1. Talent *(people)*
   students, faculty, staff - and provide environment and culture to flourish.

2. Value *(programs)*
   Continuously adding value to curriculum, programs, infrastructure.

3. Thought Leadership *(papers)*
   Grand Challenges on energy and sustainability, security and infrastructure, health and medicine, and scientific and technological discovery.

4. Innovation and Impact *(patents, practices, prototypes)*
   Campus, Silicon Beach, Southern California, the United States, and the World.
SUSTAINABILITY

› Energy, Water, Air, Food
› Basic Maslow Hierarchy Need
› Individual, School, Campus, City, Region, Country, Planet

› The era of convergence and the 4th Industrial Revolution.

Convergence

of physical, chemical, geological, biological, behavioral and social phenomena
Proposed to the Provost a UCAR-like Review for SWOT Analysis (Summer 2017)

Received and helped revise proposal on a Center for Sustainable Solutions (Fall 2018)

Received and coordinates reaching consensus on a variety of research topics from Dornsife faculty including related to the Wrigley Institute (Fall 2018)

Reached consensus on a USC-Wide Grand Challenges Scholars Program (January 2019)

On-going faculty conversations on programmatic support (Spring 2019)

Note: The committee paused deliberations in Spring 2018 awaiting for some key faculty hire.

*Yortsos (chair), Ellis, Holder, Knott, Miller (established Fall 2016)
Not addressed but in need of addressing

› Instructional USC-wide Programs
› Articulating Grand Challenges for Sustainability
› Operational sustainability related to USC (campus-wide)

*Yortsos (chair), Ellis, Holder, Knott, Miller (established Fall 2016)
WHY GRAND CHALLENGES?

Powerful, Fast Evolving, Convergent Technology Allows Us to Set Achievable Goals for all Humanity

Choosing Goals is an Ethical Question
NAE GRAND CHALLENGES (2008)

Make solar energy economical
Provide energy from fusion
Develop carbon sequestration methods

Manage the nitrogen cycle
Provide access to clean water
Restore and improve urban infrastructure

Advance health informatics
Engineer better medicines
Reverse-engineer the brain

Prevent nuclear terror
Secure cyberspace
Enhance virtual reality

Advance personalized learning
Engineer the tools of scientific discovery

GRAND CHALLENGES FOR ENGINEERING
SUSTAINABILITY
Make Solar Energy Economical, Provide Energy from Fusion,
Develop Carbon Sequestration Meth
Provide Access to Clean Water

SECURITY
Secure Cyberspace, Prevent Nuclear
Urban Infrastructure

HEALTH
Engineer Better Medicines, Advance
Engineer the Brain

ENRICHING LIFE
Enhance Virtual Reality, Advance Personalized Learning, Engineer
the Tools of Scientific Discovery

SOCIETAL ORGANIZATION?
Exploiting Social Phenomena (Through Digital Media, etc.: BIG DATA)
WHY A GRAND CHALLENGES SCHOLARS PROGRAM?

The need to cultivate mindsets in addition to Skills and Knowledge
Skills and Knowledge (+ Mindsets)

From Here

Mindset of Growth

Knowledge

Applications

To Here

From Ortiz et al.
CONCEPTED IN 2009 (USC, Duke, Olin):
ADOPTED BY > 80 SCHOOLS NATIONWIDE: NOW AN NAE SIGNATURE PROGRAM

CONSISTENT WITH WEF REPORT ON ADDED SKILLS FOR THE 21ST CENTURY:
CREATIVITY, LEADERSHIP, PERSEVERANCE
CONSISTENT WITH THE ENGINEER OF 2020

CULTIVATES FIVE MINDSETS
1. Research/creative
2. Multidisciplinary
3. Entrepreneurial
4. Cultural
5. Society conscious
EXPONENTIAL TECHNOLOGY BRINGS DISRUPTION REQUIRES AGILITY AND ADAPTABILITY – AND NEW MINDSETS

THE FIVE MINDSETS OF CHANGE TO THRIVE IN TODAY’S WORLD

1. **HUG THE EXPONENTIAL**
   Superb Technical Skills and Knowledge to Lead the Exponentially Changing Technology

2. **ENGINEERING +: CHANGE THE CONVERSATION ABOUT ENGINEERING**
   Engineering + X where X is anything (particularly, human-centric)
   Who we are, what we do and what we look like.

3. **INNOVATION IN THE BROADEST SENSE**
   Innovation and Entrepreneurship, to help create the new markets, the new jobs and to design the new self.

4. **THE CULTURAL MIND**
   Cultural Awareness (with culture broadly interpreted), to help thrive in today’s fast changing world.

5. **HEROIC ENGINEERING**
   Awareness of the Impact of Engineering to Society (and the importance of technology ethics).

And to Solve Grand Challenges
USC NAE GRAND CHALLENGES SCHOLARS CLASS OF 2018
BRILLIANT AND DIVERSE
“Culture wants to be enduring and prevailing”

from Antonio Damasio’s “The strange world of things” (2018)