Creation of TPSE Math - 1

• The problem: Undergrad math ed doesn’t meet the needs of students – or the nation
• Outdated course materials & teaching techniques haven’t provided students with quantitative skills required for employment & good citizenship
Creation of TPSE Math - 2

• NRC’s *Math 2025* called for math teaching better aligned with current state of mathematical sciences
• PCAST’s *Engage to Excel* documented that undergrad math is more of a barrier than a gateway to academic success
• Preparation for jobs in today’s economy requires math training that’s multidisciplinary & flexible
Early Steps - 1

• 2013 gathering at CCNY prompted formation of TPSE
• Initial funding from CCNY & Sloan
• Information gathering: series of meetings
• Leaders inside & outside math community identified the most urgent issues & how some were already being addressed
• Experiments were mostly on small scale, isolated & local; difficult to scale up
Early Steps - 2

Consideration of...

• Demand side of the equation
• New teaching technologies & methods
• Evolving economic model, from relatively homogeneous to mix of research faculty, temporary faculty & faculty no longer research active
• Need to increase diversity of participants: mathematicians from underrepresented institutions, ethnicities, races, gender
Early Steps - 3

Led to...

• Formation of Mathematics Advisory Group (MAG):
  – Math Department Chairs (situated at nexus between faculty & administration)
  – Middle management

• Chairs +1 concept & first meeting, October 2016
Strategic Priorities

• Multiple pathways & improved completion rates: sync pathways with student interests & employer needs
• Upper-division “routes of relevance”: offer more diverse, relevant & flexible programs
• New teaching & learning technologies & methods: ITHAKA partnership
• Graduate education: broaden preparation for diverse careers
TPSE Math & CBMS

• Mutual desire for partnership
  – CBMS member associations have signaled support for TPSE
  – Each has designated a TPSE liaison

• Value of Common Vision project (five professional associations; “spur grassroots efforts to improve undergrad ed”); strong support of CBMS

• A TPSE function: help develop implementation strategy for Common Vision recommendations
Current Activities - 1

• Develop action partnerships with math department chairs
• Partner with APLU, AASCU & New Mathways/Dana Center on lower-division pathways
• Understand how to develop pathways more relevant to careers
  – Demand for wider menu of inter- and multidisciplinary courses
  – Potential of joint majors, minors, certificates
Current Activities - 2

• Build closer relationship with community colleges
  – 2-year colleges crucial to success of this effort
  – Closer involvement with AMATYC

• Importance of communication, outreach, networking
Next Meeting Topics

Chairs +1 Meeting #2, March 2017:

• How lower-division pathways can grow to scale

• Develop “routes of relevance” in upper-division curricula that reflect growing importance of math in STEM & non-STEM fields

• Successful technologies & techniques of teaching & learning

• Design more specific strategies for improving preparation of grad students
Next Steps - 1

- Help math societies act together on areas of broad agreement
- Form partnerships with professional organizations representing social sciences, humanities, etc.
- Act in partnership with other disciplines to create more routes of relevance
Next Steps - 2

- Help public higher ed institutions collaborate in testing & implementing reforms generated elsewhere, e.g. Maryland, Ohio
- Through RFP’s & partnerships, develop resources for experimentation, scaling up, coordination
Medium Term - 1

• Analytical studies on the demand side
  – Systematic analysis of what other departments want for their students who take math
  – Understand what math backgrounds employers look for
  – Analyze career outcomes for students who take specific math courses, and who don’t

• Expand MAG into MAG networks, possibly including BIG Math (Business-Industry-Government)
Medium Term - 2

• Test our theory of action: If we do X, can we expect Y to follow?

• With math organizations, recruit/develop speakers to give pedagogy seminars, including success (and non-success) stories

• Develop a “Math plus X” initiative
  – Network with non-math STEM areas of high demand
  – Add modeling to curricula
  – Emphasize realistic, interesting problems
Challenges

• Approach math reform as a systems problem: study all components in relation to one another; strive to extend conversation, bring about cultural change

• Halt perception that success is achieved by lowering standards

• Learn how to evaluate reforms, beginning with existing initiatives
Conclusion: Role of TPSE Math

• TPSE is asked by members of the math community to help with:
  – Talking points chairs can use with their provosts
  – How to frame decisions in terms of university needs
  – How to demonstrate success in ways administrations can see

• How can TPSE serve as messenger & facilitator for faculty & administration? What might change look like, how could it benefit all sides?