

## The Design Science/Global Solutions Lab: Interdisciplinary Problem/Project-Based Research and Learning

Medard Gabel

[medard@bigpicturesmallworld.com](mailto:medard@bigpicturesmallworld.com)

610.566.0156

### **Abstract**

The Design Science/Global Solutions Lab is a model for interdisciplinary problem and project-based research and learning. Students are briefed by UN experts, learn a problem solving and strategic design and planning methodology, and use that to develop real world solutions and implementation strategies for solving real world problems. Participants are multidisciplinary and from around the world. Output, developed by Lab participants, is presented to UN experts at the end of the Lab and published as a book. The work of Lab participants is collaborative and utilizes a specially designed wiki that encourages collaboration, transparency and synergy. The process is experiential, intense and fast paced— the program is usually seven to nine days in length and eight to twelve hours per day. The program has been running for six years, at the United Nations, the UN International School in New York and Chestnut Hill College in Philadelphia. Other formats of the Lab have been developed that fit within a more traditional academic framework of semester long courses that meet two to three times per week and which could be used by engineering schools and departments.

### **Design Science/Global Solutions Lab<sup>i</sup>**

The Design Science/Global Solutions Lab is an interdisciplinary educational and strategic planning program put on each summer by two educational organizations, BigPictureSmallWorld<sup>ii</sup> and Global Educational Motivators (GEM)<sup>iii</sup>.

Students and young professionals from around the world attend, including participants from France, Spain, Turkey, Ukraine, Mexico, Venezuela, Haiti, Canada, Tanzania, Zimbabwe, Ghana, China, Hong Kong, New Zealand, Australia, Palestine, Lithuania, Sudan, Nepal and all over the US. The ages of these participants range from 15 to 55, with the average age of 24. High school students work along side college students and young professionals from a wide variety of professions. Previous professional participants included engineers, NGO executives, investment bankers, architects, designers, artists, educators, start-up entrepreneurs and research scientists.

The Lab is a model of interdisciplinary problem and project-based research and learning. Numerous academic disciplines (including history, engineering, design, architecture, English, chemistry, pre-med, business, languages, math and other subjects), along with the different professions mentioned above, along with the differing ages of the participants— all blend together in a highly structured yet open-ended research and development framework— that leads to a highly charged and creative process. The eclectic participant mixture and goal orientated framework that structures the interactions of the participants increases everyone's learning and the depth of the program's results.

Participants in the Design Science/Global Solutions Lab pay to come to the program, typically put in between ten and twelve intense hours per day, receive no academic credit for their work, produce valuable work, and have an enjoyable time.

The success of the program is a result of a combination of factors:

1. It is focused on real world problems.
2. Participants develop real solutions to those problems.
3. Participants present their ideas and solutions to people and institutions in positions capable of implementing the solutions.
4. The intense, all-consuming 10+ hours per day is spent working collaboratively in teams.
5. The high expectations that the Lab's facilitators have, and the conveying of these to the participants.
6. The "research lab" mentality of the program where everyone has the sense that they are not engaged in an academic exercise of learning what the teacher knows and then spewing that back in some form of a test, but are discovering and developing something new.
7. The "non-traditional" (or non-academic) nature of the program— meaning that students are not graded, and the focus is on engaging in activities that have not been done before.

## **Program Structure**

After sign-in and registration, participants are briefed by UN experts from UNDP, UNEP, UNESCO, UNICEF, WHO and other UN agencies. Subjects include the Millennium Development Goals, measurements for these goals and strategies for attaining them, as well as basic human needs and rights, climate change, water, energy, health, education, economics and other topics related to the chosen theme for that year's focus.

After these subject related briefings, participants learn a problem solving and strategic design and planning methodology. The origins of this methodology trace back to Buckminster Fuller, Russell Ackoff, Stafford Beer and other designers, engineers and strategic planners.<sup>iv</sup> Participants use the strategic planning and design methodology to develop real world solutions and implementation strategies for solving real world problems.

Output developed by Lab participants is presented to UN experts at the end of the Lab and published as a book.<sup>v</sup> The work of Lab participants is collaborative and utilizes a specially designed wiki that encourages collaboration, transparency and synergy. The process is experiential, intense and fast paced— the program is usually seven to nine days in length and ten to twelve hours per day. The program has been running for six years, at the United Nations, the UN International School in New York and Chestnut Hill College in Philadelphia. Other formats of the Lab have been developed that fit within a more traditional academic framework of semester long courses that meet two to three times per week and which could be used by engineering schools and departments. For more information these formats, contact author.<sup>vi</sup>

The primary contribution of this educational modality to engineering education is its focus on the development of real world solutions to real world basic human need problems in a strategic planning and engineering context that can lead to the implementation of the developed solution.

It is engineering from a “research on the frontiers” perspective— that is, what is being worked on has never been worked on before. The students are not engaged in formulaic work that has been done by many students before them, but in new, cutting edge work. The Lab also infuses values into the engineering and strategic planning process, asking, “Engineering for who, for what?” and “How can I make a difference?” One of the contributions of this program is that it makes engineering relevant and important to the student. It touches their values and vision of what they want the world to be like.

The impact of the Design Science/Global Solutions Lab will ultimately be judged by the work it produces and that work’s impact on the real world.

### **Bibliography**

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2. Buckminster Fuller, *Critical Path*, MacMillian, NY.
3. Russell Ackoff, *Redesigning the World*, Wiley, NY.
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<http://www.designsciencelab.com/resources/Regenerative%20Development.pdf>
5. Stafford Beer, *Platform for Change*,

**Author:**

**Medard Gabel**

[medard@bigpicturesmallworld.com](mailto:medard@bigpicturesmallworld.com)

610-566-0156

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<sup>i</sup> <http://www.designsciencelab.com>

<sup>ii</sup> <http://www.bigpicturesmallworld.com>

<sup>iii</sup> <http://www.gem-ngo.org>

<sup>iv</sup> *Introduction to Design Science* <http://www.designsciencelab.com/resources/Design%20Science%20Intro%20.pdf>  
*Design Science Primer* <http://www.designsciencelab.com/resources/Design%20Science%20Primer.pdf>

<sup>v</sup> *Design Science Lab Reports 2005-2008* <http://www.designsciencelab.com/previous/index.shtml>

<sup>vi</sup> Medard Gabel: [medard@bigpicturesmallworld.com](mailto:medard@bigpicturesmallworld.com)