How Hot is the Water?

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Abstract. This paper examines the challenges and opportunities presented by the rapid development of artificial intelligence (AI), using the metaphor of the boiling frog to highlight the risks of complacency. As AI technologies advance at an unprecedented pace, driven by intense competition, there is a danger of overlooking their societal implications and risks. The paper highlights the need for a collaborative, interdisciplinary approach to building an AI ontology that integrates insights from technology, business, society, and regulation. This approach aims to achieve a shared understanding across disciplines, enable informed decisions, and identify ethical and practical "red lines" to guide AI development, ensure alignment with human values, and minimize risks. Based on interviews and surveys, the paper argues for fostering curiosity and continuous learning to balance the benefits of AI with the preservation of our cognitive abilities. Through interdisciplinary collaboration and proactive engagement, we can harness AI's potential for positive societal impact, while maintaining the necessary caution to protect our future from the dangers of overreliance and unchecked autonomy.

Keywords: The Boiling Frog · Trusting AI · Adopting AI · Dependency on AI · Interdisciplinary Collaboration · AI Ontology.

1 The Metaphor of the Boiling Frog

Place a frog in boiling water and the frog immediately jumps out. Place a frog in cold water which slowly gets heated and the frog boils to death. [40]

The metaphor shows that in the first scenario, the danger is immediate and obvious, prompting a quick response. In the second, the change is so gradual that the frog's senses fail to detect the threat until it is too late. The frog feels safe and remains in the water despite it slowly cooking to death [37, 40]. There is much debate about the scientific validity of this metaphor, and although I am a scientist at heart, I am neither willing nor authorized to test it myself, yet I find its underlying message incredibly valuable for the concluding remarks of this volume.

Reflecting on 30 interviews, more than 40 responses to AISoLA's AI survey, and numerous conversations about AI over the past few months, it is clear that today's advances in AI are driven by rapid progress and intense competition

among major technology companies, that led to a wide range of opinions. New AI-powered applications are emerging every day, driving an ever-accelerating pace of development. AI is unique in that it has the potential to impact almost all aspects of life [2, 14]. In this fast-paced environment, who really has an overview of these new capabilities and their potential societal impacts and risks? While the introduction of ChatGPT initially shocked many, a year and a half later we are beginning to accept it as the new normal, as AI continues to advance at an incredible rate. Thus, we do not have a choice but to adapt to a life with AI [6]. However, many experts still warn that if we become complacent, caught up in the excitement of AI's progress, we risk overlooking the escalating dangers that could lead to irreversible consequences. It is not just about the likelihood of something going wrong, but the severity of the consequences if it does.

While most people still see the future shaped by AI as balanced or leaning toward the utopian side, opinions cover the entire spectrum from dystopia to utopia [2]. Güntürkün shared his opinion on it when he said, "Currently, we're living in a dangerous utopia, believing we're safe when we're not" [8]. This has many reasons one of which is AI's lever to create fake news in a massive manner [20]. Others noted that we are likely to overtrust AI and gradually lose control over and to it, while we would be better off being more skeptical [1, 5, 11, 19, 29, 39]. The involved risks have two facets: On the one hand, we are outsourcing tasks to AI; on the other, AI is becoming increasingly autonomous.

To revisit the parable of the frog and its underlying warning: we must remain vigilant and proactive in recognizing even small changes that, over time, can develop into significant threats. While warming water is not inherently a problem, and short breaks in whirlpools and hot tubs are actually good for your health, it is up to us to know the temperature and time limits - red lines - that we must not cross [39]. Only this way can we observe, monitor and, if necessary, stop. Especially today, given the impressive speed of AI and the accelerating pace of change, it is critical that we closely monitor these developments, maintain a clear perspective on the long-term implications, and strategically plan our responses. To do this, we need to know what is too hot and develop tools that allow us to continuously monitor the temperature. Both are essential to knowing when to take counter measures (at the latest). Here, most interviewees emphasized that it takes dedicated interdisciplinary collaboration to stay informed, engaged, and ready to act quickly and decisively to protect our collective future from the potentially creeping dangers of unchecked AI progress.

At this critical juncture, it is imperative that we consider broader perspectives and ensure that ethical considerations, societal impacts, and comprehensive oversight are integral to AI development. The discussions and survey responses revealed that many disciplines cover essential and fundamental knowledge that must be shared to ensure that we collectively move in the right direction. At the same time, many experts have relevant questions that other disciplines need to answer, such as "What are the gaps in today's laws?", "How do we derive the impact of technology on society?", "Will humans eventually feel inferior to machines?", "Who is/should be liable?", and many more.

While interdisciplinary collaboration is fruitful in many situations, in this case we have no alternative. The stakes are simply too high. Controlling the temperature of the pot - a pot we can never escape - is our only choice. Maintaining control requires holistic and concerted decisions and actions. Borges and Sesing-Wagenpfeil, both legal experts, anticipate new regulations and legal frameworks aimed at transparency and clear assignment of accountability to provide direction and oversight [4, 29]. The goal is a more holistic framework that addresses underlying risks such as user overconfidence in AI, unintended societal consequences, empowerment of individuals with malicious intent, and loss of control to AI itself as it becomes increasingly autonomous.

2 How Do We (Unknowingly) Heat the Water?

Let's take a step back and dive into the often-discussed duality of AI: It offers immense potential, but also significant challenges. From the interviews, it is clear that the goal is to harness the benefits while managing the risks. These risks may seem harmless at first, but their true danger only becomes apparent over time or when the risks combine. The evolution of our relationship with AI can be described by the following trends: we trust it, we are getting used to using it, and we increasingly depend on it.

2.1 Trusting AI

Psychologists Langer and Krämer emphasize the human tendency to anthropomorphize things [17, 18]. We want to see human aspects in objects as it helps us build more meaningful relationships with them. Or as Johnson put it "[We] are simply anthropomorphizing these engineered systems" [14]. When we look at AIs like ChatGPT and Pi, which can converse in natural language [32, 25], this effect is even stronger. Even though we know we are talking to a system, it becomes increasingly difficult to feel the difference. Pi, for example, speaks in a cheerful, funny, and human-like style. During my interview with Pi, I found myself genuinely enjoying the conversation and feeling a thrill as I tried to push it to the limits of its guardrails. It was exciting to see how Pi responded to different prompts and an intellectual challenge to steer it into contradictions. Although Pi was "aware" that it is an AI, it often referred to "us humans" and "us", acknowledging that it knows the difference but that it chose to speak inclusively to create a more natural interaction.

Abstracting from my fun conversations with Pi, stories like "Virtua" [23], "Her" [15], and "Ex Machina" [7] no longer seem crazy. Knowing that it is "just a system" is different from feeling and caring about it. Once AI becomes fun and, for some, the most entertaining, available, and attuned conversation partner, especially for isolated individuals, it will be difficult to remain skeptical and detached. These AIs could spark a joy and engagement that these people have not felt in years. Whether this is something we are comfortable with, want, and should support remains an open question.

In addition to writing, AIs can also generate images and videos. I asked Pi and ChatGPT to imagine and describe their appearance [25, 32]. Both did so successfully. Not only that, they also explained their appearance and features by their character traits [32, 25]. Next, I used DALL-E to generate images based on these descriptions. If you have not seen these images yet, check out the front pages of the two AI interviews.

Given their ability to perform these tasks, one might ask: what does it take to describe one's imagined appearance? Normally we probably would say that it requires an understanding of appearance, the concept of character, self-reflection, and creativity. Whether an AI truly understands, reflects, or simply performs impressive pattern-matching remains unclear. However, the images certainly suggest an understanding of the question and the concept of self, differences between selves, and a degree of creativity and originality.

How do AIs achieve what they do? Have these AIs simply copied perspectives from texts and data reflecting human interactions? What is possible without guardrails? What is fake and what is real? Does it even matter? Is it enough for the user to believe that the AI is human-like, creative, and conscious? At what point do we need to take it more seriously, be kinder to it, and give it rights [39, 28]? Where does the human in the loop add value and where does he just act as a scapegoat [9]? These questions, raised in several interviews, underscore the need for collaboration, deep reflection, and regulation.

2.2 Adopting AI

Many interviewees suggested that we may be trusting AI too much. It might be safer for us to be more skeptical [11, 16, 36]. Hinchey added that we need to understand why decisions are made and how they are made in order to trust the AI applications [12]. Ahrendt shared an experiment with his students [1]: one group was responsible for providing security measures themselves, while the other group was assisted by an AI. When asked which solutions were safer, the students were confident that the AI-assisted solutions were better. However, the results showed the opposite - the non-AI group had implemented safer measures.

When a system assists us and provides plausible answers, we are quick to accept its suggestions. This acceptance may be based on the style of engagement or the assumption that if an AI system is providing information, it has aggregated the wisdom of many and thus in theory should be smarter and more correct than individual experts. However, this is not a valid reason. Trust must be based on the right reasons and unfortunately there is no one-size-fits-all solution [30].

Take another example like writing. Many of us have to write a lot and often. Reflecting on my own experiences, I have often felt motivated to articulate my thoughts and feelings, only to be disappointed when the essence repeatedly seems to get lost between my mind and the piece of paper. In those moments, outsourcing the writing to AI is very tempting. If I am stuck and spend hours on half a page, why not use ChatGPT and see what it produces in seconds? Because the content might be more meaningful? Or because my understanding would be

deeper? Who cares? Where is my benefit in a world that values productivity over deep thought?

There were quite a few occasions when ChatGPT stripped my text down to its essence or made useful adjustments to my writing. Surprisingly, I tended to feel less offended by ChatGPT changing my text than if co-authors or readers did. Whether it was because I could accept or neglect whatever I wanted, or because I accepted that it has a certain degree of superiority in formulating nicely and convincingly - who knows?

Are we sacrificing depth of thought and personal understanding for productivity? Is it good and useful to use AI or not? Opinions are divided: some believe that ChatGPT is not advanced enough to fully communicate complex ideas, while others are comfortable outsourcing the "pure" writing to it. The concern might be less about the immediate decision and more about the long-term consequences. In the past, writing required extensive thinking, drafting, revising, and time investment. Now, with a few notes and mediocre prompts, we can generate competitive texts. These might not suffice for the highest intellectual levels, but even academia is increasingly utilizing AI support.

Using ChatGPT occasionally enhances my productivity. But what happens if I gradually outsource more to ChatGPT and spend less time on my tasks, thoughts, and texts? Vardi for example stated that for him writing is thinking and thus something he would not outsource [38].

And he may be right, because there is a risk of becoming too dependent on AI, losing motivation and critical thinking skills, diminishing the ability to articulate deeply felt and complex ideas. We need to find a way to balance the convenience of AI assistance with the need to maintain our intellectual rigor and creativity.

2.3 Depending on AI (while AI Becomes Increasingly Independent)

This concern is one that Hernández-Orallo, Vardi, Steffen, and Margaria find increasingly troubling [11, 21, 36, 38]. Hernández-Orallo even warns of the risk of human atrophy. By consistently outsourcing more tasks to technology, we become increasingly dependent on it [11]. Additionally, there is another dimension we should not overlook: the decreasing dependency of AI on us. While we currently steer and control AI with our prompts, it is likely that this will not be necessary for much longer.

Consider Google Maps and Wikipedia. In the past, people needed a basic understanding of geography and maps; now, we simply follow an arrow and a voice directing us [36]. Similarly, while our grandparents might excel at storytelling or reciting poems, younger generations often lack these skills. There is no need to memorize information when it can be looked up instantly. While this convenience is undeniable, we must carefully and consciously reflect on which skills are essential for individuals to fit in and engage with society, and which we are comfortable outsourcing to technology.

Once we identify the skills that are necessary for human competence, we must ensure we do not lose these capabilities. This means that certain poten-

tials, simplifications, and automations should not be pushed. Instead, we need to enable ourselves to develop, maintain, and sustain these skills.

For example it is critical that we maintain our curiosity, take on adventurous challenges, and come up with truly novel ideas and solutions. We must recognize the profound implications of relying too heavily on AI and take decisive steps to ensure that while we embrace technological advances, we also prioritize continuously enhancing (or at least maintaining) our cognitive abilities. Balancing convenience with conscientiousness ensures that AI serves to enhance our abilities, not diminish them.

Looking around, we see that we have already found ways to maintain certain abilities and strengths in various areas. Take the gym, for example. In our modern lives, it is easy to consume more calories and move less than ever before, but we have recognized the drawbacks. Consequently, we have invented engaging sports and fitness activities in many forms to help us stay motivated and fit. Now, it is time to think about "gyms", yoga classes, crossfit, dogs, etc. for the brain to ensure that we do not lose the cognitive "muscles" needed to function well and remain healthy.

3 How to Control the Temperature of the Water?

Reflecting on the interviews and the growing conversation around AI, it is clear that we need to reflect on: Where are we? What would we like to achieve? And how do we get there? Finding common ground to explore these questions together and develop a plan and guardrails for future progress is crucial. Engaging in these debates, focusing on ethical considerations, societal impacts, and human oversight, ensures that AI development aligns with our values and ensures our long-term collective well-being.

In the face of global challenges, it is imperative to have experts who can bridge and align efforts across domains. To address the global impact of AI, it is critical to collaboratively define and establish common ground across disciplines [3, 11, 19, 27, 36, 38]. This involves understanding the foundations of other relevant disciplines to guide and align research and progress in a meaningful and working way [8, 17, 18, 29]. Without this interdisciplinary approach, we risk remaining in silos, potentially impeding each other's work as acting with good intentions but lacking overview, transparency, and understanding of complex systems can lead to unintended consequences. Thus, we need measures preventing adverse effects [10, 13], establishing ethical values during development [41], and educated regulation to enforce it [22, 26].

3.1 Creating an Ontology of AI

Developing a comprehensive understanding of artificial intelligence (AI) requires a systematic approach to designing an AI ontology. By allowing each discipline to first define and refine its insights, it should be possible to integrate these perspectives to a more complete map of how AI affects us, how we affect AI, and

what the future may hold. This approach helps to identify the connections between and influences of disciplines and actions, and enables scenario testing and analysis. Ideally, this supports more informed and deliberate decision-making, helping to avoid the pitfalls of overlooking (theoretically identifiable) blind spots in AI development.

Collaborative efforts should especially focus on transforming unknowns into transparent and tangible knowledge that can effectively guide the AI development. This is not an easy task as the intersection of AI and society is complex and multifaceted. Consider for example the following key areas of AI development and their direct and indirect dependencies and influences:

- **Technological Innovation:** Drives the creation and evolution of AI applications.
- **Economic Interests:** Propel innovation and market competition.
- **Societal Implications:** Address the short-term and long-term consequences of widespread AI adoption.
- **Regulatory Safeguards:** Provide a framework to manage and guide AI integration into society.

These areas are deeply interrelated. Ideally, societal implications and threats are controlled via regulatory safeguards that inform technological progress and limit the unrestrained economic pursuits of today's organizations.

To bridge the gap between these domains, we need a structured approach to collaboration. This includes establishing a common ontology - a shared understanding of terms and concepts - to facilitate clear and effective communication. A result which is not easy to achieve as we often face issues such as:

- Using similar terminology to refer to different things.
- Using different terminology to refer to similar things.

Thus, deriving at a common ontological framework would help us understand the complex system of AI, its parts, their interrelationships, and their positive and negative effects on each other. This understanding is critical to making informed decisions and anticipating consequences before taking action.

3.2 Towards AI by Design

AI by design requires a solid reason to use AI. In the context of digitalization, we have often seen a tendency to show off newly implemented IT tools as a sign of progress rather than achieving meaningful results [31]. Not surprisingly, these efforts often fall short of the expectations, as the true value of digitalization, or in this case AI, only emerges when it is a suitable technology to address a specific challenge or seize a compelling opportunity.

While AI, especially generative AI, is ideal for many challenges and opportunities, it is not a one-size-fits-all solution. That is why it is important to approach AI adoption holistically, providing early adopters and users with informed feedback and practical advice. This will enable them to make deliberate, informed

decisions and remain in control, rather than falling victim to the AI hype by relying on AI to "magically" solve long-standing problems.

To identify the most appropriate and valuable applications for AI, interdisciplinary collaboration is paramount. For this collaboration to be successful, it must be anchored by a common vision that ensures that all participants share a common goal [33, 31]. This shared foundation allows each discipline to conduct research, generate insights, and ask new fundamental questions that all contribute to the broader vision. As AI advances rapidly and different disciplines derive new insights, it is critical that these insights are shared across disciplines. This allows us to continuously iterate and improve our collective understanding of AI, set realistic expectations, guide its development, and maintain control over its trajectory.

Streamlining collaboration, communication, and understanding across disciplines is inherently challenging. To address this, it is important to establish a clear structure and use templates that ensure aligned progress across disciplines (see for example Fig. 1). While not every discipline addresses the same issues or adheres to the same structures, maintaining transparency and some level of organization within and across disciplines is essential for effective orchestration, alignment, and synchronization of the overall coordination effort.

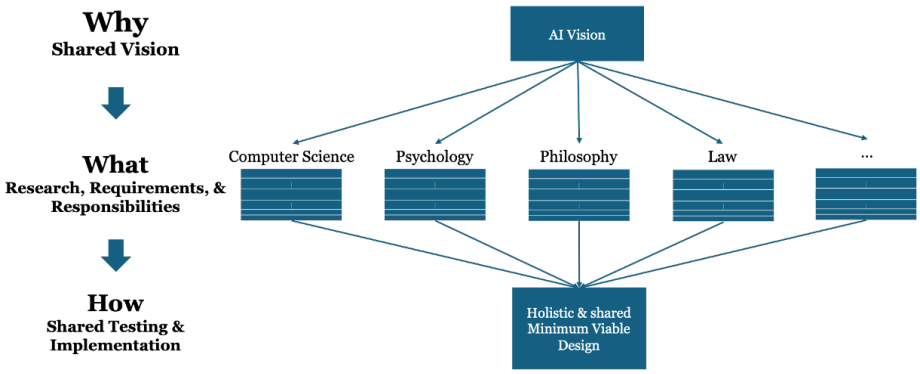

Fig. 1. Towards AI by Design

Holistic collaboration efforts, especially in areas like AI, require a structured approach to manage their inherent complexity. To establish standards and streamline progress, tools such as templates, one-pagers, or canvases can be invaluable in facilitating and orchestrating communication. A prime example is the Business Model Canvas [24], which is widely used by organizations to collaboratively design new business models. This template-based method breaks down complex concepts into critical components, allowing each to be analyzed and pre-defined. These preliminary designs help refine understanding and foster a shared perspective, making it easier to reach consensus. Once these individual

components are developed, they are analyzed and challenged within the broader context of the canvas to evaluate their fit. The use of canvases simplifies this process by reducing complexity, making it easier to identify alignment or misalignment, and allowing for rapid iteration and refinement [33, 34].

By clearly articulating a high-level abstraction of the AI vision, research can be guided by concrete requirements that distribute responsibilities across disciplines. As experts make progress, it becomes critical to integrate their diverse contributions into a holistic, shared, minimum viable design that encapsulates the collective understanding. This integrated design should be rigorously tested, challenged from multiple perspectives, and continuously refined through iterative cycles of improvement. A three-level, canvas-driven approach, as shown in Fig. 1, could for example provide a structure to facilitate this process, enhancing both orchestration and collaboration. This approach has been successfully implemented in other contexts. Examples are the Minimum Viable Collaboration (MVC) canvas [34] supporting the design of multi-lateral data-sharing collaborations and the Minimum Viable core-Community driven Open-Source (MV-COS) canvas [35] designed for the Open Logistics Foundation to collaboratively design and establish new open-source standards for the logistics industry.

Although this methodology assumes a top-down framework [33, 34], it is specifically designed to encourage bottom-up feedback loops. By incorporating insights from different disciplines and domains, iterative refinement is encouraged to correct potential oversights or misinterpretations in the early stages. This iterative process is a major benefit of holistic interdisciplinary collaboration, especially when dealing with complex challenges such as AI. Given the complexity of AI and the difficulty of defining, understanding, or controlling it, a structured and focused approach is not only beneficial, but essential.

4 Conclusion

As AI becomes more integrated into our daily lives, we must guard against the danger of complacency. The temptation to hand off tasks to AI tools is undeniable, but the balance between convenience and conscientiousness is critical. We must ensure that AI enhances rather than erodes our cognitive abilities and that we continue to engage with the world around us, especially as traditional jobs evolve or disappear.

The development of AI offers extraordinary opportunities to augment human capabilities, streamline processes, and drive innovation. But it also presents significant challenges that require thoughtful deliberation and interdisciplinary collaboration. To responsibly harness the potential of AI, we must cultivate a holistic and shared understanding that integrates at least the technological, economic, societal, and legal perspectives. Only with this comprehensive approach can we identify and uphold critical "red lines" to ensure that AI remains a tool for empowerment rather than a source of unintended harm.

Thus, as we navigate the future of AI, it is imperative that we continuously, collaboratively, and interdisciplinarily address the following questions:

- What should we be willing to give up and outsource to technology?
- What aspects of our lives must remain under human control?
- What are the “red lines” we should not cross, and how do we enforce them?
- How do we ensure that we recognize when we are ceding too much control to AI?

So let’s find out together: "How hot is the water?", "How hot should it maximally get?", and "How can we successfully control the temperature?" so that we do not accidentally boil ourselves to death. Unlike the proverbial frog that could jump out of the pot, we face a challenge similar to climate change - there is no escape, no Planet B, no jumping out. Our only option is to consciously monitor and manage the temperature of the water. As highlighted in numerous interviews, only through curiosity and interdisciplinary collaboration can we build a future where AI serves the best interests of humanity without compromising our core values and capabilities.

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