CHIRON: Integrating AI and Rigorously Interpreted Quotation Analysis to Enhance Conceptualization in System Dynamics

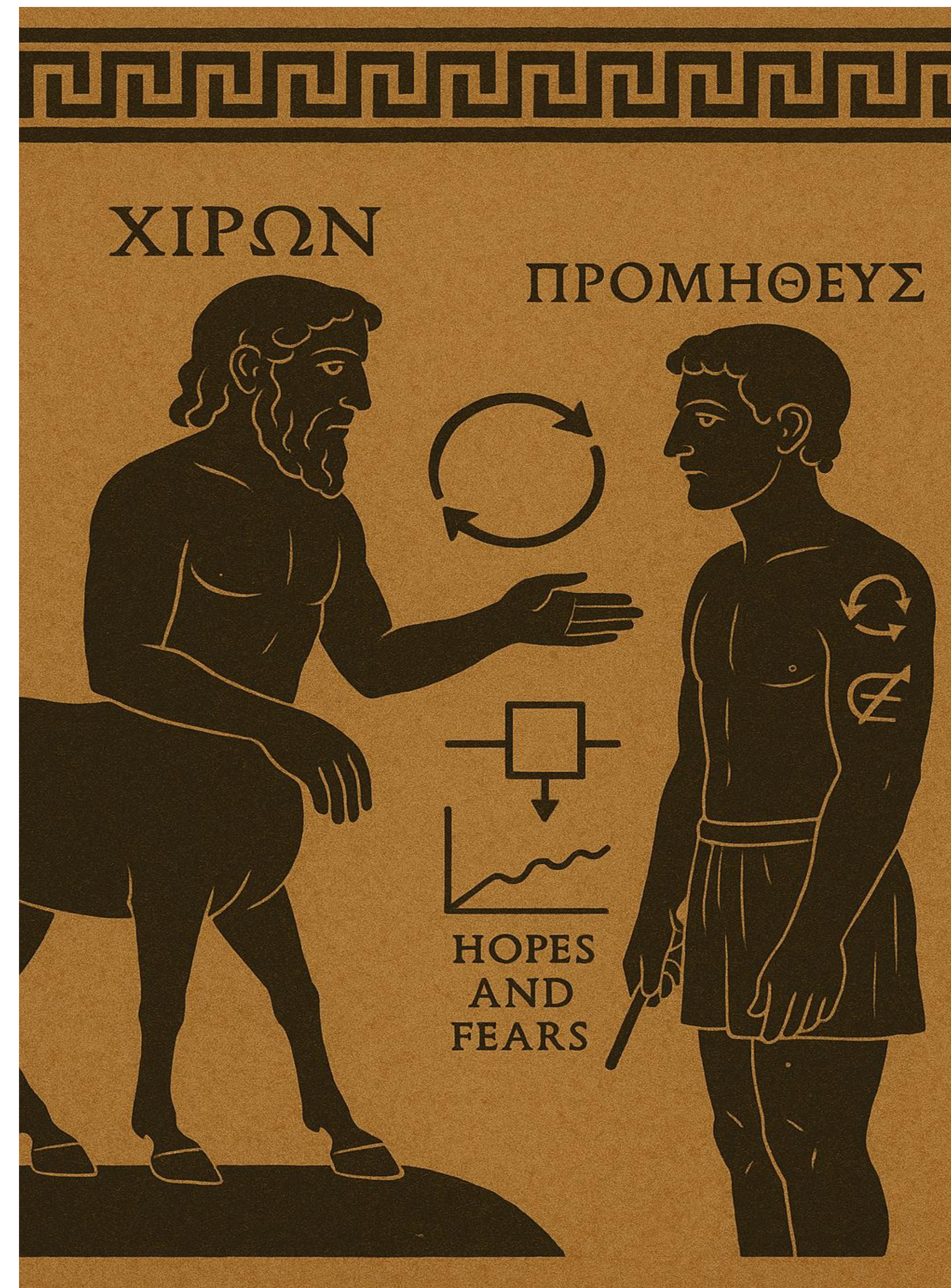Samuel Allen PhD[1], Carlos Calvo Hernandez, MS[1], Andrada Tomoaia-Cotisel PhD[1]

Problem

- Untapped value of coding's 'mental database' for SD

- Underexplored potential of LLMs for leveraging mental data

- Undue confidence in off-the-shelf LLMs value for conceptualization

- Underexplored implications of Forrester's non-SD work for AI/SD: Whirlwind, the great Dyad

Approach

- **Data**: Text: mental and/or written data, across projects, rigorously coded and documented

- **Process:** Manually curate a library of text data used to develop a model—a mental database; Develop a workflow to communicate it to train an LLM to code massive amounts of text; Produce data from mounds of text *to confirm and disconfirm the modeling*

- **Research Question**: How to leverage the mental databases we create to improve our project processes?

- **Result: C**ausal **H**ybr**I**d AI and **R**igorously Interpreted Quotati**ON** Process; named for the mythical heroes' mentor Chiron, the only wise Centaur (Kasparov, 1998) contrasts to LLM-guided, even text-informed modeling
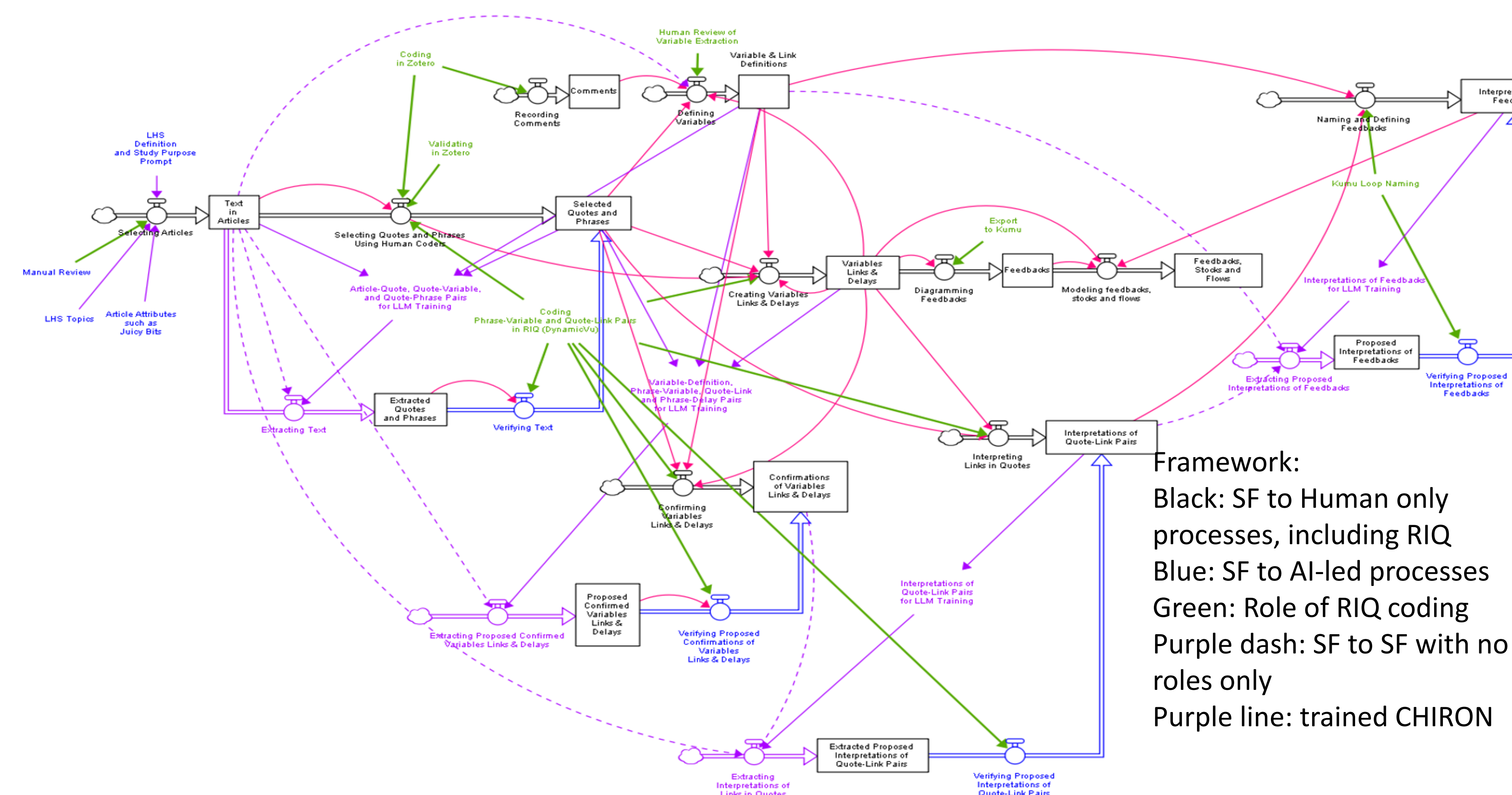
Theory Development

XIPON=Chiron (hero mentor, the wise Centaur)

ΠΡΟΜΗΘΕΥΣ=Prometheus (literally, foresight)

₵= personal SD cost

Chiron's sacrifice freed Prometheus to be useful

CHIRON's potential AI consciousness is sacrificed to preserve the human role and free the designer

Project/Conceptual Framework

Framework:
Black: SF to Human only processes, including RIQ
Blue: SF to AI-led processes
Green: Role of RIQ coding
Purple dash: SF to SF with no roles
Purple line: trained CHIRON

Discussion Questions

- In our iterative SD process, which rework is hardest (conceptualization, formulation, etc)?

- Has AI taught you something?

- If you have used AI to evaluate text or develop model structure, how has it gone?

- Have you used rigorous coding and would be willing to share data to train a CHIRON bot?

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