Re-inventing Co-op Education in Light of COVID-19

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As the COVID-19 Pandemic has disrupted how we learn and work, questions about how knowledge and skills are acquired within architecture education have become more urgent than ever. This paper examines the framework and results of running the FutureLab, a participatory project-based learning environment situated in-between academia and practice. Wentworth Institute of Technology requires two mandatory co-op experiences. During the unfolding of the COVID-19 pandemic and the initial disruptions, students had difficulties securing regular co-op jobs in the summer of 2020. Designed to offer a co-op alternative, the FutureLab connected students to industry and community leaders across different disciplines.

For 13-weeks Innovation Fellows worked in teams initially diverging into different verticals such as healthcare, sustainability, future of work, and communities among others to get inspired and jumpstart broad innovative thinking. Using a variety of innovation methodologies and tools such as Future Scenarios Planning, Design Thinking, interviews, research and data analysis as well as visualization, teams identified an area of need and a concrete agenda of intervention based on their interests. Students participating in the Future Lab honed interdisciplinary, innovative, strategic and future thinking and strengthened their employability well beyond their discipline knowledge.

Reflecting the process, impact and participants' experiences revealed that learning environments such as the FutureLab could provide a path forward in an ongoing or a post-COVID-19 world especially during a time of reassessing higher education. While based on a non-hierarchical design studio model augmented with innovation tools and methodologies, the FutureLab goes far beyond the authority and competence of one professor or one specific assignment. This paper documents phases, tools and outcomes of the FutureLab as a model for alternative co-operative learning that has potential to complement work-based learning in design firms.

1. INTRODUCTION

This paper examines the framework and results of running the FutureLab, a highly participatory, interdisciplinary project-based learning environment situated in-between academia and practice. Wentworth Institute of Technology requires two mandatory co-op experiences. Designed to offer an alternative for mandatory co-op, the FutureLab connects students to industry and community leaders across different disciplines. These interdisciplinary immersions were the foundation from which students expanded their viewpoint focusing on the question of "Post-COVID-19: How we may live and work in 2030?" Work-based or co-operative learning, "where professional work experience is closely integrated with professional studies, now forms an important component of many higher education courses, though the design, implementation, and monitoring of such learning is subject to much debate."[1]

The nature of the FutureLab was open-ended, engaging in processes and interdisciplinary investigations instead of moving towards specific and predetermined outcomes. In a typical architecture co-op position students work on projects that have a clear goal in mind, with a specific client to report to. FutureLab expanded on the fact that design education and design projects deal with open-ended problems that result in unique solutions.

FutureLab asked students to uncover the impact COVID-19 had and still has on our living and working conditions before diving into concrete solution spaces. The given theme "How will the COVID-19 crisis reshape the way we live and work?" indicates that the environment created through a perceived sudden event is also an invitation to tracing impact, defining problems before solving them. Students were experiencing the impact COVID-19 had on their lives and work situation firsthand collaborating from their parents' houses, in makeshift spaces, removed from their social connections and peers, who would typically be a source of inspiration face-to-face.

Three phases structured the 13-week immersion (Fig.1):
1 Research global and local innovations
2 Future Scenarios
3 Concrete Solutions

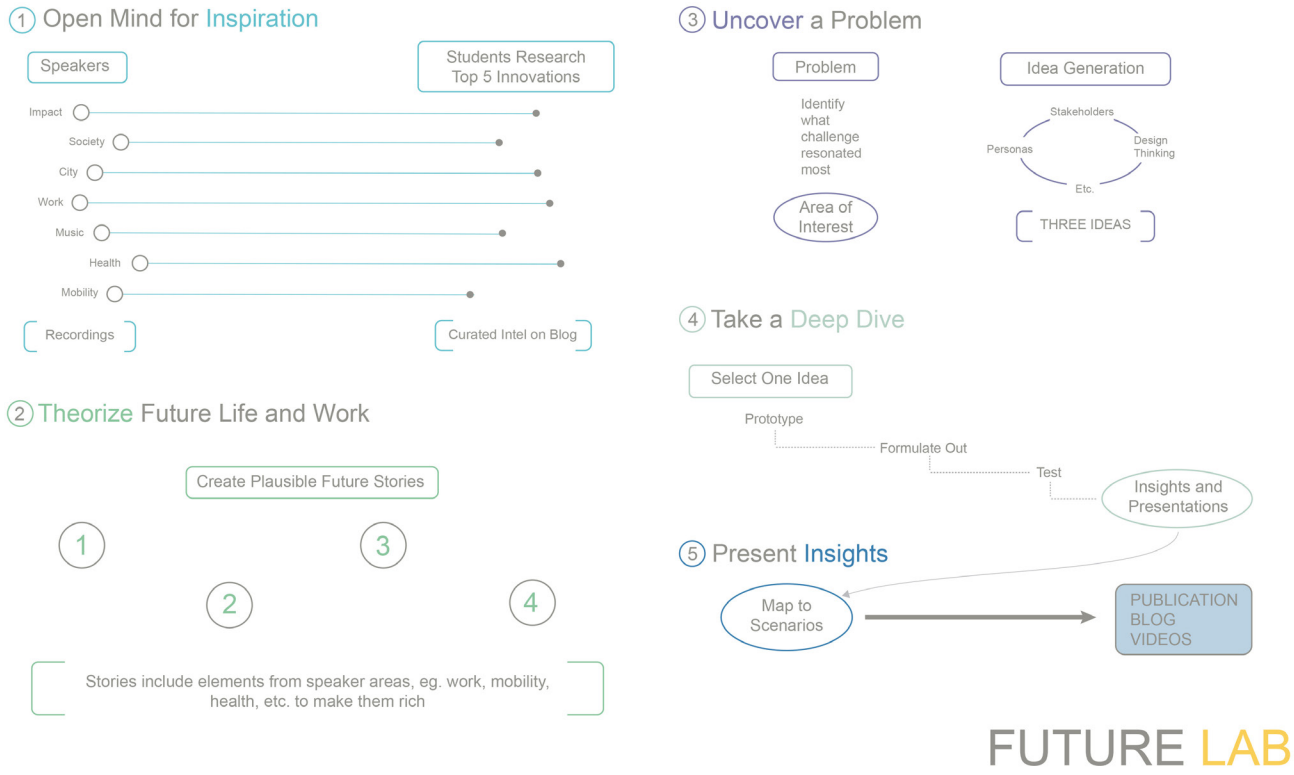

Figure 1. Phases of the FutureLab. Graphic by Sophie McKenzie.

Throughout these phases students were introduced to tools and methodologies that are rarely taught in architecture school, but that reside in the realm of design thinking and scenario planning. It allowed students to push their comfort zone, expand beyond their discipline, evaluate perceived trends while recognizing existing constraints and despite or because of them producing new and visionary solutions - moving outside the box as much as possible. Design thinking, a process defined by Tim Brown and Jocelyn Wyatt as a tool for social innovation, (instead of merely improving the look and functionality of something) resides in three spaces – inspiration, ideation and implementation. (Brown and Wyatt, 2010) The tools tested in the FutureLab helped students focus on complex processes and user experiences instead of buildings and objects. "Design thinking incorporates constituent or consumer insights in depth and rapid prototyping, all aimed at getting beyond the assumptions that block effective solutions. Design thinking – in-herently optimistic, constructive, and experiential – addresses the needs of the people who will consume a product or service and the infrastructure that enables it."[2]

Competencies developed included greater risk-tolerance towards the unknown, getting comfortable with ambiguity, experimentation and an iteration mindset to start with an idea and while exercising a user-centric focus and empathy evolving these ideas to create quick yet meaningful and relevant solutions. The exit survey confirmed that students thought the most valuable lessons learned during their time at FutureLab were: Brainstorming, creative thinking, innovation, the importance of gaining as many perspectives as possible from different industry professionals and users. Students also cited "patience with others," "group work and presentation skills" and "how to effectively work remotely"-all skills that will be crucial in the future. Others stated having more insight in "how tough times affect everyone," especially relating to the impact of COVID-19.

2. STRATEGIES: BOTTOM UP AND OUTSIDE IN

For 13-weeks, Innovation Fellows worked in diverse teams assembled based on their majors, discipline concentration, backgrounds. Most students came from the school of architecture (with different concentrations) with some students from the fields of computer science and applied mathematics. The teams underwent team building exercises for one week aided by invited coaches. They were shown mechanisms for collaborative practice with a focus on remote team work. Over the course of the 13 weeks, weekly check-ins with a coach around team dynamics and challenges created a supportive layer and an overarching learning experience, especially helpful during the remote environments, where communication, setting goals as a team, and holding each other accountable is more difficult but essential. Teams agreed on regular meetings

with each other, and their coaches, and structured their time and (remote) collaboration on their own.

Since the FutureLab was designed as a coop substitute there was special attention paid to curating constant external input to get students' inspiration flowing. During the first couple of weeks subject matter experts and thought leaders from different verticals such as healthcare, sustainability, future of work, communities & neighborhoods, retail and consumer behavior among others provided an opportunity for the students to explore and get inspired. The process gave them "permission" to exit their discipline focus and jumpstart broad future thinking across a variety of topics.

Students were also required to proactively seek external input through interviews, attending conferences, and reaching out to stakeholders to learn more about trends, innovations, potential problem spaces, workability and co-creation of ideas together with external partners.

3. PHASES AND METHODOLOGIES

As a consequence of the open-ended nature of the FutureLab there was no traditional syllabus and the 13 weeks were structured in the aforementioned phases:

1 RESEARCH GLOBAL AND LOCAL INNOVATIONS
2 FUTURE SCENARIOS
3 PROPOSED CONCRETE SOLUTIONS

Beyond the two assigned professors, FutureLab curated external experts and thought leaders into the fold to diverge students' thinking, to inspire, and to create a sense of permission to expand far beyond traditional boundaries referencing fields and experts they otherwise would not interact with.

The overall framework consisted of weekly workshops and tool/methodology sessions, daily check-ins with coaches, weekly office hours with professors, and weekly outcome presentations.The weekly presentations, modeled after studio crit sessions included invited external professionals for feedback and discussion. Especially after phase one, the developed topics and part of the approaches were driven bottom-up rather than top-down giving agency to the individual students and their teams.

Phase 1 Research Global and Local Innovations – Inspiration+Creating Context

Initially during the first couple of weeks, the FutureLab had introduced a vast network of professionals from a variety of disciplines beyond architecture and related fields to give brief talks about trends and future opportunities within their industries. These industry thought leaders were also tapped over the course of the entire FutureLab to critique teams' milestones and connect them to other professionals within the experts' networks. This approach mirrored architecture practice which is characterized by many different consultants collaborating on a project and was especially important to open students' horizons and set the proper mental frame before diving into future scenarios planning. Organized by thematic verticals speakers from Northeastern University, MIT, Paraxel, Tapp NL, City of Boston's Housing Innovation Lab, Signify, Harbor Health Community Center, Age Strong Boston and other organizations addressed the following topics:

"Impact+Society,"
"The Future of Work,"
"Future Cities,"
"Living Environment,"
"Healthcare",
"Sustainability"
"Work/Live Spheres" and
"Retail + Consumer Attitudes"

The teams were asked to research innovations that were created in response to COVID-19 challenges in each of the thematic areas and document them with a short description and assessment. During that time students worked in teams and discovered global innovations across industries and communities. The result can be seen in the first report of the FutureLab ."[3]

Findings ranged from re-organizations of city blocks, micro markets, modulare intensive care units, PPE dispensors, patient education systems, schoolbus testing units to social distancing devices from all over the world. The findings addressed a variety of scales and formats of interventions setting the groundwork for a flexible approach to each team's own projects.

Phase 2 Future Scenarios (Fig.2)

> "Scenarios are hypothetical, causally coherent, internally consistent, non-predictive descriptions of the future."[4]

From the search of existing innovations teams moved into an exercise foregrounding "what if" questions applying the specific technique of Future Scenario Planning. Utilizing this methodology will increase students' set of competencies and toolkit and as a result their employability. Especially during a major disruption such as a global pandemic, organizations are reminded about their own vulnerabilities and how important it is to sustain relevance and market positioning and the ability to act agile.

"Scenario planning is a methodology that uses the inherent human capacity for imagining futures to better understand the present situation and to identify possibilities for new strategy."[5]

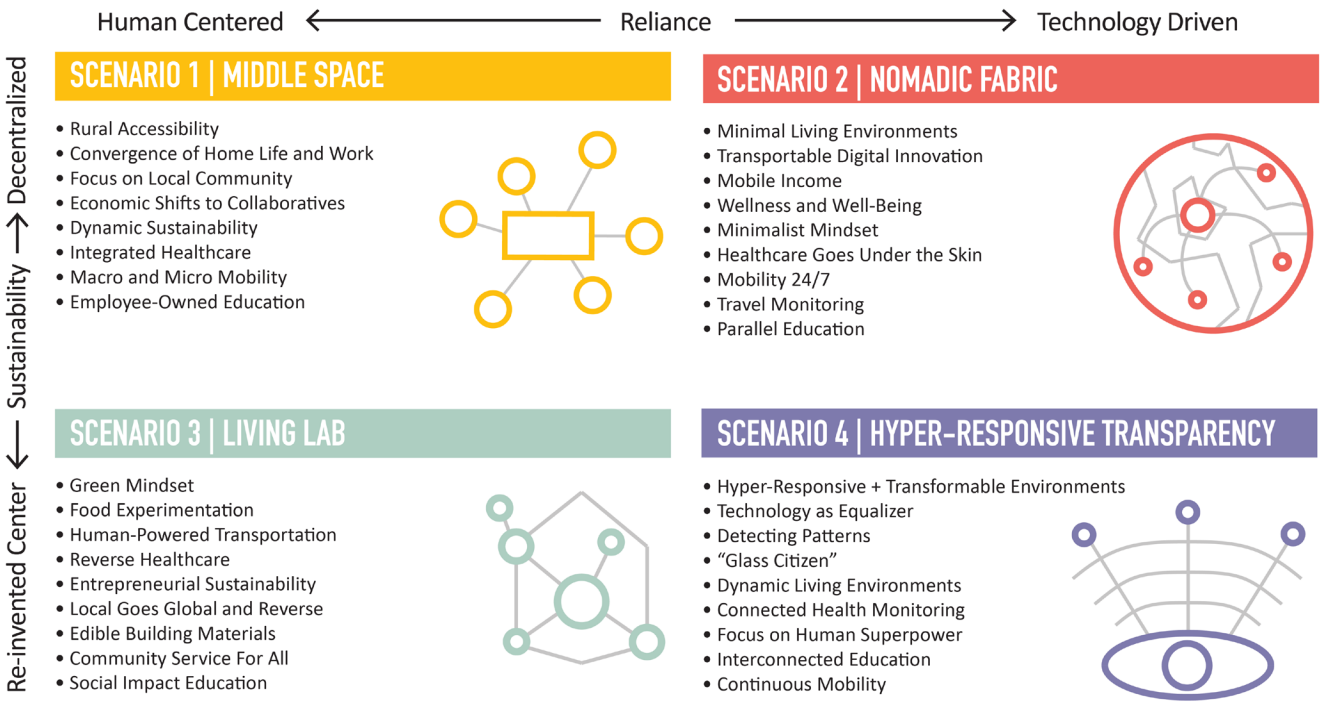

Figure 2. Future Scenarios Outcome (Image by Tory Lam).

Future Scenarios consider what may be plausible, envision alternate futures that may never happen in its entirety. However, they can provide insights to organizations and communities and inform the positioning of their strategies, services and products in case elements of these futures would become a reality. The consideration of plausible futures allows a stronger ability to innovate and respond faster and more nimbly to potential disruptions in the future. The Oxford Scenarios Programme calls out TUNA conditions: Turbulence, Uncertainty, Novelty, Ambiguity, which are always present, disruptive, and command mixed emotions ranging from excitement and imagination to worry and fear. Embracing TUNA and stretching our comfort zone is necessary in order to create alternative maps for the future. The following process was used to guide students through the future scenarios planning process:

a) Exploration of Drivers and Trends

Driving forces, sometimes called macro/mega-trend with a long life, a strong current resulting from many forces (society, technology, environment, economic, political) that cannot be influenced or manipulated. Drivers illustrate an underlying push that causes changes impacting people and resulting in modified and observable behavior triggering a trend to appear. Students explored different trends and drivers producing meaningful insights that could inform a future direction through a deep understanding of "why" did xyz emerge and what is causing certain developments? The teams utilized visualization methodologies to illustrate their research.

b) Determining Key Driving Forces

Based on their research, each student team determined their top two driving forces, stress tested each driver's polar opposite to articulate extremes and used a 2x2 matrix to develop snippets that reflect the influence of these drivers in the context of uncertainty and how they impact the way we will live and work in the future. The teams created newspaper headlines and snippets to start the process of creating strong narratives and storylines.

c) Producing Future Scenarios

The work student teams did thus far created a rich context from which to develop future scenarios. Teams produced 28 scenarios across a variety of sectors such as future of work, education, technology, role of community, healthcare, urban fabric, food security, and our radius of interaction.Students were encouraged to create relevance within their scenarios that will help to carry plausibility balancing a link to what we know today while creating a narrative that is pushing the story far into the future through innovative thinking and new ideas.

d) Creating Super Scenarios

The work of the teams was aggregated to reflect the strongest driving forces and to create four "super scenarios". As the student teams continue to dive into more concrete solutions envisioning the way we will live and work post-COVID,

Figure 3. Future Scenario—Living Lab. Graphic: Sofia Katona.

the "super scenarios" will serve as vehicle to test their ideas against these four alternate futures.[6]

Out of these 28 narratives, the following four future "super" scenarios were aggregated:

Scenario 1 | Middle Spaces - Decentralized hubs promote hyperlocal focus.
Scenario 2 | Nomadic Fabric - Loosely coupled global ties to live and work anywhere.
Scenario 3 | Living Lab - Cities turn into experimentation hubs and destinations. (Fig.3)
Scenario 4 | Hyper Responsive Transparency - Pervasive technology facilitates instant individual and environmental adaptation.

PHASE 3 PROPOSED CONCRETE SOLUTIONS

Conversations about the future are often not perceived grounded or immediately relevant for today. Human tendency is to favor the status quo and thus the present. FutureLab's scenarios created a backdrop to uncover concrete challenges and provide innovative solutions informing the context for further investigation and inspiration to external audiences to use these ideas as a launch pad to contribute further to their audiences and fields.

a) Defining a Problem

The process and outcome of the Future scenarios phase gave teams a sense of driving forces and their dualities as well as a space to work in for their own activities. Teams developed a matrix of all topics encountered and evaluated what they most wanted to work on.

While the desired outcome within an architecture project in an office typically is a building, the desired outcome of Futurelab was based on an open approach without pre-conceived goals, spending as much time understanding and defining the problem before suggesting a possible approach to the solution. Solutions also were not limited to buildings or spatial changes, they could be found in policy, software, digital devices, product design, urbanism and beyond. The open-ended approach fosters an understanding of the inseparable connection between several disciplines, acknowledging that a solution is most likely found within several topic areas. The goal of Futurelab was to encourage exploring avenues of innovative practice through interdisciplinary team work and open explorations with a focus on strategies and research beyond disciplinary boundaries and processes.

b) Tools and Methodologies for Exploration

Students were exposed to a variety of human-centered methodologies and tools to better understand underlying needs and problem spaces while testing assumptions and progressing iteratively. The tools were chosen deliberately to

1. Guide students beyond their discipline, open their horizon and stretch their comfort zones while challenging their assumptions.

- Thinking within and outside topic clusters
- Virtual Inspiration Maps
- Researching innovations
-Design Thinking
- Future Scenarios Planning

2. Focus on truly understanding needs, exercising empathy and mapping stakeholders.

- Interviews with stakeholders for empathetic insight into other people's experiences during the Pandemic.
- Observations
- Creative Matrix
- Personas and Stakeholder Maps
- Journey Mapping (Fig.4)

3. Exploring interventions and developing solutions

- Design Thinking
- Strategic conceptualization
-Research and Data Analysis
- Peer Feedback among Teams
- Critique through external professionals

c) Developing Cohesive Solutions

Student teams negotiated their areas of focus and concentrated on developing one concrete solution taking into account the learnings from interviews with "users" and stakeholders, understanding the relationships, levers and contention points among them. Over the course of a couple of weeks, they prototyped quick ideas and solicited further input from external thought leaders, stakeholders, organizations etc to continue to refine their ideas and increase impact and relevance. The solution sketches span a variety of fields, from envisioning urban solutions to introducing flexible transit pods and phone apps for on-demand produce delivery.

The following thematic areas were tackled by teams:

Food Production and Distribution: Towering Farmers [Vertical Farming], Crops for You and Produce Utility

The Concepts proposing urban farming solutions aimed at expanding access to fresh produce in offering a flexible distribution system, providing economic opportunities and introducing the experience of growing at multiple scales into communities. Public greenhouses represent a new typology of a public building common in many cities. Vertical farming solutions included underutilized urban surfaces and flexible growing beds on barges while connecting harvests and

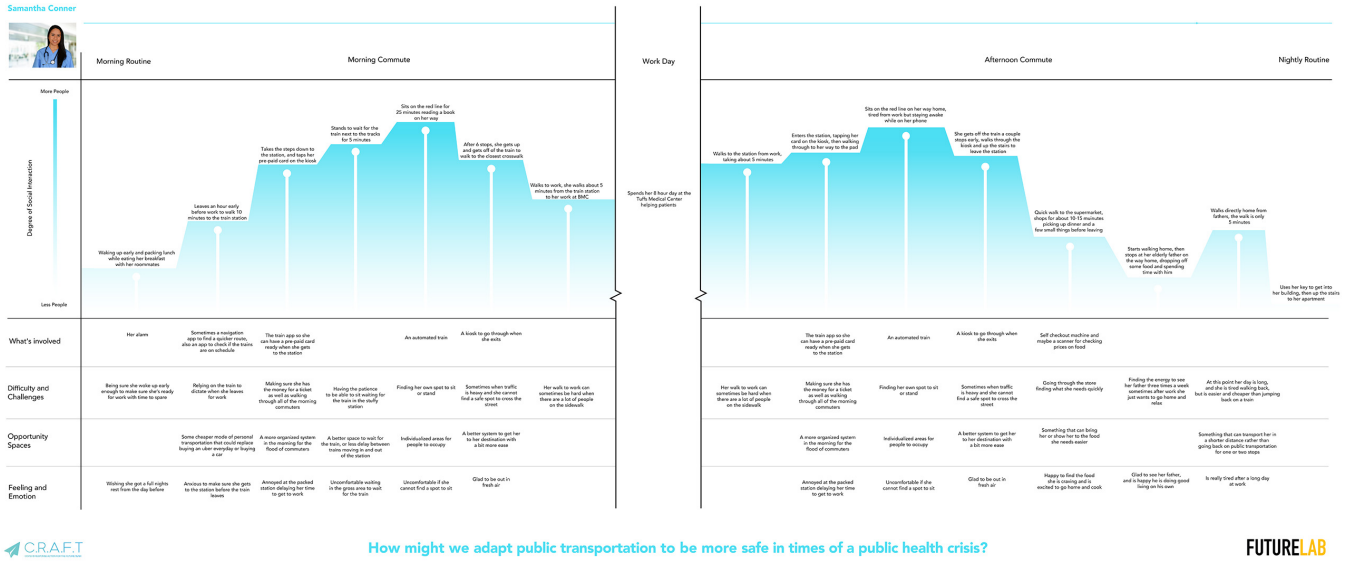

Figure 4. Journey Map. Image Jake Picariello, Maia Zavilinski, Michael Skolnick, Aidan French.

customers through phone apps allowing on-demand vegetable shopping.

Transportation: PAT Pods and The New MBTA (Fig.5)

The teams addressing transportation envisioned a combination of flexible pods attached to the existing light rail system in Boston, completely reprogramming street surfaces to be used by public transit and shared on-demand personal transportation units in combination with largely expanded pedestrian areas. The new MBTA included a flexible bus system that can travel on water and land and operates in combination with a network of electric bikes and dedicated bike lanes ensuring the safety of the riders.

Community: Communal Hub (modular system community center)

Pop-up services and stores as needed characterize the modular community hub system. Portable containers offer a more accessible way to shop - in changing locations. Local businesses can expand their reach with a farmers market style model made from shipping containers or other modular building components.

Healthcare: VitalSight - Augmented reality hospital situation

Eliminating the need for a waiting room, this system based on Augmented Reality collects medical data while immersing patients into enjoyable and fun environments. Partnering with museums, parks and cultural organizations, leisure, education and treatments are able to merge.

4. CONCLUSION

a) Challenges

In their exit survey, students mentioned their desire for more clarity within the FutureLab struggling with time management and group dynamics. The sudden COVID-19 disruption had presented a significant challenge to transition to fully remote ways of communication and especially team work. Team constellations were somewhat fluid as the university allowed students to enter at later points of the program, e.g. when an employer shortened their originally planned co-op, or some students left during the initial weeks of the FutureLab due to employers making later than usual offers. This, of course, impacted the team dynamics and required high flexibility on each individual to integrate new members or deal with the loss of existing team members, who carried responsibilities thus far.

The fact that individuals and teams were required to self-organize a significant amount of time during the week, coordinate their own schedules and manage shared responsibilities while staying accountable to the rest of the team didn't necessarily come easy. Although coaches checked-in with teams on a daily basis, regular workshops, presentation and content sessions happened during the week, students clearly struggled with adjusting to the unexpected situation, which found themselves mostly at home and not on campus grounds or in their own apartments.

Further, this alternative co-op was unpaid, placing a huge strain on many students as they typically factor in paid co-ops to organize their finances. Multiple students had to take part-time jobs to at least subsidize some of their lost income, which in turn caused team and performance issues.

FUTURELAB

Stay at Home Designers

STAY AT HOME DESIGNERS

How might we create a more sustainable and accessible public transportation system?

Sustainability and accessibility may seem as though they run on parallel tracks to each other but in fact they are two sides of the same coin and reflect each other.

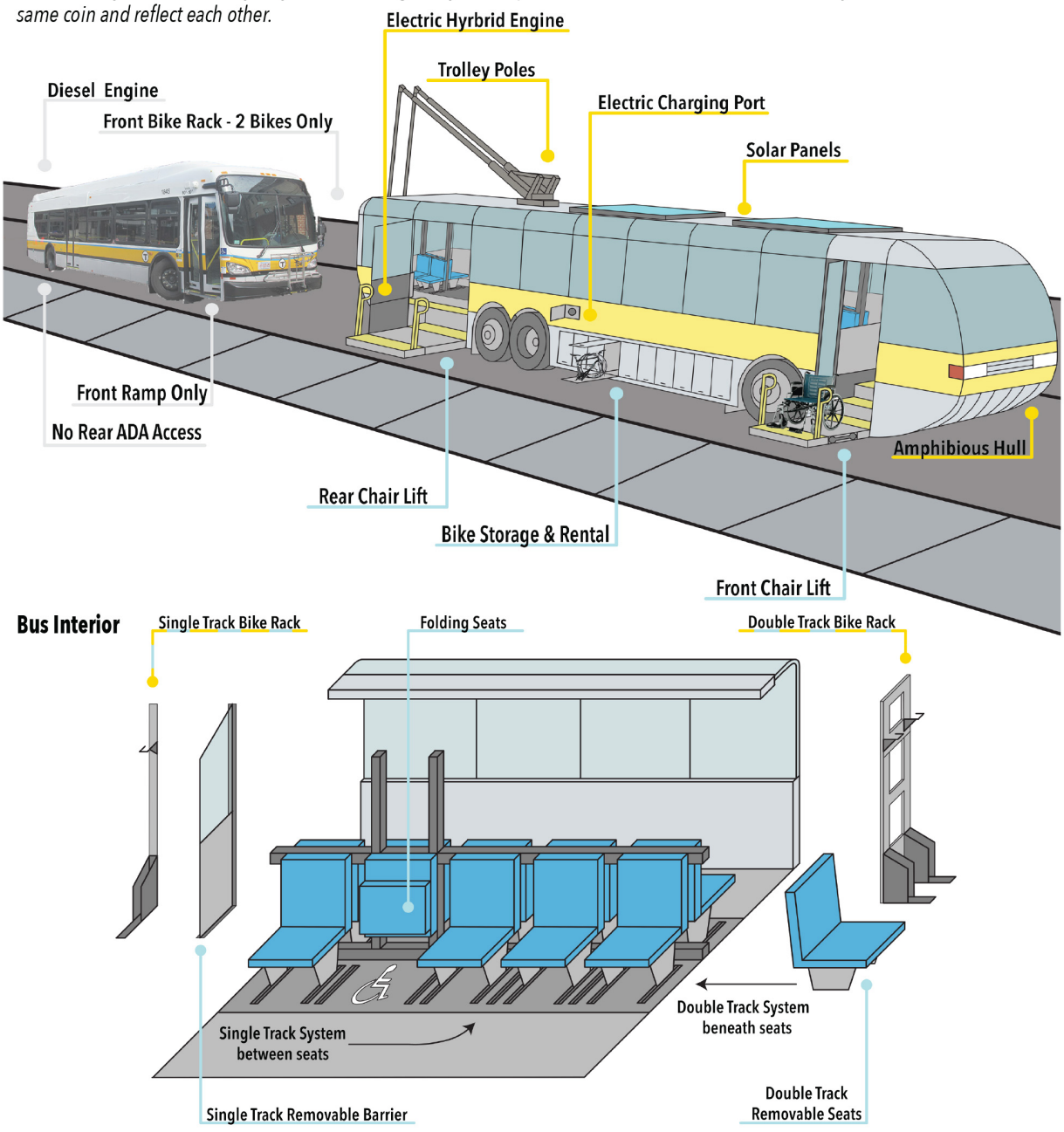

Figure 5. Project Sketch. Image by Thomas Rogier, Tina Trainque, Caden Savage, Suman Panta.

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b) Student Learning

Professional boundaries are strong and people are comfortable in falling back on what they know. One of the most impactful methodologies was the heavy integration of external professionals and thought leaders from different disciplines according to students' feedback at the end of FutureLab. It allowed them to test their assumptions, challenge their beliefs and explore new pathways and topics they may otherwise not come across. It also allowed them to see opportunities for their discipline to contribute to other industries they did not consider before. This is extremely valuable as industries are converging more and more and many companies are diversifying their skill sets and backgrounds with unusual hires from non-traditional majors. In addition, it created a tremendous platform for networking that students can continue to activate beyond the FutureLab.

Students were also very appreciative of the tools and methodology usage in general. While students initially struggled for example with the development of future scenarios and transporting themselves into the future with potentially different mindsets and attitudes toward life and work, they could see the relevance of the methodology over the remainder of the FutureLab when developing concrete solutions as well as its applicability to any future work engagement and project they are required to deliver. Utilizing these tools and methodologies clearly demonstrated an opportunity for them to position their competency portfolio for future employment strengthening their employability.

The substitute co-op clearly stayed outside of just architecture and shared tools that are applicable in the design, engineering and the business world. Many students appreciated the newness, breath and open nature of the process. Several stated that FutureLab " helped you think of different creative ways we can problem solve in our daily lives." Several students cited the improvement of "social skills," "building a network" and "learning a lot through research and are challenged to creating and developing new ideas constantly."

c) Overall Considerations

Beyond the learning outcomes, the FutureLab also provided the students the opportunity to actively contribute to future thinking across industries. All three phases were concluded with a report students can utilize in their portfolios and resumes. The publications were also shared with external partners, alumni, and the broader Boston ecosystem receiving positive feedback.

As mentioned before, the outcome of work-based learning is difficult to assess and depending on the employer and employment situation, students end up with vastly different experiences and skills. Futurelab, albeit born out of the adverse conditions of a job marked during a Pandemic, offers a more predictable experience while still being immersed with professionals and solving real world problems. A consistent issue of co-operative education can be the lack of feedback from employers and strong dependence on the economic cycles. Futurelab was set up spontaneously and allowed student interests and emerging topics to impact its course, thus developing dynamically.

While future versions of the alternative co-op will implement lessons learned, the 2020 Futurelab succeeded in providing students with an experience that is situated between academic education and work experience, familiarizing them with the challenges of a collaborative team outside of the tight boundaries of their discipline and a highly supervised classroom. The interview process, journey mapping and persona/stakeholder evaluation gave students tools to deal with ill-defined/unknown problems reframing them in a human-centric and user-focused way.

The networking aspect of co-op which ultimately can lead to job placement later, was definitely present in the Futurelab even if it presented itself in a different format than having worked for one employer. Guest speakers from the Deep Dive into Global and Local Innovations (phase 1) were invited back for progress presentations and made themselves available as interview partners for several teams.

The format of the Futurelab shows that work-integrated learning can take different shapes especially during times of disruption and successfully create an immersion in practice-based processes. Critical for the success of the FutureLab was the iterative approach and the ability to co-create with external entities

ENDNOTES

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