



Explainable Hybrid AI and Multi-Criteria Decision Support for Complex Decision-Making

EPSRC funded PhD studentship with full fee waiver and £21,805 pa stipend (2026/27 rate)

Project Code: DLA_DTP_2026_09

Main Supervisor: [Dr George Bargiannis](#)

Co-Supervisor: [Dr Emmanuel Papadakis](#)

Project Introduction

This project investigates hybrid decision support frameworks that combine Artificial Intelligence with multi-criteria decision making to address complex, data intensive and high impact decisions. It will develop decision pipelines that integrate scalable intelligent models with transparent and accountable decision processes. The work will explore methods to handle uncertainty, shifting priorities and stakeholder preferences, while also delivering end to end explainability. The project aims to create generalisable, interpretable and practically deployable hybrid architectures evaluated through real or industrially realistic datasets.

Project Details

Organisational decision making increasingly relies on large scale, heterogeneous and rapidly evolving data. Artificial Intelligence provides strong predictive and optimisation capabilities, however many high stakes decisions still require transparency, justification and clearly articulated trade-offs. Classical multi-criteria decision making (MCDM) techniques support these needs through interpretable and explainable models, but they struggle to scale in dynamic, high dimensional contexts. This project aims to address these limitations by developing hybrid decision support frameworks that combine the strengths of AI and structured decision analytic methods.

The project will design integrated decision pipelines in which data-driven models manage complexity, non-linear relationships and uncertainty, while MCDM components provide interpretability, accountability and explicit modelling of stakeholder preferences. The research will also investigate the integration of changing operational priorities, real-time data and evolving stakeholder requirements across domains such as supply chains, sustainability, resilience and software engineering. A key contribution will be end-to-end explainability combining model-level interpretation with

structured decision logic to support human-centred decision processes, in line with Industry 5.0 requirements.

Research plan:

1. Literature Review

- Conduct a comprehensive review of hybrid AI decision support, MCDM and explainable AI.
- Identify limitations in current hybrid architectures and opportunities for generalisable design principles.

2. Conceptual Framework and System Architecture

- Develop conceptual hybrid decision pipelines that allocate complementary roles to AI models and MCDM approaches.
- Define the architectural components, including data integration, model interaction, preference handling and explanation generation.
- Propose mechanisms for reducing decision complexity and supporting dynamic or uncertain conditions.

3. Model Development and Method Integration

- Investigate suitable AI models, such as predictive or optimisation-oriented techniques, focusing on scalability and robustness to imperfect data.
- Select and adapt MCDM approaches to ensure interpretability and stakeholder alignment.
- Develop integration strategies that combine both model types into coherent decision processes.

4. Explainability and Human-in-the-Loop Design

- Develop techniques that merge AI interpretability and explainability with explicit trade off representation.
- Produce explanation formats that are meaningful and usable for practitioners.
- Explore interactive mechanisms to incorporate human judgement and preference updates.

5. Evaluation and Validation

- Use real or industrially realistic datasets to assess decision quality, robustness and practical utility.
- Evaluate the clarity and usefulness of explanations for different stakeholder groups.
- Derive generalisable guidelines for designing explainable hybrid decision support systems.

Overall, this project will contribute to decision science and applied AI by developing scalable, interpretable, explainable



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and stakeholder-aligned decision support architectures suitable for complex and evolving organisational contexts.

Project-specific entry requirements

*Please note this is only open to Home students

Master's degree (merit or distinction) or an honours degree (2:1 or above) or equivalent in Computer Science, Artificial Intelligence or a related discipline

Excellent programming skills in a range of programming languages, both declarative and imperative

Practical experience in artificial intelligence projects that have involved one or more of the following areas: data analytics, machine learning, knowledge representation, automated reasoning.

(Desirable) An understanding of concepts related to supply chains, risk management, resilience and sustainability

Further Information

This call is open to **UK Applicants only**.

Applicants should be of outstanding quality and exceptionally motivated.

The studentships are funded for 3 years (subject to satisfactory annual performance and progression review) and will provide for tuition fees and a tax-free stipend paid monthly.

Please note that there are more projects than funded studentships available and therefore this is a competitive application process which will include an interview. Shortlisted candidates will be contacted for an interview in person or via Teams. After interview the most outstanding applicants will be offered a studentship.

Queries about the application process are welcome and should be emailed to pgrscholarships@hud.ac.uk.

Informal enquiries about this project should be directed to Dr George Bargiannis

Type of Award: Doctor of Philosophy (PhD).

Eligibility: UK applicants only. First Class or Upper Second-Class Honours degree or equivalent in a relevant subject area, please refer to the entry requirements on the specific projects being advertised.

Location: Huddersfield.

Funding: 3 years full time research covering tuition fees and a tax-free bursary (stipend) starting at £21,805 for 2026/27 and increasing in line with the EPSRC guidelines for the subsequent years. Funded via the Engineering and Physical Sciences Research Council Doctoral Training Programme.

Duration: 3 years full-time plus 12 months writing up (please note no funding available for writing up period).

Closing date: 28th April 2026

Start date: 1st October 2026

Application details

- Go to the EPSRC webpage and download the [Expression of Interest Form 2026](#).
- Provide copies of transcripts & certificates of all relevant academic and professional qualifications.
- Provide references from two individuals – please contact your referees and ask them to send them directly to pgrscholarships@hud.ac.uk from their email address.
- Proof of eligibility – e.g. scan of passport photo page.
- Completed forms, including all relevant documents should be submitted via-email to pgrscholarships@hud.ac.uk.

Please note: if you do not attach all the relevant documentation prior to the closing date your application will not be considered.