

CSIR woman scientists making a difference

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Celebrating women in science

Dr Auroa Gerber

Achieving more than just a key word search - ontologies to the rescue

Retrieving information through intelligent information systems is about to take the world by storm. This according to Dr Auroa Gerber, a senior researcher and computer scientist at the knowledge systems group (KSG) of the CSIR Meraka Institute.

Gerber radiates energy as she talks of her passion for ontologies. "I'll say it again and again - ontologies are making it possible to create intelligent information systems," she says. In computer science, the term 'ontology' refers to a designed artefact consisting of a specific shared vocabulary used to describe entities in some domain of interest, and a set of assumptions about the intended meaning of the terms in the vocabulary. An ontology structures information in ways that are appropriate for a specific application domain, and in doing so, provides a way to attach meaning to the terms and relationships used in describing the domain.

Why ontologies?

To explain and reinforce the power of intelligent information systems, Gerber provides some practical examples "When we google, we query by using keywords," she explains. "The search engine picks up titles and other hits in which these keywords appear. So what you see is what you get! And very often, it's more than you expect or want."

Using an intelligent information system is a different experience altogether. Gerber demonstrates the power of [Anatomy Lens](#), developed by IBM Research. "When we use this type of search engine, it can search for information related to the topic and come up with a better result." An example taken from the Anatomy Lens webpage, clearly demonstrates the power of this type of system. The query Alzheimer's, brain, neuron development, matches Alzheimer's articles that discuss dendrite development in the hippocampus; standard searches find only articles containing the queried keywords explicitly and even articles that are unrelated (such as articles about neuron development in the spine).

Gerber's role in the KSG is twofold: She works alongside research group leader Professor Tommie Meyer to promote awareness of and collaboration in the field of ontology engineering and ontology research to establish local and international research excellence. As such, she is often called upon to visit tertiary education institutions and co-supervises postgraduate students from the Stellenbosch University, North-West University and the University of South Africa. Currently she is responsible for one PhD student and supports another two PhDs, while six Master's students look to her for guidance, three of whom are at the Meraka Institute. As students and researchers in this domain depend on a background in mathematics and modelling, it is very much a postgraduate field.

Her other role is promoting the use of ontologies to create intelligent information systems. Core technologies used for this are the semantic web, in which information is intelligently described in a way that makes it possible for computers to use it. This is coupled with next generation web which makes it possible to use the web for various services. The best known phenomenon here is the explosion of social services on the web, such as Facebook.

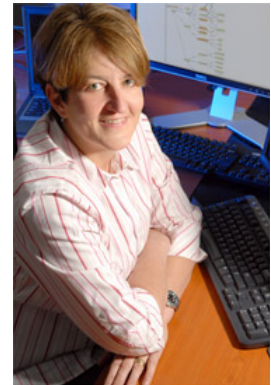
By putting description logics into this mix, the computing context is made clear. "We can manage ambiguity," she explains. "This way it is possible to weed out inappropriate query matches. For example, 'bank' could mean a financial institution or the side of a river, and we do not want both!"

The value of ontologies has been recognised worldwide and a standard web ontology language (OWL) has been developed, which is recognised by the World Wide Web Consortium (W3C) (Ontologists took the liberty of using this anagram, rather than the otherwise unpalatable acronym!) KSG researchers have contributed to OWL 2.0.

Bringing the advantages of a robust and intelligent way to manage information to the common man is but a step away. Gerber explains, "In future, we will have complementary search facilities. There will always be keyword searches but a second window will allow users to access relevant domain knowledge in an effective way."

A researcher by heart and through action

Gerber is passionate about research. She loves being on the cutting edge of developments and has been responsible for creating an in-house Meraka researcher's forum to discuss key aspects impacting on a research culture within the institute. She sees ontologies as a career of the future, as it achieves effective ways of managing information.



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Her contribution to the field has been recognised internationally in, amongst others, an FP7 project, TONES (Thinking ontologies), in which a case study of the Meraka Institute's National Accessibility Portal (NAP) was included. She had a paper accepted by the prestigious European Semantic Web Conference and also won a best paper and best project award at the fifth Summer School on Ontological Engineering and the [Semantic Web](#) in 2007.

Through networks established worldwide by Meyer, it has been possible for the KSG to bring Professor Enrico Franconi of the [Free University of Bozen-Bolzano](#) to the Meraka Institute to present a short course. This year the KSG will once again host a visiting researcher from the same institution, Professor [Diego Calvanese](#), for an ontology spring school. "It's a privilege to work alongside these world-class researchers," Gerber concludes

Extramural excellence

Gerber and husband Thinus live in the countryside near the town of Rayton, with daughters Auroa and Ané. This allows Gerber to stable the horses that she loves.

As a dressage rider, she practises the exact equestrian sport on her favourite chestnut Irish thoroughbred, Paddy's Boyo, and rides at the Jumar Equestrian Centre. She is as comfortable in the medium of water as on horseback and loves scuba diving. It seems that she excels at all she attempts!

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