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Human Factors in System Development

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Presented by

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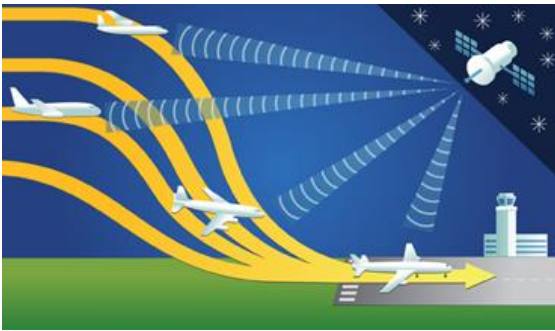
Edmundo Sierra, Scientific & Technical Advisor for Human Factors



FAA

What is Human Factors?

Human Factors Engineering (HFE) is a multidisciplinary effort to generate and compile information about human capabilities and limitations and apply that information to:



equipment, systems,
software, and facilities



procedures, jobs,
organizational design,
workspaces, and
environments



training, staffing, and
personnel management

to produce safe, comfortable, efficient, and effective human performance.

What is the FAA's policy for human factors in system development?

ORDER U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION 9550.B
10/27/93

SUBJ: HUMAN FACTORS POLICY

1. PURPOSE. This order establishes policy and responsibility for incorporating and coordinating human factors considerations in

8. POLICY. Human factors shall be systematically integrated into the planning and execution of the functions of all FAA elements and activities associated with system acquisitions and system operations. FAA endeavors shall emphasize human factors considerations to enhance system performance and capitalize upon the relative strengths of people and machines. These considerations shall be integrated at the earliest phases of FAA projects.

and coordinated efforts in the area of human factors with National Aeronautics and Space Administration, Department of Defense, and a multitude of professional groups such as the Human Factors and Ergonomic Society and the Air Transport Association Human Factors Task Force, whose members include pilot and contractor unions, airframe and parts manufacturers, as well as major airlines. One product of such efforts includes the National Plan for Aviation Human Factors.

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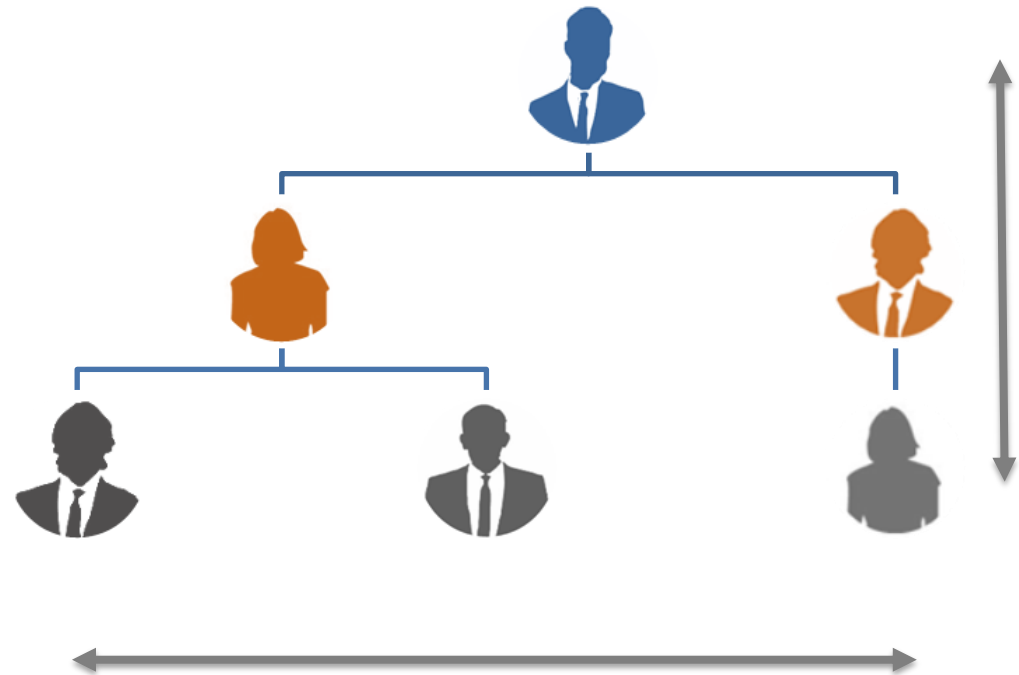
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How do FAA organizations respond to the human factors policy?

Human Factors Integration
at the Enterprise Level

Senior Human Factors Leadership
at the Portfolio Level

Human Factors Coordination
at the Program Level



Vertical & Horizontal Integration

What infrastructure does the FAA have for human factors in system development?

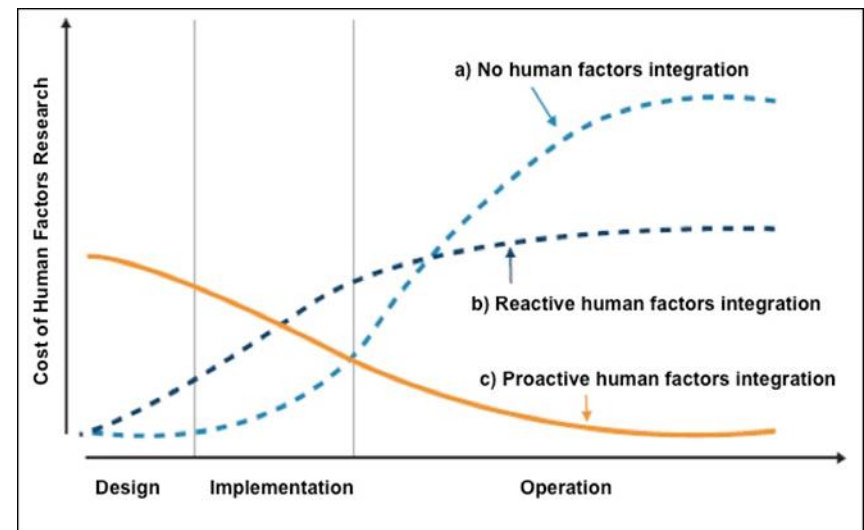


What are the human factors funding requirements?

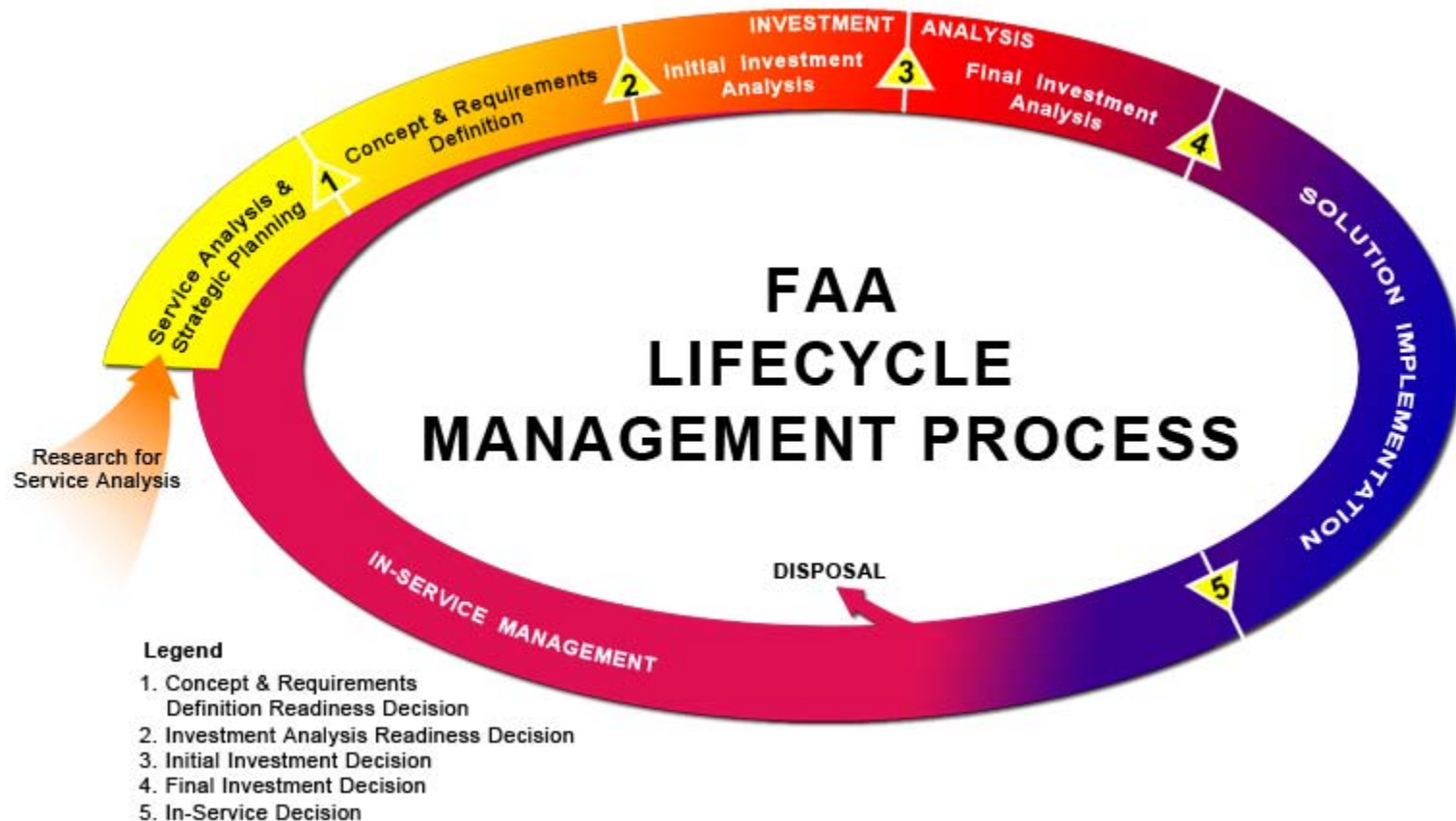
Funding requirements

- ❖ High budget estimate is 10% of program
- ❖ Median budget estimate is 7% of program
- ❖ Lowest budget estimate is 2% of program

Proactive cost estimate is less than reactive cost estimate



How are human factors system development activities in the FAA coordinated?



How does the FAA identify duplication or disconnect?

Human Factors Integration Lead

- ❖ Cross-agency human factors coordination
- ❖ Facilitates collaboration of human factors input within FAA



FAA Human Factors Subject Matter Expert

- ❖ Reviews programs to ensure that human factors issues are addressed early and throughout the system development process



How are cross-cutting human factors issues in system development addressed?

Common Starting Point

National Airspace System Enterprise Architecture (NAS EA) Products	
SRs Service Roadmaps January 2015 Roadmaps	IRs Infrastructure Roadmaps January 2015 Roadmaps for airports, air/ground...
AVs Architecture Enterprise & Program level architecture...	RQs Requirements National Airspace System Requirements Document (NAS-RD)...
FVs Financial Roadmap Facilities and Equipment (F&E)...	Data Browsers -- Select Data Element Type --

The National Airspace System (NAS) Enterprise Architecture (EA) establishes the foundation from which evolution of the NAS can be explicitly understood and modeled.

In any phase, FAA engineers benefit from using cross-cutting technical methods to determine feasibility, validate, and further define needed functions and requirements.

- ❖ Modeling
- ❖ Simulation
- ❖ Prototyping

What mechanisms are in place to identify and resolve human factors risks?

Programmatic Risk

Risk Management is a standardized, continuous, and proactive process that identifies Risks, Issues, and Opportunities, assesses and analyzes Risk, Issues, and Opportunities, and effectively mitigates risks/issues, and leverages opportunities, to achieve program/portfolio objectives.



Safety Risk

System Safety Engineering is the application of engineering and management tools—including principles, criteria, and techniques—to optimize the safety of a system within the program’s operational and programmatic constraints.

System Safety Engineering

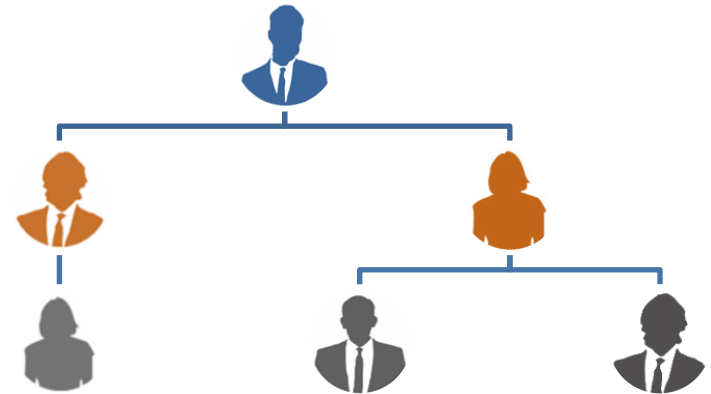
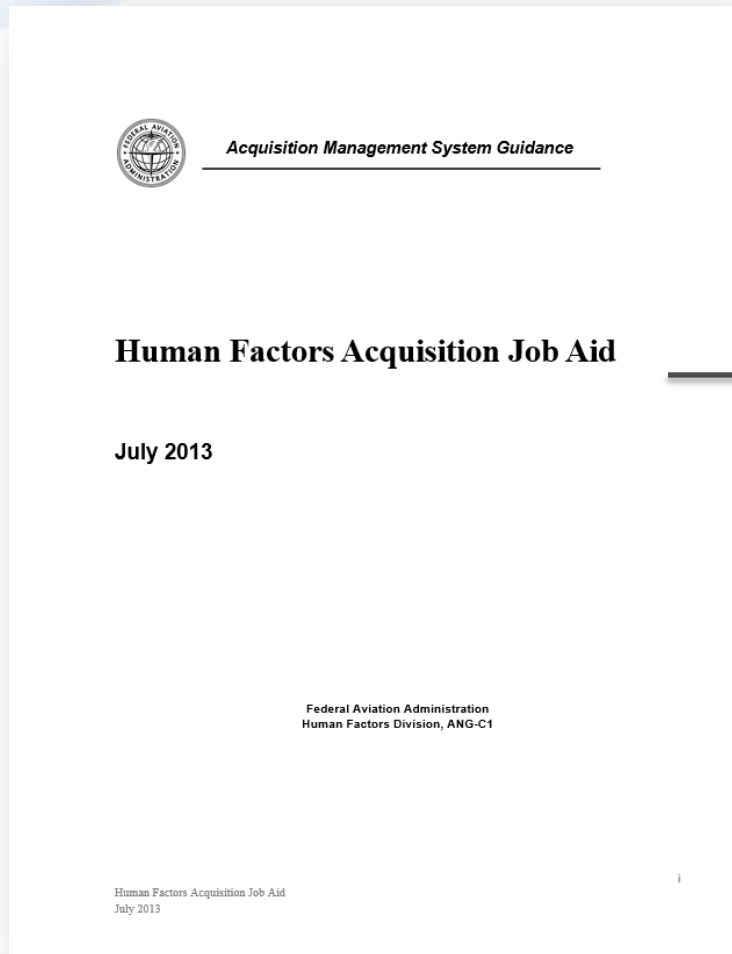
System Safety Engineering is the closed loop process of decisionmaking and allocation of scarce resources based on system safety risk assessment:

- Describe the system
- Identify hazards
- Analyze the risk
- Assess the risk
- Treat the risk

Level	Very High Risk 5	High 4	Major 3	Minor 2	Acceptable 1
Program A	Green	Yellow	Red	Red	Red
Program B	Green	Green	Yellow	Red	Red
Hardware Module C	Green	Green	Green	Yellow	Yellow
Hardware Submodule D	Green	Green	Green	Green	Green

Find the hazards (and their causes) that have the greatest potential risk and control that risk before the harm is realized!

How is the status of human factors work during system development known?



In accordance with human factors guidance, status of- and feedback for human factors is provided by the Program's Human Factors Coordinator and its Human Factors Working Group.

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