

## Research Agendas in Societal Aspects of Synthetic Biology Workshop

### *Evaluation Results*

Arizona State University  
Office of Evaluation and Educational Effectiveness (UOEEE)  
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#### *Methods*

UOEEE worked with the conference leadership team to design an evaluation to determine how well the workshop met its overall goals with respect to facilitating dialogue among synthetic biology experts to inform a National Science Foundation (NSF) research agenda on the societal aspects of synthetic biology. The evaluation team at UOEEE collected data via pre- and post-workshop surveys, observations, and document review (e.g., materials provided to and developed by participants throughout the workshop). In addition, feedback on participants' perspectives, expectations and experiences while participating in the workshop were also obtained from program staff who had conducted on-site interviews during the workshop.

The evaluation team developed a 20 item pre-workshop survey, with input from program leadership, to inform workshop planning and participant recruitment activities in summer, 2014. The pre-workshop survey was administered from June 24 through July 25, and was completed by 103 of 169 individuals, corresponding to a 61% response rate. The raw data file was cleaned and shared with program leadership in July, 2014. Tabled data and open-ended responses to evaluation questions (i.e., unrelated to workshop planning and recruitment) were shared separately from the raw dataset with program leadership.

A member of the evaluation team observed a portion of each day of the three day workshop, totaling approximately six hours. Specifically, observations occurred during the opening plenary session on day one, break-out groups on day two, and priority setting and closing plenary sessions on day three.

A post-workshop survey consisting of 17 items was developed by UOEEE, with feedback from program leadership. The survey aimed to collect participants' ratings of overall workshop quality and effectiveness toward achieving outcomes. It was also designed to capture participant satisfaction with various workshop elements, as well as specific successes, challenges, and unanticipated outcomes from the workshop. Post-workshop survey data were collected online from November 6 through December 16, 2014. Of 111 workshop attendees, 77 participated in the survey, corresponding to a 69% response rate.

This report highlights evaluation findings from the post-workshop survey, observations, and document review. Please note that, in some tables, percentages may not equal 100% due to rounding.

#### *Findings*

##### **Participants**

As presented in Table 1, the majority of respondents to the post-workshop survey represented the academic sector (69%). Due to the comparatively lower percentages of respondents representing the

government (9%), private non-profit (10%), and private for-profit (5%) sectors, survey responses from these subgroups were aggregated in this report to protect their confidentiality.

An additional 6% of respondents did not specify their professional sector; this appears to be primarily due to partial responses (i.e., four of five respondents who did not specify their sector provided some initial responses but did not complete the survey). As the post-workshop survey was analyzed by sector, the responses of these five participants were not included in the tables. However, responses to the open-ended questions were included in the analysis for this report.

	Percent	Count
Academic	69%	53
Government	9%	7
Private non-profit	10%	8
Private for-profit	5%	4
Unspecified	6%	5

### Workshop Ratings and Satisfaction

The comments offered by participants about their experiences at the workshop were extensive and forthcoming, which appeared to mirror the enthusiasm to provide feedback observed during the workshop. The majority of respondents thought that the representation of synthetic biology endeavors across intellectual perspectives, organizational sectors and geographical locations was impressive. One participant illustratively noted, “I thought the planners did an excellent job of recruiting the full range of perspectives on these issues.” The quality of discussion during the workshop was described by respondents as “well-balanced,” “thought-provoking” and “productive.” There were “opportunities for building...collaborations [and] discussion of research frontiers.” Many respondents commented that the structure and organization of workshop activities (i.e., speakers and poster presentations, break-out groups, whole group discussion) were conducive to achieving the desired outcomes, albeit ambitiously, given the challenges associated with integrating a plurality of perspectives.

As demonstrated in Table 2, below, 84% of all respondents indicated that the workshop was “excellent” or “good.” Respondents from the academic sector were comparatively less likely than respondents from the government, private non-profit, and private for-profit sectors to report that the workshop was “excellent” (28% vs. 47%). However, academic respondents were slightly more likely than those representing government, private non-profit, and private for-profit sectors to note that the workshop was “good” (57% vs. 37%) or “fair” (15% vs. 11%).

	Excellent	Good	Fair	Poor	Very poor
Overall (N=72)	33%	51%	14%	1%	0%
Academic (N=53)	28%	57%	15%	0%	0%
Government, Private non-profit, Private for-profit (N=19)	47%	37%	11%	5%	0%

Respondents identified two primary limitations that they perceived as associated with some of the stated strengths of the workshop: the efficient use of time during the workshop and the large, diverse

group of contributors. Specifically, many respondents desired more unstructured time for conversations on the workshop themes throughout the program, in addition to more opportunities to network. Participants praised the workshop design elements which encouraged free exchange of ideas, yet they suggested that some sessions (i.e., opening icebreaker, break-out groups, closing plenary) were in need of more structure.

In addition, several respondents stated that the number and diversity of participants at the workshop posed a significant challenge for engaging in dialogue capable of producing unified, representative conclusions and recommendations. Respondents noted that this was, in part, due to differences in perspective, and thus, the language and definitions used to describe synthetic biology issues. According to one respondent, “Real discussion and perhaps even deliberation among a highly diverse (institutionally, intellectually, politically) group—[was] very hard to accomplish, and it actually did go on here, to some extent.” Some participants felt that discussion during the workshop addressed issues too broadly, however. Illustratively, one participant stated, “I didn’t feel that there was ample time to really get deep into the issues we were trying to address. I felt that there may have been too many participants in order to have constructive and detailed discussions.”

Yet, overall, participants thought that the workshop was an exemplary start to the conversation on why the societal implications of emerging technologies matter. Evaluator observations suggested that the workshop successfully captured macro-level ideas for integrating, or embedding, social science into synthetic biology research agendas. The diverse group of leaders and experts in synthetic biology present at the workshop voiced a multitude of issues, concerns, and lessons learned for consideration by NSF and other funders and decision makers in charting future courses of action in this area. Numerous plans for follow-up activities were made during the plenary sessions on the final day, which appeared to contribute to an energetic culmination to an otherwise intense experience.

As demonstrated in Table 3, most participants were satisfied with various components of the workshop. Overall, the vast majority of participants reported being satisfied (“very satisfied,” “satisfied,” or “somewhat satisfied”) with the “organization of the workshop” (95%), “quality of content explored in the plenary sessions” (86%), “quality of discourse among participants” (92%), “selection of topics explored in the break-out group sessions” (82%), “variety of disciplines and professions represented by workshop participants” (87%), “opportunities for networking” (90%), “opportunities to collaborate with other participants” (79%), and “overall experience at the workshop reception” (89%).

Although the majority were satisfied with the “quality of guided activities in the break-out group sessions” (68%), this percentage was lower relative to other items. As such, 12% of respondents overall stated that they were “neither satisfied nor dissatisfied” and 20% were dissatisfied (“somewhat dissatisfied,” “dissatisfied,” or “very dissatisfied”) with the “quality of guided activities in the break-out sessions.” In addition, somewhat elevated percentages of respondents, overall, were dissatisfied (“somewhat dissatisfied,” “dissatisfied,” or “very dissatisfied”) with the “selection of topics explored in the break-out sessions” (11%) and “opportunities to collaborate with other participants” (12%).

Table 3: Please rate your level of satisfaction with each of the following aspects of the workshop.

VS=Very satisfied; S=Satisfied; SS=Somewhat satisfied; NSD=Neither satisfied nor dissatisfied; SD=Somewhat dissatisfied; D=Dissatisfied; VD=Very dissatisfied

	Overall (N=69-72)							Academic (N=51-53)							Government, Private non-profit, Private for-profit (N=17-19)						
	VS	S	SS	NSD	SD	D	VD	VS	S	SS	NSD	SD	D	VD	VS	S	SS	NSD	SD	D	VD
Organization of the workshop	45%	35%	15%	3%	0%	1%	0%	44%	33%	17%	4%	0%	2%	0%	47%	42%	11%	0%	0%	0%	0%
Quality of content explored in the plenary sessions	21%	38%	27%	6%	4%	3%	1%	23%	30%	32%	8%	4%	4%	0%	17%	61%	11%	0%	6%	0%	6%
Quality of discourse among participants	36%	35%	21%	1%	7%	0%	0%	38%	30%	21%	2%	9%	0%	0%	32%	47%	21%	0%	0%	0%	0%
Selection of topics explored in the break-out group sessions	23%	43%	16%	7%	7%	1%	3%	25%	42%	15%	8%	4%	2%	4%	17%	44%	17%	6%	17%	0%	0%
Quality of guided activities in the break-out group sessions	19%	20%	29%	12%	14%	3%	3%	19%	21%	31%	8%	13%	4%	4%	18%	18%	24%	24%	18%	0%	0%
Variety of disciplines and professions represented by workshop participants	45%	31%	11%	7%	3%	3%	0%	48%	25%	13%	8%	4%	2%	0%	37%	47%	5%	5%	0%	5%	0%
Opportunities for networking	44%	35%	11%	3%	7%	0%	0%	42%	34%	11%	4%	9%	0%	0%	53%	37%	11%	0%	0%	0%	0%
Opportunities to collaborate with other participants	28%	36%	15%	8%	11%	1%	0%	25%	34%	17%	9%	13%	2%	0%	37%	42%	11%	5%	5%	0%	0%
Overall experience at the workshop reception	34%	44%	11%	4%	4%	0%	1%	33%	45%	14%	6%	2%	0%	0%	37%	42%	5%	0%	11%	0%	5%

Satisfaction ratings by sector (Table 3) suggested that academic respondents were slightly less likely than government, private non-profit, and private for-profit respondents to report satisfaction (“very satisfied,” “satisfied,” or “somewhat satisfied”) with the “quality of discourse among participants” (89% vs. 100%), “opportunities for networking” (87% vs. 100%), and “opportunities to collaborate with other participants” (76% vs. 90%). Yet, academic respondents were more likely than government, private non-profit, and private for-profit respondents to report satisfaction (“very satisfied,” “satisfied,” or “somewhat satisfied”) with the “quality of guided activities in the break-out sessions” (71% vs. 60%) and “overall experience at the workshop reception” (92% vs. 84%).

Small percentages of respondents from all sectors reported being “neither satisfied nor dissatisfied” with most items (0%-9%). An exception was an elevated percentage of respondents from the government, private non-profit, and private for-profit sectors (24%) who provided this response with regard to the “quality of guided activities in the break-out group sessions.” Slight differences between groups were also observed in the percentages of academic vs. government, private non-profit, and private for-profit respondents reporting that they were dissatisfied (“somewhat dissatisfied,” “dissatisfied,” or “very dissatisfied”) with the “quality of discourse among participants” (9% vs. 0%), “selection of topics explored in the break-out group sessions” (10% vs. 17%), “opportunities for networking” (9% vs. 0%), “opportunities to collaborate with other participants” (15% vs. 5%), and “overall experience at the workshop reception” (2% vs. 16%).

With the exception of general agreement among respondents that the workshop was held at an “excellent venue,” participants voiced praises and critiques of each segment of the workshop. Inherent in the majority of responses was general acknowledgement and appreciation for the challenges assumed in undertaking the charge of the workshop in such an inclusive way. Some representative comments about the plenaries seemed best presented in respondents’ own words and are highlighted below. Specific feedback related to the break-out sessions are provided in the next section of this report.

- Initial plenary presentations:
  - “Having the short presentations from experts was a good introduction for discussion.”
  - “Having a visual recorder taking notes was a brilliant addition.”
  - “The plenary sessions...needed to be better prompted around lessons learnt and future plans, instead of just status reports.”
  - “I would have preferred an earlier start of the discussions and less plenary presentations.”
- Concluding plenaries:
  - “Conversation[s] in [the] final session allowed the questioning of unspoken assumptions.”
  - “I found the final activity of the workshop (with the giant post-its) incredibly fruitful, and I'd have liked to have activities like this toward the beginning of the workshop as well.”
  - “Chances to reflect on...priority setting was minimal. Conference organizers may have seen a benefit from holding this activity on Day 2, then synthesizing that material overnight, and then re-presenting it to the community for conversation and voting anonymously (with post-its or sticky dots or...emails or clickers) on Day 3.”

### **Break-out Groups**

A large portion of the open-ended feedback provided by respondents focused on the experiences they had in the break-out groups during the workshop. Survey responses reflected the experiences in each

break-out group fairly evenly; each break-out group was represented by at least 6% (4/66 overall) of survey respondents (see Table 4).

**Table 4: In which of the following break-out groups did you participate? Please select all that apply.**

	Overall (N=66)	Academic (N=47)	Government, Private non-profit, Private for-profit (N=19)
Governance	21%	21%	21%
Biosafety and Biosecurity	18%	13%	32%
Responsible Innovation	17%	21%	5%
Anticipation and Futures	12%	13%	11%
Research and Innovation Systems Analysis	11%	13%	5%
Bioeconomy	15%	15%	16%
Informal Science Education	6%	4%	11%
DIY/Makers	14%	13%	16%
Ethics	12%	9%	21%
Integration and Reflexivity	17%	19%	11%
Public Opinion and Values	15%	15%	16%
Risk and Sustainability	18%	19%	16%
Other	6%	4%	11%

In general, most respondents thought their break-out groups yielded spirited and illuminating discussions. The structure of the break-out groups, described by respondents to be facilitative of open discussion, was considered a strength of the break-out groups by some. However, more commonly, respondents suggested that the open format of the break-out groups was more challenging than helpful. Some of the challenges noted by respondents were also observed during the break-out groups. The sample of break-out sessions observed by an evaluator consisted of large groups of nine to sixteen individuals, which, according to participants, “was somewhat unwieldy for sustained discussion in the allocated time.” Scribes were appointed in advance of the break-out sessions; respondents further suggested that it would have been desirable to also pre-appoint a skilled leader or facilitator to each group. In some groups, leaders actively facilitated or moderated conversations to help keep the group on track and to diffuse occasional tension. Other groups did not appear to appoint a designated leader or the leader assumed a more passive role.

Groups appeared to experience various degrees of success with respect to addressing the guiding questions. Feedback provided by respondents underscored the need for skilled group facilitators to help “integrat[e] the insights from the very diverse perspectives present,” draw less vocal group members into the conversation, and help reduce the time spent discussing (or debating) tangential issues. One respondent expressed the concern that “In the absence of more structured and facilitated discussions in the breakout sessions, [certain] voices tended to dominate, forwarding a particular perspective on the future of synthetic biology.”

Further, there was an expressed need for break-out group members to resist jargon and instead establish shared understandings of concepts among members of the group. Observations of break-out groups suggested that some groups chose to focus on this task as a necessary precursor to the

questions; however, for such groups, there was insufficient time to accomplish both. One participant further expressed that the questions themselves were difficult to interpret: “The prompting questions were the same for each [break-out group]. They made [vague] reference[s]...that had no clear antecedent [(i.e., ‘this part’ of synthetic biology)]. As a result,...groups ejected (sic) the questions early on, leading to [a] lack of goal[s].”

Consensus and resolutions did not appear to be reached by the break-out groups, although it was unclear whether this was an intended outcome. Respondents went on to suggest that ideas generated during the break-out groups continued to develop further and fuse with other ideas through the reporting session and final plenaries. However, they suggested that the break-out group reporting was somewhat disorganized and difficult to “absorb,” especially during dinner. Further suggested by one participant, “Fewer breakouts that had the chance to meet twice and create a mini-report to add to a larger report may also have produced more focused conversation.”

In spite of these logistical challenges, respondents were interested and engaged in the content explored through the break-out groups. Thus, the majority of respondents noted that they would have liked to have participated in other break-out groups during the workshop (Table 5).

Table 5: Were there other break-out groups in which you would have liked to have participated? These may be groups that met or groups you would like to suggest.	
	Yes
Overall (N=70)	69%
Academic (N=51)	65%
Government, Private non-profit, Private for-profit (N=19)	79%

Specifically, there appeared to be a high interest overall in the Governance (40%), Responsible Innovation (50%), Bioeconomy (46%), Ethics (40%), and Risk and Sustainability (46%) break-out groups (Table 6). Academic respondents were highly likely to select the Responsible Innovation (48%), Bioeconomy (42%), Ethics (42%), and Risk and Sustainability (42%) groups. Government, private non-profit, and private for-profit respondents were highly likely to select the Governance (53%), Responsible Innovation (53%), Bioeconomy (53%), and Risk and Sustainability (53%) groups. Respondents who selected “Other” suggested the following break-out group topics of interest to them: “Formal Science Education,” “Interdisciplinary,” and “Policy.”

**Table 6: Which groups would you have liked to have participated in? Select all that apply.**

	Overall (N=48)	Academic (N=33)	Government, Private non-profit, Private for-profit (N=15)
Governance	40%	33%	53%
Biosafety and Biosecurity	25%	30%	13%
Responsible Innovation	50%	48%	53%
Anticipation and Futures	29%	27%	33%
Research and Innovation Systems Analysis	23%	27%	13%
Bioeconomy	46%	42%	53%
Informal Science Education	19%	24%	7%
DIY/Makers	25%	30%	13%
Ethics	40%	42%	33%
Integration and Reflexivity	15%	18%	7%
Public Opinion and Values	38%	39%	33%
Risk and Sustainability	46%	42%	53%
Other	10%	12%	7%

### Workshop Effectiveness

As demonstrated in Table 7, below, the majority of respondents thought that the workshop effectively met its key objectives. Overall, 84%-91% of respondents thought the workshop was effective (“very effective,” “effective,” or “somewhat effective”) in achieving the following: “inform participants on state-of-the-art societal research projects,” “engage participants in discourse about visions of research agendas in various areas of scholarly and public interest,” “prepare recommendations for NSF on agenda setting for sponsoring research on the societal aspects of synthetic biology,” “prepare post-workshop dissemination plans for recommendations,” and “establish a network of experts on the societal aspects of synthetic biology.” Comparatively fewer respondents, overall, rated the workshop as effective (68%) in meeting the objective, “generate plans for creating and maintaining infrastructure to support activities of the network.”

Responses analyzed by sector revealed that the workshop was rated as effective in each of the specified areas fairly consistently by academic and government, private non-profit, and private for-profit respondents. Aggregate effectiveness ratings (i.e., “very effective,” “effective,” and “somewhat effective”) differed only slightly by approximately 4%-8% by sector. However, there were somewhat larger differences (11%-14%) in the percentages of academic vs. government, private nonprofit, and private for-profit respondents reporting on the extreme end of the scale (“very effective”) in relation to the following items: “inform participants on state-of-the-art societal research projects” (27% vs. 16%), “prepare recommendations for NSF on agenda setting for sponsoring research on the societal aspects of synthetic biology” (19% vs. 5%), and “prepare post-workshop dissemination plans for recommendations” (18% vs. 6%).



**Table 7: How effective do you think the workshop was in terms of attaining each of the following objectives?**

VE=Very effective; E=Effective; SE=Somewhat effective; NEI=Neither effective nor ineffective; SI=Somewhat ineffective; I=Ineffective; VI=Very ineffective

	Overall (N=67-72)							Academic (N=49-53)							Government, Private non-profit, Private for-profit (N=18-19)						
	VE	E	SE	NEI	SI	I	VI	VE	E	SE	NEI	SI	I	VI	VE	E	SE	NEI	SI	I	VI
Inform participants on state-of-the-art societal research projects	24%	30%	37%	4%	3%	3%	0%	27%	23%	42%	4%	2%	2%	0%	16%	47%	21%	5%	5%	5%	0%
Engage participants in discourse about visions of research agendas in various areas of scholarly and public interest	26%	38%	26%	3%	6%	1%	0%	26%	36%	30%	4%	4%	0%	0%	26%	42%	16%	0%	11%	5%	0%
Prepare recommendations for NSF on agenda setting for sponsoring research on the societal aspects of synthetic biology	15%	34%	35%	6%	6%	3%	1%	19%	33%	31%	8%	8%	2%	0%	5%	37%	47%	0%	0%	5%	5%
Prepare post-workshop dissemination plans for recommendations	15%	45%	24%	7%	6%	3%	0%	18%	47%	16%	8%	8%	2%	0%	6%	39%	44%	6%	0%	6%	0%
Establish a network of experts on the societal aspects of synthetic biology	31%	31%	29%	1%	7%	1%	0%	30%	30%	32%	0%	8%	0%	0%	32%	32%	21%	5%	5%	5%	0%
Generate plans for creating and maintaining infrastructure to support activities of the network	4%	32%	32%	16%	10%	4%	0%	6%	34%	28%	18%	10%	4%	0%	0%	28%	44%	11%	11%	6%	0%

## Workshop Outcomes

The majority of respondents stated affirmatively that ideas for intellectual endeavors related to synthetic biology emerged from their participation in the workshop (66%; Table 8), with academic respondents slightly less likely than government, private non-profit, private for-profit respondents to indicate as such (64% vs. 71%).

Table 8: Did any ideas for intellectual endeavors related to SynBio emerge from participating in the workshop?	
	Yes
Overall (N=64)	66%
Academic (N=47)	64%
Government, Private non-profit, Private for-profit (N=17)	71%

Respondents who answered affirmatively to the aforementioned question (Table 8) were asked to identify tangible outcomes that they anticipated emerging from their ideas from a list of possibilities (Table 9). Most respondents indicated that they anticipated writing a journal article (64%). Thirty one percent of respondents, overall, suggested that a publication for general audiences was anticipated and 38% selected “other.” Tangible outcomes specified by respondents who selected “other” included grant proposals, professional development workshops or trainings, and “new” or refined “research ideas.” Unsurprisingly, academic respondents were more likely than government, private non-profit, and private for-profit respondents to select journal article (73% vs. 42%) and less likely to indicate public program (10% vs. 33%).

Table 9: What tangible outcomes do you envision coming out of your ideas? Please select all that apply.			
	Overall (N=42)	Academic (N=30)	Government, Private non-profit, Private for-profit (N=12)
Journal article	64%	73%	42%
Book	5%	7%	0%
Performance	0%	0%	0%
Public program	17%	10%	33%
Publication for general audiences	31%	33%	25%
Other	38%	37%	42%

Nearly all respondents who anticipated tangible outcomes intended to collaborate on them with fellow workshop participants (93% overall; Table 10).

Table 10: Will any of these outcomes be a collaborative effort with one or more workshop participants?	
	Yes
Overall (N=40)	93%
Academic (N=29)	90%
Government, Private non-profit, Private for-profit (N=11)	100%

Many respondents noted that unanticipated outcomes emerged from the workshop (Table 11). Nearly twice as many respondents from the government, private non-profit, and private for-profit sectors reported in the affirmative as compared to the academic sector (56% vs. 34%).

Table 11: Did any unanticipated outcomes emerge from the workshop?	
	Yes
Overall (N=71)	39%
Academic (N=53)	34%
Government, Private non-profit, Private for-profit (N=18)	56%

Some of the common unanticipated outcomes that emerged from participation in the workshop at the individual level included:

- Network connections and plans for future collaborations with workshop attendees of different disciplines or organizational sectors
- Ideas for new research or organizational projects
- Surprising insights about diverse perspectives on the definitions of synthetic biology and societal implications of synthetic biology

Finally, unanticipated outcomes that emerged through the workshop overall (i.e., at the group level) that were identified by respondents included:

- Connections and sharing of ideas and experiences between professionals in the United States and Europe
- Widespread support and interest in ideas expressed during the workshop (e.g., idea of “broadening the agenda beyond synthetic biology to include other emerging technologies, the bioeconomy, and/or responsible innovation”)

### Additional Challenges

Participants were asked to indicate whether or not they experienced challenges or barriers during the workshop. Overall, 29% indicated affirmatively, with 26% from the academic sector and 37% from the government, private non-profit, and private for-profit sectors (Table 12).

Table 12: Did you experience any challenges or barriers related to the workshop?	
	Yes
Overall (N=72)	29%
Academic (N=53)	26%
Government, Private non-profit, Private for-profit (N=19)	37%

Many of the challenges or barriers described by participants were addressed previously in this report (e.g., challenges associated with the number of participants in the workshop, time constraints, differences in language and definitions among participants, and experiences in the break-out groups). However, a few other concerns emerged in the responses, as follows:

- Comments provided by some graduate students suggested that, while they learned a lot and valued their inclusion, they felt it was challenging to make contributions to the aims of the workshop among many of the “established” scholars and professionals present at the workshop. It is unclear from the evaluation findings whether this sentiment arose internally due to difficulty answering the questions posed during the workshop, or due to actions on the part of other participants that may have discounted their contributions. The possibility of the latter arose in the findings that a few respondents thought there were too many non-contributing or under-qualified participants present at the workshop.

- It was suggested by one participant that he or she perceived “...subtle gender barriers to participation, perhaps reinforced by the number of men vs. women on some of the plenary panels.”
- Several respondents provided examples of the behaviors of other, individual workshop participants that presented barriers to attaining the objectives of the workshop (e.g., “marketing themselves and their own research agenda,” “derailing conversations,” “adversarial presentations”). Although the workshop organizers announced discouragement of counterproductive behaviors early on in the workshop, a few respondents commented that they would have liked to have seen greater enforcement, such as via ground rules.
- Although more appropriately classified as a recommendation rather than a challenge or barrier, some respondents stated that they would have liked to have seen “more international perspectives...[such as those from] China, Russia, Japan, etc.”

### *Summary*

In the words of respondents, some of the strengths of the workshop were inherent in its “inquisitive,” “inclusive,” “engaging,” and “outcome-oriented” design. The workshop utilized multiple approaches to engage participants, whose diversity in expertise and perspective was its foremost asset. Participants rated the workshop highly and identified numerous positive anticipated and unanticipated outcomes of their participation. Respondents identified several logistical and communication-related challenges that were present throughout the workshop, which mostly appeared to arise from the size and diversity of the group. Aside from the expressed challenges, respondents thought the workshop was well organized and productive. The workshop appeared to successfully capture priorities for informing a social science research agenda to improve communication between the public and the scientists and innovators of synthetic biology. Respondents to the survey expressed eagerness to participate in follow-up activities, such as providing feedback on the workshop report to NSF and other anticipated publications and projects related to the workshop.