

## Cybernetic governors

How should humanity steer the future? Together.

For an individual to answer "How should humanity steer the future?", they must for a moment leave behind all humility. An individual under optimal conditions will have access to only finite and biased information in a lifetime. Cognitive limits, not to mention the personal needs of a human life, prevent us from fully understanding the information available to us. One alone simply cannot comprehend let alone speak for the breadth of humanity.

The individual can make narrower claims--perhaps they can know that some local change would be beneficial to everyone in their consideration. But this nothing more than everyday good work. Humans steer themselves and their surrounds whether or not they have humanity as a navigator.

To ask how humanity should steer the future, then, requires an inquiry into the structures that allow humans to function collectively as a superorganism. We face the difficult if not impossible task of cells in a body trying to anticipate how they can best serve the functioning of the greater being. For cells, the best one can do is its part: to serve in the sole of the foot, or in the bloodstream, or as an electrical relay in the brain. Cells that can consider how to augment the powers of a being so much more complex than themselves serve a privileged role indeed. If that work can be done at all, it is not without the aid of the peripheral nervous system, lest these cells find solutions that serve the brain but spite the feet.

One might object to this line of reasoning. What if an individual discovers that there is a threat to all of humanity--an existential risk? Certainly it is in the interest of humanity to reduce this risk. One could know this without consulting the rest of humanity. However, if it is possible to know that this is worthy goal, could we prevent such a risk without having much more of humanity willing to steer the future with us?

Why wouldn't humanity steer away from something that could destroy all of us--such as a meteor strike, or a nuclear war? Many humans face countless other kinds of more immediate risk from the environment and from other people. If these risks do not threaten to kill them, they threaten to make them childless, or make their children socially irrelevant. Genes compete for scarce planetary resources. Fear drives self-preservation. Only those with nothing else to fear will strive to preserve the rest of us. Only those who have cleared away all other more immediate personal risks have a natural interest in the preservation of the species, as species risk is the only risk left that they face.

Many of the great catastrophic risks to humanity are due to this selfish and perhaps shortsighted conflict between those at more immediate risk. A person is not likely to change the way its behavior is impacting the climate, for example, until the immediate gains that one can

make from pollution do not outweigh their conscience. Realistically, a harmonious society in which the preponderance of humanity has the opportunity for expression and reflection on the fate of humanity is a prerequisite to guaranteeing humanity against its self-destruction.

Who could govern such a society? The most benevolent of dictators will still be a tyrant if they are unable to listen to his people. Once again, one who would justly steer humanity must consult humanity before acting rashly.

The 20th century cyberneticists, who took their name from the Greek word for steering and governing, saw both physical and social systems in terms of feedback, information flow, communication and control. This early research provided the foundation for later work in artificial intelligence, machine learning, and networking. Today we see that the world's most powerful corporations and governments have grown due to the mastery of cyberinfrastructure and telecommunications--the global networks of communication and control. It's with this technology that humanity steers itself in practice.

The Internet was designed as a means for scientific researchers to communicate with each other. As it matures its functions become more central, disrupting older institutions that have ruled through control of information and capital. Its power is in its ability to give unprecedented access to information to people all over the world. But its successes have not been unqualified. Just as use of the Internet has empowered countless people, it has also taken power away from them. Recently we have seen its much-heralded value in decentralizing power and access can be coopted in service of even greater centralization. Meanwhile, power has shifted to those who control the physical cyberinfrastructure in a near-monopolistic way--telecommunications companies. As these companies pursue their profits, as humanity we face the danger of our collective nervous system acting in selfish disregard of the rest of the body.

But the Internet is a recent invention. We could not have known all its implications when it was first created. It is the source of its own immense complexity, as it is the tool with which the lucky collaborate to expand its capacity through open software development and discussion. There is a vast and interesting design space of hardware, protocols, and services that can change the way humanity steers itself. What values should guide this design? What communications systems would help humanity steer the future?

As an example: Today we are seeing a profound transition in the nature of scientific publication. Early scholarly communication consisted of letters. Later these were compiled into journals. Now journals are honored with prestige but are irrelevant to the scientific conversation in practice. On-line pre-prints influence scientific practice day-to-day. We are discovering that for science in the 21st century, it is not enough to publish written results; we must also publish data and source code if our work is to be reproducible. Surely scientific understanding is important for humanity to steer its future. Yet the cyberinfrastructure used by scientists to confer on empirical results, let alone normative positions and policy recommendations, is in its early stage of innovation.

What of the rest of humanity--the non-scientists? Government exists to steer humanity. Modern government is the mass of humanity engaging itself through masterpieces of bureaucracy. From the ballot box to the county courts, the political state is a flow of information, rapidly digitizing. In this period of disruption we find ourselves in a laboratory of democracy and other organizational modes besides. Encoding bureaucratic practices efficiently into cyberinfrastructure is only the beginning, as we can augment these processes with machine intelligence.

This is as much a danger as an opportunity. The critical question is how we will design our cybernetic governors. Whether we like it or not, these machines will steer humanity. How should they? How should humanity steer them?

Today, we build our cybernetic governors through distributed processes of networked collaboration. Scientists and programmers work together to create software that guides the flow of information for human and machine use. At their best, they are responsive to their 'users,' adopting practices of human-centered design to create systems that warmly integrate humanity as we steer each other. At their worst, they produce systems that make uncomfortable or even violent demands of people.

These collaborations create the cybernetic governors that steer humanity. What steers these collaborations? Still more communication systems encoded into the cyberinfrastructure, and the organizational practices around them. In the most extraordinarily successful of such systems, design decisions can be made through testing en masse--a flick of a switch can confront millions of people with a new feature, to get their reaction.

For more foundational technology, the building blocks of the great systems, the community of users is smaller, but the total ecosystem is more complex. The processes by which new software evolves, how one piece depends on another, is often ad hoc and unmanaged. The cybernetic governors of these collaborations are currently among some of the least sophisticated. Chronologically, they were some of the first to be developed. They are due for an overhaul.

How should humanity steer the future? Humanely. How must it steer the future? Through the cybernetic systems that with increasing intelligence dictate how humans communicate with and control each other--our cybernetic governors. Peeling back the recursive layers to the heart of these systems, we find the cybernetic governance of the scientists and programmers that build these systems. That's it. That's the steering wheel.