



Shining a Spotlight on the Importance of Cultural Competence in Food Assistance Information Systems: A Knowledge Graph to characterize the cultural and structural factors relevant to Hispanics

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ABSTRACT

Food insecurity is a severe problem in the United States. The United States Department of Agriculture (USDA) found that 10.2% of households in the country experienced food insecurity at some point during 2021. Overall, 12.5% of the US population received Supplemental Nutrition Assistance Program (SNAP) benefits. The “Information Systems Meet CULTURAL COmpetence” (IS-CUCO) project aims to improve the development of Food Assistance Information Systems (FAIS) by integrating cultural and structural factors often overlooked in the developmental processes. As part of IS-CUCO, we present a Knowledge Graph (KG) encompassing crucial cultural and structural factors to be considered when designing FAIS. The concepts and their relationships found in the KG were obtained by evaluating questions and answers from a survey developed by the IS-CUCO team, composed of Engineering and Social Sciences experts, following best practices. Although many of the questions from the survey are related to structural factors, we noticed that there could be underlying cultural competencies. An additional literature review was performed to refine these concepts and develop shared definitions. Then, we established a concept KG in a virtual whiteboard tool. Next, we established a glossary that provides a definition and source of the definition for most of the concepts and individuals. To implement our KG, we have chosen the Web Ontology Language. The KG is a work in progress, and we are to improve it by adding more concepts and merging with KGs from different teams in IS-CUCO, resulting from future research results. The KG currently has 42 concepts such as “Material Culture,” “National Cultural Background,” and “Value.” Relationships in the KG that link these concepts include “is-a,” and domain-specific relationships such as “impacts” connect FAIS to Cultural and Structural Factors. The KG aims to describe the cultural and structural factors relevant to underrepresented communities, focusing on Hispanics. We expect that this KG will provide insight into high-impact areas affecting the effectiveness of the FAIS. Its purpose is to support the integration of information and resources by underrepresented communities who often have limited access to and use of these systems. Developing culturally competent information systems requires teams of culturally competent software developers, designers, and tools and knowledge bases that help them work with stakeholders. We envision our KG as a knowledge base and a tool that will aid in this effort.

INTRODUCTION

Food insecurity is prevalent in the United States with 10.2% of households experiencing food insecurity during 2021 according to the United States Department of Agriculture (USDA) (Coleman-Jensen et al., 2022). The highest rates were seen among Black and Hispanic households, with 20% and 16%, respectively (Coleman-Jensen et al., 2022). According to a data analysis by the Pew Research Center, 12.5% of the US population received SNAP benefits (Pew Research Center, n.d.). The National Science Foundation (NSF) funded “Information Systems meet CULTURAL COmpetence” (IS-CUCO) project aims to improve the development of Information Systems (IS) for food security services by integrating cultural and structural factors often overlooked in the developmental processes of such information systems. By incorporating cultural considerations into the design and development of information systems for food security, organizations can enhance their capacity to serve diverse communities effectively, creating more inclusive and culturally sensitive systems.

BACKGROUND

A profile from the USDHHS Office of Minority Health reports that California, New York, and Illinois rank top 1, 4, and 6 states with the largest Hispanic population, respectively (Office of Minority Health, 2023). The IS-CUCO research team members are affiliated with universities in these three cities. Therefore, surveys will be conducted in Los Angeles, New York City, and Chicago as IS-CUCO focuses on Hispanic communities to comprehend the needs and preferences of Hispanic users. We have chosen the Web Ontology Language (OWL) together with Protégé as our ontology editor. OWL is a computational logic-based language that can be used by computer programs to represent complex knowledge about things, groups of things, and relations between things (Hitzler et al., 2012). Protégé is an open-source ontology editor developed by the Stanford Center for Biomedical Informatics Research at the Stanford University School of Medicine (Musen, 2015).

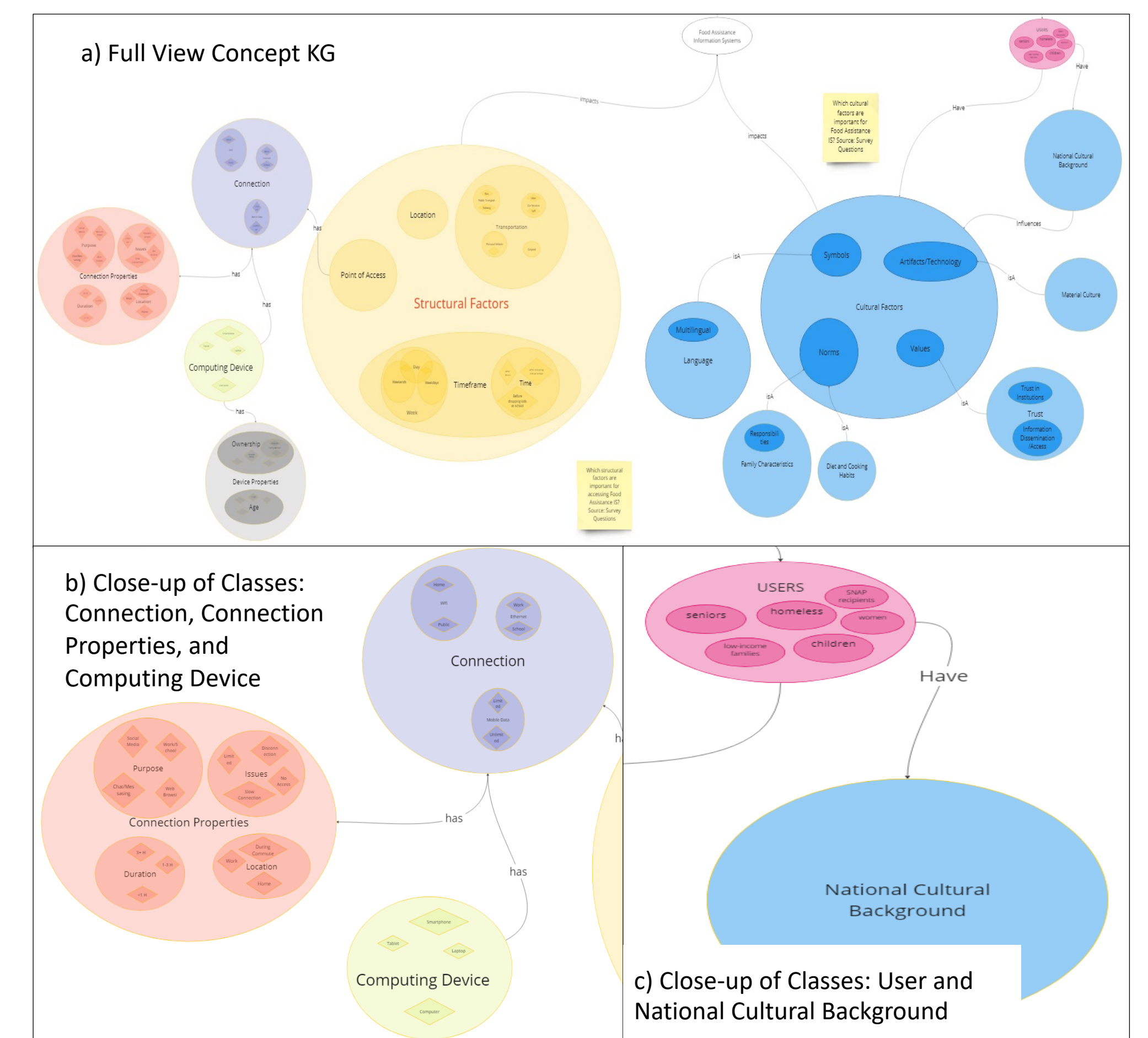


Table 1: Excerpt of glossary for shared definitions

Concept	Description	Source
Food pantry	A food pantry is a distribution center where hungry families can receive food.	https://www.feedingamerica.org/hunger
Fresh Fruit and Vegetable Program		
Information Access	Access to information is the ability for an individual to seek, receive and impart information	https://dbpedia.org/page/Freedom_of_information
Information Dissemination	is to broadcast a message to the public without direct feedback from the audience	https://dbpedia.org/page/Dissemination
Institutions	social entity established to meet needs or pursue goals	https://www.wikidata.org/wiki/Q43223
Seniors Farmers' Market Nutrition Program	The Seniors Farmers' Market Nutrition Program (SFMNP) is designed to Provide low-income	https://www.fns.usda.gov/sfmnp/vars
SNAP	SNAP helps low-income people buy the food, such as fruits, vegetables and whole grains,	https://www.fns.usda.gov/snap/outlets
SNAP recipients	Your household must meet certain requirements to be eligible for SNAP and receive benefit	https://www.fns.usda.gov/snap/recipients
Soup Kitchen	A soup kitchen, food kitchen, or meal center, is a place where food is offered to the hungry	https://en.wiktionary.org/wiki/Soup_kitchen
Material Culture	The aspect of social reality grounded in the objects and architecture that surround people	https://dbpedia.org/page/Material_culture
National Cultural Background (National Culture)	Culture of an individual nation (belonging to either a state or a historical group of people	https://www.wikidata.org/wiki/Q119801715
Value	Element of culture and involve judgements of what is good or bad and desirable or undesirable	https://pressbooks.howardcc.edu/soci101/chapter/3-2-the-elements-of-culture/#
Connection (Internet Access)	Individual connection to the internet	https://www.wikidata.org/wiki/Q1472399

Figure 1: Concept map of the IS-CUCO Knowledge Graph.

METHODOLOGY/APPROACH

As part of IS-CUCO, we present a Knowledge Graph (KG) encompassing crucial cultural and structural factors to be considered when designing FAIS. The concepts and their relationships found in the KG were obtained by evaluating questions and answers from a survey developed by the IS-CUCO team, composed of Engineering and Social Sciences experts, following best practices. Although many of the questions from the survey are related to structural factors, we noticed that there could be underlying cultural competencies. An additional literature review was performed to refine these concepts and develop shared definitions. Then, we established a concept KG in the Miro tool (<https://miro.com>). Next, we established a glossary that provides a definition and source of the definition for most of the concepts and individuals. To implement our KG, we have chosen the Web Ontology Language (OWL), using Protégé as our ontology tool.

FUTURE WORK

We are looking into producing, adding, and merging more information from further research results or different KG into ours. After acquiring surveys results, we can start querying information through our KG or the resulting KG from mergers to better understand which areas are more impactful. This could be seen in multiple forms like guidelines, courses, or grading systems.

RESULTS/DISCUSSION

The KG is a work in progress, and we are to improve it by adding more concepts and merging with KGs from different teams in IS-CUCO, resulting from future research results. The KG currently has 42 concepts such as “Material Culture,” “National Cultural Background,” and “Value.” Relationships in the KG that link these concepts include “is-a,” and domain-specific relationships such as “impacts” connect FAIS to Cultural and Structural Factors. The KG aims to describe the cultural and structural factors relevant to underrepresented communities, focusing on Hispanics.

SUMMARY/CONCLUSION

We expect that this KG will provide insight into high-impact areas affecting the effectiveness of the FAIS. Its purpose is to support the integration of information and resources by underrepresented communities who often have limited access to and use of these systems. Developing culturally competent information systems requires teams of culturally competent software developers, designers, and tools and knowledge bases that help them work with stakeholders. We envision our KG as a knowledge base and a tool that will aid in this effort.

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