

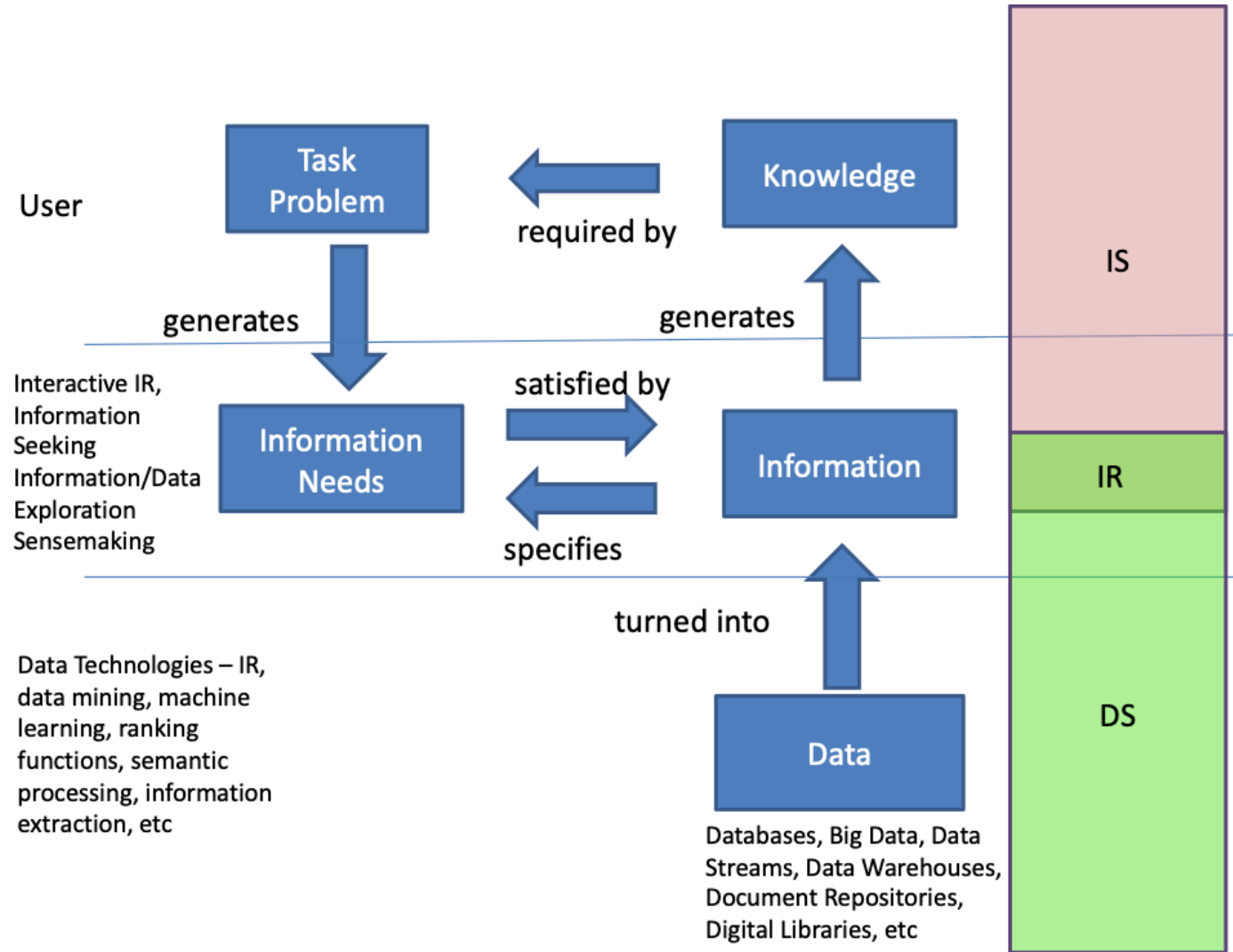
Challenges and Opportunities for IS, IR & DS in an Era of Information Ubiquity

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A Common Goal for IS, IR & DS

- Each discipline has its own specific goals, concerned with problems specific to that discipline, but
- One goal common to each is
Supporting People in Achieving Their Goals, Accomplishing Their Tasks, Through Effective (and Pleasurable) Interaction with Information and/or Data
- It's with respect to accomplishing this goal that I consider the relationships among IS, IR and DS in today's presentation

BIRDS Model of Relationships of IS, IR, DS



My Take on What Each Brings to the Table

Information Science

- Understanding people's information related tasks and goals, their behaviors with respect to interactions with information objects and information systems, the relationships between tasks/goals and behaviors, the problems people face in their interactions with information and information systems, design principles for information object representation and organization and for information systems
- By “people” is meant both individuals and groups of individuals, e.g. communities of practice, disciplines, ...

Information Retrieval

- Methods for representation of information problems and information objects, collection and organization of information objects, matching of objects and problems, prediction of relevance/usefulness of information objects, ranking, presentation and visualization of relevant/useful information (objects)
- Formal models of users of information (retrieval) systems, and of information retrieval systems, design and implementation of information retrieval systems
- Methods for personalization of IR techniques for individuals and groups

Data Science

- Methods and practices of data sensing, collection, organization, manipulation, analysis, visualization, retrieval
- Relationships of varieties of data to individual, group and social behaviors, goals, and problems

State of Interactions Among IS, IR and DS

- IS & IR have a long and chequered history
 - Started out together – librarians and information scientists working with computer scientists, psychologists, mathematicians and others; separated into distinct academic and practicing streams – LIS and CS
 - Relatively recently have begun to re-engage with one another – examples include IliX, HCIR, SIGIR CHIIR (all also incorporate HCI) and, especially Ingwersen & Järvelin, *The Turn*.
- DS & IS have had some recent interaction
 - Data curation, uses and users of data; education for DS in LIS departments
- DS & IR have had some recent interaction
 - Recommendation systems, ML and statistical techniques
- There appears to have been little interaction among all three together

The Era of Information Ubiquity

In the emerging technological and social-technical environment, people are constantly and ubiquitously emerged in sea of information/data

- Information/data of all “kinds”
- Information/data from or about increasingly varied and numerous sources
- Information/data in increasingly varied and numerous media types
- Information/data available in increasingly varied and numerous modalities
- Information/data available for access and interaction in increasingly varied and numerous contexts
- Increasingly, “pushed” competes with/replaces “pulled” information/data

Information* of All “Kinds”

For instance:

- Texts
- Images
- Sounds
- Smells
- Numbers
- Relationships
- Mashups of above

*I'll just use “information” to mean “information/data”

Information from or about Increasingly Varied and Numerous Sources

For instance:

- Knowledge bases
- Places
- "Things"
- The environment
- Ourselves
- Others

Information in Increasingly Varied and Numerous Media Types

For instance:

- Text
- Image
- Video
- Data
- Numbers
- Mass media
- Social media
- Personalized media

Information Available in Increasingly Varied and Numerous Modalities and Devices

- **Apprehending:** reading, listening, viewing, feeling, smelling – all senses become available
- **Interacting:** annotating, speaking, grasping, moving, sending, sharing
- **Through:** Screens and keyboards ever less, speech, holograms, roads, “things”, the environment in general

Information Available for Access and Interaction in Increasingly Varied and Numerous Contexts

- Physical contexts: home, workplace, while moving, "third places", occasional places, new places
- Social contexts: family, friends, neighbors, workmates, playmates, unknown others, conference mates
- Cognitive contexts: States of certainty/uncertainty, decision making, courses of action, engagement
- Purpose contexts: Tasks and goals and desires embodied in social, physical and cognitive contexts

Increasingly, “Pushed” Competes with/Replaces “Pulled” Information

- Recommendation systems
- Mass media becomes personalized
- Sharing becomes ubiquitous
- “Proactive” IR
- Bombardment throughout ordinary experience
- Think *Fahrenheit 451*, and how even the prescience of Ray Bradbury could not imagine the degree to which we are already immersed in information pushed at us

What Does All This Mean for Support for Interaction with Information and Data?

- As ever more information, data and affordances become available to people, their uses (“needs”), demands, and behaviors expand commensurately
- As people become accustomed to information and data immersion, they become ever less likely to engage with systems which are not embedded in their specific contexts, i.e. all aspects of their daily lives
- The very concept of information systems that people *use* thus becomes itself *unuseful*

Design for Support of Information Interaction Will Have to Change Its Basic Assumptions

- Will need to support *people*, not *users*
- Techniques and systems will need to become, in the general case, totally *invisible*, not *explicit*
- *Separate kinds* of techniques and systems will need to be developed to apply to the variety of multidimensional situations that people experience
- Will need to become *radically personalized*
- Will need to face and deal with difficult *ethical issues*

What Do the New Assumptions Imply?

***Radically Personalized* Support for Interaction with Information, will need to study, understand, and respond to, at least:**

- The Ubiquitous Person
- The Thinking Person
- The Feeling Person
- The Social Person
- The Goal-Driven Person
- The Non-Goal Person
- The Embodied Person

What Does *Radical Personalization* Mean?

- Taking account of, and responding to, (at least) all of these aspects (facets) of the person, in an *integrated* fashion
- Making interaction with information the given, or thrown, rather than the problematic
- From the person's point of view, *there may be no IR systems**, just **Effective interaction with information as, and when appropriate**

*A long-time goal of IR

How Can IS, IR, DS (and HCI) Support Radical Personalization

- Not (just) through adopting one another's methods, techniques, theories, but rather
- Through *sensitive, interdisciplinary* collaboration in addressing the overall problem
- That problem, with which I started this talk, was very nicely made explicit in Elizabeth Churchill's keynote presentation on Wednesday

Keynote V - From Information to Assistance

July 29, 8:30-9:30 GMT+8

Information quality, availability, and presentation

HCI dimensions & designing: information ergonomics

1

Right information

The information should address the person's information needs, allowing them to make progress on the goals and tasks.

2

Right place

The information needs to be presented in the right place, on the right surface so it can be effectively consumed.

3

Right time

The information needs to be delivered in a timely way. This may not be immediate, but should be in the temporal frame of the goals and tasks at hand.

4

Right format

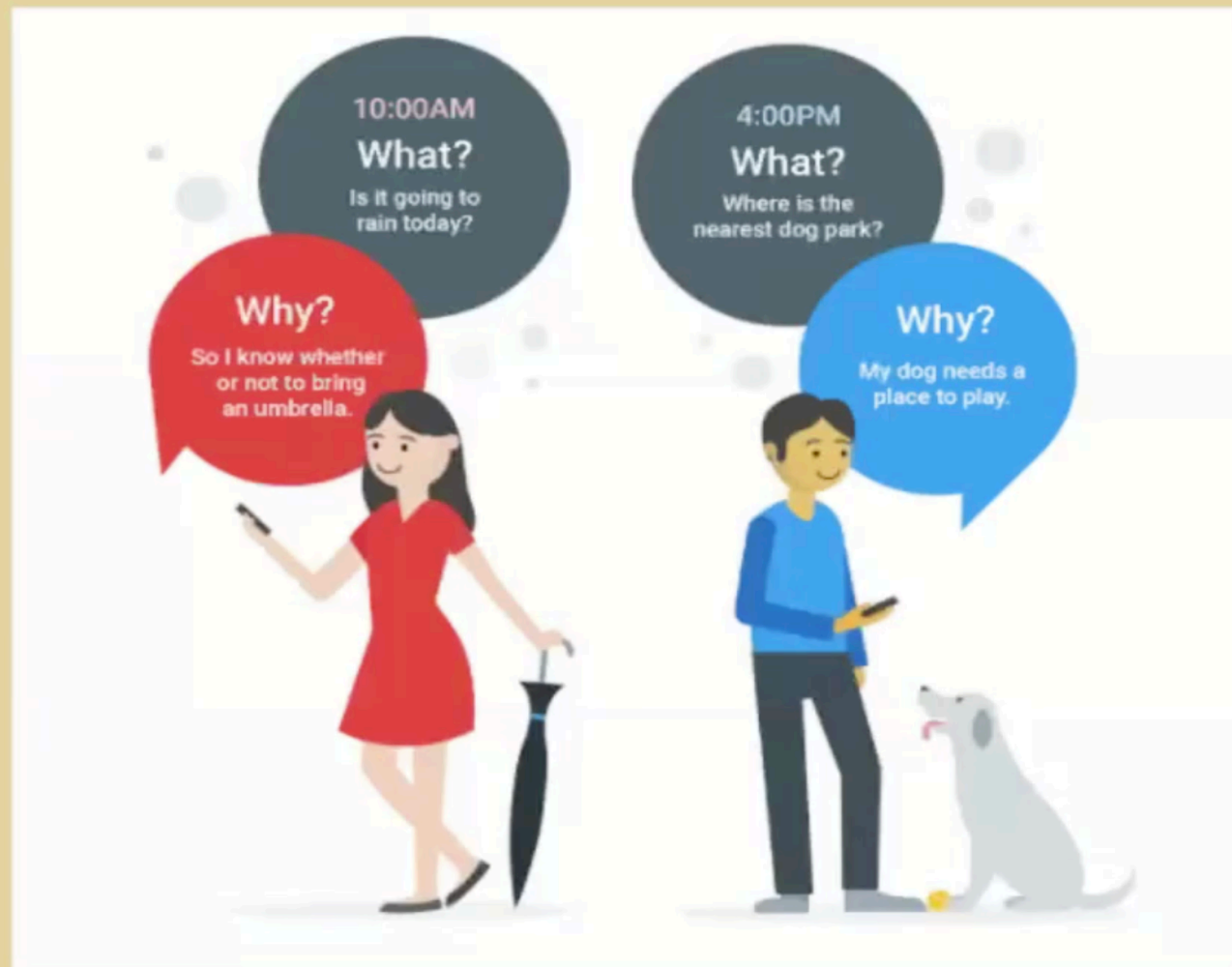
The information needs to be readable and comprehensible, be interpretable as addressing the person's goals and needs, and in the right medium and modality (visual, auditory, haptic, etc).

Keynote V - From Information to Assistance

July 29, 8:30-9:30 GMT+8

Daily information needs

Conducted for several years in many countries



Opportunities for Interaction Among IS, IR, DS (and HCI)

- Each discipline has expertise useful for addressing different aspects of radical personalization for support for information interaction
 - IS in understanding everyday goals and tasks, information problems arising, and what kinds of information/data would be useful for addressing those problems
 - DS in identifying, analyzing and providing appropriate data types/streams and in system implementation
 - IR in representing, organizing and retrieving appropriate information types, and in system implementation
 - HCI in designing and implementing appropriate interaction methods
- No single discipline can address the goal as a whole
 - Collaboration amongst them all is necessary
 - Effective collaboration can lead to cross-fertilization

Challenges for Doing Radical Personalization for Ubiquitous Information Interaction

- Challenges beyond the obvious ones specific to each discipline's expertise
 - Integration of support within a single framework, or support tailored to specific circumstances
 - Understanding people, their “needs”, and how those might be addressed, well enough, but not too well
 - Taking account of all of the facets of the person's context in an integrated fashion
 - Integration, or separation, of information and data, in support system design

Challenges for Interaction Among IS, IR, DS (and HCI)

- Agreeing on the common goal
- Overcoming institutional disciplinary boundaries
- Effective collaboration requires effective communication
 - Each discipline has a different (sub)-language, using the same tokens to denote different concepts
 - Each discipline has a specific culture with different underlying assumptions
- Balancing interests of participants
 - Academic and industrial interests might not align
 - Social science and computer science interests might not align

Challenges for Radical Personalization of Support for Information Interaction, in General

- Pragmatic
 - Who will fund/support this somewhat radical proposal?
 - Is it just pie in the sky, anyway?
- Ethical
 - Is it actually a good idea in principle?
 - What will various actors be able to do with it?
 - Who will control who knows what about whom?
 - To what extent can researchers control the use of their research? How?
 -

Some Conclusions

- The ubiquitous information/data environment requires ubiquitous support for interaction with information and data
- Radical personalization will be necessary to accomplish ubiquitous support
- Designing radical personalization requires collaborative contributions from (at least) IS, IR, DS and HCI
- Collaboration may lead to cross-fertilization among the different disciplines
- It is necessary to consider the ethical problems of radical personalization at least while, if not before, doing it

Thank You for Your Attention

- Questions?
- Comments?
- Arguments?