NIMBioS

Evaluation Data Report
Investigative Workshop: *Solid Tumor Modeling*

January 19-21, 2011

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Solid Tumor Modeling Workshop Evaluation Data Report

Background

Introduction

This report contains evaluation data for a NIMBioS Investigative Workshop entitled "*Solid Tumor Modeling*" (Tumor workshop), which took place at NIMBioS January 19-21, 2011 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 Tumor workshop comprised 37 participants, including co-organizers Vittorio Cristini (University of Texas, School of Information and Health Sciences, Houston); John Lowengrub (Mathematics Department, University of California, Irvine); Kasia Rejniak (Moffitt Cancer Center, Integrated Mathematical Oncology); and Steven M. Wise (Mathematics Department, University of Tennessee, Knoxville)

Workshop Background

The principal aim of this Investigative Workshop was to discuss current achievements and challenges in modeling solid tumors in the human body, and to identify areas in modeling, computing, laboratory experimentation, and clinical diagnosis that should be pursued to improve understanding of tumor development and ultimately treatment. The focus was on modeling tumor level cancer progression. However, all pertinent systems that influence such growth were open for discussion and analysis, including ongoing genetic mutation and genetic feedback, stem cells, angiogenesis and vascular dynamics, lymph system interaction, metastasis, mechanical properties of and interaction with host tissue, and immune system response. Specifically, the organizers wished to identify the relative advantages of certain models (or modeling principles) in specific host tissue environments; the current state-of-the-art in modeling, from the points of view of biophysical relevance, mathematical suitability, and computational and technical advances; the perceived future directions and important challenges in next-generation tumor models; and the near-term feasibility of modeling in a clinical, patient-specific setting.

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. The evaluation framework was guided by Kirkpatrick's Four Levels of Evaluation model for training and learning programs (Kirkpatrick, 1994[1]). 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. Were participants satisfied with the accommodations offered by NIMBioS?
8. 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 secure online survey host mrInterview. Links to the survey were sent to 30 registered workshop participants on January 25, 2011 (co-organizers and NIMBioS affiliates were not included in the evaluation; two evaluation forms that were mistakenly sent to organizers were not included in this summary). Reminder emails were sent to non-responding participants on February 1 and 3, 2011. By February 10, 2011, 26 of the participants had given their feedback, for a response rate of 87%.
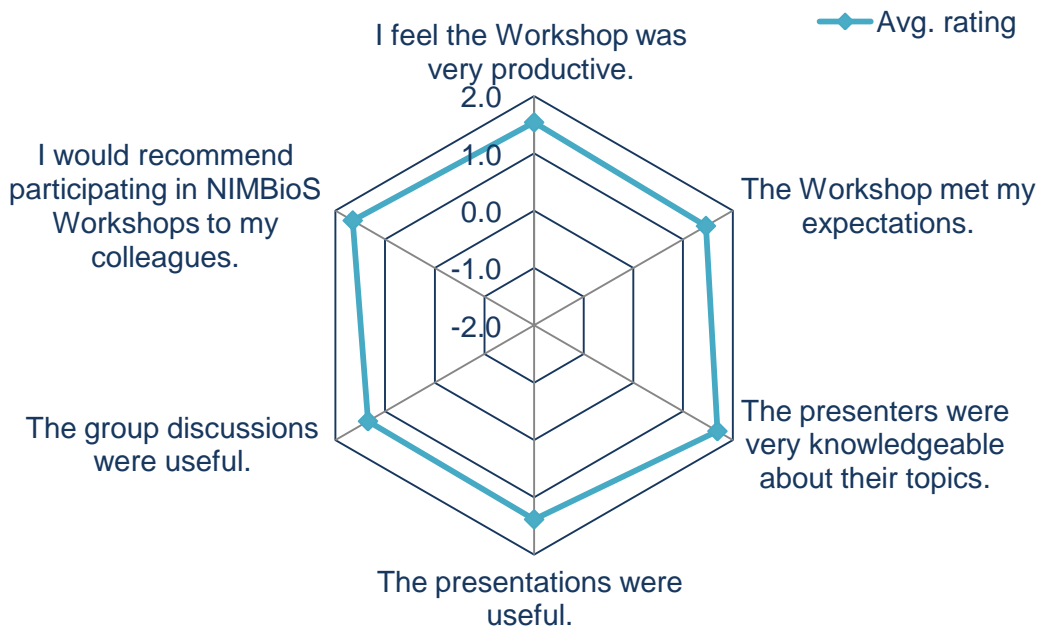
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[1] From Kirkpatrick, D.L. (1994). *Evaluating Training Programs: The Four Levels.* San Francisco, CA: Berrett-Koehler.

Evaluation Findings

Satisfaction

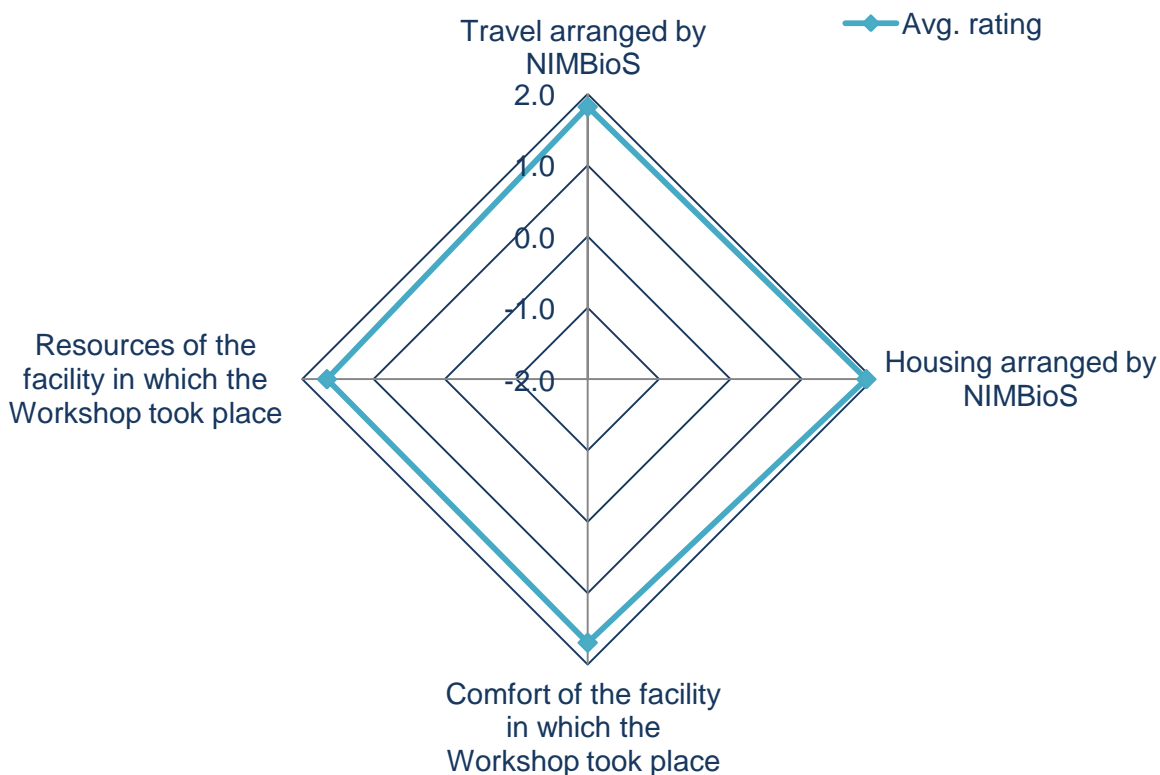### *Overall Satisfaction*

Figure 1. Satisfaction with various aspects of the workshop

Scored on a 5-point Likert scale from -2 to 2 for "strongly disagree" to "strongly agree"

Satisfaction with Accommodations

Figure 2. Satisfaction with accommodations

Scored on a 5-point Likert scale from -2 to 2 for "very dissatisfied" to "very satisfied"

Comments

 Everything was excellent. I found the staff wonderful, friendly, and very kind.

 It is perfect, but I would suggest the organizer could show us around the Univ. of Tenn. during the break, since we sit in the room from 8:30 to 6:30 all day.

 There were direct flights, but were not arranged perhaps due to financial restraints. The internet at the hotel - Holiday Inn was extremely slow.

 The wireless network was often overloaded, making it difficult to connect.

 Any improvements I would suggest are actually already underway. I have nothing to add.

 May be more working space available for attendees, that is, more conference rooms available where attendee can sit and discuss.

I think my flight could have been arranged earlier so that I did not need to take many connections. Since it was bought a bit late, only flights with many connections were available at a good price.
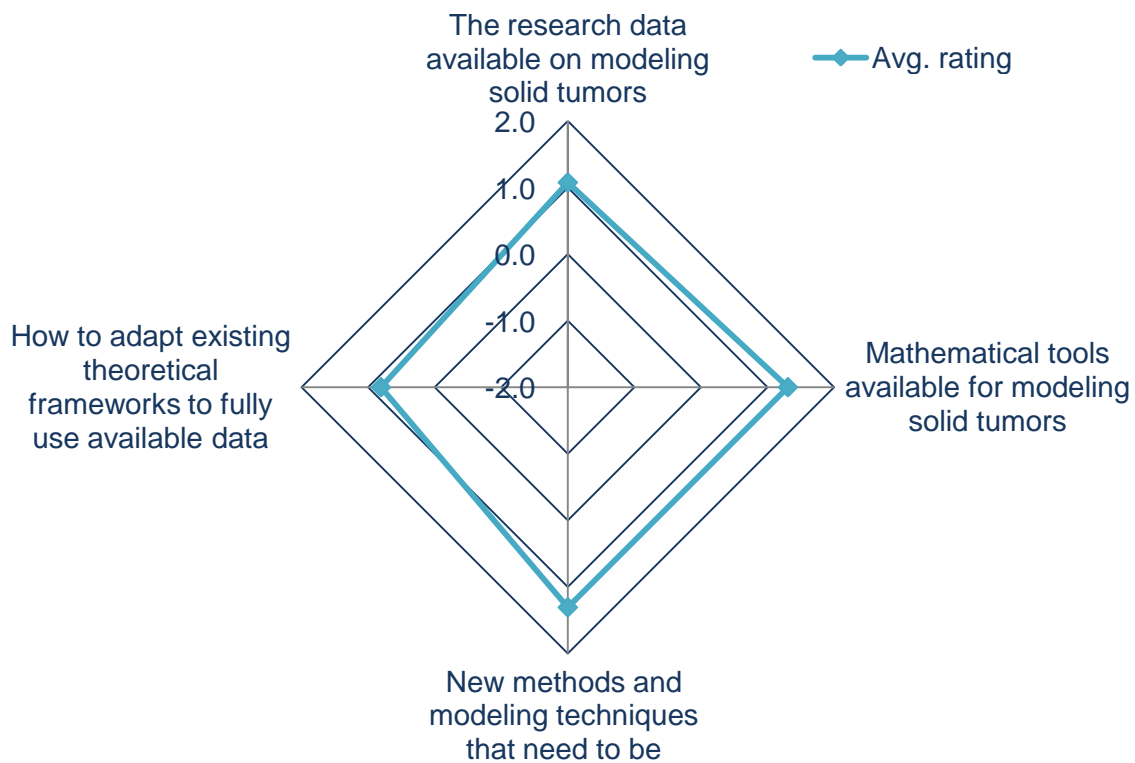
Decaf coffee please. :)

Better seating arrangement.

Workshop Content and Format

Participant Learning

Figure 3. Participant learning

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

Scored on a 5-point Likert scale from -2 to 2 for "strongly disagree" to "strongly agree"

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 solid tumor modeling?

Yes
100%
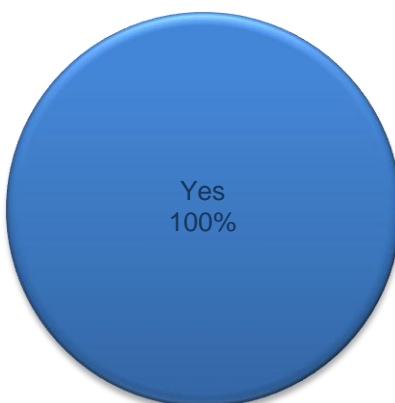
Comments

I don't think that this was really a solid tumor workshop. It was more general and, as such, was useful but not in terms of solid tumor modeling.

I found this workshop to be very educational and inspiring for the work that has been done, and for the great potential to go much further. As a biologist without any modeling background, it provided new ways to think about solid tumor growth. Very interesting.

This is a new area for bench scientists to work with computational scientists to develop modeling for generating hypotheses and unexpected questions.

This was a very productive workshop for me, however I would have liked more discussion time for some prominent topics which we had outlined, maybe a working group.

Very much appreciate the efforts of the organizers and Nimbi's staffs-that allowed me to attend and check the advances in the research going on in disciplines other than my own regarding solid tumors, I wouldn't be able to do it on my own. I am interested in the Tumor environment and hopefully we will form a working group to follow up with this workshop.

I'm an experimentalist, not a mathematician, but felt that the back and forth between myself and my math colleagues was very useful in helping me understand modeling tools, trends and predictions. I hope that my reflections on biological phenomena were as useful to them.

Participants from the workshop are all experts. I learned a lot from their talks. I am working on agent-based cancer modeling and the use of multiscale
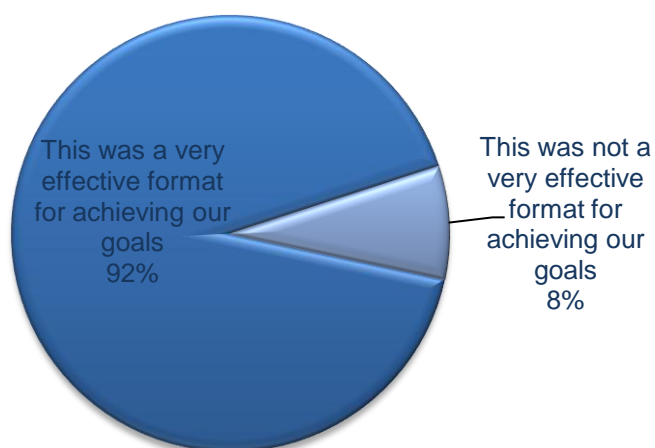
modeling to drug discovery. The workshop particularly helped me understand more how to move the modeling to clinical application.

Great workshop -- really enjoyed it! Would like to have more free discussion time and a more organized poster session.

A formal poster session, like 1-2 hours during the noon, will help.

Workshop Format

Figure 5. Effectiveness of workshop format

This was a very effective format for achieving our goals
92%

This was not a very effective format for achieving our goals
8%

The format would have been more effective if:

The overall effectiveness was hindered by the lack of mission and goal specification thereby leading to a somewhat ambiguous focus. Much of this could have been bypassed had we had a wiggio discussion concerning the workshop goals and mission prior to the actual workshop. This would have allowed the participants to come prepared with ideas addressing the goals and the mission. Providing a list of questions did not focus the discussion. Rather, I feel, it hindered the focus due to the diversity of questions and the lack of insight into what the goals of the workshop were. For example, I expected more time to interact with the researchers in order to develop potential collaborations.

Not sure what the "goals" of the workshop are/were, so difficult to judge the format meeting those goals.

Most Useful Aspects of Workshop

Comments

Wide mix of different academic/research background.

Meeting people in other fields working on cancer via modeling (or at least interested in doing so).

The presentations and the chance to meet and interact with people working in other fields.

Bringing together modelers, experimental researchers and clinicians to talk about modeling tumors and treatment.

Outlining the most important problems for solid tumor modeling and devising probable solutions.

Meeting computational scientists who are in the area of my cancer research.

Inviting people who are truly experts in cancer modeling to present their most recent research is the most useful aspect of the workshop to me.

Meeting the people doing the incredibly creative modeling in the field.

It was most useful for me to learn what other experts in the field think as the most important issues/questions.

Hearing about current activities in this field and participating in discussions

I liked the discussion groups.

Good discussion of different research projects.

The discussions were enlightening for me since it gave me a fair idea of what is going on in the field.

Some of the presentations and dialogue with others in the field. The discussion groups facilitated this, but also informal discussion during free social periods was also very good for taking this further and getting a better sense of what colleagues are interested in and to get to hear more of their ideas (due to smaller groups).

Group discussions.

The talks.

Discussions.

Extensive discussion of related topics.

The breakout discussions.

Discussion groups and synthesis of ideas.

The discussions; Discussions showed that even modelers don't always speak the same language. Exchange about apparently understood mechanisms showed that everybody has a different interpretation of biological findings. The dialog is necessary to drive the field

Fundamentally changes the way that I think.

Communication

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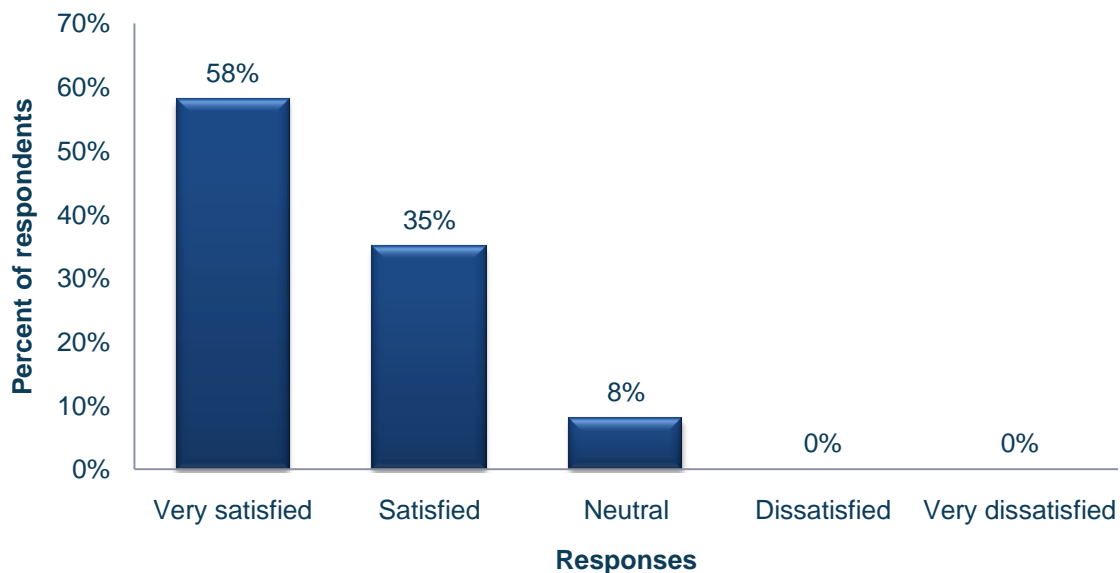
Comments

I would very much like to see groups formed specifically to match up mathematical/computational modelers with experimentalists and clinicians working in the area covered by their models. The discussions would center around developing more realistic assumptions about tumors as inputs for models, and about ways to identify, from clinicians and experimentalists' experience, the most important factors that should go into the mathematical models. This is very important since, as discussed in the workshop many times, models cannot include all known factors and effects. Therefore input from experimentalists and clinicians is essential in getting to the heart of what should (and should not) be included in models.

More group discussion and socialization time.

*Maybe a mailing list (if it doesn't exist yet).*

If the workshop can provide a brief introduction about the participants and their most recent scientific publications in hand-outs, that would be better (although we can search the internet to get such information).

Providing a picture of all participants along with their institution and email address at the beginning of the workshop would help.

A dedicated poster session

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?
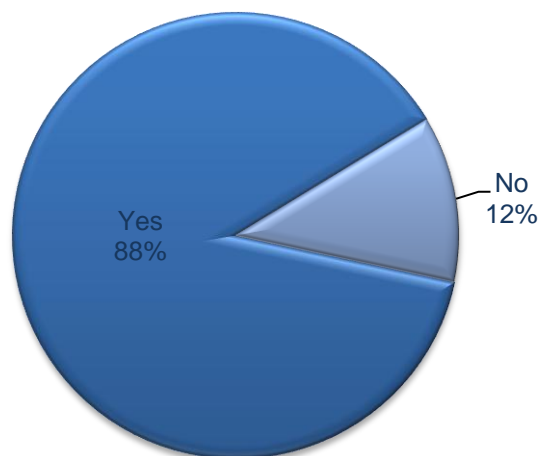
Comments

There was a serious effort at finding a common language for the field.

I think so, but this is really a huge topic and needs long-time efforts from scientists from different disciplines. This workshop is a good start.

This was a topic of some discussion - headway was made but this will continue to be a work in progress.

If this is what was supposed to happen, it should have been made more clear in the discussion prior to the actual workshop so that people could have come prepared to address this type of question.

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?

No
4%

Yes
68%

Possibly
28%
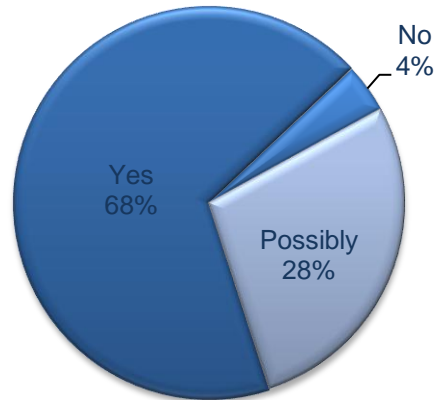
Comments

In order for me to succeed in tumor research I need to have strong collaboration with a biologist.

This would be dependent on developing collaborations with a modeler serving as a PI.

I got interested in two things -by attending this workshop-which I wouldn't otherwise-Tumor Micro-environment and tumor data management.

It influences my whole manner of thinking about tumor progression and microevolution.

Confirmed what I've always perceived as important...

Yes, I believe so. Moreover, participating in a workshop like this one is far more efficient for modelers to improve their models than just reading review/research articles.

Impact on Future Collaborations

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

Pie chart showing: Yes 31%, No 8%, Possibly 61%
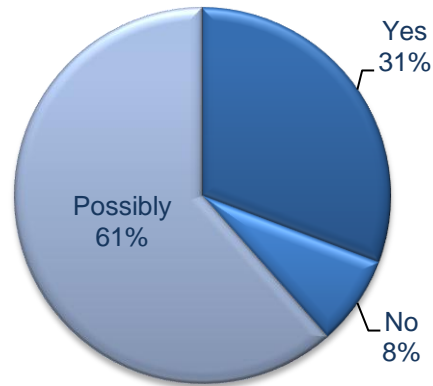
Comments

I would like to form a working group from this workshop so we can meet and work on problems on Tumor growth, which will eventually lead to publications.

I talked to several experts in the workshop. We have not come up with a specific collaboration plan yet, but we are working in that direction. To develop a successful, predictive computational model for simulating solid tumor growth, it is definitely necessary for scientists from different fields to work together. This workshop provided us this opportunity.

I indicated my availability and interest in contributing to other's projects; too early to say if anything will come of it.

I already collaborate with a number of people that attended the workshop, but was able to identify people that are newer to the field that might be interested in collaborating in the future.

Find several places of research overlap. Further communications are planned.

We at Vanderbilt have a lot of data and I have some potential collaborations, which I would not have been able to make if I had not attended this meeting.

Agreed to test predictions for two of the Math Groups (UCI, Indiana); arranged a meeting with a third group (Los Alamos).

Suggestions for Future workshops

Add some of sightseeing because there was no time to see Knoxville.

We spent a considerable amount of time discussing what were the potential topics which we should discuss, if we could have done that discussion in wigged before the workshop started, we could have allocated more time to discussing those problems.

Rather than use workshop time to debate what to talk about in the breakout sessions, maybe have participants vote on possible topics ahead of the conference (via an online poll).

Although there was some angst on the organizer's part related to lack of input/direction from participants early on, they handled it very well and the meeting flowed productively. That said, some preparation ahead of time that would facilitate a more rapid engagement by participants might be helpful. Perhaps an outline of what groundwork will be established in the first hour or 2, so participants can think about this ahead of time.

1. I'd suggest explaining to the attendees in advance of the workshop exactly how the discussion points they submit will be used. This would also help motivate more people to submit discussion points. 2. I'd suggest dividing the discussion points into broad and specific (more technical) ones. Broad ones could be discussed by everyone. Specific topics could be discussed by subgroups that are working in that particular area. 3. I would very much have liked to have discussions on model assumptions used to build mathematical models of tumors. I would find it extremely useful to go over the lists of assumptions behind some mathematical models and have experimentalists and clinicians give their feedback. To be clear, the feedback would be on the assumptions, not the methodology or results of the model. I find that experimentalists and clinicians often can provide input on whether model assumptions are realistic, or how they could be improved.

Discussion topics are a little broad. If the workshop could only focus on a few topics, that would be more helpful in my opinion, because we could have a deeper discussion within the limited meeting time.

More organized and more hands-on.

More free discussion time. The discussion sessions can be slightly more organized for better efficiency.

Should include more debates and discussions.

It was great.

Having increased commitments to collaboration for modeling of therapeutic and preventive control of breast tumor progression.

The only thing I will change about the workshop is to include Biomedical Engineers to the speaker list.

My overall critiques fall into two areas. First, the meals were poorly planned and nutritionally poor. Serving only carbohydrates in the morning induces sleepiness and lack of focus. A better balance of healthy food would have been more highly appreciated. Many people are highly allergic to nuts and the amount of foods with nuts in them was rather overwhelming, making it difficult to find edible items. The second major challenge was the seeming vagueness of the intent and goals of the meeting. While the structure was clear and the clock was well-managed, it was hard to ascertain exactly what was supposed to emerge from the meeting. Much of this could have been cleared up in an online discussion prior to the actual meeting thereby eliminating some of the difficulty in attaining a focus for the discussions.

Fewer presentations and more discussion might be helpful, though I feel that the balance was actually quite good at the workshop.

Poster session, more social time, prolonged focused discussion time.

Longer time (more days) and more time for poster sessions.

I suggest a poster session, so I could have chance to explain my work since I am not presenting in the workshop.

Was good as it was. A more formal poster session-instead of an informal.

A dedicated poster session would be good. There were lots of nice posters, but no time to discuss the work with the authors.

Layout. I think lectures morning with no discussion, then move to discussion in afternoon. Knowing discussion topics in advance would help.

More collaboration and communication across disciplines. Better formulation and organization of the various subgroups during discussion of a topic. The experts in each subgroup should spend some time to give at least the basic ideas to the rest in order to have a common starting point.

Additional Comments

Thanks for organizing!

Nice job-keep it up, and thank you to all the organizers and NIMBioS staff.

During an open discussion I floated a proposal for a "Tutorial on Cancer for Mathematicians". At least 5 people came up to me afterwards and stated that they would thought it was a good idea, that they as mathematicians would like to attend such a tutorial, and encouraged me to follow up on the suggestion. I am an experimental biologists who has, and is, collaborating with mathematicians, and who teaches a senior undergraduate course on cancer to biologists and teaches a graduate course on cancer molecular biology to molecular biologists, cell biologists, and biochemical engineers. If there is interest in NIMBioS hosting a "Tutorial on Cancer for Mathematicians" I might consider directing and teaching such a course. However, it would take some effort on my part and on the part of the NIMBioS faculty to design such a course, so a discussion would be necessary.

Meeting a research scientist at NIMBioS, helped me to get introduced to a colleague in my own university in another department. This has helped foster interdisciplinary interaction and perhaps might lead to collaborations.

It is very encouraging to see increased attention given to the role of mathematical modeling in cancer research.

Despite some of the pointed criticism that I have made, the workshop was well-worth attending and I would certainly attend others.

Appendix

Solid Tumor Modeling Workshop Evaluation Survey

Solid Tumor Modeling 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 modeling solid tumors
> Mathematical tools available for modeling solid tumors
> 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 regarding solid tumor modeling?

> 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

Comments:

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

> Yes
> No
> 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:

Please indicate your level of satisfaction with the workshop accommodations:
(Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied, Not applicable)

> Travel arranged by NIMBioS
> Housing arranged by NIMBioS
> Comfort of the facility in which the workshop took place
> Resources of the facility in which the workshop took place

Please indicate any changes NIMBioS can make to improve the resources and/or accommodations available to workshop participants:

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: