

Communicating Power: Technological Innovation and Social Change in the Past, Present, and Futures

Jim Dator

University of Hawai'i at Mānoa
USA

John A. Sweeney

University of Hawai'i at Mānoa
USA

Aubrey Yee

University of Hawai'i at Mānoa
USA

Aaron Rosa

University of Hawai'i at Mānoa
USA

Introduction

This is the final report for a research prospectus submitted in May 2011 by Jim Dator, John A. Sweeney, and Aubrey Yee in response to a call for proposals on "Technology, Innovation, and Society" (hereafter TIS) from the Office of the Vice Chancellor for Graduate Research at the University of Hawai'i at Mānoa. Focusing on category two (*How does technology change the balance of power in society?*), we were awarded a grant by the University of Hawai'i Foundation and agreed to a year-long research term commencing on January 1, 2012. In our research prospectus, we proposed to examine how communication technologies have contributed to changes in the structure of societies, and hence to the distribution of political power, in the past, at present, and in four alternative futures. We also proposed to rely on a survey and analysis of existing studies for our research into the past, produce original research on several contemporary events, utilize Futures Studies techniques of forecasting and scenario modeling in order to develop and present the possible four alternative futures, and develop a gaming platform based on our research.

In undertaking the work supported by the TIS grant, the research team was composed of Jim Dator, John A. Sweeney, and Aubrey Yee with significant contributions to the game from Aaron Rosa. Dr. Dator was responsible for the theoretical and historical portions of our research from the evolution of human language through the advent of television and the Internet. His research focused on how technologies shape what it means to be human with specific focus on dramatic shifts that sparked dramatic social change. Yee was responsible for gathering and analyzing information about contemporary communication technologies and their impacts from social media to emerging technologies. Her research emphasized the rise of new media and the nascent effects of communication technologies on various scales from bioengineering to big data. Sweeney took responsibility for research on theories of power and for the development of the game. His research examined modes of power that accounted for both the social and material aspects of technologies as well as methods and best practices for developing gameplay. Rosa contributed to gameplay by designing both the digital and actual artifacts used in the game, including the development of the mobile augmented reality (MAR) interface.

Our most important conclusions, to be discussed in detail in a forthcoming monograph detailing our work, are:

1. Our assumption that changing communication technologies do impact power (and other) relations was reinforced. But our current understanding of that process is substantially more informed and nuanced than it was when we began. As power relations are fluid and highly differentiated across social contexts, we found that social change occurs in complex ways that often defies simple and reductive classifications, which led us to emphasize various layers of both causes and effects with regards to the ways in which communication technologies impact power relations.
2. While we understood from the outset that “technology” is more than simply physical tools, the role of a great many supporting technologies, and of their hardware, software, and orgware, became even more apparent to us. This was especially made clear, for example, when examining the impact of the printing press on the structure and operation of social interactions around the world from the 15th-20th centuries. Much more good, empirical research has been done about this transformation than about any other period, and this research has greatly informed our theoretical position, which takes into consideration the myriad assemblages that drive the forces of technological innovation, development, and diffusion.
3. We were especially made aware of the time lag between the diffusion of new levels of technology (which itself occurs well after the technologies were first conceived, introduced, and developed) and when substantial social impacts occur. We have seen that it takes typically at least a generation for the social impacts of a new communication technology to become pronounced. But what is interesting about this observation is the fact that we see the time frame for a ‘generation’ shrinking now and into the futures as a direct result of the current speed of technological change. In this case, ‘generation’ is thus defined as those for whom the technology is ‘new’ versus those for whom it is seen as a natural part of one’s daily life.
4. Even though we had insufficient data to use age-cohort analysis to see clearly the process by which subsequent generations born into a once-new technology

take the technology as “natural” and “given,” the fragmentary evidence that is available to us strongly reinforces that theory’s assumptions, which speaks to our mutative application of its conceptual framing. As Arthur Levine quotes a student saying when asked how she adapted so easily to Google, Yahoo, cellphones, and Skype, “it’s only technology if it happened after you were born” (Levine 2012). The technologies already widely used once one is born are virtually invisible to that generation, and we find this to be a cross-cultural phenomena. They are the water in which, as fish, they swim.

5. On one of the central issues in our research project, we concluded that new communication technologies sometimes do enable a marginal group of early-adapters to wrest power from a dominant group. However, in many cases, the transfer is temporary—subsequent cohorts of the old power structure often effectively regain power via the now-ubiquitous and hence invisible technologies. This speaks to the relational nature of power and the ways in which technologies have both implicit and explicit power dynamics embedded within their invention, development, and diffusion.
6. Though there is considerable dispute in the literature about this, we conclude that in fact changes in the levels of technology that are the focus of this research—the emergence of language and speech; the emergence of writing; the emergence of printing; and the emergence of electronic communication technologies—did profoundly change the behavior, consciousness, and conceptual parameters of humans. Not instantly, but over time, the changing modes of communication diffused so widely and deeply that they redefined for succeeding generations what it meant to be “human” in thought and deed compared to what it meant when earlier communication technologies dominated.
7. The current era of communication technologies has taken a significant turn with as-yet under-appreciated ramifications. With the creation of the Internet, humankind launched itself into an unprecedented era of communication that is no longer predominantly and only human-centric. It is not simply the architectural interfaces of the Internet that has fomented social change, and the substantive transformational aspects have been a result of the ability for the *many* to communicate directly to the *many* for the first time in known history, which brings with it many novel challenges and opportunities—none of which is more pressing than the question of access.
8. The capabilities of social media amplify this ability for many-to-many communication, and this shift has had and will continue to have profound social impacts on power structures across various societies. We have seen both the Arab Spring, which many, perhaps hastily, called a “Twitter revolution,” and the Occupy movement utilize the galvanizing and community-building capabilities of social media to spur and orchestrate large social movements. Whether or not these revolutions (if they can be called that) would have happened without the existence of the Internet is arguable, to say the least. There have been numerous revolutions and social movements in the past when these communication technologies did not exist, but it is clear that these events relied heavily upon the speed and public visibility afforded by the Internet, and social media specifically, to achieve their ends.
9. Today, it is easy to see the capacity of networked communication and social

media challenging many of the existing power structures in society, although the classical division between the have's and have not's remains. When a website in India allows people to share their experiences with bribery and report abuse by officials and a startup in Silicon valley uses social media to bypass the traditional processes of clinical trials so that patients can manage and control their own health, it becomes clear that networked communication has the capability to re-distribute power in a way that is much more democratizing than we have seen before, although access to such technologies remains a key issue. The quantified self movement serves as perhaps the best example of this dynamic as it aims to give people (with access) the power to use, manipulate, and understand the data of their lives. If, as some contend, data is the new oil, then the material infrastructure, as with oil's pipelines and distribution outlets, should remain an area of key concern for interested parties.

10. While we are currently too close to the emergence and impacts of social media, biotechnology, and machine learning/artificial intelligence, we believe that these technologies will be as profoundly transformative as were the earlier permutations of technology before them. We do not see them as merely extensions of 20th century communications technologies, but rather as harbingers of new, even more intimate and profoundly transformative, types of social change.
11. In terms of alternative futures and emerging issues, we see the areas of biotechnology and artificial intelligence as the two most profound regions of future innovation in terms of communication. The most transformational quality of these two areas of innovation is the emerging ability of communication technologies based on biological and machine learning algorithms to evolve organically and mutate beyond their original created intention. We see a potential for explosive and highly transformative new technologies in these fields in the near and distant future.
12. Based on our analysis of the past as well as trends and emerging issues, we created four distinct futures scenarios utilizing the "Mānoa School" scenario modeling method (Dator 2009). These alternative futures became the basis for our interactive gaming experience – one of our promised major research products. The remainder of this report details the form, content, and findings of the game.

Gaming Futures¹

Form

The aim of a broader audience has become an unofficial tradition at the "Mānoa School" of Futures Studies, which is a moniker we use for the methodological and theoretical trajectory spearheaded by Dr. Jim Dator over the last 40 years at helm of the Hawai'i Research Center for Futures Studies (HRCFS). As we began thinking about how best to organize a game related to our research, we considered many platforms, including everything from card to board to video games. After weighing all of our options and the strengths of the Mānoa School, it became obvious that our project was well suited for a dynamic live-action experience—one that offered participants not just glimpses of alternative futures but embodied

perspectives from which to live and breathe in said futures. In support of this end, *Gaming Futures* was derived from a number of existing gaming platforms, including geocaching, alternative reality games (ARG), and mobile augmented reality (MAR) systems. Our heavy reliance on MAR centered on Wikitude, an open-source MAR platform. We thought it was important to leverage an existent, yet still emerging, communication technology as part of our gaming experience, and we specifically wanted to use open-source tools that could be utilized by anyone.

In short, MAR draws on the mobility and connectivity afforded by computing devices like smartphones and tablets to locate and disseminate information relative to the geo-spatial context of each user. This technology uses the GPS capabilities of mobile Internet-enabled (MIE) devices to search for digital information that has been “contextualized” within the immediate area of the user. In concert with the display capabilities of each device, information is presented in relationship to each user’s current location (latitude/longitude, elevation, cardinal direction). Some devices allow for a heads-up display (HUD) view of digital information while others provide data through a mapping service. In implementing MAR technologies for the development and distribution of our research, *Gaming Futures* explores the ways in which users navigate both physical and virtual spaces as part of the goals and activities of gameplay. As a means to promote immersivity within our scenarios, MAR allowed for the integration of the digital aspects of the futures within the existing landscape, and the digital information received along each path provided gamers with alternative lenses through which they could experience the present and futures simultaneously. Ultimately, MAR granted us the opportunity to design a game that blended real and digital information into a hybrid futures experiences, and this fusion produced a critical methodology for analyzing alternative futures by engaging with affective creation, interaction, and response. This is where *Gaming Futures* charted new waters, and the coupling of experiential scenario-based gameplay with MAR required participants to navigate a hybrid physical/digital landscape in support of embodying characters from the futures. Consequently, we believe *Gaming Futures* is one of the first gaming platform of its kind, especially with regards to its foresight-driven content and hybrid physical/digital form.

Content

At the heart of the game’s content were four alternative futures for 02062, which were researched and forecasted using the Mānoa School scenario modeling method. Utilizing four “generic” futures from which to construct scenarios that “have equal probabilities of happening, and thus all need to be considered in equal measure and sincerity,” the content for *Gaming Futures* evolved into a creative exercise in how to apply gaming dynamics to the Mānoa School paradigm (Dator 2009, 7). As Dator observes, the “four generic forms differ from each other fundamentally in cosmology, epistemology, and often deontology, and are not variations on a common set of themes” (Dator 2009, 7). We did not want to (and could not have taken the time to) create four unique gaming interfaces, one for each scenario, so we worked to develop a platform that maintained the novelty of each scenario while reinforcing the overarching nature of our research, which required building complex, yet accessible, scenarios within a plastic gaming platform.

Creating life-worlds around the four generic forms (*Grow*, *Collapse*, *Discipline* and *Transform*) required first compiling all the research we had done on historical,

contemporary, and emerging communication technologies and then extrapolating cycles and trends from our data. We then applied our findings to the STEEP (Society, Technology, Economy, Environment and Politics) framework for situating and evaluating both dimensions and drivers of change. Using our STEEP data set and the seven driving forces of the generic four futures (see Table 1), we were able to forecast alternative futures based on existing points of information and evidenced emerging technologies. The seven driving forces (Dator, Yeh, & Park 2013) matrix provides a template for transforming the four generic futures into living, breathing life-worlds that reflect the depth and complexity of the present(s). Taking Dator's 2nd Law of the Future (*Any useful idea about the future should appear to be ridiculous*) to heart, our scenarios presence the possible over the probable, although they very much reflect potentialities of ongoing trends and emerging issues. (Dator 1995).

Table 1. *Seven Driving Forces Matrix*

	Growth	Collapse	Discipline	Transform
<i>Forces</i>				
Population	Increasing	Declining	Diminished	Post-human
Energy	Sufficient	Scarce	Limited	Abundant
Economics	Dominant	Survival	Regulated	Trivial
Environment	Conquered	Overshot	Sustainable	Artificial
Culture	Dynamic	Stable	Focused	Complex
Technology	Accelerating	Stable	Restricted	Transformative
Governance	Corporate	Local	Strict	Direct

Once our scenarios were sketched out, we developed both physical and digital “artifacts” from the futures that were used to chart the MAR path for each scenario. These objects can take many forms and offer an additional means by which to make the futures more tangible and accessible. As we thought more about developing artifacts, we wanted to find a way to re-appropriate as much of the physical landscape as possible into our digital artifacts. We chose Kaka`ako, a historic neighborhood in Honolulu, as the site for gameplay as the area has undergone substantial changes over the past few years and has become a space for innovative social and entrepreneurial events, such as Pow Wow Hawai`i, which brings in street artists from around the world as part of a multi-day public event (<http://http://powwowhawaii.com/>). With Kaka`ako literally covered in world-class art, we sought to utilize this aesthetic resource and were able to integrate it into the game. Our connection of MAR with existing public art installations produced a new foresight concept: *street artifacts*. As hybrid objects that digitally re-appropriate the physical landscape for the express purpose of enlivening an experiential scenario, *street artifacts* are a novel means to enhance foresight activities and served as an integral part of *Gaming Futures*. Orchestrating gameplay in public space also created the opportunity for chance encounters, and on more than one occasion, local residents and patrons inquired as to why teams of smartphone-wielding pedestrians were meandering around Kaka`ako.



Figure 1. Gamers navigating using MAR

Gameplay

In order to play *Gaming Futures*, gamers were required to use a MIE smartphone. This requirement was not intended as a gatekeeper to gameplay, and we actually provided access to MIE devices as needed. Each gamer was also asked to setup a Twitter account to send and receive information during the game. From the outset, we wanted gameplay to take advantage of contemporary communication technologies, specifically MIE devices and social media, as a means of leveraging critical thought about the role these technologies play in the world of today and how they may (or may not) be used in the futures. Our employment of social media and MAR on MIE devices was integral in cultivating an embodied experience of the futures that strategically blended elements of the present into gameplay.

The overall structure of gameplay was setup as follows: four teams composed of three players were randomly organized from the 12 participants selected for gameplay. Each team was given, both physically as well as digitally through Wikitude, a map and a one-page scenario, which was also read aloud by each team's facilitator at the starting position. Color-coding each scenario was necessary to assist gamers in navigating along the Wikitude routes, and as each team only experienced two of the four scenarios, the teams were organized as follows: Yellow/Green, Green/Yellow, Red/Blue, and Blue/Red. Using the GPS-enabled routing available through Wikitude, each team navigated along two unique routes to each scenario experience. In order to maximize the dissonance among gamers, we chose to juxtapose Transform (yellow) with Discipline (green) and Grow (red) with Collapse (blue). Check-in coordinates and points-of-interest (POI) were created using Google Earth and inserted into the Wikitude path to designate street artifacts, and these were key to ensuring the flow and timing of the game, which was setup to keep teams from overlapping with one another (e.g. the Green/Yellow began their second route after the Yellow/Green team finished their first scenario experience and vice versa). Teams generally began the second scenario experience path immediately after completing the first scenario experience, and the timing differential among teams was marginal.

Following the paths created specifically for each team, players used their smartphone's GPS to move through Kaka'ako where they would learn more about their scenario at designated street artifacts. When players successfully made it to a street artifact using Wikitude and linked to the appropriate Google form, they were prompted to select a character from the futures in order to receive additional information about their specific role in the scenario. Two street artifacts were created for each path, and gamers were asked to tweet pictures of the street artifacts they encountered. Gamers were also told to look for color-coded QR codes that were hidden along each team's path. When gamers came across a QR code, which linked to a mobile Tumblr blog with additional scenario information, they were asked to tweet what they discovered for bonus points.

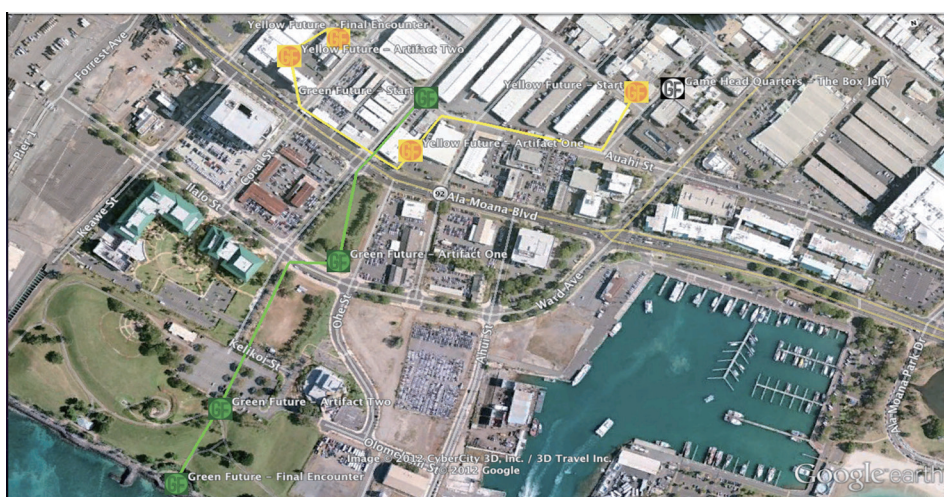


Figure 2. POI map utilizing Wikitude MAR created for the Yellow/Green team



Figure 3. Facilitator reading over scenario with Yellow/Green team at the starting point



Figure 4. Gamer scanning a QR code



Figure 5. Members of the Yellow/Green team encountering a street artifact

When a team made it to their destination, each gamer was given an envelope with a brief character description, a costume for their character, and a copy of the scenario script. Once the gamers were outfitted, two actors, who were also costumed, initiated the scenario experience, which began with a short dialogue that provided some context on the power relations and available communication technologies within the scenario. As all of the participants worked through the script, the gamers were prompted to make a decision that challenged them to consider dimensions of access, control, and force relative to the communication technologies available within that future. Ultimately, these Yes/No decisions required gamers to choose whether or not they would use a particular communication technology to either escalate or deflate conflict within the scenario. Decisions were varied such

that in some scenarios “Yes” escalated and in others “No” escalated the conflict. In addition to having gamers vocalize their Yes/No answer, each gamer was also asked to provide a brief justification for their decision. While we thought it was important to recognize the systemic and institutional forces that shape power relations, we very much wanted to emphasize the power of everyday choices and the responsibility that comes along with access to varying degrees of communication technology. Both actors and gamers were furnished a complete script to follow along with during the scenario experience, and gamers were unaware of our escalate/deflate metric for recording decisions and were encouraged to inhabit their scenarios with abandon.



Figure 6. Costumed actor engaging Yellow/Green team as Dr. Dator looks on in the back ground



Figure 7. Costumed actress responding to gamer decision

Results

Facilitators traveled with each team to assist with technological and logistical questions and needs and record the decisions made by each gamer during scenario experiences. Responses were collated by scenario and character number (see Tables 2 and 3). The results speak to the complexities inherent to the ways in which notions of agency and power effect how individuals deploy communication technologies. Of the 12 decisions made during the first scenario experience, the opposite choice was made seven times during the second scenario experience, which is also to say that the decisions during the second scenario experience were 58% different from those made during the first scenario experience. When one looks at the decisions correlated by gamer rather than character, however, the level of variance drops to 25% as only three gamers chose to escalate after having previously chosen to deflate conflict in another scenario. This suggests that once a gamer made a particular choice (escalate or deflate) they were more likely to make the same choice during the second scenario experience, even with the vastly divergent character prompts and scripts between scenarios. Of the overall 24 (12 gamers x 2 scenarios) decisions that were made during the game, the results were split down the middle (13 decisions to escalate and 11 decisions to deflate conflict with both scenario experiences). Although our data set is not statistically significant such that we can (and want to) draw any universal conclusions, most of the gamers were “digital natives,” or millennials, and we suspect that decisions regarding the impact of communication technologies upon power relations were seen by the overall group as contextual, which connects with our findings concerning the impact of communication technologies upon power relations.

Table 2. *Results from first scenario experience*

	Team/Color	Gamer #	Decision (Y/N)	escalate/deflate conflict
S	Yellow	1	Y	deflate
C	Yellow	2	Y	escalate
E	Yellow	3	Y	escalate
N	Green	1	Y	escalate
A	Green	2	N	deflate
R	Green	3	N	deflate
I	Red	1	Y	escalate
O	Red	2	Y	escalate
	Red	3	Y	escalate
EXP	Blue	1	Y	escalate
#1	Blue	2	Y	escalate
	Blue	3	N	deflate

Table 3. Results from second scenario experience

	Team/Color	Gamer #	Decision (Y/N)	escalate/deflate conflict
S	Yellow	1	Y	deflate
C	Yellow	2	N	deflate
E	Yellow	3	N	deflate
N	Green	1	N	deflate
A	Green	2	Y	escalate
R	Green	3	N	deflate
I	Red	1	Y	escalate
O	Red	2	N	deflate
	Red	3	Y	escalate
EXP	Blue	1	Y	escalate
#2	Blue	2	N	deflate
	Blue	3	Y	escalate

At the game's conclusion, all players were asked to complete a post-game survey. Gamers were given the opportunity to provide feedback on gameplay and their experience. As part of the survey, four statements about the scenario experiences were given with responses scaled using the Likert format (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). For the first statement (*the scenarios show that unequal access to communication technology escalates conflict*), a slim majority (seven out of twelve) agreed (see Chart 1). Given the decisions made by gamers, the relative ambiguity of responses for this question are reasonable, and as this statement deals specifically with access to communication technology, the responses allude to the perceived power and agency of individuals. For the second statement (*the scenarios show that equitable access to communication technology deflates conflict*), the results were mixed with half (six) selecting neutral (see Chart 2). Since we believe the gamers considered the impact of communication technology upon power relations to be contextual, the responses to the second statement certainly support this claim.

For the third statement (*the scenarios were effective in altering my approach, thinking, and actions towards the future*), a strong majority (ten out of twelve) agreed (see Chart 3). In as much as one of the main reasons we designed a game was to stimulate critical thought about our research and foresight in general, responses to this statement show that we were successful, and the game served as an excellent capstone project to our research. For the fourth statement (*the scenarios demonstrated the impact of communication technologies upon power relations*), a majority (eight out of twelve) agreed (see Chart 4). Although we wanted to make sure the decisions faced by the gamers were difficult, we also wanted to make sure that they felt as though they actually had a decision to make, and based on the responses to the fourth statement, we seem to have achieved a happy medium.

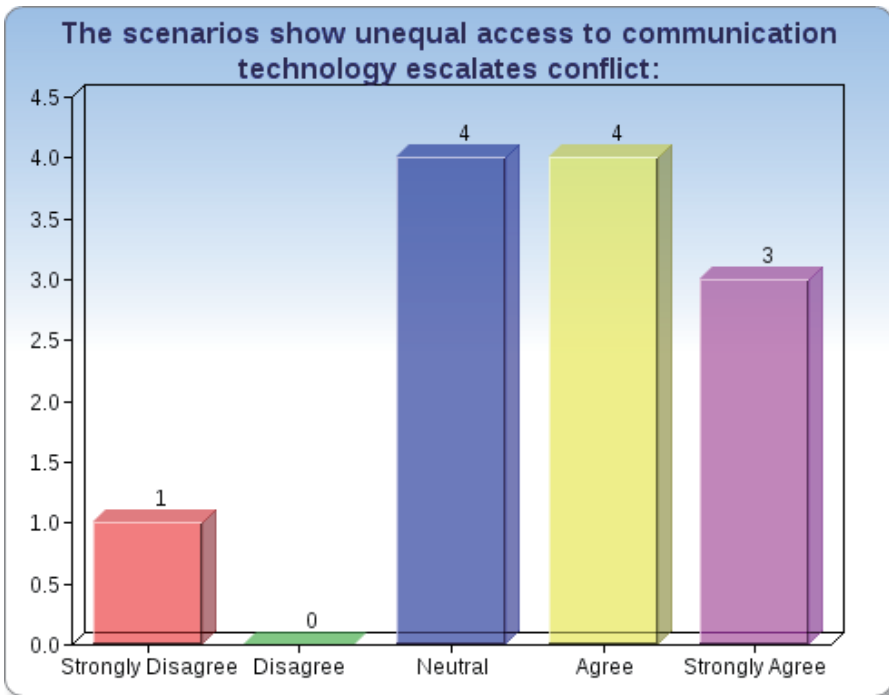


Chart 1.

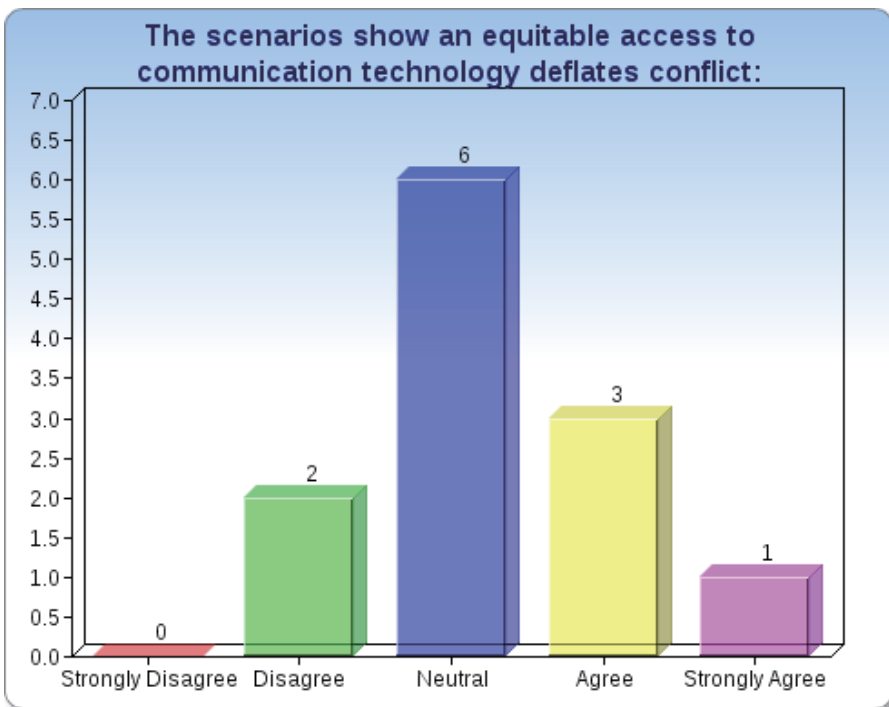


Chart 2

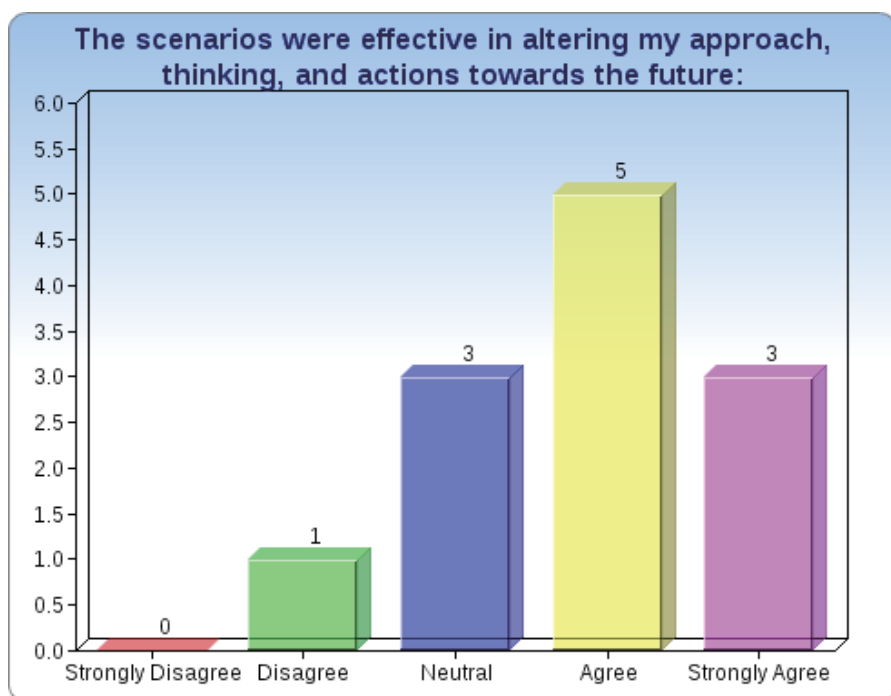


Chart 3

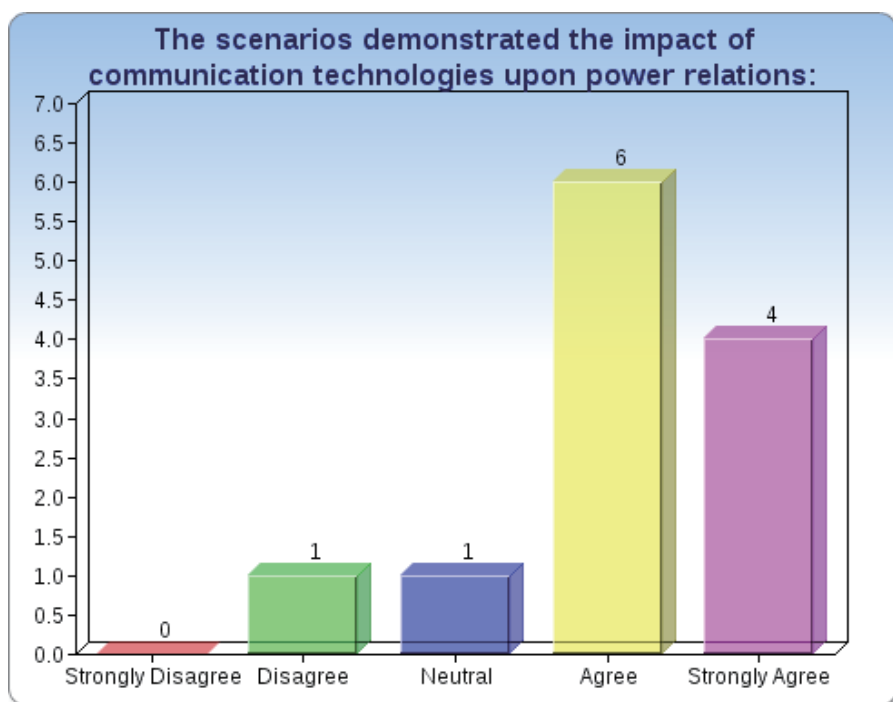


Chart 4

We also asked gamers to provide three adjectives describing the scenarios they encountered, and we created a *wordle*, a free web-based application for developing word clouds, to visualize their responses. While there were a veritable cornucopia of terms, the three most-repeated terms were *odd*, *creative*, and *complex*. Considering the range of adjectives given by gamers, we are more than pleased that these were the predominant three.

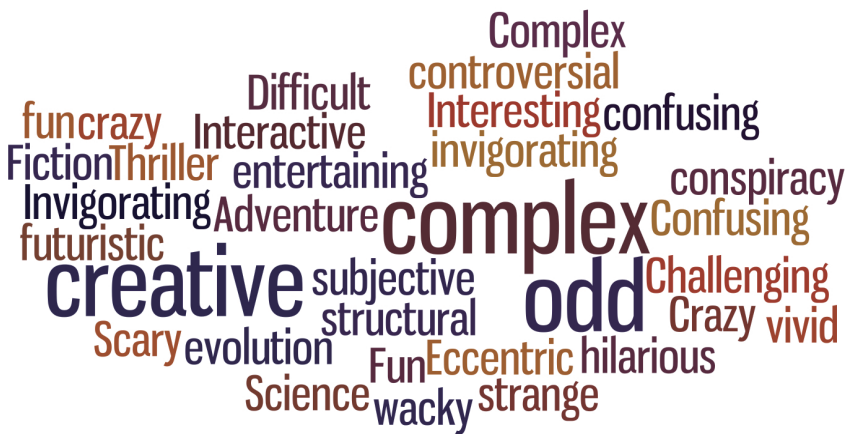


Figure 8. Adjective Wordle

Reflections

While we received feedback from the facilitators, gamers, and spectators that the game was successful, we briefly want to highlight some of the challenges we encountered in administering the game so that others might learn from our experience. As expected, we observed a wide spectrum of gamer comfort with MAR, and most players had no trouble adapting to the Wikitude interface after a brief introductory overview just before the game. Players were observed using both the HUD and map-based views within Wikitude as a method of way-finding and POI discovery. A few players found the Wikitude navigation tools difficult to understand and relied more on their team members to orient themselves within the physical landscape to find street artifacts (POIs), which is one of the reasons we wanted gamers in teams. Although the gamers did not know their teammates before the game began, a clear group dynamic and sense of commensality developed among all four teams, and we feel that future versions of gameplay could emphasize existing social networks to enhance the experience.

Looking back, the use of QR codes proved to be one of the most problematic elements of gameplay, especially as some of the codes were not able to be scanned by a handful of the gamers. We attribute this difficulty to a combination of the low-level of contrast within the QR code pattern and poor lighting on the glossy laminate that we added to protect the codes. Additionally, some of the QR codes were discovered to have been removed from their locations, which is one of the risks

of running a game in public space. The removal of QR codes was unexpected, and perhaps obtaining the necessary permissions would have alleviated this oversight. Most gamers reported that the integration of the Google Forms and the Tumblr sites were seamless once the appropriate passwords had been discovered, and as the scenarios were complex, more than a few gamers said they appreciated the layered approach to rolling out the scenario experiences. As for the scenario experience, we relied heavily upon the scripts, which provided the context and foundation for the gamer's decisions, and while many of the gamers noted that the complexity of the scenarios, even with the street artifacts, made the scripts a necessity. We plan to re-visit this work for future(s) installments of the game and have made all of the supporting documents available under a non-commercial share-alike creative commons license at our tumblr site (<http://www.gamingwiththefutures.tumblr.com>).

Correspondence

Jim Dator
Director, Hawai'i Research Center for Futures Studies
Professor, Department of Political Science
University of Hawai'i at Mānoa
2424 Maile Way, Saunders 617
Honolulu, HI 96822
Email: dator@hawaii.edu

John A. Sweeney
Researcher, Hawai'i Research Center for Futures Studies
PhD Candidate, Department of Political Science
Detp. of Political Science
University of Hawai'i at Mānoa
Email: johnswhee@hawaii.edu

Aubrey Yee
Researcher, Hawai'i Research Center for Futures Studies
PhD Candidate, Department of Political Science
University of Hawai'i at Mānoa
Email: aubreyy@hawaii.edu

Aaron Rosa
Researcher, Hawai'i Research Center for Futures Studies
PhD Candidate, Department of Political Science
University of Hawai'i at Mānoa
Email: abrosa@hawaii.edu

Notes

- 1 We want to recognize the many and varied efforts of the facilitators (Heather Frey, Brian Gordon, Ali Musleh, Aaron Rosa, & Aubrey Yee), the actors (Trevor Haldenby, Morgan Torris-Hedlund, Kirsten Rosa, Joshua Pryor, Adriane Raff-Corwin, Sally Taylor, Kyle Yamada, & Wade Yoshida), and Dr. Jose Ramos & Nischal Singh for their extraordinary efforts to capture

the event. The images used throughout this report are a direct result of their work.

References

- Dator, Jim. (1995). *What Futures Studies is and is not*. Retrieved November 25, 2012, from <http://www.futures.hawaii.edu/publications/futures-studies/WhatF-Sis1995.pdf>
- Dator, Jim. (2009). Alternative Futures at the Manoa School. *Journal of Futures Studies*. 14(2), 1-18.
- Dator, Jim, Ray Yeh & Seongwon Park (2013). Campuses 2060: Four Futures of Higher Education in Four Alternative Futures of Society. In Clarene Tan Chern Chieh (Ed.), *Proceedings of the Global Higher Education Forum*, Penang, Malaysia.
- Levine, Arthur. 2012. Digital Natives and Their Customs. *New York Times*. Retrieved November 1, 2012, from <http://www.nytimes.com/2012/11/04/education/edlife/arthur-levine-discusses-the-new-generation-of-college-students.html>

