



Testing and Training Challenges for the Evolutionary Aircraft Carrier Strategy

by

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WORKING PAPERS

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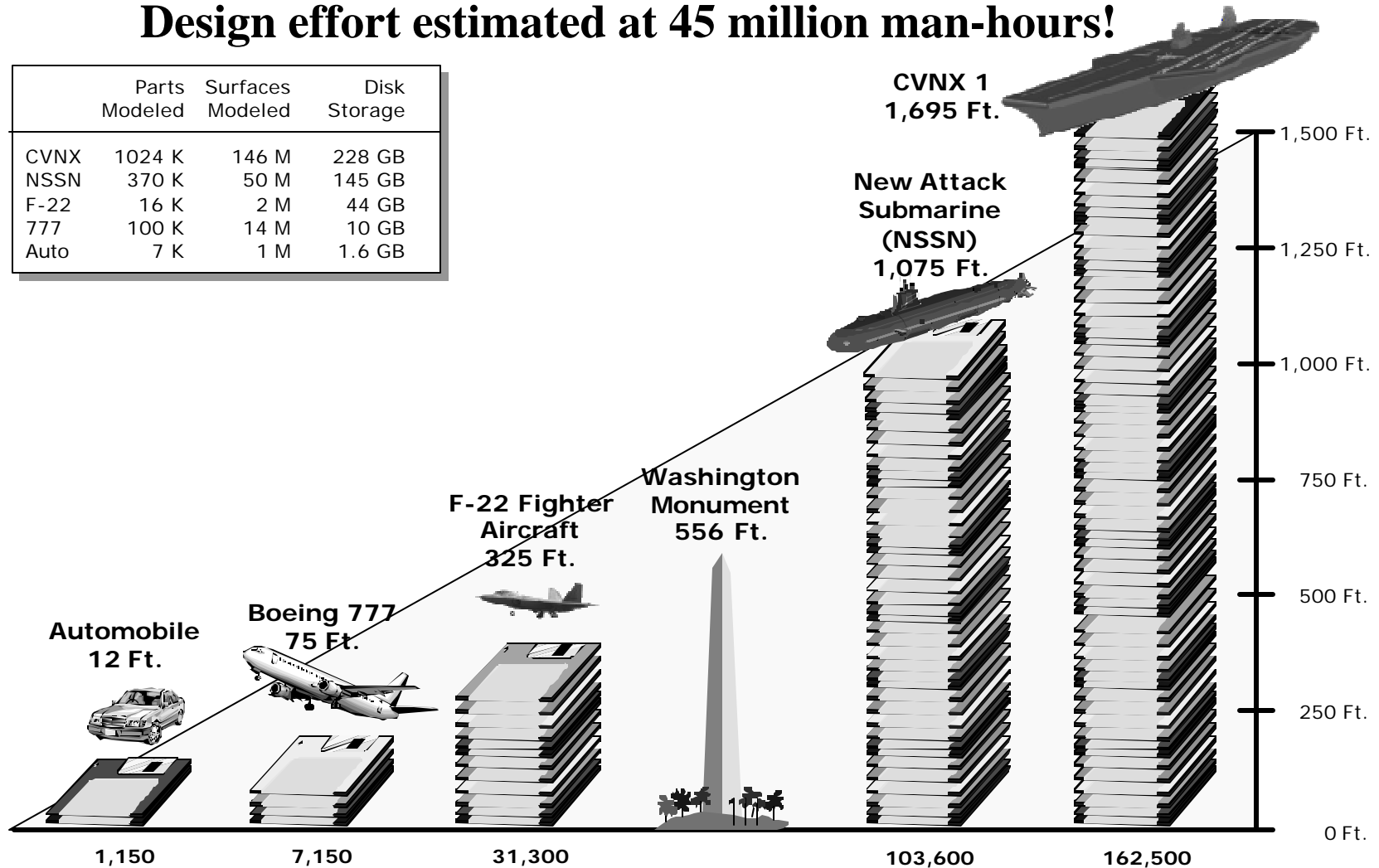
PEO Aircraft Carriers



The Technical Complexity of CVNX

Design effort estimated at 45 million man-hours!

	Parts Modeled	Surfaces Modeled	Disk Storage
CVNX	1024 K	146 M	228 GB
NSSN	370 K	50 M	145 GB
F-22	16 K	2 M	44 GB
777	100 K	14 M	10 GB
Auto	7 K	1 M	1.6 GB

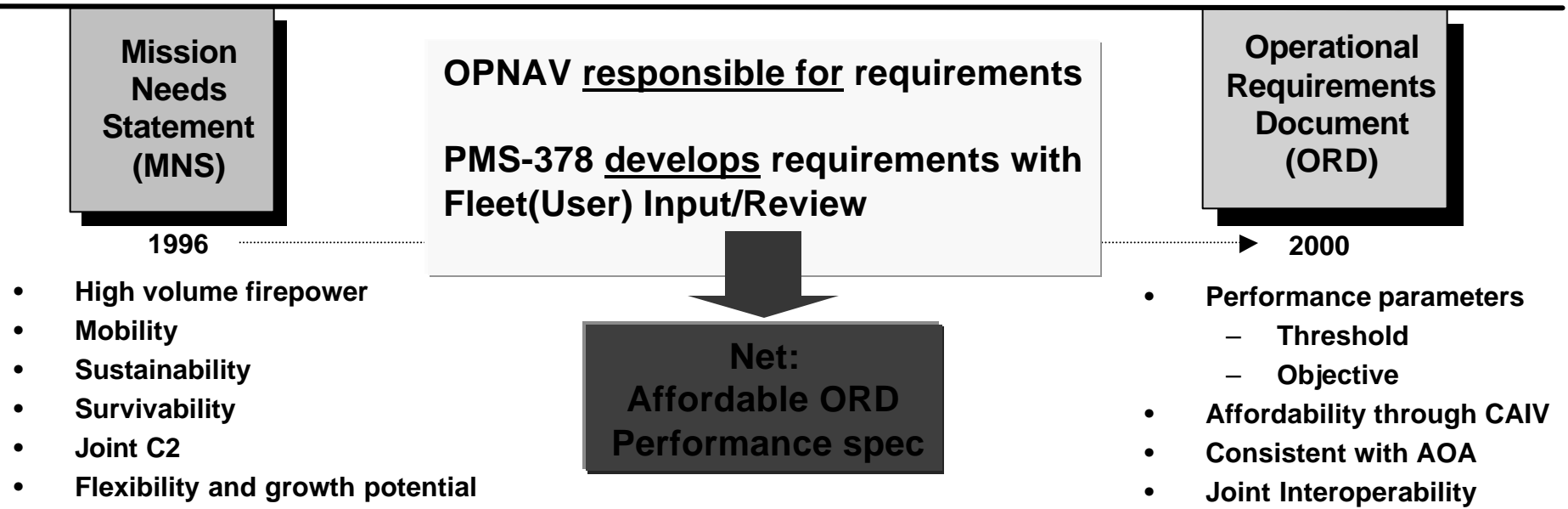


Equivalent Number of 1.4 MB Floppy Disks
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Departmental Guidance

- ◆ DoDINST 5000.2R, Section 4.3 “*Systems Engineering*”
 - “Requirements Analysis. Throughout the acquisition process the *program office shall work with the user to establish and refine operational and design requirements* that result in the proper balance between performance and cost *within affordability constraints*. Requirements analysis shall be conducted iteratively with functional analysis ... to develop and refine functional and performance requirements, external interfaces and *provide traceability among user requirements and design requirements.*”



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Development Strategy

- ◆ **Phased Approach - “Transition Ships”**
 - **CVN 77: CVN 76 + new combat system + TOC savings**
 - **CVNX 1: CVN 77 + new propulsion & electrical system + TOC savings**
 - **CVNX 2: CVNX 1 + state-of-the-art flight deck + hull improvements + TOC savings**
- ◆ **Design for flexibility**
 - **Upgrades over 50-year life**
- ◆ **Share development ideas, risk & cost with other programs(T&T results)**
 - **Horizontal integration of combat systems**
- ◆ **New acquisition methods... encourage innovation**
 - **IPPD**
 - **Subcontracting arrangements**
 - **Performance-based specs**
 - **COTS technology & procedures**
- ◆ **Link with *Smart Carrier* to provide backfit wherever possible**

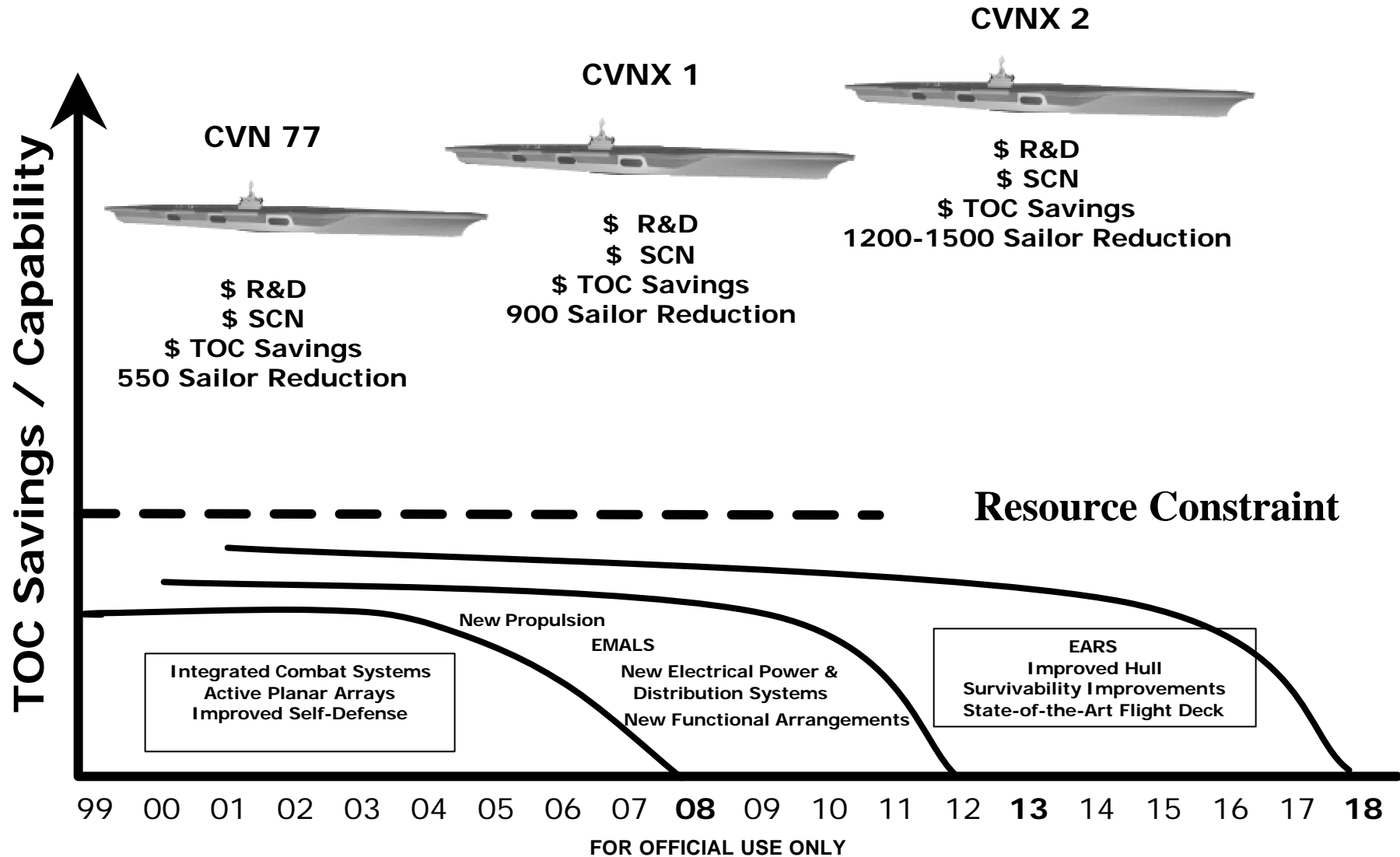
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Evolutionary Concept

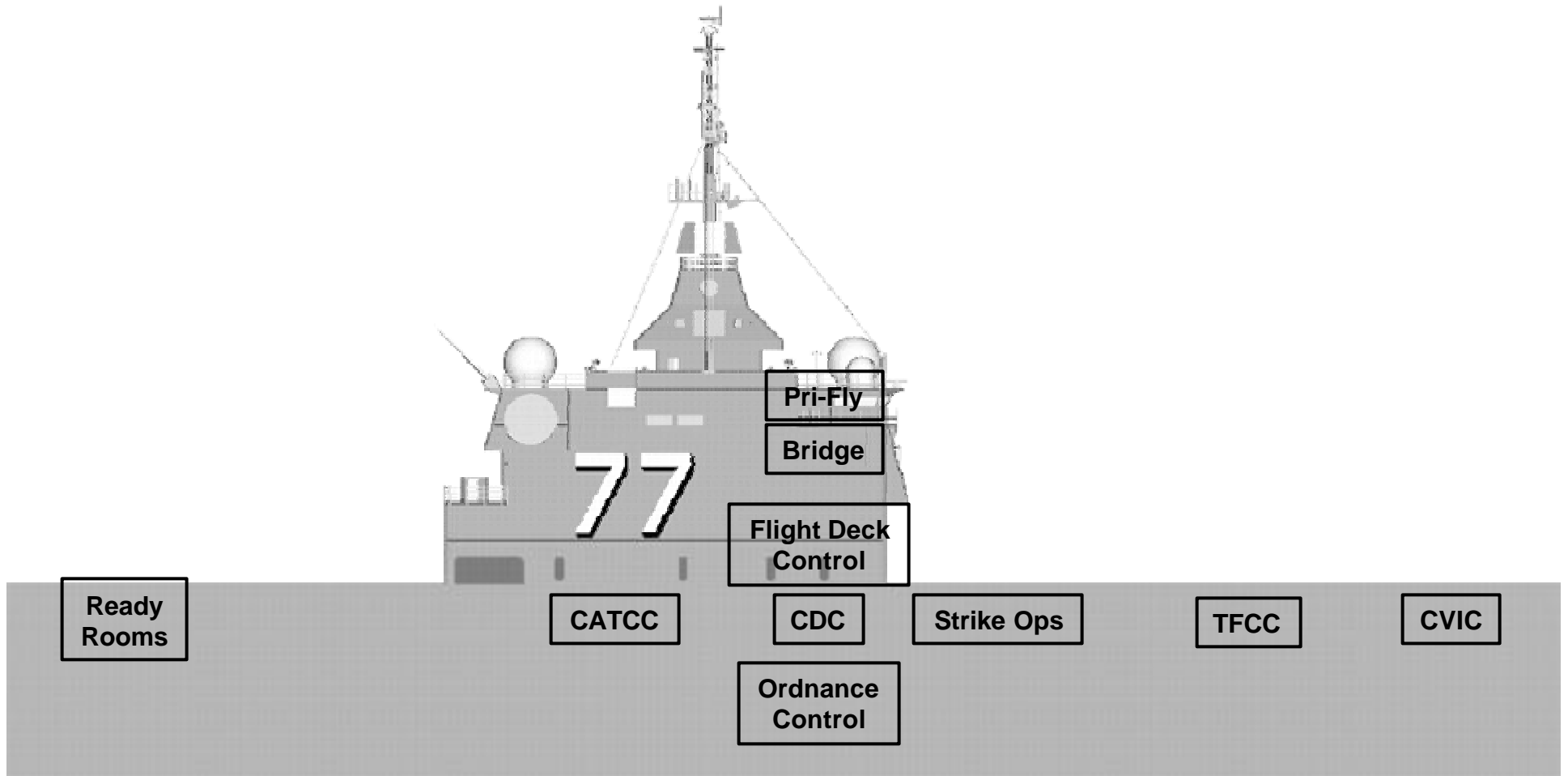


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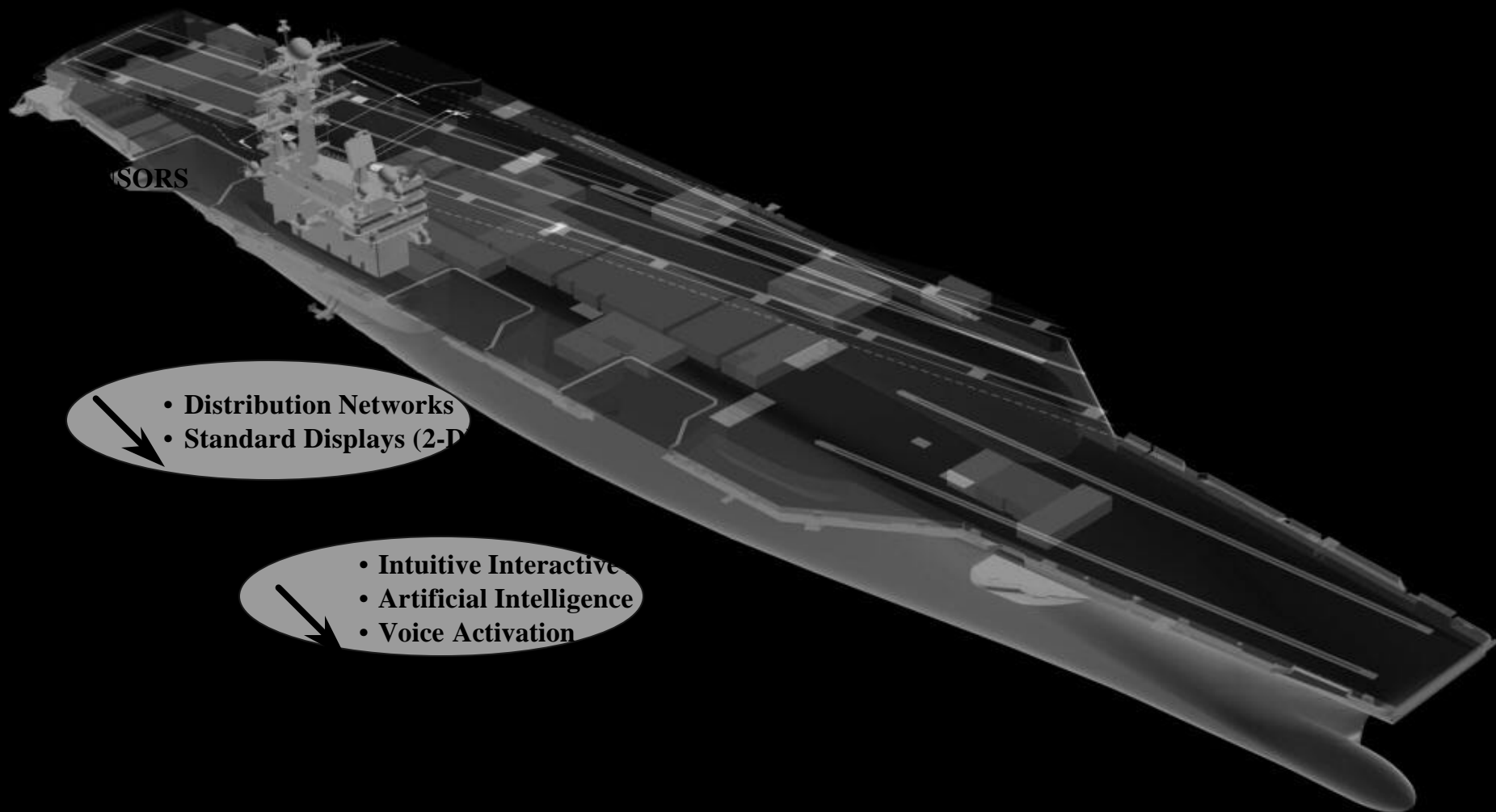
Integrated C⁴ Centers



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SORS

- Distribution Networks
- Standard Displays (2-D)

- Intuitive Interactive
- Artificial Intelligence
- Voice Activation



Think Aggressively.....Act Cautiously

- ◆ Cost reduction initiatives include reducing manning by performing tasks better (cheaper and more reliably).
 - Focus is on communication systems, remote sensors, procedural improvements
 - Blend of onboard data bases with “Dial Up” access for support as needed.

BUT.....

- ◆ The Fleet is experiencing low manpower today.
 - How to test/validate reduced manning scenarios?
 - Working with the test community to use M&S that can build confidence of all parties

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A Flexible Approach is Needed

- ◆ Obtain synergy from efforts such as **Smart Carrier** by involving test community with modification experiments to existing processes and systems.
- ◆ Early involvement with the test community may be able to identify operational training deficiencies and get the necessary steps underway to correct as the ship is being constructed.
 - Aircraft Carrier build period exceeds 7 years
 - Flexible test philosophy needed to address changes without “excess impact”



Training Challenges

- ◆ Training pipeline stressed to deliver quantity and quality into a dynamic systems environment
 - Long pipelines lead to late arrivals, high costs
 - *In Situ training* value is high, but requires foundation to be in place.
 - Schoolhouse costs driving to move some foundational training to fleet units.
- ◆ Training Strategy must be agile to satisfy both existing and new design platforms.
 - Seeking to minimize platform unique overhead

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Training Issues Afloat

- ◆ Indoctrination, Qualification, Proficiency
 - Which go to sea? All Three!
- ◆ Visual trainers for aircrew now cheaper, smaller, with high fidelity presentations.
 - Re-programmable for multiple aircraft
 - Mission rehearsal now achievable
- ◆ Reduced personnel dictate new solutions beyond NEC/MOS for all



Summary

- ◆ Evolutionary change across Carrier Line presents an opportunity for a fresh approach
- ◆ Longevity of platform presents some “unknown engineering” that may not have adequate M&S tools verified and accredited.
- ◆ “Smart” Programs can provide single T&E target while producing results for several platforms.
- ◆ Validated manpower M&S Tools are needed.

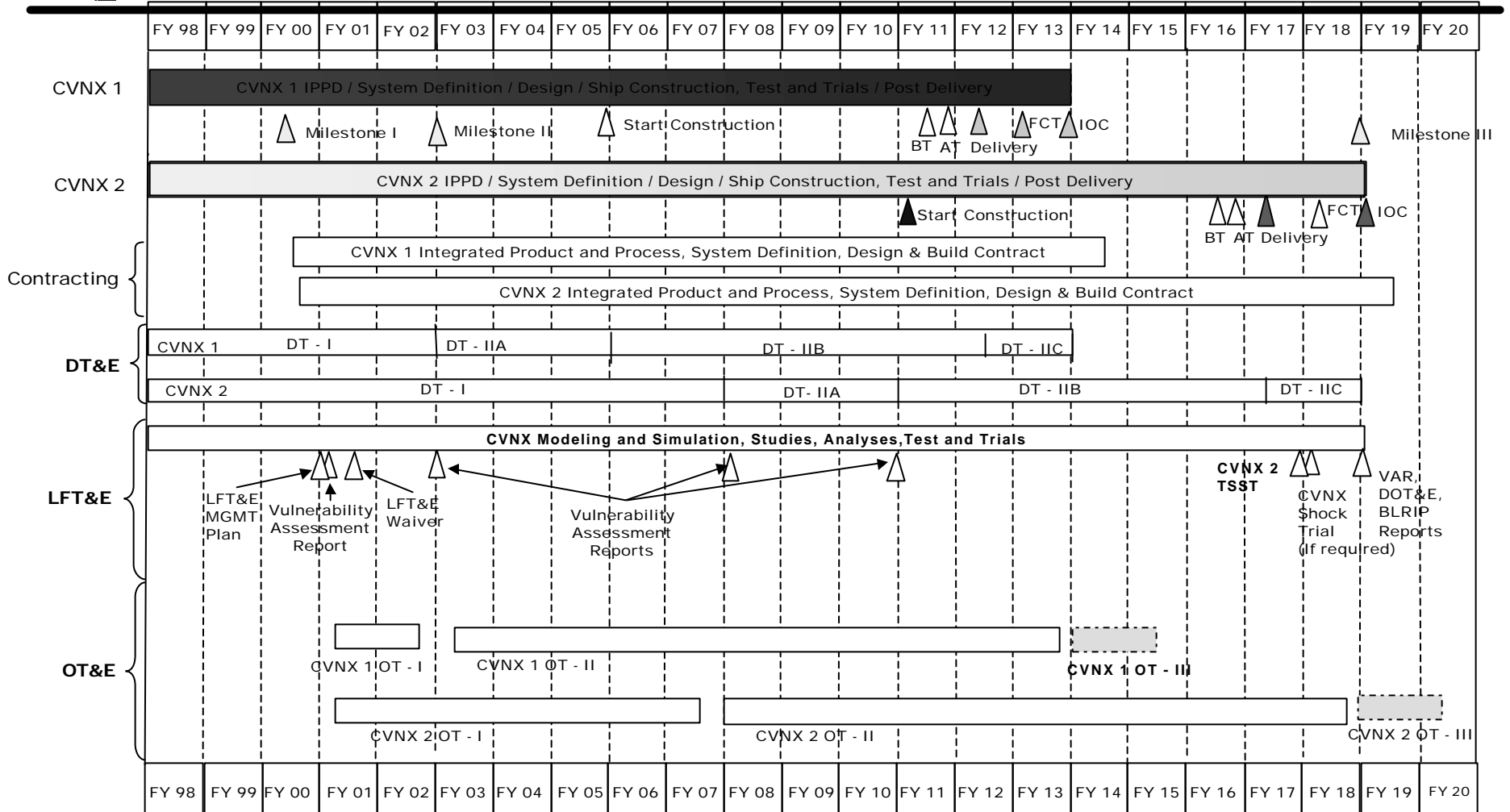
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INTEGRATED TEST PROGRAM SCHEDULE for CVNX



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