Evaluation Data Report

Investigative Workshop:
Systems and Synthetic Microbiology
March 11-13, 2013

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National Institute for Mathematical and Biological Synthesis
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Systems and Synthetic Microbiology Workshop Evaluation Data Report

Background

Introduction

This report contains evaluation data for the NIMBioS Investigative Workshop entitled "*Systems and Synthetic Microbiology"* (Systems workshop), which took place at NIMBioS May 11-13, 2013. NIMBioS Investigative Workshops are relatively large (30-40 participants), focus on a broader topic or a set of related topics than Working Groups, attempt to summarize/synthesize the state of the art and identify future directions, and have potential for leading to one or more future Working Groups. Participants may include post-docs and graduate students with less experience in the particular topic than those participating in Working Groups.

The Systems workshop comprised 38 participants, including co-organizers Christopher Rao (Dept. of Chemical and Biomolecular Engineering, Univ. of Illinois) and Lingchong You (Dept. of Biomedical Engineering and Institute for Genome Sciences and Policy, Duke Univ.).

Organizer Workshop Description

The goal of this investigative workshop was to bring together researchers dealing with modeling and experimental analysis of microbial systems, using natural or engineered systems. Cutting across the diversity of the experimental systems, tools, and modeling approaches, is the common notion of using these systems as well defined models that allow highly controlled experimentation. Such analysis in turn has the potential to generate definitive and often times generally applicable insights into issues including network design principles, ecological interactions, and evolution of cooperative traits.

The central theme was to investigate the use of well-defined microbial systems, natural and synthetic, to address fundamental questions in evolution, ecology, and design issues of cellular networks.

This workshop brought together leading researchers in the fields of systems and synthetic microbiology. Its specific goal was to create a dialogue where researchers could explore their shared insights and the theoretical approaches used to obtain them. Building from research presentations and discussions, participants examined several specific questions, including:

- Are there universal principles that govern the organization of microorganisms beyond chemistry and physics? This includes the organization of both intracellular networks and networks consisting of interacting microbial populations.
- How does evolution shape network organizations? For example, how does evolution shape the design of certain cellular networks?

- What can we say about collective behavior and "intelligence" in microbial populations?
- What inspirations can we draw from natural networks (intracellular, intercellular, and interpopulations) when creating synthetic networks at various levels?

To what extent can we apply the insights learned from these model systems, particularly engineered systems, to the understanding of biological questions in broader contexts? This applies both to the understanding of basic biological questions and to the development of tools or strategies for applications in biotechnology and medicine.

Organizer Post-Workshop Summary

No summary available at the time of report.

Evaluation Design

Evaluation Questions

The evaluation of the workshop was both formative and summative in nature, in that the data collected from respondents was intended to both gain feedback from respondents about the quality of the current workshop and also to inform future similar meetings. Several questions constituted the foundation for the evaluation:

1. Were participants satisfied with the workshop overall?
2. Did the meeting meet participant expectations?
3. Do participants feel the workshop made adequate progress toward its stated goals?
4. Do participants feel they gained knowledge about the main issues related to the research problem?
5. Do participants feel they gained a better understanding of the research across disciplines related to the workshop's research problem?
6. What impact do participants feel the workshop will have on their future research?
7. What changes in accommodations, group format, and/or content would participants like to see at future similar meetings?

Evaluation Procedures

An electronic survey aligned to the evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director. The final instrument was hosted online via the University of Tennessee's online survey host mrInterview. Links to the survey were sent to the 38 registered workshop participants. Workshop organizers were sent evaluation forms, but were only asked questions about (1) connections made with other workshop attendees and (2) satisfaction with the way NIMBioS handled their event. These data are internal to NIMBioS and not reported here.

Reminder emails were sent to non-responding participants at seven and ten days past initial contact. At two weeks past initial contact, 35 of the participants had given their feedback, for a response rate of 92%.

Evaluation Findings

Overall Satisfaction

Figure 1. Satisfaction with various aspects of the workshop

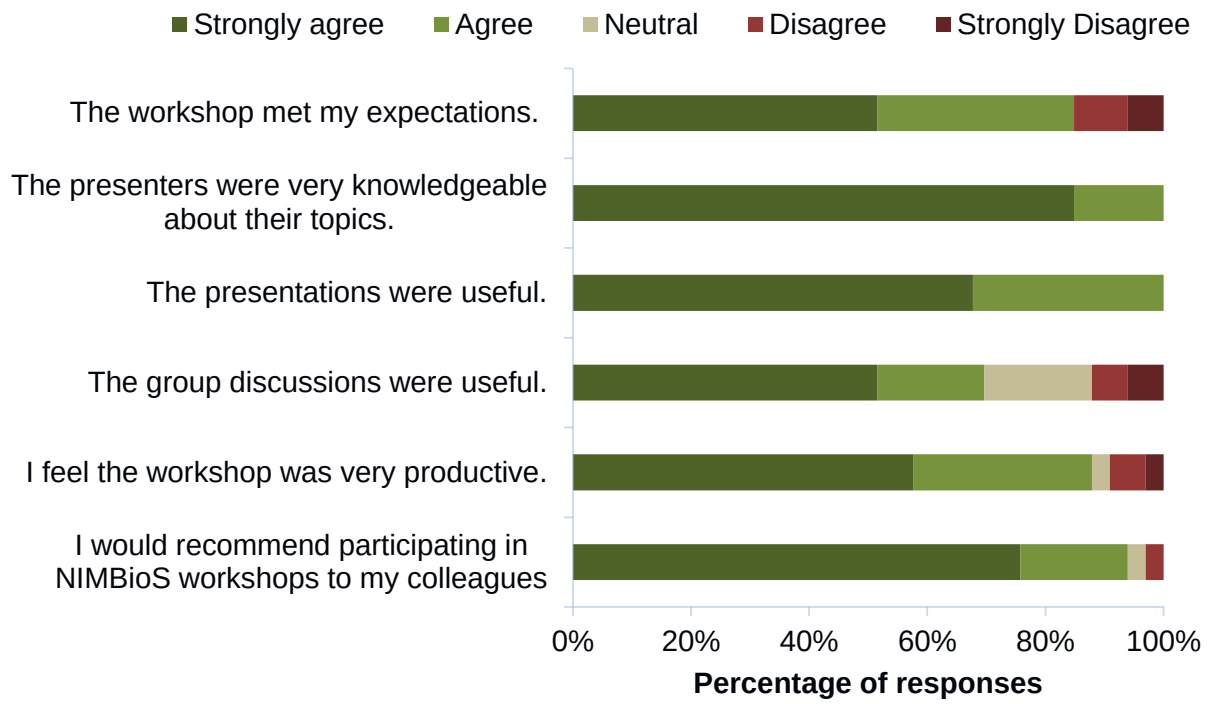
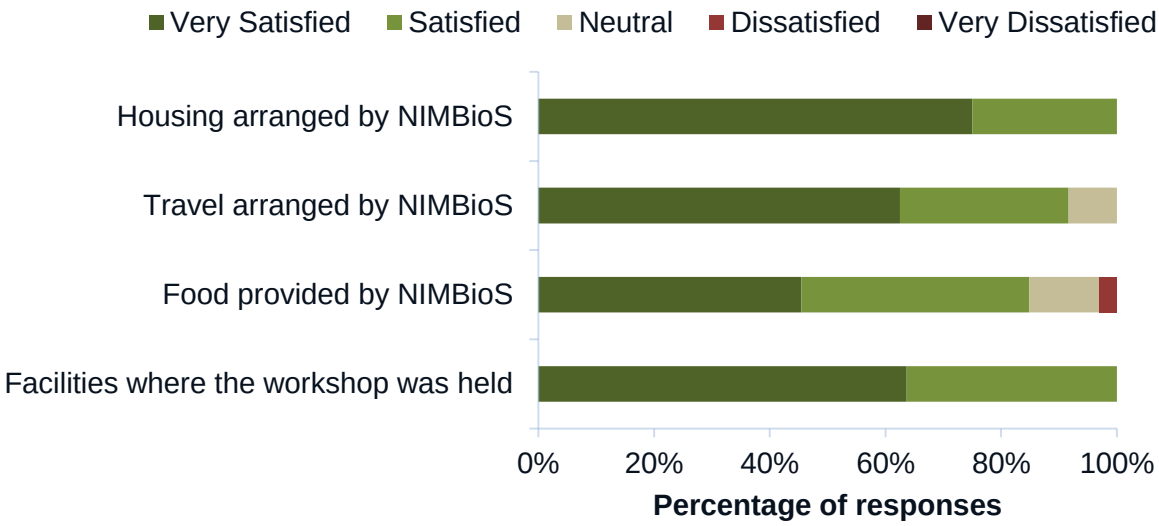


Figure 2. Satisfaction with accommodations



Workshop Content and Format

Participant Learning

Figure 3. Participant learning

As a result of attending this workshop, I have a better understanding of:

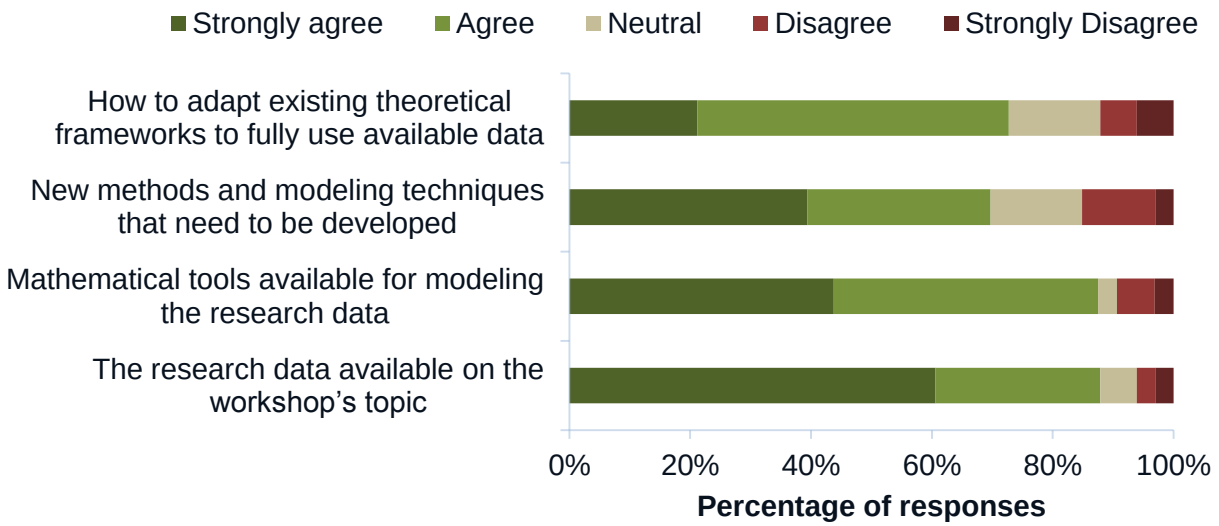
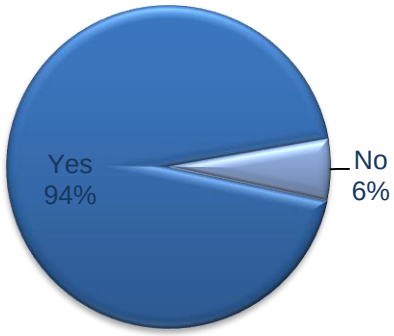


Figure 4. Do you feel that participating in the Workshop helped you better understand the research going on in disciplines other than your own regarding the workshop's topic?



Comments

A terrific workshop. Met its goals and frequently exceeded them. Well organized, planned and conducted. I am very pleased.

I really appreciate to workshop organizers for giving me a chance to attend the great workshop. I've learned a lot about the systems and synthetic biology. Moreover I met great researchers of the field.

I thought that the workshop was great. Thanks.

I work on interdisciplinary research. Although I work on Microbiology, I have not been exposed to systems biology before. This workshop was highly instructive and allowed me to understand the state-of-the-art research in the field.

It is a great meeting-- introduced me to this field that I have known of for a while but never had a chance to have length discussion with experts in the field.

It was a nice mixture of topics covering mathematical and experimental aspects both.

The description of the workshop and the questions presented were fascinating, and motivated me to apply to come. They suggested we would discuss how to engineer or alter natural and synthetic microbial communities. However, the speakers were >90% discussing very similar topics in genetic circuit engineering - the participants who study natural communities did not have any input, and it was only in the time outside of the talks that we actually discussed the types of questions posed as the purpose of the workshop. I did meet some very good people and have interesting future plans as a result. But I wish the organizers had included both sides of the topic in the presentations, and in general allowed for more time for discussion. The last 20 minutes where we did have a discussion were quite useful.

The topics of the presentations were very far from what was advertised. The workshop was not pluri-disciplinary, and I felt no desire to go beyond what the organizers are doing in their own research. I felt this workshop was not a wise use of my time.

The workshop not only extended my knowledge of systems and synthetic biology, it allowed me to generate new ideas on developing modeling and statistical tools, which is the major area of my research.

The workshop was very informative across disciplines.

There were no group discussions.

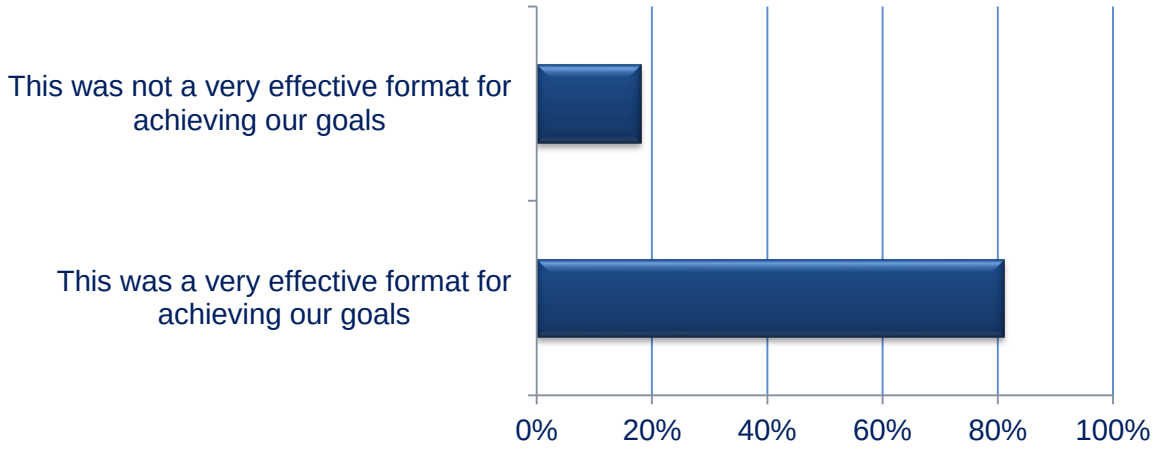
This workshop was more of a conference for model developers, than a workshop designed to tackle questions at the interface of mathematics and biology. The

workshop consisted of all-day presentations with little time for discussion of future research directions. Several experimental biologists presented their work, but the presentations were mostly from mathematicians and physicists.

Would be helpful if abstracts included links or references to papers on which the presentation is based.

Workshop Format

Figure 5. Effectiveness of workshop format



Format could be improved if:

-More time for discussion -organizers were not from an identical subfield, to include a more diverse range of speakers -talks that did not only show published results but rather posed questions or controversial ideas. Simply a few hours to discuss the questions posed as the topic of discussion would have been very informative for me; the 20 minutes we had at the end was the most useful.

I think the breakout sessions can better stimulate collaborations.

More discussions, more openness to other disciplines, as advertised.

More explorative presentations and discussions.

More open times for discussions. Do 10 min talks so that people introduce themselves, and revert to discussions.

Most Useful Aspects of Workshop

A tight integration between disciplines, search for common language.

Data and experimental methods

Efficient exchange of ideas after learning about forefront research directions.

Exposure to work and ideas of a group of researchers with whom I usually don't interact.

Getting to know other researchers in the field.

Getting a new perspective (modeling/theoretical) on my less-quantitatively oriented research.

Getting to know people.

Hearing talks of many people and learning about their research.

I learned a lot about mathematical modeling and how physics, chemistry, biology and math can be integrated to solve complex biological problems.

I liked the talks quite a lot; very clear presentations.

Interacting with researchers from different backgrounds and areas of focus.

Interactions and discussions. The size of meeting was ideal to communicate each other.

It was small, so lots of opportunities to talk with others.

It was well organized in terms of presentations, which provided different aspect of the systems biology of microorganisms.

Learning about the approaches and methods currently used to model gene networks in model microbial systems.

Learning new trend and met great researchers.

Meeting people, and discussion.

Meeting possible collaborators outside my area of expertise.

Personal and in depth interactions with other researchers

Talk selection was great.

The combination of speakers from different disciplines and their open minded interactions.

The discussion group at the end of the workshop was nice, but I felt the discussions at lunch and during the poster sessions were most beneficial to gaining knowledge and advice in development of my research.

The discussion times between talks was very productive. In many cases, these discussions were prompted by the research presentations, so those would still be essential for making this work.

The fact that the vast majority of speakers and attendees were young researchers, very approachable, and willing to talk to other people.

The number of people from different disciplines is almost equally distributed. I really enjoy the discussions during breakfast and lunch time.

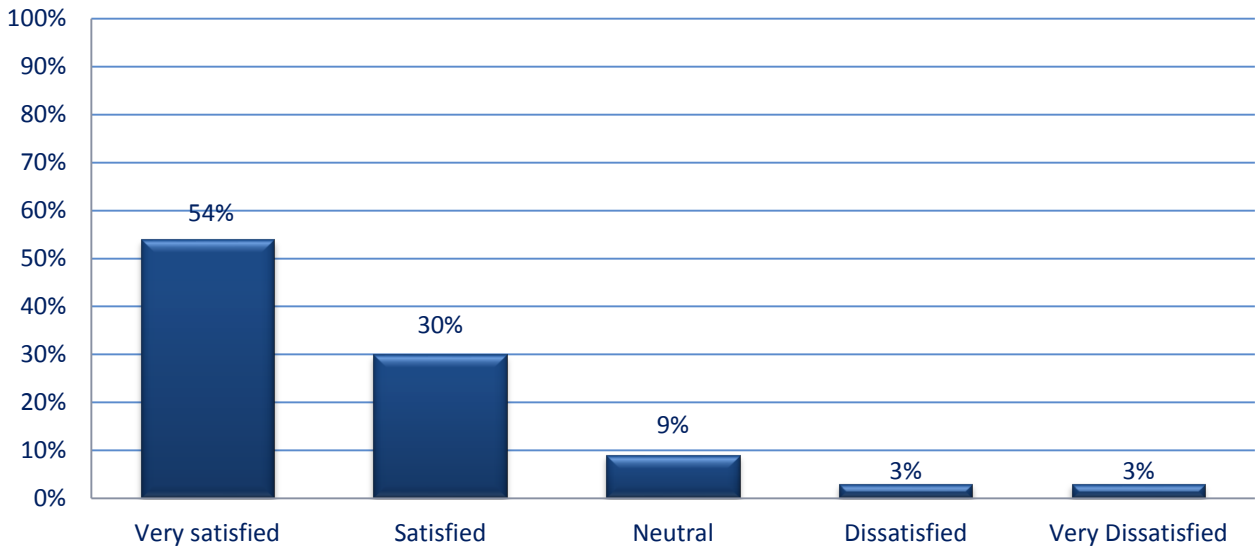
The synergy between the talks in a given session, often combining experimentalists and theorists working on the same topic, made for coherent sessions, during which one could really learn something and get a strong sense of the driving questions in the different areas that were represented. The organizers did a great job inviting the various speakers and arranging their talks to achieve this.

The talks and interactions with colleagues during lunches and breaks

The talks were excellent, but I especially appreciated the adequate time allowed for one-on-one interactions with other researchers.

Communication

Figure 6. How satisfied were you with the opportunities provided during workshop presentations and discussions to ask questions and/or make comments?



Comments

A small collaborative project and presentation could designed where individuals are placed into groups to resolve a common small research goal. This could mean that the conference may have to be extended a couple of days.

Although group discussion time was not built into the schedule itself, the lunch break was generously long. Additionally, group discussion time was possible at the end of the day before dinner.

Great workshop.

I wish that we had spent more time intentionally discussing rather than hearing old results - posing the questions presented as the purpose of the workshop, and giving time for discussion - presenting futuristic or hypothetical scenarios and discussing how we would work toward them - discussing failures or limitations from a bigger picture perspective to understand why the field is focused on a certain method or strategy - brainstorming potential targets for this type of research that are doable in the near and far future etc

More time and topics (challenges etc.) for group discussion.

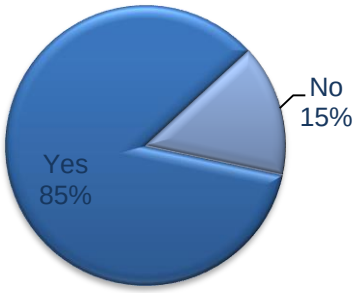
More time set aside for discussions would be great. Wine and beer after the talks on second day would be good to facilitate chatting.

Some additional time may help with communications. Maybe ensuring 10 minutes of discussion after each talk.

The NIMBioS is a great hub of science, mathematics and research opportunities. I strongly encourage the continued support of environments like this, given that provide an opportunity for trans-disciplinary researchers to converge.

Progress Toward Goals

Figure 7. Do you feel the workshop made adequate progress toward finding a common language across disciplines for research on the workshop's topic?



Comments

Absolutely adequate progress.

Been that I a new on this field, I was unable to understand most of the details for the first 2 days. But by the third day everything connected really well. And I now see ways to implement these tools to my research.

I did not see much of mathematical modeling methods apart from biological methods

The organized did not arrange group discussions. There should be more introduction to the general audience.

The panel discussion and discussions in breaks all supported this.

There was no interdisciplinary work presented.

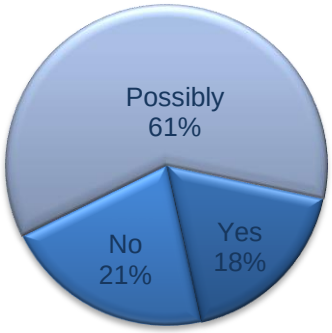
This is a qualified yes. To some extent it felt like most of the presenters knew each other already so saw less need for the common language idea.

We heard 20 talks about a minor subfield, from my perspective, instead of hearing a range of ideas. The presenters talked about existing work, rather than posing questions about the future.

While progress has been made, developing a common language remains a challenge.

Impact on Future Research Plans

Figure 8. Do you feel that the exchange of ideas that took place during the workshop will influence your future research?



Comments

Came away with several new ideas to explore esp. wrt synthetic biology.

I have some ideas on using systems biology approach in one of my projects

I work on microbiology, but not from the systems biology point of view. This workshop helped me understand the value of such tools and the applicability into my own research.

It was great to learn some unpublished results that will influence our own work.

Mainly data methods

Several ideas presented at the workshop, including possibly regulated cell death, were new to me and will be important in understanding of our data.

The presentations are too specialized. There is little impact to the general public.

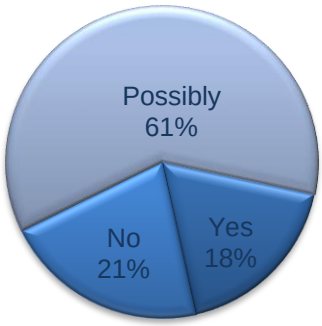
The range of research was great to clarify new areas in the field.

The workshop was quite far from my field of research

Yes, I though many ideas for my future research.

Impact on Future Collaborations

Figure 9. Did you develop plans for collaborative research with other Workshop participants?



Comments

I discussed potential collaborations with a few workshop participants.

I exchanged ideas and may collaborate with 3 individuals.

I had the chance to talk to a junior faculty and a postdoc student. We exchange contact information and consider the possibility to find common ground.

I have found a potential applicant for internship (RAMS Program at ORNL)

I made new or renewed contacts with at least different people, and we're planning to follow up with regular discussions and possible research collaborations on a few specific fronts (to start). These would definitely not have occurred without this meeting.

I may suggest collaboration to one other participant

I met several people interested in pursuing ideas related to the actual purpose of the workshop - to engineer communities. One may become a future collaborator, and with another we may organize a future working group or workshop. We shared ideas and papers, it was really fun.

I talked lots of researchers and got a motive for my future research. I will keep contacting them individually for possible future co-work.

There are potential collaborations but nothing promising at the moment

We have started discussions but not sure what will happen at this stage.

We made plans to collaborate with other workshop participants.

We may apply for a work group on analyzing complex microbial community.

With one other participant we shared some data with each other, which might lead to eventual collaboration. A few others were also touching on some points that are interesting to me, so I might contact them later.

Suggestions for Future workshops

Assign more time for group discussions.

Better food

Everything was very well organized. There is nothing that I would change about the Workshop.

Have an extra day, maybe more talks on the empirical side of microbial interactions/systems.

Have some "formal" discussions - have the leaders get input from the attendees, orally, about where the future needs are in the field in general (or specific) - maybe just a 20 min session, but it might get some good ideas rolling.

I do wish that more advanced notice had been given about the opportunity to present posters.

I was surprised there were no break-out sessions in this workshop.

I wish we had more time for discussion, that the presenters came from a more diverse range of topics, and that the presenters did not present old research but rather ideas or controversies for the future.

I would add a different variety of topics for the talks. Most of the talks were on similar aspects of biological problems with different types of modeling systems. I was interested to see what other biological data could be explored with the models

I would cut the presentations by 2/3 and have only presentations that demonstrate application of novel approaches or methods to understand biological systems. The rest of the workshops should be discussions focused on a single controversial or highly debated topic at the interface of mathematics and biology.

I would have added a few round-table discussions on specific topic (not just Q&A on presentations), potentially broken down into subgroups but with a chance to discuss collectively as well. Like the research talks, these could prompt offline

discussions, and thus I'd recommend that these come prior to the end of the meeting to allow for follow up.

I would like to see more details about how the biological experiments, from both the systems and the synthetic biology point of view, were generated, given that most talks just presented the data results and the models.

I would make sure that when the advertisement for the workshop mentions a global approach, this is reflected in the speakers and topic discussed. The final "group discussion" was really informal, and mostly self-congratulation by the organizers and a few key speakers.

I would not change anything

Maybe a bit more time and better organization with topics for "group discussions". There was only one and it was not around any particular question but more of a wrap up.

Maybe I would add more discussion sessions, or breakout sessions, where special topics discussed in more details.

More interactive discussion groups.

More time for discussions between talks. Reception on the second poster session as well to keep folks from leaving.

Provide more info about the scientific program earlier, for interested non-experts

Soliciting discussion topics ahead of time and if a topic gain enough interest, allocate time just discussing these topics.

Somewhat more time for discussions would be good.

The speaker list was a bit more homogeneous than it needed to be (organizers inviting a lot of friends and ex-students I guess), but still very interesting.

The workshop should be of investigative natures, that is, to explore new topics and methods. However, the organization was no different than a regular conference symposium.

There should be a common ground for both mathematics and biology. At the most approaches seem skewed in the biological way

Additional Comments

A great workshop, one of the best I attended recently.

I have been extremely disappointed by this workshop. Colleagues have been telling me about the wonderful time they had at NIMBioS, but this particular event

was a big letdown. Mostly the problem is that there was nothing in common between the actual content of the workshop, and what was advertised in the mailing lists. Also, there was no space for discussion, so I felt like I attended a NIMBioS funded conference for the organizers and their close colleagues.

Overall, I enjoyed the workshop very much.

Thank you!

The workshop was great. I hope to be part of a working group, or have another chance in the future to visit NIMBioS.

Appendix

Systems and Synthetic Microbiology Workshop Evaluation Survey

Systems and Synthetic Microbiology Workshop Survey

Thank you for taking a moment to complete this survey. Your responses will be used to improve the workshops hosted by the National Institute for Mathematical and Biological Synthesis. Information supplied on the survey will be confidential, and results will be reported only in the aggregate.

Please check the appropriate box to indicate your level of agreement with the following statements about this workshop: (Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied)

I feel the workshop was very productive.
The workshop met my expectations.
The presenters were very knowledgeable about their topics.
The presentations were useful.
The group discussions were useful
I would recommend participating in NIMBioS workshops to my colleagues.

Please check the appropriate box to indicate your level of agreement with the following statements. As a result of participating in this workshop, I have a better understanding of: (Strongly agree, Agree, Neutral, Disagree, Strongly disagree)

The research data available on the workshop's topic
Mathematical tools available for modeling
New methods and modeling techniques that need to be developed
How to adapt existing theoretical frameworks to fully use available data

Do you feel participating in the workshop helped you better understand the research going on in disciplines other than your own on the workshop's topic?

Yes
No
Comments:

Do you feel the workshop made adequate progress toward finding a common language across disciplines for research on the workshop's topic?

Yes
No
Comments:

Do you feel that the exchange of ideas that took place during the workshop will influence your future research?

Yes
No
Possibly
Comments:

Did you develop unanticipated plans for collaborative research with other workshop participants?

Yes
No
Possibly
Comments:

What do you feel was the most useful aspect of the workshop?

What would you have changed about the workshop?

How do you feel about the format of the workshop?

This was a very effective format for achieving our goals
This was not a very effective format for achieving our goals ->
The workshop format would have been more effective if:

How satisfied were you with the opportunities provided during workshop presentations and discussions to ask questions and/or make comments?

Very satisfied
Satisfied
Neutral
Dissatisfied
Very Dissatisfied

Please indicate any suggestions you have for facilitating communication among participants during the workshop:

Please use this space for additional comments: