Technische Universität Dortmund 🖊



Fakultät Maschinenbau Institut für Umformtechnik und Leichtbau Prof. Dr.-Ing. Matthias Kleiner Prof. Dr.-Ing. A. Erman Tekkaya

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# **Research Process**

A. Erman Tekkaya



Seminar on Scientific Publishing January 17, 2008 Dortmund



#### **Overview**



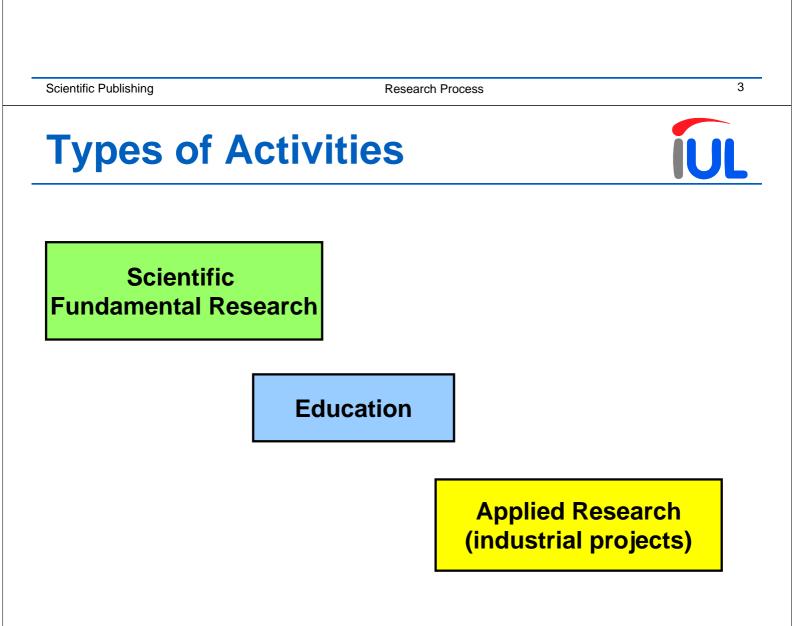
- Steps of Research
- Scientific Contribution
- Classification of Scientific Studies
- Literature Survey
- Purpose of Scientific Publishing
- Relevant Journals

#### **Overview**



#### Steps of Research

- Scientific Contribution
- Classification of Scientific Studies
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#### **Steps of Research**

- Need: What do we need to know what is not known now?
- Literature: What knowledge exists?
- Gap: Precise gap between need and existing knowledge
- Proposal: Model, solution technique, experiment, system to fill the gap
- Development: Implementation of the proposal
- Evaluation: Testing whether proposal fills the gap (e.g. by comparison with experiments)
- Further Work: Suggest further studies as a continuation of the current work

		J. M. Allwood
Scientific Publishing	Research Process	5
Golden Rule		ÍUL

# Start your study with a literature research!

#### **Overview**





#### Scientific Contribution

Classification of Scientific Studies

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#### Scientific Publishing

**Research Process** 

## **Scientific Contribution**



- Novel work
- Transferable Knowledge
- Scientific quality:
  - -Based on physical laws
  - -Analytical evaluation
  - -No fakes

#### **Novel Work**



- New theory
- New (innovative) technology (process, machine, tools, materials)
- Application of existing theory or technology to a new field
- Significant new knowledge that is applicable to different processes

#### Scientific Publishing

**Research Process** 

## **Transferable Knowledge**



- Working window of a process
- Quantified effect of process parameters (experimental or numerical or theoretical)
- Quantitative properties of products (experimental or numerical or theoretical)
- A theoretical model
- A complete process description
- Material properties (experimental or numerical or theoretical)
- An applicable software
- Others?

#### **Some Views**



- Experimental work can be also a scientific contribution!
- Simulation by commercial codes are "numerical experiments" and do not present a "theoretical work"!
- The scientific contribution consists of
  - the analytic interpretation of real experiments and/or simulations, or
  - development of a theoretical model
- A wrong or insufficient developed theory or experiments not supplying the expected results, are also scientific results and can constitute a dissertation

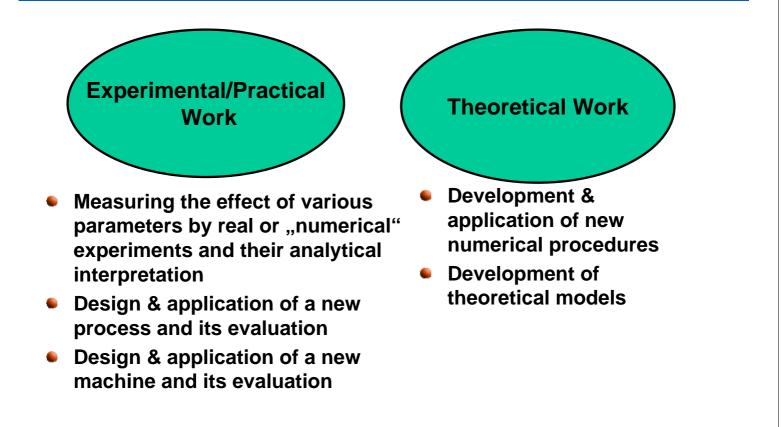
Scientific Publishing

Research Process



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### **Classification of Scientific Studies**



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Scientific Publishing
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**Research Process** 

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# **Type of References**



#### Scientific Papers

- Key Papers: Review papers, universally excepted papers equivalent to text books
- Basic Papers: Papers directly relevant to the work; building blocks
- Indirect Papers: Papers discussing a related need in a different manner
- Theses
  - doctoral
  - Master
- Patents
- Standards
- Books
- Reports
- Web-Sites

Scientific Publishing

**Research Process** 

### **Databases of Literature**

- 1. Science Citation Index THOMSON
- 2. Scopus
- 3. Science Direct
- 4. DOMA Transition Technik
- 5. Dissertation & Theses Data Bases (ProQuest-UMI: University Microfilms over 2.3 million theses, The British Library with Theses from UK, USA and Canada)
- 6. **Patents (DEPATISnet, etc.)**

#### **Overview**





#### **Purpose of Scientific Publishing**

- To distribute the knowledge acquired and hence contribute to the scientific development
- To obtain the rights on the novel contribution
- To receive the comments of peers and improve own work
- To raise own reputation
- To raise reputation of institution, university and country

# **Rules of Thumbs (IUL)**



#### • Expected Papers:

- About 2 years of work: 1 SCI-paper
- At end of work: 1 SCI-paper
- During work: 1 paper in German industrial journals
- During work: 1 to 2 presentations at conferences
- Authors of Papers:
  - 1. Author: Candidate (and other assistants or students or engineers)
  - 2. Author: Division Head (and division heads of other assistants and students or engineers)
  - 3. Author: Professor (and professors of institutes of other assistants or managers of engineers in industry)

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Scientific Publishing
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Research Process



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#### Journal

**CIRP** Annals

INT J MACH TOOL MANU

J MANUF SCI ENG TECH (ASME)

**J MATER PROCESS TECH** 

STEEL RESEARCH

**MATER MANUF PROCESS** 

**JENGINEERING MANUFACT** 

CIRP Journal of Manufacturing Science and Technology

Journal

INT J PLASTICITY

INT J NUMER METH ENG

**INT J MECH SCI** 

Z ANGEW MATH MECH

**MAT SCI ENG A-STRUCT** 

**COMP MATER SCI** 

**STAHL EISEN** 

**Research Process**