

Alternative Design for New Development Areas in Hong Kong

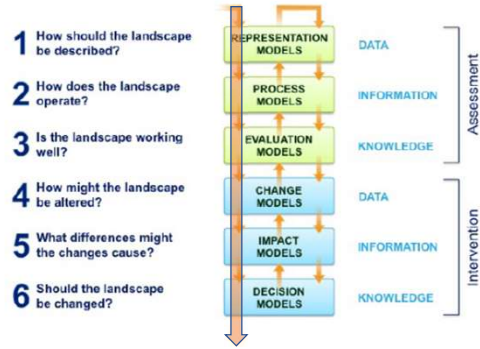
Alex Tong

Unrestricted

Objectives

- The project aims to consider natural processes, such as urban forestry and river restoration in the New Development Areas in Hong Kong.

The geodesign framework – by Carl Steinitz



Background

First Iteration – The *Why* Questions

Study Area and the People of the Place



Representation – How should the study area be described?

- Two North Development Areas (NDAs) designated by Hong Kong Government
- Currently, rural villages along Shek Sheung River between two highly-populated cities, Hong Kong and Shenzhen
- 612 ha to accommodate a total population of about 176,900
- To build 59,900 flats with social and cultural facilities
- To provide about 37,700 employment opportunities
- To provide commercial, research and development areas for the future
- To improve transport network
- To preserve river valley



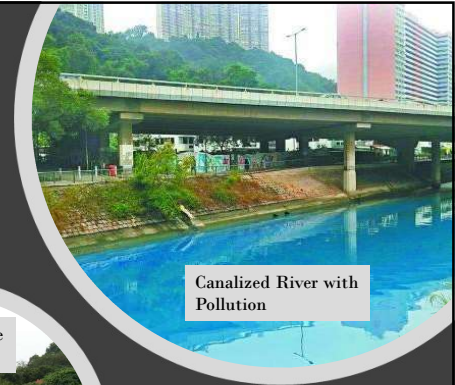
Process – How does the study area operate?

- Population growth
- Urbanization
- Abandonment of farmland
- Fragmentation of green space



Evaluation – Is the current study area work well ?

- Declining water quality in river
- Diminishing forest areas
- Fragmented green space
- Non-productive farms
- Country park areas considered to be the back garden of Hong Kong



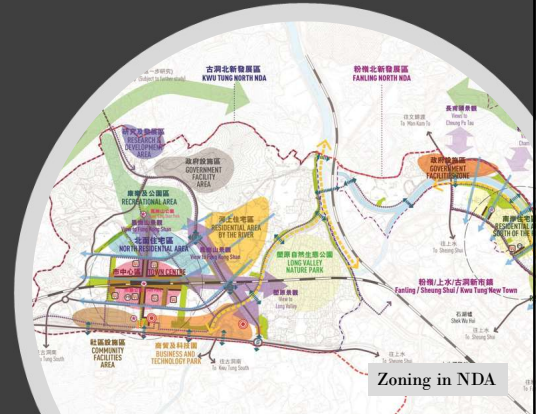
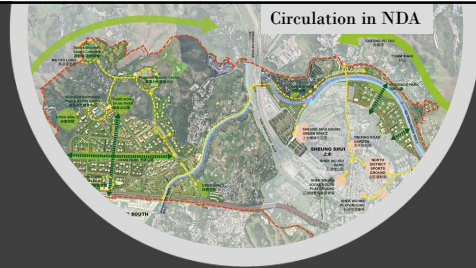
Change – How might the study area be altered ?

- Sustainable planning – green infrastructure, e.g urban forestry & river restoration
- Affordable housing
- Multi-functional landscape – agriculture as well as amenity
- Provide alternatives
- Engage stakeholders
- Learning from other cities



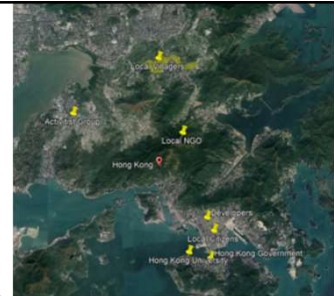
Impact – What differences might the changes cause ?

- Amenity spaces enjoyed by citizens
- Connectivity of green space
- Preserve cultural heritage



Decision – How should the study area be changed ?

- Decision model taking into account of local stakeholders' opinions
- Get away from the status-quo from government-led development



Stakeholder Groups In Hong Kong

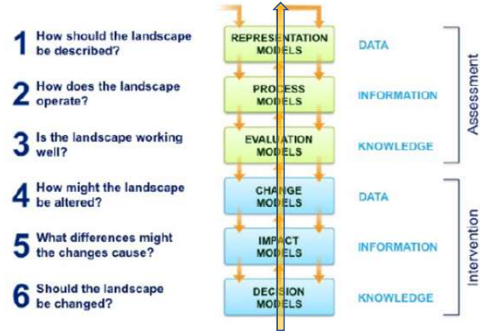


Multi-functional in London Green Grid



Clear Targets in Singapore

The geodesign framework – by Carl Steinitz



Methodology

Second Iteration – The How Questions

Decision – Personal, cultural and institutional knowledge of the decision makers

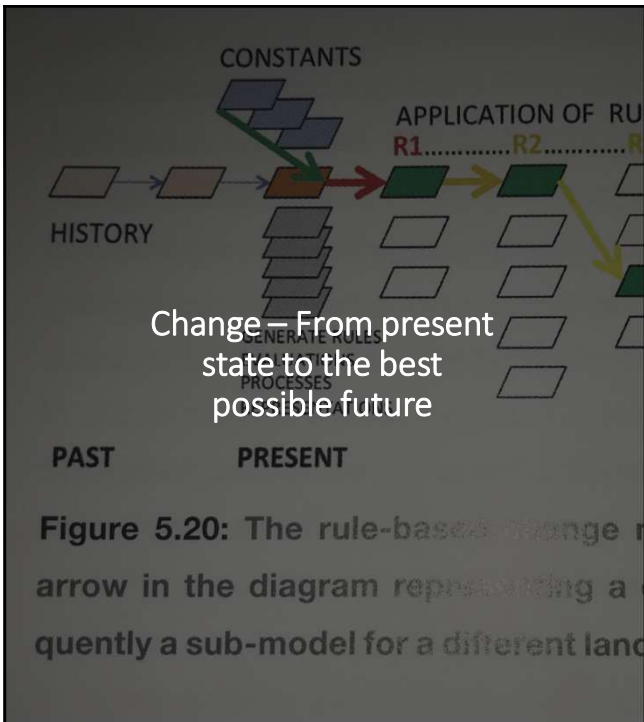
Question	What are the objectives and requirements of the decision makers and thus of the Geodesign study?
Initial Thoughts	Involve stakeholders ignored in the government's consultation and identify groups with clear visions and opinions
Follow-up	Select a group for in-depth interview



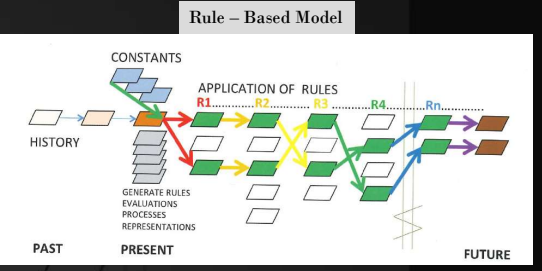
Impact – Metrics to assess benefits and costs of potential changes



Question	What, how much, where, when and to whom are the impacts seen as “good” vs “bad”?
Initial Thoughts	Combine the objectives of the government and the stakeholders
Follow-up	Convert the findings from the stakeholders’ interview into clear objectives



Change – From present state to the best possible future



Questions	Which strategy should the project choose for change model?
Initial Thoughts	Using a rule-based model and develop a set of rules on sustainable development based on case study on other cities
Follow-up	Translate rules into CityEngine script and create a number of alternatives based on the rules

Figure 5.20: The rule-based change model... arrow in the diagram representing a different requirement, frequently a sub-model for a different land use.

SITES v2 Scorecard Summary

YES ? NO	1: SITE CONTEXT	Possible Points:	13
Y	CONTEXT P1.1	Limit development on farmland	
Y	CONTEXT P1.2	Protect floodplain functions	
Y	CONTEXT P1.3	Conserve aquatic ecosystems	
Y	CONTEXT P1.4	Conserve habitats for threatened and endangered species	
	CONTEXT C1.5	Redevelop degraded sites	3 to 6
	CONTEXT C1.6	Locate projects within existing developed areas	4
	CONTEXT C1.7	Connect to multi-modal transit networks	2 to 3

YES ? NO	2: PRE-DESIGN ASSESSMENT + PLANNING	Possible Points:	3
Y	PRE-DESIGN P2.1	Use an integrative design process	
Y	PRE-DESIGN P2.2	Conduct a pre-design site assessment	
Y	PRE-DESIGN P2.3	Designate and communicate VSPZs	
	PRE-DESIGN C2.4	Engage users and stakeholders	3

YES ? NO	3: SITE DESIGN - WATER	Possible Points:	23
Y	WATER P3.1	Manage precipitation on site	
Y	WATER P3.2	Reduce water use for landscape irrigation	
Y	WATER C3.3	Manage precipitation beyond baseline	4 to 6
	WATER C3.4	Manage precipitation beyond baseline	4 to 6
	WATER C3.5	Manage precipitation beyond baseline	4 to 6
	WATER C3.6	Restore aquatic ecosystems	4 to 6

YES ? NO	4: SITE DESIGN - SOIL + VEGETATION	Possible Points:	40
Y	SOIL+VEG P4.1	Create and communicate a soil management plan	
Y	SOIL+VEG P4.2	Conserve healthy soils and appropriate vegetation	
Y	SOIL+VEG P4.3	Conserve healthy soils and appropriate vegetation	
Y	SOIL+VEG P4.4	Conserve healthy soils and appropriate vegetation	
	SOIL+VEG C4.4	Conserve healthy soils and appropriate vegetation	4 to 6
	SOIL+VEG C4.5	Conserve special status vegetation	4
	SOIL+VEG C4.6	Conserve and use native plants	3 to 6
	SOIL+VEG C4.7	Conserve and restore native plant communities	4 to 6
	SOIL+VEG C4.8	Optimize biomass	1 to 6
	SOIL+VEG C4.9	Reduce urban heat island effects	4
	SOIL+VEG C4.10	Use vegetation to minimize building energy use	1 to 4
	SOIL+VEG C4.11	Reduce the risk of catastrophic wildfire	4

YES ? NO	5: SITE DESIGN - MATERIALS SELECTION	Possible Points:	41
Y	MATERIALS P5.1	Eliminate the use of wood from threatened tree species	
	MATERIALS C5.2	Maintain on-site structures and paving	2 to 4
	MATERIALS C5.3	Design for adaptability and disassembly	3 to 4
	MATERIALS C5.4	Use salvaged materials and plants	3 to 4
	MATERIALS C5.5	Use recycled content materials	3 to 4
	MATERIALS C5.6	Use regional materials	3 to 5
	MATERIALS C5.7	Support responsible extraction of raw materials	1 to 5
	MATERIALS C5.8	Support transparency and safer chemistry	1 to 5
	MATERIALS C5.9	Support sustainability in materials manufacturing	5
	MATERIALS C5.10	Support sustainability in plant production	1 to 5

6: SITE DESIGN - HUMAN HEALTH + WELL-BEING

Y	HHWB C6.1	Promote active transportation	
Y	HHWB C6.2	Promote active transportation	
Y	HHWB C6.3	Promote active transportation	
Y	HHWB C6.4	Promote active transportation	
Y	HHWB C6.5	Support physical activity	
Y	HHWB C6.6	Support physical activity	
Y	HHWB C6.7	Support physical activity	
Y	HHWB C6.8	Reduce high speed transit noise	
Y	HHWB C6.9	Minimize energy consumption	
Y	HHWB C6.10	Minimize energy consumption	
Y	HHWB C6.11	Support local food systems	

7: CONSTRUCTION

Y	CONSTRUCTION P7.1	Communicate with stakeholders	
Y	CONSTRUCTION P7.2	Control and reduce construction noise	
Y	CONSTRUCTION P7.3	Reduce water consumption	
Y	CONSTRUCTION C7.4	Design construction to minimize disruption	
Y	CONSTRUCTION C7.5	Design construction to minimize disruption	
Y	CONSTRUCTION C7.6	Design construction to minimize disruption	
Y	CONSTRUCTION C7.7	Protect air quality	

8: OPERATIONS + MAINTENANCE

Y	OHM P8.1	Plan for sustainable site maintenance	
Y	OHM P8.2	Provide for storage and collection of recycling	
Y	OHM C8.3	Minimize energy consumption	3 to 4
Y	OHM C8.4	Minimize energy consumption	3 to 4
Y	OHM C8.5	Minimize energy consumption	3 to 4
Y	OHM C8.6	Minimize energy consumption	3 to 4
Y	OHM C8.7	Minimize energy consumption	3 to 4

9: EDUCATION + PERFORMANCE

Y	EDUCATION C9.1	Provide educational opportunities	
Y	EDUCATION C9.2	Provide educational opportunities	
Y	EDUCATION C9.3	Provide educational opportunities	

10: INNOVATION OR EXEMPLAR PERFORMANCE

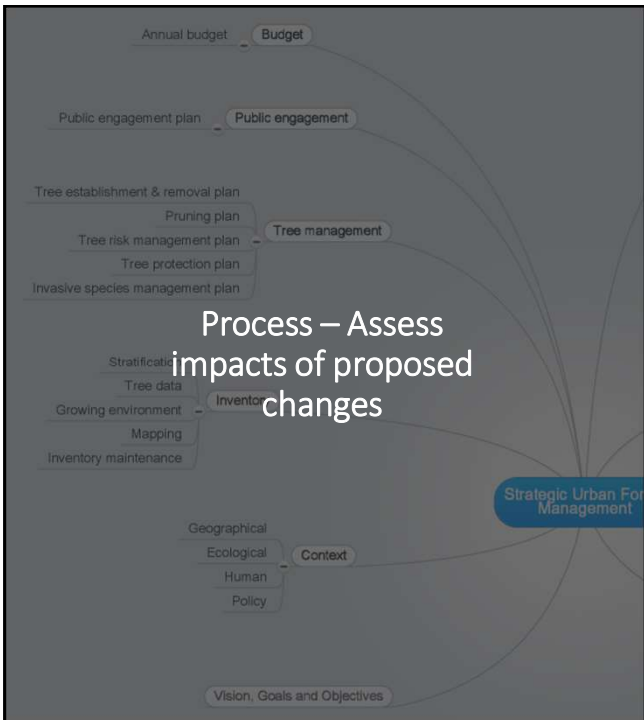
Y	INNOVATION C10.1	Innovative approach	
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YES ? NO	TOTAL ESTIMATED POINTS	70
Y	KEY	Project confident points are achieved
?	KEY	Project striving to achieve points, but 100% confidence is not achieved
N	KEY	Project is unable to achieve these goals

Rank	Score
SILVER	66
GOLD	100
PLATINUM	135

Matrix Comparing Alternative

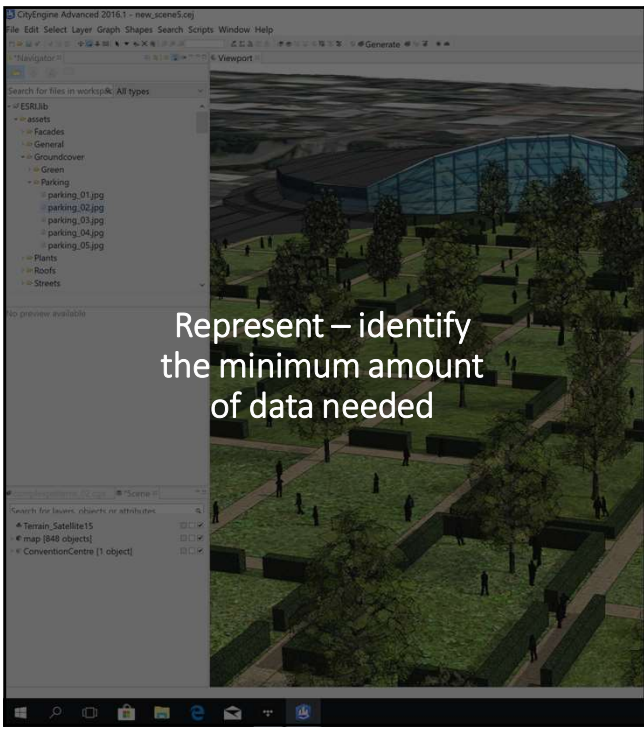
Question	What are their spatial, temporal. Qualitative and quantitative metrics?
Initial Thoughts	Build up a scorecard to compare the attractiveness of various alternatives
Follow-up	Case study on sustainable approach in other cities to build up metrics in scorecard



Process – Assess impacts of proposed changes

Sliders in CityEngine Manipulating Alternatives

Questions	How shall the impacts be summarized and visualized?
Initial Thoughts	Using sliders in CityEngine to stimulate the impacts of proposed changes
Follow-up	Learn CityEngine scripting for creating sliders on density, greenspace, etc



CityEngine Advanced 2018.1 - new_scene5.csg

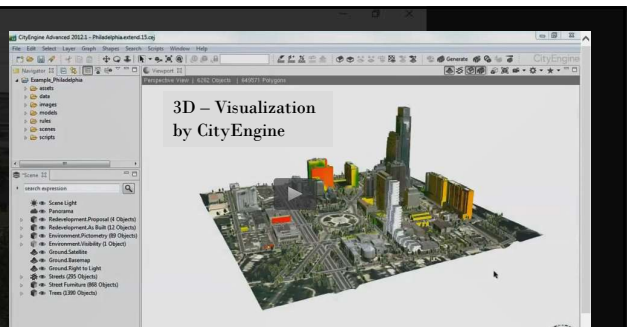
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Search for files in workspace: All types

- ESRI.lib
- assets
- Facades
- General
- Groundcover
- Green
 - parking_01.jpg
 - parking_02.jpg
 - parking_03.jpg
 - parking_04.jpg
 - parking_05.jpg
- Plants
- Roofs
- Streets

Scene 1

- Terrain_Satellite15
- map (840 objects)
- ConventionCentre (1 object)



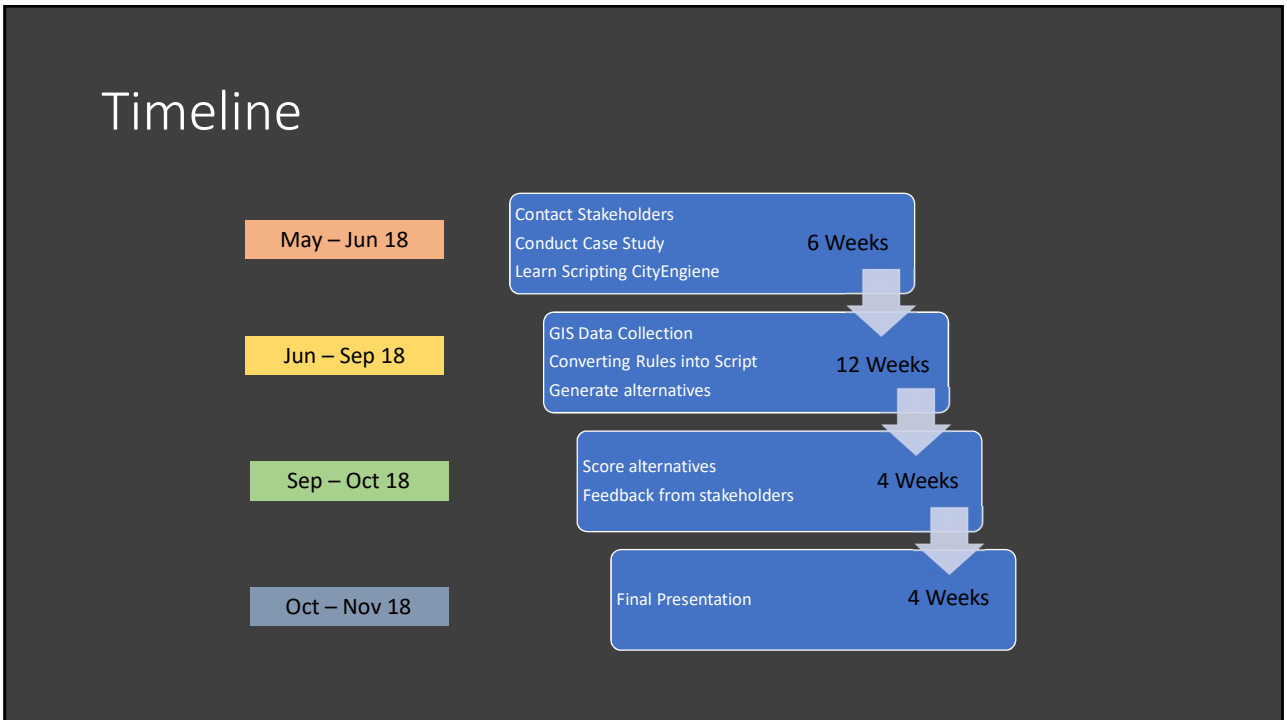
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3D - Visualization by CityEngine

Represent – identify the minimum amount of data needed

Question	Which data are needed? For which geography? At what spatial scale? At which classification? For which times? From which sources? At which cost? In which mode of representation
Initial Thoughts	Data in scale 1:25,000; using CityEngine to create 3D-visualization for feedback from stakeholders
Follow-up	Collect GIS data relating to the sit



Anticipated Results

- A set of alternative plans addressing the community need to be compared with the Government's plan
- Identify the People of the Place and collect their opinions from new development in Hong Kong
- Convert the People's opinion into a set of rules which is then translated into a CityEngine script
- A scorecard with quantifiable metrics to compare alternative plans
- 3D-visualization based on CityEngine