



Amplifying the Call for Anticipatory Governance

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OPEN PEER COMMENTARIES



Amplifying the Call for Anticipatory Governance



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As theorists, developers, and practitioners of the anticipatory governance of emerging technologies (see Barben et al. 2008; Guston 2014; Scott and Barlevy 2022), we applaud Ankeny et al.'s (2022) call for reflection, anticipation, and deliberation in the development of embryo-like “iBlastoids.” We also empathize with the difficulty they encounter in pinning down precisely what that should mean. Innovation systems, research enterprises, and socio-technical outcomes are complex, expansive, and heterogeneous, making it hard to identify the features, processes, and potentials on which foresight and public engagement should focus. Yet the overall aim of anticipatory governance, responsible innovation, and related efforts—the democratic alignment of innovation with societal needs and values—provides guidance. Such a goal requires a broadening of perspective from the merely biological potentials of particular lab activities to the social, economic, and political potentials of the programs of innovation wherein they occur. This commentary elaborates what this expansion of perspective means for foresight, public engagement, and governance.

In our view, foresight around emerging technologies should consider not just the novelty of discrete discoveries, but also the broader systems wherein

discoveries occur. Ankeny et al. argue that emerging technologies like iBlastoids require foresight and deliberation primarily to prepare for “unanticipated” or “serendipitous” discoveries. Such novelties, they say, “fall into an ... institutional void,” with “few agreed [governance] structures” (36). If by “institutions” we understand only government regulation targeted to particular classes of biological entities, this is true. But novel biotechnologies emerge and develop within dense preexisting legal, economic, and social regimes—e.g., intellectual property laws, landscapes of industrial interests and market relations, cultural values related to health and medicine, and the technical, financial, and social goals of researchers and their funders. These are the systems which, with or without additional government regulation, will shape the public effects of novel entities like iBlastoids. Governance should focus not just on discrete biological entities—the technological apparatus—but also on the larger systems that produce the aforementioned public effects. A governance which takes seriously the great uncertainty, extensive potential impacts, and significant plasticity of emerging technologies requires foresight and public engagement not only about what happens in the lab, but about why, where, and under

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what auspices it occurs; and into what programs of socio-technical change it is integrated.

Emerging technologies carry a variety of potentials, which are winnowed to concrete outcomes by the pre-suppositions and choices of the actors which develop, implement, and use them (Selin 2007). Whether a new technology is widely accessible or expensive and exclusive, directed toward military or civilian use, or controlled by public or private interests will be determined by human institutions and choices. Which types of outcomes emerge depends less upon the breaking of particular technical uncertainties or ontic categorizations than upon the goals and values (e.g. of profit, military ascendancy, life extension, or cure of rare diseases) embodied by the organizations doing the research, development, and implementation. Whatever is discovered in the lab, anticipated or not, is evaluated, developed, or discarded according to those priorities. Discovery may be serendipitous; search and utilization are not. What researchers will be able to do is unknown, but what they (and their funders and technical audiences) are trying to do—what they do and do not care about, what possibilities they anticipate or neglect, in what power structures they operate—is quite knowable. On the basis of this knowledge of institutions, it is entirely feasible to foresee plausible social outcomes, value conflicts, tradeoffs, and dilemmas arising from programs of technological innovation. Foresight work under anticipatory governance can thus help researchers, publics, and policymakers to develop strategies and mechanisms to in real time steer innovation processes toward public goods and away from plausible ills (Nelson et al. 2021).

Looking from the outside, publics tend to recognize the importance of institutional context even when researchers on the inside do not. Scientists and ethicists often and vainly hope that public engagement will 1) offer categorical answers about the acceptability of novel technical capabilities and 2) reduce public apprehension about such capabilities. Ankeny et al.'s concerned reference to 'Frankenstein' language in iBlastoid news coverage, alongside their desire for publics to learn more about the messiness and regulation of research, evokes this hope. But public concerns about scientists 'out of control' are as much or more about researchers' perceived accountability, or lack thereof, to public priorities as about the particular and technical natures of individual technologies. Engagement hoping to build public support for research merely by disseminating information elides the real value tensions underlying public mistrust and

apprehension toward innovation (Felt et al. 2007). In a recent set of American focus groups on human genome editing, participants were less concerned about the ontic categorization of such efforts than convinced that the research would simply produce more costly treatments beyond the reach of most citizens (Tomblin et al. 2021). They understandably considered pursuit of greater equity and accessibility in healthcare to be more important than development of such expensive technical novelties. Effective public engagement must offer publics the opportunity to frame emerging technologies in terms of their own concerns and values; and it must connect those concerns and values to decision-making processes about the political economy, goals, and limits of research and innovation.

Responsible innovation, anticipatory governance, and related efforts aim to genuinely broaden the horizon of constituencies and values empowered to shape the aims, aspirations, and principles of research and innovation (Guston 2014; Stilgoe et al. 2013). Premature and expert-led closure upon what "the issues" are can undercut the emancipatory potential of such work (Stirling 2008). Real reflexivity, anticipation, and deliberation require public empowerment in determining what actors should be entrusted to conduct programs of biological research and innovation, under what constraints, using what resources and methods, and pursuing what goals. It is on these topics that public competence is greatest, and researcher expertise least meaningful. Technical experts cannot be expected to become lawyers, philosophers, or public representatives, and publics cannot be expected to become technical experts. But all can fruitfully reflect upon the values and interests shaping the context and direction of research, anticipate important outcomes research might produce under those values, and deliberate about what outcomes should be aspired to or avoided, what neglected values reemphasized. Even anticipatory and reflective efforts not directly involving publics should be informed by a grounded sense of public priorities.

Democratization of science and innovation does not mean making everyone a researcher, educating everyone in science, or, as critics have occasionally suggested, getting everyone to 'vote on the laws of nature.' It means ensuring that everyone who stands to be affected by the societal, economic, and environmental changes which new technologies produce sees their needs and priorities represented in the processes which generate and shape those technologies. If innovation is to be truly responsible, it is not enough for researchers to scrupulously avoid offending public

sensibilities. It is necessary that research administrators, funders, firms, policymakers, and, yes, practitioners actively work to make research serve and respect public needs. To be feasible, such action must be informed by broadly framed and system-focused reflection, anticipation, and deliberation not only about what might emerge in the lab but about what will be sought there and what may and should be made of it.

We cannot know in advance what technical potentials new technologies will or will not bear. But we can decide what possibilities are important and what values will guide us in exploring, instantiating, and, sometimes, forgoing them. And we can continuously reflect upon and update those judgments as circumstances and knowledge evolve. Only ongoing and broadly scoped efforts toward social responsibility throughout research and innovation systems can ensure that new discoveries, whether expected or not, will redound to the public good.

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