
Distributed Testing on the Submarine Piloting and Navigation System

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Introduction



- Presenters
 - John Davis, Principal Engineer with Wyle
 - Mark Reemsnyder, Lead Systems Engineer with Undersea branch of the Naval Air Warfare Center Training Systems Division (NAWCTSD)
- Case study of distributed testing cycle
 - Submarine Piloting and Navigation (SPAN) Training System
- Outline
 - System Overview
 - Test process Overview
 - FY 09 test cycle
 - Lessons Learned



SPAN Training System Overview



- Mission of SPAN Training System
- Achieved through simulation of Los Angeles, Ohio, Seawolf and Virginia class submarines



SPAN Training System Overview



■ Fielded training locations

TTF Bangor, WA



SLC
San Diego, CA

STF
Pearl Harbor, HI

NAVSUBSCOL
Groton, CT

SLF Norfolk, VA

TTF Kings Bay, GA



SPAN Training System Capability



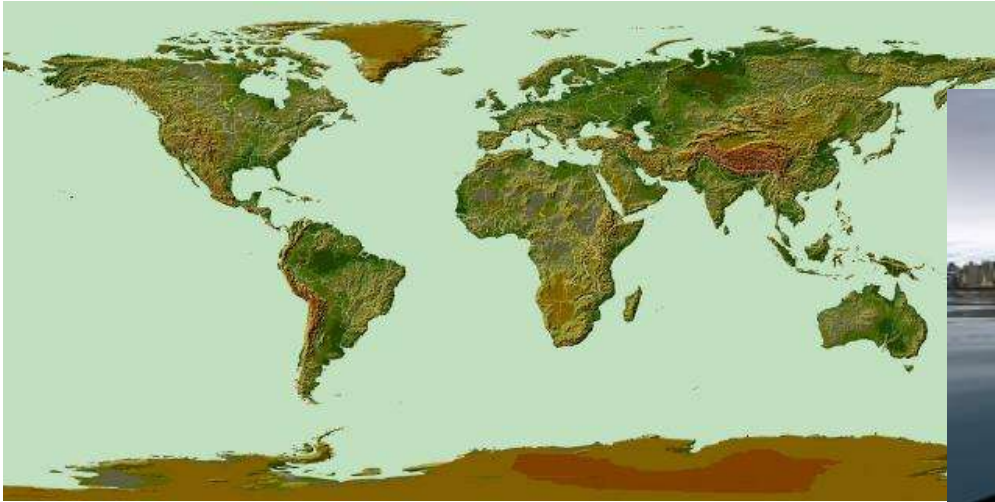
- Watch stations for each piloting team member
 - OOD, lookout watch, navigator, helm/pilot control, periscope, contact coordinator, fire control, radar, fathometer, deck log and bearing recorders
- Instructor control station
- Pre-exercise Briefing and After Action Review



SPAN Training System Capability



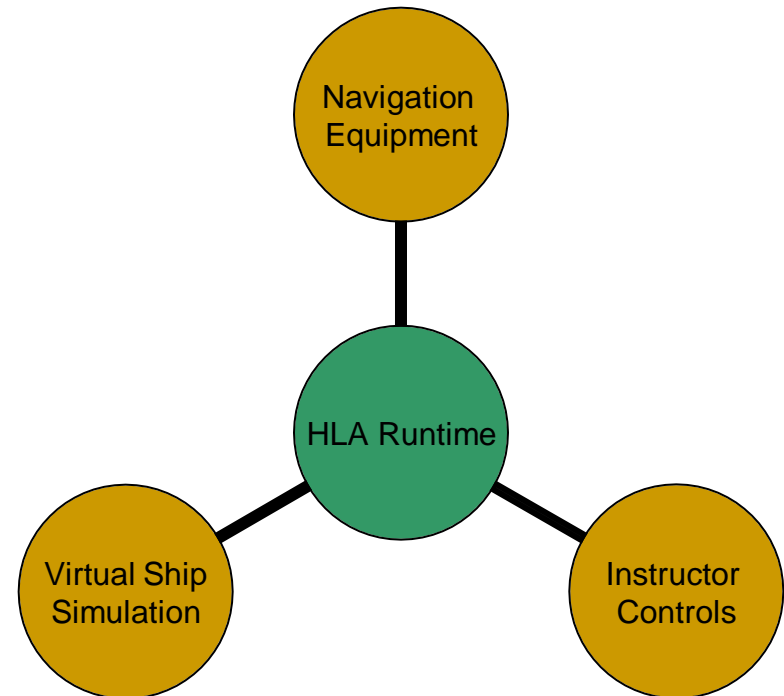
- 35 world-wide sea ports and harbors



System Architecture



- Distributed using High Level Architecture (HLA)
- Rack mounted computer hardware systems on a TCP/IP network



SPAN Test Process



- Integrated test process
- CMMI Level 3
- Requirements traceable test procedures
 - Verified
 - Peer-reviewed
- Phased testing



Test Cycles



Alpha Cycle

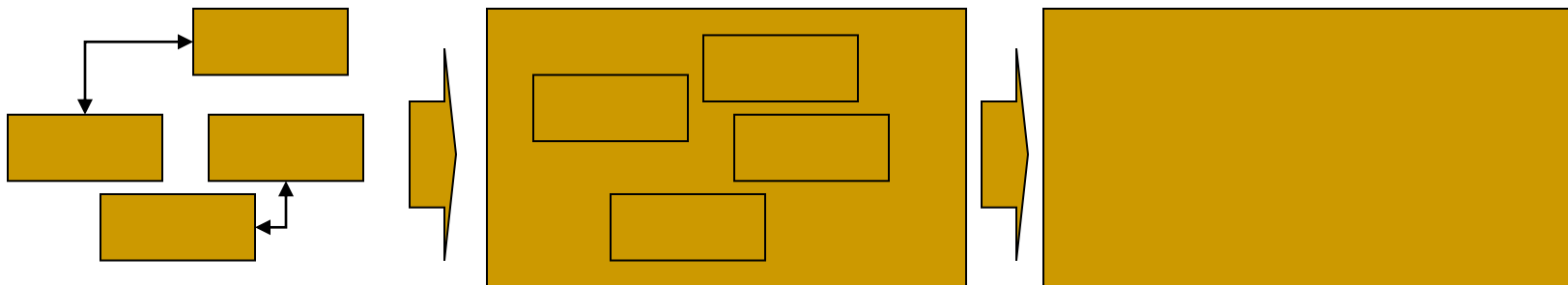
- Developers testing product items
- Some integration
- Developers generate test procedures

Beta Cycle

- Test procedures verified/peer reviewed
- Product items tested against procedures

Release Cycle

- Integrated system formally tested
- Fleet representatives validate system



Developers



Developers



Testers



Testers



Fleet/ Instructors



FY 08/09 Release Case Study

Release Description



- vShip upgrade
 - provides maritime ship behavior model
- HLA infrastructure upgrade
 - part of core system upgrade
 - All subsystems also upgraded
- Navigation equipment additions
 - Integrated Submarine Imaging System (ISIS) Workstation
 - Automatic Identification System (AIS)
- Visual model upgrades
 - New visual ship and harbor models
- Deficiency corrections



FY 08/09 Release Case Study

Alpha Test Cycle



- Contracting delays with vShip
- Compiling the new HLA Runtime Interface (RTI)
 - unplanned C++ compiler downgrade
- Single test bed
 - limited access



FY 08/09 Release Case Study

Beta Test Cycle



- HLA RTI upgrade consumed additional network bandwidth
 - network hardware upgrade
 - partial distributed system tested
 - full system tested after upgrade



FY 08/09 Release Case Study

Release Test Cycle



- Combined test procedure
 - all system configurations
 - all submarine classes
- Fleet system validation
 - minor software issues
 - release contingent on resolution of issues



FY 08/09 Release Case Study

Acceptance Test



- Release acceptance test performed at Kings Bay, GA facility
 - full system test
 - deficiency corrections signed off
 - installed and tested at all sites



Lessons Learned



- Make Time for Good Risk Management
 - Better response planning
- Plan for Team Integration
 - From requirements to deployment
- Build a Good Test Environment
 - Distributed test bed per developer



To conclude...



- Honest examination and assessment of lessons learned improved the process and the integrated team effort for current SPAN lifecycle
- FY 11 Release of SPAN currently in beta test cycle which is going smoothly



And of course...



Questions?

