PDMT Panel Project

Shipbuilding Opportunities in Short Sea Shipping (S3): Reducing U.S. Shipbuilding Cost for S3

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NSRP Panel Meeting
Seattle, WA
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Observations from April 2007 Workshop

- **Ship construction costs are perceived to be a significant roadblock for S3 in the U.S.**
  - Broad support for follow-on NSRP projects that target reduction of ship construction costs for Short Sea Shipping vessels
  - Perception that shipbuilders overseas have designs, construction methods, and supply chain practices that may be leveraged
- **Promising markets are most characterized by:**
  - Recognized deficiencies in the existing land-mode (congestion, lack of capacity)
  - Rates that permit S3 to be price competitive
- **East coast and West coast are perceived to be the best targets for S3, however the East Coast is perceived to be more likely in the near term**
  - Primarily driven by lack of port availability on the West Coast and the perception that congestion and lack of capacity is worse on the East Coast
- **General consensus that "one size will not fit all"**
  - However, there are significant series production opportunities for a number of vessel types and designs in a number of markets
- **General consensus that Ro-Ro's and Ro-Ro barges will be most prevalent for S3**

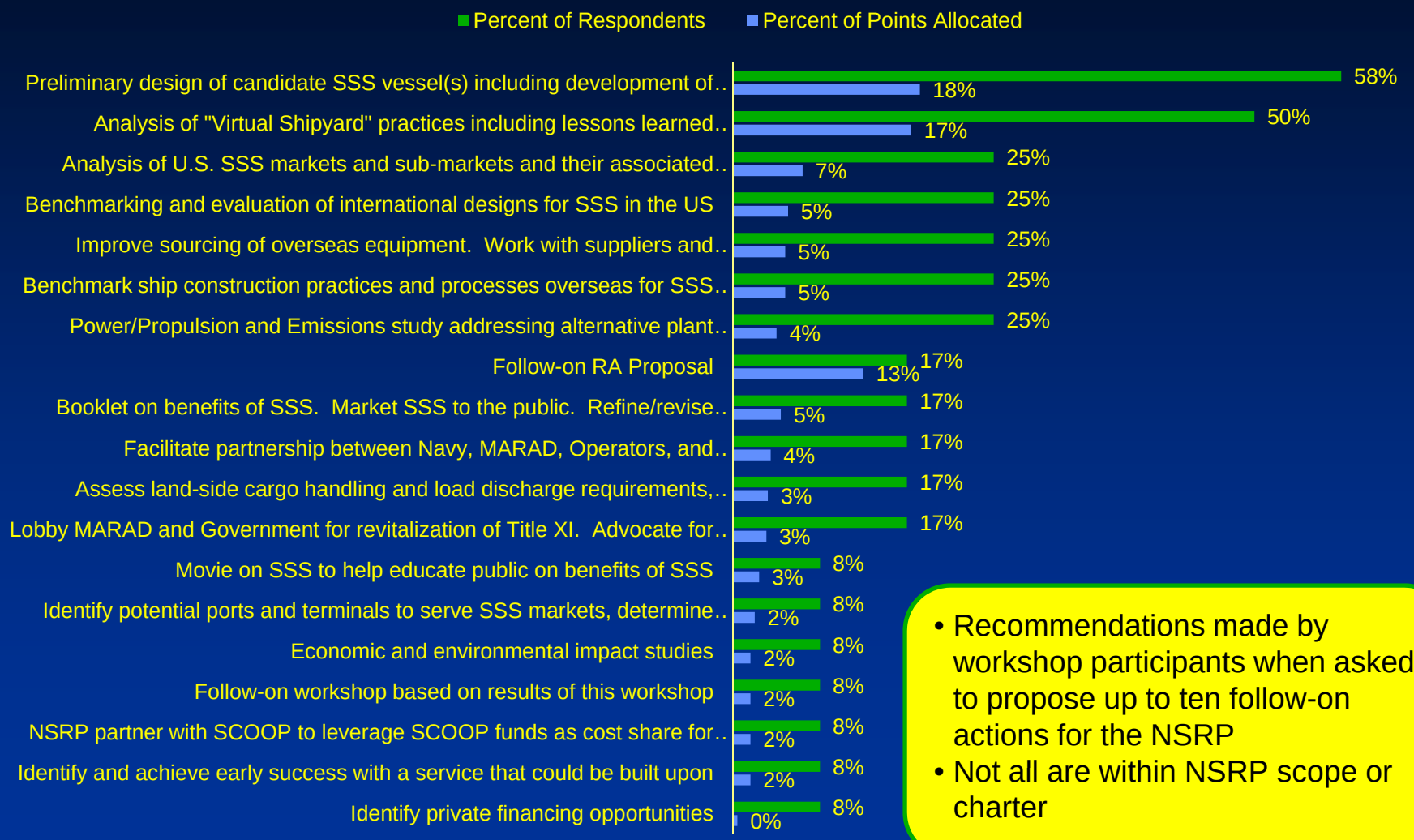
Observations from April 2007 Workshop, Cont.

- **Speeds from 20 to 30 knots are believed to be required, except in short routes where feeder vessels may operate at slower speeds below 15 knots**
  - Service standards of trucking being competed with in a given market, and port location and landside throughput, will dictate required vessel speed
- **Survey respondents are optimistic about opportunities for series construction**
  - Series up to 30 vessels for long routes
  - Series up to 20 vessels for moderate routes
  - Series up to 10 vessels for shorter routes which may be more "niche"
- **Vessel construction, vessel operating, and port infrastructure costs are perceived to be the most significant contributors to S3 required rates**
- **Strong consensus that Federal action is required to further S3**
  - Revitalized Title XI, application of CCF to contiguous trades, elimination of HMT
- **Role for State and Local Government is facilitating availability of ports and landside infrastructure**
  - State and local support may be required to ensure access

Observations from April 2007 Workshop, Cont.

- **Congestion relief, road infrastructure cost mitigation, and air pollution reduction are believed to be the most compelling public benefits**
  - Congestion relief is perceived to be the most certain benefit
- **Broad support for follow-on NSRP investment in S3, including:**
  - Analysis of application of “Virtual Shipyard” partnering and construction methods
  - Development of S3 designs applicable to multiple markets
    - » Analysis of markets and development of S3 vessel requirements
  - Leveraging of foreign designs for S3
  - Leveraging of foreign case studies for construction methods, supply chain management for S3, and partnership with foreign shipyards
  - Analysis of power and propulsion options for S3, means to mitigate fuel costs, and means to mitigate vessel emissions

Recommendations from April 2007 Workshop Survey



- Recommendations made by workshop participants when asked to propose up to ten follow-on actions for the NSRP
- Not all are within NSRP scope or charter

Roadmap Focus Areas

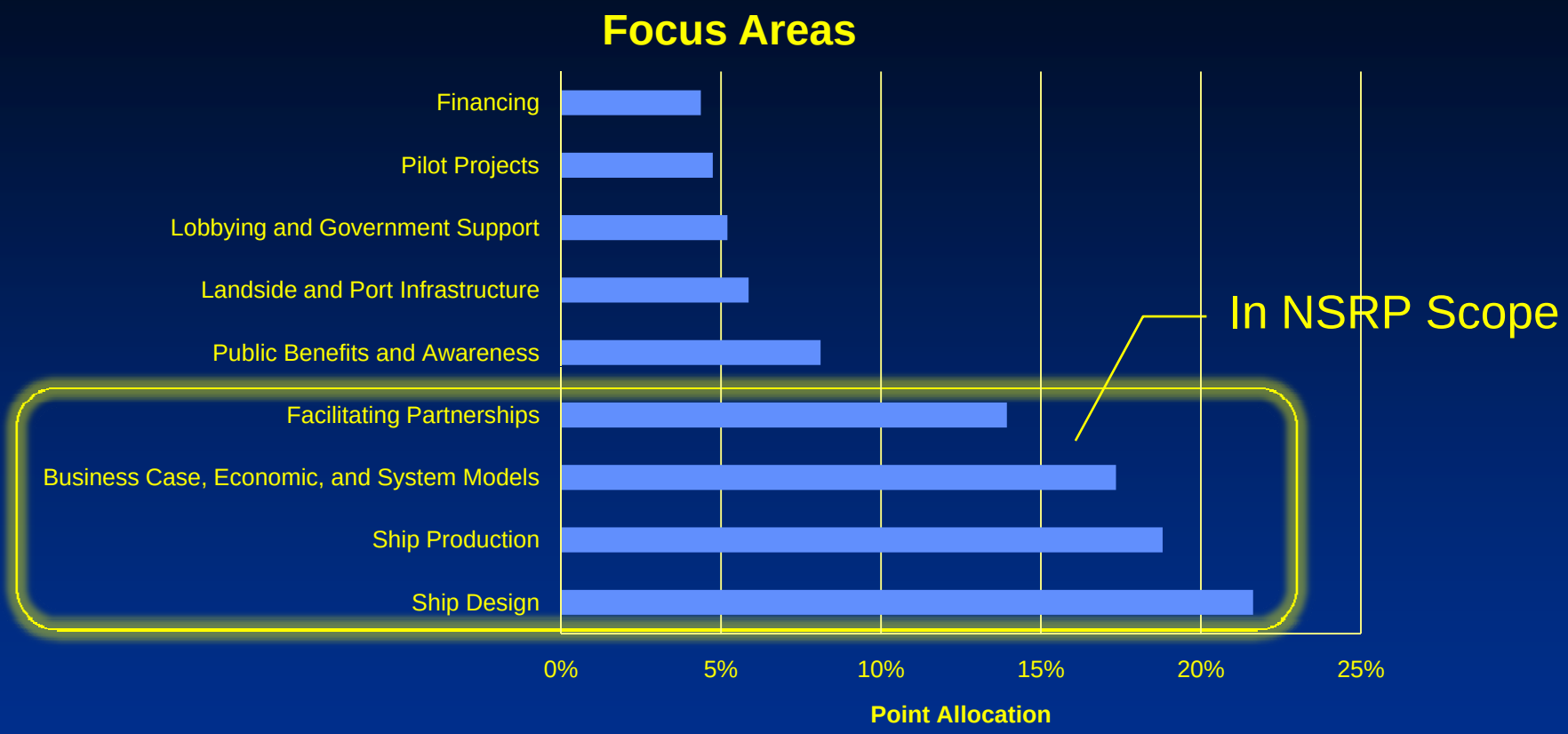
Recommendations suggest nine major focus areas:

Focus Area	Within NSRP Scope	Comments
Ship Production	Strong	Primary scope of the NSRP
Ship Design	Strong	Primary scope of the NSRP
Facilitating Partnerships	Strong	Facilitating partnerships would be a desired outcome of any S3 activity sponsored by the NSRP.
Business Case, Economics, and Systems Modeling	Strong	Tasks addressing the business case, the economics, and door to door systems modeling for S3 are necessary to verify ship design alternatives for potential S3 markets
Landside and Port Infrastructure	Moderate	While not directly in the scope of the NSRP, understanding landside infrastructure requirements will influence vessel designs and the business case.
Public Benefits and Awareness	Moderate	While not directly in the scope of the NSRP, data generated by other tasks may be used to help demonstrate public benefits.
Lobbying and Government Support	No	While important, this is not deemed to be within the scope of the NSRP.
Pilot Projects	No	A pilot project might evolve out of an NSRP activity, but it would not be within the NSRP scope to develop a pilot project.
Financing	No	While important, this is not deemed to be within the scope of the NSRP.

Map Recommendations to Focus Areas

Recommendation	Ship Design	Ship Production	Business Case, Economic, and System Models	Facilitating Partnerships	Public Benefits and Awareness	Landside and Port Infrastructure	Lobbying and Government Support	Pilot Projects	Financing
Identify private financing opportunities									■
Identify and achieve early success with a service that could be built upon								■	
NSRP partner with SCOOP to leverage SCOOP funds as cost share for studies.				■					
Follow-on workshop based on results of this workshop	■	■	■	■	■	■	■	■	■
Economic and environmental impact studies					■				
Identify potential ports and terminals to serve SSS markets, determine terminal costs, determine their desire and support for SSS business			■			■			
Movie on SSS to help educate public on benefits of SSS					■				
Lobby MARAD and Government for revitalization of Title XI. Advocate for CCF applicability to coastwise trades and for CCF in shipyards for use to finance ship construction projects.							■		
Assess land-side cargo handling and load discharge requirements, techniques, and throughput and the impacts of these characteristics on vessel requirements	■					■			
Facilitate partnership between Navy, MARAD, Operators, and Shipbuilders to successfully implement SSS. Follow-on with Navy and MARAD to ensure support.	■	■		■					
Booklet on benefits of SSS. Market SSS to the public. Refine/revise public benefits study.					■				
Follow-on RAP proposal	■	■	■	■	■	■	■	■	■
Power/Propulsion and Emissions study addressing alternative plant configurations, fuels, fuel economy, and emissions mitigation technology and associated costs. Evaluation of low-fuel cost or low-fuel consumption technologies for SSS.	■				■				
Benchmark ship construction practices and processes overseas for SSS vessels and assess application of "international model" to U.S. yards. Conduct workshop bringing in foreign yards to share lessons learned and approach.		■		■					
Improve sourcing of overseas equipment. Work with suppliers and supply chain. Supplier/Builder integration.		■		■					
Benchmarking and evaluation of international designs for SSS in the US	■								
Analysis of U.S. SSS markets and sub-markets and their associated vessel requirements. Survey truckers and shippers. Get potential customer buy-in.	■		■						
Analysis of "Virtual Shipyard" practices including lessons learned overseas, case studies of SSS vessel construction, and planning for Virtual Shipbuilding in the U.S.	■	■	■	■					
Preliminary design of candidate SSS vessel(s) including development of one or more "standard" designs with sufficient fidelity for ROM cost estimating. Economic assessment of candidate designs in representative markets.	■	■	■						

Focus Area Weighting



- **Based on mapping of recommendations to focus areas and respondents allocation of points to recommendations**
- **Strong preference for NSRP S3 activity addressing ship design, ship production, demonstrating the business case and S3 system models, and facilitating partnerships**

Recommended S3 Investment Portfolio: Best Practices S3 Workshop

- **Evaluate ship construction practices and processes overseas, including supply chain management, for S3 vessels**
  - Assess the application of the “international model” to U.S. yards.
  - Conduct workshop bringing in foreign yards
  - Assess potential to reduce ship construction costs
- **Benchmarking and evaluation of proven international designs**
- **Analysis of “virtual shipyard” or collaborative construction as an approach for S3 vessels**

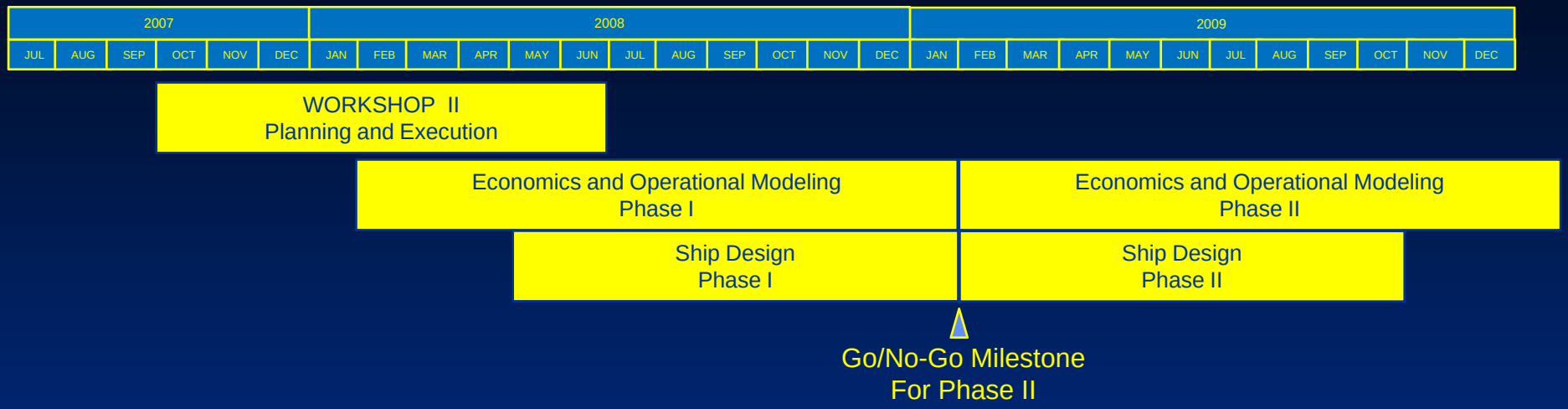
Recommended S3 Investment Portfolio: Ship Design

- **Development of vessel requirements and preliminary design of candidate S3 vessels for representative markets with sufficient fidelity for ROM cost estimating**
- **Assessment of power and propulsion alternatives and the means to reduce fuel consumption**
  - Fuel costs are the predominant driver of S3 costs
- **Assessment of S3 emissions and the means to mitigate vessel emissions**
- **Continue to engage the Navy in S3 to leverage common interests at the technology level**
  - E.g.; hull form, power and propulsion

Recommended S3 Investment Portfolio: Economic and Operational Modeling

- **Document market estimates and assumptions for use in developing candidate designs**
  - Draw on existing work in this area to document assumptions for volumes and commodity mix
- **Development of economic and door to door service models for S3 in representative markets**
  - Economic assessment of candidate designs in representative markets to assess price competitiveness
  - Throughput modeling and simulation to assess service time competitiveness
- **Document port and terminal restrictions and throughput capabilities in representative markets and their impact upon vessel requirements**

Investment Plan



- **Extend ECB initiative with a second workshop**
  - Address ship cost challenge and ship production focus area
  - Serve as a bridge to a broader RA project addressing remaining tasks and focus areas
- **Recommend NSRP support major RA initiative addressing economics, operational modeling and ship design tasks**
- **Roadmap further details the sequence of tasks within each major element of the investment plan**

Goal & Objectives

Goal:

To accelerate the shipbuilding opportunities associated with potential U.S.-based Short Sea Shipping (S3) operations

Objectives:

- **To continue the NSRP engagement with S3, and serve as a bridge to a broader effort that may be undertaken as an NSRP RA project**
- **To focus on reducing the costs of constructing S3 vessels in the U.S. with concentration on Ro-Ro vessels of varying size and configuration**
- **To facilitate forming consortia (owners, operators, U.S. shipyards, partnered foreign shipyards, suppliers and technical support companies)**

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Project Focus Areas

The project addresses four of the top six recommendations that were outputs of the NSRP-sponsored S3 Workshop in Orlando, FL on April 19-20, 2007:

- **Analysis and application of the "Virtual Shipyard" concept, including lessons learned overseas**
- **Leverage partnerships between U.S. and foreign shipyards**
- **Leverage examples of success in overseas construction methods and supply chain business practices applicable to S3**
- **Leverage examples of success in overseas designs applicable to S3**

Principal Outcomes

- **Identification of best in class practices applicable to S3 vessel designs, construction methods (including virtual shipyard approach), project management, design for production challenges (e.g., collaborative multi-yard environment, foreign designs, etc.), and supplier management**
- **Facilitation of partnerships between U.S. and foreign shipyards to reduce U.S. ship construction costs**
- **Facilitation of partnerships between U.S. shipyards and potential owners**
- **Development of generic design, business practice, and build strategies for S3 resulting in reduced U.S. ship construction costs**
- **Improved understanding of U.S. shipbuilding costs and cost drivers for S3 vessels**

Key Aspects of Approach

- **Identify "case studies" of efforts to reduce ship construction costs through:**
  - "Virtual Shipyard" collaborative approach to ship construction and project management
  - Lessons learned overseas in areas of ship designs, construction methods, project management and supply chain management
  - Opportunities and approaches for partnership between U.S. and foreign shipyards
- **Identify experts associated with each of the case studies, and engage them to participate in an NSRP-sponsored workshop. The experts may include:**
  - Representatives of foreign shipyards and ship owner/operators
  - U.S. shipyard reps with experience in partnering with foreign yards
  - U.S. shipyard representatives with experience in collaborative construction

Key Aspects of Approach (cont'd)

- **Plan and conduct a workshop to discuss the advantages and disadvantages of alternative ship design concepts, shipbuilding strategies, partnering arrangements, project management and supply chain approaches.**
  - Attendance at the workshop will be by invitation only
  - Target of 35-40 participants
  - Anticipated invitees / participants include:
    - » U.S. shipyards (those that attended the previous NSRP-sponsored S3 workshop, and those that did not)
    - » Foreign shipyards
    - » U.S. & foreign owner/operators
    - » Design agents / consultants engaged with shipyards and owners and operators
    - » U.S. Navy representatives involved in Ro-Ro / Auxiliary ship design and construction programs
- **Prepare preliminary and final reports documenting workshop outputs / results**

Tasks

- Project kick-off meeting
- Develop workshop planning document
- Develop workshop workbook
- Conduct workshop
- Draft final report
- Final report
- Presentation of results at PDMT panel meeting

Deliverables & Schedule

• Kick-off meeting minutes	February 20
• Quarterly report	April 22
• Workshop planning document	June 20
• Draft workbook	August 30
• PDMT Panel Presentation	September 15
• Draft final report	November 13
• Presentation at NSRP Joint Panel Meeting	December ??
• Final report	December 18

Accomplishments to Date

- **Conducted kickoff meeting on February 20**
- **Submitted Quarterly Report on April 22**
- **Established date and venue for workshop:**
  - Tuesday- Thursday, Oct 21 - 23, 2008
  - Offices of ATI in Charleston, SC
- **Established framework of workshop agenda**
- **Developed initial list of invitees / presenters**
- **Commenced contacting invitees / presenters**

Framework of Workshop Agenda

- **Day 1: Primarily presentations. Introductions, recap of prior workshop, overview of virtual shipbuilding and overview of foreign partnerships with contemporary examples. Lessons learned and best practices from overseas. Foreign participants review successful approaches to construction of SSS vessels and identify**
- **Day 2: Complete presentations by international participants. Discussion and prep for break-outs following day. Introduce survey and talking points for final session of day 3.**
- **Day 3: Breakout Sessions with specific focus on case studies and final session to document major take-aways.**

Workshop Agenda, October 20-21

Monday 10/20/08: No sessions. Rooms are set-up and workbooks readied for distribution. No host bar reception TBD.

Tuesday 10/21/08		
07:30 – 08:00	Registration and Breakfast	
08:00 – 08:30	Introduction & Overview	Introduce workshop objectives, agenda, attendees, and plan. Walk attendees through workbook and meeting logistics. Present ground-rules including very brief overview of ITAR etc.
08:30 – 09:00	Retrospective	Re-Cap highlights, accomplishments and results of prior workshop.
09:00 – 09:45	Operator Panel Discussion	
09:45 – 10:15	BREAK & NETWORKING	
10:15 – 11:00	Shipbuilder Panel Discussion	
11:00 – 12:00	Virtual Shipbuilding	
12:00 – 13:15	LUNCH & MARAD SPEAKER	
13:15 – 14:15	International Partnerships	
14:15 – 14:30	BREAK & NETWORKING	
14:30 – 16:45	Presentations from International Shipyards	
16:45 – 17:00	Wrap Up	

Workshop Agenda, October 22

Wednesday 10/22/08		
07:30 – 08:00	Breakfast	
08:00 – 08:15	Introduction & Overview	Re-Cap prior day and overview of days objectives
08:15 – 09:45	Presentations from International Shipyards, Continued	
09:45 – 10:15	BREAK & NETWORKING	
10:15 – 12:00	Virtual Shipbuilding Facilitated Discussion	
12:00 – 13:15	LUNCH & SPEAKER TBD	
13:15 – 15:00	International Partnership Facilitated Discussion	
15:00 – 15:30	BREAK & NETWORKING	
15:30 – 16:30	Overview of case studies for use in break-out sessions	
16:30 – 17:00	Wrap-Up, distribute surveys, and Plan for next day	Assign people to break-outs that will start the next day

Workshop Agenda, October 23

Thursday 10/23/08		
07:30 – 08:00	Breakfast	
08:00 – 10:00	Break-Out Sessions	*Case study oriented – application of VS or IP to case studies*
10:00 – 10:30	BREAK & NETWORKING	
10:30 – 11:30	Break-Out Briefs and Discussion	
11:30 – 12:30	LUNCH	
12:30 – 14:30	Facilitated Discussion and Survey	
14:30 – 1500	Wrap - Up	

Initial List of Workshop Invitees

Group	Quantity	Potential Attendees
U.S Shipyards	10	NASSCO, Aker Philadelphia, Bender (2), Atlantic Marine, VT Halter, Bollinger, Manitowoc, NGS
International Participants	8	Fincantieri, Delta Marin, Aker Germany, Flensburger, Damen, Stena, possibly Daewoo/DESEC or Hyundai, Odense
Operators	8	Crowley, Horizon, TOTE, SeaBridge, Westar, TrailerBridge, National Shipping, International Shipholding Corp and Coastal Connect, Matson
Consultants	11	J. Malone, M. Tedesco, R. Thorpe, M. Yonge, C. Cook, Finance Expert (?), Seaworthy, CDI Marine, BMT D&P, Art Anderson Associates, SPAR Associates
Government & NGO	4	Navy, MARAD, Congressional Staff, ATI
TOTAL:	41	

Questions or Comments?

Back-up Slides

Virtual Shipbuilding

- **Definition: A combination of two or more ship construction entities with capable management & technical staff to organize the planning, scheduling, budgeting, design & engineering, procurement, production control, testing and program management for the design & construction of ships.**
- **Key elements of a suggested VS approach for S3:**
  - Good business relationship between ship owner/operator & the shipper customer
  - Significant participation by the ship owner/operator in the program planning and ship design process
  - Program Management Organization (PMO) staffed by experienced commercial shipbuilders, designers/engineers, planners & managers
  - Technically sound contract design developed specifically for Virtual Shipbuilding
  - Experienced commercial vessel detail design organization (in-house or outsourced)
  - Well conceived outsourcing plan utilizing high labor productivity and low overhead mid-tier yards and proven marine contractors (system suppliers and fabricators

Virtual Shipbuilding

- **Strengths**
  - Cost reduction by using more labor productive and lower overhead fabrication & sub-assembly facilities than fully integrated traditional shipyards
  - Accelerated production schedule by distributing the production work
- **Weaknesses**
  - Additional layer of contracting
  - Requires greater program management attention & expertise
  - Added cost of transporting interim products from fab sites to assembly facility
- **Risks**
  - Poor management, planning and/or technical direction
  - Subcontractors not meeting schedule or technical requirements
  - Misunderstanding between ship buyer and shipbuilder, i.e., poor quality contract design, which can result in error-prone and/or late detail design (PI)
- **Benefits**
  - 15-30% cost reduction over large commercial U.S. yards, and much more over naval combatant yards
  - Cost reduction benefit shared by buyer, shipbuilder & other VS team members
  - Shorter delivery time
  - Shipbuilder has better understanding of buyer's needs, and buyer has better understanding of shipbuilder's constraints & issues

Virtual Shipbuilding Examples

Commercial

- U.S. Shipping Partners LP ATB Barge
- Heavy Airlifter Seabasing Ship (HALSS)
- AHL Shipping Co. Chemical/Product Tanker

Navy

- Northrop Grumman Ship Systems (NGSS) DDG 103 Deckhouse
- Lockheed Martin Co. (LMCO) Littoral Combat Ship (LCS 1)