New Jersey DoT, Annual Research Showcase

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

October 28, 2020

Jerry Buckwalter

Change is coming on a scale that can drive dysfunction unless we are prepared to tackle new realities

ASCE's Future World Vision creates virtual future communities that explore **multi-dimensional city and neighborhood systems** to prepare engineers for future challenges, consider the human impact and learn how engineers can build a better place to live.

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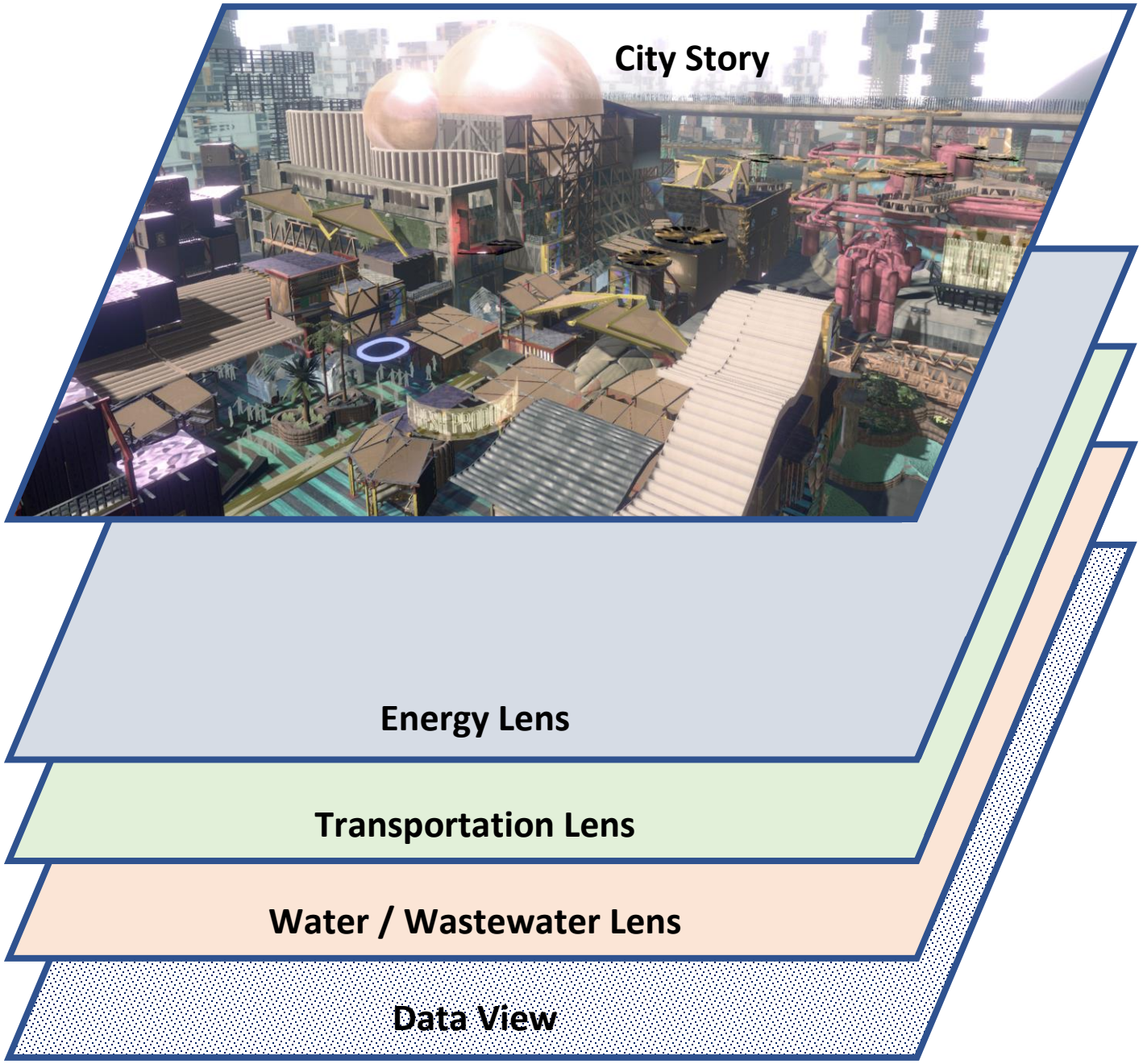
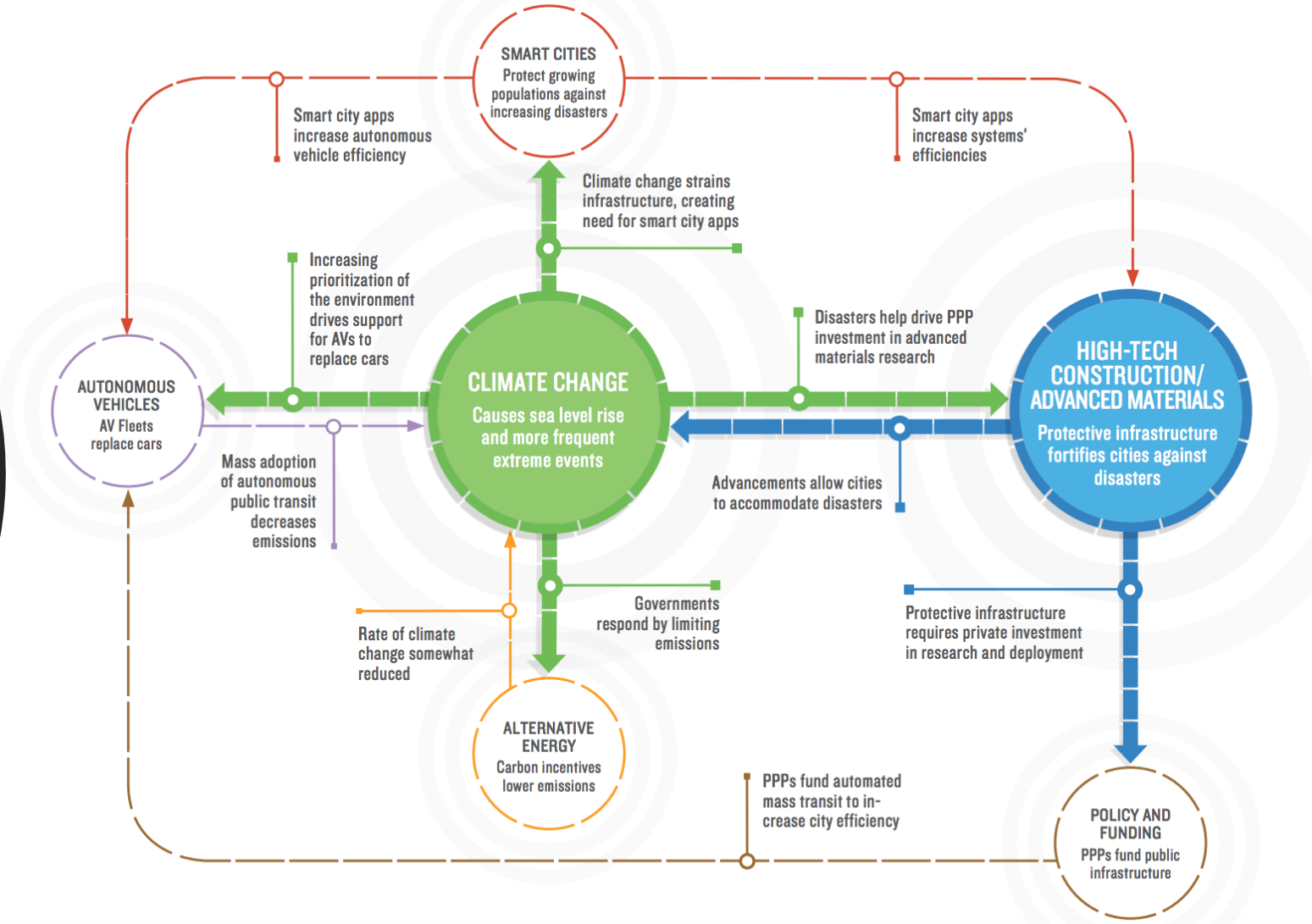


The Future World Vision Research Approach

Converging trend dynamics are deeply researched and examined holistically, including technological, cultural, social, economic, political, ethical and environmental aspects



Transforming Civil Engineering

We urgently need to help civil engineers:

- Prepare for resilience for extreme environments and anticipate changes in demographics and urbanization
- Incorporate advances in materials, computing power, technologies and engineering/ construction processes
- Embrace digital models and big data use, including digital security, intelligent systems, autonomy and virtual reality
- Understand system dynamics and nature of systems engineering and systems integration
- Increase pace of innovation and lead in change, risk management and ethics
- Create alignment and collaboration with varied engineering disciplines and non-engineering partners for non-traditional projects
- Attract new talent, continuously train and grow careers

The Future World Vision Platform

An Immersive Storytelling Experience

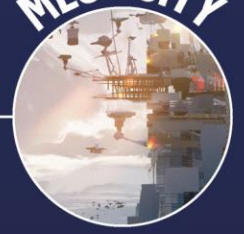
Combine the power of a 4D environment with a powerful narrative to immerse users inside 5 interactive CityWorld scenarios

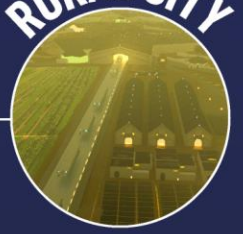
Narratives at the Macro- and Micro-Scale

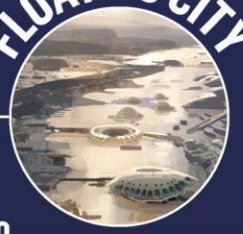
Experience the CityWorld at both the human-centric street view and the systems-based infrastructure macro view

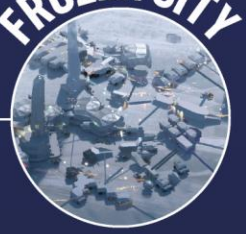
5 Fully Developed Future Worlds

Explore pressing issues that engineers face today and will face in the next 50 years: **Mega City, Floating City, Rural City, Frozen City and Off-Planet City**









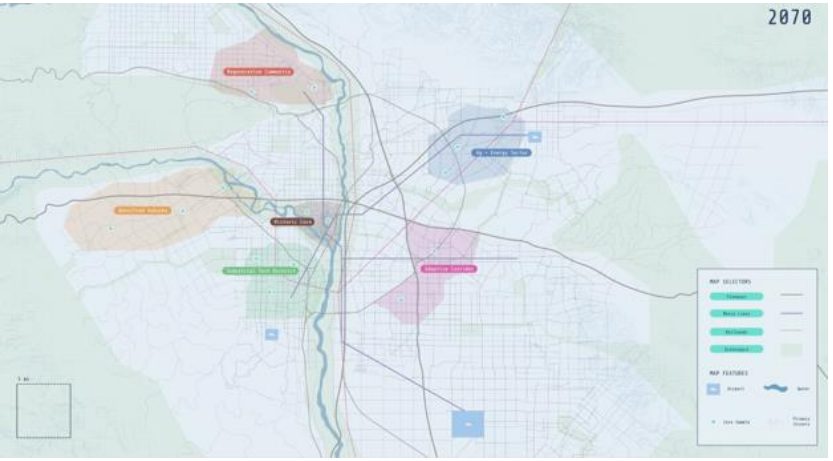
2020 2030 2040 2050 2060 2070

- Flexible Batteries
- Construction Drones
- Graphene
- GMO Food Disaster
- Liquid Battery
- 3D Printing
- Sustainable Desalination
- Autonomous Vehicles
- Nanotech
- Ubiquitous Connected Infrastructure
- Mars Manned Mission
- 15% of New Construction is 3D Printed
- Quantum Computing
- Ubiquitous "Human Scale" AIs in Cities
- 3D Printed Graphene Used in Construction
- Megastorms
- Level 6 AVs
- Ubiquitous Graphene Construction
- Commercial Quantum Computing
- General AI
- Sea Levels Rise by 1' Worldwide
- 143 Million People Displaced by Climate Change
- Rogue Asteroid or Planet Hits Earth
- Most Cargo is Shipped via Hyperloop & AV
- 25 Million to 1 Billion Environmental Immigrants

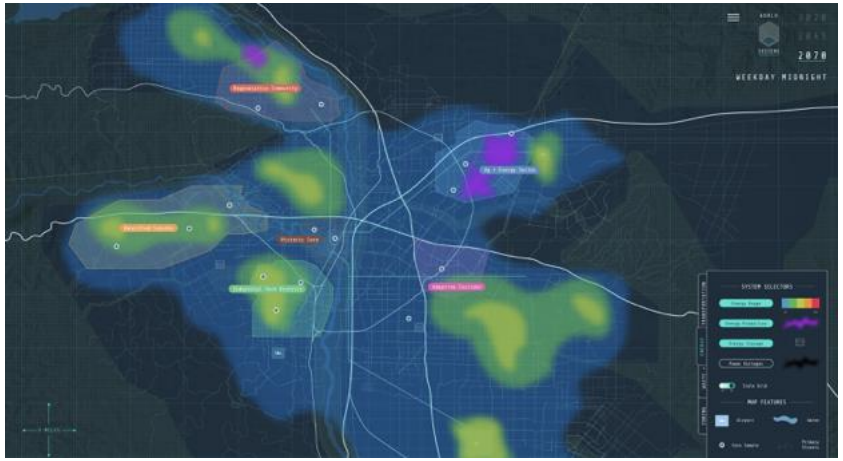
CATEGORIES: Innovation Disruptors Informed Speculation

Current Work: Mega City Development

How does a city increase its density to accommodate 50 million inhabitants while preserving its historic character, promoting accessible green space, and supporting a plurality of lifestyles and economies?

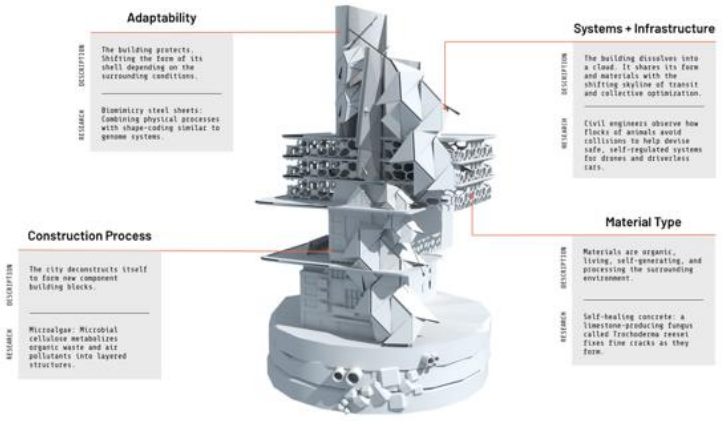


World View of Mega City its 6 districts



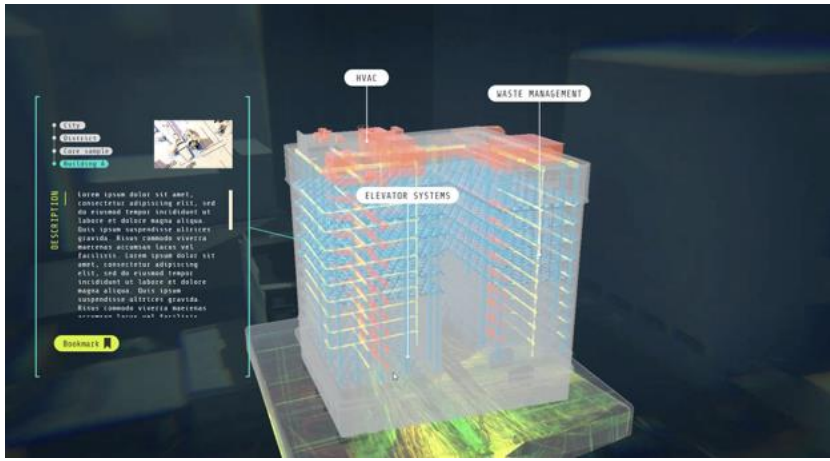
Systems View of energy production and consumption

District View of the Adaptive Corridor



A Core Sample with a variety of callouts

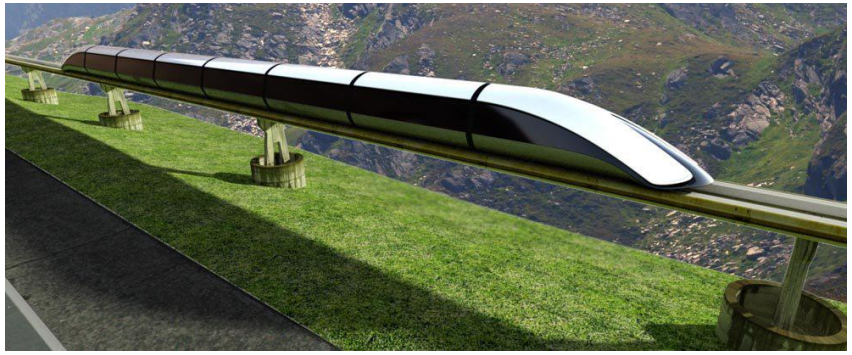
Street view inside the Adaptive Corridor

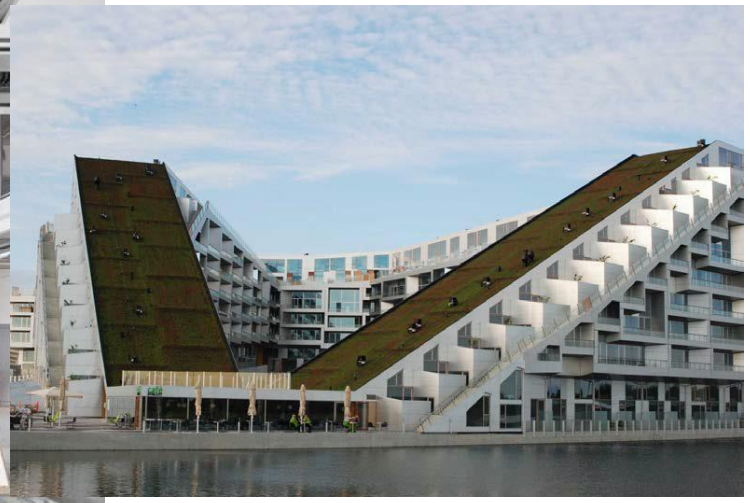


Structure View showing internal callouts to explore

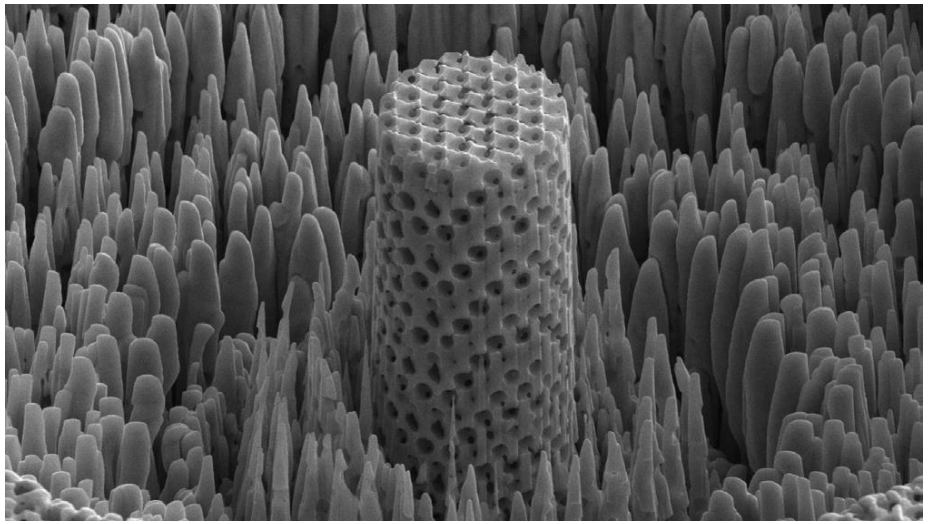
Research: Mega City 2020

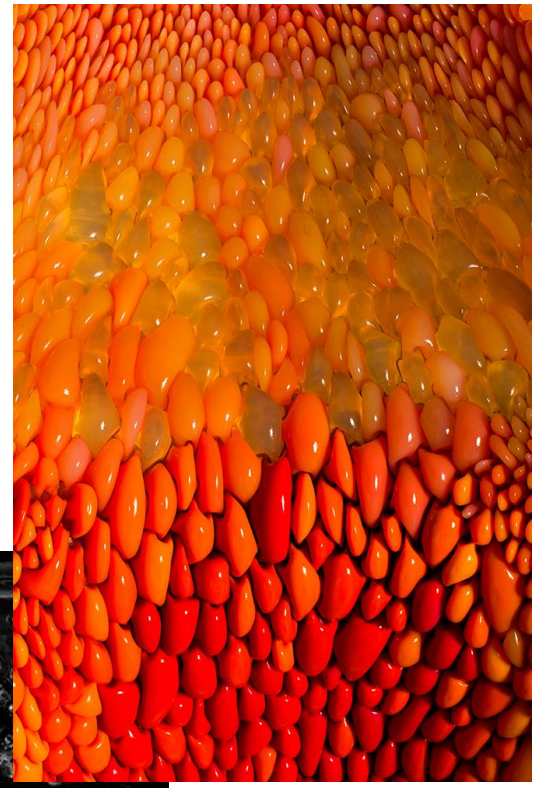
Informed Speculation: Mega City 2045

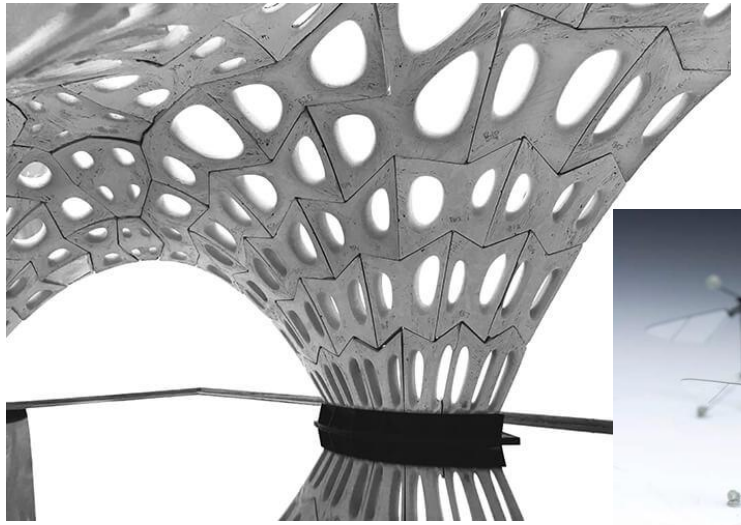


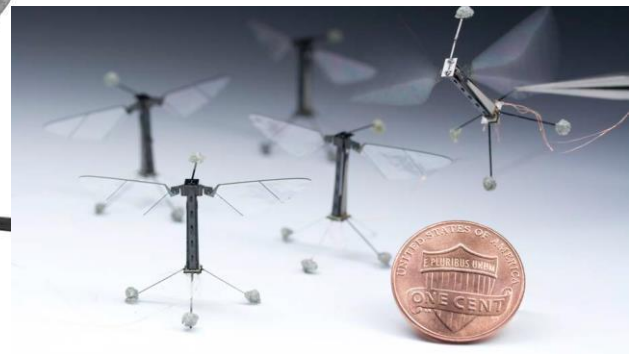


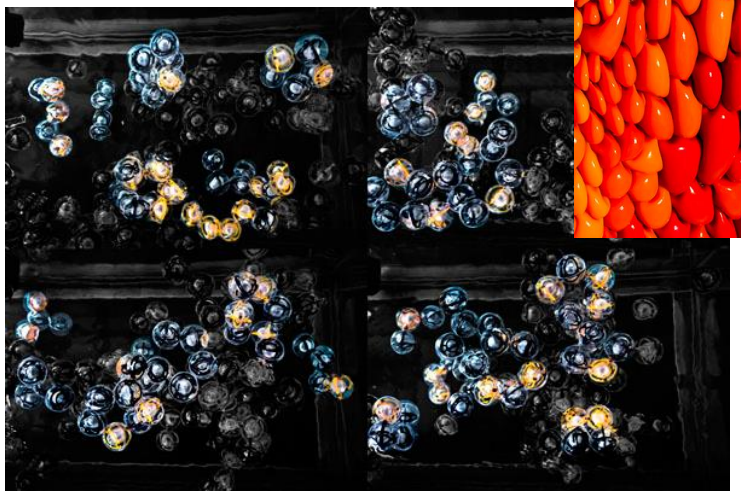
Vision: Mega City 2070











More than just a snapshot

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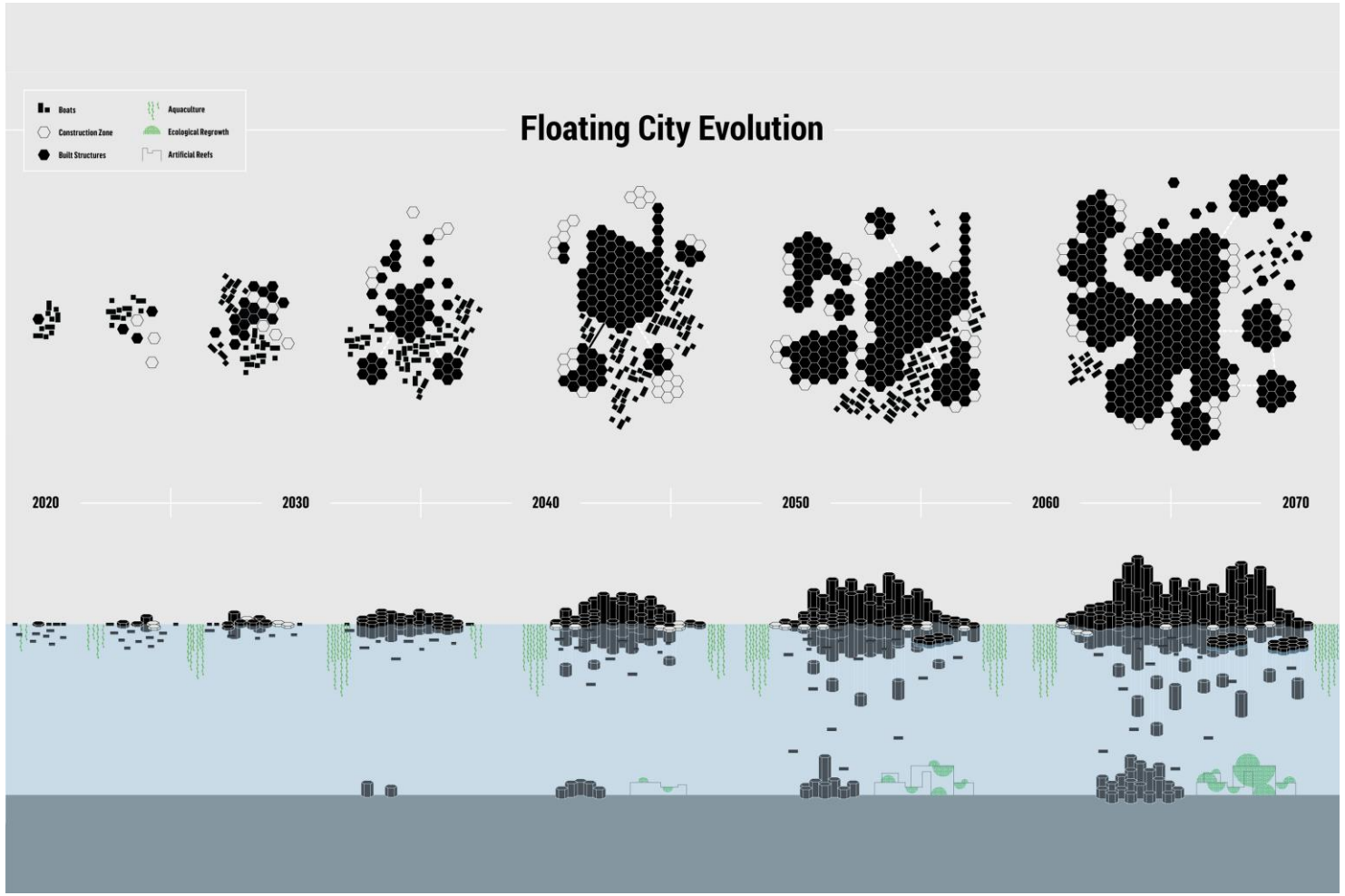
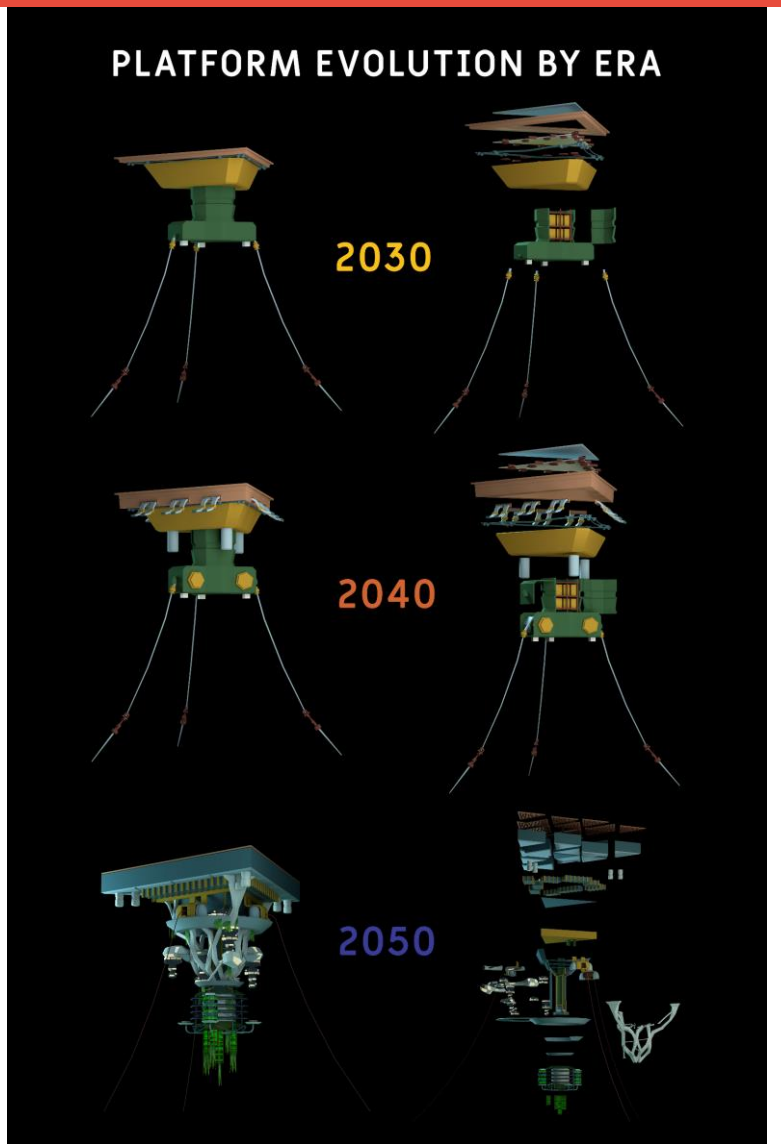
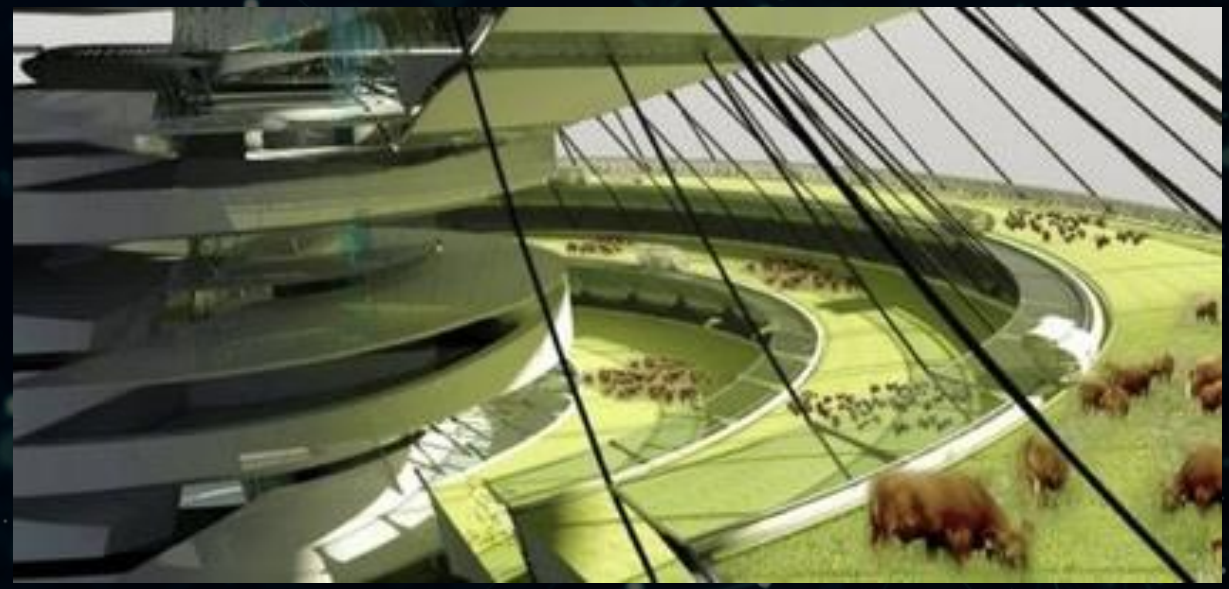
Future City World Evolution



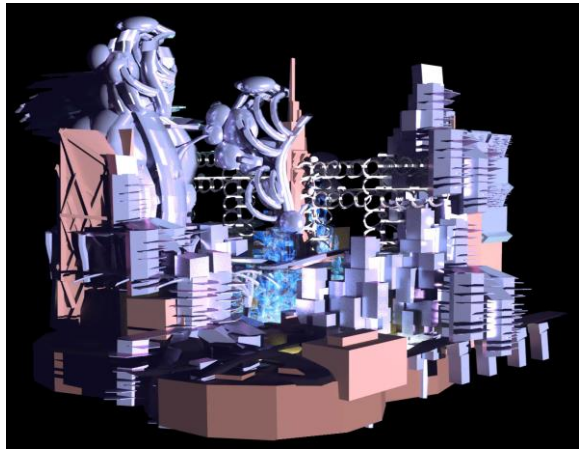




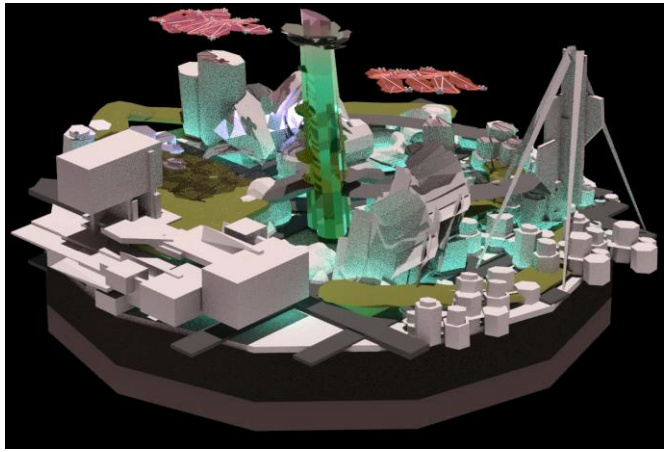
No city is a monolith

Mega City Districts

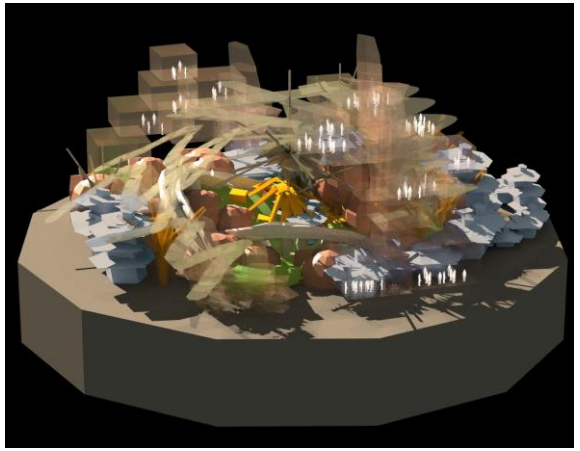
Historic Core



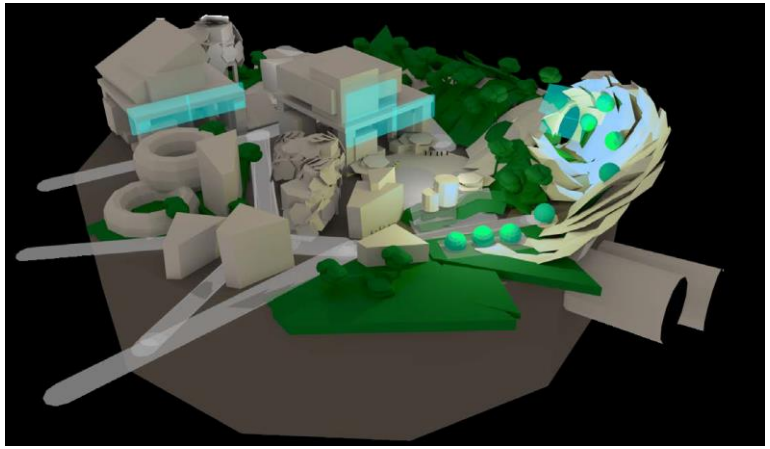
Adaptive Corridor



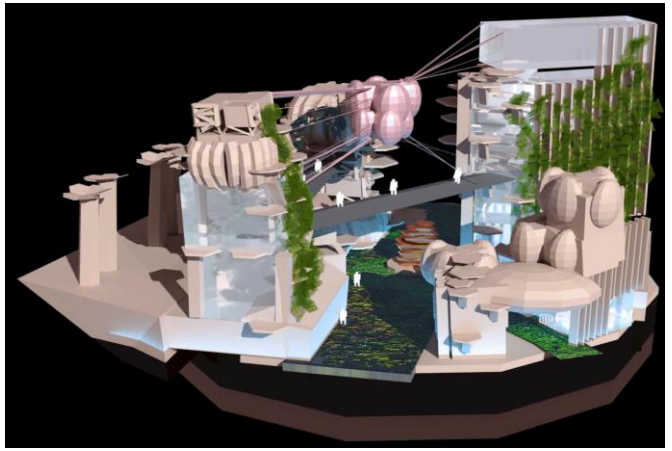
Regenerative Community



Densified Suburbs

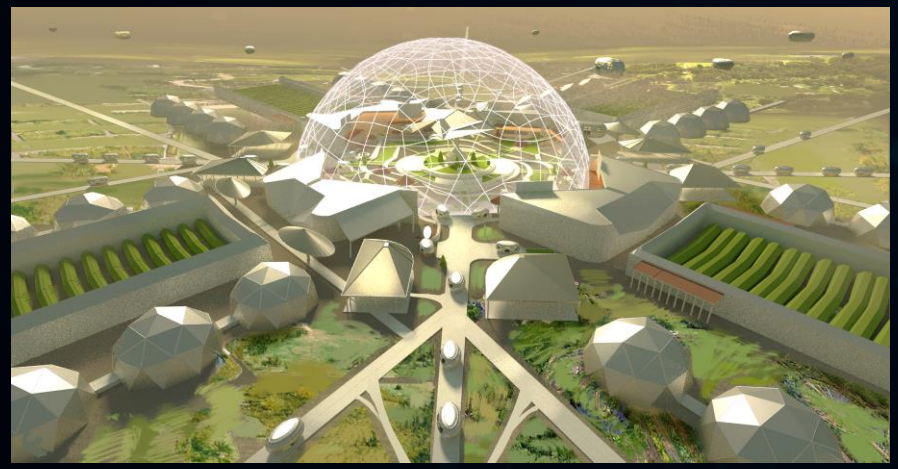


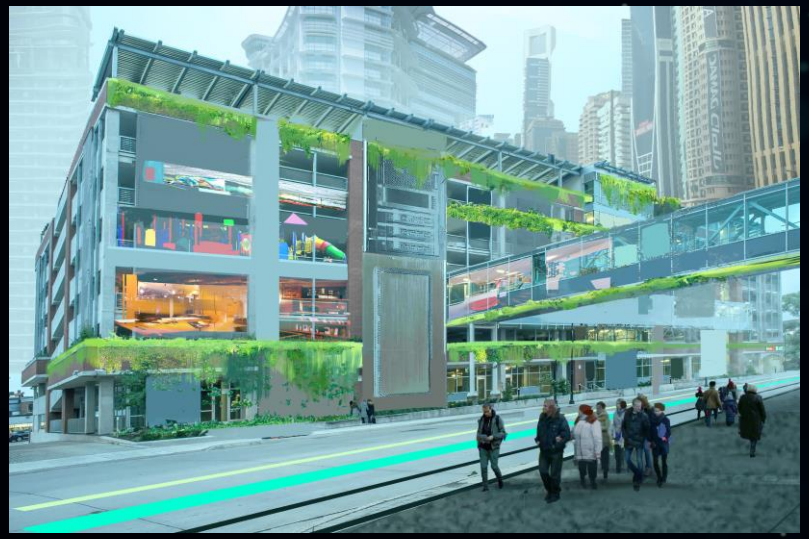
Industrial & Tech Center



Energy & Agricultural Sector

Two Overarching Themes Converge

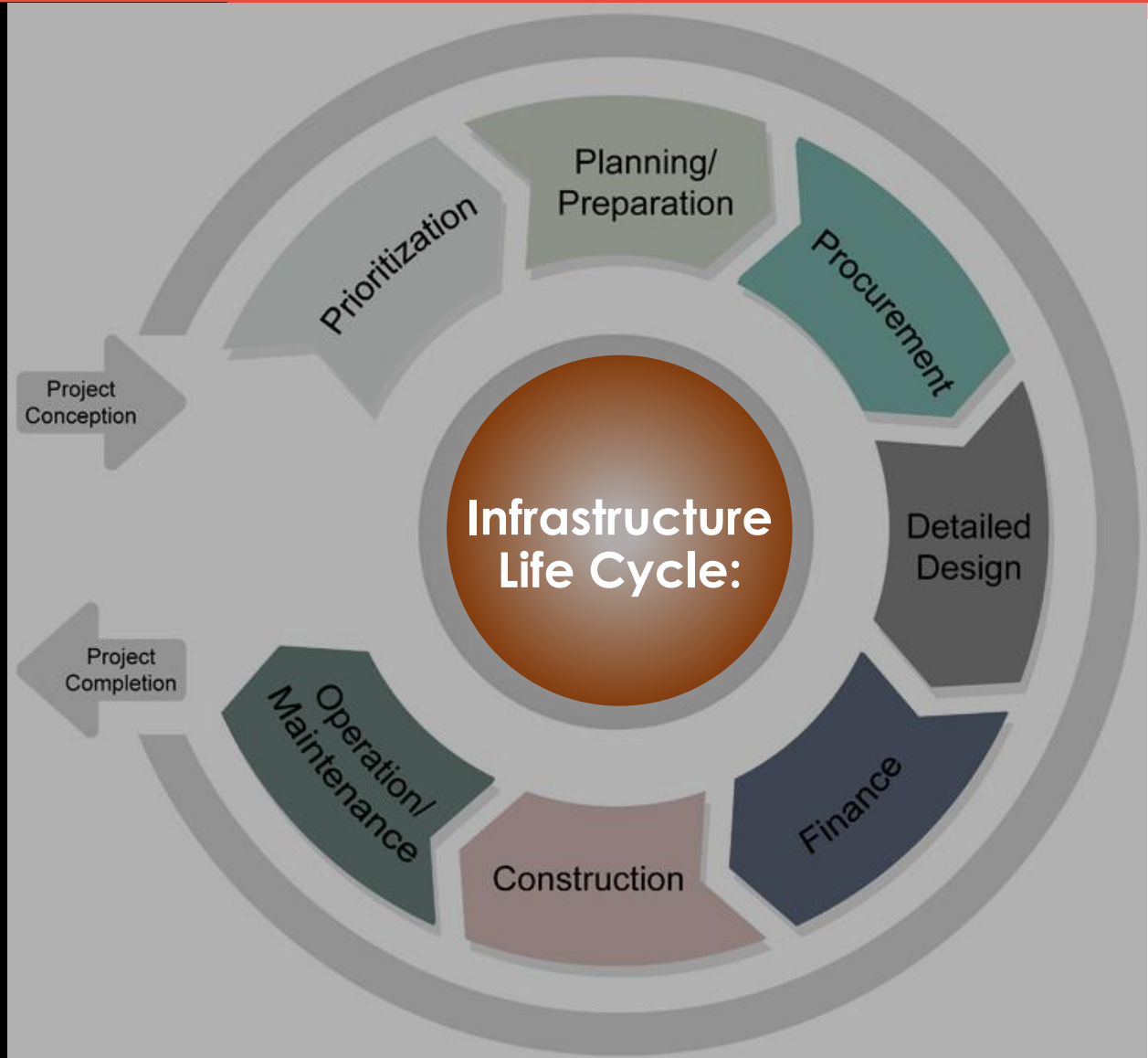




A **DIGITAL** world built on ethical **CIRCULAR ECONOMIES**

ASCE and Engineers Can Help Future Cities Become More Resilient

- Leverage well-vetted tools, standards, systems, and data specifically designed to assess vulnerability and build sustainable and resilient infrastructure
- Share knowledge and training on global best practices
- Promote innovative practices to energize more rapid implementation of resilient systems based on a long-term life cycle perspective



Future World Vision's Broad Impact

Inspire the Next Generation of Engineers

Youth Engagement

Through exhibits and showcases, we will spark an interest in engineering for children and young adults, pointing them to a rewarding career path that can make a difference for society

Public Interest

Capturing public interest in visions of the future quality of life we all desire, we will make the engineering challenges of tomorrow tangible and rewarding to non-engineers

Advance Cross-Disciplinary Thought Leadership

A Common Language

It allows users from different fields a common language and set of reference points to discuss future challenges

Systems Dynamics Viewpoints

By showing different trend interactions that drove these worlds, it will give users concrete examples of how a cross-functional view will be necessary going forward

Foster New Engineering Innovation

Visual Starting Points

By starting with a fully fleshed out city, users will be able to critique, suggest modifications and build their future vision off a plausible virtual world

University Class Projects

By integrating into the educational curricula for colleges, we will support creativity and visionary thinking in budding engineers

Global Potential

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Stay tuned for Future World Vision updates at
www.futureworldvision.org