

## **Interdivisional Town Hall Meeting (M548)**

“Why is Change so Difficult to Sustain in Engineering Education?”

2014 ASEE Conference and Exposition (Indianapolis)

Monday, 16 June 2014, 215-345pm

JM Marriott Hotel, Grand Ballroom 1

### **Report of the Interdivisional Town Hall Meeting**

During our 2014 annual meeting in Indianapolis, we organized an Interdivisional Town Hall Meeting on the topic of “Why is Change so Difficult to Sustain in Engineering Education?” The event was co-sponsored by 31 ASEE Divisions and Constituent Committees. Approximately 70 participants, including over 45 delegates from the divisions were present at the gathering.

The meeting was organized as a highly interactive session devoted to identifying specific challenges and opportunities for pursuing more sustainable reform initiatives, and discussing them through breakout sessions. The focus was on both general solutions as well as solutions specific to particular areas. The discussions from each breakout session were reported to the larger group, collected in electronic form, and distributed for refinement and final distribution to all ASEE Divisions. This report constitutes the final report resulting from this past year’s Interdivisional Town Hall Meeting.

The session began with brief opening statements by the following individuals:

- Elliot P. Douglas (ERM): “Strategies for Disseminating Pedagogical Innovation”
- Susannah Howe (DEED): “The Impact of Community Building”
- John K. Estell (CoED): “Standard Bearers and Color Guards”
- Stacy Klein-Gardner (K12): “Issues with Implementing and Maintaining Engineering in the K-12 Classroom with NGSS and Common Core”
- John-David Yoder (Mechanical): “Viewing Every Course as an Experiment in Improved Teaching and Learning”
- Julia Williams (LEES): “Experiences from the Making Academic Change Happen Workshop”

Each speaker was encouraged to frame their remarks in terms of specific actionable items that could be discussed by a group. Additional ideas were solicited, and following open voting (one vote per person), we arrived at the following topics for further discussion:

#### **META STRATEGIES**

- **Assessing Change Strategies**—Developing a framework for assessing the efficacy of different change strategies
- **Understanding Barriers to Change**—Developing a better understanding of the barriers to change
- **Transferring Best Practices**—Learning from, and transferring some of the best practices from our sister societies and other organizations

#### **ORGANIZING INSTITUTIONAL SUPPORT**

- **Incentives**—Providing incentives for continuous curricular renewal

- **Building Communities of Practice**—Building communities of practice in engineering education, and the support structures necessary to sustain them
- **Institutionalization**—Managing the change from “new programs” to enduring initiatives; getting beyond the mentality of the latest trends and “buying” change

#### TOPIC-SPECIFIC SOLUTIONS

- **K-12 Initiatives**—Cultivating a robust foundation for interest in STEM education
- **Enduring Changes in the Humanities**—Advancing the conversation about the role of the humanities in engineering education—an architecture for lasting change.
- **Rethinking Core Curricula**—Defining a stable core of engineering knowledge and expertise in math, physics, and the other sciences

The goal of the breakout sessions were to foster initial discussion of possible actions on three different time frames, corresponding roughly to:

- 3 month Planning for the next annual meeting
- 1 year An event at the annual meeting or broader action whose outcome are reportable at the next annual meeting
- 5 year The long-term goals for the initiative.

Specific questions were posed to each group to elicit response having to do with a) problem definition and analysis, b) action items, c) other comments about the initiative beyond the action items. The results of each breakout session (as refined through subsequent conversations and edits after the workshop) are reported below in tabular form below.

It was our goal to use this generative process to produce a number of feasible ideas, along with the nucleus of a group of ASEE members interested in pursuing several defined initiatives. We fully recognize that not all ideas—ideas that could be defined in just 90 minutes—would be worthy of follow through, nor that the people assembled at the meeting were necessarily the right people to carry out the initiative.

One of our major recommendations to each of the groups, should there be interest, is that they should identify and reach out to other “obvious candidates” for their particular effort. Those discussing enduring changes in the humanities, for instance, are invited to reach out to the officers of the Liberal Education/Engineering & Society Division to develop a conversation and venue suitable for further discussion at the 2015 Annual Meeting in Seattle. The members of the Ad Hoc Committee are willing and eager to offer our support to any group seeking to pursue their ideas further. (We’ve agreed to delegate this task to individual members of our committee!)

Finally, we would like to add that we reported on the Interdivisional Town Hall Meeting at a separate Program/Division Chairs’ meeting organized on the last day of the conference, and the general consensus of this group was that we should conduct another Town Hall Meeting in Seattle, with a different theme and possibly different format. The Ad Hoc Committee has met to discuss this possibility, and will initiate a conversation about the possible topics (and format) for the 2015 Town Hall meeting proposal that we will be submitting to the PIC Chairs. We’ve already heard from several of you who expressed interest in being involved. If you’d like to be a part of this conversation, please let us know.

## Ad Hoc Committee on Interdivisional Cooperation

Atsushi Akera (LEES)  
Elliot Douglas (ERM)  
Susannah Howe (DEED)  
Joe Tranquillo (Biomedical)  
Margot Vigeant (Chemical Engineering)  
John David Yoder (Mechanical)

---

---

## META STRATEGIES

Assessing Change Strategies	
<b>Problem Definition</b>	What meta-framework can we create to assess and refine the efficacy of different “change strategies” in engineering education (and disseminate the results)?
<b>Action Items</b>	<p>3 Months</p> <ul style="list-style-type: none"><li>• Further refine our “explosion” model that we developed during the meeting. (This involved a new way to visualize how change moves from top down &amp; bottom up.)</li></ul> <p>1 Year</p> <ul style="list-style-type: none"><li>• Test this model for robustness</li><li>• Apply it to successful &amp; unsuccessful change initiatives</li><li>• What do people learn when they fail &amp; fail again.</li><li>• Learn what makes change strategies stick</li></ul> <p>5 Years</p> <ul style="list-style-type: none"><li>• Develop a certification program that certifies certain faculty, staff, and administrators as “change agents” in engineering education</li></ul>
<b>Other Comments</b>	

Understanding Barriers to Change	
<b>Problem Definition</b>	<p>Defining and prioritizing all of the barriers to initiating and sustaining change would take a longer than 30 minutes.</p> <p>However, we did see two significant pervasive issues:</p> <ul style="list-style-type: none"><li>• We observe occurrence of the Walt Kelly (Pogo) syndrome -- “We have discovered the enemy, and they are us.” New ideas (and papers about them) are often accepted only if they come with a long bibliography citing examples of the application of those ideas for a long time by many others.</li></ul>

<b>Action Items</b>	<ul style="list-style-type: none"> <li>• One of the other significant barriers is ABET. Of special concern are inconsistencies amongst Program Evaluators. Practices often swing to the extreme of requiring assessments only in a pre-conceived format and over several repetitions of identical topical matter.</li> </ul>
	<p>3 Months</p> <ul style="list-style-type: none"> <li>• Assemble a cohort/cadre of stakeholders: faculty, students, administrators, employers, accreditors, etc. to pursue the task of defining and categorizing barriers to change.</li> </ul> <p>1 Year</p> <ul style="list-style-type: none"> <li>• Have this group study motivational theory, organizational change theory, and change psychology.</li> <li>• Identify and analyze successful change models.</li> <li>• Provide access for the barrier-study cohort/cadre to senior administrators—provosts, presidents, deans—at ASEE member institutions and/or at the ASEE conference.</li> </ul> <p>5 Years</p> <ul style="list-style-type: none"> <li>• Develop and disseminate strategies to overcome barriers.</li> </ul>
	<b>Other Comments</b>

<b>Transferring Best Practices</b>	
<b>Problem Definition</b>	A SWOT: This conference is too big, too much overlap, balkanized
<b>Action Items</b>	<p>3 Months</p> <ul style="list-style-type: none"> <li>• Improve the database capabilities of ASEE conference papers. <ul style="list-style-type: none"> <li>○ This needs to be broken up into short-term and long-term goals. As a short-term solution, we can borrow from other conferences and publications that require submissions to include an index of roughly 3-4 key words/phrases that could then be used as search terms. A long-term solution is presented below.</li> </ul> </li> <li>• Get page numbers for papers. <ul style="list-style-type: none"> <li>○ This should be easy for ASEE IT Department to implement.</li> </ul> </li> <li>• Better promote the poster sessions to allow for greater interaction; make sure poster sessions are not viewed as second class. <ul style="list-style-type: none"> <li>○ We've written a draft proposal for both improving the quality of published papers and creating greater value for poster sessions. Please see forthcoming proposal for the 2015 ASEE Annual Meeting.</li> </ul> </li> </ul>
	<p>1 Year</p> <ul style="list-style-type: none"> <li>• Improve the database capabilities of ASEE conference papers. <ul style="list-style-type: none"> <li>○ The long-term solution referenced above is to develop a classification system for the engineering education field</li> </ul> </li> </ul>

similar to the Computing Classification System employed by ACM ([www.acm.org/about/class](http://www.acm.org/about/class)) for all of their published papers. Developing a similar system for ASEE would require some serious committee work and input from all of the divisions; however, if done properly it would make searches for information a breeze from at least the macroscopic level. This will probably take more than one year, but less than five.

- Convene more interdivisional workshops.
  - This leads into a much greater issue – the lack of continuity due to the differences in the leadership structure across the Divisions. Some divisions use a ladder structure so that leaders are grown into their eventual roles as program and division chairs; other divisions use two-year terms for their chairs so that there is some carryover effect. On the other hand, some divisions have a “one-and-done” format for their chair positions. For interdivisional workshops to be successful there needs to be some stability in officer positions from year to year AND we need to get to know the officers in at least some of the other divisions. One suggestion: hold an “Officers Retreat” on the Thursday after the Annual Conference, as this would incur only minimal cost (an extra day’s worth of expenses, but no additional travel) where current and incoming program and division chairs (or appropriate division representatives) can work together to develop workshops based on themes suggested by the PIC Chairs.
- Cutback on number of sessions.
  - However, politically, some do not see this as a viable option, especially amongst the larger divisions.
- Promote & enhance geographic session meeting for networking, finding nearby collaborators.
  - This essentially recommends that ASEE better promote the sectional meetings. Given the reach of the Internet, this may also not be such a pressing need, as one can now easily collaborate with anyone just about anywhere. As an alternative, ASEE may be better off focusing its efforts on promoting networking opportunities at the Annual Conference.

#### 5 Years

- Have a trans-divisional, leadership development workshop.
  - The current leadership training assumes that you cannot read the Monolith manual; explanations of BASS and Operational Accounts are only slightly better. Having relevant information combined with an actual leadership workshop to provide ASEE-specific outcomes would be of great long-term benefit to the organization.
- Develop workshop formats with longer duration.

- This probably could be a one-year action item. Please note that ASEE does currently have half-day (3 hours) and full-day workshop opportunities available on Sundays. Holding such workshops on Monday or Tuesday would adversely affect the offering of technical sessions. Given that Wednesday afternoons are now pretty empty on the schedule, the PIC Chairs should consider allowing 3-hour workshops within that timeframe.
- Ban the use of PowerPoint.
  - Of course, while we understand the frustration, it might be more realistic, and in fact better if some educational outreach were used to inform authors as to how to better craft their presentation. (Some of among Communication scholars in the LEES Division specifically addresses this point, for example through the promotion of Evidence-Assertion based presentation models.) This year the New Engineering Educators Division held a successful, well-attended session entitled, “So You Wanna Present at ASEE? An Assortment of Presentation Tips from Award-Winning Engineering Educators” that at least took a step in the right direction.
- Create cohorts by such criteria as disciplinary areas, career stage, themes, and/or shared problems.
  - This can be best implemented as a “Birds-of-a-Feather” (BOF) session block during the Annual Conference. At the ACM SIGCSE Technical Symposium, the BOFs are scheduled in the evening in two back-to-back 45 minute blocks; a similar two-part structure could be used as an alternate scheduled activity during the time block currently dedicated to the second (best paper) plenary. This probably could be implemented just one or two years down the road.
- Develop virtual (online) ways to keep people connected and active in-between meetings.
  - This would require significant investment in IT by ASEE, and unfortunately they have their hands full right now. This is a good item for envisioning the future, and setting up appropriate groups on social networks such as LinkedIn or Facebook could be utilized in the short term to explore whether this is a viable concept.

**Other Comments**

(See above, as embedded into specific suggestions)

## ORGANIZING INSTITUTIONAL SUPPORT

### Incentives

**Problem Definition**

Do we provide enough support, incentive structures, and rewards to sustain change initiatives in engineering education?

<b>Action Items</b>	3 Months	<ul style="list-style-type: none"> <li>Showcase good models through ASEE annual meeting</li> </ul>
	1 Year	<ul style="list-style-type: none"> <li>Take time to canvas. Look more closely at best practices in K12 that we may want to emulate in higher education.</li> </ul>
	5 Years	<ul style="list-style-type: none"> <li>Conduct a broader review of P&amp;T, Merit raises, external review policies, course loads across institutions. Consider how this impacts sustainability of change in engineering education.</li> </ul>
<b>Other Comments</b>		

### Building Communities of Practice

<b>Problem Definition</b>	Building communities of practice and the support structures necessary for sustaining them. Doing so at the disciplinary/divisional level, as well as across engineering disciplines & ASEE Divisions.	
<b>Action Items</b>	3 Months	<ul style="list-style-type: none"> <li>Ask ASEE HQ for smart tags in conference program, so program chairs can identify people with similar interests.</li> <li>Propose a workshop on best practices for establishing communities of practice</li> </ul>
	1 Year	<ul style="list-style-type: none"> <li>Conduct this Sunday workshop at the 2015 ASEE Annual Meeting</li> </ul>
	5 Years	<ul style="list-style-type: none"> <li>Develop a 'meta-divisional' structure that would support communities of practice. This would (ideally) make it easier to have sessions on topics that are regularly discussed but cross normal division lines, without the need for a whole new set of officers and membership</li> </ul>
<b>Other Comments</b>		

### Institutionalization

<b>Problem Definition</b>	<p>The challenges are complex. They have to do with:</p> <ul style="list-style-type: none"> <li>Reward structure</li> <li>Surviving administrative change (new Dean, new institutional vision, etc...)</li> <li>ABET and the challenges of implementing the vision set forward</li> <li>The fact that we rarely see programs that are sunset at universities. These compete with new initiatives that should be the ones that get support. We need mechanisms to sunset older programs that no longer meet pressing needs to make space for new initiatives. (But we</li> </ul>
---------------------------	---

	also need to sustain those that continue to serve an important purpose, and must survive the winds of change.)
<b>Action Items</b>	<p>3 Months</p> <ul style="list-style-type: none"> <li>Review the massive literature/research on institutional change. We need to review, synthesize, and bring this to the ASEE community. (Are there any volunteers?! Is anyone doing this already?)</li> </ul> <p>1 Year</p> <ul style="list-style-type: none"> <li>Develop a more grounded understanding the landscape of change creation and sun-setting within engineering education.</li> <li>Regarding “Program Creation,” understand how this is done well; document &amp; understand when it doesn’t do well. Disseminate our findings.</li> <li>ASEE should also play a role in hosting roundtables designed to facilitate this much needed understanding of change processes and the institutionalization of new initiatives.</li> <li>Bring Industry and Academy together to discuss ABET—understand what an accreditation regime (and the current approach to accreditation in particular) does, in practical terms, in terms of benefiting or creating barriers for innovative programs</li> </ul> <p>5 Years</p> <ul style="list-style-type: none"> <li>Develop models &amp; methodologies to test &amp; evaluate the efficacy of different change models. Develop a robust research program around the question of successful (and unsuccessful) efforts to institutionalize changes in engineering education.</li> </ul>
<b>Other Comments</b>	NOTE: Some of these suggestions parallel those advanced by other groups, and could perhaps be pursued in an integrated fashion.

## TOPIC-SPECIFIC SOLUTIONS

<b>K-12 Initiatives</b>	
<b>Problem Definition</b>	How to do we get more consistent focus on STEM/engineering in K-12 in the complex sociopolitical environment for public (K-12) education in the United States?
<b>Action Items</b>	<p>3 Months</p> <ul style="list-style-type: none"> <li>Look at several representative states, and assemble a committee to design a pitch suitable for reaching out to legislators, education departments, other officials within each state.</li> </ul> <p>1 Year</p>



<b>Other Comments</b>	<ul style="list-style-type: none"> <li>• Begin lobbying in each state; in doing so, collect data that supports / helps refine our pitch.</li> <li>• Create an ASEE K-12 outreach group for each state</li> <li>• Develop a coordinate PR campaign across the states</li> </ul>
	<p>5 Years</p> <ul style="list-style-type: none"> <li>• Keep lobbying, and keep expanding the scope of our lobbying efforts</li> <li>• Evaluate pre-service teacher training programs; need to change how teachers are produced so they have more integral understanding of STEM education and their role in student preparation.</li> <li>• We also have a humongous task in in-service teacher training. Form a committee to develop model programs.</li> <li>• Study, in turn, what changes are needed in higher ed to adapt to changes that are happening in K-12 education today.</li> </ul>

**Enduring Change in the Humanities**

<b>Problem Definition</b>	Despite all that has been said and done in the past century, we still need to convince engineering faculty and others that the humanities and social sciences are important.
<b>Action Items</b>	<p>3 Months</p> <ul style="list-style-type: none"> <li>• Design a benchmarking survey on what people are actually doing in terms of E&amp;LE integration. Document more precisely what people are doing, and doing differently, to broaden student competencies that go beyond their technical coursework.</li> <li>• Embedding LEES. Get LEES members to present papers on broadening engineering education within the technical divisions of ASEE.</li> </ul> <p>1 Year</p> <ul style="list-style-type: none"> <li>• Implement the above.</li> </ul> <p>5 Years</p> <ul style="list-style-type: none"> <li>• Meet in Tampa and reap the rewards of our efforts!</li> </ul>
<b>Other Comments</b>	Note: Those associated with the Union College symposium should take the lead in doing this survey; make this happen via ASEE, including its Liberal Education/Engineering & Society Division. We're all eager to work with people "from the dark size."

**Rethinking Core Curricula**

<b>Problem Definition</b>	We need to theorize better the underlying purpose of foundational subjects such as math/physics/etc... Understand how these disciplines contribute to engineering education, student learning, and their future competencies.
---------------------------	---

It also appears that we have serious “notational” issues that prevent us from achieving better integration across foundational subjects, as well as between foundational and applied subjects. The use of different terms/notations/languages in math and sciences, and as opposed to engineering frustrates such efforts.

### Action Items

#### 3 Months

- What are the current concerns about the competency of engineering graduates? Come up with an assessment baseline using surveys issued to customers, government, industry.

#### 1 Year

- Carry out the above baseline survey.
- Develop guidelines for conversations about integration that is to take place at various colleges.
- At each college, identify faculty from engineering, and from math, physics, and the other sciences who can clearly work together. Identify people who are willing to talk to each other in interdepartmental meetings. Convene meetings according to the guidelines.

#### 5 Years

- Using external support, develop model “integrated” curricula for the first two years of study of an engineering student. Test and assess the efficacy of these curricula.

### Other Comments