# Welcome to the Token Engineering Community

Our community is a technology-abled social organization committed to the application of web3 technologies to achieve human-centric outcomes. Much like traditional engineering societies we engage in research, education, and standard setting in addition to designing, building and maintaining technological solutions.
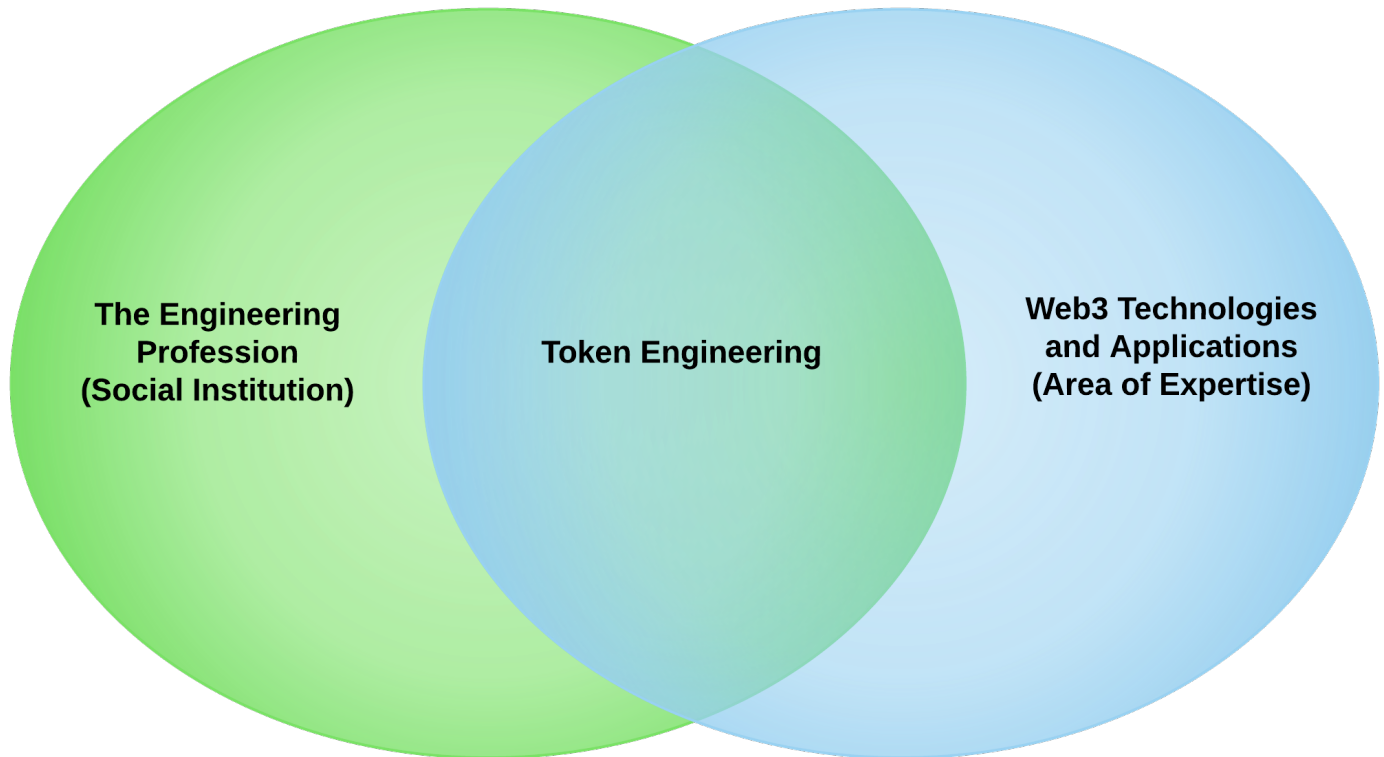
As with any emerging technology there is still a lot of uncertainty around the practice of engineering web3 enabled systems but it is already clear that these systems are deeply entangled with social and economic systems, and thus have the potential for a deep and longstanding impact on social institutions. With this in mind, our community coalesced around a shared commitment to the values upheld by the broader institution of professional engineering. While it remains unclear where the web3 technology stack will carry the our society, we believe that this journey must be undertaken with a values first mindset.

The Professional Engineering Values System

Engineering Values according to **Martin, M. & Schinzinger, R. Ethics in Engineering. NY: McGraw-Hill, 1983:**

(1) a primary obligation to protect the safety of and respect the right of consent of human subjects;

(2) a constant awareness of the experimental nature of any project, imaginative forecasting of its possible side effects, and a reasonable effort to monitor them;

(3) autonomous, personal involvement in all steps of a project; and

(4) accepting accountability for the results of a project.

Engineering Values according to **Pinkus, R. L. B, Shuman, L. J., Hummon, N. P., Wolfe, H. Engineering Ethics: Balancing Cost, Schedule, and Risk—Lessons Learned from the Space Shuttle. Cambridge: Cambridge University Press, 1997.**

"The ethical engineer is one who is competent, responsible, and respectful of Cicero's Creed II. Cicero's Creed, engineering's oldest ethic, directed engineers to place the safety of the public above all else."

Engineering Values according to **Wike VS. Professional engineering ethical behavior: a values-based approach. age. 2001**

Instead, I prefer a third scheme that focuses squarely on what is to be valued and not on questions of methodology or technical expertise. This scheme proposes that professional engineers (and for that matter, any professionals) share a commitment to these six values: integrity, respect for persons, justice, compassion, beneficence and nonmaleficence, and responsibility.

The Web3 Values System

Investors, Builders, and Early Adopters of web-based cryptographically secured social and economic infrastructure and applications have a wide range of beliefs and values but some key concepts form a common thread: privacy, transparency and agency.

Privacy and transparency are in direct tension but this provides a fertile ground for discussing trade-offs. Agency then includes the right of humans to opt-in and out of web3 networks. Furthermore, opting in does not require an intermediary, provided you are sufficiently technically inclined to manage your own infrastructure and/or private keys.

Another interesting tension arises in the pursuit of agency: in a network participants are connect, where does ones right to control their own actions meet the rights of those their actions impact. At one level protocols can be said to address this directly by providing an explicit specification of what actions are and are not acceptable within the network. However, at the level of governing these networks the boundaries of these rights are non-obvious.

The Ethereum hard fork after the DAO hack is an example where the Ethereum Institution (humans) split over

a values difference. The Ethereum Classic Community upholding a principle that the "code is law" and that actions taken in bad faith (exploiting a flaw in code to take someone elses money rather than taking action to see the code secured) were to be upheld because the code itself was the deciding factor. The broader Ethereum community took extreme measures to reverse the malicious activity and initiated an irregular state transition, effectively removing the hackers funds to be redistributed to the affected parties. Neither was right in any absolute sense but the event was a very public exercise of a values judgement on the part of leaders in the Ethereum community.

For more on Web3 Values and History see: **Voshmgir S. Token Economy: How Blockchains and Smart Contracts Revolutionize the Economy. BlockchainHub; 2019.**

For thoughtful criticism see **Walch A. In Code (Rs) We Trust: Software Developers as Fiduciaries in Public Blockchains; 2019.**

Reconciling Value Systems

At first glance, these value systems are in conflict. Simply, the authority of a traditional engineer is derived from the power of the nation-state to regulate its territory. However, the web3 value system is native to the internet, the social institution is extra-national and openly rejects the authority of the state to regulate it. Adherents to the web3 value system adhere to regulations out of pragmaticism rather than in deference to those regulatory authorities.

Let us set aside for a moment the interpretation of the engineering profession as the institution empowered by sovereign nations to design, build and maintain technological infrastructure. Instead let's look at the engineering profession as the instution empowered by the public to safeguard their well-being in the face of technologies so broad and deep that they cannot hope to understand it all, and thus make individual judgements regarding their own safety.

Taking this latter perspective, it is possible to undertake the responsilility to safeguard the public good without first submitting to the authority of a soverign state, and their right to regulate. This reconciles with the agency aspect of the web3 value system; in choosing which systems one opts into it is possible to select for those systems one believes have been created and maintained by persons adhering to a public welbeing first values system. Though it may take time, we believe history tells us that people want to enjoy the benefits of new technology while the underlying complexity is abstracted away from them. This is only possible when their interests are safeguarded through social institutions.

A Path Forward

Upholding a value system is a journey not a destination; it can never be totally reduced to a set of methods and

procedures but drawing on methods and procedures is a good place to start. In particular the Token Engineering community has been committed to improving design methodologies and associated tools drawing on the engineering subfield of CyberPhysical systems (CPS). Wikipedia defines CPS as follows:

A cyberphysical system (CPS) is a system in which a mechanism is controlled or monitored by computer-based algorithms. In cyber-physical systems, physical and software components are deeply intertwined, able to operate on different spatial and temporal scales, exhibit multiple and distinct behavioral modalities, and interact with each other in ways that change with context.[1] Examples of CPS include smart grid, autonomous automobile systems, medical monitoring, industrial control systems, robotics systems, and automatic pilot avionics.[2]

CPS involves transdisciplinary approaches, merging theory of cybernetics, mechatronics, design and process science.[3][4] The process control is often referred to as embedded systems. In embedded systems, the emphasis tends to be more on the computational elements, and less on an intense link between the computational and physical elements. CPS is also similar to the Internet of Things (IoT), sharing the same basic architecture; nevertheless, CPS presents a higher combination and coordination between physical and computational elements.

Cyber–Physical Systems – a Concept Map

See authors and contributors.

http://CyberPhysicalSystems.org
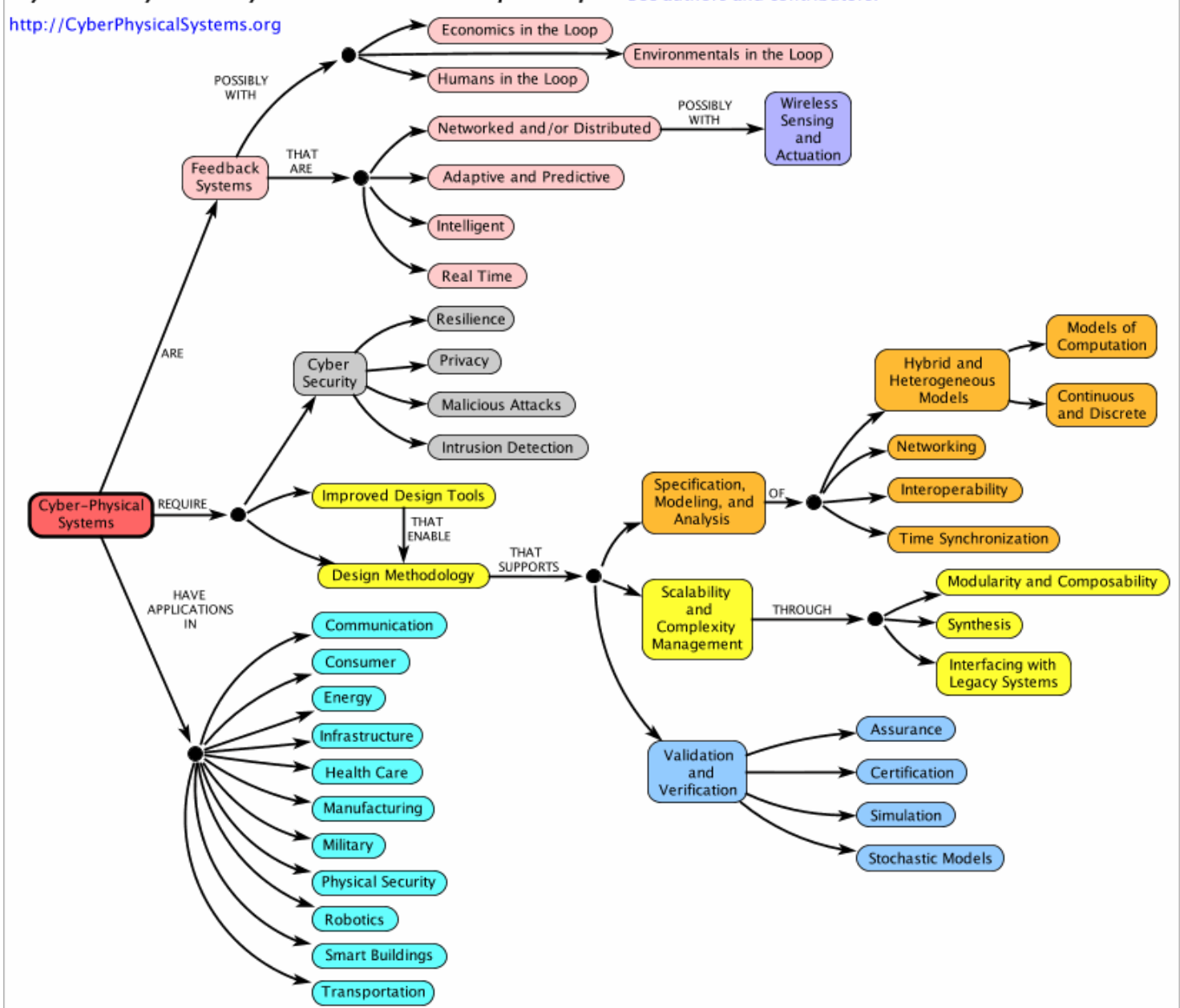
See Image Source, Ptolemy Project, UC Berkeley CyberPhysical Systems

In **Voshmgir S, Zargham M. Foundations of cryptoeconomic systems, 2020** a case is made that following the definition of CyberPhysical Systems, the web3 internet native social and economic infrastructure projects should be approached as CyberPhysical systems. While CPS predates web3, it is also plagued by ethical questions as algorithms take the role of administrating policies which directly impact human activies.

Following in the engineering tradition, the Token Engineering community has worked on design methodologies and associated design tools in a manner associated with system safety in complex engineered systems. The state of the art in the broader engineering domain can be found in **Leveson NG. Engineering a safer world. The MIT Press; 2016.**

However, the growing crisis of AI explainability and prediction algorithms creating self-fulfilling prophecies shows us that technological expertise alone is insufficient for upholding public wellbeing first value system. On an even grander scale, our existing public institutions have visibly failed to address systemic challenges such as global warming and acute public health crises.

As such we look beyond the boundaries of our technical fields to experts in the humanities and social sciences with a particular need for those studied in ethics, law and governance. Our community is open to all who wish to take up the burden of safeguarding the public, not because a regulatory authority demands it, but because it is a role in society necessitated by the existence of technology.