ACM GreekCHI-CYCHI Symposium 2026 · HUMAN-CENTERED, RESPONSIBLE & EMERGING INTELLIGENT TECHNOLOGIES

DESIGNING AI INTERFACES FOR HUMAN-CENTERED LOGISTICS DECISION-MAKING

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01 — BACKGROUND & CONTEXT

Artificial Intelligence (AI) is transforming operational logistics through automated forecasting, route optimization, inventory management, and resource allocation.

> **Core Challenge:** High algorithmic accuracy does not automatically lead to effective decision-making if human operators cannot comprehend, evaluate, or appropriately act upon AI recommendations.

Research Gap: Conventional research heavily prioritizes technical prediction accuracy and efficiency over human cognition, trust, cognitive workload, and human control.

02 — RESEARCH PROBLEM

The Interface as the Human–AI Decision Layer:

LOGISTICS DATA
Demand • Traffic • Vehicles • Operations

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AI / ML ENGINE
Prediction • Optimization • Recommendation

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HUMAN-CENTERED AI INTERFACE
Explanation • Context • Confidence • Alternatives • Control

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HUMAN DECISION-MAKER

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LOGISTICS ACTION

Research Question: How can human-centered AI interface principles improve the effectiveness and trustworthiness of AI-supported logistics decision-making?

03 — RESEARCH OBJECTIVES

O1 — Identify: Human-centered requirements for AI decision support in complex logistics environments.

O2 — Develop: A conceptual framework linking HCI principles with operational AI decision support.

O3 — Design: An interactive prototype showcasing recommendations, rationale, uncertainty, and alternatives.

O4 — Evaluate: Usability, decision quality, cognitive workload, trust, and human control.

04 — MOTIVATION & STATE OF ART

Shifting from algorithm-centric AI to human-centered decision support:

Conventional Focus	Proposed Focus
Prediction accuracy	**Prediction + Understanding**
Optimization alone	**Optimization + Judgment**
Automated output	**Explainable recommendation**
Single solution	**Alternatives & Trade-offs**
Raw AI output	**AI output + Contextual rationale**
Full automation	**Meaningful human oversight**

11 — INNOVATION & LOGISTICS 5.0

Aligning AI decision-support with the central directions of Logistics 5.0:

- **Human-Centricity:** AI supports and empowers human judgment rather than replacing human operator oversight.
- **Sustainability:** Interfaces explicitly expose environmental trade-offs (e.g. CO_2 impact, fuel efficiency) alongside time metrics.
- **Resilience:** Enables human decision-makers to adapt to dynamic operational disruptions when AI assumptions fail.

05 — PROPOSED INTERFACE CONCEPT

Central Visual Prototype — Presenting actionable AI recommendations alongside expected operational impact, rationale, model confidence, and alternative scenarios.

⚡ AI LOGISTICS DECISION SUPPORT DASHBOARD

RECOMMENDED ACTION
Reallocate Vehicle V14 → Route B

−18 min	87%	−12%
EXPECTED DELAY	AI CONFIDENCE	CO_2 EMISSIONS

WHY THIS RECOMMENDATION?

- Increased demand spike (+35%) detected on Route B.
- Current primary route experiencing severe traffic congestion.
- Vehicle V14 is available nearby with 92% battery capacity.
- Prevents estimated cumulative delivery delay of +25 minutes.

ALTERNATIVE SCENARIO
Keep current allocation → Expected delay: +11 min | Operational Risk: Moderate

✓ ACCEPT | ✎ MODIFY | ✕ REJECT

Key Principle: "The AI recommends — the human decides."

06 — HUMAN-CENTERED DESIGN PRINCIPLES

Explainability
Why is this recommendation being made? Clear contextual factors.

Transparency
What underlying operational data supports the recommendation?

Uncertainty
How confident is the AI, and what are the confidence bounds?

Alternatives
What alternative actions exist and what are their trade-offs?

Cognitive Support
How to structure information to minimize operator mental workload?

Human Control
Can the decision-maker easily accept, modify, or reject AI outputs?

07 — PROPOSED METHODOLOGY

STAGE 01 — Literature Synthesis
HCI, Human-AI Interaction, XAI, Logistics 4.0 / 5.0

STAGE 02 — Requirements Analysis
Domain needs + cognitive demands in logistics

STAGE 03 — Interface Design
Applying human-centered AI design principles

STAGE 04 — Prototype Development
Interactive web-based logistics dashboard

STAGE 05 — User Evaluation
Controlled tasks with logistics decision-makers

STAGE 06 — Framework Refinement
HCI design guidelines for AI logistics software

08 & 09 — EXPERIMENTAL DESIGN

Planned User Study: Controlled simulation evaluating AI-supported vs. conventional logistics interfaces.

Evaluation Metric	Measurement Tool / Indicator
Usability	System Usability Scale (SUS)
Decision Quality	Accuracy & Quality of choices
Decision Time	Task completion time
Cognitive Workload	NASA-TLX assessment
Trust & Autonomy	Human-AI trust + Override behavior
Comprehension	Recommendation understanding

10 & 12 — CONTRIBUTIONS & FUTURE PLAN

Expected Contributions:

- **Theoretical:** Framework uniting HCI, XAI, and decision support in logistics.
- **Design:** Actionable interface principles for presenting AI recommendations.
- **Methodological:** Evaluation protocol combining performance with human factors.
- **Practical:** Guidance for developing transparent Logistics 5.0 systems.

Progress & Future Plan:

✓ Research problem & questions defined
✓ Core design principles formulated
✓ Prototype architecture conceptualized
→ Detailed user requirements gathering
→ Prototype coding & study execution

⚑ KEY RESEARCH QUESTIONS

- Explanation Density: How much explanation is optimal?
- Trust Dynamics: Does full transparency always build trust?
- Uncertainty Communication: How to show confidence without overload?
- Human Agency: When should operators override AI recommendations?