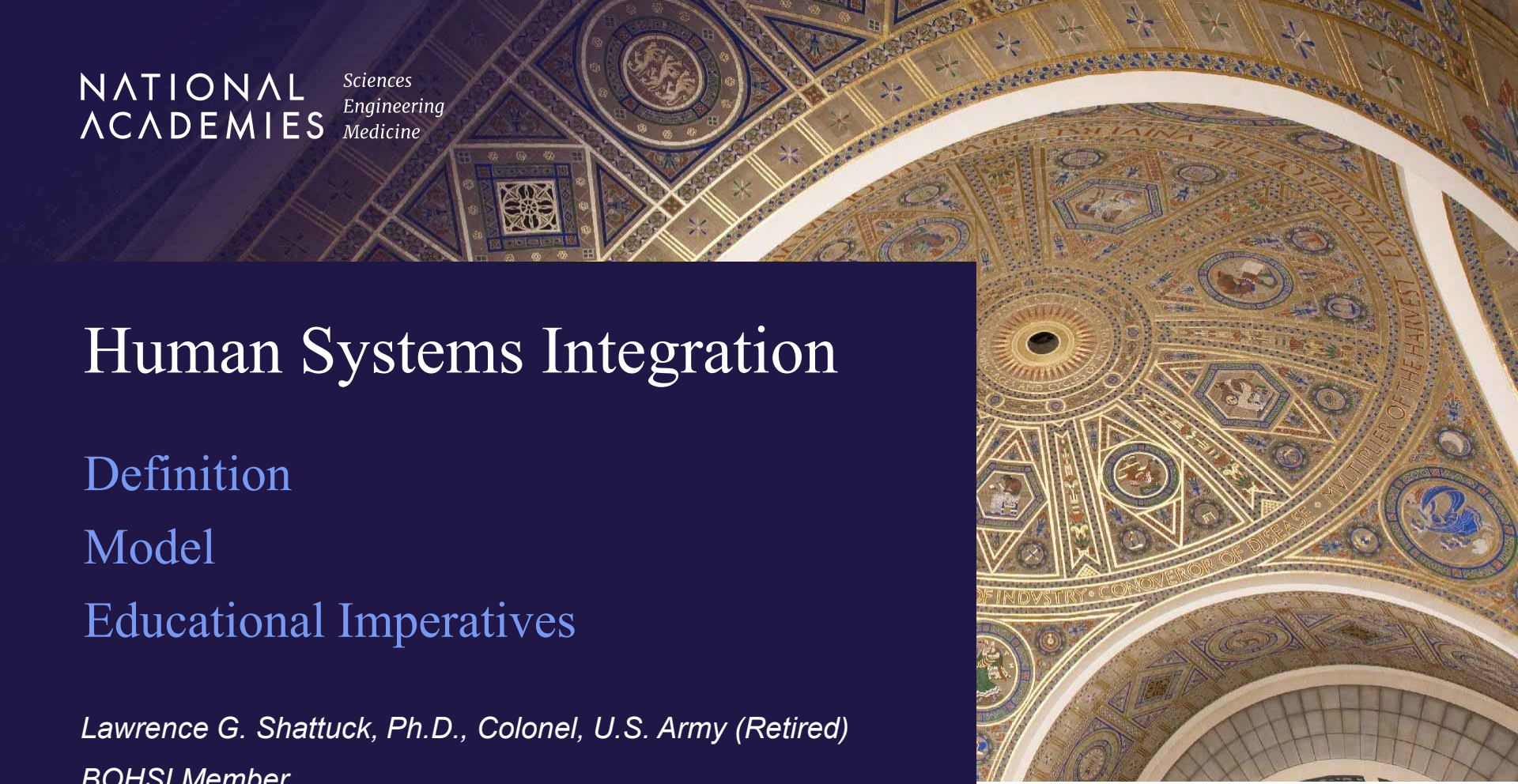
NATIONAL ACADEMIES Sciences Engineering Medicine



Human Systems Integration

Definition

Model

Educational Imperatives

Lawrence G. Shattuck, Ph.D., Colonel, U.S. Army (Retired)

BOHSI Member

NOVEMBER 2022 UPDATE

“HSI exists in the interstitial spaces”

Dr. Nita Shattuck, circa 2006

Interstitial adjective
in·ter·sti·tial
1: occurring in or being an interval or intervening space or segment
https://www.merriam-webster.com/dictionary/interstitial

DoD Definition of HSI

The *systems engineering process and program management effort* that provides integrated and comprehensive analysis, design, and assessment of requirements, concepts, and resources for human factors engineering, manpower, personnel, training, safety and occupational health, force protection and survivability, and habitability.

https://www.cto.mil/sea/hsi/

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DoD Definition of HSI

These *HSI domains are interrelated and interdependent* and must be among the primary drivers of effective, efficient, affordable, and safe system designs. HSI integrates and facilitates trade-offs among these domains and other systems engineering and design domains but does not replace individual domain activities, responsibilities, or reporting channels.

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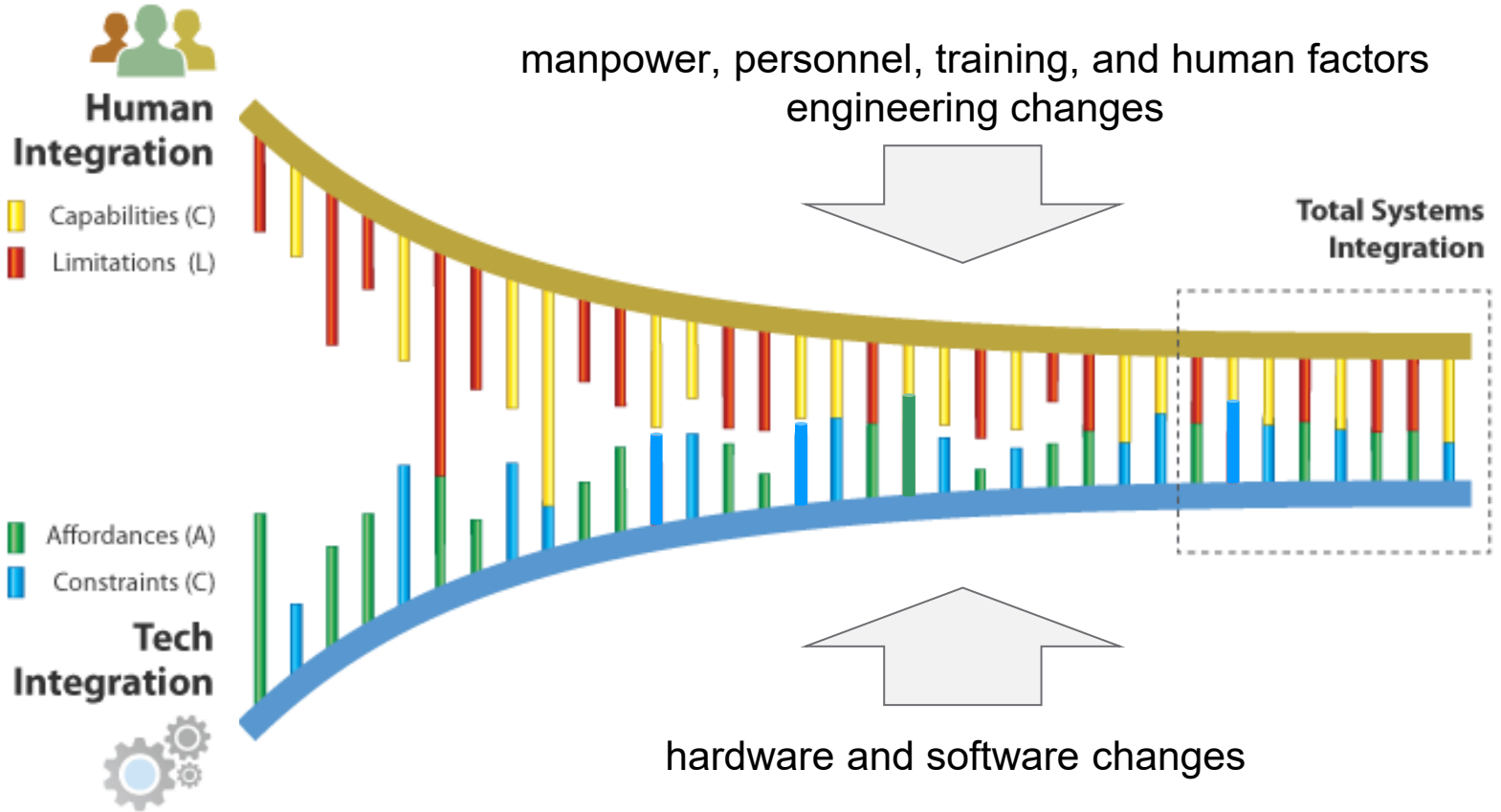
DoD Goal for of HSI

- Ensure human performance is optimized
- Increase total system performance (TSP)
- Minimize total system ownership costs (TOC).

Incorporating HSI early in system design promotes more successful and effective transition of capability to the warfighter.

https://www.cto.mil/sea/hsi/

Human-Technology Integration Model



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Adapted from Shattuck, L.G. (2017). From Cognitive Systems Engineering to Human Systems Integration: A Short but Necessary Journey. In P. J. Smith & R.R. Hoffman (Eds.), *Cognitive Systems Engineering: The Future for a Changing World* (pp. 309–325). CRC Press.

Educational Imperatives for HSI Practitioners

1. HUMAN PERFORMANCE: Be knowledgeable in both individual and team performance, including perception, cognition, decision making, and motor control. Understand current human performance theories and practices for assessing physiological, psychological, social, and situational impacts on attention, memory, situation awareness, stress, fatigue, and motivation.

2. HSI DOMAIN KNOWLEDGE: Possess a background in all HSI domains: Human Factors Engineering, Manpower, Personnel, Training, Environment, Safety, and Occupational Health, Survivability, and Habitability.

3. ANALYTICAL TECHNIQUES: Able to conduct appropriate human performance and human-system empirical analyses and perform tradeoff analyses across domains of HSI and other engineering disciplines.

Educational Imperatives for HSI Practitioners

4. MODELING and SIMULATION: Apply modeling and simulation (M&S) techniques to explore HSI domain tradeoffs and tradeoffs within other engineering disciplines.

5. SYSTEMS APPROACH: Comprehend the principles, practices, and terminology in related fields and disciplines, e.g., systems engineering, program management, test & evaluation, etc.

6. IMPLEMENT HSI TRADEOFFS: Be able to conduct trades among HSI domains and with other engineering disciplines, Understand the political, organizational, social, and economic issues associated with integrating human-machine systems into organizational cultures and environments. Articulate the cost-benefit of these analyses to both technical and non-technical audiences.

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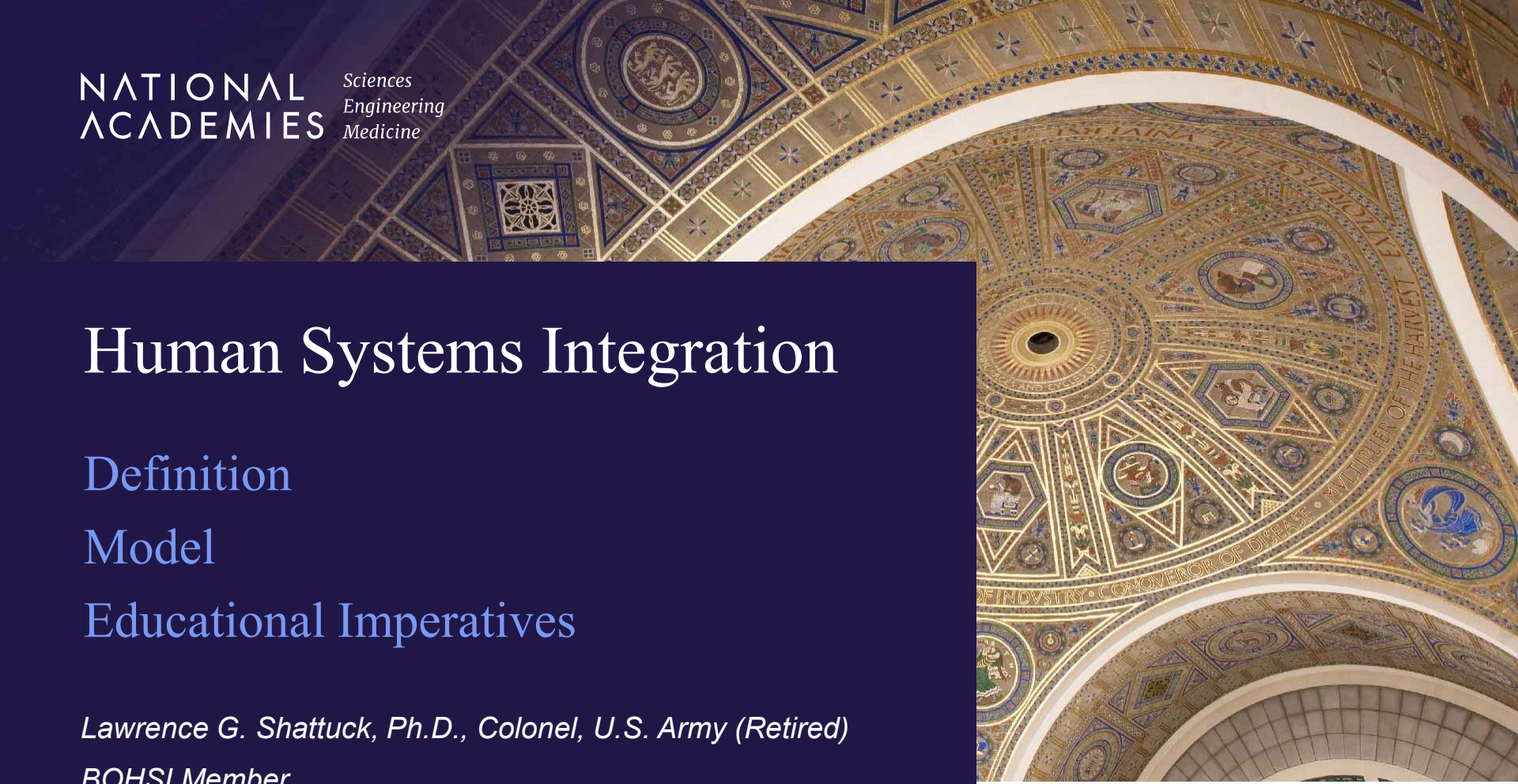

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