74. Business Development and Technology Transfer - How to Earn Money with Your PhD

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1) Strategic Analysis
2) Business Development
   1) BOA
   2) Business Cases
3) Forms of Technology Transfer
4) Push Transfer
5) Pull Transfer
6) Coopetition
7) Founding Startups

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References

► [Osterwalder/Pigneur] Alexander Osterwalder. Ives Pigneur. Business Model Generation. Wiley. !Fantastic!

► There is a preview available from the website http://www.businessmodelgeneration.com/book, do NOT miss it

► http://www.businessmodelgeneration.com/downloads/businessmodelgeneration_preview.pdf

► [Maurya] Ash Maurya. Running Lean. Iterate from Plan A to a Plan That Works. O'Reilly. Excellent for Startup Founding.

► [Carlson-Wilmot] Curtis R. Carlson, William W. Wilmot. Innovation. The Five Disciplines for Creating what Customers Want SRI International. Crown Business, US, 2006 !Excellent!

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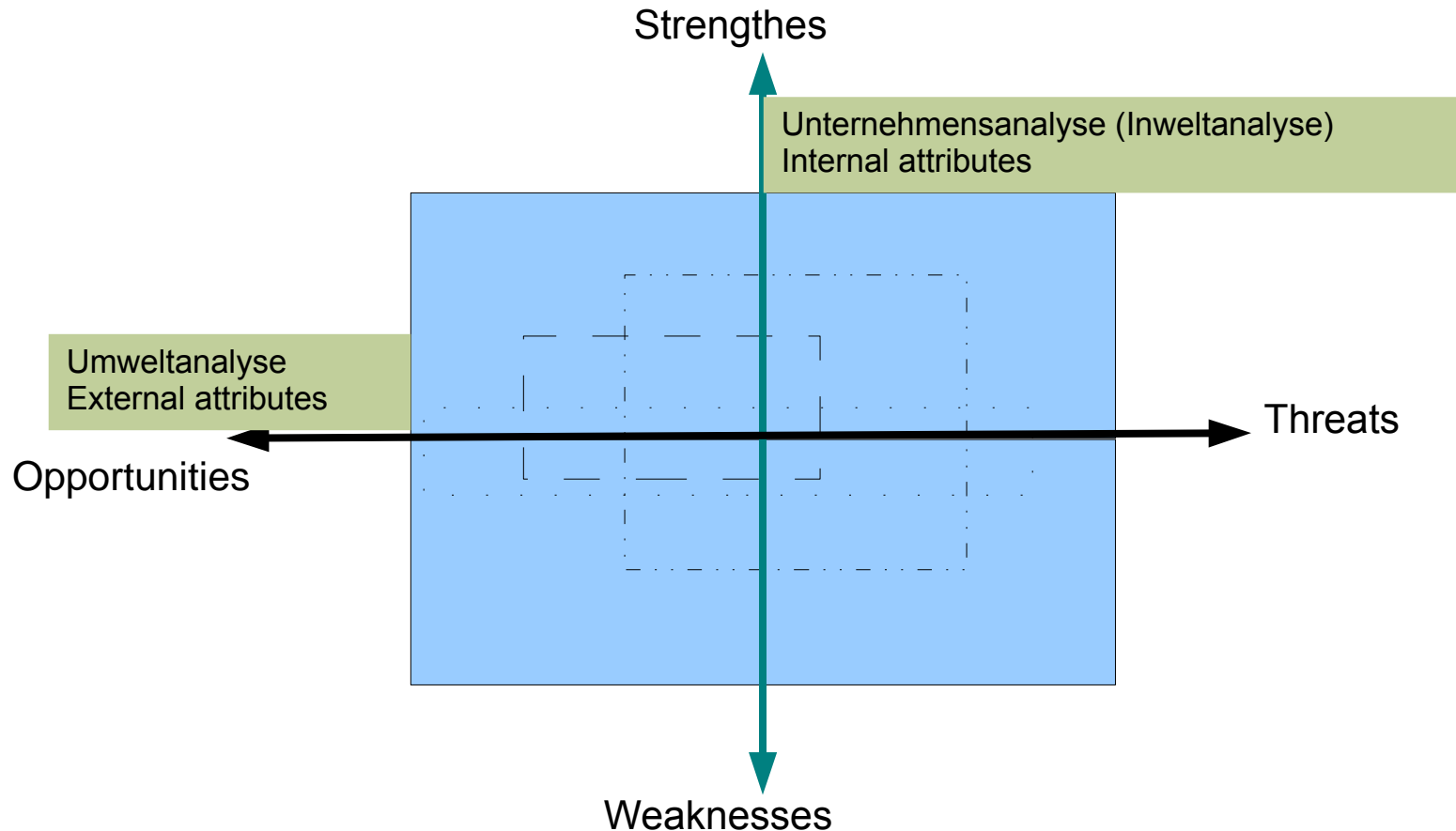# 74.1 Strategic Analyses for Research and Innovations

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- Not all research is *relevant*
- For developing your research direction
    - Often, decisions have to be made about which way to go in research. Several general analysis for strategy can be used.
- For deriving an innovation
    - Out of a set of research results, it has to be decided, which one has be best chances to become a product and have success to be sold
- For defining the "minimal viable product" (MVP) of a startup
- [more material in course "Software Management (summer)"]

SWOT Analysis for Estimating Relevance of Your Idea

► SWOT is a 4-dimensional attribute analysis for the development of a strategy for of a project, research result, technology, service, or product [Albert Humphrey]

► For strategic decisions of your thesis and your research

Strengthes

Unternehmensanalyse (Inweltanalyse)
Internal attributes

Umweltanalyse
External attributes

Opportunities

Threats

Weaknesses

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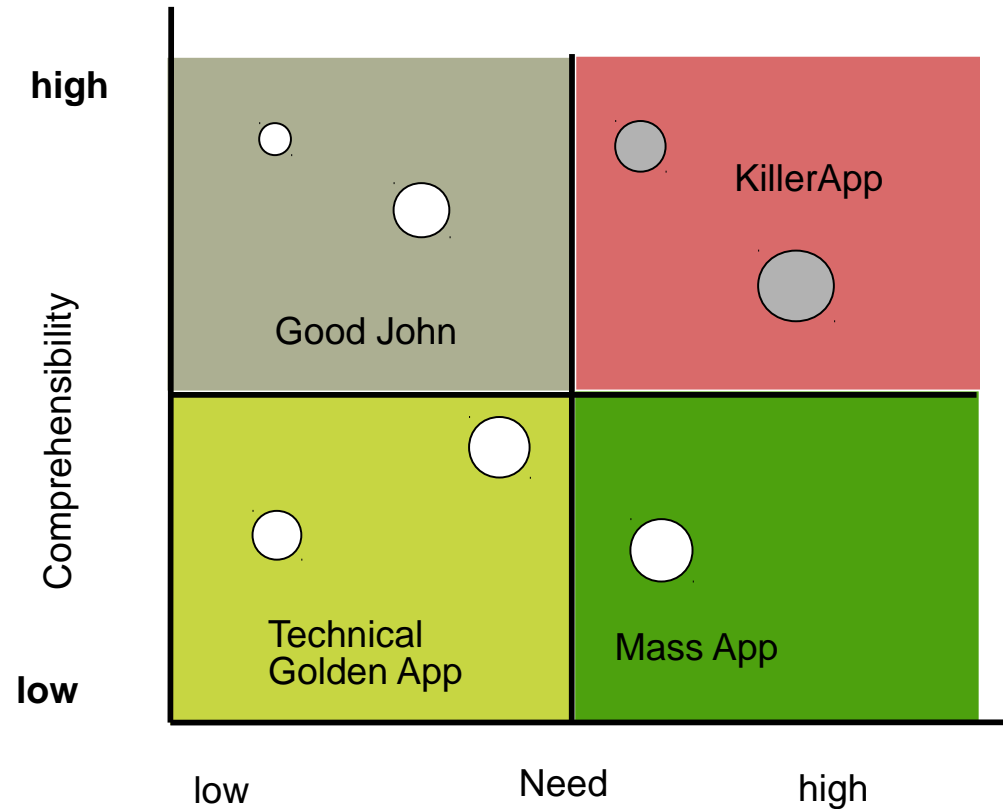# „Low Hanging Fruit" Analysis (Cost-Utility Product)

- ► **"low hanging fruit"-Analysis (Fruchtbarkeitsanalyse)** analyses the set of possible research questions and results in a research portfolio

- ► The **Cost-Utility-Product** is:

- • **Cost-utility-product** = Win*Effort

- ► Most attractive are **"low hanging fruits" (Abstaubertore)**, because they bring bit win with low effort

- ► **Dogs** questions can be investigated, but will not lead to anything

- ► **Snakes** kill immediately – never do research on them!

- ► **Elefants** kill your research and your life on the long term if you are not careful. But they can also be rewarding

Snakes — Elefants — „(poor) Dog" — Low hanging fruit

Effort: high / low

Win: low / high
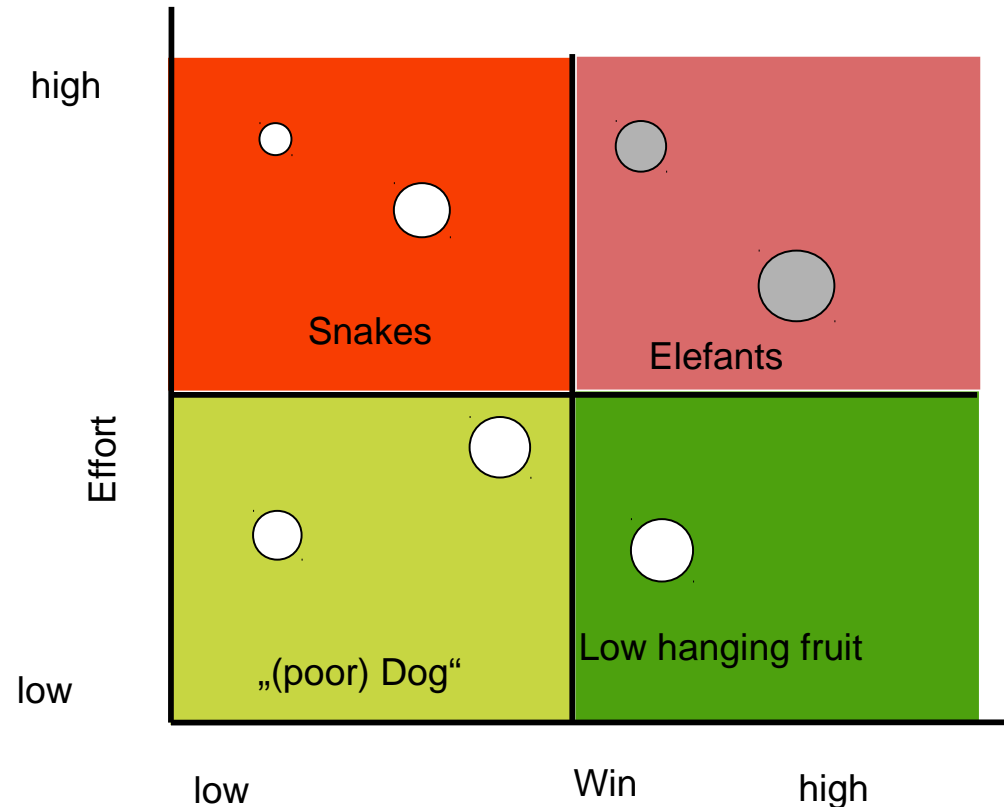
„KillerApp" Analysis (Attractivity Portfolio)

▶ Die **"KillerApp"-Analysis** investigates for a product or a research paper
  ▪ whether it is needed
  ▪ whether it is comprehensible

▶ the **Attractivity Product** is a Utility-utility-product:
  – **Attractivity** = Need * Comprehensibility

▶ Most attractive papers, ideas, or projects are "KillerApps", because they are easy to comprehend and useful for many

high

Good John

KillerApp

Comprehensibility

Technical
Golden App

Mass App

low

low   Need   high

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BCG-Box zur Marktanalyse als Attraktivitätsfaktor

► Die **"BCG-Box" (growth-share matrix)** analysiert die Menge aller aktiven Projekte auf (Boston Consulting Group)

– Der **Marktfaktor** ist ein Nutzen-Nutzen-Attraktivitätsfaktor:

– **Marktfaktor** = Marktwachstum * Marktanteil

► Am attraktivsten sind Cash Cows

► Stars befinden sich noch in einem kleinen Markt, sind aber für Investitionen sehr attraktiv

► Dogs sollten auslaufen

► Question marks (problem children) können sich unter Investitionen zu Stars wandeln
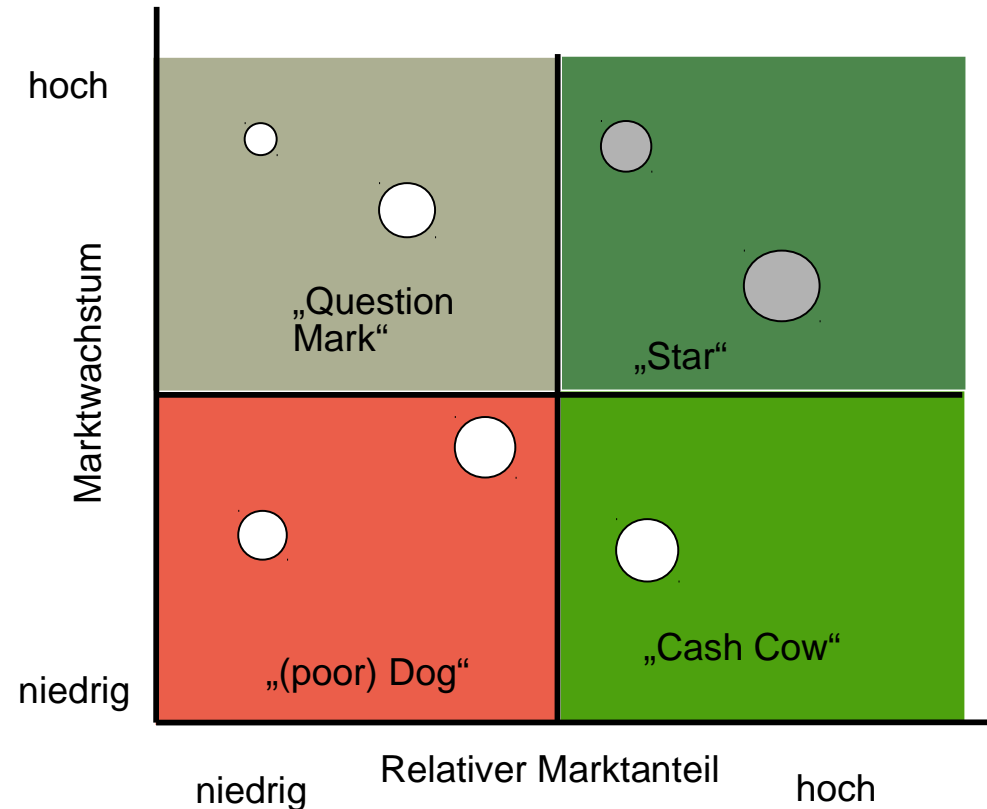
[DecisionBook]
http://de.wikipedia.org/wiki/BCG-Matrix
http://en.wikipedia.org/wiki/Growth-share_matrix

Eisenhower's Urgency Analysis

▶ X4: important and important: do/realize immediately

▶ X3: important, but not important: do

▶ X2: not important, but urgent: delegate

▶ X1: not important, not urgent: ignore
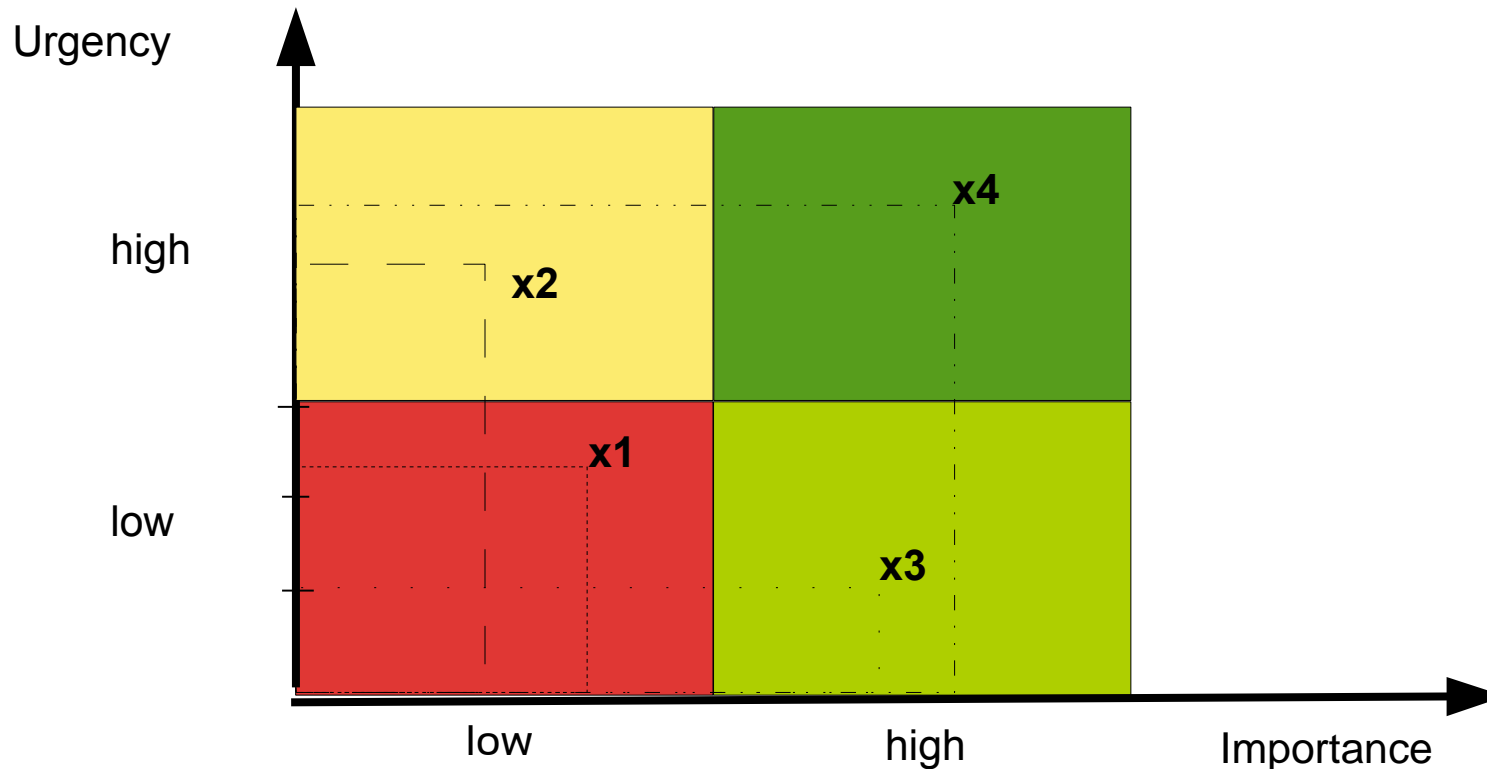
Home Work

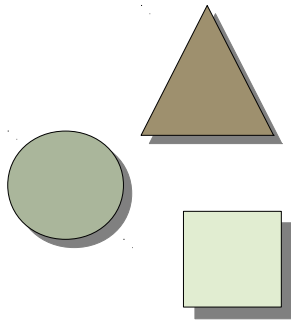► Conduct a "low hanging fruit" analysis for the topic "Smart Grid"

► Conduct a "killer app analysis" for the topic Smart Grid

  – find a killer app

  – find a golden technical app

74.2 Innovation Engineering and Business Development

- .. from business opportunities to business cases.
- For startups
- For transfer.

# 74.2.1. Business Opportunity Analysis (BOA) for Products and Services (Innovation Analysis)

► How to find interesting problems or objectives of a customer?
  ▪ Aspect-oriented problem analysis such as SWOT-BPOPP or UCEW-BPOPP
  ▪ Value-Proposition Analysis (VPA), such as NABC

► This **business opportunity list (BOL)** contains prospective opportunities to solve problems for the customer, and earn money
  ▪ It must be prioritized according with other 2-D or multi-critiera analysis methods

► *Low-hanging-fruit analysis* finds out those products/services which are easiest reachable and are most business efficient

► *Eisenhower urgency analysis* finds out, how important or urgent the problems are for the customer. Helps to derive the *busines opportunity list*

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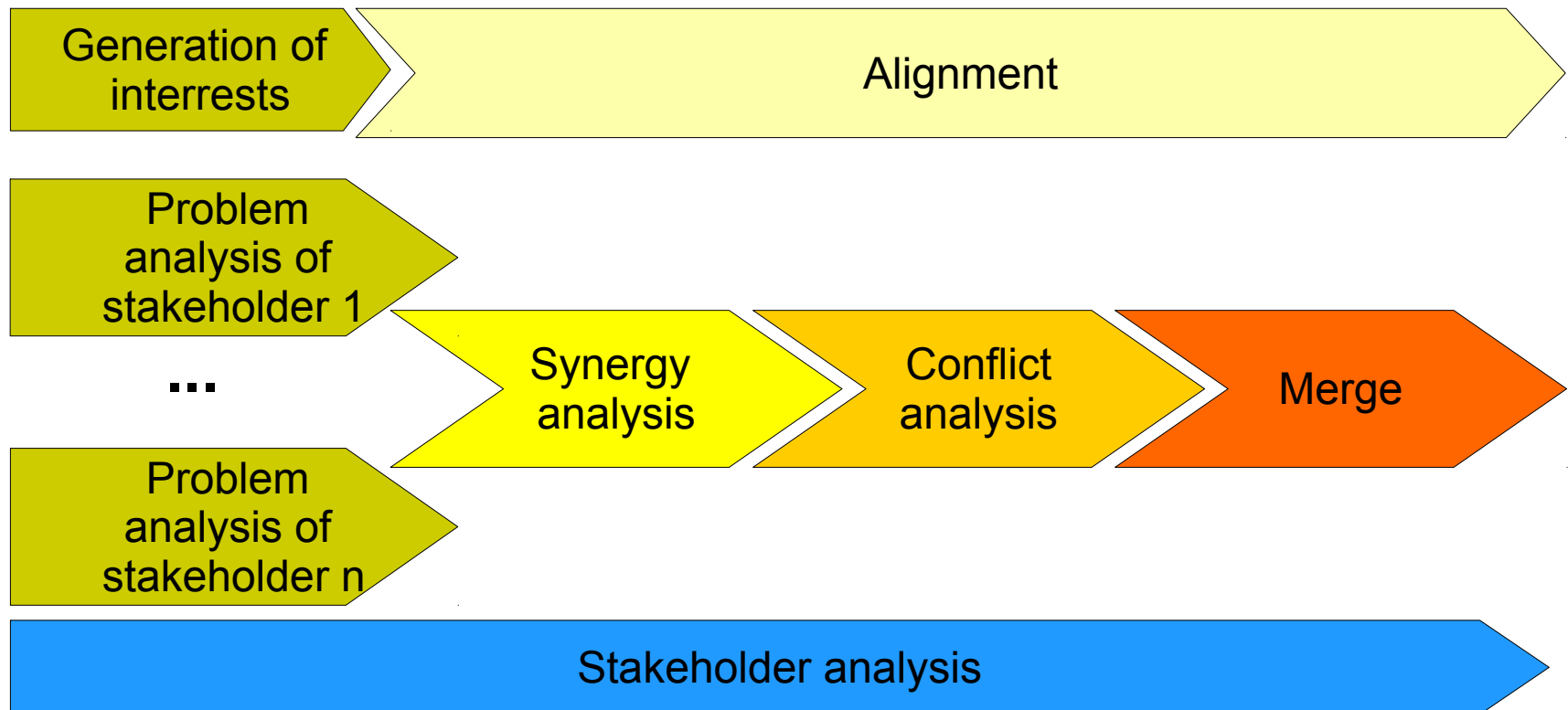| Generation of opportunities | Prioritization of business opportunity list | | | Business opportunities |
| Value proposition analysis (VPA) | Low hanging fruit analysis | Urgency analysis | Selection | |
| Business opportunity analysis | | | | |
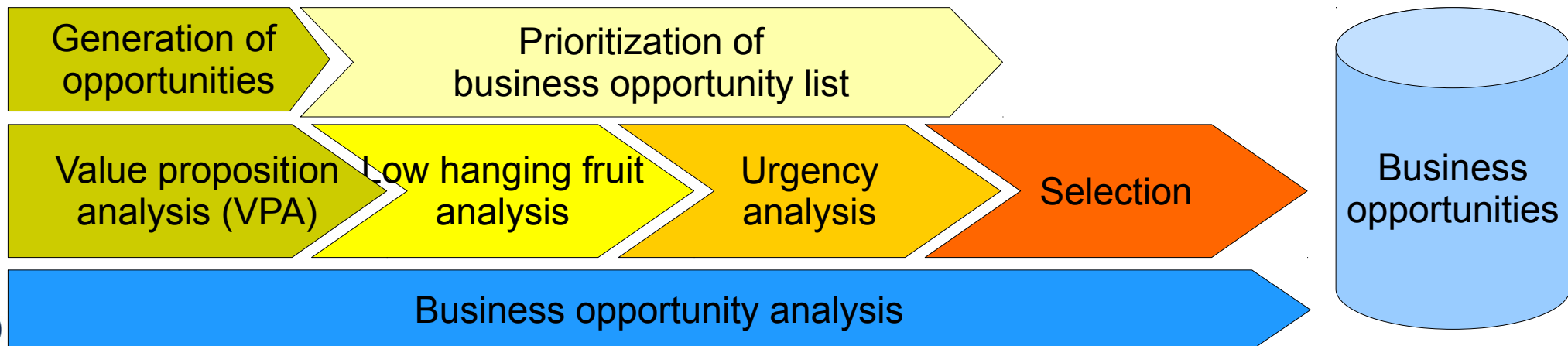
Market and Competitor Analysis

- A simple market analysis prioritizes the BOL with the chances in the target markets.
- *Killer-App analysis* finds out those products/services which are very attractive
- *BCB-Box analysis* finds out "cash cows" and "stars"
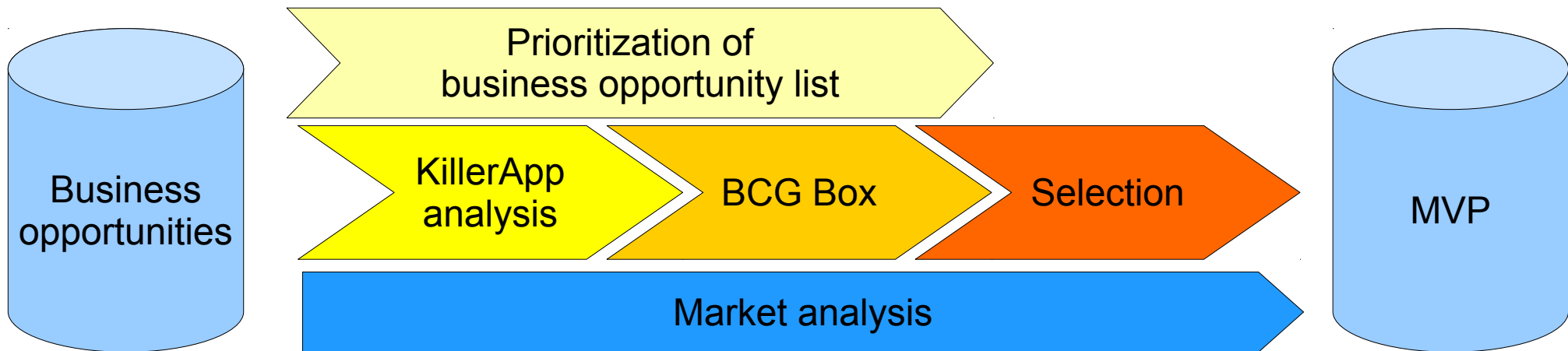
Stakeholder Analysis in Innovation Engineering

▶ Also stakeholder analysis relies on aspect-oriented problem analysis.

▶ Here, the concerns (SWOT, UCEW, or Maslow) can be used to find **synergies and conflicts**. From these, a **merge** of the problem analysis result must be achieved

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Generation of interrests → Alignment

Problem analysis of stakeholder 1

...

Problem analysis of stakeholder n

Synergy analysis → Conflict analysis → Merge

Stakeholder analysis

▶ For Start-Ups

- Do a VPA with NABC
- Conduct AOPA with SWOT-BPOPP
- Conduct a AOEA with UCEW-BPOPP
- Do a Stakeholder analysis.
- It will bring out new ideas for business and sort out conflicts between stakeholders.
- Then do a business opportunity analysis for "low hanging fruits"

▶ For strategic project and product managers:

- Do a regular aspect-oriented problem analysis for your markets.
- After a certain time, re-check the success analysis.

▶ Companies entering new markets:

- Identify in a business opportunity analysis with a KillerApp analysis the "Stars" and "KillerApps".
- Avoid GoodJohns and TechnicalGoldenApps.

74.2.2 Business Cases (Geschäftsfall, -szenario)

A **Business Case (Geschäftsfall, Geschäftszenario)** plans the economic cost and benefit of a business opportunity, as well as the time of Return-Of-Investment (ROI, Wirtschaftlichkeit). [Wikipedia]

▶ Business Cases are derived from the Top-Level Business Opportunities

▶ Synonyms:
- Kosten-Nutzen-Analyse
- Wirtschaftlichkeitsrechnung
- Renditerechnung
- Investitionsrechnung

▶ Without ROI analysis there is no investment

A **business case** captures the reasoning for initiating a project or task. Whenever resources are consumed, they should be in support of a specific business need.

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74.3 Technology Transfer

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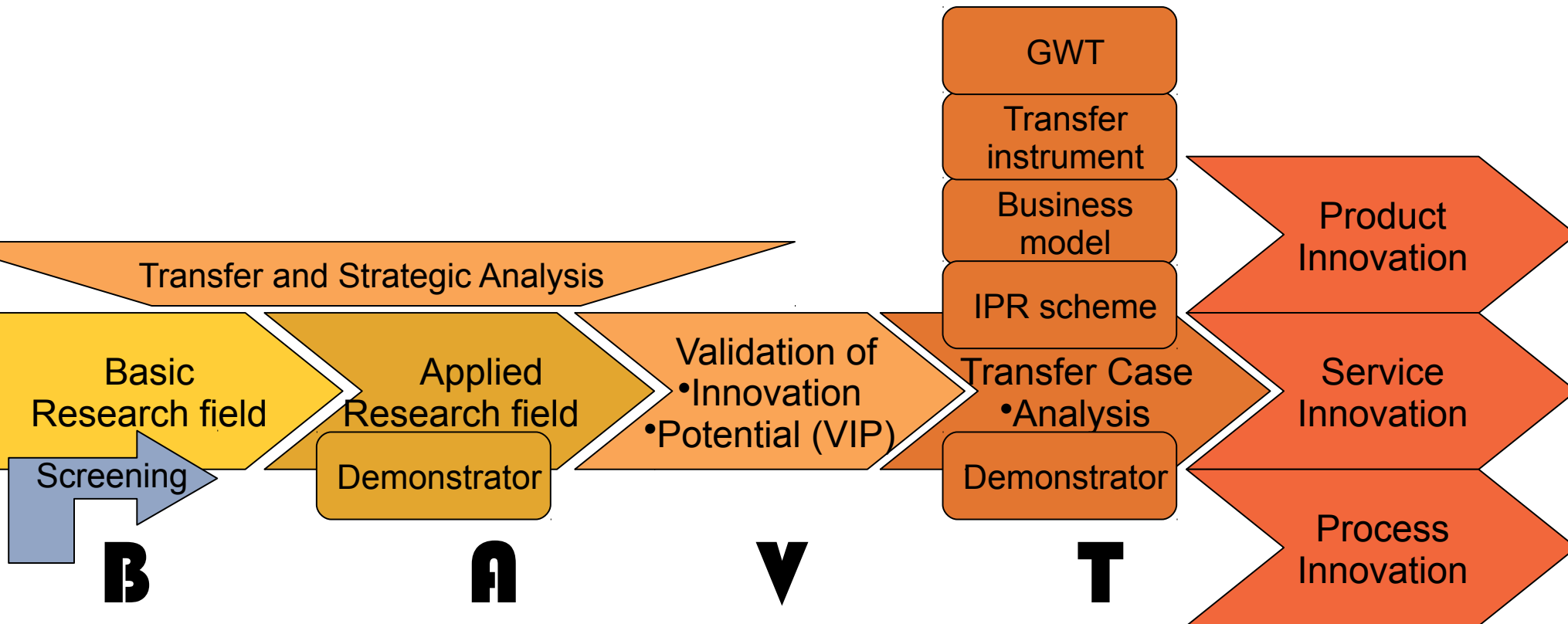- How to organize transfer projects from which products can be commercialized
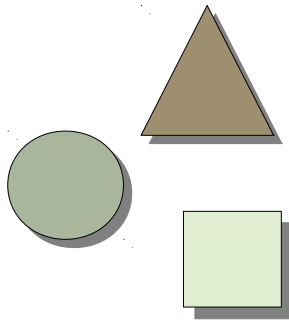
The Generic Transfer Process

- Transfer fields must be *matchmaked* with applied and basic research fields
- So that a concrete transfer process can be installed

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Transfer and Strategic Analysis

Basic Research field

Screening

B

Applied Research field

Demonstrator

A

Validation of
• Innovation
• Potential (VIP)

V

GWT

Transfer instrument

Business model

IPR scheme

Transfer Case
• Analysis

Demonstrator

T

Product Innovation

Service Innovation

Process Innovation

74.3.1. Push Technology Transfer Process

- **Push technology transfer process** operates in **phases** in concert with several partners.
- Companies are searched who realize innovation.

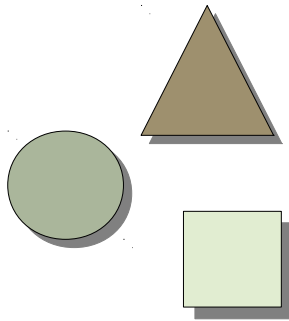Academic Skills in Computer Science, © Prof. Uwe Aßmann
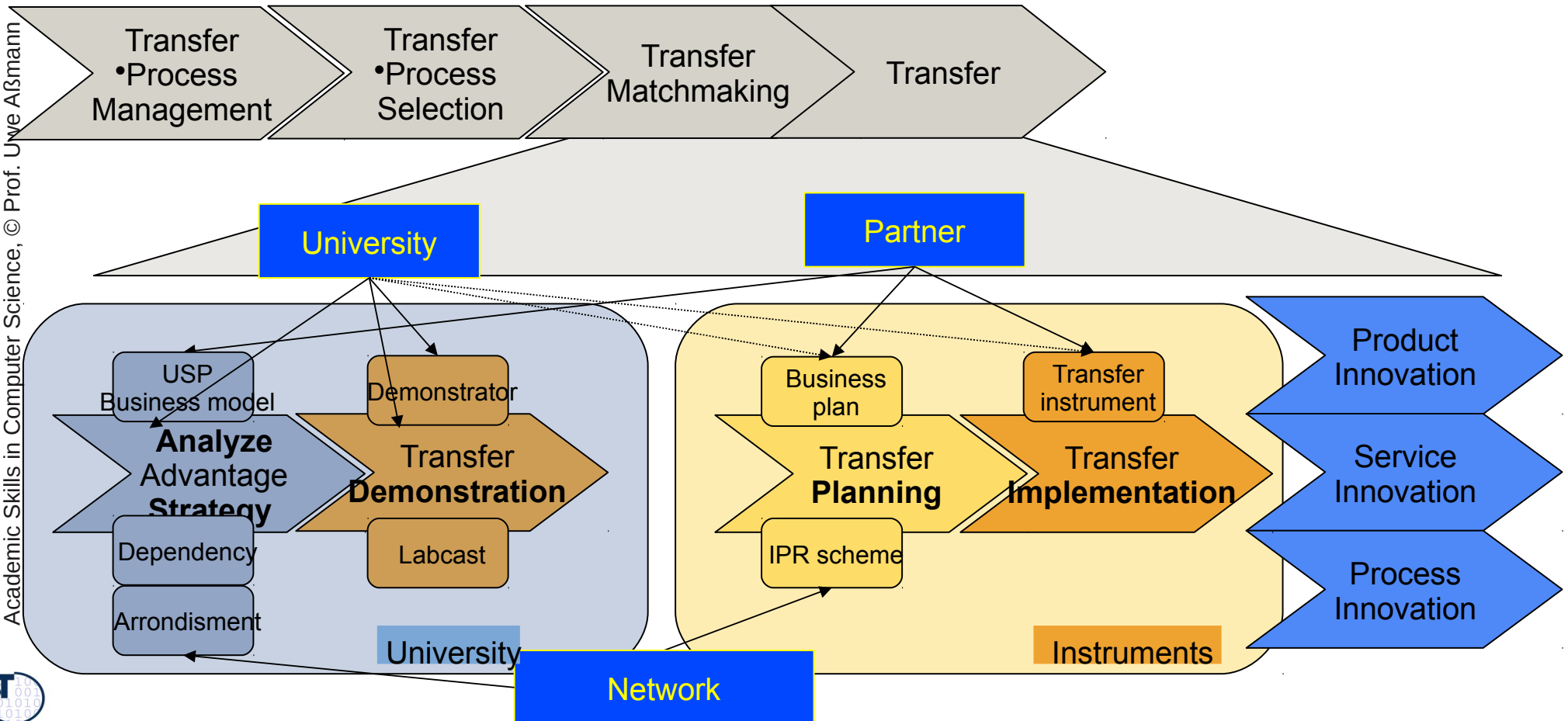
74.3.2. Specific Push Transfer Processes

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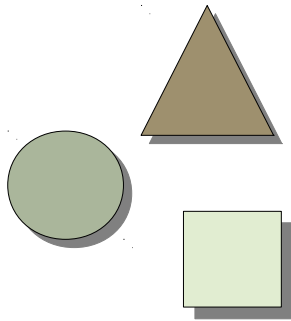
74.3.2.1. Push Transfer Process with VIP

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- VIP is a transfer instrument of BMBF
- www. validation-innovationspotential.de

Push Transfer Process with VIP

- University prepares transfer with VIP project; company waits
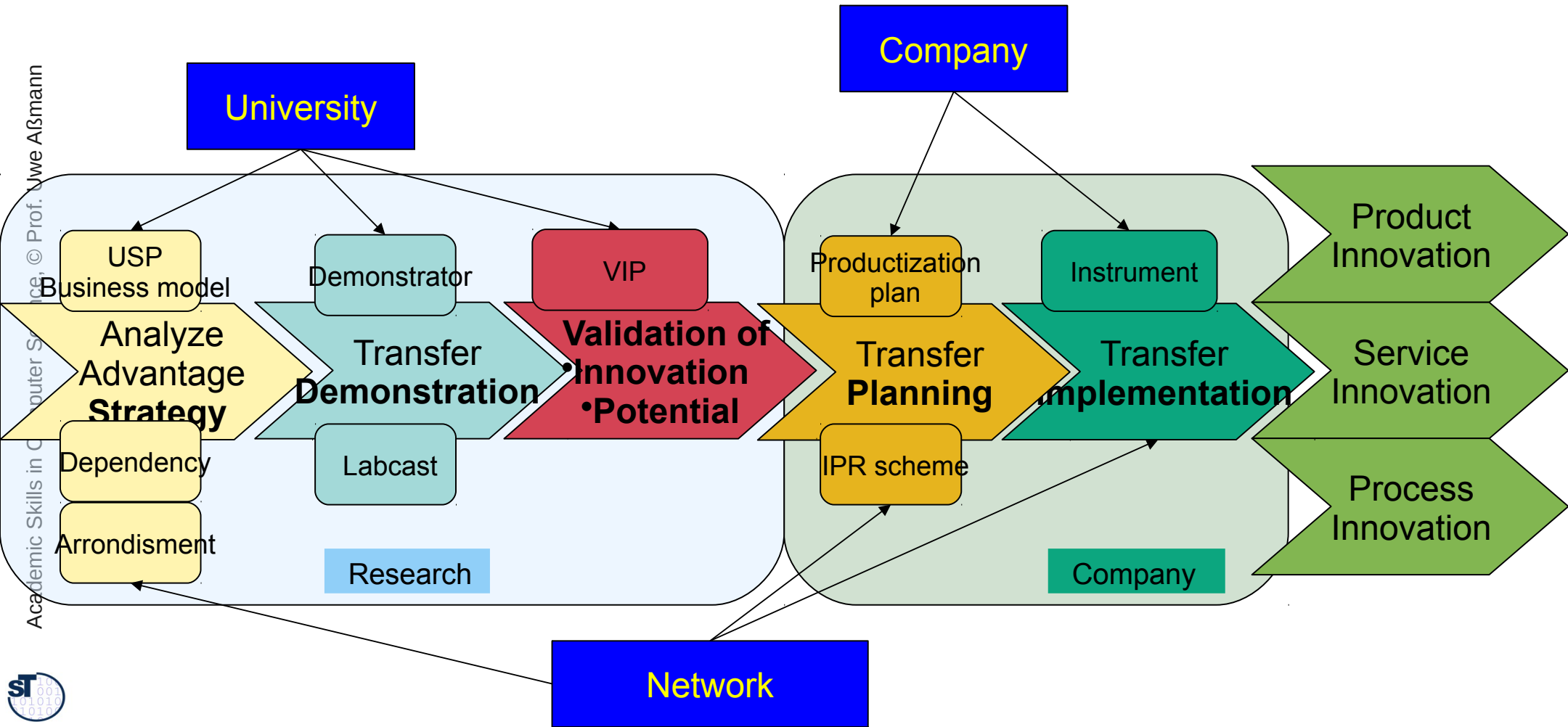
VIP Unique Selling Points for Software Machine Tools

▶ For a Software Machine Tool (Software-Werkzeugmaschine) the VIP instrument can deliver new application domains and business opportunities

▶ Matrix of domain-specific use cases

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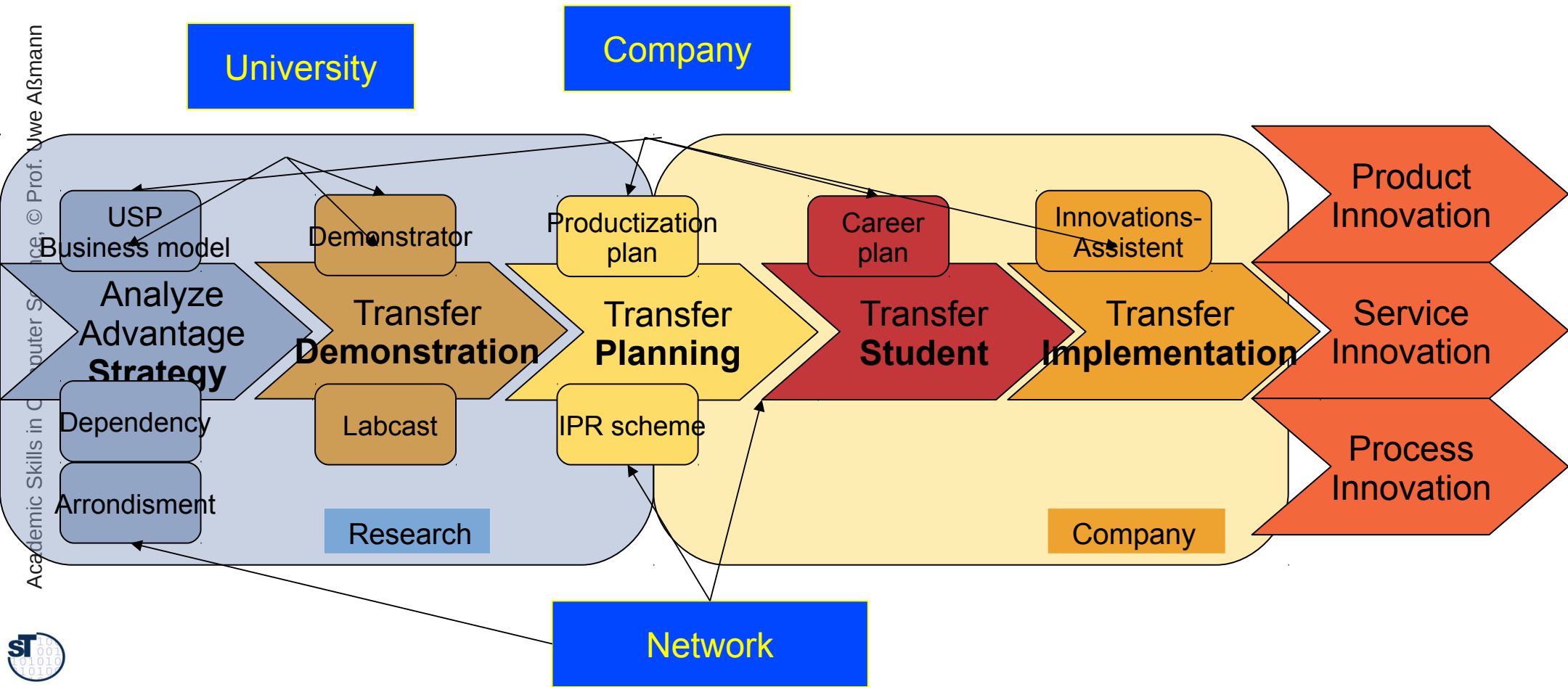| Tool Use Cases	Domain 1	Domain 2	Domain 3	
Function A			Customer b	
Function B		Customer a		
Function C			Customer c	

74.3.2.2. Personal Transfer Process (PTP)

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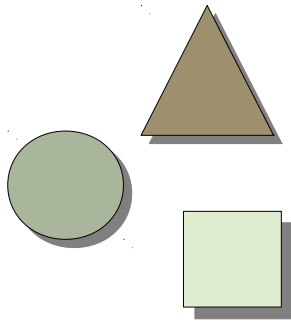
Personal Transfer Process

- **Personal transfer process** transfers students into existing business fields
- Light-weight process
- Advantage: extending a product

ESF Innovationsassistent

► After a master's thesis, a student can be employed 2 years for 50% in a small company, if he continues to transfer his master's thesis topic (or another research result) into the company

► High grant approval rate

► May be a chance for you?

74.4 Pull Transfer Processes

- ■ "Pulling" means that industry pulls technology out of the Unversity
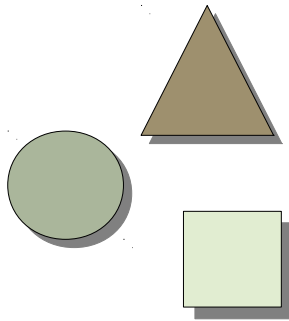
▶ PhD student gets a topic relevant for a company

- works part time for the company
- is paid 50% by the company

▶ Examples

- Georg Püschel
- Julia Schroeter

- ▶ "Industry young researcher groups"
- ▶ Cell transfer process creates new fields for companies
- ▶ Transfers focussed junior research groups together with topic („Cell")
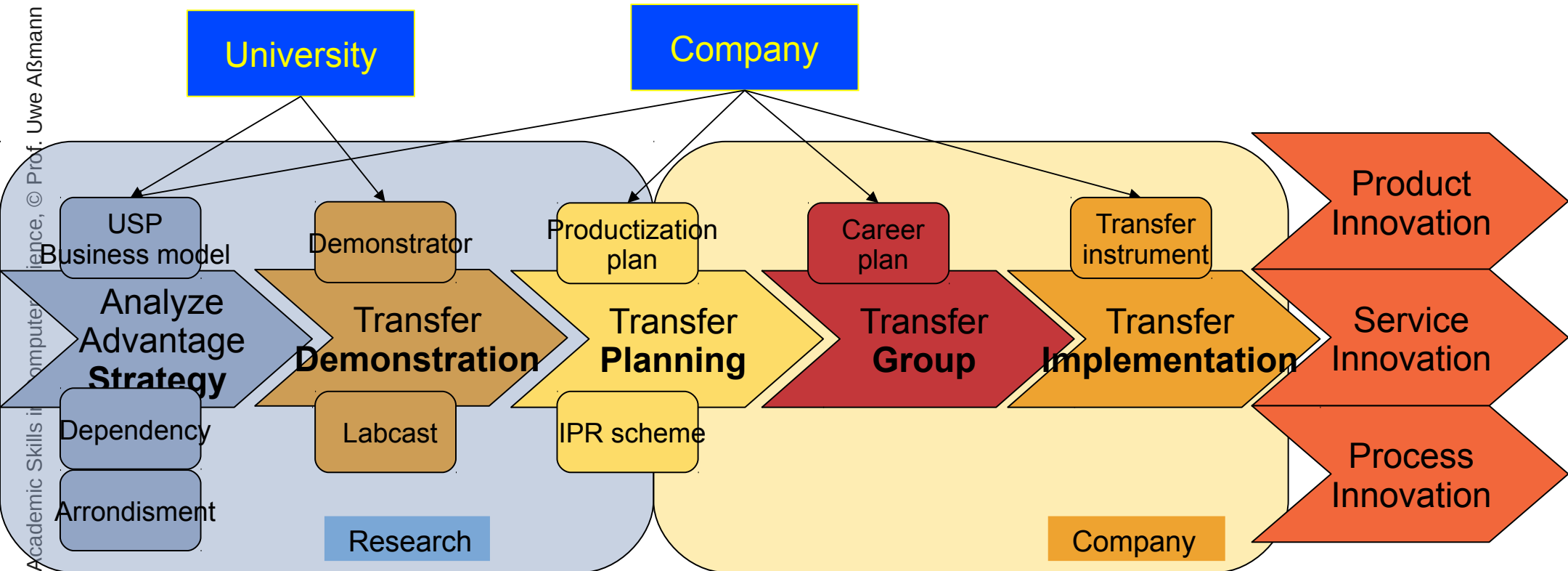
▶ BMBF exist" is a stipend program of 1 year to derive a business plan for a startup

▶ A professor of the university becomes "Mentor"

▶ The startup agency "Dresden Exist" mentors, too

- and gives hints how to get the grant

74.4.4 Common Research Projects (Verbundprojekte)

► EU: Horizon 2020 mit Innovation process

► Saxonian instruments

- Master's thesis with Innovationsassistent
- InnoPrämie (10kEuro pro Jahr)
- ESF Industriepromotion
- Innovationsberatung für KMU

► BMWI

- ZIM

► BMBF

- KMU-initiativ
- VIP

Beispiele erfolgreichen Transfers

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- Millersville Software Productization Center Pennsylvania
  http://www.millersville.edu/spc/
- The mission of the Software Productization Center (SPC) at Millersville University is to provide emerging technology-focused entrepreneurs within the Central Pennsylvania region with assistance in advancing software products from concept to marketable product. The Center will accomplish this mission utilizing faculty expertise, the assistance of student interns from various disciplines, and support from community business leaders and technology experts. The Center will:
  - Serve regional economic and community development needs
  - Enhance the quality of instruction and learning resources available to students
  - Link the University community to regional business, government, and nonprofit resources

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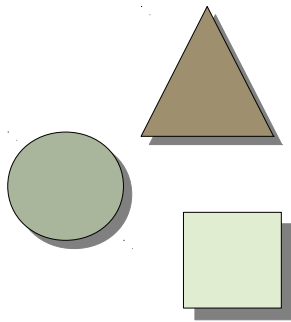
74.5 Coopetition and Collaborative Networks

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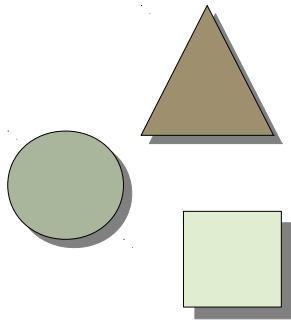
74.5.1 Innovation Clusters aggregate Clustered (Colored) Value Chains
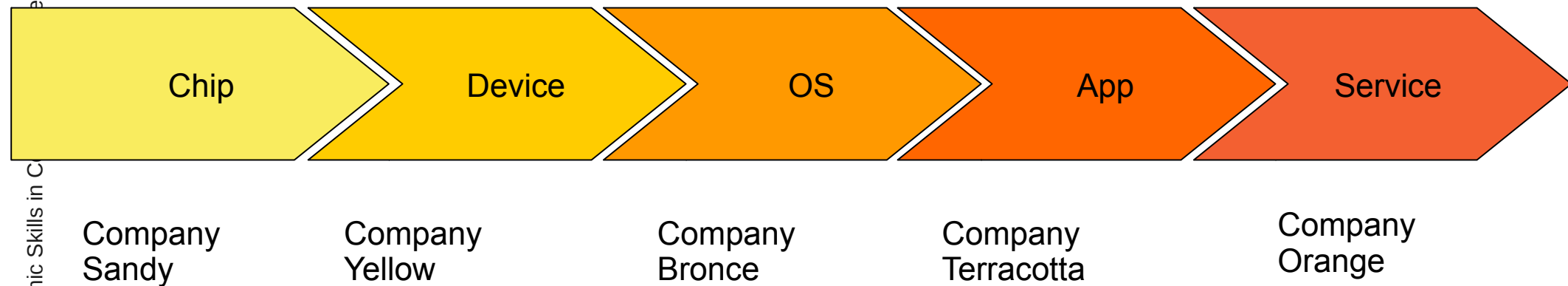
36

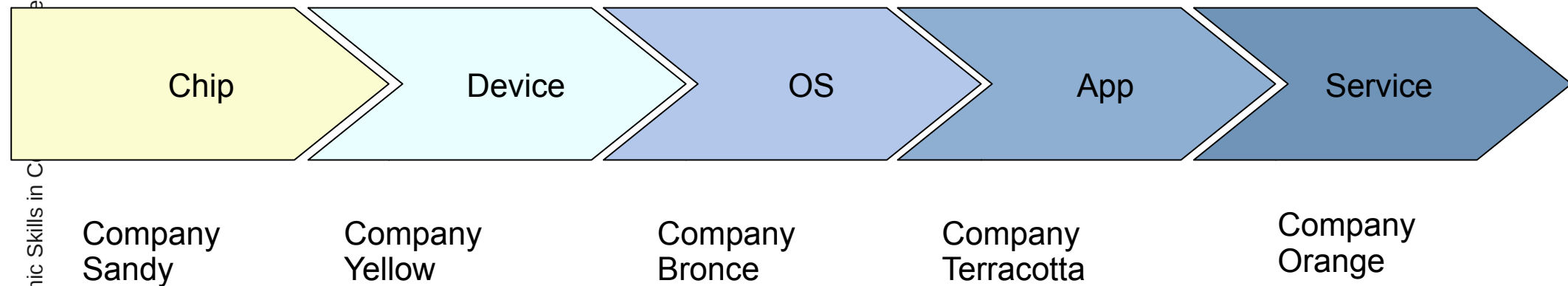# Innovation Clusters aggregate Colored Value Chains

- An **innovation cluster aggregates** a **colored value chain** with companies grouped to an application field
  - Product-structured colored value chain
  - Process-structured colored value chain

Chip	Device	OS	App	Service

Company Sandy

Company Yellow

Company Bronce

Company Terracotta

Company Orange

Creating Colored Value Chains

- Blueprints for Colored Value Chains should be asked in Delphi studies
  - Web community
  - Matchmaking system
- » Wie erzeugt man Benefit für alle? (Motivationssystem)

Chip	Device	OS	App	Service
Company Sandy	Company Yellow	Company Bronce	Company Terracotta	Company Orange

- The process needs matchmaking of the cluster partners for the value chain
- **Cluster leader**: drums cluster together
  - Starting from a blueprint of a CVC
  - Does Delphi studies for innovation field
- Clustering IT-system
  - Simplifies Delphi studies
  - Fragebogenaktionen mit Review-System
  - Web 2.0 community a la itsax.de
- Cluster leader drums together a CVC for companies
  - Company as cluster leader
  - O4I as cluster leader

Leader

Chip	Device	OS	App	Service

The End

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