70. Advanced Information Gathering for PhD Students (Screening, Strategy)

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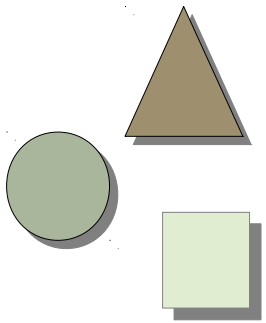
1) Screening processes
2) Paper reading groups
3) Strategic analysis



Homework – The Weekly Schmidt

- Write an outline of an essay - “Why the Euro should not be given up”.
  - Background: European debt crisis, Greeks almost bankrupt etc.
- Read first Helmut Schmidt's essay “Sechs Gründe, warum der Euro nicht scheitern darf” from “Einmischungen”, S. 169. Apply PQ4R.
  - Write down questions
  - Summarize the article with a mind-map or structure tree
  - Recite it loud to your friend
- Try to find one other article on the web sites of FAZ, Süddeutsche, Zeit or similar, on the subject, and select some of your arguments from the material. Read with PQ4R.
- For the outline, use your recited material.
- After you have written a clear argumentative outline, write an introduction and a conclusion.

Homework – The Weekly Churchill

- Write an outline of an essay - “Why Germany should belong to Europe”.
- Read first Winston Churchill's speech “Council of Europe”. Apply PQ4R.
  - https://www.winstonchurchill.org/learn/speeches/speeches-of-winston-churchill/1946-1963-elder-statesman/111-the-council-of-europe
  - Write down questions
  - Summarize the article with a mind-map or structure tree
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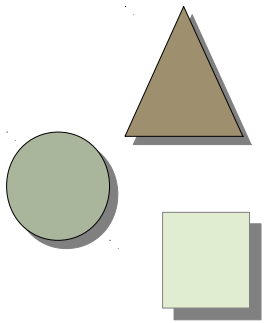
70.1 Information Gathering Processes



Search Machines

- Google scholar
- For a LaTeX thesis, as well as LaTeX papers, the bib search engine in Karlsruhe is very useful:
  - http://liinwww.ira.uka.de/bibliography/index.html#search
  - Cut and paste of many literature references possible
  - First google-scholar, then bibserver
- DBLP
- Springer LNCS
- ACM Digital Library
  - ACM Journals
  - ACM Conferences
- IEEE explore
- Research Gate

Who tried what already? Experiences?

Screening the World

- Screening analyzes trends to find interesting subjects for research.
- Internal screening group: everybody presents something cool
  - Motivation: Discovering disruptive technologies early is very important
  - Track important web sites
  - Collect new ideas for demonstrators
  - Collect interesting labcast videos and web sites on an inspiration site
- Research Blog
- Paper reading group

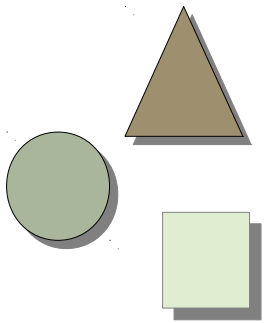
Fix Interesting Web Sites for News

- Finding the newest news is very important for research.
- Interesting addresses of public labs:
  - MIT media labs labcasts.media.mit.edu
  - Berkeley EEES, CPS lab
  - Berkeley ParLab
  - ResUbic Lab www.resubic.org
- Interesting company-based research labs
  - Www.mozillalabs.com
  - Microsoft research
  - Intel research
  - IBM research
  - Google labs
- Interesting news sites
  - Golem.de
  - www.slashdot.org
  - Technology Review
  - Heise Newsticker

Reports with Strategic Analyses

- President's Counsil for Science and Technology
  http://www.nitrd.gov/pcast/
  - The 2013 report is on
    http://www.nitrd.gov/pcast-2013/pcast-nitrd-report-2013.pdf
- BITKOM the German ICT association of companies
  - www.bitkom.de
- The academy of technical science (German's PCAST)
  - www.acatech.de

70.2 Paper Reading Group (PRG)



PRG – A Lightweight Screening Process

- "Good" papers are read together
- Papers should be put on the agenda as proposed
- Everybody should read the paper before
- In the meeting, a ***paper leader*** summarizes a paper
  - Others ask questions and discuss
- A ***PRG chair*** collects papers and organizes the process
- Topics are of free choice, but
  - Topics should be interesting and valuable to all participants
  - If a topic is too specific, it might not be interesting for all
  - Historical or overview papers (Computing Surveys) are ok

Example TUD OS, Prof. Härtig

- http://www.inf.tu-dresden.de/index.php?node_id=1324&ln=de
- From this web site:
  - This seminar is participation driven. At each meeting, someone briefly presents a paper by summarizing the problem it deals with and its contributions and by raising some discussion points. The paper is then further explored together. Each participant is expected to contribute to the discussion by, for instance, asking questions, helping to clarify difficulties, proposing case studies or offering critiques.
  - CERTIFICATION
  - Students must provide a short review describing each paper. This should be e-mailed to Björn Döbel prior to the meeting. The text should identify the motivation for the research and the problem with current approaches. It should include a very brief outline of the approach focusing on the paper's contributions. It may also raise difficulties, reactions or discussion points.
  - Each participating student is required to present at least one paper himself during the term. You are expected to show understanding of the paper as well as its relation to other work done in this area. Guidance will be provided to help select a paper. Please see the introduction slides for details.

Example Uni Marburg, Prof. Ostermann

- http://www.uni-marburg.de/fb12/ps/PRG?set_language=en
- From this web site:
  - We will read and discuss one paper per meeting. One participant (the discussion leader) will give a short summary and raise a few points for discussion, but every participant is expected to read the paper beforehand.
  - Guests are always welcome!
  - Please subscribe to our mailing list to be notified about upcoming meetings!
  - Feel free to propose candidates for future meetings by email to <PRG chair>.

Example Uni Passau, Dr. Apel

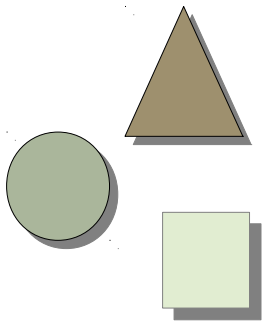
- http://www.fim.uni-passau.de/home/lehrveranstaltungen.html?module=Lecturedetails&target=7774&source=7774&config_id=232ee5ad516ac92bf590f99ac8c2baa8&range_id=f01&seminar_id=6b0336c2bda33aea5e258419a2f303fa
- From this web site:
  - Beschreibung: Die Paper Reading Group (PRG) ist eine woechentliche Veranstaltung in der wissenschaftliche Arbeiten aus dem Bereich Informatik diskutiert werden. Die PRG hat folgende Ziele:
    - kritische Auseinandersetzung mit wissenschaftlichen Arbeiten,
    - Erlernen von Argumentationsstrategien,
    - Erlernen der Moderation einer Gruppe und
    - Erweiterung des eigenen Horizontes im Bereich Informatik.
  - Es werden aktuelle und vergangene Arbeiten aus verschiedenen Bereichen der Informatik (z.B., Software-Engineering, Compilerbau und Parallelitaet) besprochen.
  - Webseite: https://www.infosun.fim.uni-passau.de/wiki/prg

Example Bernhard Scholz, Sydney

- Reading Group on compiler construction

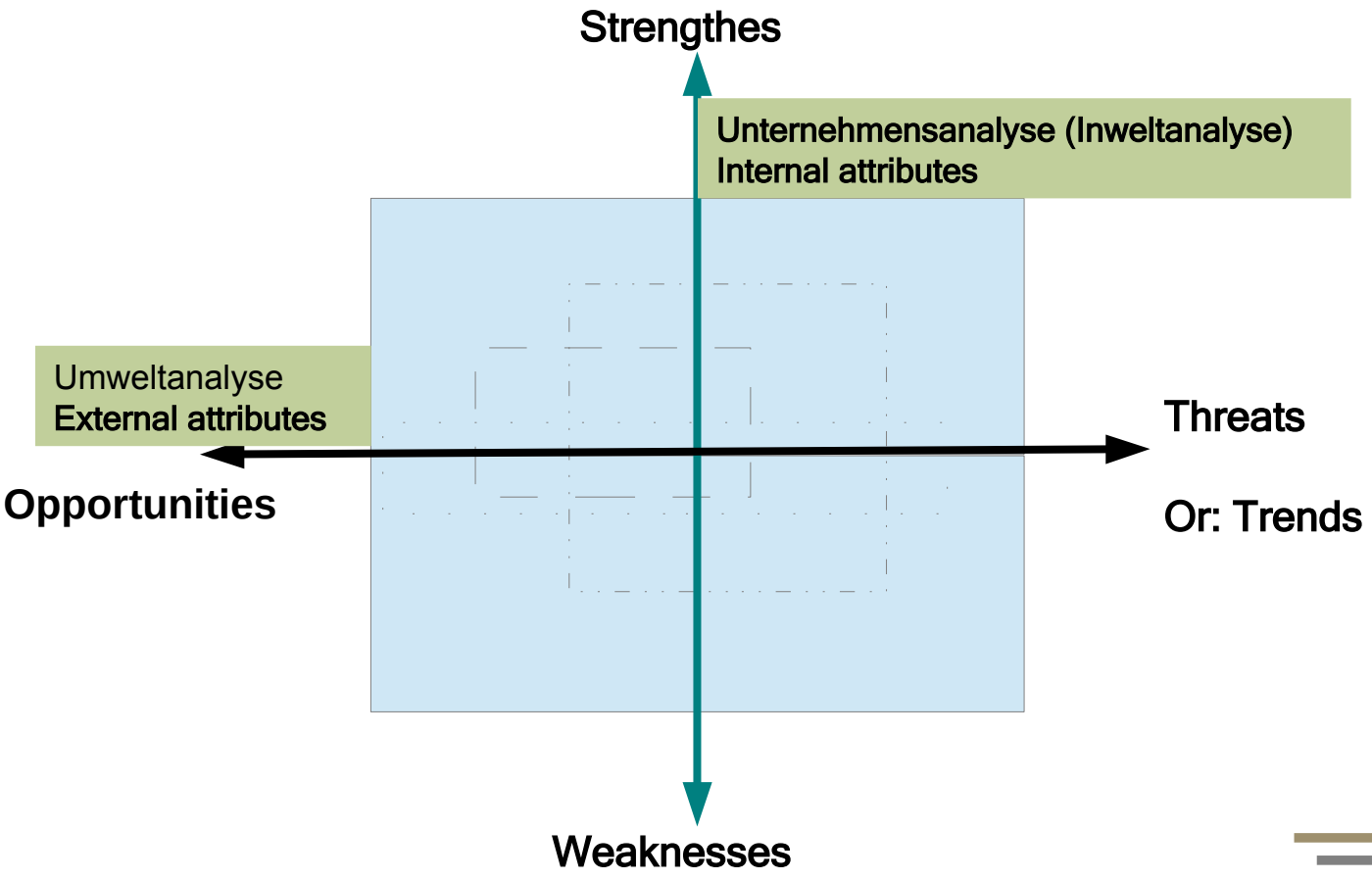
20.3 Analyzing Advantage Strategies and Unique Selling Points (USP)

- Researching for innovation as a PhD student



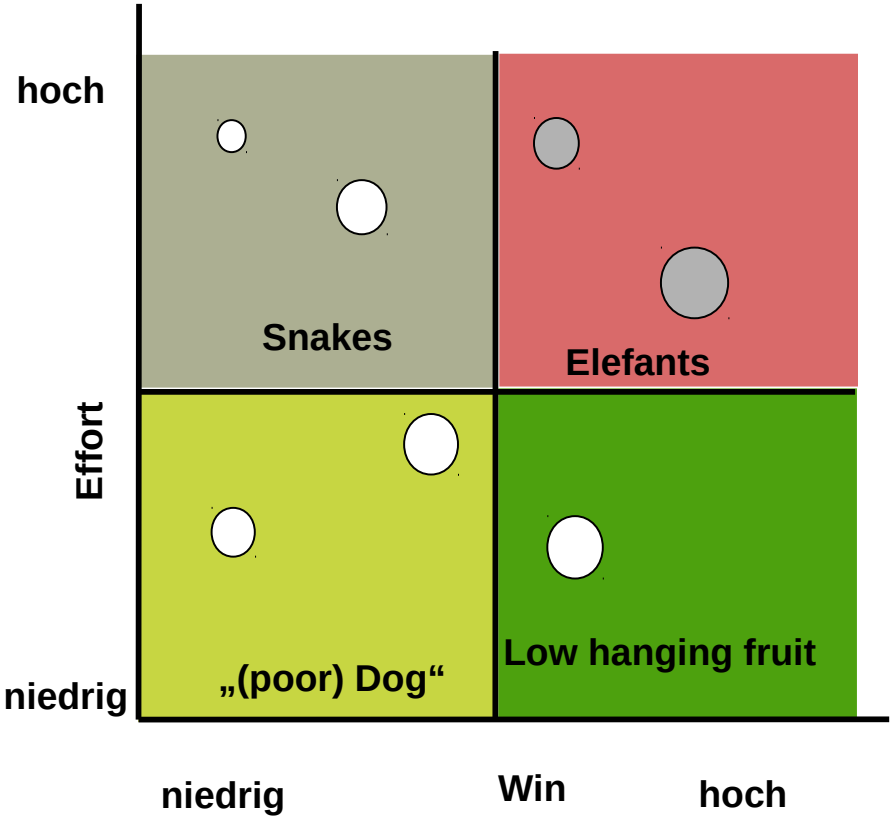
SWOT Analysis

- SWOT is a 4-dimensional attribute analysis for the development of a strategy for of a project [Albert Humphrey]
- For strategic decisions of your thesis and your research



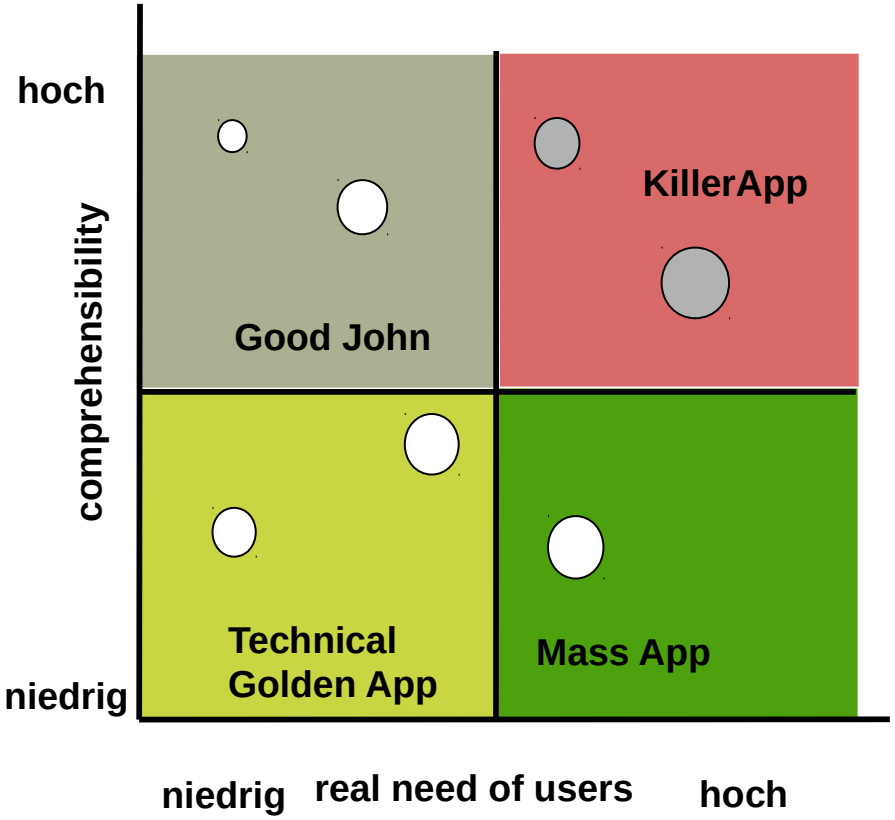
„Low Hanging Fruit“ Analysis (Utility-Utility Factor)

- The “**low hanging fruit” analysis (Fruchtbarkeitsanalyse)** analyses a set of possible research questions or problems
  - A utility-utiliy-factor:
  - **LowHangingFactor** = Win*Effort
- **Low hanging fruits** are most attractive because they yield a lot with few effort
- **Dogs** can be researched, if strategic reasons exist
- **Snakes** kill the researcher immediately – never do research on them!
- **Elefants** can be worthwhile doing, but need a long-term employer...



„KillerApp/KillerResult“ Analysis (Utility-Utility Factor)

- The **“KillerApp/KillerResult”-Analysis** analyses the set of research results which are really attractive
  - **AttractivityFactor** = Need * Comprehensibility
- **Killer Apps/Killer Results** are great research results because everybody needs them and they are easy to understand.
- **“Mass Results”** are also great because many people need them, but: they are hard to understand
- **Technical Golden Apps** are usually not really popular
- **Good John** research will be unattractive

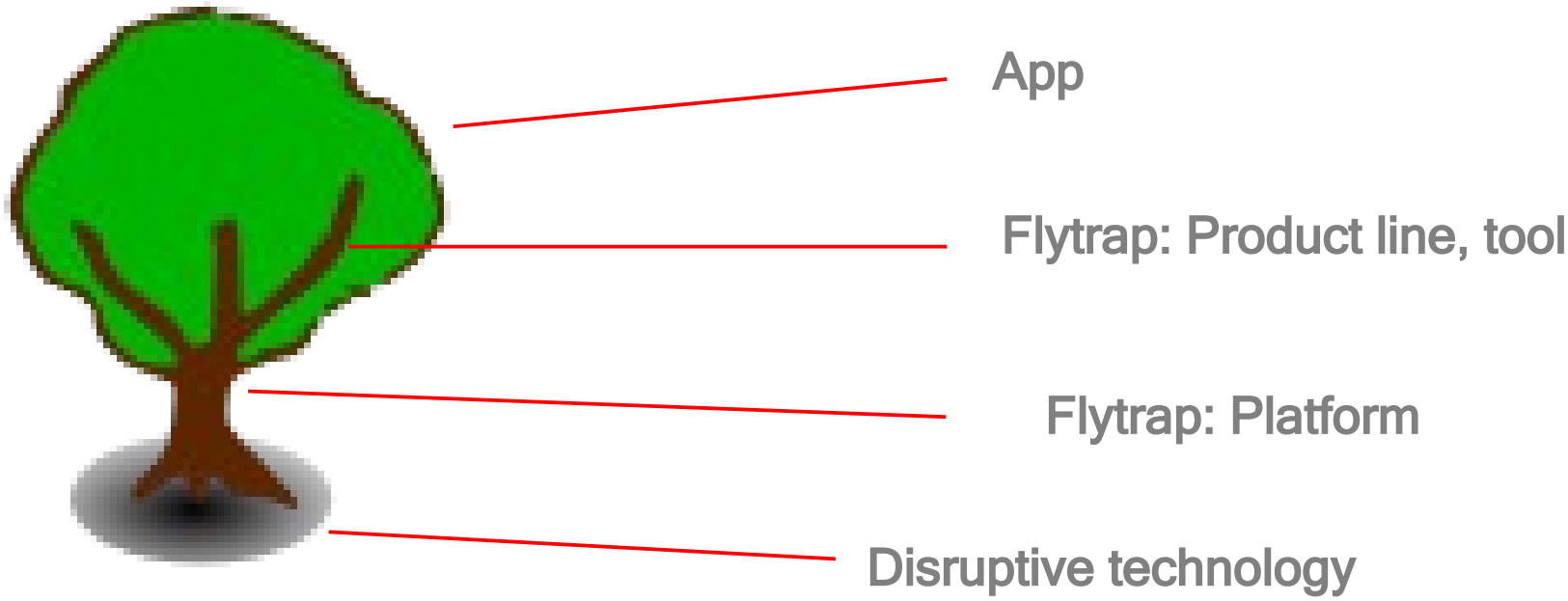


Strategic Analysis

- The chapter on the OISDR process already contained strategic analyses, such as SWOT, SWOT-PROBLOSS and others.
- See also chapter on problem analysis

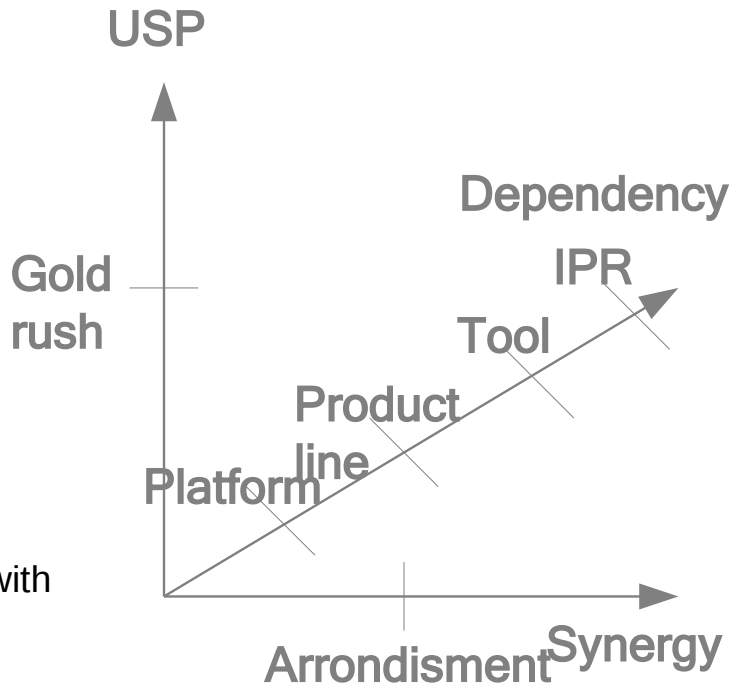
Dependencies on „Vendor-Lock-In“ (Flytraps, Fliegenfallen)

- Platforms with Vendor-Lock-In are truncs of the innovation trees
- Apps are the leaves



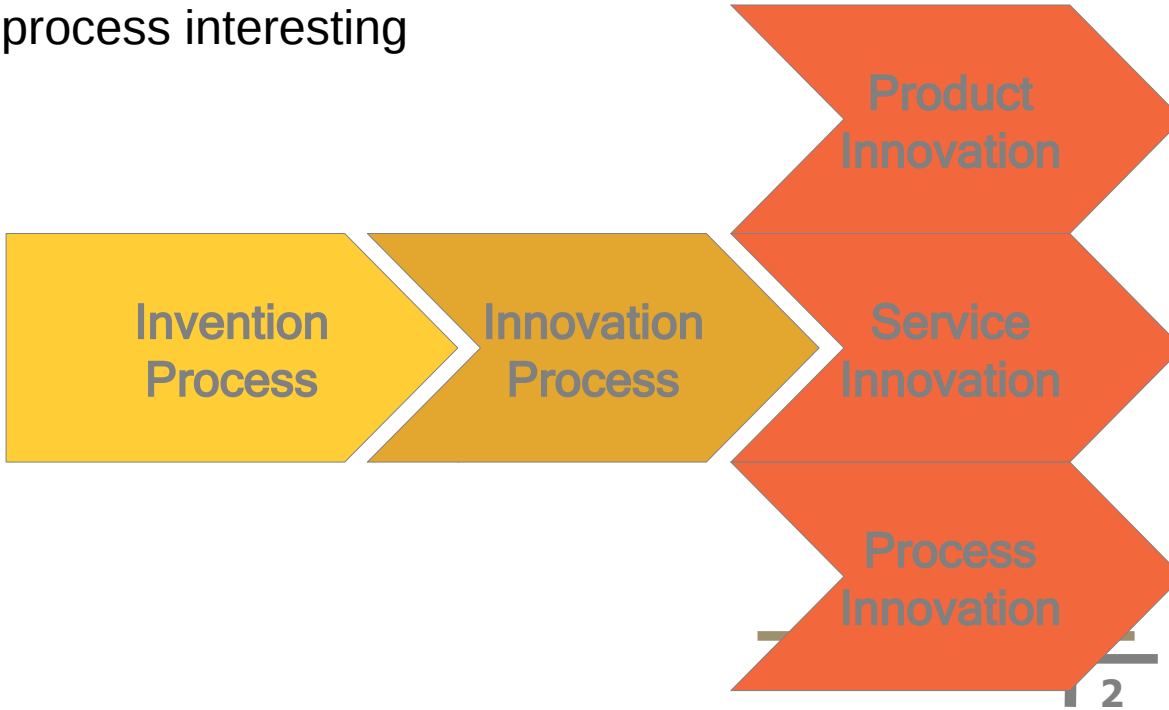
Strategies for Creating Advantages (Überholstrategien)

- USP strategies (unique selling points)
  - Gold rush strategy („blue ocean“)
  - Disruptive technologies create markets
- Platform with Vendor-Locked-In potential („flytrap“)
  - Software platform strategy
    - Platforms create dependent markets
  - Product line strategy
    - Product lines create stability
  - Tool strategy
    - Tool increases productivity
  - IPR: trademark, patent
- Synergy strategies
  - Value arrondisment strategy
    - Arrondisment creates value with Colored Value Chains
  - Business model generation (Osterwalder, Pingeur)



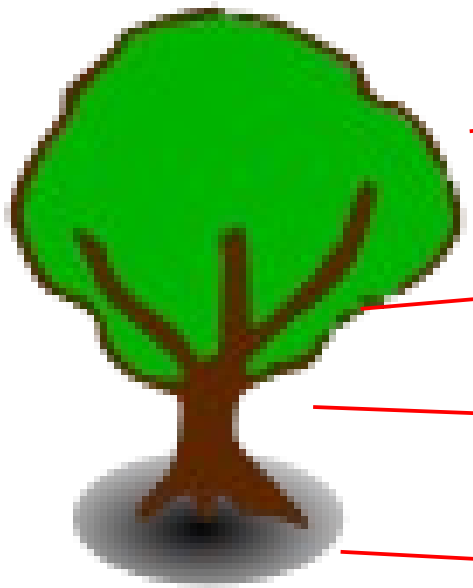
Research for Innovations

- First invention, then innovation (First technology science, then advanced development)
- Edisons goal: „I don't want to invent what I cannot sell“
- „Invention costs money, innovation creates money“
- Story from COMPARE
  - Absint: PAG and AIT
  - ACE and FSDL, EDL, BEG and CoSy
- Why is an innovation process interesting for PhD students?



Why Disruptive Technologies are Interesting

- „Disruptive technolgies“ change the world
- Create thousands of innovations



Zweiganwendungsfeld mit Zweiginnovationen

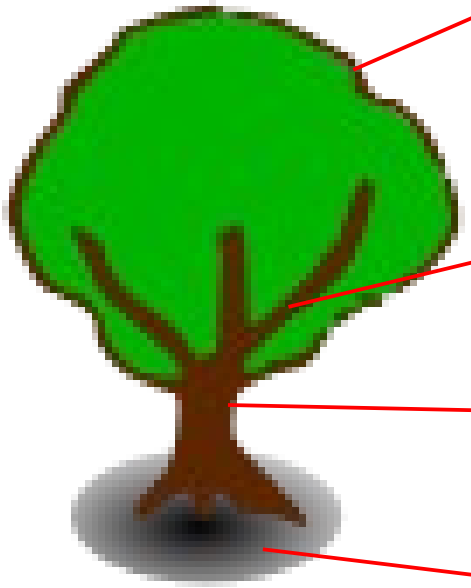
Astanwendungsfeld mit Astinnovationen

Stamminnovation “disruptive technology”

Wurzelinnovation

Example for Disruptive Technology: Embedded automation systems

- Intelligent Building



Zweiginnovationen:
Intelligenter Umgang mit Energie
(mehr als Passivhaus)
Life Sciences / assistierendes Gebäude
(Wohnen im Alter, Health Care)

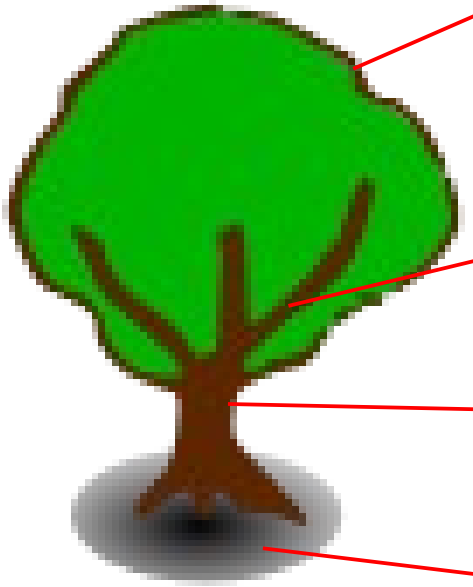
Astinnovation: Automatischer Entwurf für neue, branchenübergreifende Anwendungsfunktionen (2007)

Stamminnovation: Integrierte Datenmodelle für ganze, voll vernetzte Gebäude (2000)

Wurzelinnovation:
reaktive Datennetze (1990)

Example for Disruptive Technology: Cyber-physical systems

- Intelligentes Gebäude



Zweiginnovationen:
Verkehrslenkungssysteme
Service robot swarms
Smart grid

Astinnovation: Cyber-Physical System (2007)

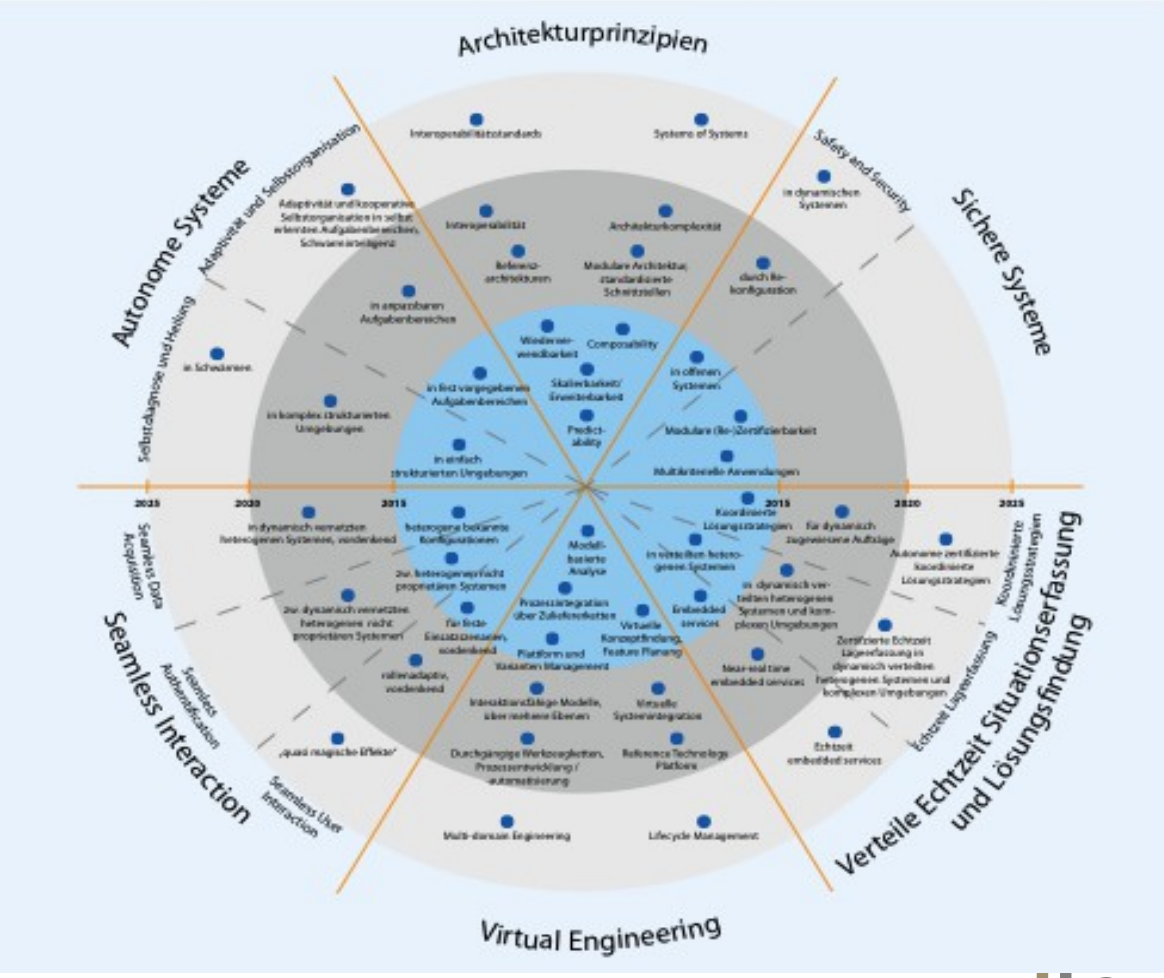
Stamminnovation:
RFID (2000)
Wireless LAN (2000)

Wurzelinnovation:
IPV6 (1995)

Example for Disruptive Technology: Cyber-Physical Systems

National Roadmap on Embedded Systems (Bitkom, Dec 2009)

- Software architecture principles
- Distributed real-time
- Virtual engineering
- Seamless interaction
- Secure systems
- Autonomous systems



The End

Courtesy Birgit Grammel, Dr. Birgit Demuth