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Observation Platform for Technical and Institutional Consolidation of Safety research

OPTICS - Observation Platform for Technical and Institutional Consolidation of Safety research

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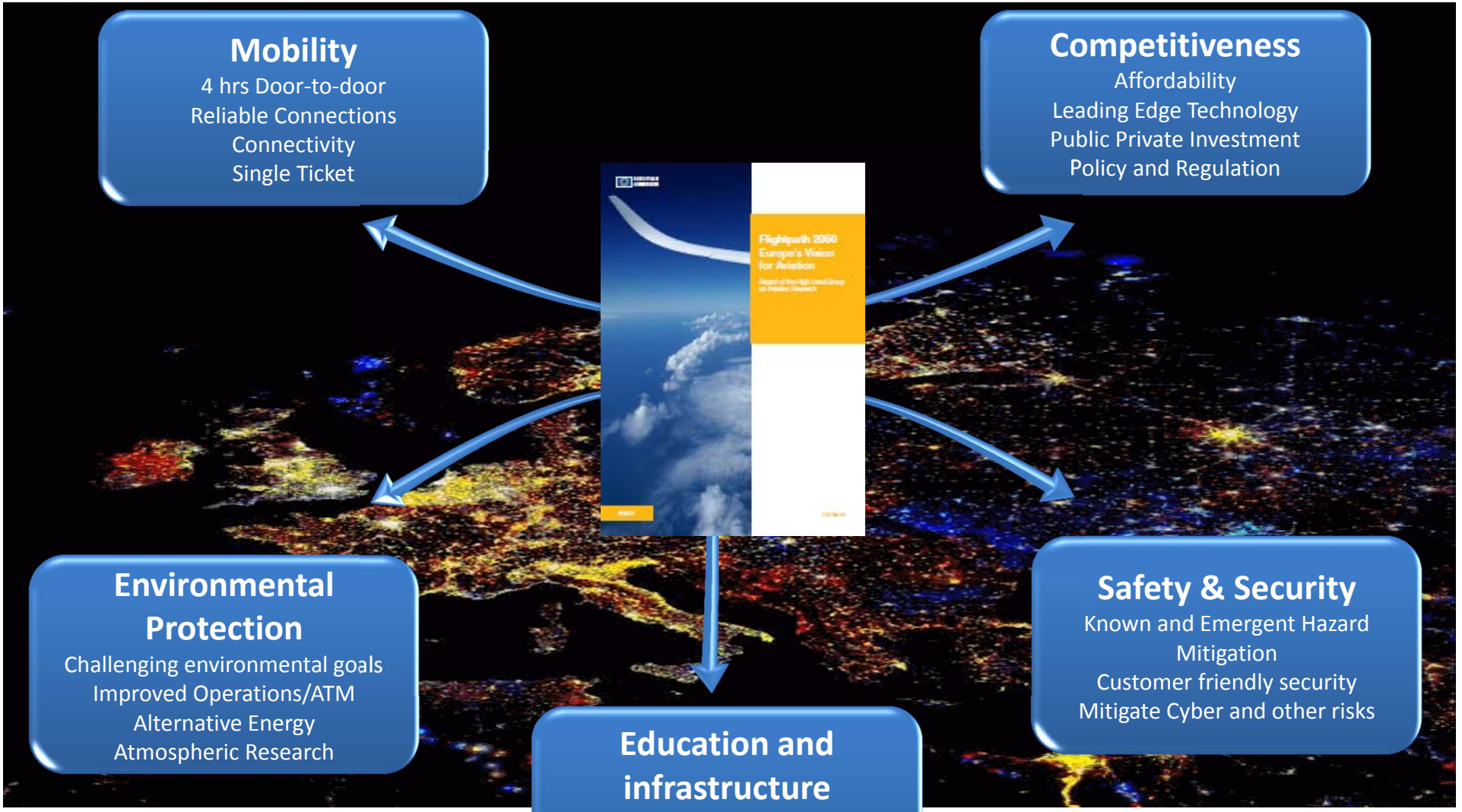
Flightpath 2050

Flightpath 2050 sets vision of European aviation transport

- **Advisory Council for Aviation Research in Europe (ACARE)**: Engaged hundreds of experts across the entire Aviation Transport System
- **Strategic Research and Innovation Agenda (SRIA)**: Roadmap of what needs to be done in three time frames – 2020, 2035, and 2050.
- **Vision includes five principal pillars**: OPTICS is a European Commission-funded project that monitors the safety part of the SRIA

Europe's Vision for mid-century



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Europe's Vision for mid-century

Safety & Security

Known and Emergent Hazard Mitigation

Customer friendly security

Mitigate Cyber and other risks

The European air transport system has less than one accident per ten million commercial aircraft flights.

Weather and other hazards are precisely evaluated and mitigated.

Seamless operations through fully interoperable and networked systems (including manned and unmanned vehicles)

Efficient boarding and security checks allow seamless security

Air vehicles are resilient by design to security threats

The air transport system has a fully secured global high bandwidth data network.

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OPTICS asks two simple questions

- Are we doing the right research for aviation safety?
- Are we doing the research right?

Series of 4 safety workshops including HF, vehicle operations

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SRIA Landscape Map
Safety Capabilities - Human Factors

	INDIVIDUAL	TEAM	ORGANIZATIONAL
TECHNOLOGIES	ADAPTIVE AUTOMATION AUTOMATION SUPPORT HF IN DESIGN AND MANUFACTURING	CREW MANAGEMENT SYSTEMS MONITORING OF CREW/TEAM CAPACITY SYSTEMS FOR HAZARD AVOIDANCE INTEGRATED TECHNOLOGIES FOR TURNAROUND INFORMATION SYSTEMS SUPPORT FOR HUMAN COLLABORATION	TOOLS AND METHODS FOR EMERGENT RISKS INTEGRATED SEARCH AND RESCUE CAPABILITIES PREVENTIVE MAINTENANCE AND SYSTEM UPGRADES COMMON FRAMEWORK FOR CERTIFICATION
METHODS	HP ENVELOPE	CISM FOR TEAMS AND ORGANISATIONS NEW TEAM CONCEPTS UNDERSTANDING MULTICULTURAL INTERACTION BTWN CREW AND PASSENGERS UNDERSTANDING CULTURAL ASPECTS OF PASSENGERS	MANAGING HUMAN BEHAVIOUR IN EMERGENCIES BEHAVIOURAL ANALYSIS TO IDENTIFY HAZARDS SAFETY PERFORMANCE INDICATORS OPERATIONAL RISK MONITORING SAFETY DATA SYSTEMATIC ANALYSIS SAFETY CULTURE SAFETY INFLUENCES

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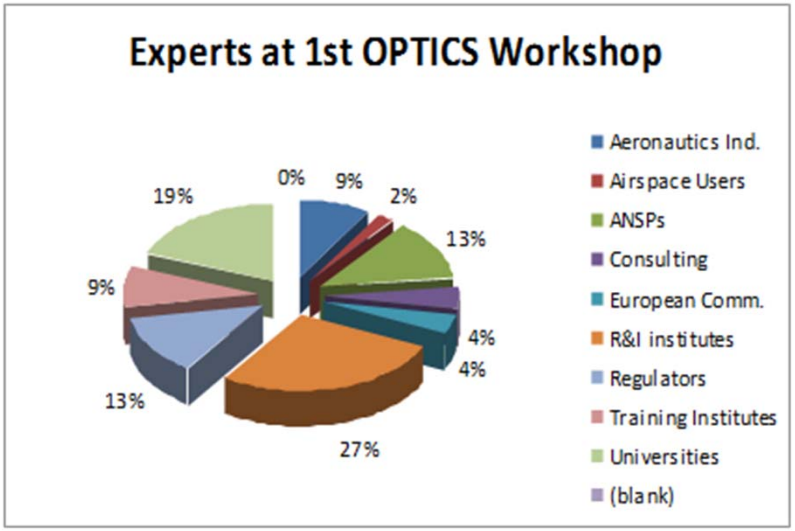

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1st Expert Workshop: Human Factors

Initial Priorities Sorted Into Six Categories

DESIGN FOR HUMAN USE	OPERATIONAL SAFETY
Human Factors in the Design Life Cycle Human Factors Guidance Human Factors Standards and Regulations Human Systems Integration Usability	Helping pilots avoid and recover from adverse events Understanding pilot performance in unsafe scenarios Online measurement and forewarning Human performance data collection and usage SAFURITY – Security impacting on safety

1st Expert Workshop: Human Factors

AUTOMATION	RISK MANAGEMENT
A framework for incorporating automation Adaptive automation using better cognitive models Tools for pilot training and selection Human-Machine Interactions Human/Automation System Roles	More integrated risk management Integrating HF into risk management Broader safety assessment (e.g., including ground operations, and safety culture) Integration of HF into Safety Management Systems Quantitative human performance prediction
HUMAN RESOURCES	**HUMAN PERFORMANCE**
Advanced training concepts Advanced selection testing Better understanding of organizational culture A focus on the role of social dialogue in facilitating the acceptance of technological and social change	Better measurement of: fatigue, situation awareness, workload, complexity, cognition, physiological measures Team performance monitoring and assessment Understanding/management of human variability Human Performance Envelope development and implementation More use of prototyping simulations Skill retention and degradation

Overarching Issues

Design for Human Use: After decades of research, the uptake of Human Factors into system designs is still low and uneven.

Are we getting Human Factors into the design life cycle at the right stage, or at all? Where are the HF standards and guidance materials that can be applied across the entire aviation transport system?

Automation: We have challenging goals for automation, but in practice, despite decades of experience in the cockpit, it is difficult tog et it right and acceptable to the user.

Where is the over-riding framework for incorporating automation into new systems, and for making the human-automation partnership effective?

Operational Safety: Pilots need more support for those rare emergency scenarios when they can find themselves suddenly in a dangerous situation with little time to recover.

How can we better understand, warn and support the aircrew in sudden emergency situations?

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Overarching Issues

Risk Management: Risk management and SMS usage are widespread, but Human Factors stays largely outside of these processes and frameworks, which still largely concern human risks in the system.

How can we get HF better integrated into these processes?

Human Resources: Selection and Training approaches in the industry have not evolved significantly, and organizational culture is treated as largely untouchable. Yet if safety is to improve, standards need to be raised at the individual, team, and organizational culture level.

How can we make better use of new ideas and methods from academia to raise standards in people management and performance in aviation organizations, both at the sharp end (pilots, controllers) and at the blunt end (management, leaders)?

Overarching Issues

Human Performance: Decades of research on individual factors such as fatigue and situation awareness gives the impression that the whole field of human performance in not 'joined-up'.

How can we develop an integrated approach that takes account of multiple factors and their interactions (human performance envelope), so that we can predict and guide the impact of future changes on total human performance?

Conclusions

Four Top Priorities Based on Most Votes

Human Performance Envelope

Research on individual factors (fatigue, methods for assessing complexity, skill degradation) needs to move to understand better how these factors interact and collecting influence human performance. Human Performance Envelope is to an extent a game-changer , as the usual approach is not having sufficient impact.

Human Factors in Design and Manufacturing

To close the shortfall in guidance and good practice for integrating Human Factors to encompass the entire aviation transport system (ATS) and its design life cycle (when to do HF, with what guidance, and against which standards), incentize the ATS with a benchmarking approach with which to rate processes and products for maturity.

Conclusions Continued

Top Priorities Based on Most Votes

Automation:

Adaptive Automation

With limited progress and questions about its viability, consider an intermediate stepping stone such as adaptable automation that is employed at the discretion of the user, so the user remains in the loop and does not lose situation awareness, and can recover if things go wrong and the automation can no longer cope.

Automation Support

As a key enabler for Flightpath 2050, the most inclusive idea at the Workshop was “Develop a framework for the incorporation of automation within complex systems.” This includes a toolkit of approaches and best practices for developing automation.

Additional Conclusions

Items Missing from SRIA

- Training and selection for the pilot and controller of the future
- Security impacts on safety (in particular cyber attacks)
- A common HF education system to teach the basics of HF to all system actors (operational, technical, design, and managers).

Main Game Changing Priority

To evolve an industrial and organizational culture that values Human Factors and uses it in design and management processes

Suggestions, Questions?

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