

# Dexign Futures: A Pedagogy for Long-Horizon Design Scenarios

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**Abstract:** The transition towards societal level sustainability requires thinking and acting anew. Traditional design pedagogy poorly equips designers to integrate long-range strategic thinking with current human-centered design methods. In this paper, we describe a three-course sequence: *Dexign Futures Seminar (DFS)*, *Introduction to Dexign the Future (iDTF)*, and *Dexign the Future (DTF)*. The term *dexign* indicates an experimental type of design that integrates Futures Thinking with Design Thinking. Students learn to engage strategic long time horizon scenarios from a generative design perspective. DFS, online modules, teaches students to critique and deconstruct existing futures scenarios. iDTF situates students to explore futures based themes and apply design methods and research techniques. DTF takes students into a semester-long project designing for 2050. In this paper, we describe lessons learned that lead to a pedagogy for supporting novices as they develop skills and methods for long time horizon futures design.

**Keywords:** design scenarios; long-horizons; dexign futures; design pedagogy

## 1. Introduction

The world is changing rapidly. Corporations, governmental organizations, and civil associations face accelerating change in uncertain times. For designers trained to shape futures defined by uncertainty and change, these exponential times represent unprecedented creative opportunities for innovation. Innovation needs to be aligned strategically with the forces that drive change in the future (e.g., social, economic, political, environmental, technological). Designers need to adapt and adopt new methods and tools.



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The forces are complex and dynamic. There is no single method to meaningfully articulate complex and dynamically changing design spaces. We use an eclectic approach that relies on composite representations – finding the best available paradigms or set of assumptions for design problems, rather than a single paradigm to apply to everything.

## **2. Dexign Futures**

The design research project described in this paper has the following problem, purpose and objectives:

**Research Problem** The field of futures studies grew out of and is dominated by epistemologies of economics, politics, technology, social science and military/defense. Largely missing from the field is the voice of design, even as more designers engage in design for social impact, which, for authoritative practice would seem to call for literacy in future foresight strategies for long time horizons.

**Purpose** The Dexign the Future project is an exploration in how best to introduce and induct design students into the field of future foresight strategy.

**Objective** The three-course sequence represents three iterations/versions intended to achieve several goals including: (a) Provide foundation in the theory, history, and current state of the field of future foresight strategic planning; (b) Guide students toward professional-level literacy in the application of futures thinking, methods, techniques and tools to “wicked” design challenges; (c) Establish a hybrid practice of future scenario authoring that integrates futures thinking with design thinking; (d) Create curricula, syllabi, teaching materials, and pedagogy to deliver these objectives; and (e) discover how best to leverage online and blended models to optimize course delivery and student mastery.

In this paper, we expand on the connections between practice and pedagogy, extending on our previous work (Scupelli & Wasserman, 2014; Wasserman, Scupelli, & Brooks, 2015a; Wasserman, Scupelli, & Brooks 2015b). First, we provide context through an overview of design futures traditions. Second, we expand on pedagogical challenges our students experienced with futures thinking in the Dexign the Future course (Scupelli & Wasserman 2014) and Introduction to Dexign the Future (Wasserman, Scupelli, & Brooks 2015a). Third, we describe our ongoing efforts to improve students’ efficacy in developing futures design expertise Dexign Futures Seminar.

## **3. Design Futures Traditions**

To help contextualize and distinguish our efforts, below we describe the design futures traditions in sections: (a) critical design, design fiction, persona-based user scenarios); (b) future studies (i.e., alternative worlds scenarios, normative scenarios); (c) futures thinking x design thinking = futures dexign; and (d) design futures programs worldwide.

### *3.1 Critical Design, Design Fiction, and Persona-Based User Scenarios*

Here, we link the intersections of the Dexign Futures courses with the traditions of Critical Design, Design Fiction, and Persona Based User Scenarios.

*Critical Design*, usually credited to Anthony Dunn (1999) and Fiona Raby (2001), is an adaptation of Post-Modern critical theory, applying social, moral, political, economic, and environmental arguments to challenge the epistemic norms of design inherited for the most part from canonical Modernism.

In the Dexign Futures courses described in this paper, we encourage students to challenge the ground of authority of delivered belief structures as we guide them through critique of past and present predictions/forecasts of futures.

*Design Fiction*, often treated as a subset of Critical Design and usually credited to Bruce Sterling (2005), is defined as (a) the use of narrative scenarios to envision speculative designed artifacts (i.e., products, services, environments, systems) in a future setting or (b) the use of designed artifacts to envision speculative futures. Often cited as an example of Design Fiction is the gestural interface in the film *Minority Report* (Spielberg, 2002).

The future scenarios we use in our Dexign the Future courses employ both variants of Design Fiction. Unlike much Design Fiction, however, our courses are grounded in ethnographic study of target populations in specific geographic loci as well as scans of weak signals/early signs of drivers of change. We also employ foresight frameworks from Futures Studies such as Alternative Worlds and Normative Scenarios.

*Persona Based User Scenarios (PBUS)*, widely familiar to practitioners of Human-Centered Design, place characters (Personas) in hypothetical situations and portray their interaction with products, services, experiences, environments or systems. Often used to explicate proposed design situations, user scenarios are most valuable when applied generatively to explore user needs, uncover design opportunities, and define appropriate design requirements. The earliest use of PBUS, in the form familiar today, is described by Wasserman in *Xerox Strategy for Industrial Design and Operability, 1983* and *Unisys Corporate Design Strategy, 1987*. Interaction designers may be more familiar with user personas described in “*About face: The essentials of user interface design*” by Alan Cooper (1995).

In the Dexign Futures courses described in this paper, students use PBUS as their main tool to speculate on, explore, and demonstrate design propositions in the contexts of Alternative Worlds and Normative Futures.

### *3.2 Future Studies*

Ideas about the future most familiar to the general public are the inventions of imaginative literature and media. Behind the scenes however, there exists a professional field of some

technical rigor called Futures Studies, which includes futurism, future foresight, and strategic scenario planning. The discipline's roots can be traced to military war-gaming well back into the 18th Century. In the modern era the formal work of "futurists" originated in 1948 with the creation of the RAND (Research ANd Development) Corporation by the U.S. Air Force to explore the future of intercontinental warfare and its technical, economic, and diplomatic policy implications. In 1961 Herman Kahn, a RAND futurist and pioneer in systems theory, military strategy, and scenario planning moved to form the Hudson Institute to develop alternative strategies for averting and conducting nuclear warfare.

In the 1960s, major corporations, most notably Shell Corp. and General Electric Co., began hiring futurists to develop long-range strategic planning scenarios. In 1967, Ian Wilson was leading G.E.'s future's group (Wilson & Ralston, 2006). Wilson gave Wasserman, who was working on future product strategy as a design consultant to G.E., this concise one-sentence explanation of strategic foresight:

If you try to predict the future, you will be wrong. What you can do is work to understand the forces likely to drive change in the future and then align your strategies with those forces. This is what we call strategic foresight. (Ian Wilson, 1967, personal observation in conversation with Arnold Wasserman.)

Practitioners in the field of Futures Studies develop strategic foresight using Futures Thinking, applying a wide range of methods drawn from many academic disciplines and only recently has the design profession begun to engage with the futures field and connect Futures Thinking to Design Thinking.

A key activity of futures design is the act of developing futures scenarios. Here we describe two main types of future scenarios: Alternative Worlds Scenarios and Normative Scenarios.

### **Alternative Worlds Scenarios**

Using a general scenario framework with a cross-matrix of two critical uncertainties (Figure 1), we can generate four very different futures scenarios – expected, possible, feared, and preferred. Perhaps the most famous example of strategic future foresight using the Alternative Worlds framework is the Mont Fleur Scenarios (Figure 2), which cross-matrixed the uncertainties of Governance with the risks of Policies (Kahane, 2012).

The Montfleur Scenarios<sup>1</sup> were led by Adam Kahane of the Generon group in 1991-92 to help describe a path forward to end apartheid after the release of Nelson Mandela from prison in 1990. A diverse group of 22 prominent South African politicians, activists, academics, and businessmen, from across the ideological spectrum met in a series of three-day workshops at the Mont Fleur conference center outside Cape Town. They agreed on four scenarios that they believed to be plausible and relevant:

- *Icarus*, in which transition is rapid but unsustainable

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<sup>1</sup> An excellent summary of the project is available at:  
<http://www.generonconsulting.com/publications/papers/pdfs/Mont%20Fleur.pdf>

- *Ostrich*, stuck in the past, in which a negotiated settlement to the crisis in South Africa is not achieved
- *Lame Duck*, in which a settlement is achieved but the transition is slow and indecisive
- *Flight of the Flamingos*, in which the government’s policies are sustainable and the country takes a path of inclusive growth and democracy

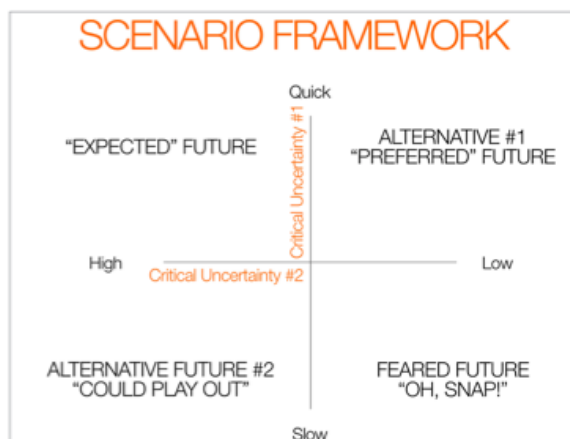


Figure 1. General Framework for generating four alternative world scenarios based on two critical uncertainties.

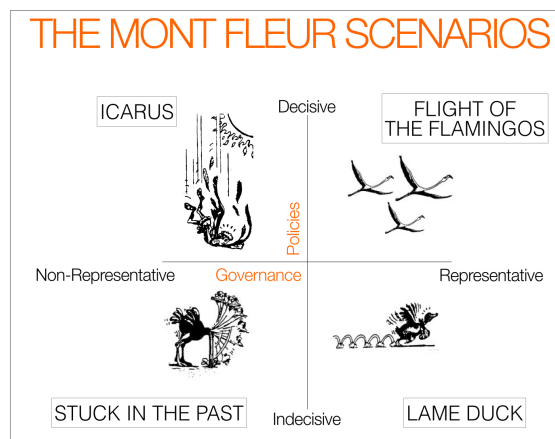


Figure 2. The Mont Fleur Scenarios based on two critical dimensions: governance (non-representative, representative) and policies (decisive, indecisive).

Making the alternative pathways visible, tangible, and comparable had a great influence on the participants understanding of the possible consequences of their difficult choices. They finally agreed on the Flight of the Flamingos – inclusive democracy and sustainable growth – as the goal state they must crucially work toward (Kahane, 2012).

### Normative Scenarios

Using the Normative Scenario framework, futurists describe a desired future in terms of long horizon vision goals, and then back-cast to define decade-by-decade benchmark milestones required to achieve those goals.

Arguably one of the most important normative scenarios in operation today is “The Vision 2050 Roadmap” created in 2009 by the World Business Council for Sustainable Development (WBCSD). For this endeavor, in 1992, 200 of the largest global companies came together with a common goal to explore how business might transition towards sustainable development.

WBCSD created a detailed map of the strategic milestones that must be met to achieve sustainability by 2050, illustrating what has to happen decade-by-decade and identifying risks to progress. The map begins with current state starting points identifying ten key forces that will drive change, and ends with measures of success in 2050. The critical drivers of change: 1) energy and power; 2) buildings; 3) mobility; 4) materials; 5) global economy, finance, and business models; 6) governance; 7) people, values, behaviours, and

development; 8) agriculture; 9) forest; 10) ecosystems & biodiversity. Details articulate starting points (e.g., energy efficiency regulations) and milestones of what needs to happen each decade. In the map, three-hundred and fifty milestones are described. Forty of the milestones are necessary within a tight time frame for the world to accomplish the WBCSD sustainable vision by the year 2050. The measures of success for each critical driver are indicated.<sup>2</sup>

### *3.3 Futures Thinking x Design Thinking = Futures Dexion*

Today, future scenario planning is conducted at levels of central, regional, and local government around the world; by most International 500 corporations; and by myriad international organizations, foundations, and civic organizations, often in collaboration with think tanks like RAND, Hudson Institute, Global Business Network, Insitute for the Future, The Arlington Institute, Collective Invention, and so forth.

However rich and widespread the practice, both clients and practitioners share a frustration that the adoption and operationalization of scenario outputs is far less than optimal. The main problem seems to be that scenarios have long time horizons (10, 20, 30+ years). Organizations, by contrast, operate within short time horizons. The result is the “I get the Vision Goals for 2050, but what do I do Monday Morning” problem.

Future planning strategy inhabits a different register, level of abstraction, and granularity than day-to-day or year-to-year organizational operations. This is where Design Thinking brings real help to bridge the gap. Unlike standard foresight scanning, modes of design research, such as ethnographic observation and co-design uncover latent and emergent “Weak Signals” and “Early Signs” at a more granular level than standard foresight scanning. Future Foresight employs continual wide-net scanning, Delphi networks and, increasingly, Big Data analytics. By contrast Design Thinking generates artifacts, immersing the user in concrete experiences, visualizations and mockups, entailing tangible interactions with a succession of operational simulations. It is our experience that high-level future scenario strategies can be understood, adopted, and embedded more effectively when brought down to ground level and represented as persona-based user scenarios in simulated operational settings.

The persona-based design scenario, common in design practice, benefits from exposure to the Weak Signal/Early Sign tracking methods of futures as well as the overall foresight model of defining long range vision goals and back-casting to what has to happen decade by decade to reify those goals.

From the description of Futures Thinking thus far, we argued that – if you multiply Futures Thinking by Design Thinking you get a powerful toolkit for dexigning the future. Next, we

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<sup>2</sup> <http://www.wbcds.org/vision2050.aspx>

discuss design futures worldwide to provide a global context for our work. Then we describe the pedagogy for our Dexign Futures courses.

### *3.4. Design Futures Programs Worldwide*

In this section, first, we describe other university design futures programs with respect to the various design futures traditions; second, list known critiques of Design Futures, Critical Design, and Speculative Design; and third, describe how the Dexign the Future courses described in this paper address these critiques.

- The work of Fiona Raby and Anthony Dunne in the realm of critical design and design fiction was often associated with the Design Interactions program at Royal College of Art. Designers were trained to ask “what if” questions about desirable and undesirable futures to engender public discussion (Dunne & Raby, 2013). Starting in 2016, Raby and Dunne moved to the New School - Parsons School of Design in New York City. (De Zeen Magazine, 2016).
- Design Futures and Metadesign Masters programme at Goldsmiths College in the University of London was launched in 1995. It encourages designers to explore business ethics and the role of the natural environment while dreaming of new and exciting futures.<sup>3</sup>
- The Queensland College of Art in Griffith University in Brisbane, Australia offers undergraduate and masters-level programs based on a “Design Futures philosophy recognises that many of the social and environmental catastrophes of the contemporary world have been caused by design, and that we need to better educate designers”<sup>4</sup>
- In 2009, the Ontario College of Art and Design University (OCAD U) launched the Master in Design Strategic Foresight and Innovation (MDes) to create a “new kind of designer: A strategist who sees the world from a human perspective and re-thinks what is possible; An innovator who can imagine, plan and develop a better world.”<sup>5</sup>
- California College of the Arts created a two-year MBA in Strategic Foresight program. Students “learn to view uncertainty through multiple lenses and develop effective strategic techniques applicable to companies, governments, and NGOs.”<sup>6</sup>

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<sup>3</sup> <http://www.gold.ac.uk/pg/ma-design-futures-metadesign/>

<sup>4</sup> <http://designfutures.com.au/>

<sup>5</sup> <http://www.ocadu.ca/>

<sup>6</sup> <https://www.cca.edu/academics/graduate/foresight-mba>

- RMIT offers a new online MA in Design Futures.<sup>7</sup> “The Master of Design Futures is an accelerated post-professional program for experienced designers wanting to apply their skills to strategic and leadership roles.”
- UC San Diego launched a new undergraduate offering in 2016. “Speculative Design is a 21st century mix of art, science, and emerging technology focused on aesthetic, entrepreneurial and activist intervention.”<sup>8</sup>

The growing number of offerings of Design Futures degrees is a testament to global enthusiasm but there are also critiques for Design Futures, Critical Design, Design Fiction, and Speculative Design. For example, futurist Jamais Cascio describes three types of flaws with futures scenarios (2012): The first flaw is focusing on partial aspects of a scenario in three ways: (a) focus only on technological advances and missing how people live; (b) assume everything works and missing the failures and the unintended uses; and (c) focus only on the dominant class missing the broader impact on all of society. The second flaw involves ignoring human nature in futures scenarios. The third flaw, entails lacking respect for the intelligence of the audience (e.g., make your case and trust your audience to choose the better scenario; provide equally seductive and terrifying scenarios that prepare for success and failure).

A second critique has to do with the grounding of critical design and impact of speculative design. Bardzell and Bardzell (2013) comment that Raby and Dunne’s focus on transgression, defamiliarization and estrangement in “Critical Design” is too narrow a view of critique. In “Speculative Design and Food Cultures” DiSalvo (2012) asks if speculative design can be more than superficial spectacle and wonders how it might instigate more productive public debates.

A third critique of Design Futures regards public engagement, type of authorship, and extent of public participation. How engaged or unengaged are audiences with futures scenarios? Is the public merely responding to pre-made design futures or are they involved in the co-creation of design futures?

The Design Futures courses described in this paper were developed to help students align their design work strategically with long time horizons necessary to explore a transition design framing for planetary-scale societal-level sustainability (Scupelli, 2016). The three courses described can be taken as elective courses to enhance the learning opportunities for undergraduate and graduate students at the School of Design at Carnegie Mellon University.

We begin to address the Design Futures critiques mentioned previously in the Design Futures courses by: (a) incorporating Cascio’s critiques into the coursework, (b) focusing on daily life sustainable futures rather than provocative speculative futures, and (c) requiring

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<sup>7</sup> <http://www.rmit.edu.au/study-with-us/levels-of-study/postgraduate-study/masters-by-coursework/mc245/#pageId=overview>

<sup>8</sup> <http://visarts.ucsd.edu/news/new-visual-arts-undergraduate-major-speculative-design>



students to ground their futures scenarios with user-centered design interviews and field observations.

## **4. Dexign Futures Courses**

Here we describe three courses designed to help novices learn how to integrate “design thinking” with “futures thinking”: a) DEXIGN FUTURES SEMINAR provides students with: initial exposure to concepts, opportunities to analyze and deconstruct existing futures scenarios, practice constructing scenarios. b) INTRODUCTION TO DEXIGN THE FUTURE helps students explore a variety of futures-based themes; develop proficiency with new design methods and research techniques. c) DEXIGN THE FUTURE is a semester-long project course where students immerse in real-world context such as Pittsburgh in 2050.

### **4.1 DEXIGN THE FUTURE**

The purpose of the DEXIGN THE FUTURE (DTF) course was to explore an integration of “futures thinking” with “design thinking.” As described in some depth above, futures thinking involves the use of models and methods for inquiry into what futures might be. Design thinking is about the purposive means – methods, techniques, and tools – for planning and actualizing preferred futures. We call this synthesis “Futures Dexign”.

This student team-based semester-long project course involved: (a) Context: societal-level sustainability in metropolitan contexts. The intensive urbanization of life on earth is arguably the crucial design problem of our era. According to the 2014 United Nations report “World Population Prospects”: by 2050, 66% of the world’s population will live in cities; in North America the urban population is already 82%. (b) Loci: Pittsburgh, Pennsylvania, USA served as a real-world metropolitan region for students to pursue four goals. (c) Goals: Explore the imperatives, opportunities, risks, and uncertainties of urban life on a long horizon (2050). Envision goals for preferred “normative” futures. Back-cast to define decade-by-decade milestones along pathways to achieve the envisioned goals. Create a desired world of health, equity, justice, creative fulfillment, and economic sustainability for all.

Three teams were formed and each selected a Pittsburgh neighborhood for their field research to identify present day “Early Signals” of forces likely to drive change toward (or inhibit) their 2050 vision goals.

Student teams each chose different focus topics for their 2050 scenarios. Team “Opportunity”: made economic opportunity available for people across socio-economic classes. Team “Share/Quality of Life”: explored a future where the sharing economy improves the quality of life for all. Team “Learning”: sketched the future of learning as a ubiquitous activity. All course materials and student projects are available online here <http://dexignthefuture.com/student-projects/>.

Third year undergraduate students and graduate students enrolled in the DTF course; all students were invited to anonymously evaluate their learning experiences. In the Faculty-

Course Evaluation (Carnegie Mellon University, 2015), students rated the quality of the course 4.6 out of 5. Response rate for the course was 55%, the College of Fine Arts average response rate for the fall 2013 semester was 51%. For a summary of student comments in faculty course evaluations, see Wasserman, Scupelli, & Brooks (2015b).

In a post-course debrief, students and faculty agreed that the DTF course was very challenging due to the steep learning curve (Scupelli & Wasserman, 2014). The steep learning curve had much to do with expert and novice approaches to engaging with complex problems. Below we list three big challenges students faced:

- First, students struggled to interpret and articulate early signs in the present as future signals for 2050. For example, when the students visited one of the University's Robotics Labs to get exposure to concrete examples of design for social change projects, students would respond to the various projects by saying things like, "That's cool" or "I like that." They were not asking questions that related back to DTF course concepts (e.g., forces of change that influenced the project goals, milestones planned for and unexpected consequences, frameworks/methods for design used). Essentially, students were unable to connect the exemplars (e.g., an intervention aimed at improving gender bias in STEM fields) to forces of change that they could identify and leverage as early signs of forces influencing their futures design class projects.
- Second, students did not robustly use the various futures design frameworks when exploring the long-term horizon goals. For example, students identified Rent-A-Center (RAC) as a desirable sharing economy solution without exploring possible adverse affects. Students wanted to increase rentals to help the RAC workers, but did not consider negative impacts on consumers (e.g., Consumers Reports, 2011). The students liked RAC because it fit into the sharing economy theme in their project.
- Third, students experienced difficulty in understanding how multiple forces might combine to impact 2050 benchmark goals and influence characteristics and behaviors of three-generational persona families, not to mention the materials, forms, and values present in their alternative worlds. For example, when developing persona scenarios, students did not know how to explore combinations of forces (e.g., the impact of technology and mobility on gender relations, family relations, etc.), which caused them to operate at the very superficial level when developing persona scenarios (e.g., A single mom in 2050 enjoys working at a retail store because the employer is nice and she can bike to work).
- Overall, students struggled to: a) imagine the 2050 timeframe in a grounded way linked to existing global trends, b) establish believable benchmark goals, and c) articulate forces of change along decade-by-decade pathways. For example, in attempting to understand how "mobility" might play out along a long time horizon, students were unable to map connections between WBCSD global forces of change

(including milestones and barriers) to local forces of change (information gathered from their field work). This breakdown had consequences for all other aspects of the design process, including difficulty envisioning beyond short term or current state developments and discussions (e.g., bike sharing, public transit/monorail). The misses in making these connections led teams to generate one-dimensional measures of success (e.g., more infrastructure), which in turn limited their ability to identify and articulate various forces of change decade-by-decade.

To address these challenges, Scupelli developed and taught a new course in Fall 2014: INTRODUCTION TO DEXIGN THE FUTURE (iDTF). In parallel, Brooks further developed a set of frameworks and tools designed to help lower observed barriers that futures design novices experience when managing and organizing information in ways that lead to productive questioning critical for identifying early signals and forces of change, as well as for generating futures scenarios. More details available in her Masters of Design thesis (Brooks, 2014).

#### *4.2 Introduction to Dexign the Future*

The iDTF course was organized as a seminar-studio course with readings, videos, discussion, and applied design assignments to introduce content necessary to understand global forces of change and practice applying such ideas. The course had four assignments: Alternative Worlds and Economies, Three-Generation Personas, Signs of the Times, and Sustainable Lifestyle Scenarios. All course materials are available here (Scupelli, 2014):

<http://dexignthefuture.wordpress.com>

Assignment 1: Alternative Worlds and Economies set the context for students to explore and recognize forces of change that are likely to shape aspects of everyday life in the future (e.g., live, work, play, mobility). The assignment introduced students to Dator's four alternative futures: continued growth, collapse, disciplined society, and transformational society (2009) and provided students with practice exploring how forces of change shape desirable or undesirable futures and combine to impact benchmark goals.

- While students explored forces of change and alternative worlds, many struggled to communicate in an experiential way what it might feel like to live in the alternative worlds grounded in day-in-the-life scenarios.

Assignment 2: Three-Generation Personas situated students to explore the impact of forces of change on intergenerational dynamics. Students explored: How extended families in the future might organize themselves given rises in healthcare costs and decreases in public expenditures on social welfare programs. Students created a "day in the life" future scenario for their three-generation persona families set in 2054.

- Students explored the individual characters in the three-generation persona families in some depth. However, they struggled to articulate the intergenerational struggles and generation gaps within families.

- Students created storyboards to explain key aspects of a day in the life of the family, but missing from the scenarios was a focused thematic exploration in the three-generation family.

Assignment 3: Signs of the Times provided the context for students to explore how forces of change shaped the past and the present and to hypothesize preferable futures. Students began with global normative futures such as the WBCSD plan for a sustainable 2050. This assignment had three goals: (1) identify global benchmark goals for 2054 in a sustainable normative future in a specific location; (2) back-cast decade-by-decade from the desired normative future to the current state and include milestones, barriers, and risks for each decade; (3) link each benchmark goal to Future Signs in the present. Future Signs are clues visible today that enable anticipatory action. A Future Sign consists of three dimensions: the signal, the issue, and the interpretation (Hiltunen, 2008).

- Graduate students with more advanced research training were able to link Future Signs in the present to benchmark goals along pathways of change. Undergraduate students struggled with such synthesis and abstraction activities.
- Creating a communication from the future, given the textual nature, worked well for most students.
- Students said they were overloaded by the task of linking global benchmark goals to a particular location. There was little time to polish the scenario storyboards and visually depict human experiences.

Assignment 4: Sustainable Lifestyle Scenarios required students to create scenarios for sustainable lifestyles exploring the redesign of urban centers and suburbs. Students had to distinguish between five scenarios: present, probable, plausible, possible, and preferable (Voros, 2001). Design scenarios in preferable normative futures were to be distinguished from the present, today (e.g., what we know, where we are now), or a linear extension of the present. “Probable” is where most designers operate and it is the “likely” world, barring major disasters and upheaval (e.g., financial crashes, eco-disasters, war). “Plausible” is the realm of scenario planning and foresight. “Possible” follows laws of nature and current science supports it. All other changes – political, social, economic, and cultural – are possible but need to have a credible path from today to a possible world. “Preferable” is the world we would like. It intersects the probable and the plausible. Students explored for whom the futures were preferable (e.g., top 1% income bracket, bottom 50% of the income bracket).

This assignment focused on: exploring scenarios for sustainable lifestyles in Pittsburgh 2054. Students were asked to explore sustainable lifestyle design opportunities in a particular location and describe the current situation (average/median income, # of inhabitants, surface area, etc) link it to global forces of change, and speculate on how the city/region/zip code studied might be in 2054.

- Students were especially challenged with situations where a specific locale/zip code was experiencing opposite trends in the present compared to the normative future scenario (e.g., problems linking decreased public transportation funding in the present to futures with increased reliance on mass public transport).
- Some students focused on the positive aspects of future scenarios glossing over the negative aspects. Others focused on the negative aspects of dystopian futures. They struggled to explore the tensions between the seductive and terrifying aspects of possible futures.

Both undergraduate and graduate students were enrolled in the iDTF course and all were invited to anonymously evaluate their learning experiences. In the Faculty-Course Evaluation (Carnegie Mellon University, 2015), students rated the quality of the course 5 out of 5. For more details on student evaluations see Wasserman, Scupelli, & Brooks (2015b). However, a close analysis of the projects created in the course reveals that students struggled with two fundamental aspects of Dexign Futures: information synthesis and familiarity with futures thinking methodologies.

- First, students wrestled with synthesis in three ways: (a) background information to be synthesized across a breadth of topics such as, demographic trends, economic theory, technological change, public policy, and so forth; (b) quickly gaining actionable critical insights; and (c) grounding their futures scenarios in research.
- Second, some students lacked familiarity with futures scenarios and some were particularly attracted to techno-utopian (e.g., technology will solve everything) or dystopian Hollywood type futures (e.g., world war III, societal collapse, robot apocalypse). One likely explanation is familiarity with the popular culture dystopian futures and lack of familiarity with desirable normative futures. For example, students were not familiar with the future-oriented design scenarios that might inform public policy (e.g., Kahane, 2012), and corporate decisions (e.g., Schwartz, 1991).

Judy Brooks used a class session to conduct a workshop to support practice with futures dexign methods. Students responded positively to the frameworks given in the workshop to organize information from the dense readings; and they were able to pick up on some significant current signs (e.g., current disruptions in education). However, we also observed some of the same barriers persisting (e.g., students experienced difficulty envisioning alternative normative futures, mapping milestones along pathways).

We continue efforts to refine and test pedagogical approaches to teaching novices and towards this end two authors are developing and piloting an online course: DEXIGN FUTURES SEMINAR.

### *4.3 Dexign Futures Seminar*

Scupelli and Brooks, drawing on domain expertise from Wasserman, are developing DEXIGN FUTURES SEMINAR (DFS)<sup>9</sup> to address some of the learning challenges described previously. Through a series of instructional activities, we provide exposure to key concepts with frequent practice and targeted feedback designed as a way to isolate students' practice on and build proficiency with the component skills associated with "identifying forces of change."

For example, students explore forces of change by examining Wasserman's future of learning scenario (Wasserman, 2014). Students are asked to identify forces of change that might converge to create free lifelong education as described in the futures scenario, given the current state (i.e., cost of higher education is increasing in the United States). Then, through a series of case studies students extract a range of education funding models. Students then link current future signs to future benchmark goals by back-casting decade-by-decade benchmark goals, establishing milestones, barriers, and risks along the way.

To deliver this course, we chose an online learning platform that supports pedagogical design best practices and collects data on student learning. This data (e.g., accuracy measures, engagement with course activities) will provide us with insights as to what aspects of the course is working for learning and what to target for iterative improvement.

### *4.4 Dexign Futures Pedagogical Sequencing*

While in this paper we have presented these courses in the order in which they have been developed and delivered to date, the future sequencing is first, the seminar course: intended to provide students with exposure to "Futures Dexign" key concepts and component skills practice; second, the intro-level course: intended to provide students with a breadth of themes for deeper exploration; third, the semester-long project course: intended as an opportunity for students to apply methods in authentic/real-world contexts. We believe with this pedagogical scaffolding (i.e., component skills practice to integrated practice to application to real-world contexts), students experience more efficient learning and fluency with the application of Futures Dexign methodologies in practice; and we continue to collect data to inform this hypothesis and target iterative refinements to this pedagogical approach.

## **6. Summary**

The DEXIGN FUTURES courses explore opportunities for designers at the intersection of "futures thinking" and "design thinking." In this paper we describe current practice and challenges novices face in learning this new domain. We discuss the design of three courses that integrate "design thinking" with "futures thinking": DEXIGN FUTURES SEMINAR provides students with: initial exposure to concepts, opportunities to analyze and deconstruct existing futures scenarios, practice constructing scenarios. INTRODUCTION TO

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<sup>9</sup> DFS is an Open Online Course offered through Carnegie Mellon University Open Learning Initiative (OLI).

DEXIGN THE FUTURE provides students with a framework to: explore a variety of futures-based themes; develop proficiency with new design methods and research techniques. DEXIGN THE FUTURE is a semester-long project course where students take a deep-dive into an authentic/real-world context (i.e., Pittsburgh 2050).

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