Peace Engineering – The Concept of Sustained Growth

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Abstract—This paper discusses some specifics of the theme of Peace Engineering. We discuss the different topics and questions that can be asked and answered when preparing papers and workshops for Peace Engineering, which is the conference theme for the WEEF-GEDC-2018 to be held in Albuquerque, New Mexico, USA, in November 12-19, 2018.

What is Peace Engineering?

Books have been written on the topic of Peace Engineering [1].

"The absence of conflict is a necessary but not sufficient condition for peace...Therein lies a great opportunity for engineers, for they have at their disposal the knowledge and practical skills to ameliorate the many forms of material injustice that are the root causes of most violent conflicts." - **Peace Engineering, P. Aarne Vesilind and W. Richard Bowen [1]**

We are defining **Peace Engineering** as the application of science and engineering principles to promote and support peace. **Peace Engineering** envisions and works towards a world where prosperity, sustainability, social equity, entrepreneurship, transparency, community voice and engagement, and a culture of quality thrive. Engineers have the power to play a vital role delivering creative solutions that can radically transform and improve human and natural wellbeing.

At the core of **Peace Engineering** is our planet's sustainable future, which is calling its leaders to act in concert. We must actively develop solutions by collaboratively addressing known problems, integrating transdisciplinary education programs, technology, ethics and policy – all based around the language of technology. The biggest asset in a business is the human capital and we must all contribute in the development of the next generation leaders.

When does technology not promote Peace?

"...The crash made it all too clear that **mathematics**, once my refuge, was not only **deeply entangled in the world's problems but also fueling many of them**. The housing crisis, the collapse of major financial institutions, the rise of unemployment —all had been aided and abetted by mathematicians wielding magic formulas. What's more, thanks to the extraordinary powers that I loved so much, math was able to combine with technology to multiply the chaos and misfortune, **adding efficiency and scale to systems that I now recognized as flawed**…"
- **Cathy O-Neill - Weapons of Math Destruction [2].**

What does contributing to Peace Engineering look like?

We have identified the education system as the cornerstone to start discussions of how the future of engineering can have more of a positive societal impact and how we could collectively and collaboratively develop Peace Engineers. In order to achieve this, the conference is being developed to help foster discussions and develop collaborations.

We have chosen this to be the topic of the World Engineering Educators Federation (WEEF), and Global Engineering Dean's Council (GEDC) joint conference to be held in Albuquerque, NM in November 2018. This is the first time these conferences will be held together in the United States and we want to make a global impact.

The goal is to bring together key stakeholders to begin the dialogue of how to define the problem on a systemic level, enhance curriculum, develop the right skill sets for the next generation and to provide a purpose for developing the next generation leaders. We are challenging all the people and institutions that are receiving the calls for abstract and workshops. We want to collaborate with all the attendees, which will be the actors of catalyst and change. We want this conference to be a conference of doers, people that commit to Peace and not just "another conference".

As a group of entrepreneurs, professors and professionals, we have developed a concept that outlines the core of a path that we believe can lead to the implementation of Peace Engineering.

First, ecosystems seem to be a viable approach for economic development. The duplication (with mixed results) of Silicon-Valley, Silicon-Alley, Silicon-Beach, Silicon-Slopes are all well known ecosystems that have been established in Northern California, New York, Southern California, and Utah, respectively. In addition, concepts like Rainforest Development [3], have also been developed to establish, create and enhance existing ecosystems. However, historically, we have found that these concepts have lended mixed results.

We have taken the development of an ecosystem to the next level by the development of what we call the Natural EcoSystem^{TM} . The natural ecosystem concept is diagrammed below [4]. It is the ability to bring together all the stakeholders to get on a common focus. In the center of the Natural EcoSystem^{TM} is the concept of sustained (or sustainable) growth, which is the common

focus. The question then becomes what can we do to develop systems that contribute to sustained growth?
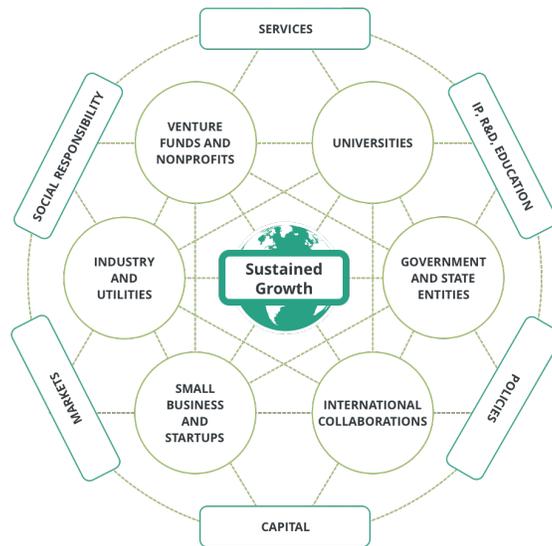
In order to be a part of the Natural EcoSystem^{TM}, a new kind of Engineer and leader needs to be developed. One that is comfortable in working in and developing concepts that are not only transdisciplinary, but also cross-disciplinary. The Engineer needs to understand business concepts like, Entrepreneurship and finance, political concepts like policies and regulations, and even understanding capital needs. The question is then how do I become part of this system?

We are looking for papers and workshops that can provide concepts to answer the following (see our definition but is not complete). We should create a movement and you should be part of that with ownership and sense of belonging. A small list of questions/challenges follows. Help us expand and we invite you to propose a process to tackle a solution:

- How do we develop the next global generation of engineers (curriculum reform, socratic method in engineering, executive programs in engineering, joint and cross disciplinary programs, ethics, social responsibility, etc.)?
- How do we create and bring into the classroom and our daily lives Peace Engineering content? We have to walk the talk.
- How do we deal and live with transparency?
- How do we reduce the gap between the do-haves and do-not-haves?
- How do we spread wealth and wellbeing?
- How do we make people, institutions (local, national, global, public, private) accountable?
- What does Industry 4.0/5.0 - Circular Economy really mean and its impact in local, national, global contexts?
- Let's talk about ethics by design, employability, policy, mobility (displaced people), social responsibility.

- What can we do to contribute to the global challenges (food, water, air quality, smart cities, security, food security, climate change, health, security).
- How do we establish and address sustainable development goals? Are the United Nations sustainable goals realistic? How about the NAE challenges?
- How do we address diversity? (political, geographical, gender, religious, culture, ethnicity, socio-economic status, refugees, people reintegrating to society, other)
- How do we deal with disruptive and complex thinking
- What to do with global engineering innovations and ventures (social and business innovation and ventures)
- Creation of global natural ecosystems for innovation and entrepreneurship
- Transdisciplinary academic programs to foster innovation, ventures, internationalization and impact
- International systems to measure the impact of innovations and ventures
- How do we embrace culture of quality: teaching, accreditation, research, innovation?
- How can we create a forum where academia, industry, governments, banks, NGOs, multilateral organizations, R&D centers, concerned citizens and leaders interact to continue the conversation/action on Peace Engineering?
- How do we live and deal with the xeno and phobia in us, i.e. like aporophobia?

All with a focus on the concept of sustained growth.

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[4]. Concept and diagram of Natural EcoSystem^{TM} is trademarked by SensorComm Technologies. Reproduced here with written permission from SensorComm Technologies, Inc. All rights reserved.

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