

Risk and escape policies, procedures, and practices: Issues and implications for biosystems design (synthetic biology) R&D

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Project Goals: This project investigates risk and containment issues associated with biosystems design (synthetic biology) research and development (R&D) from social and institutional perspectives. It aims to identify circumstances that affect human health and environmental risks stemming from biosystems design R&D, thereby identifying opportunities for avoiding, minimizing, or mitigating those risks. By focusing on research practices in a variety of research settings and associated with different target organisms, this project seeks to identify possible blind spots that inadvertently could create or increase human health or environmental risks.

To achieve our project goals, we investigate risk and containment issues associated with biosystems design R&D from three perspectives:

- Public sources—secondary data collected and analyzed from formal (e.g., journal articles) and informal (e.g., news articles, reports) publications related to biosystems design;
- Scientists conducting biosystems design R&D—primary data we gather through interviews with people engaged in energy- or environment-related biosystems design R&D; and
- Biosafety professionals— primary data we gather through interviews with people who play key biosafety roles in biosystems design R&D (especially institutional biosafety committee members).

Our analyses center on risk- and containment-related research practices and on issues associated with risks to human health and the environment. We divide “research practices” into two broad categories—practices used in the day-to-day conduct of research and practices associated with the organism or system being designed. Our analyses emphasize key elements that shape the social and institutional context within which biosystems design R&D takes place, such as research setting, research goal, organism studied, formal and informal rules, and disciplinary training. We study “research practice” because that is where the set of elements (listed above and others) that influence research context translate into behavior.

To date, we have conducted interviews with dozens of scientists and 10 biosafety professionals. These interviews reveal notable variability in risk- and containment-related research practices

and institutional approaches, even in seemingly similar circumstances. As examples, scientists report differences in containment and disposal practices when conducting research on the same category of target organism, and only some institutional biosafety committees members report using a ‘plus’ approach in assigning Biosafety Levels to labs (e.g., BSL 1+). Interviews also reveal some remarkably consistent responses. For example, virtually all of the scientists interviewed report that they use routine research practices in their laboratory or greenhouse settings, and that their day-to-day research practices are not biosystems design- or synthetic biology-specific. We are continuing to gather interview data, to analyze those data, and to consider the implications of those analyses for risk- and containment-related research practices.

References

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