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Statement of Research Program 2023-2027

Disciplinary Areas

My 2 disciplinary areas in IS/IT are: (1) **digital innovation** strategies and leadership; (2) **data analytics** and ontology applications. I favor applied research in such sectors as healthcare, energy, and financial services industries, as well as public administration. The 2 areas represent 60%/40% of my research time, but after 7 doctoral supervisions are completed in 2024, I will refocus toward 30%/70%, i.e., expanding my research projects with ontology applications.

Research Priorities

1. *Digital Innovation:*

- 1.1. Evolving CIO profile & digital project success factors, impact of governance frameworks, incentives.
- 1.2. Impact of CIO innovation leadership on transformation focus, link digital project staffing priorities.
- 1.3. Impact of agile methods and practices on project leader careers, control for digital strategy context.
- 1.4. Integration of open-source BOKs within a coherent framework uniting IS/IT/TIM/PM in one profession.

2. *Data Analytics:*

- 2.1. Annotate parliamentary proceedings with policy ontologies, automated queries, recommendation.
- 2.2. Use ontologies to identify disinformation campaigns, corruption allegations against public sector projects.
- 2.3. Analyze project governance, use ontologies to analyze projects, match events to project patterns.
- 2.4. Use ontologies and semantic rules for cyber defense strategies, team capabilities, knowledge gaps.
- 2.5. Use semantic rules to match IT candidates to jobs, use distributed ontology & rules, real-time.

Publication Plans

In 2024-2025, I will publish journal articles based on 7 doctoral dissertations to be defended in 2024: 3 relied on Partial Least Squares (PLS), of which 2 on Digital Innovation Leadership, and 1 on Dynamic Capabilities; 3 relied on ontologies: 1 for text analytics of expert interviews with agile project managers, 1 for job matching rules, and 1 for reasoning; 1 thesis relied on 25 in-depth interviews with CIOs and used a grounded theory approach.

In 2026-2027, new journal articles will be based on emerging results from 4 open-source projects I am starting. They all focus on Risk and Governance applications using Knowledge Graphs, Ontologies, and Semantic Reasoning. I am studying system architectures to help annotate parliamentary debates, identify disinformation, anticipate project risks, mitigate corruption, recommend cyber defense tactics, manage talent in projects, etc.

Technology Expertise

My data analytics projects rely on semantic technologies and using big data platforms. I run a lab of 7 servers and use 5 large HPC clusters of the Digital Research Alliance of Canada (DRAC). My research software skills are:

- Causal models: SmartPLS for SEM, GeNIe Modeler for Bayesian networks;
- Machine Learning (ML): R, Python, Spark (Databricks, Sparkflows.io), and Superset for visualization;
- Natural Language Processing (NLP): Inception, DKpro CASSIS, UIMA, and ARDAKE;
- Semantic Reasoning: OWL/RDF/SWRL with Stanford Protégé, Stardog, SANSA stack;
- Started Studying New Platforms: Graph Embeddings using GPUs and FPGAs.

Project Progress

1. **Digital Innovation:** 4 doctoral and 1 master theses ongoing; 1 large grant completed; published 5 articles, 1 chapter, and 7 papers in proceedings.
 - 1.1. (Active, TBC 2024) **Digital Leadership Competency Profiles:** Evolving CIO profile and digital project success factors, impact of governance frameworks, incentives.
 - **1 DBA thesis ongoing**, 2 series of expert interviews of 11 and 9 CIOs in large government agencies.
 - **1 MSc thesis ongoing**, 3 stepwise regressions, survey of 3300 resp, open-source leadership incentives.
 - 1.2. (Active, TBC 2024) **Digital Transformation and Innovation Strategies:** Impact of CIO innovation leadership on transformation focus, link to digital project staffing priorities.
 - **1 PhD thesis ongoing**, 3 PLS moderated mediation, survey of Canadian CIOs, 630 responses 2015-2022.
 - 1 article published on innovation capabilities, 1 on career anchors of digital project leaders.
 - 1.3. (Active, TBC 2024) **Agile Methods and Project Leadership:** Impact of agile methods and practices on project leader careers, control for digital strategy context.
 - **1 PhD thesis ongoing**, 1 large PLS model, survey of agile project leaders, already half-way to 100 resp.
 - **1 PhD thesis ongoing**, 1 series of 55 expert interviews on DevOps and PaaS in D365 ERP projects.
 - 1.4. (Old - closing) **Body of Knowledge (BOK) - [GitHub BTMBOK](#):** Integration of open-source BOKs within a coherent framework uniting IS/IT/TIM/PM in 1 profession.
 - 1 grant of CAN\$160,000 for 5 years concluded in 2022, 5 conf. papers published, **1 to be submitted**.
2. **Data Analytics:** 2 doctoral theses ongoing; 8 doctoral and 6 masters theses completed; preparing 3 new doctoral and 1 master theses; 5 grants completed; published 9 articles, 3 chapters, and 10 papers in proceedings.
 - 2.1. (In preparation, #1 priority) **Parliamentary Ontologies and Proceedings Annotation - [GitHub LegisIntel](#):** Annotate parliamentary proceedings with policy ontologies, automated queries, and recommendation.
 - 1 project completed with partner in 2022-2023, 2 papers published by Springer, **1 to be submitted**.
 - 2.2. (In preparation, #2 priority) **Corruption Ontologies and False Allegations Detection - [GitHub CorruptIntel](#):** Use project management to mitigate corruption, integrate semantic rules and ontologies for controls.
 - 1 DBA thesis completed, *prep. 2 new DBA thesis*, 3 articles published.
 - 1 international working group, 5 profs in 3 countries, 1 grant CAN\$25,000 plus 2 grant applications in 2023-2024.
 - 2.3. (In preparation, #3 priority) **Project Ontologies and Risk Analytics - [GitHub ProjOnto](#):** Analyze project governance, use ontologies to analyze projects, match events to project patterns.
 - 1 DBA thesis completed, 2 MSc theses completed, *preparing 1 new MSc thesis*.
 - 2.4. (In preparation, #4 priority) **Cybersecurity Ontologies and Defense Capability Inference - [GitHub CyberOnto](#):** Use ontologies and semantic rules to assess defense strategies, team capabilities, and knowledge gaps.
 - 1 PhD thesis completed, *preparing 2 new PhD theses*, **1 paper under review**, **1 to be submitted**.
 - 1 international working group, 15 profs and students in 10 countries, grant applications in 2024.
 - 2.5. (Active, TBC 2024) **Distributed Rules-Based Matching Systems:** Use semantic rules to match IT candidates to jobs, use distributed ontology and rules, real-time match.
 - **2 PhD theses ongoing**, 1 jobs-CVs dataset, OWL ontology and SWRL rules, distributed Erlang inference.
 - 2.6. (Old - closing) **Ontologies, Rules Systems, and Analytics in Various Sectors:** Use ontologies and rules to optimize value chains, e.g., Energy, Procurement, Healthcare, Trade.
 - 1 DBA thesis completed, and 3 PhD theses completed.
 - 2.7. (Old - closing) **Dynamic Bayesian Networks (DBN) and Risk Analysis:** Use DBNs to identify features and patterns anticipating system failures, use for forecasting.
 - 1 PhD thesis completed and 1 paper published on semiconductor manufacturing system failures.
 - 3 grants total of about CAN\$70,000 completed, mostly exploratory data analytics.
 - 2.8. (Old - to be restarted) **Financial Market News Trading and Events Analytics**
 - Daily, High Frequency, and market microstructure analytics, matching events to timeseries patterns.
 - 4 MSc theses completed, 2 articles and 2 chapters published, 1 dataset compiled, algo in development.

Research Accomplishments

Productivity	While average given my career advancement, I rank among the top 5 in my department of 36.
Publications	I have published 24 journal articles, 7 book chapters, and 24 papers in proceedings. Respectively 9, 3, and 10, or 42%, are in data science applications: finance, healthcare, energy, procurement, government.
Grants	I have developed partnerships with private organizations and was awarded more than CAN\$400,000 in grants, including CAN\$222,000 in the last 5 years. I submitted applications to Canadian funding agencies SSHRC and FQRSC, and I benefited from matching funds from MITACS. I target applied research projects with community partners with student fieldwork.
Supervisions	I supervised 20 theses, of which 14 have graduated, including 6 masters and 8 doctorate. I still have 6 theses to supervise, 4 of which will go for defense in 2023-24.
Software	I use in research (my servers or Canadian HPC services): R, Python, Spark (Databricks, Sparkflows.io), and Superset for visualization. NLP tech.: UIMA, DKpro, and Inception. In Semantic tech.: OWL/RDF/SWRL with Stanford Protégé, Stardog, SANSA stack. Algorithms: Bayes networks, classification, NLP-Ontology linking. Exploring: Graph Embeddings GPUs and FPGAs.
Leadership	While each of my leadership roles has been of short duration, my experience is very diverse.
University Service	I was lab director at NJIT in 2002-2006. Department chair at UQO in 2011 and 2017-2018. Program chair of MSc PM in 2007 and 2018, as well as DBA PM chair in 2018. Member of the university senate sub-commission in 2006-2007, and campus research committee in 2017-2019.
Journal Editorship	<ul style="list-style-type: none">• EiC, Business Technology Management Journal (BTMJ)• EB, International Journal of Information Systems and Project Management (IJISPM)• EB, International Journal of Information Technologies and Systems Approach (IJITSA)• EB, Management and Production Engineering Review (MPER)• SI Co-Ed., Journal of Enterprise Information Management (JEIM)
Conference Chair	<ul style="list-style-type: none">• General Chair, Business Technology Management Symposium (BTMS)• SIGLEAD Mini-Track Chair, Americas Conference on Information Systems (AMCIS)• Panel Chair, Project Management Methodology (PM2) Alliance Conference
Community Roles	<ul style="list-style-type: none">• CEO, Digital Innovation Foundation (DIF), a non-profit research consortium• Co-Founder, Government Analytics Research Institute (GARI), an inter-university lab• Special Advisor & BOK Leader, Business Technology Management (BTM) Forum• Board Member, AIS SIG on Leadership in IT (SIGLEAD)• Canada-Ontario Chapter Chair, Project Management Methodology (PM2) Alliance