Research Network for Studying and Developing Collaborative Assistants to Stimulate Sustainable Bioeconomy in Agricultural Production Chains

Sustainability and Bioeconomy are convergent and reciprocally complementary issues in the search for solutions to global problems, directly linked to the worldwide concern for the guarantee of life. Bioeconomy, as a new socioeconomic paradigm, becomes clearly conceptualized from the second decade of the 21st century. The concerns on Sustainability are "somewhat older", as they arose from the second half of the 20th century, with the development of the systemic and organic view of the Planet.

At the heart of the intersection of these two themes, there are two fundamental needs of modern societies: food and energy production in alternative ways to those that have been practiced. These processes are being committed and dependent on agricultural activities. In some cases, there are controversy discussions around the competition created in the choice of using lands for the production of energy in detriment of food production (or vice-versa). These themes are close related to two of five impact axes listed in the new Brazilian Agricultural Research Corporation (Embrapa) strategic planning (1) Advances in sustainability search and (2) Strategic and competitive insertion in Bioeconomy.

The knowledge developed on both themes, considering their epistemological and ontological nature has been expressed in great volume, diversity and complexity with respect to data and information. It concerns various involved areas of human knowledge because innovative solutions that link Sustainability and Bioeconomy approaches are related to natural, economic and social sciences.

Databases, information systems and other types of repositories are fasting growing up. They include documentary (academic or corporate, public or private), patent or collections of news, in addition to curricular bases where specific competences can be identified and mobilized. However, the rationality to cognitively relate such data and information, aiming to guide the development of innovations as solutions to various problems, still requires a lot of human efforts (intellectual and manual) and resources (*e. g.,* human, logistical, financial, infrastructure).

These challenges essentially emerge from the complexity of both themes. They are manifested in the cognitive arena, when considering: (1) approaches of collective construction of knowledge; (2) methodological and technological issues; (3) inadequate technological design of interoperable and integrated solutions, and (4) dispersion of these knowledge bases and difficulties of accessing, sharing, integrating and disseminating information.

Aiming to address these challenges, we propose a novel approach, which integrates theories and tools for developing collaborative environments. We assume production chains as complex systems and align the analysis and modeling process with this assumption considering causal relationships between data, information and knowledge.

Cognitive systems encompass a series of software technologies that enable to provide a better user engagement, discovering and decision-making. They should allow changing significantly the way people interact with computational systems, by bringing to people information in a timely, natural and usable way.

The **proposed research network** aims to design cognitive assistant solutions to act collaboratively with human agents in complex problem solving settings, such as those related to agricultural production chains, a complex production chain.

Name	Education / Research Interests
Andreiwid Sheffer Corrêa	Ph.D in Computer Engineering (2017), M.Sc. in Electrical Engineering (2011), B.Sc. degree in Computer Science (2004) / Open Government Data, e-Government, Government infrastructure frameworks, Fuzzy logic and fuzzy systems, Geographic information systems.
Francisco Edeneziano Dantas Pereira	M.Sc. in Mechanical Engineering (Unicamp, 2001), Graduation in Electrical Engineering (Unicamp, 1982) / cooperative enterprise, enterprise modeling and complexity theory applied to management solutions
Ivo Pierozzi Junior	Ph.D in Biological Sciences/Ecology (UNICAMP, 1989), M.Sc. in Biological Sciences (UNICAMP, 1985) and B. Biological Sciences (UNICAMP, 1981) / Knowledge organization; Knowledge representation; Knowledge mapping; Knowledge management; Knowledge Organization Systems (KOS); Agrisemantics; Agricultural terminology.
Jarbas Lopes Cardoso Junior	Ph.D in Science (USP, 2017), M.Sc. in Physics (Unicamp, 1980), B. in Physics (Unicamp, 1977) / Collective Intelligence, Social Project Management, Free software and Open Standards for Web, 5W1H framework for supporting decision, Ontologies, IT Strategic Planning, Problem-solving by cases, Collaborative innovation networks.
Julio Cesar dos Reis	Ph.D. in Computer Science (University of Paris Sud, 2014), M.Sc. in Computer Science (UNICAMP, 2011) and B.Tech in Informatics (UNICAMP, 2007) / Computational Ontologies, Ontology Evolution, Semantic Web, Computational Semantics, Human-Computer Interaction.
Katia Regina Evaristo de Jesus	Ph.D. in Biotechnology (USP, 2003), M.Sc. in Biotechnology (USP, 1999) and B. in Biological Sciences (São Carlos Federal University, 1996) / Development of metrics to assess complex issues such as agricultural sustainability, risks and impacts of nanotechnologies in agriculture. Development of methods and softwares for evaluating the sustainability of agricultural production systems through the formulation of indicators, Delphi consultations, consultation rounds with stakeholders and panels of experts.
Olga Fernanda Nabuco de Araújo	Postdoc at Laboratory for Analysis and Architecture of Systems 2006-2007, Ph.D in Mechanical Engineering (Unicamp, 2003), MSc in Mechanical Engineering (Unicamp, 1997) and BSc in Electrical Engineering (Federal University of Santa Catarina, 1980) / Ontology, Knowledge Engineering, Semantic Technologies, Semantic Web Services, Artificial Intelligence, Manufacturing.
Rodrigo Bonacin	Postdoc in medical informatics (CRP Henri Tudor - Luxembourg, 2011), Ph.D in Computer Science (Unicamp, 2004), MSc in computer science (UFPR, 1999) and BSc in computer science (UFPR, 1998) / Human Computer-Interaction, Semantic Technologies, Medical Informatics, Informatics in Education.
Tania Cristina Lima	Ph.D in Social Sciences (Unicamp, 2012), Master degree in Social Anthropology (Unicamp, 1983), Graduation in Social Sciences (Unicamp, 1975).