

What is Scientific Research?



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Objectives of the Module

1. 🧠 Knowledge :

- Sensibilization onf the scientific research process and High Superior Education system

2. 🔨 Know-how :

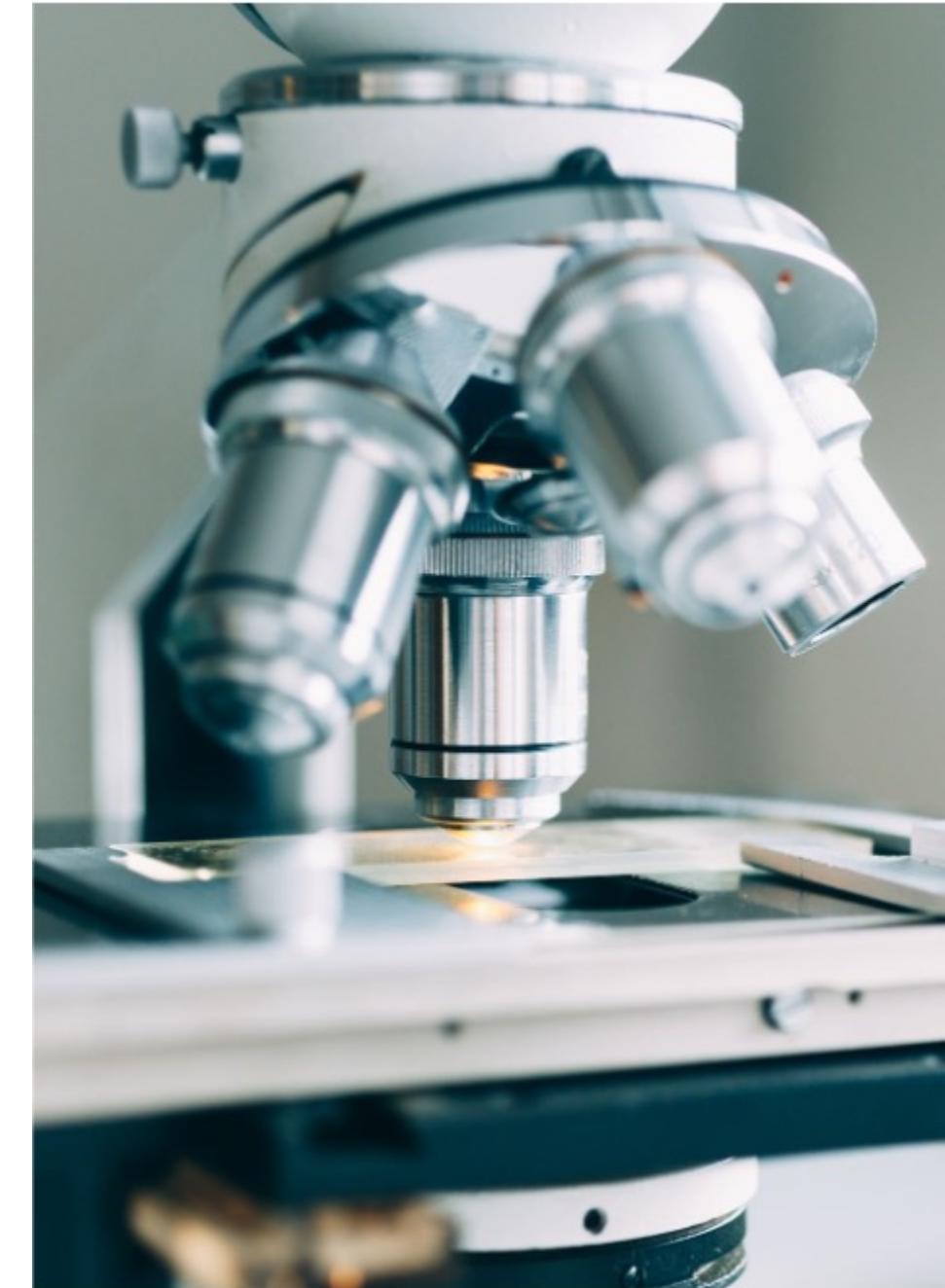
- Search on pertinent scientific databases
- Sensibilization of a crical thinking of research
- Identify a pertinent bibliography

3. ✎ Competence :

- Be able to structure a scientific document presening the main components (Context, Problem, Research Question, Methodology and Results)

Evaluation of the Module

1. A final output will be putted on ARCHE.
2. Article of **State of the Art about your Internship** (7 pages).
 - Title
 - Abstract
 - Résumé en anglais
 - Résumé en français
 - Synthèse (7 pages)
 - References



Agenda for today

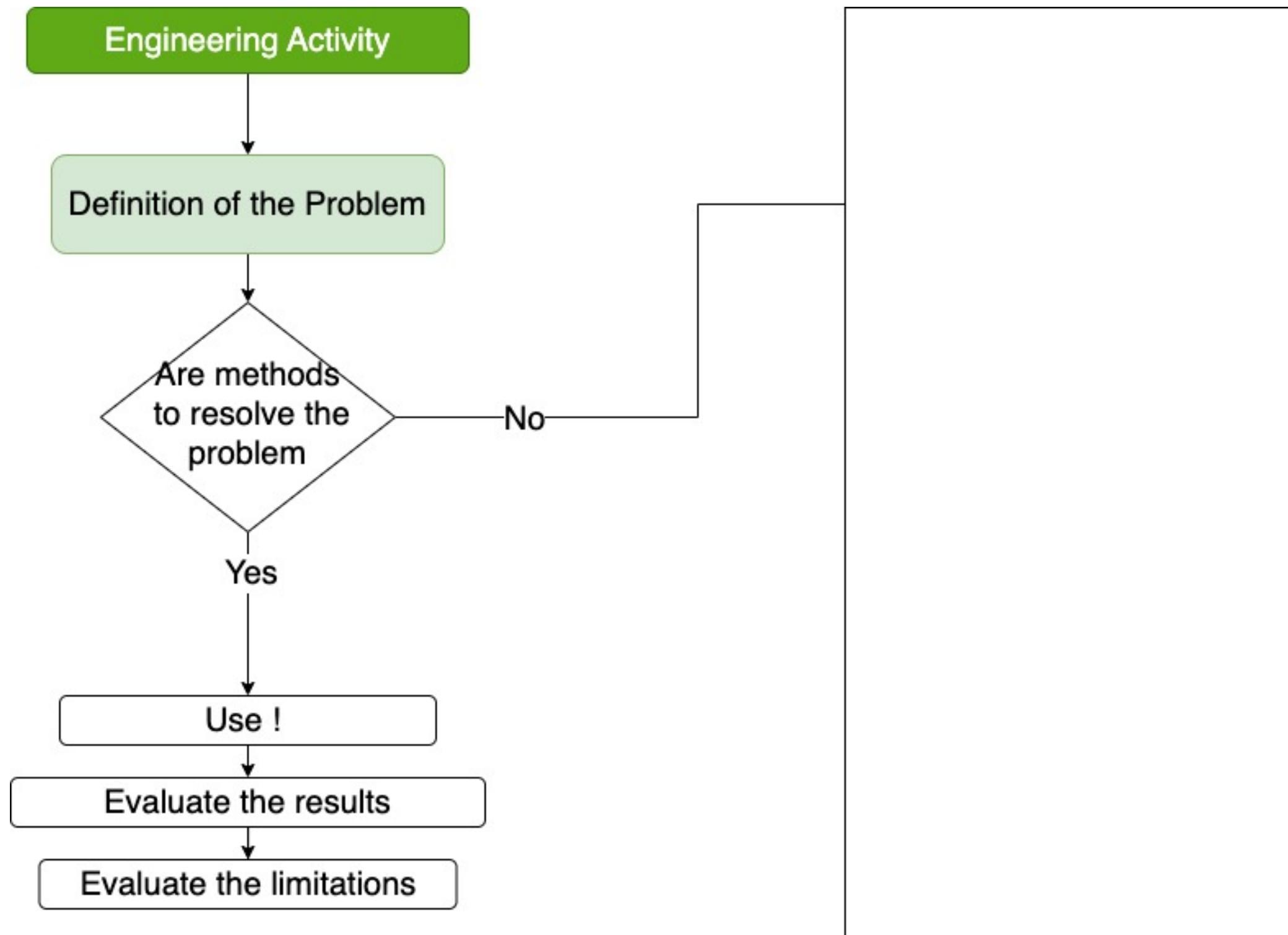
- 1. Introduction to the Scientific Research**
2. Why bother to study the scientific research?
3. Everything start with a good research question !
4. Research in the context of France

What are the difference between Engineering and Research (*in Innovation*) ?

Engineering vs Research (*in Innovation*)

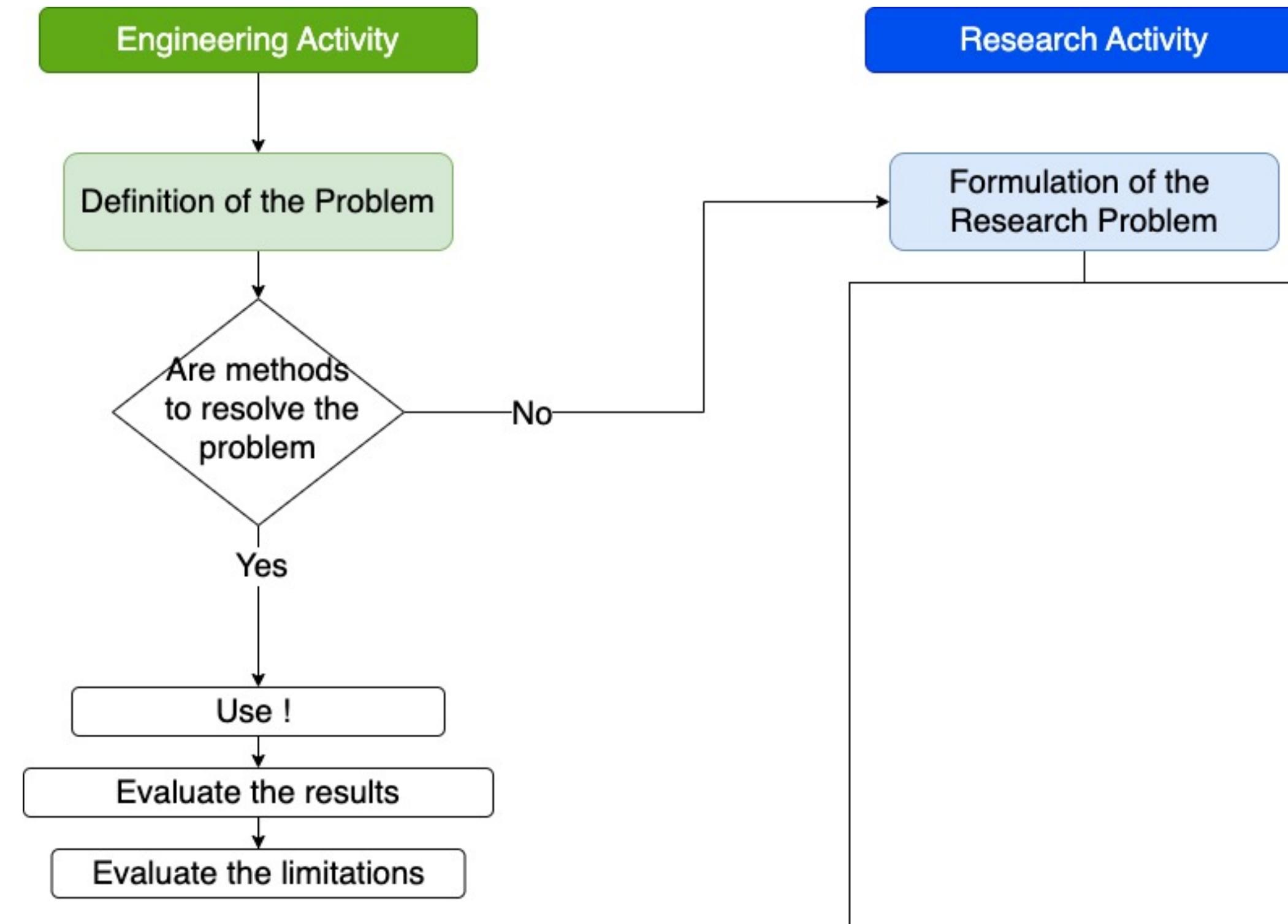
Presentation

Engineering vs Research (*in Innovation*)



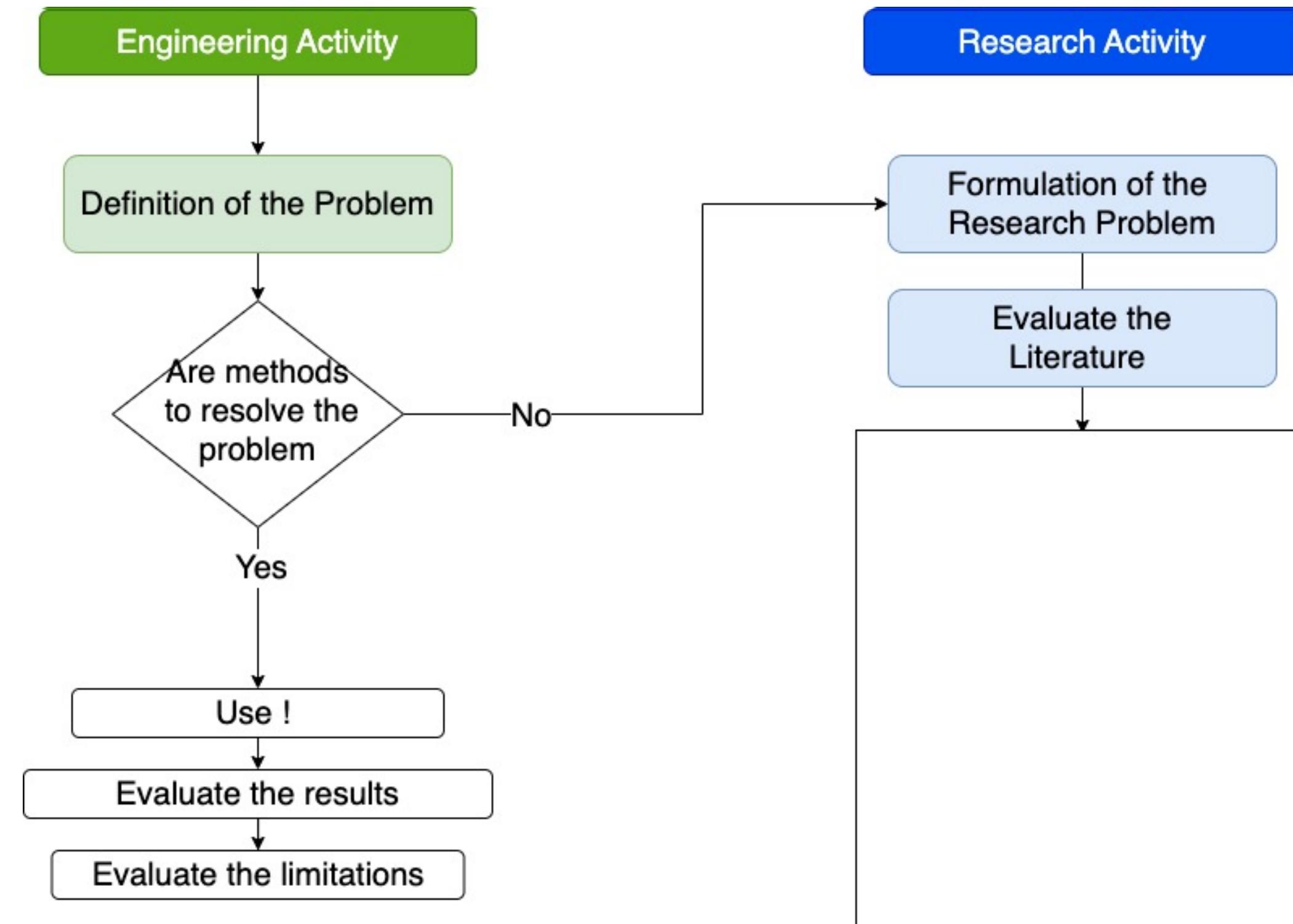
Engineering vs Research (*in Innovation*)

Presentation



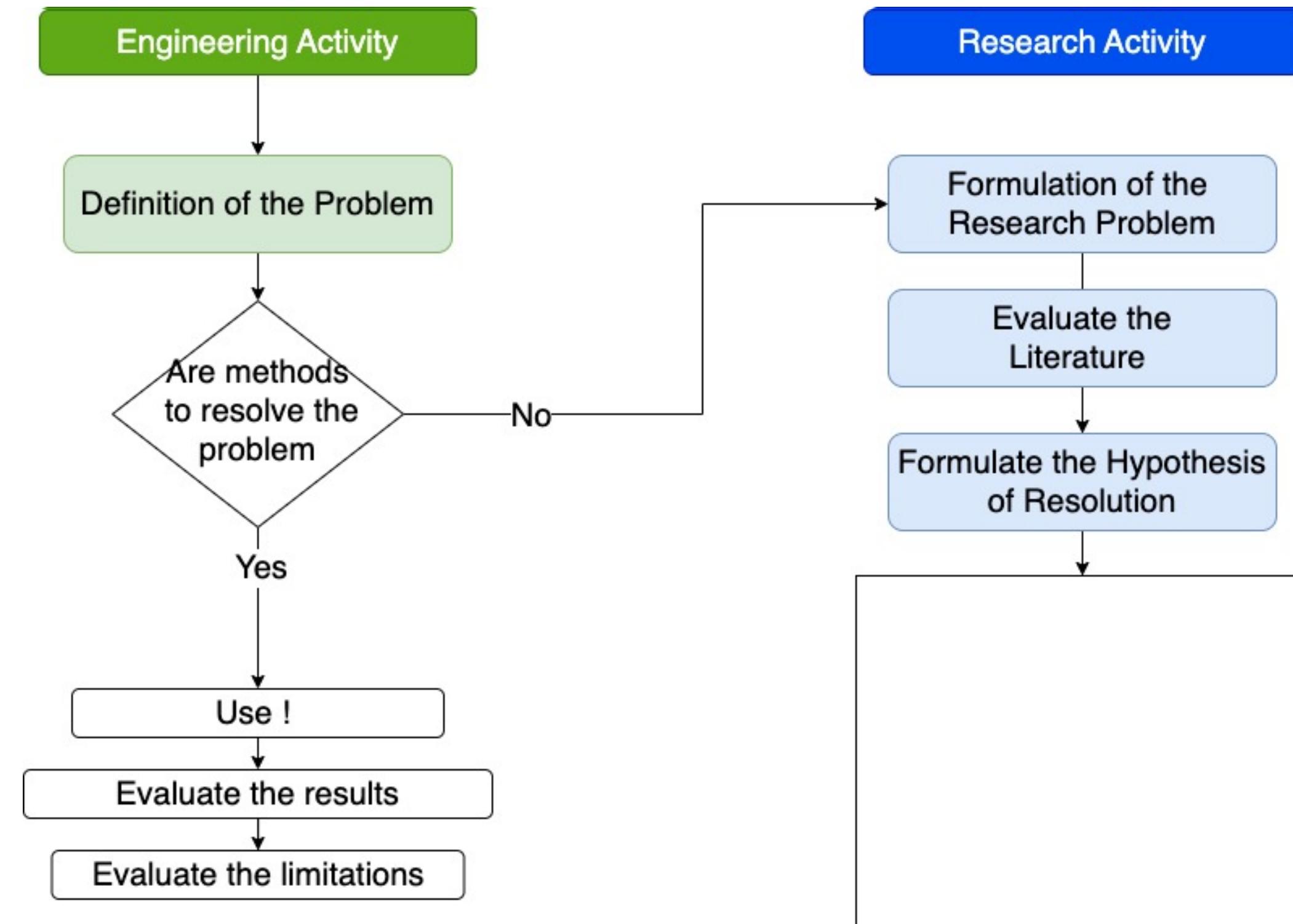
Engineering vs Research (*in Innovation*)

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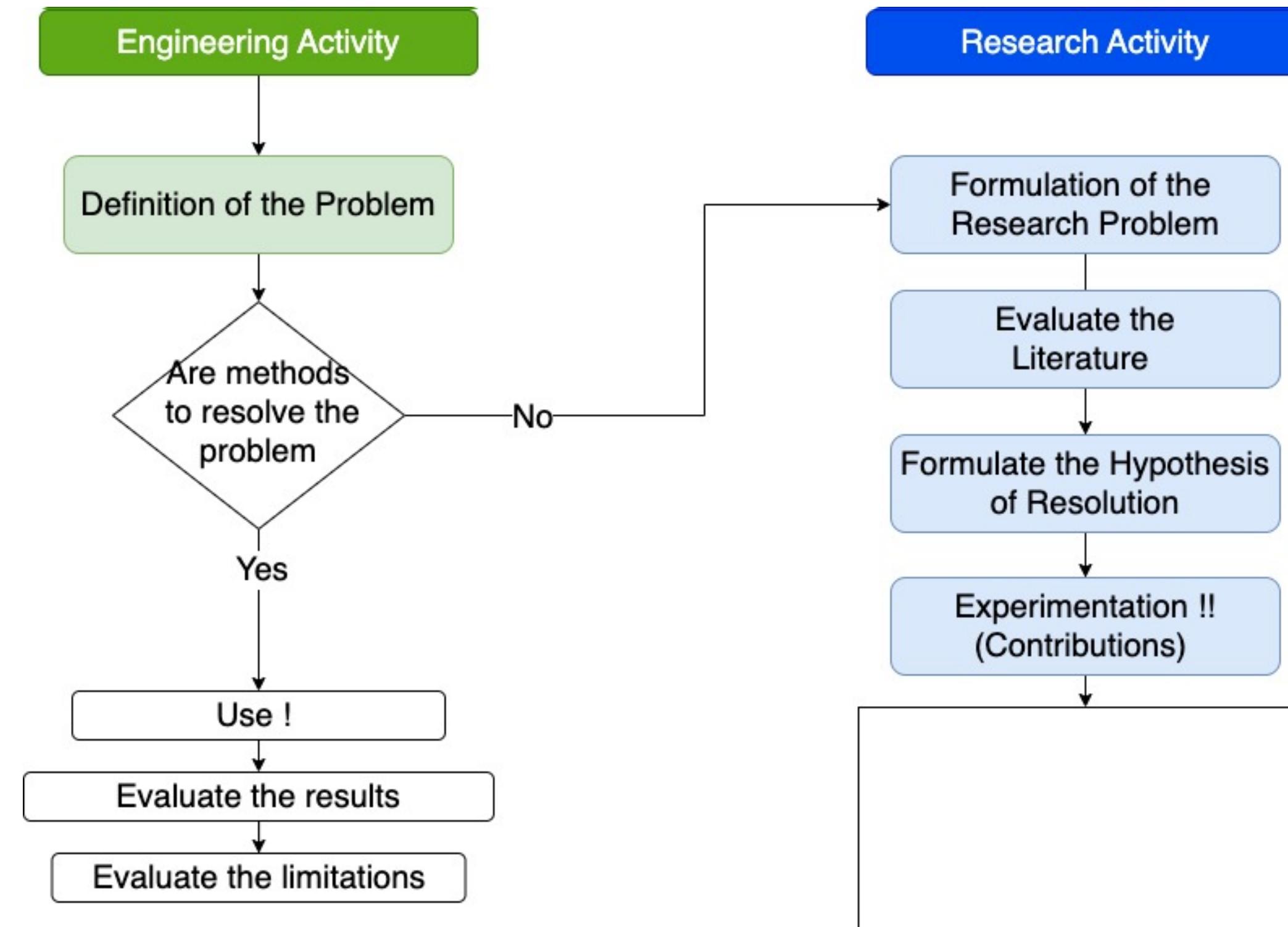
Engineering vs Research (*in Innovation*)

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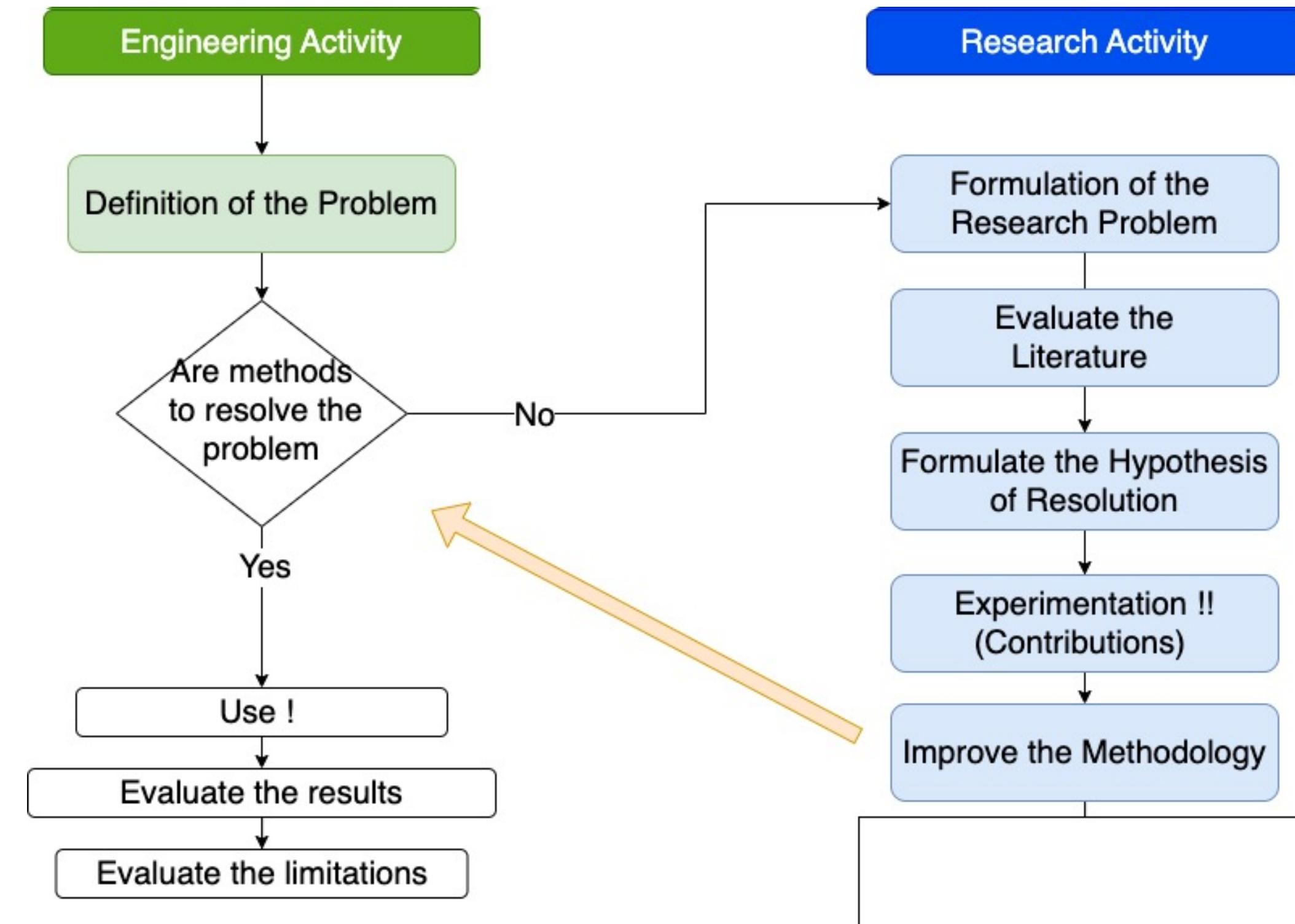
Engineering vs Research (*in Innovation*)

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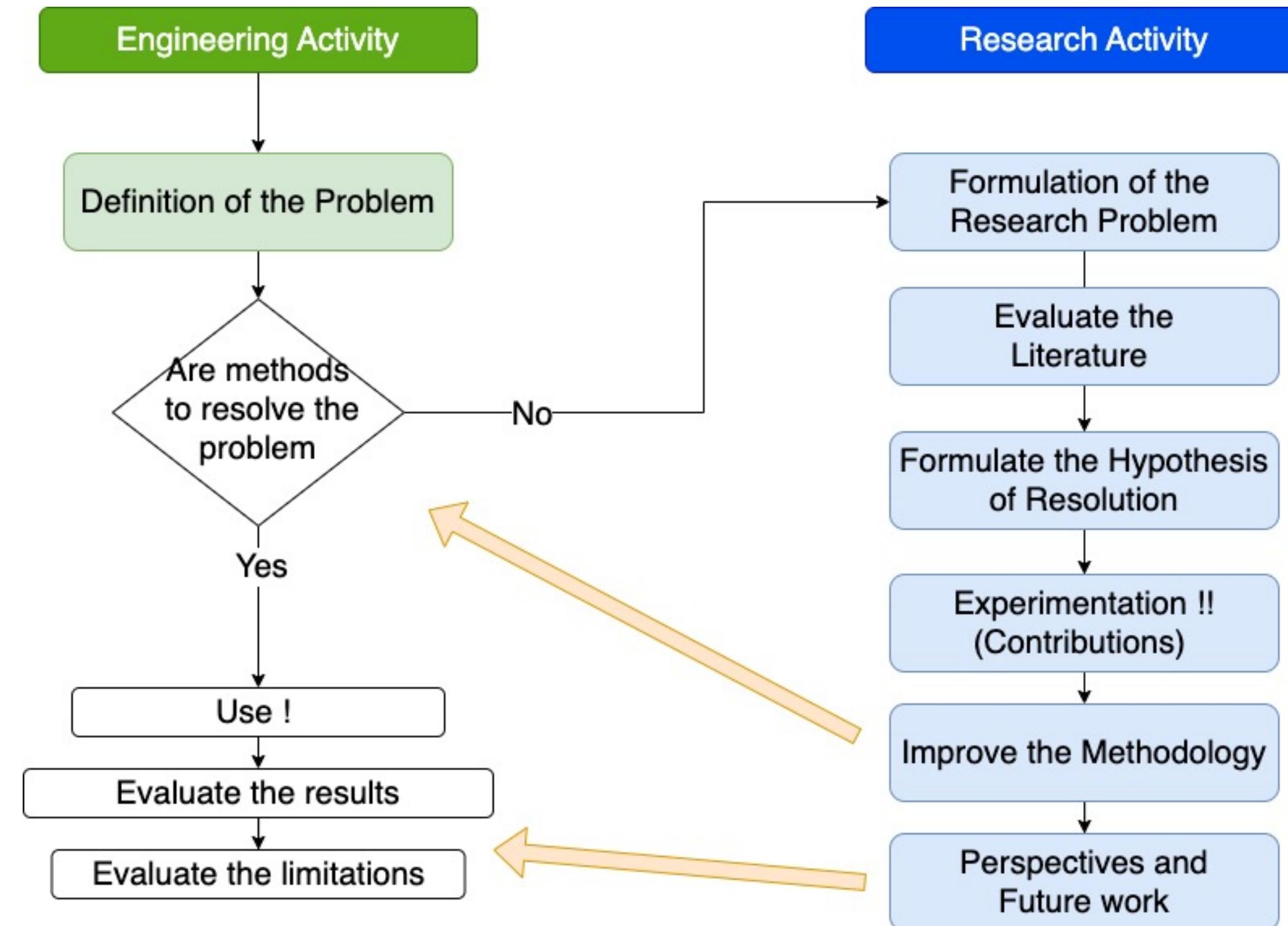


Engineering vs Research (*in Innovation*)

Presentation

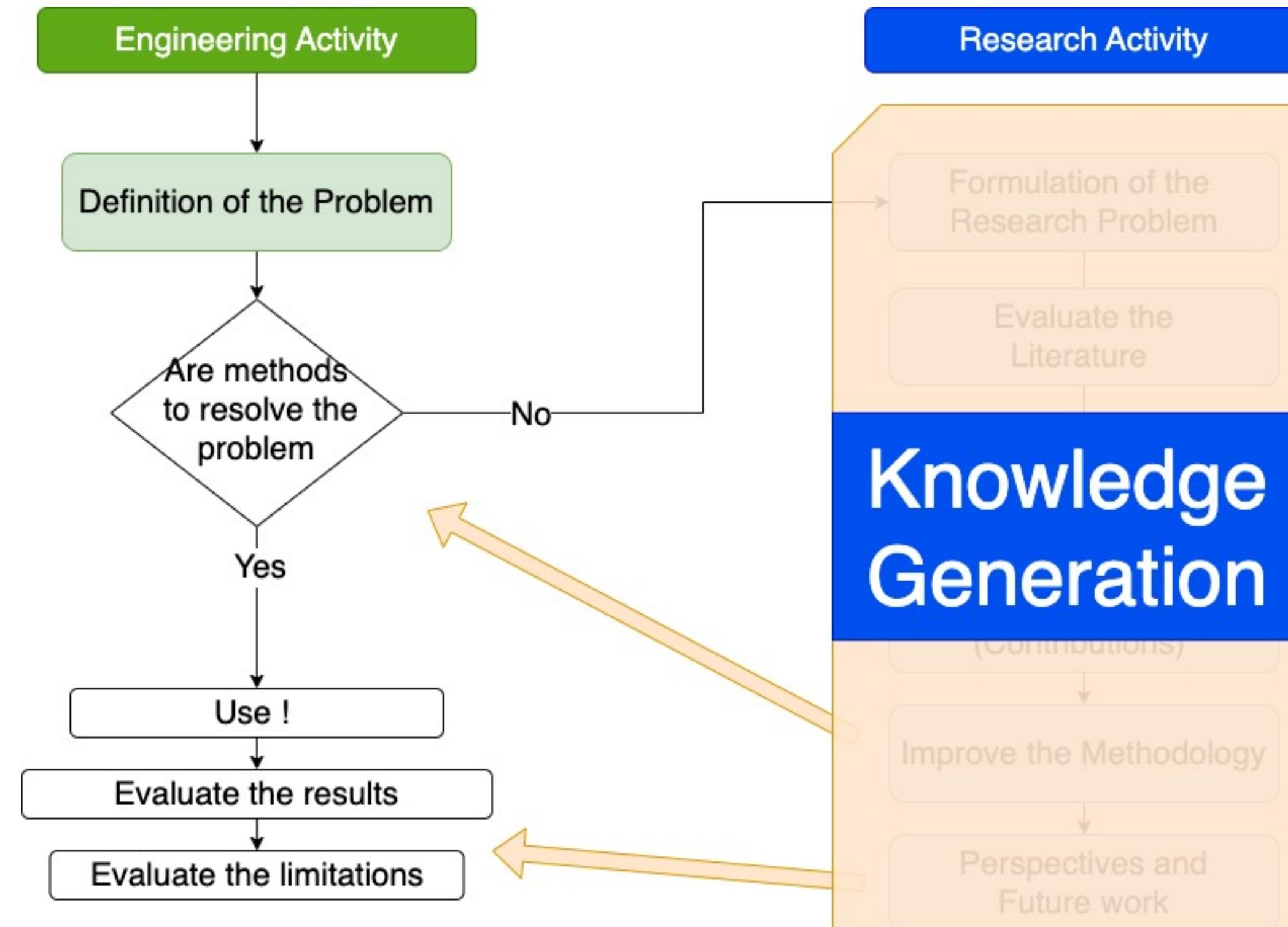


Engineering vs Research (*in Innovation*)



Engineering vs Research (*in Innovation*)

Presentation

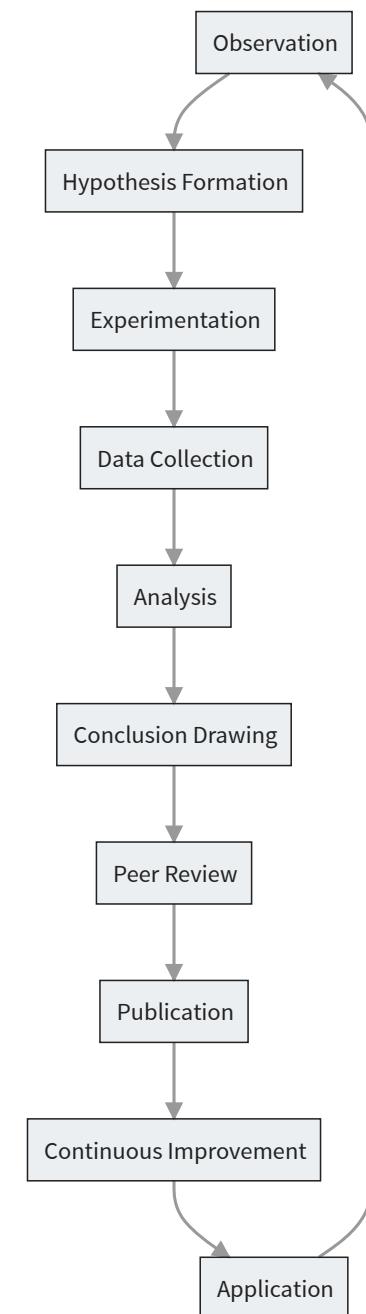


What is scientific research ?

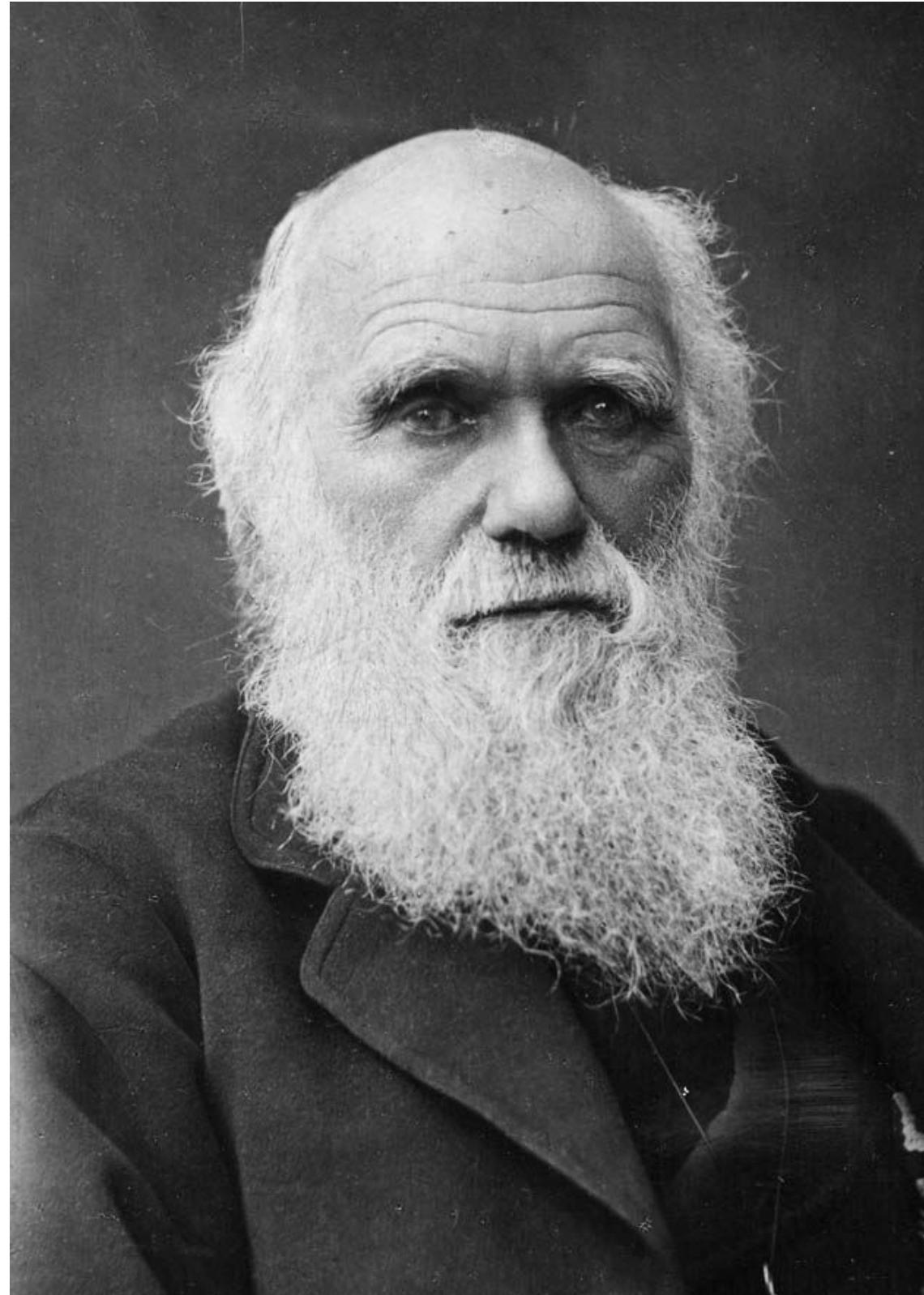
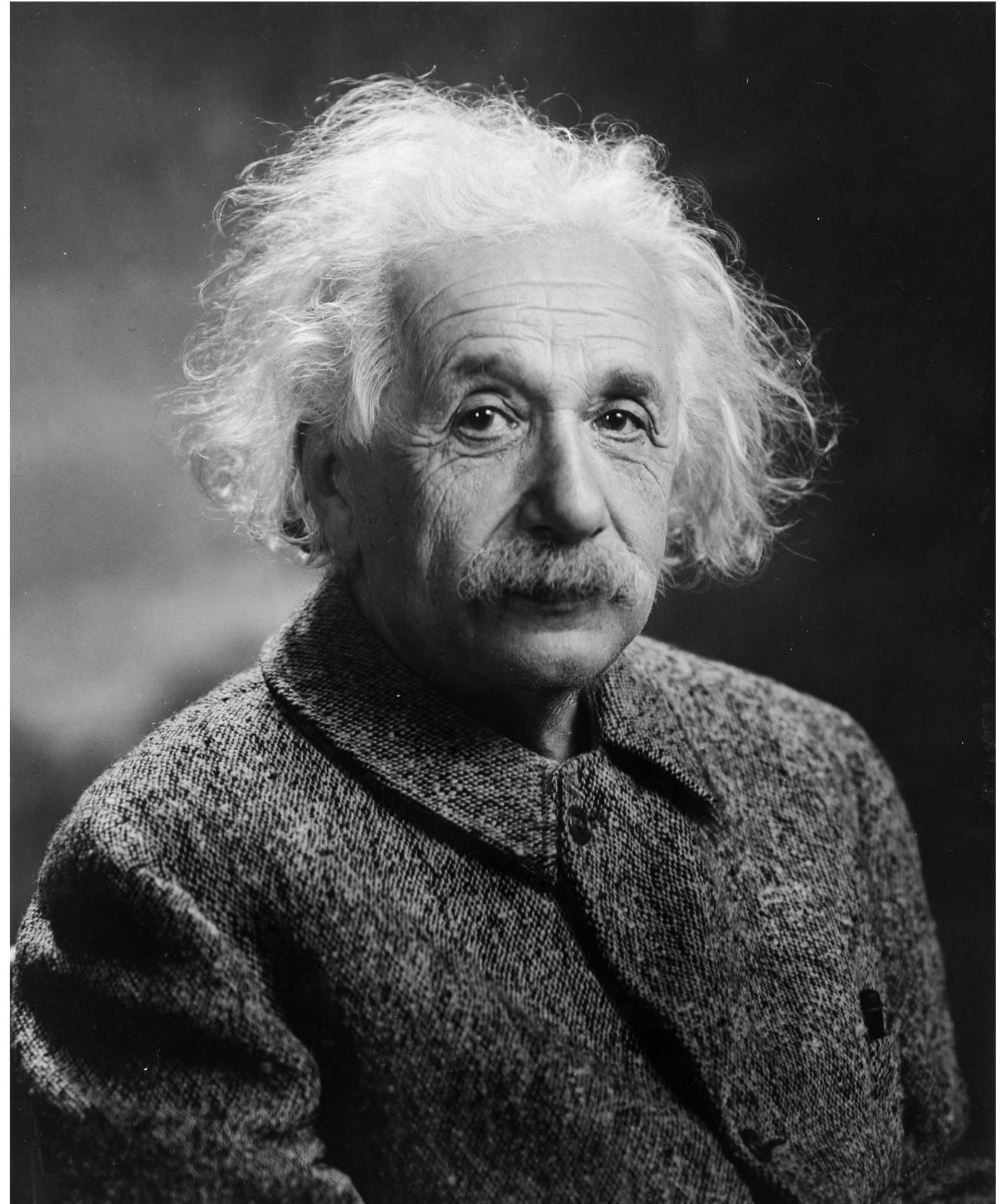
“The process of finding solutions to a problem after a thorough study and analysis of the situational factors.”
(Sekaran and Bougie 2016)

Based on two research elements:

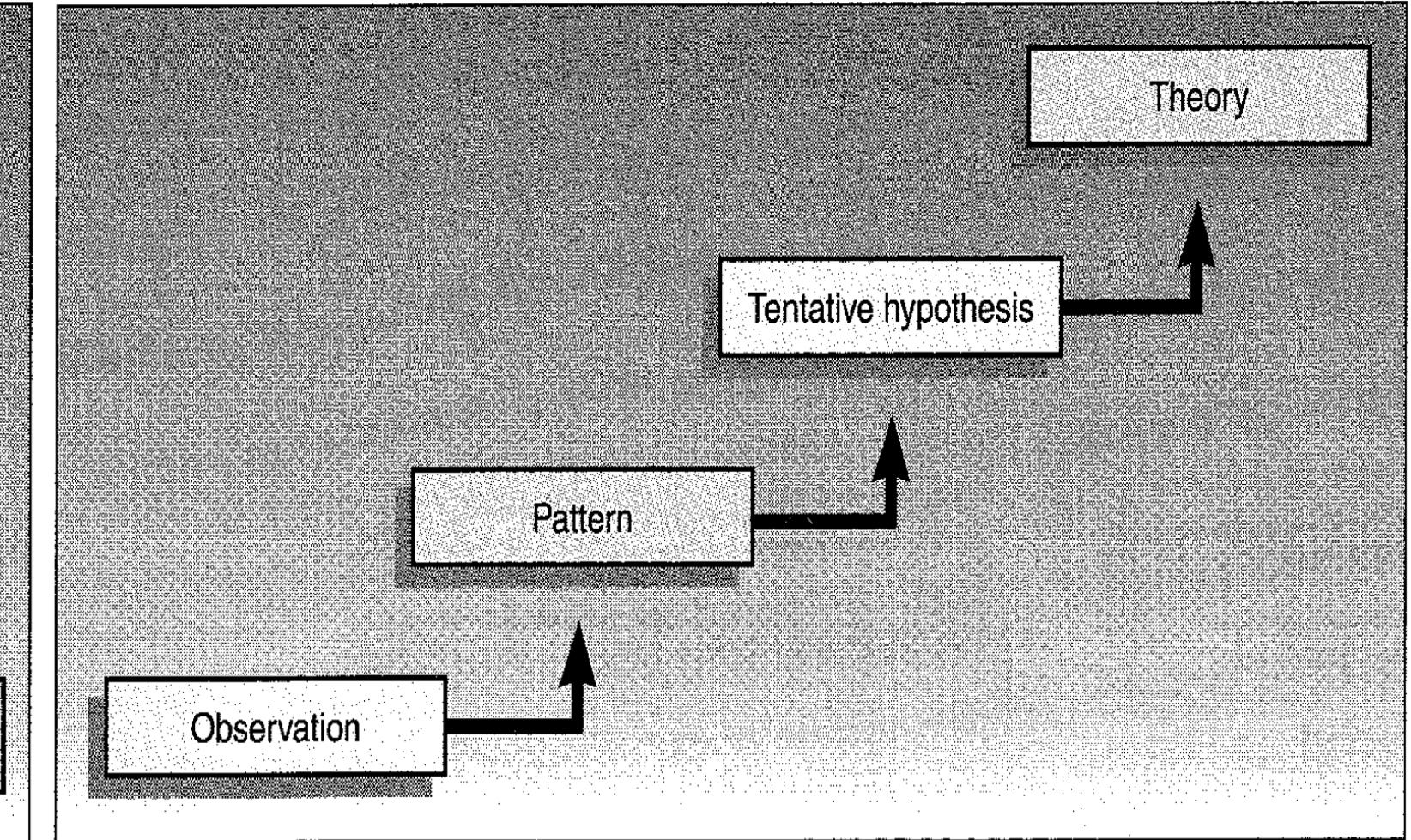
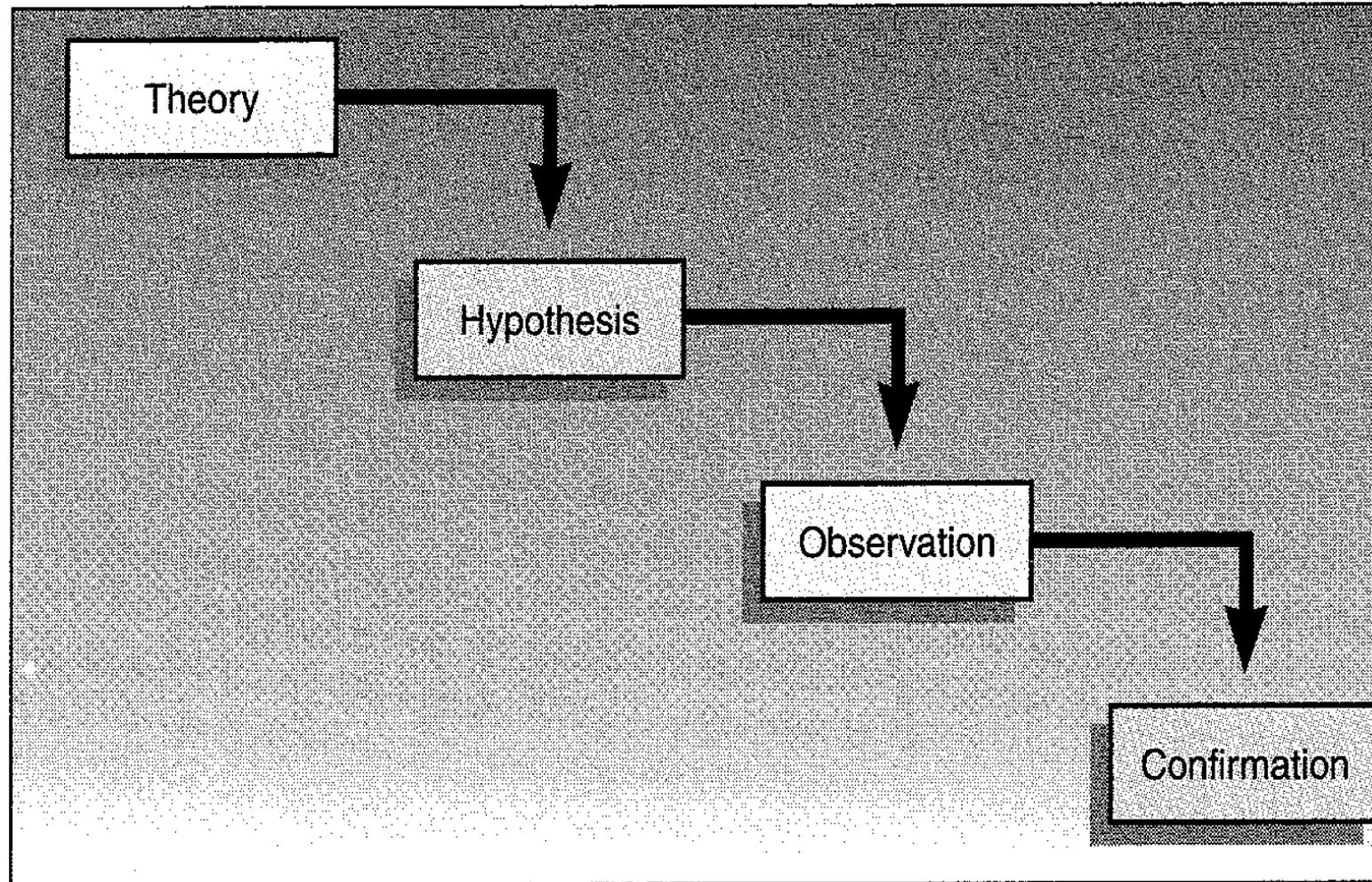
-  Observations (information or data)
-  Theory (arguments)



Presentation



Scientific approaches



Scientific approaches

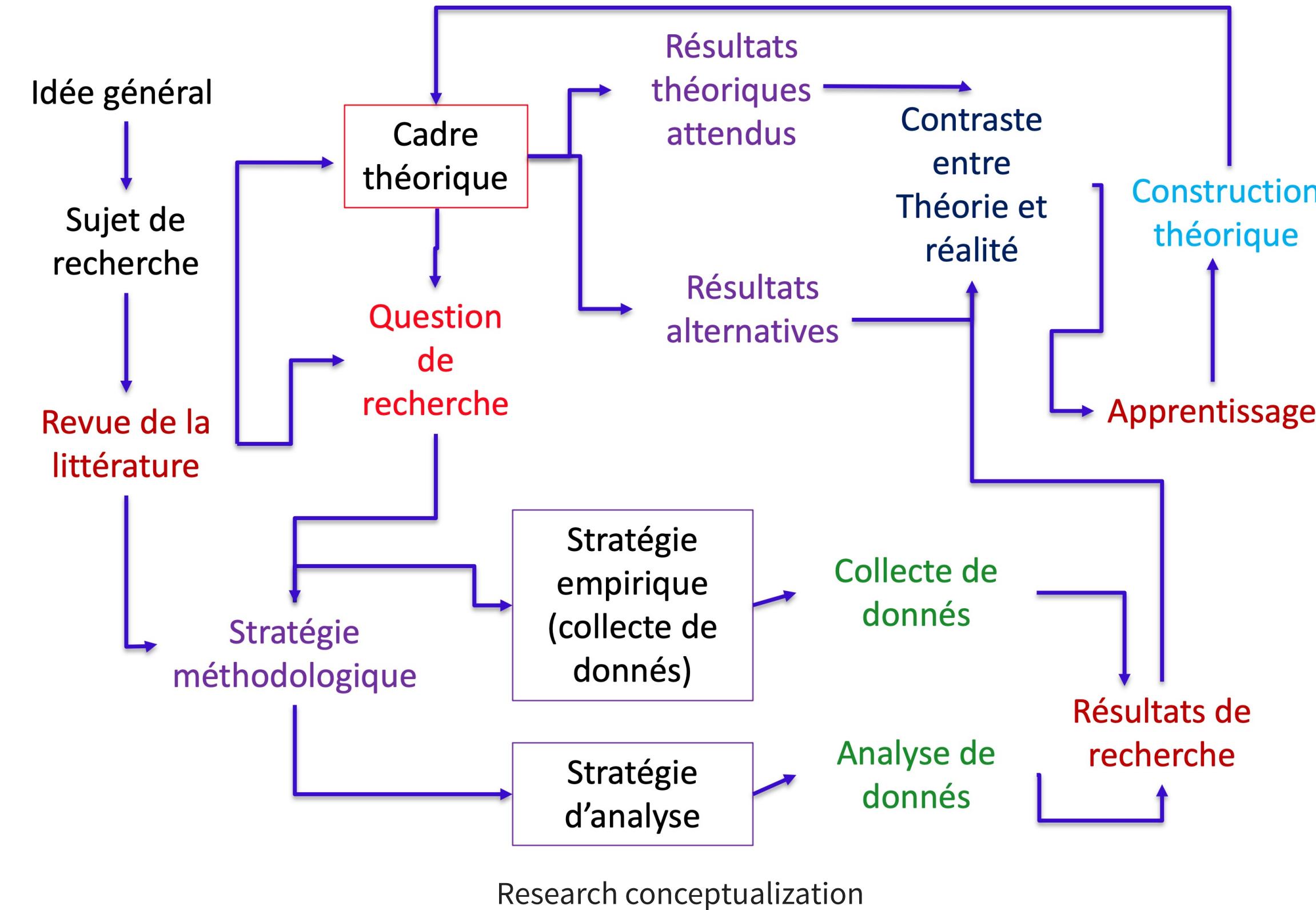
Deduction

la méthode par laquelle on va de la cause aux effets, du principe aux conséquences, du général au particulier.

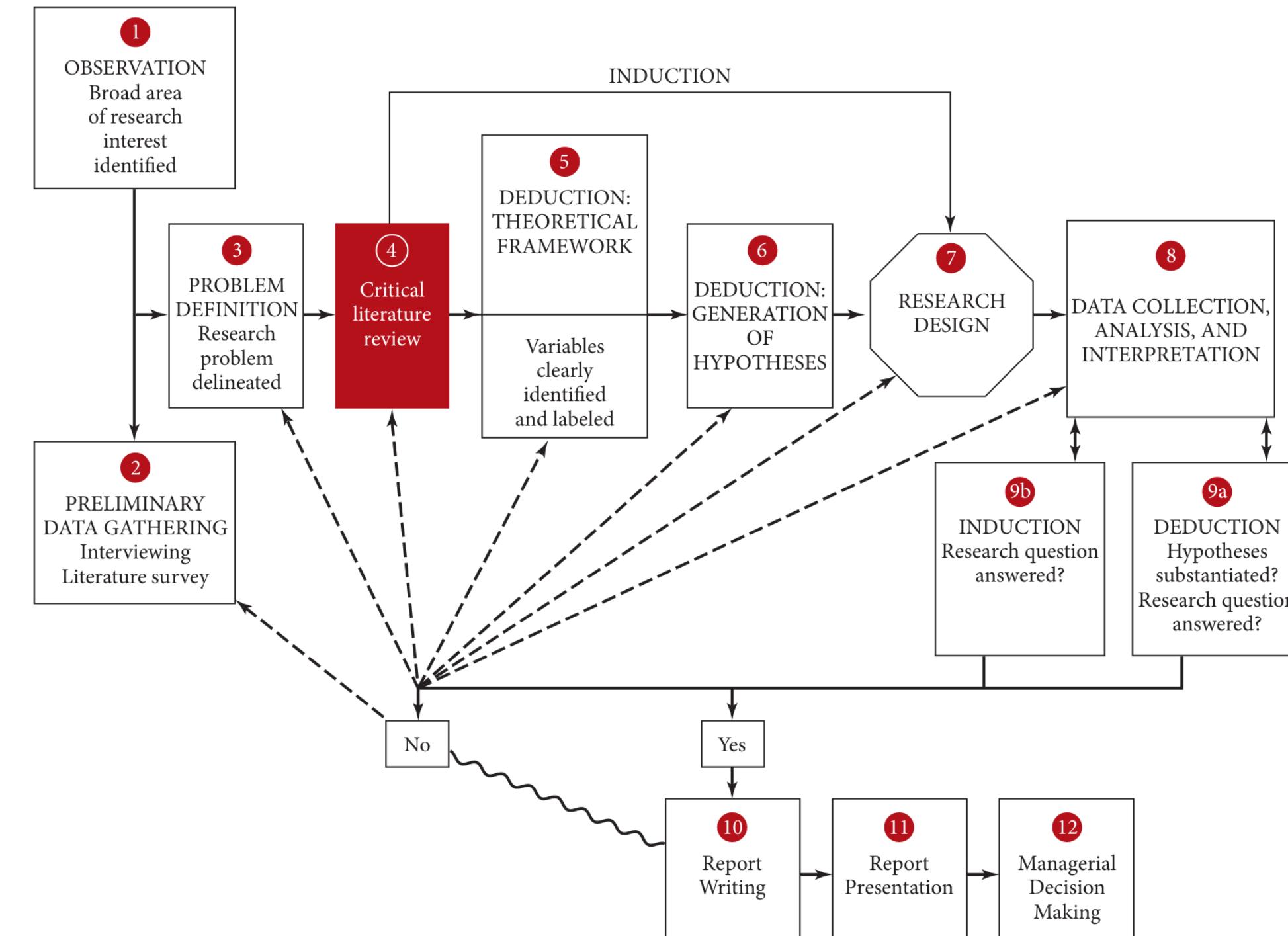
Induction

La règle découle de l'observation répétée de faits réels, contingents.

Mental model for the research development?



Mental model for the research development?



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Pourquoi devrais-je me renseigner sur le processus de recherche ?

Research and the “Managers”

-  To work as a researcher (PhD., R&D Department)
-  To become a pertinent intelectutor at your company
-  Help to make evidence-based decisions: e.g. Public politics
-  Help in the strategic and future decision-making

As an **Innovation Manager** you are going to face problems that your R&D department or/and external researcher (open-innovation) can help you to solve.

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Everything start with a good research question

1. Descriptive: ('What', 'When', 'Where', 'Who' or 'How')

e.g. 'What percentage of coachees report that coaching helped them with a problem they experienced?

2. Explanatory ('Why')?

e.g. 'Why did 65% of coachees report that coaching helped them with a problem they experienced?'



Articles

Formulating a convincing rationale for a research study

Céline Rojon & Mark N.K. Saunders

Pages 55-61 | Received 25 Nov 2011, Accepted 30 Nov 2011, Published online: 11 Jan 2012

[Download citation](#) <https://doi.org/10.1080/17521882.2011.648335>
[Full Article](#)[Figures & data](#)[References](#)[Citations](#)[Metrics](#)[Reprints & Permissions](#)[View PDF](#)

Abstract

Explaining the purpose of a research study and providing a compelling rationale is an important part of any coaching research project, enabling the work to be set in the context of both existing evidence (and theory) and its practical applications. This necessitates formulating a clear research question and deriving specific research objectives, thereby justifying and contextualising the study. In this research note we consider the characteristics of good research questions and research objectives and the role of theory in developing these. We conclude with a summary and a checklist to help ensure the rationale for a coaching research study is convincing.

Keywords: rationale, research question, research objective, theory, coaching research

Good research question: Descriptive + Explanatory

Presentation

Being able to provide meaningful explanations requires answers to ‘why’ (i.e. explanatory) questions in addition to ‘what’ (i.e. descriptive) questions.

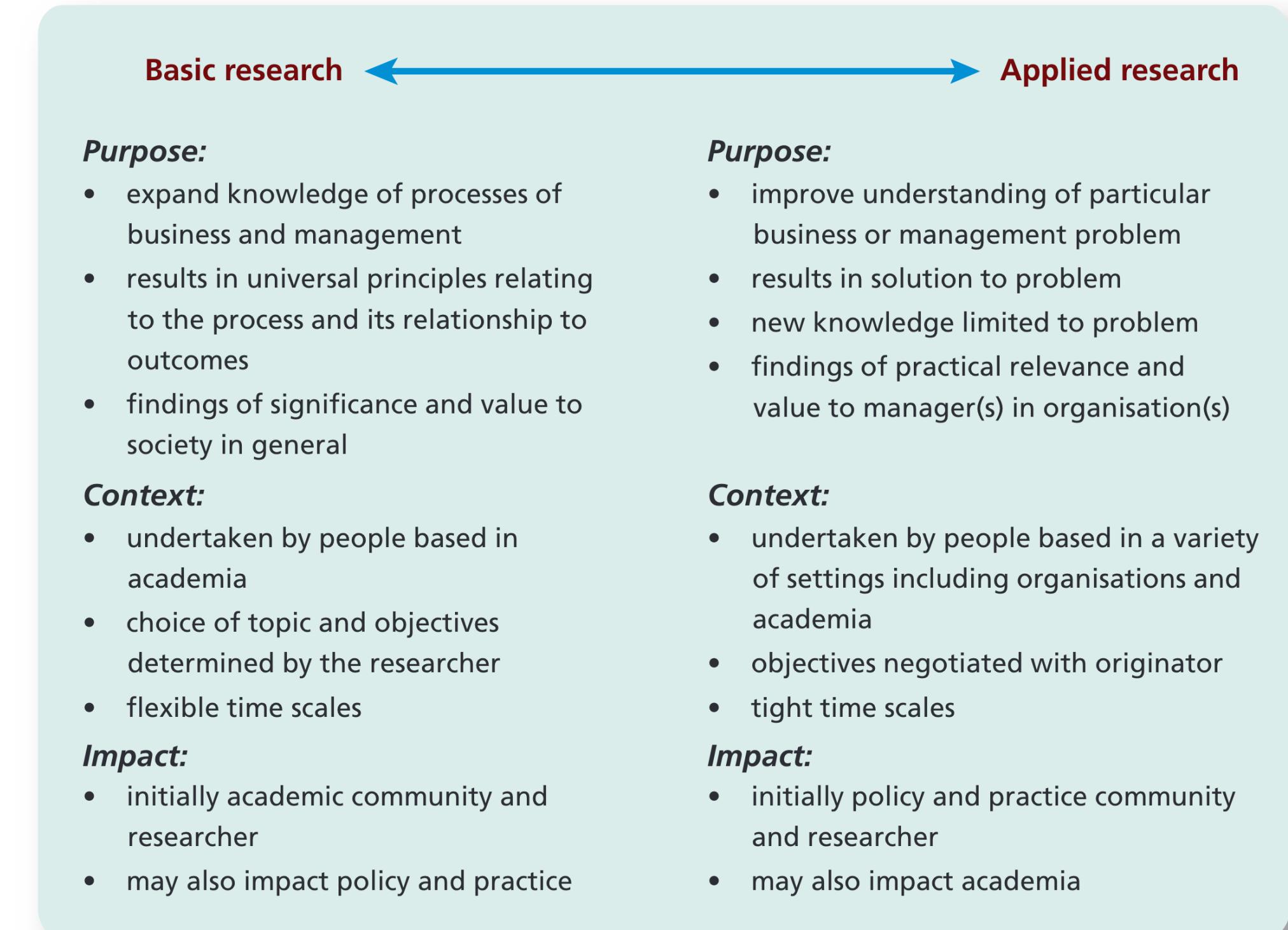
For example:

- *‘How effective is the coaching process at helping coachees to solve a problem they experience and what are the reasons for this?’*
- *‘To what extent is the coaching process effective at helping coachees solve a problem and why?’*

What kind of type of research can we do?

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- Basic Vs. Applied
- Exploratory
- Descriptive
- Causal



What kind of type of research can we do?

- Basic Vs. Applied
- Exploratory
- Descriptive
- Causal
- Not much is known about a particular phenomenon;
- Existing research results are unclear or suffer from serious limitations;
- The topic is highly complex; or
- There is not enough theory available to guide the development of a theoretical framework

e.g: AI and its influence in the future?, Decroissance?

What kind of type of research can we do?

- Basic Vs. Applied
- Exploratory
- Descriptive
 - Obtain data that describes the topic of interest
 - Understand the characteristics of a group in a given situation
 - Think systematically about aspects in a given situation
- Causal

e.g: Social Media Usage Patterns, Workplace Satisfaction Surveys, Consumer Behavior Studies, etc...

What kind of type of research can we do?

- Basic Vs. Applied
- Exploratory
- Descriptive
- Causal
 - Whether or not A causes change to B
 - X causes variable Y. So, when variable X is removed or altered in some way, problem Y is solved

e.g: Impact of (Educational, Recycling, Motivation, Training ...) Interventions, Efficacy of Medical Treatments, Causal loops, etc...

Examples of ERPI Research

Articles

2023

Journal articles

[Optimisation de la Supply Chain alimentaire : application du Lean six sigma dans un établissement de santé](#)

Sarah Garidi, Auguste Rakotondranaivo, Julien Husson

Management & Avenir Santé, Management Prospective Ed., A paraître



2022

Journal articles

[Qualitative sustainability assessment of road verge management in France: An approach from causal diagrams to seize the importance of impact pathways](#)

Brunelle Marche, Mauricio Camargo, Sandra Cecilia Bautista Rodriguez, Clémence Chaudron, Frédérique Mayer, Christophe Bachmann

Environmental Impact Assessment Review, Elsevier, 2022, 97, pp.1-15. <[10.1016/j.eiar.2022.106911](https://doi.org/10.1016/j.eiar.2022.106911)>



[Chaotic Honeybees Optimization Algorithms Approach for Traveling Salesperson Problem](#)

<https://erpi.univ-lorraine.fr/publications/articles/>

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Research Ecosystem in general

Presentation

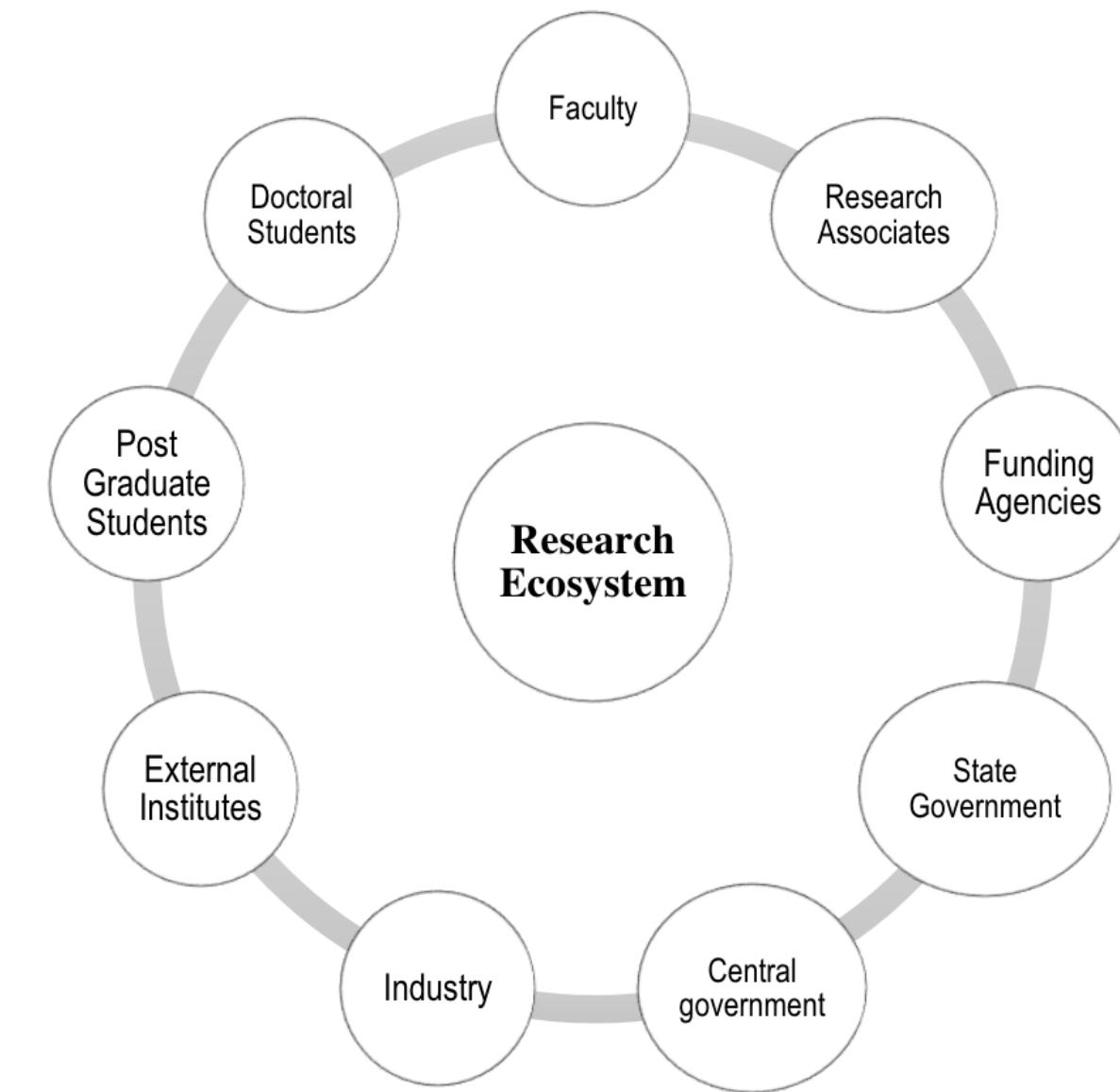


Figure 1: Stakeholder View of Research Ecosystem

Research Ecosystem

Research Ecosystem in France

Teaching and research

- Universities (IUT, Ecoles d'ingénieurs)
- INSA , ENSI , CNAM , ...

Private companies (Big/Smees)

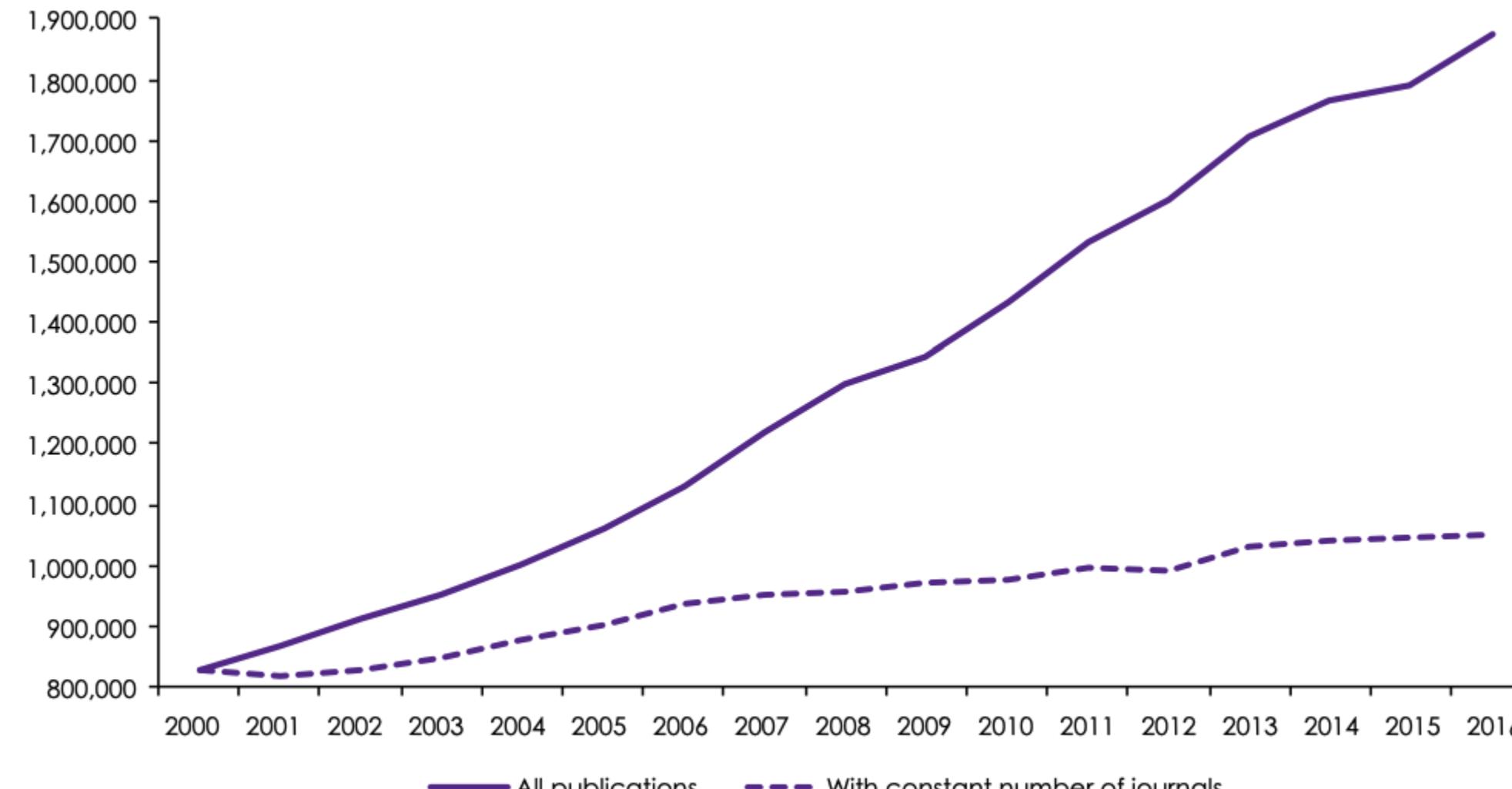
- Sagem; Véolia; PSA Thales
- TEA; JEI; FITLE; myXtramile...

Funding Agencies

National & EU - Ministeries - ANR - ADEME

Science and technology observatory (OST)

Figure 1. Number of world scientific publications: total and with constant journal set, 2000-2016



www.hceres.fr/OSTReport2019-Fig-1

Source: Computed by OST using WoS

High Council for Evaluation of Research and Higher Education - HCERES

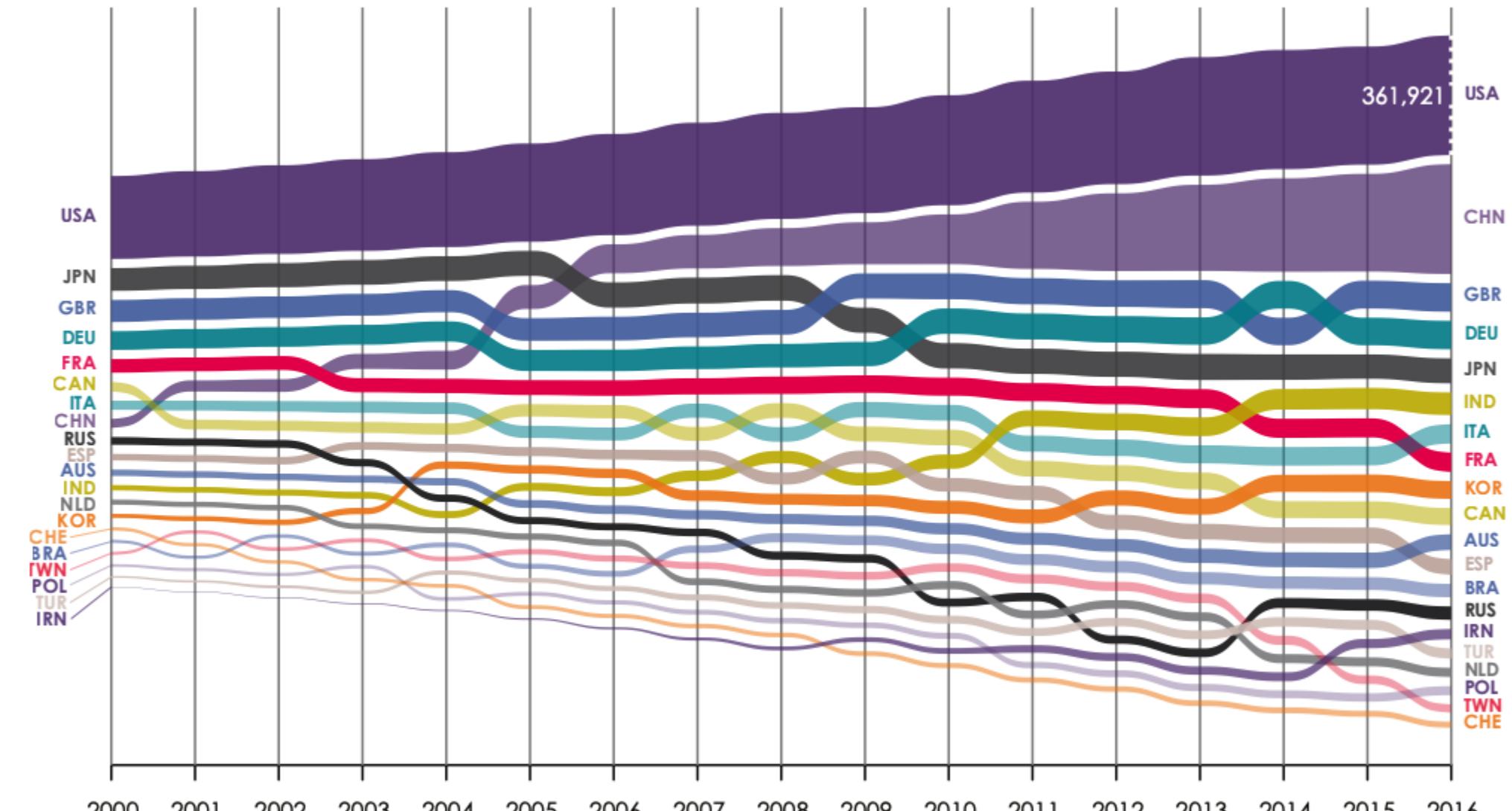
Source: Rapport HCERES

Introduction to Scientific Research

Science and technology observatory (OST)

Presentation

Figure 3. Trends in scientific publications, top 20 countries, 2000-16


www.hceres.fr/OSTReport2019-Fig-3

Source: Computed by OST using WoS

High Council for Evaluation of Research and Higher Education - HCERES

Source: Rapport HCERES

HCFRES: <https://www.hceres.fr/en/science-and-technology-observatory-ost>

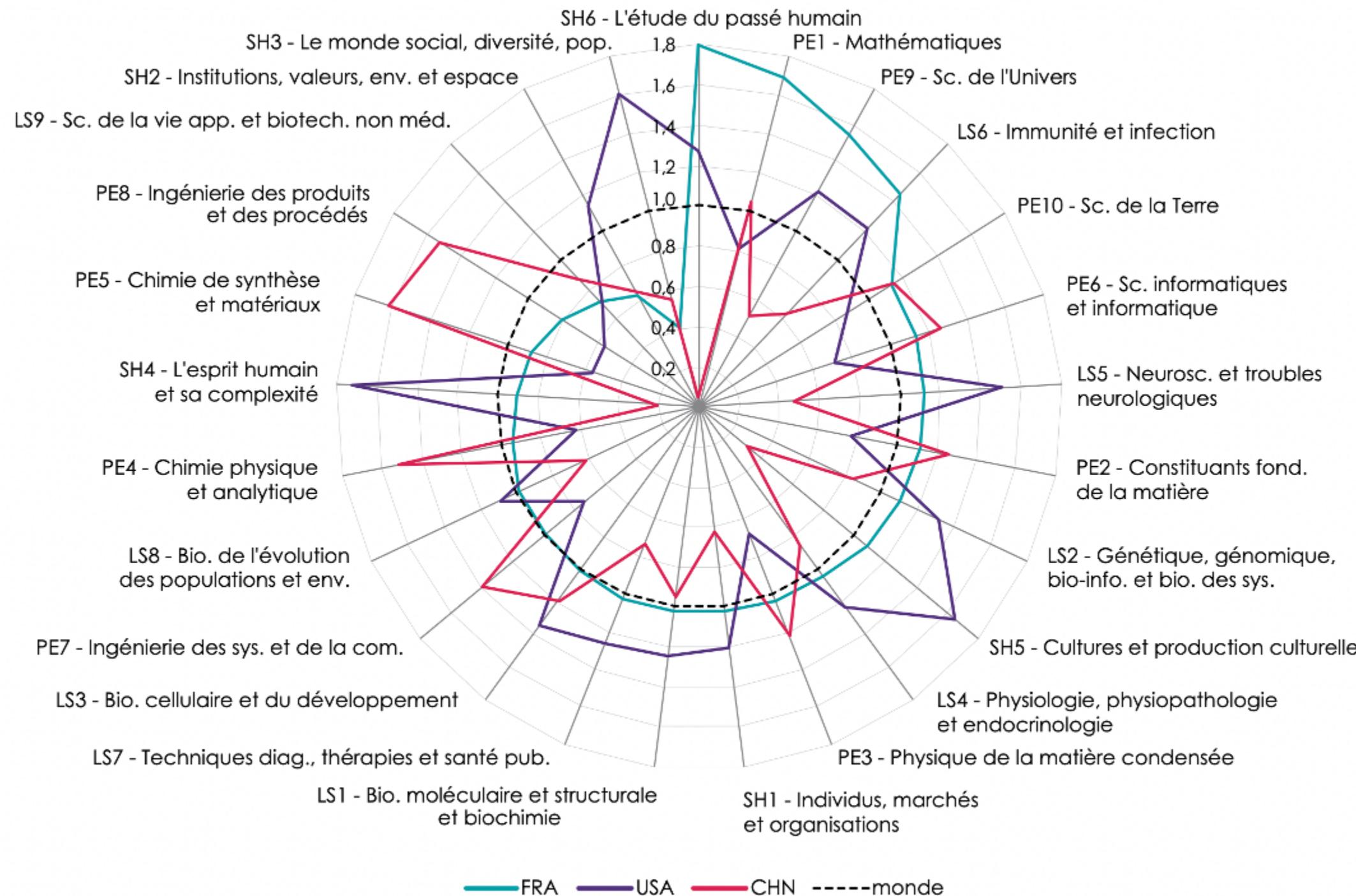
Introduction to Scientific Research

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Graphique 8. Indice de spécialisation par domaine ERC : Chine, États-Unis et France, 2016-18

Présentation



 www.hceres.fr/Rapport-PSF2021-Graphique-8

Source : Base OST, Web of Science, calculs OST

Thanks

Presentation

