

PRESENTED TO AUTODESK FOR DESIGN FUTURES 2023
BY CARLO LOPA, NICCI OBERT, AND OLIVIA CUELLAR



2043 MASTER PLAN GAME

**CLIMATE VISIONS OF THE FUTURE
FOR TOMORROW'S ENGINEERS,
ARCHITECTS, AND GLOBAL
CITIZENS**

CLIENT BRIEF

AUTODESK

“What visions of the future do tomorrow’s engineers hold?”

WICKED PROBLEM

Given our changing climate, how might future engineers design for resilience? What approaches (localization, circular economy, adaptive reuse, etc) might the future engineer leverage?

TIME HORIZON

25 - 30 years to create artifacts in the more speculative range

TARGET AUDIENCE

Autodesk’s Strategic Foresight Team
Architecture, Engineering, Construction (AEC) Industry Futures Team
AEC Industry Stakeholders

DESIRED OBJECTIVE

Build greater understanding of tomorrow’s engineers and how their learning, ways of working and working environments might evolve, and support student teams to experiment with new or hybrid methods for approaching corporate strategic foresight.

ENGINEERING FOR A CHANGING CLIMATE: 2043 MASTER PLAN GAME

THE MASTER PLAN GAME IS...

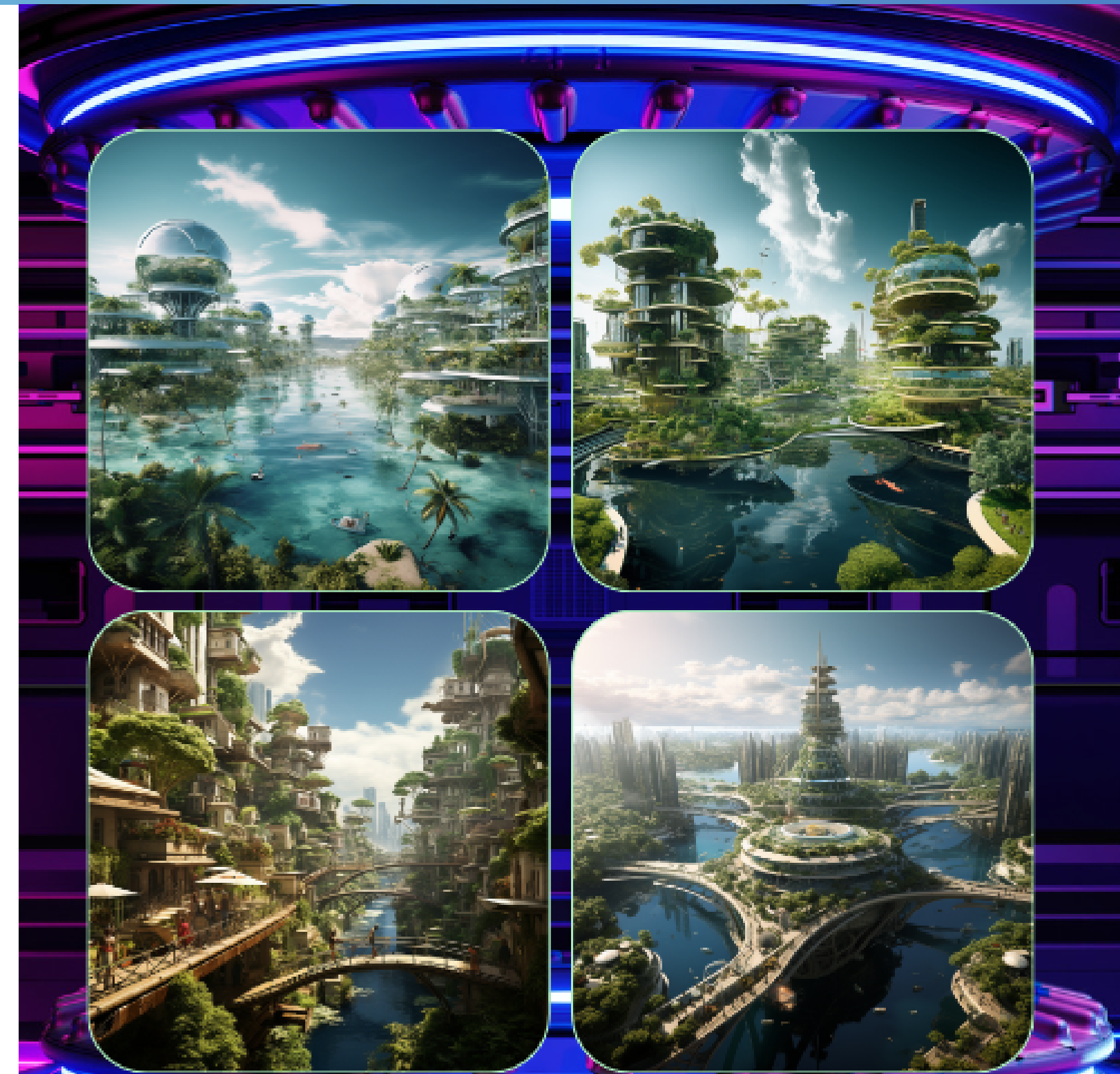
EXPERIENTIAL
IMMERSIVE
PROVOCATIVE

ITERATIVE
INCLUSIVE
PURPOSEFUL

The 2043 Master Plan Game is an artifact from the future that simulates a crowdsourcing platform where community members, engineers, architects and local government officials collaboratively iterate the (re)design of infrastructure and layout of climate-vulnerable communities.

The project addresses increasingly negative effects of climate change and encourages a collective reimagination of built environments with respect to resilience, community needs, and environmental impact. It addresses the systemic nature of responding to climate change, incorporating social, technological, environmental, economic, and political challenges into the final product.

Recommendations for the client included elevating and prioritizing community voices and needs, leveraging engineering knowledge of innovative materials, and collaborating effectively with all stakeholders.



Images from the game artifact created with Midjourney

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

STAGE 1 HINDSIGHT

Contextual Territory Definition + Systems Mapping

STAGE 2 INSIGHT

Discovery + Exploratory Research

STAGE 3 FORESIGHT

Conceptual + Generative Research + Design

STAGE 4 OVERSIGHT

Iterative + Evaluative Design Methods

STAGE 5 EXPERIENCE

Artifact Presentation + Feedback

OUR PROCESS

Framework + Methodology

Our approach underscores the integration of design methodologies with foresight framework principles. Each project phase drawn from the Houston Foresight Framework is aligned with a stage in the design process. Many of these stages encompass more than one framework phase, highlighted in the progress bar at the top of the slides. We provide comprehensive explanations of how each phase of the framework is applied within our project context, enhancing the dynamic synergy between design methods and foresight practices.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

RESEARCH QUESTION

This stage bridged the framing and scanning phases of our initial research. Our team identified the research question which is coalesced around three foundational questions that emerged from primary scanning and framing activities. The question focused the design process on highlighting improved resiliency of the built environment of climate-vulnerable communities to combat inequality in the face of climate change.

“How can engineers leverage innovations in materials science, local resourcing, and the specific culture, values, and socio-economic needs of communities to increase the resiliency and sustainability in the redesign of master plans of climate-vulnerable communities?”

1

PRIORITIZING LOCAL COMMUNITY INPUT

How can communication between researchers, engineers, the public, and governments improve so that each can contribute to reframing the narrative of climate change and resilient communities?

2

REIMAGINING A POST-CAPITALISM WORLD

How can engineers, both researchers and practitioners, participate in and support post-capitalist societies? What would an after-plastic society look like for engineers?

3

LEVERAGING MATERIAL SCIENCE

How can engineers, researchers and practitioners, bring material science and engineering perspectives into the burgeoning circular economy movement?

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

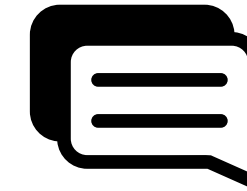
RESEARCH INPUTS

This next stage of our process combined the scanning, and futuring phases of our research. Our team conducted both primary and secondary research to explore the future of engineers amidst climate change. We conducted horizon scanning, autoethnographies, and designed a gamified survey called the 'Master Plan Survey'. Simultaneously, we started to individually brainstorm various artifacts inspired by our research — a process we called parallel provotyping — a more provocative version of prototyping.



HORIZON SCANNING

Horizon scanning involved individually collecting signals of change across the time horizon of 15-25 years and inputting them on a group library on Raindrop to pinpoint emerging trends and key drivers of change.



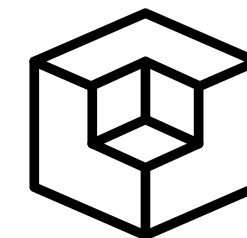
MASTER PLAN SURVEY

The Master Plan Survey was collectively designed and developed by our team for engineers, architects, and island community residents to contribute to and provide feedback on four unique speculative master plan ideas for future communities.



AUTOETHNOGRAPHIES

Autoethnographic research entailed individually reflecting upon our personal experiences and unique challenges living in three climate-vulnerable island communities across the globe: Okinawa, the Philippines, and Galveston, Texas.



PARALLEL PROVOTYPING

Parallel provotyping is the culmination of individual artifact ideas, scanning research, group discussions, and presentation feedback into several thoughtful and provoking possibilities to be interwoven with the final master plan game artifact.

FRAMING

SCANNING

FUTURING

VISIONING

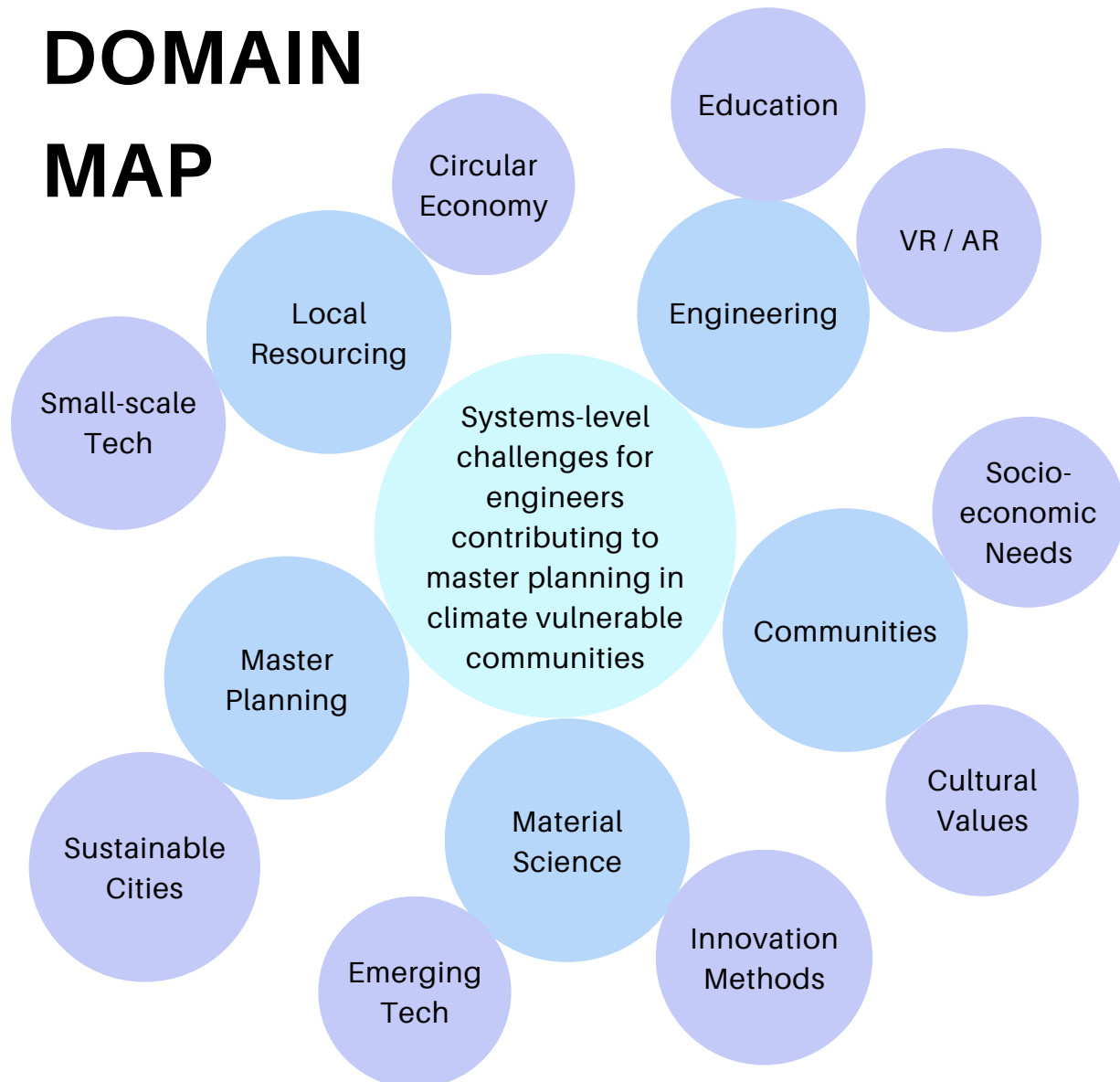
DESIGNING

ADAPTING

HORIZON SCANNING

Our team utilized the Raindrop App to aggregate scan results in a shared library, employing our domain map to search for signals within well-thought out categories such as Local Resourcing, Master Planning, Materials Science, Engineering, and Climate Vulnerable Communities. This ultimately helped us to identify emerging trends and influential drivers for our final artifacts.

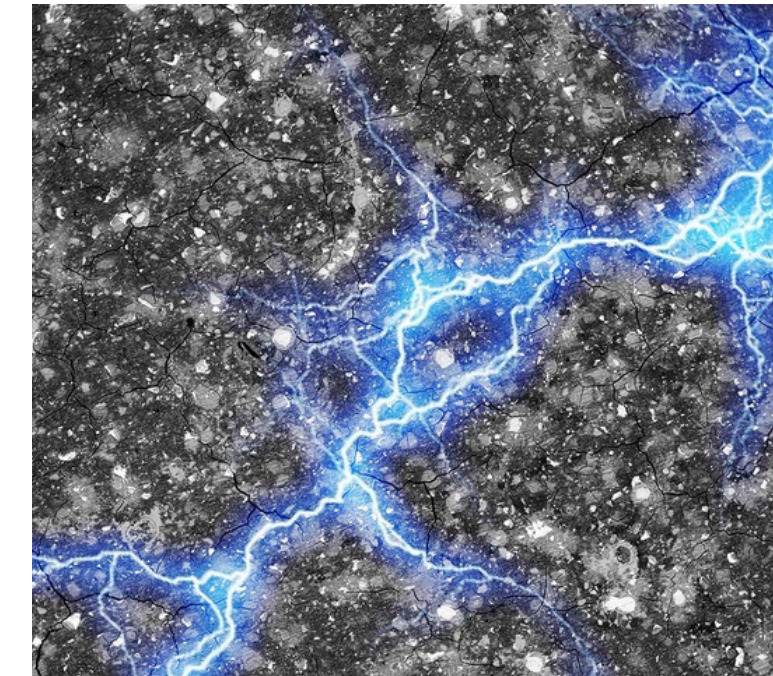
DOMAIN MAP



How to Cool Down a City
Singapore is rethinking its sweltering urban areas to dampen the effects of climate change.



A blueprint for Turkey's resilient reconstruction and recovery post-earthquake
Planned neighborhoods should be rebuilt resilient to known hazards caused or intensified by climate change.



Electrified cement could turn houses and roads into nearly limitless batteries
Energy storing building materials could make on-demand power from renewables affordable worldwide.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING



AUTO-ETHNOGRAPHIES

As our team discussed the effects of climate change, we all realized that we share similar experiences living in island communities that are vulnerable to severe storms, rising sea levels, and flooding. Consequently, we believed that our first-hand experiences with climate change would add valuable insights and unique perspectives to the research. Essential elements of the Master Plan Game were intimately influenced by these autoethnographies. We specifically chose Bicol, a city in the Philippines, as the main setting of our experience.



Okinawa, Japan

"I have lived in Okinawa for the past two years. It is a beautiful island and the Okinawans have tried to preserve the environment. However, coastal loss due to increased concrete seawalls have contributed to habitat loss. Typhoons have increased in frequency and intensity annually. Interestingly, the typhoons also started to cause less damage after 1950s. This is because reinforced concrete is the primary building material and the reason for increased resiliency. However, concrete contributes significantly to climate change due to high emissions, so the future of concrete could include more sustainable options like vegetable-composite concrete." -Olivia Cuellar



The Philippines

"I have lived in the Philippines for all my life, and experiencing severe typhoons is nothing new to me. Ever since 1980, the occurrence of storms has annually increased in frequency and intensity. Regions such as Cagayan Valley, Bicol, and Eastern Visayas are the most affected by these severe storms. Simultaneously, sea levels are constantly rising, and temperatures are projected to rise. Unfortunately, despite efforts to mitigate climate change and disasters from happening, many Filipinos do not feel that they are prepared. In fact, we are already so fed up with having to be 'resilient' when storms and temperatures disrupt our lives." - Carlo Lopa



Galveston, Texas

"I've lived in Galveston for a little over a decade. It's impossible to spend much time on the Island without encountering reminders of the 1900 Storm. After the devastation, the Galveston community physically raised the Island using dredge sand, lifting homes with hand levers to backfill underneath them, and designed, engineered and built the 17' Seawall within three years. After Hurricane Ike devastated the Island in 2008, a professor at Texas A&M Univ. at Galveston developed and championed the Ike Dike concept which was finally approved by Congress 15 years later in 2023. No funds were subsequently appropriated. Despite Galveston being disproportionately vulnerable to sea level rise from melting glaciers, the City has not established a Climate Action Plan. The 2020 drainage plan used 1969 sea level and rainfall maps to determine pump station capacity and drainage pipe diameters. It is important to note that the areas of the city most vulnerable to flooding, especially after the implementation of the current drainage plan, house the Island's historically marginalized communities." Nicci Obert

FRAMING

SCANNING

FUTURING

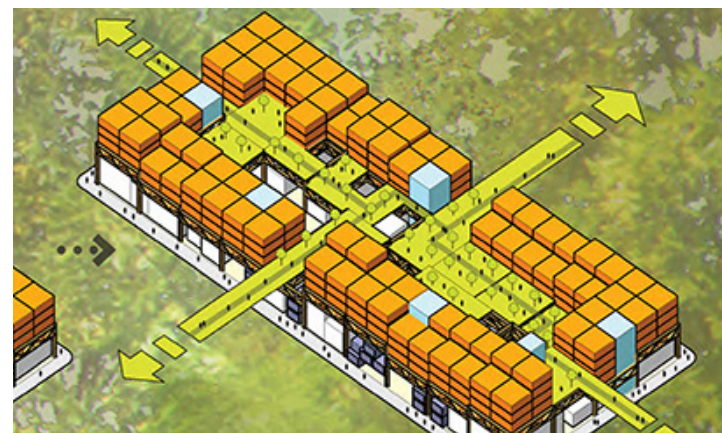
VISIONING

DESIGNING

ADAPTING

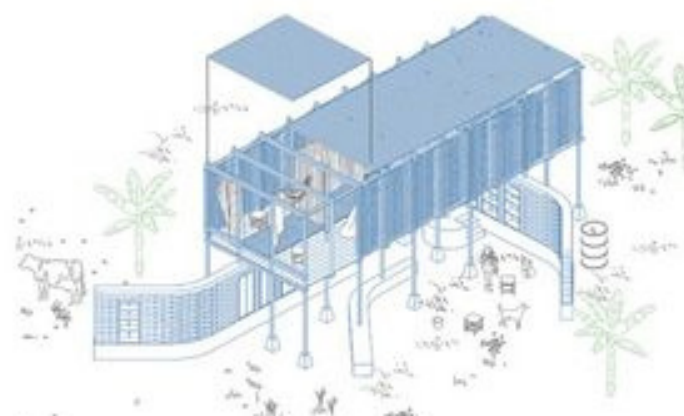
MASTER PLAN SURVEY

To incentivize participation, our group designed a gamified survey called the 'Master Plan Survey'. It successfully yielded thoughtful feedback from participants. They shared their fondness for some concepts, but also their concerns. Community members and engineers were critical of the crazy designs, but most of them said it helped them reimagine their communities. Of significance, we noticed that while the community members were more concerned about personal preferences, engineers were more concerned about the feasibility of the design.



MODULAR CITY

- Concerns about the financial costs of this design
- Concerns about the sustainability of the solution as climate change continues to get worse
- Concerns about the separation of private and public spaces
- Appreciate how this city design mitigates the issue of flooding
- Fondness for smarter mobility



RAISED CITY

- Concerns about feasibility of housing large populations
- Concerns about safety and privacy
- Appreciation for the cultural inclusiveness of the design
- May cultivate a culture of responsibility for the natural environment and community
- This design is preferable for communal spaces



BAMBOO CITY

- Concerns about fire resistance (especially the chances of household appliances catching fire)
- Concerns about whether the greenery will lead to insects and other creatures being in the vicinity of where they live
- Bamboo is costly or affordable depending on the geographical location



FLOATING CITY

- Concerns about vulnerability to typhoons and earthquakes
- Concerns about the engineering feasibility (e.g. how will they connect electricity, drainage, and access to other services)
- Financial concerns
- Motion sickness potential
- Appreciate the adaptability to sea level rise

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

MASTER PLAN SURVEY

We had a total of 8 engineers and 4 community members participate in the gamified survey. As a team, we found the best way to synthesize all of this data was through an affinity diagram, where we pulled common and diverging likes and dislikes, revealing similarities and differences between engineers and community members.

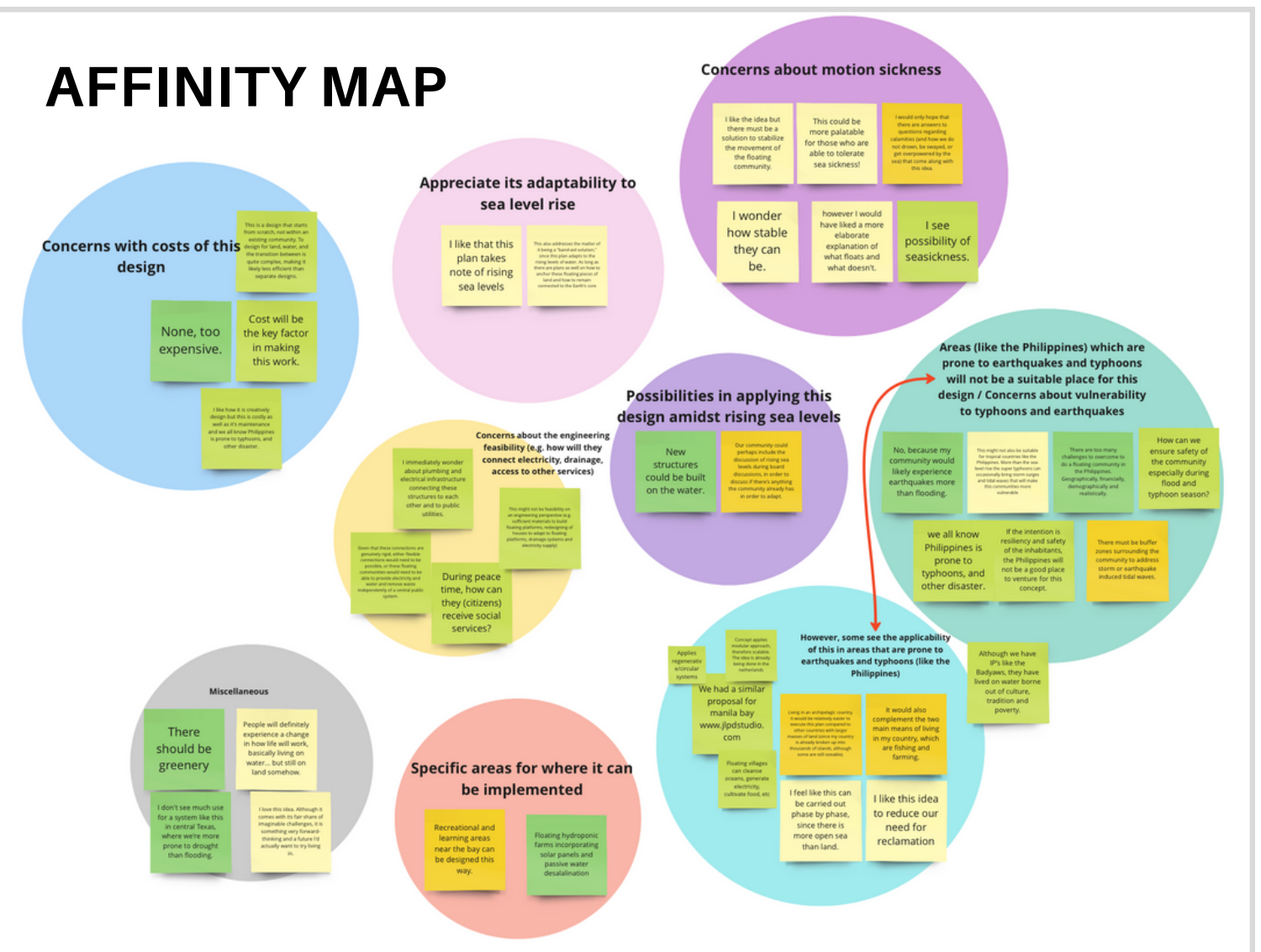
Feedback from Participating Engineers, Architects, and Community Members

“Floating town can utilize bamboo for construction grown from the town itself. Agri waste can be recycled to produce energy. Edges of the floating town can be designed to grow mangroves as protection against storm surges and serve as biohabitats”

“Stackable neighborhoods and workplaces made out of bamboo and other green materials with adjacent spaces that float on the bay!”

“I'd love to see spaces which heat and cool themselves more efficiently than modern dwellings. The heating/cooling system tends to be one of the largest energy consumers in a standard home whether single or multifamily, and it would be great to see more natural cooling systems and breathable spaces.”

AFFINITY MAP



FRAMING

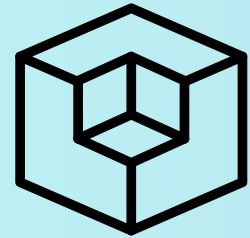
SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING



PARALLEL PROVOTYPING

This stage bridged the futuring phase and the visioning phase of our research. Our team worked individually to develop ideas for tangible and provocative artifacts from the possible future indicated by our research. After reconvening, it became clear that a more immersive Master Plan Game would be the primary artifact, with the other prototypes supporting and enhancing the central design goal. It was at this stage that our vision for the game simulation started to come together.

Materials Menu (a foundational artifact within the game)

Incorporated into the final game is a choice of sustainable, climate-resistant building materials:

- Vegetable-Composite Concrete
- Mycelium
- Hybrid Bamboo/Texas Esperanza crops

Day in the Life (eventually discarded through iteration)

Tell the story in an every-day setting.



UN Global Prize (sparked the idea of a formal invitation to participate)

Awarded to climate-informed engineers who make innovative contributions revitalizing climate-vulnerable communities.

- Medal
- Bio of winner

Commemorative Coin

An NFT coin is given to participants of the Master Plan Game to commemorate their contribution to a city.

News Article (evolved into a news cast)

Announcement of UN Global Prize winner and coverage of their Master Plan Game initiative.

FRAMING

SCANNING

FUTURING

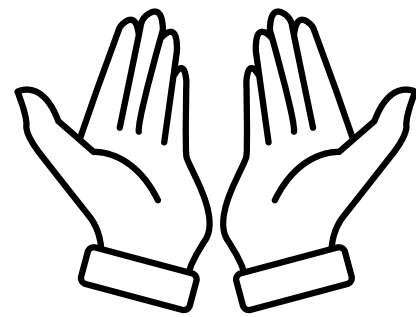
VISIONING

DESIGNING

ADAPTING

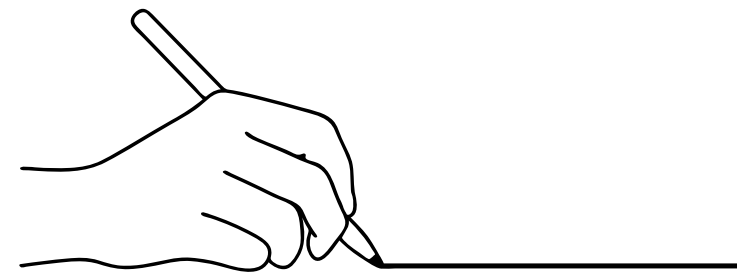
FUTURES + DESIGN

After investigating the commissioned project using traditional foresight methods and newly learned design methods, our team considered the best possible way to convey our research results to the client. Faced with a myriad of design options and methods, our final product drew from the core concepts of experiential futures, powerful storytelling, and the suspension of disbelief through seamlessly integrated built-in artifacts.



Experiential Futures

Participatory design can be highly engaging and impactful, offering a deeper dimension for the audience. Artifacts were designed to provide decision points, "Easter Eggs," and audio-visual elements to immerse participants in the Master Plan Game.



Powerful Storymaking

Charged with imagining a new need from a potential future scenario and translating into a product, our team focused on building a new mechanism to provide climate-vulnerable communities with agency and a communication path to engineers and decision-makers.



Suspension of Disbelief

Recognizing that an audience will usually be willing to participate and forgo many constraints if the project is designed well, our team created a presentation that provided attendees with a simulated participatory experience with links to go back to recreate and personalize the experience.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

ITERATION, CRITIQUE + FEEDBACK

Continuous phases of iteration drove our team's progress. After each of our four progress presentations to the client, we incorporated key feedback through collaborative critique workshops. These workshops encouraged constant refinement of both depth and breadth throughout the entire project. Some of the key themes our team pulled from the client were to explore more deeply, consider blind spots, and create beyond expectations. The following slides represent a selection of the interactive artifacts and simulated dialog designed for the final project.

EXPLORE

Resiliency and Reconstruction

How will engineers navigate transition to preferred future(s)?
Focus on material science innovation for infrastructure reconstruction.

CONSIDER

Unintended Consequences

Look at unintended consequences of material supply chains and resource management. Include both material and non-material lifestyle implications.

CREATE

High-Definition Artifacts

World-building is key. The idea is to make a future world around the game. Construct the situation, suspend belief, activate play.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

THE EXPERIENCE

ARTIFACT: NEWS CAST

“Welcome to UNB Global News. I’m Julia Canon. It’s Friday, November 27.

The 2043 UN Gates Prize in Sustainability Innovation was announced this afternoon. Architect and activist Yesinia Hernandez received the call that her inspiring work facilitating collaboration between community stakeholders to rebuild and pre-build climate vulnerable infrastructure had earned her the \$1 million prize. Dr. Hernandez’s family immigrated to the United States, matching with Galveston, TX through the pilot CliMigration System that won the inaugural UN Gates Prize in 2035. Yesinia studied architecture at Rice University where she built a virtual platform at the intersection of infrastructure, design, and community needs, hopes and values. This platform elevates community input and provides a venue for a collaborative, iterative master plan process.

In September of 2040, Hurricane Melissa, the first Category 6 hurricane to make landfall in the US breached the seawall and decimated Galveston Island and the Hernandez family home.”



FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

THE EXPERIENCE

ARTIFACT: NEWS CAST

“Leveraging her relationship with officials in the city, Yesinia proposed a test run of her software to resounding success. Galveston was reborn virtually, and engineers, city officials, and hundreds of community members met together to iterate a thriving, resilient Galveston.

The city now supports its own microgrid using solar power and a wave harvest generator. A desalination system installed on the seabed of Galveston Bay provides a steady, sustainable source of potable water, and a canal system runs through a now elevated downtown area.

Invitations to the most recent project using Dr. Hernandez’s work went out this weekend and stakeholders will gather in the CR space representing Bicol City, Philippines later this week.”



FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING



THE EXPERIENCE

ARTIFACT: UN INVITATION



WITH GREAT PLEASURE, I EXTEND TO YOU A MOST EARNEST INVITATION TO PARTAKE IN AN ENDEAVOR OF PARAMOUNT SIGNIFICANCE. THIS COLLABORATIVE GAME MAY ALTER THE COURSE OF THE WORLD ITSELF. THE STAKES ARE ELEVATED, THE CHALLENGES FORMIDABLE, AND THE POTENTIAL RAMIFICATIONS PROFOUND. I IMPLORER YOU TO JOIN THIS INTELLECTUAL FORAY, WHERE WIT AND SAGACITY SHALL BE YOUR ALLIES, AND THE OUTCOMES MAY RESONATE FAR BEYOND THE BOUNDARIES OF MERE SPORT. YOUR PARTICIPATION IS NOT ONLY DESIRED BUT CRUCIAL, FOR INDIVIDUALS OF YOUR PERSPICUITY AND ACUMEN POSSESS THE CAPACITY TO LEAVE AN INDELIBLE MARK ON THE ANNALS OF THIS CONSEQUENTIAL UNDERTAKING.

SINCERELY,
THE WORLD CLIMATE CZAR
ALFRED PADDINGTON
UN
NEW YORK CITY

NEXT STEPS

PLEASE REPORT TO YOUR LOCAL UN RESOURCE OFFICE NO LATER THAN 9:00 AM DECEMBER 28TH, 2043. YOU CAN BRING TWO CONTAINERS FOR YOUR BELONGINGS, EACH NO GREATER THAN 120 LITERS IN VOLUME. THIS COMPETITION IS EXPECTED TO LAST BETWEEN 1 AND 4 WEEKS. FOOD, ROOM, AND BOARD WILL BE PROVIDED FOR YOU AT NO COST, AND YOUR SALARY WILL BE COMPENSATED FOR WHILE YOU PARTICIPATE.

IMMEDIATELY FOLLOWING THE COMPLETION OF THE COMPETITION, YOU WILL BE RETURNED HOME AT NO EXPENSE. THE COLLABORATIVE MASTER PLAN WILL BE ANNOUNCED NO LATER THAN ONE MONTH FOLLOWING COMPLETION OF THE COMPETITION.

ALL PARTICIPANTS RECEIVE GLOBAL TAX EXEMPTION FOR THE 2043-44 TAX YEAR.

GRAND PRIZE WINNERS RECEIVE THE DISTINCTION OF SAVING THE PLANET AND GLOBAL TAX EXEMPTION FOR LIFE.

PARTICIPATION IS MANDATORY. PLEASE CONTACT YOUR UN RESOURCE OFFICE IF YOU HAVE EXTENUATING CIRCUMSTANCES.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING

THE EXPERIENCE

ARTIFACT: MENU ROOM



“Welcome to the Bicol Menu Room. Our engineers and architects have used Bicol’s existing and projected elevation and environmental conditions to curate options. Participants are encouraged to browse the menus and reach out to the AI assistant with any questions.”

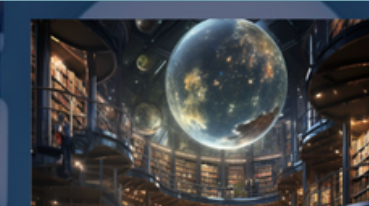
UN-RECOMMENDED

COMMUNITY OPTIONS



The Commons

The United Nations subsidizes the rebuilding of infrastructure in climate-vulnerable communities, but requires that a substantial percentage of usable land be dedicated to common space to meet the social and cultural needs of the community.



Education

Collaborative teams are asked to find structural ways to incorporate UN learning initiatives (universal literacy, foresight fluence, social-emotional skills) and social and cultural education requirements into the built environment.



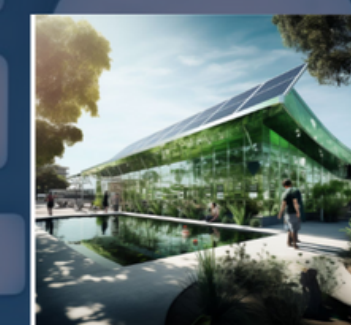
Innovation Hubs

Rebuilt cities and the We Built This City game exist because innovative people had the opportunity to turn their ideas into action. Collaborative teams are encouraged to build Innovation Hubs into the city plans to provide space and resources to nurture and iterate new ideas.

CLEAN ENERGY OPTIONS



Wave Energy



Solar Energy



Hydrothermal

FRAMING

SCANNING

FUTURING

VISIONING


DESIGNING

ADAPTING

THE EXPERIENCE

ARTIFACT: INOVATIVE MATERIALS MENU

INNOVATIVE MATERIALS MENU



SELF-HEALING BIO CONCRETE

This concrete mixture contains a water-activated bacteria, which produces limestone under specific conditions, coating the cracks with calcite to seal them.

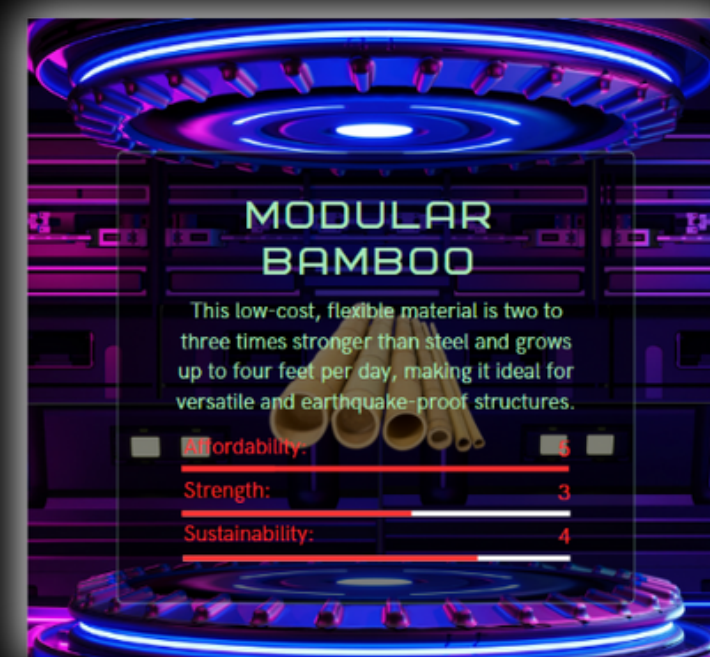
Affordability: 2
Strength: 5
Sustainability: 3



ORGANIC MYCELIUM

These building blocks grown from the roots of fungi are used to create airtight insulating walls. Growing within just three days, they are 100% biodegradable.

Affordability: 4
Strength: 2
Sustainability: 5



MODULAR BAMBOO

This low-cost, flexible material is two to three times stronger than steel and grows up to four feet per day, making it ideal for versatile and earthquake-proof structures.

Affordability: 5
Strength: 3
Sustainability: 4

SELF-HEALING BIO CONCRETE

This concrete mixture contains a water-activated bacteria, which produces limestone under specific conditions, coating the cracks with calcite to seal them.

Affordability: 2
Strength: 5
Sustainability: 3



MODULAR BAMBOO

This low-cost, flexible material is two to three times stronger than steel and grows up to four feet per day, making it ideal for versatile and earthquake-proof structures.

Affordability: 5
Strength: 3
Sustainability: 4



ORGANIC MYCELIUM

These building blocks grown from the roots of fungi are used to create airtight insulating walls. Growing within just three days, they are 100% biodegradable.

Affordability: 4
Strength: 2
Sustainability: 5



CROSS-LAMINATED TIMBER

These boards are stacked in perpendicular layers, allowing for greater dimensions and they provide the same level of insulation at 1/18th the thickness of concrete.

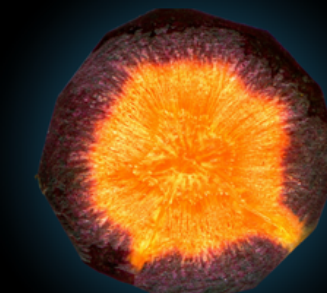
Affordability: 3
Strength: 3
Sustainability: 5



VEGETABLE COMPOSITE CONCRETE

Made from sugar beet or carrot, these composites structurally out-perform cement additives, such as graphene and carbon nanotubes at a lower cost while also reducing CO2 emissions.

Affordability: 3
Strength: 4
Sustainability: 5



EXCERPTS FROM SIMULATION DIALOGUE

Participant: (after viewing stats on bioconcrete, mycelium and modular bamboo) It's perfect! It's affordable and durable, but also sustainable. Could I get a little bit more information?

AI Sustainability Engineer: An organization called the Hilti Foundation that has been working on bamboo for the past 30 years. They have found bamboo to be cost effective and regenerative because it grows quickly. Additionally, engineers with Hilti have strengthened bamboo to make it resistant to strong typhoons and earthquakes.

Participant: Great! We will choose bamboo as our material.

FRAMING

SCANNING

FUTURING

VISIONING

DESIGNING

ADAPTING



EXCERPTS FROM SIMULATION DIALOGUE

Participant: A raised city might be a good option. It resolves our storm surge issues and rising sea levels, but I'm concerned that it might mitigate community space. Throughout the year, we have several cultural festivals that involve parades, colorful costumes, lively music, and dances. Would we have to give that up? Additionally, we supply 95% of the world's Abaca. I'm concerned that if we raise the city, the abaca fields would be at an increased risk of flooding and we would lose our primary source of income.

AI Sustainability Engineer: One of my priorities is to ensure that when we rebuild infrastructure, we also build more resilient community structures. We can match your community with UN-subsidized programs that will fund the raised city model, but require municipally maintained common spaces, which will be perfect for your festivals and daily communing. I would also suggest adding vertical farming for your abaca plantations. The UN has consistently identified this as a valuable product and source of livelihood for many Filipinos. Our sustainability partners will help you to find grants that will subsidize the transition to vertical farming, and we can ensure that the vertical farming structures will be resilient to typhoons. Finally, I would recommend considering mangroves for erosion control and storm surge mitigation. They are regenerative and avoid the carbon taxes that traditional cement incurs.

IMPLICATIONS + RECOMMENDATIONS

“What visions of the future do tomorrow’s engineers hold?”

WICKED PROBLEM

Given our changing climate, how might future engineers design for resilience? What approaches (localization, circular economy, adaptive reuse, etc) might the future engineer leverage?

RESEARCH QUESTION

How can engineers leverage innovations in materials science, local resourcing, and the specific culture, values, and socio-economic needs of communities to increase the resiliency and sustainability in the redesign of master plans of climate-vulnerable communities?

DESIRED OBJECTIVE

Build greater understanding of tomorrow’s engineers and how their learning, ways of working and working environments might evolve, and support student teams to experiment with new or hybrid methods for approaching corporate strategic foresight.

RECOMMENDATIONS

Develop an immersive and experiential platform to facilitate true collaboration among stakeholders.

- Elevate and prioritize community voices and needs
- Leveraging engineering knowledge of innovative materials
- Collaborate effectively with all stakeholders.

BIBLIOGRAPHY

Bason, C., & Skibsted, J. M. (2022). Expand: Stretching the Future by Design. Matt Holt.

Boelen, J., Huygens, I., & Lehtinen, H. (Eds.). (2018). Studio Time: Future Thinking in Art and Design. Black Dog Press.

Dunne, A., & Raby, F. (2013). Speculative Everything: Design, Fiction, and Social Dreaming. MIT Press.

Martin, B., & Bruce Hanington. (2019). Universal Methods of Design. Rockport Publishers.

Montgomery, E. P., & Woebken, C. (2016). Extraolation Factory: Operator's Manual. Createspace.

**SCAN TO VIEW
THE SIMULATION
PRESENTATION**



**SCAN TO VISIT
THE INTERACTIVE
WEBSITE**



Image, Design, and Animation Platforms Used

- Midjourney
- Canva
- Genially
- Synthesia Studio

ACKNOWLEDGEMENTS

We are grateful for the knowledge, guidance, and encouragement provided by **Professor Adam Cowart** and Autocad Liaison **Kelly Kornet** and for contributions from **Keller Akin**.