the logistics footprint, redundant staging, and dwell time at the SPOE de-conflicting with concurrent commercial operations.

3.6.6 Risk Table

Risks	Low	Medium	High
Technical	**X**		
APS JDDSP has already been successfully, physically or virtually using MSA, demonstrated to de-conflict a concurrent commercial operation Stryker Brigade deployment at the SPOE Port of Tacoma, in using an installation ITO, PPP and motor pool at Fort Stewart and the Third ID deploying through the SPOE Port of Savannah, and most recently as a participant engaged in reset observation, data collection, and parallel planning with SDDC and 3PLs in a JTFPO New Dawn joint exercise with the 832d Transportation Battalion at Port Canaveral FL. While there will be many DOTMLPF implications associated with widespread evolutionary acquisition progressive insertion of APS JDDSP elements over time, they can be addressed in sequence, and the overall result of successful achieving the ambitious goals of expeditionary logistics are reward enough and well worth the collaborative effort.			
Schedule		**X**	
Successful introduction and transition of APS JDDSP to the Navy-USMC and in parallel with the Army to USTRANSCOM is an ambitious undertaking, but no more ambitious than the envisioned end state outcome of expeditionary logistics. However, a five year progressive timetable with interim milestones or mutations (SBIR/STTR, CRADA, OTA, RTT etc) is far more realistic under a single Program Management Plan (PMP) encompassing the entire effort applying evolutionary acquisition and systems engineering principles.			
Cost		**X**	
A focused effort would require dedication of adequate in kind and financial DoD resources whether at the service component, joint staff, and COCOM level, integration of a cadre of dual use experienced 3PL service providers with military and commercial backgrounds, commercial partners motivated aligned with Dole Foods to help DoD logistics transformation, an appropriate home for the programs such as the Cebrowski Center at NPS and JIFX-Operation Relief to provide the required open learning environment and support network along the way and most importantly, a uniquely qualified and experienced and highly motivated 4PL organization to vision, plan, execute and maintain requisite course and speed for the duration of the required effort. The PMP should produce a definite cost estimate for the program.			
Business	**X**		
CCDoTT SM 21 as its own best use case has developed a methodology that incorporates DoD and Seal Team Six ethos, that collaboration is key and mission failure is not an acceptable outcome. To this end. it deploys an Adapt, Buy, and Create (ABC) cost effective capability strategy, execution level requirements generation focus and validation, best of breed selection of strategic partners with the same fair broker ethos, agile development to mitigate software development and engineering risk.			

3.6.7 Business Case

The central value proposition is incalculable, but could be measured as a first approximation, in contrast, by replaying and applying the agile enterprise individual and collective metrics to OEF I the war had been fought as a Sea Based distributed dispersed series of special operations engagements with expeditionary logistics -for once logistics is an enabler and force multiplier - rather than a conventional protracted counter-insurgency conflict and war of attrition that emerged over a decade in a landlocked harsh environment that successfully challenged the British Empire at its zenith and. the former Soviet Union a neighboring country with secure lines of communication and re-supply.

The energy costs alone in moving a ton of conventional supplies into Afghanistan has run into the billions of dollars. The circuitous routes through Pakistan and reliance upon relay teams of local drivers traversing the notorious Khyber Pass, frequent Pakistani politically generated delays and flaming tank trucks –let alone the thrilling landing and takeoff maneuvers at Bagram and Kandahar - offer moot testimony to the folly of the overall supply effort independent of an a assessment of the overall strategy and objectives.

No greater series of lessons learned in both treasure and tactics could be gathered than by using real unit transportation costs multiplied by the countless Code 999 next plane out redundant shipment of the same supplies and equipment to countless forward operating bases frustrated with the abject failure of the theater distribution system –and the estimated one million unopened orphan containers signed off on by successive CENTCOM containers now reserved for class three barrier material and destined to be retrograded i.e. left in place after the planned 2014 withdrawal or surreptitiously manifested as freight all kinds and shipped commercially back to the west coast and trucked over public highways back to Sierra Army Depot near Reno NV.

3.6.8 Funding

Funding: S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's.

Acquisition sponsor(s): USMC PEO Ground Systems Logistics and Information Technology Division for integration with Marine Corps Deployment Support System (MDSS), Integrated Computerized Deployment System (ICODES) and Joint Force Requirements Generation (JFRG II) current systems.

3.6.9 Transition Requirement

As more of an overarching philosophy of expeditionary outbound logistics, there is no single Seminal Transition Event (STE) that will constitute the definitive end point in the APS JDDSP technology transition effort. Rather applying an evolutionary acquisition strategy, there will be numerous individual opportunities for points of insertion of APS JDDSP elements at TRL 7 as part of an overall transformative strategy. However, an interim goal should be a seminal war gaming event perhaps at the Naval War College analogous to a NAS/NAE collaborative effort in the form of a desktop HADR scenario to provide guidance, direction, sponsorship, and formation and charter of an oversight community of interest and practice at the outset to the remainder of the campaign effort.

This could be followed by the further development of the federated MSA suite applied to Sea Basing scenarios for VVA as a robust software web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of MARCORSYSCOM and SPAWAR at PEO Ground Systems Advanced Technology Investment USMC.

This should occur at Q2 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance including sea trial by an Expeditionary Readiness Group by the user community of interest.

3.6.10 Recommended S&T Investment and Transition Pathway

APS JDDSP is a prime candidate for evolutionary acquisition beginning with an ONR Code 30 Expeditionary Warfare and Logistics and Sea basing Future Naval Capability SS&T investment in partnership with SM 21 Inc CCDoTT SM 21 transition execution agent.

S&T investment could seed further concept of operations (CONOPS) validation in support of expeditionary logistics and Sea Basing through ONR Future Naval Capability (sea basing and expeditionary logistics) in collaboration with USMC Combat Development Command (MCCDC), Marie Corps Warfighting Laboratory (MCWL), and 1 MEF, joint air-land-sea (JLASS) Naval War College wargaming, and sea trial insertion into alternate HADR scenario planning for biennial Talisman Saber PACOM multinational exercise.

The only CCDoTT SM 21 concept to formally commit to comply with the Evolutionary Acquisition process is the generic Agile Port System (APS) concept behind the Joint Deployment Distribution Support Platform (JDDSP) or the militarized joint force deployment version of the APS. For purposes of DoD transition, combining the JDDSP and dual use APS concept is logical as reflected in the JDDSP Initial Capabilities Document (ICD) formally circulated for military use evaluation comment among US Transportation Command (USTRANSCOM) the Distribution Process Owner and US Joint Forces Command (USJFCOM) Joint Force Deployment Process Owner.

Modeling and simulation collaboration using Fort Stewart as the notional JDDSP and tracking unit equipment flow by rail through the Port of Savannah constituted a proof of concept demonstration of APS-JDDSP with Fort Stewart substituting for an inland dual use multi-modal transfer/transload hub .and its rail ramp (making it a Power Projection Platform) and use of class one railroads over the STRACNET serving as the smart secure trade corridor connecting the agile port and the inland facility together comprising the APS.

Although several programs of record were subsequently briefed in the concept demonstration, and USTRANSCOM actively participated, the transition process halted before an actual live force deployment by a Brigade Combat Team from the Third Infantry Division could be scheduled involving both troops and equipment.

Combined modeling and simulation, and an actual business process demonstration involving military equipment yielded results measured in reduced time from installation to Seaport or Embarkation (SPOE) and footprint, dwell time and vessel loading.

For technology transfer purposes, it is clear that a formal Technology Readiness assessment (TRA) and an Intent level Technology Transfer Agreement (TTA) between ONR and target acquisition sponsor (USTRANSCOM SDDC) and USMC Combat Development Command (MCCDC)

represent the next logical steps toward transition and enshrining JDDSP-APS in joint deployment modernization and expeditionary warfare doctrine and training. From a user perspective, involving Army and Marine Corps Forces Command (and Marine Corps Warfighting Laboratory as evaluator) should be explored.

Execution of the Intent TTA and the conduct of a Technology Readiness Assessment (TRA) by the acquisition sponsor program manager represent the next logical steps in the technology transfer transition process for the concept. As Strategic Mobility 21 Inc non-profit is the designated transition execution agent for the concept, it should take the lead in partnership with ONR in this effort.

SM 21 Inc as the designated execution agent for APS JDDSP should be given the opportunity to inject the concept into COCOM exercises such as PACOM TALISMAN Saber.

Military user evaluation into accepted doctrine will require G4 Logistics Innovation Agency (LIA), Army Training and Doctrine Command (TRADOC), USMC Combat Development Command (MCCDC), Warfighting Laboratory (MCWL), and Training and Education Command (TECOM) validation.

Advanced logistics principles and concepts should be taught through the USMC MAGTF Logistics Training Center Quantico VA.

3.6.11 Schedule and Tasks:

See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.7. Port Disruption Recovery and Resilience (PDR2M) Risk Mitigation Model

3.7.1 Description

The Port Disruption Recovery and Resilience (PD2RM) Risk Management Mitigation Model is a federated suite of models built upon the triennial Oak Ridge National Laboratory Freight Analysis Survey and Flow Network designed to analyze freight flows by mode (ocean, intermodal rail, over the road truck and inland waterway) to optimize and expedite recovery from systemic disruptions (hurricanes, floods, derailments, HAZMAT events)), and build resilience capacity into the global supply chain network dependent upon the continued operation of the national defense Strategic Highway (STRAHNET) and Strategic Rail Corridor (STACNET) surface transportation infrastructure network necessary to support the CONUS Global Transportation Network (GTN) and commercial freight movement upon which DoD joint force deployment, sustainment and reset logistics relies.

3.7.2 Potential Capability

A macro global, meso regional and micro enterprise level disruption and resilience operational model that can mitigate major disruption global supply chain impacts upon the national, regional and local economy as a “Big Data” strategy and support enterprise level business continuity planning.

3.7.3 Operational Need

There is currently no macro (global, national), meso (regional) or micro (enterprise e.g. JDDE, Fleet Forces, 1 MEF, COCOMS, Joint Staff) scenario/vignette driven solution set measuring intermodal transportation system and global supply network interdependency in the form of a federated suite of simulation models similar to SCASN-MMTM, capable of analyzing the:

- Global operational, force protection, and sustainment supply chain vulnerability, impacts assessment, and developing and analyzing alternate courses of action (COA's) to mitigate effects from man-made and natural disasters
- Creating secure safe havens (DoD and BRAC facilities), damage to critical infrastructure (ports, terminals, STRACNET and STRANET) movement and operations and reconstitution as safe secure trade corridors,
- Prioritizing and re-routing vessels, rail, local and long haul trucks, and supply chains by class of supply based upon op tempo and real time demand while
- De-conflicting concurrent Emergency Management (EM), DoD assistance to civil authorities, and commercial supply chain operations
- Restoring networks to pre-event status incorporating resilience and operational and business continuity based upon lesson learned and inserting self healing network capabilities whenever possible.

From an emergency management perspective, while under the National Incident Management System (NIMS) incident response with or without Defense Assistance to Civil Authorities (domestic through NORTHCOM or foreign through geographic COCOMs) consequence management and recovery (and resilience building) are exclusively State and local responsibility with Federal disaster funds. No comprehensive damage assessment and recovery planning and execution methodology and tools exist, as evidenced most recently in Hurricane Sandy recovery still underway costing billions of dollars to date.

USTRANSCOM S&T capability gaps (STIPL) addressed include: visibility, Distribution System Interoperability, Distribution Planning and Forecasting, Process Measurement, and Business Rules.

3.7.4 Proposed Solution

The solution is the development of an iconic COTS federated suite of modeling and simulation tools based upon the Oak Ridge National Laboratory (ONRL) 2007 Freight Flow Analysis model to assess in real time the impact of a port disruptive event and initiate actions to the regional and national transportation and global supply chain to mitigate the disruption and its impacts upon the system and aggregate network.

3.7.5 Current Status

P2R2 Model is a TRL 3 macro level descriptive conceptual model concept intended to provide decision support to improve global or regional aggregate supply chain resiliency and rapid recovery from natural or man-made disruptive event.

PD2RM once fully developed, validated (verified and accredited), and operational can be deployed as a federated distributed suite of cloud based COTS web services capability. PD2RM is capable of multiple concurrent exercises such as conducted by the FEMA Institute for disaster

planning and execution. Scenarios can be run at the national, regional or enterprise level for business continuity planning. Risk managers, underwriters, transportation planners, and operations planners of every variety and description are stakeholders in this effort.

From a POR perspective, ideally OPNAV, and every Naval system command, and MARCORSYSCOM have an enterprise level financial stake -- from a CONUS operational and OCONUS littoral operational perspective -- as part of Maritime Domain Awareness (MDA). Certainly USTRANSCOM; as Distribution Process Owner (DPO), and interested in critical infrastructure protection, as with FEMA DHS; has a vital interest in developing such a model.

At a minimum, at a tactical level, the COTS model must be integrated with the GOTS Freight Flow Analysis model for functionality purposes.

On the strategic level the model is critically useful from a whole of government perspective to OPNAV for continuity of operations planning, to Fleet Forces Command for port access to naval facilities and disaster planning and response, to NAVSUP for naval global supply chain disruption planning as well as to NPS, Naval War College etc. for scenario and war games generation.

The model represents a critical component of Maritime Domain Awareness (situation awareness and understanding) for the effective understanding of anything associated with the global maritime environment that could adversely impact the security, safety, economy or environment of the United States.

Given the broad potential utilization of the model (and eventual likely joint migration as with TET and possibly TIP, the SECNAV Direct Reporting Program Manager, Strategic Systems Program (DRPM SSP) may be the appropriate PEO for the program.

3.7.6 Risk Table

Risks	Low	Medium	High
Technical		**X**	
There is always technical risk associated both with the integration of multiple layered models here through the use of translator algorithms and the quality of underlying data here at this time totally dependent upon the 2007 ORNL Freight Flow Analysis survey data and not independently correlated and validated with annual PIERS data tied to mandatory US Customs reporting or to actual primary industry proprietary data sources such as used by SM 21 Inc.			
Schedule		**X**	
There is moderate schedule risk that a validated integrated model can be validated within the two year time window of RTT programs.			
Cost		**X**	
In order to validate a model at the strategic national, regional and enterprise level with associated web and mobile application services a budget of $3M in a best approximation within the two year window. PDR2M is a relatively low cost high payoff S&T investment mashing proven.			
Business		**X**	
Various defense and industry thought leaders have expressed the common sentiment that emphasizes risk and uncertainty at every level embodied in the ancient Confucian double edged proverb about living in interesting times. For this reason risk management, the phenomenon of acceptance by various political, financial, and economic institutions of unprecedented levels of risk without a thorough understanding of the underlying fundamentals –and the increases interdependency of global systems			

at many levels- places a premium upon the availability of risk management tools to guide continuity of operations and institutional response and recovery and building in resiliency wherever possible.

3.7.7 Business Case

The principal value proposition of PDR2M benefits may be measured in institutional survivability, elimination/reduction of unacceptable consequences through avoidance of mission failure, mitigation of disaster and recovery costs expressed in projected cost savings and avoidance (resilience) from reduced damage to installations and equipment and acquisition replacement costs, reduced operating, logistics and transportation costs from re-routing re-prioritizing and rescheduling shipments.

Indirect benefits include reduction in loss of life and property in CONUS and OCONUS host countries in AOR's from rapid institutional response capability (e.g. USMC USN NOLSC) to the current event and in the future from building resiliency and rapid recovery from future events.

3.7.8 Funding

S&T sponsor(s) ONR Code 30 Expeditionary Warfare/Sea Base FNC's.

Alternate: SECNAV S&T investment maritime domain awareness.

Alternate: CRADA with SM 21 Inc and industry government consortium.

Acquisition sponsor(s): USMC PEO Ground Systems Logistics and Information Technology Division.

Alternate: Naval Air and Space Warfare (SPAWAR) Systems Command.

Alternate: Department of Homeland Security (DHS) FEMA.

3.7.9 Transition Requirement

The Seminal Transition Event (STE) constituting the definitive end point in the PDR2M model technology transition effort is the insertion at TRL 7 of a robust asynchronous distributed software modeling and simulation SEM SOA web service capability from the S&T sponsor to the acquisition sponsor acting on behalf of OPNAV, MARCORSYSCOM, SPAWAR, NAVSEA, Fleet Forces Command, USTRANSCOM and COCOMS. This should occur at Q4 of FY 2 of project timeline in order to allow for extended user evaluation and acceptance by the multiple user community of interest. A joint program with Army PEO STRI would mitigate risk and ensure interoperability with DoD systems.

3.7.10 Recommended S&T Investment and Transition Pathway Schedule and Tasks

PDR2M is a prime candidate for evolutionary acquisition beginning with an ONR Code 30 Expeditionary Warfare and Logistics and Sea basing Future Naval Capability (FNC) S&T investment in partnership with SM 21 Inc CCDoTT SM 21 transition execution agent.

An alternative is ONR and SECNAV S&T investment as integrating concept for FORCENET Sea Strike Sea Shield Sea Base triad Seapower 21 enabler based upon HADR and coalition capability capacity development in PACOM AOR. Shared CRADA GOTS COTS capability transitioned into cloud SEM SOA architecture.

At the COCOM level, the logical military customers are geographic combatant commanders in particular NORTHCOM and PACOM. Trade studies are underway or have been completed. To complete the concept formation phase, a military utility analysis, and analysis of alternatives are the next logical steps in the evaluation process.

As part of either transition strategy a proof of concept and approach should be the development of an algorithm to provide a high fidelity view of the impact of a disruption upon import and export container movement, and joint force deployment, incorporation of cross technologies.

In any event an ONR Technical Development Strategy to meet TRL 3 minimum requirements should include the execution of an Interest level TTA with a program of record (POR) PM for transition purposes.

3.7.11 Schedule and Tasks

As the least advanced concept within the CCDoTT SM 21 portfolio and uncertainty of S&T and acquisition sponsors, current forecasted schedule is pure conjecture. See Consolidated CCDoTT SM 21 Capability Deployment Schedule.

3.8. Schedule and Tasks

Concept/Capability	S&T Sponsor	S&T Funding Mechanism	User MUE	Opp	Primary Transition POR	Alt Transition Pathway
TIP	ONR/MARAD	FNC TET RAMP MOD JDDE GT Nexus LMI	NOLSC HADR JPAG USTRANSCOM	HADR JCTD CWD JIFX Op Relief	FACTS JPAG GOTS	JPAG/USTRANSCOM JDDOC JDAC HERO TOC SM 21 Inc non-profit
Geo VIZ	ONR/USTRANSCOM	FNC Ex War JDDE SIBR STTR CRADA Anti ESRI	1 MEF MAGTFOPES USTRANSCOM	NPS JIFX Op Relief JDAC Sandbox	USTRANSCOM TransVIZ (6-4)	HERO TOC SM 21 Inc License LVC J7 DESS Training tool JDAC

Joint Sea base/AB	ONR/USTRANSCOM	FNC JT Sea Base LMI	MCWL PACOM MARPORPAC	SDDC AB JT Exer	MARCORSYSCOM	SOA Web service AnyLogic HERO TOC SM 21 Inc
GTMS	ONR/USTRANSCOM DLA	FNC Ex War SRL USTRANSCOM JDDE DLA IDE FLOW Integration SIBR/STTR CRADA JCTD QSSI VirtualAgility	MARLOGCOM USTRANSCOM sandbox JCTD CWD HADR	Sea Trial USTRANSCOM Sandbox MARLOGCOM	USTRANSCOM DTCI	License GFM JDAC SOA web service HERO TOC SM 21 Inc non-profit Licensor

RTLS	ONR/SDDC	FNC Ex Warfare JDDE SIBR/STTR CRADA Patent holder	1 MEF NECC SDDC	Demo 1 MEF NECC Fort Stewart SDDC JTFPO NIE USMC Barstow Albany Blount Island JIFX Op Relief	MDSS/TC AIMS II (6-4) SDDC PPP Installation ITO MARCORLOGCOM	NECC JTFPO Civil large scale construction SM 21 Inc licensor
APS JDDSP	ONR/USTRANSCOM	FNC Ex War JDDE LMI	MCWL SDDC JTFPO Reset Red Dawn	Jt Exer JLASS Talisman Saber PACOM TRADOC TECOM	MARCORSYSCOM JT DEP MOD FORCES Command	JDDOC

PDR2M	ONR /DHS/FEMA	Oak Ridge Nat Lab Parons Brinkerhoff MARAD CRADA (SM 21 Inc non-profit like PierPass)	FEMA NORTHCOM PACOM MDA	FEMA Exer NORTHCOM Exer OES	DHS NORTHCOM COCOMS	FEMA Institute NORTHCOM OES UCSD Supercomp HERO TOC
Reg Dray Connect Connectors	ONR	FNC Ex War JDDE Combined JCTD SRL E2E Instaknow	JCTD CWD HADR	MARLOGCOM JT Exer	MARCORSYSCOM	SOA Web service HERO TOC SM 21 Inc license or sell

4. Program

4.1. CCDoTT SM 21 Transition Execution Agent

Strategic Mobility 21 Inc. is:

- the predecessor in earlier and continuing CCDoTT –SM 21 transition efforts,
- assignee of much of the intellectual property emanating from both the SM 21 and CCDoTT programs,
- incubator of multiple small logistics and information technology related businesses as dual use military and commercial third party logistics service providers in relation to SM 21 as a fourth party logistics service provider or integrator , and
- the successor in interest to the SM 21 program within the academic, government and commercial industry domains, and collaborator affiliate of CSU and other universities in the academic research and education arenas.

SM 21 Inc, therefore, is the logical transition execution agent for the CCDoTT SM 21 concepts and technology portfolio and future strategic partner with ONR in the transition effort envisioned in this transition plan.

In this role SM 21 Inc is expected to augment its Technology Transition Agreement with the execution of multiple affiliation agreements with several universities in New Zealand, several departments, colleges, and campuses within the California State University system, Naval Postgraduate School (NPS) and several major global non-governmental organizations active in Humanitarian Assistance and Disaster Response (HADR) as the Humanitarian Emergency Response Organization (HERO) center.

4.2. CCDoTT SM 21 Extended Transition Team

Unlike the case of CCDoTT, the SM 21 program stood up with transition through evolutionary acquisition clearly in mind from its inception having:

- internally structured itself as an Integrated Project Team (IPT) comprised of government, transportation and logistics industry (as third party logistics service providers to SM 21, functioning as a systems integrator and fourth party logistics services provider), and academic strategic partners;
- adopted the organizational principle of a Joint Capabilities Integrated Demonstration (JCTD) including a Program Management Plan, Demonstration Plan, Transition Plan, and Implementation Directive;
- in combination with the use of the acquisition process Joint Capabilities Integrated Development System (JCIDS) process to effect technology insertion of the Southern California Agile Supply Network (SCASN), Multi--Modal Terminal Model and Operating System at TRL 7 level Capabilities Development Document (CDD) Milestone B as primary elements of the Joint Force Deployment Toolkit as envisioned by the US Joint Forces J7 Joint Deployment Process Owner.

In August 2010, prior to submitting its own interim Transition Plan, SM 21 Inc non-profit executed a Technology Transfer Agreement with the California State University Foundation (CCDoTT academic and contractual sponsor). SM 21 Inc non-profit, is therefore the successor in interest and

designated execution agent for all SM 21 and Agile Port System related technology developed under ONR agreement.

Since then, despite the loss of $3M in dedicated transition funding that would have accelerated the pace of transition, and created a bow wave for CCDoTT in the process, SM 21 Inc has made steady forward progress in this effort. Using the "Best of Breed" approach to selection of strategic partners; and an Adapt, Buy, Create (ABC) trilogy of acquiring additional functionality to overall capability; SM 21 Inc has forged a new coalition of the willing with the common purpose of transforming military and commercial logistics.

A major part of that effort has been the search for a venue to demonstrate both:

- the physical transloading and integration of multi-modal carriers (air, truck, rail, ocean, sea and airports and third party logistics service providers);
- and information technology to virtually integrate those entities into a single E2E demonstrated capability functioning as a fourth party logistics service provider (4PL).

The principal target of that effort remains at Fort Gillem, GA. Conditional arrangements are in place with the Local Reuse Authority (LRA). Those arrangements should be concluded once the final Development Conveyance Agreement is executed with the Secretary of the Army. Necessary brownfield cleanup may also further delay site access.

In the interim, a complementary site has been identified in Macon, Georgia that offers rail service with the ports of Savannah and Brunswick. The site also provides the potential for transloading, load consolidation, multiple regional dray trips to and from the ports; and a major regional agriculture transshipment, processing, and distribution hub in a Food and Drug Administration certified Food Safety and Security center.

Starting in 2012 the Naval Postgraduate School Cebrowski Network Centric Warfare Center invited SM 21 Inc to participate in their semi-annual Joint Interagency Field Experiment Venue (JIFX). The Naval Postgraduate School Cebrowski Network Centric Warfare Center and subset, entitled Operation Relief, is a unique venue at the California National Guard Camp Roberts Training Center for programs to demonstrate and conduct military use evaluations of promising technology before representatives of all the COCOMs, 1 MEF USMC, and DHS/ FEMA.

Under these auspices and guidance, SM 21 Inc has formed a collaboratory global social network and consortium of small businesses (many service disabled veteran owned); Navy-USMC and DHS SIBR candidates and program participants; US and foreign universities; and entitled Humanitarian Assistance Response Organization (HERO).

Under the Community Response Integrated Synthetic Information Support System (CRISIS) banner, HERO is a pioneering community, rather than a government centric approach to emergency management; peer sourcing of global experts in support of local communities in the PACOM area of operation;, and the development of an ad hoc rapidly deployable virtual tactical operations center built upon its original USJFCOM sponsored Joint Force Collaborative Toolkit.

4.3. CCDoTT SM 21 Integrated Technology Transfer and Transition Process

4.3.1 The Technology Transfer Transition End Game: Navigating the Agile Evolutionary Acquisition Process

DoD Technology Transition process, referred to as Joint Capabilities Integrated Development System (JCIDS), is set forth in DoD 5000 series guidance. The Science and Technology and Acquisition processes are inextricably linked. The military user evaluation; represented by milestones A, B and C; bridges the S&T and Acquisition processes that are separated by color of appropriations money or Budget Activity code. This interdependency is depicted in Figure 3. As the JCIDs process concepts for capability employment, user evaluations at the milestone points, provide evaluation of the maturity of technologies to fill the required capabilities.

4.3.2 Linkage Between Acquisition and S & T Programs

Indicative of the inextricable linkage between the S & T Development Process and the DoD Acquisition process are the number of points at which S & T programs can first transform (and later transition) into capabilities developed under DoD Programs of Record in the Acquisition process., It is important therefore, when viewing this evolutionary acquisition process, to remember that there are multiple points of entry unto the process, each requiring cumulative criteria to reach each milestone, and the goal of technology transition is to integrate the S & T developed technology with an existing program of record thus obtaining an acquisition partner commitment on behalf of some identified user community.

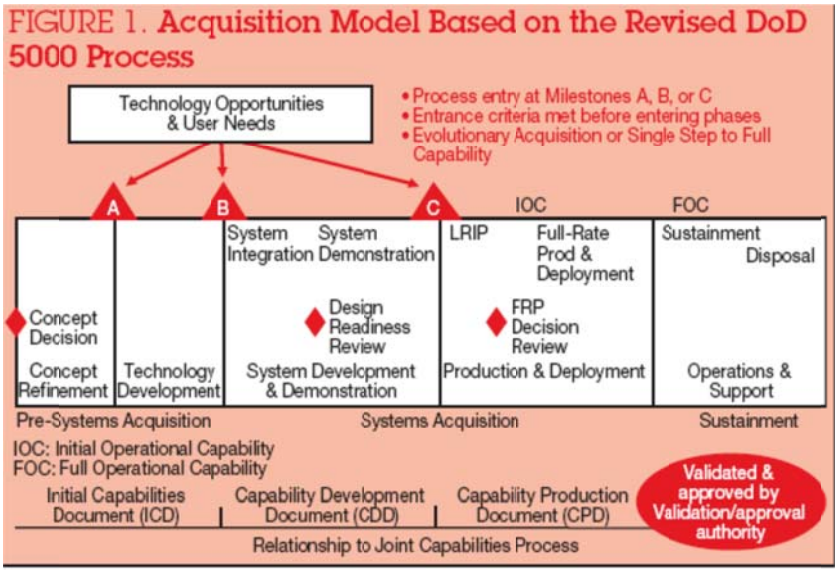


Figure 3 DoD Acquisition Process

4.3.3 Aligning Acquisition and Science & Technology Programs

The DoD Acquisition process and the S & T Technology development begin to cross paths at Milestone A, with the development of the Draft Capabilities Development Document (CDD), and the Science and Technology Development program achieving Breadboard Validation Analysis (validating technology functions at the laboratory testing level). At this point TTA's begin to

change from those of interest in a technology, to those of intent to sponsor further development of a technology from sponsors connected to Programs of Record.

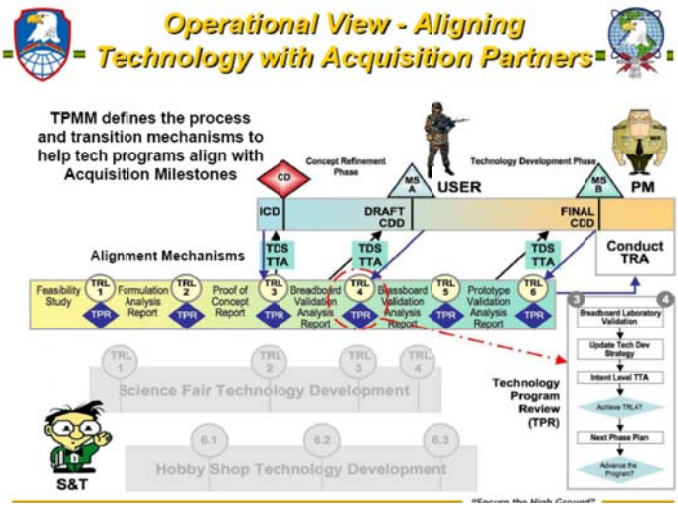


Figure 4 Aligning Science and Technology Development with Defense Acquisition

Figure 4 depicts this relationship, as indicated by in the several traditional and non-traditional threads to a Technology Readiness Assessment (TRA). The DoD Acquisition process, through the preparation of a formal Initial Capabilities Document (ICD) and Capabilities Development Document (CDD) to Milestone B System Development and Demonstration brings concepts to the TRA in a set process in preparation for user engagement and Program of Record (POR) Manager involvement, while in the more informal technology development as followed under the S & T Development process, reaching TRL 4, indicative of readiness for TRA, - collaboration with users is less formal. The challenge to S & T Development programs is to identify the vehicles and sponsors necessary for military user assessments needed to transform the S & T project from intellectual inquiry to sponsored programs dedicated to fielding a capability.

4.3.4 Technology Readiness Levels – Relations to Acquisition Interest

Technology Readiness Level describe relationship in the scientific development process; i.e., Discovery, Formulation, Proof of Concept, etc. The descriptions are in terms that provide alignment with maturity concepts, such as the defining of Basic Principals to the defining of Validation of Physical Functionality. The descriptions further allow for the identification of types of agreements (Technology Transfer Agreements – Interest, Intent, Commitment) to forge relationships between the S & T programs and Acquisition programs.

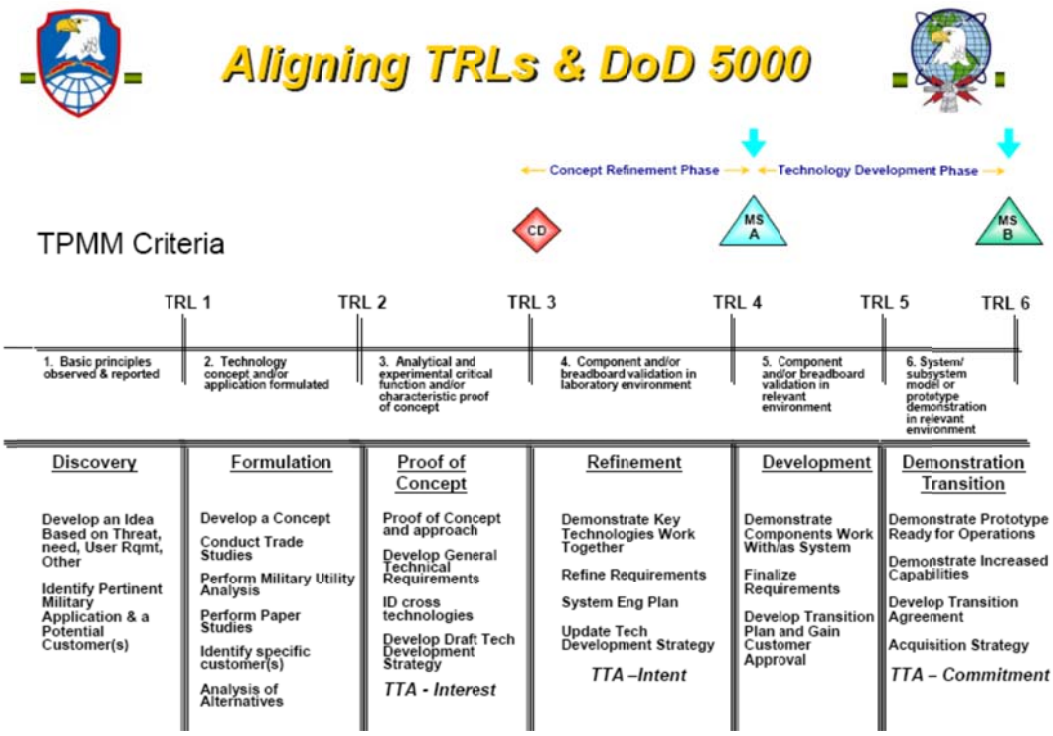


Figure 5 Technology Readiness Level Criteria for Alignment with Acquisition Process

Figure 5, above expresses those relationships, and identifies at which stages of both the Acquisition Process and the S & T Development process when the relationship between programs should be expressions of Interest, expressions of Intent, and at what point an expression of Commitment.

4.3.5 Technology to Acquisition

Good science is not engineering, and engineers are not scientists for a reason. Ideally, from a systems engineering perspective, the transition thread from TRL1 through TRL 7 would follow an evolutionary acquisition path and would engage at least intended users, if not acquisition sponsors, at each level. TRL 1, instead of reflecting an abstract concept, would define a user need and functional utility.

Ideally the Science and Technology development would follow a linear path, depicted in Figure 6.

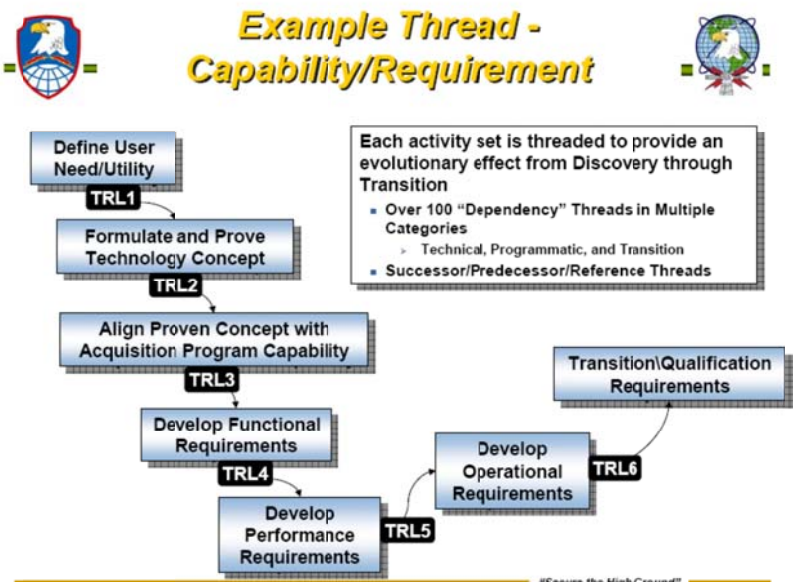
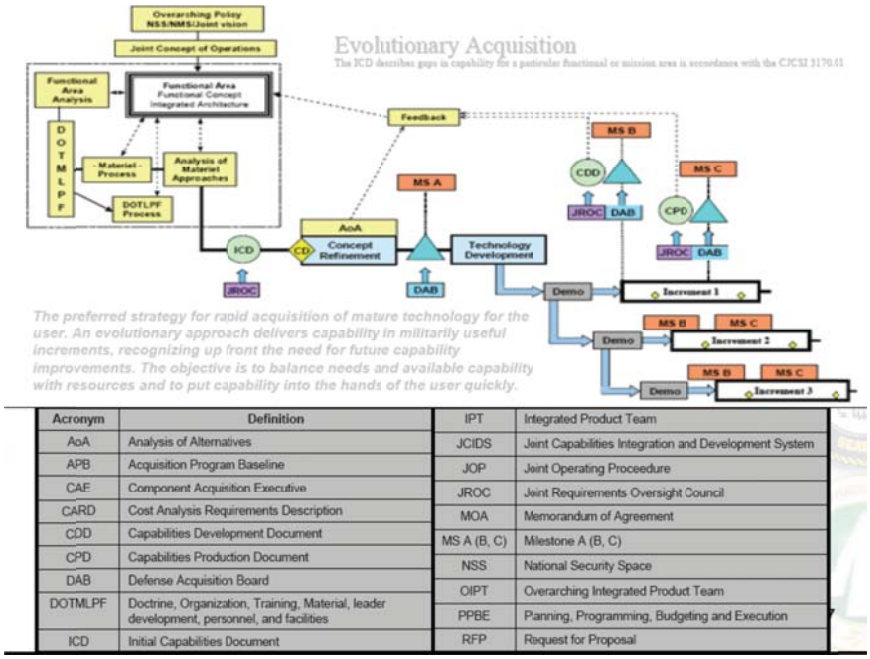


Figure 6 Pulling the Transition Threads Through the TRL Development Process

Unfortunately that deliberate linear approach does not follow the real world of inspiration, invention, and innovation, let alone entrepreneurship necessary to see the process successfully through to conclusion. History is replete with examples, such as Edison seeking one result, discovering another completely different application, then steadfastly refusing to aggressively pursue the obvious functionality and social benefit of the newly discovered branch of inquiry. So while Edison may have discovered the recorded phonograph, he did not develop it.

Similarly, the S & T Development community must recognize the dominance of evolutionary nature of the Acquisition Process, that through its iterative nature, allows for redirection of effort, redefining of programs at critical junctures, as expressed in Figure 7.



Acronym	Definition		
AoA	Analysis of Alternatives	IPT	Integrated Product Team
APB	Acquisition Program Baseline	JCIDS	Joint Capabilities Integration and Development System
CAE	Component Acquisition Executive	JOP	Joint Operating Proceedure
CARD	Cost Analysis Requirements Description	JROC	Joint Requirements Oversight Council
CDD	Capabilities Development Document	MOA	Memorandum of Agreement
CPD	Capabilities Production Document	MS A (B, C)	Milestone A (B, C)
DAB	Defense Acquisition Board	NSS	National Security Space
DOTMLPF	Doctrine, Organization, Training, Material, leader development, personnel, and facilities	OIPT	Overarching Integrated Product Team
ICD	Initial Capabilities Document	PPBE	Planning, Programming, Budgeting and Execution
		RFP	Request for Proposal

Figure 7 Evolutionary Acquisition Process

For the record all of the CCDoTT SM 21 concepts and technology are eligible for either use of JCIDS or rapid technology insertion at Technology Readiness Level (TRL7) Capability Development Document (CDD) Milestone B because they are included in Acquisition category ACAT 3 or less than $140M in FY 02 dollars.

4.3.6 Collaboration Need

To the scientist, or inventor; a feasibility study does not precede proof of concept, prototype development, and evaluation. At the same time transition, from S & T programs to Acquisition programs, should not be an afterthought prior to TRL 4. Early user input and feedback is needed, to develop the relationships necessary to create Technology Transfer Agreement of Interest, Intent, and Commitment. Opportunities, such as the JIFX Operation Relief at NPS Camp Roberts, provide early indicators of user community interest.

Alignment of acquisition program capability at TRL 3 is much too premature, as the technology does not have sufficient substance to warrant acquisition interest, but user community indication of interest and input at this point, and at TRL 4 functional requirements, TRL 5 performance requirements, and TRL 6 operational requirements would definitely provide relevant guidance to the S & T community in the evolution of a concept to better align the development with potential military and commercial application in preparation for advancement to a demonstrated capability thus positioning the emerging end product for acquisition sponsor meaningful rapid integration at TRL 7.

4.3.7 Technology Program Management Model

The Space and Missile Defense Technology Center has developed a set of Quad Charts that help report the status of a program as it transforms from concept to capability and transforms from S & T program to fielded capability, Figure 8.

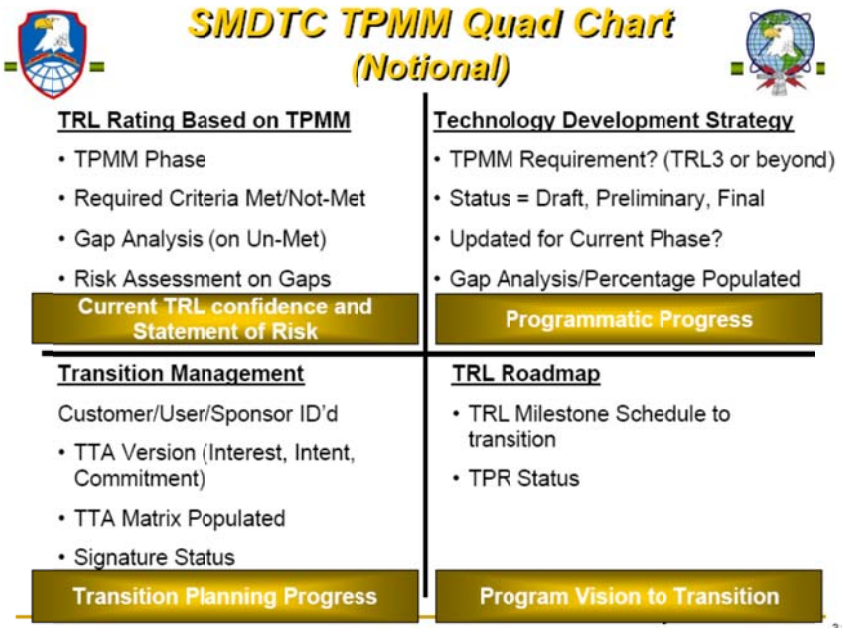


Figure 8 Technology Development Strategy

Using, the charts above to create program status, technology sponsors can use the following chart (Figure 9), as a basis to identify where a concept is in the developmental process, both S & T Development as well as Acquisition status, and identify the appropriate program and funding vehicles to further the transformation and transition of concepts to capabilities.

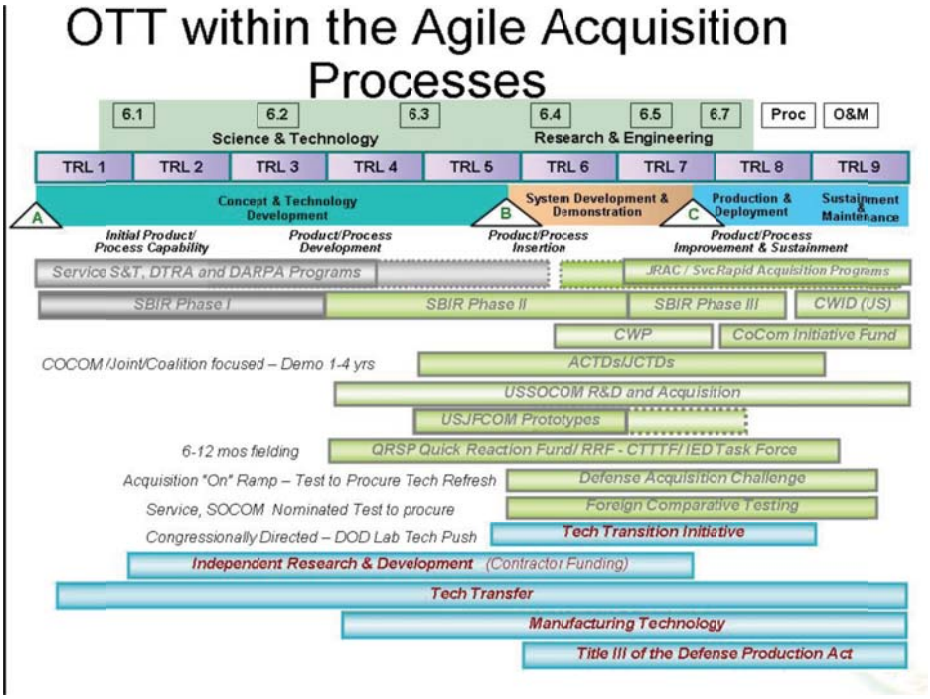


Figure 9 Transition: Navigating the Agile Acquisition Process[4]

4.4. Integrating Technology Transfer and Transition with Agile Acquisition

4.4.1 Integrated Evolutionary Agile Acquisition

Figure 9.0 depicts and overlays the Agile Evolutionary Acquisition Process including:

- The S&T TRL technology development process spanning
  - TRL 1-5 of concept and technology development consisting of Initial Product/Process Capability between JCIDS Milestones A and B (the ideal product/ process insertion point,
  - and the Research and Engineering process through TRL 5-7 System Development and Demonstration to Milestone C
  - with transition to TRL 8 Production and Deployment
  - and TRL 9 Sustainment and Maintenance as part of Product/Process Improvement and Sustainment with Service level
- Use of SIBR for funding
  - S&T and SIBR Phase I Feasibility Analysis to TRL 4,
  - SIBR Phase II spanning TRL 4-7 Technology Transfer,
  - and Phase III SIBR and Service Rapid Acquisition Programs spanning transition TRL 7-9

[4] Source Technology Transfer (T2) at USTRANSCOM David Cox Intellectual Property Counsel

- COCOM Joint Coalition warfare military
  - use evaluations and focused demonstrations by the user community in a military relevant environment (and former USFCOM rapid prototyping)
  - and 6-12 months rapid fielding followed by more detailed DOTMLPF evaluations at the service component level
- Technology Transition Initiative (TTI) DoD laboratory tech push spinoff (CRADAs)

Classic Technology Transfer (IRD, Manufacturing Technology (MANTECH) and Title III Defense Production Act (industrial base).

4.4.2 Merging Processes Integrating Technology Transfer and Transition with Agile Acquisition

Following the JCIDS and evolutionary acquisition process suggests a two tier approach to engage system commands. One is to engage them early on through TTA's in the S&T process. The other is engage them in collaborative military use evaluation. This approach is necessary:

- to conduct operational test and evaluation
- to engage program managers of POR operation and maintenance purposes and to administer life cycle program to budget transitioned capabilities in FYDP and POM;
- and for management and sustainment of fielded capabilities as life cycle executive agents

4.4.3 Military Use Evaluation Opportunities

Some of the available mechanisms for military use evaluation of JCIDS initiated (e.g. GTMS or JDDSP) or external (other CCDoTT concepts and technology) technology development for technology insertion at JCIDS Milestone B or TRL Level 6 include:

- Sea trial insertion in deployed units e.g. Amphibious Readiness Groups for Sea Basing related concepts and technology
- USMC warfighting laboratory to assess potential new technologies to transform warfighting
- Doctrine and training evaluation by MCCDC or MAGTF Center of Excellence le Quantico VA
- Evaluation of software system by SPAWAR or MARFORSYSCOM
- Participation in planning execution and analysis of operational experiments (NPS JIFX Operation Relief HADR HERO TOC thread SM 21 Inc). joint exercises (e.g. PACOM Talisman Saber), technology demonstrations and war games (JLASS Naval War College for APS JDDSP) of high interest to ONR
- Participation in warfare innovation development teams at Naval warfare dev command Newport RI
- Research and engineering by the PEO program manager with research and engineering (6-4) money to customize the product or process
- Fleet assessment test evaluation (Fleet FOPrce Command or NAVFAC NECC)
- Planning and coordination of development and op testing for CNO code N 912 Arlington VA.
- Participation in planning execution and analysis of op test and eval by Commander Operational Test and Evaluation Force NORVA

- Evaluation by NAVSEA Naval Surface Warfare Center Expeditionary Warfare Panama City FL

4.5. Technology Development Strategy Applied to CCDoTT SM 21 Portfolio

The common theme of CCDoTT (unstated) SM21 (stated) end state outcome is Agile Enterprise. The agile enterprise is characterized by common traits:

- Mobile (fast moving)
- Global
- Forward leaning (future gain strategy oriented)
- Dynamic capable of rapid flexible response to unexpected challenges, events, and opportunities
- Built upon policies and processes that facilitate speed (to market or AOR) and adaptive change (disruptive transformational)
- Seeking continuous strategic competitive advantage
- Diffused authority,
- Virtual flat force matrix organizational structure,
- Collaborative,
- Networked (interoperable)
- Robust and resilient to disruption
- Rapid information flows
- Knowledge based institutional learning management system and repository for reuse
- Trust based relationships within social network

Viewed through this wider prism or aperture, each of the concept and technology emerging dual use capability portfolios is designed to facilitate the evolution of the agile enterprise: defense, civil, commercial, industrial, or academic All are cross domain intended to help build multi-disciplinary communities of interest and practice around.

4.6. Identifying and Validating Transition Opportunities

In seeking to provide capabilities to the US Navy and Marine Corps, in the most complex metaphor of commercial global supply chain management, the Navy and USMC seek to rapidly deploy a fixed global supply chain management infrastructure aboard ships to rapidly support Marine expeditionary operations in diverse austere locations in response to geo-political crisis. The Army, in transitioning from a fixed force in a Cold War alignment to a CONUS based expeditionary force, brings a demand to support heavier, more robust forces utilizing USMC expeditionary concepts. This has provided a unique crucible for developing technology concepts to support these complex military demands, which have great potential for commercial exploitation.

CCDoTT and SM 21 concepts, technologies and capabilities were developed as an integrated solution set in response to these identified Science and Technology (S&T) and operational gaps and seams augmented by formal unfunded requirements (UFR's), integrated project lists (IPL's) and science and technology project list (STIPL), COCOM priorities.

The integrated solution set of capabilities encompass the common elements of enterprise agility, emphasizing need for efficiency over previous desires for effectiveness at any cost. Solution sets were assumed to need to meet the need to be effective, but that solution sets must also be effective efficiently, and they must be portable across domains:

- joint force deployment;
- transportation;
- emergency response (EM);
- freight movement; and
- provide for collaboration and data sharing across modes, and across a network centric real time information backbone.

The solution sets included for transformation and transition represent ONR interest in:

- Expeditionary Warfare and Sea basing Future Naval Capabilities through CCDoTT SM 21 Modeling, simulation, and predictive analysis necessary to display and analyze alternative courses of action in advance, rehearsal (as in the case of 1 MEF) equally translatable into Adaptive Planning and execution systems by merging logistics and operational planning data
    - TIP Tool Transportation Capacity Demand Scheduling and Priority HADR necessary to coordinate eh planning and use of naval and commercial strategic lift assets particular with respect to HADR missions for supply and evacuation
    - Collaborative Visualization Tool necessary to visualize maritime domain awareness and help collaboratively navigate the complex network centric operational environment of the littoral zones around the globe
    - Sea Base Advanced Base MAGTFOPES SCASN necessary to move from deliberate stove-piped planning to adaptive planning with the ability to determine feasibility and optimization of plans, and if necessary develop alternate courses of action if conditions on the ground or combatant commander's intent changes
    - PDR2M Transportation Disruption Planning necessary to improve resiliency and recovery HADR to develop strategies to rapidly recover from major global supply chain disruptions, and inject resiliency into those processes and infrastructure
    - Global supply chain network modeling SCASN to run scenarios to determine feasibility and optimization of alternate plans, routes, schedules, assets, and dynamically re-plan as an agile enterprise
- Transportation (Physical Movement)/Distribution Logistics
    - Global Distribution Management System (GDMS) Connect the Connectors necessary to transform the Global Transportation Network into a global distribution network from a demand perspective of the user warfighter to enable sea basing and distributed joint task forces controlling dispersed forces with precision supply
    - Real time location system (RTLS)/Transportation measurement system (TrAMS) necessary to track and manage assets (containers, equipment and supplies) in an austere environment where RFID tags have limited utility.
    - Joint force deployment ground equipment web services necessary to transform the joint deployment cycle from deployment, through sustainment, reset and retrograde to unit readiness for re-deployment
    - Construction heavy equipment operated by Naval Expeditionary Combat Command SEABEES (NECC) like large global engineering and construction firms require RTLS

and Transportation measurement of outside equipment with special lift requirements
    - Emergency management /first responders require opportunistic lift in response to no notice HADR events in the form of rapidly deployable response capability package requirements and expedited lift requirements
- Business Process. Re-engineering / Doctrine, Education and Training
    - E2E Transportation and Distribution logistics GDMS Connect connectors support event execution performance monitoring to modernize expeditionary logistics doctrine, capabilities, and training to match agile force deployment requirements
    - GDMS eventual replacement of Distribution Environment Support System (DESS) to provide advanced joint logistics training to generic logisticians in the form of an E2E network centric global joint logistics education and training replacement environment for current operations

Joint Force Deployment Expeditionary Warfare Deployment for HADR missions require an APS JDDSP agile enterprise capability, and related doctrinal education and training to integrate a "whole of government" and community centric approaches to HADR including DoD in a support role, interagency, coalition-multinational, and non-government organizations.

5. Transition Path Development

This transition plan intends to support the iterative nature of development, from identifying concepts to study through validation as user need capability. To leverage the natural relationship CCDoTT / SM 21 can exploit:

- an agent rooted in an academic world,
- developer of commercial freight management, transportation infrastructure, and global supply chain management capabilities, and
- its studies of concepts to support logistical support to expeditionary forces requiring agile E2E management of logistical processes and facilities.

CCDoTT is in the unique position to work from expressed needs articulated in Figure10, below, describing the life cycle of force deployment by military forces. Figure 10 expresses the model to project, sustain, regenerate, and redeploy forces from a central base to forward locations (and back) utilizing a diverse set of facilities, rooted in several different socio/political cultures, representing various levels of sophistication and physical development, to support an executing force in a timely manner.

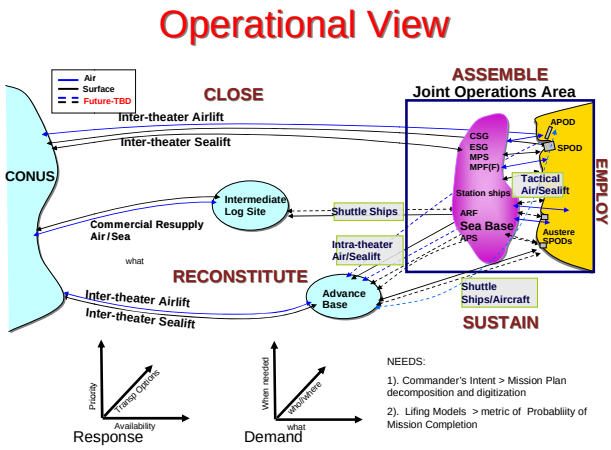


Figure 10 Joint Force Deployment Life Cycle

5.1. SM 21 Inc. as a Bridging Agent

In looking for ways to support the E2E cycles represented above, leads to envisioning and developing a commercial distribution logistics application, where SM 21, served as surrogate fourth party global logistics service provider for Dole Foods (Figure 10).

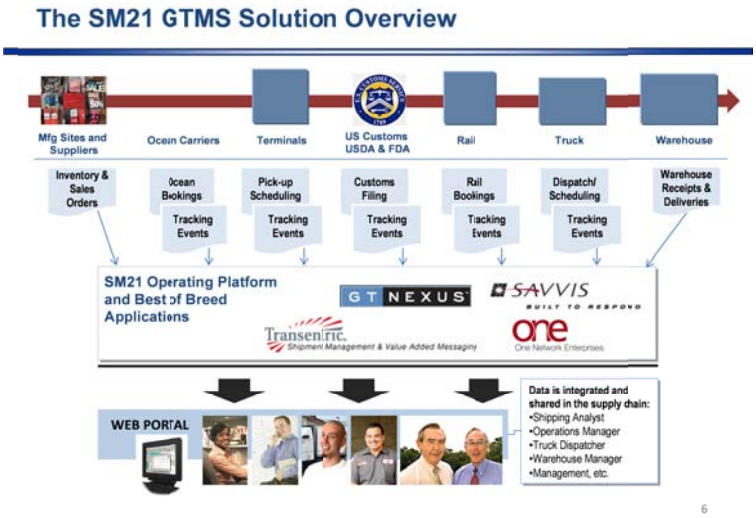


Figure 11 Dole Foods Combined E2E Transportation and Inventory Order Cycle Management

The GTMS program forged partnerships between SM21, commercial partners, and commercial vendors. That partnership, on a limited scale, proved that transportation management systems and warehouse management systems can be fused over a marine terminal ocean – rail – truck transportation network. That fusion can track by SKU (line item) pieces, which provides order cycle managers actionable information that is provided by the ability to track items E2E, particularly in providing visibility at the seams, where items change transport modes or transport container types.

Leveraging the ability to work with a commercial network, CCDoTT/SM21 was able to prove concepts vital to providing agile logistical support in a DoD setting (E2E visibility to line item level

from entry into the distribution pipeline to exit at issue to consumer) while providing a commercially viable service to commercial clients. GTMS proved the viability of a fused transportation management/warehouse management model over a common portal allowing interaction amongst a diverse set of stakeholders, each being able to access the knowledge providing priorities and instructions from order cycle managers to execute their functions in a timely manner. GTMS allowed order cycle managers the visibility to make critical decisions that provide better instructions to stakeholder partners in the distribution pipeline.

For development purposes the GTMS project used Dole Foods as a global supply network surrogate for DoD. SM 21 conducted a high fidelity E2E global supply network business process lean six sigma re-engineering analysis of the Dole supply network. This was followed by the fusion of key elements of a combined transportation-warehouse management system hybrid system with marine terminal ocean-rail-truck transportation business process elements for output and display purposes, and an order cycle inventory fulfillment process through virtual integration using the Global Transportation Management System (GTMS) (see Figure 11).

Lessons learned from the GTMS project lead directly to the development of specific applications that support ONR identified projects, such as:

- Integrating TET (military) and TIP (VISA commercial) through appropriate Navy programs as single global air and sealift match with demand requirements.
- Further refinements based on the integration of the Transportation Exploitation Tool (TET) and Transportation Internet Portal (TIP),
- Identifying natural synergies to continue to develop fusion of warehouse/transportation managements systems to produce both militarily useful capabilities as well as commercially viable applications / products / services.

5.2. Technology Transfer – Collaborative Planning

This technology transfer and proposed collaborative transition plan builds upon a previous CCDoTT Technology and Concept Strategic Planning White Paper that:

- Incorporated an overall review and capabilities-based self assessment under relevant OSD, Navy-USMC, and USTRANSCOM capability gaps and investment priorities of the combined CCDoTT SM 21 concepts and technology portfolio for suitability for technology transfer and transition
- Focused upon notional transition pathways for ONR designated candidates of interest for potential Science and Technology (S&T) investment selected in terms of Technology Readiness Level (TRL),
- Elicited ONT code 30 and Office of Research Technology Assessment (ORTA) collaboration and support in that effort and
- Made appropriations for ONR S&T investment for selected technologies including capturing the lessons learned in a knowledge management system as the basis for forming a community of interest and practice among DoD and commercial stakeholders around further development of these concepts and capabilities
- Mapped concepts, processes, technologies products and services to capabilities filling gaps and seams to various military and commercial users

5.3. Identifying Program Insertion Points

In viewing capabilities development as an agile process, combing the Acquisition and S & T development process, demystifies the broader concept of technology transfer in the defense and commercial sectors from formal transition to defense system acquisition.

Building upon the Technology Readiness Level paradigm of concept and technology development, it first deconstructs the JCIDS evolutionary acquisition in order to highlight appropriate insertion points in the process. It describes available technology transfer tools such as SIBR/STTR and CRADA to facilitate dual use development into capabilities.

It describes available Science and Technology service component level, COCOM and OSD programs directed at rapid transition and fielding capabilities to the warfighter from TRL 4 level capabilities. Alternatively, it describes available venues and opportunities to conduct joint experimentation, demonstration, and evaluation in order to obtain military user requirements feedback for further development.

Agile acquisition processes recognize the need for integration at the critical TRL 7. This is where service component system command and program executive office integration opportunities exist to complete the transition process through TRL 8-9 levels. This is necessary for the incorporation of the product or service capability in the Program Operating Memorandum (POM) and the Five Year Defense Plan (FYDP), commensurate with commitment of life cycle operations and maintenance funds, from the program of record to the fielded capability.

Available rapid fielding vehicles are explored. These vehicles provide military use evaluation and requirements integration, while combining interactions with S&T, Acquisition and user communities to ultimately identify acquisition sponsors needed to bridge the gap between S&T and acquisition investment.

Agile transition seeks to identify not only formal pathways for development, but alternate pathways to transition for each concept and technology through formal alignment of S&T to acquisition process, alternate dual use spin on and off co-development strategies, and commercial strategic partnerships.

5.4. Emerging Trends in Capability Needs

The body of CCDoTT SM 21 knowledge, skills and experience in dual use collaborative web based smart capabilities, and related live-virtual-constructive education and training competency aligns and meshes perfectly with acknowledged converging dominant megatrends in defense, civil, and commercial domains in the 21st century.

With reduced future defense budgets the new norm, twin megatrends are on the ascendant. One is the acknowledged need for greater partnership, collaboration and capacity-capability building among allies. The other closely aligned trend is the official mission recognition and growing emergence of Defense Assistance to Civil Authorities and Humanitarian Assistance Disaster Relief (HADR) as a geopolitical strategic imperative also reflected in the five year defense plan and budget FYDP in a renewed geopolitical shift back to the Pacific Rim from the SW Asia AOR.

5.4.1 Humanitarian Assistance Disaster Relief

HADR requires a whole of government approach involving interagency, and international partnership capacity building. It also requires maximum data sharing and collaboration, including non-governmental organizations (NGO's), high fidelity real time dynamic situation awareness and understanding across multiple domains: Defense, civil, commercial and NGOs.

The hidden readiness benefit of this mission is twofold. First it requires agility –as a no notice event requiring adaptive planning. Secondly, it uniquely combines training and exercise skills qualification and competency with actual operational experience -- like super on the job training -- and justifies ship and aircraft time and fuel consumption with real results measured in metrics- a twofer.

5.4.2 Predictive Analytics

The most cost effective pre-event training emphasizes a combination of visualization and along with virtual and experiential learning experiences –immersive training and adaptive planning and dynamic re-planning capability. This overlaps with recent Aberdeen surveys of business executives that consistently rank visualization and business intelligence as a" Number priority" in strategic competiveness. The other component of this equation is the capacity to manipulate, display, and convert Big Data into predictive analytics Cloud based service oriented architecture coupled with integrated mobile applications are key enablers of this capability.

5.4.3 Convergence

The convergence of all these megatrends is in emergency management and business continuity measured in predictive analytics and risk management, resilience, and rapid recovery from natural and manmade events –the black swans and butterfly events of chaos theory. The ability to engage in adaptive dynamic planning, and execution monitoring develop multivariate scenarios, exploit geospatial visualization and analysis, train in virtual synthetic environments across boundaries of time, distance, and cultures is the key to future survival of interdependent nation states, regional alliances, multinational corporations, and global markets.

6. CCDoTT SM 21 Transition Plan Conclusion

This CCDoTT SM 21 transition plan provides both a framework and road map for Office of Naval Research (ONR) evaluation and further science and technology (S&T) investment across a range of concepts and technologies that individually and collectively better enable the efficiency and effectiveness of naval expeditionary warfare and logistics in the 21st century as a basis for both further internal and external support through evolutionary acquisition.

It provides a navigation plot solution to bridging the doldrums or reputed "valley of death" between science and technology and acquisition investment and capability fielding by:

- interweaving important evolutionary acquisition process with necessary technology evolution processes to reach maturation from Technology Readiness Levels 1-4,
- providing early and continuous opportunity for military user evaluators; from the service component, and Combatant Commander (COCOM) levels; during TRL levels 4-6, and
- engaging acquisition program sponsors before the critical TRL level 7 juncture for planning the transition through TRL 7-9, lining up the necessary acquisition sponsor investment required to

convert a proven technology into a sustainable capability. This requires indentifying and using operation and maintenance funds; as well as capturing future cost savings and avoidance at the service component program executive office (PEO) level.

SM 21 Inc understands the acquisition process and the Science and Technology Development process, and can thus bring an agile approach to Technology Transformation/Transition, by understanding the intersections between the two processes, seeking early engagement of acquisition program sponsors, leveraging rapid fielding programs when appropriate, and an understanding that the next step may not always follow a linear path implied by stove piped approaches to acquisition or S & T Development.

These selected concepts and capabilities are all representative candidates for further:

- direct S&T investment as standalone or as part of an integrated information technology architecture through existing Future Naval Capability pillars of Expeditionary Warfare and Sea Basing,
- indirect institutional support through SBIR/STTR and CRADAs (and later commercial acquisition), or
- rapid transition combining multiple sources of S&T and acquisition funding as standalone or in combination under a unified mission scenario such as a Sea Based Humanitarian Assistance and Disaster Response (HADR) as part of a Joint Capabilities Technology Development (JCTD) including multiple users such as USMC MARFORPAC, Fleet Amphibious Forces, Naval Expeditionary Combat Command (NECC), and Pacific Area Command (PACOM) as Combatant Commander.

The latter approach from a service component perspective combines desk top and field exercises and individual, unit and integrated training qualification with operational mission experience improving deployment readiness while introducing and mastering new concepts and capabilities for US and coalition-multinational forces at the same time.

The JCTD model represents the best available method yet devised for:

- rapidly incubating and maturing a promising capability, integrating all three critical players (S&T sponsor, military user community evaluation and requirements input, and acquisition sponsor) initially at the service component level through fielding a capability across multiple user through Naval Logistics Integration (NLI) and FORCEnet, and
- with COCOM and OSD involvement potentially extending service component experience to a joint capability to all COCOMS, interagency (through Presidential Policy Directive 8 to the "whole of government", coalition-multinational (e.g. 48 countries participating in biennial Talisman Saber joint exercise), and even non-governmental organizations (NGO's).

Regardless, at the same time as part of its statutory mission to disseminate ONR sponsored technology, ONR's Office of Research and Technology Applications (ORTA) has a unique opportunity to introduce these concepts and capabilities to a wider audience within the Navy-USMC, and Combatant Commanders, especially US Transportation Command (USTRANSCOM) and the Defense Logistics Agency (DLA) for further awareness, collaborative development from a wider user perspective through a Knowledge Management System (KMS) repository of knowledge and lessons learned and website, briefings and tender of Technology Transfer Agreements (Intent), and intra-service workshops at an appropriate venue.

7. List of Symbols, Abbreviations, and Acronyms

Acronym	Meaning
3PL	Third Party Logistics
4PL	Fourth Party Logistics
ACAT	Acquisition Category
ACTD	Advanced Concept Technology Demonstration
AIT	Automatic Identification Technology
AMC	Air Mobility Command
AoA	Analysis of Alternatives
AOR	Area of Responsibility
APS	Agile Port System
ARG	Amphibious Ready Groups
AT 21	Advanced Technology for the 21st Century
BA	Budget Activity
BAA	Broad Agency Announcements
BRAC	Base Realignment and Closing
C2	Command and Control
CBAT	Capability Based Assessment Team
CCDoTT	Center for the Commercial Deployment of Transportation Technologies
CDD	Concept Development Document
CENTCOM	Central Command
CNO	Chief of Naval Operations
COA	Courses of Action
COCOM	Combatant Command
CONEX	Container Express
CONOPS	Concept of Operations
CONUS	Continental United States
COTS	Commercial Off-the-Shelf
CRADA	Commercial Research and Development Agreements
CRAF	Civil Reserve Air Fleet
CRISIS	Crisis Response and Integrated Simulation Science Laboratory
CSULB	California State University Long Beach
DESS	Distribution Environment Support System
DHS	Department of Homeland Security
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DOD	Department of Defense
DODAAC	Department of Defense Activity Address Code
DOT	Department of Transportation
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel

Acronym	Meaning
	and Facilities
DPO	Distribution Process Owner
DTCI	Defense Transportation Coordination Initiative
DTS	Defense Transportation System
E2E	End-to-end
EDI	Electronic Data Interchange
EM	Emergency Management
ERP	Enterprise Resource Planning
ESG	Expeditionary Support Group
ESRI	Environmental Systems Research Institute
ETO	Expeditionary Theater Opening
EX	Exercise
FACTS	Fleet Air Clearance Transportation System
FEMA	Federal Emergency Management Agency
FFRDC	Federally Funded Research & Development Center
FISMA	Federal Information Security Management Act
FLOW	Focused Logistics Wargam
FMCSA	Federal Motor Carrier Safety Administration
FNC	Future Naval Capability
FORCENET	US Navy enterprise network
FSS	Fast Sealift Ship
FY	Fiscal Year
FYDP	Five Year Defense Plan
GAO	Government Accounting Office
GATES	Global Air Transportation Execution System
GCCS	Global Command and Control System
GCSS MC	Global Command Support System Marine Corps
GEOCOP	Geospatial Common Operational Picture
GOTS	Government Off-the-Shelf
GPS	Global Positioning System
GTMS	Global Transportation Management System
GTN	Global Transportation Network
HADR	Humanitarian Assistance and Disaster Relief
HERO	Humanitarian Emergency Response Organization Center
HERO TOC	Humanitarian Emergency Response Organization Tactical Operations Center
HSS	High Speed Sealift
IA	Information Assurance
ICD	Initial Capabilities Document
ICODES	Integrated Computerized Deployment System

Acronym	Meaning
IDE	Integrated Data Environment
IOC	Initial Operational Capability
IP	Internet Protocol
iPaaS	integration Platform as a Service
IPL	Integrated Priority List
IPT	Integrated Project Teams
IT	Information Technology
ITV	In Transit Visibility
JCA	Joint Capability Areas
JCIDS	Joint Capabilities Integrated Development System
JCTD	Joint Capability Technology Demonstration
JDAC	Joint Deployment Analysis Center
JDDE	Joint Deployment Distribution Enterprise
JDDOC	Joint Deployment Distribution Operations Center
JDDSP	Joint Deployment Distribution Support Platform
JDTC	Joint Deployment Training Center
JFCOM	Joint Forces Command
JIFX	Joint Interagency Field Experiment
JLASS	Joint Land, Aerospace, and Sea Simulation
JMTK	Joint Mapping Toolkit
JOPES	Joint Operations Planning and Execution System
JPAG	Joint Planning Advisory Group
JROC	Joint Requirements Oversight Council
JTCD	Joint Capabilities Technology Development
JTPFO	Joint Task Force Port Opening
KMS	Knowledge Management System
LAT LON	Latitude / Longitude
LIA	Logistics Integration Agency
LMI	Government Consulting Firm
LogC2	Logistics Command and Control
LogCOP	Logistics Common Operating Picture
LogIT	Logistics Information Technology
LRA	Local Reuse Authority
LVC-G	Live Virtual Constructive and Gaming
MAGTF	Marine Air-Ground Task Force
MAGTFOPES	Marine Air-Ground Task Force Operations Planning and Execution System
MANET	Mobile Adaptive Sensor Networks
MARAD	Maritime Administration
MARCORSYSCOM	Marine Corps Systems Command

Acronym	Meaning
MARFORPAC	Marine Corps Forces Pacific
MARLOGCOM	Marine Logistics Command
MARVIEW	Maritime Common Operating Picture Application
MayaVIZ	Early Government Maritime Shipping Visibility Application
MCCDC	Marine Corps Combat Development Center
MCO	Major Combat Operations
MCWL	Marine Corps Warfighting Laboratory
MDA	Marine Domain Awareness
MDSS	Marine Corps Distribution Support System
MEB	Marine Expeditionary Brigade
MEF	Marie Expeditionary Force
MEU	Military Use Evaluation
MITRE	not-for-profit national technology resource
MMTM	Multi-modal Terminal Model
MOA	Memorandum of Agreement
MOC	UK Ministry of Defense
MPFF	Marine Pre-Positioning Force Future
MSA	Modeling, Simulation, and Analysis
MSC	Military Sealift Command
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NECC	Naval Expeditionary Combat Command
NGO	Non-Governmental Organization
NIE	Network Integrated Evaluation
NIMS	National Incident Management System
NIPERNET	Non-Classified Internet Protocol Router Network
NLI	Naval Logistics Integration
NOLSC	Naval Operational Logistics Support Center
NORTHHCOM	Northern Command
NPS	Naval Post Graduate School
NSA	National Security Agency
NTC	National Training Center
OCONUS	Outside the Continental United States
OEF	Operation Enduring Freedom
OES	Office of Emergency Services
OIF	Operation Iraqi Freedom
OMFTS	Operational Maneuver from the Sea
ONR	Office of Naval Research

Acronym	Meaning
ONRL	Oak Ridge National Laboratory
OPNAV	Office of Chief of Naval Operations Logistics Programs and Corporate Operations
OPNAV 41	Office of Chief of Naval Operations
ORTA	Office of Research and Technology Applications
OSD	Office of the Secretary of Defense
OTA	Other Transactions Authority
OTR	Over the Road
PAC FLT	Pacific Fleet
PACOM	Pacific Command
PDR2M	Port Disruption Resilience and Recovery Model
PEO	Program Executive Office
PM	Project Manager
PM J-AIT	Project Manager Joint Automated Information Technology
PMP	Project Management Plan
POM	Program Objective Memorandum
POR	Program of Record
PPP	Power Projection Platform
PSH&T	Packaging, Handling, Shipping and Transportation
R&D	Research and Development
RAMP	Remote Access Movements Portal
RDT&E	Research, Development, Test, and Evaluation
RFID	Radio Frequency Identification
RTLS	Real Time Location System
RTT	Rapid Technology Transfer
S&T	Science and Technology
S&T RDT&E	Science & Technology Research Development Testing & Evaluation
SACLANT	Supreme Allied Commander Atlantic
SBIR	Small Business Innovation Research
SCASN	Southern California Area Supply Network
SDDC	Surface Deployment and Distribution Command
SEASN	South East Area Supply Network
SECNAV	Secretary of the Navy
SEI	Software Engineering Institute
SEM	Semantically Enabled
SEM SOA	Semantically Enabled Service Oriented Common Architecture
SIPRNet	Secret Internet Protocol Router Network
SKU	Stock Keeping Unit
SM21	Strategic Mobility 21
SM21 Inc	Strategic Mobility 21 Inc
SMDC	Space and Missile Defense Command

Acronym	Meaning
SOA	Service-Oriented Architecture
SPAWAR	Space & Naval Warfare Systems Command
SPOE	Seaport of Embarkation
SRL	Sense and Respond Logistics
SSP	Strategic Systems Program
STIPL	Science and Technology Integrated Priority List
STE	Seminal Transition Event
STOM	Ship to Objective Maneuver
STRACNET	Strategic Railroad Network
STRAHNET	Strategic Highway Network
STRI	Simulation Training and Instrumentation
STTR	Small Business Technology Transfer
SYSCOM	Systems Command
T-AKE	Dry Cargo and Ammunition Ships
TAV	Total Asset Visibility
TC AIMS II	Transportation Coordinators Automatic Information for Movement System II.
TDA	Tactical Decision Aids
TEA	Transportation Engineering Agency
TECOM	Training and Education Command
TET	Transportation Exploitation Tool
TIA	Technology Investment Area
TIP	Transportation Internet Portal
TMS	Transportation Management System
TOC	Tactical Operations Center
TPFDD	Time Phased Force Deployment Data
TPMM	Technology Program Management Model
TRA	Technology Readiness Assessment
TrAMS	Transportation Measurement System
TransVIZ	Early Government Maritime Shipping Visibility Application
TRL	Technology Readiness Level
TTA	Technology Transfer Agreement
TTI	Technology Transfer Initiative
UFR	Unfunded Request
USAID	US Agency for International Development
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corp
USN	United States Transportation Command
USTRANSCOM	United States Navy

Acronym	Meaning
VISA	Voluntary Intermodal Sealift Agreement
VPN	Virtual Private Network
VVA	Verification, Validation and Accreditation
WMS	Warehouse Management Systems

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APPENDIX A – Agile Port System Transition Support Quad Charts

Agile Port System Transition Support Quad Charts

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FY 10 Project 10-5, PE 6.10.2
Subcontract No: S07-386410EMS
Task 5.3 – APS Transition Plan Development
Deliverable 5.3 Appendix B

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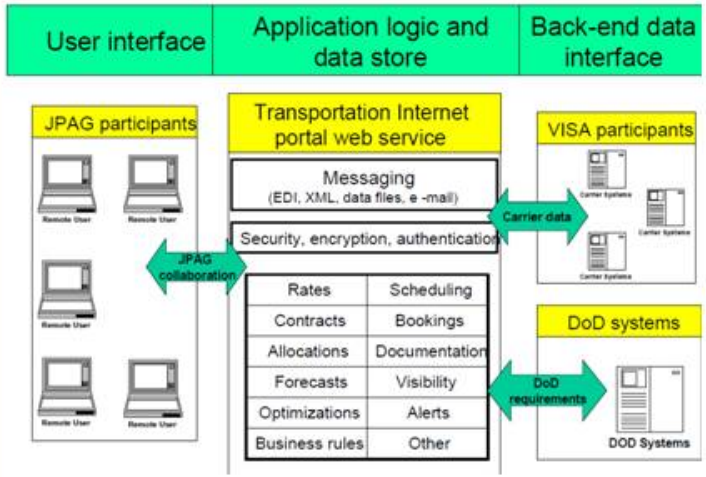
Transportation Internet Portal (TIP)

OPERATIONAL REQUIREMENT

Description: TIP is a prototype web portal in the form of a virtual private network (VPN) hosted by a third party logistics services provider. TIP provides a functional capability to match available commercial sealift capacity to transportation demand for response on short or no notice contingency operations.
Technology Category: E2E transportation in transit visibility ,Logistics command and control (LOG C2) Transportation/Distribution Management
Current status: TIP has been demonstrated to the Joint Planning and Analysis Group (JPAG) including the Joint staff, US Transportation Command (USTRANSCOM), and the Maritime Administration (MARAD) US Department of Transportation
S&T Sponsor/Sponsor(s): ONR Code 30, NavSup /FACTS TET sponsor
Acquisition Customers –NAVSUP, PEO FACTS, MSC, MARAD (USDOT), USTRANSCOM Defense Transportation Coordination Initiative OCONUS air and sea lift integration, Joint Special Operations Command (JSOC)
Mission enabler: Humanitarian Assistance Disaster Relief, Major Combat Operations, Sustainment Logistics , SeaBasing



GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: in In-Transit-Visibility (ITV), Distribution Systems Interoperability, Distribution Planning and Forecasting, Process Management, Distribution Performance Metrics, Container Management, Container Management, Coalition/Multi-National Interagency Capabilities

Key enabler: TIP provides a single sign on autonomic tool to display and match opportunistic lift demand with available military and commercial air and sea dynamic lift capacity. When combined with integration by way of the US Naval Supply Systems Command (NAVSUP) and Fleet Air Clearance Transportation System (FACTS) Program Executive Office supported Transportation Exploitation Tool (TET), TIP incorporates US fleet and naval air lift capacity.

Customer Pain Point(s): Lack of interoperability in HADR and sea/advanced base, lack of visibility in joint sea base throughput flow

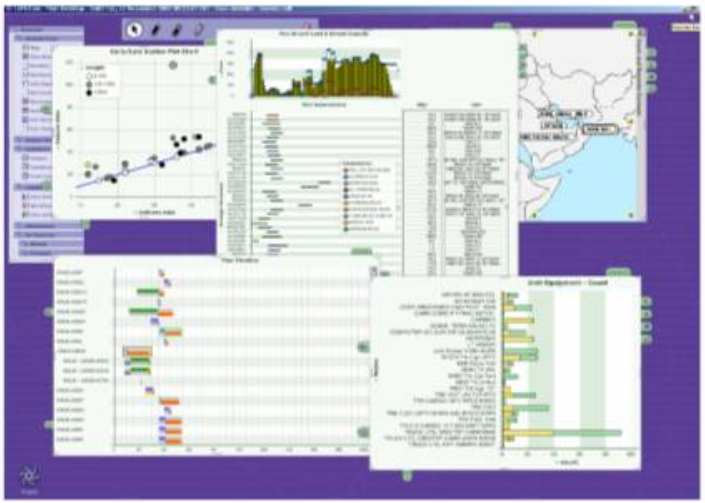
Transition Pathway

Military/Commercial/Joint Utility: Dual use COTS
Required : S&T Investment and Transition Sponsor
Risk: Technical, Schedule, Cost and Risk: All Low
Requirements for Transition: Sponsorship, Financial Investment, MUE
Technology development: Conversion to cloud based web service under Semantic Service oriented Architecture, Integration with NSA FISMA cloud framework certified information architecture Ozone Widget Framework
Business Case for S&T Investment:
•projected transportation cost savings and administrative manual manpower cost avoidance
•speed to market of transported assets, reflected in improved additional response time and reductions of delay in Required Delivery Date of units and equipment
•more efficient allocation of strategic lift capacity, reducing length and cost of operational deployment .
Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR

Agile Port Node of Collaborative Visualization Software (GEOViz) TransViz

OPERATIONAL REQUIREMENT

Description: Successor to CCDoTT MayaViz/TRANSCOM TransVIZ proven in Operation Iraqi Freedom joint force deployment planning. GEOVIZ updates proven software to reflect advances in geospatial visualization to permit dynamic analysis of alternative courses of action as well as integration of data from multiple sources (i.e. sensors, social media, current deployment planning systems, etc.)
Technology Category: Collaborative Visualization/Decision Support
Current status: Fielded USTRANSCOM system – needs updating to leverage current technology advances
S&T Sponsor/Sponsor: : ONR, 1-MEF, MAGTF Operations Planning and Execution System with Virtual Agility and SCASN
Acquisition Customers: 1-MEF, Marine Air-Ground Task Force Operations Planning and Execution System (MAGTFOPES), USTRANSCOM for CoCOMS upgrade of TransViz



GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: E2E Visibility, Distribution System Interoperability, Distribution Performance Metrics Strategy

Key Enabler: Modernization of TransVIZ to incorporate current geospatial visualization capabilities, mobile adaptive networks sensors, social media integration, and converted to distributed SEM SOA architecture to support expeditionary logistics operations through sea basing (USN USMC) and joint task force port opening (USA) in support of dispersed operations within AOR

Customer Pain Point(s): GEOVIZ is prime candidate to augment or replace the current primary visualization tool for all Ship to Objective Maneuver (STOM) mission planning and execution in the form of the two dimensional Joint Mapping Toolkit (JMTK), which is the already technologically outdated It is now technically obsolete and not used by COCOMS

Required Pathway to Transition

Military/Commercial/Joint Utility: Dual e COTS
Required: S&T Investment and Transition Sponsor
Risk: Technical, Schedule, Cost -- Medium Business -- Low
Requirements for Transition: Sponsorship, Financial Investment
Technology development: Fielded TransViz lacks SEM SOA cloud based geospatial agnostic platform. Lacks distributed asynchronous planning framework and capability to rapidly integrate geospatial, sensor e.g. UAV, MANET, and social media data for display and decision support
Business case for S&T investment: The principal value proposition of GEOVIZ benefits may be expressed in improved readiness reflected in improved ability to execute core capabilities in terms of expeditionary warfare measured in speed in decision making and agile response to changing conditions in the battlespace.
Productivity/Cost Savings and Avoidance: Millions of dollars in time required for concurrent/ redundant planning, and delayed response time to no notice events such as HADR
Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR

Seabase/Advance Base Concepts Modeling and Simulation

OPERATIONAL REQUIREMENT

Description: Sea Base Advance Base Expeditionary Logistics is a dynamic federated suite of regional supply node arc network (Southern California Agile Supply Network -- SCASN), and Multi-modal Terminal Model (MMTM) operating System for use in COA feasibility and optimization planning, mission rehearsal, alternative course of action analysis, and dynamic re-planning based on real time changed conditions and commander's intent in the AOR for a distributed sea base joint task force planning group
Technology Category: Sea Basing
Current status: Seabase Advanced Base Expeditionary Logistics Concepts Modeling and Simulation, validated node arc federated suite of integrated discrete event simulation models (Regional Agile Supply Node Arc Network and high fidelity single node Multimodal Terminal Model). Together they form an end to end (E2E) sea base network.
S&T Sponsor/Sponsor: : ONR Sea Base FNC
Acquisition Customers: 1-MEF, USTRANSCOM JDPAC, COCOMS integrated with OHASIS model

GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: : E2E Visibility, Distribution System Interoperability (and data fusion), Distribution System Planning and Forecasting, Process Management and Business Rules, Distribution Performance Metrics Strategy, Coalition/Multinational Interagency Capabilities, and Supply Chain Simulation Tools.

Key Enabler: Tools to create E2E logistics solution that is agile, scalable, and focused –meaning the right stuff at the right time and place in the right quantity from the right source depending upon the type of mission and level of effort, in support of no notice expeditionary operations, particularly in evaluating Seabasing potential.

Customer Pain Point(s): Inadequate and inflexible to examine impacts of packaging for expeditionary and sea based logistics; and in the commercial world, visualization of end-to-end commercial product distribution

Transition Pathway

Military/Commercial/Joint Utility: Dual use smart network node COTS Modeling and simulation

Required: S&T Investment and Transition Sponsor

Risk: Technical, Schedule, Cost and Bsuiness: All Low

Requirements for Transition: Sponsorship, Financial Investment

Technology development: Federated MSA suite is critical to POC Capability.

Business case for S&T investment The principal benefits may be expressed in improved readiness reflected in improved ability to execute the core capabilities sea basing and expeditionary warfare in the urban littoral across full spectrum of operations, limitation/reduction of unacceptable consequences –such as-- mission failure, and indirect benefits measured in speed in decision making and agile response to changing conditions in the battlespace

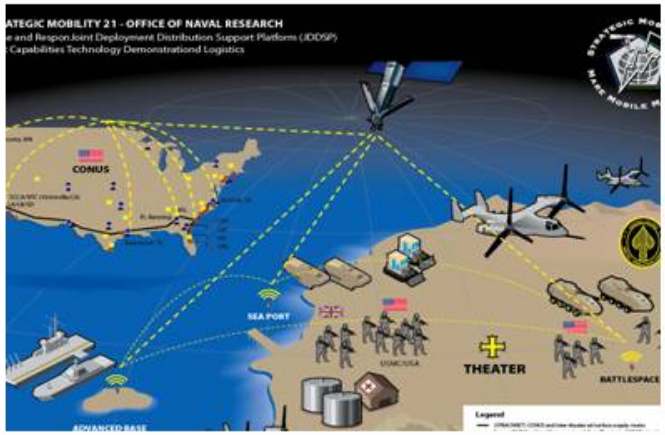
Productivity/Cost Savings and Avoidance: Optimized use of Seabase and expeditionary support network from fort to foxhole through advanced base

Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR and MARCORSYSCOM

Strategic Mobility 21 - Global Transportation Management System (GTMS)

OPERATIONAL REQUIREMENT

Description:. Integration of transportation and warehouse management systems to create true E2E visibility by combining the ability to see both what part of the inventory is stationary (stored) and what part of the inventory is moving (in-transit) in one common operating picture/dashboard at both strategic and tactical levels.
Technology Category: Agile Port System IT (JDDSP) Visibility (ITV), optimization, asset mgmt (TAV)
Current status: Validated commercial prototype
S&T Sponsor/Sponsor: ONR SRL and Sea Base FNC, USTRANSCOM SEM SOA architecture initiative, AT 21, USMC LOGCOM, 1-MEF S&T, USMC warfighting lab
Acquisition Customers: USTRANSCOM/SDDC US Army Materiel and Sustainment Command USMC LOGCOM/TECOM



GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: E2E Visibility, Distribution Systems Interoperability, Distribution Planning and Forecasting, Process Management and Business Rules, Distribution Performance Metrics Strategy, Container Management, Coalition/ Multi-National Interagency Capabilities, Professional Joint Logistics Workforce Development, Supply Chain Simulation Tools

Key Enabler: E2E transportation management system that integrates near real time ocean, marine terminal, rail, and warehouse inbound information; along with traditional track and trace, TMS booking and tender, payment, event management, auditing and other features; and demand driven algorithms for priority pickup of containers, synchronized to the order cycle; and with warehouse and distribution system operations and ERP systems.

Customer Pain Point(s): No interoperability between Defense Global Transportation Network (GTN) and supply systems. The ability to see single lane focus, strategic or tactical, transport systems or supply systems, but not both concepts with same dashboard.

Transition Pathway

Military/Commercial/Joint Utility: Dual use COTS
Required: S&T Investment and Transition Sponsor
Risk: Technical, Schedule, Cost and Risk: All Medium
Requirements for Transition: Sponsorship, Financial Investment
Technology Development: GTMS is in transition to an E2E Global Distribution Management System (GDMS) fusing a CONUS-OCONUS based global transportation management system (TMS) **Planned** Conversion to cloud based web service under Semantic Service oriented Architecture (SOA)
Business case for S&T investment: The benefits of GDMS can be measured in cost reduction and avoidance in excess inventory in pre-positioned storage, that is required to be transported to theater, through throughput constrained nodes, such as, constricted Sea Base and Advanced Base. Enhances both effectiveness and efficiency to get the deployed MEU or MEB in and out as quickly as possible when forward deployed while maintaining a high state of readiness for the next deployment.
Productivity/Cost Savings and Avoidance: Reduction of excess inventory, more efficient use of supply chain/distribution assets
Funding: S&T sponsor Expeditionary Warfare FNC Code 30, SIBR/STTR, MARLOGCOM, NAVSUP, NECC, DLA, USTRANSCOM

Real Time Location System (RTLS)

OPERATIONAL REQUIREMENT

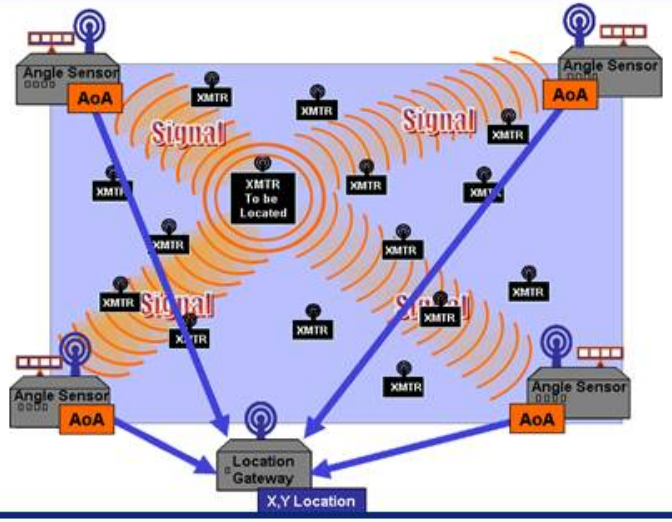
Description: Real Time Location System (RTLS) or geolocation system is a deployable transportable system based upon a phased array search radar unit, hardware, firmware and software in a current client server configuration capable of conversion to a cloud based semantically enabled service oriented architecture (SEM SOA) and deployed as a COTS web service

Technology Category: Physical measurement and geo-location

Current status: Real Time Location System (RTLS) or geolocation system is a field tested and deployable transportable system.. The system requires military use evaluation for re-configuration and further development of COTS technology to deploy as a robust sustainable capability in austere environments.

S&T Sponsor/Sponsor: ONR Code 30 USMC Warfighting lab

Acquisition Customers: 1-MEF, USTRANSCOM JTFPO and JDDOC, US Army PEO STRI PEO TC AIMS II, FORSCOM, Installation ITOs, Sustainment System Mission Command (SSMC) USMC Logistics Command (LOGCOM)



GAPS and SEAMS/Value to Warfighgter

USTRANSCOM RDT&E Capability Gaps: Distribution Systems Interoperability, Distribution Planning and Forecasting, Process Management/Business Rules, Container Management, Coalition/Multi-National Interagency Capabilities

Key Enabler: Accurate position geolocation in dynamic operating environment key to visibility (in stock, process, transit)

Customer Pain Point(s): Key E2E Joint Force Deployment loss of ITV visibility at unit equipment and CONEX level in all austere environments (Container consolidation points and lack of E2E ITV)

Transition Pathway

Military/Commercial/Joint Utility: Dual use COTS

Required: S&T Investment and Transition Sponsor

Risk: Technical, Schedule, and Cost -- Low Business -- Medium

Requirements for Transition: Sponsorship, Financial Investment, MUE

Technology development: Needs to be integrated with TC AIMS II/USMC MDSS, GCSS/MC, JFAST, ICODES, JOPES/TPFDD

Business Case for S&T investment: in better use and avoiding redundant manpower resources as process shift from manual to automated information processing, Reducing redundant effort in matching mission strategic sealift requirements with opportunistic lift

Productivity/Cost Savings and Avoidance: Reduction of redundant searching and measurement from a single entry of ground truth and precise measurement (including associated secondary loads with unit equipment), better identification of oversize and overweight equipment' avoiding exceeding load factors and carrying capacity in allocating lift capacity

Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR ONR/MARFORPAC

Agile Port System Joint Deployment Distribution Support Platform (APS JDDSP)

OPERATIONAL REQUIREMENT

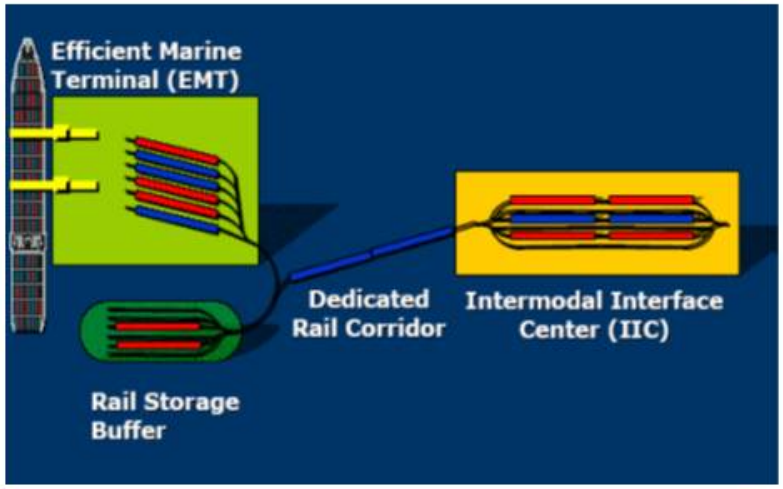
Description: The Agile Port System (APS)- Joint Deployment Distribution Support Platform (JDDSP), a Joint Integrating Concept for expeditionary warfare and logistics purposes., employs a network centric warfare agile enterprise system of systems (SOS) methodology and approach to improve the efficiency of the joint force deployment cycle and import-export logistics operations while de-conflicting the two in the same physical and temporal space reducing conflict between military operations and concurrent commercial port operations and the global supply chain upon which both depend for sustainability

Technology Category: Agile Port System/force deployment

Current status: Validated commercial and military domain proof of concept demonstrations

S&T Sponsor/Sponsor: ONR Seabase FNC, USTRANSCOM AT 21, US Army DPMO, USMC Warfighting lab, 1-MEF S&T

Acquisition Customers: USTRANSCOM/SDDC US Army TRADOC, USMC MCCDC/ TECOM



GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: E2EVisibility, Distribution Systems Interoperability, Distribution Planning and Forecasting, Process Management and Business Rules, Distribution Performance Metrics Strategy, Coalition/ Multi-National Interagency Capabilities, Professional Joint Logistics Workforce Development, Supply Chain Simulation Tools

Key Enabler: Streamline Deployment/Distribution operations to minimize conflict between military needs and commercial port operations.

Customer Pain Point(s): Current inability to adequately track and manage reset, retrograde, and redeployment of unit equipment costing millions of additional scarce Defense Transportation Working Capital Fund expenditures. Repetitive redundant effective but inefficient force deployment is expensive and delays theater unit reconstitution reducing combat readiness.

Transition Pathway

Military/Commercial/Joint Utility: Dual use COTS

Required: S&T Investment and Transition Sponsor

Risk: Technical and Business – Low Schedule and Cost -- Medium

Requirements for Transition: Sponsorship, Financial Investment

Technology development: Can be adopted as Deployment Process Modernization doctrine (Army TRADOC) or USMC expeditionary warfare doctrine w/1 MEF and warfighting lab concept validation

Needs Proof of Concept in Military Relevant Environment of CDD

Business case for S&T investment: Reduction of deployment and distribution operational cost, commercial operations savings through reduction of military/commercial port use conflict.

Productivity/Cost Savings and Avoidance: in reducing footprint, dwell time and redundant movement to and from theater and millions of dollars in additional transportation costs (thousands per unit equipment and containers and consequent disruption of commercial port operations

Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR and MARCORSYSCOM

CCDoTT
Center for the Commercial Deployment of Transportation Technologies

Port Disruption Resilience and Recovery (PDR2) Model

OPERATIONAL REQUIREMENT

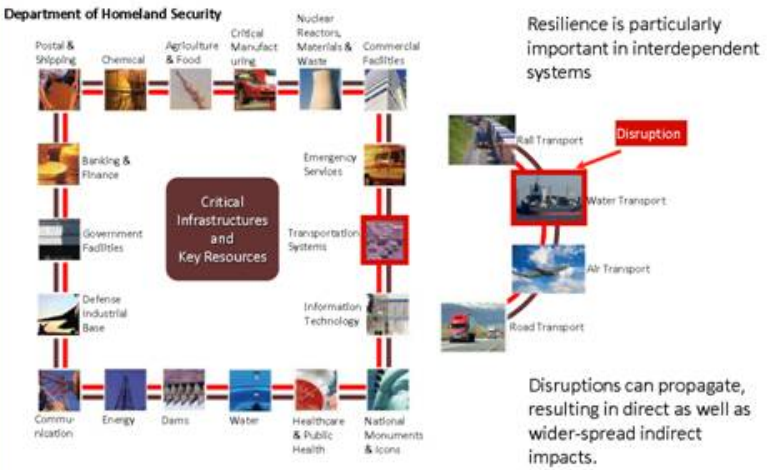
Description: A federated suite of models built upon the triennial ORNL Freight Analysis Survey and Flow Network designed to analyze freight flows by mode (ocean, intermodal rail, over the road truck and inland waterway) to optimize and expedite recovery from systemic disruptions (hurricanes, floods, derailments, HAZMAT events)), and build resilience capacity into the global supply chain network.

Technology Category: Emergency Response/Consequence Management Critical Infrastructure/Force Protection

Current status: P2R2 Model is a TRL 3 macro level descriptive conceptual model concept intended to provide decision support to improve global or regional aggregate supply chain resiliency and rapid recovery from natural or man-made disruptive event

S&T Sponsor/Sponsor: ONR, MARAD (USDOT), DHS HSARPA, NORTHCOM S&T

Acquisition Customers: NORTHCOM, FEMA Institute, DHS, CoCOMS USTRANSCOM Critical infrastructure



GAPS and SEAMS/Value to Warfighter

USTRANSCOM RDT&E Capability Gaps: Visibility, Distribution System Interoperability, Distribution Planning and Forecasting, Process measurement and Business Rules

Key Enabler: HADR recovery from anticipated/unanticipated events is orphan in EM domain i.e. local or enterprise system responsibility yet most costly overall Resilience is organizational agility to recover from unanticipated events.

Customer Pain Point(s): Economic disruption, extended recovery time, increased unemployment, decreased manufacturing output, higher trans and distribution costs for most items

Required Pathway to Transition

Military/Commercial/Joint Utility: Dual use COTS

Required: S&T Investment and Transition Sponsor

Risk: Technical, Schedule, Cost and Risk: All Medium

Requirements for Transition: Sponsorship, Financial Investment

Technology Development: Further model development and refinement/ augmentation of Oak Ridge Freight Analysis Survey data sources

Business case for S&T investment: The principal value proposition of PDR2M benefits may be measured in mitigation of disaster and recovery costs expressed in projected cost savings and avoidance (resilience) from reduced damage to installations and equipment and acquisition replacement costs, reduced operating, logistics and transportation costs from re-routing re-prioritizing and rescheduling shipments

Productivity/Cost Savings and Avoidance: Hundreds of millions of dollars to billions of dollars in costs to critical infrastructure, global and regional supply chain and to GDP from reduced output and economic activity and short supply of critical items

Funding: S&T sponsor Expeditionary Warfare FNC ONR Code 30 SIBR/STTR