

How should we search for new application fields for technologies?



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Problem & Background

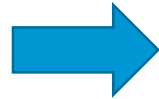
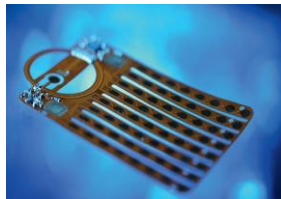


Commercialization of innovative technologies: Approaches to finding new application fields

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

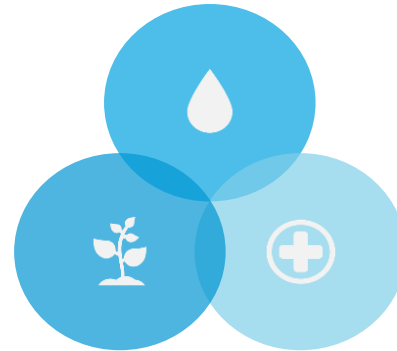
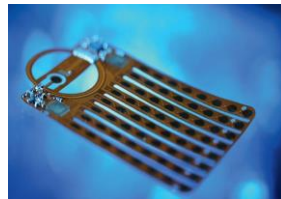


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How to search for relevant fields?

How to search for relevant fields using external knowledge

Parallel search

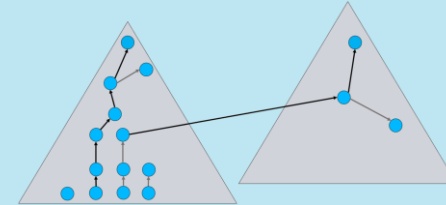
Crowdsourcing contests



“By tapping into a broad, diverse community of solvers, you can often solve problems **faster, better, and cheaper** than you can internally” (Lakhani, 2016)

Sequential search

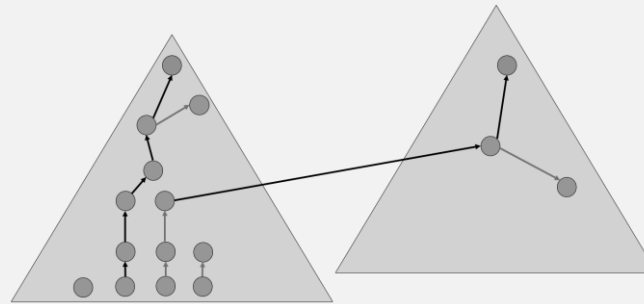
Pyramiding



“Pyramiding holds **great potential** for **crossing** domain-specific **boundaries** and identifying problem **solvers** from contextually **distant domains**” (Poetz & Pruegl, 2010)

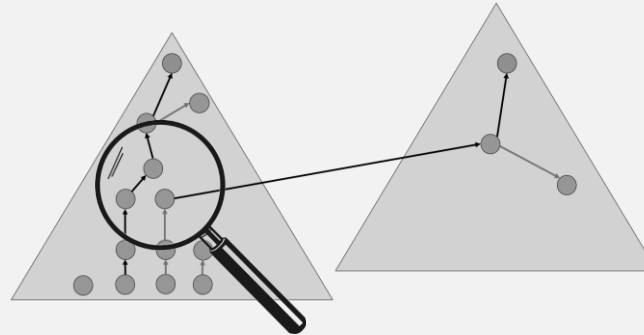
What's the **benefit** of **sequential search**?

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



Research questions

1. **What** do searchers **learn** in the sequential search processes?
2. What **effects** do these learning processes have **on the outcomes** of sequential search?




Methodological Approach & Data Collection




Method: Exploratory longitudinal field study

1 Nano-porous materials 

2 Near infrared detectors 

3 Lightweight hydraulic cylinders 

4 Elastomer injection molding 

New application fields?

Sequential search

n=18, 4 teams

Pre-test

Documentation & observation



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Post-test

In-depth interviews

10 weeks

Crowdsourcing contests

Atizo solver community
>25.000 members



Expert evaluations of solutions

Findings



Research questions

1. **What** do searchers **learn** in the sequential search process?
2. What **effects** do these learning processes have **on the outcomes** of sequential search?



Findings: Pyramiding searchers learn about the problem

Problem & goal learning

Problem structure
& refinement

New problem &
goal formulation



New characteristics
and benefits emerge:
Is the **technology**
biocompatible?



What new **features**
do customers want?

Findings: Pyramiding searchers learn about the search space

Search space learning

Search space
structure

Source quality

 **Fraunhofer**



Carbon nanotubes:
Where does the field
develop most, who are
the big players, who does
research... ?

Manufacturers can
provide more relevant
information.

Findings: Pyramiding searchers learn about solutions

Solution learning

Solution quality

Solution refinement

Potentially novel need-solution pairs

No application in in **hydroelectric power stations** - But try hydraulic pumps.

Hydraulic pumps
→ **Concrete pumps**

Can you also build **shock absorbers** with this material?



Research questions

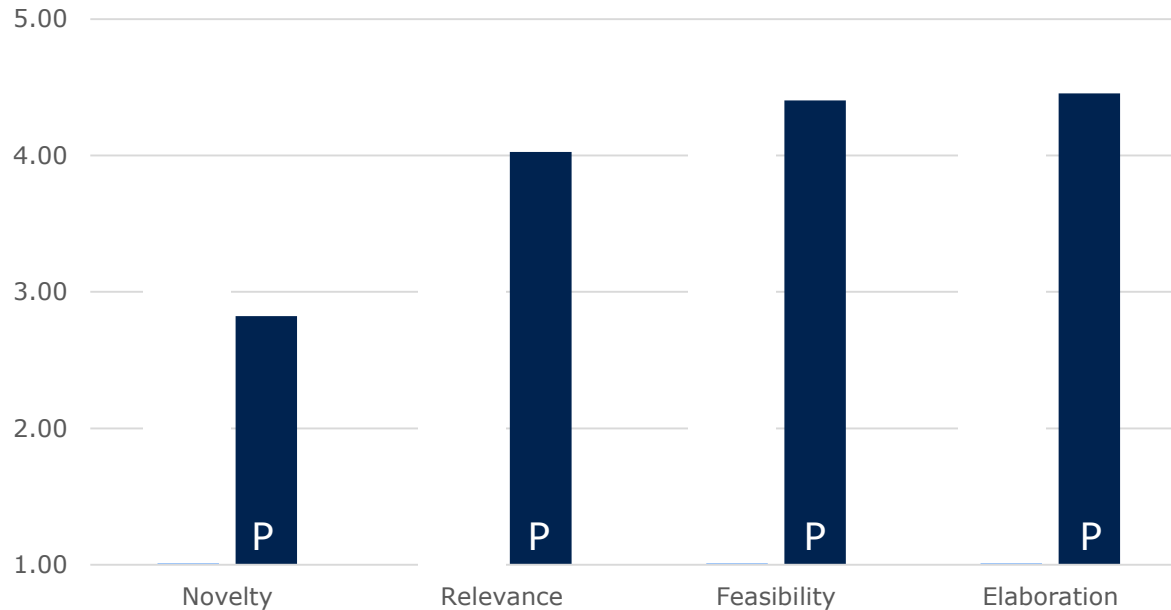
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Structural differences in pyramiding search outcomes

Mean rating of solutions by experts from the seeker organization*

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



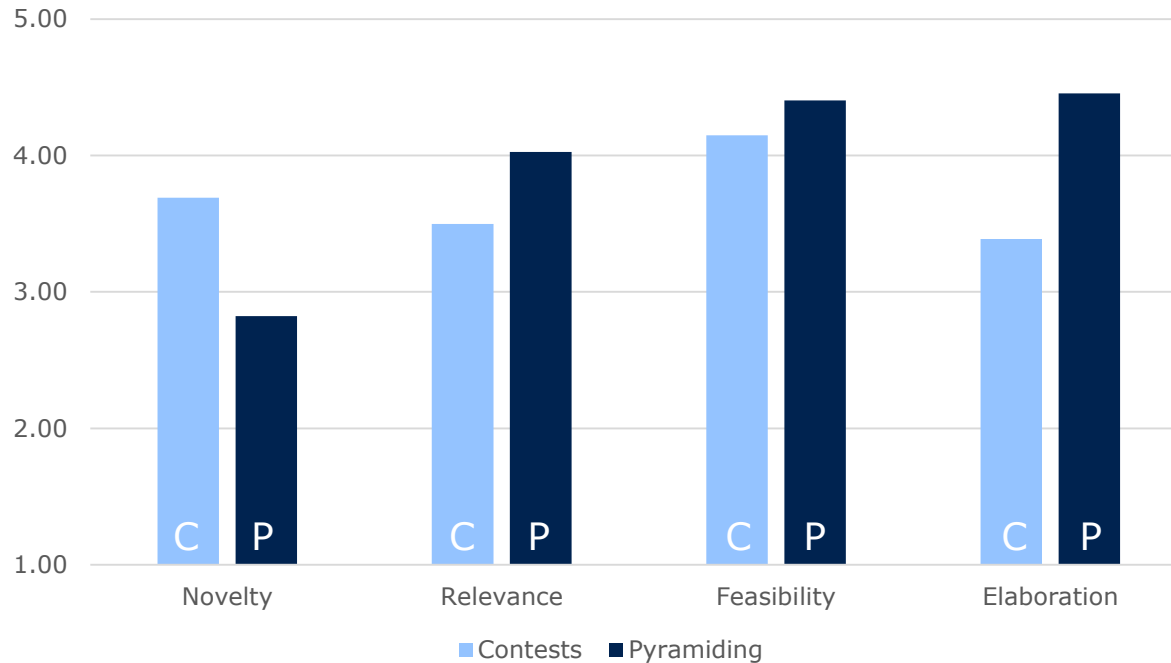
Pyramiding solutions
n = 67

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

Structural differences in pyramiding search outcomes relative to parallel search

Mean rating of solutions by experts from the seeker organization*

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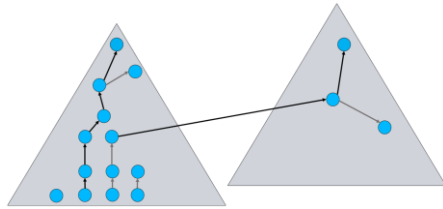
Pyramiding solutions
n = 67
Contest solutions
n = 114

Patterns are consistent for top-solutions!

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

In a nutshell: High problem-solution-fit vs. novelty and high risk

Sequential search...



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

Parallel search...



- Extraordinary ideas
- Higher risk
- Higher uncertainty

What you should ask yourself when deciding how to search for new application fields



Do you know exactly, what your problem is?

Can you define it well?

What is the accepted risk level?

What outcome do you expect?

Do you have the expertise to evaluate solutions?

How much time do you have?

Questions & Feedback



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