

## 1. Title Page

Investigating Ubuntu Philosophy in Multi-Agent AI Systems for Organizational Support:  
A Case Study of Sun International GrandWest Casino, South Africa

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## 2. Abstract

Multi-agent artificial intelligence systems offer significant potential for organizational IT support, yet most implementations lack cultural coherence with collaborative organizational values. This research develops and evaluates UGENTIC (Ubuntu + Agentic: Ubuntu-Driven Agentic Collective Intelligence), a multi-agent AI system integrating Ubuntu philosophy with organizational IT workflows through design science research methodology.

The study develops a working UGENTIC prototype - a six-agent AI system built using Sun International GrandWest Casino's IT department as the case study context. The developed system includes agents representing IT Manager, Service Desk Manager, IT Support, Application Support, Network Support, and Infrastructure roles, mirroring the actual departmental structure. The system implements cultural principles of collective humanity through specific agent behaviours, coordination protocols, and decision-making mechanisms, operationalizing the philosophy "I am because we are" within technical multi-agent architecture.

Using an explanatory sequential mixed methods approach within a single case study, the research combines system development with expert evaluation through semi-structured interviews with 10-14 IT staff across strategic, tactical, and operational levels. The research addresses four core objectives: system development with cultural integration, cultural authenticity validation, comprehensive system evaluation, and transferability for broader organizational adoption. These interviews evaluate the developed system's effectiveness for cross-departmental collaboration, assess its feasibility and organizational fit, validate cultural authenticity, and provide implementation recommendations.

This represents the first study developing and evaluating multi-agent organizational AI systems that integrate Ubuntu philosophy with real departmental workflows and authentic hierarchical structures. Expected outcomes include empirical evaluation of the developed system's effectiveness, documented development methodology and implementation guidelines, and contribution to culturally-grounded AI system development approaches.

**Keywords:** Ubuntu philosophy, multi-agent AI systems, organizational collaboration, IT departments, design science research, cultural AI integration, human-AI teaming.

### 3. Introduction

#### Background and Context

Organizations worldwide face persistent challenges integrating AI with human work practices. Recent research reveals significant AI-workplace misalignment: the Upwork Research Institute (2024) survey of 2,500 global workers found that 77% of employees using AI report it has increased their workload, with 47% uncertain how to achieve expected productivity gains. This is corroborated by Gallup's (2024) survey of 21,543 working adults, which revealed that only 15% of employees report their organization has communicated a clear AI integration plan or strategy. This disconnect between AI capabilities and actual work practices creates productivity barriers rather than improvements.

Traditional AI implementations often ignore organizational hierarchies and team dynamics, optimize individual performance at expense of collective goals, lack cultural coherence with collaborative organizational values, and fail to respect authentic departmental workflows (Davenport and Ronanki, 2021; Bean, 2025). Organizations face persistent challenges with departmental silos that impede cross-functional collaboration and decision-making (Kanter, 2020).

Multi-agent artificial intelligence systems offer potential solutions through distributed coordination and collaborative decision-making (Moore, 2025; Krishnan, 2025). However, most multi-agent implementations lack cultural frameworks that align with organizational values. Indigenous African philosophy - specifically the concept of collective humanity where individual identity emerges through community relationships - provides a stable cultural framework for AI integration that transcends changing company policies (Mhlambi, 2020).

This foundational principle - "I am because we are" - remains constant while organizational policies evolve and AI capabilities advance rapidly. This stability makes it particularly

valuable as a guiding philosophy for AI systems operating in dynamic organizational environments because it provides unchanging ethical and operational grounding, works on cultural grounds for AI integration, ensures technology doesn't lose the human aspect, and demonstrates structural coherence with multi-agent architectures where agents are literally defined by their relationships (Mkhize, 2022; van Norren, 2023).

### **The UGENTIC Research Prototype**

To investigate these questions, this research develops UGENTIC (Ubuntu-Driven Agentic Collective Intelligence) as a research prototype and proof-of-concept system. UGENTIC functions as a methodological artifact enabling systematic investigation of whether cultural principles can enhance AI collaboration design. The prototype uses Sun International GrandWest Casino's IT department as the case study context for authentic organizational grounding.

UGENTIC consists of six AI agents, each representing an actual IT department role:

- **IT Manager Agent** - Strategic leadership and resource allocation
- **Service Desk Manager Agent** - Team coordination (manages IT Support only)
- **IT Support Agent** - Front-line technical support (reports to Service Desk Manager)
- **Application Support Agent** - Software troubleshooting (reports to IT Manager)
- **Network Support Agent** - Network infrastructure management (reports to IT Manager)
- **Infrastructure Agent** - Server and system management (reports to IT Manager)

This hierarchy mirrors the actual GrandWest IT organizational structure, where the Service Desk Manager manages only the IT Support team, while Application Support, Network Support, and Infrastructure report directly to the IT Manager. The agents are implemented using local AI models (Ollama LLMs), retrieval-augmented generation (RAG) for departmental knowledge access, and the Model Context Protocol for inter-agent communication.

The prototype demonstrates how agents could collaborate on cross-departmental decisions while maintaining authentic hierarchical relationships, using cultural principles to guide agent behaviors such as acknowledging others' expertise, articulating collective benefits, adopting consultative approaches, providing transparent reasoning, and offering mutual support.

This research investigates whether this culturally-grounded design approach is feasible and valuable for organizational collaboration through expert validation with IT staff who understand the real departmental workflows and challenges.

### **Problem Statement**

Despite significant advances in multi-agent AI systems and organizational collaboration theory, a critical gap exists in understanding whether and how AI agents can be designed to integrate with real departmental operations to improve organizational collaboration while maintaining cultural authenticity and respecting authentic hierarchical structures.

While extensive research exists in multi-agent AI (Moore, 2025; Wu et al., 2023), cultural philosophy (Mhlambi, 2020; Bührmann, 2024), and organizational implementation (Aldoseri et al., 2024; Holmström et al., 2025) separately, virtually no research combines cultural philosophy with multi-agent organizational AI systems in real departmental contexts with authentic hierarchical structures.

Absence of validated design methodologies for bridging real departmental operations with AI agent capabilities prevents organizations from confidently investing in AI-driven collaboration solutions. Recent evidence demonstrates significant AI-workplace challenges: the Upwork Research Institute (2024) found that 77% of employees using AI report increased workload, with 47% uncertain how to achieve expected productivity gains, while Gallup (2024) found that only 15% of employees report their organization has communicated a clear AI strategy, indicating fundamental disconnect between AI capabilities and actual work practices.

Research lacks generalizable design frameworks enabling different organizations, particularly SMEs, to adopt AI-enhanced departmental coordination with validated

implementation pathways. This study addresses this critical void through design science research using UGENTIC as a prototype to validate whether cultural principles can enhance AI collaboration design without sacrificing technical capability.

### Research Aim

To investigate whether indigenous Ubuntu philosophy can enhance the design of multi-agent artificial intelligence systems for organizational IT departments, and to develop a validated methodology for designing AI systems that bridge AI capabilities with real-world organizational work practices through culturally-grounded collaboration principles.

This research aims to validate whether collective cultural principles can inform both philosophical wisdom and technical multi-agent architecture design, providing empirical evidence of their structural coherence and practical feasibility.

## 4. Research Questions

### Primary Research Question:

How can indigenous Ubuntu philosophy be integrated into the development of multi-agent artificial intelligence systems for organizational IT departments, and what is the effectiveness of the developed UGENTIC system in enhancing collaborative decision-making when evaluated by IT staff experts?

### Secondary Research Questions:

**RQ1 (System Development - Requirements & Cultural Integration):** How can real departmental workflows, hierarchical structures, and decision-making patterns be translated into development requirements for building multi-agent AI systems, and how can Ubuntu philosophy principles be operationalized through specific agent behaviours and coordination mechanisms during system development?

**RQ2 (Cultural Authenticity & Validation):** How can Ubuntu philosophy be implemented within multi-agent AI system development while preserving cultural

authenticity, respecting indigenous knowledge systems, avoiding cultural appropriation, and ensuring validation through participant feedback?

**RQ3 (System Evaluation - Effectiveness & Feasibility):** What are the evaluated benefits and limitations of the developed UGENTIC system for cross-departmental collaboration and organizational coordination, and how do IT staff experts assess its feasibility, organizational fit, and practical value compared to traditional AI approaches?

**RQ4 (Transferability & Implementation):** What development methodology and implementation guidelines can be derived from building the UGENTIC system to enable other organizations, particularly SMEs, to successfully develop and adopt culturally-driven multi-agent AI frameworks adapted to their specific contexts?

## 5. Research Objectives

### Primary Objective:

To develop the UGENTIC multi-agent AI system integrating indigenous African philosophy with organizational IT workflows, and to evaluate its effectiveness for enhancing collaborative decision-making through expert validation by IT staff across organizational levels.

### Secondary Objectives:

**RO1 (Addresses RQ1 - System Development & Cultural Integration):** To analyze real departmental workflows, hierarchical structures, and decision-making patterns, translating these into concrete development requirements and technical specifications while simultaneously developing and implementing Ubuntu philosophy principles within the UGENTIC system architecture through specific agent behaviours, coordination protocols, and communication mechanisms.

**RO2 (Addresses RQ2 - Cultural Authenticity & Validation):** To ensure cultural authenticity throughout the development process by validating philosophical implementation through participant feedback, respecting indigenous knowledge systems, avoiding cultural appropriation, and maintaining ethical cultural integration practices.



**RO3 (Addresses RQ3 - System Evaluation):** To comprehensively evaluate the developed UGENTIC system's effectiveness through expert assessment by IT staff, measuring perceived benefits and limitations for cross-departmental collaboration while assessing feasibility, organizational fit, and factors influencing acceptance and implementation success.

**RO4 (Addresses RQ4 - Transferability & Implementation):** To document the development methodology and derive generalizable implementation guidelines from building UGENTIC, enabling other organizations (particularly SMEs) to develop and adopt culturally-driven multi-agent AI frameworks with adaptation strategies for different organizational contexts and sizes.

## 6. Literature Review

The comprehensive literature review encompasses six critical areas, with 60 peer-reviewed sources from 2020-2025 (80% from 2024-2025) providing cutting-edge theoretical grounding. This review is explicitly structured to demonstrate comprehensive coverage of all four research objectives before discussing system development.

### Multi-Agent AI Systems & Development Requirements (Addresses RO1)

Research demonstrates significant theoretical advances in multi-agent coordination, with frameworks for agent communication, coordination protocols, and distributed decision-making well-established (Moore, 2025; Krishnan, 2025; Ju, 2025). However, empirical evidence of successful design integration with real organizational structures remained limited. Moore (2025) provides hierarchical multi-agent taxonomy for industrial applications, establishing foundational architectures for organizational AI systems. Krishnan (2025) presents the Model Context Protocol for agent interoperability, enabling coordinated multi-agent communication essential for organizational workflows. Ju (2025) demonstrates 73% productivity improvements in human-agent collaboration, though primarily in controlled environments rather than authentic departmental contexts.

**This body of literature directly informs RO1 by establishing the technical foundations for translating organizational workflows into multi-agent system requirements. The**

architectural principles from Moore (2025), communication protocols from Krishnan (2025), and collaboration evidence from Ju (2025) provide the technical building blocks necessary for developing systems that authentically represent organizational IT contexts while maintaining hierarchical relationships and coordination mechanisms.

### **Cultural Philosophy & Authenticity (Addresses RO2)**

Academic exploration demonstrates effectiveness of collective philosophical frameworks in enhancing organizational decision-making (Mhlambi, 2020; Mkhize, 2022). However, application to multi-agent AI system design remained largely theoretical. Mhlambi (2020) establishes indigenous philosophy as an AI ethics and governance framework, emphasizing relationality over pure rationality and providing foundational principles for culturally-grounded AI development. Mkhize (2022) explores the role of African values in global AI inclusion discourse from a normative ethics perspective, addressing questions of cultural authenticity and appropriation. Bührmann (2024) examines how traditional economics paradigms can be reimaged through communal philosophies, demonstrating broader applicability of collective cultural frameworks. van Norren (2023) discusses community reconstitution through shared values, providing insights into how philosophical principles translate into practical organizational contexts.

**These works guide our approach to RO2 by establishing frameworks for cultural authenticity, appropriation avoidance, and ethical integration of indigenous knowledge.** The philosophical foundations from Mhlambi (2020) and Mkhize (2022), combined with practical cultural implementation insights from Bührmann (2024) and van Norren (2023), provide comprehensive guidance for ensuring cultural authenticity throughout system development while respecting indigenous knowledge systems and obtaining appropriate validation through participant feedback.

### **Evaluation Frameworks & Human-AI Teaming (Addresses RO3)**

Authoritative frameworks establish human-AI teaming requirements and evaluation methodologies (National Academies, 2022; Daugherty and Wilson, 2024; Berretta et al., 2023). The UGENTIC research prototype design implements these principles through departmental agent specifications preserving human expertise while enabling collaborative

capabilities. National Academies (2022) provides comprehensive human-AI teaming state-of-the-art analysis, establishing evaluation criteria for assessing AI system effectiveness in collaborative contexts. Ju (2025) demonstrates 73% productivity gains with rigorous empirical evaluation methods. Daugherty and Wilson (2024) reimagine work in the age of AI, emphasizing human and machine complementary strengths and providing frameworks for assessing organizational fit and feasibility.

This research establishes the foundation for RO3 by providing evaluation frameworks, assessment methodologies, and criteria for measuring system effectiveness. The comprehensive evaluation approaches from National Academies (2022), empirical measurement techniques from Ju (2025), organizational assessment frameworks from Daugherty and Wilson (2024), and implementation insights from Aldoseri et al. (2024) enable systematic evaluation of UGENTIC's benefits, limitations, feasibility, and factors influencing acceptance by IT staff experts.

#### **Organizational Implementation & Transferability (Addresses RO4)**

Research consistently identifies organizational readiness and implementation strategies as critical for AI adoption success (Aldoseri et al., 2024; Bean, 2025; Holmström et al., 2025). Aldoseri et al. (2024) provides automation integration roadmap with practical implementation guidelines adaptable across organizational contexts. Bean (2025) examines how companies use AI in 2024, identifying successful adoption patterns and transferable strategies. Holmström et al. (2025) presents the phased AI transformation framework for navigating organizational AI journeys, with particular emphasis on SME applicability. Kanter (2020) explores organizational innovation beyond traditional boundaries, providing insights into cross-organizational knowledge transfer.

**These studies inform our transferability framework in RO4 by establishing principles for deriving generalizable implementation guidelines.** The implementation roadmaps from Aldoseri et al. (2024), adoption pattern analysis from Bean (2025), transformation frameworks from Holmström et al. (2025), and knowledge transfer insights from Kanter (2020) provide comprehensive foundations for documenting UGENTIC's development

methodology in ways that enable other organizations, particularly SMEs, to adapt and adopt culturally-driven multi-agent frameworks for their specific contexts.

### **Supporting Technologies: RAG Systems**

Advanced RAG architectures demonstrate significant potential for enterprise knowledge management (Balaguer et al., 2025; Zhang et al., 2024; Ranjan et al., 2024). The UGENTIC research prototype implements RAG capabilities for departmental knowledge access design. Balaguer et al. (2025) presents contemporary RAG frameworks for enterprise knowledge management, addressing latest advances including GraphRAG and hierarchical retrieval. Zhang et al. (2024) provides RAG framework specifically for IT operations. Ranjan et al. (2024) offers comprehensive survey of RAG evolution and future directions. Practical RAG implementation design enables cultural principles through shared knowledge access and value retrieval.

### **Contextual Considerations: South African AI Landscape**

Research establishes unique challenges and opportunities for AI adoption in African contexts (CIPIT, 2025; Mastercard, 2025; McKinsey, 2025). This research contributes South African-specific design implementation evidence. CIPIT (2025) provides comprehensive analysis of AI ecosystem across Africa, examining infrastructure, skills, and policy dimensions. Mastercard (2025) explores AI's transformative potential across African sectors including healthcare, agriculture, and financial services. McKinsey (2025) analyzes opportunities for generative AI in African markets, projecting significant economic value potential. Mbonye (2024) addresses POPIA compliance for AI systems with regulatory frameworks. Nzama et al. (2024) examines AI adoption barriers in South African manufacturing. Research explores feasible AI adoption design strategies despite contextual challenges while respecting POPIA requirements and cultural considerations

### **Identified Research Gap**

While extensive research exists in multi-agent AI, cultural philosophy, evaluation frameworks, and organizational implementation separately, virtually no research combines indigenous philosophy with multi-agent organizational AI system design in real

departmental contexts with authentic hierarchical structures. This study addresses this void by providing the first design science investigation of culturally-driven multi-agent AI designed for integration with real organizational departmental workflows, hierarchies, and cultural frameworks. The literature reviewed above comprehensively addresses all four research objectives, establishing the theoretical and practical foundations necessary before proceeding to system development and evaluation.

## 7. Research Methodology

### Research Design

This study employs design science research methodology with explanatory sequential mixed methods approach within a single case study context. Design science research enables systematic investigation of innovative artifact design while generating scholarly knowledge about design principles and implementation feasibility. Mixed methods provides both depth (qualitative understanding through expert interviews) and validation (design assessment through multiple perspectives). The research uses Sun International GrandWest IT departments as the case study context for authentic organizational grounding, with framework designed for transferability to establish broader applicability.

### Design Science Research Framework

Design science research follows established frameworks (Tuunanen et al., 2024; vom Brocke et al., 2020) addressing both complexity management in DSR projects and knowledge accumulation in design research. The research implements six systematic phases:

**Phase 1: Problem Identification and Motivation** - AI-workplace integration challenges, organizational collaboration gaps, and cultural misalignment in existing AI implementations identified through literature and organizational analysis.

**Phase 2: Objectives of Solution** - Define requirements for culturally-grounded multi-agent AI system that respects organizational hierarchies, enhances collaboration, and preserves cultural authenticity.

**Phase 3: Design and Development** - Create UGENTIC prototype implementing Ubuntu principles in multi-agent architecture with six departmental agents mirroring GrandWest IT structure.

**Phase 4: Demonstration** - Develop working prototype showcasing culturally-driven agent coordination, hierarchical decision-making, and collaborative problem-solving capabilities.

**Phase 5: Evaluation** - Validate design through expert interviews with IT staff assessing feasibility, organizational fit, and potential value. This research focuses primarily on this evaluation phase.

**Phase 6: Communication** - Document findings in dissertation and disseminate through academic channels.

Tuunanen et al. (2024) emphasize organizing complex DSR projects through design echelons - decomposing projects into logically coherent self-contained parts. This research applies this principle by treating UGENTIC's six-agent architecture as interconnected design echelons, each representing a distinct organizational role while contributing to the collective system design. vom Brocke et al. (2020) stress the importance of positioning design knowledge contributions within wider problem and solution spaces, which this research addresses by explicitly connecting cultural philosophy (solution space) with organizational collaboration challenges (problem space).

### **Three-Phase Research Implementation**

#### **Phase 1: Organizational Context Analysis (Completed May-August 2025)**

Understanding the case study context through document analysis of departmental procedures and hierarchical structures, workflow documentation for authentic organizational patterns, hierarchical relationship mapping, and preliminary discussions with departmental staff about collaboration challenges and AI perceptions.

#### **Phase 2: Prototype Development (Completed August-September 2025)**

Developed UGENTIC research prototype with six IT department agents (IT Manager, Service Desk Manager, IT Support, App Support, Network Support, Infrastructure), implemented cultural collaboration protocols in agent design, established three-dimensional integration (technical plus cultural plus organizational), validated hierarchical coordination design respecting authentic GrandWest structure, and created working proof-of-concept demonstrating design feasibility.

### **Phase 3: Design Validation Through Expert Interviews (Current Phase October-November 2025)**

Expert validation interviews with IT staff across departments and hierarchical levels, qualitative assessment of design feasibility and organizational fit, evaluation of cultural integration appropriateness, identification of design improvements and implementation considerations, and transferability assessment for framework abstraction.

#### **Participant Requirements**

Primary participant pool consists of Sun International GrandWest IT Staff (10-14 total) across strategic level (IT Manager: 1 participant), tactical level (Service Desk Manager: 1 participant), operational specialists (Infrastructure, App Support, Network Support: 3 participants), and operational support (IT Technicians: 6-8 participants). Selection criteria include minimum 2-3 years experience in current role, deep understanding of departmental processes and workflows, experience with cross-departmental coordination, willingness to provide honest feedback about AI design concepts, and availability for 45-60 minute interviews.

#### **Data Collection Methods**

**Qualitative Data Collection:** Semi-structured interviews with 10-14 participants across 6 departments and 3 hierarchical levels focusing on current workflow challenges and collaboration pain points, assessment of UGENTIC concept feasibility and organizational fit, evaluation of cultural integration appropriateness and authenticity, design recommendations for AI-workplace integration considerations (privacy, trust, acceptance factors), and expert validation of whether proposed design addresses identified challenges.

**Interview Protocol Structure:**

- Section A: Current workflows and collaboration challenges (15 minutes)
- Section B: UGENTIC concept presentation and feasibility assessment (15 minutes)
- Section C: Cultural integration and design appropriateness (10 minutes)
- Section D: Design recommendations and implementation considerations (10 minutes)
- Section E: Transferability and organizational factors (5 minutes)

**Supporting Documentation:** Analysis of departmental documentation, organizational structure charts, existing workflow diagrams, and collaboration patterns to triangulate interview findings.

**Data Analysis Techniques**

**Qualitative Analysis:** Reflexive thematic analysis following Braun and Clarke (2024) six-phase methodology for identifying patterns in expert assessments, content analysis of design recommendations and feasibility concerns, cultural integration assessment evaluating framework appropriateness, feasibility assessment synthesizing expert validation across participants, and NVivo software for systematic coding and theme extraction.

**Thematic Analysis Process:**

1. Familiarization with interview transcripts and documentation
2. Generating initial codes for design feasibility, organizational fit, cultural appropriateness
3. Searching for themes across expert assessments
4. Reviewing themes for coherence and distinctiveness
5. Defining and naming themes related to design validation
6. Producing final analysis integrated with design recommendations

**Design Validation Framework:**



- **Feasibility Assessment:** Can this design work in practice?
- **Value Assessment:** Would this design add value to organizational operations?
- **Appropriateness Assessment:** Does design respect cultural authenticity?
- **Transferability Assessment:** Can design principles apply to other organizations?

**Mixed Methods Integration:** Triangulation across multiple expert perspectives for validation, convergent analysis synthesizing evidence across interviews and documentation, member checking for participant validation of interpretations, and synthesis of findings into design recommendations and implementation guidelines.

### **Ethical Considerations**

Ethics application will be submitted to Richfield Ethics Committee with organizational approval request to Sun International GrandWest. Research poses minimal risk as no production deployment occurs and no operational systems are affected. Participants provide expert assessment only, with no requirement to use or test AI systems.

All departmental information and participant data will be anonymized and stored securely. Organizational data remains confidential with compliance to POPIA (Protection of Personal Information Act) requirements throughout.

All participants receive detailed information about research objectives, interview process, time requirements, and data usage. Voluntary consent required for participation with clear explanation of rights including withdrawal at any time. All research data stored on encrypted, password-protected systems with access limited to authorized research personnel.

Research maintains high cultural sensitivity in philosophical interpretation and application, with explicit validation of cultural appropriateness through participant feedback. Full compliance with POPIA requirements including lawful processing, purpose specification, minimal data collection, data quality, openness, security safeguards, and data subject participation rights.

## 8. Expected Outcomes

This research will produce design validation evidence demonstrating whether cultural philosophy can enhance multi-agent AI collaboration design effectiveness, expert assessment of UGENTIC concept feasibility and organizational fit, and qualitative insights into how IT staff perceive culturally-driven AI design compared to traditional approaches. The research will identify design recommendations for improving AI-workplace integration, understanding of cultural integration appropriateness and authenticity considerations, and evidence of factors influencing feasibility and organizational acceptance.

### **Outcomes Aligned with Research Objectives:**

**For RO1 (Development & Cultural Integration):** Validated methodology for translating organizational workflows into culturally-grounded multi-agent system requirements, with documented approaches for simultaneous technical development and cultural principle implementation.

**For RO2 (Cultural Authenticity):** Framework for ensuring cultural authenticity throughout AI system development, with participant-validated approaches for respecting indigenous knowledge and avoiding appropriation.

**For RO3 (System Evaluation):** Comprehensive expert assessment of UGENTIC's effectiveness, feasibility, and organizational fit, with identified benefits, limitations, and factors influencing acceptance by IT staff across organizational levels.

**For RO4 (Transferability):** Generalizable implementation guidelines enabling other organizations, particularly SMEs, to adopt culturally-driven multi-agent frameworks, with documented adaptation strategies for different contexts and sizes.

Practical deliverables include the working UGENTIC research prototype demonstrating culturally-driven multi-agent framework functionality with six AI agents designed for integration with real departmental workflows respecting authentic organizational hierarchies. Comprehensive design guidelines will enable other organizations to adopt the framework, with adaptation guidelines for different organizational contexts and sizes,

resource requirements and realistic timelines for implementation, and design considerations for privacy, trust, and cultural appropriateness.

Academic contributions include the first design science validation of culturally-driven multi-agent organizational AI in real departmental contexts, novel framework for translating real departmental operations into AI agent design specifications, and mixed methods approach combining organizational analysis with expert validation. The research contributes to practical application methodology of indigenous African philosophy to AI system design and human-centered AI development discourse.

Societal impact includes demonstrating AI augmentation rather than replacement design principles, supporting approaches addressing societal concerns about AI impact, and preserving human expertise and dignity in technological advancement. The research shows how indigenous philosophies can inform modern AI system design while maintaining cultural authenticity and respect for indigenous knowledge, validating African philosophical contribution to global AI innovation.

## **9. Limitations and Delimitations**

### **Research Limitations**

Primary focus on Sun International GrandWest IT departments as case study context may limit direct generalizability to other organizational sectors. However, framework designed for transferability testing establishes broader applicability principles through detailed documentation of design adaptation strategies.

Cultural aspects specific to South African and broader African contexts. Cultural framework design principles may translate to other collective-oriented cultural contexts, but adaptation required for individualistic cultural environments. Expert validation limited to one organizational context.

Design validation through interviews rather than operational deployment means findings demonstrate conceptual feasibility rather than empirical performance measurement. Short

validation timeframe (October-November 2025) captures expert assessment at single point rather than longitudinal validation.

Sample of 10-14 expert participants, while sufficient for qualitative saturation in stratified organizational study, represents subset of total IT staff and may not capture all perspectives. Expert assessments reflect perceptions and professional judgment rather than measured operational outcomes.

Prototype design dependent on existing IT infrastructure compatibility and organizational technology environment assumptions. Replication in different technical contexts may face varying infrastructure constraints requiring design modifications.

Researcher's role as prototype developer and investigator requires careful boundary management. However, this dual role provides unique design insights and deep organizational understanding advantages. Expert interviews may include participant bias or socially desirable responses. Mitigated through confidentiality assurances and triangulation across multiple expert perspectives.

### **Research Delimitations**

Study deliberately focused on Sun International GrandWest Casino in Cape Town, South Africa for authentic cultural environment and established organizational relationships enabling deep access. Research limited to IT department operations within hospitality industry, enabling depth of investigation while providing transferable design principles.

Focus specifically on collective cultural philosophy rather than broader spectrum of African philosophies, selected for well-established theoretical foundation and clear operationalization potential. Study examines multi-agent collaborative AI systems specifically, excluding single-agent systems or fully autonomous AI without human-in-loop design.

Investigation focuses on design validation through expert interviews rather than operational deployment or performance measurement. This delimitation enables feasible completion within dissertation timeframe while providing meaningful design validation evidence.

Research conducted October-November 2025 for expert validation interviews, chosen to meet dissertation deadline while providing sufficient design assessment evidence. Study includes only IT staff directly involved with departmental operations for authentic organizational expertise.

## 10. Proposed Chapter Outline

The final dissertation will comprise seven chapters totaling 45,000-50,000 words:

**Chapter 1: Introduction** - Complete. Background, problem statement, research questions (RQ1-4), research objectives (RO1-4) with 1:1 alignment, significance, scope, and dissertation structure overview.

**Chapter 2: Literature Review** - Complete. Structured to demonstrate comprehensive coverage of all four research objectives: Multi-Agent AI Systems & Development (RO1), Cultural Philosophy & Authenticity (RO2), Evaluation Frameworks & Human-AI Teaming (RO3), Organizational Implementation & Transferability (RO4), plus supporting technologies (RAG) and contextual considerations (South African context). Total 60 peer-reviewed sources (80% from 2024-2025).

**Chapter 3: Research Methodology** - Complete. Design Science Research Framework, Case Study Context, Research Prototype (UGENTIC), three implementation phases, expert validation through interviews, data analysis techniques, ethical considerations, validity and reliability measures.

**Chapter 4: System Design and Implementation** - Complete. UGENIC Research Prototype Overview, Six-Agent Architecture Design, Hierarchical Structure Design, Cultural Operationalization in Design, Technical Infrastructure (Ollama, RAG, MCP), Knowledge Management Design, Workflow Integration Design, Three-Dimensional Framework, Design Challenges, Prototype Demonstration.

**Chapter 5: Design Validation Findings** - Pending Interview Data Collection. Participant Demographics (10-14 IT staff), design validation findings for each research question (RQ1-4), qualitative results with thematic analysis of expert assessments, feasibility

assessment synthesis, cultural appropriateness validation, design recommendations, unexpected insights. BLOCKED requires expert validation interviews (October-November 2025).

**Chapter 6: Discussion** - Complete (will be revised after Chapter 5). Discussion of primary research question and RQ1-4 analysis, theoretical implications for design science, practical implications for implementation, comparison with literature, three-dimensional design integration effectiveness, feasibility factors, design constraints and considerations, limitations, alternative design approaches.

**Chapter 7: Conclusion and Recommendations** - Complete (will be revised after Chapter 5). Research summary, design validation synthesis, research aim achievement, academic contributions, practical contributions to design methodology, societal contributions, recommendations for design practice/SMEs/policy/future research, generalization principles, implementation roadmap, final reflections.

**Supporting Materials:** Abstract Complete. References (60 sources) Complete, Harvard style, 80% from 2024-2025. Appendices Prepared including interview protocols, ethics documents, architecture diagrams, cultural operationalization framework, design validation instruments, consent forms.

**Current Status:** 87% Complete (6 of 7 chapters), Chapter 5 (Design Validation Findings) requires interview data, 52 days to December 5, 2025 deadline.

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