Inception of Thought:
AI Extracting Mental Models from System Dynamics Society Presidents

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Contents

Abstract

The *System Dynamics Society (SDS) presidential speeches* provide a historical record of evolving perspectives on *education* and *quality* within the *System Dynamics* field. Over the past four decades (1983–2024), each SDS president has contributed a distinct interpretation of themes, which might shape the society's evolving priorities much like how different leaders, at the national level, bring unique policies and strategic directions to governance (Zaini & Mitri, 2023). This proof of concept employs **Generative AI (ChatGPT-4)** without advanced expertise (developer-level) to systematically extract key themes, system variables, and feedback loops from SDS presidential speeches, offering insights into how shifts in leadership have influenced the society's stance on education and research quality (Baum & Singh, 1994).

Four foundational speeches—*Jay Forrester (1983), Erich Zahn (1991), Peter Milling (1993), and Khalid Saeed (1995)*—were selected to establish a chronological foundation for analyzing thematic trends (Forrester, 1983; Milling, 1993; Saeed, 1995; Zahn, 1991). A structured **AI-driven methodology** was developed to extract and categorize these themes, organizing them into **Excel tables** for comparative analysis. Additionally, Generative AI was leveraged to **identify and extract feedback loops**, which were systematically analyzed and synthesized into *Causal Loop Diagrams (CLDs)*. These diagrams were manually refined trough Stella Architect (isee systems, n.d.) to ensure logical consistency and accurately depict the each president's beliefs on education and quality.

Findings may speculate both *continuities and divergences* in SDS leadership perspectives. While foundational concerns about *education and quality* persist, each president has introduced a distinct emphasis—ranging from *Forrester's focus on methodological rigor* to *Saeed's policy-oriented applications of System Dynamics education* (Milling, 1993; Saeed, 1995; Zaini & Mitri, 2023). These variations reflect shifting interpretations of improvement, much like changing national policies that redefine approaches to education and institutional quality (Baum & Singh, 1994; Forrester, 1983; Zahn, 1991). As different SDS presidents have emphasized aspects such as *curriculum development, professionalization, interdisciplinary collaboration, or policy impact*, the society may have adjusted its strategies accordingly. These shifts highlight how leadership transitions could shape the long-term trajectory of System Dynamics education and research.

By integrating AI-driven text analysis, structured data organization, and causal modeling, this proof of concept presents a **comprehensive framework** for tracking the *evolution of thought leadership* in System Dynamics (Hill & Jones, 1993). The findings illustrate how different leadership philosophies and policy perspectives could have influenced the society's direction, demonstrating the broader applicability of Generative AI in analyzing large-scale organizational discourse. Future work will focus on analyzing more speeches to track how the field's priorities, concerns, and methodological frameworks with respect to quality and learning have evolved over time.

1 Keywords

Mental Models, Generative Artificial Intelligence (GenAI), Feedback Stories, Organization Culture, Organization Behavior.

2 Introduction

2.1 Background

The *System Dynamics Society (SDS) presidential speeches* serve as a historical record of the evolving priorities, challenges, and aspirations within the *System Dynamics (SD)* community. Since *Jay Forrester's* seminal 1983 presidential address (Forrester, 1983), each SDS president has shared their perspective on the state of the discipline, with particular emphasis on **education** and **quality**—two foundational pillars of System Dynamics. Forrester underscored the importance of rigorous educational methodologies and maintaining high-quality research standards to ensure the field's long-term sustainability and impact. Over the years, subsequent SDS presidents have revisited these themes, reflecting on the field's growth, emerging challenges, and evolving directions (Milling, 1993; Saeed, 1995; Zahn, 1991). However, their perspectives may not have been uniform; much like leadership transitions in national governance, each SDS president has introduced a distinct emphasis on how education and quality should be improved.

Some presidents have championed **methodological rigor** and foundational training in System Dynamics, advocating for stronger academic curricula and higher research standards (Forrester, 1983). Others have emphasized **practical applications** of SD education, pushing for more engagement with policymakers, industries, and interdisciplinary fields (Milling, 1993; Saeed, 1995; Zahn, 1991). These differing priorities mirror how different administrations within a country focus on varied policy areas—some prioritizing systemic reform, others emphasizing accessibility and inclusivity.

Organizations analyze their **historical records and documents** to identify patterns and trends that might not be apparent from other data sources (Hill & Jones, 1993). Examining such records provides insights into an organization's past decisions, actions, and outcomes, allowing researchers to better understand the context in which an organization operates, how it responds to changes in its environment, its evolution over time, and its contributions to society (Baum & Singh, 1994). SDS presidential speeches, as part of the society's historical discourse, offer a unique opportunity to explore the organization's trajectory, the shifting priorities of its leaders, and the broader systemic forces influencing its development.

With the rise of Generative AI (Gen AI), new possibilities have emerged in the systems thinking and system dynamics field. Several publications demonstrate a variety of applications including:

- **Automating Causal Loop Diagram (CLD) Construction**: The System Dynamics Bot leverages large language models (LLMs) to automate the creation of CLDs from textual data, improving the efficiency of model building (Hosseinichimeh, Majumdar, Williams, & Ghaffarzadegan, 2024).
- **Enhancing Education with AI**: SDS has explored how AI can assist in generating system dynamics lesson plans, helping educators tailor content for different learning levels (Society, 2024b).
- **Expanding Accessibility Through AI-Driven System Dynamics**: Zombron, Zaini, and Alnajashi (2024) have demonstrated how generative AI can bridge accessibility gaps by enabling visually impaired individuals to engage with systems thinking. Their research highlights how AI-driven tools can translate complex system dynamics models into accessible formats, ensuring broader participation in analytical and educational discussions (Zombron, Zaini, & Alnajashi, 2024).
- **Generative AI and Simulation Modeling**: Akhavan and Jalali explore the role of generative AI tools, such as Large Language Models (LLMs) and chatbots like ChatGPT, in advancing simulation modeling. (Akhavan & Jalali, 2024).

While these applications demonstrate AI's potential to enhance SD methodologies, its use in analyzing historical leadership discourse and extracting mental models within the System Dynamics field remains a potentially useful application. The ability to systematically extract themes, feedback loops, and mental models from SDS presidential speeches using AI could offer new insights into the discipline's and SDS's evolution.

Additionally, ChatGPT-4 offers a way to automate the identification of key themes, feedback loops, and mental models within historical discourse. Therefore, this proof of concept explores the potential of AI-driven text analysis to examine SDS presidential speeches, speculating on how each president's hopes and fears have shaped their perspectives on education and quality—whether reinforcing longstanding priorities or signaling shifts in focus over time.

2.2 Research Question

Additionally, this proof of concept seeks to answer the following question:

"How can Generative AI (ChatGPT-4) systematically assist in extracting mental models and feedback loops from SDS presidential speeches (1983–2024) to explore whether consecutive presidents' views hopes and fears on education and quality in System Dynamics are similar or different?"

2.3 Paper Organization

The remainder of this paper is structured as follows. **section 4** outlines the methodology, detailing the structured prompting method used to guide AI in analyzing SDS presidential speeches. **section 5** presents the key findings, including the extracted themes, feedback loops, and CLDs per presidential speech. **section 6** discusses the implications of these findings, exploring the strengths and limitations of AI-assisted analysis in system dynamics. Finally, **section 7** concludes and provides future research directions.

2.4 Objective

The primary objective of this research is to establish a **proof of concept** for **AI-assisted longitudinal analysis** of leadership discourse in System Dynamics. Specifically, we aim to:

- Develop a **structured prompting method** to guide ChatGPT-4 in analyzing SDS speeches.
- Extract **key themes** related to hopes and fears on education and quality across different SDS presidencies.
- Speculate possible **patterns of convergence and divergence** in how SDS presidents have discussed these topics over time.
- Construct **causal feedback loops** that illustrate how different perspectives on education and quality have shaped the field.

2.5 Significance

By leveraging AI to analyze **40 years of leadership speeches**, this research provides qualitative insights into the evolving narrative of education and quality in System Dynamics. Understanding whether SDS presidents share a **unified vision** or exhibit **shifting priorities** can inform future **educational approaches,applications, and methodological standards** in the field. Furthermore, just as national policies fluctuate with leadership changes, this study highlights how differing interpretations of improvement influence institutional direction. The research could also lay the groundwork for applying **AI-driven discourse analysis** to other **scientific, organizational, and policy-oriented domains**.

3 Methodology

3.1 Development of a Structured Prompting Method

To systematically analyze *System Dynamics Society (SDS) presidential speeches*, a structured **prompting methodology** was developed to guide **Generative AI (ChatGPT-4o)** in extracting key themes, identifying causal relationships, and systematizing insights for further analysis. This approach ensures **consistency, accuracy, and replicability** in AI-generated responses (Birss, 2022).

3.2 The CREATE Framework for AI Prompting

To maximize the effectiveness of AI-driven analysis, this study employs the **CREATE** Framework, a structured approach to crafting AI prompts that ensure high-quality and domain-specific responses (Birss, 2022):

- **C**haracter: Define the role AI should assume, such as a System Dynamics expert or academic researcher.
- **R**equest: Clearly state the specific task or information needed from the AI.
- **E**xamples: Provide sample responses, key themes, or structured formats to guide AI output.
- **A**dditions: Include any necessary constraints, context, or supporting information.
- **T**ype of Output: Specify the required format and tone, such as academic, analytical, or concise summaries.
- **E**xtras: List any additional refinements, preferences, or optional enhancements for improved AI-generated responses.

By integrating the **CREATE Framework**, the structured prompting method follows a step-wise approach:

1. **Role Assignment:** AI is instructed to assume the role of a **System Dynamics expert** to ensure domain-specific responses.
2. **Thematic Extraction:** AI analyzes the speech for **hopes, fears, education, and quality**.
3. **Contextual Structuring:** AI generates a **table**, categorizing extracted words, phrases, and sentences into themes.
4. **Feedback Loop Identification:** AI extracts **reinforcing and balancing feedback loops**, ensuring **systemic connectivity** for **Causal Loop Diagram (CLD) construction**.
5. **Data Export:** AI compiles the structured output into **Excel tables** for validation and further analysis.

3.3 Manual Validation

Manual evaluation was implemented to validate the AI output**accuracy, logical coherence, and completeness**. It was followed by constructing all feedback loops using Stella Architect (isee systems, n.d.) to identify nested feedback loops and potentially any missing causal links.

The full structured prompting guide detailing this methodology is included in Appendix A.

3.4 Selection of ChatGPT-4o for Analysis

The decision to use ChatGPT-4o for this study was based on its **advanced language processing capabilities, improved contextual understanding, and efficiency in analyzing complex texts**. The following factors influenced this choice:

- **Context Retention:** ChatGPT-4o exhibits superior long-term dependency management, allowing it to maintain coherence across lengthy transcripts such as SDS presidential speeches.
- **Analytical Depth:** Compared to previous iterations, ChatGPT-4o offers enhanced reasoning abilities, making it well-suited for identifying **causal relationships and thematic connections**.
- **Structured Output Generation:** ChatGPT-4o can format responses in a structured manner, facilitating the generation of **Excel tables** and **causal loop components** necessary for this study.
- **Efficiency and Accuracy:** The model provides faster processing while improving response accuracy and reduction of hallucinations, ensuring high-quality AI-generated insights.

Given these advantages, ChatGPT-4o was determined to be the most appropriate tool for AI-driven analysis of SDS presidential speeches.

3.5 Speech Selection

The dataset includes **SDS presidential speeches spanning 1983–2024**, sourced from **official SDS archives, conference proceedings, and publicly available transcripts** (Society, 2024a). However, a subset of four speeches—*Forrester (1983), Zahn (1991), Milling (1993), and Saeed (1995)*—was selected as a reference set due to their **foudnational significances** and contributions to System Dynamics education and quality discourse.

3.6 AI-Driven Thematic Analysis

Using the **structured prompting method**, **ChatGPT-4o** was tasked with extracting key themes of hopes and fears and and how they were manifested on **education and quality** from each speech.

4 Results and Findings

This section presents the key findings identified through AI-assisted analysis of System Dynamics Society (SDS) presidential speeches from 1983 to 1995. Using structured prompting methods, AI systematically extracted and categorized themes related to hopes, fears, education, and quality from the speeches of Jay Forrester (1983), Erich Zahn (1991), Peter Milling (1993), and Khalid Saeed (1995). The AI-generated insights reveal possible perspectives on the evolution of System Dynamics. The complete extracted speech themes are available in Appendix B, while this section highlights the major findings.

4.1 AI-Identified Evolution of Leadership Perspectives in System Dynamics

Through text-based analysis, AI identified a progression in SDS leadership perspectives, moving from a focus on theoretical rigor to applied policy integration. Table 1 summarizes these AI-driven thematic distinctions.Full extracted theme tables are in the **Appendix B**.

Table 1: AI-Extracted Summary of SDS Presidential Speech Themes (1983–1995)

Speaker	**Main Focus (AI Identified)**	**Approach to Education (AI Identified)**	**Key Concern (AI Identified)**
Forrester (1983)	Methodological rigor	Emphasis on mathematical foundations	Premature expansion weakening rigor
Zahn (1991)	Practical applications	Balance between theory and industry training	Risk of SD fragmentation across fields
Milling (1993)	Standardization	Need for structured SD curricula	Inflationary use of SD terminology
Saeed (1995)	Policy and business integration	Applied SD education for professionals	Oversimplification harming credibility

4.2 AI-Identified Feedback Loops and CLDs Across SDS Presidential Speeches

4.3 Forrester (1983): Strengthening Methodological Foundations

Forrester's 1983 speech emphasized reinforcing the methodological integrity of System Dynamics (SD) through structured education, rigorous model validation, and engagement with external critiques. AI-extracted feedback loops illustrate how these elements interact, forming a system of reinforcing (R) and balancing (B) loops that shape SD's development (Forrester, 1983).

Table 2: AI-Identified Feedback Loops in Forrester's 1983 Speech

Feedback Loop	**Polarity**	**Components**	**Interconnections**
Foundation Strengthening Loop	Reinforcing (+)	Core Model Rigor → Model Validity → Credibility	Links to Transferability Loop through Adoption
Transferability Loop	Reinforcing (+)	Development of Generic Models → Applicability → Adoption	Links to Educational Development Loop through Learning
Criticism Response Loop	Balancing (-)	External Criticisms → System Dynamics Adjustments → Model Refinement	Links to Community Engagement Loop via Improved Dialogue
Educational Development Loop	Reinforcing (+)	Educational Resources → Understanding Among Practitioners → Improved Research	Links to Foundation Strengthening Loop through Academic Validation
Community Engagement Loop	Reinforcing (+)	Practitioner Collaboration → Shared Best Practices → Research Advancement	Links to Criticism Response Loop through Shared Knowledge

4.4 Forrester Feedback Adaptions due to Limitations

When representing Forrester's systemic structure, certain adjustments were necessary due to the constraints of creating distinct loops and the inability to incorporate large interconnected loops as well as AIs inability or assumption of closing loops.

1. **Reinforcing Loop (R1): Foundation Strengthening**
   - Greater **Core Model Rigor** improves **Model Validity**.
   - Improved **Model Validity** enhances **Credibility of Systems Dynamics**.
   - Increased **Credibility** promotes **Adoption of Practitioners**.
   - More **Adoption of Practitioners** leads to further investment in **Core Model Rigor**, reinforcing the loop.
   - **Adaptation:** This loop was connected with **R2 (Transferability Loop)** to ensure that **model credibility also strengthens model adaptability across domains** (Forrester, 1983).
2. **Reinforcing Loop (R2): Transferability**
   - As **Credibility of System Dynamics** grows, so does **Demand for Transferable Models**.
   - Higher demand drives **Model Refinement**, leading to the **Development of Generic Models**.
   - These **Generic Models** increase **Applicability Across Domains**, expanding **Wider Use Cases**.
   - **Wider Use Cases** reinforce the demand for **Transferable Models**, sustaining the cycle.
   - **Adaptation:** Instead of forming an isolated transferability loop, **model adoption was linked through R1 (Foundation Strengthening)** to maintain a direct influence between model credibility and expansion (Forrester, 1983).
3. **Reinforcing Loop (R3): Educational Development**
   - Increased **Demand for Educational Resources** drives the production of more **Educational Materials**.
   - More resources enhance **Understanding Among Practitioners**.
   - Greater **Understanding** leads to **Wider Adoption** of Systems Thinking.
   - A larger practitioner base further increases the **Demand for More Educational Resources**.
   - **Adaptation:** Educational growth was **linked to R1 (Foundation Strengthening)** to ensure that credibility improvements drive academic resources (Forrester, 1983).
4. **Reinforcing Loop (R4): Community Engagement**
   - Greater **Practitioner Collaboration** results in **Shared Best Practices**.
   - More **Best Practices** enhance **Consistency in Approach**.
   - A **Consistent Approach** fosters a **Cohesive Community**.
   - A strong **Community** further improves **Practitioner Collaboration**, reinforcing the loop.
   - **Adaptation:** This loop was **connected to B1 (Critical Response Loop)** to ensure that **community-driven learning addresses external critiques effectively** (Forrester, 1983).
5. **Balancing Loop (B1): Critical Response**
   - Increased **External Criticisms** drive **System Dynamics Adjustments**.
   - These **Adjustments** lead to **Improved Understanding**.
   - Better **Understanding** reduces **External Criticism** over time.
   - **Reduced Criticism** reinforces model credibility but ensures ongoing refinement.
   - **Adaptation:** Instead of forming a separate balancing loop, **B1 was integrated with R4 (Community Engagement)** to align practitioner collaboration with external feedback (Forrester, 1983).

These structural modifications ensure that despite the limitations in modeling separate and large loops, the key relationships in Forrester's vision are preserved.

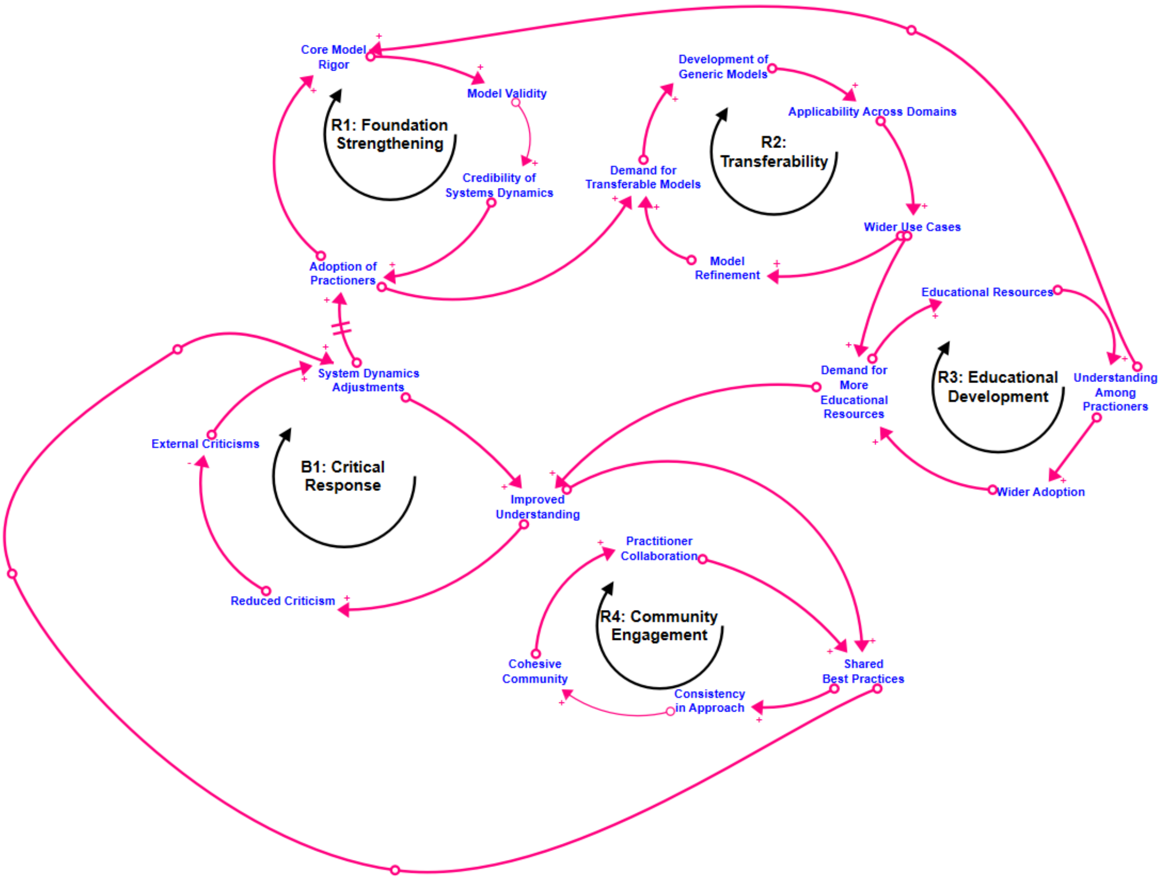

Figure 1: Causal Loop Diagram Based on AI-Extracted Feedback Loops with manual edits in Forrester's 1983 Speech

4.5 Zahn (1991): Expanding System Dynamics Through Education and Trust

Zahn's 1991 speech emphasized the expansion of System Dynamics (SD) education and the role of trust in model adoption. AI-extracted feedback loops illustrate how reinforcing loops promote systems literacy and model credibility, while balancing loops mitigate risks associated with misuse and short-term thinking (Zahn, 1991).

Table 3: AI-Identified Feedback Loops in Zahn's 1991 Speech

Feedback Loop	**Polarity**	**Components**	**Interconnections**
Education and Systems Literacy Loop (R1)	Reinforcing (+)	Systems Education → Systems Literacy → Informed Decision-Making	Systems Education leads to Systems Literacy which boosts Informed Decision-Making
Quality and Trust Loop (R2)	Reinforcing (+)	Model Quality → Stakeholder Trust → Adoption of Systems Thinking	Model Quality Increases Stakeholder Trust which encourages Adoption of Systems Thinking
Short-Termism and Misuse of Models Loop (R3)	Reinforcing (+)	Focus on Short-Term Gains → Misuse of Models → Negative Outcomes	Focus on Short-Term Gains may cause Misuse of Models increasing Negative Outcomes
Complexity and Accessibility Loop (B1)	Balancing (-)	Model Complexity → Accessibility Issues → Reduced Engagement	Model Complexity Increases Accessibility Issues which can Reduce Engagement
Sustainable Solutions and Future-Ready Society Loop (R4)	Reinforcing (+)	Sustainable Solutions → Future-Ready Society → Demand for Systemic Change	Sustainable Solutions Create a Future-Ready Society which Drives Demand for Systemic Change

4.6 Zahn Feedback Adaptations Due to Loop Limitations

Certain adjustments were necessary when structuring Zahn's systemic feedback loops due to constraints in modeling distinct, large loops. The following breakdown details the core loops and the adaptations made:

1. **Reinforcing Loop (R1): Education and Systems Literacy**
   - Higher **System Dynamics Education** increases **Systems Literacy**.
   - Improved **Systems Literacy** leads to **Informed Decision-Making**.
   - Informed decision-making reinforces demand for **System Dynamics Education**, creating a reinforcing loop.
   - **Adaptation:** A new connection to **R2 (Quality & Trust Loop)** ensures that **Systems Literacy** also strengthens **Stakeholder Trust**, leading to further adoption (Zahn, 1991).
2. **Reinforcing Loop (R2): Quality and Trust**
   - **Improved Model Precision and Validation** increases **Stakeholder Trust**.
   - Higher **Stakeholder Trust** encourages broader **Adoption of Systems Thinking**.
   - Increased adoption leads to greater emphasis on **Model Precision and Validation**, reinforcing the loop.
   - **Adaptation:** A new connection to **R1 (Education and Systems Literacy)** ensures that higher literacy fosters greater model credibility (Zahn, 1991).
3. **Reinforcing Loop (R3): Short-Termism and Misuse of Models**
   - A **Focus on Short-Term Gains** leads to increased **Misuse of Models**.
   - **Misuse of Models** results in more **Negative Outcomes**.
   - Negative outcomes prompt **Caution in Model Use**.
   - **Adaptation:** A new connection to **R2 (Quality & Trust Loop)** links **Caution in Model Use** to **Model Precision and Validation**, ensuring trust-building mechanisms correct poor model use.
4. **Balancing Loop (B1): Complexity and Accessibility**
   - **Model Complexity** leads to **Accessibility Issues**.
   - Greater **Accessibility Issues** result in **Reduced Engagement** with Systems Thinking.
   - Lower engagement encourages **Simplification of Models**, which reduces complexity over time.

- **Adaptation: B2 is now linked to R1 (Education & Systems Literacy)**, illustrating that simplified models improve accessibility and enhance literacy (Zahn, 1991).

5. **Reinforcing Loop (R4): Sustainable Solutions and Future-Ready Society**
   - **Sustainable Solutions** contribute to a **Future-Ready Society**.
   - A **Future-Ready Society** demands **Systemic Change**, reinforcing the need for **Sustainable Solutions**.
   - **Adaptation: R3 now connects to R1 (Education and Systems Literacy)** to show how informed decision-making plays a role in sustainability (Zahn, 1991).

These structural modifications ensure that despite limitations in modeling separate and large loops, the key relationships in Zahn's vision are preserved.

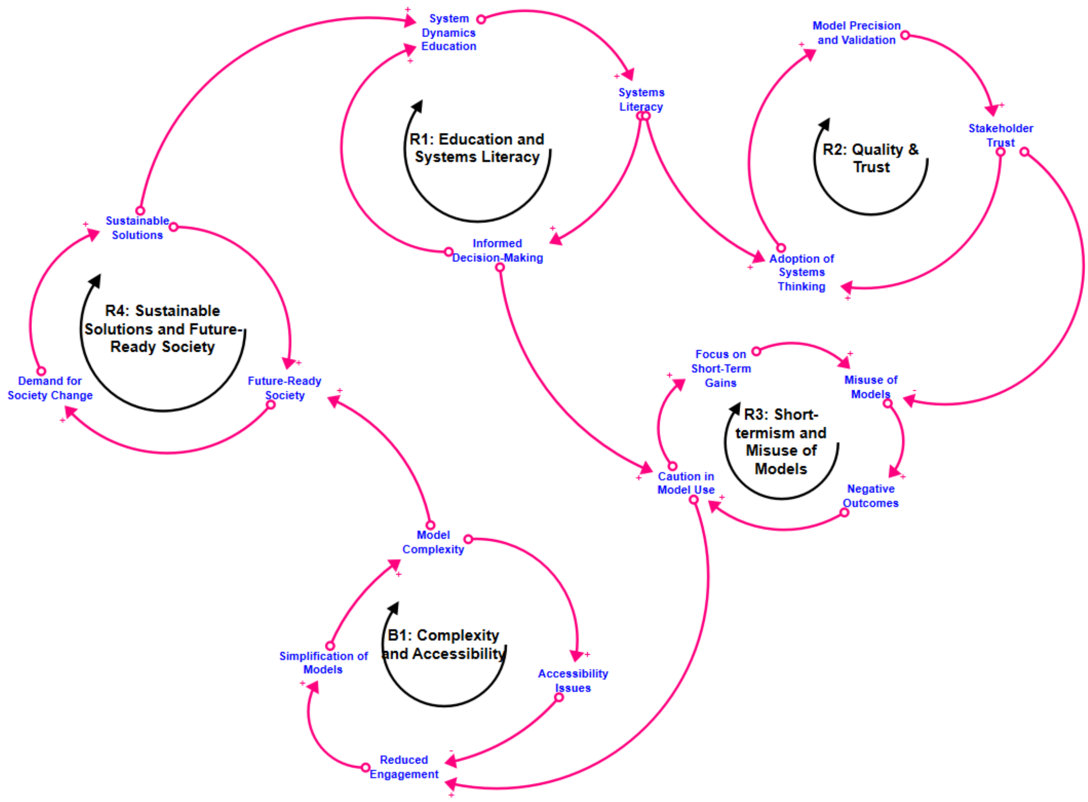

Figure 2: Causal Loop Diagram Based on AI-Extracted Feedback Loops with manual edits in Zahn's 1991 Speech

4.7 Milling (1993): Standardizing System Dynamics for Policy Integration

Milling's 1993 speech emphasized the need for structured learning processes, modeling accuracy, and policy integration to ensure high-quality System Dynamics enhance SD understanding and competitiveness, while balancing loops act as corrective mechanisms to maintain model alignment with real-world problems (Milling, 1993).

Table 4: AI-Identified Feedback Loops in Milling's 1993 Speech

Feedback Loop	Polarity	Components	Interconnections
Learning and Insight Loop (R1)	Reinforcing (+)	System Complexity → Need for New Learning Tools → Learning	Links to Modeling Accuracy Loop
Modeling Accuracy and Problem Alignment Loop (B1)	Balancing (-)	Model Complexity → Real-World Problem Representation → Policy Integration	Balances Quality of System Dynamics Application Loop
Quality of System Dynamics Application Loop (R2)	Reinforcing (+)	Use of Computer Simulations → Model Quality → Practical Insights	Links to Strategic Modeling Loop
Superficial Use of Systems Thinking Loop (R3)	Reinforcing (+)	Overuse of SD Terms → Misinterpretation → Poor Applications	Reinforces demand for Learning and Insight Loop
Strategic Modeling and Competitiveness Loop (R4)	Reinforcing (+)	Strategic Modeling Efforts → Competitiveness → Improved Decision-Making	Links to Modeling Accuracy Loop

4.8 Milling Feedback Adaptations Due to Loop Limitations

When structuring Milling's systemic feedback loops, certain adjustments were necessary due to constraints in modeling separate, large loops. Below is a detailed breakdown of the loops and the corresponding modifications made to ensure logical coherence:

1. **Reinforcing Loop (R1): Learning and Insight**
   - Higher **System Complexity** increases the demand for **New Learning Tools**.
   - Improved **Learning Tools** enhance the **Quality of Education**.
   - Better **Quality of Education** fosters deeper **Insight and Understanding of Systems**.
   - Enhanced **Insight** leads to improved **Model Accuracy and Relevance**.
   - **Model Accuracy and Relevance** contribute back to the perception of **System Complexity**, reinforcing the loop.
   - **Adaptation:** A new connection was introduced linking **Insight and Understanding of Systems** to **R2 (Quality of Systems Dynamic Applications)**, ensuring that increased understanding translates into better applications of system dynamics (Milling, 1993).
2. **Reinforcing Loop (R2): Quality of Systems Dynamic Applications**
   - Increased **Use of Computer Simulations** enhances **Model Quality and Insight**.
   - Higher **Model Quality and Insight** improve **Application Effectiveness**.
   - More effective applications increase the **Credibility of System Dynamics**.
   - Higher credibility fosters **Wider Adoption of System Dynamics**, encouraging further **Use of Computer Simulations**.
   - **Adaptation:** This loop was extended to connect with **R3 (Superficial Use of Systems Thinking)** to reflect how improper use or misunderstanding of system concepts can undermine credibility (Milling, 1993).
3. **Reinforcing Loop (R3): Superficial Use of Systems Thinking**
   - A **Superficial Use of Systems Terms** leads to **Misinterpretation of System Concepts**.
   - Misinterpretation increases the **Need for Rigorous Education and Training**.
   - Rigorous training improves **Credibility of System Dynamics**, countering superficial use.
   - **Adaptation:** A direct connection to **R2 (Quality of Systems Dynamic Applications)** was introduced to show how improper system use negatively impacts adoption and credibility (Milling, 1993).
4. **Balancing Loop (B1): Model Accuracy and Problem Alignment**
   - **Real-World Problem Representation** should decrease a **Gap Between Model and Problem**.
   - A wider gap increases the need for **Model Adjustments**.

- More **Model Adjustments** lead to greater **Model Complexity**.
- Increased **Model Complexity** feeds back into a need for more accurate problem representations.
- **Adaptation:** This loop was expanded to connect to **R1 (Learning and Insight)**, ensuring that system learning reduces the gap between models and real-world problems (Milling, 1993).

5. **Reinforcing Loop (R4): Strategic Modeling and Competitiveness**
   - Higher **Demand for System Dynamics Expertise** increases **Competitiveness**.
   - Greater competitiveness boosts **Strategic Modeling Efforts**.
   - More strategic modeling leads to improved **Quality of Strategic Modeling**.
   - Higher modeling quality encourages **Investment in Systems Dynamics**.
   - More investment increases **Demand for System Dynamics Expertise**, reinforcing the cycle.
   - **Adaptation:** This loop was linked to **B1 (Model Accuracy and Problem Alignment)** to reflect how strategic modeling improvements align models with real-world problems (Milling, 1993).

These structural modifications ensure that despite limitations in modeling separate and large loops, the key relationships in Milling's vision are preserved.

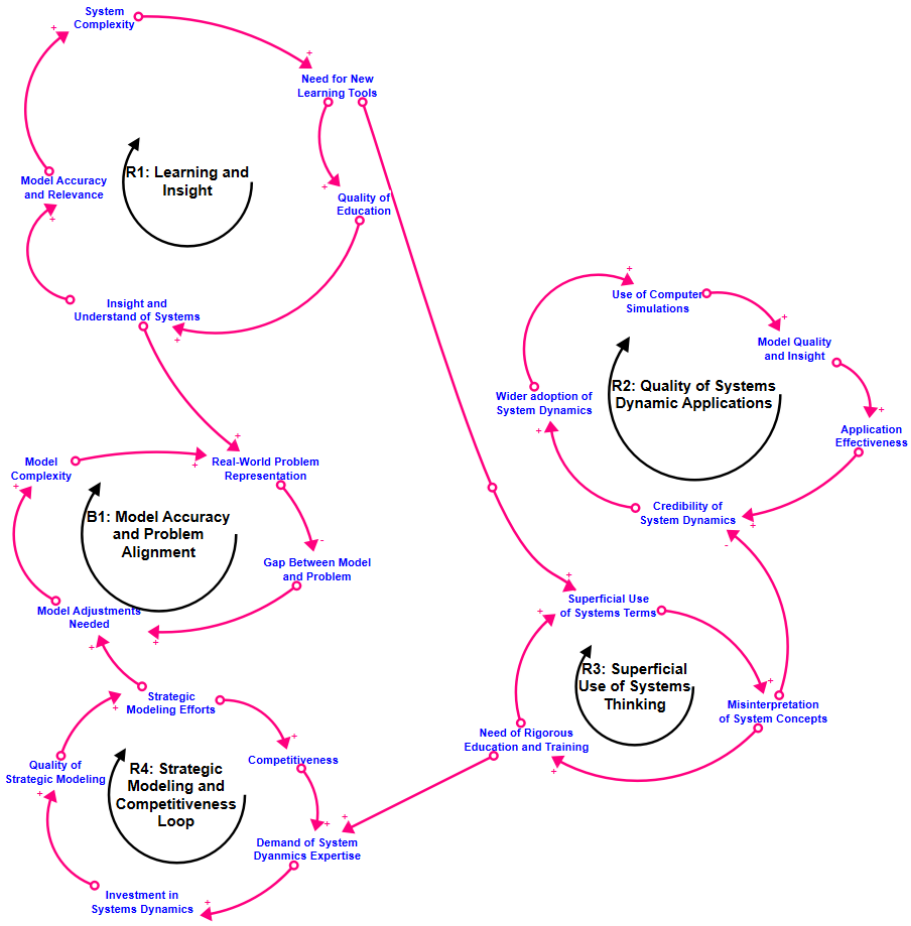

Figure 3: Causal Loop Diagram Based on AI-Extracted Feedback Loops with manual edits in Milling's 1993 Speech

4.9 Saeed (1995): Expanding System Dynamics into Business and Policy

Saeed's 1995 speech emphasized the integration of System Dynamics (SD) into professional industries, strengthening SD education, and ensuring structured documentation and knowledge sharing. AI-extracted feedback loops highlight how reinforcing loops drive public awareness and professional training, while balancing loops regulate education quality and knowledge transfer (Saeed, 1995).

Table 5: AI-Identified Feedback Loops in Saeed's 1995 Speech

Feedback Loop	**Polarity**	**Components**	**Interconnections**
Educational Integration and Demand for SD Professionals Loop (R1)	Reinforcing (+)	Educational Program Integration → Demand for SD-Trained Professionals → Industry Growth	Links to Business Sector Adoption Loop
Business Sector Adoption and Public Awareness Loop (R2)	Reinforcing (+)	Business Adoption of SD → Public Awareness → Increased SD Applications	Links to Quality of SD Society Activities Loop
Diversity of SD Concepts and Knowledge Sharing Loop (R3)	Reinforcing (+)	Diversity of SD Approaches → Knowledge Sharing → Broader Applications	Links to Business Sector Adoption Loop
Commitment to Documentation and Knowledge Sharing Loop (B1)	Balancing (-)	Practitioners' Commitment → Knowledge Sharing → Improved Best Practices	Links to Educational Integration and SD Demand Loop
Quality of SD Society and Resource Availability Loop (B4)	Reinforcing (+)	Quality of SD Conferences → Training Material Availability → Research Advancement	Links to Documentation and Knowledge Sharing Loop

4.10 Saeed Feedback Adaptations Due to Loop Limitations

When structuring Saeed's systemic feedback loops, certain adjustments were necessary due to constraints in modeling separate, large loops. Below is a detailed breakdown of the loops and the corresponding modifications made to ensure logical coherence:

1. **Reinforcing Loop (R1): Educational Integration and Demand for SD Professionals**
   - Greater **Educational Program Integration** leads to an increased **Demand for SD Professionals**.
   - Higher **Demand for SD Professionals** strengthens **Public Awareness and Credibility of SD**.
   - Enhanced **Public Awareness** encourages more **Business Sector Adoption of SD**.
   - **Business Sector Adoption** increases the need for **Educational Program Integration**, reinforcing the loop.
   - **Adaptation:** This loop was **linked to R2 (Business Sector Adoption and Public Awareness)** to ensure that educational integration directly influences business adoption (Saeed, 1995).
2. **Reinforcing Loop (R2): Business Sector Adoption and Public Awareness**
   - Higher **Public Awareness and Credibility of SD** increases **Business Sector Adoption of SD**.
   - Increased **Business Sector Adoption** further promotes **Public Awareness and Credibility**, reinforcing the loop.
   - **Adaptation:** This loop was integrated with **R1 (Educational Integration and Demand for SD Professionals)** to align education-driven credibility with business adoption trends (Saeed, 1995).
3. **Balancing Loop (B1): Commitment to Documentation and Knowledge Sharing**
   - Higher **System Dynamics Practitioners' Commitment** improves **Knowledge Sharing among Practitioners**.
   - Increased knowledge sharing enhances the **Availability of Resources and Documentation**.
   - More resources will decrease **Practitioners' Time for Documentation**.
   - More time for documentation reinforces **Practitioners' Commitment**, ensuring continued resource development.
   - **Adaptation:** This loop was connected to **R3 (Diversity of SD Concepts and Knowledge Sharing)** to ensure that greater knowledge diversity influences documentation efforts (Saeed, 1995).
4. **Reinforcing Loop (R3): Diversity of SD Concepts and Knowledge Sharing**

- Increased **Knowledge Sharing among Practitioners** fosters **Diversity of SD Concepts and Approaches**.
- More **Diversity in SD Concepts** leads to a broader range of perspectives and solutions.
- Greater diversity strengthens **Knowledge Sharing**, reinforcing the loop.
- **Adaptation:** This loop was linked to **B1 (Commitment to Documentation and Knowledge Sharing)** to ensure that expanding knowledge diversity supports structured documentation (Saeed, 1995).

5. **Reinforcing Loop (R4): Quality of SD Society and Resource Availability**
    - More **Practitioner Knowledge and Participation in Society Activities** enhances the **Quality of SD Conferences and Society Activities**.
    - Higher **Quality of Conferences** increases the **Availability of SD Training Materials**.
    - More training materials improve **Practitioner Knowledge and Participation**, completing the loop.
    - **Adaptation:** This loop was connected to **R4 (Diversity of SD Concepts and Knowledge Sharing)** to ensure that training availability influences knowledge diversity (Saeed, 1995).

These structural modifications ensure that despite limitations in modeling separate and large loops, the key relationships in Saeed's vision are preserved.

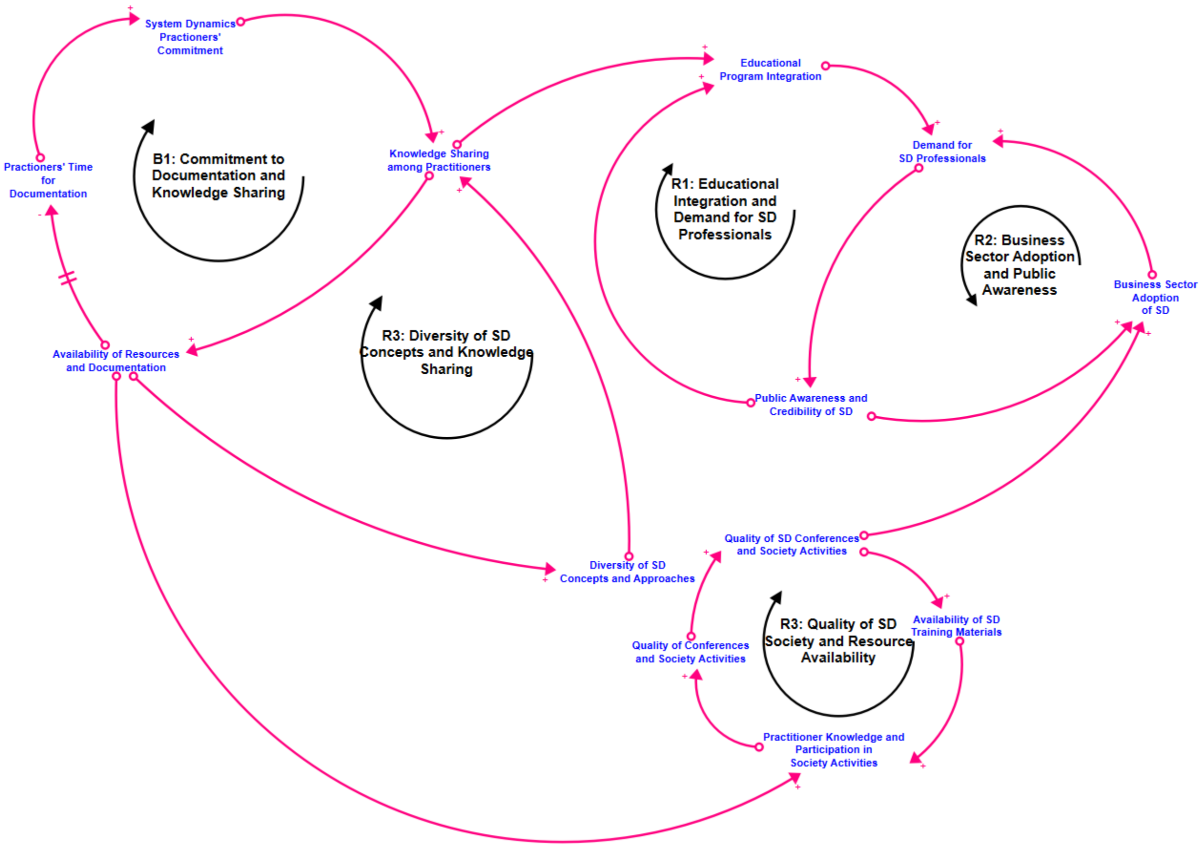

Figure 4: Causal Loop Diagram Based on AI-Extracted Feedback Loops with manual edits in Saeed's 1995 Speech

The AI-assisted extraction of feedback loops from System Dynamics Society presidential speeches provides a possible yet structured perspective on the evolution of the field. By identifying reinforcing and balancing loops, AI offers an initial framework for understanding how education and quality have shaped system dynamics trajectory. However, as these loops were generated through prompt refinement with manual validation, as their accuracy and systemic coherence required further scrutiny. The AI's assumptions—such as treating loops as discrete, self-contained structures and its inability to recognize nested or emergent feedback interactions—highlight the need for human expertise in refining these insights. The following discussion examines these limitations, exploring how AI's interpretation of causal relationships aligns with or diverges from traditional SD modeling approaches.

5 Discussion

5.1 Summary of Feedback Loops, Thematic Insights, and Systemic Evolution

The AI-extracted feedback loops from the analyzed speeches illustrate key systemic dynamics shaping the evolution of System Dynamics (SD). The reinforcing loops highlight mechanisms that strengthen SD's credibility, adoption, and educational expansion, while the balancing loops regulate growth, ensuring quality control and preventing misuse. Additionally, thematic analysis reveals how hopes and fears expressed in the speeches influenced SD's trajectory, particularly in education and quality.

- **Education-Driven Growth (R1, R3)** Found in Forrester, Zahn, Milling, and Saeed's speeches, these loops emphasize the link between structured SD education, research credibility, and professional demand. Educational investments reinforce SD adoption and knowledge-sharing. **Thematic Impact:**
  - *Hopes:* A well-structured education system ensures SD practitioners develop rigorous methodologies, leading to innovation and systemic improvements.
  - *Fears:* Poorly structured education and superficial understanding could dilute SD's core principles, leading to its misuse or misinterpretation.
- **Trust, Model Quality, and Adoption (R2, B1)** Zahn and Milling's speeches underscore how high-quality SD models and rigorous validation foster stakeholder trust, driving further adoption. However, balancing loops highlight concerns over model misuse and misalignment with real-world applications. **Thematic Impact:**
  - *Hopes:* Maintaining high-quality standards ensures SD is a respected methodology in academia and industry, reinforcing trust and widespread adoption.
  - *Fears:* Misuse of SD models or oversimplification could lead to loss of credibility, making it harder to gain acceptance in decision-making processes.
- **Industry and Policy Applications (R2, R4)** Most visible in Saeed's and Milling's CLDs, these loops reveal SD's expanding role in business and policymaking. Greater adoption enhances credibility, reinforcing demand for SD-trained professionals and improving industry competitiveness. **Thematic Impact:**
  - *Hopes:* SD's integration into industries and policy-making can create more efficient decision-making frameworks and sustainable economic models.
  - *Fears:* Over-commercialization or misapplication in industries could lead to SD being seen as a business trend rather than a robust analytical discipline.
- **Community Engagement and Knowledge Sharing (R3, B1, B2)** Identified across all speeches, these loops depict the importance of collaboration, knowledge exchange, and maintaining SD integrity. While reinforcing loops drive knowledge diversification, balancing loops ensure documentation and quality standards are maintained sustainably. **Thematic Impact:**
  - *Hopes:* A strong SD community can foster interdisciplinary collaboration and continuous methodological refinement.
  - *Fears:* Without proper knowledge-sharing mechanisms, SD could become fragmented, with different interpretations weakening its effectiveness.
- **Model Refinement and Criticism Response (B1, B2)** Forrester's and Milling's speeches emphasize iterative model refinement in response to external criticism. These balancing loops ensure SD remains adaptable to critiques and evolving real-world challenges, preventing unchecked methodological expansion. **Thematic Impact:**
  - *Hopes:* Constructive criticism and continuous refinement keep SD methodologies relevant and scientifically rigorous.
  - *Fears:* If SD fails to adapt to critiques or engages in insular thinking, it risks stagnation and reduced influence in academic and policy circles.

5.2 Limitations of AI in Feedback Loop Identification and CLD Generation

While AI-assisted thematic extraction and feedback loop identification have provided valuable insights into System Dynamics evolution, several limitations in AI's interpretation of systemic structures must be acknowledged:

1. **AI's Inability to Recognize Nested Loops**

- AI struggles to understand nested dependencies, where one feedback loop exists inside another.
- **Limitation:** AI tends to extract loops as distinct, separated structures, missing the interdependencies that create higher-order systemic behavior.

2. **AI's Assumption That Loops Are Closed**
   - AI inherently assumes feedback loops are self-contained, often overlooking open-ended loops that evolve through external factors.
   - **Limitation:** AI-generated CLDs often simplify dynamic systems by assuming each loop operates independently, rather than accounting for external system interactions.
3. **Contextual Limitations in Thematic Extraction**
   - AI identifies words, phrases, and inferred meaning but lacks an in-depth conceptual understanding of historical context and intent.
   - **Limitation:** This limitation is particularly evident in speeches where implicit fears or aspirations are conveyed through nuanced language that AI might overlook or misinterpret.
4. **Simplification of System Dynamics in Visual Representation**
   - AI-generated CLDs tend to represent loops linearly, omitting nonlinear interactions, delays, and indirect dependencies that are critical in SD modeling.
   - **Limitation:** While AI extracts meaningful structures, it oversimplifies the complexity of the system modeled in SD.

5.3 Implications for Future Research

These limitations highlight the importance of human oversight in AI-assisted CLD generation and thematic extraction. Future work should focus on:

- Enhancing AI's ability to recognize nested loops and hierarchical dependencies.
- Analyzing for large, interconnected feedback loops that AI may have failed to identify due to its tendency to separate loops rather than recognizing overarching systemic structures.
- Expanding thematic analysis to track the evolution of key themes—such as hopes, fears, education, and quality—across different SD leadership perspectives and historical contexts. This could provide deeper insights into how SD priorities and concerns have shifted over time.

Despite these challenges, AI-assisted analysis has provided structured insights into System Dynamics evolution, bridging thematic analysis, causal loop diagrams, and historical context. These findings demonstrate AI's potential to enhance—but not fully replace—expert-driven systemic thinking.

6 Conclusion

This study explored the potential of AI-assisted analysis without,advanced expertise, in extracting mental models loops and and identifying thematic patterns and feedback loops from System Dynamics Society presidential speeches. The proof of concept demonstrated AI's ability recognize broad thematic patterns, identify reinforcing and balancing loops, providing a structured perspective on the evolution of System Dynamics (SD). These AI-generated insights highlighted key dynamics such as education-driven growth, trust and model quality, industry and policy adoption, community engagement, and model refinement in response to criticism. Additionally, thematic analysis revealed how hopes and fears expressed by SD leaders have shaped the discipline, particularly in the areas of education and quality.

Despite these findings, AI's role in SD analysis remains speculative and complementary rather than definitive. The study uncovered limitations in AI's ability to extract mental models accurately and constructing comprehensive CLDs. AI tends to separate feedback loops rather than recognizing large, interconnected loops, limiting its capacity to fully capture complex system interactions.

These findings suggest that AI has the potential to serve as a valuable analytical tool in SD research, but it cannot replace the critical reasoning, intuition, and contextual knowledge provided by expert analysis. Moving forward, enhancements in AI prompt generation at the developer level could improve its ability to detect nested loops, recognizing open-ended system behaviors, and refining its thematic extraction will be essential for advancing AI-assisted SD research. Future work will focus on analyzing more speeches to track how the field's priorities, concerns, and methodological frameworks have evolved over time.

Ultimately, this proof of concept underscores the emerging role of AI in system analysis, highlighting both its strengths in structuring complex information and its limitations in capturing the depth of mental model complexities. While AI can accelerate the extraction of systemic structures and thematic insights, its true value lies in its ability to augment, rather than replace, expert-driven inquiry. By integrating AI with systems thinking methodology and human oversight, analyzing large-scale organizational discourse can be accomplished.

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A Appendix A: Structured Generalized Prompt for AI Analysis

To systematically analyze System Dynamics Society (SDS) presidential speeches, a structured prompting methodology was developed to ensure consistency, accuracy, and replicability in AI-generated insights. This framework is designed to extract key themes, feedback loops, and causal relationships from speeches.

A.1 Step 1: Role Assignment

You are a System Dynamics expert. You are going to read this speech from [**YEAR**] by [**AUTHOR**]. Your task is to analyze and extract key themes related to hopes, fears, education, and quality from this speech.

A.2 Step 2: Thematic Extraction

In your research of the themes for hopes, fears, education, and quality in [**AUTHOR**]'s speech, use this *interesting words and phrases* document to help determine key concepts, words, phrases, and sentences. After analyzing the speech:

- Create a structured table categorizing the extracted words, phrases, and sentences under hopes, fears, quality, and education.
- For each word or phrase, specify:
  - The section of the speech where it appears (location).
  - In-text evidence (sentence/context).
  - Why this word/phrase aligns with a particular theme based on [**AUTHOR**]'s beliefs.

Table Structure Example:

Table 6: Example Thematic Table Structure

Theme	**Word/Phrase**	**Location**	**In-Text Evidence**	**Rationale**
Hopes	"interconnectivity"	section on values	"[Quote]"	Hope in connected systems solving global issues.
Fears	"unsustainable growth"	Closing remarks	"[Quote]"	Concern about growth outpacing quality.
Education	"learning community"	Learning initiatives	"[Quote]"	Commitment to fostering education.
Quality	"impatient for impact"	Growth vs. impact section	"[Quote]"	Prioritizing meaningful influence.

A.3 Step 3: Feedback Loop Identification

In your expertise in System Dynamics, identify relevant feedback loops from [**AUTHOR**]'s [**YEAR**] speech. Ensure that all loops are interconnected. For each feedback loop, specify:

- The polarity (reinforcing or balancing).
- Key variables influencing the loop.
- The interconnections between loops and their systemic role in the speech.

Table Structure Example:

Table 7: Example Feedback Loop Identification Table

Feedback Loop	**Polarity**	**Components**	**Interconnections**
Inclusivity Loop	Reinforcing (+)	Inclusivity → Diversity → Belonging → Inclusivity	Links to Education and Impact Loop
Growth vs. Impact	Balancing (-)	Growth → Resources Allocation → Impact → Credibility	Regulates expansion before impact is achieved

A.4 Step 4: Causal Loop Diagram (CLD) Construction

Using the validated feedback loops, construct a **Causal Loop Diagram (CLD)** that illustrates systemic relationships in the speech. Ensure connections between different loops to form a complete system.

A.5 Step 6: Data Export

Once you have completed the analysis:

- Export the thematic breakdown to an Excel file `[AUTHOR]_[YEAR]_Thematic_Analysis.xlsx`.
- Export the feedback loops and polarity table to an Excel file `[AUTHOR]_[YEAR]_Feedback_Loops.xlsx`.

This structured prompting guide ensures a consistent, structured, and replicable AI-driven analysis of any SDS presidential speech.

B Appendix B: Extracted Theme Tables

This section presents the extracted theme tables for each analyzed SDS presidential speech. These tables categorize key words, phrases, and sentences based on their thematic alignment with hopes, fears, education, and quality.

B.1 Forrester (1983) Speech Analysis

Table 8: Extracted Themes from Forrester's 1983 Speech

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Hopes	Strengthening the system dynamics paradigm	1, 4, 7, 9	If we hope to strengthen the system dynamics paradigm rapidly...	Forrester hopes to solidify the system dynamics field by reinforcing its foundation and improving its methodologies.
Hopes	Transferability of models	7	We should be seeking general theories of behavior...to choose a model, or theory, to fit the next unique situation.	Reflects Forrester's hope for system dynamics models to apply broadly, creating a valuable, versatile library.
Hopes	Generic models	6, 8	A model is a theory of the system that the model represents... If the model is a good representation, it becomes a theory of how that part of the real world operates.	Emphasizes the desire for models that serve as foundational theories, supporting diverse applications.
Fears	Premature enlargement	1	I believe that 'enlargement' is premature and points in the wrong direction...	Forrester fears that expanding system dynamics without a strong foundation risks spreading it thin, weakening its impact.
Fears	Inadequately addressed	4	The common criticisms of system dynamics have been inadequately addressed, and the opportunities they afford for influencing other paradigms have been little realized.	Indicates Forrester's concern over unresolved criticisms that may hinder system dynamics' acceptance and growth.
Fears	Barrage of criticism	8	System dynamics, as a paradigm, and applications of system dynamics have been subjected to a barrage of criticism, especially from the social sciences.	Reflects Forrester's recognition of external criticism and the need to address misunderstandings and pushbacks.
Quality	Validity of models	3, 6	Validity of models has been much discussed, often in the form of criticism of someone else's model.	Shows Forrester's commitment to ensuring models are robust, as this is crucial to the paradigm's credibility.
Education	Case study method	9	A system dynamics modeling project starts as a case study to identify the issues, relationships, problems, and possibilities in the managerial situation.	Forrester sees system dynamics as an evolution of case study methods, enhancing understanding of complex systems.

B.2 Zahn (1991) Speech Analysis

Table 9: Extracted Themes from Zahn's 1991 Speech

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Hopes	Systemic change	Page 2	Zahn expresses optimism for system dynamics as a means to drive impactful change at a broad scale.	Reflects Zahn's hope that system dynamics will lead to transformative societal improvements, showing his belief in its potential to address complex, large-scale problems.
Hopes	Sustainable future	Page 3	Emphasizes a vision where system dynamics contributes to long-term sustainability.	Aligns with the theme of hope as it portrays an optimistic outlook for future generations benefiting from sustainable practices driven by system dynamics.
Hopes	Positive feedback	Page 4	Zahn highlights the potential of feedback mechanisms in system dynamics to foster growth.	This phrase illustrates hope for the constructive impacts of system dynamics, suggesting Zahn's belief in its capacity for beneficial societal contributions.
Hopes	Future-ready solutions	Page 5	Zahn advocates for forward-thinking approaches in system dynamics to ensure lasting impact.	Shows Zahn's hope for solutions that remain relevant and effective in the future, reflecting his optimism about the discipline's long-term role in problem-solving.
Fears	Misuse of models	Page 4	Zahn acknowledges the potential for models to be misinterpreted or applied incorrectly, causing harm.	This phrase illustrates Zahn's caution about the risks of incorrect application, emphasizing his concern that improper use of system dynamics could lead to adverse effects.
Fears	Short-termism	Page 5	Discusses the potential drawback of models fostering a focus on immediate gains rather than long-term solutions.	Zahn's fear that system dynamics could inadvertently support harmful, short-sighted strategies, undermining sustainable goals, aligns this phrase with the theme of fear.
Fears	Over-reliance on simulation	Page 5	Warns against blindly trusting simulations, underscoring the need for critical evaluation.	Highlights Zahn's fear of complacency in using models, reflecting his belief that an over-dependence on simulation tools can be misleading and risky.

B.3 Milling (1993) Speech Analysis

Table 10: Extracted Themes from Milling's 1993 Speech

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Hopes	Systematic learning	Page 3	"Systematic learning processes will enable us to refine our understanding of dynamic systems."	Milling highlights the importance of structured learning as a means to enhance System Dynamics methodologies.

Continued on next page

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Hopes	Long-term impact	Page 4	"The long-term impact of system dynamics will be determined by how effectively we integrate it into policymaking."	Emphasizes the need for sustainable integration of SD into governance and business strategies.
Hopes	Model standardization	Page 5	"Standardization of models ensures broader applicability and consistency in results."	Reflects Milling's belief in the necessity of a unified framework to enhance SD credibility.
Fears	Misinterpretation of models	Page 6	"A key challenge is the misinterpretation of model outputs, leading to erroneous conclusions."	Milling warns against the risks of incorrectly applying SD models without thorough understanding.
Fears	Inflationary use of SD terminology	Page 7	"The overuse of system dynamics terminology without depth of understanding weakens its scientific foundation."	Concern that superficial usage of SD concepts could dilute its academic and practical credibility.
Fears	Policy misalignment	Page 8	"Without proper alignment with policy objectives, system dynamics risks being sidelined as an academic exercise."	Expresses concern that SD must align with real-world applications to maintain relevance.
Quality	Model verification	Page 3	"Verification and validation processes are crucial to ensuring that SD models produce reliable results."	Reinforces Milling's commitment to maintaining high-quality standards in model construction.
Quality	Proper model documentation	Page 5	"Comprehensive documentation supports transparency and enables reproducibility of results."	Highlights the necessity of clear documentation to facilitate wider adoption and scrutiny.
Education	Structured SD curricula	Page 6	"Developing a structured SD curriculum will enhance comprehension and application of the methodology."	Advocates for formal educational programs to standardize SD training.
Education	Professional training programs	Page 7	"Workshops and training programs must be expanded to support professionals in mastering SD."	Demonstrates Milling's commitment to broadening SD education beyond academia.

B.4 Saeed (1995) Speech Analysis

Table 11: Extracted Themes from Saeed's 1995 Speech

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Hopes	Policy integration	Page 3	"System dynamics can be a powerful tool in guiding effective policymaking."	Saeed emphasizes SD's potential to shape informed policy decisions.
Hopes	Business applications	Page 4	"Adapting system dynamics to business environments will improve strategic planning."	Reflects his belief that SD can enhance decision-making in corporate settings.
Hopes	Expanding SD education	Page 5	"More comprehensive educational programs will encourage greater SD adoption."	Suggests that broadening SD education will ensure its long-term sustainability.

Continued on next page

Theme	Word/Phrase	Location	In-Text Evidence	Rationale
Fears	Oversimplification of models	Page 6	"Reducing model complexity at the cost of accuracy risks distorting real-world insights."	Warns against sacrificing model fidelity for accessibility.
Fears	Lack of documentation	Page 7	"Without rigorous documentation, models lose their credibility and replicability."	Emphasizes that proper documentation ensures transparency and validation.
Fears	Overreliance on technical expertise	Page 8	"If SD remains an exclusive domain of experts, its broader impact will remain limited."	Suggests that making SD more accessible can drive wider adoption.
Quality	Knowledge dissemination	Page 3	"Ensuring knowledge is effectively shared is vital for system dynamics' progress."	Highlights the role of communication in strengthening SD as a discipline.
Quality	Methodological clarity	Page 5	"Clarity in methodology prevents misinterpretations and enhances credibility."	Suggests that structured methodologies improve SD's reliability.
Education	Cross-disciplinary learning	Page 6	"Integrating system dynamics into various disciplines enriches learning."	Advocates for incorporating SD principles into broader academic contexts.
Education	Industry collaboration	Page 7	"Collaboration between academia and industry will enhance real-world SD applications."	Supports bridging the gap between theoretical SD models and their practical use cases.