

# Persistence, vision, networks, collaboration - leadership in information retrieval research

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The library and information science community has its share of inspirational research pioneers building a corpus of knowledge to influence and construct the future. Intuitive search interface design, the psychology and mechanics of information retrieval (IR) and information seeking behaviour are key development priorities.

In December 2021, Ian Ruthven, Professor of Information Seeking and Retrieval at the Department of Computer and Information Sciences, University of Strathclyde, presented the seventh annual Strix Memorial Lecture entitled: 'Google's what you use when Alexa doesn't know the answer, Uncle Ian.'

The prestigious international Tony Kent Strix Award was presented to him in late 2020, in recognition of his outstanding contribution to the field of IR. The award, inaugurated in 1998 by the Institute of Information Scientists, is presented by CILIP's Special Interest Group UKeIG in partnership with the International Society for Knowledge Organisation UK (ISKO UK), the Royal Society of Chemistry Chemical Information and Computer Applications Group (RSC CICAG) and the British Computer Society Information Retrieval Specialist Group (BCS IRSG).



Ian's departmental colleague Dr. David McMenemy nominated him for the award. 'Ian's research is focused on the human experience of interacting with information. This involves understanding how and why people approach the task of seeking information, designing appropriate interactive search systems and developing human-focused approaches for evaluating information systems.'

Ian leads the Strathclyde iSchool Research Group. SiSRG operates across the boundaries between information and computer sciences and has established an international reputation for research excellence and inquisitive and experimental IR analysis and exploration. In a fascinating online lecture, Ian referenced the significant research activity of international peers and role models, alongside the ground-breaking work of his Strathclyde team. He acknowledged that he was honoured to be a beneficiary of visionaries and mentors who had planted the seeds of curiosity that catalysed his innovative, impactful IR portfolio.

Ian expressly thanked his PhD supervisors Professors Keith van Rijsbergen and Mounia Lalmas for their professional and personal support; for enabling him to pursue his research goals without the fear of failure. True leaders in their field, they were 'great examples that you can be a significant scholar, a great academic, but also a very decent human being.' He reflected that previous recipients of the Strix award were also close personal colleagues and had contributed to his success. 'I remember how touched Keith was to receive the award back in 2004. Now I know how he felt.'

Professor Emeritus Peter Ingwersen, Department of Communication, Copenhagen University (recipient of the 2015 Tony Kent Strix Award), applauded Ruthven as 'one of the few academics originating in computer science who has succeeded in bridging the gap between computer science and information science but also the social sciences.' Professor Pia Borlund, Oslo Metropolitan University (recipient of the 2018 Tony Kent Strix Award), concurred. 'Within the research community Professor Ruthven is recognised for his high quality analytical and practical research. He is driven by a strong devotion to users with the purpose to optimise and support people's information searching and access to information.' Peter and Pia played a significant role in Ian's career, encouraging the transition from a purely computer science background by introducing him to library and information science theories and concepts from a rich and diverse user-oriented perspective.

Ian's research journey has been twenty-five years in the making. Back then pundits weren't even sure if 'this World Wide Web thing' wasn't just a flash in the pan. In an amazingly short space of time the world has experienced the transition of search, like Dorothy stepping out of a black and white landscape into a technicolour Oz, from an 'elite activity' - the domain of trained computer and information scientists - to an everyday routine where information seeking and retrieval is public property and pervasive. As early as 1984, Peter Ingwersen had forecast that research and development into interface support - 'simple, flexible and

intelligent' solutions to help people work with information and search more effectively - was crucial to progress the liberation of search tools to a 'mass market.' Ian's research continues to build on this premise, analysing interfaces and interaction models and fathoming the complex search motivations and behaviours of a diverse population.

His whirlwind tour of this eclectic body of research was compelling in its exposition of this softer underbelly of IR; the human elements that determine the success and longevity of a search tool. Ian asserted that our adherence to search solutions is transient and fickle. Retrieval tools like Lycos and AltaVista are a dim and distant memory, but they served a purpose at the time. They were a means to an end. Perhaps Google will be forgotten, done and dusted in ten years' time?

He cited the ['Book House'](#) search strategies and system design model (1989) that is underpinned by the physical metaphor of browsing in a bookshop. This serendipitous approach to information seeking behaviour is crucial to the understanding the psychology of IR. We browse, interact, respond and adapt to the inspiration of the environment; albeit physical or online. We navigate pathways through 'complex information spaces.' He flagged the work of Iain Campbell (2000) on an ['Ostensive Model of Developing Information-Needs.'](#) 'People don't want to interact with IR systems. They want to interact with information.' Joe Public is ambivalent towards, indeed indifferent to, the backroom engineering of searches. We don't have preconceived notions of the look and feel of an interface. 'We don't think about them. We don't reflect on them.' In short, we don't really care; we just click on what we want, or what we think we want. Peter Ingwersen went one stage further by describing information seeking and behaviour as a 'a pain in the neck,' a necessary evil that had to be tolerated in order to achieve your research goals. People just cope with IR tools in order to 'augment their deficient knowledge.'

I recall with a certain amount of nostalgia (and trepidation) studying for my MSc in Information Science at City University, London between 1991 and 1992. The stress of online search training fuelled by whirring modems in overheated computer rooms was palpable. Time was money, and search strategy formulation was a perilous activity. Professor Stephen Robertson (recipient of the inaugural Tony Kent Strix Award in 1998) was Head of the Department of Information Science at City while I was a postgraduate student. He pioneered the probabilistic ranking principle that information objects (search results) should be displayed to the searcher in order of the likelihood of 'relevance to the request, or of usefulness to the user, or of satisfying the user.' Ian praised Professor Robertson's significant scholarly contribution over decades, his work on IR theories and models alongside the design and evaluation of IR systems. Concepts like 'relevance ranking,' 'relevance feedback' and 'probabilistic retrieval' came flooding back. Probabilistic ranking is still the dominant model of IR that has had other innovations and design features bolted on to it over the years. Yet, the ultimate challenge for IR researchers continues to be understanding how searchers define relevance or usefulness.

Ruthven introduced Robert Taylor's 1968 exposition of four levels of information need and question negotiation, which still pose significant challenges for interactive searching.

- Visceral need: an unexpressed response to 'a vague feeling of dissatisfaction'
- Conscious need: a brain-held understanding of what we wish to know
- Formalised need: how we express and verbalise what we wish to know and translate our thoughts into a linguistic context
- Compromised need: how we express what we wish to know to an IR system.

Compromised need is the base level that we are still at. Interface designers have toiled at the coal face to rectify this problem with query modification enhancements, resource recommendations and other decision-making capabilities, but these laudable solutions are still based upon assumptions that reflect the stakeholder perspective and world view of the individuals and technical teams who devised them. Over the years IR design has been rooted in efficiency, system precision and performance management. Ian recalled the insightful comments of a psychologist colleague who observed that search systems have been dominated for years by a 'library reference' model; a practical 'get in, do it and get out' transaction where a person wanting information asks a question and gets back what they asked for; rather like going to your local supermarket with a scribbled wish list of items.

Compare that with a complex interaction with a doctor, lawyer or teacher, where numerous questions may be asked, alternative paths explored, and fresh new goals and outcomes contemplated. The search process in this context becomes a highly individualised, iterative experience and makes interface design and the information seeking experience much more complicated. We all have our own perspective on how to get the best out a system. How many of us have vented our frustration when Google has withdrawn a search feature or made an 'irritating tweak' to its interface?

So, how do individuals assess, interpret or judge the value of their results and the resolution (or not) or their information need? Ruthven introduced anthropologist Edward Hall's (1976) concepts of [high and low context culture](#) frameworks to highlight the nature of interactions.

- High context interactions are implicit, influenced by tacit knowledge built through long term activities, associations, familiarity, understanding and the accumulation of information. In a face-to-face context we can interpret changes in non-verbal communication through the facial expressions and body language of a close family member or long-term work colleague, for example. The longevity of association impacts the nature of the interaction. Amazon is an obvious online example, underpinned by a highly personalised relationship management ethos. Wisdom, intuition and personality define the interactive experience
- Low context interactions imply looser connections. A typical example is a dialogue with a shop assistant or waiter in a restaurant. Our information requirements from

this perspective are invariably task-oriented or needs-based; practical, short, sharp exchanges. We want to get what we require quickly and effectively. Queries tend to be more structured, explicit and underpinned by a 'linear logic' as opposed to the 'spiral logic' of a high context interaction.

An understanding of these interaction models is crucial to IR design but also to understanding user satisfaction and the evaluation of relevance. We're all aware of tangible relevance criteria like the accuracy, currency, quality, research integrity and cost of information, for example. Perceptions of relevance run deeper however, driven by personal experience; by who we are. High context search interactions will require hierarchies of system and interface support.

Ian provided examples of collaborative interactive interface development projects that experiment with these human conundrums. Parking global search tools, he highlighted a personal information management and retrieval initiative. Elusive emails, documents and photographs can still be notoriously difficult to retrieve. (How gratifying it is to know that most of us still struggle to organise or interact effectively with our own resources.) In 2007 one of Ian's undergraduate students Chris Jones used photographs retrieved from his personal collection as a model to build an iterative, memory supporting retrieval system based on the notion that, invariably, we only tend to remember 'bits of things.' Retrieving a photograph based on one fragment from his memory triggered the system to prompt him with multiple conceptual clues which in turn redefined the nature of the search and the results. In this context, searching becomes intuitive, truly interactive and does not require instant recall, extensive knowledge or indeed experience of complex query syntax and formulation.

Another observational study invited searchers to comment on their retrieval strategies as they interrogated Google so the team could experience the morphing of decision-making processes in situ. Searchers were assigned a task for twenty minutes or so and invited to talk aloud as they navigated the screen. Eye trackers mapped interface 'reading' and navigation. It became obvious that there was no such thing as a 'good/well done' or 'bad/not well done' search; just different approaches to searching. 'People use things differently depending on their task or motivation.' A 'well done' search can often mean that the interface is used in the way that the designer designed it to be used.

There is so much potential to continue to progress research in this fascinating field by placing information seeking and retrieval within the broader societal and cultural framework of what people or populations want from or do with information. The 'lived experiences' of specific marginalised communities like recent immigrants and BAME (Black, Asian and minority ethnic) groups, for example. What of the impact on IR of information poverty and the inequality of information access as a social justice issue?

Ian concluded his lecture by revisiting its title:

'Google's what you use when Alexa doesn't know the answer, Uncle Ian.'

It was inspired by an innocent comment made by his young niece, Kayla. People create their own models of how information works for them. Information seeking behaviour is social and shaped by life, so there are infinite iterations of queries and limitless perceived solutions to perceived problems. IR systems are indeed a means to an end. Kayla had a relevant point to make in her innocence. Alexa will evoke an immediate response to a query. No need for laptops, tablets or 'phones with drained batteries. No data entry. No results to scroll and interpret. The emotional and human aspects of IR outweigh the cognitive mechanics of query formulation and are essential considerations in future search interface design.

