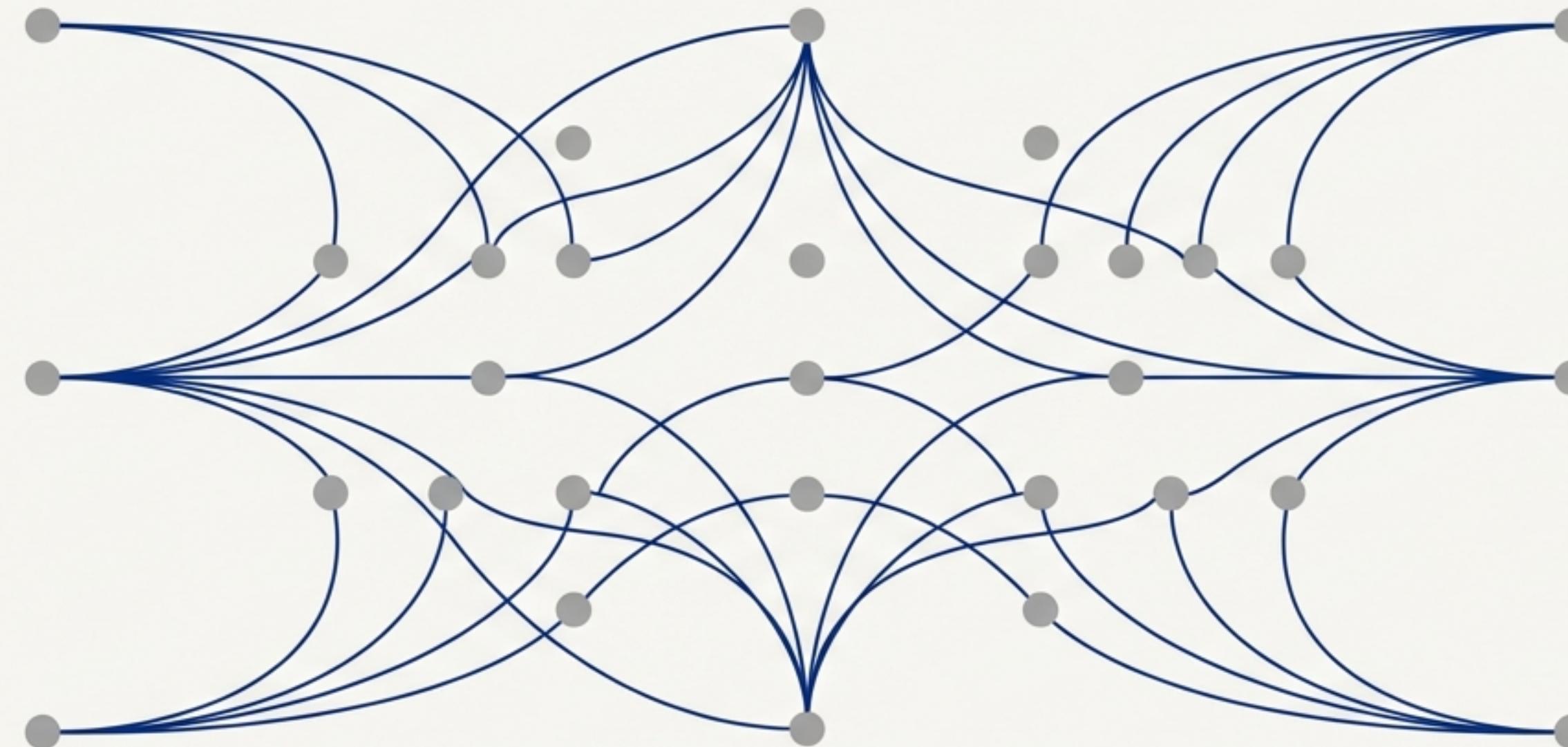


# Beyond Recommendation: Engineering Autonomous AI Agents for Collaborative Decision-Making

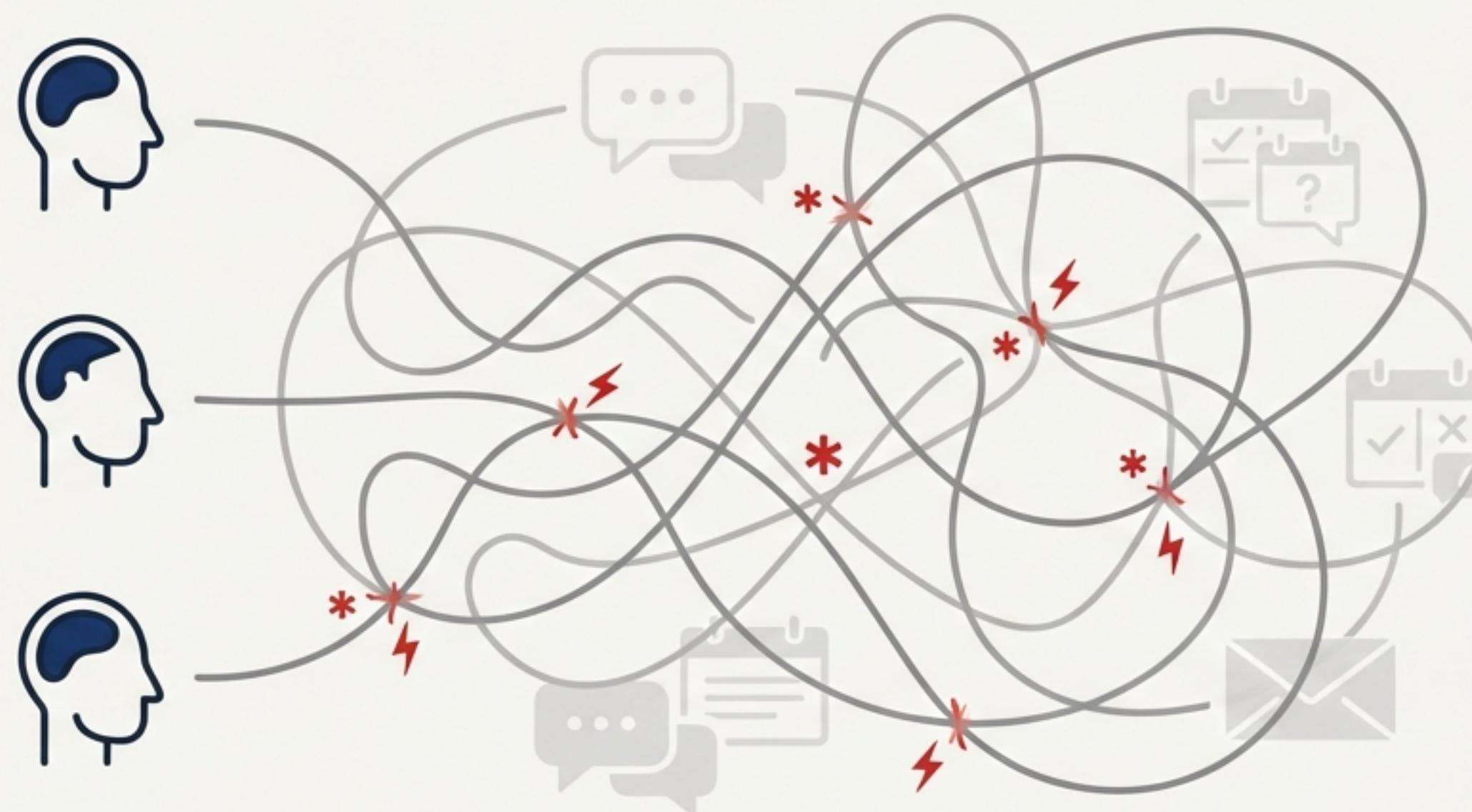
A Final Project Proposal



Presented by: [Student Name 1], [Student Name 2], [Student Name 3]

# Group Decision-Making is Beset by Friction

Despite countless communication tools, coordinating groups remains a manual, time-consuming, and often frustrating process.



Current tools organize information, but the cognitive load of negotiation and decision-making still rests entirely on humans.

This is especially true for complex decisions with multiple constraints and conflicting preferences.

# Today's AI Assistants are Powerful Recommenders, Not Active Participants

## Passive Recommendation



Suggests a playlist



Finds a recipe



Recommends a movie

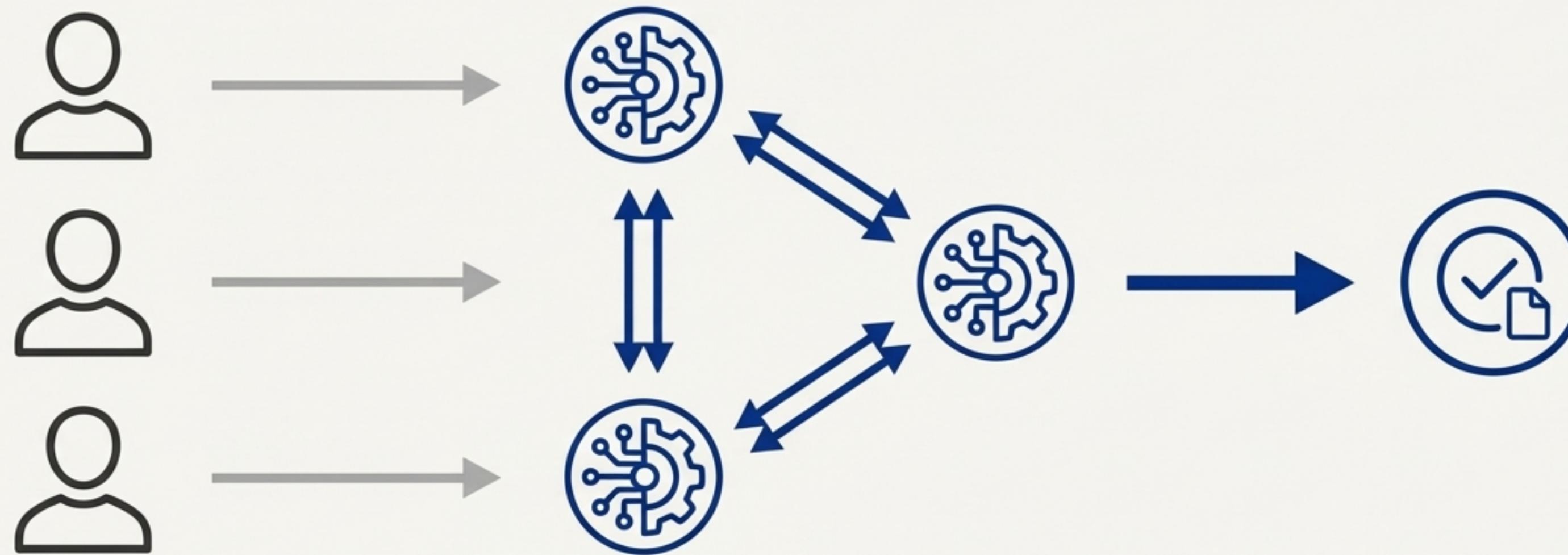


## The Limitation

They operate on a one-to-one-to-one basis and require active human involvement to analyze, negotiate, and finalize any group decision.

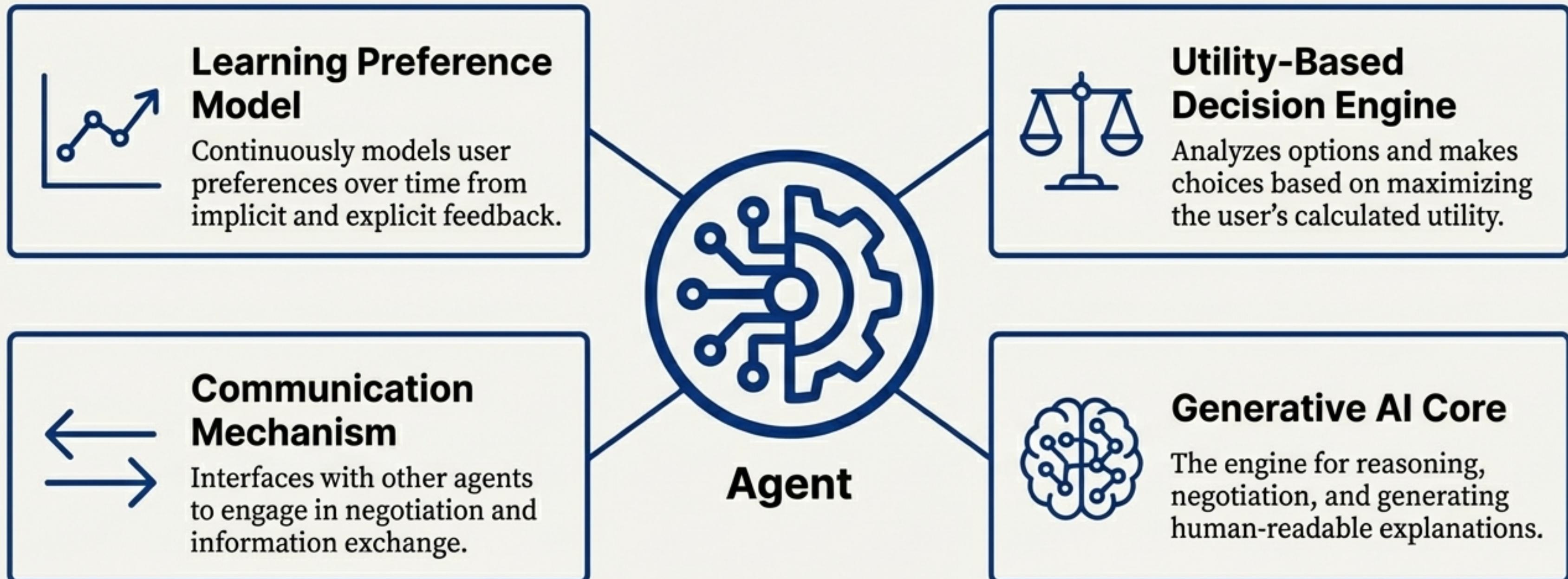
**Key Takeaway:** Current systems lack the autonomy to represent users and negotiate complex, multi-party outcomes.

# We Propose a System of Autonomous Agents that Learn, Represent, and Decide



The system shifts the burden of coordination from humans to AI. Each user is represented by a personal, autonomous agent that learns their preferences and acts on their behalf in a collective decision-making process.

# The Anatomy of a Personal AI Agent



Each agent is a self-contained entity designed to be a faithful digital representative of its human user.

# Generative AI as the Core of Reasoning and Negotiation

## Natural Language Preference Representation

Translates complex user tastes and constraints into a machine-understandable format.

## Conflict Analysis & Negotiation

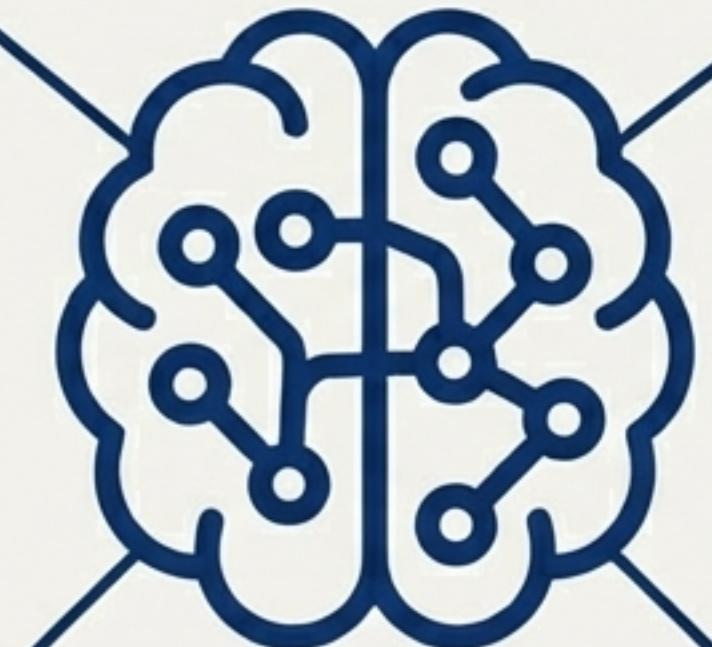
Identifies points of friction between agents and dynamically manages negotiation processes to find common ground.

## Explainable Decision-Making

Generates clear, human-readable summaries explaining why a final decision was reached.

## Strategic Communication

Formulates persuasive arguments and proposals during inter-agent dialogue.



# Use Case: Arranging a Team Dinner



**User A (David)**

- Strictly vegan
- Prefers budget-friendly options (<\$30 per person)
- Dislikes loud environments



**User B (Maria)**

- Loves spicy food (Thai, Mexican)
- Prefers mid-range restaurants
- Available only after 7 PM

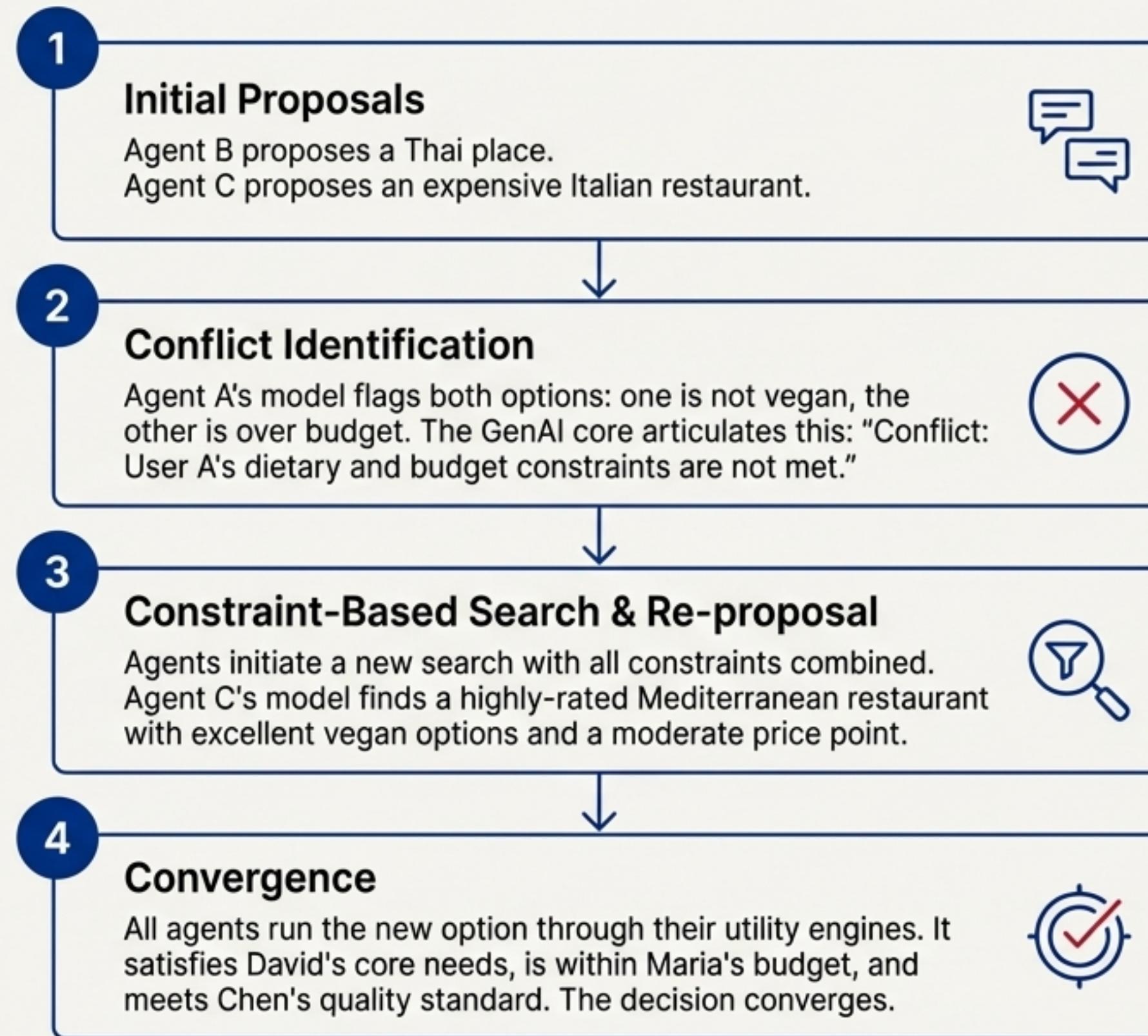


**User C (Chen)**

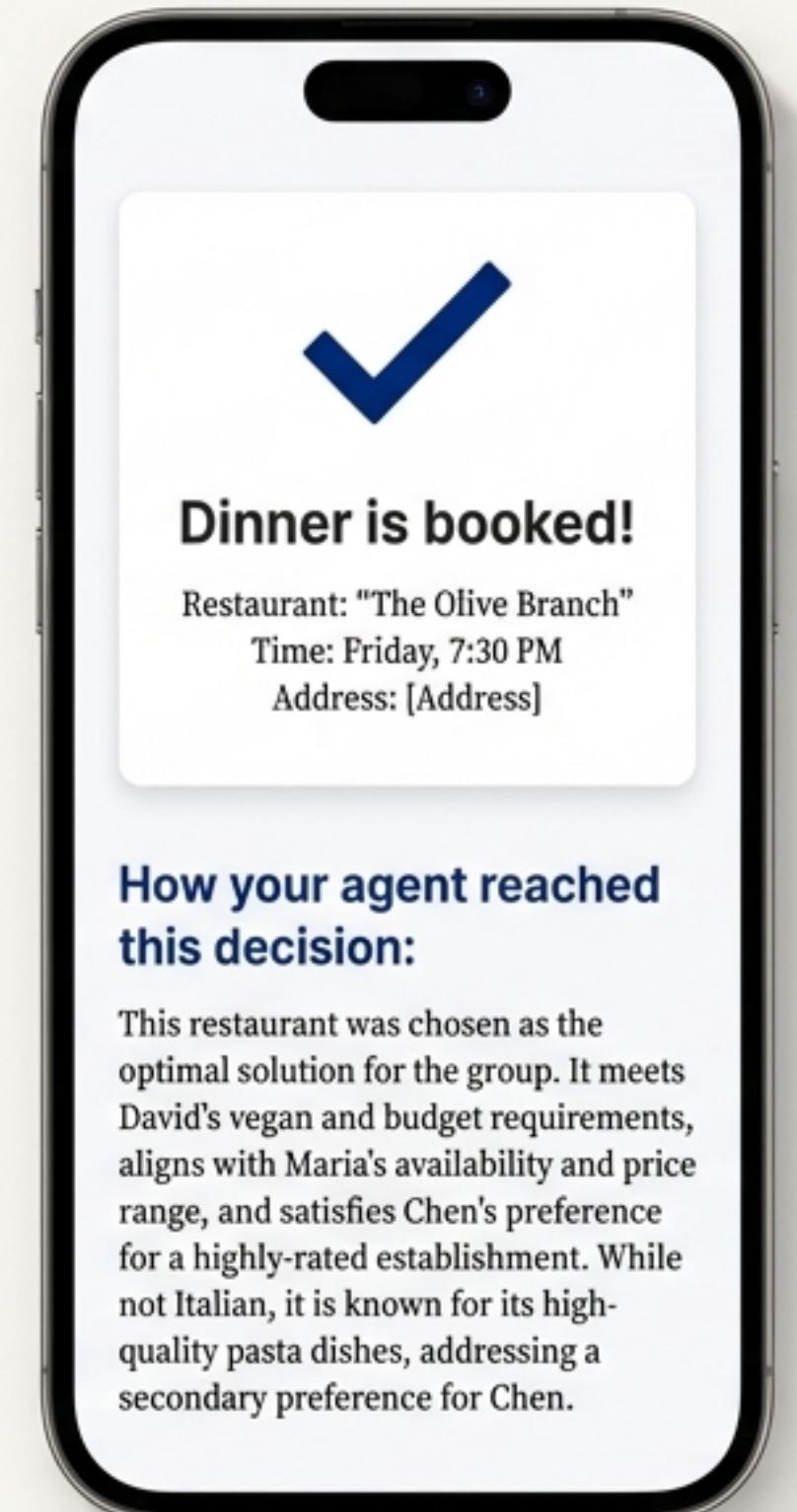
- Prefers Italian or Japanese cuisine
- Values ambiance over price
- Wants a location with good reviews (4.5+ stars)

The Task: The group delegates the task to their agents:  
"Find and book a restaurant for Friday night."

# The Agents Negotiate to Find an Optimal Solution



# The Result: A Transparent Decision with Clear Rationale



# Our Framework for Evaluation and Performance Measurement



## User Satisfaction

Measured through post-simulation surveys on the quality and appropriateness of the decisions.



## Decision Stability

Assessing the consistency and optimality of group decisions across multiple runs.



## Transparency & Understanding

Testing user comprehension of the AI's explanations and their trust in the system.



## Scalability & Efficiency

Benchmarking computation time as the number of agents and decision complexity increases.

**Methodology Note:** Performance will be evaluated through simulated scenarios with diverse user group profiles.

# Core Innovation: Moving AI from Tool to Autonomous Partner

THEN



AI as a Passive  
Recommendation Engine.

NOW



AI as an Active  
Decision-Making Agent.

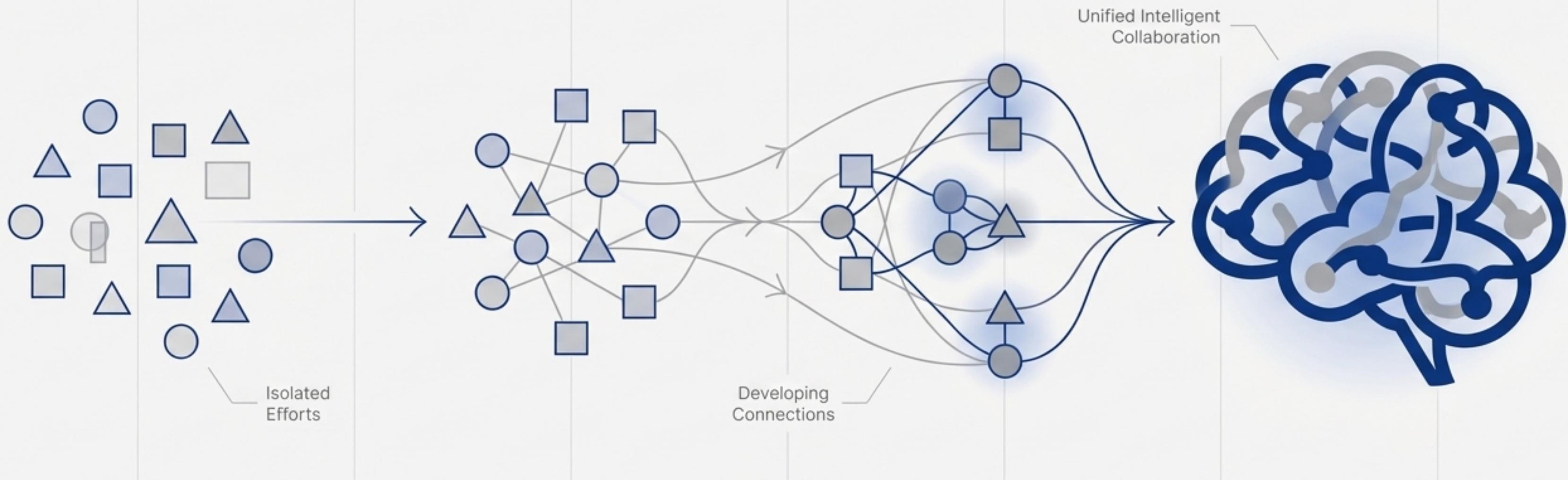
## Key Contributions

- A novel application of Generative AI as an active, negotiating decision-maker.
- A practical synthesis of Multi-Agent Systems, preference learning, and group decision theory.
- A contribution to the field of Explainable AI (XAI) by generating transparent, human-centric rationales for complex automated decisions.

# Grounded in Established Theory, Focused on Novel Application



This work builds upon foundational research in these areas  
to create a system with new applied capabilities.



# The Future of Delegated Autonomy and Trust

This project is a foundational step towards a future where digital agents act as trusted, autonomous partners, freeing human cognition for more creative and strategic endeavors.

It also opens critical new research avenues in the ethics, transparency, and governance of autonomous AI systems.