

MIL-STD-1472 Revision "H"

Significant Updates and Challenges for the Human Factors Engineering (HFE) Standard

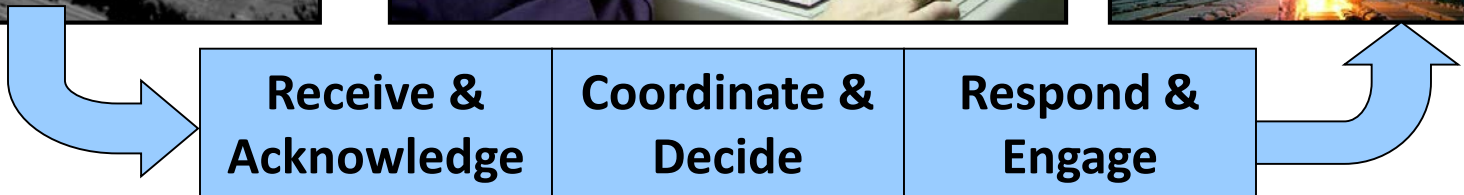
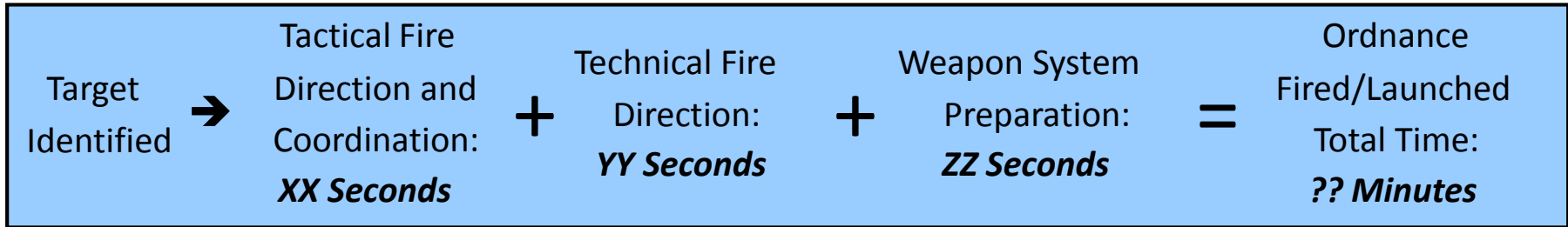
Daniel F. Wallace, PhD
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Brief Introduction to Human Factors and Context for MIL-STD-1472

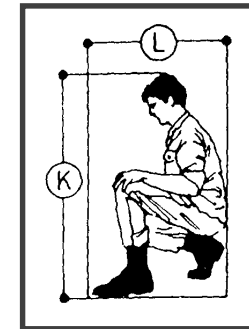
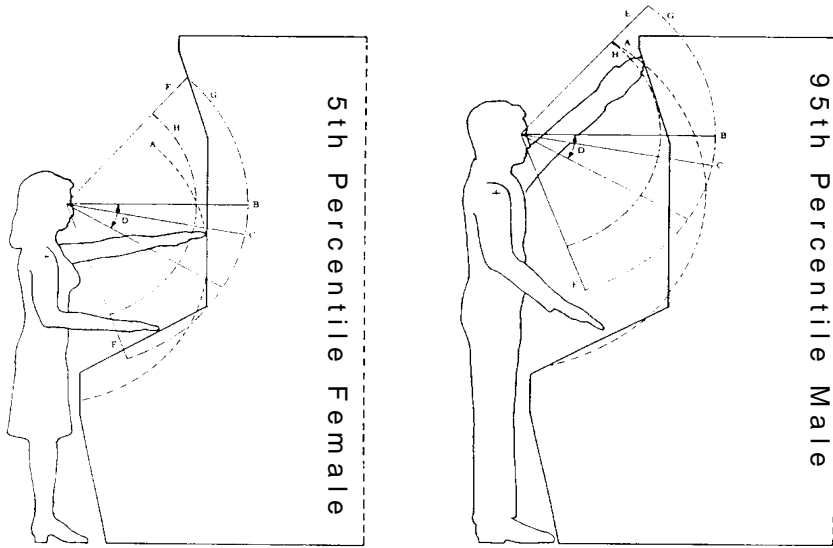
Human Factors Engineering (HFE) addresses system design features and factors that ensure an optimal “fit” for the **physiological** and **cognitive** capabilities and limitations of the users

HFE Drives System Capability



← *Human Performance* →

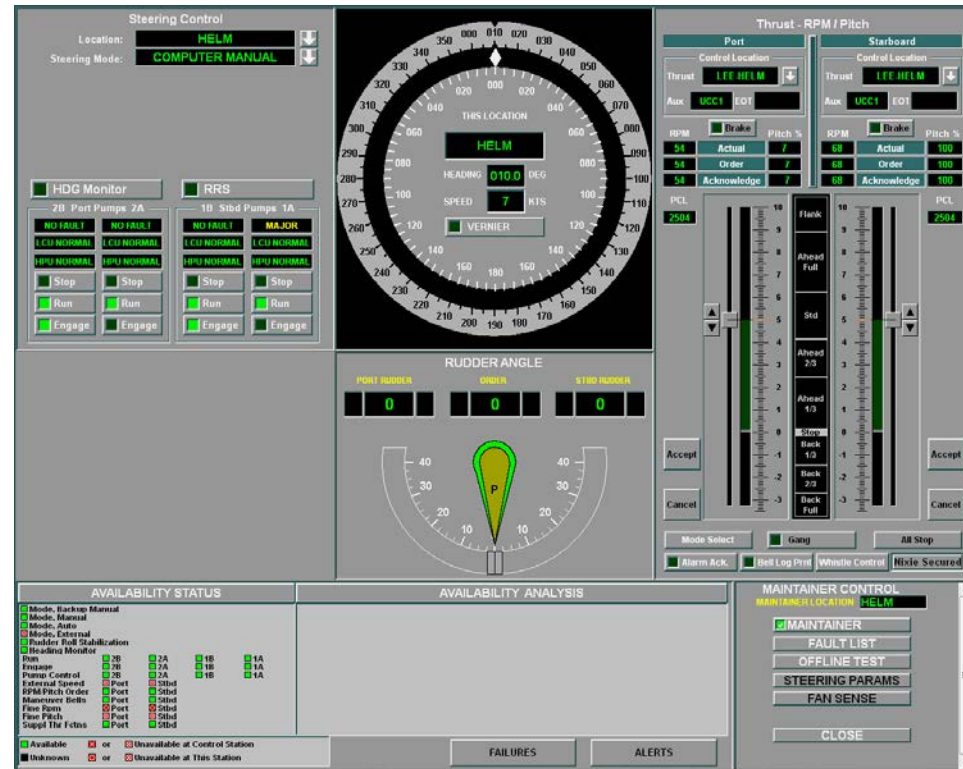
← *Total System Performance* →



	Minimum		Preferred	
	mm	in	mm	in
K Height	1220	48	---	---
L Depth	685	27	910	36

*Figures from MIL-STD 1472

- Human reliability is already notoriously suspect
 - E.g., 10^{-3} error rate as a starting point
 - Influenced by design by orders of magnitude
- Even if the system information is ‘technically’ accurate, but the design has the potential to induce an operator error, the system has failed



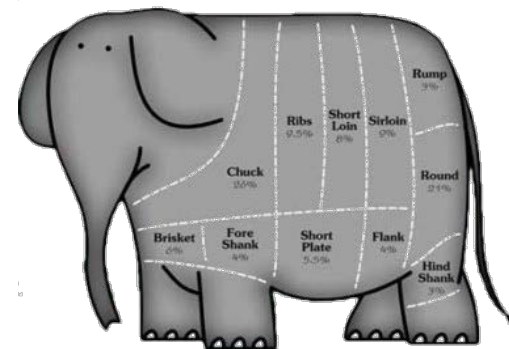
Design criteria can help mitigate human performance challenges

- The DoD “Flagship Standard” for the Human Factors Engineering domain is MIL-STD 1472 (DoD Design Criteria Standard, Human Engineering)
- “G” Revision Issued in January 2012
 - First true revision in 20 years
 - Significant reorganization
 - Clean-up of obsolete information
 - Correction of errors, and
 - A few additional topic areas
- Significant gaps remained

DoD Human Factors Engineering Technical Advisory Group (HFE TAG) topics

- Update anthropometry data (US Army Natick survey results)
- Revise strength guidance
- Thermal stress associated with combat equipment and PPE
- Weight limits for combat equipment
- Passageway minimum clearance while wearing protective gear
- Add content on acceptable vehicle/ship motion/acceleration (MSI, MIF, MII, injury) including information on permissible whole body vibration
- Provide guidance on the design and use of handheld devices
- Expand content on unmanned systems and controls, and telepresence
- Expand information on alarm and alert presentation
- HCI section (complementary to ANSI/HFES 200)
- Consider adding information on common information views
- Provide guidance on user authentication such as computer card access, fingerprints, retina scanning, voice recognition systems, and facial recognition systems
- Update to habitability design criteria
- Provide a section on emergency escape devices (hoist, lifeboats, survival gear)
- Etc...

- Multi-agency / Tri-service cooperation vital to success
- DoD HFE Technical Advisory Group represents the core community of practice for the use (and development) of MIL-STD-1472
 - Use their lessons learned
 - Leverage expertise in content creation/editing
 - Leverage resources
 - Build service component, agency, and industry buy-in
- Divide and conquer...
 - 26 initial working groups
 - 30 government and industry organizations
 - >200 contributors



- Section 3 – Definitions
- Section 4 - General Requirements
- Section 5.1 - Controls
- Section 5.2 - Visual Displays
- Sections 5.3 - Speech & Audio Systems
and 5.5.4 - Acoustical Energy & Noise
- Section 5.4 - Labeling
- Section 5.5 – Environment
- Section 5.5.5 - Vibration & Shock
- Section 5.5.7 - G-Loading
- Section 5.6 - Ground Vehicles
- Section 5.7 - Warnings, Hazards, and Safety
- Sections 5.8 - Physical Accommodation &
Anthropometry
- Sections 5.8.5 - 5.8.6 - Strength and Handling*
- Section 5.9 - Design for Maintainability
- Section 5.10 - Workstation Design
- Section 5.11 - Physical Environment Design
- Section 5.12 - Virtual Environments
- Section 5.13 - Individual, Crew-Served, Ground and
Air Weapons Systems, and Optics
- Section 5.14 - Peripherals
- Section 5.15 - Ship and Industrial Structures Valves
- **New Section 5.16 - Habitability**
- **New Section 5.17 - Technical Documentation**
- **New Section 5.18 - Cybersecurity**
- **New Section 5.19 - Human-Computer Interface**
- **New Sections 5.20 - Emergency Escape Devices**
- **New Section 5.21 - Ship Bridge Design**
- **New Section 5.22 - Seat Restraint Systems**
- **New Section 5.23 - Handheld Devices**
- **New Section 5.24 - Human Performance**

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- 3 December 2015 memorandum from Secretary Ashton Carter on “*Implementation Guidance for the Full Integration of Women in the Armed Forces*”
 - OSD ATL directed that MIL-STD-1472 values be adjusted to be consistent with accommodation for mixed gender crews, thereby removing barriers “*to the integration of women into all military occupational specialties and career fields within the U.S. military*”
 - Strength and anthropometry sections modified to reflect mixed gender crews, including removal of "male only" criteria from the tables
 - Deviations and waivers are already being discussed and developed for legacy system designs and technologically infeasible solutions (e.g. 120 lbs. transformer power supplies)

- Interagency/DoD standards have unique challenges:
 - Larger user population to be supported
 - More diverse mission requirements (e.g., NASA, FAA, DHS, DoD)
 - More stakeholders and contributors
- As it is a very large and comprehensive document (~400p.) MIL-STD-1472 must be consistent and cross-referenced
- Using a “coalition of the willing” across ~30 organizations requires coordination of cultures, terminology, and priorities
- With >20 volunteer teams, schedule slippage is a reality

