Human-Centric and Sustainable Smart Cities

PROF. PHILLIP ANDREWS

First, An Important Realization

90% OF SMART CITIES HAVE FOCUSED (SO FAR) ON COMPLETING THE MUCH-NEEDED TECHNICAL INFRASTRUCTURE. THAT WAS IMPORTANT!

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The Early Main Focus Of Smart Cities

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- Most cities focused on implementing and installing 5G, IoT, Sensors, Vision Systems, Fiber-optic backbones, Cloud, and Edge Infrastructure, Smart Energy Infrastructure (Smart Grids), Smart Mobility and Transportation Systems, Smart Buildings, Smart Utilities, Cybersecurity and Data Governance, and many more technologies.
- This was normal as the infrastructure needs to be installed first before new services and innovative solutions are identified and implemented.

One must have first of
all a solid foundation.

Moreover, It Is Impossible To Take Any Existing City and Turn It Into A Smart City Because The Cost Is Astronomical.

The Best Approach Is To Start Fresh With A New City. Examples:

- Masdar City, Abu Dhabi
- The Line, Saudi Arabia
- Songdo. South Korea
- Punggol Digital District, Singapore
- Telosa, United States
- BiodiverCity, Malaysia

Some of them will fail because we all learn by trial and error.

Example: Masdar City's Great Concepts Masdar City: A Blueprint for a Sustainable Future? | SLICE EARTH | FULL DOC)

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This was the biggest flop of Masdar City, as solar panels were distorted from the heat and got dirty from the sandstorms.

The Masdar City solar farm covers an area of 210,000 square meters and includes a 10 MW solar power plant composed of both 5 MW of polycrystalline silicon modules and 5 MW of thin-film solar modules. There are also rooftop solar panels on buildings like the Masdar headquarters and the Mohamed bin Zayed University of Artificial Intelligence campus, adding another 1 MW of capacity to the project.

These are some of the many mistakes that Masdar City made.

Great dreams, some bad choices!

New ideas and inventions re: Solar Panels

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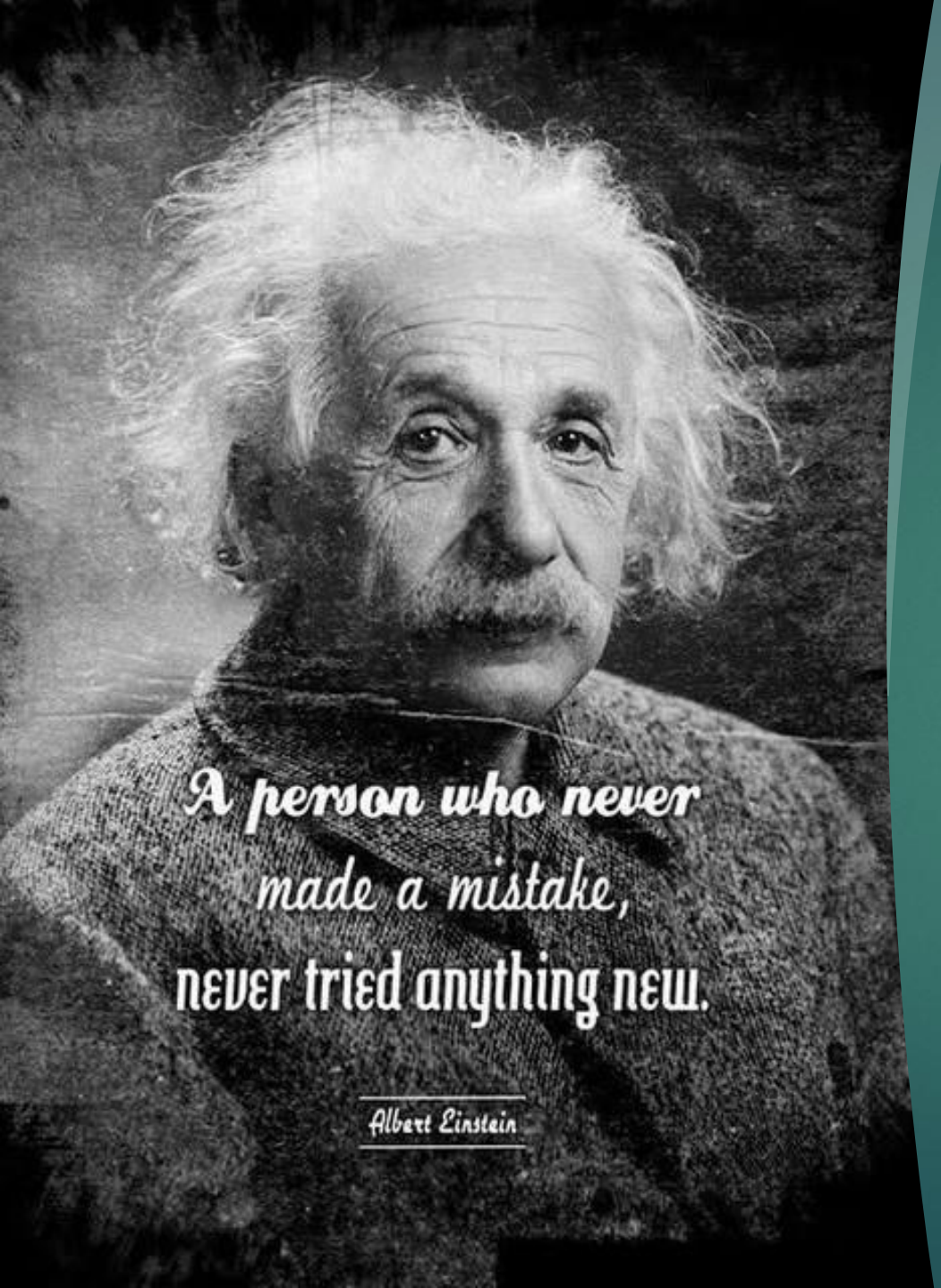
New inventions to clean solar panels

Another goofy mistake

MISTAKES ARE:

- [ ] Embarrasing
- [ ] For Rookies
- [x] Inevitable
- [ ] Avoidable
- [ ] Not Allowed

@marieforleo



- The same applies to organizations, companies, cities, and countries.
- The reality is that most government officials are conservative because they don't want to be blamed for failures. Their careers are more important than their citizens' well-being.

Current Smart Cities

- According to the 2024 Smart City Index, the best smart cities are Zürich, Oslo, Canberra, and Geneva. Other top contenders include Singapore, Copenhagen, and London.
- Factors for evaluation
  - Technology implementation:
    - Cities are ranked based on how effectively they use technology in areas like health and safety, mobility, and governance.
  - Citizen perception:
    - An important factor is how smart technology is perceived by the citizens themselves. Technologies improve QoL.

The U.S. Cities Best Prepared for a Smart City Future

The following U.S. cities are the best prepared for a smart city future, scored out of 100 and based on 16 metrics related to tech infrastructure and connectivity, sustainability, and the tech job market.

City	Connectivity & Infrastructure	Green infrastructure	Tech Job Market	Index Score
Seattle	85.7	67.0	61.5	75.7
Miami	83.3	64.9	75.0	75.4
Austin	86.2	60.4	55.2	72.7
San Jose	78.1	66.0	62.5	71.6
Oakland	68.5	67.0	91.7	70.8
Boston	74.2	59.4	86.5	70.2
San Francisco	77.1	60.1	67.7	69.5
New York City	84.9	44.4	51.0	65.5
Los Angeles	77.1	56.6	43.8	65.2
Atlanta	70.8	46.2	92.7	64.3

Source: ProptechOS (2024)

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That's NOT the complete criteria for Smart Cities!

Criteria For Ranking Smart Cities

- There are NO universally accepted criteria.
- Criteria for ranking smart cities typically include economy, environment, governance, QoL, mobility … and applied technologies.
  - These core dimensions are assessed using a variety of indicators such as health and safety, education and job opportunities, transportation efficiency, citizen engagement, sustainability, and the use of technology to improve quality of life.

- Smart Infrastructure
- Open Data and Interconnectivity
- Smart Governance & Citizen Engagement
- Smart Mobility and Transportation
- Smart Environment and Sustainability

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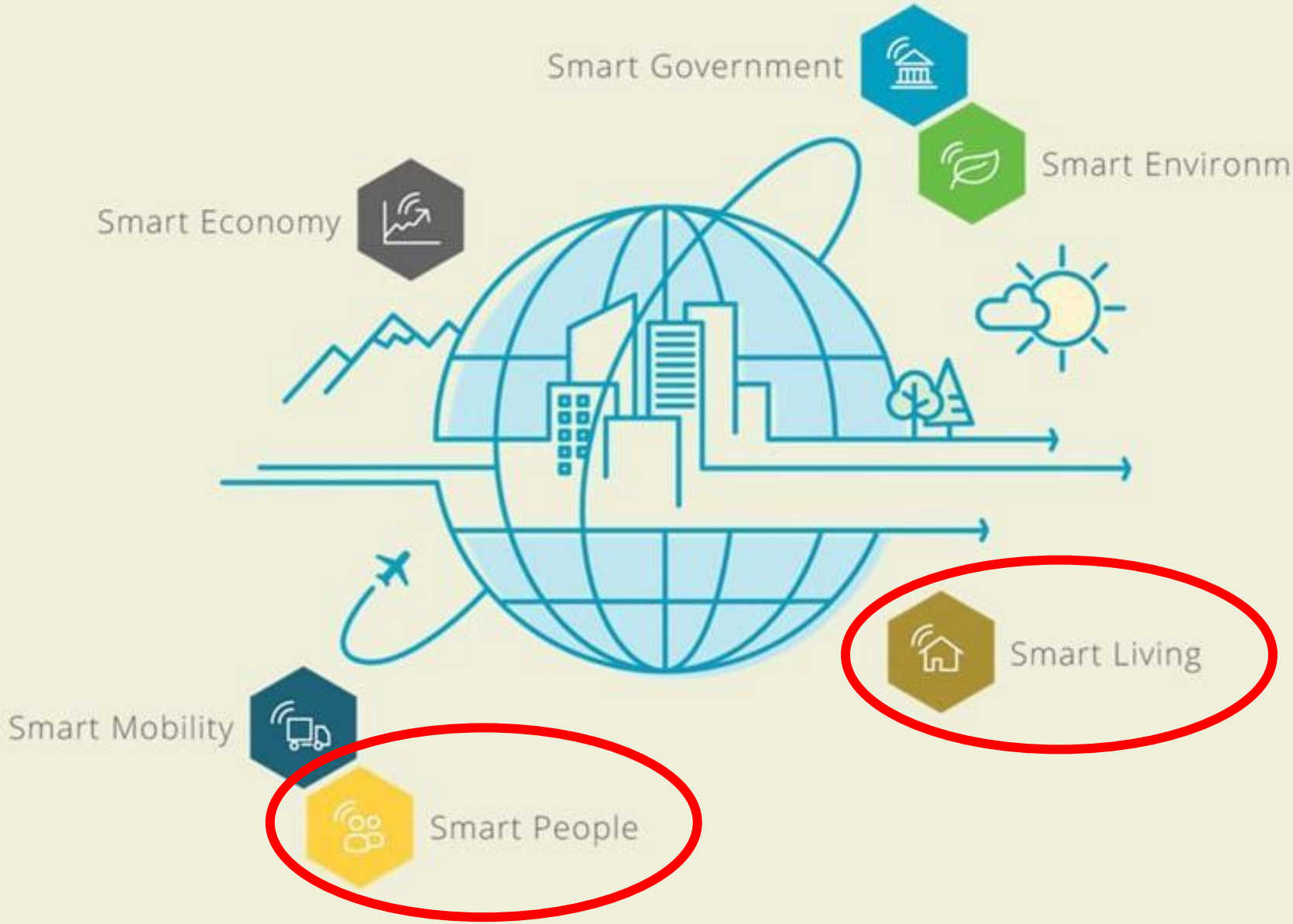
THE 6 SMART CITY INDICATORS



Smart building is core for all 7 focus areas of smart city

Smart Industry

Smart City Services

Smart Environment

Smart Living

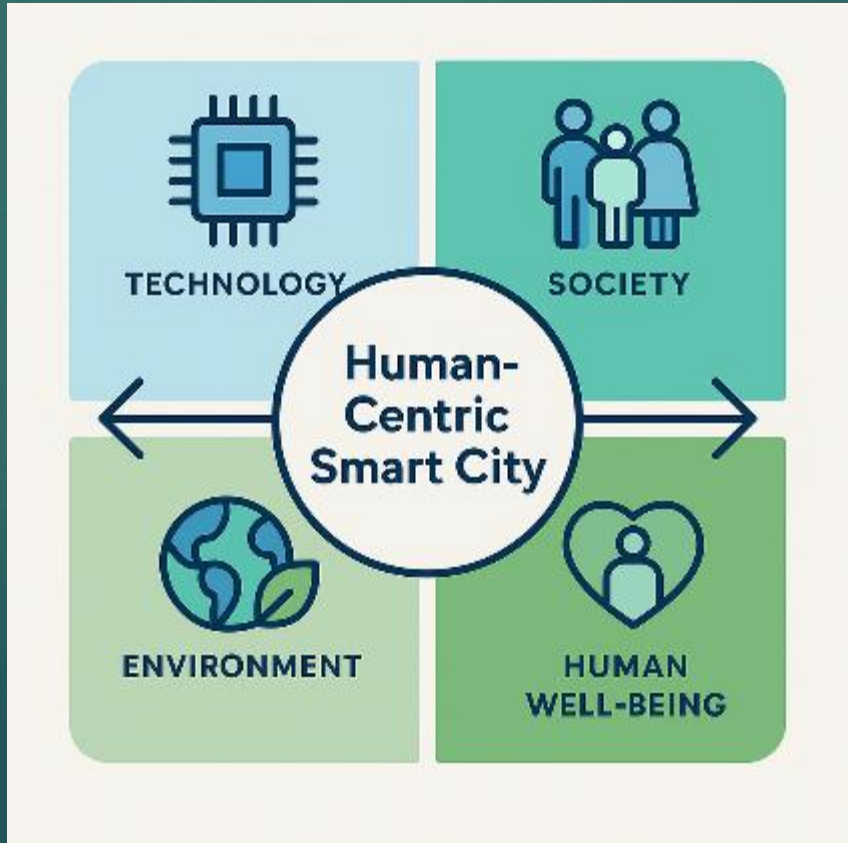
Smart Mobility

Smart Energy

Smart Governance

And Now The Smart Cities Are Ready For Phase 2

- The emphasis in Phase 2 is on Human-Centric Solutions



The Best Idea Is To Design Smart Cities Based on 5IR Concepts And Precepts

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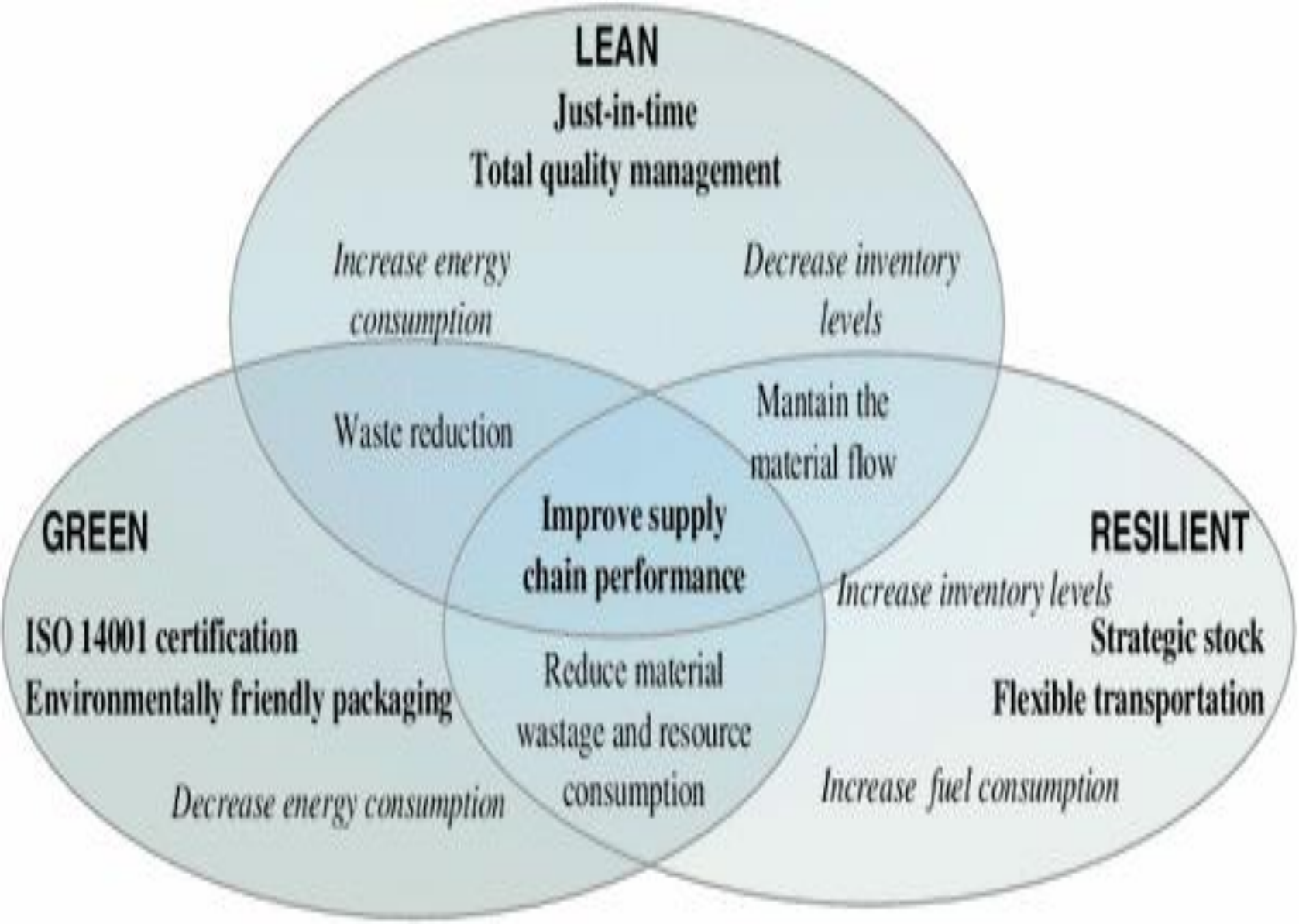
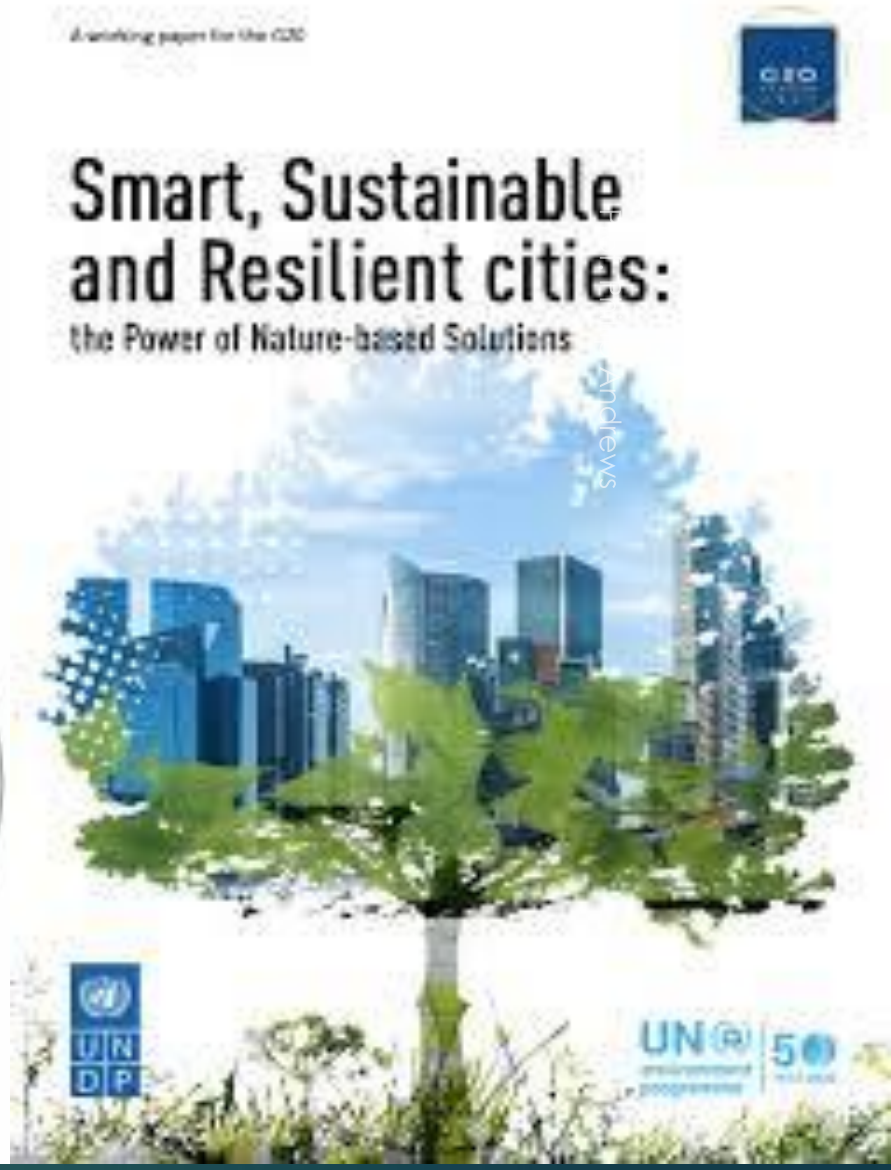
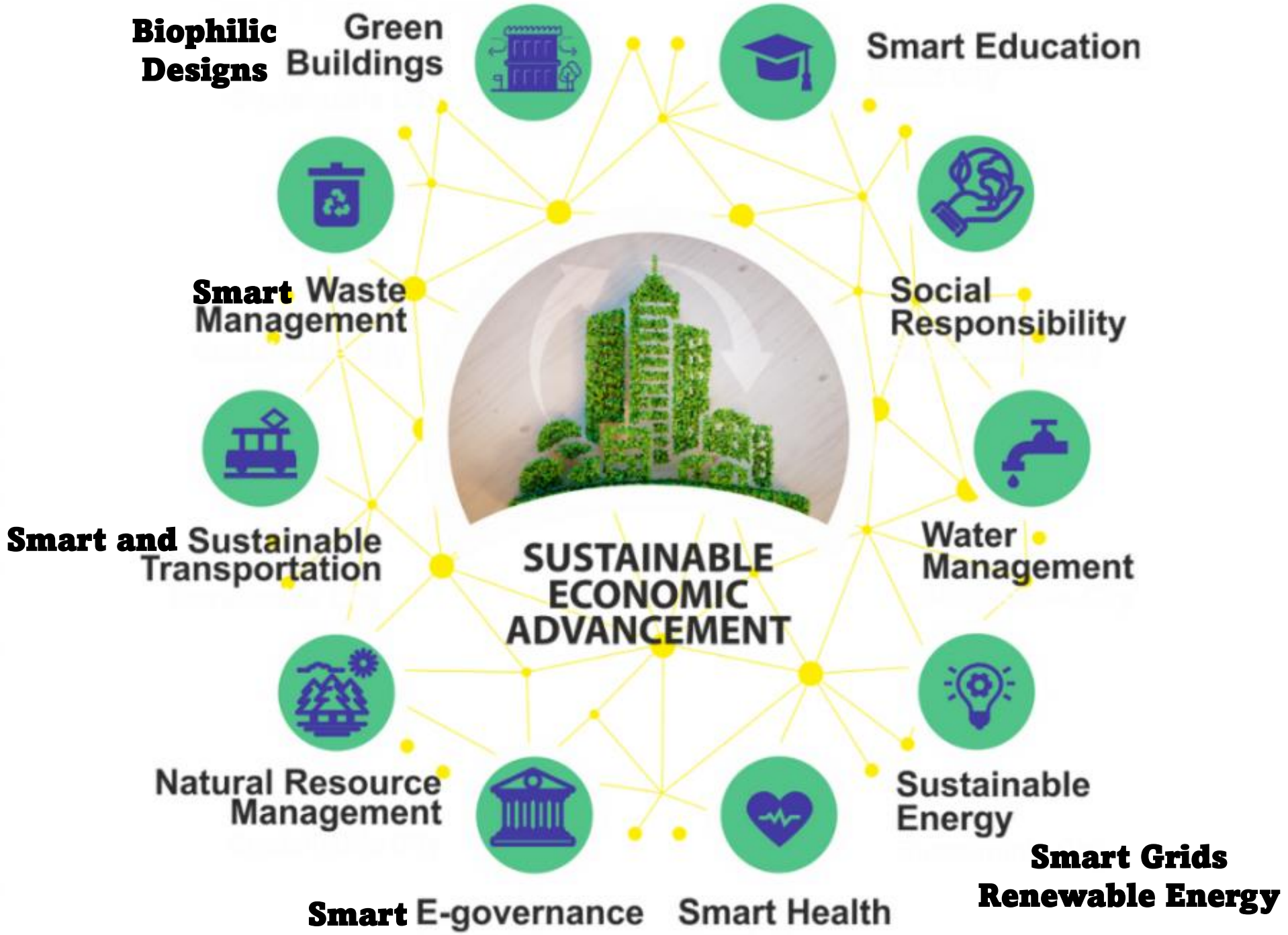
- **Sustainable, Lean, Green, and Resilient Solutions**
- **Human-centered innovation** (EQ + IQ + SQ)
- **Regenerative design** (healing ecosystems)
- **Ethical AI and data transparency**
- **Participatory governance** (citizens as co-creators)
- **Cultural and spiritual vitality**
- **Holistic integration** of technology, society, and nature


FUTURE STARTS NOW


LEAN
Just-in-time
Total quality management
Increase energy consumption
Decrease inventory levels
Waste reduction
Mantain the material flow
GREEN
ISO 14001 certification
Environmentally friendly packaging
Decrease energy consumption
Improve supply chain performance
Reduce material wastage and resource consumption
RESILIENT
Increase inventory levels
Strategic stock
Flexible transportation
Increase fuel consumption


Smart, Sustainable and Resilient cities:
the Power of Nature-based Solutions
UNDP
UN



PLUS:

Smart Connectivity

Smart Policing

Smart Homes

Smart Ag

Smart Clothes And Shoes

Smart Everything!

Key Realization

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- Old Style Architecture separated us from Nature, and that was a great mistake. It created a lot of physical, mental, and psychological problems!

- Nature has healing powers. We need Nature to heal people physically, mentally, psychologically, and even spiritually!

The Healing Effects of Nature - Five Rivers MetroParks

- Stress reduction
- Reduced chronic illnesses
- Better focus
- Better sleep
- Strengthened immunity
- Enhance mood

Regenerative Architecture

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- Regenerative architecture designs buildings and communities to have a net-positive impact on the environment, going beyond mere sustainability to actively restore and improve the surrounding ecosystem. Instead of just reducing harm, this approach aims to reverse ecological damage by integrating living systems, generating more energy than they consume, purifying air and water, supporting biodiversity, and enhancing social well-being. Regenerative buildings act as ecosystems, mimicking natural processes to become self-sufficient, adaptable, and restorative.

Key Principles And Goals

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- **Beyond "less bad":**
  While sustainable design aims to minimize negative impacts, regenerative design seeks to actively **improve the environment.**
- **Net-positive impact:**
  Projects are designed to generate **more renewable energy** than they use, harvest and treat more water than they consume, and even generate a surplus that can benefit the surrounding community.
- **Integration with nature:**
  Buildings are designed as a part of the local ecosystem, using living systems as building blocks and materials. This includes features like **living roofs, native plantings, and habitat corridors.**

Key Principles And Goals (cont'd)

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- **Resource restoration:**
  Regenerative architecture focuses on **creating resources.** Buildings can generate clean water, produce food, and sequester carbon.
- **Social and community benefits:**
  The approach is holistic, aiming to **enhance social well-being** by improving air quality, fostering community through shared spaces, and being inclusive and accessible to all.
- **Reversing damage:**
  A core goal is to **heal, repair and improve damaged environments**. Examples include designing a building to clean stormwater runoff from its site or creating a new wildlife habitat.

Examples Of Regenerative Features

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- **Living roofs and walls** that support biodiversity and improve air quality
- Water systems that capture, clean, and reuse rainwater
- **On-site renewable energy generation** that produces more energy than the building needs
- **The use of bio-based, reclaimed, or recycled materials** that benefit the environment
- Integration with public transit and shared spaces to **reduce reliance on cars**
- Design that actively restores a site's natural hydrology or creates new **wildlife habitats**

See actual examples in a separate PPT presentation


Regenerative Architecture
An Innovative Step Beyond Sustainability


REPLACING SUSTAINABILITY
WITH REGENERATIVE DESIGN


REIMAGINING CITIES
INTEGRATING REGENERATIVE DESIGN FOR
SUSTAINABLE URBAN FUTURES
Prof. Phillip Andrews

Prof. Phillip Andrews

Fallingwater is Frank Lloyd Wright's crowning achievement in organic architecture and the American Institute of Architects' "best all-time work of American architecture."

The five senses of biophilic design are:

- **Touch.** Touching organic matter, such as plants and gardens, tends to harm the organisms themselves. However, residents can feel the warmth of sunlight and soothing breezes from open-air spaces.
- **Smell.** Biophilic design that includes wonderful-smelling plants (especially in the spring and summer) makes it easy to check off this sense requirement.
- **Sight.** Green grass, leaves, and the unique biodiversity of plants and vegetation help your residents feel more immersed in the natural world.

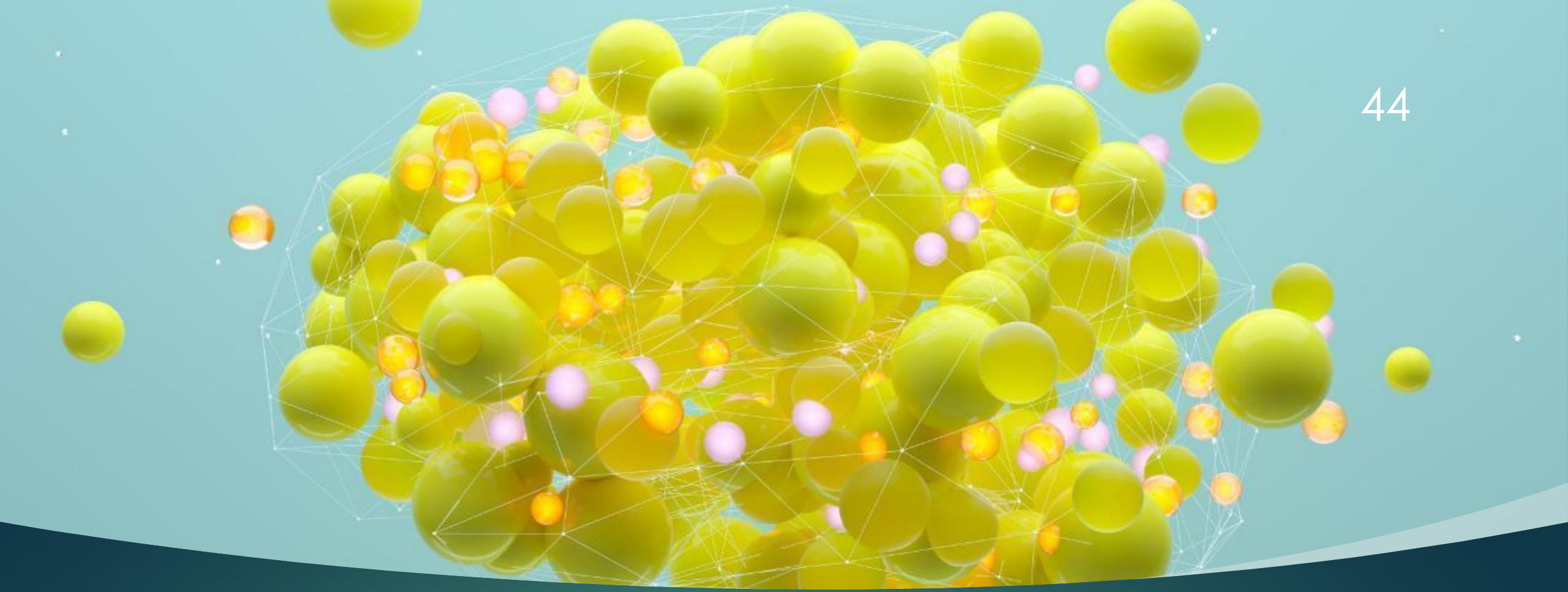
The five senses of biophilic design are (cont'd):

- **Hearing.** A truly biophilic property will attract wildlife, such as birds, which residents will be delighted to listen to.
- **Taste.** While seemingly a tricky sense to tackle when designing a building, it's also relatively simple to accomplish. A true biophilic property will likely include a garden of sorts. Whether this results in multiple fresh crops or just a few tomatoes, a biophilic element that gives back to your community is one to pay attention to.

Moreover, There Are Magnets That Attract The Best And Brightest People

Biophilic Designs Are Not Enough To Attract Capital And Smart People

- Great Industries that create jobs
- Great Jobs that attract the best of the best (Smart People)
- Smart People want Smart Education (incl. great Universities), Smart Healthcare, Smart Buildings, Sports, Attractions, great Entertainment …
- Smart People also want to be surrounded by beauty and great aesthetics (statues, sculptures, monuments, shrines … parks … great architecture)
- Smart Government …
- Innovation Centers (that create new industries, new professions, new jobs)



Smart Attracts Smart

- Smart people invent things
- Smart people create and build things
- Smart people solve problems
- Smart people help others
- Smart people advance civilization

Old Smart Cities

Ancient City "Magnets"

- Center of Power and Control
- Architecture
- Great Stadiums
- Great Entertainment
- Art (sculptures and monuments)
- "Universities" (opportunities to learn new things)
- Smart People (Philosophers, Storytellers, Artists, Playwrights, Poets …)

Sedona has statues everywhere. Sedona has become the Spiritual Center of America.

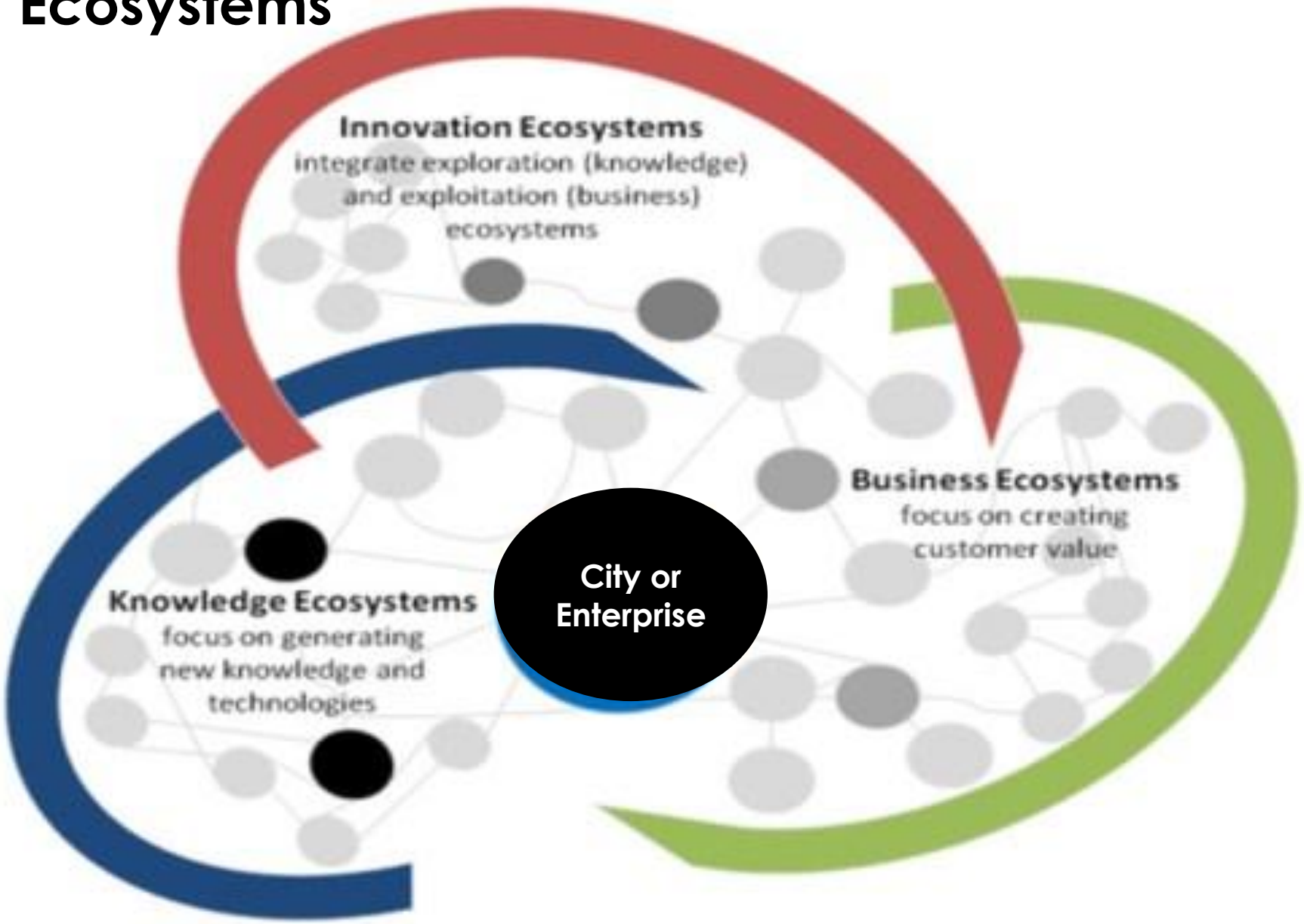
All the buildings in Sedona are Earth colors to blend in with the environment

Some New Smart City "Magnets" (On top of the old "magnets")

- **QoL** (Safe, green, healthy, and inspiring)
- **Education on Steroids** (Continuous research and learning)
- **Knowledge Ecosystem** *(see slides 53 and 54)*
- **Exciting and Life-Changing Technologies**
- **Innovation Explosion** (Funding sources, Room to experiment and create)
- **Hybrid (flexible) Work** (Creative, collaborative zones)
- **Ecology** (Green, sustainable, ethical growth)
- **Spiritual Quotient Rising** (Spirituality In Business is coming)

What else matters?

Ecosystems



Credit Katri Valkokari

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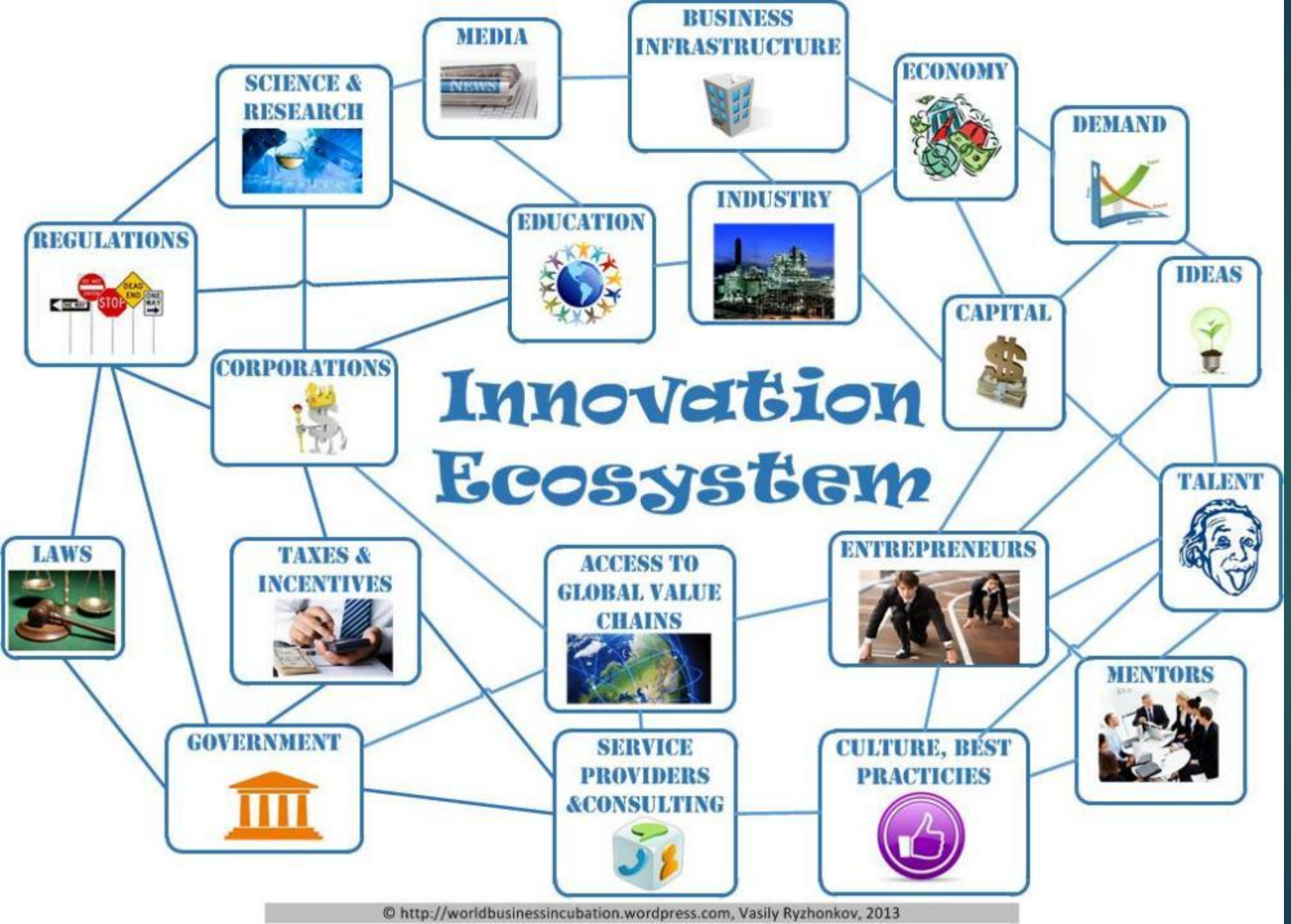
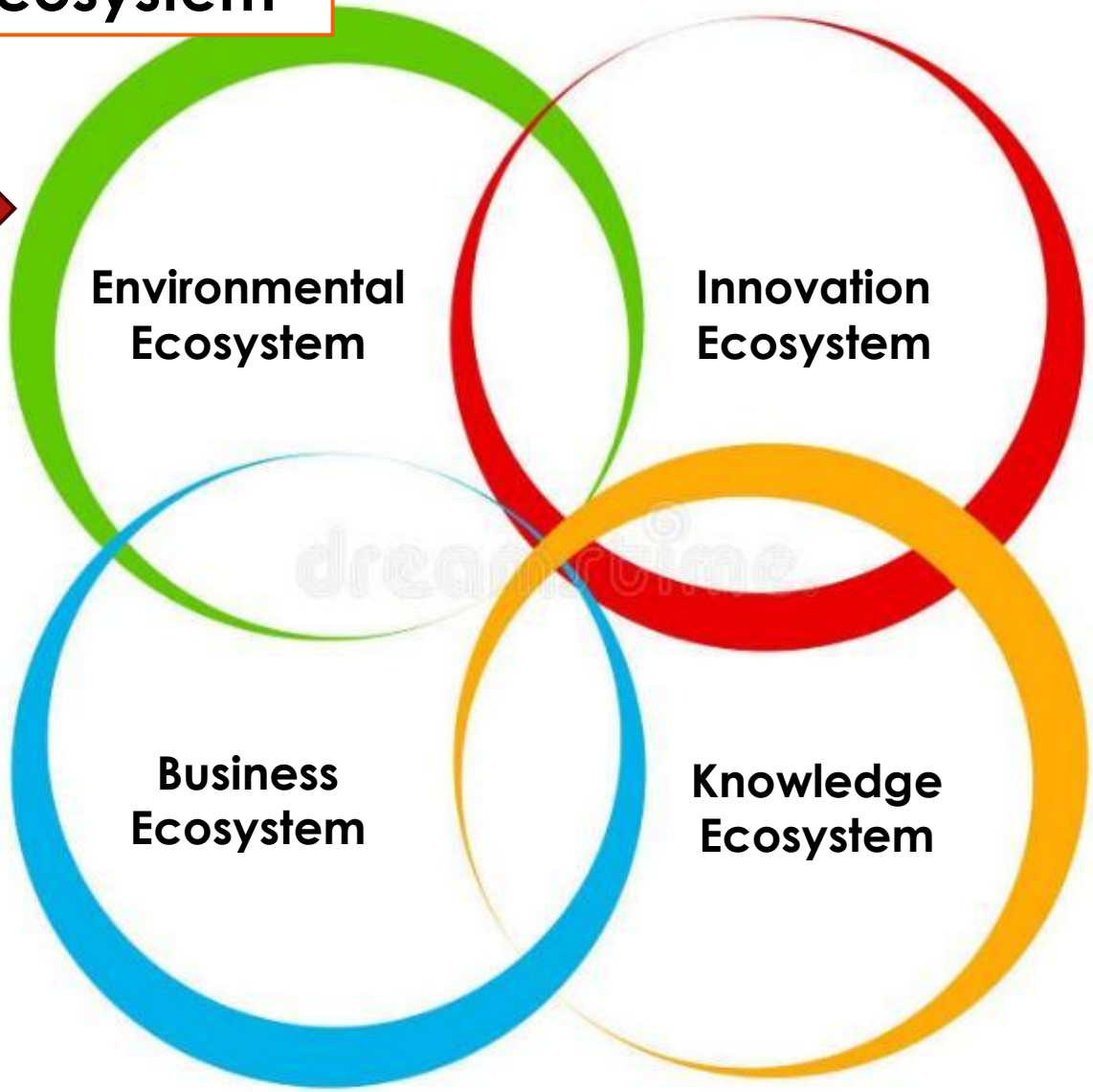


This is also the Business and Knowledge Ecosystems. One can expand this to as many entities/nodes as one prefers.

Need to add the Environmental/Planet Ecosystem



When we "kill" or mistreat Environmental Ecosystems, we are actually giving humanity another stub wound.

What The Future Holds

- In the next 30 years, humanity will witness a technological and societal Renaissance. With the rise of artificial superintelligence, sentient robots, and optimized quantum computers, our world will be transformed. NASA's upcoming Nancy Grace Roman Space Telescope and the Interstellar Mapping and Acceleration Probe (IMAP) will unlock cosmic secrets and deepen our understanding of the universe.

What The Future Holds (cont'd)

- As Generation Alpha matures, experts believe they will reject authoritarian ideologies, embracing freedom and global cooperation. Fossil fuels will be replaced by limitless fusion energy, solving Earth's energy crisis.
- This future points to a species more aware of its place in the cosmos; interwoven with nature and existence itself. Humanity may evolve into a peaceful, adaptive civilization, guided by knowledge, empathy, and sustainability.

This is the essence of 5IR!

And There Will Be Phase 3. Autonomous Self-Managed Cities!

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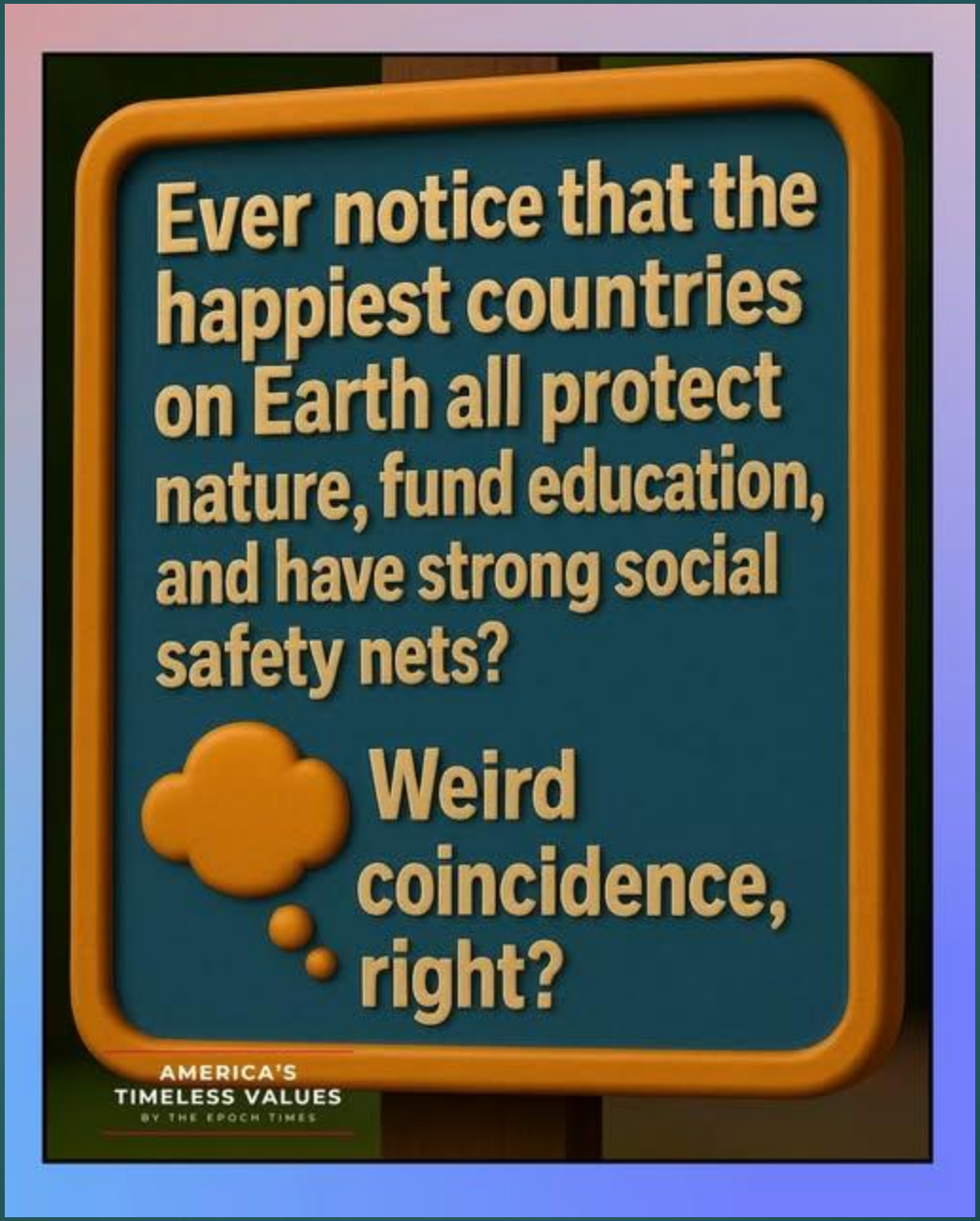
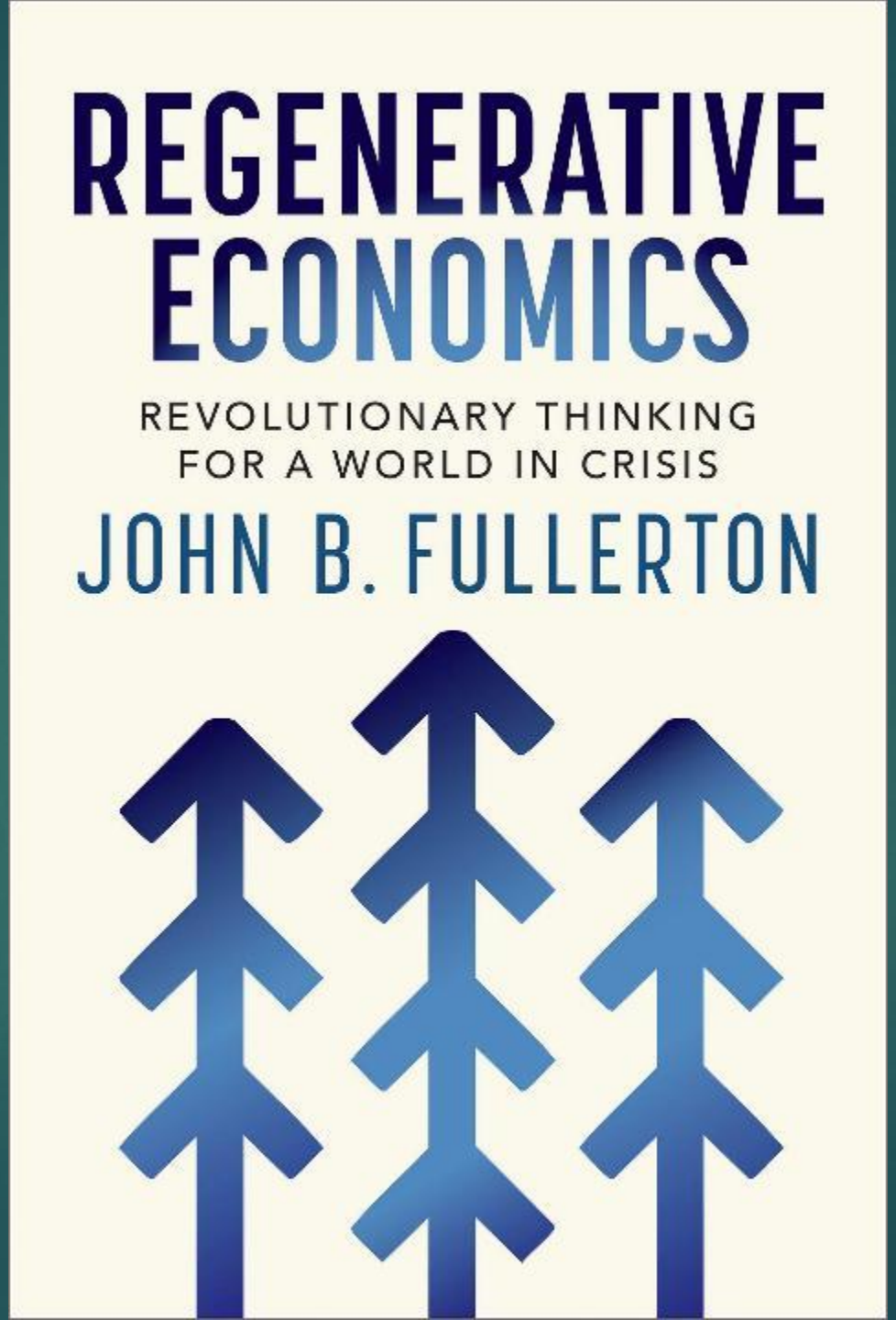
… And There Will Be Phase 4 …


Ever notice that the happiest countries on Earth all protect nature, fund education, and have strong social safety nets?
Weird coincidence, right?
AMERICA'S TIMELESS VALUES
BY THE EPOCH TIMES


REGENERATIVE
ECONOMICS
REVOLUTIONARY THINKING
FOR A WORLD IN CRISIS
JOHN B. FULLERTON