CLIMATE-WISE TOOLKIT APPLICATION:

'NET-ZERO CITIES'

V3: 31-10-18

Details in the Practical Guide on www.manchester.ac.uk/synergistics and www.urban3.net

1) OVERVIEW

This briefing is an outline of the agenda for 'net-zero' cities, and demonstration of the Climate-wise toolkit.

Net-zero cities are not just about carbon – they are about economics and finance, governance and planning, social change, technology innovation, psychology and culture and more. Most net-zero pathways focus on technical energy-economy models, and then try to fit policy around them. Experience shows this may not work well, if at all. So we need another way to fit all these together, with 'joined-up thinking', with all involved.

This is the role of synergistic thinking and the toolkit. Recent experience (e.g. Qatar, Mexico and Australia) has shown the role of creative collaboration in turning complex inter-connected problems into opportunities.

This Guide contains:

- brief outline of the low-carbon cities agenda
- outline of the synergistic methods for collaborative learning thinking and co-creation.
- a set of visual templates for practical use.

2) OUTLINE OF NET ZERO CARBON CITY AGENDA

CARBON CYCLE MAPPING

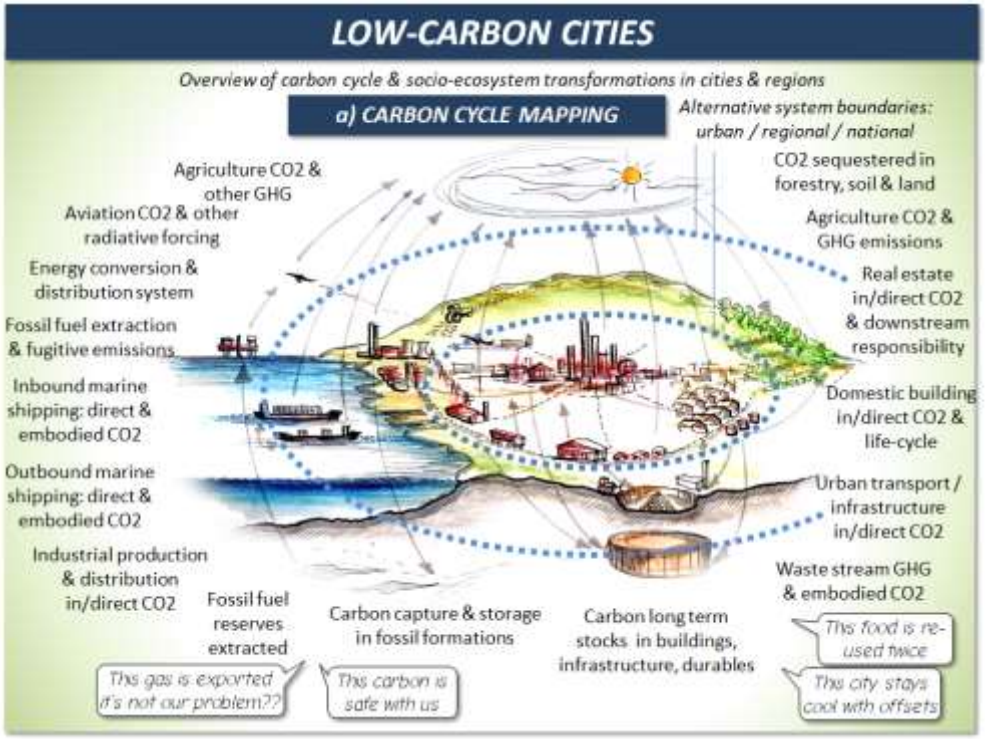
Cities around the world proclaim their policies for the climate / low-carbon transition, but few have much knowledge of their own carbon cycle with its many stocks and flows. So here's a cartoon version to get started. Carbon cycles show up in three basic types:

- The direct cycle ('Scope 1' in technical terms), starts with local burning of fossil fuels, releasing carbon to the atmosphere, with some re-circulation into oceans, soils or vegetation.
- An indirect cycle ('Scope 2') burns the fossil fuel outside the city or region, to make electricity for the urban energy mix.
- Thirdly come many kinds of local or regional cycles, stocks and flows: land-use and forestry, agriculture and food chains, bio-fuels and bio-mass, imported products which end up in landfill, carbon embedded in buildings and infrastructure, (duty free purchases by passengers in transit). These are not only physical flows but accounting flows, political or economic commitments, such as carbon offsets (which can be problematic).

There's an important difference between the first two, which are accounted and targeted by production sectors, and the third which is more about consumption. The UK carbon accounts look good on paper, only because most heavy industry moved to Asia and the products are reimported (with ongoing debate about the shipping and aviation accounts).

We could draw a boundary around the built-up city, shown here with the inner circle, and try to manage the carbon with local-level policies or markets. But for the most part, local powers are lacking, and the built-up city

is only a hub in its region, which in turn is a landing strip for global supply chains. Each level of boundary seems incomplete and problematic, as carbon flows don't respect political or economic units. So we need to work across boundaries in a way which is transparent and manageable.



SCOPING FOR SYNERGIES

To put together net-zero cities with economics and finance, governance and planning, social change, technology innovation, psychology and culture, we look for the 'synergies' between these different domains. These synergies can be found in three different layers or *'Modes':*

- *Mode-I*: functional, 'clever': command and control type regulation, linear growth trends.
- *Mode-II*: evolutionary, 'smart': entrepreneurial incentives, competitions, markets, innovation
- *Mode-III*: co-evolutionary, 'wise': synergies of multiple deeper layers of value, wider communities of stakeholders, further cause-effect linkages.

This *Mode-III* calls for new levels of integration of social/eco objectives, with some kind of '*collective carbon intelligence*', with collaborative (co) learning, co-creation, co-production, etc. Table 1 shows a general outline of how this works, in several categories:

- direct emissions & indirect emissions;
- energy / carbon systems & policy systems;
- also including deeper archetypes and myths (as in 'causal layer analysis').

Table 1: Outline			
	Mode-I Linear	***Mode-II Evolutionary***	***Mode-III Co-evolutionary***
	'CLEVER'	***'SMART':***	***'WISE':***
Direct emissions	CO2 flows in tonnes	CO2 as market opportunity	CO2 as global chains & loops
Indirect emissions	Bio-geo-physical frame	Adaptive innovation niches	Integrated human development
Energy system	Linear supply side growth	Smart diverse self-balancing energy grids,	Socially integrated diverse self-balancing grids
Carbon system	Direct storage etc	Markets & speculation in offsets etc	Integrated carbon policy / enterprise
Policy system	Direct regulation & control	Markets, incentives, competitions	Collaborative partnerships, co-learning / production.
Archetypes / myths	*Material growth discourse*	*Aspiration for status & affluence*	*System transformation for 'Quality of life'*

MULTI-LEVEL GOVERNANCE

A first practical question for net-zero cities is how to manage 'multi-level governance'. Many of the powers and resources needed are at national level, not local, and many technologies and financial streams are at global level. At the same time there are opportunities at the local level which don't appear at the national or global levels. So there is a space of challenge and conflict, or just possibly, synergy and opportunity. Again we can explore this with different *Modes*:

- *Mode-I:* Local as dependent subset of national, with small powers and resources handed down: likely to be in a hierarchical governance structure, lacking active links with stakeholders and citizens.
- *Mode-II:* Local in a competitive situation with other localities, and competing for national powers and resources;
- *Mode-III:* Local in synergistic balance with national, with emerging powers and resources via local co-learning and co-production. This is likely to be a non-hierarchical round table or 'co-governance' structure, more suitable for partnerships, social innovation etc.

In reality the lines between are not fixed but up for debate and enquiry.

DETAILED SECTOR ANALYSIS

This more specific analysis can then start to identify the difference between local and national (to be filled by stakeholders). The lines on Table 2 below can capture these important differences, not as a fixed outcome but a space of enquiry and opportunity.

Table 2: Sector analysis				
	'CLEVER':	*'SMART':*	*'WISE':*	*LOCAL AGENDA*
	government policy, planning, regulation,	*Markets, incentives, trading, competition*	*Collaborative partnerships, social learning, co-production*	*Local scope of governance, economic, social, technology*
DIRECT EMISSIONS				
New housing				
Retrofit housing				
Commercial				
Industry				
Private transport				
Public transport				
Freight transport				
Other infrastructure				
Agriculture / LUF				
INDIRECT EMISSIONS				
Land-use & forestry				
International travel				
International shipping				
Consumption footprint				
ENERGY SUPPLY SYSTEM				
Fossil fuels				
Renewables				
Other				
CARBON CYCLE SYSTEM				
Sequestration & stocks				
Carbon storage				
Offsets etc.				
POLICY SYSTEM				
Finance				
Enterprise				
Technology				
Skills training				
Education				
Procurement etc				

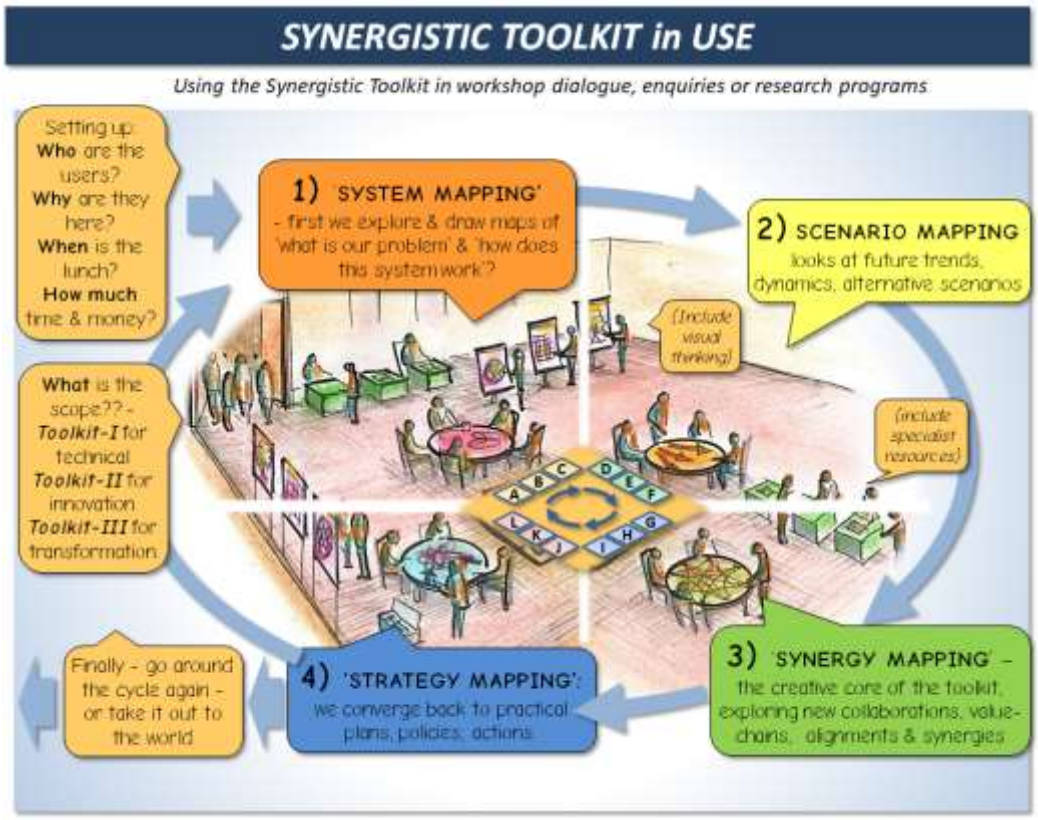
SYNERGISTIC TOOLKIT

A 'Net-Zero City' has to somehow connect environmental management with social, technology, ecology, economic, political and cultural issues. Meanwhile there are other 'grand challenges' such as artificial intelligence or social inequality, which are equally complex, inter-connected, and controversial. What can be done?

'Synergistics' – the science and art of working with synergies – has been developed for such challenges. It provides practical methods and tools, to help explore and enable 'collective intelligence'. It can work in organizations, institutions, supply chains or value-chains, business / enterprise models, networks or communities.

To explore the potential for collective intelligence, calls for creative and collaborative and visionary thinking. For this we use the Synergistic Toolkit, a flexible set of techniques with 4 stages and 12 steps:

a) ***System mapping:*** mapping baseline syndromes / problems on the table: also includes '*co-learning':*
b) ***Scenario mapping:*** mapping drivers of change & alternative futures: ('*co-knowledge'):*
c) ***Synergy mapping:*** design of opportunities, synergies, innovations: ('*co-creation'):*
d) ***Strategy mapping****:* design of practical pathways, road-maps, policies & projects ('*co-production')*.



The picture here shows all four stages in one big room (in reality each could be at a different time and place)**.** The scheme is very flexible: it can take hours, days, weeks or months, depending on time, people and resources. The cycle can be more interactive, or more about desk-study, data-mining, expert debate, or stakeholder interviews. Overall these tools help to explore 'grand societal challenges': to identify 'what kind of problems' are we talking about: and then explore 'what kind of solutions' are most useful.

Visual thinking is at the centre of the synergistic methods and tools. This Guide provides a series of templates and typical questions, for each of the 4 stages and 12 steps.

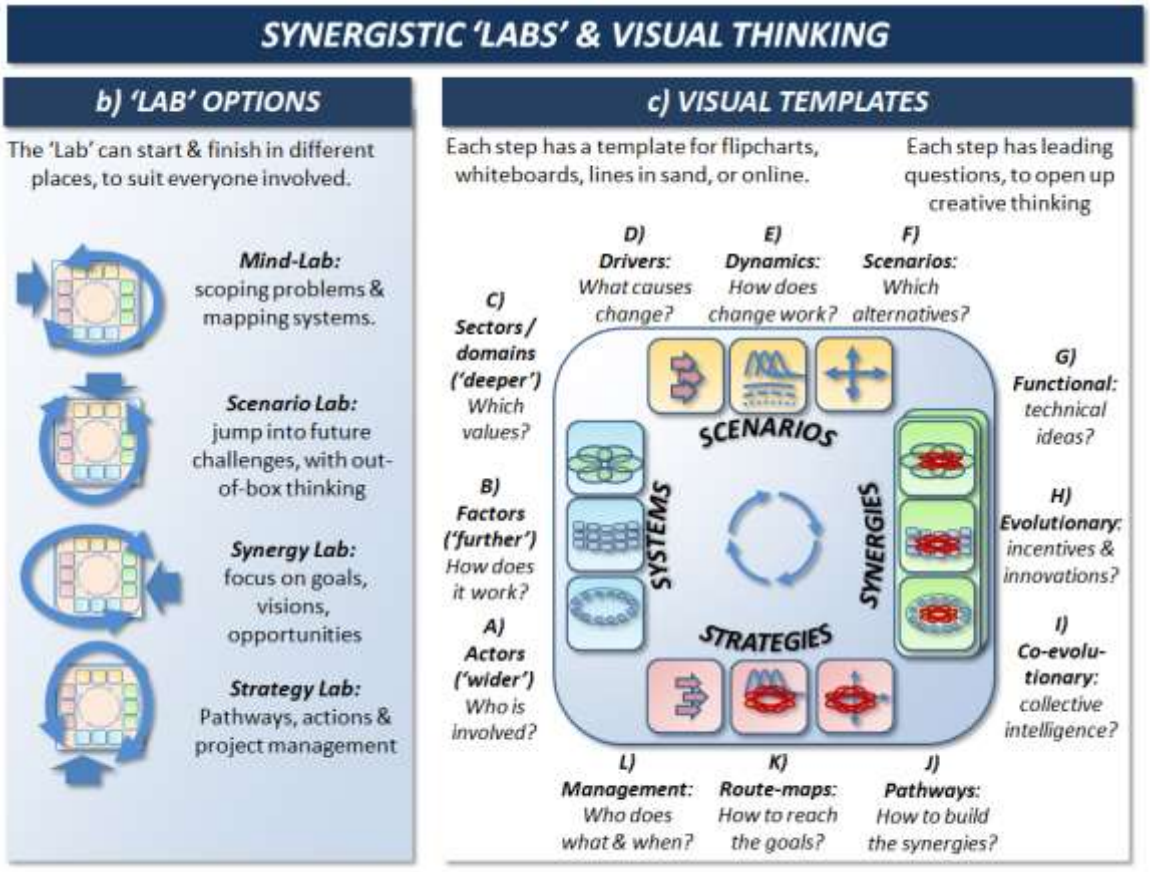
VISUAL THINKING AND VISUAL TEMPLATES

These visual templates provide an easy and practical structure for building and visualizing complex information, i.e. concept maps / systems maps / *deeper-mind* maps. (these are different to *mind-maps*, as they focus on collective intelligence with multiple agendas).

The templates can be easily copied onto flip charts with writing or images on sticky notes. The order of using the templates depends on the theme, the event, the participants etc. Sometimes we start with the Scenario Mapping (D,E,F): in others we start with Synergy Mapping (G,H,I).

Overall, visual thinking is one of the best ways to explore creative, out-of-the-box, inter-connected ideas.

- Participants are asked for visual ideas or small sketches, to be completed by a graphic facilitator.
- Participants can respond to 'future cards', 'scenario visions', or other visual inputs
- Participants are encouraged to draw concept mappings, using the visual templates.
- The templates are very flexible, and can be used in a creative open-minded way.
- If participants don't agree on the images or mappings, each can do their own version.
- The templates in stage 1 & 3 are focused on the development of collective intelligence.
- The templates in stage 2 & 4 fit with mainstream futures / scenario methods: and with standard route-mapping / project management methods.



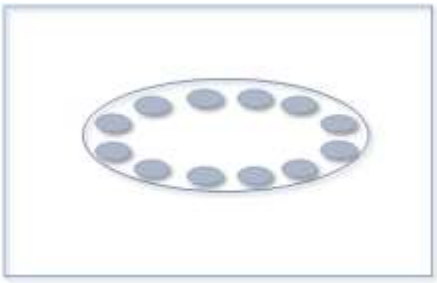
TOOLKIT - STAGE 1: ***'TABLES'*** (SYSTEM MAPPING): *'WHAT'S THE PROBLEM?'*

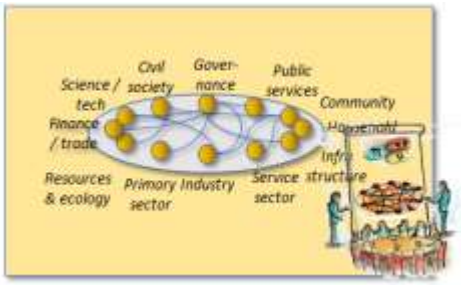
Each of the 4 stages and 12 steps is shown in the following pages, with likely questions to be addressed, and with cues for visual thinking methods. The graphics on the left side are blank templates (to be copied onto flip-charts or similar). The graphics on the right side are worked examples (based on a low-carbon agenda).

A) ACTORS MAPPING – ('WIDER' SYNERGIES): ***'ROUND TABLE'*** TEMPLATE

- *Q: Who is involved?*
- *Q: how do they interact?*

Identify the most important people, stakeholders, communities: explore their roles & relations (social, economic, political etc).

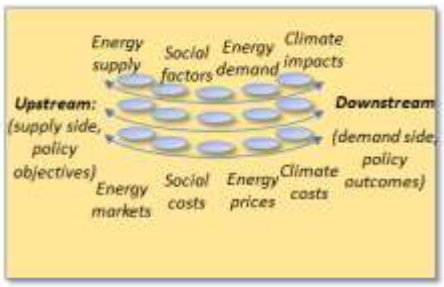




B) FACTORS MAPPING – ('FURTHER' SYNERGIES): ***'BUSINESS MODEL'*** TEMPLATE

- *Q: How does the system work?*
- *Q: Where are the upstream / downstream factors?*

Explore the metabolism or flows (resources, money, policy, labour, social value etc):



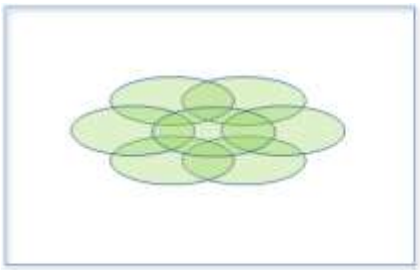
Look for upstream causes / downstream effects of the flows, (e.g. ecological / social impacts)

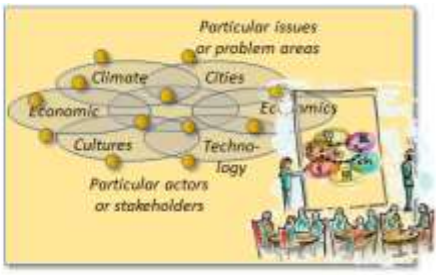
C) DOMAIN MAPPING – ('DEEPER' SYNERGIES): ***'CLOUDY CRYSTAL BALL'***.

Questions to be addressed:

- *Q: Why is this project important?*
- *Q: Which values & domains are involved?*

Explore what kind of problems & what is the scope: which are the goals / visions? (social / technology / economic / environment / political /cultural etc).



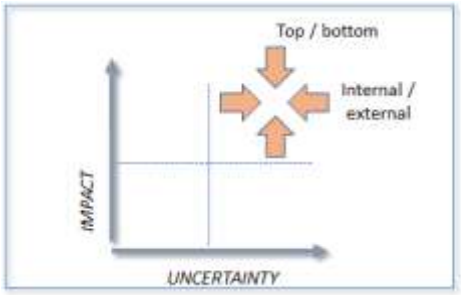


TOOLKIT STAGE 2: ***'CROSSROADS'*** (SCENARIO MAPPING): *'WHAT'S CHANGING?'*

DRIVERS - ***'FORCE FIELDS'*** TEMPLATE

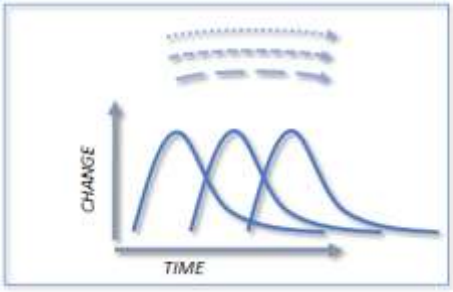
- *Which forces of change?*
- *Which uncertainties?*

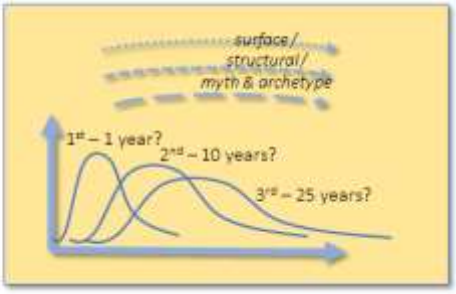
Identify each kind of change, for impact & uncertainty. Select the top 2 or 3 most important changes.



D) HORIZONS - ***'3 MOUNTAINS'*** TEMPLATE

- *When are the horizons of each change?*
- *Which are surface / structural / archetype changes?*
- *When is there growth / decline/ restructuring?*



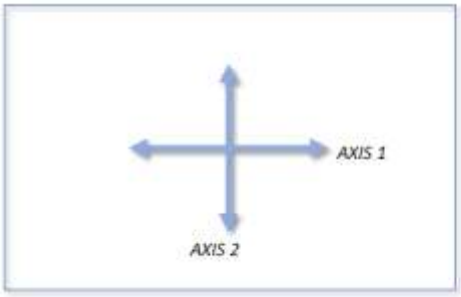


Explore which are short / medium / longer term changes:

Explore the patterns or cycles of change

E) SCENARIOS - ***'CROSS-ROADS'*** TEMPLATE

- *What if the best / worst happens?*
- *Which are the most 'interesting' alternative futures?*



Explore 'what-if' the top 2/3 changes are high / low impact, positive / negative.

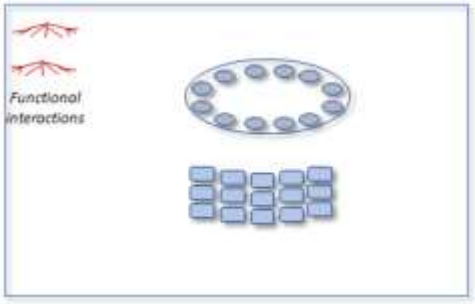
Explore the scenarios with stories, headlines, images.

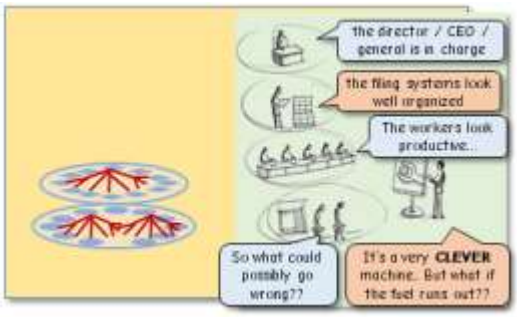
TOOLKIT - STAGE 3: ***'VISIONS'***: (SYNERGY MAPPING): *'WHAT OPPORTUNITIES?'*

F) LINEAR – (MODE-I) - ***'CLEVER IDEAS'*** TEMPLATE

- *How to improve the functions & operations?*

Explore practical ideas & synergies between the 'actors' & 'factors' (social / technology / economic / environment / political /cultural etc). Draw the possible inter-connections.

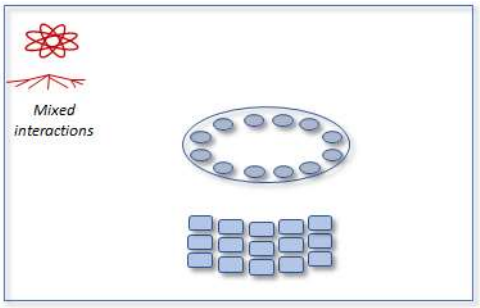


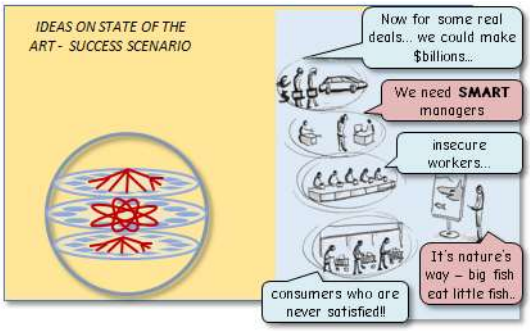


G) EVOLUTIONARY (MODE-II): ***'SMARTER IDEAS'*** TEMPLATE

- *How to make smarter inter-connections?*

Explore the state-of-the-art entrepreneurial ideas & synergies between 'actors' & between 'factors'. Draw the possible inter-connections.

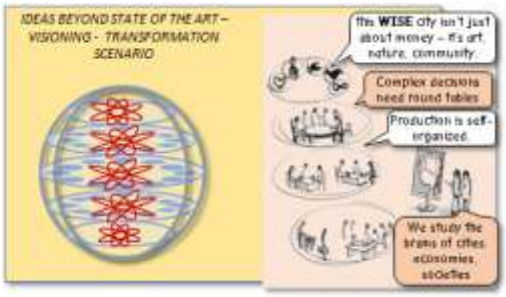




H) CO-EVOLUTIONARY (MODE-III): ***'WISER IDEAS':*** TEMPLATE

- *How to grow a wiser kind of intelligence?*

Explore beyond state-of-the-art 'visionary' ideas & synergies, between different 'actors' & 'factors'. Draw the possible inter-connections, with multiple layers.



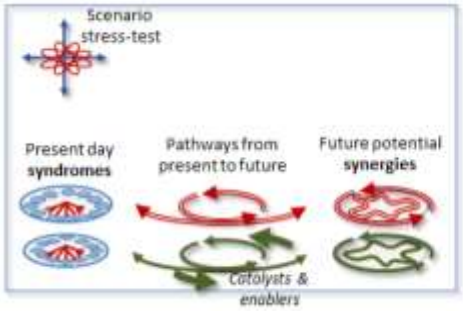
TOOLKIT STAGE 4 - ***'ROUTE-MAPS'***: (STRATEGY MAPPING): *'WHAT'S TO BE DONE?'*

(J) PATHWAYS - 'PATHWAYS'

- *Which pathways could best realize the opportunities??*
- *Are these future-proofed?*

Develop 'pathways' of strategic change, which connect the most robust ideas / synergies (internal / external: short /medium / longer). *(there are different formats to show the pathways)*

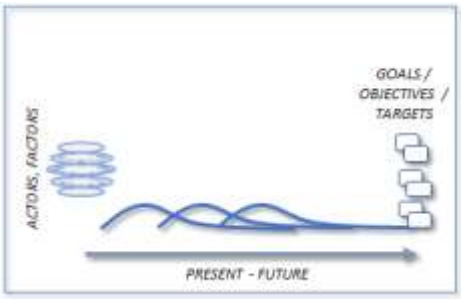
Test the best ideas / synergies against each scenario: & select the most robust.

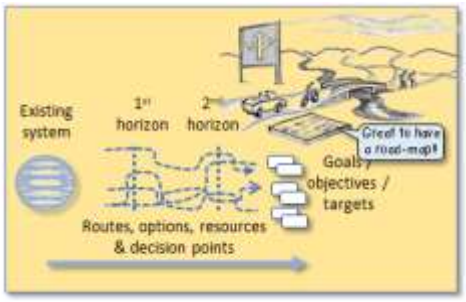


(K) ROUTE-MAPS - 'ROUTE-MAPS'

- *What strategies could turn the pathways into reality??*
- *When are the key stages?*
- *How much resources are needed?*

Identify the goals & objectives: Identify links to plans & actions, actors involved, factors & resources needed. (internal / external: short /medium / longer)

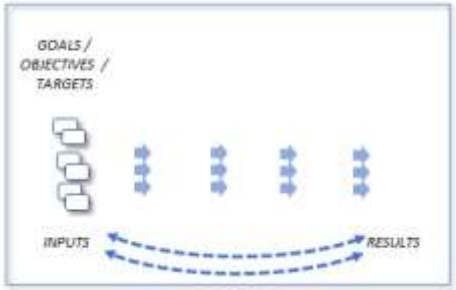


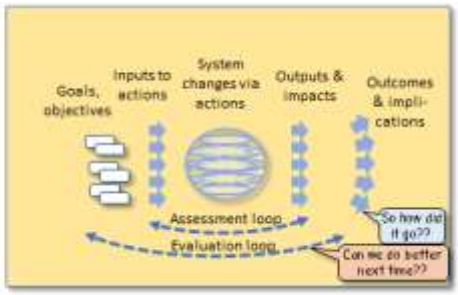


(L) MANAGEMENT/ EVALUATION - 'ACTION PLANS'

- *How to manage the actions?*
- *How to evaluate the results??*

Set up management plan with practical priorities & actions: Identify the next steps with actors & resources: Explore how to monitor performance, evaluate results & feedback.





ANNEX: SUMMARY TABLE

This table is a summary of the 12 steps in the Synergistic Toolkit, with key questions to be addressed, with examples from the urban development agenda. Note the steps can follow in a different order where needed)

	KEY TASKS	***KEY QUESTIONS***	***URBAN EXAMPLE***
SYSTEM / SYNDROMES			
A) Scoping	Explore the scope of the problem / system /issue / agenda / problematique…	what is the agenda or problem for today: where are the boundaries?	*What is the scope & agenda: housing / infrastructure / public space?*
B) 'Wider' synergies	Explore how the system works, , and the relations of the actors in the system,	how do the actors / factors interact: what kind of system, hierarchical or networked?	*E.g. who are the key actors- investors /owners / developers / designers / residents?*
C) 'Deeper' synergies	Map the overall 'metabolism' of the system, with inter-connections between domains.	Which are the key domains e.g. social / technical / economic / ecological /political ?	*What are the main forces shaping behind the peri-urban syndromes*
SCENARIO MAPPING			
D) Drivers	Explore the forces of change, both external and internal.	what are the driving forces of change, uncertainty, internal / external, near / far horizon?	*What are key drivers of change & uncertainty ('21 drivers')*
E) Dynamics	define the most significant dynamic cycle effects.	what dynamics of change – succession / renewal / tipping points / transitions?	*How does the cycle of renewal work here: (e.g. development / conservation / restructure?*
F) Scenarios	explore alternative futures with structured 'what-if' questions.	which projections and scenarios are most relevant & plausible?	*How could the future peri-urban be different from today?*
SYNERGY MAPPING			
G) Linear mode-I	map the system qualities which are more linear & mono-functional	what opportunities for functional efficiency & performance of the system? Any negative effects?	Is the key peri-urban issue ***linear growth****? (housing, services, infrastructure etc)*
H) Evolutionary mode-II	map the qualities which are evolutionary & inter-connected.	opportunities for creative enterprise, new functions & niches? Any negative effects?	Is the key peri-urban issue ***adaptation / evolution****? (housing, services, etc...)*
I) Co-evolut-ionary mode-III	Map the qualities which are more co-evolutionary & synergistic	how can opportunities emerge via synergistic collaboration, co-learning & social intelligence?	Is the key peri-urban issue ***co-intelligence / co-evolution****? (housing, services, infra, etc...)*
STRATEGY MAPPING			
J) Pathways	look for synergistic pathways, to link between present 'syndromes' & future 'synergies'	which synergistic combinations can form pathways to bring actors/ factors into alignment & added value.	*How to make real positive change in the peri-urban? (housing, services, infra, public realm...)*
K) Road-maps	look for synergistic links between objectives, resources, actions, enablers.	which pathways, actors and factors can be combined into practical strategies & actions? what implications for resources?	*Which resources, actions, timescales to realize these? (housing, services, infrastructure, public realm...)*
L) Management / Evaluation	rational /relational management methods with assessment & evaluation.	how can results be evaluated, with feedback & learning into the next cycle?	*How to learn: before, throughout & following the urban policy process?*