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## **Academic Scholarship in the Digital Age**

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# Academic Scholarship in the Digital Age



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- Changes in Scholarship in the Digital Age
- Data: The Basis of Scholarly Research and Teaching
- An Information Infrastructure for, not only of Scholarly Information!
- What are we heading for? Where should we go?  
Some Ideas

# The Internet Age

- Internet integral part of academic life
- From „logging on“ to „always on“
- Used in a mixture of scholarly demands and everyday tasks
- Intensification of information and communication
- Deluge of information
- New forms of communication: listservs, weblogs („blogs“), wikis, wikipedia, wikisearch (?) etc.

# The Age of Digital Content?

- Not yet, really:
- New contents are produced digitally, but older ones are only selectively available
- And new ones often limited by access restrictions
- True for research and learning
- Networks of data, information, people: How about interoperability?
- We are at an early stage of a new scholarly infrastructure:  
Lack of standards

# Extended basis of scholarly work

- ICT sufficiently mature to enable rich and productive forms of information-intensive, distributed, collaborative scholarship
- Problems are social, economic, and political rather than technological
- Positive:  
Better access to data and information, more data available and accessible, more collaboration, increased international awareness, extended networks, easier to transcend disciplinary boundaries

# New Challenges and Tasks

- But also: More to read and to handle (Tenopir/King, D-Lib 11/12-2008)
- Intensification of work, higher velocity, increased competition
- To secure data production, verification, representation and preservation
- Improved document representation
- Publication sphere in rapid change, no clear direction, disciplinary differences
- Increased public demands and responsibility (better informed users and clients)

# Data as Basis of Scholarly Work

- Substantial differences of data between disciplinary cultures
- From measured (and often machine-recorded) process data to subjective records demanding interpretation
- What about (old, printed or in other form existing) non-digital data and records?
- Extreme differences in accessibility of data between disciplines and even within them (e.g. bio-technology vs. language)



# New Worlds of Data

- New dimensions of scholarly research through digital technologies, examples:
- Astronomy, Earth studies: Spectral surveys, mass data
- Medicine: X-Rays, MRTs etc.
- Sociology: Cluster analysis of milieus
- Linguistics: Language mass data bases, extended quantitative analyses
- Mechanical Engineering: Simulation with product and production data from manifold sources
- Civil Engineering: Building physics – role of visualization
- Virtual Journal of Joint Inst. for Nuclear Astrophysics

# The Situation

- Today: Infrastructure of, not for scholarly Information and Communication (Borgman 2007)
- I.e. infrastructure is technology-based resp. institutionally-based, not shaped by and aligned to the varieties of the many scientific cultures
- Often extremely diverse parts of an (ideally integrated) disciplinary infrastructure
- Difference between more canonical and rather „soft“, interpretative or basically contradictory or competitive disciplines
- Great differences in national vs. international orientation of academic disciplines

# (Dis-) Continuities

- Print publication still central for academic rewards' system (90% of ArXiv pre-prints are eventually published in printed journals)
- Contradictory aims of scholars, esp. when learned societies and journals are part of the game
- Systems of quality certification and legitimation differ substantially
- Stakeholder roles in publishing in move, no clear positions and fronts
- Regulations of „Intellectual Property“ differ internationally and in practice

- Increasing role of Open Access, Open Repositories and Open Archives in various scholarly cultures
- We are still in a period where different functional and business models are experimentally tested: „Faculty, librarians, and publishers are now one big dysfunctional family“ (Schottlaender)
- But: In sum clearly enhanced role of open publication and access
- Some Landmarks: Berlin Declaration; PubMed Central; CERN SCOAP3; recent arrangement between Google and authors guild in the USA (with new critical dimensions!); agreement between the Dutch Library Federation FOBID and the rightholders' representatives VOICE

# New Features

- Publication of documents together with the data, upon which the research is based  
==> possible only via digital publication, relevant for the broad area of empirical research
- Documents move from static to dynamic entities: They become documentation of a process rather than of a final state of things (and will change over time)
- Research possibilities are considerably enhanced: All formal operations can be more or less automated (not only mathematically based operations, but e.g. language analysis, complex social analyses)
- Access to global scholarly information new for many disciplines

- „The best way to predict the future is to invent it“ (Alan Kay 1971)
- Scholarly Work and Publishing as well as Technological Infrastructure are in the midst of restructuring  
==> options, creating „path dependencies“
- The earlier one intervenes, the better chances one has to influence future shapes of information systems (social shaping of IT and IT shaping the social)
- The inner relation between the way scholarly work is conducted and the usage of information and communication technologies and the modes of publication has to be observed and turned to practical solutions

- Central: To understand the different scholarly cultures, i.e.
  - who are the users,
  - how they conduct their research,
  - what their data are,
  - and how they publish;  
and that means
  - to realize that special (tacit or personal) knowledge is required to handle and interpret the respective data of the discipline or field
  
- Practical challenges and chances emerge from that:

- Reward systems in academic institutions have to be extended to comprise not only printed publication, but also the provision of data, i.e. other (enhanced) forms of publication gain an increasing importance
- Research will depend much more on a multi-technological and -dimensional access to data and information
- Reality as the object of scholarly research is not disciplinary, but urges the transgression of disciplinary boundaries (which is a strong real tendency in academia)
- New disciplinary and trans-disciplinary information cultures will have to be developed, including their new I&C forms and their publication modes



- Scholars are today more than in the past dependant on information infrastructure services (libraries, documentation centers, disciplinary information centers etc.), because their information worlds are increasing in complexity
- The visionary hope from the beginnings of the digital revolution that scholars will organize their information sphere themselves, has proved to be an inviable utopia, because it does not take into account the real work conditions of scholars
- Institutions have to seriously re-think their role as service organizations for scholarly work

- Libraries are not at all deemed to die away in the Digital Age (articles obtained by readers are continuously increasing), but they will have to adjust to it
- On one hand, there is an increase in central administrative functions: Negotiating bundle agreements, cooperating with other libraries, administering access rights etc.
- On the other hand, there is an increasing need to support scholars in their respective scientific information fields, i.e. scientific personell in libraries should be located in the faculties as advisory and helping staff with a disciplinary academic education
- i.e the scholarly service function of libraries should be revitalized

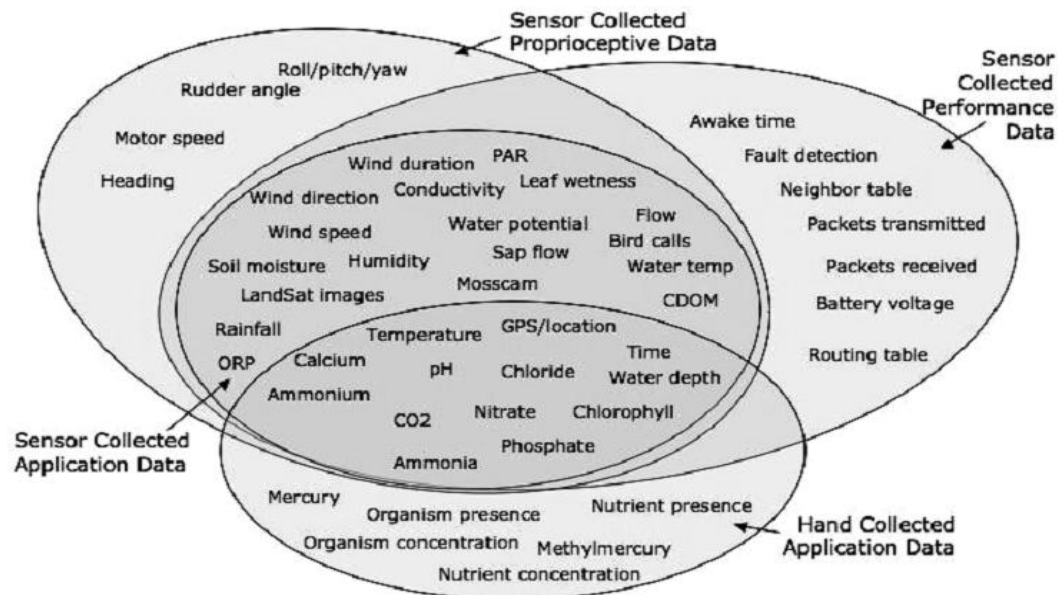
# Research + Development I

- For the manifold disciplines of scholarship special support, documentation and information centers are necessary
- They should be as deeply as possible rooted in the various disciplinary cultures
- A multitude of traits of curation and preservation of data and publications (also dynamic ones) has to be developed
- Preservation implies special right-of-property problems which have to be solved
- The problems of lacking standards of scholarly information and communication have to be tackled

# Research + Development II

An Example:

Center for Embedded Networked Sensing (CENS),  
a Science and Technology Center based at UCLA with  
4 other partner institutions in California.



- Development of a „Data Discovery Library“ as a bottom-up approach  
(because top-down approach of a central „sensorbase“ proved to be unfeasible)
- From the project's inception (2002) collaboration of the natural scientists and information specialists  
(among > 100 participants)
- Implementation of Open Access tools (OAI-ORE protocol, data description bei Dublin Core elements etc.)
- Core: Studying data practices in the evolution of a major research center, „capture and manage CENS data for use and reuse by others“ (JCDL, 338) by active participation

- The current notions of „information competence“ or „media competence“ are conceptualized technologically, i.e. they are not sufficiently complex in relation to the new information worlds and needs of an autonomous handling of the new tasks
- The human ability to mediate between information and reality, to contextualize information, is increasingly important and has to be developed and supported
- Danger of re-evaluating knowledge (from true/wrong to accessibility, i.e. in/not in Google)
- Knowledge about Non-Knowledge essential, ability to distinguish both is basis of autonomous human competencies

- Central for human autonomy and individuality remains to be intellect and reason, the power of judgement (Kant)
- The power of judgement today is largely dependant upon the ability to deal with information from external sources and to deliberately and consciously handle them
- Today: Principal lack in education towards these competencies („stefi“-study and notebook-university projects in Germany, various international studies)
- We are lagging behind real development in most curricula and in education in general
- The younger generation will turn up with new demands, we will have to find ways of a reasonable transgression

# Where do we go, how can we go?

- In practice, in-between forms of organizing scholarly work and publication have emerged, fronts have eroded
- But: The general situation, especially in Germany, is still characterized largely by the non-existence of a debate on general aims
- NGO bodies of debate on strategy should be brought into existence (preferably with participance of the resp. Ministry and EU)
- The discussion and cooperation of the important stakeholders in the field should be positively encouraged
- We need an upgrading of the role of scholarship in the discussion about future forms of scholarly information and contours of new chances for scholarship



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**That's the end**

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Thank you for your attention!

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