Vienna, June 20 - 23

STREAM Joint Training Course
-
Innovation Management and Technological Competence Leveraging

Institute for Entrepreneurship and Innovation
WU Vienna University of Economics and Business
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peter.keinz@wu.ac.at

Today's agenda

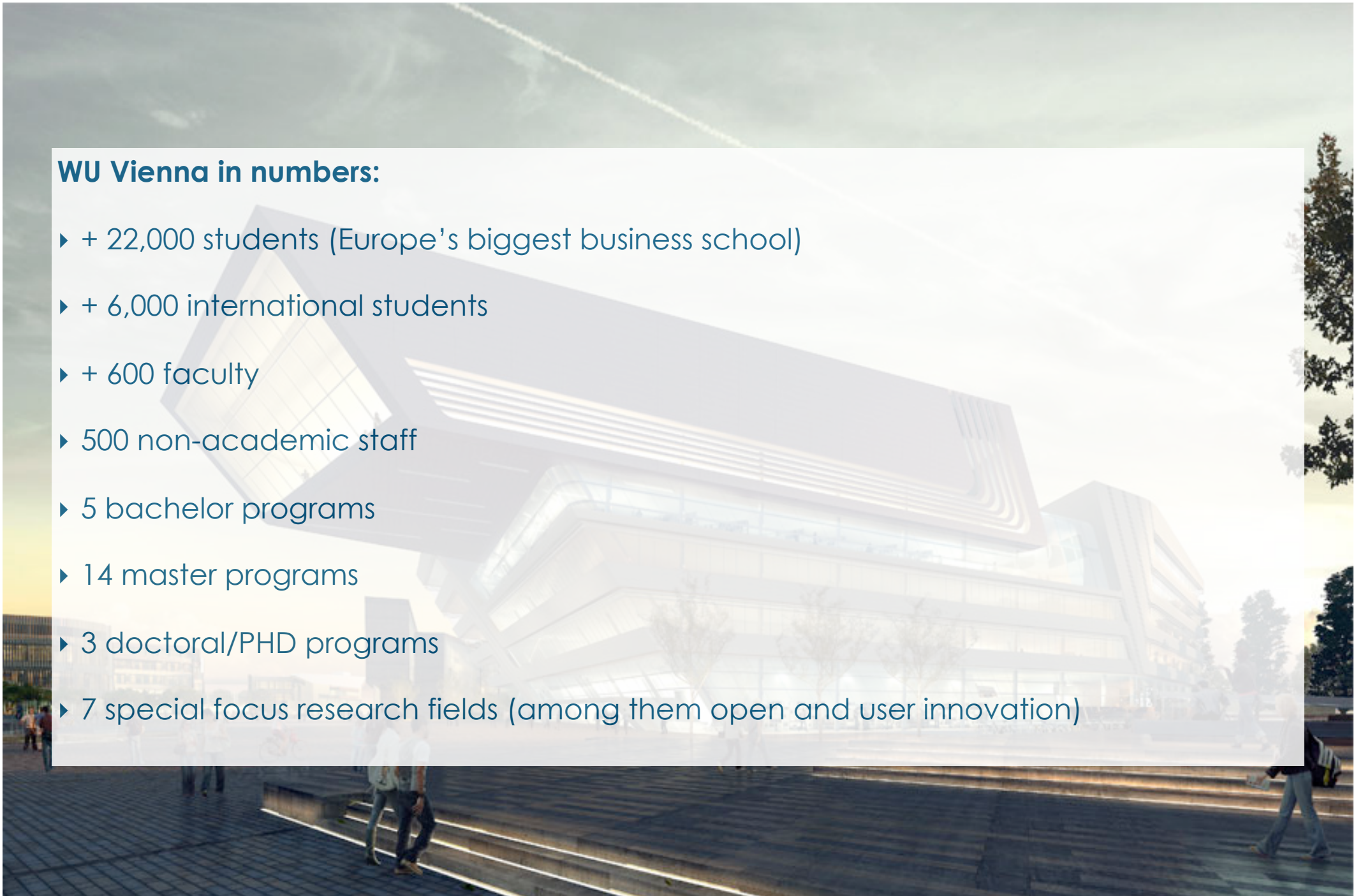
- Introduction of WU Vienna and the lecturers

- Overview of the summer school

  - What's the logic of the program?
  - What to expect from the next 4 days?
  - What's the idea behind the „real life project assignment" (2nd Joint Training Course)?

- Session on Technology Transfer & Creativity

WU Vienna University of Economics and Business



WU Vienna in numbers:

- + 22,000 students (Europe's biggest business school)
- + 6,000 international students
- + 600 faculty
- 500 non-academic staff
- 5 bachelor programs
- 14 master programs
- 3 doctoral/PHD programs
- 7 special focus research fields (among them open and user innovation)

The Institute for Entrepreneurship and Innovation

ENTREPRENEURSHIP & INNOVATION

- founded in 2002
- 2 Profs, 2 Post-docs, 11 Prae-docs, approx. 100 external guest professors and lecturers
- +1000 alumni and 250 current students
- Bachelor and master level program, MBA together with the Technical University Vienna
- Host of the Entrepreneurship Center Network, the University Knowledge Transfer Centers
- Research cooperations with MIT, Harvard Business School, Copenhagen Business School, Technical University Munich, Ludwig Maximilians University Munich, Bocconi University, etc
- + 35 consulting projects per semester

The E&I team

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Assoz. Prof. Dr. Peter Keinz

stv. Institutsvorstand

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External lecturers

Dr. Thorsten Lambertus

- Business Modeling expert
- Head of the Fraunhofer „FDays“-accelerator program

Hanna Poikela

- ETN/ITN expert
- Midterm Reporting coach

Bernhard Weingartner

- Science Communicator
- Founder Science Slams Austria

What we stand for…

Innovation = Invention + Implementation

Different levels

- Bridging the gap between people from different disciplines, e.g. physicists and business people
- Bridging the gap between science and industry

Work Package 6

Work package 6 aims at identifying market opportunities for Smart CMOS sensors and developing commercialization strategies.

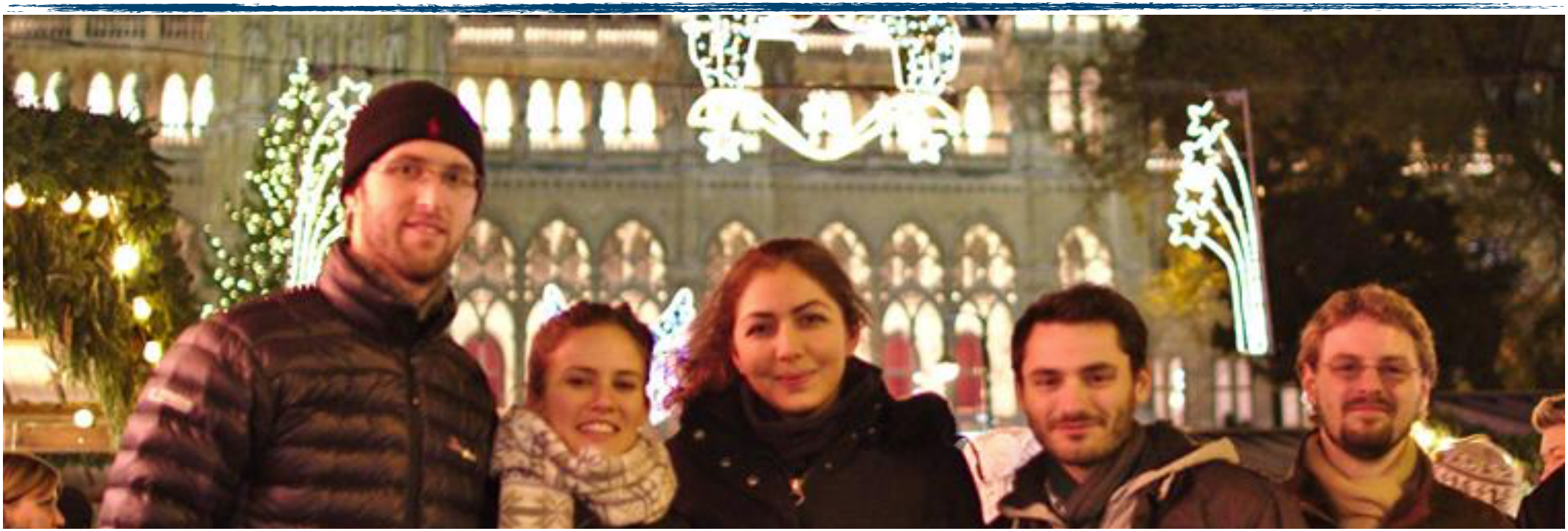
Work package name

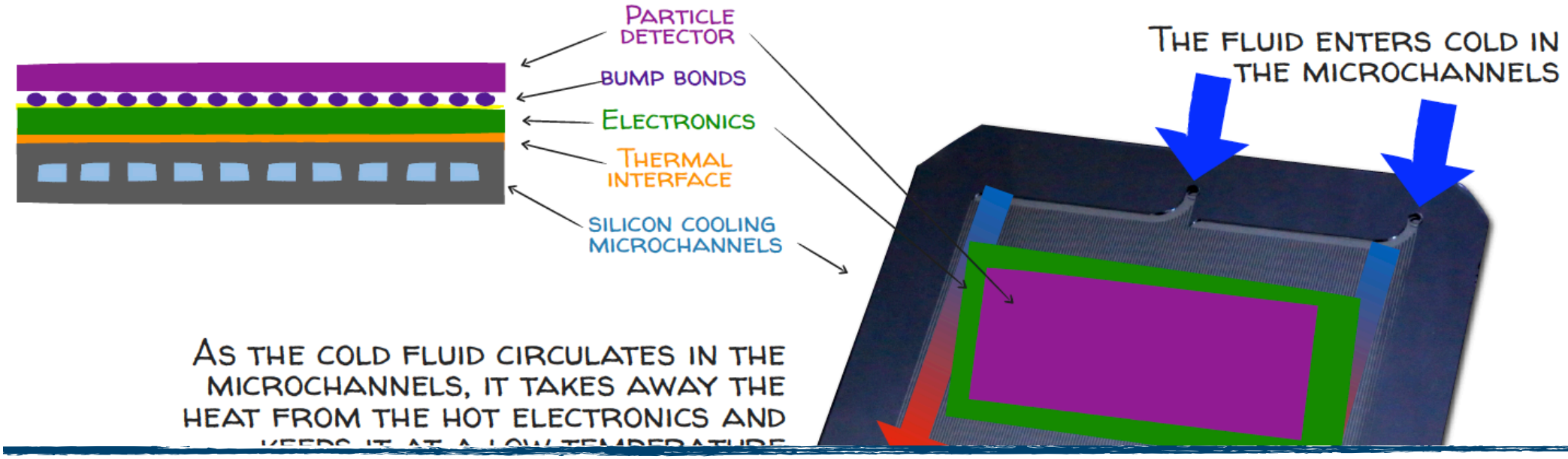
- Technology valorization

Work package team

- Peter Keinz (Work package leader)
- Evgeniia Filippova (ESR 16)
- Barbara Mehner (ESR 17)

Our mission




PARTICLE DETECTOR
BUMP BONDS
ELECTRONICS
THERMAL INTERFACE
SILICON COOLING MICROCHANNELS
THE FLUID ENTERS COLD IN THE MICROCHANNELS
AS THE COLD FLUID CIRCULATES IN THE MICROCHANNELS, IT TAKES AWAY THE HEAT FROM THE HOT ELECTRONICS AND

Deliverables and Milestones

Work Package 6 comprises two formal deliverables.

Innovation management and entrepreneurship training (D6.1)

t_{18}

Business planning and modeling course (MS10)

t_{18}-t_{42}

Project start

t_0

Project end

t_{48}

STREAM Tec2App roadmap (D6.2)

Report on valorization potential and market entry strategies

t_{42}

Structure of the program

The training will consist of a four-days workshop including theory input and case studies.

Structure

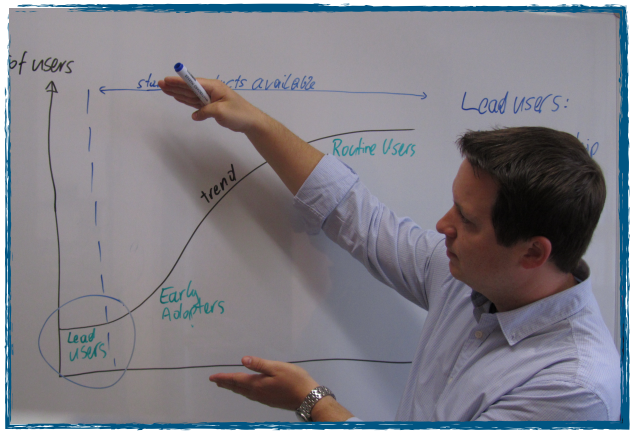
Day 1
- Innovation management
- TCL

Day 2
- Bus. Planning
- Bus. Modeling

Day 3
- Technology WS
- Reporting WS

Day 4
- Presentation workshop

Didactiacl concept



2nd Joint Training Course

During the winter semester, the ESRs will participate in real-life KTT projects hosted at WU Vienna and conducted by business students.

Coaches

- WU Vienna lecturers
- Business consultants

Preparation & controlling

Coaching & support

Interdisciplinary project work

Project partners

- consortium members
- ATLAS, CIS, CIVIDEC, etc.

Project teams

- ESRs and ERs
- WU Vienna Business students

What's in for you (and the STREAM consortium)?

Please do a little brainstorming (individually) and come up with reasons on why this program makes sense (for you as well as for the STREAM consortium itself).

- Individual exercise
- Timeline: max. 5 minutes

What's in for you (and the STREAM consortium)?

What's in for you?

Formal benefits

- 8 ECTS
- Certificate of attendance
- Official training event for midterm report

Informal benefits

- Interdisciplinary collaboration (network!)
- Insights into innovation and technology management
- Experience through participation in a real-life KT project

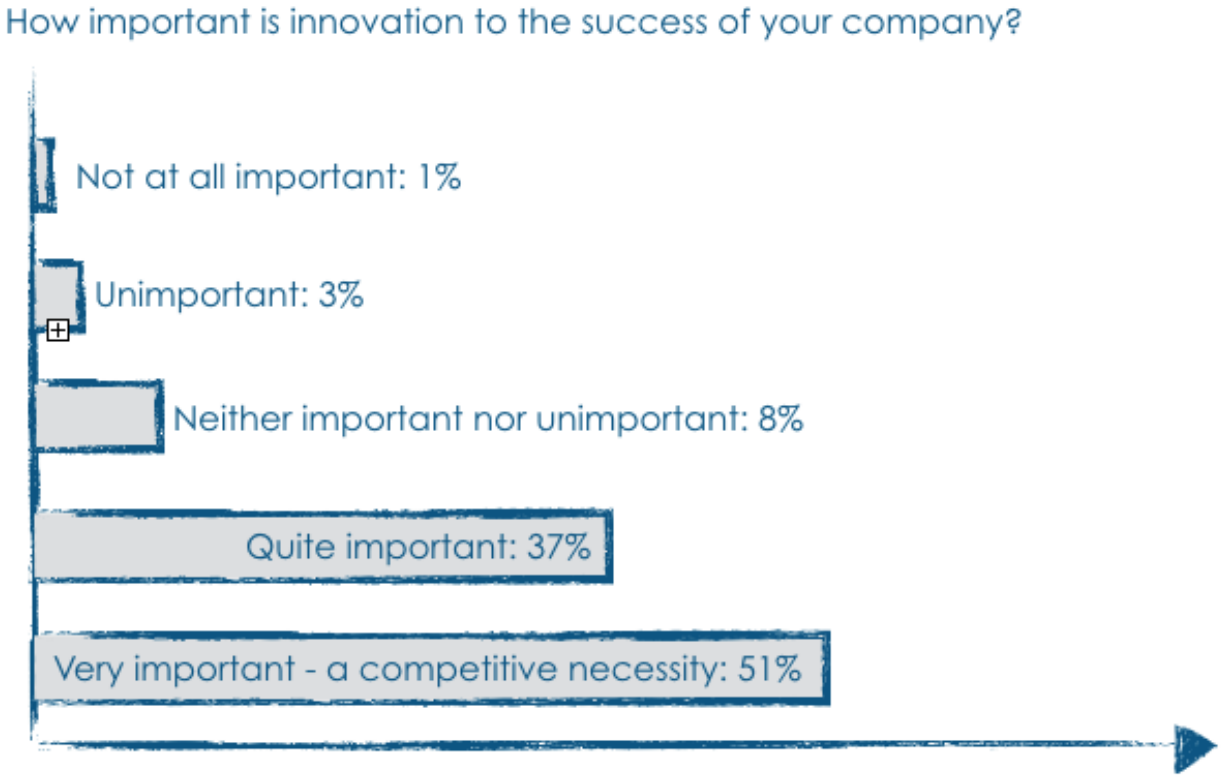
—> increase in your employability

- Preparation for own start-up / spin-off

What's in for you?

Innovation Management makes a difference!

Innovation Management as an organizational success factor



Increasing the ESRs' capabilities and networks

- Get to know state-of-the-art management methods
- Collaborate with partners from industry (potential employers, customers, etc.)

Source: PwC Unleashing the power of Innovation 2013 survey.

Why it is important for CERN

Relevant stakeholders expect us to think about KTT.

Formal "requirement"

- The EC regards KTT as an integral part of ITNs

CERN's mandate to do KTT

- *"Knowledge transfer is an inherent component of CERN's mission and culture: it fuels scientific collaboration and great technological endeavors alike; it drives innovation, motivates future generations of scientists, and makes the general public aware of the impact of basic science on their lives."*

Let's start with a quiz!

Do you know these two guys?

The challenge of finding (new) applications

Inventors are not necessarily good at coming-up with application ideas.

Theodore Maiman, inventor of the „laser technology“

- 1960: development of first ruby laser
- Employer: „laser is a solution to a problem that does not exist“
- After a publication in „Nature“, laser technology gains importance

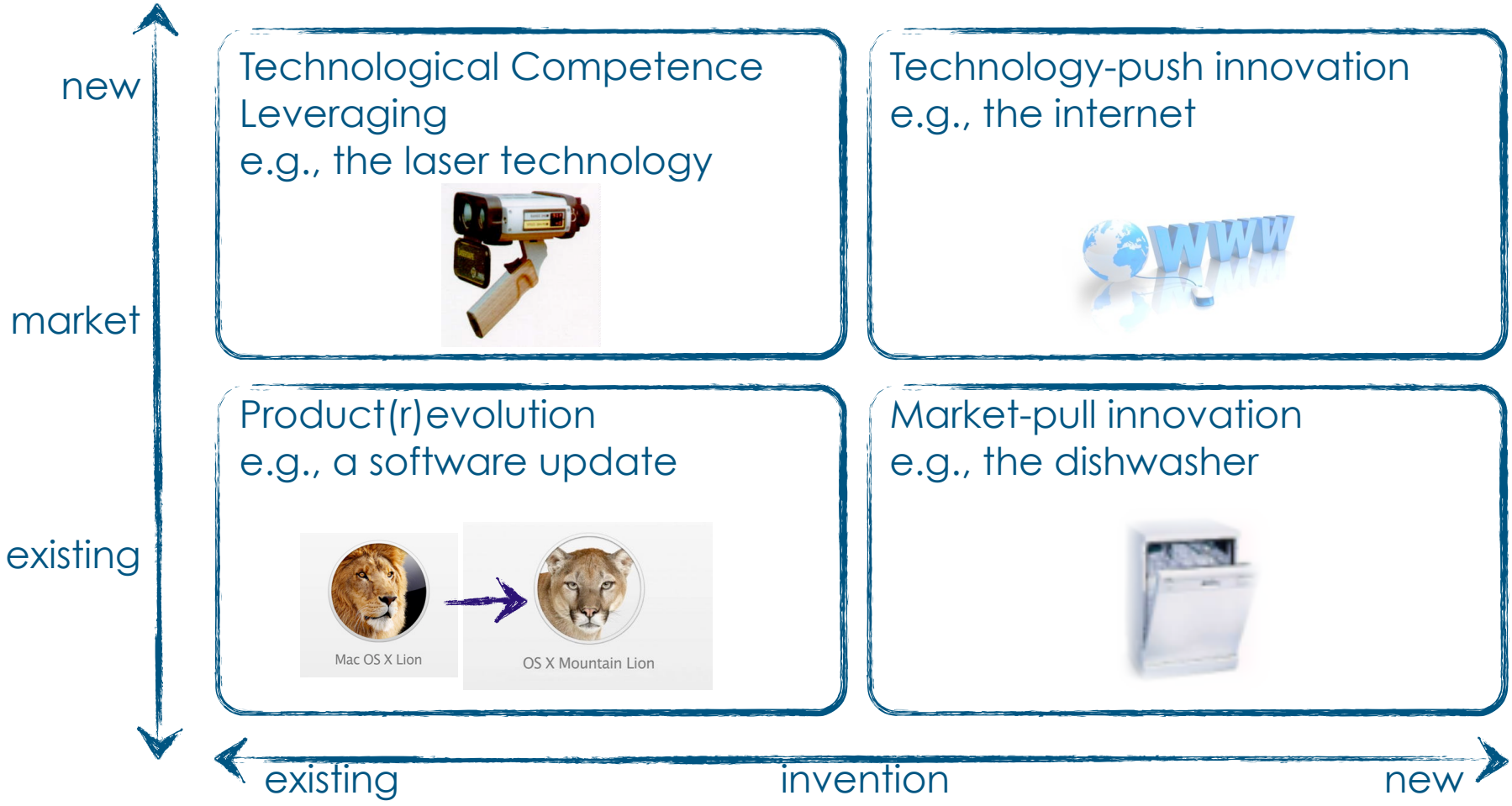
Spencer Silver, inventor of the „post-it“

- 1968: 3M invents an easy-to-apply and remove adhesive
- No obvious use for this invention
- Business Idea: A colleague used it to attach bookmarks in his songbook

Sources: Keinz & Prügl, 2011

Innovation strategies

Innovation strategies aim at matching inventions with market opportunities.



Reasons for Technological Competence Leveraging

Motives to conduct Technological Competence Leveraging vary in dependency of the organization's nature.

Motives of enterprises

- ↑ return on investment
- ↑ capacity utilization
- ↓ strategic dependency from certain markets
- identification of best business opportunity
- gaining VC / funds

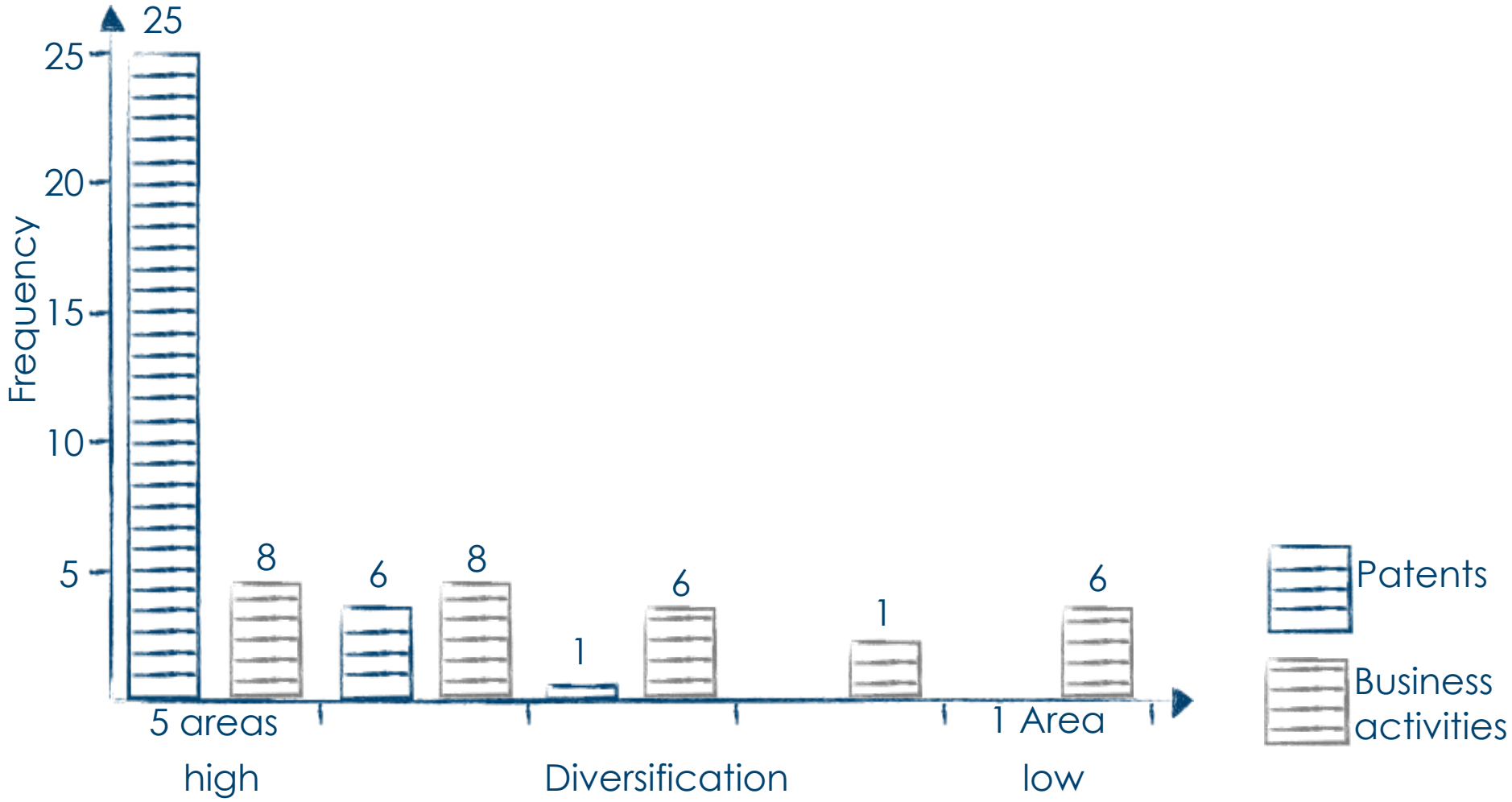
Motives of research organizations

- ↑ reputation
- new collaborations (know-how insourcing)
- mandate to create value for society
- support in fundraising

Sources: Danneels, 2007; CERN Knowledge Transfer Report, 2012

“Under-utilization“ is a wide-spread phenomenon

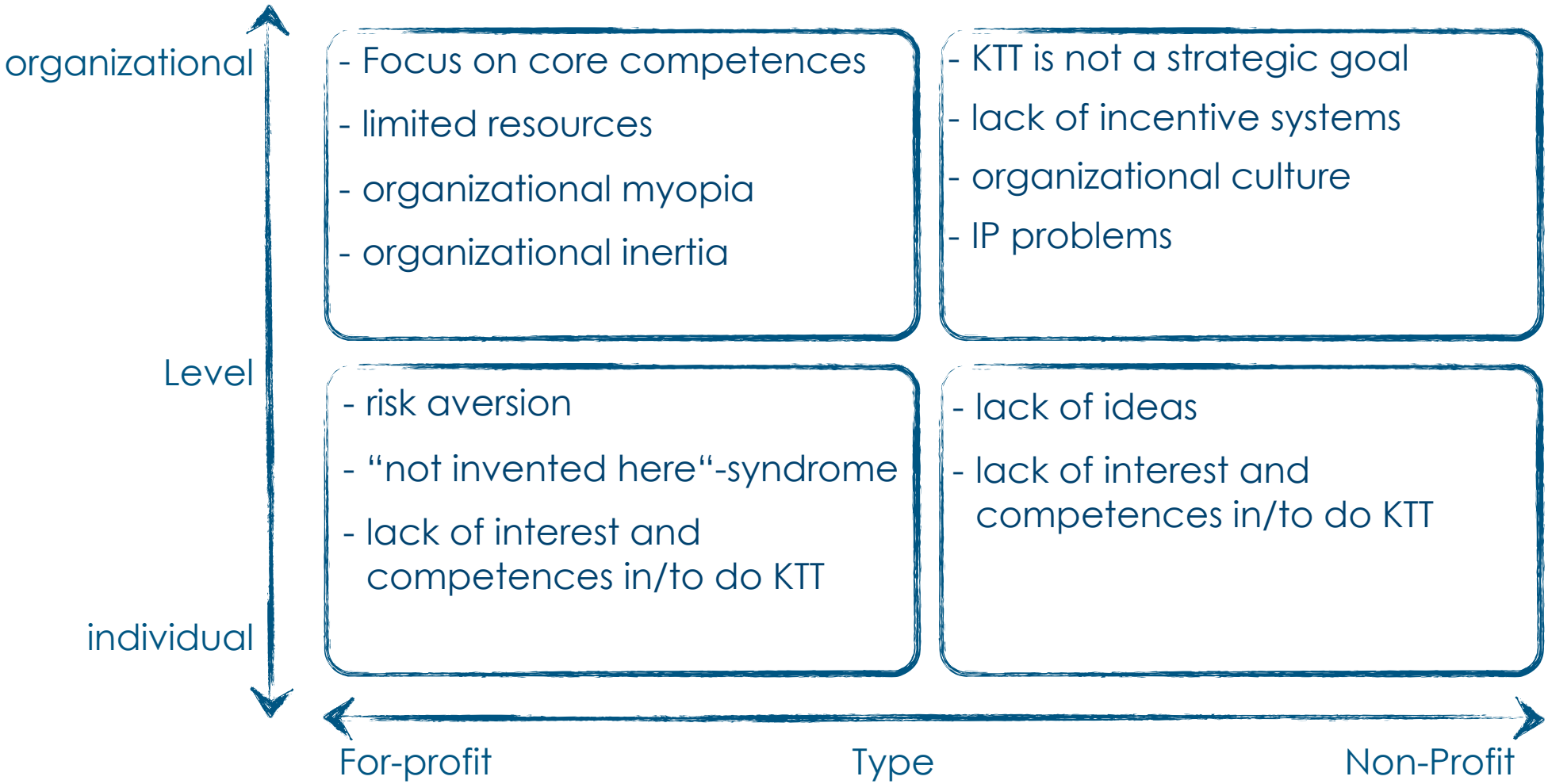
A study among 32 European and US electronic-goods companies show that technical diversification is high while market diversification is low.



Sources: Gambardella & Torrisi 1998.

Reasons for "Under-utilization"

There are several organizational and psychological barriers that hinder companies from leveraging their technologies effectively.



Common approaches to TCL

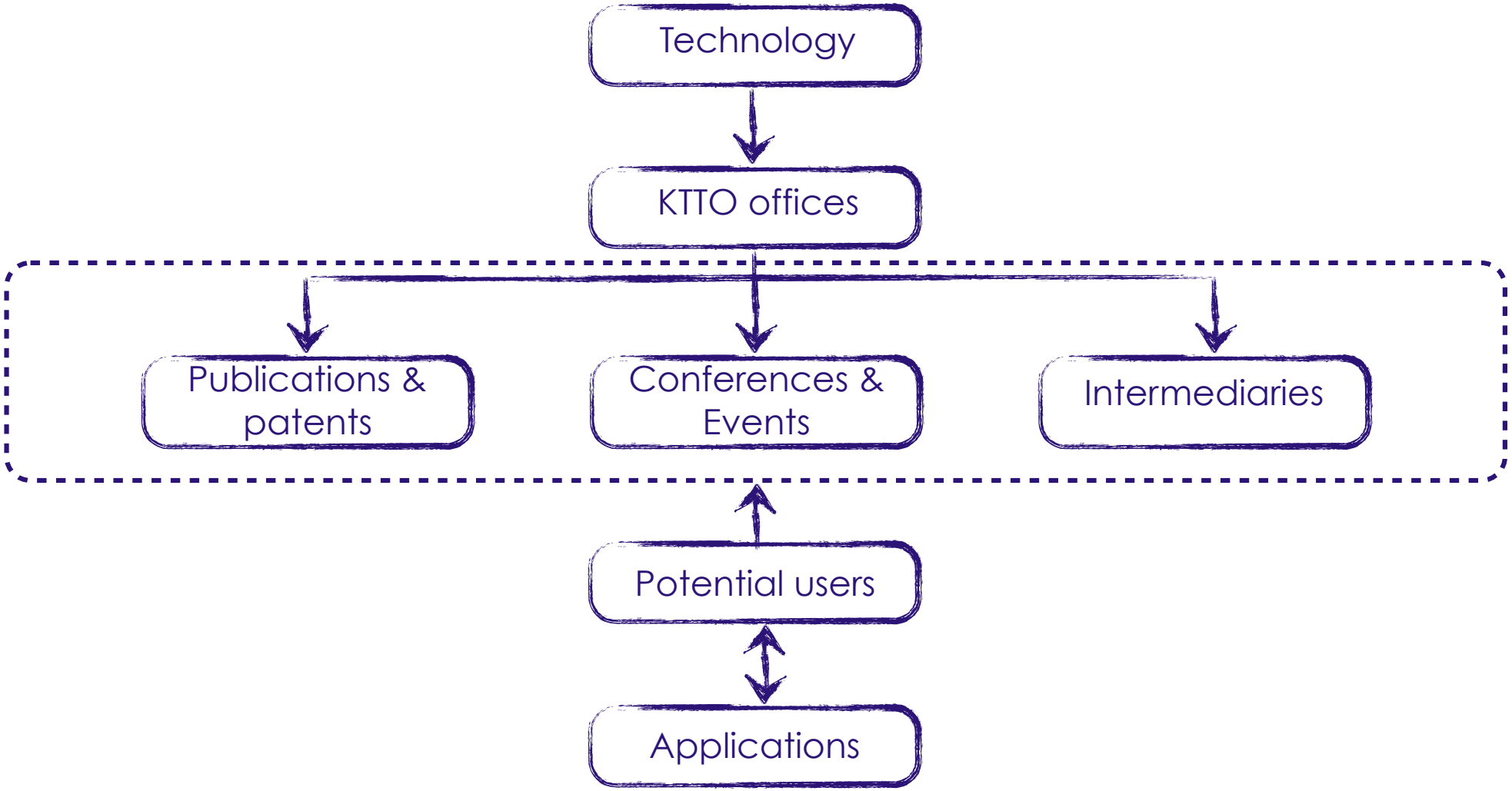
Most companies follow two "traditional" approaches when trying to identify new fields of application to existing technologies.

Technology

Application

The state-of-the-art in TCL

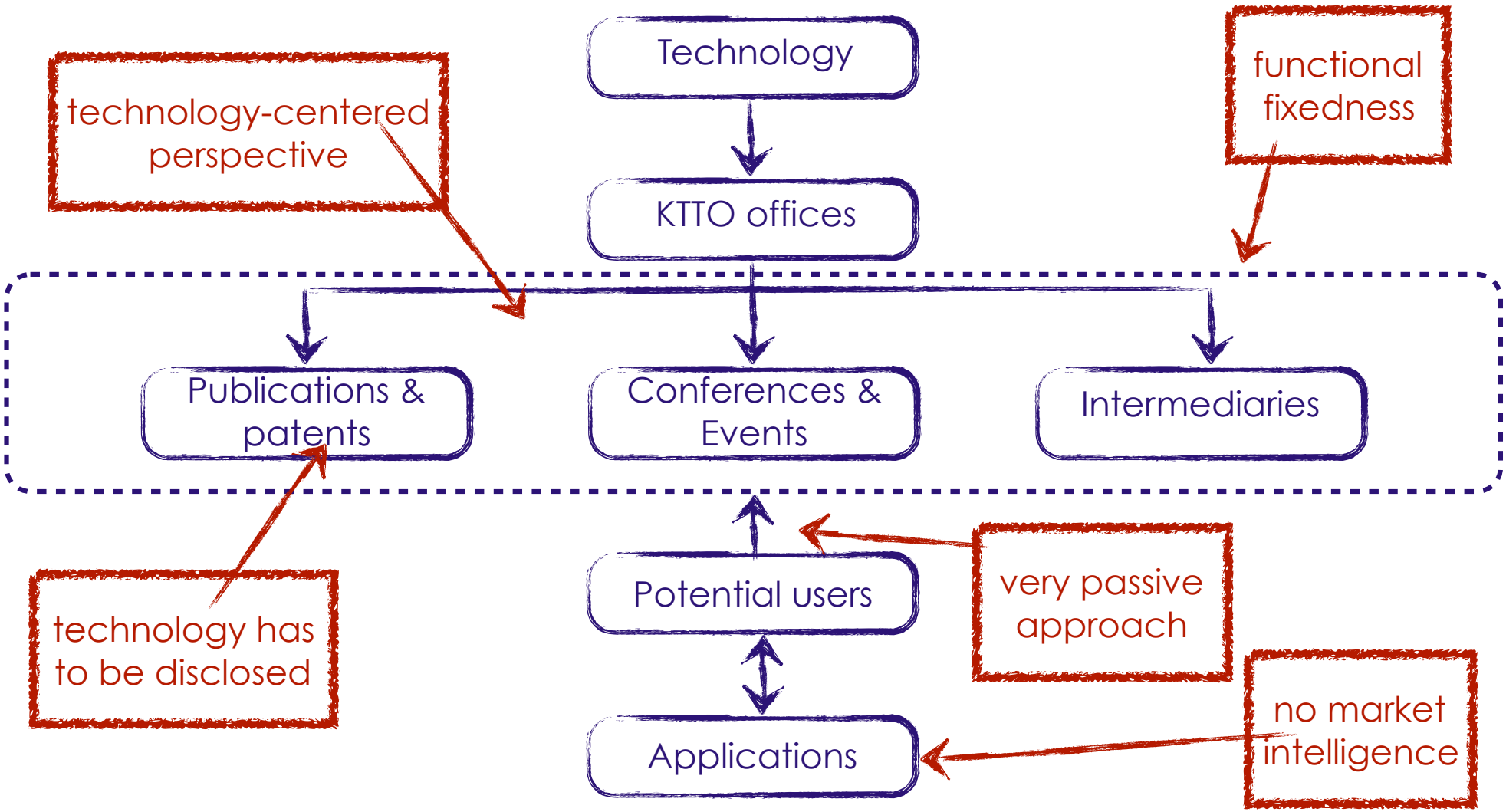
Some companies draw on more advanced activities in order to identify new applications to existing technologies.



Sources: EdI 2014.

The state-of-the-art in TCL

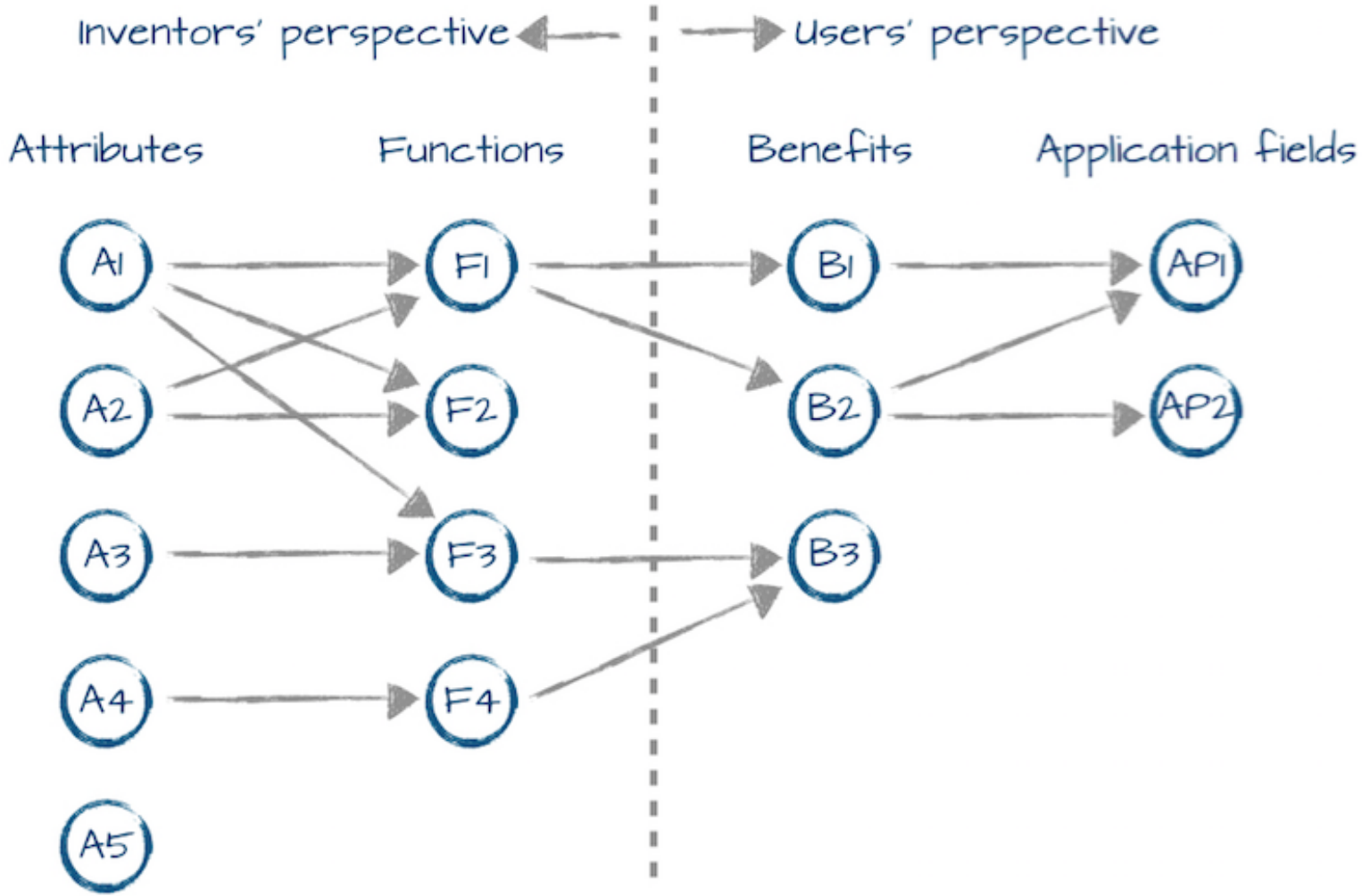
There are several issues with (even advanced) state-of-the-art TCL activities.



Sources: Keinz & Prügl, 2011

Problem 1: Technological perspective

Engineers apply a technological perspective on their invention - they think in terms of attributes, specifications, and functionalities.



Sources: Keinz & Prügl, 2011

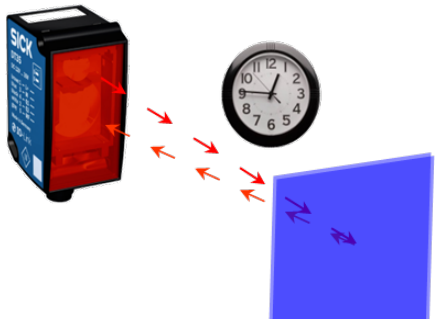
Problem 1: Technological perspective

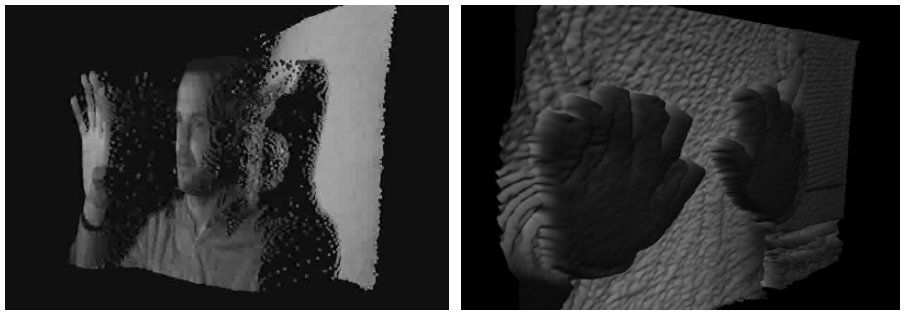
Engineers apply a technological perspective on their invention - they think in terms of attributes, specifications, and functionalities.

Technological perspective:

"...communicate features instead of benefits, leaving the cognitively challenging tasks of understanding the [...] technology as well as linking it with a potential market [...] to future users ."

Technology:





Typical description:

HDDM Technology (High Definition Distance Measurement)

HDDM is a statistical time-of-flight measurement technology

Statistical evaluation of several 100 pulses in each measurement cycle to get one measurement value

HDDM offers economical but highly accurate & reliable time of flight measurement

Coded sending sequences of Dx35 assure unique measurement and avoid cross talk when using several sensors

Sources: Keinz & Prügl, 2011

Problem 2: Local Search Bias

The Local Search Bias - also referred to as Functional Fixedness - limits the organization's creativity in finding far analogous application fields.

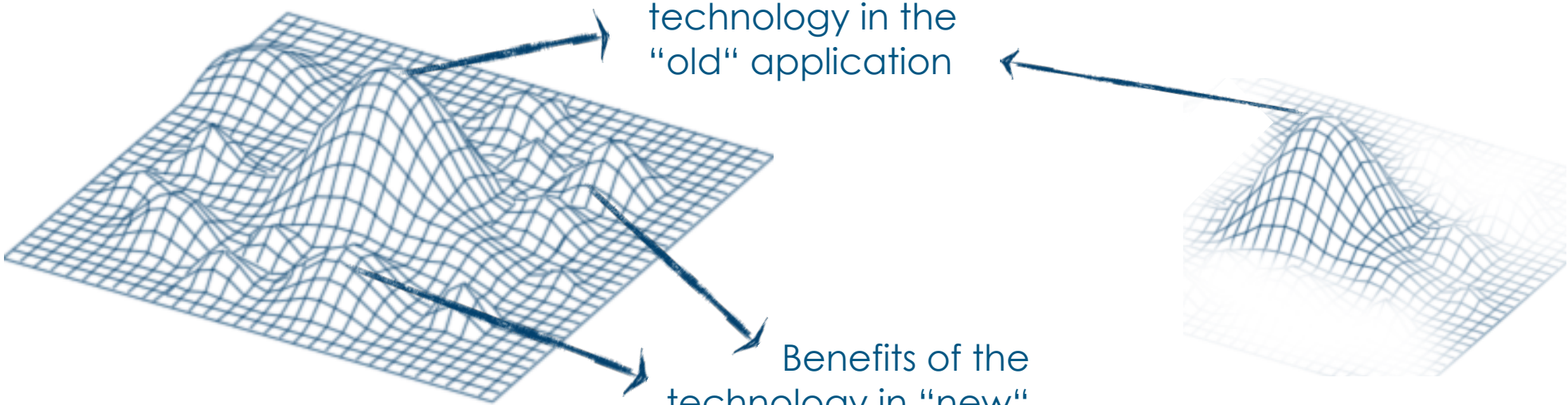
Local search:

"…*the behavior of any firm or entity to search for solutions in the neighborhood of its current expertise or knowledge.*"

Limited creativity

KTT solution space

Organizational search space



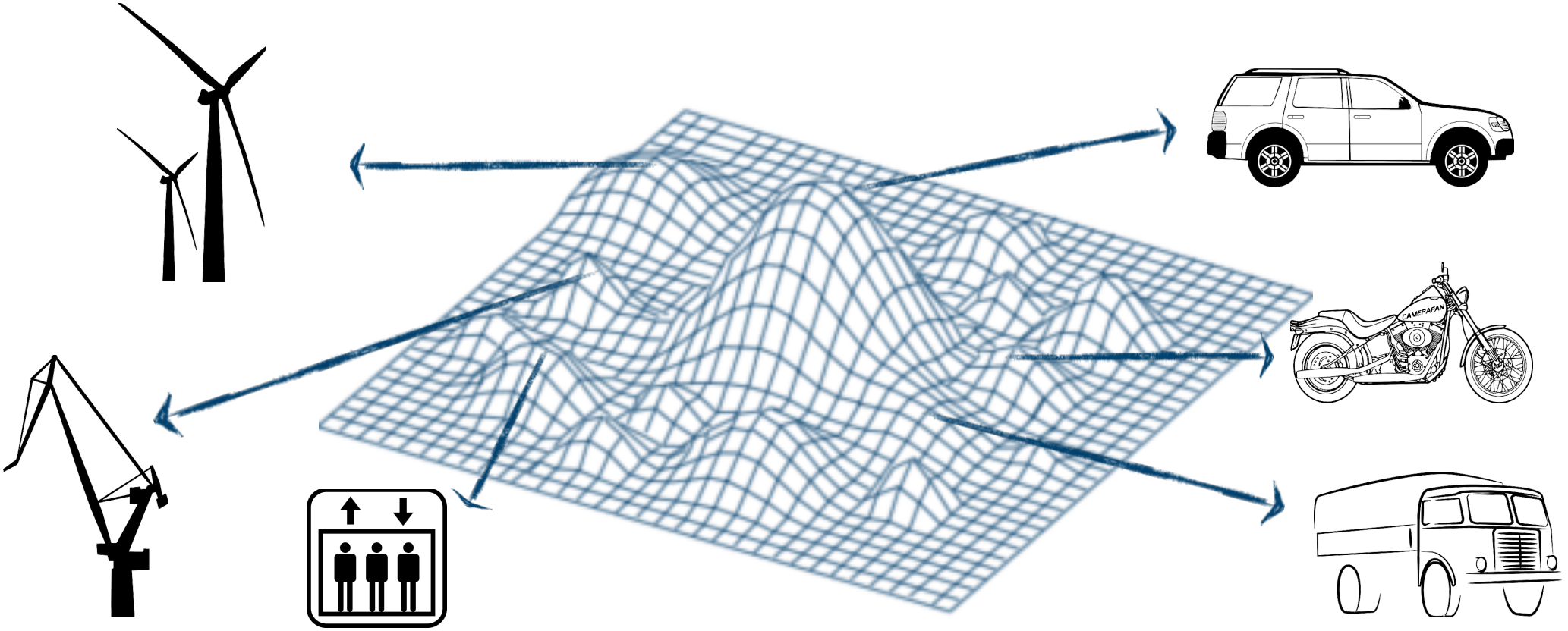
Sources: Rosenkopf & Nerkar 2001; Lilien et al. 2002.

Problem 2: Local Search Bias

Once a company overcomes the Local Search Bias, it can identify a whole lot of new applications.

The case of Magna Powertrain:

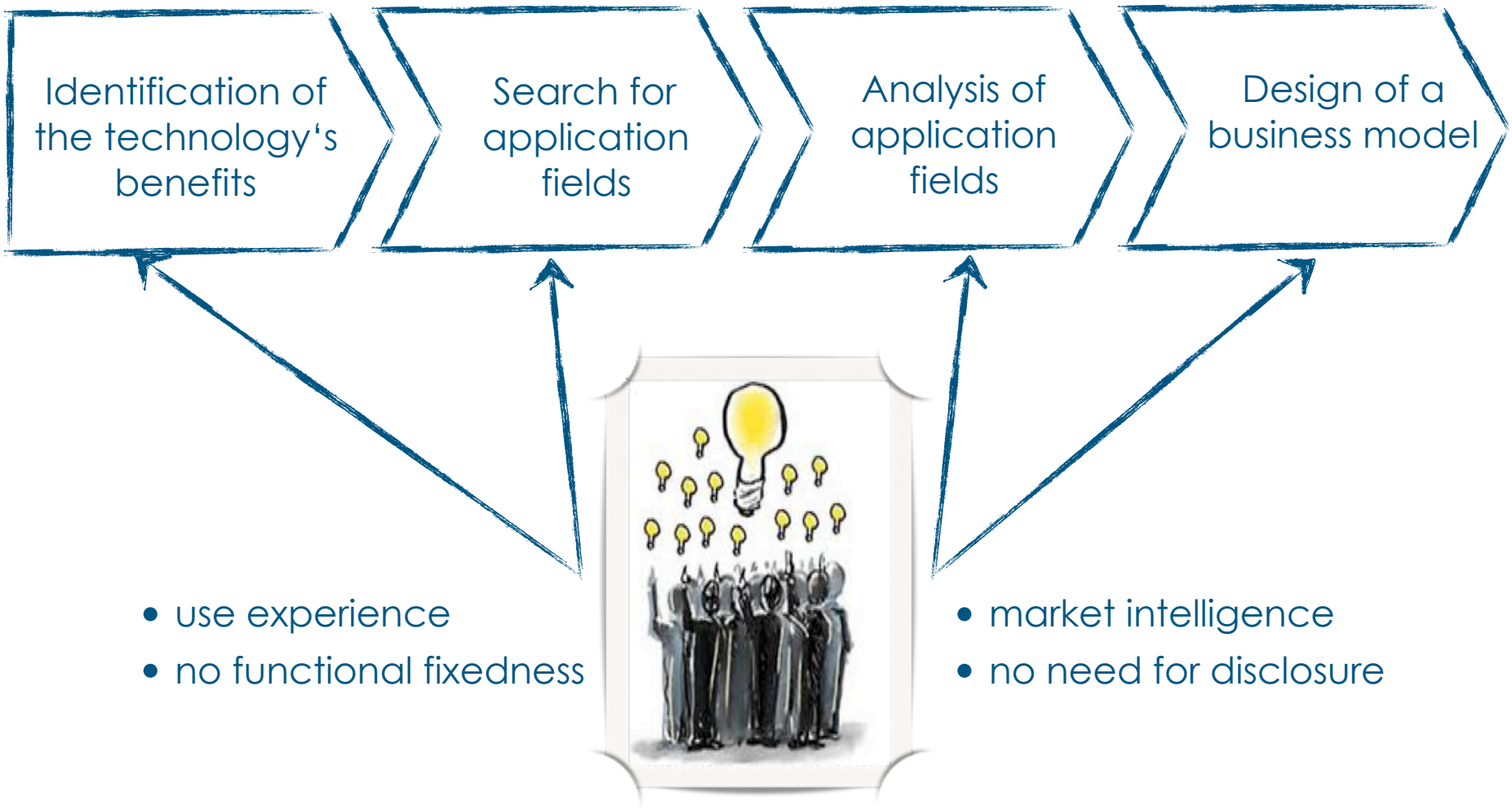
—> high-performance gear-boxes from the automotive industry might be needed in off-shore wind parks as well as in escalators



Sources: E&I project, summer term 2013.

The solution

User Community-based Technological Competence Leveraging is a new approach to identify and evaluate alternative fields of application to existing technologies.



The RallyPoint Case

The HCID technology is a sensor-embedded glove looking for viable applications.

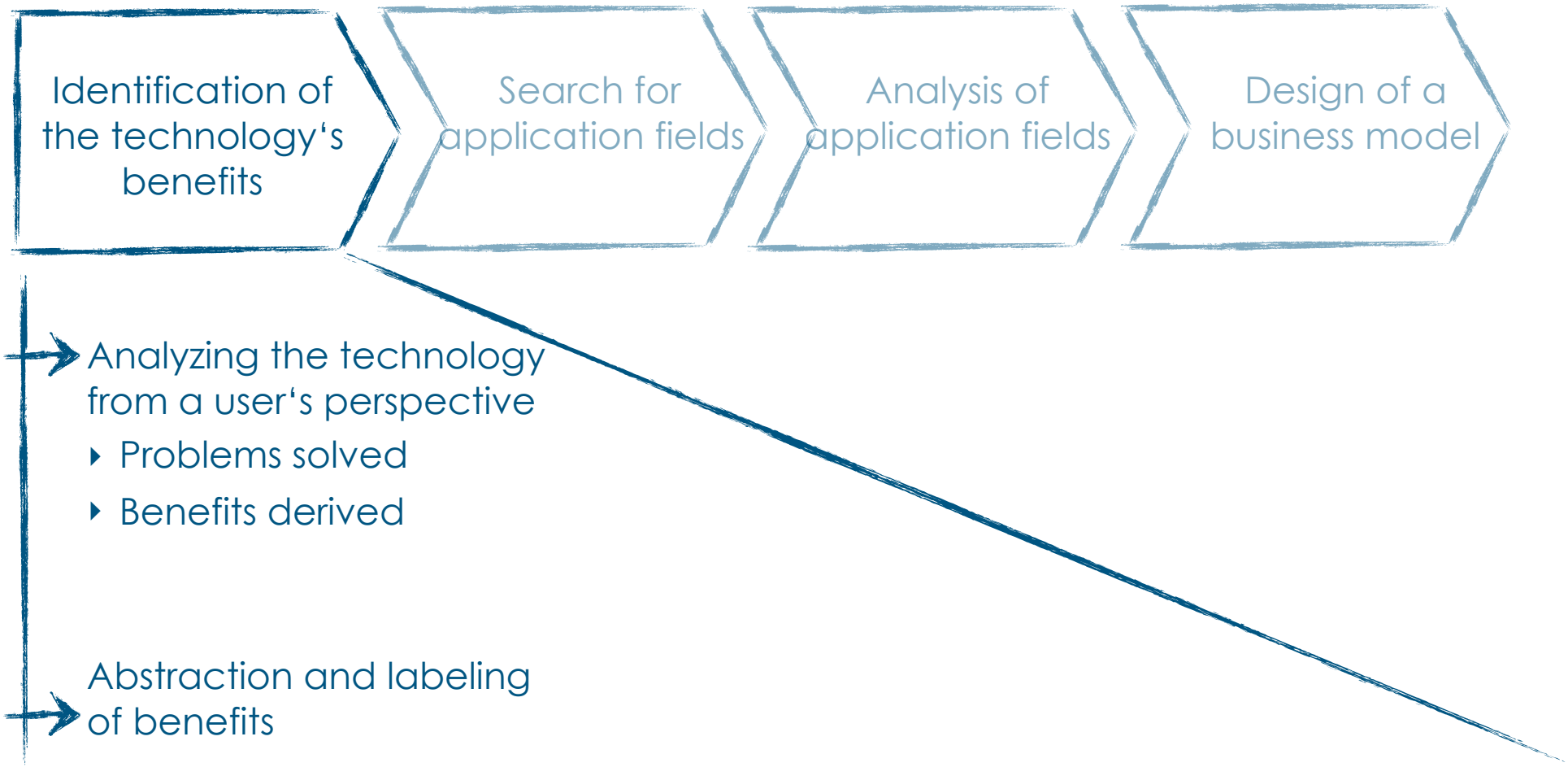
- HCID technology
- developed by RallyPoint (MIT alumni)
- capable of recognizing intuitive single-handed gestures
- US Army as strategic partner and VC investor

How to increase ROI by systematically exploiting business opportunities in non-military applications?

Sources: Keinz & Prügl, 2011

Step 1

The first step is about looking at the technology from a user's perspective.

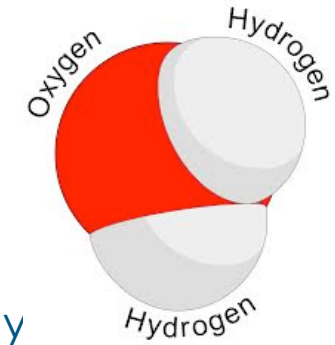


Sources: Keinz & Prügl, 2011

Attributes vs. Benefits

Distinguishing between attributes and benefits is not easy and should be done by applying three indicators.

Attributes



- describe the technology
- are independent from specific applications
- can be measured

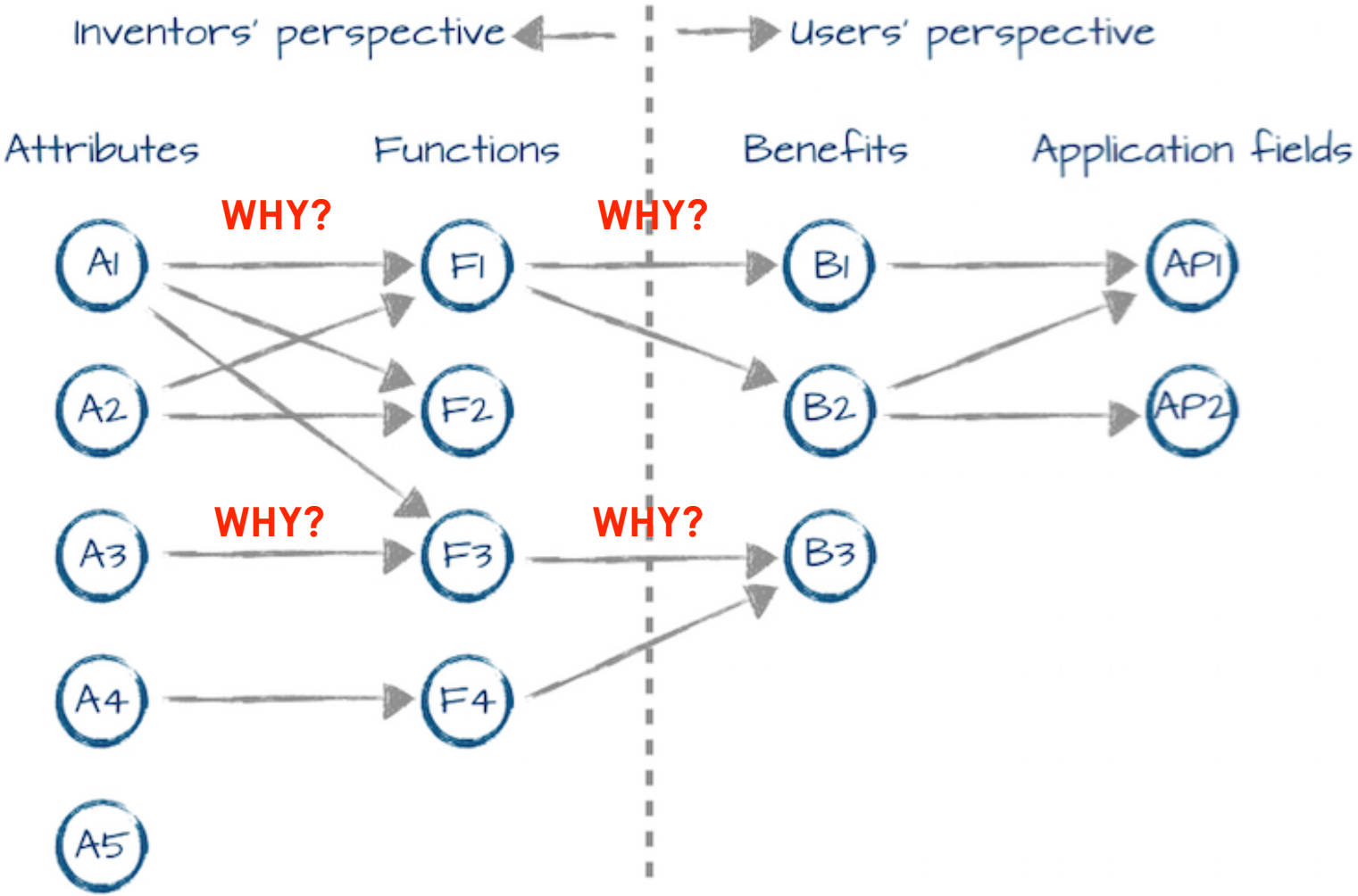
Benefits

- describe how people gain advantages from using the technology
- arise in specific use situations
- can not be measured reliably

Sources: Keinz & Prügl, 2011

Attributes vs. Benefits

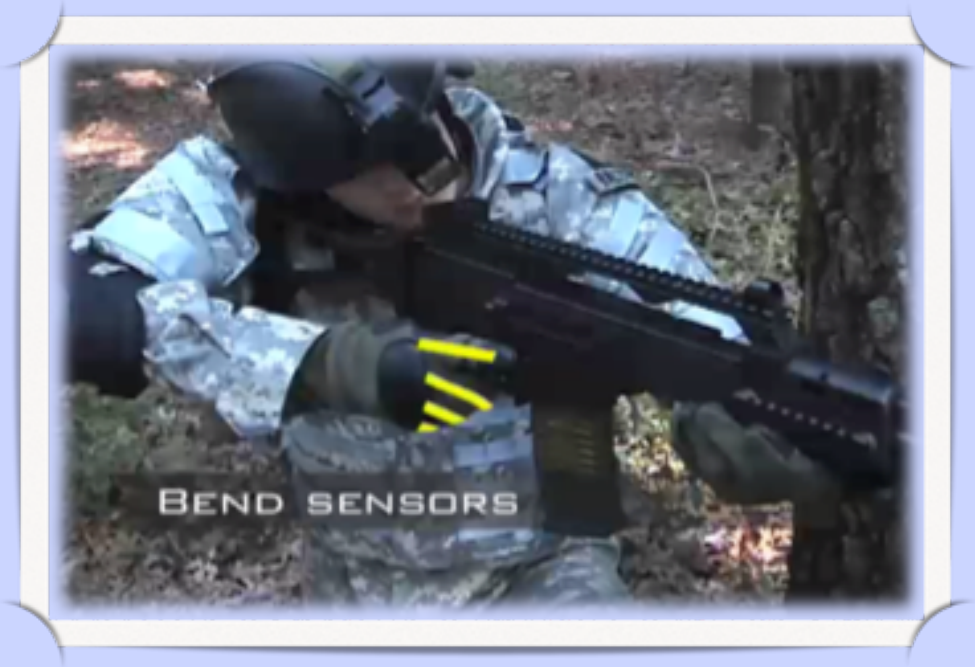
You can reveal a technology's benefits by the "laddering" technique.



Sources: Keinz & Prügl, 2011

Team exercise 1

Identify the benefits delivered by the HCID technology from a user's point of view and label them appropriately.



- Groups of 3-5 people
- Timeline: max. 10 minutes

Sources: Keinz & Prügl, 2011

A possible solution

Interviews with current users remained 3 main benefits, 2 of them were "new" to RallyPoint.

... HCID enables me to control my radio without having my hands go off the rifle...

.. even minimal gestures are noticed which is important if you are in a dugout...

..on scouting missions or during combat, I can control my devices without having to speak...

3rd hand/multitasking

„silent" communication

minimal gesture capturing

Sources: Keinz & Prügl, 2011

Tips from experience - Step I

Clarify on the transfer object

vs

Talk to users to reveal „actual“ benefits

Focus on the technology‘s problem solving capability rather than tech specs

HDDM Technology (High Definition Distance Measurement)

- HDDM is a statistical time-of-flight measurement technology
- Statistical evaluation of several 100 pulses in each measurement cycle to get one measurement value
- HDDM offers economical but highly accurate & reliable time of flight measurement
- Coded sending sequences of Dx35 assure unique measurement and avoid cross talk when using several sensors

So what?

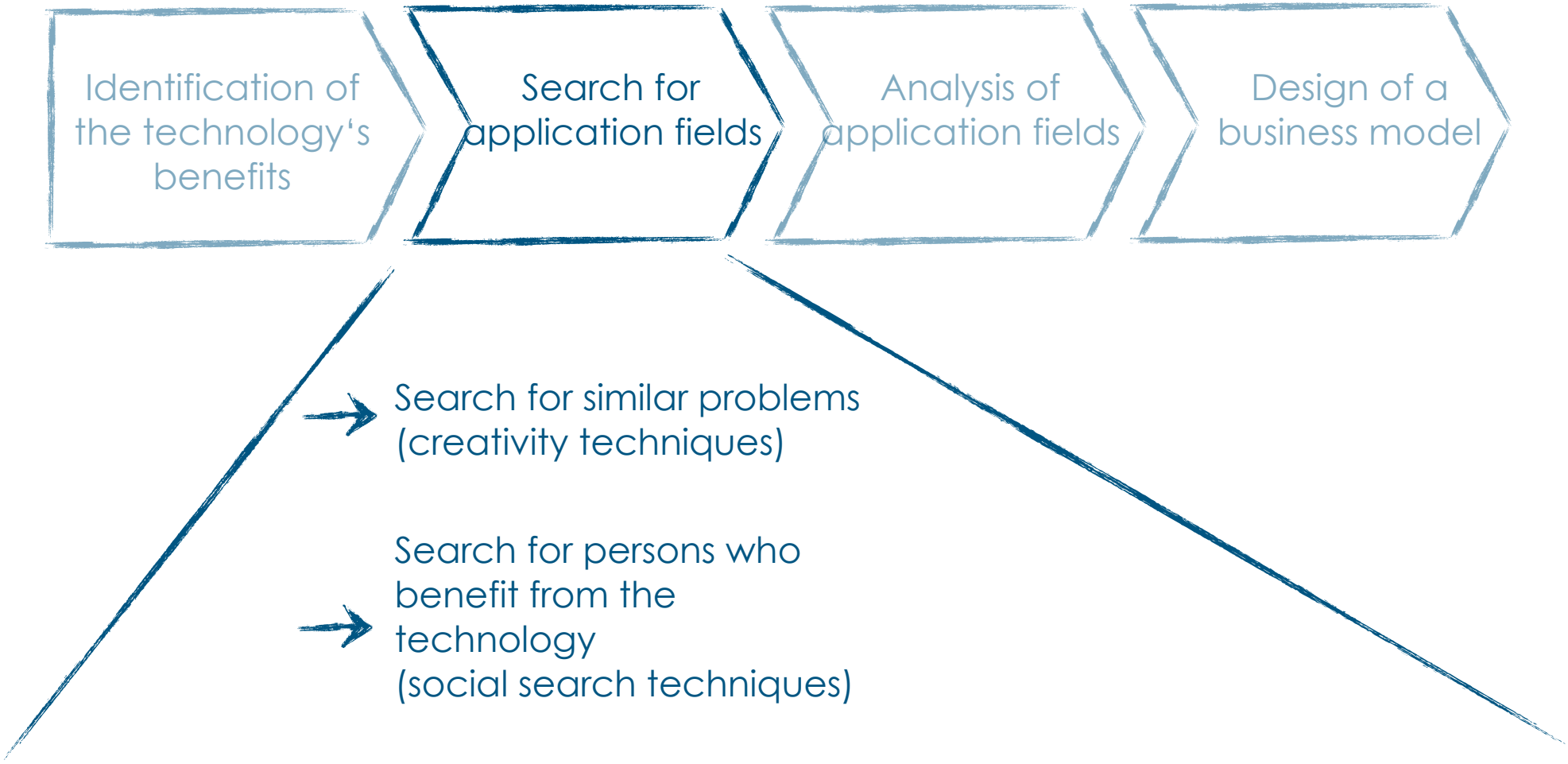
Be as abstract as possible when labeling the technology‘s benefits

3rd hand/multitasking

Sources: Keinz & Prügl, 2011

Step 2

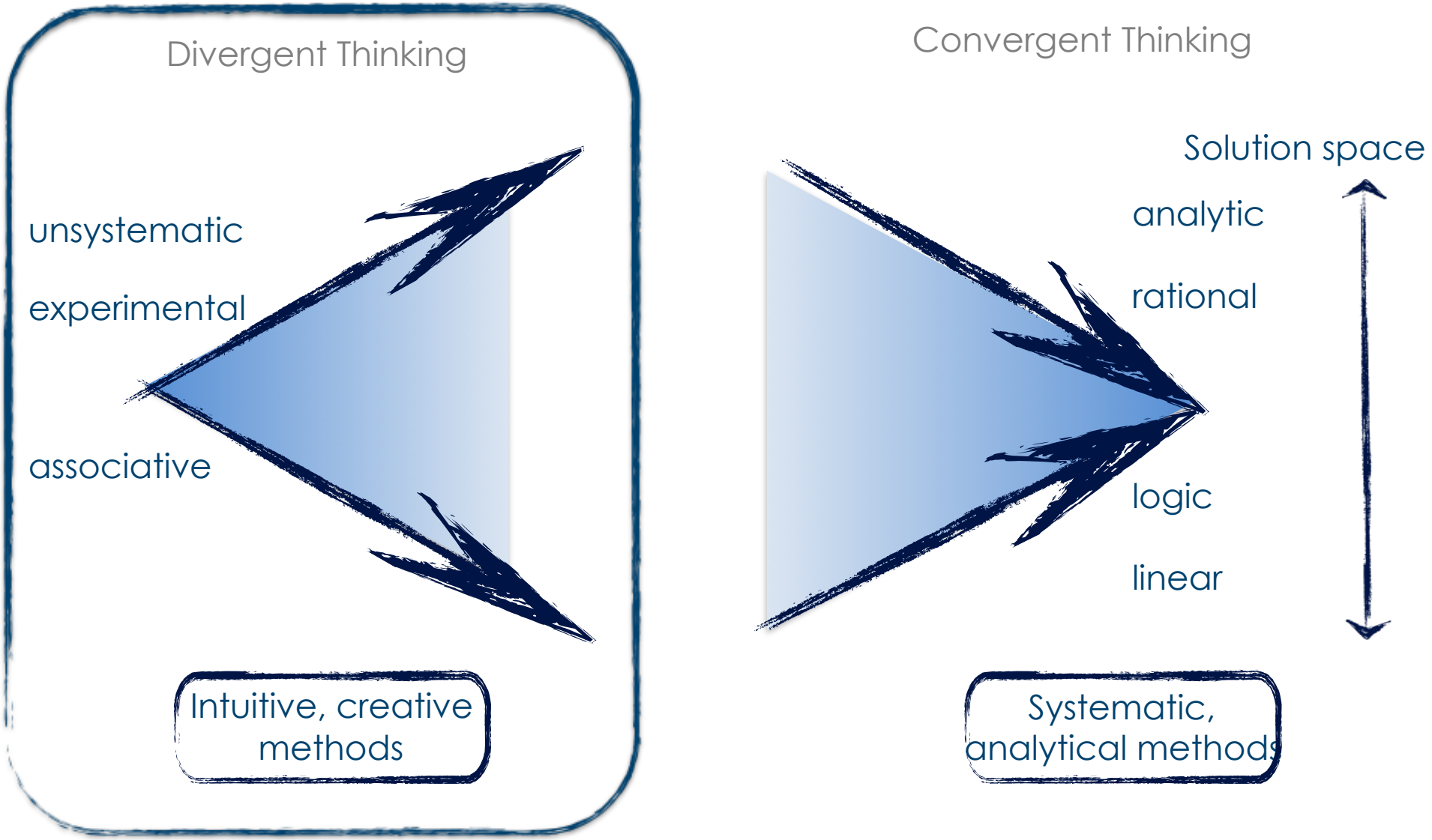
The second step is about searching for concrete application fields.



Sources: Keinz & Prügl, 2011

Overview: Creativity techniques

Creativity techniques can be devided into two categories.



Brainstorming

Brainstorming is the best known and easiest creativity technique.

Goal: generation of as many ideas as possible

Duration: 30min

Basic rules:

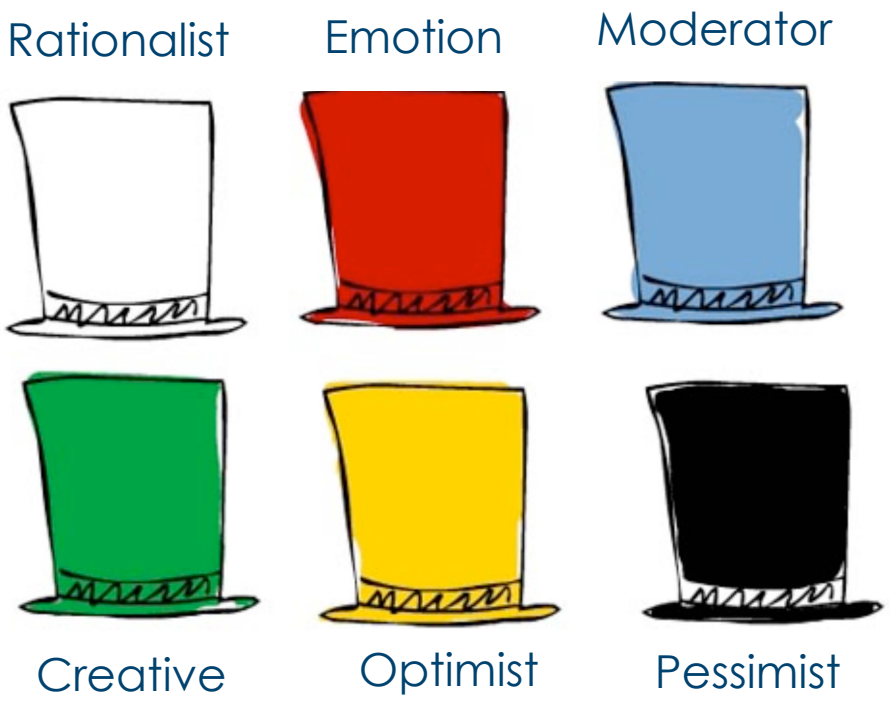
- Quantity before quality
- Everything goes
- No feedback or critique during the ideation process
- Build on ideas of others

Tips

- Don't stop in the "valley of tears"
- the best ideas are yet to come
- Nominate a moderator
- Group ideas only after ideation

6 Thinking Hats

The 6 Thinking Hats is a creativity techniques by Edward de Bono that allows for applying different perspectives on a problem.



Tips
- Appoint a moderator
- Explain the method
- Use flip-charts and cover them after each round
- Visualize the 6 hats

Group discussion/Brainstorming with different roles
The whole group takes on each and every perspective step by step
Ideas are visualized
Reflection of all findings after the discussion phase(s)
Start with the white hat, end with the blue hat

Word Association analysis

The Word Association analysis triggers unsystematic thinking and new associations.

Goal: Find completely new associations by "getting out of the box"

Duration: 15 min

Steps:

- Define the problem
- Chose a random word or picture that is completely unrelated to the problem
- Try to find connections between your problem and the word/picture

Tips

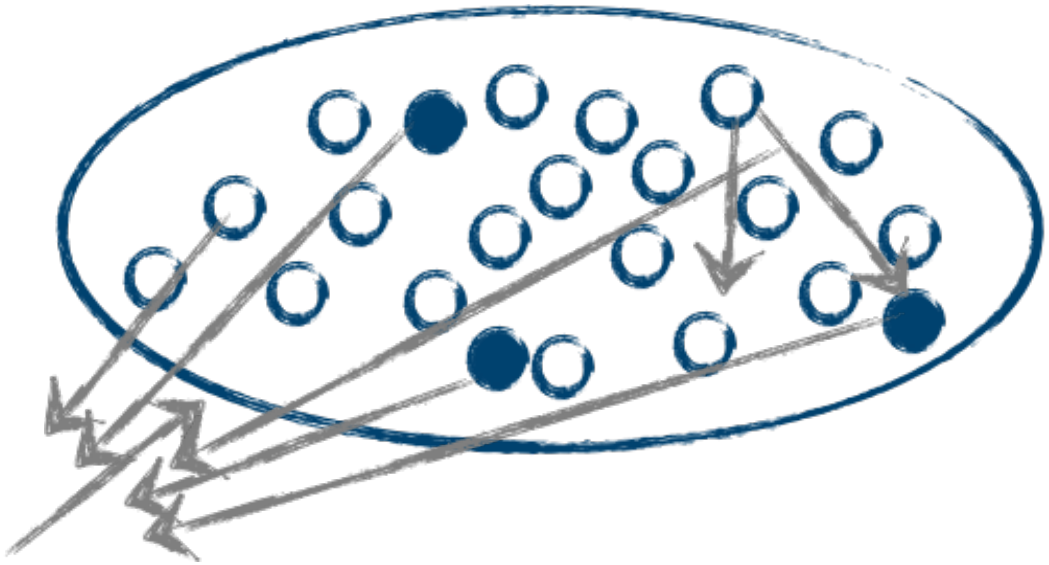
- Chose a random word out of a staple of books/magazines
- No moderator needed
- do short brainstorming on the connections/associations

Social Search techniques: Broadcasting

Latest developments in the field of ICTs have paved the way for social search techniques, e.g. Broadcasting and Pyramiding.

Broadcasting

(Postings in online forums & User Communities)



... Postings
(75% result in valuable ideas)

... Users with relevant problems

... Users in a forum

Who could benefit from a solution, that ...

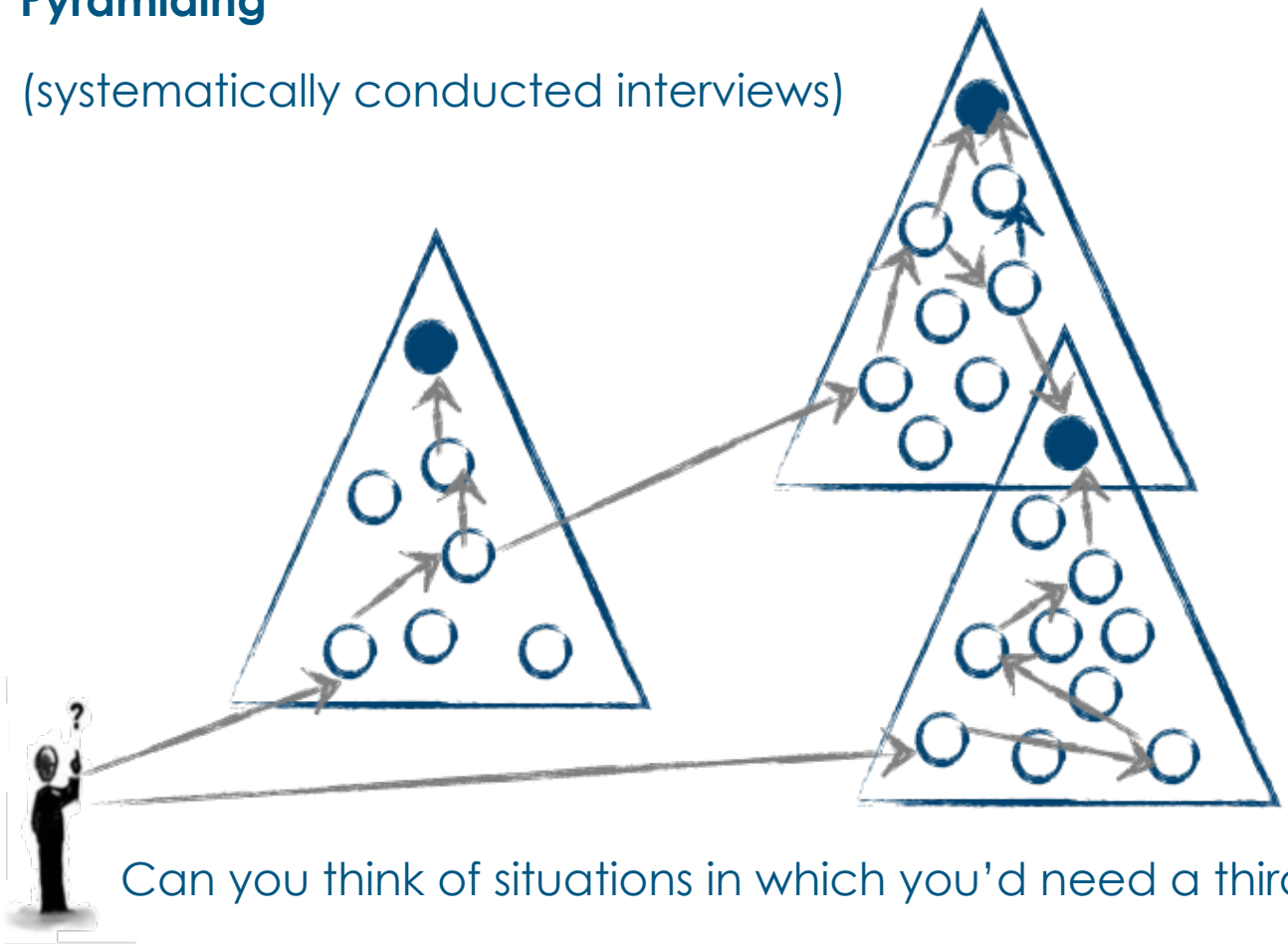
Can you think of any other areas where people suffer from similar problems like…?

Social Search techniques: Pyramiding

Latest developments in the field of ICTs have paved the way for social search techniques, e.g. Broadcasting and Pyramiding.

Pyramiding

(systematically conducted interviews)



... referral by the interviewee (25% lead to application ideas)

... Users with relevant problems

... Interviewees

Can you think of situations in which you'd need a third hand?

Can you think of anybody with a similar problem who might benefit from a third hand?

Information to be gathered during Step 2

In this step, you want to learn everything about the potential user's problems.

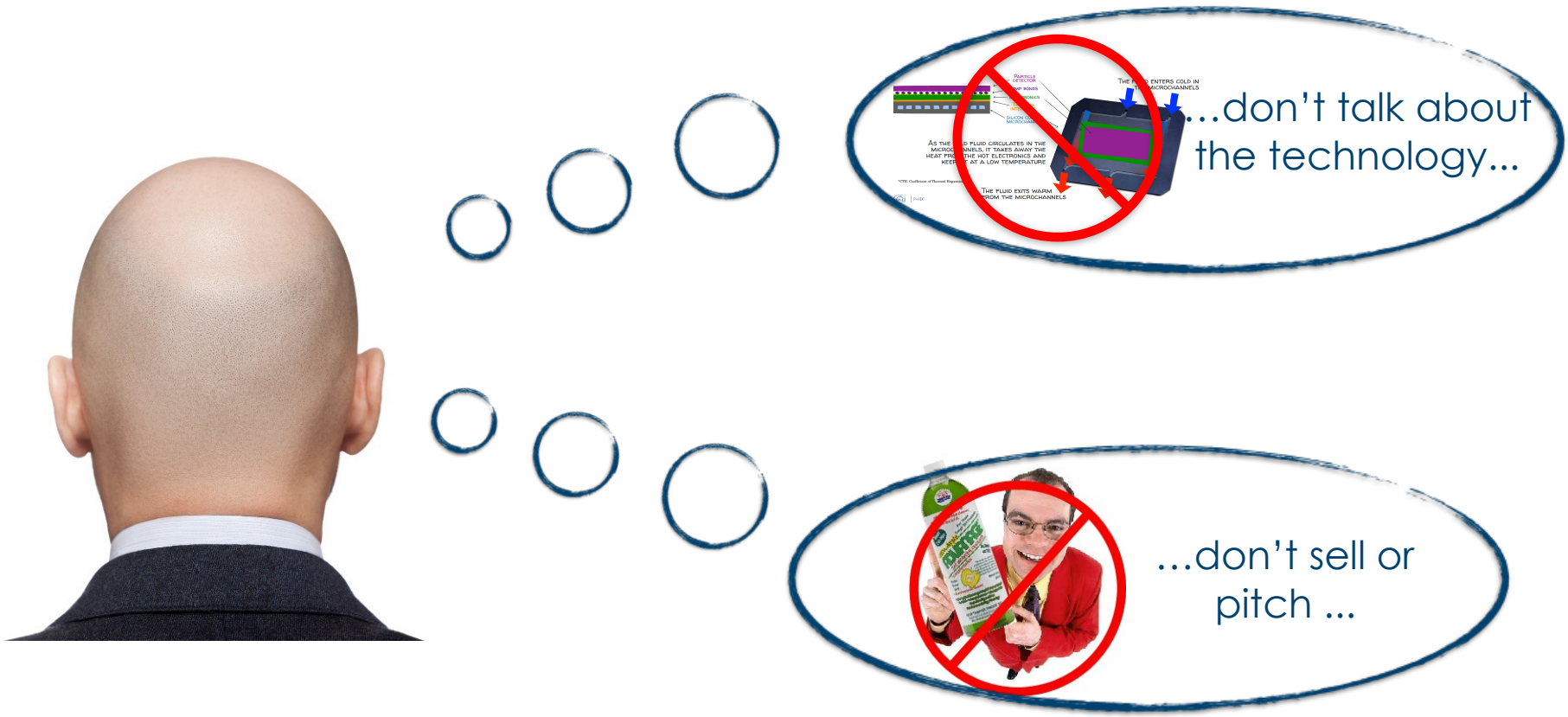
Essential information:

- problem in the application
- Current solution and potential solution as offered by the technology
- Technical requirements
- Information on Benefit relevance
- Information on Strategic Fit
- Number of mentions
- Willingness to pay
- Contact data and referrals

Conducting customer-insight interviews

When conducting customer-insight interviews, beware of two common mistakes.

2 central principles:



A possible solution

150+ interviews and some 40 postings yielded nearly 90 application fields, 30 of them highly feasible and commercially attractive.

152 Interviews

37 Postings

> 30 applications

95% far-analogous areas

- Police
- Fire brigade
- Gaming
- Industr. welding
- Presentation device
- RC robot arm
- Flight controller
- Sterile keyboard
- Computera. surgeries
- motor cyclists
- Diving
- Virtual rehabilitation

Sources: Keinz & Prügl, 2011

Example of a successful search process

Combining different search approaches yields in efficient and effective search processes.

Private James W. Drewer

„... maybe gotcha-players, I know a guy who might ...“

www.gotcha-action.de, User „speedfreak“

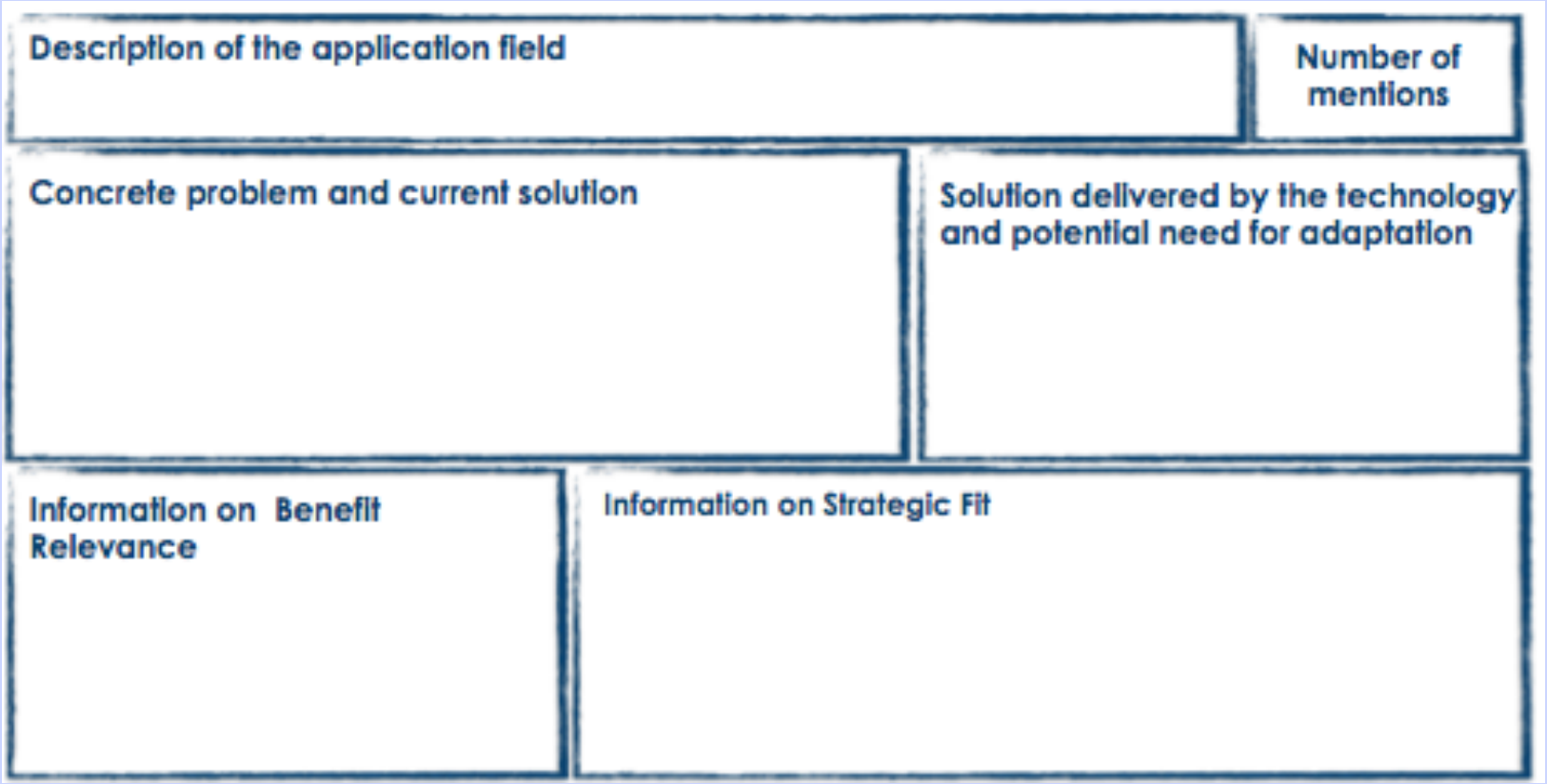
„... would be cool to control the headset during a tournament. However, diving might be interesting as well. Go and ask my diving instructor Yvonne…“

Dr. Yvonne F., physician and diving instructor

*„... maybe for underwater photographers…*and definitely interesting in the field of stroke therapy…“

Team exercise 2

Identify as many application fields as possible. Choose one and explain it in detail by using the application canvas.



- Groups of 3-5 people
- Timeline: max. 20 minutes

Sources: Keinz & Prügl, 2011

Tips from experience - Step 2

Search for areas and persons

Police

Industr. welding

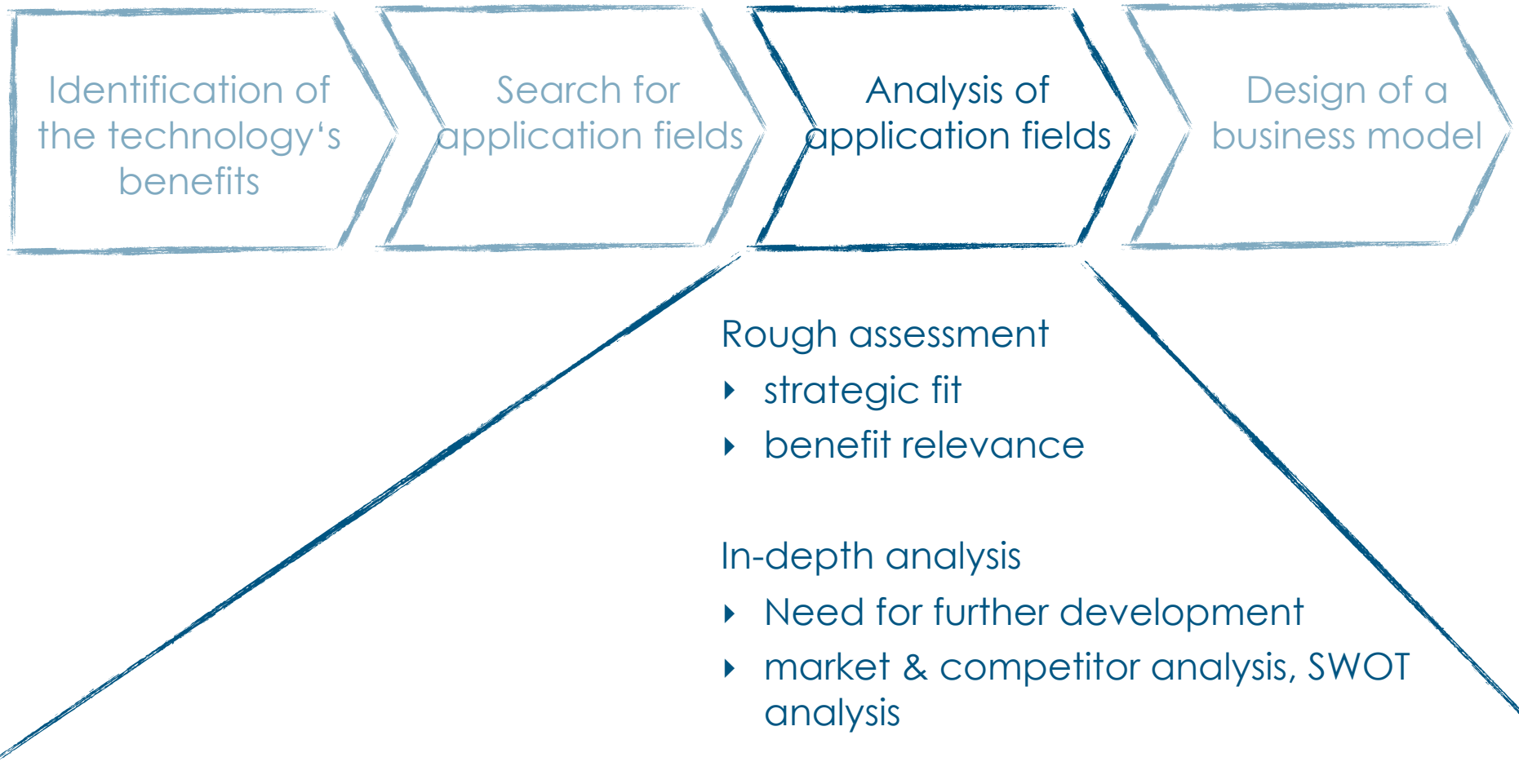
Use your personal network

Validate your application areas

Combine search techniques

Step 3

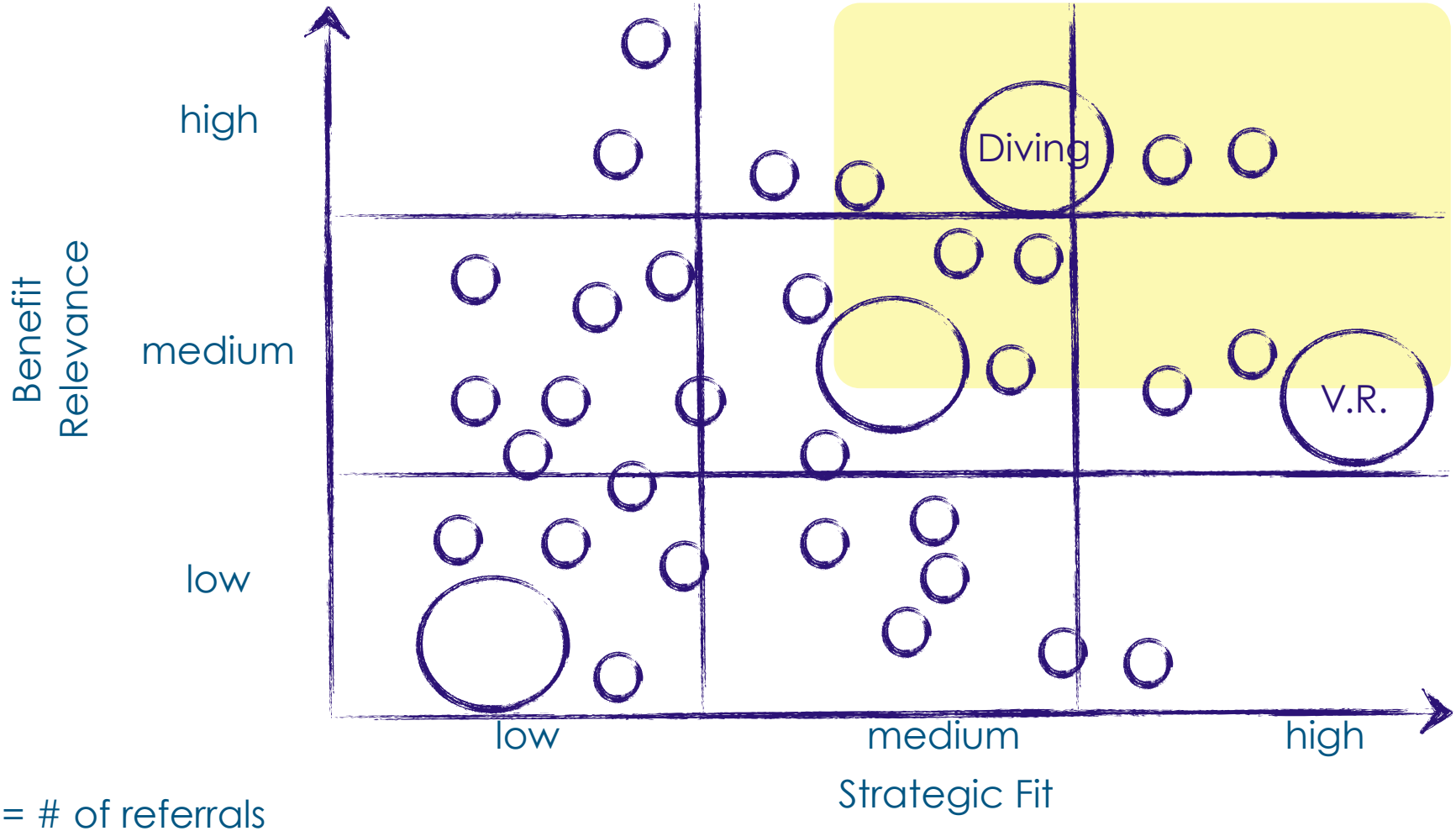
The third step is about evaluating the identified application fields.



Sources: Keinz & Prügl, 2011

Rough assessment of application fields

A first but valid assessment of the application fields can be done using the indicators Benefit Relevance and Strategic Fit.



Bubble size = # of referrals

Sources: Keinz & Prügl, 2011

Application field "Diving"

A first but valid assessment of the application fields can be done using the indicators Benefit Relevance and Strategic Fit.

Typical problems of divers

Solution through HCID

Waterproof diver's glove regulating the compressed air cylinder

- 3rd hand/multitasking
- sensitive motion capturing
- „silent" communication

Sources: Keinz & Prügl, 2011

Application field "Virtual Rehabilitation"

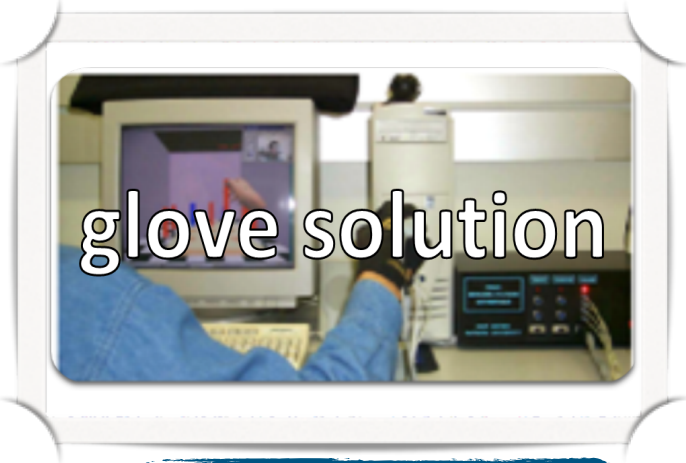
Patients recovering after a stroke need guidance and professional feedback during their rehabilitation therapies.

State-of-the art stroke therapy

low effectivity due to
- a lack of motivation
- a lack of feedback

Solution through HCID

Stroke therapy with the HCID



~~3rd hand/multitasking~~

sensitive motion capturing

~~„silent"~~ communication

Sources: Keinz & Prügl, 2011

Calculating Benefit Relevance

Benefit Relevance is a valid indicator of market attractiveness.

$$\frac{\text{\# of benefits relevant in AF}}{\text{\# of all benefits}} \times \text{Relevance index *}$$

* = Index built from 4 items; 3-point multi-item likert scale (0 = I don‘t agree, 1 = I agree, 2 = I fully agree)

Items: The problem is highly relevant; The problem will become even more relevant in the future; There is no solution to this problem yet; Many people suffer from this problem.

Sources: Keinz & Prügl, 2011

Calculating Strategic Fit

Strategic Fit describes the application field's fit with the company's strategic requirements towards new applications.

$$\frac{\text{Time horizon } * + \text{Resource fit } *}{2}$$

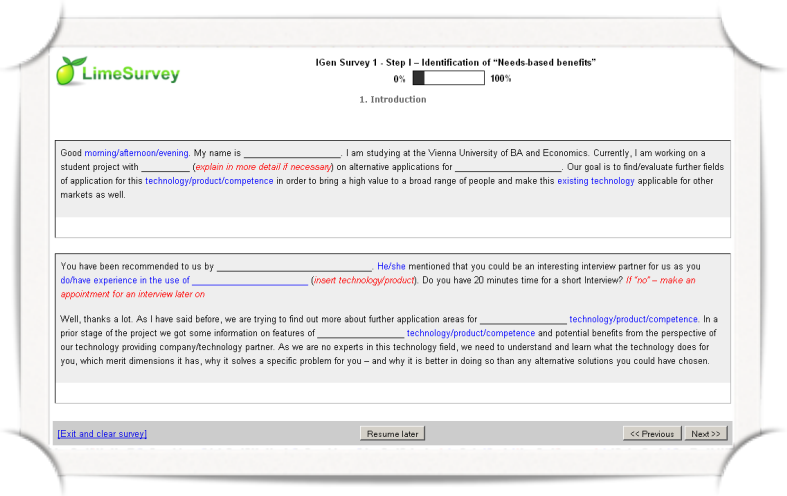
* = measured using 3-point single item likert scales (0 = not at all, 1 = somehow, 2 = perfectly)

Items: Time horizon -> Desired and actually possible market entry coincide.
Resource fit -> Market can be served with existing resources.

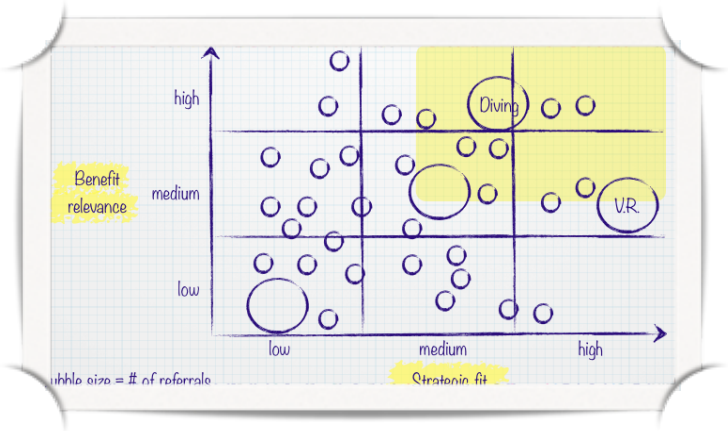
Sources: Keinz & Prügl, 2011

Tips from experience - Step 3 (rough assessment)

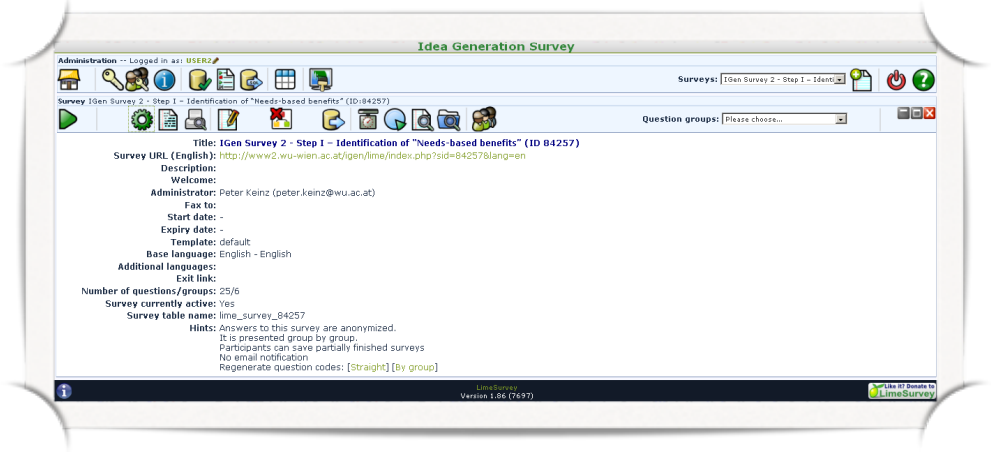
Use an interview guideline



Do not put too much effort into calculations



Document all your interviews



Adapt „benefit relevance“ and „strategic fit“ to the specific needs of the project

How to increase ROI by systematically exploiting business opportunities in non-military applications?

Sources: Keinz & Prügl, 2011

Step 3.2 (detailed evaluation) and Step 4

See Tomorrow's Lecture

The Challenge

Let me introduce to you: The KEINZ pump

- Invented by Peter Keinz, student at the Technical University Vienna
- rotorless pump
- simple construction
- hardly any moving parts
- noise level: 10 decibel
- resistant to acids with a PH value of up to 10

The Challenge

Your tasks:

-> Analyse the technology presented and derive it‘s benefits from a user‘s perspective.

-> Conduct interviews with the inventor and one potential user to gain additional information on the technology and its applications.

-> Come-up with at least 3 viable application fields.

-> Validate and explain them in detail, using the application canvas.

-> Chose one of them, convince Peter Keinz about your idea and get a 50% share in the company!

Rules of the game:

-> Work in groups of 3 to 5 people each.

-> You may use sources; you could interview Peter Keinz, the inventor; there are some statements of interviewees available to you.

-> If you make any assumptions, be prepared to explain them.

-> Deadline for the presentation: 4 pm

-> Prepare a short presentation (max 5 minutes) about your findings

Sources: Keinz & Prügl, 2011

Thank you!

In case of any questions and/or ideas, please contact me:

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To receive a full literature list, please send me an email!