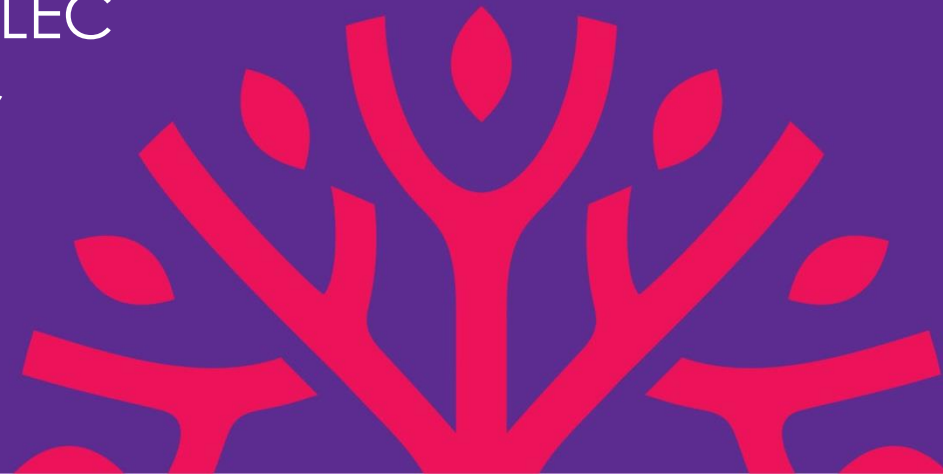




HOW TO EMBRACE AI IN THE NEW ERA OF STI POLICY MAKING: OPPORTUNITIES, UNDERSTANDING — THE LIMITATIONS AND RISKS

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Question: What can AI do to help the government design, implement and evaluate research and innovation policies? How to avoid AI generated pitfalls?

➤ Answer: AI can do a lot, in a framework of human-machine collaboration.

Intelcomp has opened several veins, they now need to be exploited!

Structure of the presentation

1. Context: Why using AI for informing policy making?
2. What AI can do.
3. Use cases in research and innovation policy making.
4. Conclusion: The road ahead.

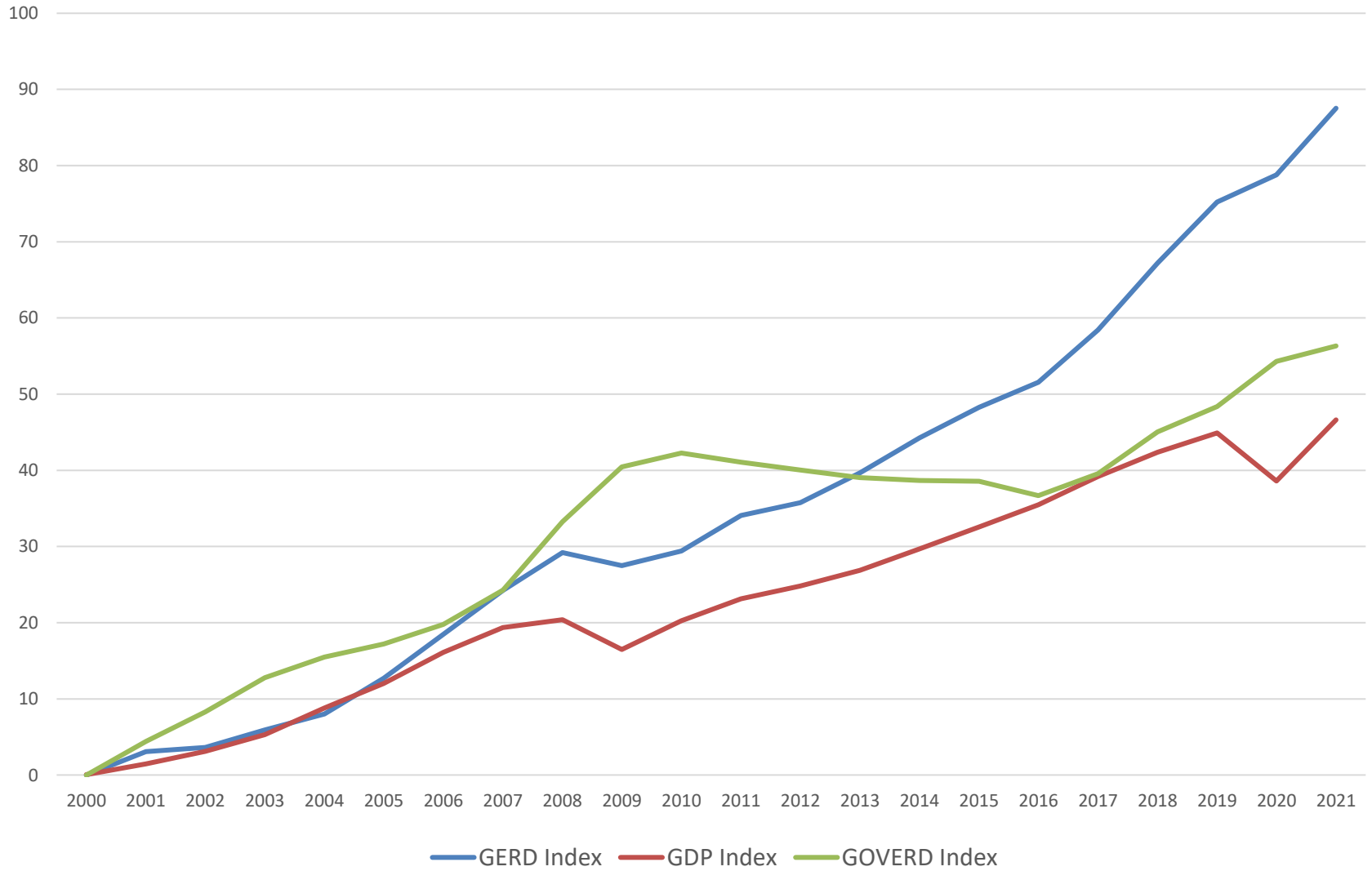
Why using AI? The Demand side

Demand side:

- Growing size and complexity of S&T activity

GDP, GERD and GOVERD - Total OECD

Index 2000=100



Why using AI? The Demand side

Demand side:

- Growing size and complexity of S&T activity
- Growing size and role of government vs markets: requires more information processing (green, aging, security etc.).
- Current STI policy frameworks (societal challenges, systems innovation, support to entrepreneurship etc.) involve many actors, have multifaceted goals, hence high information requirements

=> Policymakers need more information: more granular, connected and dynamic, and more elaborated.

Why using AI? The Supply side

- More **data** is available for processing: vast amounts of information are digitised and accessible online – and offline; digital communication.
- **Machine Learning** techniques have made huge progress over the past decade: notably CNN and computer vision (2012); transformers and Natural Language Processing (2018); LLMs and generative AI (2022).

AI: The main capabilities

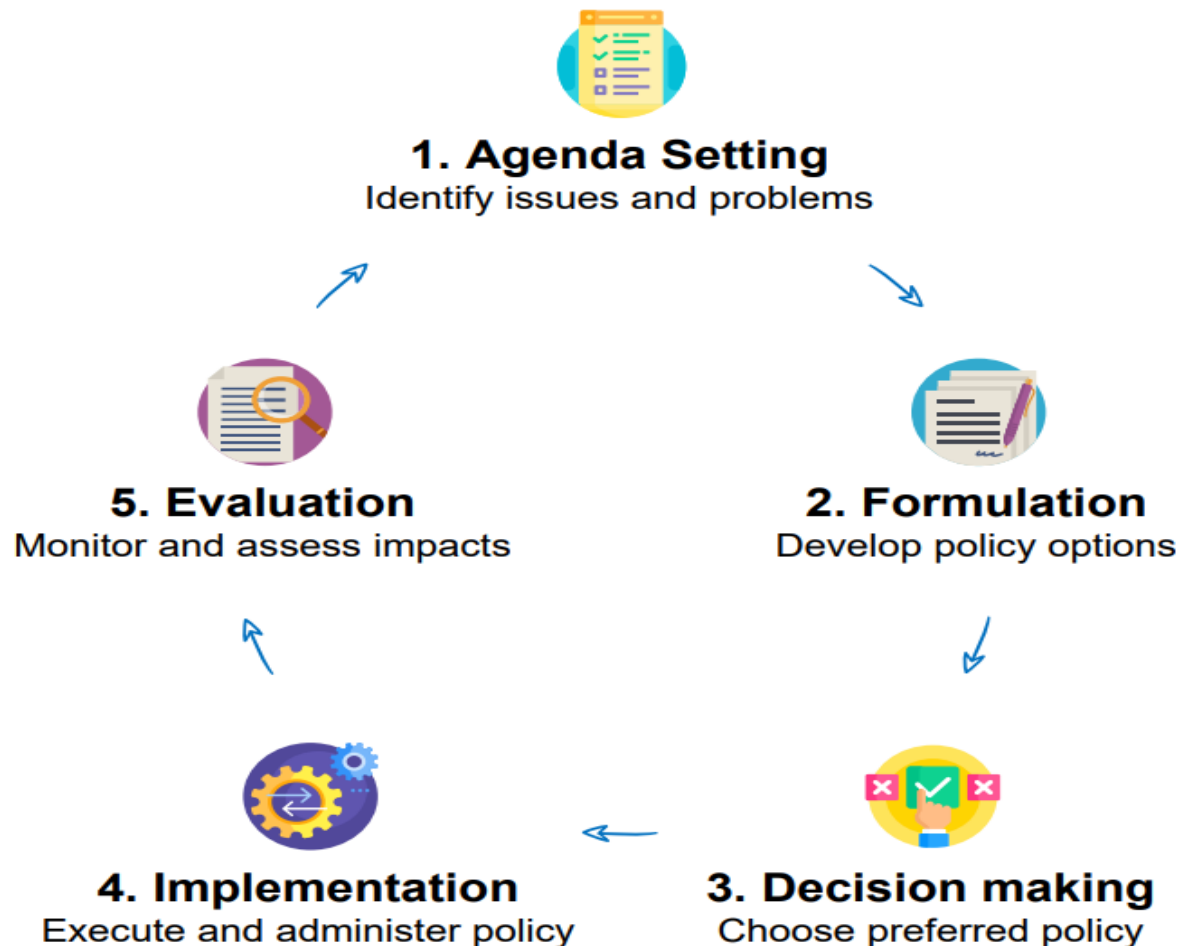
- **Quantitative analysis:** cleaning and analysing vast amounts of quantitative data => classifying entities, connecting entities, finding patterns.
- **Natural Language Processing** and text analysis: retrieve specific information from vast corpuses of texts, detect anomalies; summarise documents, sets of documents; connect documents (compare, classify, merge, adapt).
- **Generative:** text, graphs, images, strategies (patterns) => react to “prompts” by collecting and synthesizing vast amounts of information.

AI: The main capabilities

Similar capacities as humans, BUT,

PROS	CONS
<ol style="list-style-type: none">1. Can process vast amounts of data in multiple languages;2. Much cheaper to run => used more often.	<ol style="list-style-type: none">1. Hallucinations;2. Mistakes and biases due to the training set;3. Lack of explainability;4. Difficulty to extrapolate outside the training set ("Out Of Distribution").

The STI Policy Cycle

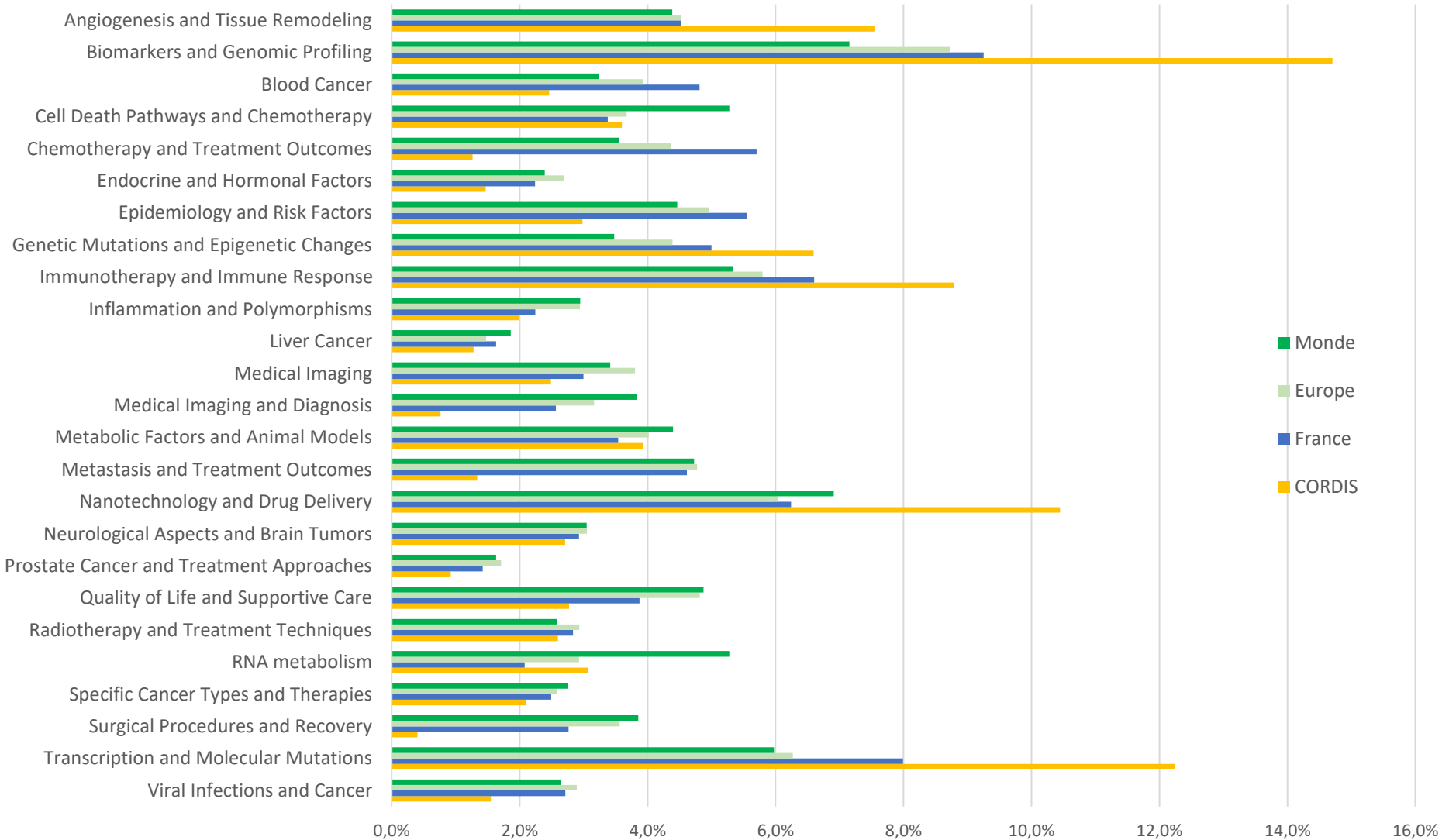


Source: Adapted from M. Howlett and S. Giest, "Policy Cycle," International Encyclopedia of the Social & Behavioral Sciences, 2nd edn (Elsevier, 2015), <https://doi.org/10.1016/B978-0-08-097086-8.75031-8>

Agenda Setting

Establishing diagnosis: identifying problems, mapping issues and actors

Scientific publications in sub-fields of cancer research and European funding



Formulation/ decision making

What are others doing?

An intelligent search engine: SAI

<https://huggingface.co/spaces/mila-quebec/SAI>

The screenshot shows a web browser window displaying the SAI interface. The browser's address bar shows the URL `huggingface.co/spaces/mila-quebec/SAI`. The page title is "SAI: Search engine for AI policy".

The interface includes a header "About SAI" with a chat icon. Below it, a text block reads: "Ask SAI your AI policy questions! Keep in mind this tool is a demo and can sometimes provide inaccurate information. Always verify the integrity of the information using the provided sources. Since this tool is still in its early stages of development, please only engage with it as a demo." Below this is a grey bar with the text "By using this tool you agree to our [terms and conditions](#)" and a checkbox labeled "I accept".

A search input field contains the text "Accept the terms and conditions to use the app" with a warning icon. To its right is an orange "Ask" button. Below the input field, there is a section titled "Sample questions to ask SAI" with three example questions: "Are there any AI policies related to AI adoption in the public sector in the UK?", "How is Canada evaluating the success of its AI strategy?", and "Has the EU proposed specific legislation on AI?".

At the bottom of the main content area, there is a "Generated Answer" section with a chat icon. To the right of the main content is a feedback sidebar titled "We would love your feedback!". It contains the text "Please submit feedback for each question asked." and "Your feedback is anonymous and will help us make the tool as useful as possible for the community!". There are two feedback questions, each with thumbs up and thumbs down buttons: "Did SAI help answer your question?" and "Was the generated answer clear and understandable?".

The Windows taskbar is visible at the bottom, showing the search bar with the text "Taper ici pour", several application icons, and the system tray with the time "10:25" and date "12/12/2023".

Formulation/ decision making

What are others doing?

=> SAI is a “RAG” (retrieval augmented system), trained exclusively on safe and high quality material (OECD documents)

Formulation/ decision making

What are others doing?

What should I do?

Uses

update their strategies or introduce new measures over time.

ChatGPT 3.5 ▾



You

What is the main obstacle to developing AI in Europe and what policy measures could help solving it?



ChatGPT

As of my last knowledge update in January 2022, the main obstacles to developing AI in Europe included concerns related to data privacy, lack of standardized regulations, and the need for increased investment in research and development. It's essential to check for the latest developments and policy changes since the landscape may have evolved.

Here are some common challenges and potential policy measures that could help address them:



Formulation/ decision making

What should I do?

Generative AI is used to help drafting Policy Briefings: locate and retrieve data - statistics and text (multilingual literature) ; the LLM/Generative system can suggest a storyline or bullet points.

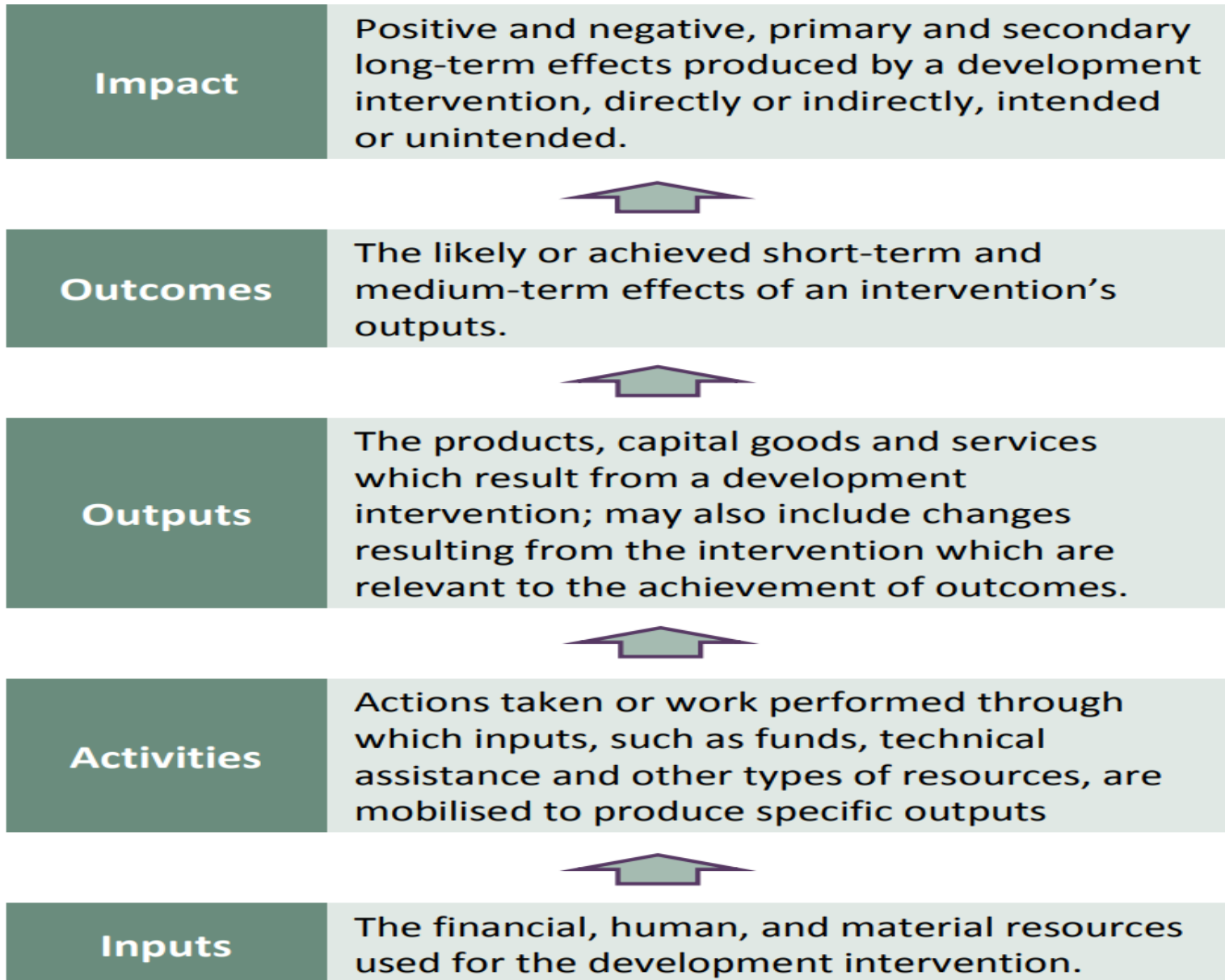
- can address unusual issues, escaping usual classifications
- can be made more articulated by challenging the LLM's responses on a conversation mode, requesting evidence, chain of reasoning, furthering ideas etc.
- can be personalised to a targeted audience (specific concerns, level of familiarity with the domain etc.);

Implementation

Screening submissions to funding agencies

- conformity to the goals of the program;
- originality.

Evaluation: Mapping Impact Pathways



Evaluation: Mapping Impact Pathways

AI helps in

- identifying individual outputs, outcomes, impacts (classifiers, name entity recognition etc.);
- connecting them to constitute the entire pathway;
- evaluating the products (relevance, originality).

Conclusions

Enormous opportunities... but there remains problems to be addressed: biases (due to data); hallucinations (due to techniques); explainability ; lack of understanding (OOD issue).

=> Current efforts aim to mitigate these problems

=> Need the “human in the loop” to challenge the system, to experiment and to learn and improve queries and responses (“chain of thought”)

=> Must trace sources as much as possible

Basic choices should be made by Humans having a democratic mandate: The future is with human-machine collaboration rather than pure ML systems

=> It's time for European policymakers to invest in these now tools!

Chat GPT's view

Question: What can AI do to support innovation policy making?

Answer: "It's important to note that while generative AI offers valuable capabilities, ethical considerations, transparency, and human oversight are essential in the development and deployment of AI in policymaking to ensure responsible and accountable decision-making. Additionally, engaging with diverse stakeholders, including the public, in the design and implementation of AI-driven policies is crucial for legitimacy and effectiveness."