

Don't Be Afraid of Gaps

Amara Graps (1,2,3)

(1) Baltics in Space, Riga, Latvia (2) Institute of Astronomy, University of Latvia, Riga, (3) Planetary Science Institute, USA
(amara@balticsinspace.eu)

Abstract

Instead of shying away from *Gaps*, it might be wise to consider what *Bridges* can be developed to help our friends across those *Gaps*.

1. Introduction

At the edge of the precipice of a canyon lies the challenge of the **Gap** to reach the other side. Big picture concepts often have a Gap: for example, the Gaps in the legal regime of outer space; the Gap in asteroid mining between the short-term revenue plan and the long-term pay-off, the communication Gap between researchers in Academia and Industry.

Indeed, Gaps might be an indicator of the *breadth* of the proposed concept.

For example, starting at the smallest scale with the individual: Gaps might be one's psychological blocks. I.e. a new concept to jump to with a little bit of support. Or a mental 'I can't' block, to jump over with a brief lesson.

At a larger scale, multi-dimensional Gaps in time and space could be just the challenge with the greatest impacts. Instead of shying away, it might be wise to consider what *Bridges* can be developed to integrate an entire community across those multi-dimensional Gaps.

Gap and Bridge Outcomes

Themes of "Gaps and Bridges" denote a unifying theme for my kind of outreach. The most successful *bridges* I built were those that I found the most fun.

Newsletters. In the 1990s, my Digital Explorations newsletter at NASA Ames helped some of the scientists *bridge* the Gap from a calculator scientist to a savvy Internet user. It tickled my funny bone to use a graphic from my MS Physics simulation for the newsletter's header.

Wavelet whitepaper, talks and colloquia, websites. Near the same time, my favorite mentor, Jeff Scargle, whom seemed to be on eternal quest of digital fun, introduced me to wavelets. There was even a small contract in it for me, if I could *bridge* a mental Gap.

After I taught myself the basics from the top down, so I could program wavelets from the bottom up, I had many Internet resources in hand. I thought others would find my resources useful too. So I built more *Bridges* for their Gaps. I didn't lose the fun element either: wavelets are terrific for audio files to transform your own voice. Or other voices. One of my bits of personal fun was to legally circumvent copyrighted characters from Star Trek audio files by displaying their wavelet transforms instead.

In the last decade, my *Bridges* have become multi-dimensional.

Planet P.I. I'm currently spanning age groups in citizen science to *bridge* the gap of scary engineering. Planet PI *bridges* my own fear of electronics first, in order to show how to build something useful with Raspberry Pis. It turns out that others have the same fears and want to build too. And do science with them. And have fun.

The Asteroid Science Intersections with In-Space Mine Engineering (ASIME) community is my largest Gap in space and time. The fun element is at a maximum when the asteroid mining companies express their claims and everybody else dissects those claims. The ASIME community is a collection of *Bridges* across the multi-dimensional Gaps between researchers (and Research) in Academia and Industry, and between near-term and far-term Industry.

Finally, the Local Organization of the EPSC 2017 Riga followed the *Bridges* idea in its main development.

- *Bridges* across education challenges of the Baltic societies.

- *Bridges* across all age groups.
- *Bridges* across multiple sectors of business.
- *Bridges* across multiple STEM skillsets.
- *Bridges* in geographic and political space between four countries: (FI, EE, LV, LT)
- *Bridges* to the common 100-year birthday celebrations of the four countries (FI, EE, LV, LT).

These multidimensional *Bridges* provided valuable integration and cooperation in the four countries and between them and the international public and scientific communities. The integration success was due partly to the inspirational nature of the subject (Space!), and the rest due to what I hoped was by paying careful attention and understanding the needs of the Baltic region. Naturally, many of those needs were my own, that's why I understood them well.

What was a little surprising to me was how deep and wide the connections/bridges were. What was even more surprising to me is that I had the tools, knowledge, experience and network to make it happen. The EPSC 2017 LOC was almost a confidence-building exercise.

The result of the EPSC 2017 LOC were 190 Baltic people paid directly or in-kind in a plan to represent eight Baltic institutes in the conference (exhibits, booklet), an engagement of the Baltic scientists in the scientific program, employment of five students in the ground-floor, supported 25 early-career Baltic students to display their Summer 2017 internship space projects, invited and supported five Baltic and European government Ministers to give talks, supported a Solar System for Kids Exhibit which is expected to reach 10,000 Latvian (600 visited during the conference week), supported the Latvian social event and art-science exhibits and communicated publicly (600 Latvian and International press mentions) about the event and the value of space for the Baltic region.

What's Next?

A continuation of the foundations I've built:

- Baltic space integration: Next up: a Baltic Climate Change Cubesat called ELLF
- Planet P.I. citizen science: Let's get the device into classrooms and homes.

- ASIME Community: Let's grow our community and check-off the milestones on the Asteroid Mining Roadmap

Acknowledgements

Europlanet, especially Anita Heward, Planetary Science Institute: Mark Sykes and my wonderful PSI colleagues, my great colleagues at the Finnish Meteorological Institute and the University of Latvia, the rest of the Baltic space workers, my dear Riga friends, my Baltics in Space mentor, my far-away family (I miss you!), the 54 individuals in two crowd-funding campaigns who helped me survive while I developed the EPSC, the asteroid miners and the Luxembourg Ministry of the Economy, the several individuals who are patiently waiting for my financial world to improve so that I can pay them back, and my wonderful daughter, who has carried the largest weight while I build Bridges.