Engineers: What do they read and write, and why?
A survey of information and publishing behavior of academic engineers

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Outline

• Survey

• Purpose: to learn the information needs of our researchers to set our services accordingly

• Deep interview survey in engineering
  • 17 respondents in academia
    • Age, research areas, academic degree
  • 7 respondents in industry

• Topics
  • Work motivation and characteristics
  • Information behavior
  • Publishing behavior
  • New aspects of scholarly communication
Character and motivation for the work of academic engineers

• Core: **applied research** – (laboratory) measurements and testing, modelling, prototyping, prototype testing, etc.

• Secondary basic research (e.g. students’ works etc.)

• **Multi-field research** – combination of some field of science and technology

• Based on the **cooperation with external subjects** and their character

• Strong financial motivation and **dependence on external funding**
  • „Research and publishing is a business.“
  • „Finding the gap on the market.“
  • „Finding what is needed and financed.“
  • „Hunt for funding opportunities and industry cooperation.“
External funding

• Grant projects
  • The main funding opportunities (personal, equipment)
  • Tendency to keep projects continuously / more at a time
  • Tight deadlines for publishing
  • Demanding project management & formal criteria

• Industry cooperation
  • Essential
  • Based on personal cooperation / contacts
  • Projects and contractual research
  • Student internships, research cooperation – modelling, calculations
Document types used 1
Academic literature

• Information resources used are relate to the types of their outputs
• Journals and proceedings for research – IF journals, online access is essential
• Proceedings – often available only for attendees, often used only if attending the event
• Monographs and chapters – for education – describe basic theories, takes long time to publish, contain rather stable information
• Dissertations – only if reviewing, if received from a colleague, or if found accidentally; good dissertation research is published in articles
• Wikipedia – for first insight into a new topic
Document types used 2
Grey literature & other outputs

• For applied research and cooperation with industry – mostly applied resources are used

• Reports – used mostly when cooperating with industry; usually non-public materials, available from the partners

• Standards – key information sources for many research areas; researchers have their own (secret) ways to obtain – cooperation with the standardization institute or with industry

• Patents – not very important – researchers do not patent themselves very much; also patent information is usually mentioned in journal articles

• Company materials – both, internal and publicly available information, e.g. internal reports or trade magazines, product catalogues
Searching for documents

• **Follow key journal titles**
  • Know what information and documents they need and search specifically for them
  • Find out about documents from colleagues, through article references, at conferences, though reviewed articles, from students

• **Information retrieval** – mainly for teaching purposes

• **Subscribed electronic resources** and **library document delivery services** – frequent

• **Google search** – frequent – often used as a central discovery tool to access subscribed resources + Open Access resources (without knowing it is OA)

• **Ask authors** – frequently used – e.g. nuclear physics community is small and compact, authors send out their preprints to the community

• **Informal information** from colleagues – very frequent – personal contacts are key means of sharing experience and know-how; often more important than literature
Priorities for access to information

• Have their own methods and channels to get information
• Have not much time to learn new methods and communication techniques
• They are saturated with information resources
• They feel overloaded with information and information systems
• Immediate access within 24 hours
Publishing behavior in academia

• *Publish or perish* principle
  • „To spread the ideas and results to the community.“

• National and global R&D assessment system
  • Considered negatively
  • Increases pressure
  • Balance at the edge of publishing ethics
  • Adjust to the system, publish outputs that do not comply with the research area

• Researchers are more tolerant if not existentially dependent on the funding from the R&D assessment

• Negative impact on publishing educational materials and coursebooks - not supported by the R&D assessment -> negative influence on educational activities
Some feedback on publishing

• Publish where companies might reach the information
• It is moral obligation to publish:
  1. For R&D assessment credit
  2. To get the ideas out
  3. Publish popular texts
• Producing those outputs that pay off by the R&D assessment
• Sell all we can
• Problems with conference outputs
• Problems finding suitable journal with IF
• Problem – the system favors only excellent international research outputs
• Grant agencies – h-index, citation rates, etc.
• Researcher’s quality judged by WoS – a private company
Document types published

• **Journal articles** – core materials

• **Conference proceedings** – core in some research areas, however are considered lower quality compared to the journal outputs

• **Chapters and monographs** – review materials composed by those who have had the knowledge and experience

• **Reports** – outputs from a cooperation with industry and project reports. Usually non-public materials for funders

• **Standards** – rare

• **Patents** – only if a product is invented based on a cooperation with industry

• **SW, utilities and patents** – in past richly funded by the national R&D assessment, were produced more widely, nowadays we see significant decline
Motivation to choose an output

• **Journal/publisher prestige** – key principle – IF is the main metric

• **Speed of peer-review process** – key, mainly for meeting requirements of grant agencies; a critical issue that influences publishing process

• **Secondary issues** – publishing standards and website quality correspond to the journal prestige

• **Experience with the journal** incl. knowing an editorial board member to learn information about the editorial process and habits, have an experience with the journal as a peer-reviewer

• **Electronic publishing and indexing in a global database** of research literature that can be reached by the research community
New trends in scholarly communication

Open Access

• The philosophy of open access to research literature is broadly accepted
• „The more open environment the better access to literature and research results.“
• „Not always possible to open all publications due to patent and copyright issues.“
• No plagiarism fears or fears of low-quality - everyone should be able to judge the quality themselves.
• Advantage - openness, recency of published information, free communication of information, self-promotion, and better chance to become member of the community
• Negatives - financial and bureaucratic matters
Green OA

• Not broad awareness of copyright and self-archiving issues
• Otherwise positive attitude
• Negatives – no capacity to self-archive publications themselves
Gold OA

• „New business model related to the overload of research articles.“
• „A way to publish more outputs.“
• „APCs need to return through national R&D assessment or must have external funding available.“
• „Publishing in OA is faster than publishing in a traditional journal so it is useful to publish there in time pressure.“
• „OA generates many 2nd category articles and hardly publishes new ideas.“
• „OA journals are lower quality and there are many threads.“
Social media

• No age-pattern in using/not using social media
• ResearchGate is almost only preferred
• Reasons for using:
  • Following authors
  • Searching for publications
  • Following authors who have cited their works
  • Keeping up-to-date
• Negatives:
  • No much added value if the worldwide community has about 10-20 people
  • Waste of time
  • Many spam e-mails
  • Self-marketing which the established authors do not need
  • No online community in the respective research area
Summary of findings

• Information behavior is an individual characteristic
• No influence by research domain (within engineering) nor age
• Main differences according to:
  • Type of research (basic x applied)
  • Extent of cooperation with industry
  • Purpose of seeking information (research x teaching)
  • Experience and academic reputation of the researcher
  • Financial dependence on the income from R&D
• Follow own ways and information means, no capacity to adopt new tools
• Willing to learn new things only if it helps in the research process
• At the edge of information overload
• Prefer quality, speed, and principle of least effort
• The core information behavior has not changed compared to the literature of 1970s
Industrial area

• Aimed at development, innovation, and processing based upon request of the customer or by market demand
• Research activities are given by the business strategies of the company and by the return of investments
• „In many areas there is nothing new to invent.“
• Cooperation with universities – student internships, attracting graduates, lectures, consulting, lecturing theses, etc.
Information seeking in industry
Basic principles

• Work under time pressure and rely on their own information, knowledge, experience and on their colleagues
• Information need - usually quick and accurate answers to particular questions at the very moment
• Engineers rely on their own knowledge and experience and if they need they get information their own way
• Libraries, literature and information resources are a matter of ROI
• Libraries are first departments to get reduced or transferred because of economic reasons
• Not much demand for electronic information resources
Information seeking in industry

Documents used

- **Standards** and safety regulations – the most important resources; standards are given by the customer – products must correspond to the standardization and regulations given by the customer’s country.

- **Technical documentation** – internal documentation and reports: technical drawings, system and processing documentation, safety regulations, and internal technical regulations; documentation according to ISO 9000.

- **External technical documentation** – technical drawings, material characteristics, documents from their providers – reports, catalogues, trade magazines, handbooks.

- **Patents** – followed as a competitive intelligence issue.

- **Informal resources** – individual – partners and contacts from exhibitions, trade fairs, testing, cooperating companies, annual reports, even monographs.

- **Factual databases** – e.g. material characteristics, etc.
Publishing in industry

- **Product technical documentation** - kept in their own archives and provided to the customer

- **Standards and industrial property documents** - most common external output; companies are members of standardization committees, i.e. co-authors/reviewers of new national standards or translations

- **Patents** are carefully considered - only in case of a large invention; strategy is to keep know-how internal and unpublished

- **Technical reports** - internal materials, for internal archive and use only

- Other types of outputs - published by individual people, e.g. articles, presentation at fair trades, conferences, seminars, etc.
Thank you!
Questions?
Or rather ...

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