# Identification of New Application Fields for Technologies: Sequential Search Increases the Problem-Solution-Fit

**WU** WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

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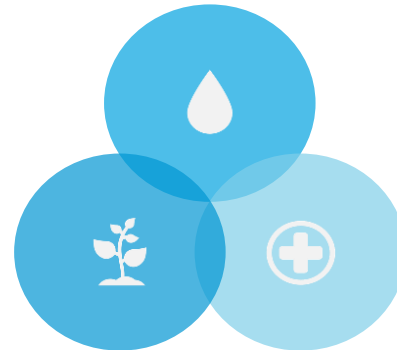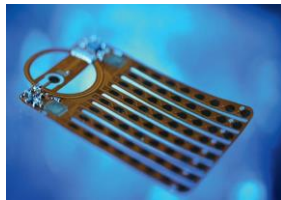
# Problem & Background

# Commercialization of innovative technologies: Approaches to the identification and evaluation of new applications for technologies

*Methods of identifying and evaluating new business opportunities for new technologies and products can be summarized in three steps.*

**1** Identification of benefit dimensions

**2** Search for relevant fields

**3** Analysis of the most attractive fields from a commercial perspective & implementation

Source: Henkel und Jung , 2009; Keinz und Prügl, 2010

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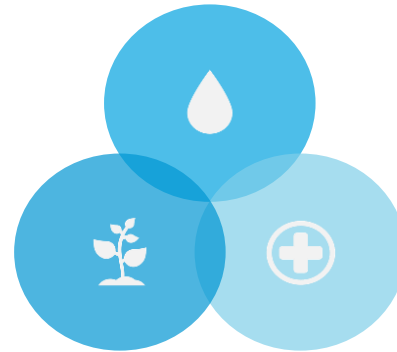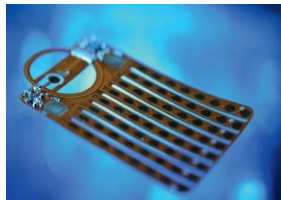
## How to search for relevant fields?

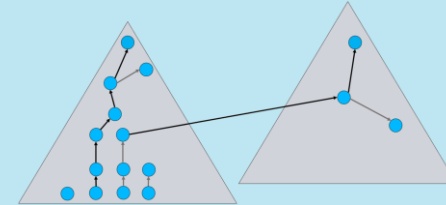# How to search for relevant fields using external knowledge

| **Parallel** search | **Sequential** search |
|:---:|:---:|
| **Crowdsourcing challenges** | **Pyramiding** |



"By tapping into a broad, diverse community of solvers, you can often solve problems **faster, better, and cheaper** than you can internally" (Lakhani, 2016)
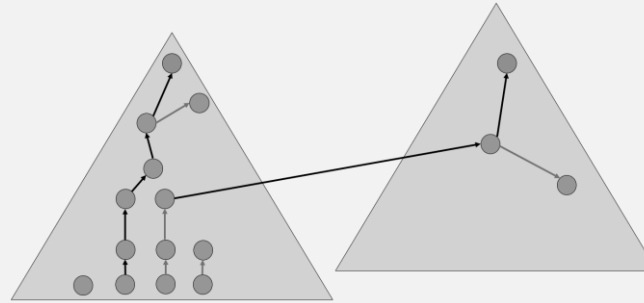
"Pyramiding holds **great potential** for **crossing** domain-specific **boundaries** and identifying problem **solvers** from contextually **distant domains**" (Poetz & Pruegl, 2010)
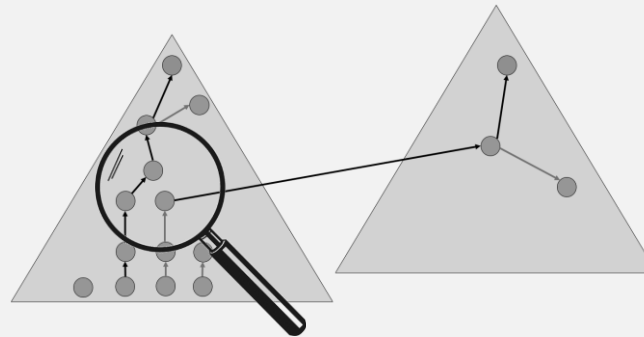
## What's the **benefit** of **sequential search**?

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# Sequential search for external knowledge

**Sequential search**



- Innovation projects often complex and **ill-structured**
- **Objectives**, evaluation criteria, and boundary conditions **need to be refined** during the project
- Sequential search allows for such learning and hence is **potentially advantageous** to parallel search
- So far, role of **learning** in sequential search **unclear**

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# Research Questions

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1. **What** do searchers **learn** in the sequential search processes?

2. What **effects** do these learning processes have **on the**

**outcomes** of sequential search?

?

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# Methodological Approach & Data Collection

# Method: Exploratory longitudinal field study

**1** Nano-porous materials — Fraunhofer

**2** Near infrared detectors — am · Sensing is life.

**3** Lightweight hydraulic cylinders — MARK

**4** Elastomer injection molding — RORA MOTION

New application fields?

## Sequential search

n=18, 4 teams

Pre-test

Documentation & observation

Post-test

In-depth interviews

10 weeks

## Crowdsourcing contests

Atizo solver community
>25.000 members

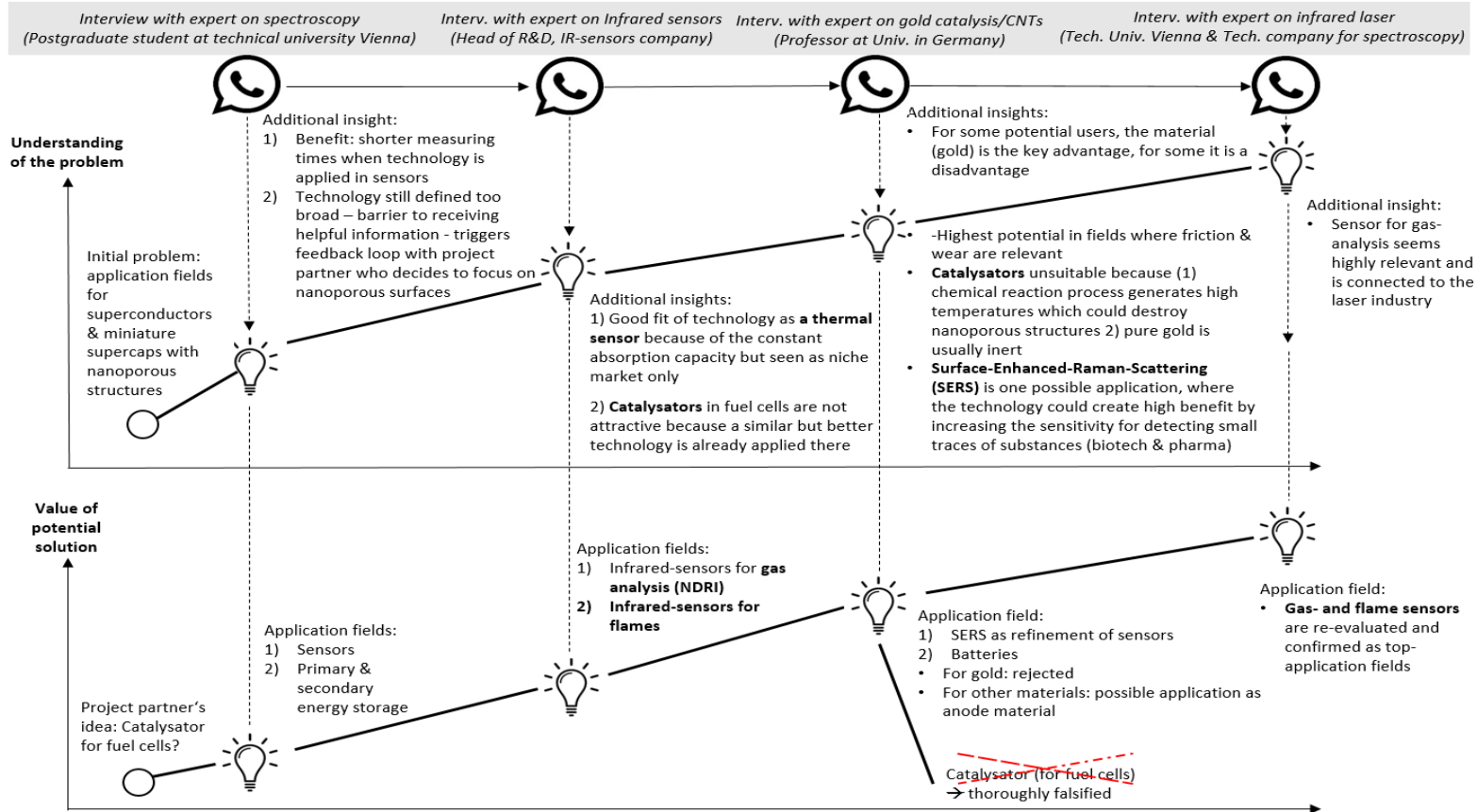atizo.com

Expert evaluations of solutions

# Findings

# Research Questions

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# Learnings in a typical search chain

# Sequential search in the innovation context facilitates learning about the problem, the search space and solutions

**Most important and valuable: (re)- structuring and refinement of the problem and potential solutions**

## Problem category - Structure & specification:

- What is the problem? E.g. what is the transfer object?
- Background and causes of the problem, e.g. limitations of the technologies
- Priorities: e.g. which benefits of technology are most important for potential users

## Value for the problem owner:

- **Exploration** & **challenging** of perceived problem
- Overcoming **biases** & identifying **limitations** unknown to the problem owner
- Important basis for **problem-solution-fit evaluation**

## Solution category: Specification

- Specific details of solutions
- Continuous refinement in correspondence to problem
- …

## Value for the problem owner:

- **Problem-solution-fit**
- More **comprehensible solutions**
- Easier **evaluation** of solutions
- Added **knowledge** on **implementation** of solutions

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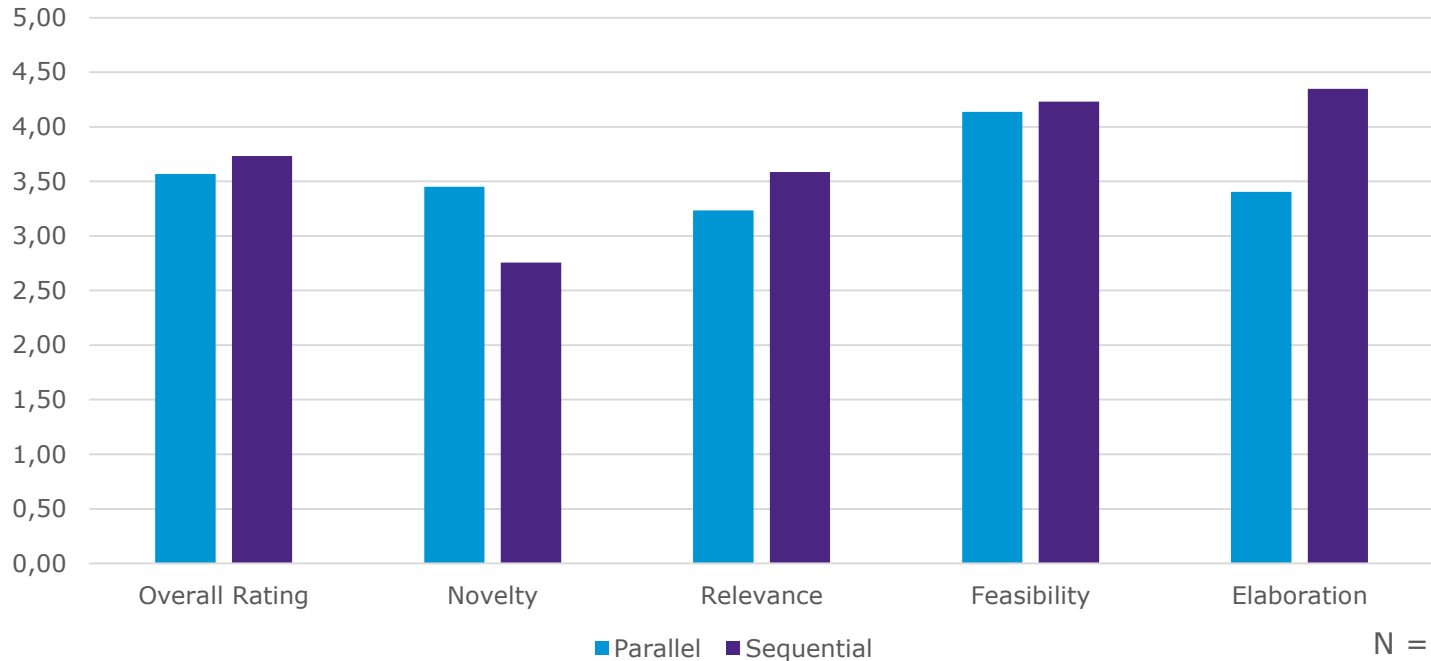
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# Structural differences in parallel search outcomes compared to sequential search

Mean rating of solutions*

Rating scale:
1(lowest); 7(highest)



Expert evaluations of solutions

N = 181 solutions

* Items for solution evaluation according to Blohm, Bretschneider, Leimeister, & Krcmar (2011)

# High-quality, detailed and specific "ready-to-use"-solutions

- Overall, problem owners rated **sequential search** solutions **higher** than contest solutions

- The main advantage of sequential search solutions compared to parallel search solutions is their increased **usefulness**

- **Iterative refinements** enable searchers to customize detailed solutions matching specific problems

- In several examples searchers could disconfirm **unfeasible** solutions within the search process that the problem owner initially deemed interesting based on evidence from multiple expert perspectives

- **Novelty** is perceived relatively **lower** in sequential search – not consistent over all problems
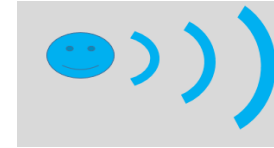
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# In a nutshell: High problem-solution-fit vs. high risk

## Sequential search…
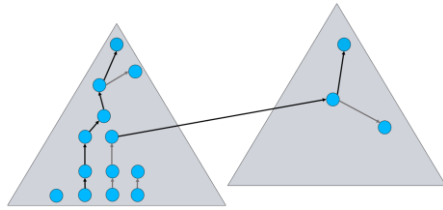


- High-quality solutions
- Good problem-solution-fit
- Easier to evaluate & implement

## Parallel search…



- Extraordinary, „crazy" ideas
- Higher risk
- Higher uncertainty

# Questions & Feedback

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