



*Helping Secure Undersea Superiority  
for Tomorrow's Fleet...*

*by  
Actions Today*



# Command & Control Centers in Virtual Worlds

vNUWC Project Lead  
Topo Harbour

**13 May 2011**

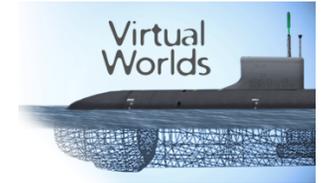
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# NUWC Mission Objectives



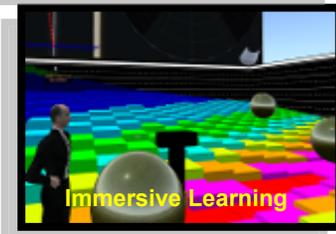
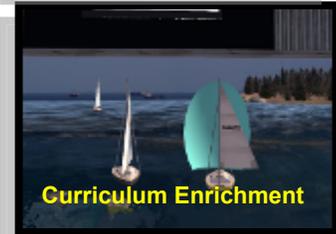
- To investigate, apply and adopt rapidly evolving and converging **Virtual World** technologies that have the potential to radically change the way the Navy approaches:

## Collaboration & Innovation

- **FY08** began **investigation** of various virtual world technologies (i.e., Second Life, Open Sim , OLIVE and Wonderland) to fully understand their strengths, weaknesses and limitations.
- **FY09** began **experimentation** so that NUWC, its customers and sponsors can effectively apply this technology to specific Use Cases in support of undersea warfare mission areas. Limited investigation continued focusing on convergence to a single VWT.
- **FY10** began **adoption** and **integration** of mature virtual world technologies as a beneficial tool in employee services and program utilization. Experimentation in new USW use cases will continue as opportunity / fleet need requires.



# Virtual Worlds Collaborative Environment



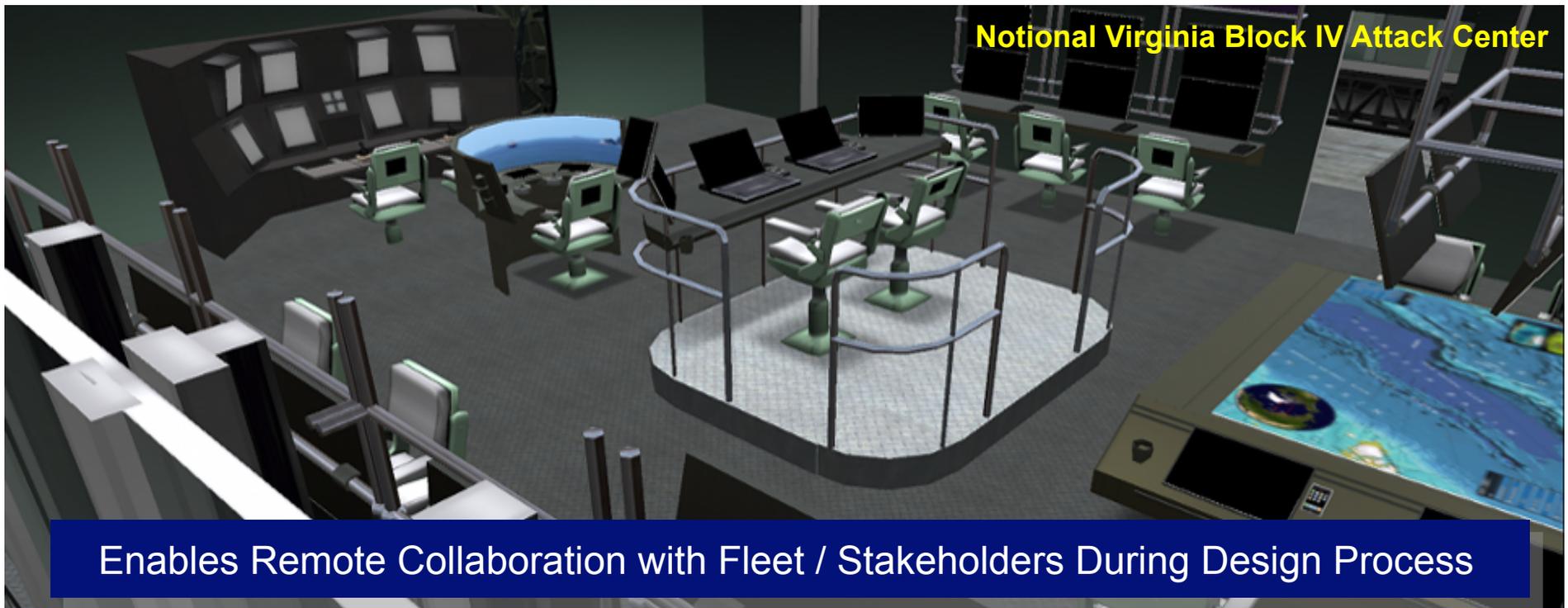


# Collaborative Engineering

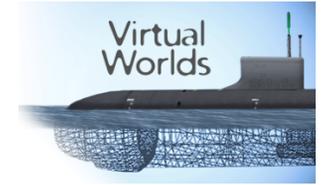
## PMS 450 Reconfigurable Command & Control Center



- *Second Life*® *Enterprise* is being used to evolve Virginia Block IV attack center concepts supporting rapid prototyping and collaborative design
  - Fleet and designers **participate remotely** (to be accessible from **SIPRNET**)
  - Virtual layouts can be optimized against different missions and hypotheses
  - Concepts reviewed and changed in real-time
  - Allows prototyping of not yet available technology (e.g., 180° flexi-display)
  - Full concept evolution maintained with linkage to source material



# C2 Design Concepts



Virginia Block III



IA Group Concepts  
(team arrangement driven)



RCACC Future Concepts  
(technology driven)

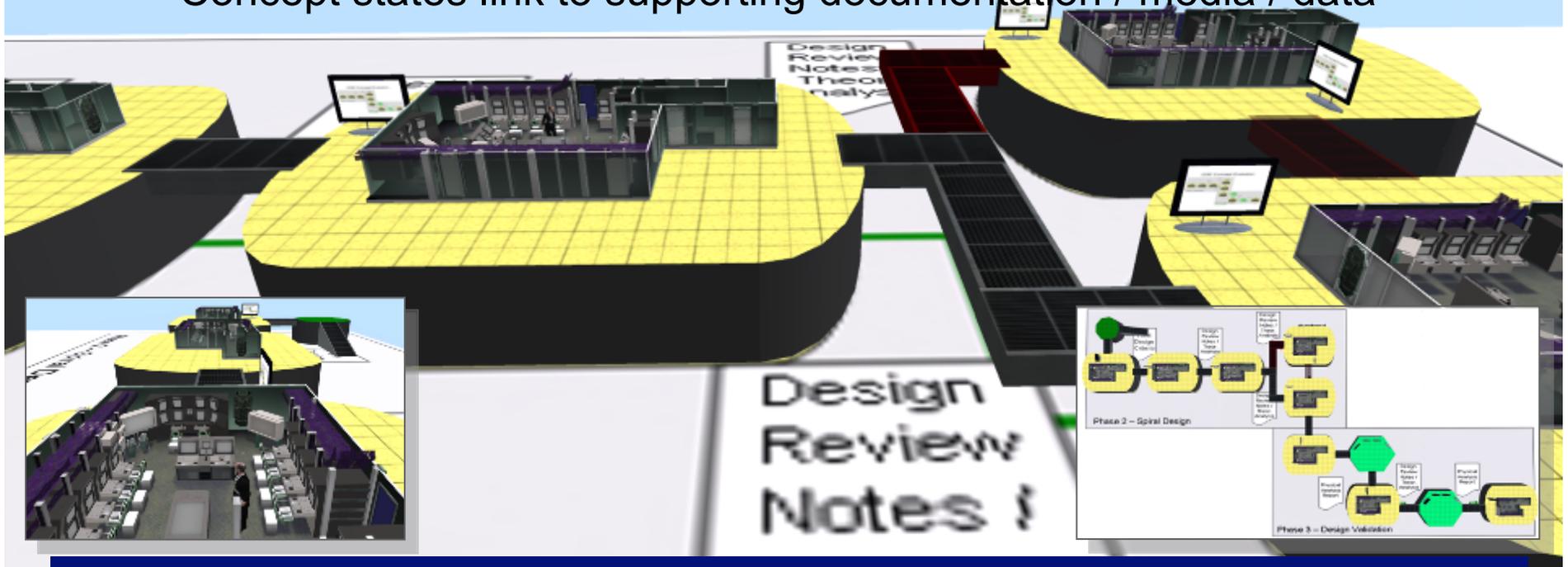


Chaum Concept  
(command driven)

# C2 Evolution



- 2-D concept evolution actually 3-D spatial environment
  - Each concept is represented by full model with optional information flow & analysis
  - Allows access remotely and collaboratively
  - Relationships / evolution preserved
  - Concept states link to supporting documentation / media / data



Design is Not a Single Model But an Evolution with Linked Supporting Material

# Visualization & Analysis For Command Decision Making



- VWs being used to “expose” information flow within a C2 space by showing Visual, Audio, control and electronic transmission paths



Audio Flow  
Visual Flow  
Control Flow  
Elect. Flow



Human Comms

# Virtual C2 Demonstration



Remote, Distributed Access

Virtual C2 Space

Actual Tactical Systems



Team C2 on Tactical System

- Supports distributed team dynamics
- Enables virtual COOPEX and team training
- Enables Integration of legacy and prototype components

**Virtual C2  
Supported  
Equivalent  
Performance as  
Physical C2**



First Remote and Distributed Control of a Submarine CCS