Can High Quality Research be Really Useful?

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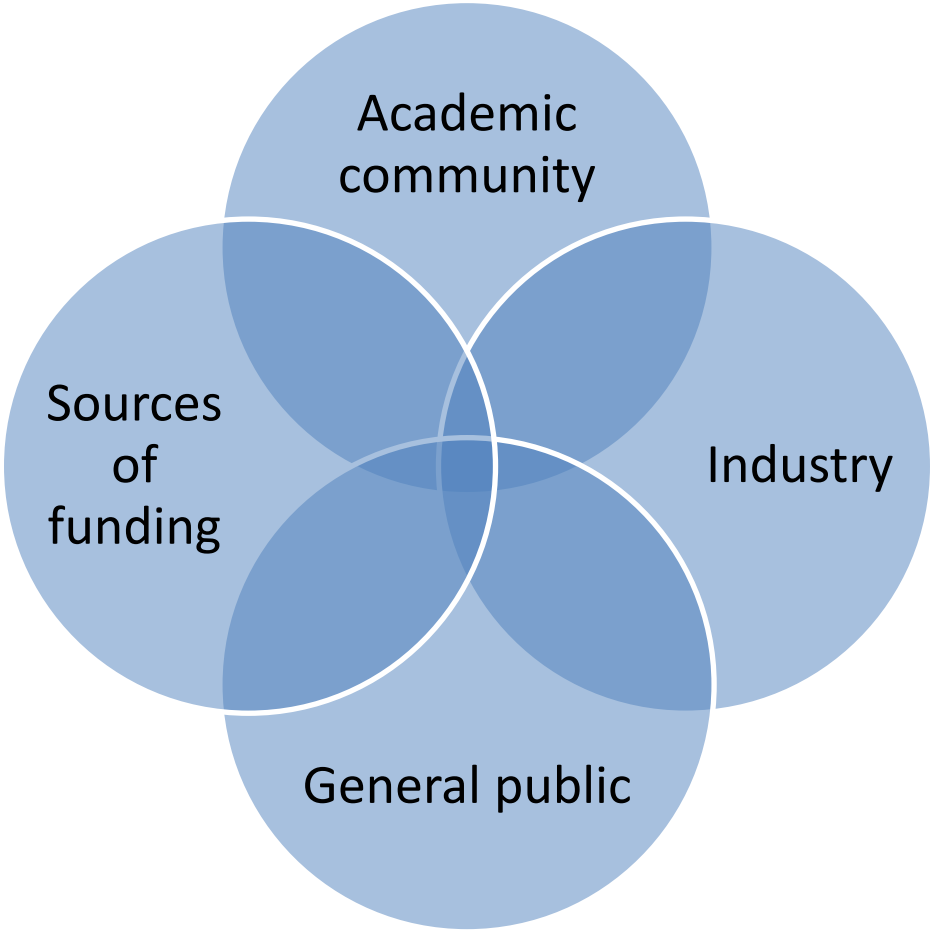
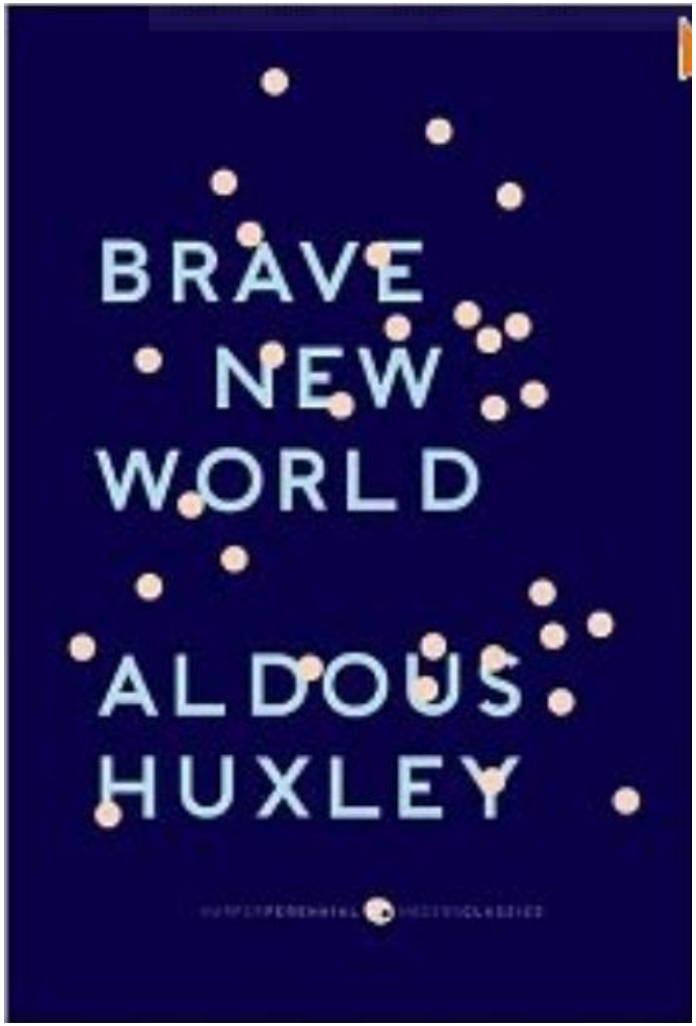
An Immediate answer: Certainly NO.

	Research	Production
The outcome	Knowledge	Product
Novelty	Is a must	Not necessary
Timeliness	Desirable	Is a must
Balance between features/parts	Not needed	Is a must
Reliability	Not needed	Expected
Relative cost	x	Approx. 10x

Viewpoints


Academic community
Sources of funding
Industry
General public

5000 Repetitions

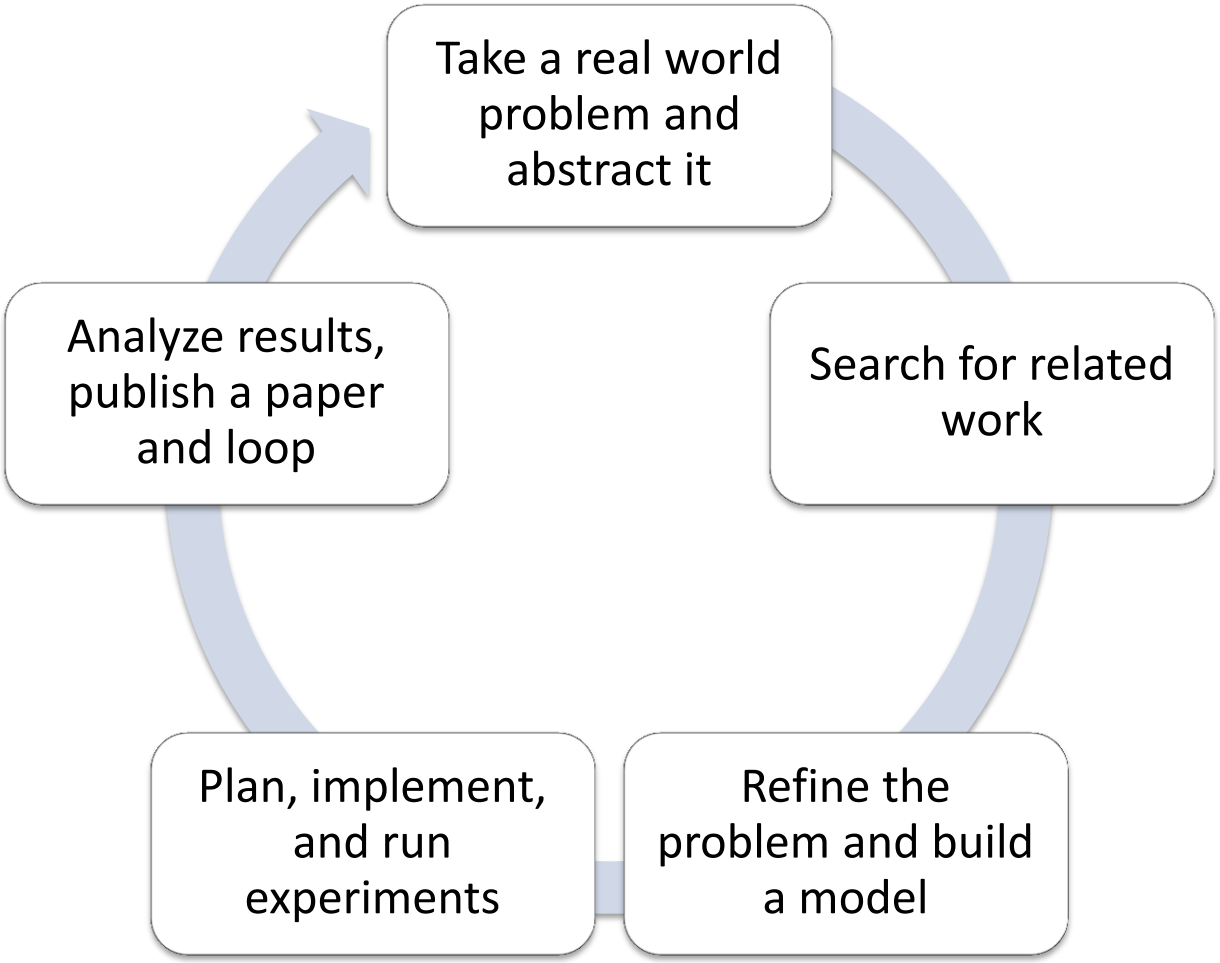


Doing Research

What Makes it High Quality?

- Originality
- Technical content
- Reproducibility
- Timeliness
- Presentation
- References

Research Cycle



Identify and Shape the Problem

- Requirements:
  - The problem Should be challenging and hard enough for your project (e.g. PhD project)
  - The goals should be feasible
- Consult:
  - Recent research publications
  - Mass media
  - Your advisor
- Do not rely completely on anyone, this is going to be your problem

Abstracting a Problem

- Start with right real-world problem
- Real-world problems are too complex for exhaustive study
- Build a model
  - Cut out everything unimportant
  - Keep everything essential
- Is the problem still there?

Dive into Related Work

- Prove the novelty of your approach
- Cannot be exhaustive
  - Rely on high-quality papers
- If you miss something important, it is your fault, ant it is severe
- Highlight the differences in your approach, but be relevant

The Theoretical Model

- Represents the knowledge gained from your research
- Provides the base for analysis and interpretation of experimental results
- Identifies the scope and applicability
- Makes the work reproducible
  - Provides guidelines for several contexts

Planning the Experiments

- Do your really need them?
- Synthetic vs. real data
  - Algorithms
  - Human perception
- What to measure?
  - Effectiveness (e.g. precision and recall)
  - Efficiency (e.g. response time)
- Statistics
  - Have you enough data?
  - How reliable are measurements?

Presentation

- Follow recommendations with caution
  - What is motivating example?
  - Explain your abstract model and concepts
  - Prototype description only does not work
  - Examples are essential
  - Explain-by-example only does not work
- Do it in your own way
  - Be creative
  - Dependencies: include only the stuff needed for main result
- Rehearse and try to present your work often

Publish Results

Quality measures

- Citations
- Reviewing
- Journal vs. conference
  - Acceptance rate
  - Revisions
- Community vs. formal measures

Ahead of Time

- Tycoon

  Migrating persistent threads in a distributed object database system (early 90-ies)

  Today: Virtual machines on a cloud

- Real-time distributed persistent object store (mid-90-ies)

  Today: Key-value stores

- More examples can be found

Making It Work

Research Objectives

Organize already known facts scatterd in several papers into a theory	Find solutions for challenging problems of real world
• Essential for teaching • The only knowledge which have chances to survive for centuries	• The only way to real-world applications

The Paths

- Basic research in an academic environment
- Industrial projects, still in an academic environment
- Trying to do it yourself: Start-Up

Long-Term Funding

- Essential for structuring of the knowledge
- Important for long projects (like PhD)
- Needed for really deep insights
- Provides stability (not always a plus)
- Tends to go too far from real life problems

Industrial Projects

- Typically short-term
- Solving problems, rather than organizing knowledge
- High risks are acceptable
- Patents vs. publications

Do it on Your Own: Start-Up

Have a great idea, just be brave to start

What happens then?

- Thousands start-up companies are created every year, but the total remains approximately same
- At least 90% disappear during the first year
- Some continue as small-to-medium businesses
- Successful are acquired by big corporations
- Out layers are well-known, never try to repeat, create new market

Gaining the Popularity

What is Really Important for Success?

- Highlight Innovations
- Present innovations as improvements
- KISS
- Claim you are dropping some old stuff
- Never try to be precise or just completely correct
- To be successful, you have to blame something or at least claim it is outdated

Big Claims

The Claim	Translates to
Finally B-trees are outdated	Actually we are using somewhat different trees
Get rid of stupid database joins	Replace optimized database queries with nested loops implemented in the application code
Performance is not an issue	The implementation is not yet available
Flexible design	Real requirements are not known
Scalable architecture	Performance is not acceptable but hardware is not expensive

Refer to Principles

- From a book on software engineering: “The object paradigm is based on the principles of software engineering, and the relational paradigm, on mathematical principles.”
- Compare to aircrafts design based on psychology **INSTEAD OF** mathematics

Mess Up the Logic

1. “All databases suffer from XXX problem”
2. Proof: Consider any DBMS, for example, xxSQL. It definitely suffers from XXX and this feature is annoying.
3. **Consequently, ANY** database has the same problem.

Quality Metrics

- “About 12000 persons already downloaded our product, consequently, there is something good in it.”
- Probably the product is really good, but the argument is NOT.
- Much more people are, unfortunately, addicted to illegal drugs.

Conclusions

- Research
  - Provides perfect fulfillment
  - Is not a way to richness
- The quality of research does matter
- Identify your objectives and choose an appropriate path

Good luck to all of you!