

Cultivating Interdisciplinary Trading Zones and Building Interactional Competence:

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An Experiment in Co-
Imagining Socio-
Technical Futures
With Contributory
Experts



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Note: This presentation was delivered by Dr. Shannon Conley, Dr. Emily York (faculty in the School of Integrated Sciences at James Madison University in Virginia), and Futures Lab undergraduate student Sam Kodua, a rising senior in the Integrated Science and Technology major at JMU.

Conley:

Today we are going to share some of our work on a project we call co-imagining futures, a series of workshops we are conducting with invited experts with the goal of facilitating trading zones and cultivating interactional competence with an eye towards engaging in anticipatory governance.

The project brings together experts of different disciplines and also includes a pedagogical element by including undergraduate students from the JMU STS futures lab.

I'd like to make a note regarding a slight change of our title in the program, While the original title says "building interactional expertise," we are instead using the term "interactional competence," a term I first introduced at SEESHOP 2017, and published a chapter on with Erik Fisher in our new Third Wave volume.

Expertise vs. Competence

- “Developing interactional expertise is the job of months or years of interaction” (Collins 2004, 129)
 - High level of linguistic fluency
- Interactional competence - absence of high level of linguistic fluency
 - Necessitates shared trading zone, collaborative creole
 - Needs to be **conversant enough to engage** with scientist collaborators (Conley and Fisher 2019)

Conley:

We think it's important to call this distinction out, because our engagements primarily occur in half-day workshops and are more directed toward creating a collaborative creole and a shared trading zone.

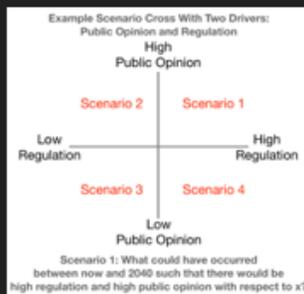
While Collins notes that “Developing interactional expertise is the job of months or years of interaction” (Collins 2004, 129). “Interactional expertise requires the attainment of a high level of linguistic fluency, so much so that one with IE could “pass” as an expert. Interactional **competence**, on the other hand, in the absence of a high level of linguistic fluency, necessitates the development of shared trading zones and a collaborative creole. While an understanding of key vernacular and concepts is important, one does not necessarily need to know enough to, as Erik and I note, “pass” as an expert, but needs to be **conversant enough to engage** with scientist collaborators,” which is what we posit is what is occurring in the case we will present today (Conley and Fisher 2019).

Approach

Blend scenario analysis, design fiction, and moral reasoning

Blend research and pedagogy

Invite experts to join us in serious play



Scenario Analysis



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Design Fiction



Moral Reasoning

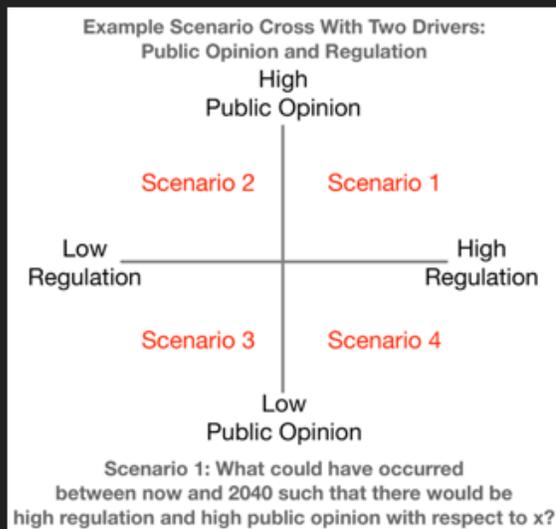
Conley:

This is an approach we've used in our classrooms to engage applied science students in critical thinking about technology and the future, and we are now reimagining these **pedagogical tools** as a **research methodology** to help facilitate students as well as experts from different disciplines in becoming interactionally competent in each other's domains of expertise.

In order to cultivate a collaborative trading zone in which this learning can occur, we blend scenario analysis, design fiction, and moral reasoning to facilitate what we call "serious play."

The pedagogical aspect adds another element to our trading zone, as the experts we have engaged with thus far have all been faculty - we have found that the "teaching" element of the workshop opens up new avenues for communication and learning that might otherwise have been difficult - it encourages the experts to frame things in a way that undergraduates would understand. It also aids in the comfort level of the expert - establishes a feeling that "we're all here together to learn" and on the same team, and reduces feelings of being interrogated or confronted.

SCENARIO ANALYSIS: PLAUSIBLE FUTURES



Scenario Cross: Two drivers at a time

York:

Scenarios are stories that extrapolate based on a couple of different drivers at a time. A 'scenario cross' maps two drivers--one along the x axis and one along the y axis--to map 4 values--for example, high regulation and low regulation along an x axis, and high public opinion and low public opinion along the y. This forms 4 quadrants--and each becomes a possible scenario. Why is it true in 20 years that there is high regulation and high public opinion?

This process surfaces assumptions and uncertainties, and challenges participants to step outside of technologically deterministic thinking.

Design Fiction: Forms of Life



http://imagination.lancs.ac.uk/sites/default/files/imagecache/single632_image/news_images/ex-machina-ava.jpg

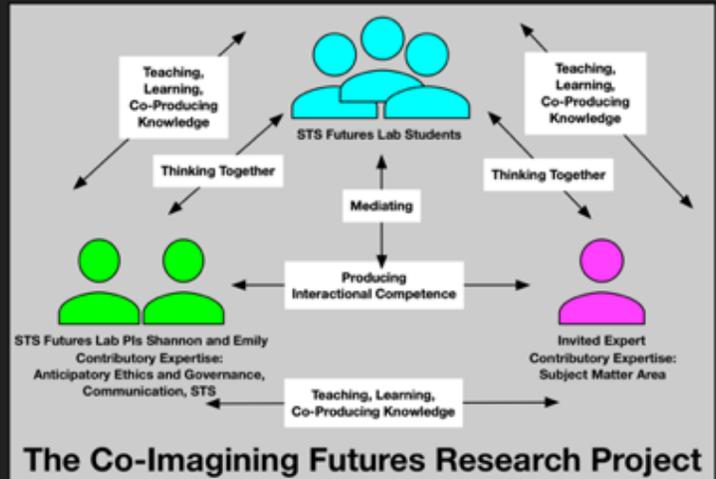


Artifacts From the Future | BY JOSHUA DAVIS

York:

Design fiction is a blend of material production and narrative, to evoke a form of life related to the plausible future that is being explored. We draw on Langdon Winner's discussion of technologies as forms of life to help shift our gaze from just thinking about a future technology to imagining a slice of life in which some particular materialization of a technology is ordinary and commonplace to ask: Who are we in this future?

Preliminary Observations



York:

- Scenario analysis and design fiction provide a grounded yet creative structure to facilitate rigorous anticipation of plausible futures and the development of interactional competence and trading zones
- The development of interactional competence is crucial to inter- and multi-disciplinarity, which we posit is important for both addressing complex problems and enabling the surfacing and interrogation of values and assumptions
- The undergraduate students' participation is key to mediating between experts and facilitating the development of trading zones

Co-Imagining Futures: Process

Initial Interview → Expert Selects Topic

→ Pre-Discussion & Analysis in STS
Futures Lab

On Camera
Interview

→ Workshop

→ Ideal
Scenario Analysis
Design Fiction

Post-Engagement Discussion, Design Fiction, Follow Up

Conley:

The process starts with an initial interview with our invited expert, in the weeks **prior** to the workshop. During this time, we teach the expert about the process of scenario analysis and design fiction. The Expert selects a topic, and provides readings - knowing that undergrads will be doing the reading pushes the expert to select accessible readings, which is very helpful for me and Emily as well, since we are also unfamiliar with the expert's domain! Emily and I then engage in pre-discussion and analysis with lab. On the workshop day, Emily and I interview the expert in a 30 minute on camera interview, where we discuss topics such as how the expert got interested in their domain, why they selected the topic, and other topics, such as their definition of responsible innovation. We then transition into another room for our full engagement, in which the STS futures lab students participate. The expert first states their "ideal" - essentially, if things worked out perfectly, where would they like to see their technology or the state of their discipline in the next 30 years? We then engage in collaborative Scenario Analysis and quick Preliminary Design Fictions. The engagement doesn't end there however.

Co-Imagining Futures: First Two Engagements



York:

Our first two engagements occurred in the spring of 2019. The first was with Dr. Morgan Benton, an Associate Professor in the School of Integrated Sciences at JMU whose research and teaching are broadly in the area of computing and mobile app development. He had been conducting research on information technology education designed to promote gender parity, and selected as his topic for our engagement “Flourishing With IT” or information technology. His acronym for this is FIT.

Co-Imagining Futures: First Two Engagements



York:

Our second engagement was with Dr. Anne Henriksen, a Professor Emerita in the School of Integrated Sciences at JMU whose recent research has been in the area of sex hormones and epigenetics. She selected as her topic the implementation of precision medicine.

In the following, you will see some video clips from each of these engagements, labelled to help you follow which engagement it is.

Right now we are relying on YouTube closed captioning, which isn't always accurate.

Making the Ideal Explicit

Henriksen/Precision Med

- **Expert articulates the "ideal future"**
- **Provides insight into expert's assumptions and values**
- **Allows us to see a way towards this ideal future**
 - **What needs to happen?**
 - **What needs to be avoided?**
 - **How do we achieve (or avoid) these phenomenon?**



Kodua:

The following is a clip of the expert, Dr. Henriksen, starting the workshop off by articulating an ideal future in which bioinformatics and personal medicine have become commonplace.

Play Video

This clip of stating the ideal provides an opportunity for us to think about trading zones and values. It provides an opportunity for us to honor what Dr. Henriksen cares about - she cares about robust healthcare that enriches people's lives.

The process of explicitly stating the ideal upfront forces us, through the process of scenario analysis, to come to terms with what needs to happen or not happen to get to the ideal future, and what assumptions, values, and ideals are present within it. As you will see later, it sets things up for a later opportunity of critical participation in critiquing Dr. Henriksen's emphasis and values centered around individualized medicine.

Shared Definition - Development of Inter-Language?

Henriksen/Precision Med

- **Students establish a shared definition for selected drivers**
- **Transfer of knowledge can happen beyond traditional disciplinary boundaries**
- **“Inter-Language”**
- **Note body language - York shifts to create shared space**



Kodua:

In this next clip, we will see the student and the expert working together to interpret and explain a driver on the scenario cross.

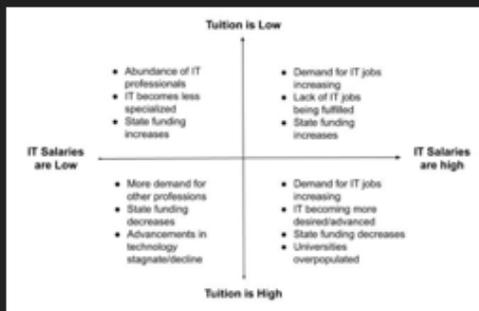
Play Video

It is important to note that in these spaces, a shared language is established so that the transfer of knowledge within distinct disciplines/understandings can happen beyond traditional disciplinary boundaries (Collins, Evans, Gorman). The process of working with the expert in negotiating drivers on the scenario cross plays this role in the Futures Project.

This is where and when these definitions and characterizations are agreed upon. According to Collins Evans and Gorman, this shared language can be referred to as the “inter-language”. Also note body language--Dr. York resituates herself, creating a shared space.

Negotiating Scenario and Driver, Unearthing Assumptions Benton/FIT

- Thinking and Re-Thinking Together
- Re-defining
- Different and dramatic beliefs and assumptions about Higher Ed
- Shifting Priority



York:

One thing that happens in the context of laying out scenarios and selecting drivers is a kind of negotiation, in which we are further revealing our assumptions and thinking together.

In this clip with Benton and IT education, students have presented a scenario cross with some drivers, and one of the axes correlated to the driver of tuition, with one side being high tuition and one side being low tuition. Benton and I begin to engage each other directly about the role of tuition in shaping high ed--

and the backdrop of this conversation is that even though we've started with a focus on gender parity, our conversation has shifted to focus on the changing value of higher education as something that might be key in shaping any kind of IT education.

Moral Reasoning Sequence on Role of Automation

Benton/FIT

- Emergence of moral reasoning
- Note moments of critical participation
 - Challenging assumptions on automation
- Convergence Within trading zone
- Shape of trading zone
- Role of expertise within trading zone?
- Body language



Conley:

Here we have an example in which the students, faculty, and expert are engaging in a SERENDIPITOUS and collaborative moral reasoning exercise regarding the future of automation, the implications of automation, and how automation might or might not lead to flourishing and meaningful lives.

While watching, note how this becomes a potential moment of critical participation in which the participants challenge each other's assumptions on the purpose and values of automation. This clip has caused us to reflect on how the shape of a trading zone is affected by the expertise of those within the trading zone. Would this sort of engagement have arisen if there hadn't been two STS professors that teach ethics present? How might things have been different if students weren't present - would it have been more confrontational?

PLAY

Note in this clip how as I offer an alternative perspective/critique of the expert's assumption, I'm primarily oriented towards and talking to the students.

Critique in Critical Participation

Henriksen/Precision Med

- Dr. York brings up an insight on patient's choice
- Challenging assumptions
- Body language/orientation less confrontational



Kodua:

As we will see next, Dr. York provides an insight about the role of a patient's choice and ability to carry out the preventive measures assigned by physicians.

Play Video

The development of interactional competence allows Dr. York, an expert in the STS discipline, to challenge Dr. Henriksen's assumptions, as an expert in the bioinformatics field, about implications of personal medicine strategies on patients. This is indicative of the bi-directional flow of knowledge that occurs within shared zones.

Additionally, I'd like to call out body language in this clip. Dr. York is critiquing Dr. Henriksen's orientation towards individual choice in healthcare. We can see Dr. York shifting her body language towards the students - here she is playing the role of a "teacher" in her critique. She is facing us as the students - this makes it safer and less confrontational to have a critique of role of individual choice with Dr. Henriksen.

Expert Reframes Ideal and Shifts Views on Automation Benton/FIT

- Expert also creates design fiction prototype
- Return to and restates ideal



York:

Following the scenario analysis, we work with the guest expert to select some of the scenarios to create quick 5-minute design fictions. In the end, our guest expert presents their own design fiction.

In this case, the expert returns to his originally stated ideal, but he has reframed it. Initially, he talked about more about gender parity.

Note that he has also shifted his perspective on individual views on automation - in the moral reasoning clip we challenge his assumption that everyone will embrace automation that replaces manual work, to a more nuanced one, where he acknowledges that some people, in his ideal, might want to continue doing manual work - he uses the comical example of cleaning one's bathroom. There are indicators of him reframing and shifting what he's talking about.

Contributory Expert Developing Interactional Capacity? Henriksen/Precision Med

- **Invitation from students to reflect on plausibility**
 - **Participants and the expert cooperatively develop the future scenarios**
 - **Create plausible narratives**
- **Expert invites students to “imagine the future”**
 - **Expert is “wearing hat” normally worn by York/Conley**
 - **Example of interactional capacities being developed both ways**



Kodua:

In this clip, the students invite the expert to provide feedback, to which the expert is able to clarify and reorient the students' interpretation of the driver spectrum. After this, the student questions the previous understanding of the scenario cross and reforms the scenario to one in which patients look to “Dr. Google” to mitigate genetic health concerns. And through the analysis of the scenario's plausibility, we see the interactional competence is developing. Particularly when inter-language is established through the phrase “Dr. Google”.

-SK

PLAY

Conley:

We would like to emphasize with this clip how the expert invites/challenges the students to “imagine the future.” This is a moment where Dr. Henriksen wears a hat normally worn by York/Conley. This is a moment to emphasize that interactional capacities can be developed in both ways - not only are the STS faculty and students learning about precision medicine, but Dr. Henriksen is also stepping into the shoes typically inhabited by the STS faculty member, and posing a question that might normally be posed by Conley or York. This call to imagine the future seems to indicate that the expert has really embraced the co-imagining futures ethos.

-SC

Concluding thoughts/questions

- Opportunity to rigorously reflect on role of pedagogy and trading zones
- How would engagement look w/o student facilitators?
- The role of serious play?
- Creation of a “hybrid culture”? (Galison 2010)
- Scenario and design fiction as boundary objects?
- Development of interactional competence?



Conley:

To wrap up, we'd like to continue exploring these approaches as an opportunity to reflect on the tools themselves, as well as the role of students and pedagogy in the development of trading zones.

We are curious - what shape would these engagements take if there were no students present? There seems to be little explicit literature regarding trading zones and pedagogy - if you are aware of literatures, please let us know.

We are also interested in exploring the role of “serious play” [in our trading zones, and how our approach might help to create what Galison refers to as a] “hybrid culture” between disciplinary worlds.

And of course, we seek to continue to explore and experiment with scenario analysis and design fiction as boundary objects that can serve to link diverse communities together in thinking collaboratively, productively, and collegially about the future.

Finally, we will continue interrogating the Futures study as a tool for facilitating development of interactional competence. Thank you and we look forward to your suggestions, thoughts, and questions!

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Thank you to Morgan Benton, Anne Henriksen, and all of our future participants

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Trading zone on the fly (Clip 33)



Expert calls on students to choose the appropriate scenario crosses, an invitation that encourages critical participation between expert and students. This is indicative of a shared zone and bi-directional flow of knowledge.

Kodua:

Expert invites students to choose appropriate scenario crosses to which the expert agrees, the interactional expertise that occurred in the shared zone has successfully established an understanding between experts and students about the most ideal and least ideal scenarios

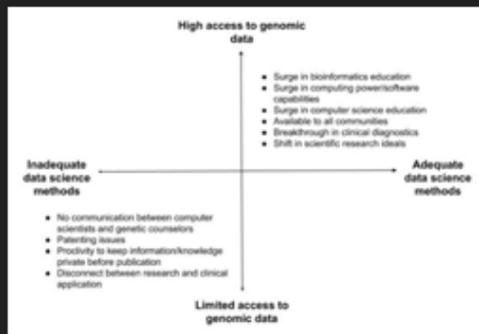
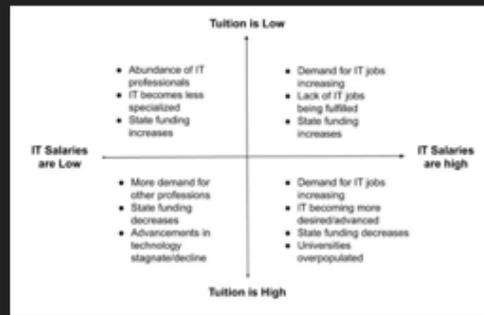
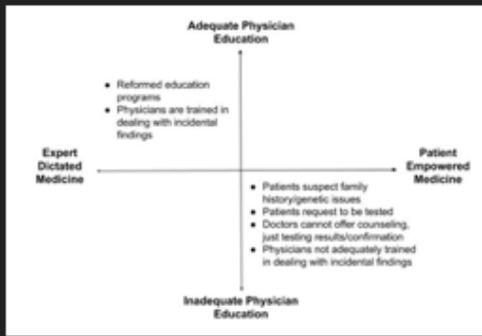
Interactional capacity is developed as a product of the successful linguistic socialization within the shared zone (Collins, Evans, Gorman)

Renegotiating/Correcting (Clip 28)



Expert suggests a modification of the "dimensionality" driver. This suggestion is more accurate in describing the real world context of the dimensionality in genomic data processing. The driver spectrum change is more reflective of possible directions genetic counseling could go in the future.

Kodua: Expert provides input that orients students/participants towards an understanding of the dimensionality driver that is more representative of the real world based on her own expertise, interactional expertise



Scenario Crosses