
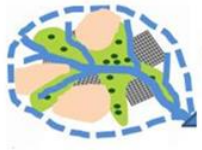
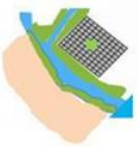
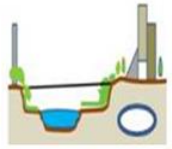


المؤتمر العربي الثاني للأراضي

Second Arab Land Conference

22-24 FEBRUARY 2021
CAIRO, EGYPT

Session Name: Technologies and Smart Solutions

Enhancing Land Management, Land Development and Construction

Building Capacity in Geodesign: Alternative futures for Al Ain, Abu Dhabi, United Arab Emirates

Naeema Al Hosani <naeemam@uaeu.ac.ae>

Carl Steinitz <csteinitz@gsd.harvard.edu>

UN-HABITAT FOR A BETTER URBAN FUTURE

GLTN GLOBAL LAND TOOL NETWORK

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

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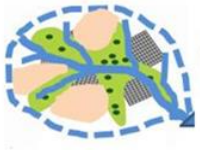
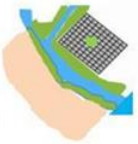
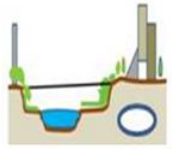
United Arab Emirates University

UAEU

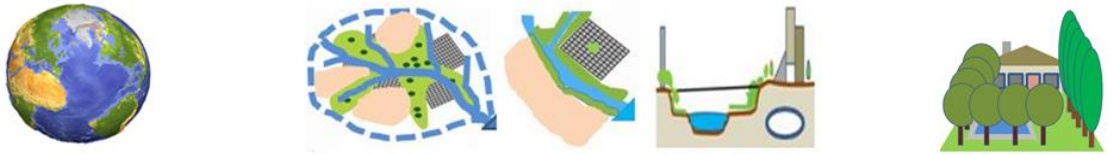

THE GENERIC PROBLEM:

How do we organize and conduct the very beginning and strategic stages of planning for longer-term change in a large, multi-system, multi-client, relatively unpredictable and contentious context …..and one which should not become a zero-sum game? This is very frequently the situation for important and complex projects and studies.

WHY GEODESIGN? AND WHY NEGOTIATION?

Because when fundamental conditions are changing and big data-based models predict future problems, the endgame of our work still requires a purposely designed spatial-temporal strategy for future action, and this is necessarily a political process

Carl Steinitz, 2012, *A Framework for Geodesign*



"Geodesign changes geography by design"

Carl Steinitz

"Geodesign applies systems thinking to the creation of proposals for change and their impact simulations, informed their geographic contexts, and usually supported by digital technology."

Tess Canfield after Michael Flaxman

Carl Steinitz, Notes on Geodesign Dynamics, October 2015

GEODESIGN IS SERIOUS:

Geodesign is most useful at the beginning of thinking about and deciding on **the strategy** of what to do. It does not normally produce a precise final product. Rather, "It could….or should….be something like this…."

GEODESIGN IS COMPLEX:

There are multiple systems and geographic scopes, and uncertainties. Geodesign methods should fit the context. Its technical support must be **flexible, iterative, transparent and rapid.**

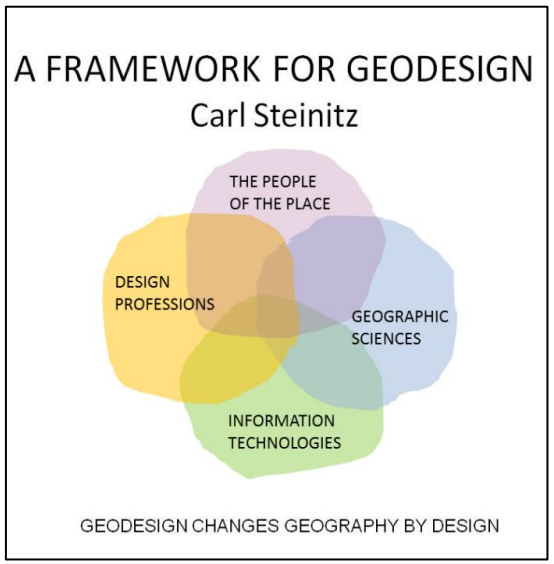
GEODESIGN IS DYNAMIC:

Geodesign changes are sets of system-based policies and projects. Geodesign must rapidly move from infinite possible designs toward a socially, environmentally and economically feasible set of decisions.

GEODESIGN IS COLLABORATIVE:

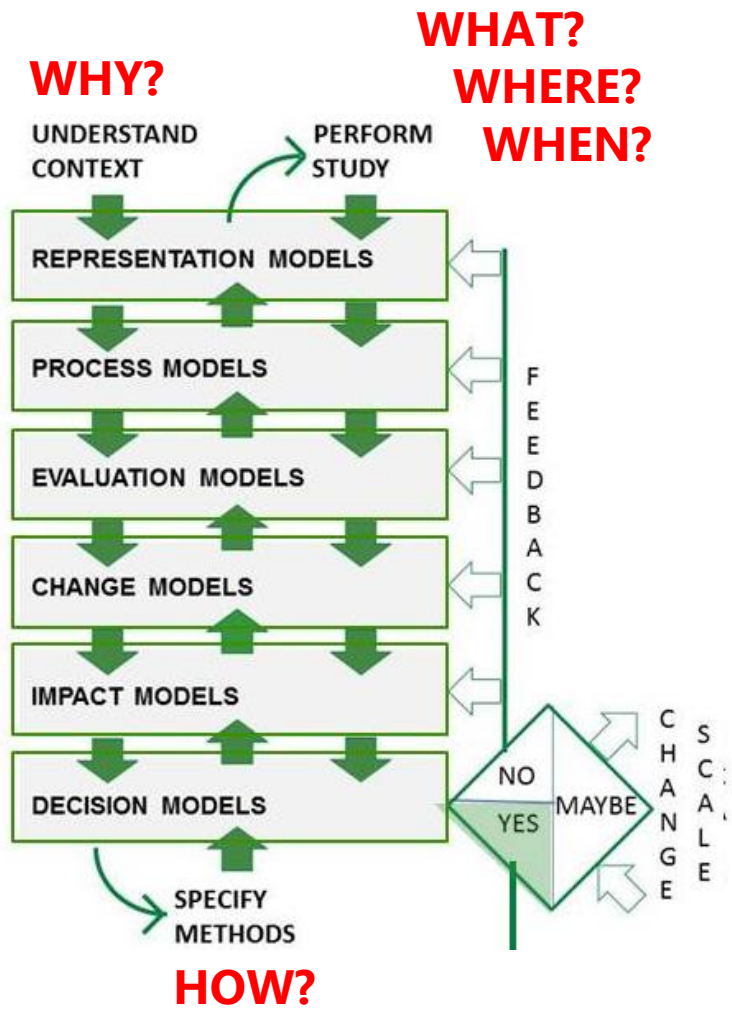
The "**natural language**" of geodesign must be easily understood by all. **The geodesign endgame must support informed negotiation.**

THE DESIGN WILL EMERGE



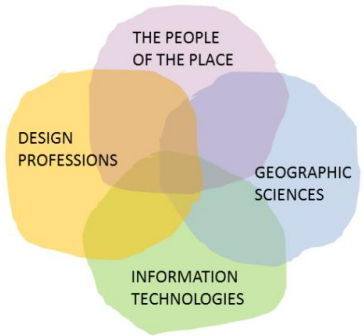
A FRAMEWORK FOR GEODESIGN

1. HOW SHOULD THE CONTEXT BE DESCRIBED?.....
2. HOW DOES THE CONTEXT OPERATE?.....
3. IS THE CONTEXT WORKING WELL?.....
4. HOW MIGHT THE CONTEXT BE ALTERED?.....
5. WHAT DIFFERENCES MIGHT THE CHANGES CAUSE?.....
6. HOW SHOULD THE CONTEXT BE CHANGED?.....



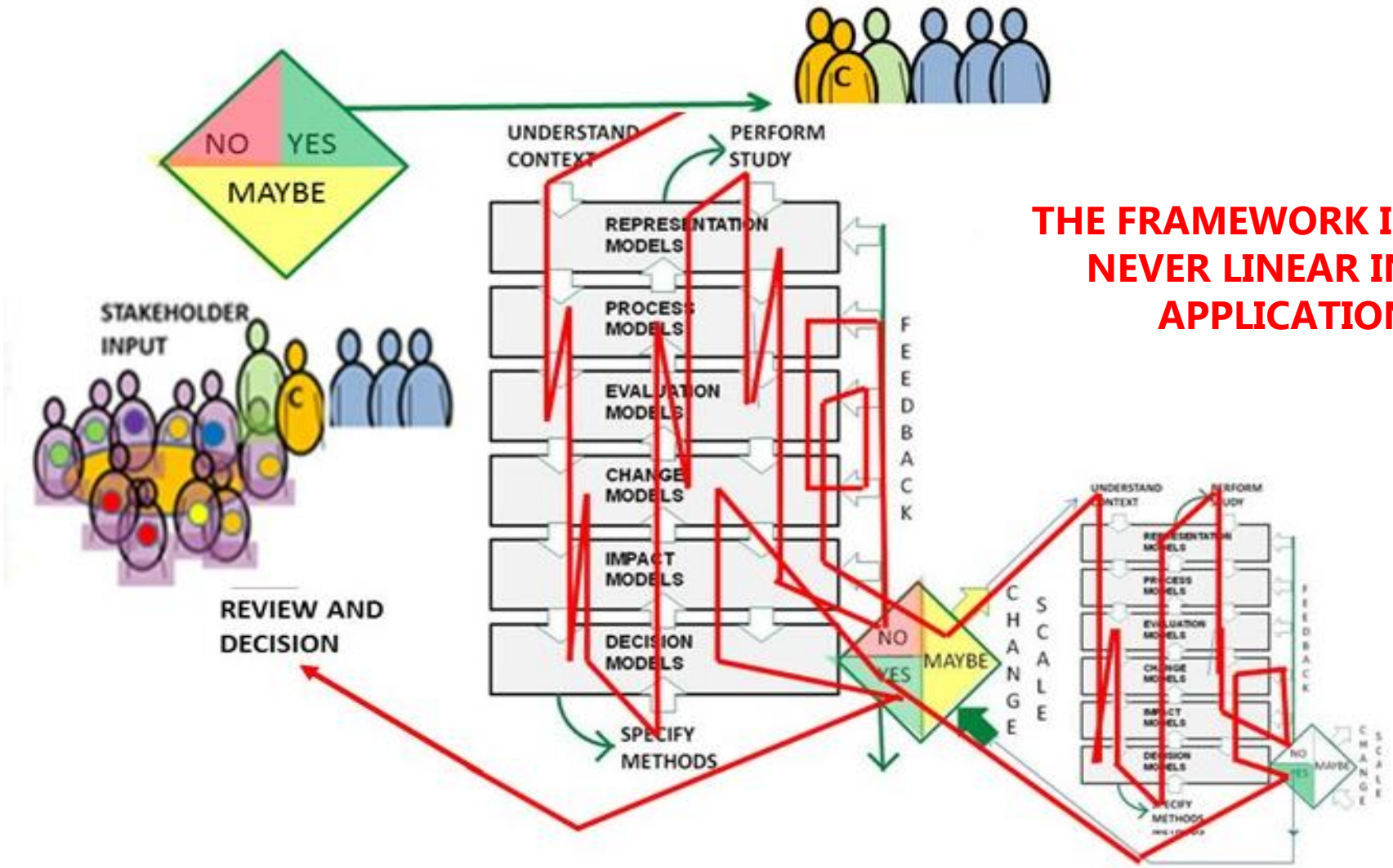
A FRAMEWORK FOR GEODESIGN

Carl Steinitz



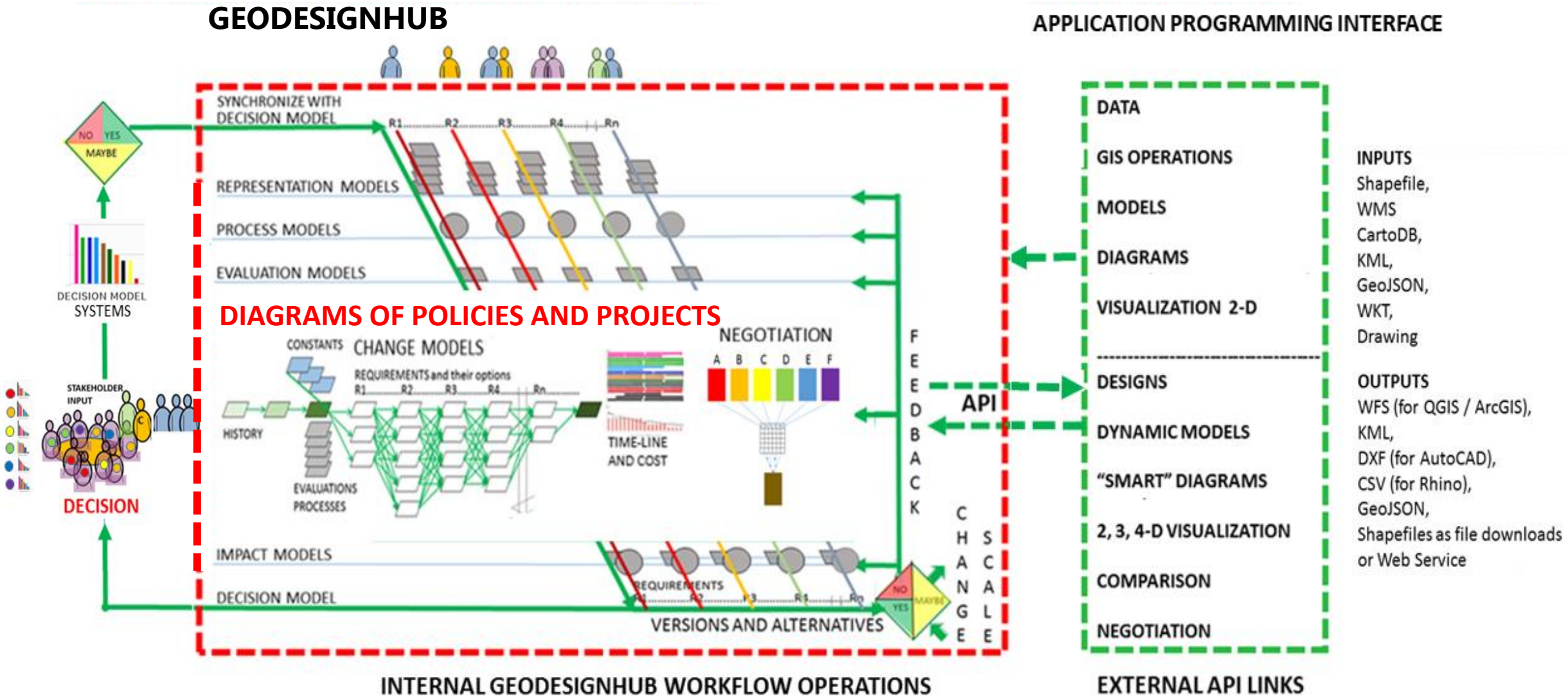
GEODESIGN CHANGES GEOGRAPHY BY DESIGN

GEODESIGN IS NEVER LINEAR



THE FRAMEWORK IS NEVER LINEAR IN APPLICATION

GEODESIGNHUB: WORKFLOW SUPPORT FOR GEODESIGN



IGC INTERNATIONAL GEODESIGN COLLABORATION

Changing Geography by Design

JOIN THE COLLABORATION http://www.igc-geodesign.org

2018-2020: IGC IS 150+ UNIVERSITY-BASED TEAMS IN 50+ COUNTRIES WITH 96 COMPLETED STUDIES

IGC INTERNATIONAL GEODESIGN COLLABORATION
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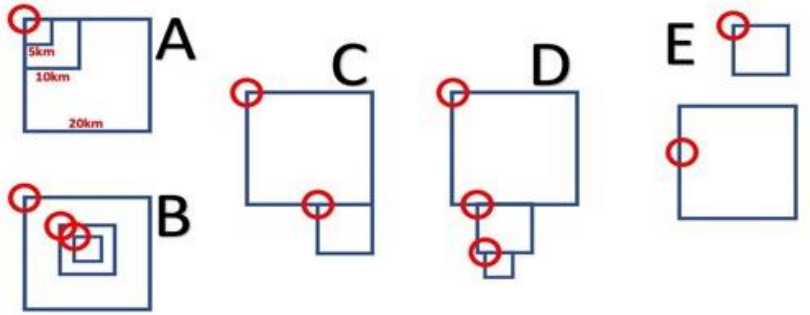
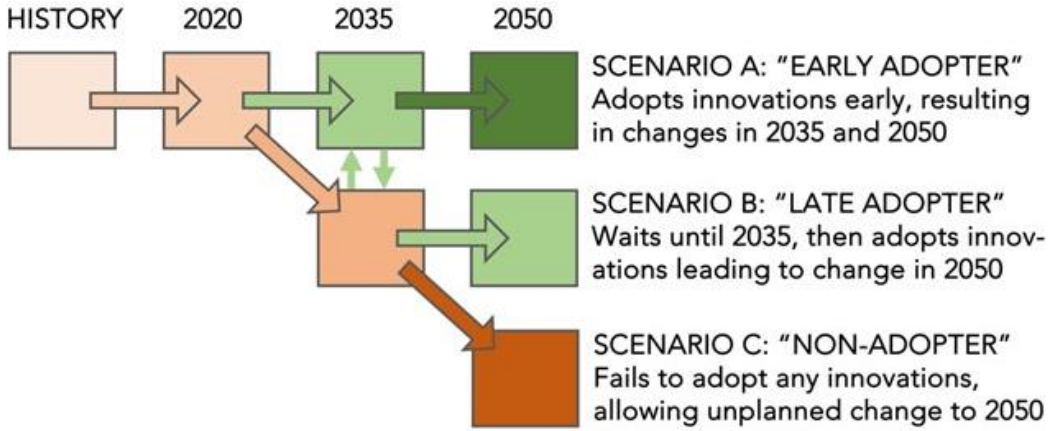
IGC COMMON SYSTEMS, SCENARIOS AND TIME FRAMES

IGC SYSTEMS: EIGHT ARE REQUIRED TWO ARE FLEXIBLE

Water Infrastructure	RGB: 113 184 255	RGB: 175 215 255	Ocean, Rivers and Lakes
		RGB: 113 184 255	Water supply, treatment, recycling
Agriculture	RGB: 194 230 153	RGB: 194 230 153	Agriculture
		RGB: 120 198 121	Forestry
Green Infrastructure	RGB: 49 163 84	RGB: 49 163 84	Recreation
		RGB: 0 104 55	Conservation landscape
Energy Infrastructure	RGB: 205 50 155	RGB: 225 140 200	Energy production
		RGB: 205 50 155	Energy distribution
Transport Infrastructure	RGB: 90 90 90	RGB: 90 90 90	Rail, airport, ship port transport
		RGB: 55 55 55	Road transport
Industry and Commerce	RGB: 116 45 159	RGB: 175 111 215	Industry – light, and Commerce
		RGB: 116 45 159	Industry - heavy
Institutional	RGB: 36 73 110	RGB: 255 230 153	Residential - Rural
		RGB: 255 204 0	Residential - Low Density
Residential, mixed	RGB: 218 128 28	RGB: 218 128 28	Residential - Medium Density, Mixed
		RGB: 132 60 12	Residential - High Density, Mixed
		RGB: 59 119 179	Institutional - Government, Military
		RGB: 36 73 110	Institutional - Education, Healthcare
		RGB: 235 130 125	Commercial, Offices
		RGB: 222 45 38	Commercial, Shopping
		RGB: 0 166 162	Tourism, Cultural
		RGB: 0 102 102	Tourism, Historical
		RGB: 225 182 113	Special landscape e.g. Desert,
		RGB: 115 155 50	Special landscape e.g. Mangrove
Two flexible systems: Choose additional systems from column at right or specify new system and add RGD color code	RGB:		
	RGB:		



Squares of 0.5, 1, 2, 5, 10, 20, 40, 80, 160km etc.



SCENARIO A: "EARLY ADOPTER"
Adopts innovations early, resulting in changes in 2035 and 2050

SCENARIO B: "LATE ADOPTER"
Waits until 2035, then adopts innovations leading to change in 2050

SCENARIO C: "NON-ADOPTER"
Fails to adopt any innovations, allowing unplanned change to 2050

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SYSTEMS BASED INNOVATIONS

MIX 2035 16 SUSTAINABLE URBAN INFRASTRUCTURE

Stormwater Management: Reduce the runoff volume and improve water quality. This can be achieved by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

Heat Island Reduction: Minimize effects on microclimates and human and wildlife habitats by reducing heat islands. Use existing plant materials, vegetation orenergy generation system to provide shade for 50% of non-roof site paving; High-Reflectance and Vegetated Roofs; Use roofing materials that have at least 0.75 SRI.

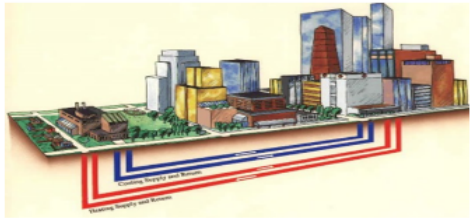
On-Site Renewable Energy Sources: Reduce environmental and economic harms associated with fossil fuel energy by increasing self-supply ofrenewable energy; Incorporate on-site nonpolluting renewable energy generation, such as solar, wind, geothermal, small-scale or micro-hydroelectric, or biomass, with production capacity of at least 5% of the project's annual electrical and thermal energy cost.

District Heating & Cooling: Encourage development of energy efficient neighborhoods by employing district heating and cooling strategies that reduce energy use and energy-related environmental harms.

Solid Waste Management Infrastructure: Include a recycling center available to all occupants, dedicated to separating, collecting and storing materials for recycling.

Wastewater Management: New design and construction projects should retain at least 25 percent of the average annual wastewater on site generated by the project.

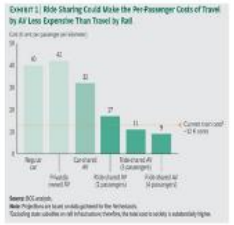
Source:https://w5.siemens.com/web/si/sl/corporate/portal/raziskave/Documents/sustainable_urban_infrastructure-study_london.pdf



TRA 2035 8 SELF-DRIVING CARS WILL DISRUPT THE TRAIN INDUSTRY

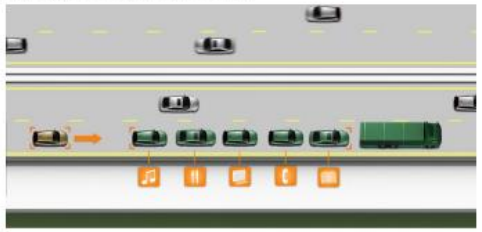
Self-Driving Cars Will Disrupt the Train Industry, Too - CityLab

"…a new report released Monday from the Boston Consulting Group concentrates on the potential impact AVs will Have on an older, globally popular form of transportation: passenger rail. "Will Autonomous Vehicles Derail Trains?"



Trains will remain the least expensive mode of transport during peak times in urban areas. But during off-peak hours and in rural environments, they will lose riders to AVs. Rail companies may even end up in a downward spiral: with reduced overall ridership, rail companies' overall unit costs for all remaining passengers will escalate because of the inherently high proportion of fixed costs in operating a train network. This could trigger price increases or reduced schedules, which would result in a further reduction in ridership. It is difficult to operate fewer off-peak trains without affecting the costs of peak trains.

Source--
https://www.citylab.com/transportation/2016/10/self-driving-cars...trains.../502430/



ENE 2035/2050 1 RENEWABLE ENERGY SOURCES

„Industrial production is projected to increase by a factor of four between now and 2050. In the absence of a strong contribution from energy efficiency improvements, renewable energy and CO2 capture and storage (CCS) will need to make a significant impact if industry is substantially to reduce its consequent greenhouse-gas (GHG) emissions."

Source:
Renewable Energy in Industrial Applications An assessment of the 2050 potential
https://www.solarthermalworld.org/sites/gstec/files/unido_renewables_industrial_applications.pdf

„The present analysis of the long-term potential for renewable energy in industrial applications suggests that up to 21% of all final energy use and feedstock in manufacturing industry in 2050 can be of renewable origin."

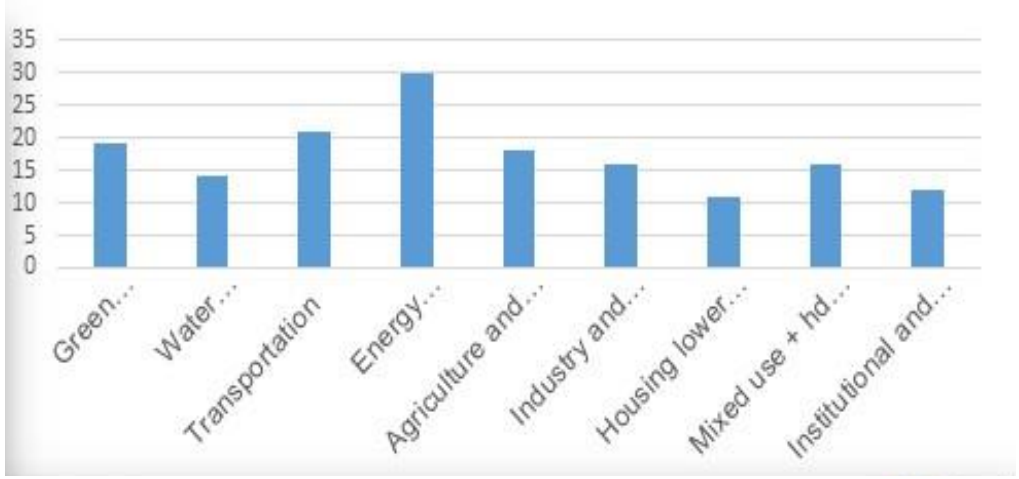
„Across all industrial sectors, biomass has the potential to contribute 37 EJ/yr."

„Solar thermal energy has the potential to contribute 5.6 EJ/yr to industry by 2050."

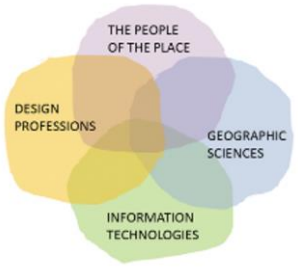
„Heat pumps also have a part to play in low temperature process applications and are estimated to contribute 4.9 EJ/year in 2050."

By continuing to use renewable energy sources in industry, it will not be necessary to supply solid fuels to factories or build their landfills.

Source:
https://ohs9sciencestelr.weekly.com/renewable-energy-sources.html



https://www.igc-geodesign.org/global-systems-research



WHY APPLY GEODESIGN IN A WORKSHOP FORMAT?

- WHEN EXPLORING STRATEGIC POSSIBILITIES
- WHEN APPLYING GEODESIGN AND THERE IS LITTLE TIME AND SMALL DATA
- WHEN STARTING FAST TO IDENTIFY CENTRAL ISSUES, OPTIONS AND CHOICES
- WHEN IT TAKES A DESIGN TO KNOW WHAT THE QUESTIONS REALLY ARE
- WHEN IT TAKES A DESIGN TO KNOW WHAT IS REALLY WANTED

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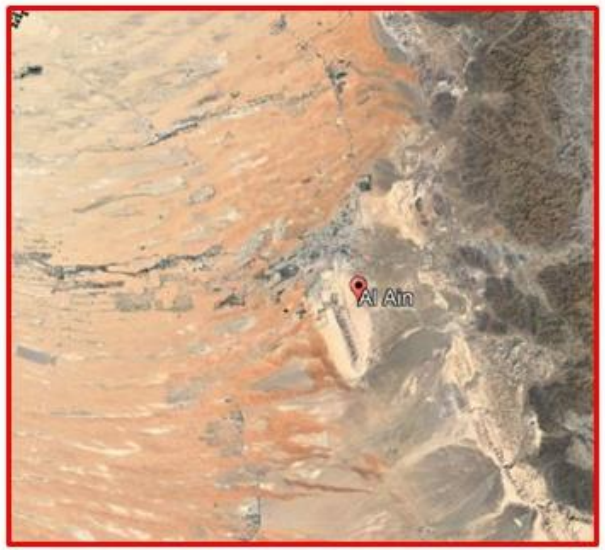
THE AL AIN STUDY AREA



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THE GEODESIGN CHALLENGE

- The Al Ain study proposes that the population of around 800,000 will double by 2050.
- The current Al Ain Plan 2030 proposes a substantial rebuilding and densification of major portions of the existing city to accommodate growth to 2050 within the current city boundary.
- This approach is not been followed by the geodesign teams in the UAEU workshop.
- Rather, the assumed population growth to 2050 is seen as requiring substantial additional urban development and this has been the main focus of the workshop.
- Two alternative contiguous and distributed strategies which double development, and their subsequent negotiation, were the basis of defining the geodesign teams and their designs.

2020 EXISTING

AL AIN PLAN 2030

CONTIGUOUS

DISTRIBUTED

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REQUIREMENTS AND INNOVATIONS

REQUIREMENTS

- Double all development in Al Ain by 2050 as a "rule of thumb" estimate
- From Al Ain Plan 2030: The Al Ain workshop was guided in part by the by principles established by Sheik Zayed when the city was developed in the last half of the 20th century. These policies have been respected by the workshop participants:
  - Protect the cultural and heritage buildings and landscapes
  - Protect nature and develop subject to environmental conditions
  - Apply sustainable infrastructure technology for managing energy and water
  - Maintain strict height controls on new buildings, to no more than four floors
  - Shape new growth by mixed-use
  - Develop in districts with a clear desert edge
  - Develop a park system for outdoor use
  - Develop pedestrian friendly centers

IGC INNOVATIONS:

- WAT 3 Agricultural Water Conservation Best Practices
- WAT 8 Bioretention
- AGR 8 Ecological Pest Management
- AGR 18 Controlled-environment Agriculture (CEA)
- GRN 3 Integrated Vegetated Stormwater Infrastructure
- GRN 10 Green Urban Streets
- ENE 1 Renewable Energy Sources
- TRA 1 Autonomous Vehicle Revolution
- TRA 12 Autonomous Air Taxis
- IND/COM 6 Computer-integrated Manufacturing
- MIX 1 Mixed Use Development
- MIX 5 Technology for Multi-dimensional Use of Space
- HER 1 Protect and manage cultural-historical heritage
- DES 1 Protect and manage desert landscape

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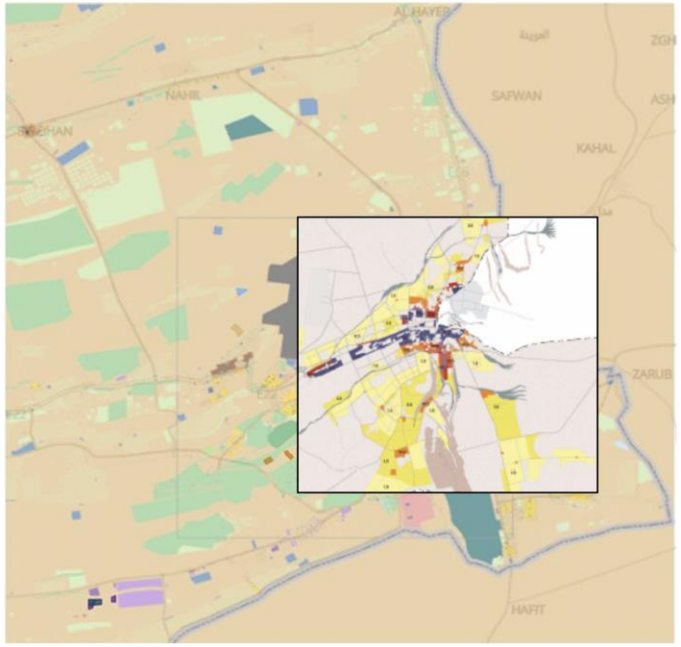
AL AIN WORKSHOP PREPARATION

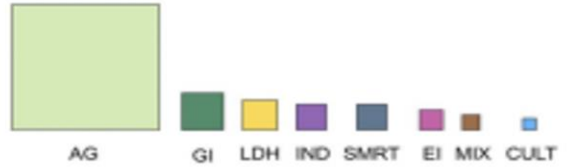
GEODESIGNHUB PREPARATION



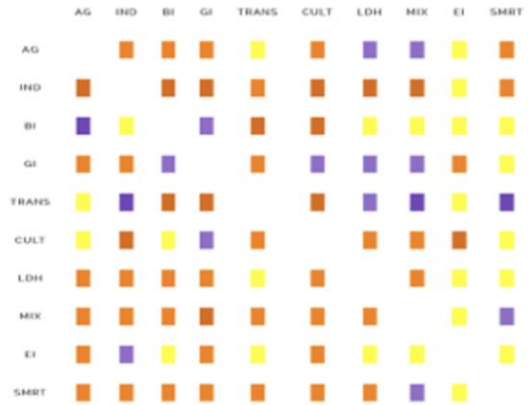
2020 EXISTING

Plan Al Ain 2030

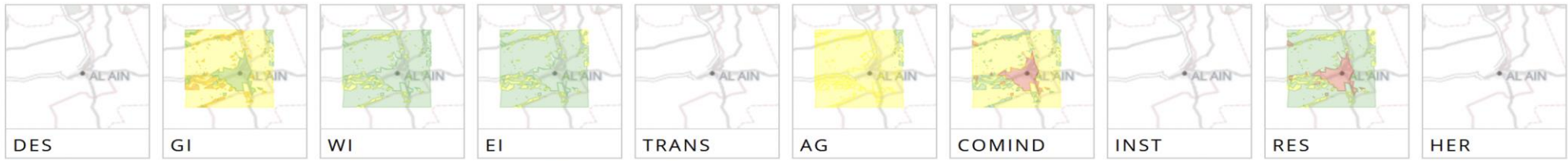
10 SYSTEMS



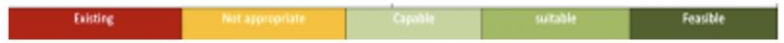
THE REQUIREMENTS



SYSTEM IMPACT MODELS



EVALUATION MODELS



DIAGRAMS OF POLICIES AND PROJECTS

GEODESIGN HUB

Search Diagrams...

FILTER DIAGRAMS

DES 20	GI 29	WI 17	EI 21	TRANS 41	AG 26	COMIND 30	INST 33	RES 40	HER 18
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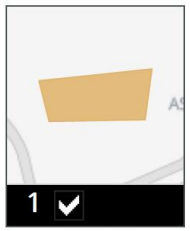
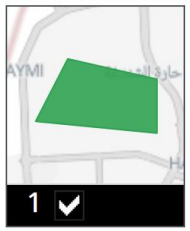
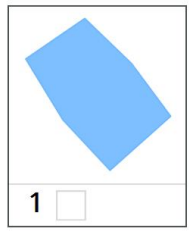
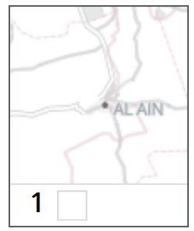
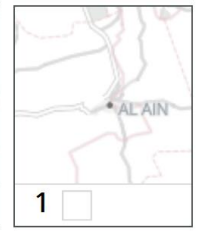
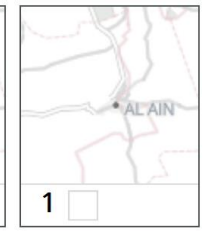
3	3 ✓	3	3	3 ✓	3	3 ✓	3	3 ✓	3

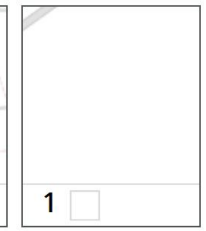
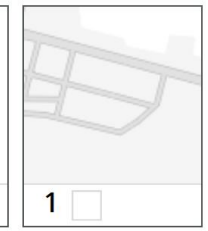
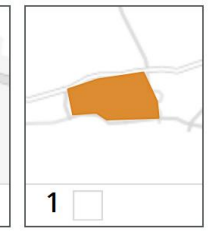
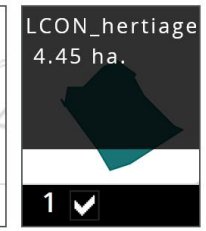


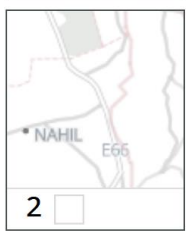


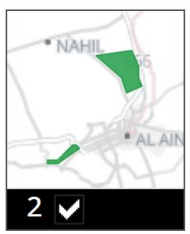



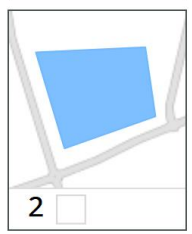


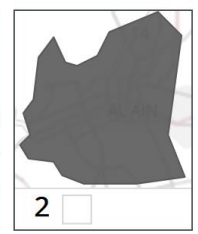


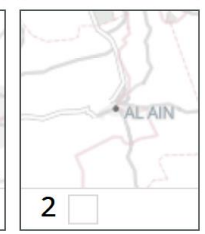





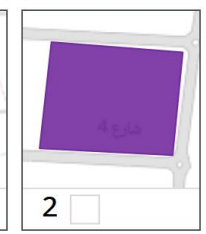
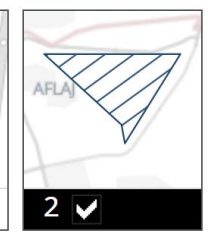


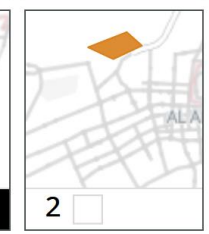


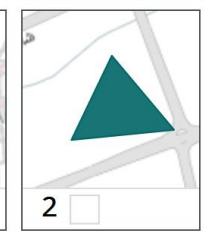
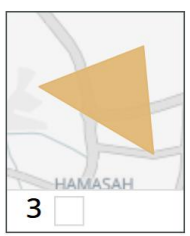


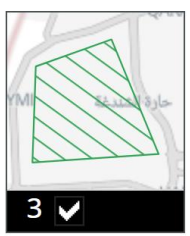
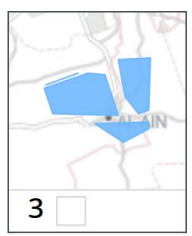



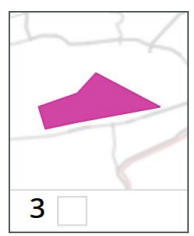
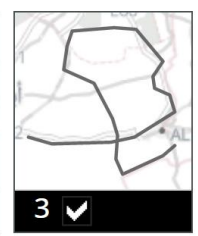


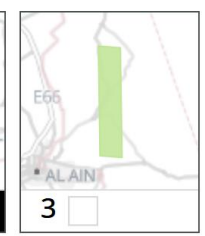



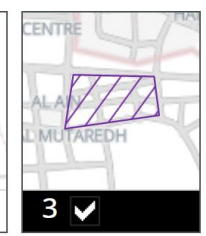


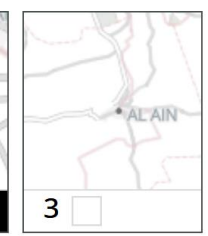



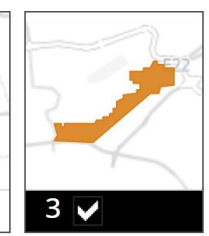







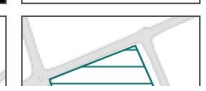












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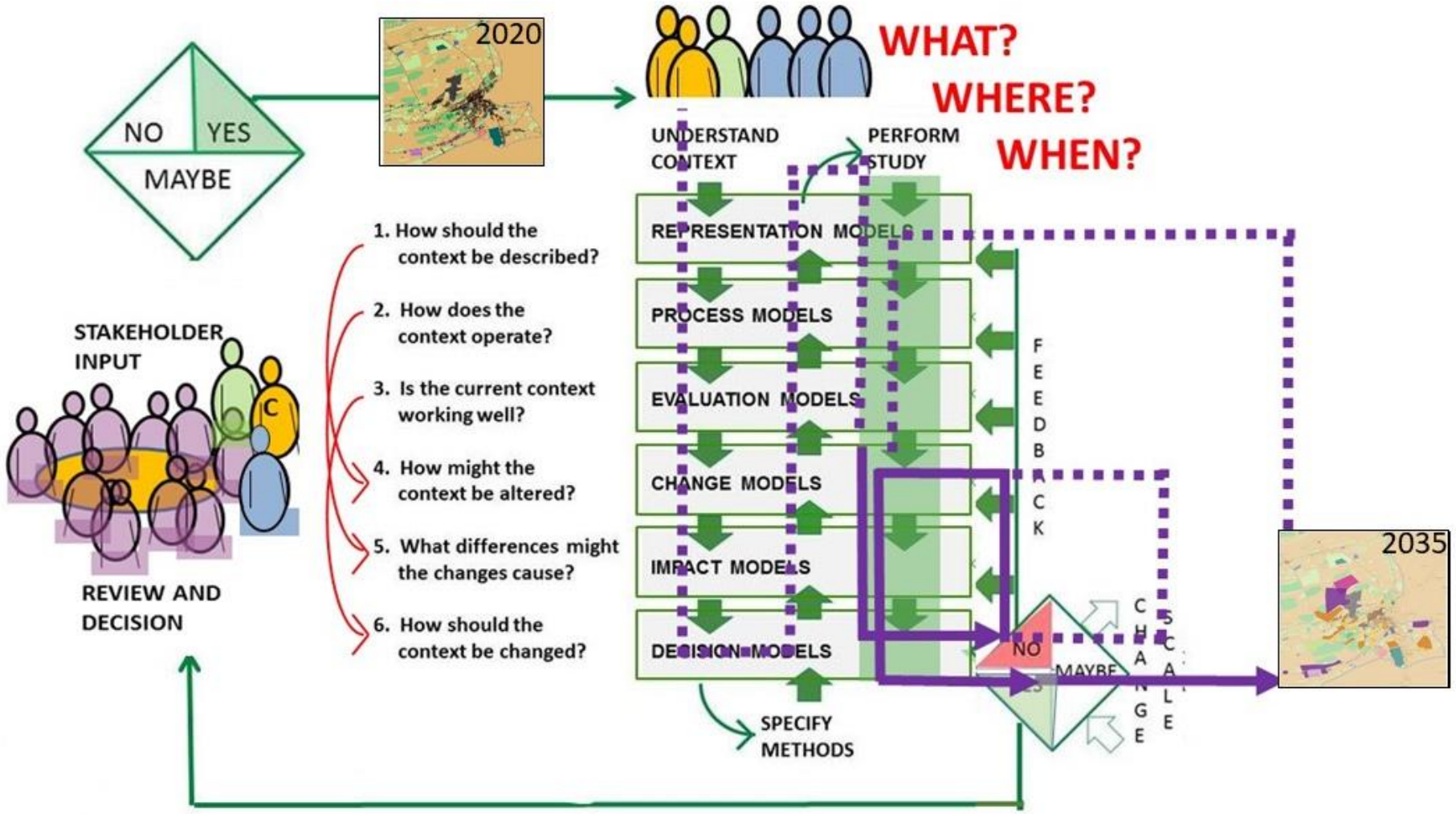
UAEU

THE WORKFLOW FOR GEODESIGN

DAY 1

INTRODUCTION, THE PROBLEM, DIAGRAMS OF POLICIES AND PROJECTS

SYNTHESIS: GEODESIGN FOR 2035



IGC INTERNATIONAL GEODESIGN COLLABORATION
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UAEU

THE WORKFLOW FOR GEODESIGN

DAY 1

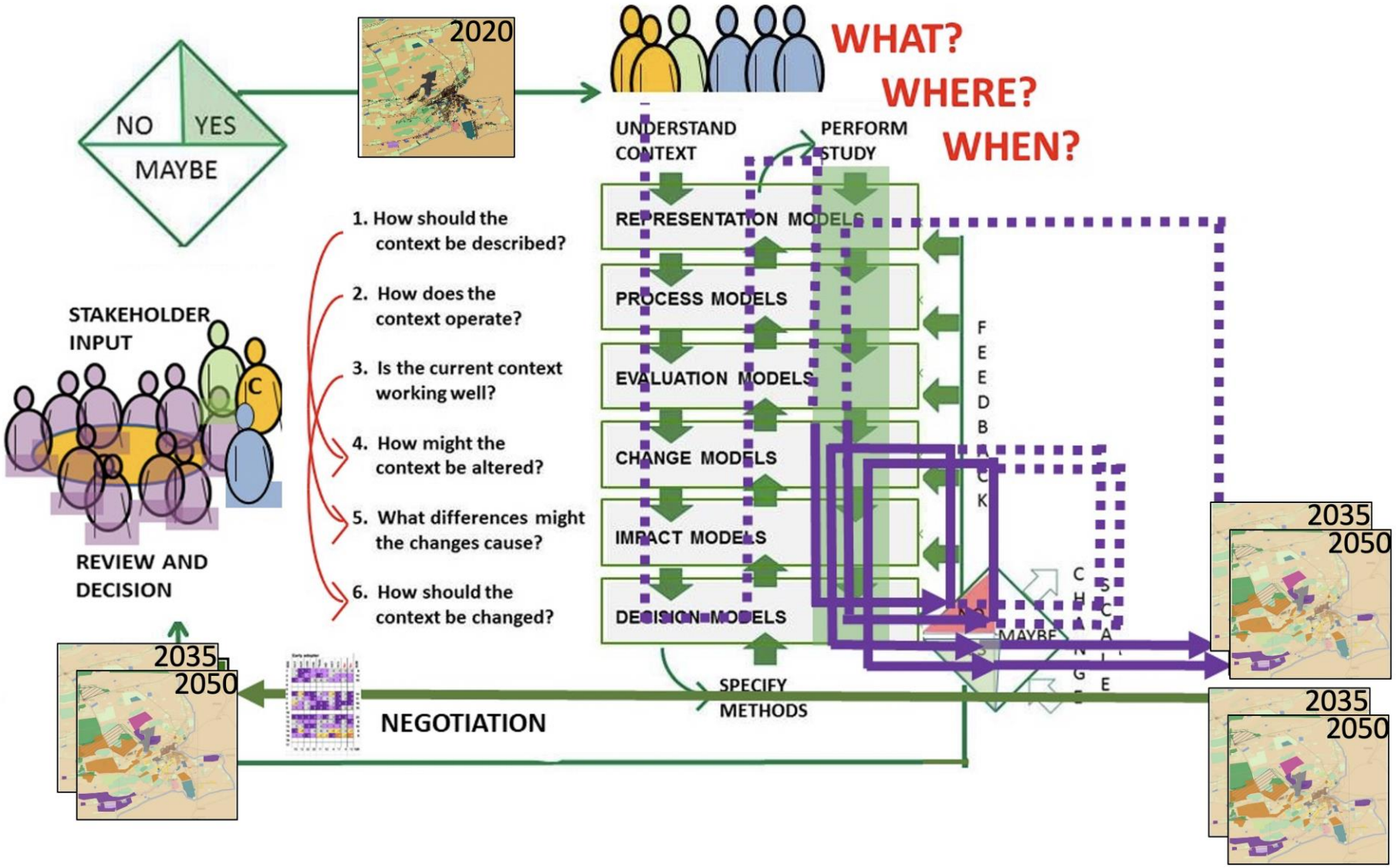
INTRODUCTION, THE PROBLEM, DIAGRAMS OF POLICIES AND PROJECTS

SYNTHESIS: GEODESIGN FOR 2035

DAY 2

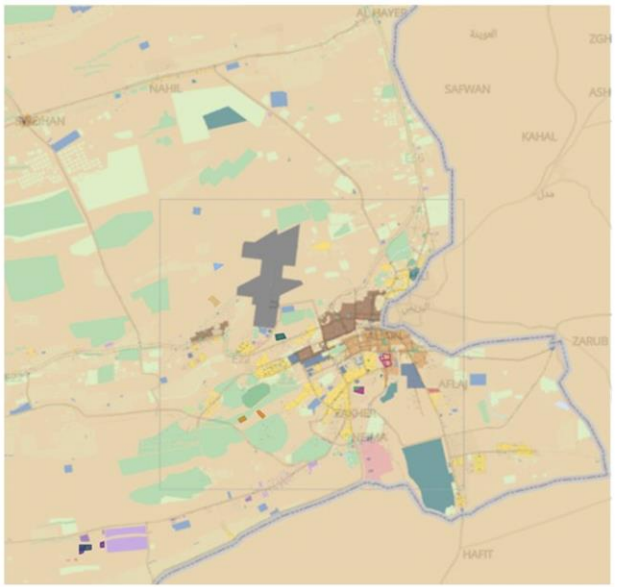
SYNTHESIS: GEODESIGN FOR 2050

COMPARISON, PRESENTATION AND NEGOTIATION



THE EARLY ADOPTER SCENARIO

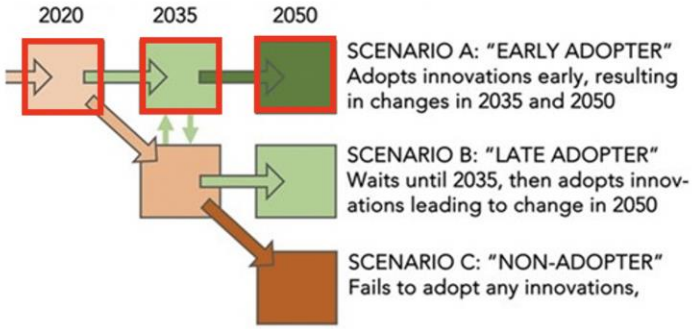
2020 EXISTING



2035 EARLY ADOPTER

2050 EARLY ADOPTER

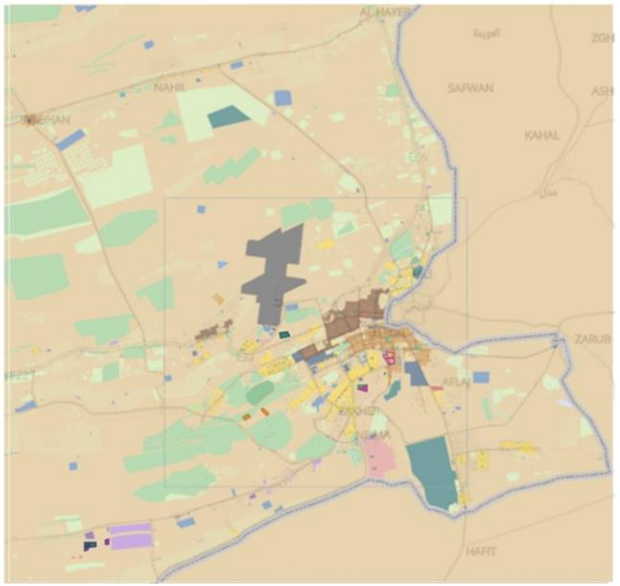
- Water Infrastructure
- Agriculture
- Green Infrastructure
- Energy Infrastructure
- Transport Infrastructure
- Industry and Commerce
- Institutional
- Residential, Mixed
- Flexible, e.g., Cultural/Historical
- Flexible, e.g., Desert



EARLY ADOPTER 2050	Geodesign Systems									
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	3	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	3	3	1	3	-1	1	1	1	3
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	3	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	3	1	3	3	3	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	3	3	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	3	3	3	3	3	1	3	1	1
GOAL 12: Responsible Consumption and Production	1	3	1	1	3	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	3	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	3	3	3	-1	-3	-3	3	-1	3
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										
	3	1	0	-1	-3					
	Most beneficial	Beneficial	Neutral	Detrimental	Most detrimental					

THE LATE ADOPTER SCENARIO

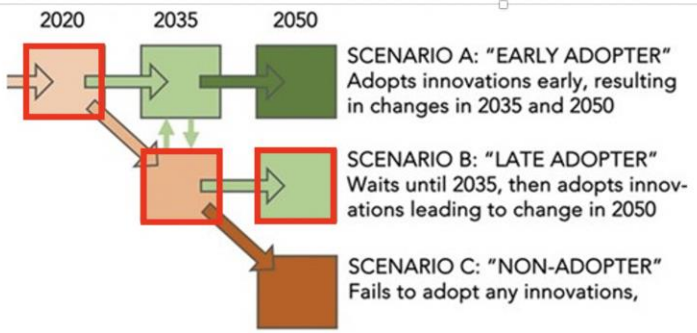
2020 EXISTING



2035 NON AND LATE ADOPTER

2050 LATE ADOPTER

- Water Infrastructure
- Agriculture
- Green Infrastructure
- Energy Infrastructure
- Transport Infrastructure
- Industry and Commerce
- Institutional
- Residential, Mixed
- Flexible, e.g., Cultural/Historical
- Flexible, e.g., Desert

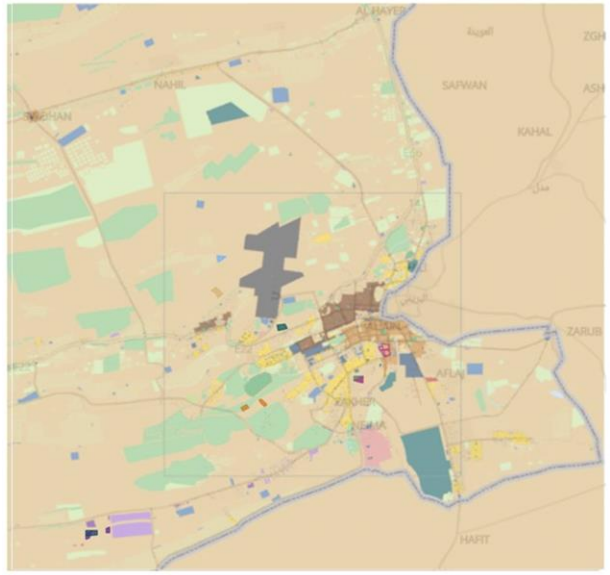


LATE ADOPTER 2050	Geodesign Systems										
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	3	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	1	1	1	1	-1	1	1	1	1
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	1	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	1	1	3	3	3	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	1	1	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	1	3	3	1	3	1	1	1	1
GOAL 12: Responsible Consumption and Production	1	1	1	3	1	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	1	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	3	3	3	-1	-1	-1	3	-1	3
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										

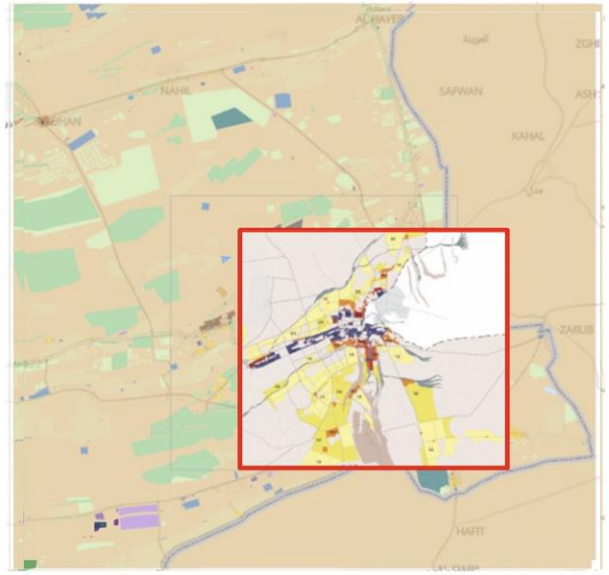
3	1	0	-1	-3
Most beneficial	Beneficial	Neutral	Detrimental	Most detrimental

THE NON ADOPTER SCENARIO

2020 EXISTING

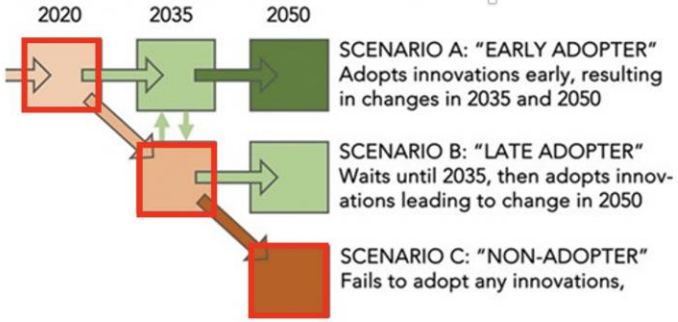


2035 NON AND LATE ADOPTER



2050 NON ADOPTER

- Water Infrastructure
- Agriculture
- Green Infrastructure
- Energy Infrastructure
- Transport Infrastructure
- Industry and Commerce
- Institutional
- Residential, Mixed
- Flexible, e.g., Cultural/Historical
- Flexible, e.g., Desert



NON ADOPTER 2050	Geodesign Systems									
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	1	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	1	1	1	1	-1	1	1	1	1
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	1	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	1	1	3	1	1	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	1	1	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	1	1	3	1	3	1	1	1	1
GOAL 12: Responsible Consumption and Production	1	1	1	3	1	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	1	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	1	1	3	-1	-1	-1	1	-1	1
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										
	3		1		0		-1		-3	
	Most beneficial		Beneficial		Neutral		Detrimental		Most detrimental	

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U N SUSTAINABLE DEVELOPMENT GOALS

EARLY ADOPTER 2050

EARLY ADOPTER 2050	Geodesign Systems									
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	3	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	3	3	1	3	-1	1	1	1	3
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	3	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	3	1	3	3	3	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	3	3	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	3	3	3	3	3	1	3	1	1
GOAL 12: Responsible Consumption and Production	1	3	1	1	3	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	3	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	3	3	3	-1	-3	-3	3	-1	3
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										

3	1	0	-1	-3
Most beneficial	Beneficial	Neutral	Detrimental	Most detrimental

SDGs 154

LATE ADOPTER 2050

LATE ADOPTER 2050	Geodesign Systems									
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	3	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	1	1	1	1	-1	1	1	1	1
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	1	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	1	1	3	3	3	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	1	1	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	1	3	3	1	3	1	1	1	1
GOAL 12: Responsible Consumption and Production	1	1	1	3	1	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	1	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	3	3	3	-1	-1	3	-1	-1	3
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										

3	1	0	-1	-3
Most beneficial	Beneficial	Neutral	Detrimental	Most detrimental

SDGs 128

NON ADOPTER 2050

NON ADOPTER 2050	Geodesign Systems									
UN Sustainable Development Goals	Water Infrastructure	Agriculture and Fisheries	Green Infrastructure	Energy Infrastructure	Transport Infrastructure	Industry and Commerce	Institutional	Residential, mixed	Tourism, Cultural	Conservation landscape
GOAL 1: No Poverty	3	1	1	3	1	1	1	1	1	0
GOAL 2: Zero Hunger	3	3	1	1	1	3	1	-1	-1	-1
GOAL 3: Good Health and Well-being	3	1	1	1	1	-1	1	1	1	1
GOAL 4: Quality Education										
GOAL 5: Gender Equality										
GOAL 6: Clean Water and Sanitation	3	-1	1	3	-1	-1	-1	-1	-1	0
GOAL 7: Affordable and Clean Energy	0	0	1	3	1	1	1	1	1	0
GOAL 8: Decent Work and Economic Growth	3	1	1	3	1	1	3	1	1	0
GOAL 9: Industry, Innovation and Infrastructure	3	3	1	3	1	1	3	1	1	-1
GOAL 10: Reduced Inequality										
GOAL 11: Sustainable Cities and Communities	3	1	1	3	1	3	1	1	1	1
GOAL 12: Responsible Consumption and Production	1	1	1	3	1	1	1	3	0	0
GOAL 13: Climate Action	1	-1	3	3	1	-1	3	3	-1	1
GOAL 14: Life Below Water	-1	-1	-1	0	-1	-1	-1	-1	-1	0
GOAL 15: Life on Land	3	1	1	3	-1	-1	-1	1	-1	1
GOAL 16: Peace and Justice Strong Institutions										
GOAL 17: Partnerships to achieve the Goal										

3	1	0	-1	-3
Most beneficial	Beneficial	Neutral	Detrimental	Most detrimental

SDGs 105

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THANK YOU FOR THE ATTENTION!

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