WHAT DOES PEACE ENGINEERING MEAN TO YOU?

ASAMBLEA GENERAL
ISTEC 2019
20, 21 y 22
de Noviembre 2019
Córdoba - República Argentina

Ramiro Jordan – Nov 20-22, 2019
On 23 September, the United Nations is convening a Climate Action Summit with concrete and realistic plans to accelerate action to implement the Paris Agreement.
Outcomes from the *VIII World Engineering Education Forum, X Global Engineering Deans Council, XIV Global Student Forum*, held in November 2018 in Albuquerque, NM USA. The first global conference on Peace Engineering (PEng).

Creation of the Peace Engineering Consortium/Movement.
A sample of questions asked on the conference [1 star = very poor, 5 stars = very good]:

• How would you rate the overall conference?
  • Result: weighted average = 4.06
• Was the conference theme of Peace Engineering valuable in terms of understanding what Peace Engineering is and how it impacts various aspects of what you do (e.g. faculty development, curriculum, organizational challenges, global partnerships and opportunities)?
  • Result: weighted average = 4.34
The 9th World Engineering Education Forum (WEEF - 2019)

Outcomes of the First Global Peace Engineering Conference

Ramiro Jordan¹, Kamil Agi², Bernard Amadei³, Tybur Casuse¹, Donna Koechner⁴, Indira Nair⁵, Mark Nelson⁶, Mira Olson⁷, Margarita Quihuis⁶, James Tangorra⁷

¹University of New Mexico, NM, 87131, USA; ²SensorComm Technologies, Inc. NM 87131, USA; ³University of Colorado - Boulder, CO, 80309, USA; ⁴GINET, NM, 87131, USA; ⁵Carnegie Mellon University, PA, 15213, USA, ⁶Peace Innovation Lab - Stanford, CA, 94305, USA; ⁷Drexel University, PA, 19104, USA
- A Global Peace Engineering minor
- Peace Engineering Certificate program
- Master of Science in Peace Engineering
- Database of Peace Engineering case studies
- Workshops and other forums to promote discussion and planning for Peace Engineering programs and curricula
- Data models, metrics, analytics and simulations: fine grain to large grain
- Development of Peace Engineering as the new global engineering mindset
Peace Engineering Consortium
The 9th World Engineering Education Forum (WEEF - 2019)

Peace Engineering Consortium: Outcome of the First Global Peace Engineering Conference

Ramiro Jordan¹, Bernard Amadei², Joseph Hughes³, Donna Koechner⁴, Mark Nelson⁵, Mira Olson³, Margarita Quihuis⁵, Madeline Rose⁶, James Tangorra³, Kamil Agi⁷

¹University of New Mexico, NM, 87131, USA; ²University of Colorado - Boulder, CO, 80309, USA; ³Drexel University, PA, 19104; ⁴GINET, LLC NM, 87131, USA; ⁵Peace Innovation Lab - Stanford, CA, 94305, USA; ⁶Alliance for Peacebuilding, Washington, DC, 20036 USA; ⁷SensorComm Technologies, Inc. NM 87131, USA
Curricula and content – Members are collaborating to define, create and share curricula for undergraduate minors, professional certificate programs and graduate work; Creating experiential laboratories with industry and practitioner partners; Facilitating information exchange and the symmetry of information/knowledge through globally accessible digital libraries; Incorporating engineering diplomacy, diversity and cultural awareness (including the arts, music and language) into the practice for peacebuilding, peacemaking and peacekeeping.
Research and Development - The group is focused on collaborations, both domestic and international, and internal initiatives that advance the state of Peace Engineering. Key areas of focus have been developing metrics, data models, analytics, visualization and prediction. Some key initiatives include developing a modelling and visualizing conflict, Peace Data Standard, and pollution mitigation.
Entrepreneurial and Economic Development – The consortium is pursuing entrepreneurial activities in peace technology. It has been invited to produce a special edition on Peace Engineering and Innovation in the high impact *Technological Forecasting and Social Change* journal.
Events – In its charter year, the consortium organized a summer institute at The Hague and Peace Engineering workshops in Colombia – both models for future global workshops.

Case Studies – Members are compiling and publishing case studies and collaborating with US National Laboratories, industry, and governments to create scalable Peace Engineering case studies.
Why Peace Engineering?
Why Peace Engineering?

First symposium in Nov. 2003.

Compilation of papers Edited by P. Aarne Veselind and W. Richard Bowen.

Peace Engineering by Professor W. Richard Bowen, FREng

Peace is characterised by relationships between individuals, and social groupings of all sizes, based on honesty, fairness, openness and goodwill. Peace provides the conditions for real human flourishing. It is much more than the absence of conflict, much more than the avoidance of war. Crucially, peace is an activity that requires continuous commitment and imaginative input.

Many more contributions!
Why Peace Engineering? A New Engineering Mindset

Peace Engineering 2018

Peace as a profit center
Peace as a profitable business
Trans-disciplinary
Sustainability
Accountability/Transparency
Global Citizen/Engineer
Symmetry information/knowledge

Peacekeeping
Peacemaking
Peacebuilding
System level thinking
Natural Ecosystems™
Engineering Peace

Diplomacy
Peace Technology
Negative vs. Positive Peace
Investing in Peace for ROI
Peace Metrics
Data Analytics
Why Peace engineering? Thought provoking paper.

A new Engineering Education mindset!

Engineering for Peace! Engineered for Peace!
Hague Summer Institute on Peace Engineering

THE APPLICATION OF SCIENCE AND ENGINEERING PRINCIPLES TO PROMOTE AND SUPPORT PEACE

First Annual Hague Summer Institute on Peace Engineering

The Hague, Netherlands | August 19-23
Colombia – Sep 24-25, 2019
Una Definición

**Ingeniería para la Paz** es la aplicación intencional del pensamiento sistémico de los principios de la ciencia y la ingeniería para promover y apoyar directamente las condiciones de paz. **Ingeniería para la Paz** trabaja directamente hacia un mundo donde florece la prosperidad, la sostenibilidad, la equidad social, el espíritu empresarial, la transparencia, la voz y el compromiso de la comunidad, la ética y una cultura de calidad. Los ingenieros tienen el poder de desempeñar un papel vital en las soluciones creativas que pueden transformar y mejorar radicalmente el bienestar de las personas y otros sistemas vivos, día a día.

**Qué es Ingeniería para la Paz para usted?**
Porque hacemos esto?

• Necesitamos una nueva mentalidad para encara los desafíos:
  • 17 ODS de NU, 11 Desafíos de la ANE-USA – un planeta, un medio ambiente, un chance
  • Nueva mentalidad en todas las disciplinas y nuevas a crearse: ingeniería humanitaria, ingeniería social …
  • Industria 4.0, 5.0 – Economía Circular
  • Usar el idioma de ciencia y tecnologia para integrarnos y colaborar globalmente, crear/mejorar la confianza.
  • Necesitamos educar nuevos lideres/campeones como ciudadanos globales.
  • Asimetría en el conocimiento/información!!!!
**Peace Engineering** as the intentional application of systemic-level thinking of science and engineering principles to directly promote and support conditions for peace. Peace Engineering works directly towards a world where prosperity, sustainability, social equity, entrepreneurship, transparency, community voice and engagement, ethics and a culture of quality thrive. Engineers have the power to play a vital role in the creative solutions that can radically transform and improve the wellbeing of people and other living systems, day to day.

**What does peace engineering mean to you?**
Why are we doing this?

- Need a new mindset to address global challenges:
  - UN 17 SDGs, NAE Challenges – one planet, one environment, one chance.
  - New mindset across all disciplines and new ones: Humanitarian engineering, societal engineering, …
  - Industry 4.0, 5.0
- Use the language of Science and Technology language to integrate and collaborate globally, create/enhance trust.
- Need to educate new leaders/champions as global citizens.
- Asymmetry in knowledge and information!!!!!!!!!!
Circular Economy
Industry 4.0 – Circular Economy
Industry 4.0 – Circular Economy
Industry 4.0 – Circular Economy

Amazonas - Brazil

Chiquitania - Bolivia
Industry 4.0 – Circular Economy
Climate Change – Circular Economy

https://www.youtube.com/watch?v=JT73puKg8cc
Climate Change – Circular Economy

Climate emergency ‘a new danger’ to peace, youth activists hear ahead of World Day

UN Photo/Ariana Lindquist | Students from the UN International School in the UNHQ Visitors’ Plaza after attending the Peace Bell Ceremony. Some of these students will be taking part in Friday’s Global Climate Strike March in New York City.
Peace Engineering New Mindset

Circular Economy – Industry 4.0

Educate  Innovate  Damage  Repair

Unintended Consequences (Conflict)
Global Challenges
Challenges

AI – Privacy – Biases - Cambridge Analytica

Haves vs. have-nots
KAL's cartoon

Transparency - Justice
Challenges

< 1% control
> 50% of GDP
Challenges

- Population < 1%
- Control < 1%
- GDP > 50%
Challenges

population < 1% control > 50% of GDP
Challenges

population < 1% control > 50% of GDP
Challenges

Elections fraud
Challenges

Elections fraud
Challenges

Lebanon
Challenges

Morales en conferencia de prensa | Foto: ABI

Bolivia

Corruption Perceptions Index 2017

KAL's cartoon

F21 protesters chanting “Bolivia Diyo No” in the unofficial anti-government parade on Monday afternoon (Jacquelyn Kowalik)
Challenges

A couple holding a Bolivian flag embrace in La Paz on Monday after spending the night celebrating the resignation of President Evo Morales. (Natacha Pisarenko/AP)

Evo Morales ya vuela hacia su asilo en México

Bolivian Senator Jeanine Añez gestures after she declared herself as Interim President of Bolivia, at the balcony of the Presidential Palace, in La Paz, Bolivia November 12, 2019. REUTERS/Marco Bello [Reuters]
Challenges

Aporophobia

Globish

Social Responsibility

Accountability
Challenges
With input from people around the world, an international group of leading technological thinkers were asked to identify the Grand Challenges for Engineering in the 21st century. Their 14 game-changing goals for improving life on the planet, announced in 2008, are outlined here. The committee suggested these Grand Challenges fall into four cross-cutting themes: **SUSTAINABILITY, HEALTH, SECURITY, and JOY OF LIVING.**
Challenges

Are we aware?
Are we educating?
Are we learning?
Most American teens are frightened by climate change and about 1 in 4 are taking action, Post-Kaiser poll finds

A solid majority of American teenagers are convinced that humans are changing the Earth’s climate and believe that it will cause harm to them personally and to other members of their generation, according to a new Washington Post-Kaiser Family Foundation poll. Roughly 1 in 4 have participated in a walkout, attended a rally or written to a public official to express their views on global warming — remarkable levels of activism for a group that has not yet reached voting age.

Read more »
Climate Change – Circular Economy

The march in Melbourne on Friday was the largest in Australia, with an estimated 100,000 demonstrators.

Asanka Ratnayake/Getty Images
Climate Change – Circular Economy
Climate Change – Circular Economy
Climate Change – Circular Economy

Video: Protesta por el Amazonas en la embajada de Brasil en Buenos Aires
Climate Change – Circular Economy

Global Temperature
Difference from 1951-80 average, in degrees Fahrenheit

Source: NASA
Challenges

Rate of Extinction of Species
Challenges
Challenges

Echo Hubs & Programs: Global

<table>
<thead>
<tr>
<th>ECHO Countries</th>
<th>ECHO Hubs</th>
<th>ECHO Programs</th>
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<tbody>
<tr>
<td>38</td>
<td>357</td>
<td>770</td>
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Challenges

AI
Privacy
Biases
Democracy
Challenges

AI
Privacy
Biases
Democracy

Facebook admits it may not be good for democracy.
Challenges

Haves vs. have-nots
Challenges

Resiliency

Extreme Engineering

Privacy
Challenges

- EDUCATION
- SERVICES
- CAPITAL
- IP, R&D
- MARKETS
- POLICIES
- SOCIAL RESPONSIBILITY (CSR, GSR, CISR)

SUSTAINED GROWTH
“One planet, one environment, one chance”

(ISTEC GA – 1992 R. Jordan)
Challenges

50 years of going to the Moon and .......
WHAT DOES PEACE ENGINEERING MEAN TO YOU?
Peace Engineering New Mindset

Circular Economy – Industry 4.0
A simple exercise

**A BUYER’S GUIDE TO THE SUSTAINABILITY OF AT-HOME TISSUE PRODUCTS**

### TOILET PAPER

<table>
<thead>
<tr>
<th>BRAND</th>
<th>COMPANY</th>
<th>TOTAL % RECYCLED</th>
<th>% POST-CONSUMER RECYCLED</th>
<th>% FROM FARM</th>
<th>BLEACHING PROCESS</th>
<th>WRAP BEESWAX, ZEN®</th>
<th>SCORE/GRADE</th>
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<td>Green Forest</td>
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<td>100</td>
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<td>N/A</td>
<td>290/1A</td>
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<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>270/1A</td>
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<td>0</td>
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<td>100</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
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<td>Marcal</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>240/1B</td>
</tr>
<tr>
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<td>100</td>
<td>0</td>
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<td>N/A</td>
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<td>100</td>
<td>TCF</td>
<td>Mix</td>
<td>100/D</td>
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<td>Cottonelle Ultra</td>
<td>Kimberly-Clark</td>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>Yes</td>
<td>100/D</td>
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<tr>
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<td>Kimberly-Clark</td>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>Yes</td>
<td>100/D</td>
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<td>100/D</td>
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<td>Trader Joe's Super Soft Bath Tissue</td>
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<td>0</td>
<td>100</td>
<td>TCF</td>
<td>Mix</td>
<td>100/D</td>
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<td>Charmin Ultra³</td>
<td>Proctor &amp; Gamble</td>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>Mix</td>
<td>50/F</td>
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<td>Dexter</td>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>Mix</td>
<td>50/F</td>
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<tr>
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<td>Georgia-Pacific</td>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>No</td>
<td>N/F</td>
</tr>
<tr>
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<td>0</td>
<td>100</td>
<td>EEF</td>
<td>No</td>
<td>N/F</td>
</tr>
<tr>
<td>Up &amp; Up Soft &amp; Strong</td>
<td>Target</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>EEF</td>
<td>No</td>
<td>N/F</td>
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### PAPER TOWELS

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<tr>
<th>BRAND</th>
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<tr>
<td>Green Forest</td>
<td>A</td>
</tr>
<tr>
<td>365 Everyday Value, 100% Recycled</td>
<td>A</td>
</tr>
<tr>
<td>Earth First</td>
<td>A</td>
</tr>
<tr>
<td>Natural Value</td>
<td>A</td>
</tr>
<tr>
<td>Seventh Generation</td>
<td>A</td>
</tr>
<tr>
<td>Trader Joe’s</td>
<td>A</td>
</tr>
<tr>
<td>Marcal 1000</td>
<td>B</td>
</tr>
<tr>
<td>Marcal Small Steps</td>
<td>B</td>
</tr>
<tr>
<td>Viva</td>
<td>D</td>
</tr>
<tr>
<td>Bounty</td>
<td>F</td>
</tr>
<tr>
<td>Breweny</td>
<td>F</td>
</tr>
<tr>
<td>Sparkle</td>
<td>F</td>
</tr>
<tr>
<td>Up &amp; Up</td>
<td>F</td>
</tr>
<tr>
<td>Kirkland</td>
<td>F</td>
</tr>
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</table>

### FACIAL TISSUE

<table>
<thead>
<tr>
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<tbody>
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<td>A</td>
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<td>Natural Value</td>
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<td>Trader Joe’s</td>
<td>A</td>
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<tr>
<td>Marcal</td>
<td>B</td>
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<td>Marcal Small Steps</td>
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</tr>
<tr>
<td>Viva</td>
<td>D</td>
</tr>
<tr>
<td>Bounty</td>
<td>F</td>
</tr>
<tr>
<td>Breweny</td>
<td>F</td>
</tr>
<tr>
<td>Up &amp; Up Soft</td>
<td>F</td>
</tr>
</tbody>
</table>

---

a. Some products receive FSC certification for their recycled content. However, to avoid double-counting recycling and FSC certification, FSC certification is not applied as a grading metric for products that do not contain eligible fiber. For more information, see the Appendix.

b. Processed chlorine free

c. Due to a fire at their New Jersey paper plant in January 2018, Marcal is suspending manufacture of their at-home products, including all Marcal products listed in this report; however, they could become available again in the future.

d. Elemental chlorine free

In this entry applies to both Charmin Ultra Soft and Charmin Ultra Strong.

https://www.nrdc.org/
### A simple exercise

<table>
<thead>
<tr>
<th>Foodstuff</th>
<th>Quantity</th>
<th>Water consumption, litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td>1 kg</td>
<td>17,196</td>
</tr>
<tr>
<td>Beef</td>
<td>1 kg</td>
<td>15,415</td>
</tr>
<tr>
<td>Sheep Meat</td>
<td>1 kg</td>
<td>10,412</td>
</tr>
<tr>
<td>Pork</td>
<td>1 kg</td>
<td>5,988</td>
</tr>
<tr>
<td>Butter</td>
<td>1 kg</td>
<td>5,553</td>
</tr>
<tr>
<td>Chicken meat</td>
<td>1 kg</td>
<td>4,325</td>
</tr>
<tr>
<td>Cheese</td>
<td>1 kg</td>
<td>3,178</td>
</tr>
<tr>
<td>Olives</td>
<td>1 kg</td>
<td>3,025</td>
</tr>
<tr>
<td>Rice</td>
<td>1 kg</td>
<td>2,497</td>
</tr>
<tr>
<td>Cotton</td>
<td>1 @ 250g</td>
<td>2,495</td>
</tr>
<tr>
<td>Pasta (dry)</td>
<td>1 kg</td>
<td>1,849</td>
</tr>
<tr>
<td>Bread</td>
<td>1 kg</td>
<td>1,608</td>
</tr>
<tr>
<td>Pizza</td>
<td>1 unit</td>
<td>1,239</td>
</tr>
<tr>
<td>Apple</td>
<td>1 kg</td>
<td>822</td>
</tr>
<tr>
<td>Banana</td>
<td>1 kg</td>
<td>790</td>
</tr>
<tr>
<td>Potatoes</td>
<td>1 kg</td>
<td>287</td>
</tr>
<tr>
<td>Milk</td>
<td>1 x 250ml glass</td>
<td>255</td>
</tr>
<tr>
<td>Cabbage</td>
<td>1 kg</td>
<td>237</td>
</tr>
<tr>
<td>Tomato</td>
<td>1 kg</td>
<td>214</td>
</tr>
<tr>
<td>Egg</td>
<td>1</td>
<td>196</td>
</tr>
<tr>
<td>Wine</td>
<td>1 x 250ml glass</td>
<td>109</td>
</tr>
<tr>
<td>Beer</td>
<td>1 x 250ml glass</td>
<td>74</td>
</tr>
<tr>
<td>Tea</td>
<td>1 x 250 ml cup</td>
<td>27</td>
</tr>
</tbody>
</table>

[https://www.nature.com/scitable/blog/eyes-on-environment/water_world/](https://www.nature.com/scitable/blog/eyes-on-environment/water_world/)
How about these other areas

- Ethanol
- Electric cars
- Electronics (cellphones, other)
- Batteries
- Facebook – Cambridge Analytica
- Blockchain
- Petroleum, Mining
- Water, Air
- Plastic
- Food waste
- Risk assessment for pollutants (humans/environment)
- Others

Explore the unintended consequences
How about these other areas

- Furniture industry
- Clothing industry
- Amazon, FedEx, UPS
- Telecom industry
- Shipping
- Cattle industry
- Farming industry
- Fishing industry
- Weapons industry (military industrial complex)
- Pharmaceutical/Chemical industry
- Other …

Explore the unintended consequences
Peace Engineering New Mindset

Can we measure peace? Do we have the metrics and the tools?
Peace Engineering New Mindset

Metrics, data models, analytics, prediction, emergence engineering, respectful design, systems and complex systems
Gracias
Obrigado
Thank you
Merci
First Global Peace Engineering Conference

November 12-16, 2019
Albuquerque, NM, USA
Ingeniería para la Paz es la aplicación intencional del pensamiento sistémico de los principios de la ciencia y la ingeniería para promover y apoyar directamente las condiciones de paz. **Ingeniería para la Paz** trabaja directamente hacia un mundo donde florece la prosperidad, la sostenibilidad, la equidad social, el espíritu empresarial, la transparencia, la voz y el compromiso de la comunidad, la ética y una cultura de calidad. Los ingenieros tienen el poder de desempeñar un papel vital en las soluciones creativas que pueden transformar y mejorar radicalmente el bienestar de las personas y otros sistemas vivos, día a día.

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  • Industria 4.0, 5.0 – Economía Circular
  • Usar el idioma de ciencia y tecnología para integrarnos y colaborar globalmente, crear/mejorar la confianza.
  • Necesitamos educar nuevos líderes/campeones como ciudadanos globales.
  • Asimetría en el conocimiento/información!!!!
At the core of **Peace Engineering** is our planet’s sustainable future, which is calling leaders to act in concert from a systems mindset. It is a call to develop solutions differently: that is, collaboratively; integrating transdisciplinary expertise and education programs; simultaneously applying technology solutions while supporting ethics, policy and living systems. And it is a call in the mingled vernacular of civil society, global institutions, and science and technology. Further, beyond addressing today’s challenges, we must cultivate together the development of next generation leaders to continue to drive momentum. Peace Engineering is a new disruptive mindset needed to address global challenges.

**What does peace engineering mean to you?**
Challenges

\[
\text{Collaboration } \propto T \times \frac{1}{d^n}
\]

\(T = \text{Tropicalization, } d = \text{Distance, } n = \text{Bureaucracy}\)
Challenges

You = like
Growth >= you
Less <= you

Evolution?
Immigration?

Function $x(n) = \alpha^n$

--- LESS
--- LIKE
--- MORE
Challenges

Haves vs. have-nots
MESSAGE FROM THE CHAIR

Time to Up Our Game

Susan S. Silbey

This is my final column as Chair of the Faculty. It is uncharacteristically short in hopes of communicating an unambiguous and urgent message: we can no longer engage in business as usual at MIT. Time is running out. MIT, the United States, and the world face an existential threat unprecedented in human history.

A kids chant on NPR from a climate march:

We are trying
Trump is lying
Quit denying
The earth is dying