



For more information on Engineering Change Lab-USA, contact Executive Director Mike McMeekin at mike.mcmeekin@lamprynearson.com and visit our website www.ecl-usa.org

ENTREPRENEURSHIP & ENGINEERING

Summit 6 Report
July 15 - 16, 2019
Berkeley, CA





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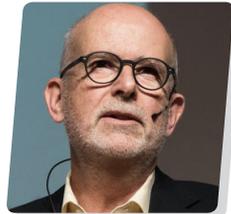
Summit 6 offered the opportunity to explore the relationship between engineering and entrepreneurship in the emerging future, as expressed broadly in the Bay Area's engineering and tech community.

PROVOCATEURS



Tom Byers

PROFESSOR, DEPARTMENT OF MANAGEMENT
SCIENCE AND ENGINEERING, STANFORD
UNIVERSITY



Tim Draimin

SENIOR ADVISOR, THE JW McCONNELL FAMILY
FOUNDATION, MONTREAL, CANADA



Alissa Fitzgerald

FOUNDER, A.M. FITZGERALD & ASSOCIATES
SAN FRANCISCO, CA



Ikhlag Sidhu

FACULTY DIRECTOR & CHIEF SCIENTIST,
SUTARDJA CENTER FOR ENTREPRENEURSHIP
& TECHNOLOGY, UNIVERSITY OF CALIFORNIA -
BERKELEY





Synopsis of Provocations

THE EDUCATIONAL PERSPECTIVE ON ENTREPRENEURSHIP: TOM BYERS AND IKHLAQ SIDHU

In the last 15 years, entrepreneurship and innovation programs have spread from business schools to engineering schools, with well-established curricular approaches centered on experiential, project-based learning.

Driven by well-publicized ethics crises (and significant harm) resulting from technological entrepreneurship gone awry (Elizabeth Holmes & Theranos, Facebook, Brotopia, etc.) Stanford, UC Berkeley, and other engineering schools have recognized that they need to add significant leadership and ethical components to their entrepreneurship curriculum designs. The curriculum adaptations include those described below.

- › Incorporating personal stories from engineering entrepreneurs in classes, focusing on the

behaviors and mindsets of successful leaders and the psychology of entrepreneurship, rather than just on economic facts and statistics.

- › Shifting the drivers of entrepreneurs from solving problems to understanding what problems need to be solved through entrepreneurship (mission-driven entrepreneurship).
- › Addressing the need for technical entrepreneurs to develop emotional intelligence, cultural intelligence, and the ability to be more reflective and to think more broadly in addition to developing technical skills.
- › Increasing multi-disciplinary approaches to problem-solving.

BEST PRACTICE EXAMPLE: “BERKELEY METHOD OF ENTREPRENEURSHIP” PIONEERED AT UC BERKELEY BY IKHLAQ SIDHU

“THE BERKELEY METHOD OF ENTREPRENEURSHIP IS BASED ON THE HYPOTHESIS THAT THE MINDSET OF AN ENTREPRENEUR CAN BE CHARACTERIZED BY A SET OF BEHAVIORAL PATTERNS AND THAT AN INDUCTIVE GAME-BASED TEACHING APPROACH IS A SUCCESSFUL VEHICLE FOR INTRODUCING AND RE-ENFORCING THESE.”



THE VIEW OF AN ENGINEER ENTREPRENEUR IN ACTION: ALISSA FITZGERALD

Alissa Fitzgerald’s journey to becoming an entrepreneur began in response to her frustration with the working conditions and culture in her first job at a large tech company. Her desire for a different working environment combined with her “get stuff done” mindset, her niche technical expertise in microelectromechanical systems (MEMS), and her self-confidence were the ingredients for her to succeed as an entrepreneur. Fitzgerald noted that she is not a licensed professional engineer, which she described as not relevant in the MEMS industry.

Fitzgerald described her 10-year journey to success as filled with both joys and hassles. She also described the myths of Silicon Valley entrepreneurship.

For the entrepreneur of the future, Fitzgerald believes the path will be easier than what she has experienced. Several key factors are changing.

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|---|---|
|  Becoming an entrepreneur is the easiest way to build wealth. (Living modestly and being fiscally conservative are most important.) |  Social acceptance of non-traditional career paths. |
|  Anyone can be an entrepreneur. |  Free access to a world of information and resources (Google, etc.). |
|  If you can’t create a \$1 billion market, don’t bother with it. (Opportunities exist in smaller markets that solve customer problems.) |  Networking tools making the world a smaller place. |
|  The venture capitalists will help you succeed. |  New funding mechanisms. |

Opportunities exist for entrepreneurial engineers to change our world by addressing the grand challenges and big macro-ethical issues that we face. Technologies being developed today may forever change privacy, truth, humans, society, and the planet. Engineers should adapt the Amish philosophy of “animistics” (coined by Neal Stephenson), “Conscientiously choosing which technologies to allow into our lives and our society.”



THE RISE OF PURPOSE: TIM DRAIMIN

An inexorable trend over the last 25 years has been the rise of purpose- intentionally linking to deeper, more positive and consequent desired outcomes for human directed activities. This trend has accelerated in response to the rise of existential threats (such as climate change, etc.) and demographic shifts (young people and more diverse groups). This shift has been apparent in several sectors.



These shifts bring with them the need for a new leadership mindset defined by these characteristics.



UNLEASHING SOCIAL
EXPERIMENTS



ALIGNING RESOURCES WITH PRIORITY
MISSIONS (APOLLO MISSION)



RETHINKING ROLES (BUSINESS AND
GOVERNMENT AND PROFESSIONALS)



UTILIZING CROSS-DISCIPLINARY
COLLABORATION

“ IN A CONTEXT OF MAJOR SOCIAL AND ENVIRONMENTAL CHALLENGES SUCH AS TACKLING CLIMATE CHANGE, IMPROVING PUBLIC HEALTH AND WELLBEING AND ADJUSTING TO DEMOGRAPHIC CHANGE, MISSION-ORIENTED INNOVATION POLICY TACKLES THESE ‘GRAND CHALLENGES’ BY IDENTIFYING AND ARTICULATING CONCRETE PROBLEMS THAT CAN GALVANIZE PRODUCTION, DISTRIBUTION, AND CONSUMPTION PATTERNS ACROSS VARIOUS SECTORS. - Marianna Mazzucato, *Mission-Oriented Research & Innovation in the European Union* ”

New Insights on the Roles of Engineers as Entrepreneurs

- › Entrepreneurship represents a major opportunity and path for engineers in society, a return to the role of engineers in the 19th Century.
- › “Engineer Entrepreneurs” can offer value beyond traditional economically oriented engineers because of their professional mindsets, value systems, and ethics.
- › Entrepreneurship is traditionally focused on the power of the individual, but we also need entrepreneurial engineering organizations and collaborations.
- › The trend of engineering schools teaching entrepreneurship and adding robust ethics components is positive for the future.
- › Recognizing the contributions of “engineer entrepreneurs” will help in attracting young people with entrepreneurial potential to engineering.
- › How is public sector entrepreneurship rewarded?
- › Engineers are good at designing incremental improvements, but are they good at creating and inventing new technologies? How could that capacity be nurtured?
- › There are significant gaps in engineering licensure by engineer entrepreneurs. How can our licensure model adapt to accommodate engineering entrepreneurs?
- › Opportunities exist in the linkage of engineering, entrepreneurship, and purpose (linking concepts of macro-ethical decision-making and technological stewardship).
- › There is a strong need to incorporate robust macro-ethical development as part of growing the next generation of engineer entrepreneurs.

- › ***KEY SURPRISING TAKEAWAY:*** *How quickly the conversation about entrepreneurship surfaced ethical aspects and imperatives. What would the world be like if engineer entrepreneurs with well-developed, ethical capacity (micro & macro) more fully populated organizations engaged in the traditional practice of engineering, as well as those engaged in technological invention, innovation and business building?*

ECL-USA Next Steps

Find ways to foster the evolution and development of engineering entrepreneurship (Future of Consulting Engineering Task Force; Incorporating Leadership in Engineering Curriculum Task Force).

Feature “ethical engineer entrepreneurs” in ECL-USA communications.

Foster discussions of public sector engineering entrepreneurship.

Explore adaptations in licensure models related to engineering entrepreneurship (Future of Licensure Task Force).

Sources of Learning

- › “Introducing Berkeley Method of Entrepreneurship – a game-based teaching approach,” Ikhlaz Sidhu, et.al., Center for Entrepreneurship and Technology, University of California, Berkeley, <https://ikhlaqidhu.files.wordpress.com/2013/09/bmoe-paper.pdf>
- › Bad Blood: Secrets and Lies in a Silicon Valley Startup, John Carreyrou, Alfred A. Knopf, 2018
- › Brotopia: Breaking Up the Boys’ Club of Silicon Valley, Emily Chang, Penguin Random House, 2018
- › The Responsible Business: Reimagining Sustainability and Success, Carol Sanford, 2011
- › “Mission-Oriented Research & Innovation in the European Union, a problem-solving approach to fuel innovation-led growth” Marianna Mazzucato, European Commission, Directorate-General for Research and Innovation, 2018, https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf

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