Towards a Gamification-Enhanced Agent-Based Simulations for the Digital Transformation Process

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Contents

Introduction

Introduction

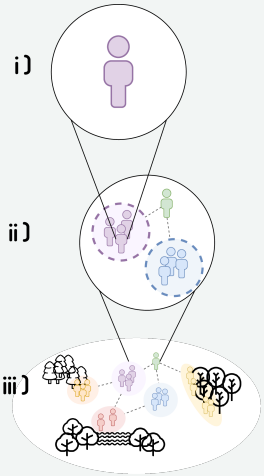
- Digital transformation is a thorough transformation of business through digital technologies.
- Critical in this process: accurately describing the business process to be digitised.
- This paper introduces agent-based simulation models for richer feedback in the transformation process.

Problem Definition

- Traditional token-based simulations provide limited feedback for business process transformations.
- Proposal: Integrate ontology-based agent models into intelligent virtual environments (IVE).
- The addition of gamification can enhance feedback quality by simulating more nuanced, real-world interactions.

Related Work

- Intelligent Agents: Systems capable of perceiving and acting upon their environment.
- Intelligent Virtual Environments (IVE): Combine high-fidelity environmental simulations with AI for real-time interaction.
- Digital Twins: Real-time synchronizations between virtual and physical systems.

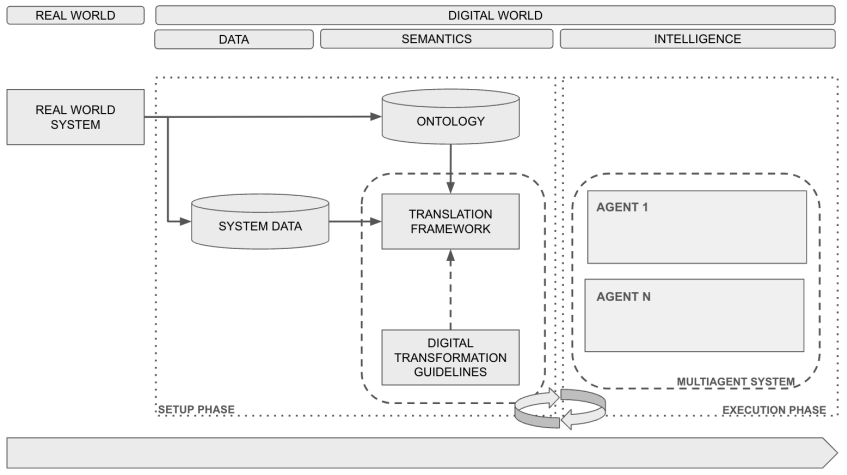


Proposed Architecture

Proposed Architecture

- Three-phase architecture:
  - Setup phase: Map real-world elements to the virtual environment using an ontology.
  - Implementation phase: Translate ontology-based models into simulation-ready blueprints.
  - Execution phase: Use data to simulate agent behaviours and observe feedback.
- Agents are implemented as digital twins, and their behaviour is observed using different levels of integration.

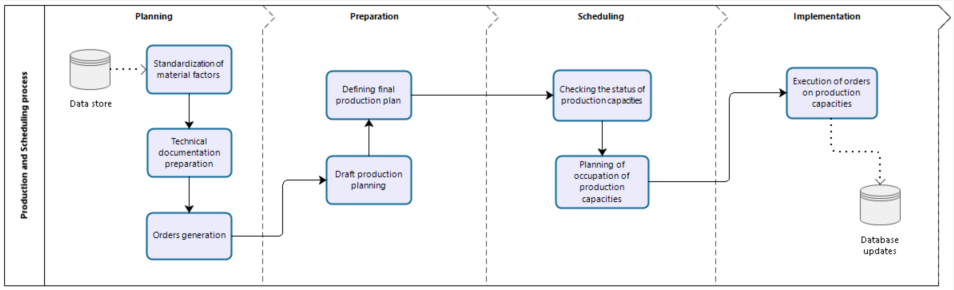
Proposed Architecture



Use Cases

Use Case: Production Planning

- Production planning and scheduling process
- The proposed architecture simulates the impact of digital transformation in these phases.



Scenario 1: Planning and Preparation

- Digital inputs (material stocks, work orders) are synchronized in real-time.
- Production plans dynamically adjust to changes in the market and inventory.
- Simulation models customer orders, inventory, and suppliers as interacting agents.

Scenario 2: Scheduling and Implementation

- Work orders are allocated digitally to available resources.
- Real-time updates provide continuous feedback on capacity and workload.
- Simulation adjusts production plans based on incidents like equipment failures.

Discussion and Conclusion

Discussion

- Simulating digital transformation using agents offers richer, more interactive feedback than traditional methods.
- Incorporating gamification techniques mimics real-world human behavior changes.
- Applications of AI in business process modeling create more accurate transformation insights.

Conclusion and Future Work

- Contributions: A three-phase simulation framework using agents, ontologies, and gamification.
- Future Research:
  - Expanding ontology for business processes.
  - Integrating machine learning for more advanced decision-making.
  - Validating the framework with empirical case studies.

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