Try Before you Buy?!
How to get users to buy off on your "yet to be developed" system

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Agenda

- Why “Try before you buy”?
- What we are trying to accomplish
- Current Challenges
- Cost of Ignoring the Human in Design
- HSI Requirements in Acquisition
  - *HSI DoD Milestone Requirements*
- Evolutionary Acquisition
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Why “Try before you buy”?

- Space systems acquisitions have inherent Human Systems Integration (HSI) challenges
  - *Increasing information demands on operators,*
  - *Requirements for operators to perform jobs in new/different ways, and*
  - *Continuing pressure to limit manpower and exposure of personnel to threats.*
- Successful implementation of HSI can result in significant cost reduction in
  - *The number of personnel required by the system,*
  - *Time and resources for training,*
  - *Error and accident rates,*
  - *Error recovery time, speed and proficiency with which personnel operate, maintain, repair, and deploy the system.*

Why “Try before you buy”? (cont’d)

- Case studies of existing space programs reveal programs that failed to adequately address user integration have encountered a number of problems during turnover to operations.
  - *Problems include significant system redesign,*
  - *Delays in operational acceptance,*
  - *The need for more personnel with greater skills, and*
  - *The need for additional operator training.*
- Provides a starting point for the actions planned and taken by a government team to reduce cost, schedule and technical acceptance risk by taking a back to basics approach to addressing user requirements in the early acquisition phase of a program.

What are we trying to accomplish?

Can these warfighters?

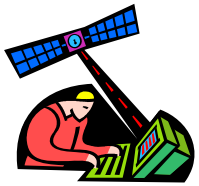
With this training?

Using this equipment?

Under these conditions?

TIME PRESSURE

24/7 ops



STRESS

Weather

Accomplish their mission?

Images courtesy of United States Air Force

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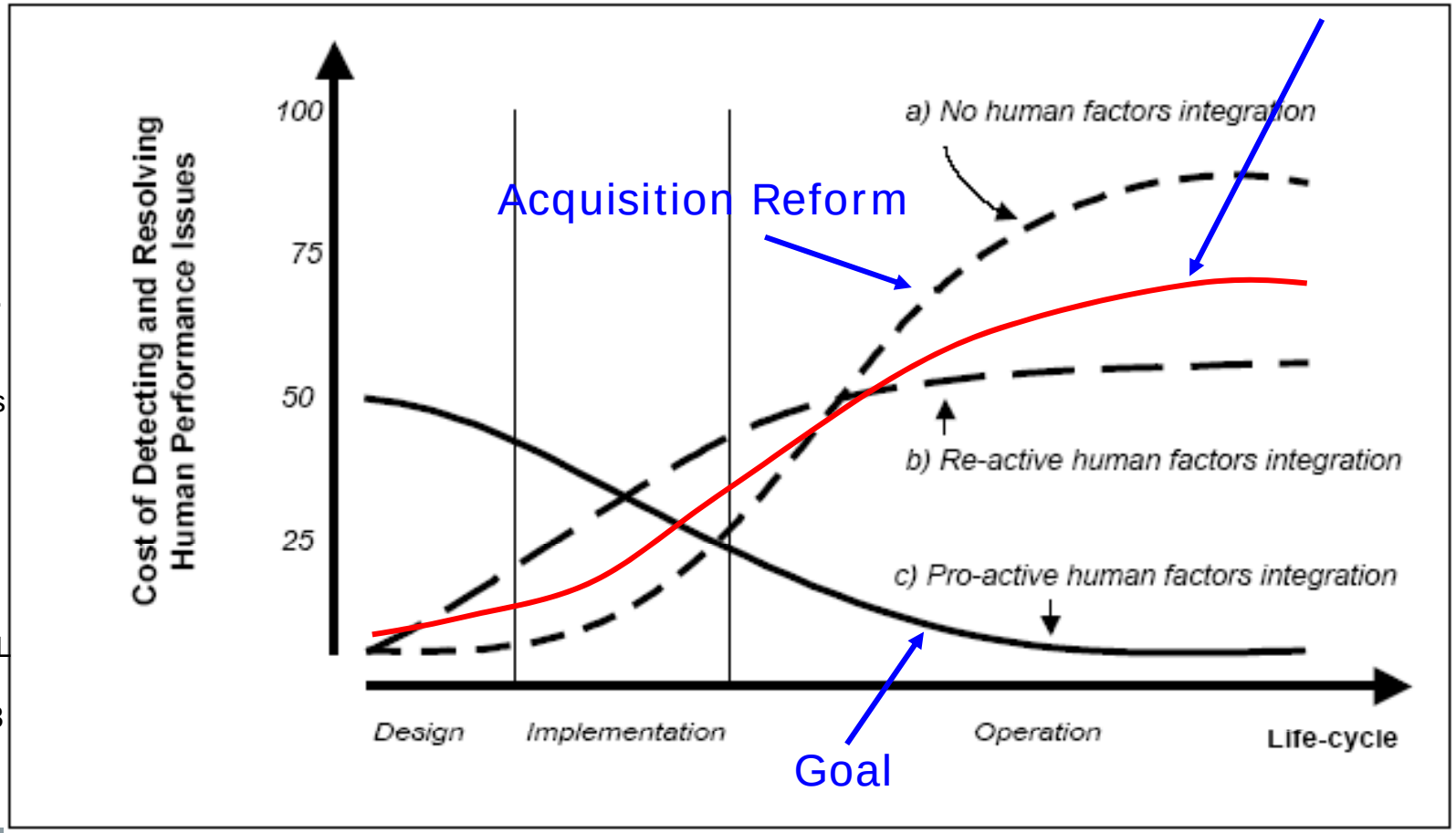
Current Challenges

Integration of users across system lifecycle represents 40-60% of life-cycle costs

* Increased demands on operators – new missions, CONOPS, tactics
* Increased volume and rate of information
* Reduced manpower projections - number and experience
* Changing human roles – control of multiple platforms, multi-mission tasking

Cost of Ignoring the Human in the Design

Objective: Address HSI issues and concerns early in the development lifecycle reducing both development and operational costs.



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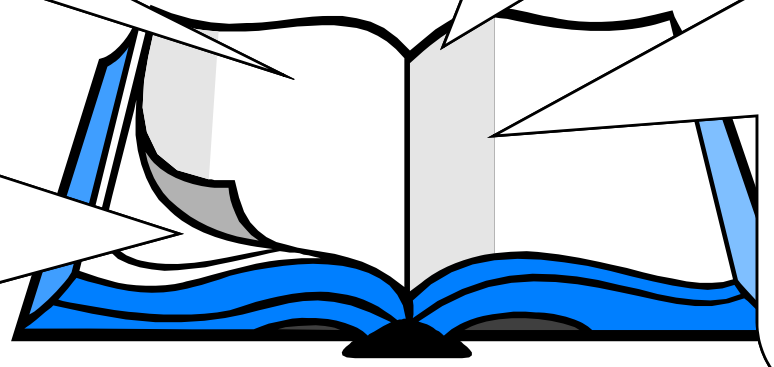
Human Systems Integration Requirements in Acquisition

DoD 5000.2-R, Chapter 2, Para C2.8.5.
"The PM shall pursue HSI initiatives to optimize total system performance and minimize TOC. The PM shall integrate [human-related domain] considerations into the acquisition process."

NSS Acquisition (03-01), Para AP 1.1.7
"The PM shall have a comprehensive plan for Human Systems Integration (HSI) in place *early* in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure that the system is built to accommodate the characteristics of the user population"



DoD 5000.2-R, Chapter 5, Para C5.2.3.5.9.
"For all programs regardless of ACAT, the PM **shall** initiate a comprehensive strategy for HSI early in the acquisition process [to minimize cost and maximize performance]."

SMC HSI Policy Letter
Must consider the man-machine interface "up-front and early"… "Actively work with operators /maintainers… to develop HSI requirements"

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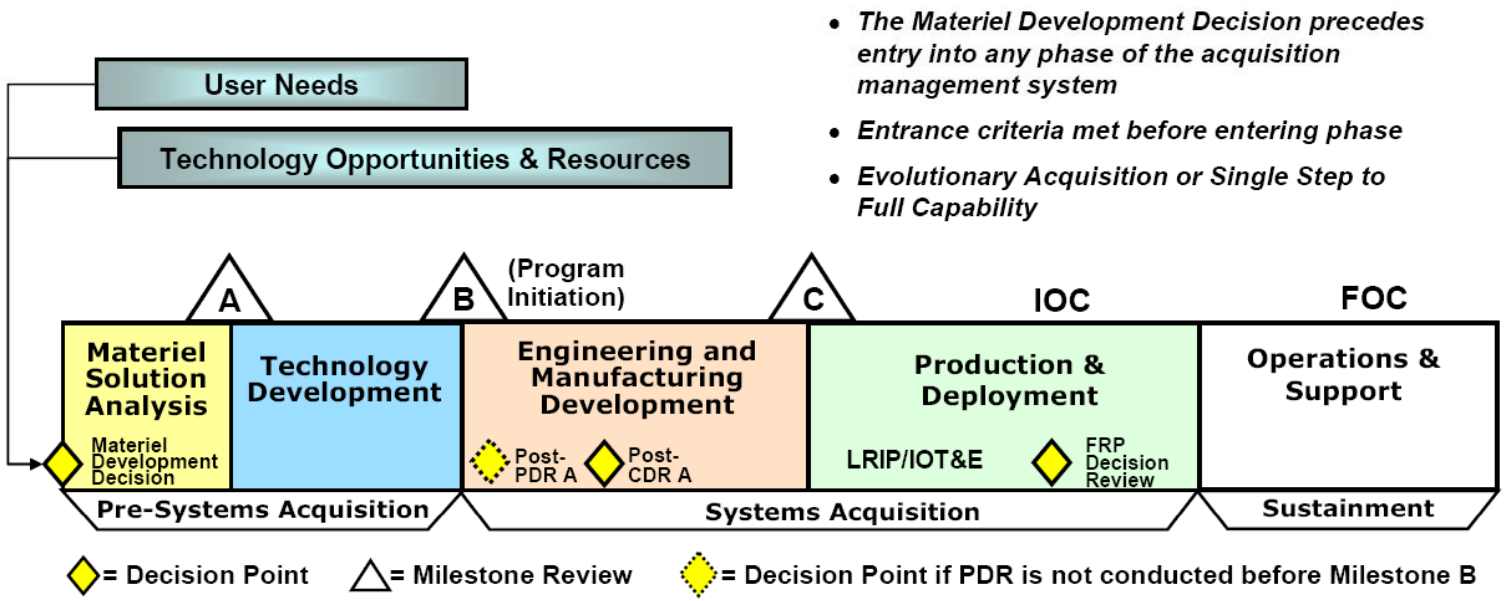
DoD HSI Milestone Requirements

Figure 1. The Defense Acquisition Management System.



HSI Inputs during Acquisition

- *Acquisition Strategy - Describe technical and management approach (including responsibilities) to meet HSI requirements/initiatives. DoD 5000.02*
- *HSI Plan – Document the HSI acquisition activities to be performed in the acquisition, management, and sustainment of the program over the entire acquisition life cycle. The focus is on the activities that pertain to the integration of users, operators and maintainers with the system design. (DoD 5000.2, NSS 03-01, SMC HSI Policy)*
- *Contract – Include appropriate specifications, requirements, contract deliverables*

DoDI 5000.02, December 8, 2008, p. 12

Evolutionary Acquisition

- An evolutionary approach delivers capability in increments, recognizing, up front, the need for future capability improvements.
- Evolutionary acquisition requires collaboration among the user, tester, and developer. In this process, a needed operational capability is met over time by developing several increments, each dependent on available mature technology.
- Technology development preceding initiation of an increment shall continue until the required level of maturity is achieved, and prototypes of the system or key system elements are produced.

Evolutionary acquisition promotes user involvement and acceptance

DoDI 5000.02, December 8, 2008, p. 13

Barriers to addressing user requirements

- Human Factors = common sense

  …ok, well let's use some common sense

- The human factors engineer didn't tell me anything I could not have thought of myself

  …but you didn't think of it

- The handbooks never have recommendations for the conditions that I need - I need an answer tomorrow

  …yes human factors requires analysis and testing… this isn't a paint by number activity

- Get the system to the user they can figure it out (people are adaptive)

  …yes, users are very smart, but why should they be expected to compensate for poor/lack of engineering?

- After I get the system working, then I'll look into human factors questions, if I have any time (and money) left

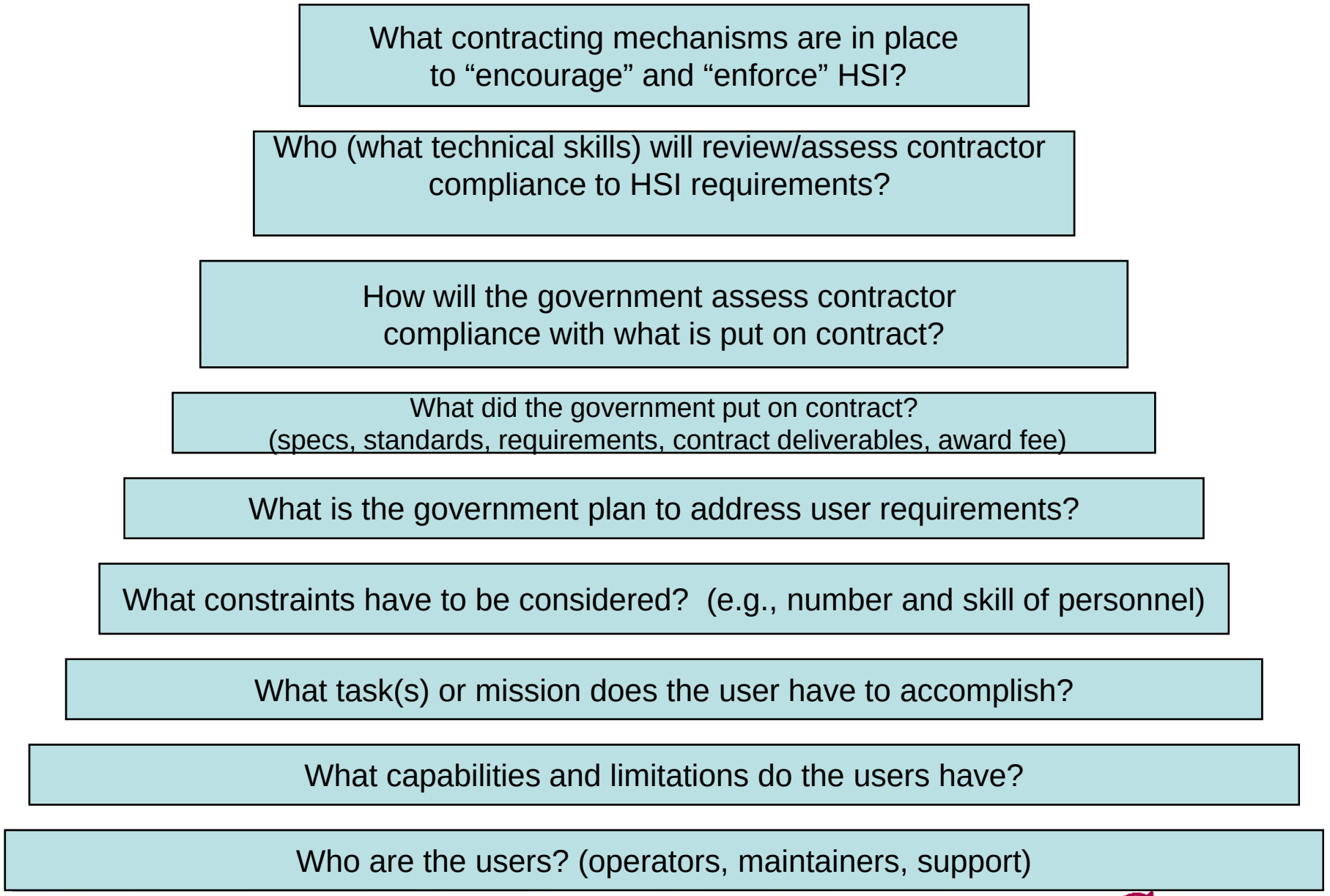
  – *…isn't making sure the human can operate, maintain and support the system part of getting the system working?*

Adapted from Pew (1978)

So maybe you are required to do this “stuff” but what exactly should you do?

- Admit you have humans in your system – These include operators, maintainers, and support personnel
- Understand the knowledge, skills and abilities (capabilities and limitations) of the designated operators, maintainers and support personnel
- Understand the specific mission and tasks that are required of the operators, maintainers and support personnel
- Develop and implement a “back to basics” engineering
  - *Develop (and write it down) a plan for how your program will address HSI*
  - *Include compliance specifications, requirements, data items (products) and formal demonstrations/prototypes in the contract*
  - *Develop a team to address HSI issues (expertise in human factors engineering, systems engineering, software/hardware, logistics and operations) (Both government and contractor)*
  - *Determine an effective approach to address transition and contractor interaction with operators early in the program*

Building Blocks to Success



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Summary

- Effective solutions can be taken to incorporate user requirements in the early acquisition phase of a program.
- Requires commitment on the part of the leadership, technical team and operations community
- Addressing HSI issues early in the program will support objective to reduce overall system lifecycle costs

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