Federation 2.0 Scenarios from an Alternate Universe

(10/14/2019 - David Walker)

The scenarios constructed for the Federation 2.0 effort tend to have a cautionary tone, often expressing negative outcomes within each of the working group's four quadrants of potential future environments, based on the degree (*abundant* or *limited*) of resource availability and the degree that external (*e.g.*, political) issues affect academic endeavors (*directed* or *autonomous*) in each of these quadrants.

This is an attempt to cast the scenarios with positive outcomes to highlight what might happen in each of those quadrants to result in those positive outcomes. The results are below as markups of the original scenarios. New text is in red, and removed text has been ~~struck-through~~.

As one might expect, it's hard to do well with limited resources. In fact, I couldn't think of any practical way to improve the outcomes of the I Will Survive (Autonomous-Limited) scenario. Multiply and Divide (Directed-Limited), though, shows the benefit of wise Direction in the face of limited resources. To mitigate the negative aspects of the Directed scenarios, wise policies and community advocacy are valuable.

Multiply and Divide (Directed-Limited)

It wasn't always like this, I was educated as a chemical economist . During "the before" I studied like everyone else, and was excited about doing research to figuring out how companies had benefited from our current environment. We were so young and naive. We were completely taken by surprise by "the freedom". Everything was taken away from us - "the others" closed themselves off and we were left with nothing.. There was no more money to do any research - everything was about survival, and you couldn't think about anything else. My dreams about a future in the agri-chemical industry turned to survival. I knew that life could be better, so I ran for office with the goal of making our world better.

I got to work in the Government creating a system of policies, applications, and processes that helped to make basic living easier. It completely worked - the systems anticipates practically every need. My colleagues were brilliant in pulling this all together. Now students are trained in the system at an early age, and are taught how to be creative and innovative in making things even better for us. They learn how to analyze data and how to use this system to improve things, how to develop processes and policies to make our lives even easier. All research and education is designed to benefit us. My daughter, Else, and her friend Rasmus were educated in this system. Rasmus has been working on a cure for this terrible disease that has been

plaguing our country over the past 5 years. We are definitely in a much better place now ~~- who needs "the others"?~~ ; even "the others" have largely recognized the value of working together.

But yesterday, Else told me about a really disturbing situation. She and Rasmus have been doing some side analysis based on some resources that she found at the library where she works. They have found that one of my colleagues in the government has been compromising our opportunity to cure the disease that has been challenging our citizens. There is a plant that only grows in the Solmstas region. It seems that the reason that this region is so special is because of the composition of the soil which is rich in a lithium cobalt salt - a rare substance that can be used in advanced battery technology. The Minister for Agriculture apparently has created a side deal with a coalition of remaining "~~the~~ others" to mine this area. Even more disturbing is that it looks like they have done it for their own financial benefit. All of my work to make our country and lives better ~~is likely to~~ could be compromised because of their greed. Luckily, though, the policies we created, coupled with the increasingly strong community support (particularly from former "others"), should be sufficient to replace the Minister of Agriculture and undo the harm.

Mission Accomplished (Directed-Abundant)

The year is 2030. The citizens of Earth realize we are running out of energy. Traditional avenues (fossil fuel, solar) fall short of ever increasing demands. ~~AppleGoogle~~ AllGood (AG), the new mega multi-trillion dollar coalition of private industry, universities, and national governments has decided to solve the world's energy problem by directly investing in fusion research to power the planet for the next millennium.

The news captures the imagination of the world population. To bypass the bureaucracy and delays, ~~AppleGoogle~~ AllGood establishes massive research centers around the world, directly recruiting research talents in multiple disciplines to work on projects. Researchers respond to the call to action, with large-scale defections from traditional higher learning institutions to work in these research centers.

Further, ~~AppleGoogle~~ AllGood establishes learning institutes starting at K-12 range to in order to develop the next generation of digitally-skilled talents. After a couple of years a key breakthrough is made which requires massive investment from several startups and a large cottage industry. At the same time AG receive indications that the US govt is considering eminent domain to ensure that critical IP does not fall into enemy govt hands. A small group inside the AG executive team take quick action and publish the core findings on multiple public repositories and places the IP in a Swiss trust with a ~~non-compete, non-litigation clause and the stipulation that derivative work from the IP must be shared with AG~~ Creative Commons "Share Alike" license. This action makes the research immediately public.

Very quickly India, China and the EU spin up research and development projects to take the fundamental research to products. This causes a massive increase in public funding directed

back at the traditional academic institutions and a series of VC investment efforts to create products.

~~AppleGoogle~~ Support for AllGood ~~valuation~~ soars on the news, generating even more revenue to fund further research.

Basic research in traditional institutions shifts completely to these new research centers, depleting traditional academic research organisations. After the IP holder foundation is created a second wave of applied research creates a renewed interest in publicly funded academic research at traditional institutions. However theoretical physics which created the initial breakthrough is decimated (they are all AllGood executives living in Hawaii) and ~~doesn't recover for several generations~~ and is slow to recover. Applied physics sees a major increase in interest and captures the imagination of the generation.

~~Publicly~~ Privately funded research survives but they have to deal with a new reality of obtaining license agreements with key IP holders in the future. Researchers are supported by AI and deep learning engines to continue research breakthroughs. This replaces the current conflict with journal publishers who no longer hold a key role in research. As a result libraries and open access publishing finally wins.

Research infrastructure is caught by surprise by the initial development phase at AG but quickly adapts to providing services during the applied phase. They are, however, all tied into the IP scheme established by AG ~~and after the initial phase of work are pressured (gently at first) to buy the majority of their technology from AG that increasingly is referred to as "The Company" by the public~~.

Learning fundamentally shifts as well. Online/e-learning technology is now mature. With teachers (researchers) now concentrated in specialized research centers, students learn not from completing coursework from a single institution, but through a collection of purpose-specific, likely international online learning centers.

Tinder for Collaboration (Autonomous-Abundant)

Setting: A Holodeck of Collaboration

Actors:
Established collaborators (creators of all flavors (science, engineering, art, etc))
Students.
Institutions with specific research interests (resources, but not creators)

Once upon a time (in the not too distant future), in a Holodeck far far away, there was a stream of young collaborators searching for their perfect collaboration match. These collaborators are young, energetic, and confident. Around them are so many opportunities, so many choices. Will they find that perfect match… only time will tell…

(good outcome)
In the first and most positive example, Angela is interested in pursuing a global societal problem. She ponders her passions and searches for problems that interest her. She enters the basic parameters of her interests into “Tinder for Collaboration” to find collaboration partners. She virtually meets with her collaborators regularly in the Holodeck. Her institution provides her with the resources and tools to make the collaboration successful. Three years later the collaboration develops a cure for the common cold.

(failed outcome)
Poor Roger on the other hand is trying to create a collaborative sculpture with a diverse global team. Several attempts are made together in the Holodeck but many collaborators are unsatisfied with the results. Despite regular use of the Holodeck, the coordination has not resulted in a shared vision for the sculpture that is sufficient to actually produce it. The team ultimately abandons the work and each pursues their own creative visions separately, having learned from the experience.

(rare problems not being addressed)
Felicity has a rare allergy to sunlight. She searches Tinder for Collaboration for anyone with a similar allergy or researchers working to address it. All she finds are a few other sufferers and people posing as collaborators who actually want to take advantage of their plight. ~~Because there is no coordinated research program on the topic, bona fide researchers are not drawn to the work.~~ The Institute of Rare Allergies, however, discovers Felicity’s interest, realizes the importance of her work, and creates a program to attract bona fide researchers to the work.

(duplication of results --)
John from the Moon University and Jason from Lower Texas State university have searched Tinder for Collaboration, established teams, and worked for five years to solve the issue of potable water on the Moon. While they are aware of each other’s efforts, because they have plenty of resources, they choose not to collaborate. They both get results and publish them in different venues, only later discover their results are virtually identical and each suffers from small inconsistencies that the other has solved. Lack of coordination results in duplicate efforts and that damage the reputation of each.

(grand challenges not being addressed)
The problem of successfully colonizing Mars is not making any progress because of a lack of a unified vision and leadership. While many want to see it happen, the scale of the logistical challenges requires significant coordination and planning that is not occurring. The sum of the parts being produced does not equal the whole needed to solve the problem. Luckily, the Mars Exploration Society steps in to provide the organizational kernel for that planning and coordination.

I Will Survive (Autonomous-Limited)

[As mentioned above, I was not able to alter this to achieve a more positive outcome. What is described in this scenario is probably as good as an Autonomous-Limited outcome can be.]

Jenny is an archaeologist at an institution in the continental US. Her research area is in American Samoa, specializing in stone tools. She is able to secure enough funding to travel to American Samoa to work in the field once every couple of years. Her institution isn't able to provide any support. However, she is able to store her collected data in G Suite using her institution provided account.

One night at the pub, she was chatting with a geologist from another institution, Alfred. One of her research questions is where the material for the stone adzes originated from. Alfred was quite willing to help out. Luckily, Alfred can easily plug into G Suite too. However, when Jenny went to share her Google Drive folders out, she found out that to "protect the institution", she wasn't able to share her material with an account external to her own institution. In order to collaborate with Alfred, she had to copy all of her work over to a personal Google account so that she could add Alfred.

Alfred was able to trace the source of the material to islands nearby. However, this now brings up the question of how the material made it from one island to another. Jenny knows a researcher specializing in those islands, Nurul. Nurul is happy to collaborate. However, her institution has her storing all of her research materials in Microsoft OneDrive. This puts our three collaborators on different platforms, with various sharing rules, and some requirements to create personal or additional accounts.

A local, Lolo, finds an interesting adze. However, since he doesn't know the researchers working in American Samoa, he finds it difficult to figure out who to talk to. Once he gets Jenny's contact information, it is difficult to fully collaborate with her as she is still storing her data in whatever format was easiest for her in on a Google Drive shared out of her personal account.

Over dinner one night, Jenny and Alfred realized that between the two of them, Nurul, and Lolo, they are really starting to understand some of the patterns of early commerce, and they want to accelerate progress by enabling more regular collaboration. They organize a plan to hold a videoconference so that they can have a real-time conversation between Jenny, Alfred, and Nurul.

At their meeting, they all acknowledge that their collaboration tools are an obstacle to further collaboration. They agree to pick one collaboration platform to be a central repository for their work. Nurul indicates that her institution has funding to cover additional users on in their Microsoft Teams environment, and that her University uses identity federation so that each researcher can log in with their home institution account, and if their institution doesn't have a federated IdP, they can log in with an external credential (eg Google).

Commented [1]: A bit more positive would maybe be "Her institution only provides the most basic infrastructure to allow her to be able to work there (or: get paid) and do research from behind her desk. However, she's free to go out and do field expeditions if deemed necessary - she only needs to setup her own tools then."

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Commented [2]: So I guess the question is how do we finish this story? :)

I'm missing what the consequences of this high autonomy but limited resources scenario will exactly be.

Some of it is implicitly there I think: data in different formats, scattered across few different services (no interoperability; no reproducability? What would happen to R&E in this case...), services offered by commercial providers for "free" (user = the product, but what does that mean in this case?)...

What about which topics get addressed by researchers? They are autonomous in that so which topics are likely to be chosen and which not?

How do instutions operate? They are able to pay salaries and provide some basic infrastructure, but what else? Since they do not (or barely) interfere with whatever their "employees" actually do...

(Note: I am/was also part of this scenario, so my remarks are not meant as critique ;-))

Excited about their decision, the researchers agree on a basic file hierarchy for consolidating their findings and migrate all their data to Microsoft Teams. This outcome is dependent on the resources available at Nurul's University, but the other researchers do not have to expend any additional resources. Simply by consolidating on a set of agreed upon online tools and streamling access to those tools, Jenny, Alfred, and Nurul (with insight from Lolo) complete a ground-breaking whitepaper for the Journal of Social Archaeology.

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