

Knowledge Graph for Academic Libraries: A User-Centered Design Approach

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INTRODUCTION

Interdisciplinary research produces more impactful results than mono-disciplinary research [1], and the role of academic libraries is to support such efforts. This study proposes an extensible knowledge graph (KG) designed to aggregate information necessary for establishing interdisciplinary research collaborations and supporting interdisciplinary PhD education.

This case study grounds in an interdisciplinary PhD program in Communication and Information Sciences (CIS) at the University of Hawai‘i at Mānoa, with the objective to produce a helpful tool for the doctoral student population and other interested parties. Academic librarians can support students and faculty in building and maintaining these knowledge networks.

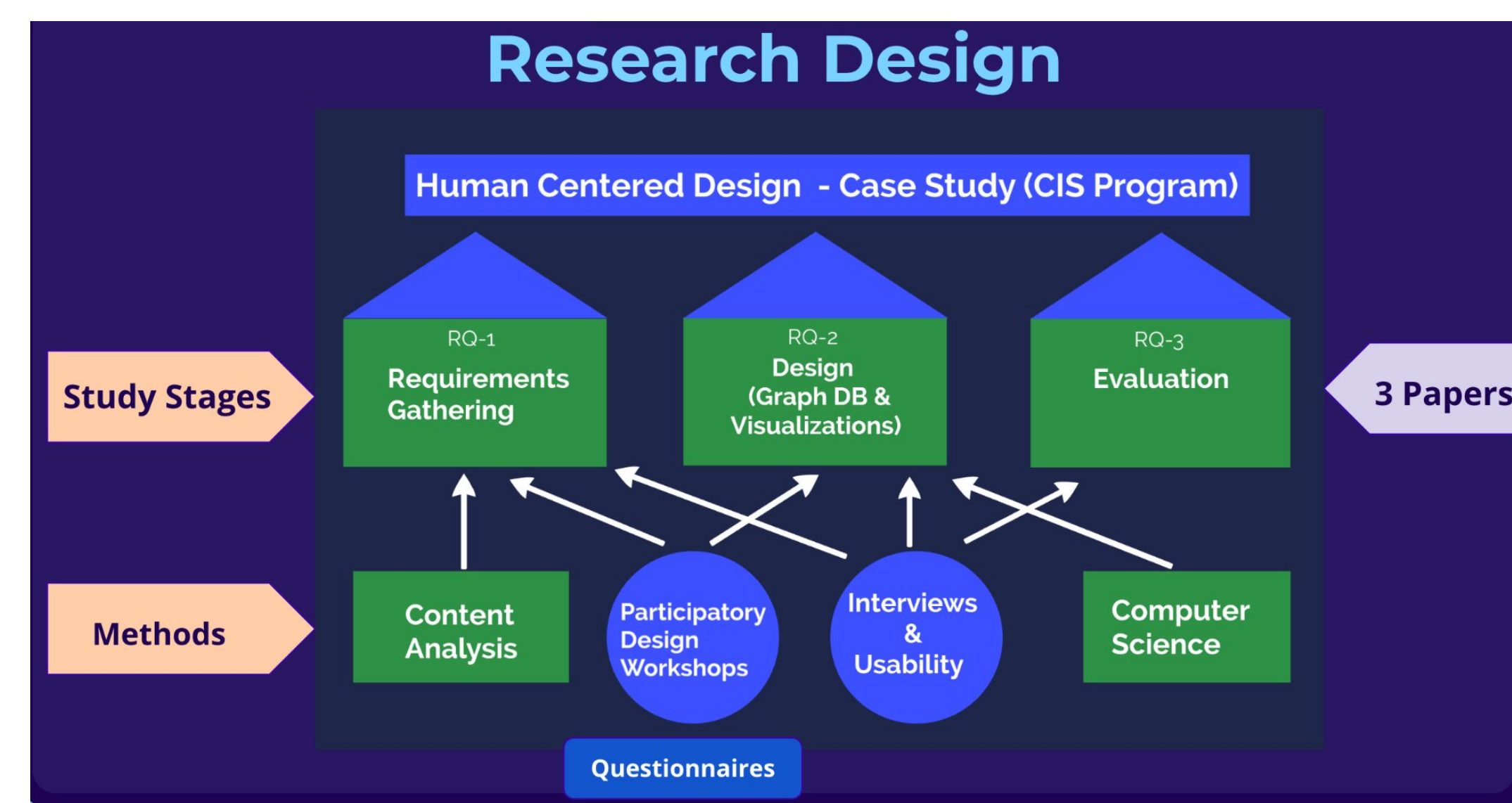
AIM

This study aims to design a knowledge graph through which academic libraries can facilitate information discovery and support interdisciplinary researchers by pointing them to relevant **information resources** necessary for their success; and helping them **discover collaborators** (e.g., supervisor, committee members.)

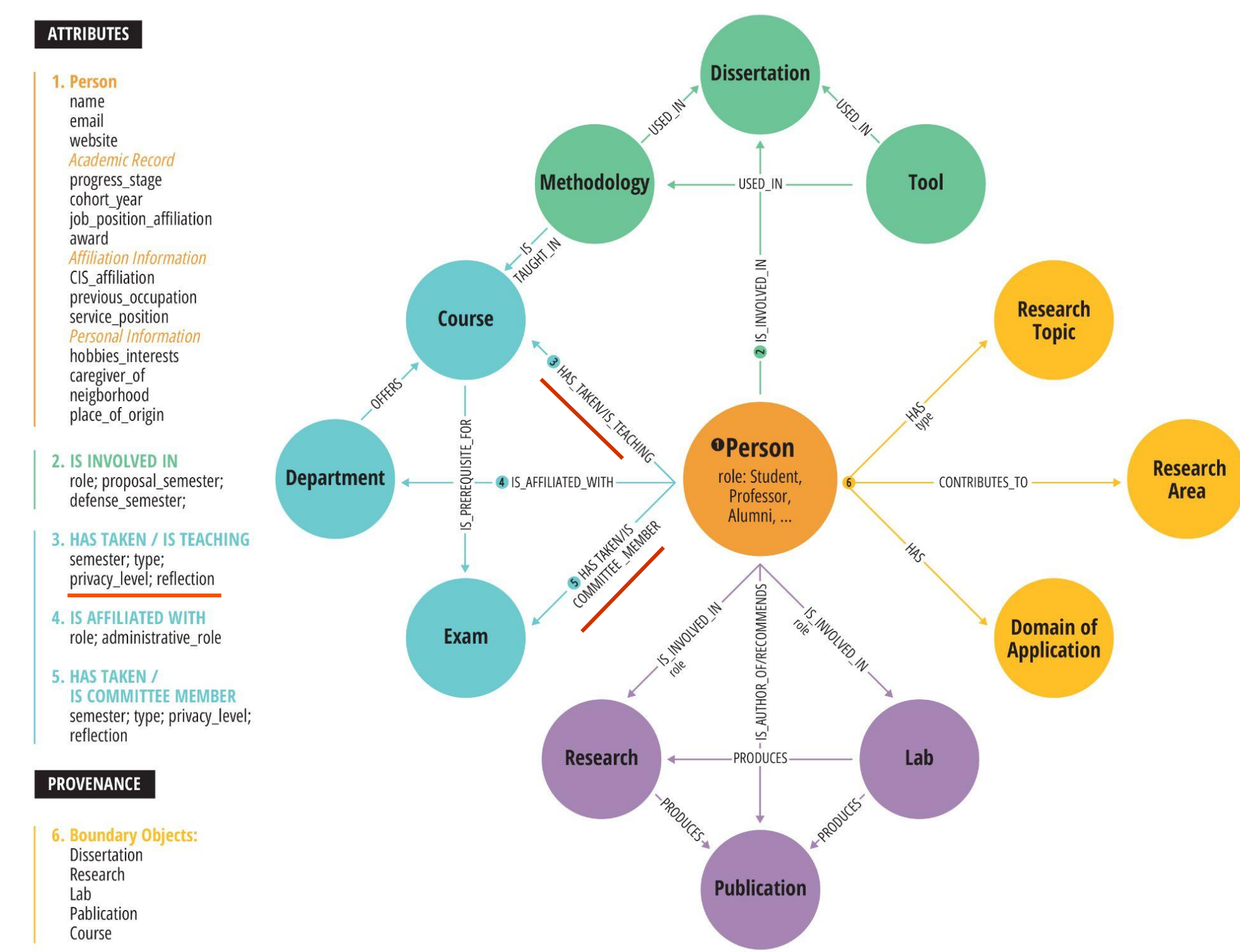
METHOD

We applied a Human-Centered-Design Approach and involved interdisciplinary CIS PhD students in every stage of the research.

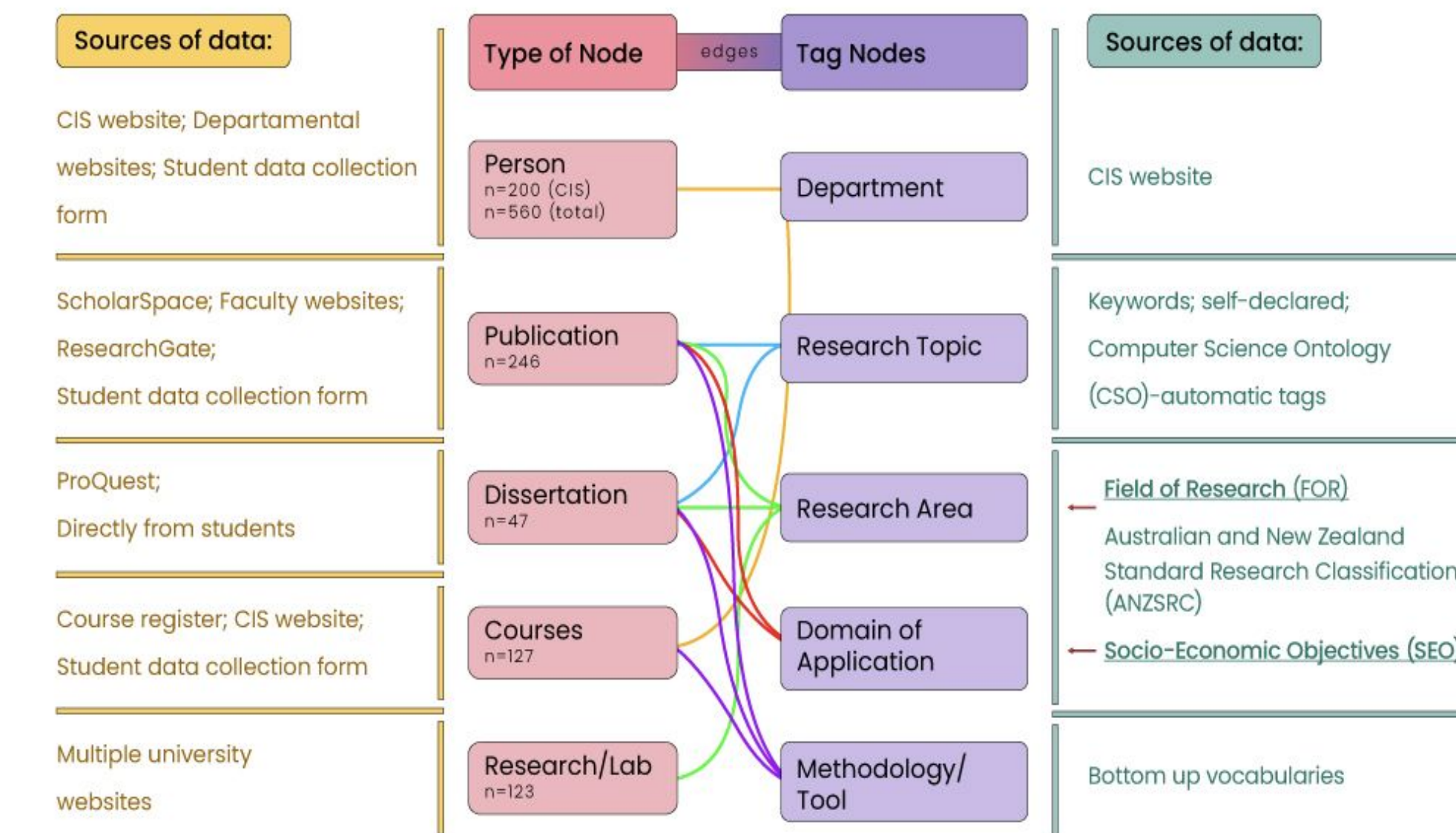
Following figure outlines the overall research approach:



CIS KNOWLEDGE GRAPH MODEL



GRAPH DATA SOURCES



Data was manually collected and inserted to Neo4J Graph Database

FINDINGS

1) Requirements Gathering Stage [2]

- CIS PhD students **rely on people** to get information, yet there are not enough opportunities for exchange
- Different information seeking styles for **International** and **US students**
- Timeline** is important (stage of the program, progress check)

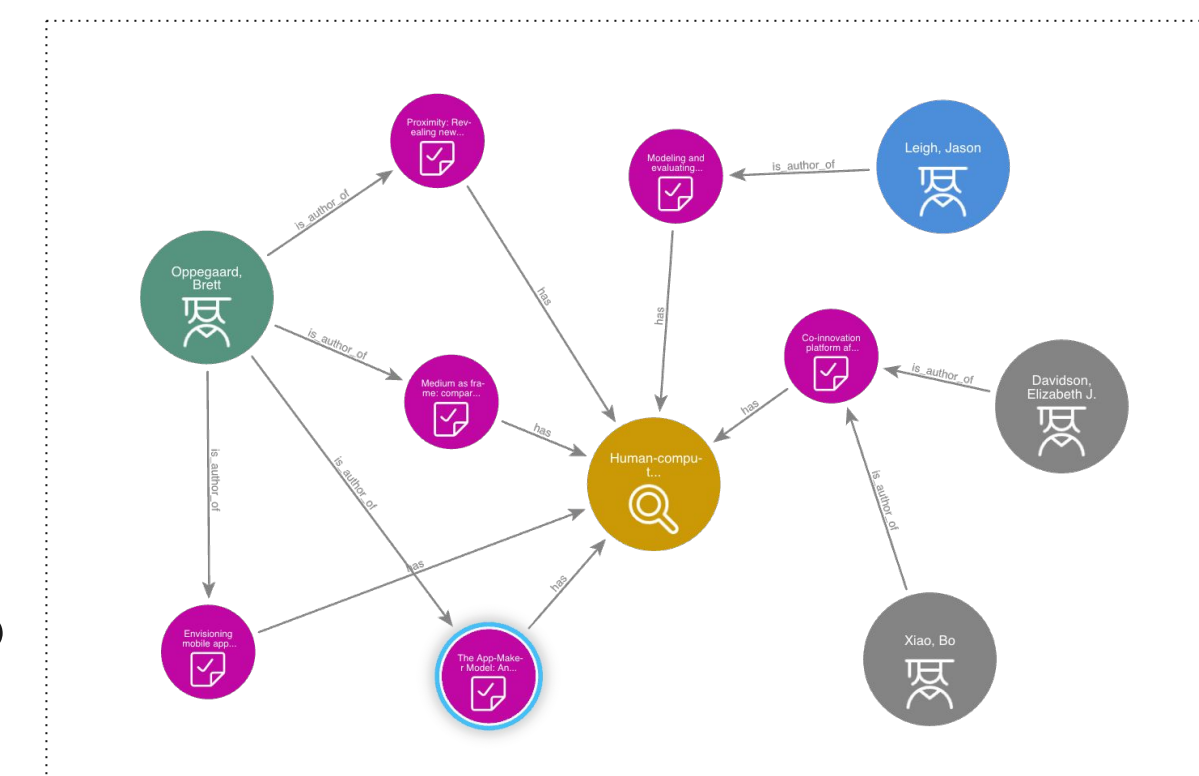
2) Graph & Visualization Design Stage [3]

Participatory approach to defining graph categories and attributes to support capturing and exploration of:

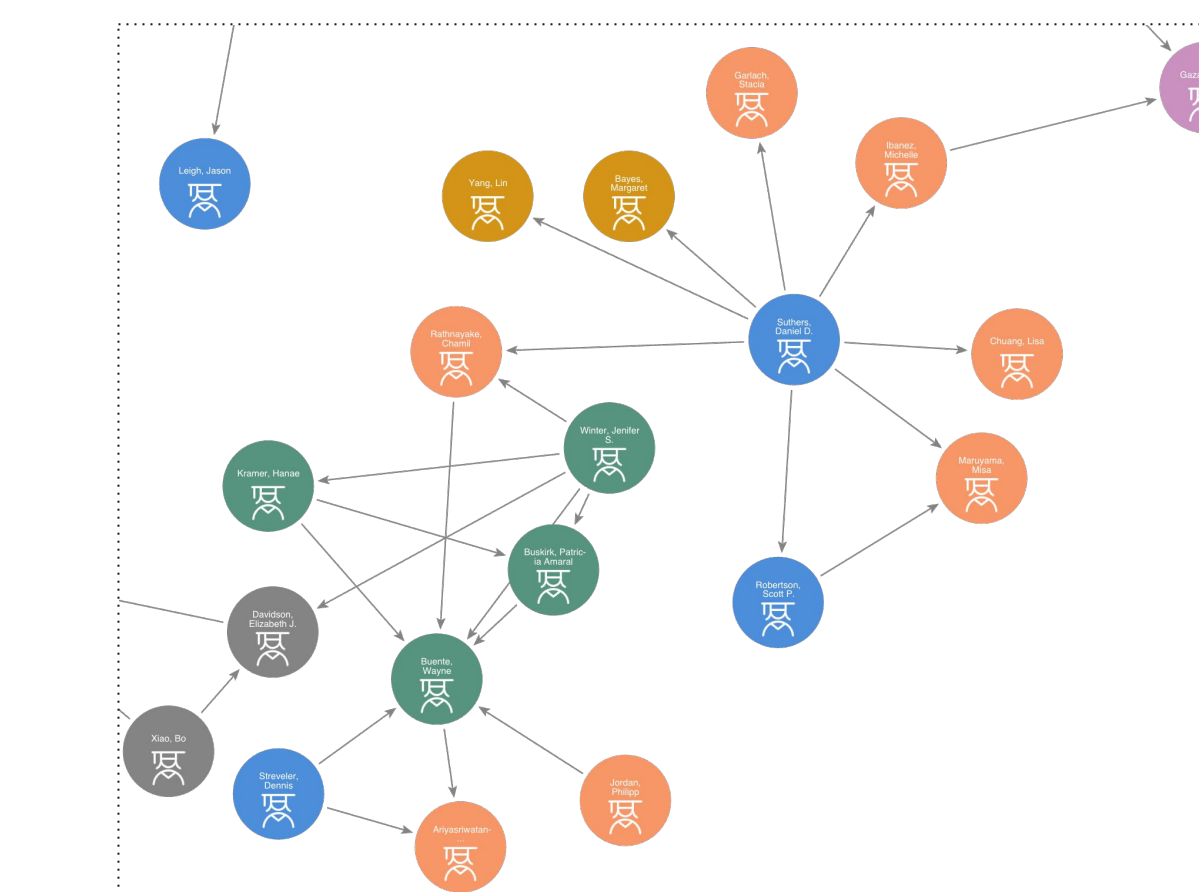
- Institutional knowledge
- Personal student experiences (including *Privacy* labels)
- Faculty activities and research interests
- Building social connections
- Students' *Progress check* and comparison
- Clearly defined questions of interest for the population

3) Evaluation Stage (showing the queries with Neo4J Bloom)

- “Useful” & “Helpful”*; supports specific curiosity & exploratory search
- Good for planning for success (*comparing with other students paths*)
- Valuable information not else available (*students’ reflections on courses & exams*)
- Aggregated information saves time
- Anticipates the user needs -> *“It answers questions I didn’t know I had”*
- Lacks qualitative aspect, but allows to discover people to talk to about these topics



Example Query: Faculty from different departments with publications (pink) in “Human-Computer Interaction” research area



Example Query: Co-authorship network of CIS-affiliated faculty, students, and alumni

IMPLICATIONS

- Innovative methodology applied to KG design - a **blueprint for community engagement design**
- KG model** (extensible) for **interdisciplinary research** collaboration (e.g. in **iSchools**)
- Improves visibility** and, consequently, the accountability of activities of all involved in a domain [4]
- Reduces uncertainty and academic stress within doctoral student population based on **data driven decision making** especially when selecting faculty to work with [5]
- User-generated queries successfully **anticipated new student information needs** [6]
- Can be used to create an **archive of people’s activities and experiences** for an academic unit (or university)

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- [3] Gardasevic S, Gazan R. Community Design of a Knowledge Graph to Support Interdisciplinary PhD Students. In: Sserwanga I, et al., editors. Information for a Better World: Normality, Virtuality, Physicality, Inclusivity. Cham: Springer Nature Switzerland; 2023. p. 473–90. (Lecture Notes in Computer Science).
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- [6] Li H, Appleby G, Brumar CD, Chang R, Suh A. Knowledge Graphs in Practice: Characterizing their Users, Challenges, and Visualization Opportunities. Presented at VIS 2023; 2023.; Available from: <https://arxiv.org/abs/2304.01311>

DATA AVAILABILITY STATEMENT

The KG dataset (with publicly available data only) and the Neo4J Bloom styling available via FigShare: <https://bit.ly/45dPWK3>



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