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Needs-aware Artificial Intelligence: AI that 'serves [human] needs'

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Many boundaries are, and will continue to, shape the future of Artificial Intelligence (AI). We push on these boundaries in order to make progress, but they are both pliable and resilient–always creating new boundaries of what AI can (or should) achieve. Among these are technical boundaries (such as processing capacity), psychological boundaries (such as human trust in AI systems), ethical boundaries (such as with AI weapons), and conceptual boundaries (such as the AI people can imagine). It is within this final category [1] that we find the construct of *needs* and the limitations that our current concept of *need* places on the future AI.

Serve [Human] Needs

Multiple AI thought leaders (including Kai-Fu Lee [1] and Ben Shneiderman [2, 3]) have posited that a primary goal of AI (and Human-Centric AI) is to serve human *needs*. A laudable goal for sure, but there is a great deal of history, controversy, and complexity packed into both the word *need* and the overarching construct of *needs* [4]. Thus, if serving *needs* is to remain an ambition of

[1]while it can play a fundamental role in all other boundaries

our AI systems, further attention (i.e., dialogue, research, guidelines, policies) and collaboration across multiple disciplines is required to develop the construct of *needs* into a pragmatic tool that be applied to shape the very goals of what future AI can and should achieve.

Need is a commonplace word (such as, "I *need* coffee"), making it easy to overlook that the term has specific meaning, definition, connotation, and power. Its power, for example, stems from the connotation that the object of the statement (such as, coffee in the example above) seems to be absolutely necessary and without alternative. In other words, only coffee will satisfy the implied *need*. Coffee may not be sufficient, but tea or water definitely won't do.

We routinely leverage this power (as do politicians and advertisers) when we use the word *need* to effectively eliminate other options (such as, "AI companies *need* government regulations", when, e.g., market-based instruments, co-regulation, self-regulation, and education might be other viable options to be considered [5]). We do this because *need* statements typically induce the desired associated behaviors (such as, choosing regulations rather than other alternatives); though typically creating ethical difficulties both for those defining the *need*, and those tasked with satisfying the *need*. In these cases, *need* is a very powerful construct–and yet it remains one that we have little understanding of or agreement on.

It is worth emphasizing that being *in need* (and accordingly serving *needs*) is not limited to individual humans. *Needs* can be associated with different types of systems (e.g. life forms, organizations, societies). Therefore, *needs*-aware AI systems should ideally consider different systems' needs (plural) in different levels and different contexts sustainably.

What Are Needs?

Distinguishing between what is necessary (i.e., *needs*) and what is desired (i.e., wants, cravings, motivators) has multiple ethical implications for AI and AI developers. This distinction is easily lost, for example, when put into the context of determining what potential clients/customers will purchase (where people might elect to spend their own money on what they desire over what is necessary). While ascertaining peoples' desires is not always an easy task, it is relatively much easier than identifying and prioritizing their *needs* (i.e., the goal of a needs assessment [6]). The philosopher Stephen McLeod has even questioned if people are capable of knowing their *needs* at all [7].

For AI developers, for instance, the challenges of this distinction (i.e., *needs* from wants) leads to an ethical difficulty that spans the continuum stretching from creating systems that merely meet consumers stated desires at the moment, to systems that assist in resolving [human] *needs* even when people may be unaware of the benefits at the time. Moving from basic perspectives of *needs* (e.g., *needs* are what people say they *need*, or *needs* are only what motivates an individual to take action [8]) to a more robust and multidimensional definition and understanding of *needs* (e.g., *needs* are gaps between

desired accomplishments and current achievements at multiple interdependent levels [6]) brings many benefits, but also introduces complexity for AI developers creating (or co-creating) Sustainable *H*uman-centric, *A*ccountable, *L*awful, and *E*thical AI (Sustainable HALE AI [9]) systems (for instance, balancing individual, organizational, and societal *needs* that are routinely in conflict).

What are *needs*? What are not *needs*? How do we prioritize among *needs*? How do my *needs* relate to your *needs*, and how do our *needs* relate to the *needs* of others? How do we measure *needs*? How can we utilize needs? What will satisfy a *need*, and how will we know if the *need* has been satisfied? How can AI serve *needs* and still be economically viable? These, and many other, questions have been and are still debated within and across multiple disciplines (e.g., philosophy, ethics, law, social work, education, business, economics, political science, sociology, management, cognitive science, psychology, and engineering). These debates have not, however, reached a resolution; and we suggest that this does, and will continue to, create pragmatic boundaries on what AI can and should achieve. Likewise, without answers to these questions it might be ethically challenging to ask (or expect) AI developers (or AI systems) to assess the *needs* of others, and then to use the results of those assessments to create AI systems that meet ethical standards.

Roles for *Needs*

AI developers are often placed in a so called *social dilemmas*–with societal good on one side and commercial pressures on the other [10]. Part of the solution to these dilemmas (beyond ethical, legal, and regulatory frameworks) could be the introduction of well-defined and measurable *needs*[2]. For example, by identifying and measuring *needs* (i.e., societal, organizational, and individual *needs*) we can contribute to building the foundations for finding an appropriate equilibrium that serves *needs* in meaningfully and balanced ways; while providing tools capable of guiding AI ethics. As an integrated component of *H*uman-centric, *A*ccountable, *L*awful, and *E*thical AI (or HALE AI) [9], the construct of *needs* can, we suggest, add value and push the boundaries of AI development from chasing wants, to serving *needs*[3].

Needs can thereby contribute in multiple roles in the development of AI. HCAI developers, for example, can utilize *needs* to identify and prioritize both what the systems can and should achieve–meeting peoples' desires and also serving their *needs*. AI systems, for instance, can use measurable *needs* to evaluate their own performance in resolving *needs*, while at the same time assisting people in making decisions where the complex relationships among *needs* must be weighed. Meanwhile, policy makers can utilize well-defined societal *needs*

[2]Calling for well-define and measurable *needs* (or needs satisfaction) does not mean that we are advocating absolutist perspectives on *needs*. With that in mind, we propose that, among others, considering *disagreements* [11] should be an important aspect of *needs-aware* AI systems.

[3]Considering that meeting different systems' interrelated (and sometimes conflicting) needs in a sustainable manner is crucially important for our societies, re-thinking needs (and needs satisfaction) into AI can not only contribute toward the development of HALE AI but *Sustainable* HALE AI [9].

to craft effective policy, regulatory, and ethical frameworks. As such, precise, comprehensive, and transparent constructs of *needs* can play many vital roles in the future development of AI.

What Next?

If AI is going to serve our *needs*, then we have to answer some of these questions, and discover new questions that are waiting below the surface. From our perspective this is an urgent matter since these questions will not be answered quickly and without debate, and AI researchers and developers must be part of the professional dialogues in order for useful guidance to be achieved. No single discipline or field can come to resolution on these matters–*needs* are illustrative of the types of broad interdisciplinary challenges (bringing together STEM, social science, and humanities scholars and practitioners) that will be the hallmark of future decades of AI research and development. At the same time, the development of new AI systems will not necessarily wait for academic debates—as history shows.

Needs, as both a construct and professional term, can (and should) be a fundamental element of ethical frameworks and the tools that are derived from those frameworks. We must use the word with the same precision and with the same care as we accord to terms such as "values" or "rights". We must also work to create a shared understanding of what *needs* are, defining them in manners that can transcend disciplinary boundaries and allow us to align individual, organizational, and societal *needs* [12].

If we give up, however, and choose not to become precise in our construct of *need* (our language when discussing *needs*), and the operational definitions required for future *Needs-aware AI* systems–then we will be left with AI that merely helps us meet our transitory wants, desires, cravings, motivations, or passions[4]. All of which may be profitable and favorable at times, but none of which are sufficient (nor necessary) for meeting our ideal of future AI that has the capacity to serve human *needs*.

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