Deliverable 7.5

SHS case guidance and ways forward for performance-based and risk-based regulatory frameworks

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Abstract:

This document presents the **HAIKU Guided Path**, a framework providing practical guidance for designing human-centred AI-based Intelligent Assistants, targeting systems at TRL 1-6. An interactive mock-up of the HAIKU Guided Path has been developed and provided in the document.

This project has received funding by the European Union's Horizon Europe research and innovation programme HORIZON-CL5-2021-D6-01-13 under Grant Agreement no 101075332

Information Table

Deliverable Number	D7.5
Deliverable Title	SHS case guidance and ways forward for performance-based and risk-based regulatory frameworks
Version	1.0
Status	Final
Responsible Partner	DBL
Contributors	Roberto Venditti (DBL)
Contractual Date of Delivery	August 31st, 2025
Actual Date of Delivery	August 26th, 2025
Dissemination Level	Public

This project has received funding by the European Union's Horizon Europe research and innovation programme HORIZON-CL5-2021-D6-01-13 under Grant Agreement no 101075332

Document History

Version	Date	Status	Author	Description
0.1	03.07.2025	First Draft	R. Venditti (DBL)	First draft of the whole document
0.2	15.07.2025	First Review	B. Kirwan (ECTL-DBL)	Review with minor comments
0.3	06.08.2025	Second Draft	R. Venditti (DBL)	Interactive Prototype added to the main body
0.4	07.08.2025	Final Review	V. Arrigoni (DBL)	Final Review and quality check
1.0	26.08.2025	Final Version	R. Venditti (DBL) V. Arrigoni (DBL)	Final version for submission

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List of Acronyms

Acronym	**Definition**
AI	Artificial Intelligence
AIDUA	AI Device Use Acceptance
ATCO	Air Traffic Controller
ConOps	Concept of Operations
EASA	European Union Aviation Safety Agency
HAIQU	Human-AI Teaming QUestionnaire
HAT	Human-AI Teaming
HAZOP	Human Hazard and Operability Study
HF	Human Factors
IA	Intelligent Assistant
ISA	Intelligent Sequence Assistant
SART	Situation Awareness Rating Technique
SHELL	Software, Hardware, Environment, Liveware (individual), and Liveware (others)
SHS-L	Safety, Human Performance, Security and Liability
STAI	State-Trait Anxiety Inventory
STAMP	System-Theoretic Accident Model & Processes (STAMP)
SUS	System Usability Scale
TRL	Technology Readiness Level

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UI	User Interface
UC	Use Case
UX	User eXperience
WP	Work Package

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Executive Summary

This document presents the **HAIKU Guided Path**, a human-centred process for designing AI-based Intelligent Assistants (IA) in aviation, targeting systems at TRL 1-6.

The **HAIKU Guided Path** is structured into seven key phases, each with a clear objective, recommended methods and tools, and a defined outcome:

- **Phase 1: Identify End-Users and Stakeholders**
  Outcome: Clear understanding of who will interact with the IA, influence its introduction, or be affected by its adoption..

- **Phase 2: Understand Context and Identify Requirements (Human, AI)**
  Outcome: Comprehensive list of system requirements covering user needs, legal and regulatory constraints, and technical considerations.

- **Phase 3: Human–AI Teaming ConOps Definition**
  Outcome: A clear concept of operations (ConOps) describing how the human and AI will work together as a team.

- **Phase 4: Initial Design Activity**
  Outcome: Low-fidelity system mock-ups and initial design solutions that give form to the concept.

- **Phase 5: Identify Risks and System-Level Issues**
  Outcome: A more robust concept that accounts for potential risks, limitations, and safety implications.

- **Phase 6: Validate and Iterate Higher-Fidelity Designs**
  Outcome: A validated concept supported by tested, higher-fidelity prototypes refined through user feedback.

- **Phase 7: Deployment and Continuous Improvement**
  Outcome: The system is implemented with processes in place for ongoing monitoring, evaluation, and iterative improvement.

To encourage practical use and wider adoption, the HAIKU Guided Path has been designed as an **interactive web tool**. An interactive mock-up has been developed and

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represents the core component of this deliverable. The next step involves advancing its development by transforming the mock-up into a fully functional tool designed to serve the aviation community and other relevant stakeholders. This tool will be developed and exploited beyond the HAIKU project conclusion.

The HAIKU Guided Path interactive mock-up is available here.

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1. Introduction

This document provides practical HF (Human Factors) guidance for the human-centred design of AI-based intelligent assistants (IA) in aviation. The guidance is embodied in the *HAIKU Guided Path*, which is a structured sequence of methods, tools and techniques to support the design of IA that meet human needs and ensure safe, effective operations. The Guided Path is meant to be used by researchers and industry professionals.

The Guided Path specifies *what* HF method to use, *when* to use it, and *how* to use it. It brings together the methods used and developed in HAIKU into a practical format that covers all stages of design, from concept development to validation and deployment. It also addresses Safety, Human Performance, Security and Liability (SHS-L) factors and supports iterative cycles to refine the assistant and increase its Technology Readiness Level (TRL).

The deliverable is structured as follows:

- **Chapter 1** is the introduction.
- **Chapter 2** provides an overview of how the guidance was developed, including the creation process, method selection and design of the Guided Path in terms of theory and practical application (Interactive mock-up).
- **Chapter 3** is a concrete example of the application of the path to design an AI-based IA (HAIKU Use Case 4).
- **Chapter 4** concludes with reflections and next steps.

These sections are followed by the following two Annexes:

- **Annex A**: Details on phases and steps of the HAIKU Guided Path.
- **Annex B**: UX/UI Design process of the interactive tool.

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2. Overview of the Guidance Development Process

2.1. Need for guidance

Designing AI-based IAs for safety-critical domains such as aviation is complex. This is mainly due to:

- The lack of a single, shared definition of Human–AI Teaming (HAT), despite the progress observed over the past three years, and the consequent fragmented state of the HAT community, which is still in the forming stage;
- AI development remains largely engineering-oriented and is still underexplored from a Human Factors perspective.

There is a clear need to address these gaps. No standardised Human Factors methods exist for AI-based assistants, and the divide between technical and Human Factors approaches must be bridged by combining both perspectives.

To help achieve this, HAIKU has explored HAT over the past three years by developing six AI-based IA prototypes across various use cases. Alongside the necessary engineering work, the project focused on identifying practical Human Factors methods, techniques and tools to ensure each solution remained human-centred and safe for operations. This experience has been consolidated and leveraged at the end of the project to create the HAIKU Guided Path *"Apply Human Factors to the design of an AI-based assistant in aviation"*.

2.2. Ways of working

The concrete process for creating the HAIKU Guided Path can be summarised as follows:

1. **Method identification, application and adaptation:** from the start of the project, continuous work has been carried out across the various HAIKU WPs to identify suitable methods for managing both the overall design process and the Safety, Human, Legal and Security (SHS) aspects of AI-based IA. This included using existing Human Factors methods and adapting them to address AI-specific issues. For example, HAZOP was adapted to include AI as a distinct agent in the analysis. These methods were then tested across the six use cases.

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2. **Documentation and consolidation:** After each prototype validation, each use case team documented all design tools, techniques and methods used to develop their assistant. This information was then consolidated into a single reference document.
3. **Design process definition:** An in-depth analysis of the consolidated material was carried out to group and abstract methods into common design phases. This work defined a consistent process covering phases such as concept development, design and validation.
4. **Method selection:** For each phase, appropriate methods were selected. (e.g., low-fidelity prototyping was identified as a key method for the design phase.)
5. **Guidance development:** Once the design phases and methods were defined, these were structured into a complete, coherent path. The guidance describes which methods to use in each phase, when to apply them and how they contribute to the overall design. The Guided Path *Design of an AI-based Intelligent Assistant in Aviation Contexts* is the culmination of this work.
6. **Interactive version:** The Guided Path has been implemented as an interactive mock-up to make it easily accessible for users. See Annex B for further details.

2.3. Guided Path overview

The *"Apply Human Factors to the design of an AI-based assistant in aviation"* Guided Path is organised into seven phases. Each phase defines a specific objective. Within each phase, key steps are supported by recommended methods, tools and techniques designed to achieve the desired outcome. Each phase also specifies an expected result, providing a clear sense of progress through the path. The Path is designed to support the design of systems from TRL level 1 up to 6, though some more advanced methods can be used even in higher TRL scenarios.

The phases follow a typical design sequence covering the entire process, from concept development to validation and deployment. However, the Guided Path is not intended to be used in a rigid, linear fashion. The steps and methods presented offer an ideal way of working, but can be adapted to suit the needs and context of each project. Not every method needs to be applied in every case, and the order of steps may change depending on how far a project has already progressed. In practice, phases and steps can be repeated or revisited as needed, supporting an iterative approach. Steps are intentionally left unnumbered to emphasise this flexibility. Where certain steps depend

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on the completion of others (e.g., a high-fidelity simulation requires a robust prototype), these links are indicated.

Finally, the focus of this Guided Path is on human performance and Human Factors considerations. Other relevant aspects, such as broader safety methods or sustainability, were reviewed but fell outside the scope of this guidance. Separate tools should be used to address those areas and are therefore not included in this path.

Figure 1 below provides an overview of the seven phases with the driving questions underpinning all of them.

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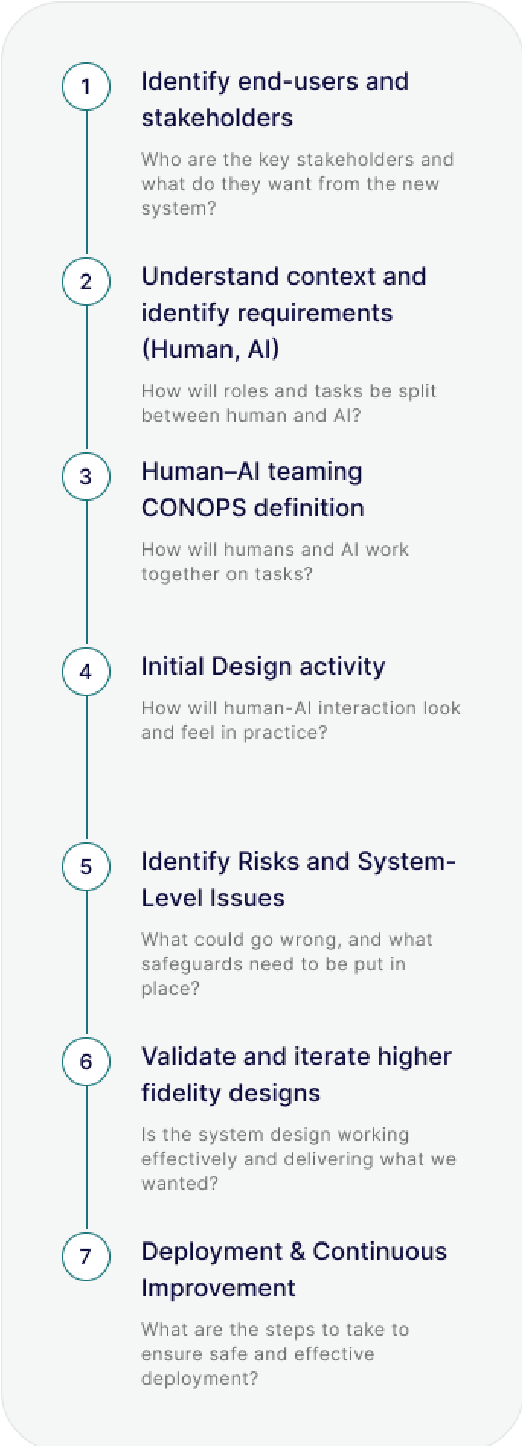

Figure 1: Overview of the HAIKU Guided Path

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More details about each phase and method are provided in Annex A.

Besides the theoretical aspects, the HAIKU Guided Path was conceived from the start as more than just a static document. The intention was to build upon the model of the HF Compass[1], a web-based platform developed by Deep Blue during the SAFEMODE project (2019–2022). The HF Compass is currently used by over 800 registered HF professionals and provides structured, step-by-step Guided Paths for designers, engineers and safety analysts working in safety-critical domains. It translates complex HF knowledge into accessible workflows and practical actions.

However, until now, the HF Compass did not include content specifically focused on AI systems. The HAIKU Guided Path addresses this gap by offering concrete guidance tailored to the design of AI-based IA, with emphasis on Human-AI Teaming.

To support this objective, an interactive version of the HAIKU Guided Path was developed as a Figma-based mock-up. While not a fully functioning tool, the mock-up simulates the experience of using the platform. It takes the form of a scrollable single-page interface that presents the entire Guided Path in a clear and structured way. All phases and associated methods are displayed on a single page, with each method represented by a clickable card that reveals detailed information. Users can explore the mock-up freely and navigate it according to their interests. The mock-up is available here.

Further explanations of the design process behind the interactive mock-up, along with screenshots of the mock-up, are provided in Annex B.

[1] https://safemodeproject.eu/EhuridIndex.aspx

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3. The Guided Path in practice: the HAIKU Use Case 4 example

Use Case 4 demonstrates how the HAIKU Guided Path can be applied in practice to design a human-centred AI-based IA in a complex, safety-critical environment. HAIKU Use Case (UC) n.4[2] developed the *Intelligent Sequence Assistant* (ISA) to support Tower Controllers at Alicante-Elche Airport, a single-runway airport with unique layout constraints and high seasonal traffic peaks. ISA was designed to increase runway throughput, reduce ATCOs' mental workload, act as an additional safety net for separation conflicts, and improve situational awareness by suggesting sequencing solutions for arrivals and departures. By the end of the project, UC4 reached TRL 6 following the completion of the second validation phase.

It is important to note that the Guided Path was still being developed during the time of development for ISA; UC4 directly contributed to shaping it as it is presented in this deliverable. Not all phases were carried out exactly as described in this document, and not every step was used in strict sequence. Still, the overall blueprint was followed, ensuring that core phases and key Human Factors principles guided the development process. Insights gained from UC4 helped define which methods and phases were ultimately included and how they were structured for future users.

The work began with **Phase 1: Identify End-Users and Stakeholders**, where *User Observation*, *Verbal Protocols* and *Semi-Structured Interviews* (conducted in the Alicante Tower) were used to understand ATCOs' tasks and needs.

In **Phase 2: Understand Context and Identify Requirements**, the team carried out a *Hierarchical Task Analysis* to map how ATCOs manage sequencing. This helped define clear human, technical and explainability requirements for the ISA.

Phase 3: Human–AI Teaming CONOPS Definition was developed using tools such as the *SHELL Model* to map interaction scenarios related to AI use.

In **Phase 4: Initial Design Activity**, the team created low-fidelity *mock-ups* in Figma.

[2] https://haikuproject.eu/use-case-4/

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These designs were refined based on feedback gathered in quick, low-cost *Low-Fidelity Simulations* and *Wizard of Oz* sessions.

Phase 5: Identify Risks and System-Level Issues involved additional *HAZOP* workshops and the use of the *HAIQU* tool to check compliance with regulatory requirements and reveal design weaknesses that were not addressed in the first iteration.

Through **Phase 6: Validate and Iterate Higher-Fidelity Designs**, the team conducted higher-fidelity simulations (VAL 2), where the ISA was integrated with real data and tested in a simulated tower environment. Additional *Debrief Interviews* were used to refine explanations, usability and workload effects.

Finally, preparation for **Phase 7: Deployment and Continuous Improvement** included planning *Social Acceptance* and *Safety Culture Questionnaires* to gather further insights post-implementation.

In parallel with the Guided Path phases, the technical development team (Suite5) began work on implementing ISA. Based on the requirements elicited (Phase 2) and the initial HMI design (Phase 4), the team developed the assistant's core features and interface. Notably, the HMI was implemented exactly as designed, including the integration of ISA into the electronic strip system, a key element of the existing controller workflow observed during early phases. Results from Phase 5 (Identify Risks and System-Level Issues) and feedback from Phase 6 (Validation) had a direct impact on technical decisions. For example, following the first validation (VAL 1), it became clear that ISA would need to operate in real time to be operationally viable. The development team adjusted the system accordingly, ensuring that the technical implementation always followed the HF work. The final result was a working prototype that was validated in the second round of Validation (VAL 2) at a higher level of fidelity with operational end-users.

The UC4 example shows that the HAIKU Guided Path is not just a theoretical framework but a practical resource. By combining established Human Factors methods with technical aspects, it supported a team of designers, engineers and domain experts in developing a real, working TRL 6 IA that meets real operational needs. This demonstrates the Path's value for other projects and sectors seeking to integrate AI safely and effectively in demanding, safety-critical environments.

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4. Conclusions

The HAIKU Guided Path proves that it is possible to translate complex HF knowledge into practical, actionable guidance that bridges the gap between technical AI development and human-centred design in safety-critical domains like aviation. By combining proven HF methods with targeted adaptations for AI-specific challenges, the path shows how systematic guidance can support the design of Human-AI Teaming.

A key insight from this work is that guidance must be flexible and adaptable: the Path is not a rigid checklist but a structured framework that teams can tailor to their project's context, constraints and maturity. It shows how HF guidance can be made more accessible and engaging, for example, by transforming it into an interactive web tool, supporting real-world design teams that may not be deeply familiar with HF concepts.

The next step involves advancing its development by transforming the mock-up into a fully functional tool designed to serve the aviation community and other relevant stakeholders. This tool will be developed and exploited beyond the HAIKU project conclusion.

Beyond the aviation context, the Path offers a replicable model for other high-risk industries grappling with AI integration (e.g. maritime, rail). Any domain that demands the safe, transparent and human-centred deployment of AI could benefit from adapting this approach to its own needs.

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5. Annex A: Guided Path: deep dive

5.1. Phase 1: Identify end-users and stakeholders

In this phase, we establish the initial context by identifying all relevant stakeholders and end users. This includes those who will interact directly with the AI assistant, as well as those affected by its outputs or dependent on its performance.
At the end of this phase, the full context for the AI-based intelligent assistant will be clear.

Gather contextual knowledge

- Documentation review: Review existing research, documentation, and reports to identify stakeholders, users, and operational needs relevant to the AI system.

Identify stakeholders

- Stakeholders mapping: Identify and categorise individuals or groups who affect or are affected by the AI system.

Envisaged outcome of the phase: Clear understanding of the assistant's context and purpose.

5.2. Phase 2: Understand Operational Context and Human Needs

This phase establishes a foundational understanding of the work environment, human roles, and key challenges the AI assistant must support. Techniques such as Observation & Walk-throughs, Semi-Structured Interviews, and Focus Groups help ensure that the work as currently done is thoroughly understood, including all the factors, uncertainties, trade-offs and constraints that human end users habitually manage on a day-to-day basis. This in-depth understanding helps to ensure the AI assistant will be able to meet the challenge of assisting the human end user in realistic working conditions. Hierarchical Task Analysis enables a first structured allocation of the split of roles and tasks between human and AI assistant, showing how the future

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human-AI teaming concept could work in an integrated fashion. The additional consideration of Legal (e.g. EU Act on AI) and Compliance Requirements (e.g. EASA Artificial Intelligence Concept Paper Issue 2) can further ensure a good allocation of function between human and AI system elements. In particular, an EASA documentation review is a crucial step for any team aiming to certify an AI-based system. The EASA Artificial Intelligence Concept Paper Issue 2 (the most recent version at the time of this deliverable) defines Human–AI Teaming levels aligned with SESAR automation levels. At this early stage, it is important to define the intended EASA Human–AI Teaming level for the assistant concept and to identify the specific compliance requirements that must be addressed from the outset.

Data Collection (initial exploration)

- Observations; Walk/Talk-through; Verbal protocol

Data Collection (detailed inquiry)

- Semi-Structured Interviews: Capture user expectations, decision-making, and concerns regarding automation, in-depth.

Data representation

- Hierarchical Task Analysis (HTA): Decomposes activities into subtasks, highlighting how high-level goals drive tasks and sub-tasks, including the attendant rules or procedures. HTA provides a blueprint of how the job is done.

Elicit high-level requirements

Translate user needs and operational constraints into design requirements.

- Focus Groups: Engage stakeholders to define functional and non-functional system goals.

Analyse the regulatory landscape

- Legal documents to read (examples)
  - EU AI Act
  - GDPR
  - Open Data Directive
  - Data Governance Act
  - Data Act

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- ○ Ethics Guidelines for Trustworthy AI

Explore EASA AI Levels

- EASA Artificial Intelligence Concept Paper Issue 2

Envisaged outcome of the phase: Defined AI role and its support to users, with human oversight ensured.

5.3. Phase 3: Human-AI Teaming CONOPS definition

In this phase it is important to understand how the human and AI will work together on specific tasks in a set of representative scenarios, whether routine, maintenance, emergency or a combination of the three. Scenario-Based Design can identify and explore different scenarios, and Ideation Sessions can then consider how humans and AI would respond and interact. This can then be made explicit by mapping the different actors, events and actions in a time-based Operations Sequence Diagram. Early application of the HAIQU tool occurs in this Phase. HAIQU (Human-AI QUestionnaire)[3] is a tool designed within the context of HAIKU to be used in a collaborative session to elicit and document teaming-specific requirements. It is envisaged to use HAIQU in multiple phases. In this phase, it is particularly useful to explore the areas of Human Centred Design, Roles and Responsibilities and Teamworking, which will help verify the Conops from a Human Factors Requirements perspective, and avoid costly changes in these areas in later Phases.
The output of Phase 3 is a representative set of scenarios and 'scripts' showing how human-AI teaming should work in detail, forming the basis to develop human-AI interfaces and modes of interaction in the next Phase.

Understand the task(s) distribution

- Scenario-based design

Map interactions over time

- Operations sequence diagram

[3] https://haiqu.eu/

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Ideation

- Co-design session

Verify ConOps from an HF perspective, focus on Human Centred Design, Roles and Responsibilities and Teamworking

- HAIQU Tool application.

Envisaged outcome of the phase: Detailed scenarios outlining human-AI teaming, ready for interface design.

5.4. Phase 4: Initial Design Activity

In this phase, a prototype, whether static (e.g. successive screenshots) or dynamic (an interactive interface), is developed and tested with end users using Low Fidelity Prototyping. To represent the AI part of the interaction, either a 'Wizard of Oz' approach is used in which a human pretends to be the AI (e.g. responding using text messages), or else a programme gives scripted answers that the 'real' AI would generate in the real situation. In some cases, an early prototype of the AI assistant itself may be ready, in which case it can be used (this can also help the 'training' of the AI). A key ingredient in human-AI teaming is sense-making, ensuring that the human and AI are 'on the same page'. If prototyping suggests that the human may need to better understand what the AI is doing and why, this is where Explainability Generation should be applied. The HAIQU tool should be reapplied in this phase, focusing on Sense-Making (which includes displays, interactions and explainability) and Communications (particularly if speech interfaces are to be used). This phase is likely to go through several iterations and should enlist end-user feedback at each iteration. The output of Phase 4 will be a relatively robust preliminary design of the human-AI interaction interface. At this stage, either the interface and AI assistant will be further developed and matured so that real-time simulations and measures can be evaluated (TRL 5-6), or else the project may pause or stop, having developed a satisfactory 'proof of concept.'

Develop lo-fi interactive prototypes

- Low-Fidelity Prototyping

Explainability Generation

- Construal Level Theory (CLT) for XAI generation

Simulate and refine behaviour

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- Wizard of Oz

Verify ConOps from an HF perspective

- HAIQU Tool (2nd application, focus on Sensemaking and communications)

Envisaged outcome of the phase: Preliminary design of the human-AI interaction interface.

5.5. Phase 5: Identify Risks and System-Level Issues

In this phase, risks are identified related to the use of the AI-based assistant. Techniques such as Human HAZOP, SHELL and Expert Walk-through can be applied to low and higher-TRL projects, whereas techniques such as STPA are for later TRL projects (TRL 6+). These techniques all aim to identify and mitigate vulnerabilities in the human-AI teaming operation, and as such, normally only one technique needs to be applied, though the application of more than one may flag differently nuanced risks. Legal Case Methodology, usually applied to later TRL projects, considers legal aspects. The HAIQU tool can be applied again with a focus on Errors and Resilience, and the project progressing towards TRLs 5 and beyond may wish to revisit the EASA Regulations, specifically those relating to human-AI teaming, explainability and ethics. The output of this Phase is the basis of a hazard and risk assessment, identifying hazards and risks and appropriate mitigations. If the project progresses to Phase 6, the studies carried out in Phase 5 should be updated at the end of Phase 6, as undoubtedly new issues and evidence will arise.

Identify Hazards

- Human Hazard and Operability Study (HAZOP)

Identify General Risks and Further Requirements

- SHELL Model

Evaluate concept robustness

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- Expert Walkthroughs

Evaluate accidents from a system-level point of view

- System-Theoretic Accident Model & Processes (STAMP)

Identify Legal Risks

- Legal Case Methodology

Monitor System Evolution

- HAIQU Tool (third application, focus on Errors and Resilience)

Revisit EASA

- EASA Guidance (2nd run)

Envisaged outcome of the phase: Identified hazards, risks, and proposed mitigations.

5.6. Phase 6: Validate and iterate design

In this phase, a dynamically interactive system is available and tested with licensed end users in a high-fidelity simulation across one or more scenarios. Performance is measured, including overall system performance as well as the performance of the constituent components (human and AI). Since the AI assistant is there to support the human end user, measures such as workload and situation awareness may be measured, as well as canvassing simulation participants' views on the degree of support afforded by the AI assistant, via Qualitative Debriefings and post-simulation questionnaires such as the System Usability Scale. In some cases, more advanced 'Neuro-ID' psycho-physiological measures (e.g. heart rate, galvanic skin response, EEG, etc.) may be used to infer impacts on the human user. Eye Tracking may also be used to determine effects on pilot or air traffic controller visual patterns and sense-making of the scenario, or to better track the dynamic interaction between human and AI. System Logs can often help understand the detail of such interactions. Following such simulations (often there are more than one, to allow at least one design iteration), the HAIQU tool can be run again for the previous six areas, updating earlier

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responses where new insights or information have arisen. As mentioned under Phase 4, towards the end of Phase 5 hazard analyses should be repeated to see if mitigations identified in Phase 4 worked, and if any new hazards have been discovered. Usually by the end of this Phase (TRL 6), most applicable Human Factors Requirements should have been satisfied, and the end users should be giving the AI assistant at least a cautious approval.

Produce a robust prototype

- This part is a technical prerequisite. In order to conduct simulations, a robust interactive prototype that can be connected to simulators is required.

Conduct simulations

- Real-time simulations (high-fidelity)

Collect visual data (during the experiment)

- Eye tracking

Collect cognitive data (during the experiment)

- NEURO-ID

Collect qualitative data (during the experiment)

- Observations; Walk/Talkthrough; Verbal protocol (second application)

Collect qualitative data (post-experiment)

- Qualitative debriefings

Collect quantitative data (post-experiment)

- System logs

Collect data via questionnaires (post-experiment)

- SUS (System Usability Scale)
- State-Trait Anxiety Inventory (STAI) questionnaire
- NASA Task Load Index (NASA-TLX) questionnaire
- SART (Situation Awareness Rating Technique) questionnaire
- CSUQ/PSSUQ: Computer System Usability Questionnaire)
- AIDUA (AI Device Use Acceptance) Questionnaire

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Monitor System Evolution

- HAIQU Tool (4th run, full run)

Envisaged outcome of the phase: Most HF requirements addressed; initial user approval achieved.

5.7. Phase 7: Deployment & Continuous Improvement

This phase consists of preparation for transition to deployment into the intended operational, organisational and social environment for which the AI-based assistant will be used. The HAIQU tool contains two areas relevant to Phase 7, namely Competencies and Training, and Organisational Readiness. Additionally, two questionnaires on Societal Acceptance and Safety Culture help determine the readiness of the user population to accept the new technology, and any concerns over impacts on individual or organisational safety culture. When the tool is first being deployed and people are being trained to use it and working with the tool, it can be useful to apply the User Journey Map technique on a representative sample of end users. This technique picks up annoyances (called 'pain points'), whether related to the tool itself, the way it is being released and deployed into the system, or lack of smooth integration into legacy systems. Such problems can detract from the tool's effective usage, such that its full benefits are never realised, no matter how well it was designed. Lastly, Error Reporting on the use of the tool is critical in the early deployment phase in case of errors (human or AI) or misunderstandings or other problems. If such problems are not detected quickly and corrected, the AI assistant will rapidly fall into disuse. This Phase does not end until decommissioning, and so is a continuous learning and adaptation phase, and hopefully one in which the AI assistant becomes a valued part of the aviation system in which it serves. This phase implies successive AI Maintenance activities (such as continuous monitoring and benchmarking, and model retraining whenever necessary)

Monitor system's evolution

- HAIQU (5th run, focus on competencies and organisational readiness)

Assess broader impact

- Societal Acceptance Questionnaire

Assess Safety Culture

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- Safety Culture questionnaire

Identify pain points from actual usage

- User Journey Map

Identify errors and/or misunderstandings

- Error Reporting

Envisaged outcome of the phase: AI assistant deployed, monitored, and continuously improved for effective long-term use.

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6. Annex B: HAIKU Guided path as an interactive web-tool

6.1. UX/UI Design approach of the platform

The HAIKU Guided Path was developed as a scrollable single-page interface that presents a clear, structured, and interactive visualisation of the entire path. Currently, a high-fidelity mock-up version exists, created using the prototyping software Figma. The page is divided into two main sections:

- **Hero Section**: This is the first element users see when landing. It provides a concise, high-level introduction to the purpose of the Guided Path along with an overview visualisation of all phases, giving users immediate orientation. The Hero Section is shown in Figure 2 below.

- **Main Path Section**: Below the hero, the full sequence of phases is presented in a vertically stacked layout. Users scroll down the page to navigate through each phase in order or jump to specific sections as needed. The Hero Section is shown in Figure 3 below.

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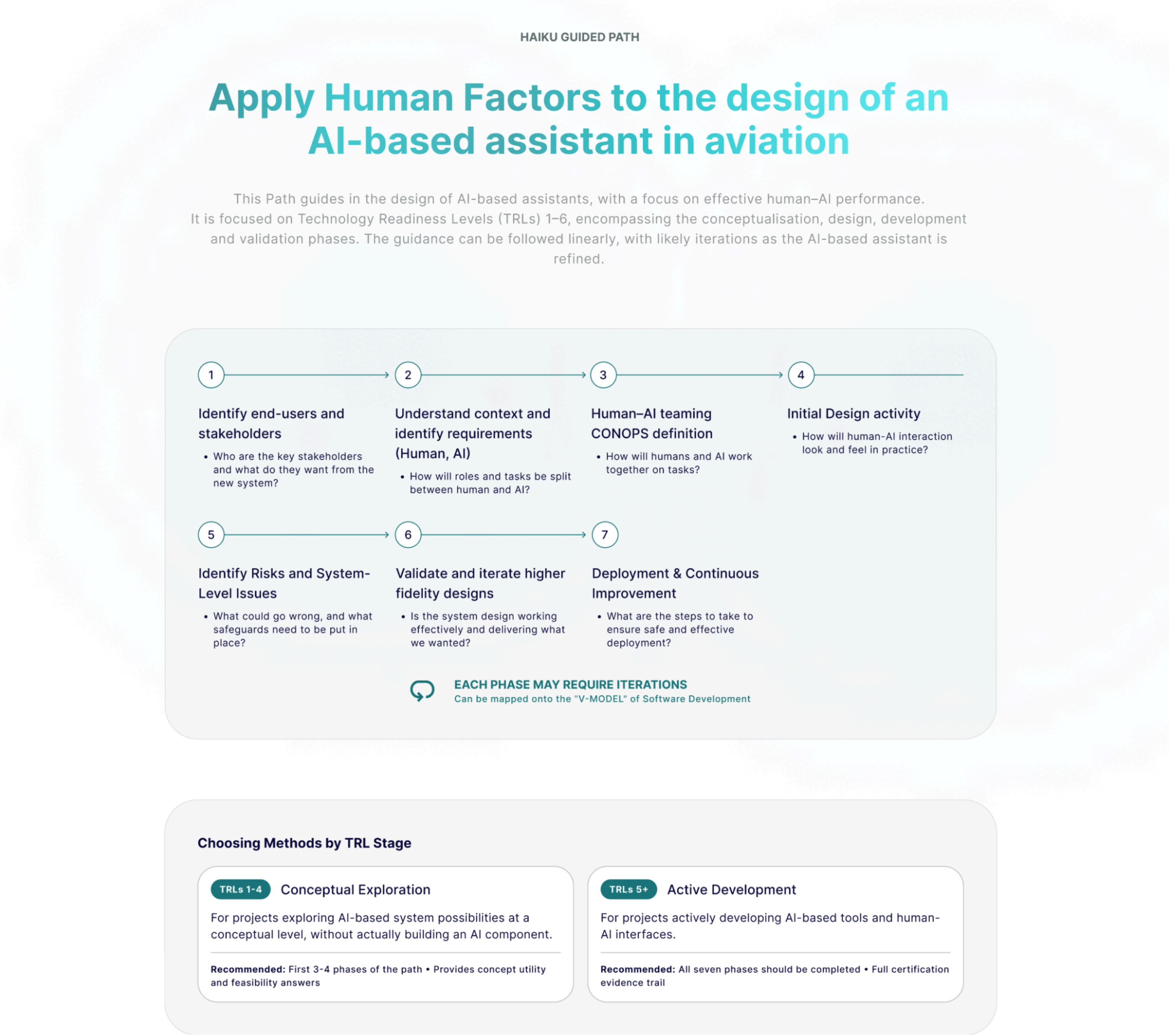

Figure 2: Hero Section on the tool

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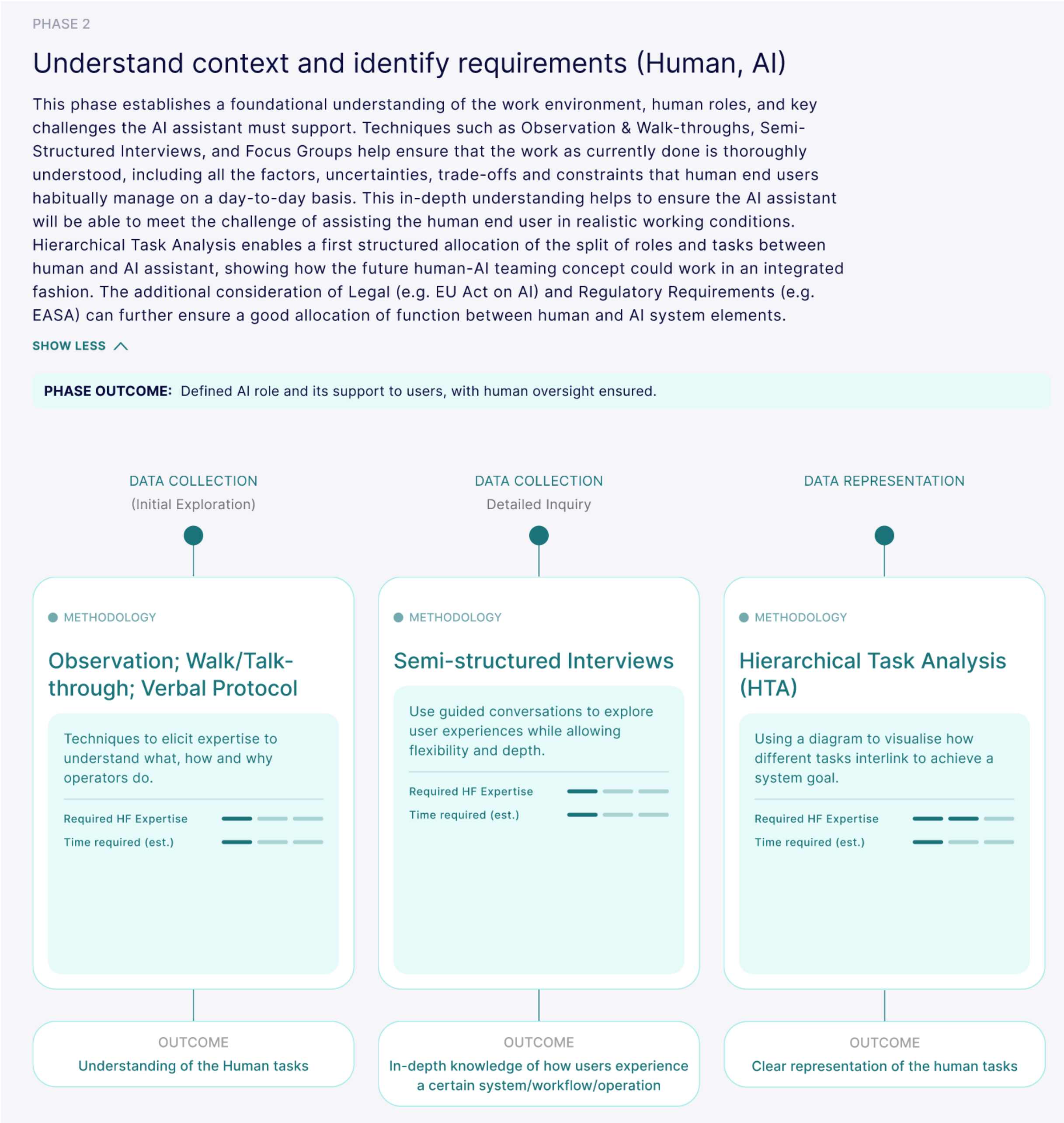

Figure 3: Example of the user interface for Phase 2 of the Guided Path

Within the main section, each method, tool, or resource is represented as an interactive method card. From a UX perspective, these cards are designed to support fast scanning and intuitive interaction. They employ clear hierarchy, consistent styling, and interaction patterns to help users identify relevant methods at a glance.

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Each card uses a progressive disclosure pattern:

- In its default state, a card displays essential information: a short method description, the level of Human Factors expertise needed, and an estimated time requirement.
- On mousehover on the card, an expanded layer appears, revealing additional details such as the method's purpose, prerequisites, and expected outcomes.
- A clear Call-to-action button ("See More in Detail") allows users to open a dedicated detail page for that method.

The method detail page provides all supporting information a practitioner might need: an overview of the method, when and why to use it, step-by-step application guidance, practical benefits and limitations, and supplementary assets like video tutorials or real-world examples. This ensures that users can access the exact level of depth they need, without being overwhelmed upfront.

The design leverages common interaction design patterns for clarity and usability, supporting both high-level browsing and deep dives into specific methods. Visual examples of the card states (default, hover, detail view) are shown below in Figure 4. A full view on the dedicated page of a method is also provided in Figure 5.

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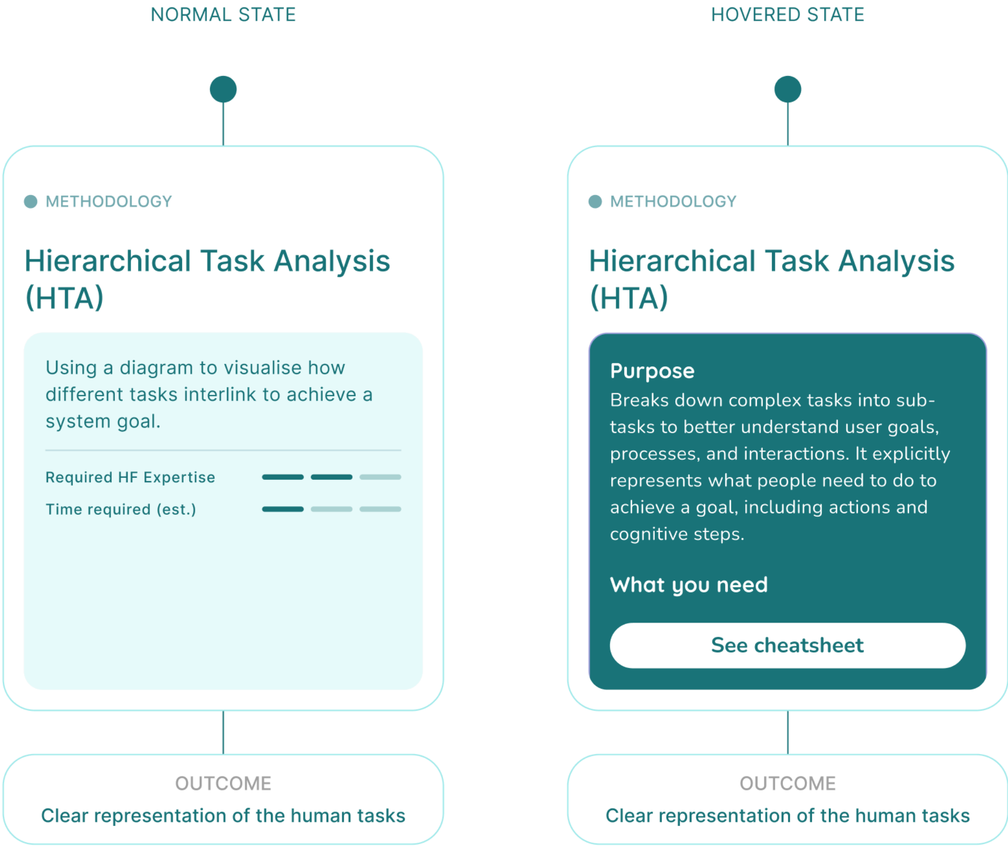

Figure 4: Normal and hovered state for method cards

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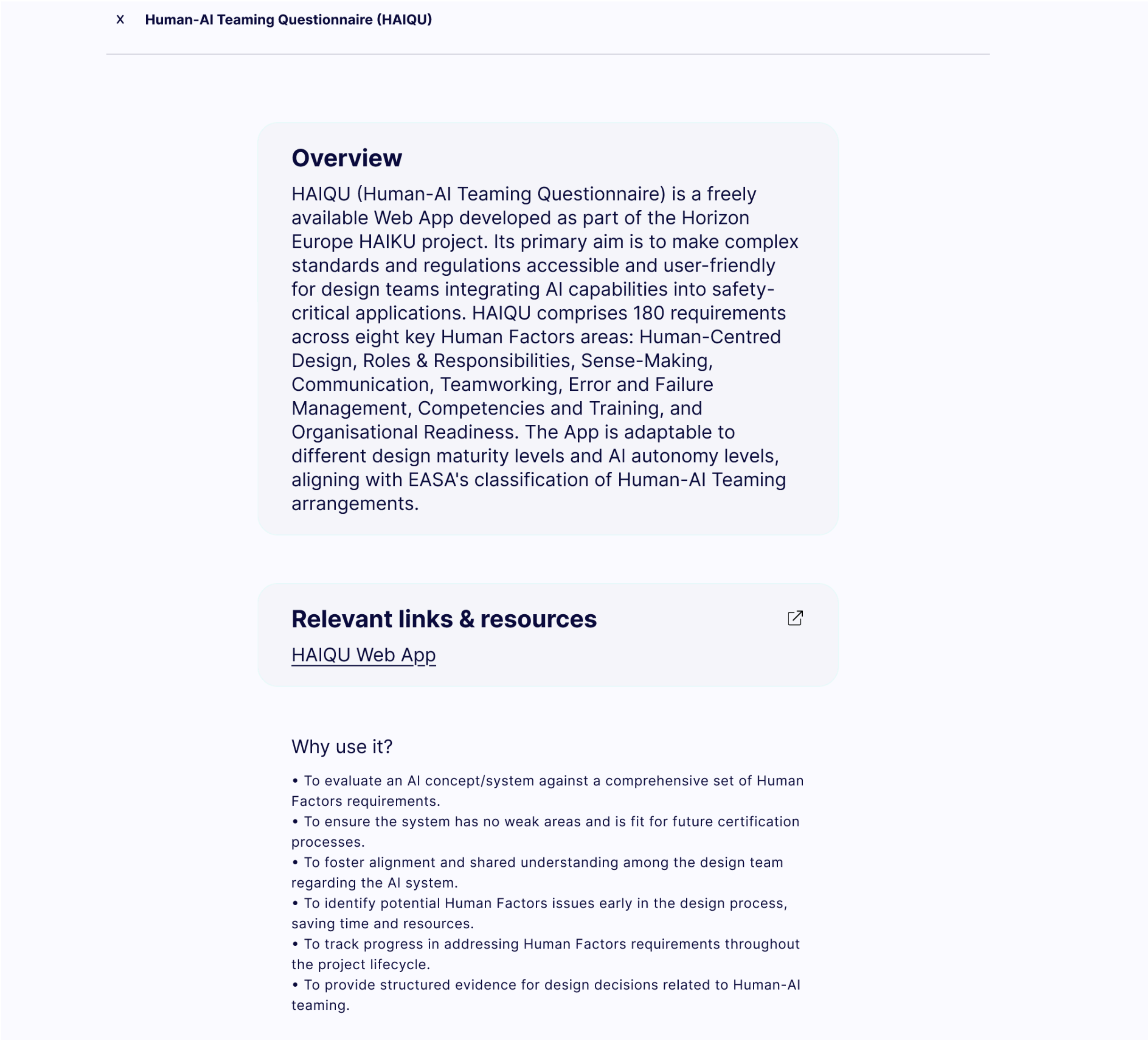

Figure 5: Full method page

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