Editing Engineering Education Research Handbooks & Institutionalizing an Academic Field

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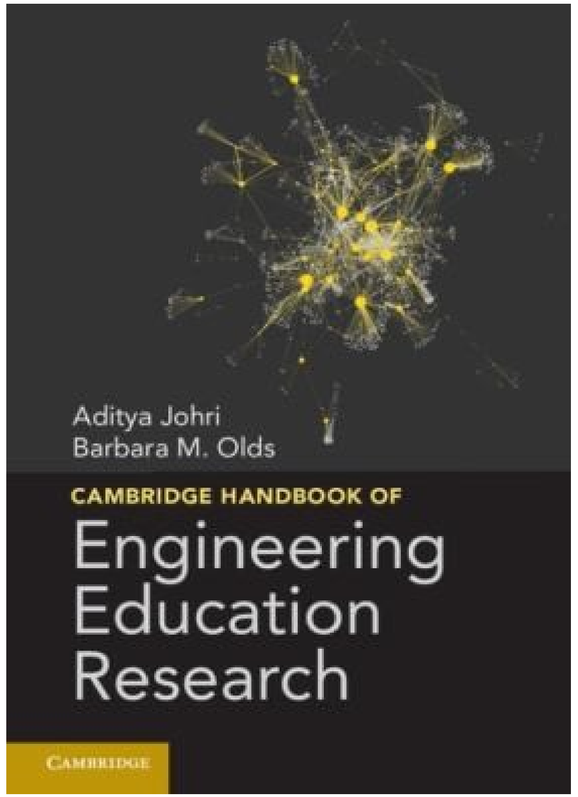
ABOUT ME

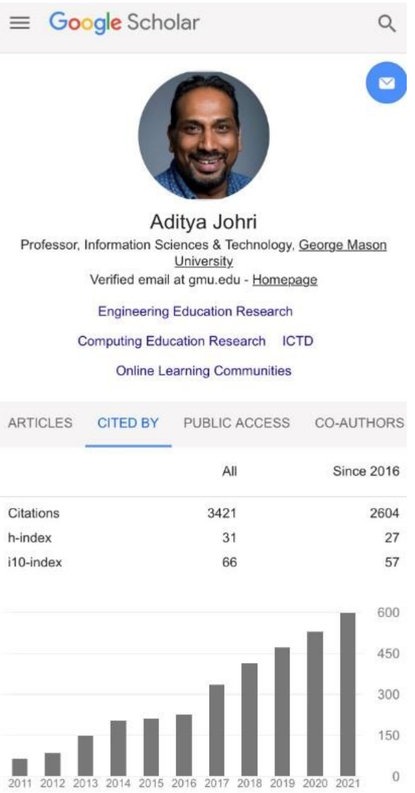
Professor

Department of Information Sciences & Technology

Director, Engineering Education & Cyberlearning Laboratory (EECL)

George Mason University





Previously positions:

Assistant - Associate Professor (2007-2013)

Department of Engineering Education, *Virginia Tech*

Affiliated Faculty: CS, ISE, STS, Center for HCI & CiBM

Education:

Ph.D., Stanford University, Learning Sciences & Technology Design

Undergrad: Mechanical Engineering

M.S. degrees: Mass Communication, Information Design, Creative Writing

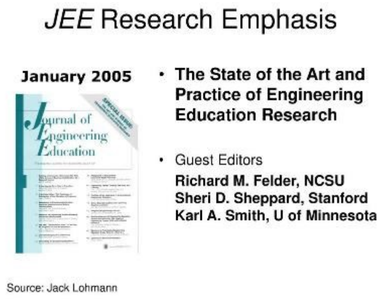
RESEARCH

Interdisciplinary research program; publish largely in engineering education; serve on editorial boards of *Advances in Engineering Education* & *Engineering Studies*. Other publications in educational technology and computing journals and proceedings. (ACM CHI, CSCW, ICTD; CSCL, ICLS).

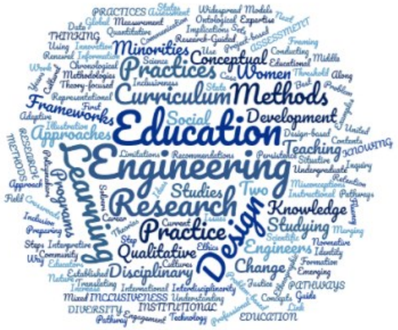
WHAT INFORMED MY INITIAL PERSPECTIVE

Engineer of 2020 (2003)

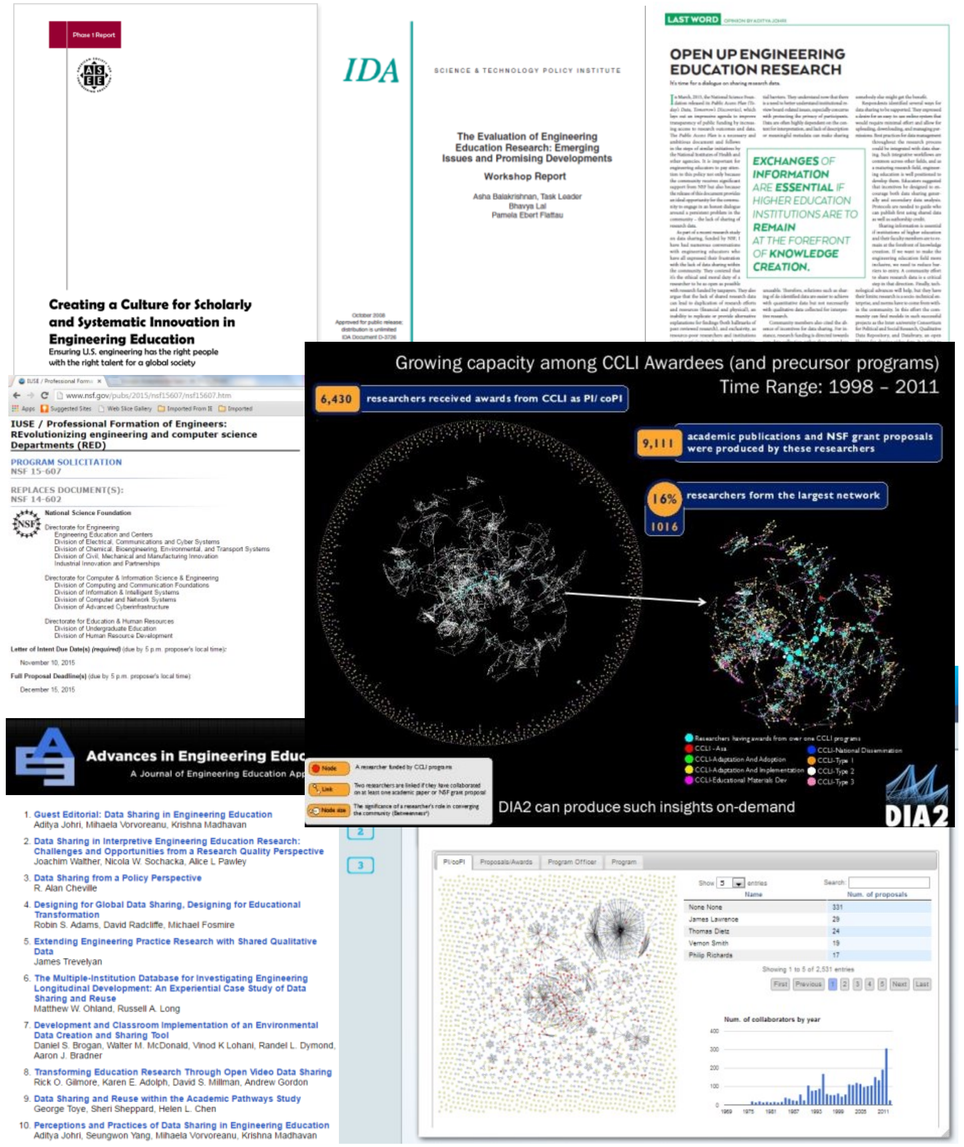
EE2020 (2005)



JEE Special Issue (2005)



ENG ED COLLOQUIES (2006)



SCHOLARLY ENGAGEMENT WITH THE ENGINEERING EDUCATION COMMUNITY

REPORTS

Contributed to several NSF, NAE, and ASEE reports on different aspects of engineering education,

PUBLICATIONS

Co-editor of the research handbook. Write a regular column for ASEE Prism and have edited several journal special issues (JEE, AEE, Engineering Studies).

SOFTWARE

Co-developed iKNEER, (Interactive Knowledge Networks for Engineering Education Research), a interactive repository of engineering education papers and proposal abstracts. Subsequently developed DIA2, a portal to analyze NSF funding portfolio,

SERVICE

Serve as director of ASEE-ERM, and on editorial boards of AEE & Engineering Studies. Organized a doctoral consortium and participate as mentor in PEER. Part of the organizing team for EEC Awardees conferences.

NAE Special Report (JEE 2006)

Special Report

The Researc
of Engineeri

I. Introduc

Rapid changes in the worldwide e
ating a compelling rationale for us to
cate future generations of engineers [1
neer of 2020 [5], tomorrow's graduat
contribute expertise across multiple
global economy that is fueled by rapid
astonishing pace of technological b
urban infrastructures, environmental
provide housing, food, water, and hea
ple will challenge the analytical skill
From a U.S. perspective, a continuing
can youths in engineering, a shrinking
novation, and an engineering researc
early warning signs that the nation's
stake if we fail to take action. Our lead
vation are destined to erode unless
[6–8].

Meeting these and future challe
tional change rather than increment
recruit and educate engineering st
and government leaders from acros
have repeatedly remarked that systen
ucate engineers must be the path b
episodic cycles of educational reform
long-lasting improvements in our e
in engineering education must bec
change to improve the technical fluen
increase interest in engineering and
pact of the engineering profession, i
neering student body, and increase
global engineering workforce. Such
principles, methodologies, and educa
to continuously build innovative cu
rary engineering practice and meet
the world. Ultimately, we assert tha
approach to our educational system,
research is performed and used in the
ciplines, it will allow us to be mor

[1]As exemplified in recent editorials in th
(Kerns, 2005; Gabriele, 2005; Haghighi, 200
Smith, 2006) and in the Special Issue devoted t
Engineering Education Research (Lohmann,
2005). Also see "Envisioning a 21st Century S
for the United States", A report to the Govern
Roundtable, The National Academies Press, 20

October 2006

II. Research Areas

The five research areas for the new discipline of Engineering Education consist of one or more interrelated strands of research that can be investigated independently or integrated with other areas of inquiry. The research areas include:

- Engineering Epistemologies
- Engineering Learning Mechanisms
- Engineering Learning Systems
- Engineering Diversity and Inclusiveness
- Engineering Assessment

h designing assessment instruments and
es that may be unique to engineering. Re-
n the value systems and effective models for
nd faculty. For example: What deters or en-
nent? What are extrinsic and intrinsic moti-
gage in assessment? How does assessment fit
f the institution? What are the implications
impact or inform change? and What are ef-
ding communities of diverse researchers for
essment? Ultimately, we need to understand
needed by engineering educators to develop,
essment methods and tools as well as define
o accomplish this goal.

. Call to the Nation

of how to educate an engineer is becoming
sophisticated. Our goal for developing the
been to build from our collective knowledge
a roadmap for organizing our efforts for edu-
he dynamic world of engineering practice.
collaboration between academia, industry,
ovide the necessary leadership that will help
reality. Our nation needs to make the criti-
s that will transform today's educational sys-
nt paradigm for engineering education and
aintains its leadership role in addressing the
future.

References

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Gathering Storm, Committee on Science, Engineer-
06, http://www.nap.edu/catalog/11463.html.
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u.
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Education Research Colloquies," *Journal of En-*
95, No. 4, October 2006, pp. 257–258.

INSTITUTIONALIZING A FIELD (circa 2010)

Building legitimacy for EER as a worthwhile field of endeavor

Showcasing a strong rigorous/"scientific" foundation for EER

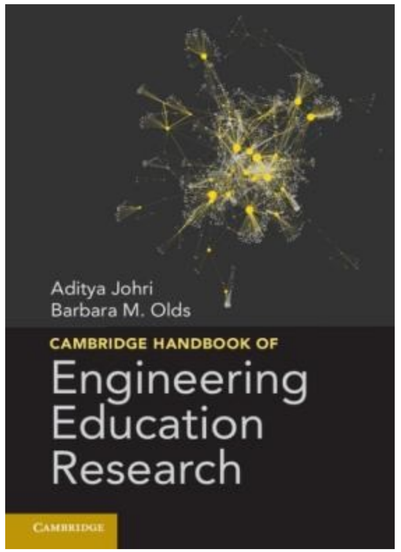
Creating recognition beyond scholarly community

Attracting new talent into the field

Forward looking and reflective (continuous process for any field)

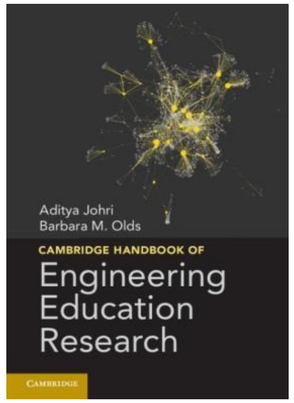
The field of Learning Sciences as a model as I was familiar with it through my graduate work (master's and doctoral)

The Cambridge Handbook of The Learning Sciences (2005) (Ed. Sawyer)



CAMBRIDGE HANDBOOK OF ENGINEERING EDUCATION RESEARCH

70+ authors, 30+ chapters; Shaped NSF solicitation, NAE agenda, used as core volume for engineering education research courses; Best Book Award by AERA Division I (2014).




Guest Editors' Introduction

The Cambridge Handbook of Engineering Education Research and Reflections on the Future of the Field


ON THE SHELF

A CHEER FOR ENGINEERING EDUCATION

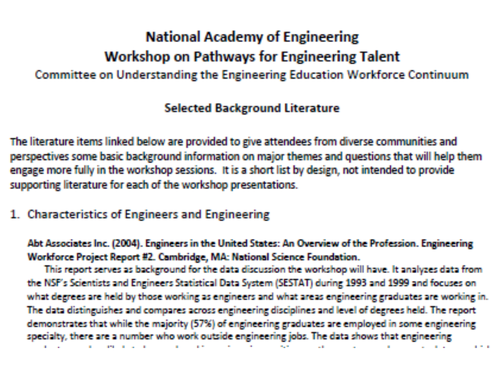

ENGINEERING EDUCATION LETTERS

OPEN ACCESS

Book Review

Cambridge Handbook of Engineering Education Research

Donna S. Reese*

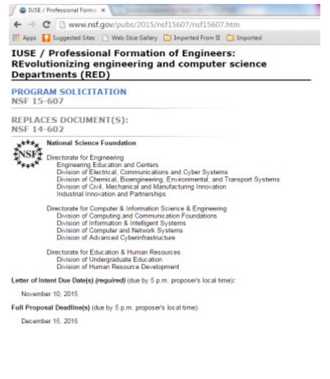

National Academy of Engineering
Workshop on Pathways for Engineering Talent
Committee on Understanding the Engineering Education Workforce Continuum

Selected Background Literature

The literature items linked below are provided to give attendees from diverse communities and perspectives some basic background information on major themes and questions that will help them engage more fully in the workshop sessions. It is a short list by design, not intended to provide supporting literature for each of the workshop presentations.

1. Characteristics of Engineers and Engineering

Abt Associates Inc. (2004). Engineers in the United States: An Overview of the Profession. Engineering Workforce Project Report #2. Cambridge, MA: National Science Foundation.


IUSE / Professional Formation of Engineers: REvolutionizing engineering and computer science Departments (RED)

PROGRAM SOLICITATION
NSF 15-607

REPLACES DOCUMENT(S):
NSF 14-602

National Science Foundation

Directorate for Engineering
Engineering Education and Centers
Division of Electrical, Communications and Cyber Systems
Division of Chemical, Bioengineering, Environmental, and Transport Systems
Division of Civil, Mechanical and Manufacturing Innovation
Industrial Innovation and Partnerships

Directorate for Computer & Information Science & Engineering
Division of Computing and Communication Foundations
Division of Information & Intelligent Systems
Division of Computer and Network Systems
Division of Advanced Cyberinfrastructure

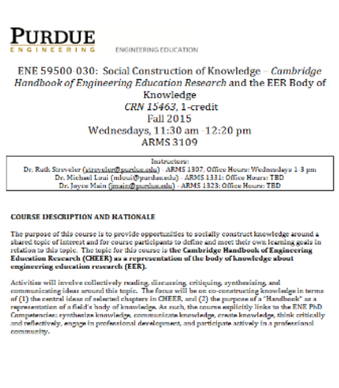
Directorate for Education & Human Resources
Division of Undergraduate Education
Division of Human Resource Development

Letter of Intent Due Date(s) (required) (due by 5 p.m. proposer's local time):

November 10, 2015

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

December 16, 2015


PURDUE ENGINEERING

ENGINEERING EDUCATION

ENE 59500 030: Social Construction of Knowledge – *Cambridge Handbook of Engineering Education Research* and the EER Body of Knowledge
CRN 13462, 1-credit
Fall 2015
Wednesdays, 11:30 am - 12:20 pm
ARMS 3109

Instructors:
Dr. Ruth Streveler (streveler@purdue.edu) - ARMS 1307, Office Hours: Wednesdays 1-3 pm
Dr. Michael Loui (mloui@purdue.edu) - ARMS 1331; Office Hours: TBD
Dr. Jayce Main (jmain@purdue.edu) - ARMS 1323; Office Hours: TBD

COURSE DESCRIPTION AND RATIONALE

The purpose of this course is to provide opportunities to socially construct knowledge around a shared topic of interest and for course participants to define and meet their own learning goals in relation to this topic. The topic for this course is **the Cambridge Handbook of Engineering Education Research (CHEER) as a representation of the body of knowledge about engineering education research (EER).**

Activities will involve collectively reading, discussing, critiquing, synthesizing, and communicating ideas around this topic. The focus will be on co-constructing knowledge in terms of (1) the central ideas of selected chapters in CHEER, and (2) the purpose of a "Handbook" as a representation of a field's body of knowledge. As such, the course explicitly links to the ENE PhD Competencies: synthesize knowledge, communicate knowledge, create knowledge, think critically and reflectively, engage in professional development, and participate actively in a professional community.

ENGINEERING EDUCATION IN THE U.S. AND INTERNATIONALLY

1st GEN: CENTERS

2nd GEN: DEPTS

3rd GEN: CENTER+

4th GEN: DEPT EXP

5th GEN

INTERNATIONAL

CAEE – Center for the Advancement of Engineering Education

EERC – Engineering Education Research Center

Stanford University

University of Washington

Colorado School of Mines – Earth • Energy • Environment

Purdue University

Virginia Tech

Utah State University

Clemson University

Berkeley Lab CSEE – Center for Science and Engineering Education

Montana State University – Engineering Education Research Center

University of Michigan

Center for Engineering Education, School of Engineering | University of St. Thomas

University of Georgia

The Ohio State University

Arizona State University

FIU – Florida International University

University of Cincinnati

University of Nebraska Lincoln

University at Buffalo – The State University of New York

ASEE – American Society for Engineering Education

SASEE

REEN – Research in Engineering Education Network

IFEES – International Federation of Engineering Education Societies

SEFI – European Society for Engineering Education

INEER – International Network for Engineering Education & Research

IUCEE – Indo Universal Collaboration for Engineering Education

AEEA – African Engineering Education Association

WEEF 2019

9th World Engineering Education Forum 2019

Disruptive Engineering Education for Sustainable Development

13-16 November 2019 | ITC Grand Chola, Chennai, India

Australasian Association for Engineering Education – AAEE

UCL Centre for Engineering Education

JSEE

Centre for Engineering Education – CEE – Universiti Teknologi Malaysia

CEEA ACEG – Canadian Engineering Education Association / Association canadienne de l'éducation en génie

VIEW EDIT

Engineering Education Community Resource

last edited by K. Yasuhara 2 weeks, 1 day ago Page history

This engineering education wiki is a resource created in 2011 by the American Society for Engineering Education's Student Division (ASEE SD), in collaboration with the Center For Engineering Learning & Teaching (CELT). The resource primarily consists of links to programs, centers, researchers, societies, publication venues, etc., intended to help in the exploration of engineering and, more broadly, STEM education. We hope that ultimately this wiki will encourage community members to expand this resource as a place to inform students and other interested individuals new to engineering education about the research happening in this field at institutions and centers all over the world.

FYI most site visitors do *not* need to request access to join this workspace. All site content is public. Only those interested in maintaining the wiki need to request access to join. If you want to suggest a simple addition or edit, feel free to email us (details below).

The resource currently consists of lists in the following categories:

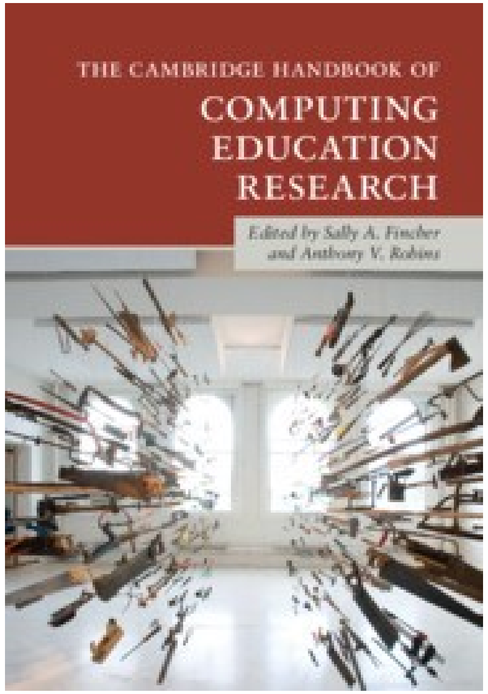
- Engineering/STEM Education Departments and Programs
  - Graduate level
  - Undergraduate level
- Engineering/STEM Education Centers, Institutes, and Research Groups
- Engineering Education Communities and Societies
- Engineering Education Research Publication Venues (including Special Issues and Calls for Book Chapters)
- Engineering Education Conferences
- Engineering Education Events (including PhD program open houses and workshops) **(last addition: 2021/09/16)**
- Engineering Education Accreditation Organizations
- Resources for Engineering Educators
- Engineering Education Scholarship and Funding Sources
- Engineering/STEM Education Job Postings **(last addition: 2021/11/16)**
- Research Briefs - Engineering Education Podcasts
- Domestique - Support for developing NSF CAREER Proposals

These lists are works in progress. Your contributions help keep them current and complete. If you wish to add anything on this wiki, please contact the list maintainers by e-mailing engineeringeducationlist@uw.edu and providing a link to your addition (**Note: The wiki does not post files**):

Adam Carberry, Associate Professor @ Arizona State University

http://engineeringeducationlist.pbworks.com/w/page/27578912/Engineering%20Education%20Community%20Resource

CAMBRIDGE HANDBOOK OF COMPUTING EDUCATION RESEARCH



- Similar efforts in the field of computing education research (CER), as it moves from CSEd, a more practice-oriented community, towards a research-driven field. Changes in journals as well (what they are called and the kinds of papers they accept).
- Both EER and CER are following models from others discipline-based education research (DBER) fields such as physics and mathematics education. CER is more international in nature and CER is different than EER in that for many CER contributors, use of technology or computing for education is often a part of their disciplinary work as well.
  - Development of tools is characteristic of a lot of CER (e.g., assessment, programming).
  - Use of tools found online, such as GitHub or online communities such as StackExchange also a large component of education and learning.
- In the U.S., many scholars involved in CER come from schools of education and preK-12 related research is quite common (compared to EER).
  - Many researchers come from fields such as Learning Sciences and Cognitive Science and have been funded by NSF programs such as Cyberlearning.
- In the U.S., some new engineering education departments are "engineering and computing education" departments as the integration between the field is gaining momentum.
- What can the disciplines/fields learn from each other?

International Handbook of Engineering Education Research (IHEER/Routledge)

Update of previous handbook (Cambridge Handbook of Engineering Education Research, 2014) with new content not covered earlier; Almost a decade during the first and second volumes; work on the first started in 2010.

Open access model funded through U.S. National Science Foundation.

Rather than just research, focus also on educational practice and a lot more international than previous version as engineering education field has grown a lot across countries (it is still a little U.S. centric as it has been hard finding authors).

- Around 100 authors of which 10% were authors of chapters in volume one.

Process: community-wide survey to get feedback on topics and suggested experts who could write the chapters (~150 complete/usable responses).

Conference inspired review model; 18 Associate Editors helping with the process; EasyChair for managing the process; AEs will also assist with virtual seminar/discussion of chapters through a series of talks.

The Process and Field Building

The process of putting together a volume like this, if done in the right way, is a field building exercise on its own.

It creates collaborations and a network; it brings those on the margins/periphery towards full participation.

It leads to future collaborations among contributors, many of whom have not worked together before.

Leads to new ideas that then results in new papers and projects.

Showcases field maturity to stakeholders.

Process

- Step 1: Figure out what you want to do and if you really want to do it (why?); talk to people, other scholars who have edited handbooks before.
- Step 2: Find an editor and get feedback on the overall idea (publishers' webpage, conferences, acknowledgement sections of similar books); this is a tricky thing as you don't really know the person and a lot of trust is required. Easier to trust university presses as opposed to the big ones (for me!).
- Step 2.5: Try to get a sense of authors, chapters, and abstracts before Step 3 for a smoother process but a proposal doesn't necessarily need that. Every publisher has a template they will send you (you need to be able to justify the need for a book).
- Step 3: Write the book proposal and send it to the editor who will send it out to get reviewed (this process varies but usually 5-10 reviewers are solicited through a single-blind process; reviewers, of course, know editor and proposed authors).

Process

- Step 4: Recruit authors, create a timeline, put together a system for article submission and review; this is a very time-consuming process and often the biggest bottle-neck for the editor (if you really want to do a comprehensive job; for non-handbook edited volumes you can also just invite people you know from within the community). Arrange reviewers.
- Step 5: Send authors instructions including formatting, references. indexing so that the chapter is in as good a shape as possible; try to do it from the first draft itself or there will be a lot to take care of later.
- Step 6: Set a strict timeline to complete everything and send it to the publisher (they will not start their process until everything is completed at your end); they are often likely to comeback with more changes and/or formatting issues.
- Step 7: Plan for post-publishing discussions, events, reviews, etc.; Make a list of people you'd like to send the book to who can influence its uptake.

THANK YOU!