Goals

• Overview
• First hand account of what has occurred to date
• Show details of process to date (NASA HQ slides)
• Discuss the future steps (as I understand them)
Overview

• Past: Chaired workshops with writing assignments, results circulated, and published
• This year (astrobiologyfuture.org)
  NASA involved knowinnovation.com
Effort to cast a very wide net of participants
Stated aim to inspire rather than just list topics
2013 Process

• The process started with five panel webinars (with Q and A, plus a real-time chat window).
• Each followed by a week of online discussion, and another live online discussion.
• And then a four day in-person workshop:
  Wallops Island, VA
  Mediated: A. Burnett & team (knowinnovation.com)
  Design: Look 10 years out, freeform, inspire, natural clusters, user-defined groups, outside-of-the-box, jump over methodological hurdles, etc.
2013 Webinars

- Astrobiology for Solar Systems Exploration Webinar
- Prebiotic Evolution Webinar
- Evolution of Advanced Life Webinar
- Early Evolution of Life and the Biosphere Webinar
- Planetary Conditions for Life Webinar
Astrobiology Roadmap Progress

(Slides prepared by Michael H. New, PhD)
The process so far (Part 1)

1. Create a website to form the home for our virtual community.
2. Divide Astrobiology into five areas, introduce each to the nascent community via a webinar.
3. Host open forums on each topic area for at least one week.
4. Pick a big question for each topic area, hold web-based discussion on it only.
5. Use website as a record & a hub.
astrobiologyfuture.org

• 598 registered members from all over the world
• 82 discussions
• 621 posts
• 11 user-generated groups
• Discussions to date have been collegial and (remarkably) free from trolls.
The process so far (Part 2)

6. What talk do you want to give/hear in 10 years?

7. Put ideas on tons of Post-It Notes™

8. Participants group Post-It Notes™ into broader concepts & describe them in 1 page

9. Group 1-pagers, solicit volunteers, and write 3 page concept documents
The Face-to-Face Workshop

• 131 researchers were invited to participate
  – All of the webinar leaders were invited.
  – Active, serious commenters in the forums were invited.
  – Other astrobiology researchers were invited.
• 53 researchers attended in person and 4-6 others participated virtually for the entire workshop.
• 21 three-page concept documents were written.
How are things connected?

Prebiotic to Biotic Chemistry

How did biologically relevant elements evolve into molecules?

How did macromolecules gain functionality?

How are stable populations of oligomers synthesized and assembled?

How did polypeptide meet polynucleotide?

What are the sources of organic monomers relevant to the origin of life?

How can we make laboratory models of earliest cellular life?

How do we make our planet Earth a free lunch for early life?

What are the common attributes of extant living systems and what can they tell us about all living systems?

What does the simplest life look like?

What genomic, metabolic, and ecological features characterized LUCA?

What genomic, metabolic, and ecological features are at the root of the Tree of Life?

What experimental studies of evolutionary pathways and emergence in molecular systems should be performed?

How can we best overcome our ignorance about microbial life on Earth?

How can we substitute space for time to better understand geochemical and co-evolutionary dynamics?

How can we substitute space for time to better understand geochronal and co-evolutionary dynamics?

How do habitable planetary systems form?

How can we identify habitable environments in our Solar System?

How can we enhance the utility of biosignatures as a tool to search for life in the Solar System & beyond?

How could we identify & characterize a habitable planet?

How could we identify & characterize a habitable planet?

How can a world generate and support life & how can we use remote characterization to understand such worlds?

How would we find and identify an inhabited planet?

How does Earth's earliest rock record inform us about the origin of life on Earth?

How did complex organs arise from early life and what were the mechanisms that controlled their subsequent evolution?

How can we understand the Earth's past, present, and future as proxies for habitable worlds?

How can environmental factors be coupled to the emergence of life?

What environmental factors are coupled to the emergence of life?
What next?

• The 21 concept documents will be posted on astrobiologyfuture.org and open to be read by anyone.
• Each document will be the focus of an hour-long webinar.
• After the webinar, the document will be opened to comments from the community.
• The original writers will meet to revise/update the documents.
• Another workshop will be held to integrate the documents.
• A draft roadmap will be produced and reviewed.
Schedule

<table>
<thead>
<tr>
<th>Name</th>
<th>Begin date</th>
<th>End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept documents</td>
<td>7/1/13</td>
<td>1/30/14</td>
</tr>
<tr>
<td>Hangout 1/webinar 1</td>
<td>7/16/13</td>
<td>7/16/13</td>
</tr>
<tr>
<td>Hangout 2/webinar 2</td>
<td>7/18/13</td>
<td>7/18/13</td>
</tr>
<tr>
<td>Hangout 3/webinar 3</td>
<td>7/23/13</td>
<td>7/23/13</td>
</tr>
<tr>
<td>Hangout 4/webinar 4</td>
<td>7/25/13</td>
<td>7/25/13</td>
</tr>
<tr>
<td>Paper 1 open for comment</td>
<td>7/16/13</td>
<td>1/31/14</td>
</tr>
<tr>
<td>Paper 2 open for comment</td>
<td>7/18/13</td>
<td>1/31/14</td>
</tr>
<tr>
<td>Paper 3 open for comment</td>
<td>7/23/13</td>
<td>1/31/14</td>
</tr>
<tr>
<td>Paper 4 open for comment</td>
<td>7/25/13</td>
<td>1/31/14</td>
</tr>
<tr>
<td>Group Editing Sessions</td>
<td>1/15/14</td>
<td>2/18/14</td>
</tr>
<tr>
<td>Technical Editing</td>
<td>2/3/14</td>
<td>3/10/14</td>
</tr>
<tr>
<td>Integration Workshop</td>
<td>2/25/14</td>
<td>2/28/14</td>
</tr>
<tr>
<td>First Draft</td>
<td>3/10/14</td>
<td>3/10/14</td>
</tr>
<tr>
<td>PSS (+ CAPS?) Review</td>
<td>3/10/14</td>
<td>4/4/14</td>
</tr>
<tr>
<td>Final Draft</td>
<td>4/18/14</td>
<td>4/18/14</td>
</tr>
<tr>
<td>NAI CAN-7</td>
<td>8/14/13</td>
<td>1/31/14</td>
</tr>
</tbody>
</table>