74. Relevance Analysis and Technology Transfer - How to Earn Money with Your PhD
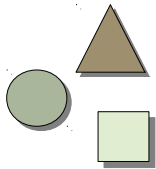
Prof. Dr. rer. nat. Uwe Aßmann
Lehrstuhl Softwaretechnologie
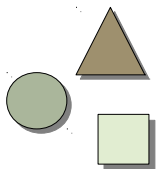Fakultät Informatik
TU Dresden
13-0.2, 14.01.14

1) Relevance Analysis and Value Proposition 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

74.1 Relevance of Research

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!

How Relevant is a Research Problem?

► For selling: Distance to commercialization and product or service
► Age of problem
► Maturity of field: how long it has been investigated

5

- ▶ VPA is similar to Problem/Goal Analysis, however, it thinks about the **pains** and the **gains** of the customer or target group.
  - ▪ Pains are problems that hurt the customer
- ▶ Usually, the goal is to reduce pain and improve gain.
- ▶ A VPA is important in the beginning of a Master's or PhD process, because it helps to clarify the scope of the work.
- ▶ For VPA, you may use
  - ▪ Pain-Gain-ZOPP
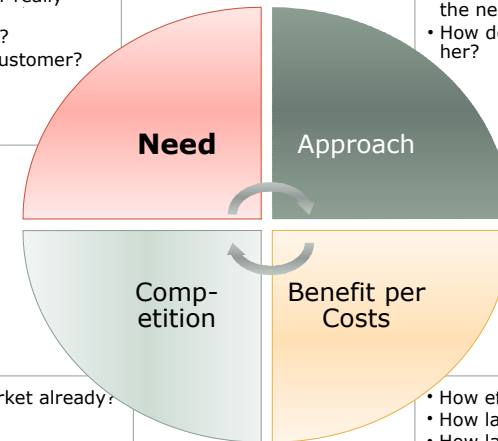 - ▪ Innovation Scorecard
  - ▪ NABC from Carlson/Wilmot

NABC Analysis [Carlson-Wilmot]

6

- • What does the customer really need?
- • What is of value for her?
- • What is a *pain* for the customer?

- • How does your company solve the needs of the customer?
- • How does it create value for her?

Need — Approach — Comp-etition — Benefit per Costs

- • Who is in the market already?

- • How efficient is the solution?
- • How large is the benefit?
- • How large are the costs?

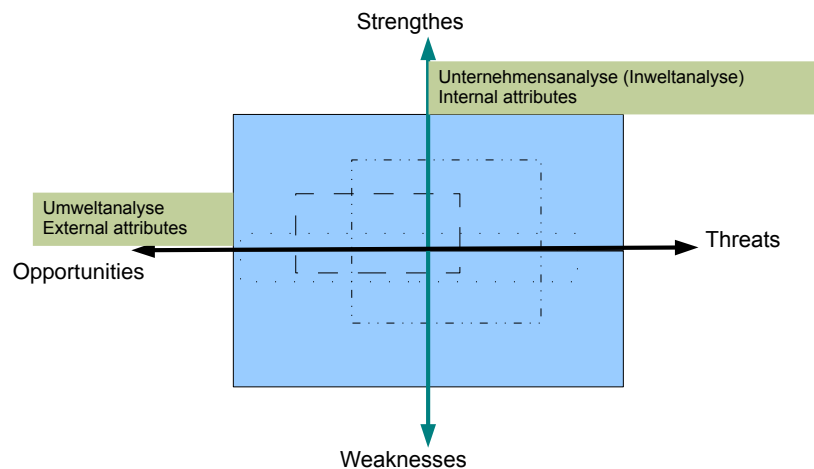http://www.oulu.fi/english/sites/default/files/content/NABC_presentation.pdf

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Exercise: Application

7

- ➢ For preparing your next application for a job,
- ➢ Analyze the future employer with NABC
  - • What are his needs?
  - • What is your approach?
  - • What is his benefits?
  - • Who are your competitors?
- ➢ Learn the answers for these questions by heart, to be able to present them in the interview!

nAbc → Nabc

74.1.2 Strategic Analyses for Research

8

- ▪ Not all research is *relevant*
- ▪ Often, decisions have to be made about which way to go in research. Several general analysis for strategy can be used.
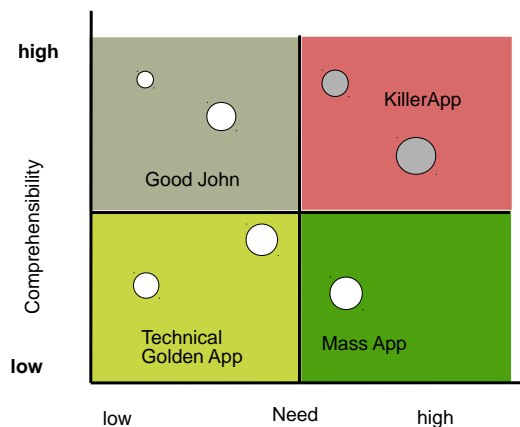- ▪ [more material in course "Software Management (summer)"]

SWOT Analysis for Research Relevance

9

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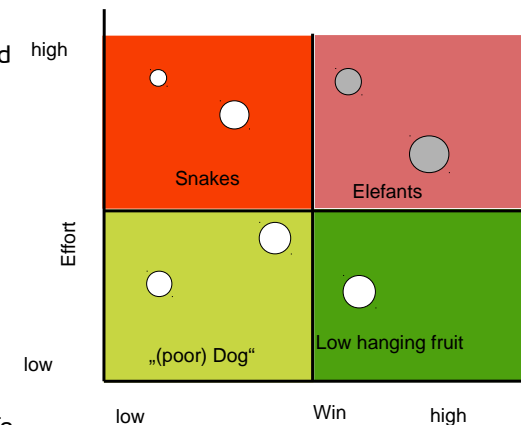
▶ For strategic decisions of your thesis and your research

Strengthes

Unternehmensanalyse (Inweltanalyse)
Internal attributes

Umweltanalyse
External attributes

Opportunities ← → Threats

Weaknesses

„Low Hanging Fruit" Analyse

10

▶ "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!

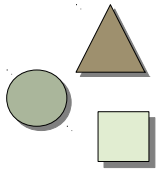▶ Elefants kill your research and your life on the long term if you are not careful. But they can also be rewarding

high

Snakes

Elefants

Effort

„(poor) Dog"

Low hanging fruit

low

low   Win   high

„KillerApp" Analysis (Attractivity Portfolio)

11

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

high

KillerApp

Good John

Comprehensibility

Technical Golden App   Mass App

low

low   Need   high

Home Work

12

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

▶ Conduct a "killer app analysis" for the topic Smart Grid
  – find a killer ap
  – find a golden technical app
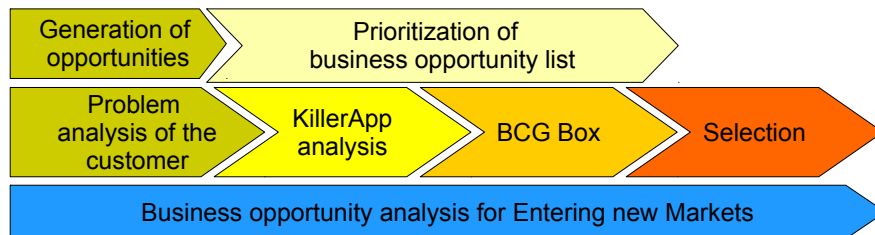
74.2 Relevance for Others: Business Development

13

- .. from business opportunities to business cases..

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

14

- ▶ How to find interesting problems or objectives of a customer?
  - ▪ Aspect-oriented problem analysis such as SWOT-PROBLOSS or UCEW-PROBLOSS
  - ▪ Value-Proposition Analysis (VPA)
- ▶ This **business opportunity list** 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 analysis (importance, urgency analysis)* finds out, how important or urgent the problems are for the customer.

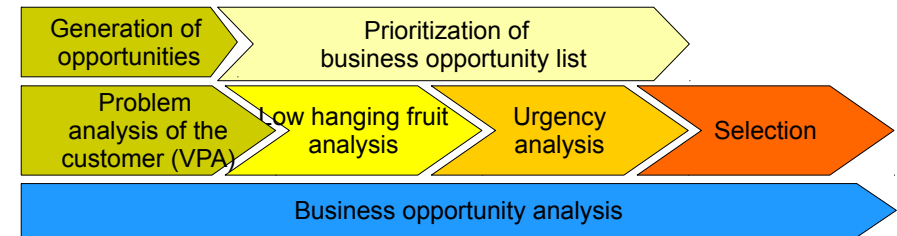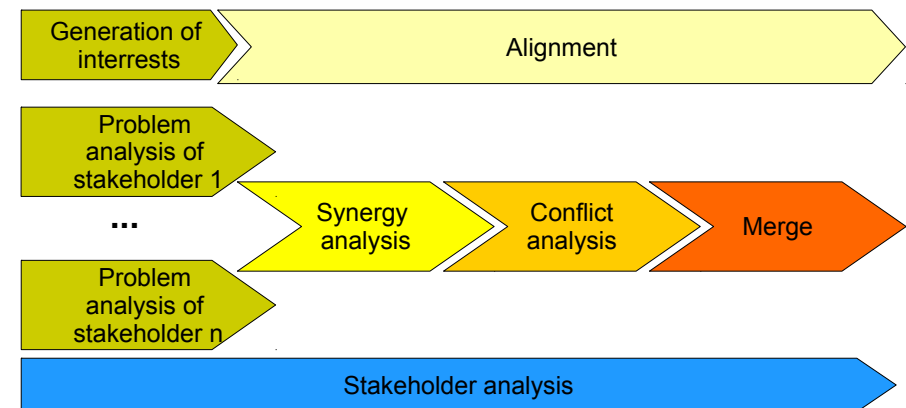| Generation of opportunities	Prioritization of business opportunity list		
Problem analysis of the customer (VPA)	Low hanging fruit analysis	Urgency analysis	Selection
Business opportunity analysis			

Business Opportunity Analysis for Entering New Markets

15

- ▶ A **business opportunity lists** can also be constructed with
- ▶ *Killer-App analysis* finds out those products/services which are very attractive
- ▶ *BCB-Box analysis* finds out "cash cows" and "stars"

Generation of opportunities	Prioritization of business opportunity list		
Problem analysis of the customer	KillerApp analysis	BCG Box	Selection
Business opportunity analysis for Entering new Markets			

Stakeholder Analysis in Requirements Engineering

16

- ▶ 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

Generation of interrests	Alignment		
Problem analysis of stakeholder 1			
...	Synergy analysis	Conflict analysis	Merge
Problem analysis of stakeholder n			
Stakeholder analysis			

Strategic Analysis

17

- ▶ For Start-Ups
  - Conduct AOPA with SWOT-PROBLOSS
  - Conduct a AOEA with UCEW-PROBLOSS
  - 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)

18

Ein **Business Case (Geschäftsfall, Geschäftszenario)** plant betriebswirtschaftliche Kosten und Nutzen eines Geschäftsgelegenheit (business opportunity), sowie den Zeitpunkt der Wirtschaftlichkeit (Return-Of-Investment, ROI). [Wikipedia]

- ▶ Business Cases werden aus den Top-Level Business Opportunities entwickelt
- ▶ Synonyme:
  - Kosten-Nutzen-Analyse
  - Wirtschaftlichkeitsrechnung
  - Renditerechnung
  - Investitionsrechnung
- ▶ Ohne Wirtschaftlichkeitsrechnung tätigt man heute keine Investition

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.

Inhalt einer Wirtschaftlichkeitsrechnung

19

in Form eines Papiers oder Präsentation

- ▶ Überblick (Thematik und Zielsetzung)
- ▶ Management Summary (kurz)
- ▶ Definition und Abgrenzung
- ▶ Kostenpositionen
- ▶ Wirtschaftliche Vorteile in Ressourcen und Geld
  - Kostenersparnis
  - finanzielle Vorteile der Handlung bzw. Entscheidung
- ▶ Nicht-monetäre Aspekte (Risiken und Nutzenaspekte)
- ▶ Bewertung
- ▶ Empfehlung, Entscheidungsvorlage
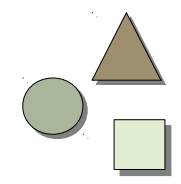

20

- ▶ Oft werden eingesetzt:
- ▶ SMART
- ▶ SWOT-Analyse
- ▶ UCEW-Analyse
- ▶ BSC

21

▶ For writing of proposals, these analyses are very important:
- relevance analysis
- value proposition analysis
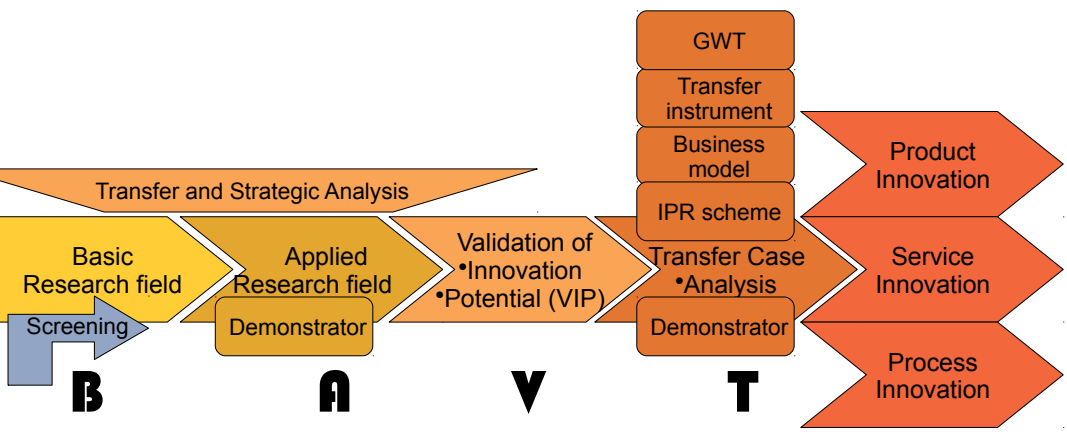- strategic analysis
- innovation scorecard

74.3 Technology Transfer

22

■ How to organize transfer projects from which products can be commercialized

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The Generic Transfer Process

23

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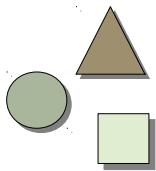- So that a concrete transfer process can be installed

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74.3.1. Push Technology Transfer Process

24

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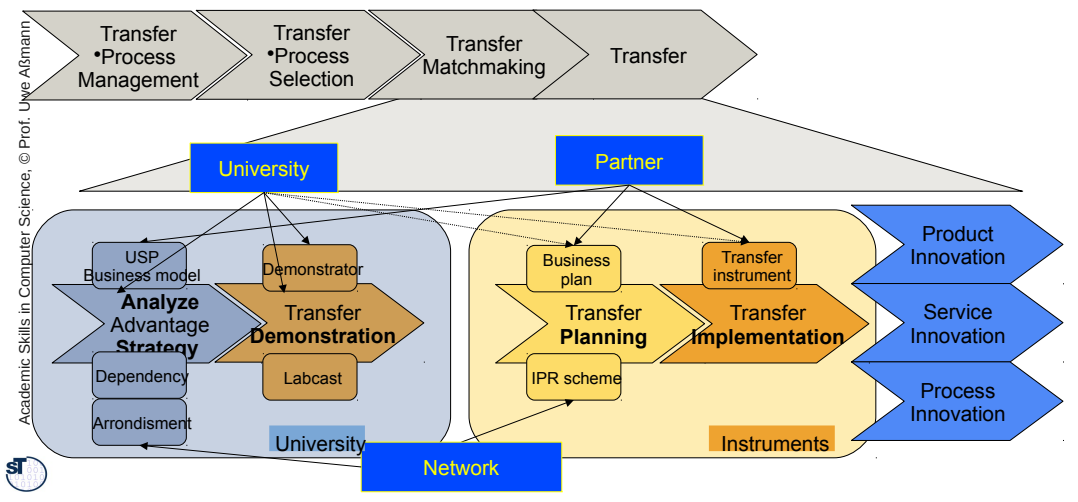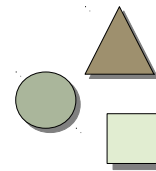
74.3.2. Specific Push Transfer Processes

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74.3.2.1. Push Transfer Process with VIP
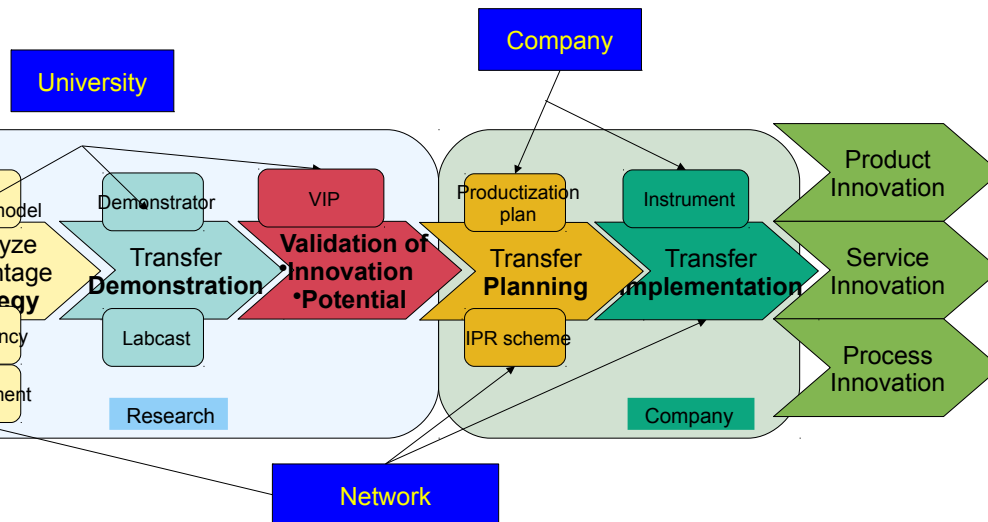
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Push Transfer Process with VIP

- University prepares transfer with VIP project; company waits

VIP Unique Selling Points for Software Machine Tools

► For a Software Machine Tool (Software-Werkzeugmaschine) kann VIP
  ▪ Neue Funktionalitäten erweitern
  ▪ Neue Anwendungsdomänen erschließen (use cases)
► Es ergibt sich eine Kreuzmatrix von domänenspezifischen Anwendungsfunktionalitäten (Werkzeug-Use Cases)

Tool Use Cases	Domäne 1	Domäne 2	Domain 3	
Function A			Company b	
Function B		Company a		
Function C			Company c	

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## Wann wird ein Tool zu einer Plattform?

29

- ▶ Wenn der Nutzen, die Fremd-Komplemente aus ihm ziehen, groß ist
- ▶ Wenn man nicht nur Einzel-Komplemente hat, sondern ganze Ökosysteme (Märkte)
  - ▪ Viele Tools erzeugen keine Märkte, sondern einzelne Anwendungen, die isoliert verwendet werden.

74.3.2.2. Personal Transfer Process (PTP)

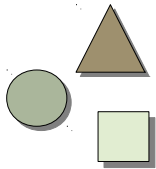**30**

Personal Transfer Process

31

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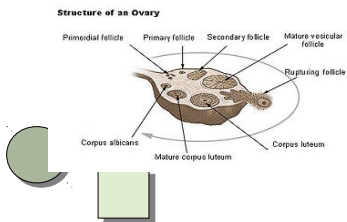

ESF Innovationsassistent

32
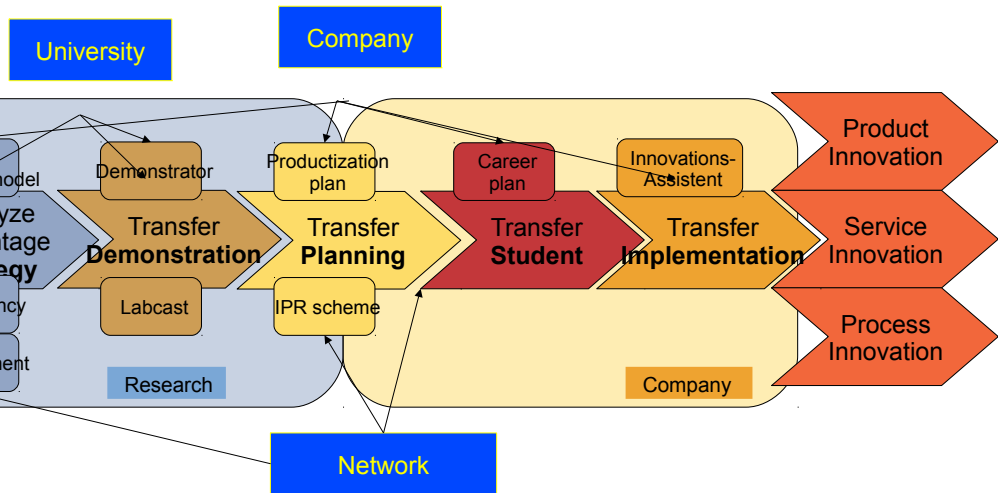
74.4 Pull Transfer Processes

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Pull Cell Transfer Processes

Structure of an Ovary

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74.6.1 Industriepromotion (Industrial PhD), z.B. Europäischer Sozial Fond ESF)
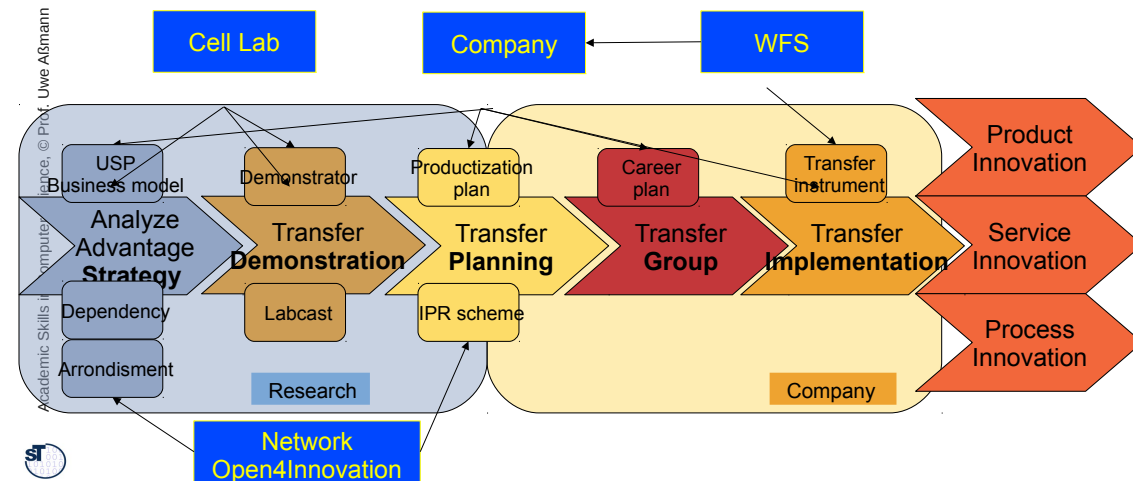
► PhD student gets a topic relevant for a company
   ▪ works part time for the company
   ▪ is paid 50% by the company
► Examples
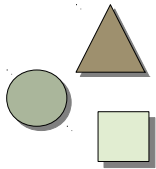   ▪ Georg Püschel

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74.6.2 Pull Cell Transfer Process

► Cell transfer process creates new fields for companies
► Transfers focussed junior research groups together with topic („Cell")

74.6.3 Common Research Projects (Verbundprojekte)

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EU, BMBF

► Horizon 2020 mit Innoprozess
► Beispiele erfolgreichen Transfers

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Overview Transfer Instruments

- Sächsische Instrumente
  – Master's thesis with Innovationsassistent
  – InnoPrämie (10kEuro pro Jahr)
  – ESF Industriepromotion
  – Innovationsberatung für KMU
- BMWI
  – ZIM
- BMBF
  – KMU-initiativ
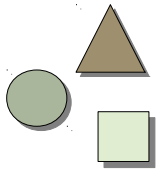 – VIP
  – BMBF exist

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Example: Software Productization Center for Transfer

- 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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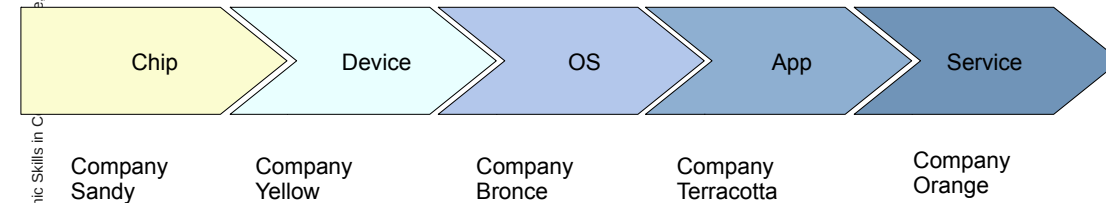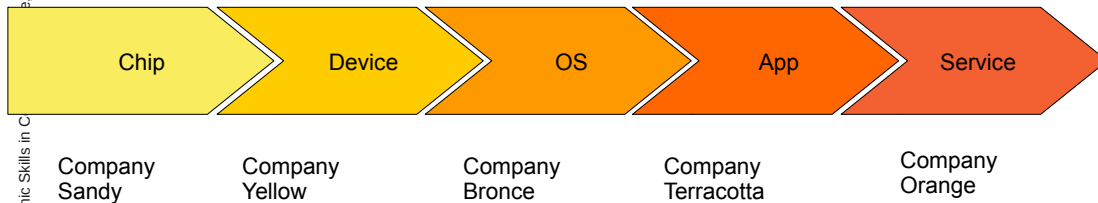Academic Skills in Computer Science, © Prof. Uwe Aßmann

Academic Skills in Computer Science, © Prof. Uwe Aßmann

Innovation Clusters aggregate Colored Value Chains

43

- 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

44

- 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

A Process to Create Innovation Clusters

45

- 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
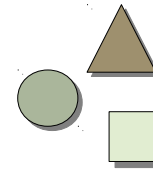 - Company as cluster leader
  - O4I as cluster leader

Leader
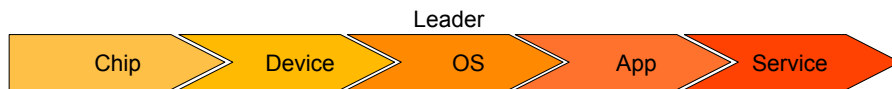
| Chip | Device | OS | App | Service |

74.8. Founding Startups

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Dresden EXISTS

47

▶ Beispiele

Working with GWT

48

▶ As a bridge to industry contacts

The End