VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS

(Juanjo Galan Vivas, Polytechnic University of Valencia)

STAFF TRAINING SEMINAR_TELOS project
Rome (Italy), 11-13 July 2022

Contents and Research Questions

1. Systems, Models, and Systems representations
2. Stable systems and Dynamic systems
3. Landscape Systems representations: an overview
4. Some examples:
    - Urban Green Infrastructures (and DPSIR)
    - Metabolic approaches
    - Landscapes of production
    - Landscape Planning and Ecology

1. Systems, Models, and Systems representations

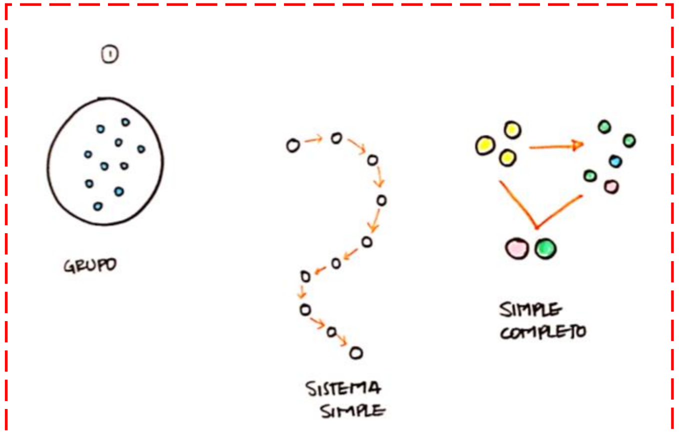
WHAT IS A SYSTEM?

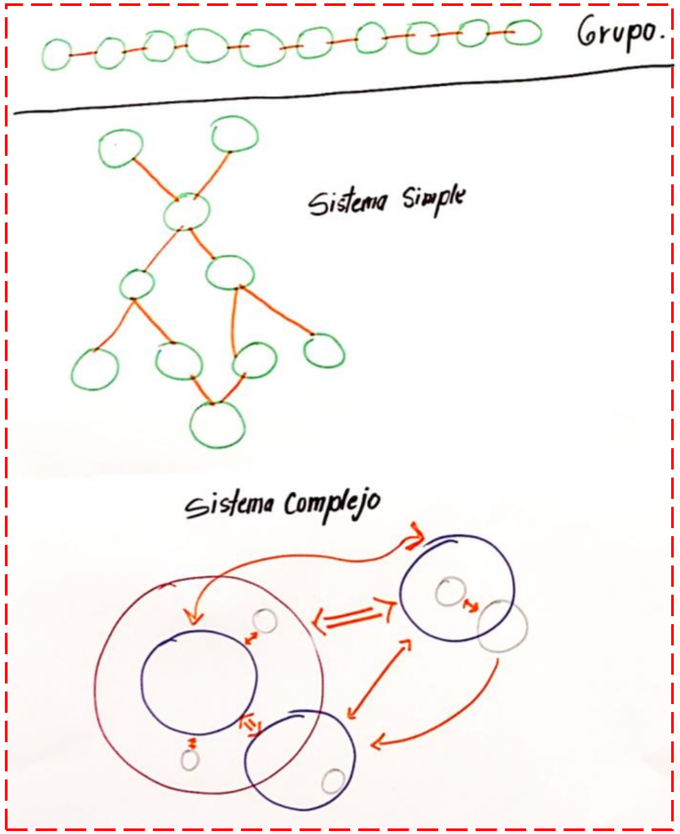
Exercise for the students (10 minutes):

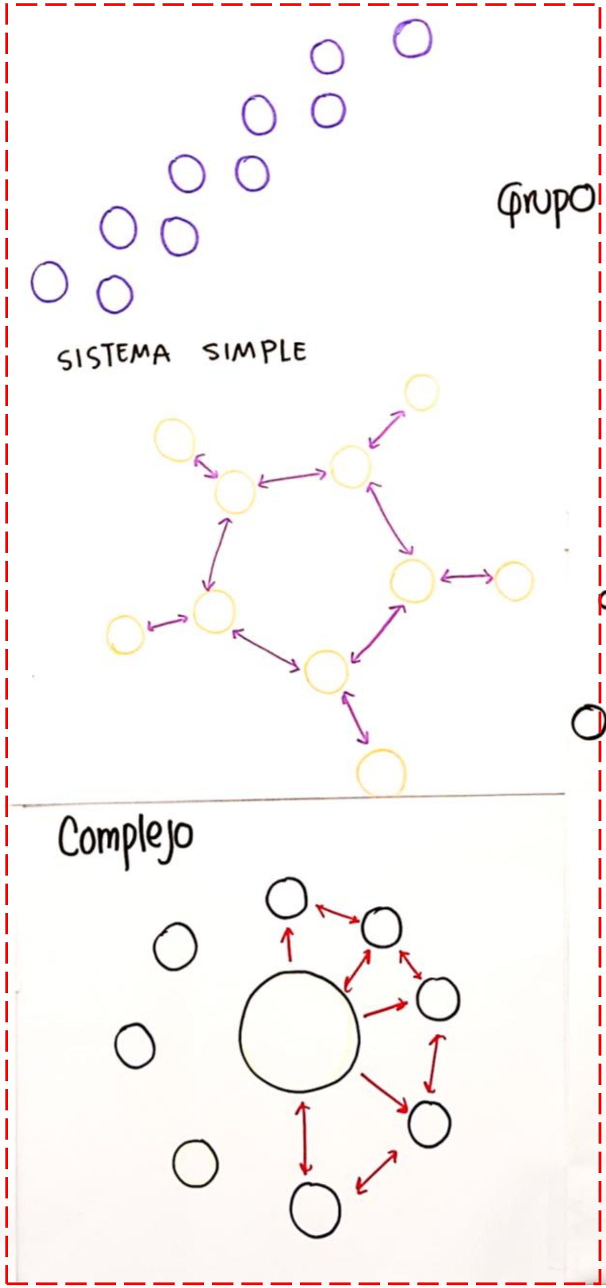
- **Represent graphically a system with circles and arrows**

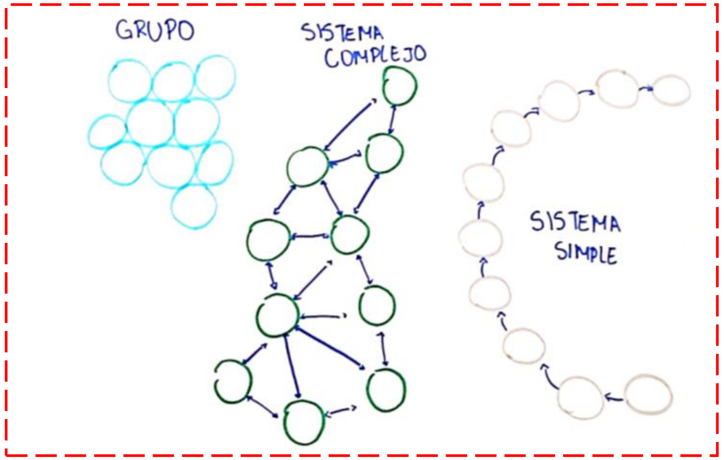
    - **A GROUP of 10 elements**
    - **A simple SYSTEM of 10 elements**
    - **A COMPLEX SYSTEM of 10 elements**

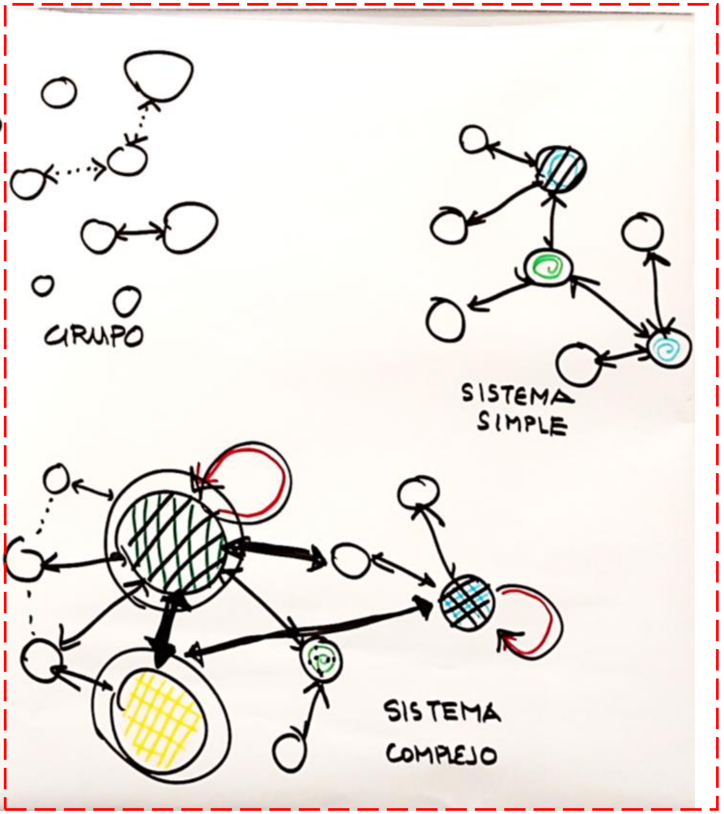
Systems, Models, and Systems representations





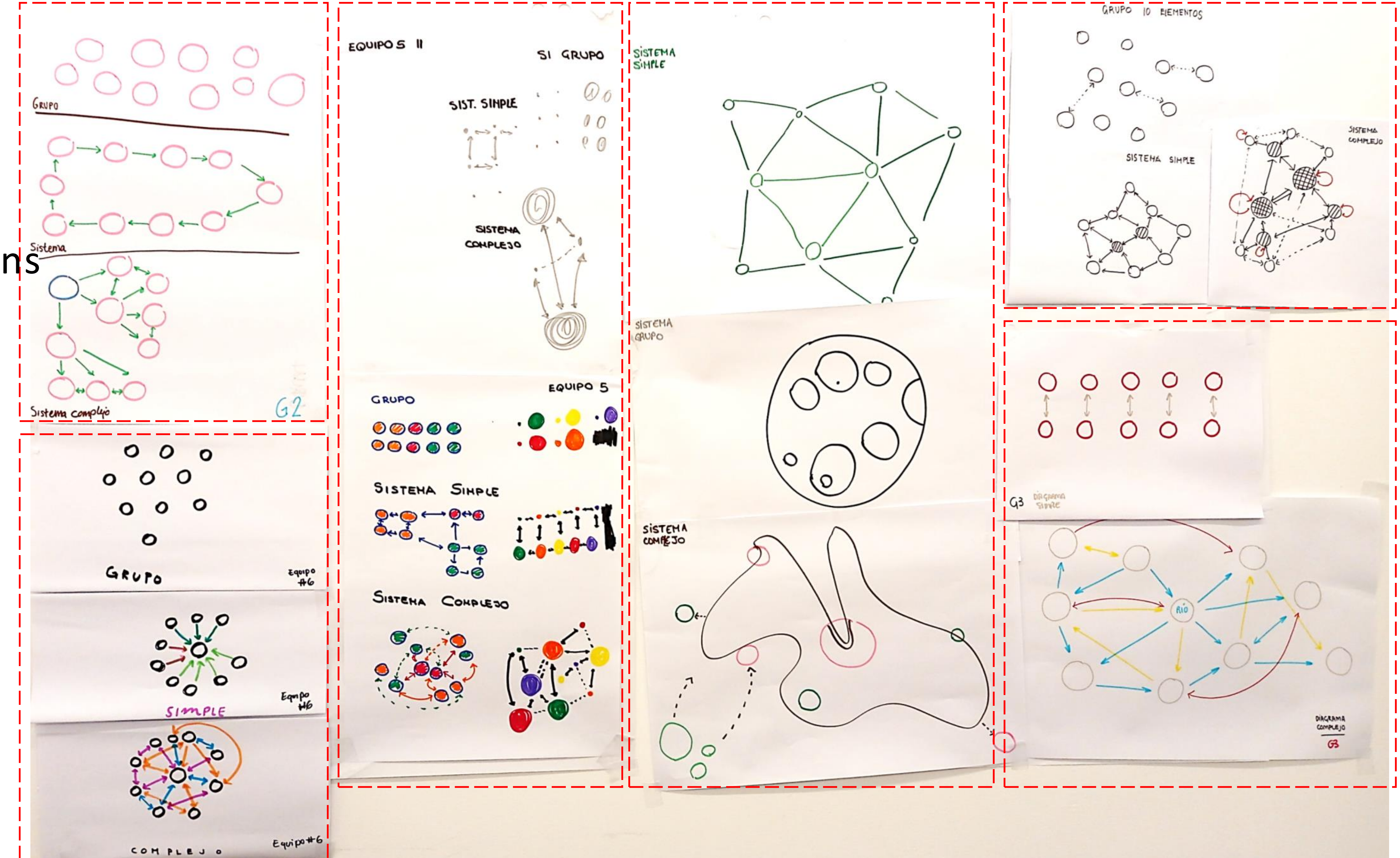






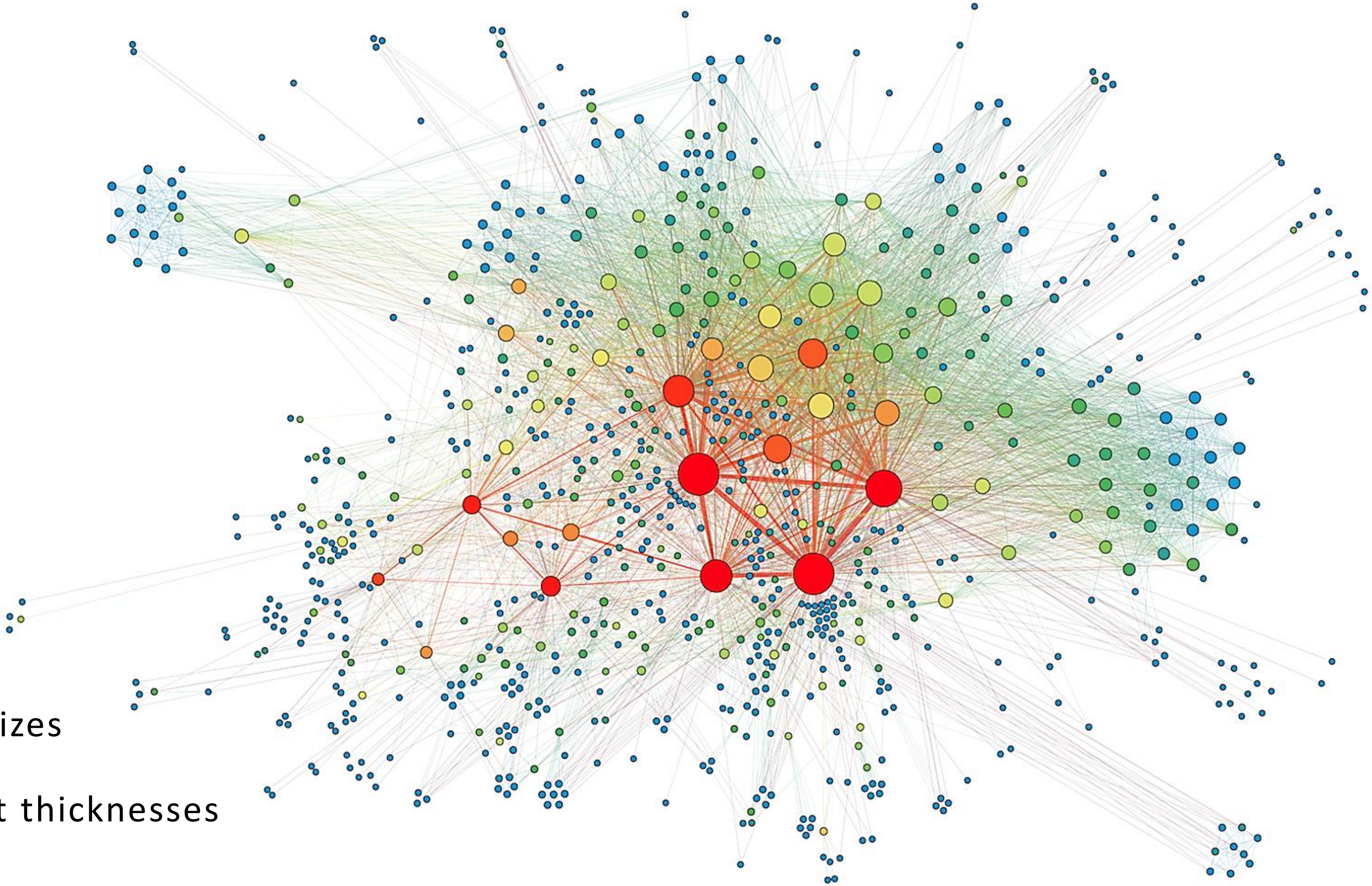
Source: quick diagrams by students of the course 'Landscape and Environment' 2022, Polytechnic University of Valencia

Systems, Models, and Systems representations



Source: quick diagrams by students of the studio course 'Urbanism, Territory and Landscape'' 2022, Polytechnic University of Valencia

Systems, Models, and Systems representations



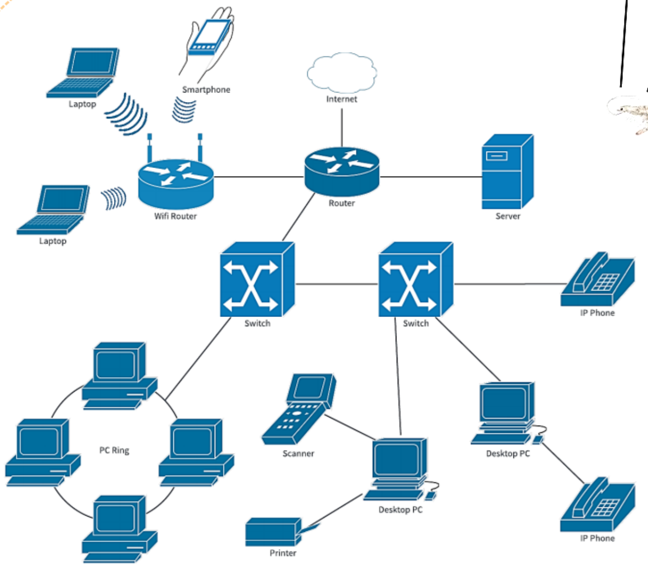
Notice:

- Elements: different colors and sizes
- Relationships (arrows): different thicknesses
- Clusters and hierarchies
- Is this a representation of a social, informational, ecological, economic system:

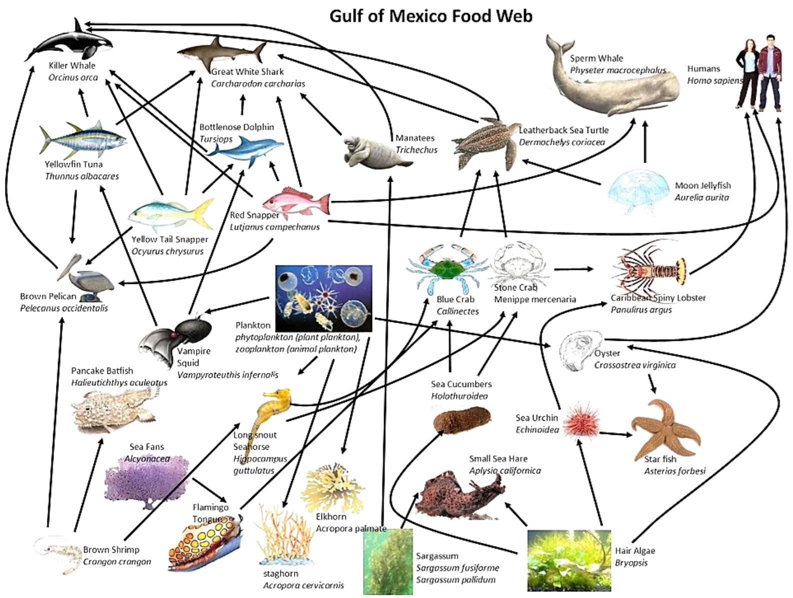
SYSTEMS THEORY and the representation of different types of systems….

SOCIAL

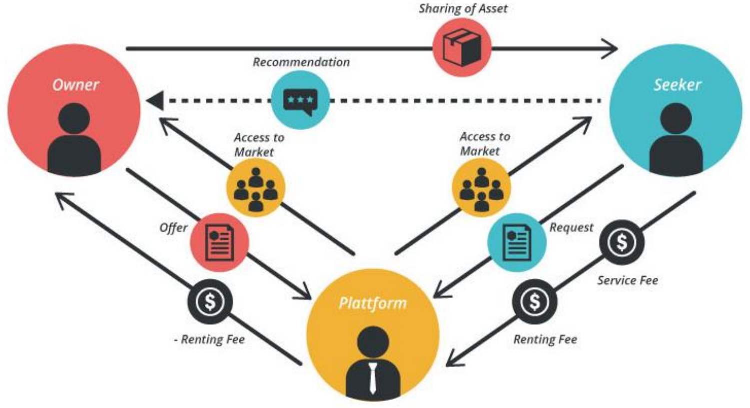
INFORMATION



ECOLOGICAL



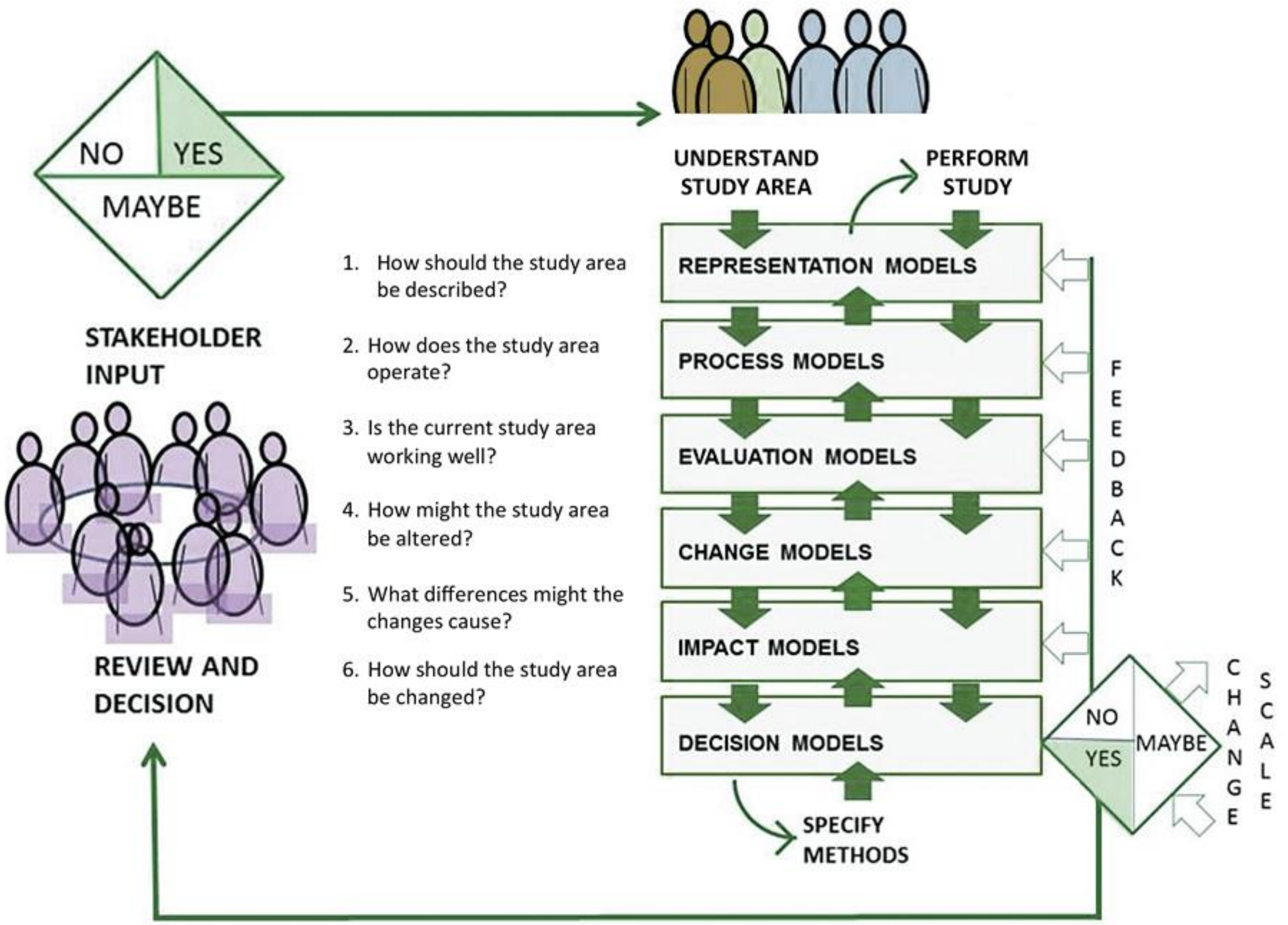
ECONOMY



A SYSTEM: a group of interacting or interrelated elements that act according to a set of rules to form a unified whole

A COMPLEX SYSTEM: systems whose behavior is intrinsically difficult to model due to the dependencies, competitions, relationships, or other types of interactions between their parts or between a given system and its environment. Systems that are "complex" have distinct properties that arise from these relationships, such as nonlinearity, emergence, spontaneous order, adaptation, and feedback loops, among others

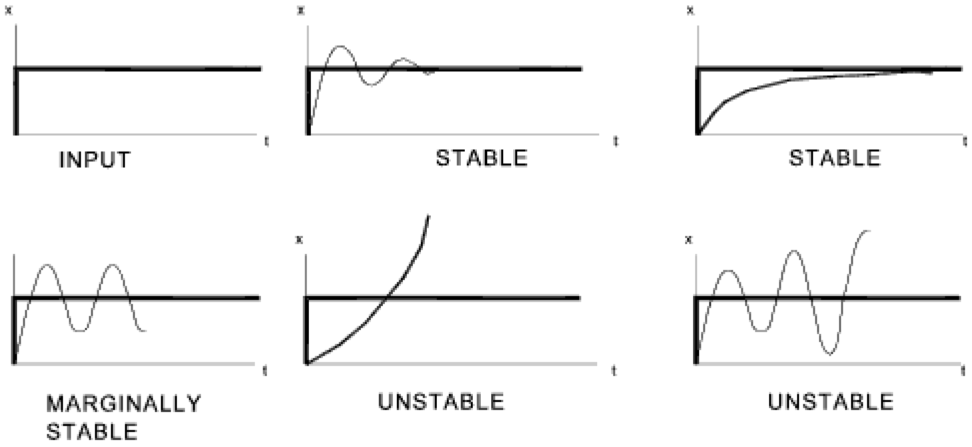
A MODEL: a simplified descriptionof a system or process to assist calculations and predictions. A simplified representation of reality (e.g. a complex system), usually made for specific purposes

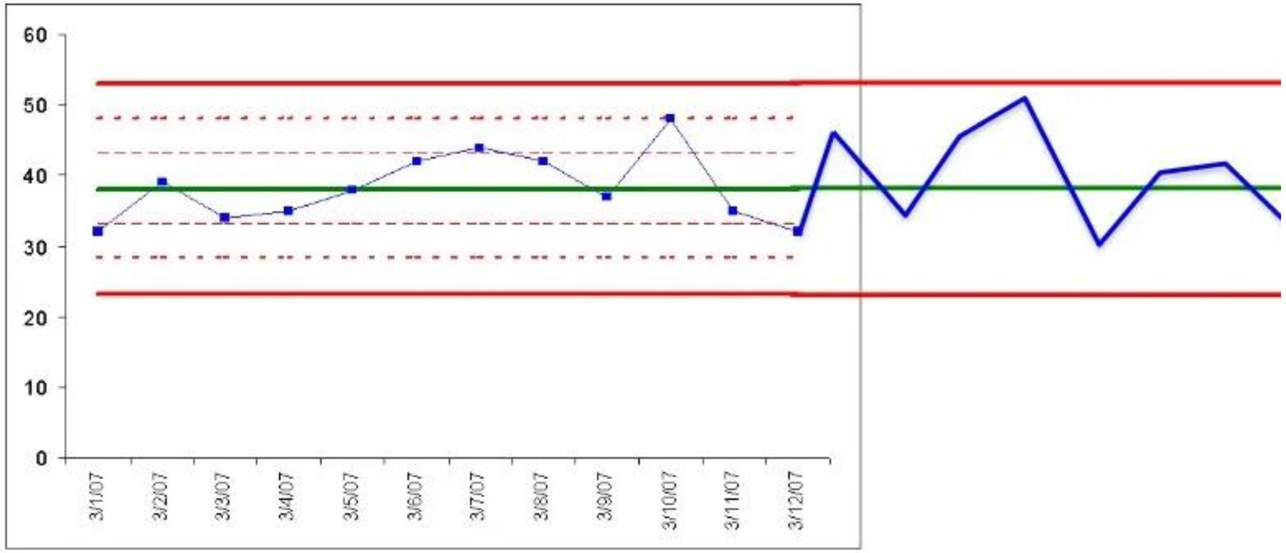


Source: 'A Framework for Geodesign' Carl Steinitz, 2012

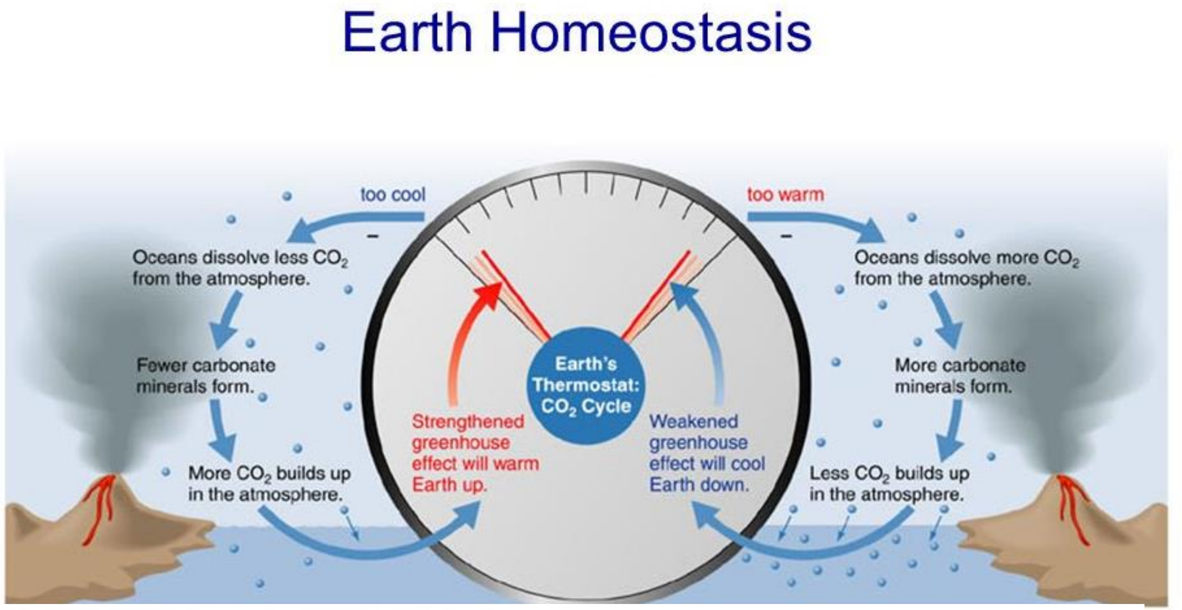
2. Stable systems and Dynamic systems

Stable systems and Dynamic systems: SYSTEMS & TIME





Source: Mark Graban Deming Red Bead 2016 SHS



Stable systems and Dynamic systems: SYSTEMS & TIME

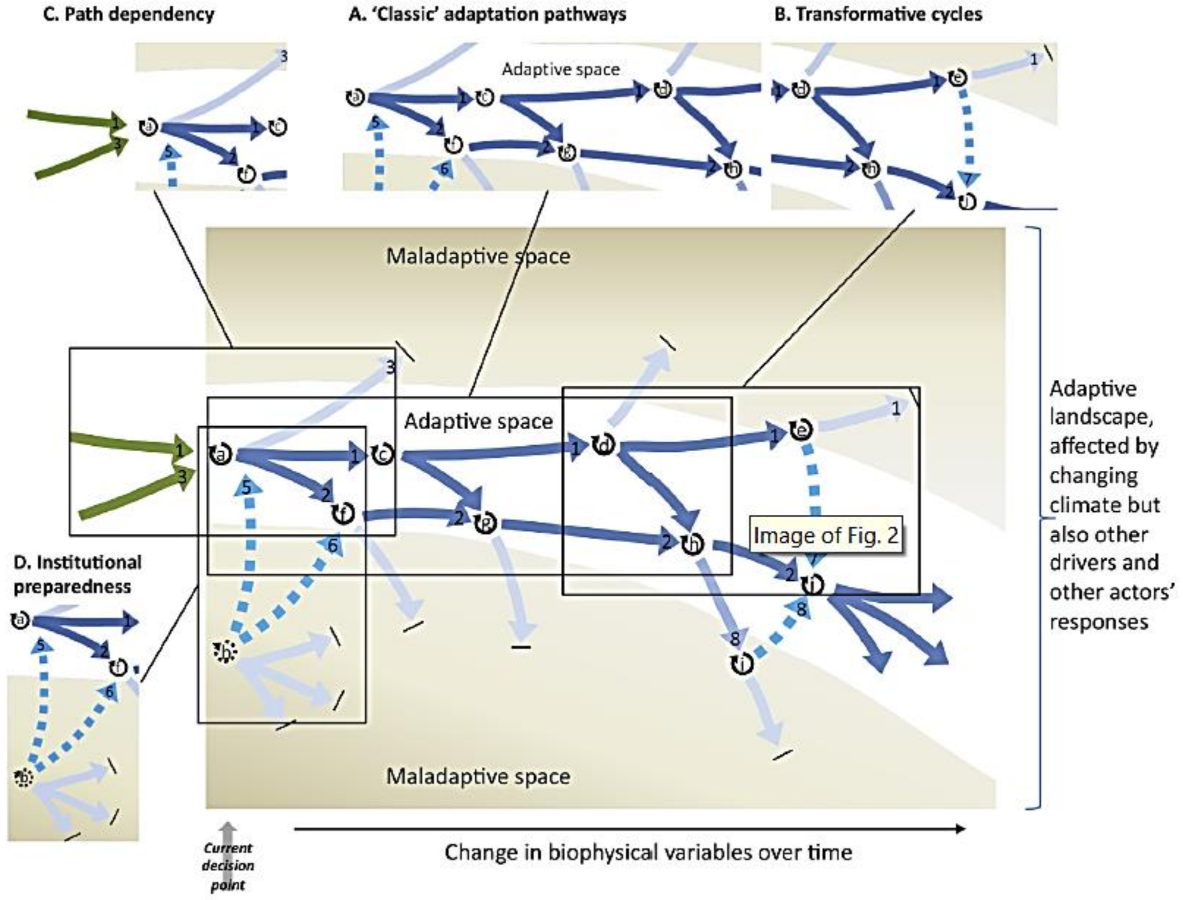
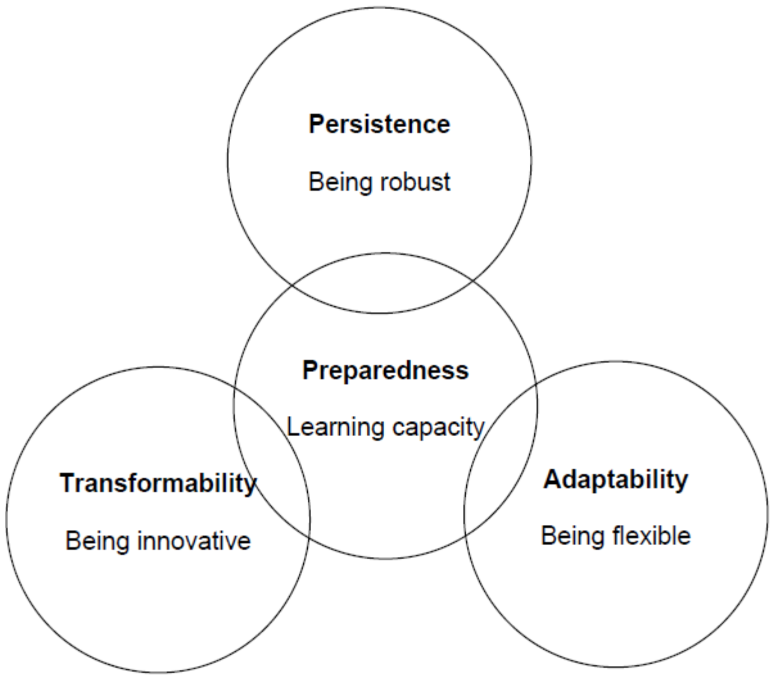


Fig. 2. One decision-making actor's adaptation pathways through an adaptive landscape, building on the metaphor of Fig. 1, where the boundaries between adaptive and maladaptive responses are changing over time, due to biophysical changes, but also due to changes in social and institutional context, including the actions of other decision-makers who may perceive different adaptation pathways. Circle arrows represent decision points, dark blue arrows represent pathways that are contemporaneously adaptive, grey arrows lead to maladaptive dead-ends; dashed blue arrows represent more-or-less transformative pathway segments, and the green arrows show antecedent pathways prior to the current decision cycle (a) faced by the decision-maker of concern. Boxes A–D highlight differences from Fig. 1 that are discussed in the text.

Source: Reconceptualising Adaptation to Climate Change as part of pathways of change and response (Wise et al., Global Environmental Change, 2014)



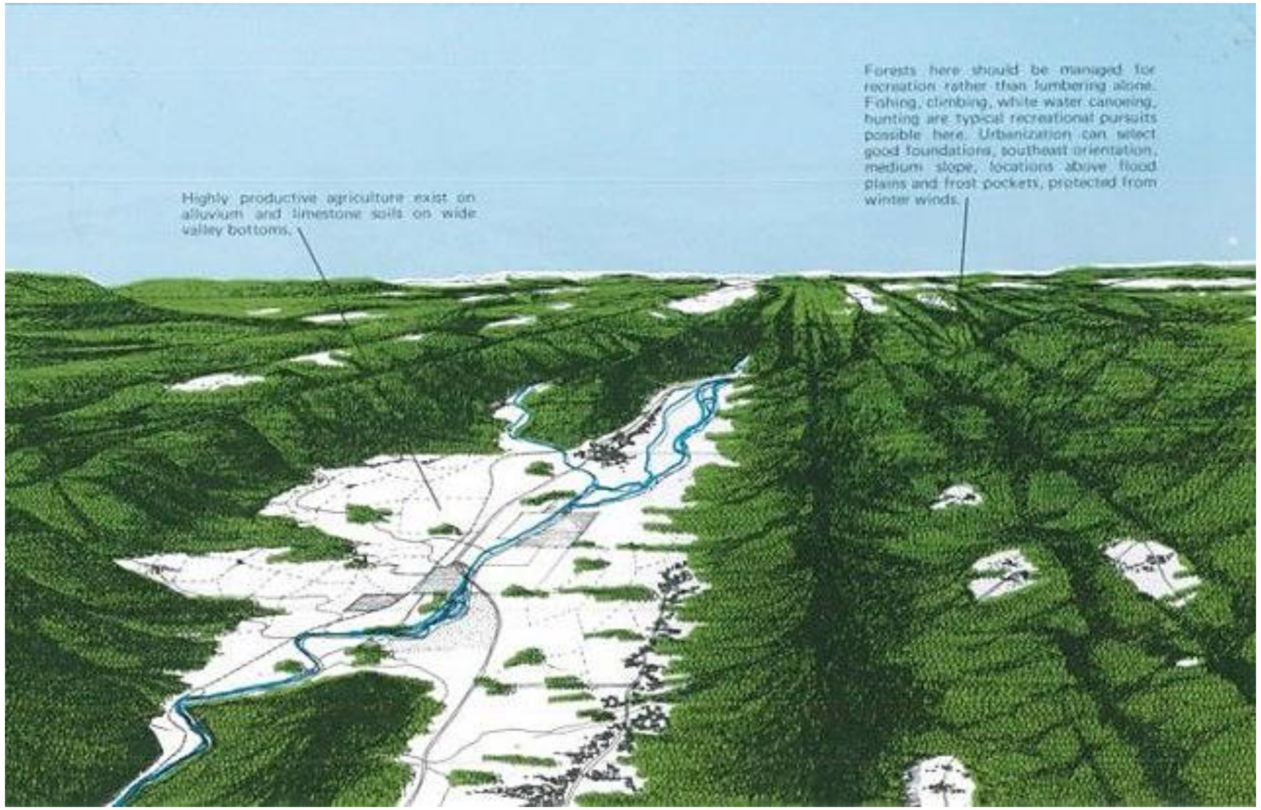
Four-dimensional framework for resilience building. *Source*: the authors.

Source: Evolutionary Resilience And Strategies For Climate Adaptation (Davoudi, Brooks & Mehmood, Planning Practice & Research, 2013)

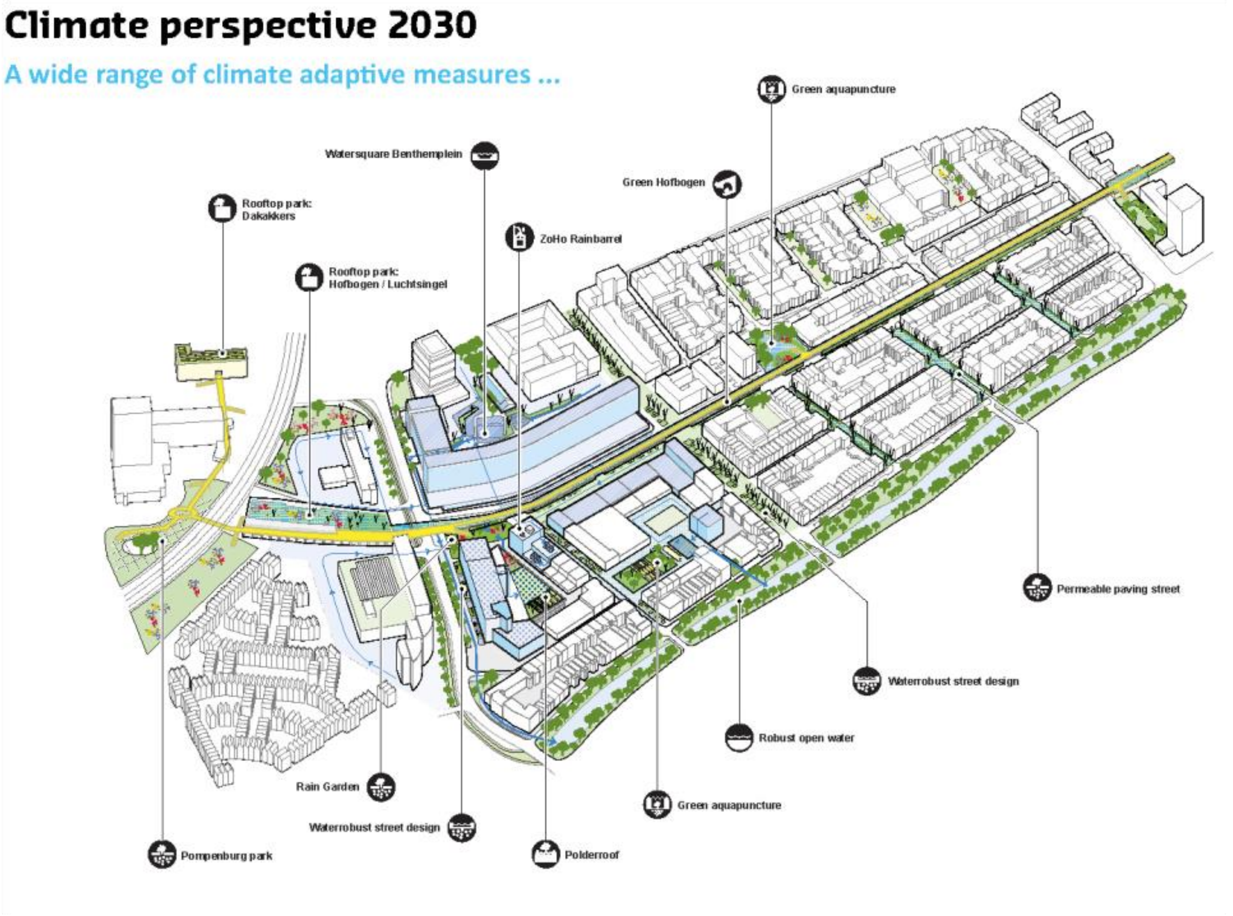
3. Landscape Systems representations: an overview

Representing spatial systems: simplification and abstraction of a complex reality

Physical and spatial structure



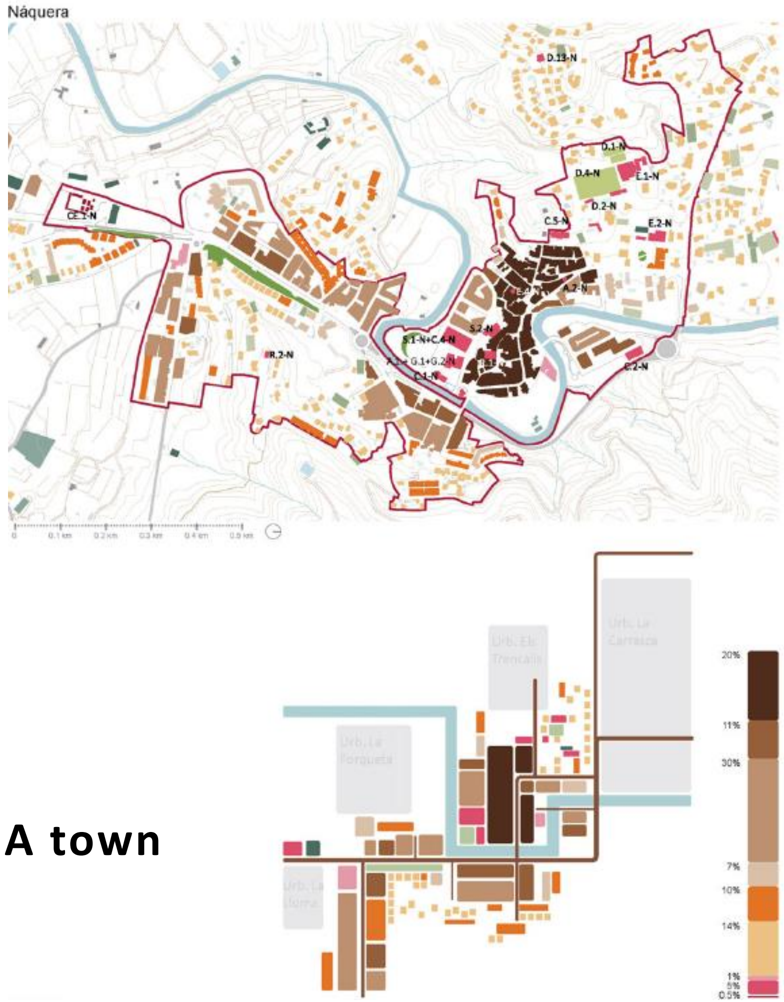
Source: 'Design With Nature' Ian Mc Harg, 1969



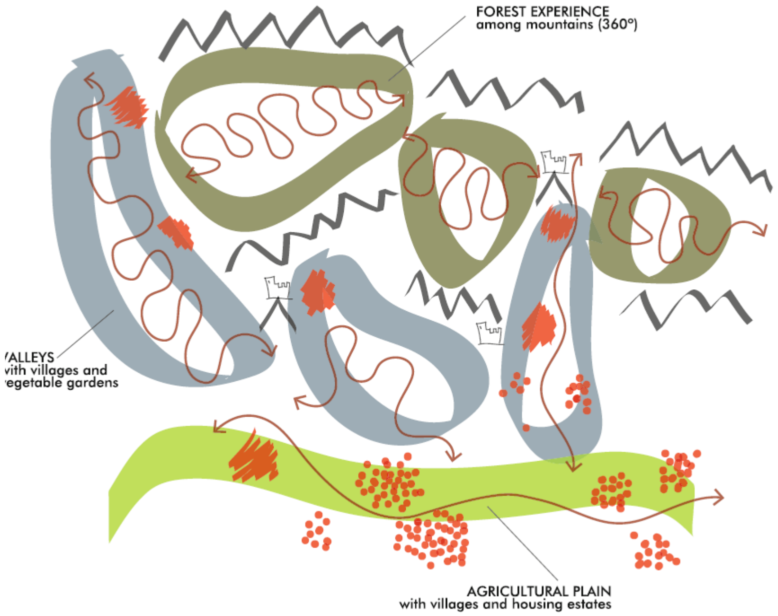
ZOHO DISTRICT (Rotterdam,((source: DeUrbanisten)

Representing spatial systems: simplification and abstraction of a complex reality

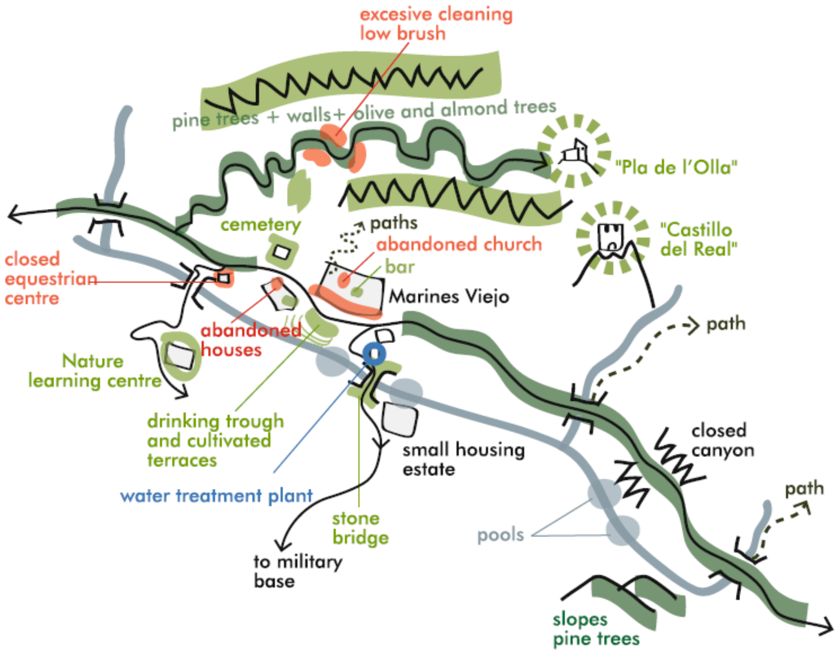
Physical and spatial structure + Abstract representation of a City, a Territory, a District… a Landscape



A town



A region

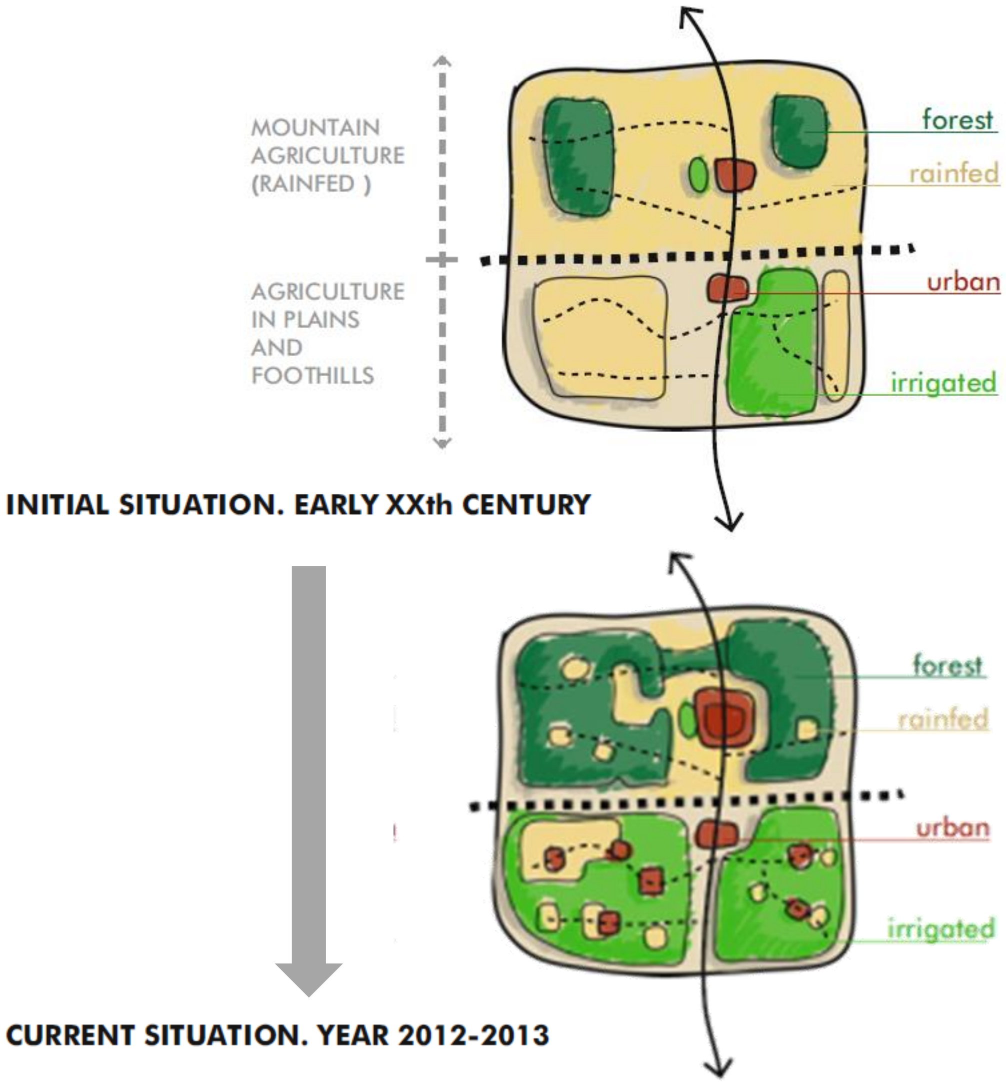


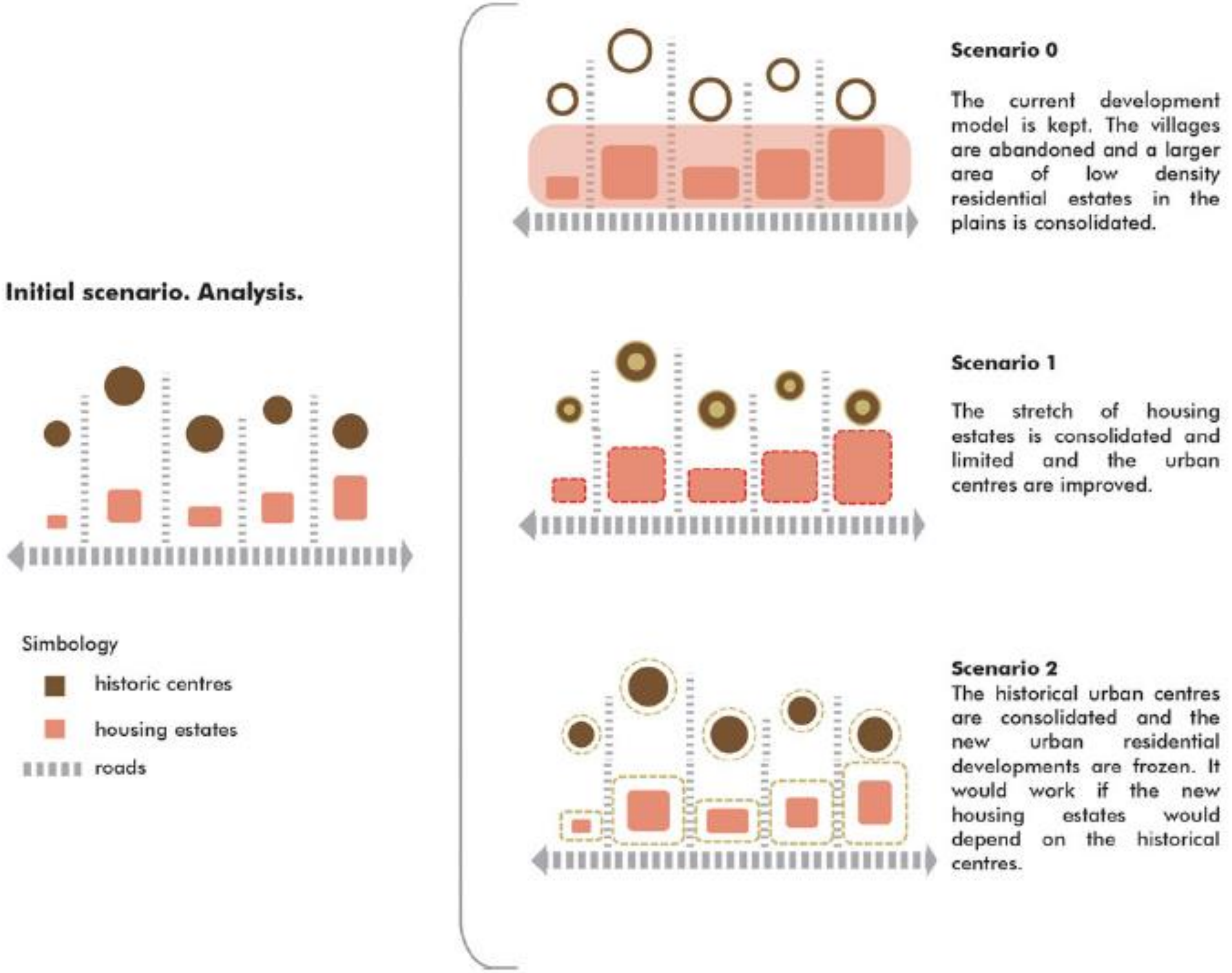
The landscape from the road

Source: Analysis and Strategies for Sustainable Regional Planning: Sierra Calderona Strategic Plan (Galán, 2019)

Representing spatial systems: simplification and abstraction of a complex reality

Physical and spatial structure + Abstract representation of the EVOLUTION of a City, a Territory… a Landscape

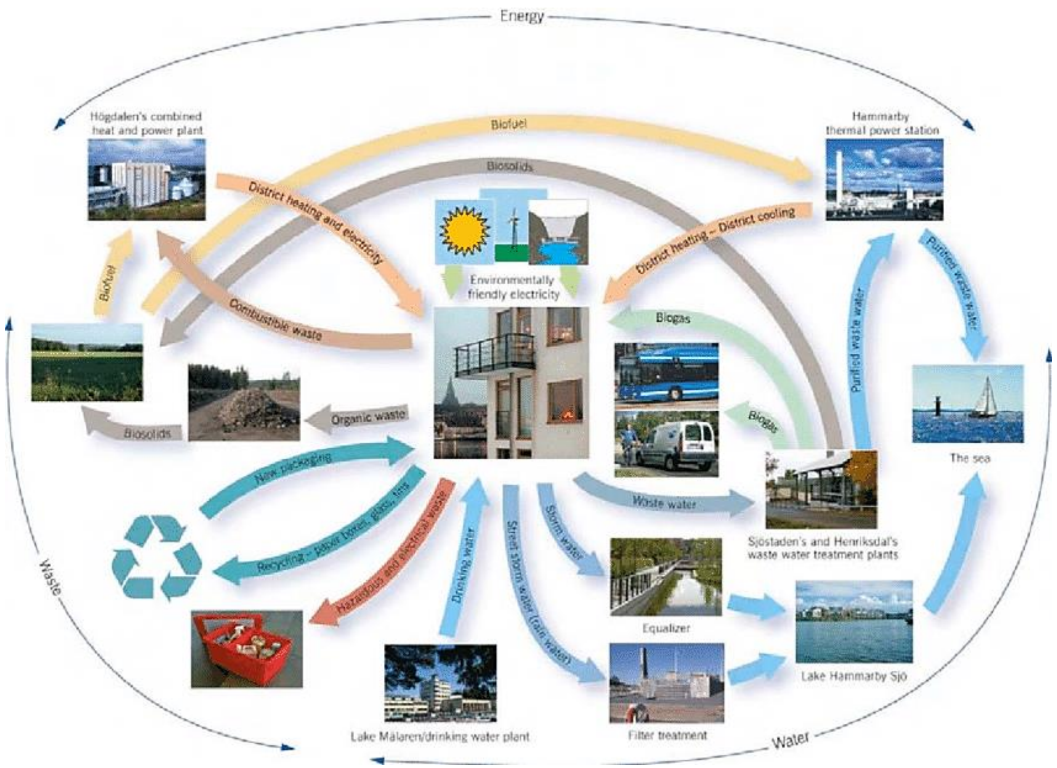




Source: Analysis and Strategies for Sustainable Regional Planning: Sierra Calderona Strategic Plan (Galán, 2019)

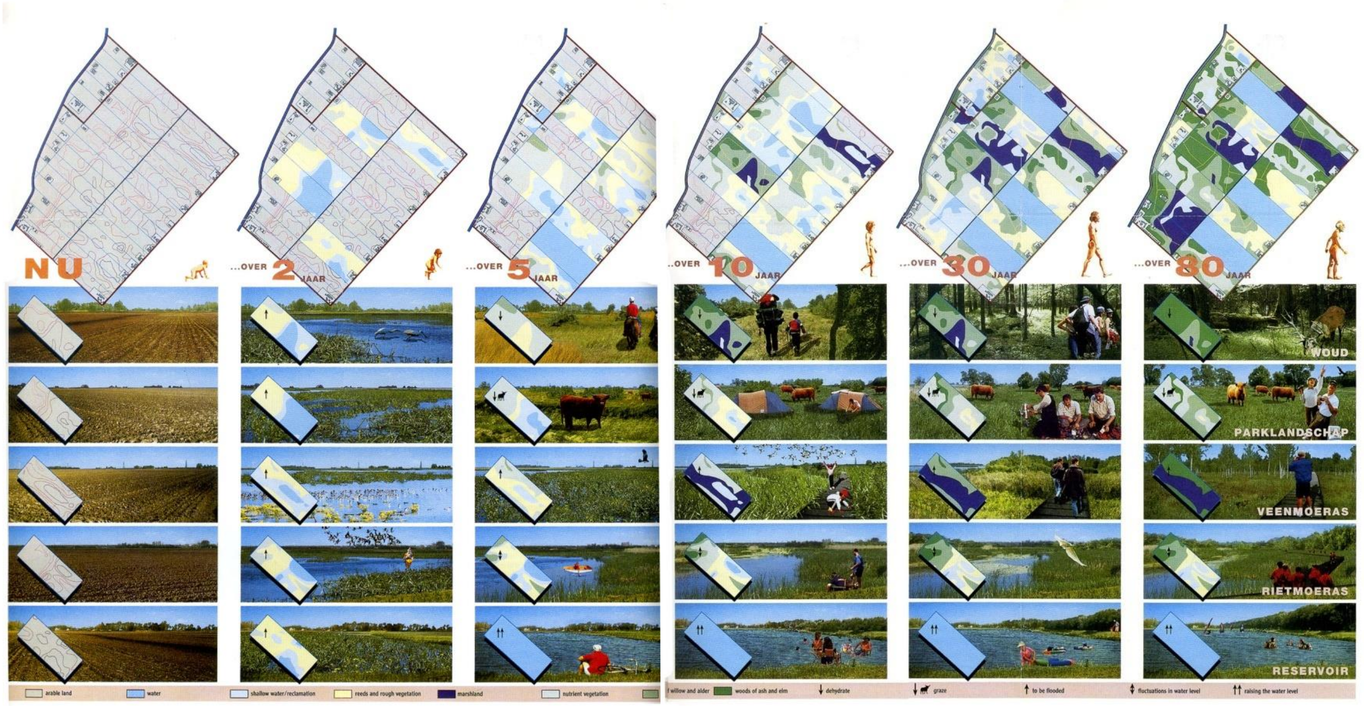
Representing spatial systems: simplification and abstraction of a complex reality

Functional structure and processes



Hammarby Model (2004, sourceFortum, Stockholm Water Company, City of Stockholm)

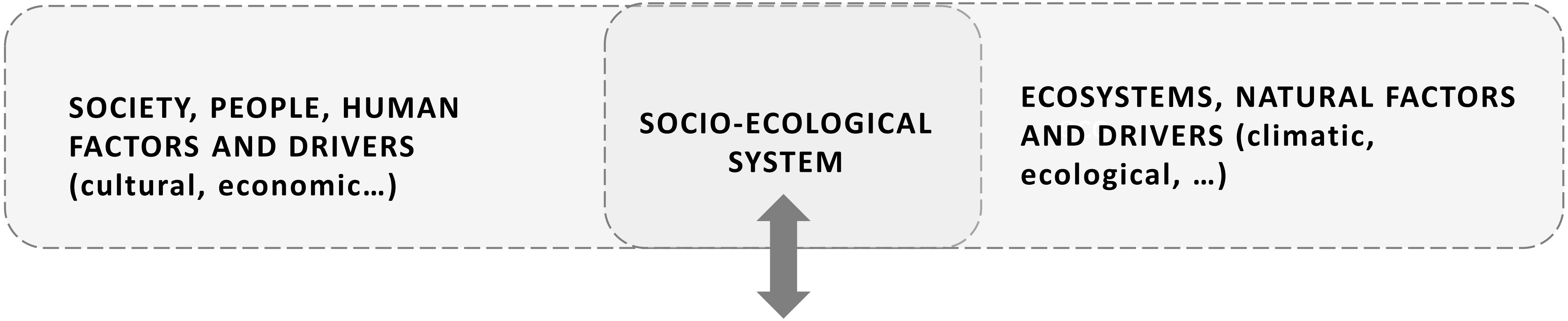
Temporal evolution



Progressive transformation of agricultural land into natural marshes and urban areas (Haarlemmermeer, (Netherlands)), (source: VISTA office for environmental planning, landscape architecture and ecology)

Representing SOCIO-ECOLOGICAL systems:

Socio-ecological system: complex adaptive system composed of two primary subdomains highly interlocked, a human society and economy on the one hand and ecosystems on the other.



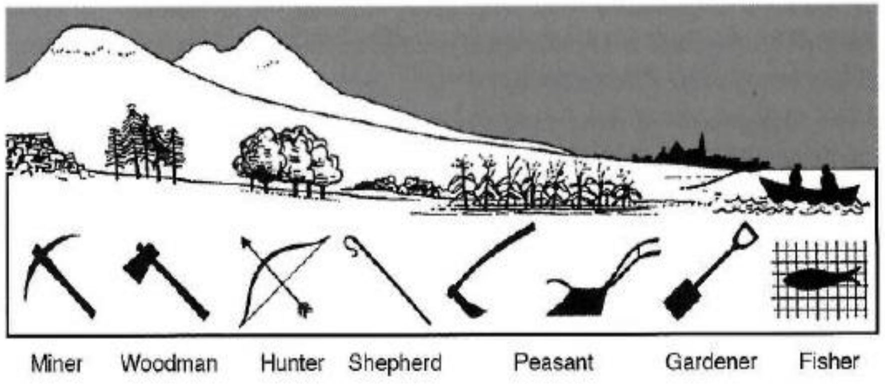
LANDSCAPE: an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (European Landscape Convention)

VISUALIZING LANDSCAPE SYSTEM AS SOCIO-ECOLOGICAL RELATIONSHIPS?

Representing LANDSCAPE SYSTEMS and/as SOCIO-ECOLOGICAL systems:

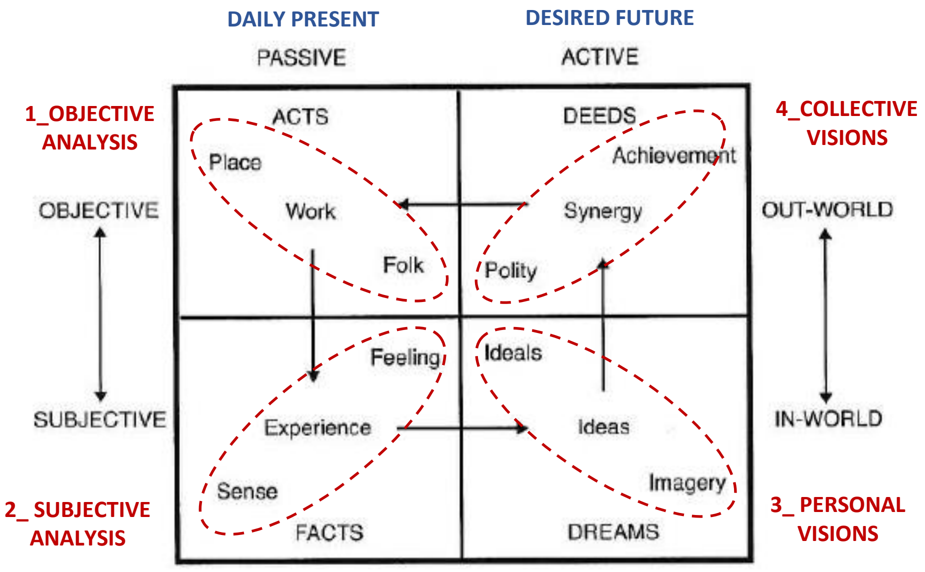
Landscape concept: … *from being a concern of specific fields of expertise to an integrative concept encompassing both natural and cultural dimensions as well as many levels of meaning"* (Clemetsen, 2016)

The landscape lends *"materiality to the… frequently incomprehensible science of models and predictions. It connects disciplines by operating as a platform at which multi-, trans- and interdisciplinary conversations might be had"* (Leyshon & Geoghegan, 2013)



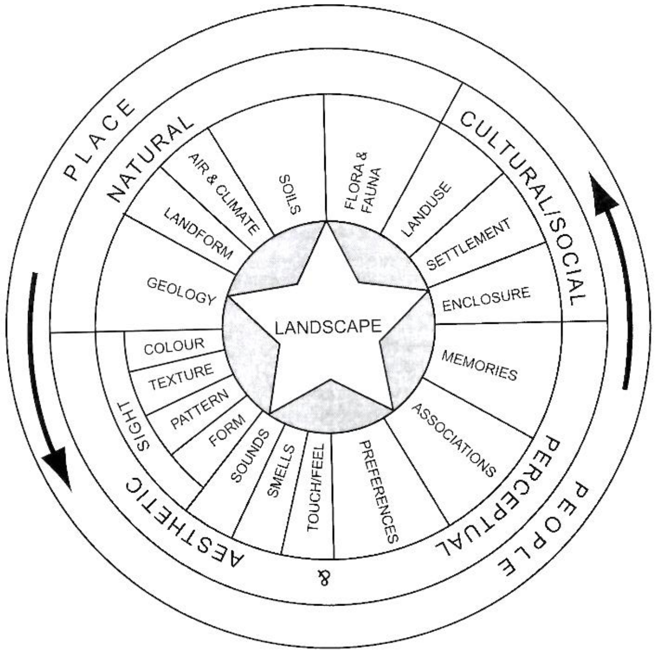
'The valley section' – a pedagogical illustration of how nature and human communities co-evolve within a regional context

The Valley Section by Partick Geddes, 1909 (in Clemetsen, 2016)



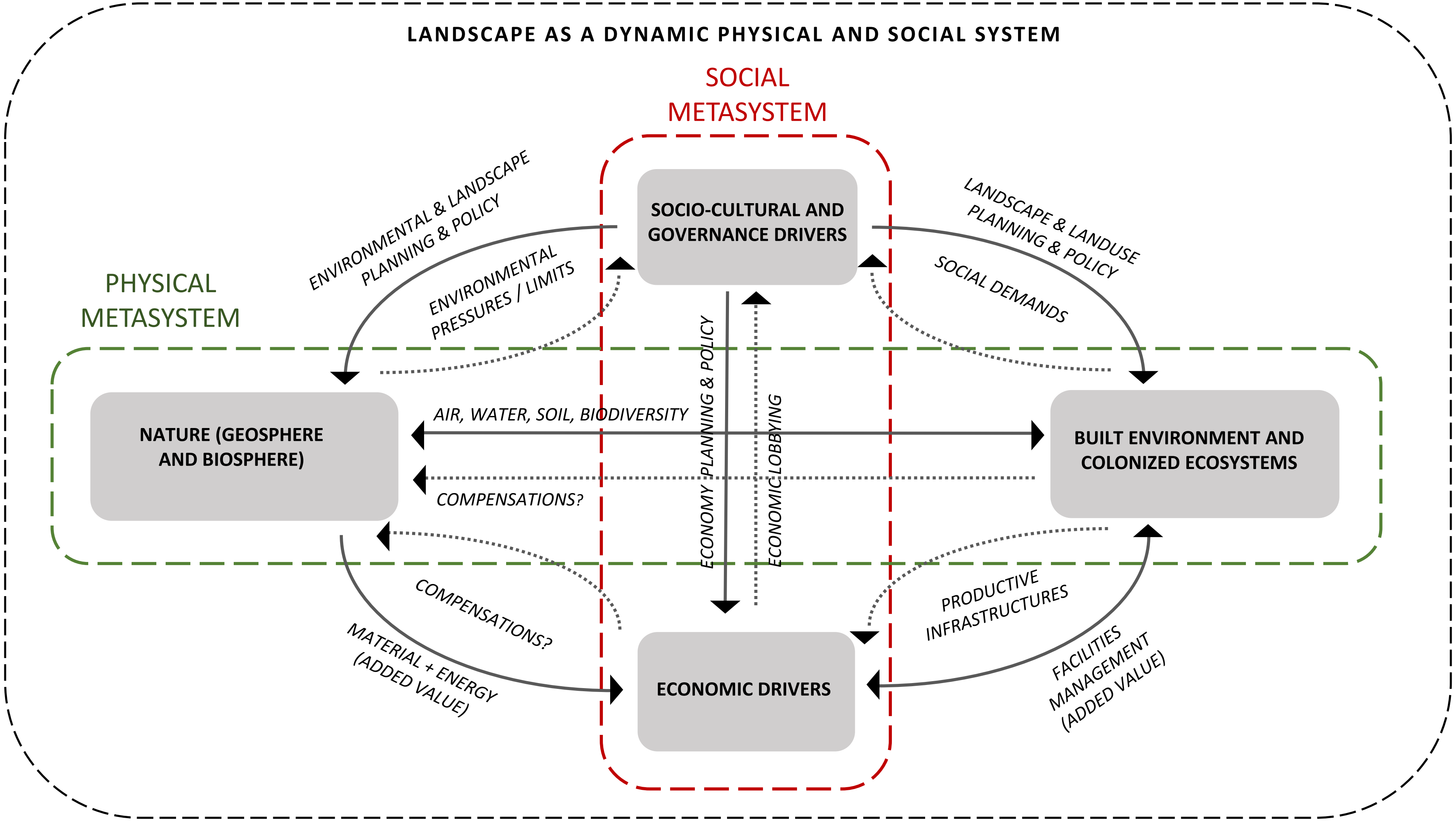
A simplified model of the Notation of Life, by Patrick Geddes (1917)

Source: Reprinted in and adapted from King 2005 (in Clemetsen, 2016)



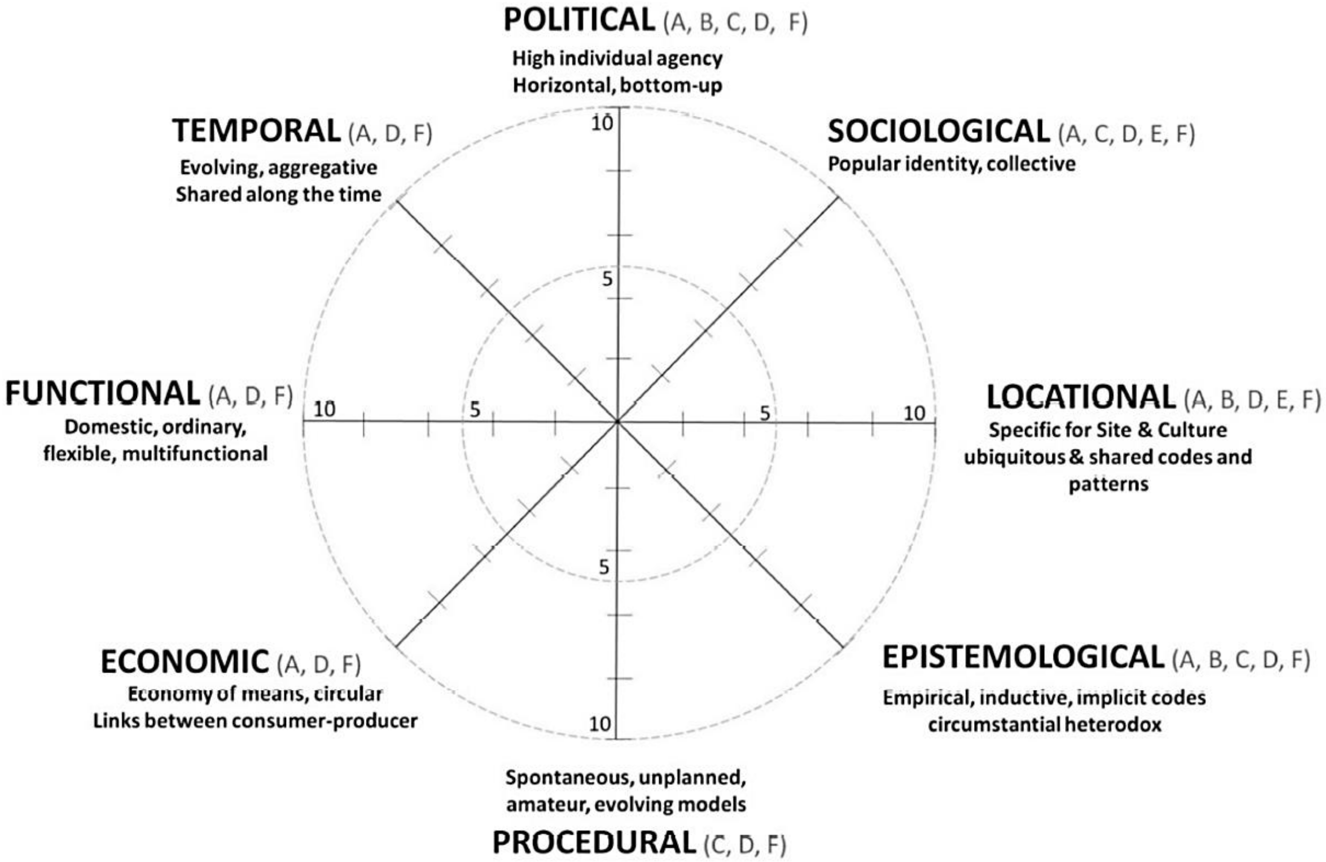
Landscape as an integrated concept; Swanwick and Land Use Consultants, 2002 (in Kidd, 2013)

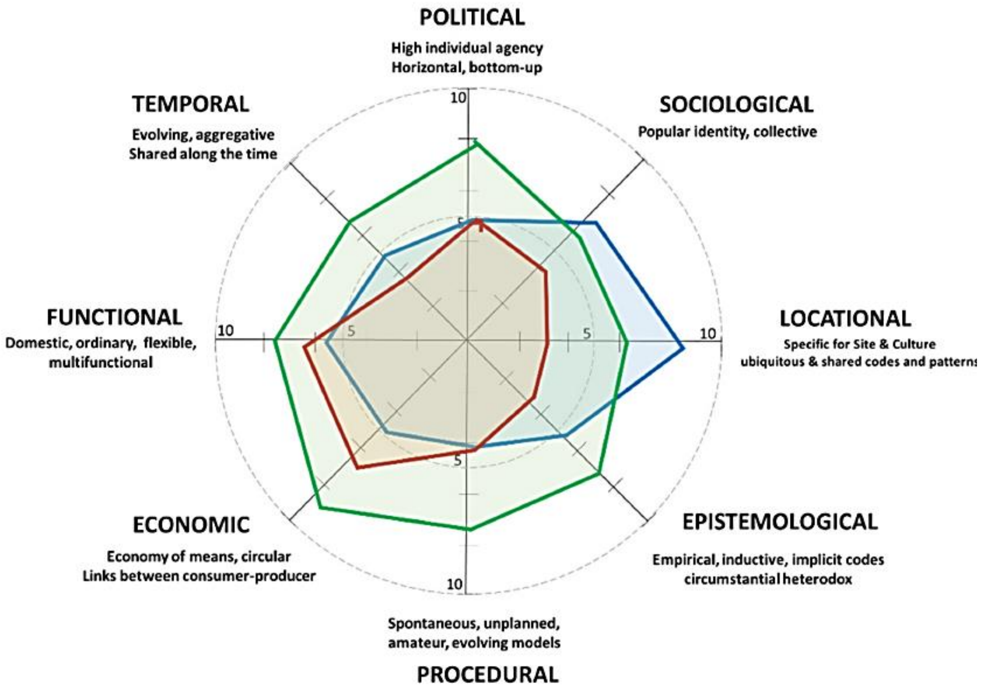
Representing spatial systems: simplification and abstraction of a complex reality



Source: Incorporatig Metabolic Thinking into Regional Planning (Galán and Perrotti, 2019)

VERNACULAR LANDSCAPES: A multifactorial phenomenon





: **House1:** Designed by a professional architect using local materials and techniques and reinterpreting in a contemporary language some basic compositional factors (volume, shape, distribution and shape of openings, connection to the landform, etc.).

: **House2:** Designed by a professional architect using a formal and material language disconnected from the site and traditions.

: **House3:** Designed and constructed gradually by a local neighbor with his savings and with some leftovers from other constructions. For the design, he uses the experience accumulated in the house where he lived before and the advice provided by his family, friends and neighbors adding also some "nice" things that he saw on TV.

Source: Galan, Juanjo, Felix Bourgeau, and Bas Pedroli. 2020. "A Multidimensional Model for the Vernacular: Linking Disciplines and Connecting the Vernacular Landscape to Sustainability Challenges" Sustainability 12, no. 16: 6347.

4. Some examples

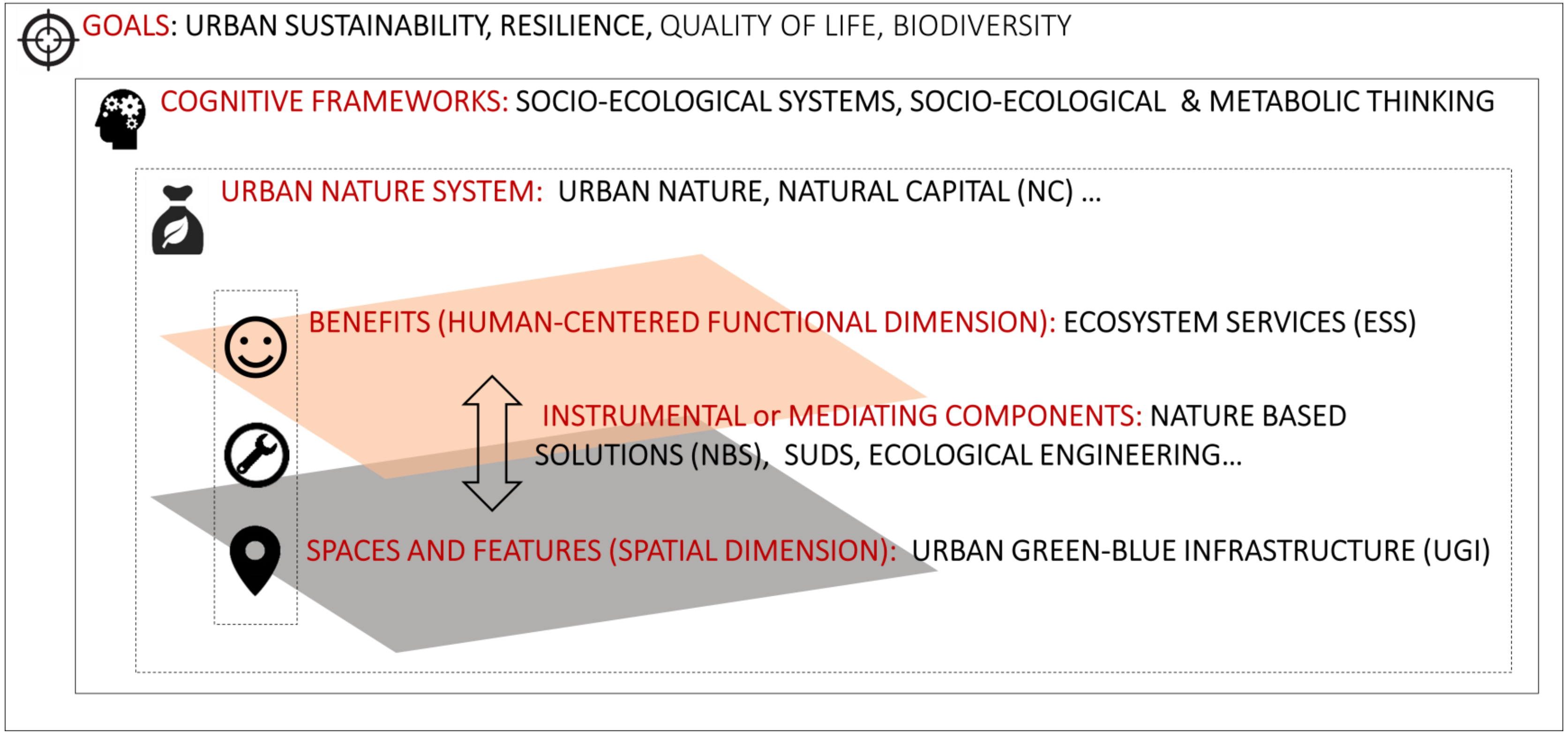
4a. Some examples

URBAN GREEN INFRASTRUCTURE (and DPSIR)

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

Activator: A RELATIONAL MODEL FOR URBAN-NATURE CONCEPTS (Galán, 2018)



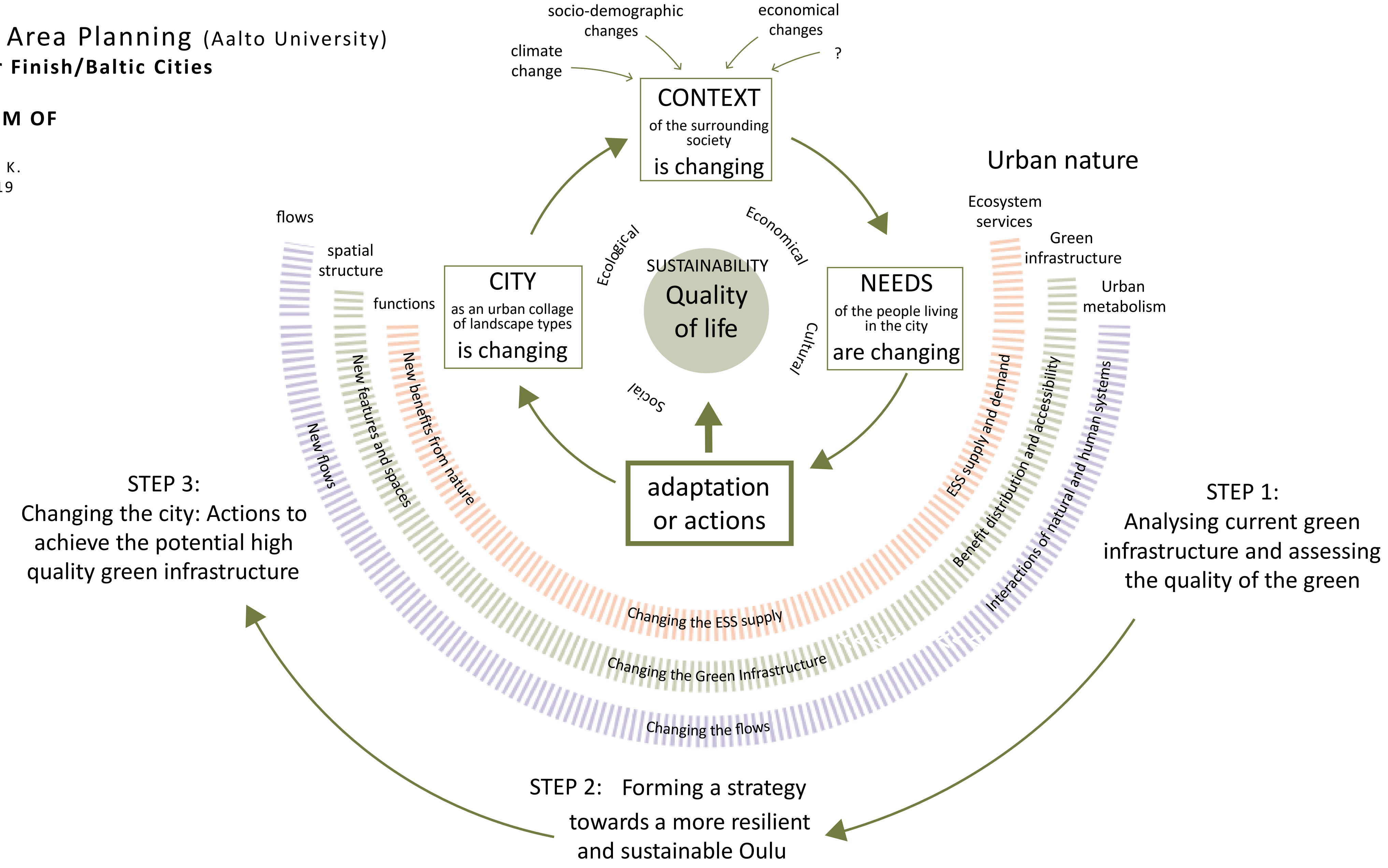
Galan, Juanjo. 2020. "Towards A Relational Model for Emerging Urban Nature Concepts: A Practical Application and an External Assessment in Landscape Planning Education" *Sustainability* 12, no. 6: 2465.

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

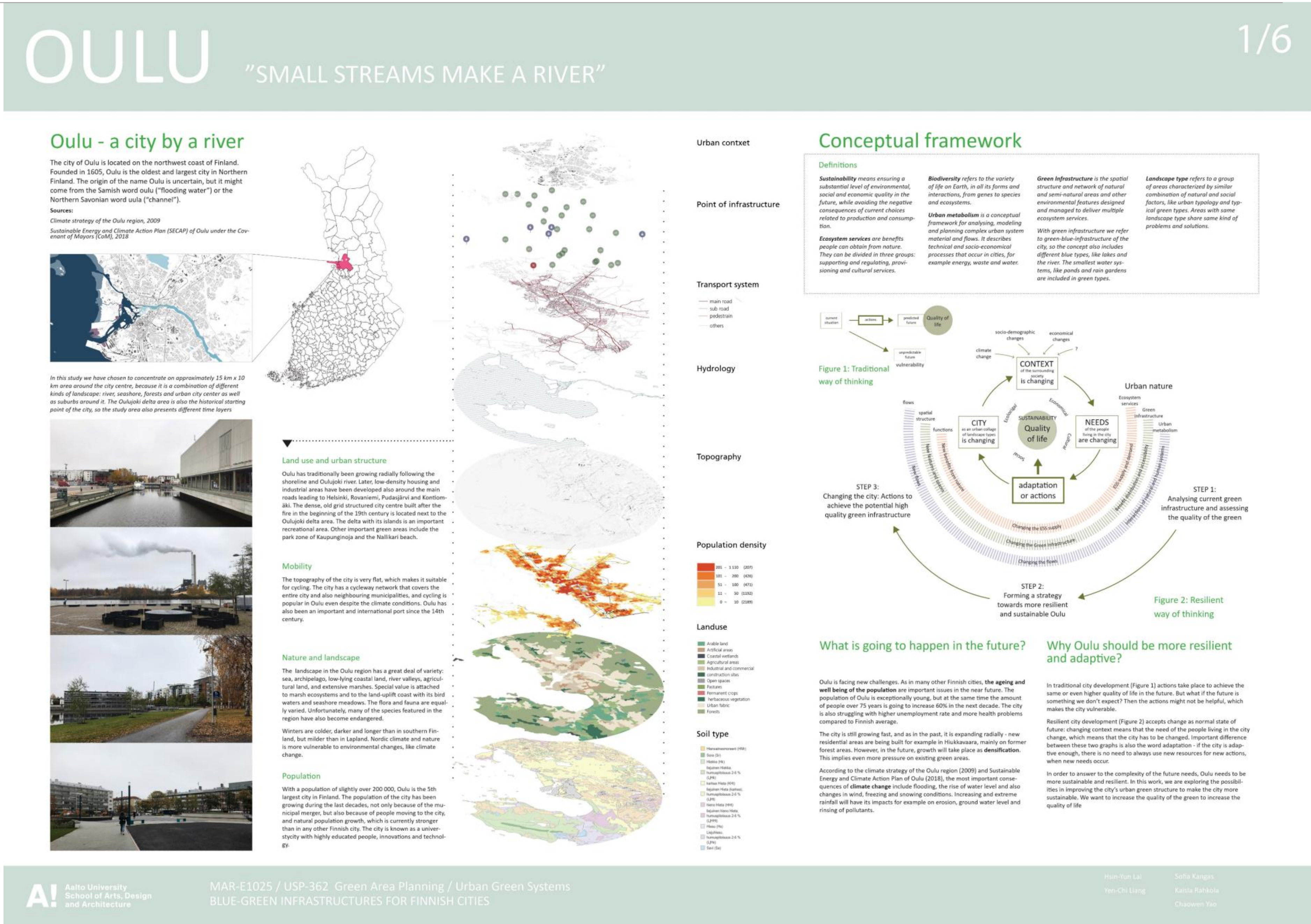
MODEL FOR THE GREEN SYSTEM OF THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019



Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

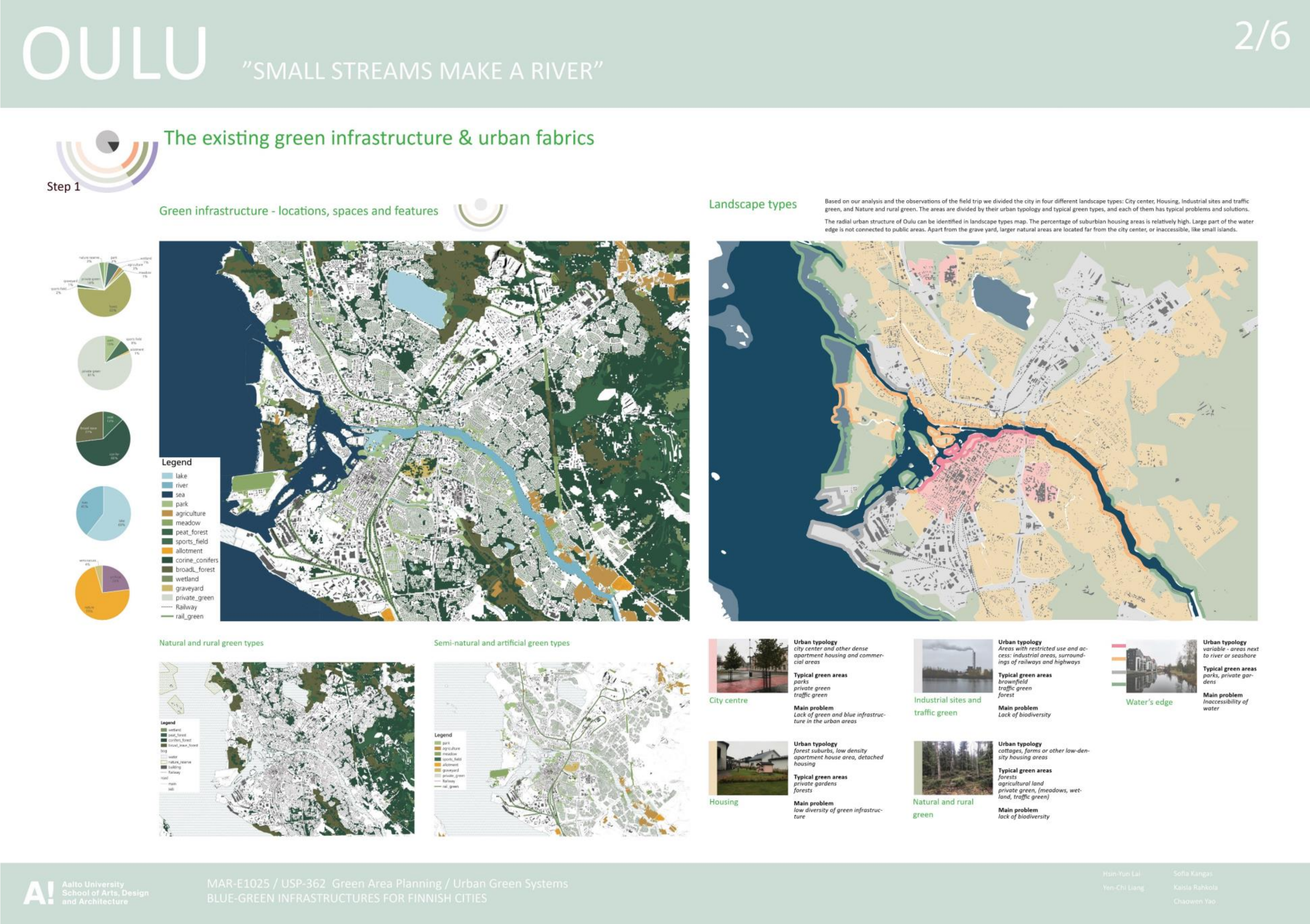


BUE-GREEN INFRASTRUCTURE FOR THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

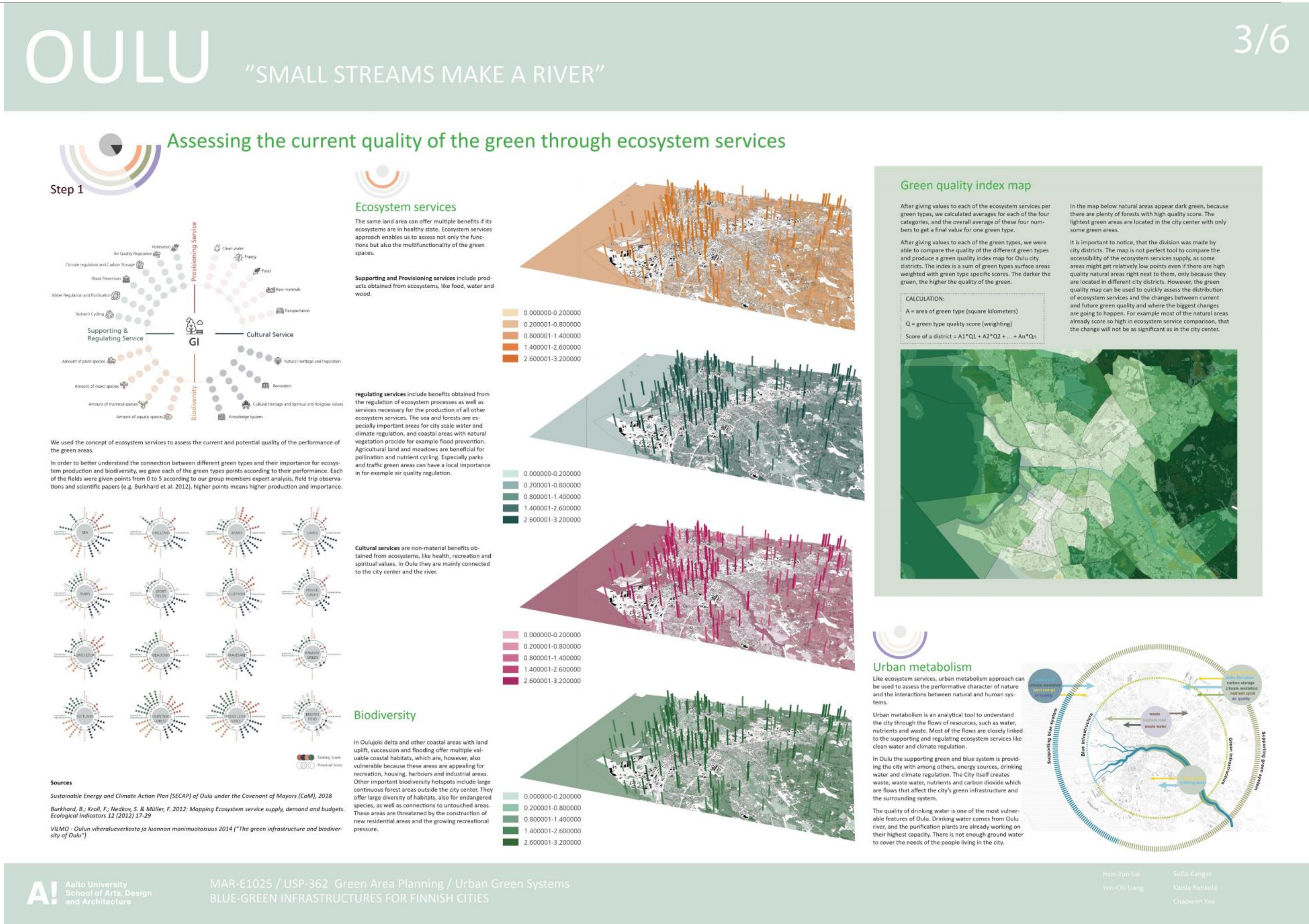


BUE-GREEN INFRASTRUCTURE FOR THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

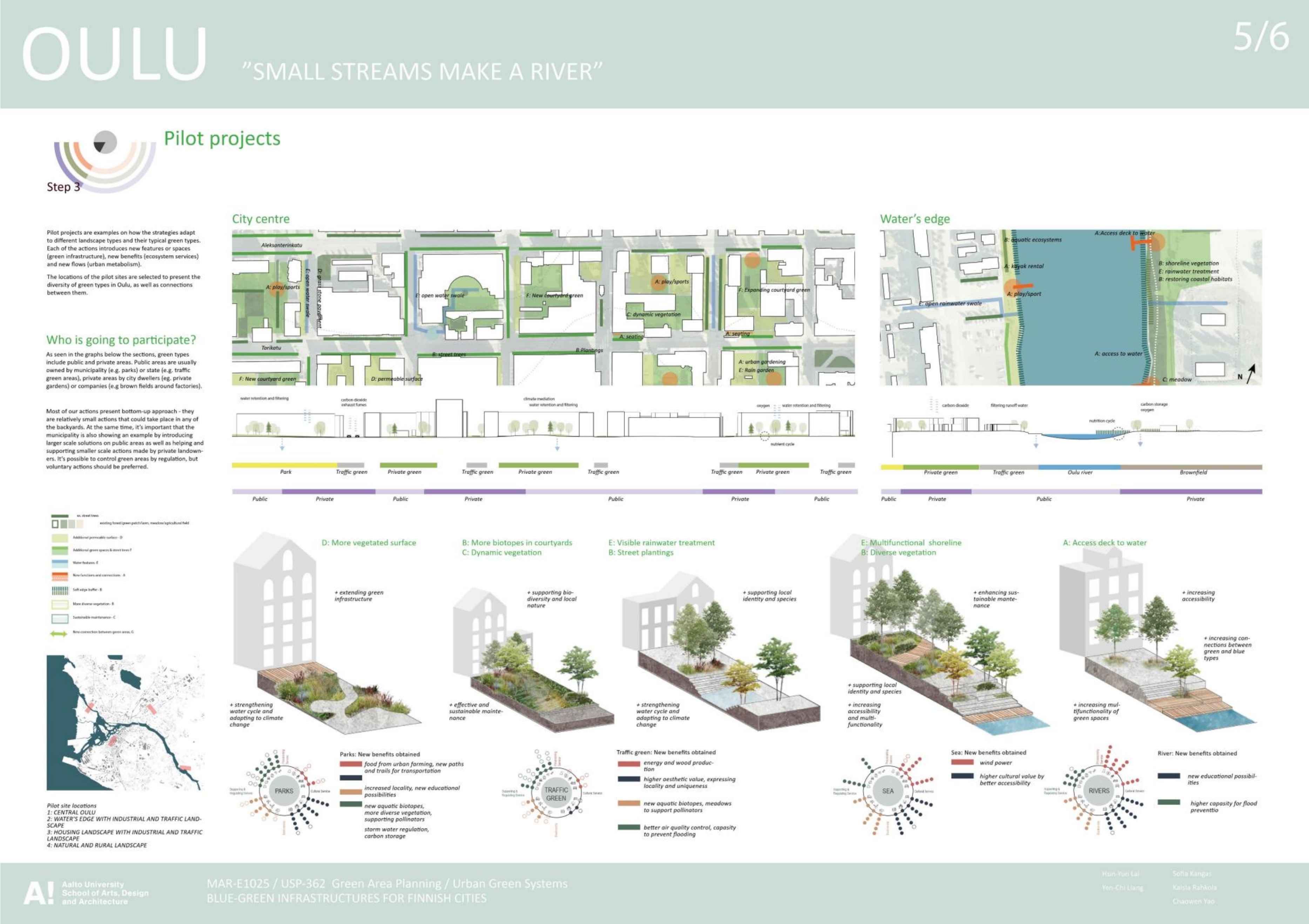


BUE-GREEN INFRASTRUCTURE FOR THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

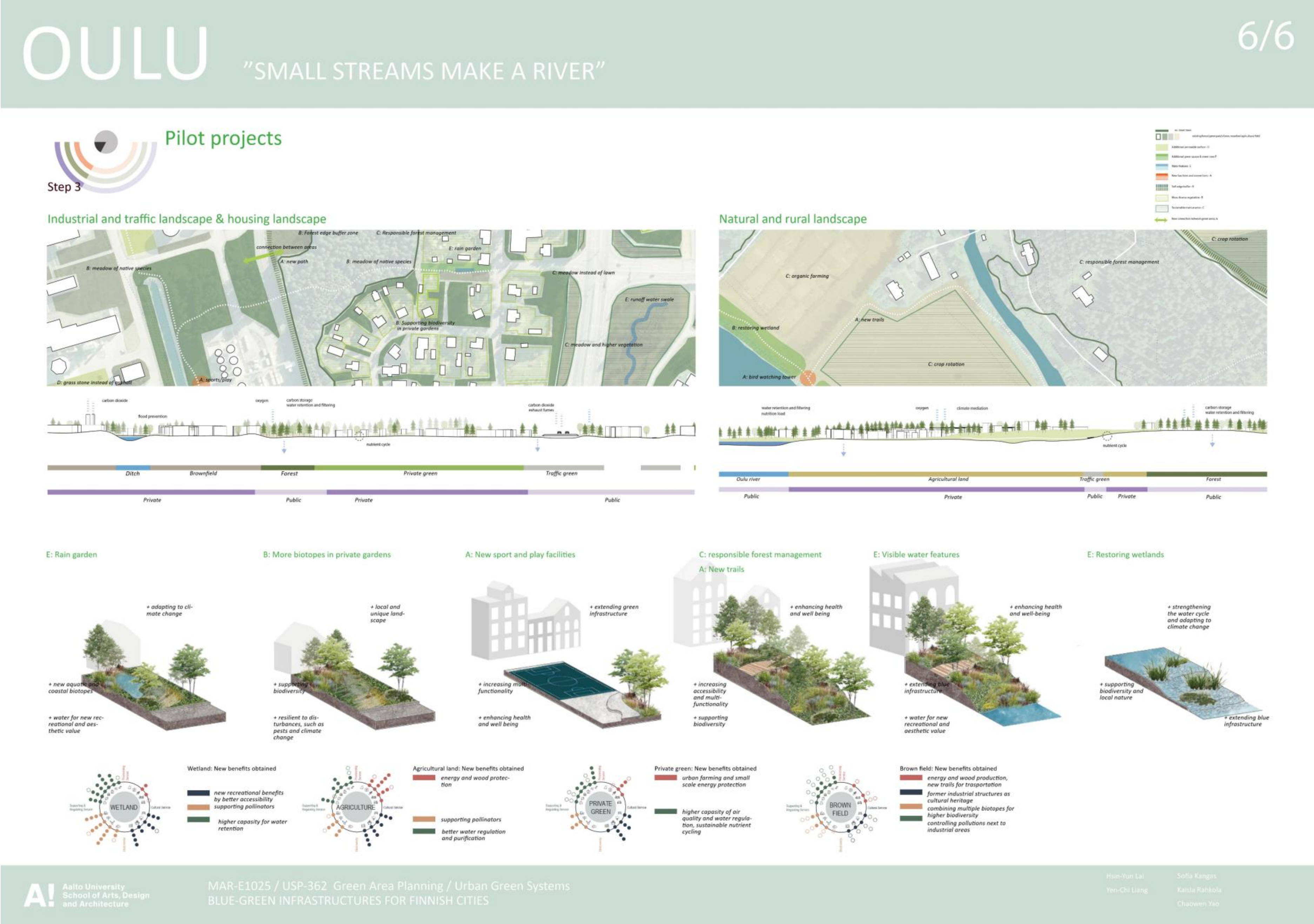


BUE-GREEN INFRASTRUCTURE FOR THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019

Studio Course on Green Area Planning (Aalto University)

Blue-Green Infrastructures for Finish/Baltic Cities

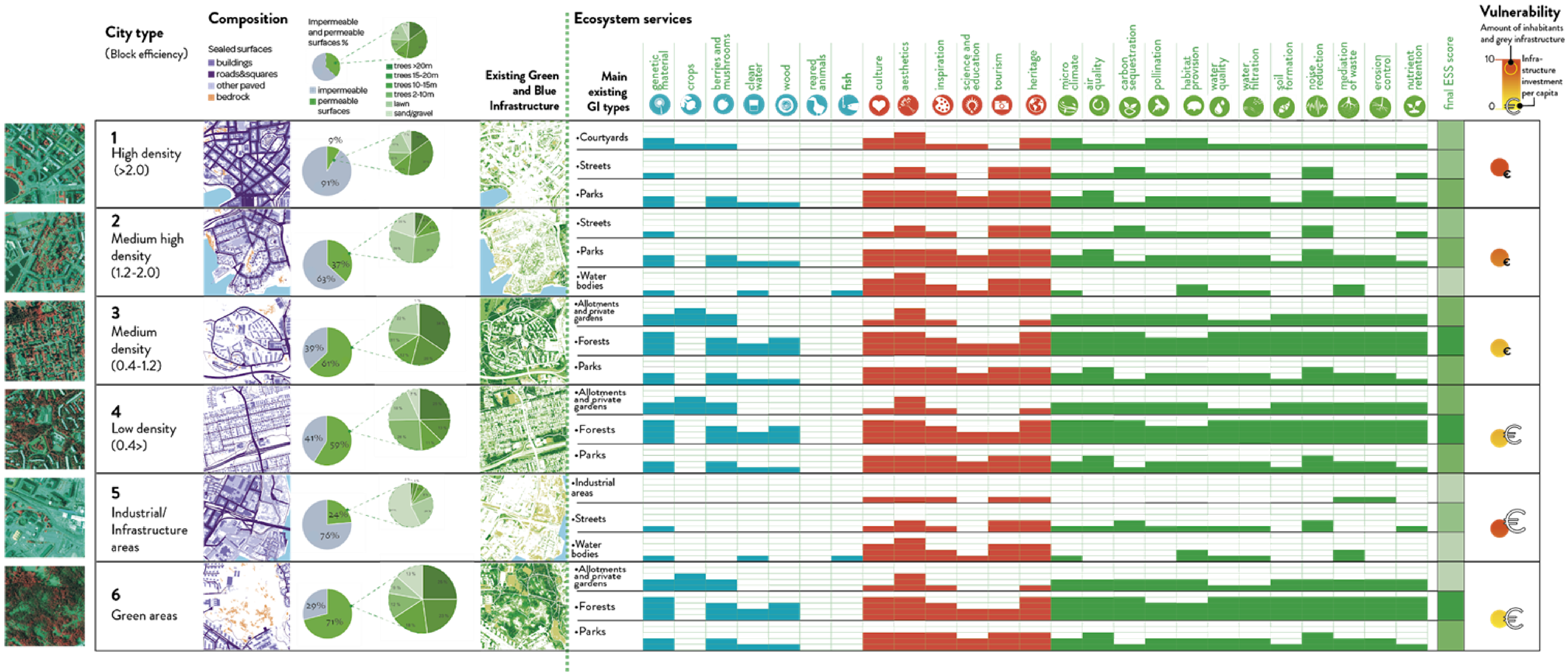


BUE-GREEN INFRASTRUCTURE FOR THE CITY OF OULU

students: H.Y. Lai, Y. Liang, S. Kangas, K. Rahkola, C. Yao; teacher: J. Galan, 2019

Studio Course on Green Area Planning (Aalto University). Blue-Green Infrastructures for Finish/Baltic Cities

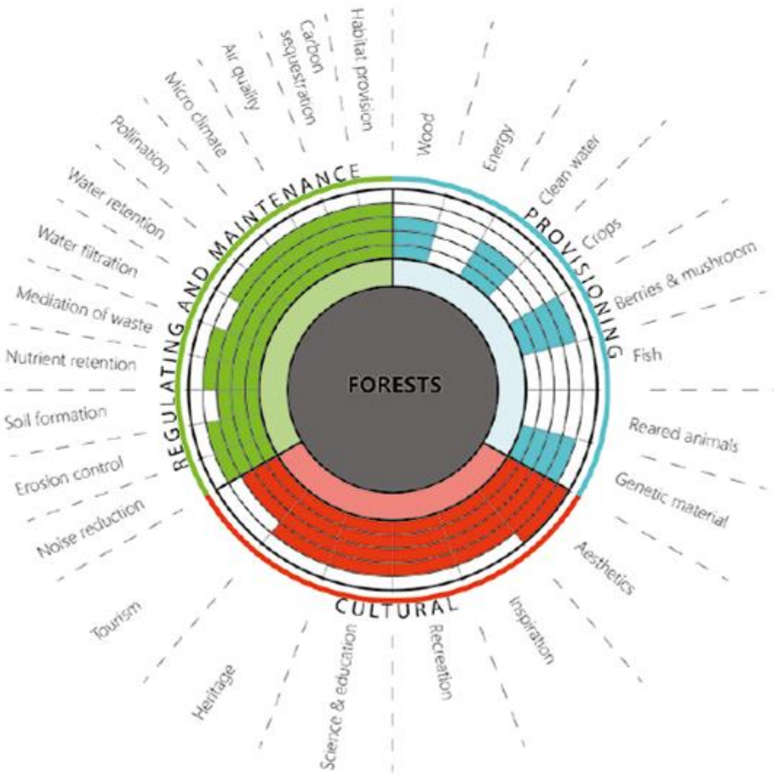
URBAN TYPOLOGIES, TYPES OF GREEN AREAS AND ECOSYSTEM SERVICES IN HELSINKI (Efraimsson, K.; Hakala, K.; Toivola, K. Green Area Planning, teacher: Juanjo Galan 2018)



Studio Course on Green Area Planning (Aalto University). Blue-Green Infrastructures for Finish/Baltic Cities

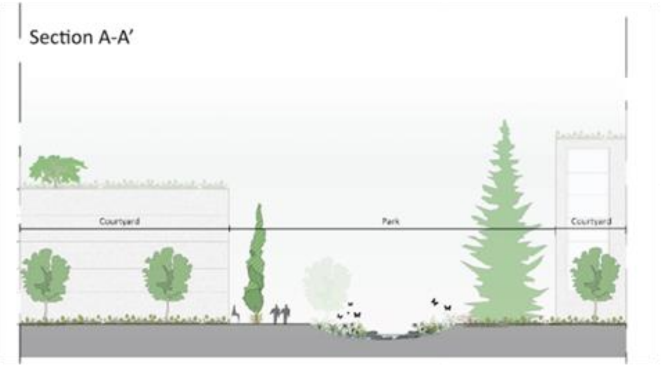
GREEN INFRASTRUCTURE, TYPES OF GREEN AREAS AND ECOSYSTEM SERVICES IN HELSINKI

(Efraimsson, K.; Hakala, K.; Toivola, K. Green Area Planning, teacher: Juanjo Galan 2018**)**

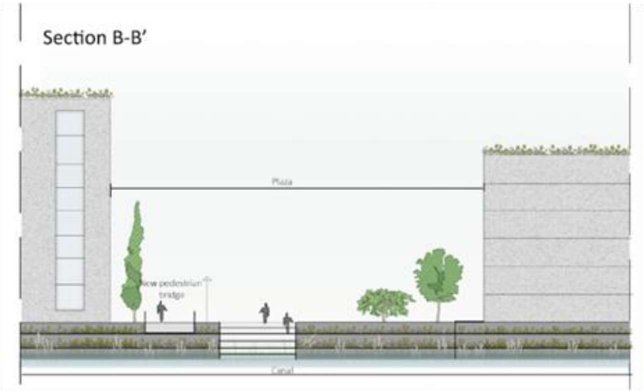


Studio Course on Green Area Planning (Aalto University). Blue-Green Infrastructures for Finish/Baltic Cities

KALASATAMA DISTRICT (Helsinki) Revising the masterplan through the generation of a mofe performative Green-Blue Infrastructure, (K.; Hakala, K.; Toivola, K. Green Area Planning, teacher: Juanjo Galan 2018)

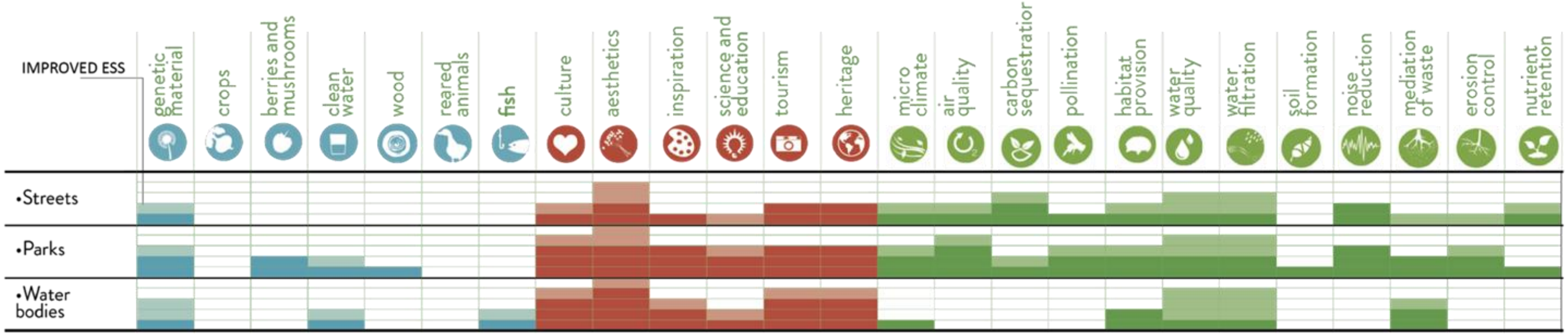


Improvements to GI:
- reorganize walkways to create larger and less fragmented green areas
- previously closed apartment blocks are opened from the park side to improve green connections
- better utilization of stormwater to promote formation of diverse habitats (insects, butterflies)
- increase the quality of green areas by using a large variety of plants (monoculture -> polyculture)



Improvements to GI
- sides of the canal will be made into cascading stairs to improve the utilization of the shoreline
- reeds and other suitable plants are planted in the shoreline and on the surface of the stairs to improve water quality
- the amount of impervious surface on the plaza will be decreased and the quantity and quality of green areas increased

Improvements to GI
- reeds and other suitable plants are planted in the shoreline to improve water quality
- new habitats created on the shoreline
- the amount of impervious surface on the street will be decreased and the quantity and quality of green areas increased



4b. Some examples
URBAN AND REGIONAL METABOLISM

1 SUSTAINABILITY

Sustainable development is a moving target…

It often relies in the management of transitions and tends to be specific to each site …

Urban sustainability can provide an integrated approach supporting urban plans and projects in a flexible and continuous process of change

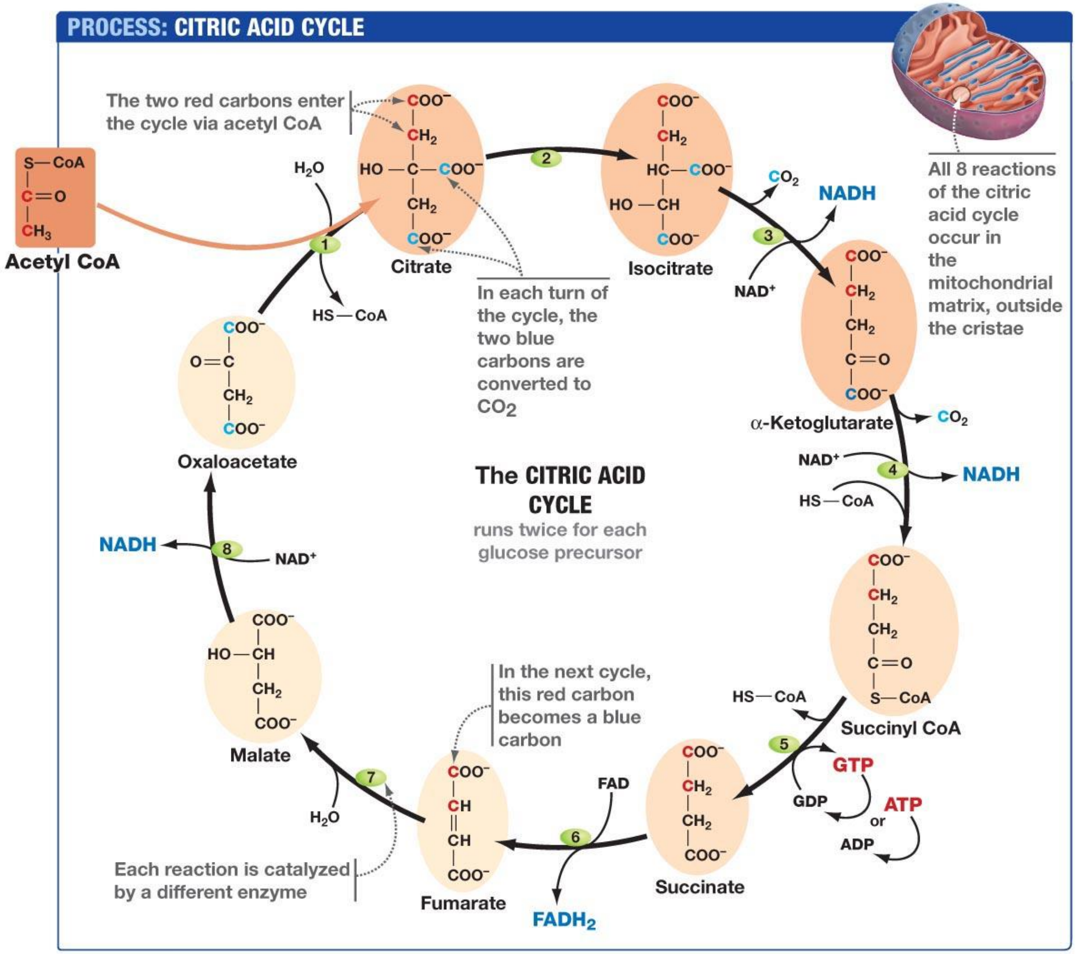
(Timmeren, 2014)

1 METABOLISM

Metabolism: *"The chemical processes that occur within a living organism in order to maintain life"*

- *Catabolism: The breakdown of complex molecules in living organisms to form simpler ones, together with the release of energy*
- *Anabolism: The synthesis of complex molecules in living organisms from simpler ones together with the storage of energy*

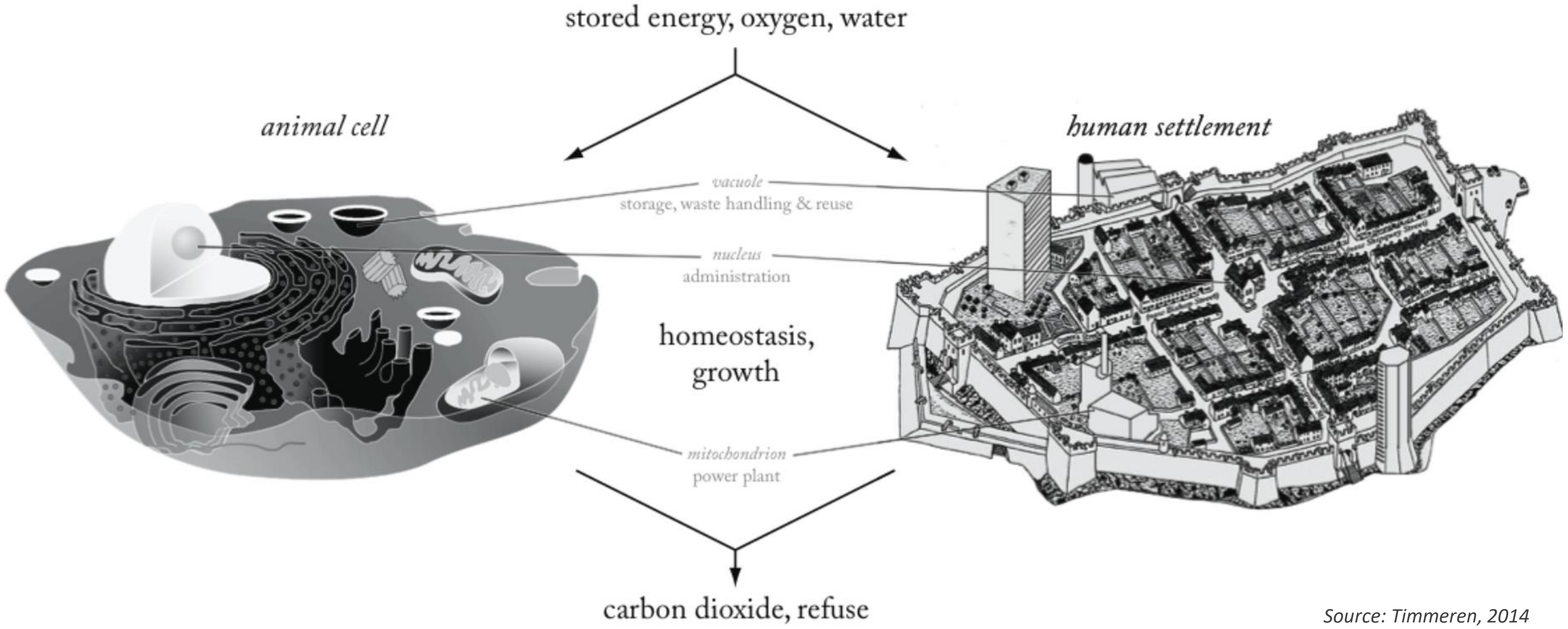
(Oxford Dictionary)



Source: 2011 Pearson Education Inc.

1 The Concept: URBAN METABOLISM

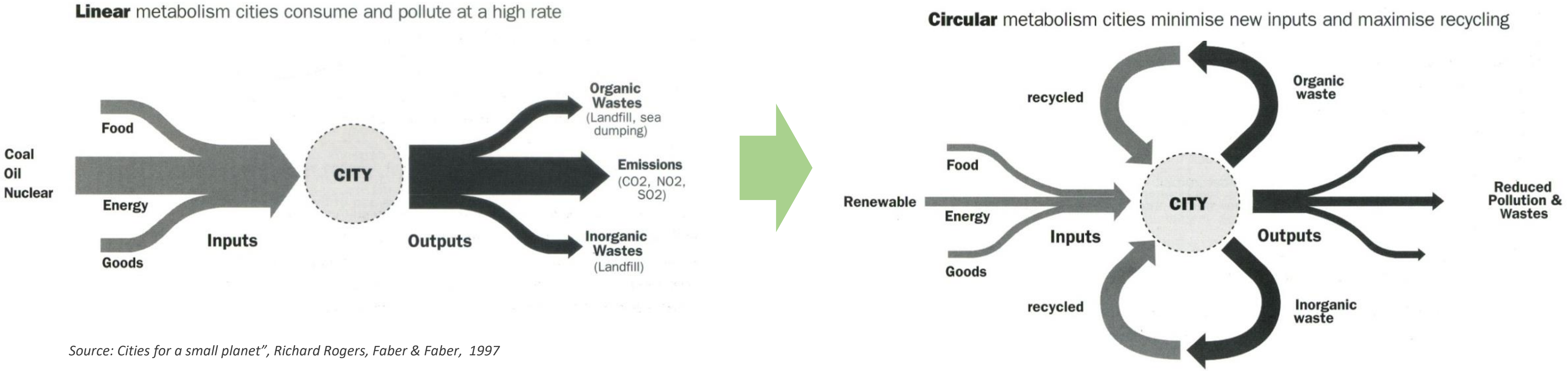
"The metaphor of a city, or living environment, as a living organism with a collective urban metabolism can be traced back for more than 150 years. More recently, the concept of urban metabolism has been used as an analytical tool to understand energetic and material exchanges 'between cities and the rest of the world'" (Fischer-Kowalski, 2002 in Timmeren 2014).



Source: Timmeren, 2014

1 The Concept: URBAN METABOLISM

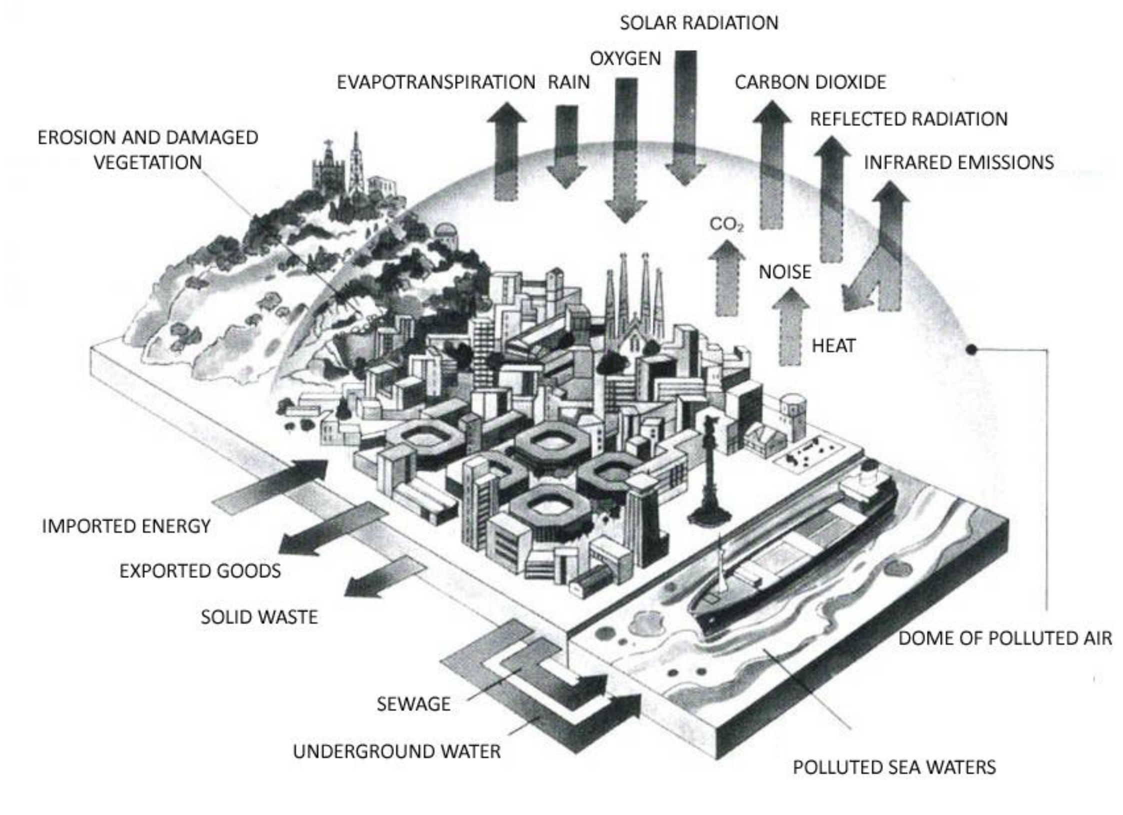
URBAN METABOLISM: … A framework for MODELING complex urban systems' material and energy flows



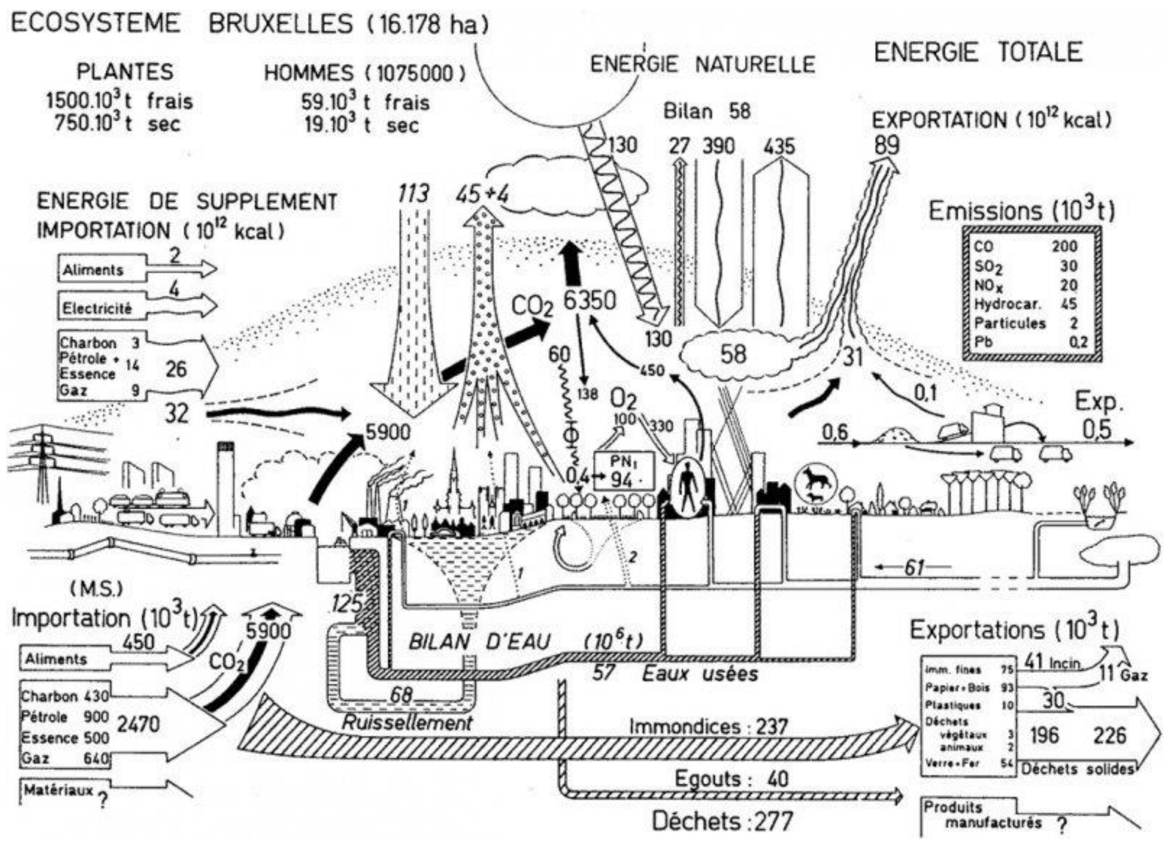
Source: Cities for a small planet", Richard Rogers, Faber & Faber, 1997

SUSTAINABLE TRANSITION FROM A METABOLIC PERSPECTIVE?...
How can planners, administrations and decision-makers use this approach?

2 METHODS: MATERIAL (& ENERGY) FLOW ANALYSIS (MFA)

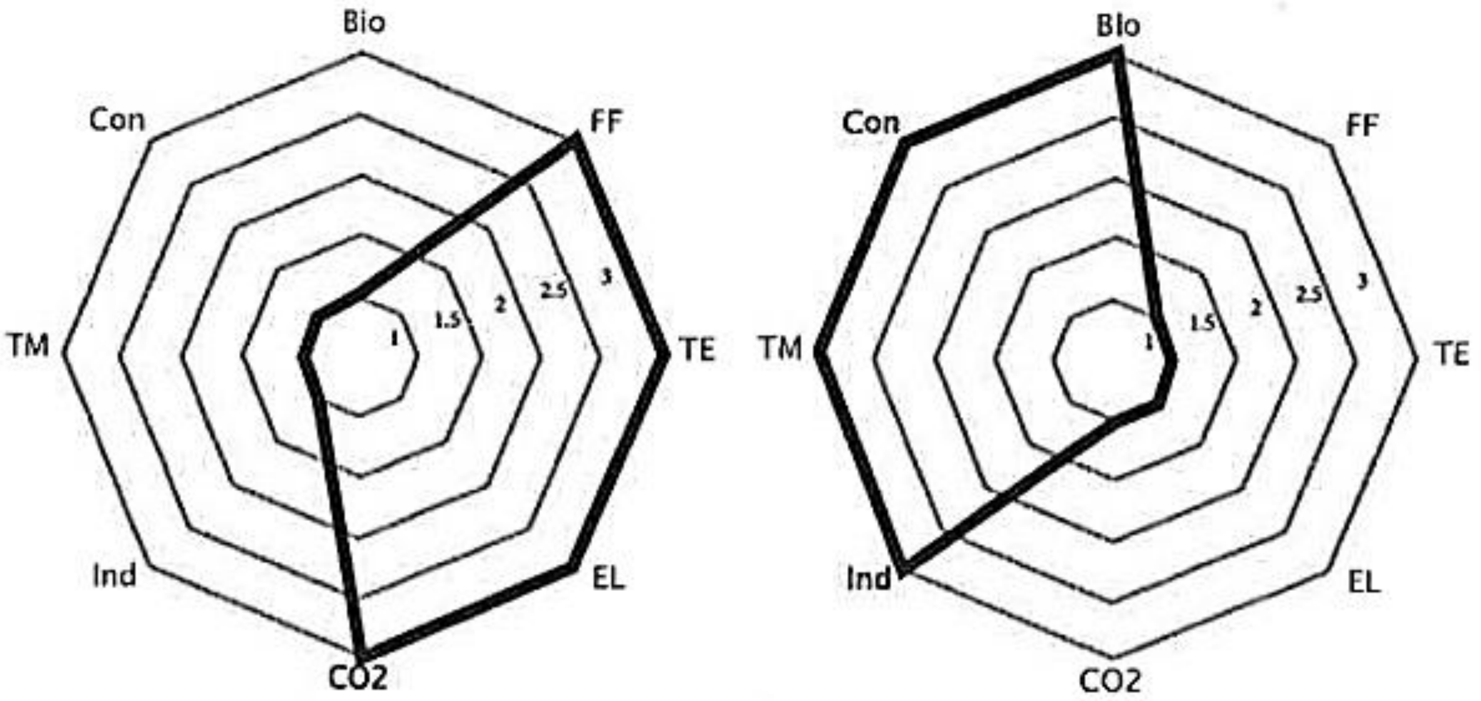


Fuente: Parés, Pou y Terradas, 1985.



Source: Duvigneaud, P., 1974, “Ecosystème Urbs-Brussels”,

2 METHODS: MATERIAL (& ENERGY) FLOW ANALYSIS (MFA)

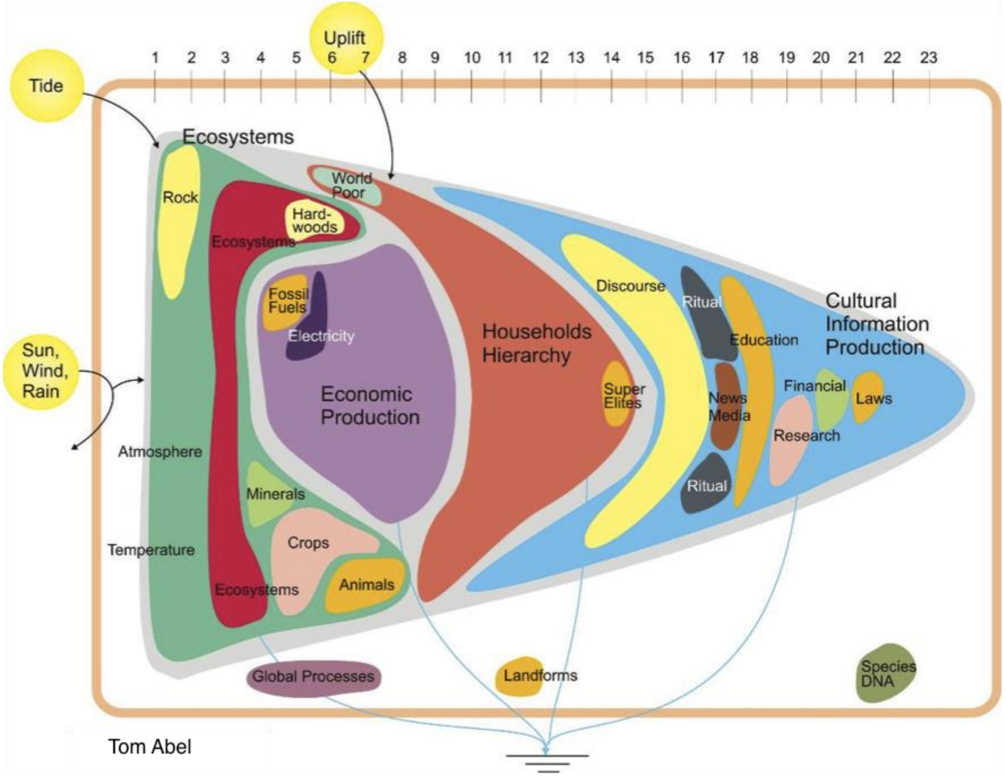


Two graphic representations of city resource-consumption types showing an energy-intensive city on the left and a material-intensive city on the right (Bio, biomass; FF, fossil fuels; TE, total energy; EL, electricity; CO_2, carbon dioxide emissions; Ind, industrial minerals; TM, total materials; Con, construction minerals).

Source: Ferrão, P., Fernandez, J. E. (2013). Sustainable Urban Metabolism,

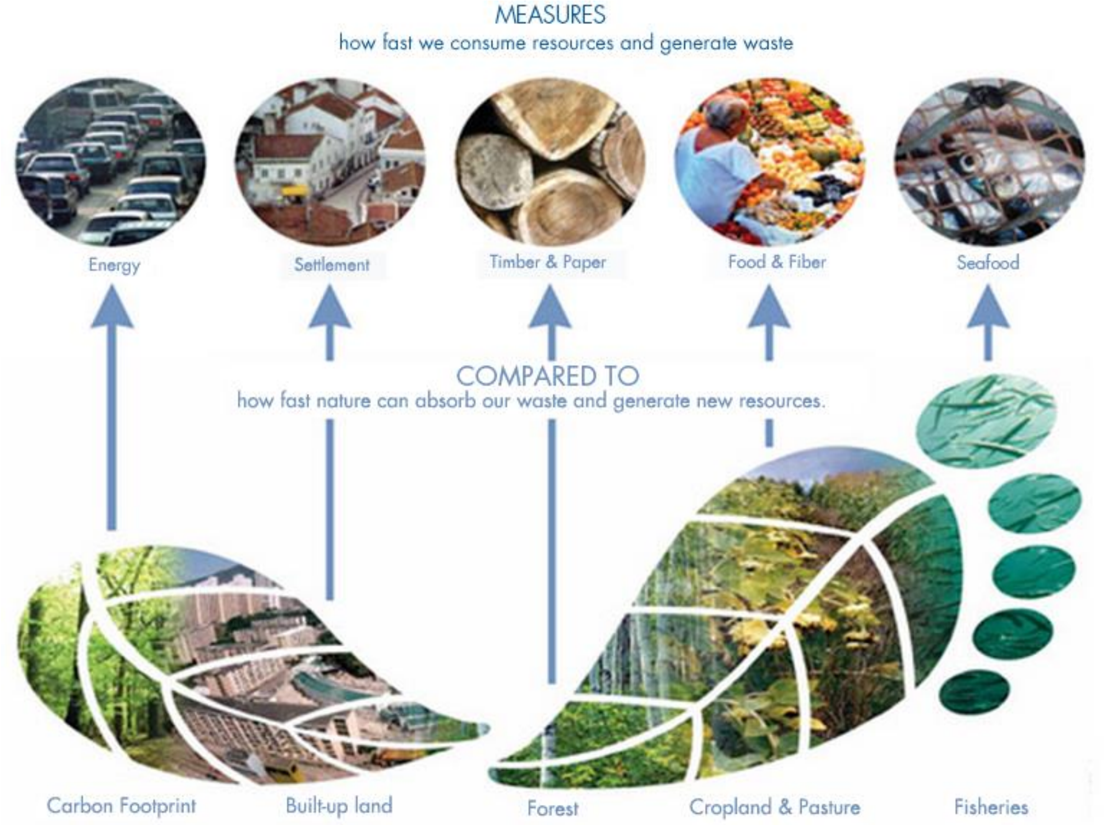
2 other METHODS:

EMERGY is defined as the total amount of solar energy that is used directly and indirectly to make a product or a service (Odum 1996).



Source: Transformity Depiction (Tom Abel)

ECOLOGICAL FOOTPRINT ANALYSIS: Ecological Footprint accounting measures the *demand* on and *supply* of nature(measured in global hectares)
An intuitive tool for planning, decision-making processes and policy-making (Ferrão and Fernandez, 2013)



Source: Global Footprint Network

3 CHALLENGES

DATA a quantitative method

- **MEASURING WHAT?:** Water, Energy, Waste, Goods, Substances linked to key activities (Phosphorus, Nitrogen…?
- **ACCURACY?:** Levels of extrapolation?, Account Balancing?
- **SOURCES?**

LIMITS System and Hinterland

- **DISTRICTS, CITIES, REGIONS?**

GOAL?

What for?

PLANNING?

URBAN METABOLISM:

- A **framework** to study the functioning of cities in a transversal way…

- A **tool** to inform planning…

How can this connection between urban metabolic studies and planning take place?

4 Example: SUSTAINABLE DEVELOPMENT of ROTTERDAM_2014

GOAL: To investigate "urban metabolism" can contribute to the city's sustainable Development

↓

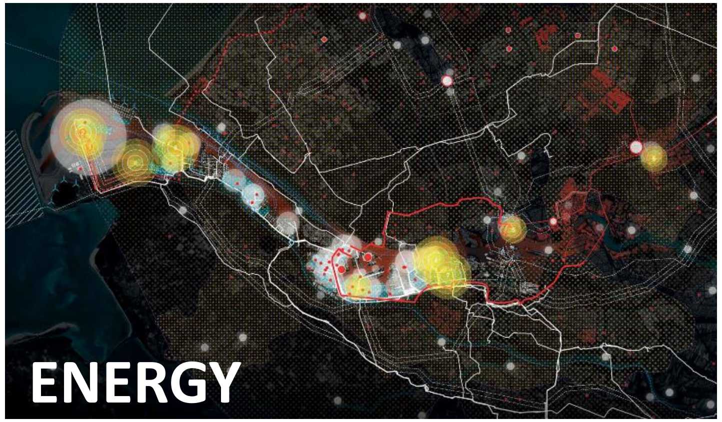
9 FLOWS:

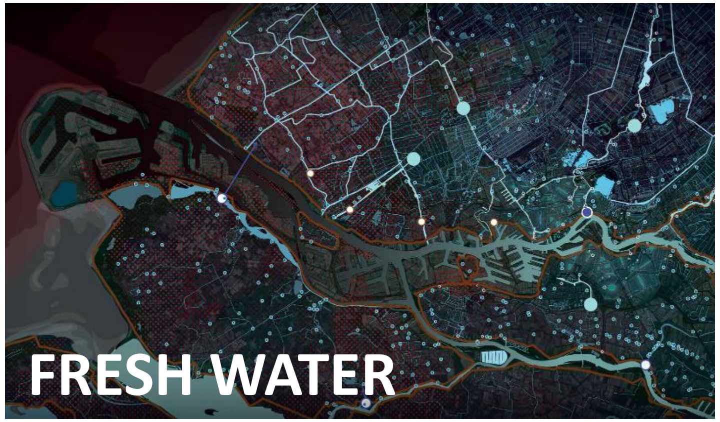
- GOODS, PEOPLE, WASTE, BIOTA, ENERGY, FOOD, FRESH WATER, SAND & CLAY, AIR
- Quantification, Mapping

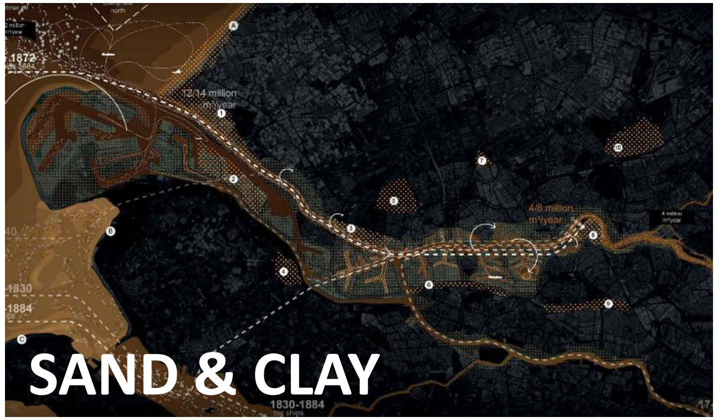
↓

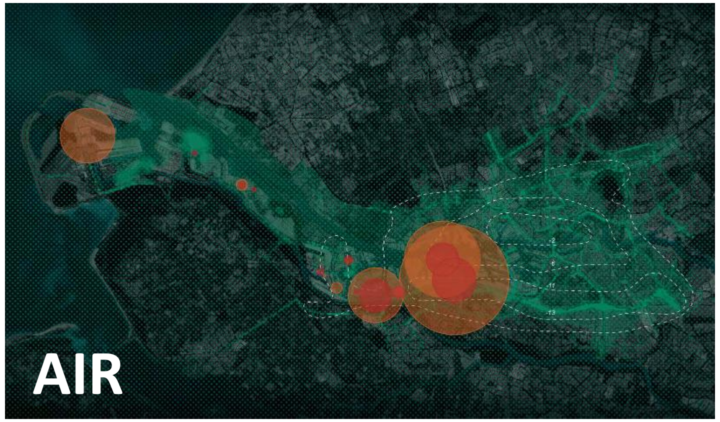
4 STRATEGIES to optimize flows in Rotterdam + **PILOT DESIGNS**

9 FLOWS: - GOODS, PEOPLE, WASTE, BIOTA, ENERGY, FOOD, FRESH WATER, SAND & CLAY, AIR









4 Example: SUSTAINABLE DEVELOPMENT of ROTTERDAM_2014

4 STRATEGIES To optimize flows in Rotterdam **+ PILOT DESIGNS**

1. COLLECTING RESOURCES: Obtaining raw materials from waste and food

2. CREATING BIOTOPES: Improving urban nature by local use of freshwater, sand and clay

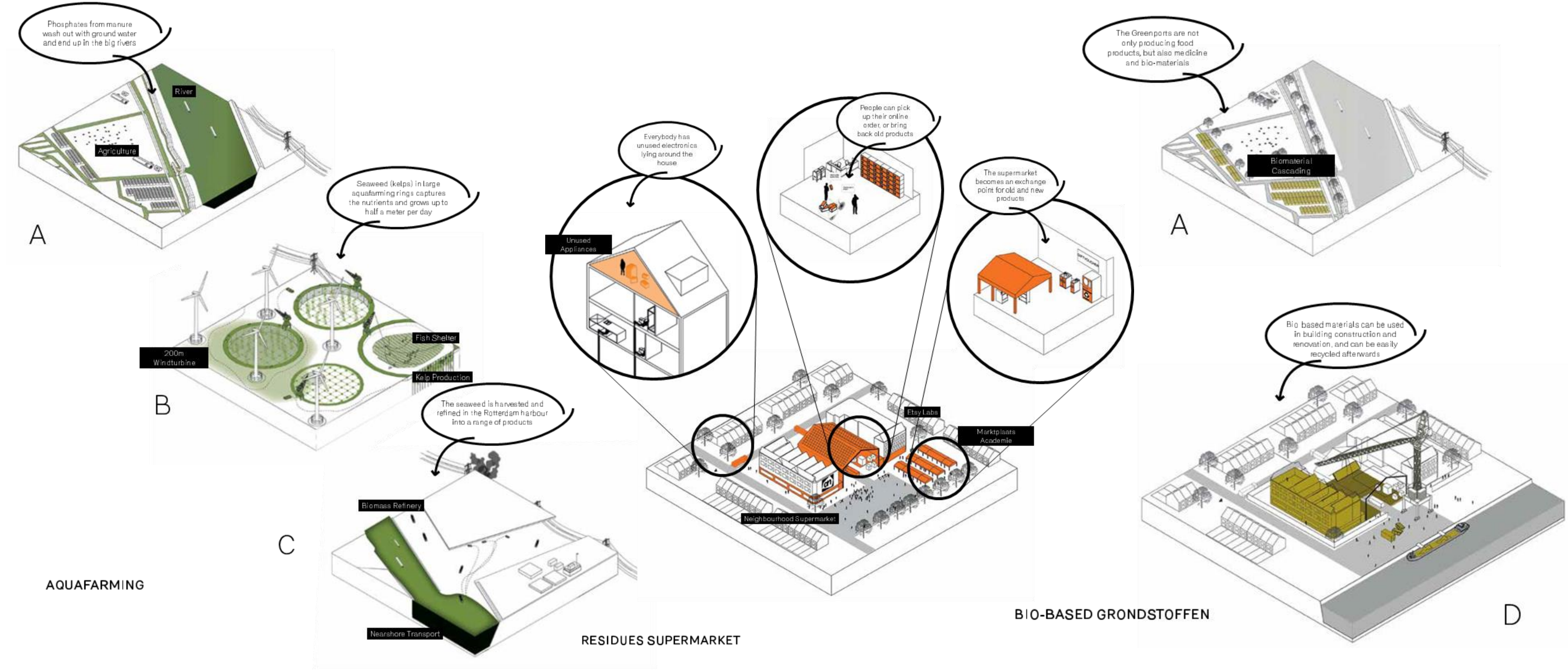
3. CHANNELING (ENERGY) WASTE: The use of by-products of energy extraction

4. CATALYZING RE-INDUSTRIALIZATION: Boosting the quality of flows of goods, people and air

Source: « Sustainable Development of Rotterdam » IABR-FABRIC-JVFO-TNO, 2014

4 STRATEGIES To optimize flows in Rotterdam + PILOT DESIGNS

PILOTS Strategy 1. COLLECTING RESOURCES: Obtaining raw materials from waste and food



Source: « Sustainable Development of Rotterdam » IABR-FABRIC-JVFO-TNO, 2014

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

GOAL: Support Sustainable Regional Planning with metabolic inputs

⇩

4 FLOWS
WATER, WASTE, ENERGY, PEOPLE

ECOLOGICAL FOOTPRINT ANALYSIS
DIFFERENT USER PROFILES

⇩

REGIONAL STRATEGIES (5 SPECIFIC FOR METABOLISMS)

⇩

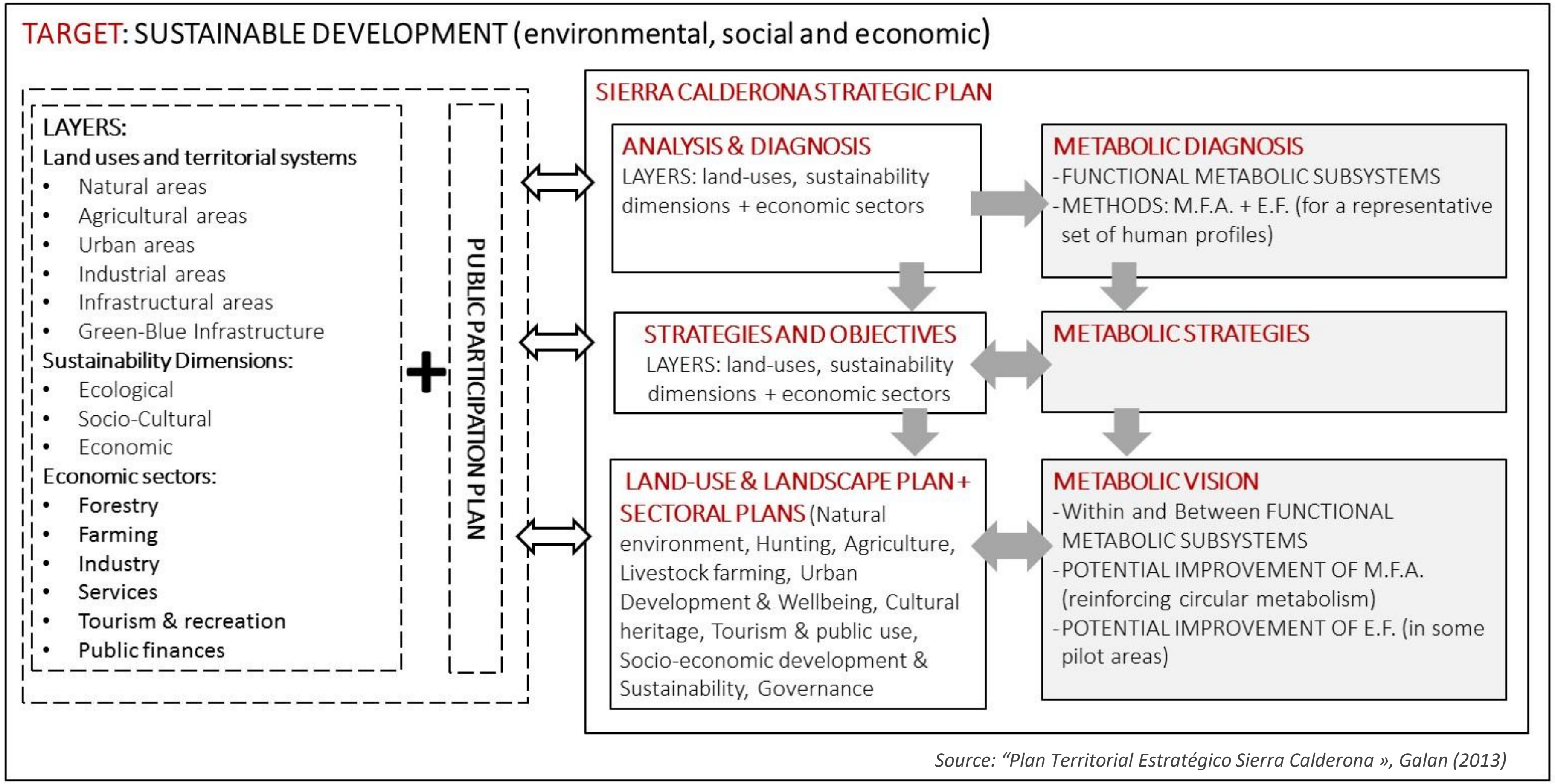
A VISION: A REGIONAL METABOLIC MODEL CURRENT & FUTURE

⇩

TOOLS: LAND-USE PLAN + SECTORAL PLANS + PILOT PROJECTS

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

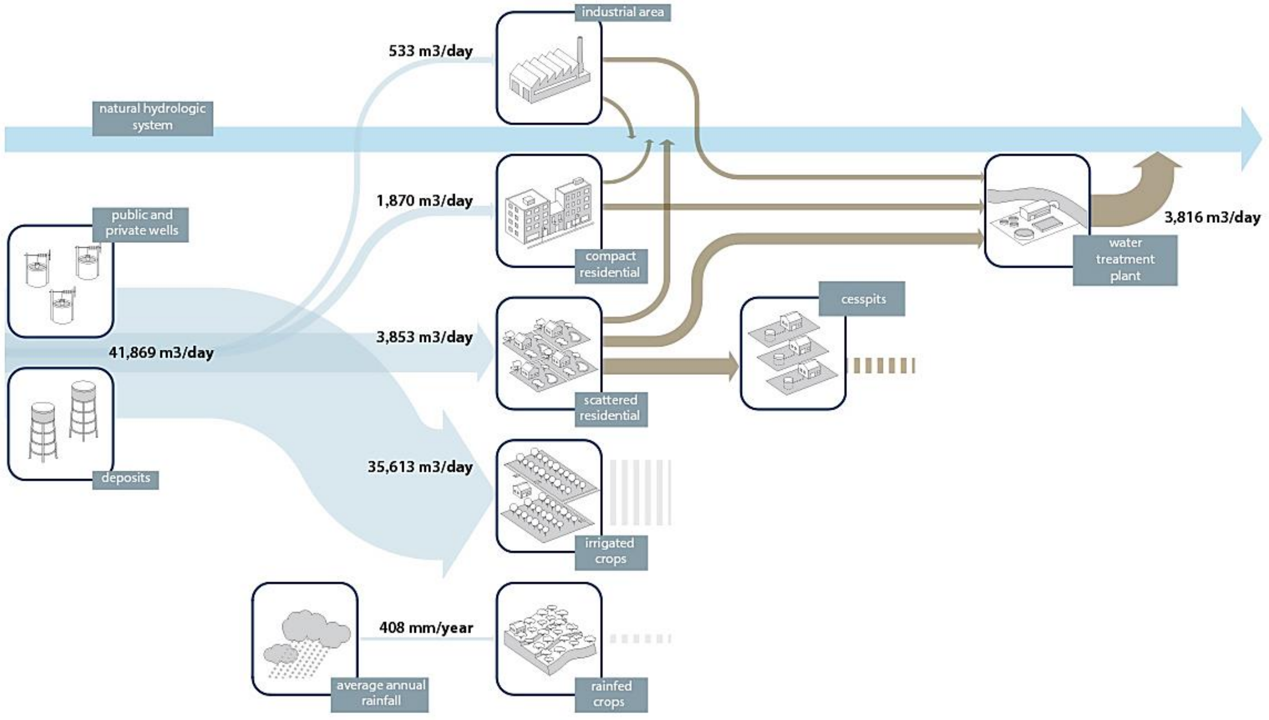
GOAL: Support and Inform Sustainable Regional Planning with metabolic inputs



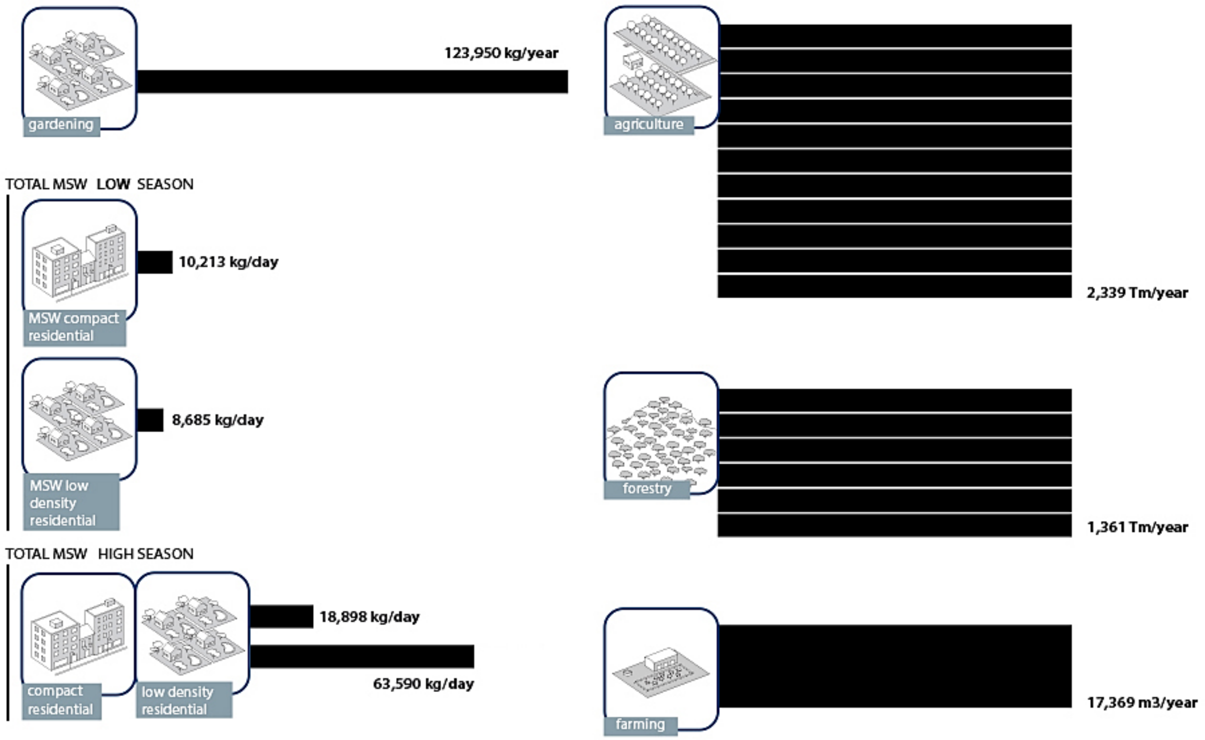
4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

CURRENT FLOWS: WATER, WASTE, ENERGY, PEOPLE

WATER



WASTE



Source: "Plan Territorial Estratégico Sierra Calderona», Galan (2013)

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

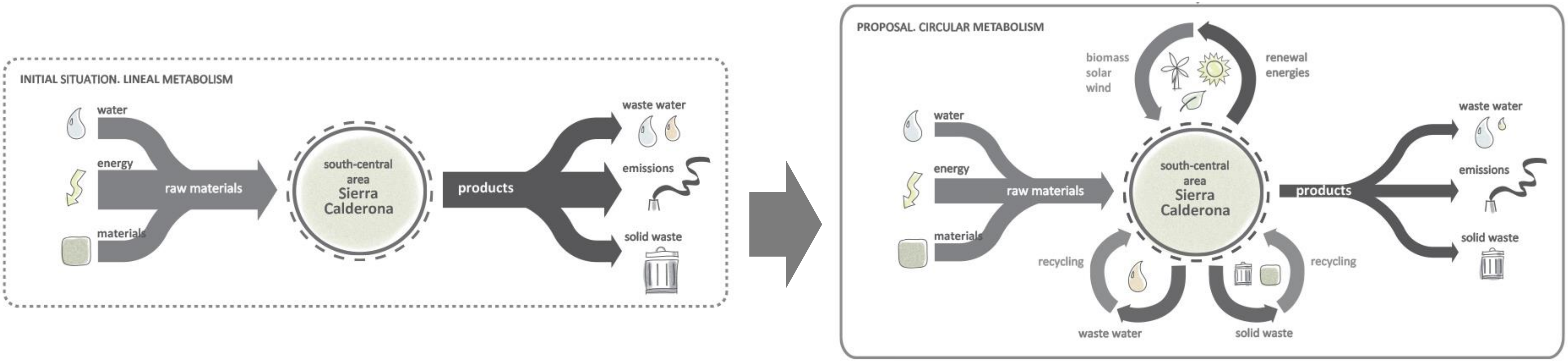
CURRENT ECOLOGICAL FOOTPRINTS

	CARBON FOOTPRINT	FOOD FOOTPRINT	LODGING FOOTPRINT	SERVICES FOOTPRINT	TOTAL FOOTPRINT	NUMBER OF EARTHS
AVERAGE AREA STRATEGIC PLAN	11.68	17.19	4.79	9.75	43.4	2.76
Person living in a compact town and working in a nearby industrial estate	4.9	16.5	3.6	7.5	32.62	2.08
Housewife living in a compact town	5.7	14.9	3.6	7.5	31.75	2.02
Person living in housing estate working in the city of Valencia	17.1	19.5	4.5	10.6	51.73	3.29
Part-time farmer living in a compact town and working in the local service sector	5.7	16.5	6.1	12.7	40.92	2.6
Retired person living in a compact town	4.9	12.4	3.2	6.6	27.03	1.72
Retired person living in a low-density housing estate	15.2	17	6.5	9.1	47.73	3.04
Children living in a compact town	5.7	16.5	2.4	11.6	36.22	2.31
Children living in a low-density housing estate	17.4	19.5	7.4	12	56.24	3.58
Young person studying at a university in the city of Valencia and living in a compact town or low density housing estate	9	16.5	3.6	7.5	36.59	2.33
Seasonal resident (summer)	22.8	19.5	6.5	12	60.82	3.87
Person working in the military camp	20.1	20.3	5.3	10.1	55.78	3.55
NATIONAL AVERAGE	12.9	14.9	4.8	9.4	42	2.5

Source: "Plan Territorial Estratégico Sierra Calderona », Galan (2013)

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

REGIONAL STRATEGIES (5 SPECIFIC FOR METABOLISMS)

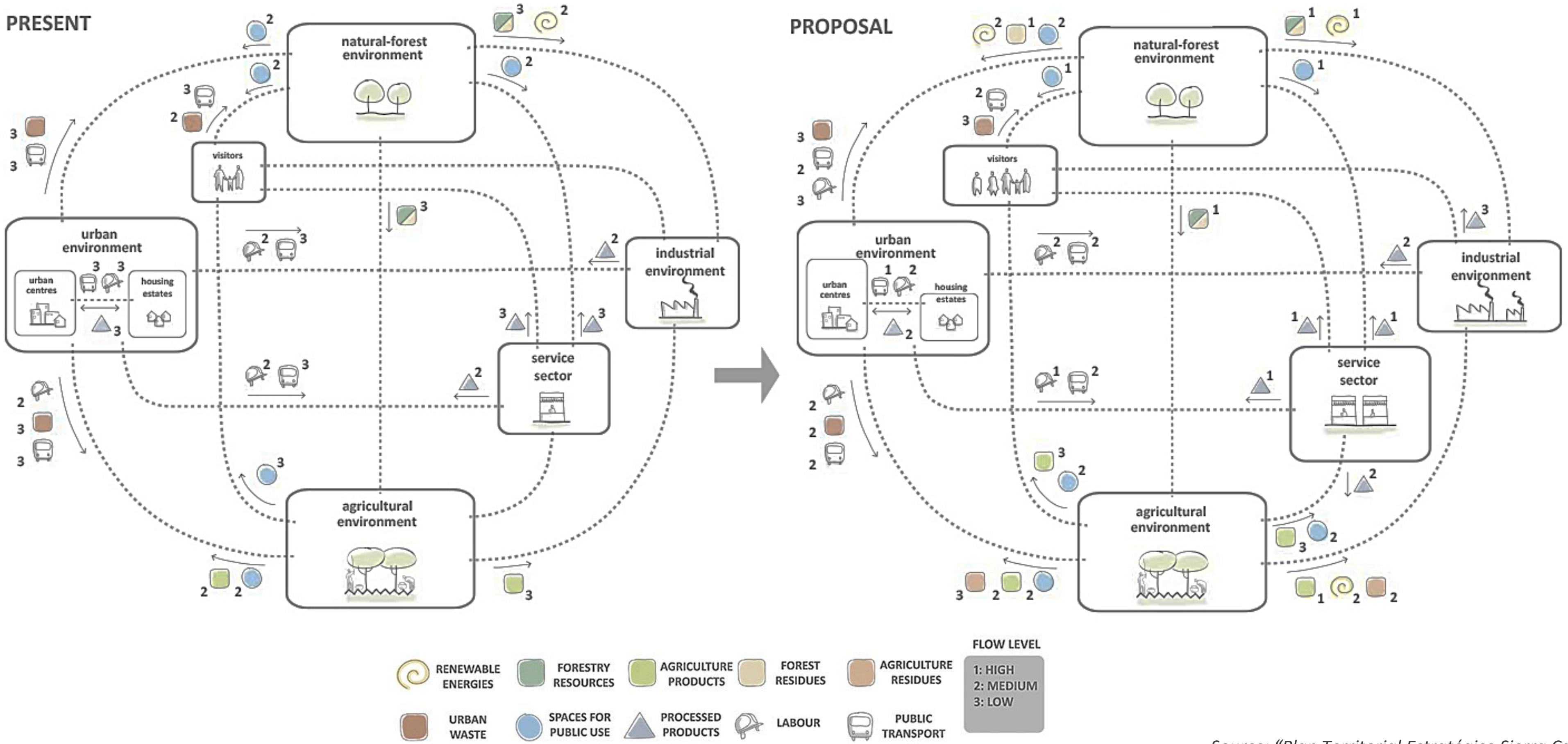


SUSTAINABLE TRANSITION
TOOLS FOR THAT?

Source: "Plan Territorial Estratégico Sierra Calderona », Galan (2013)
Adapted from Cities for a small planet", Richard Rogers, Faber & Faber, 1997

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

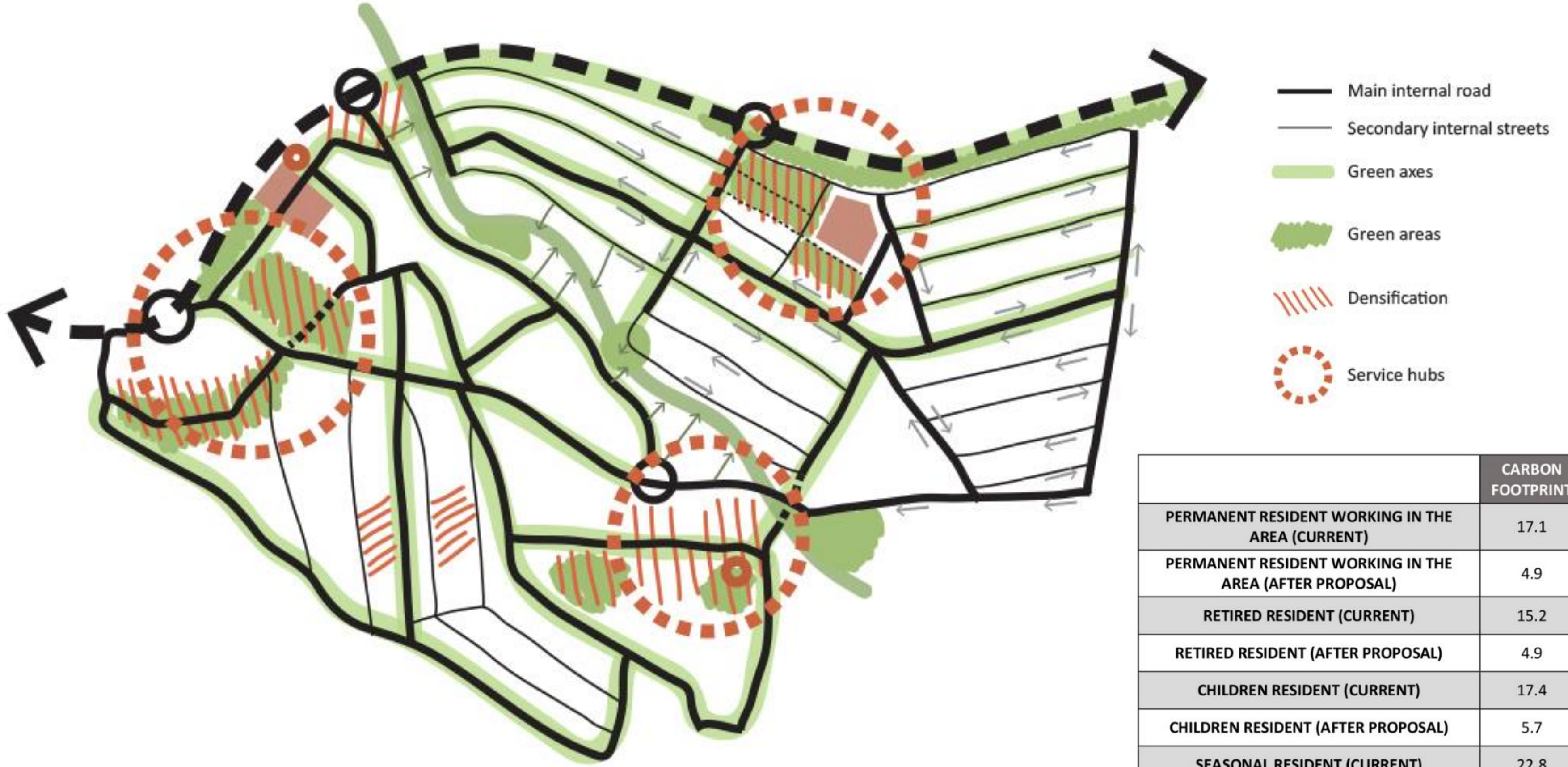
A VISION: A REGIONAL METABOLIC MODEL: CURRENT & FUTURE



Source: "Plan Territorial Estratégico Sierra Calderona », Galan (2013)

4 Example: THE SIERRA CALDERONA STRATEGIC PLAN (Galan, 2013)

TOOLS: LAND-USE PLAN + SECTORAL PLANS + PILOT PROJECTS



	CARBON FOOTPRINT	FOOD FOOTPRINT	LODGING FOOTPRINT	SERVICES FOOTPRINT	TOTAL FOOTPRINT	Number of Earths
PERMANENT RESIDENT WORKING IN THE AREA (CURRENT)	17.1	19.5	4.5	10.6	51.7	3.29
PERMANENT RESIDENT WORKING IN THE AREA (AFTER PROPOSAL)	4.9	16.5	4	7.5	32.9	2.09
RETIRED RESIDENT (CURRENT)	15.2	17	3.2	6.6	42	2.67
RETIRED RESIDENT (AFTER PROPOSAL)	4.9	12.4	4.5	9.1	30.9	1.97
CHILDREN RESIDENT (CURRENT)	17.4	19.5	7.4	12	56.3	3.58
CHILDREN RESIDENT (AFTER PROPOSAL)	5.7	16.5	3.4	11.6	27.2	2.37
SEASONAL RESIDENT (CURRENT)	22.8	19.5	6.5	12	60.8	3.87
SEASONAL RESIDENT (AFTER PROPOSAL)	7.5	16.5	3.2	11.6	38.8	2.47

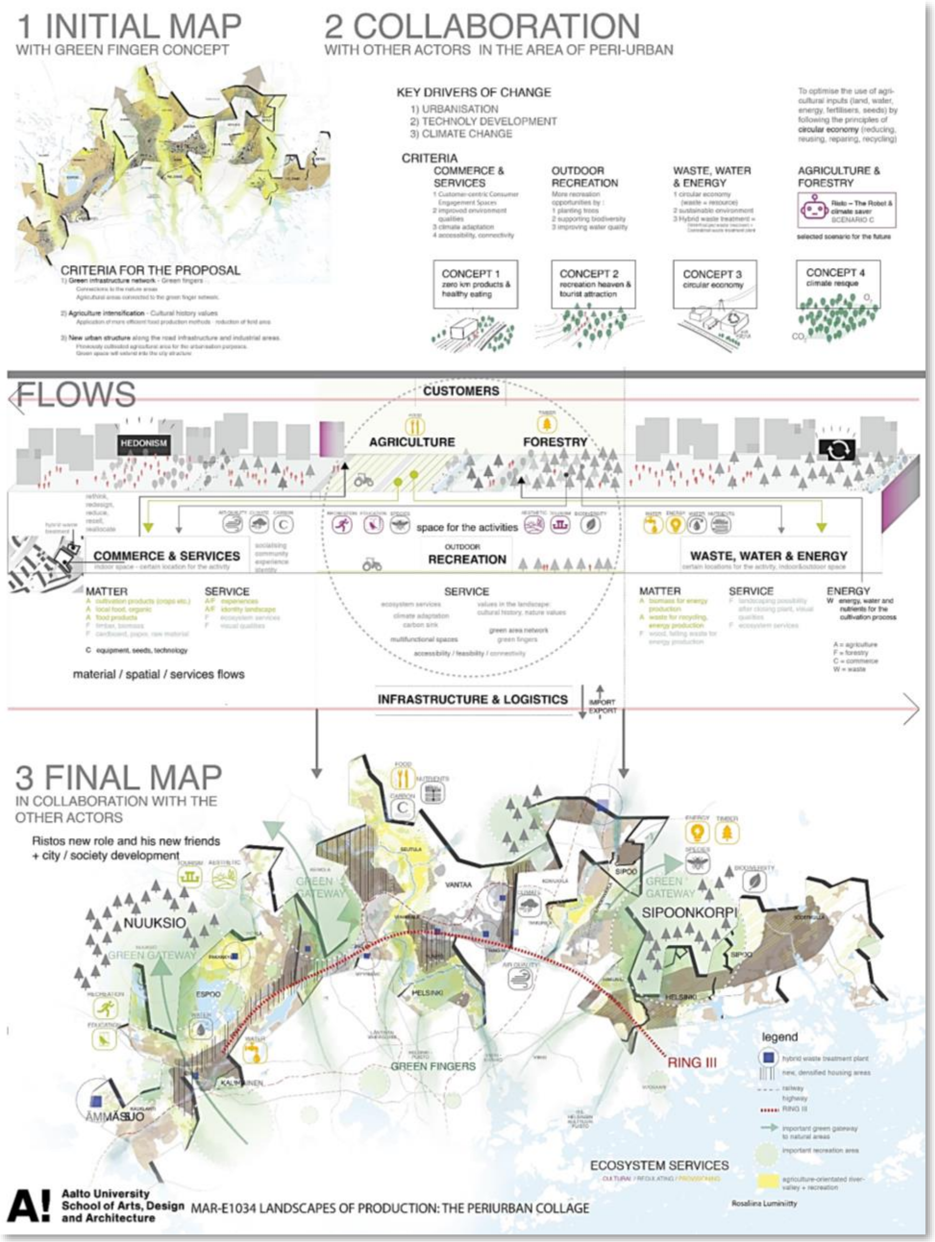
Source: "Plan Territorial Estratégico Sierra Calderona », Galan (2013)

4c. Some examples

LANDSCAPES OF PRODUCTION

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS
(11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

STUDIO COURSE: ‘LANDSCAPES OF PRODUCTION’ (Aalto University, 2019, Teacher: Juanjo Galán)

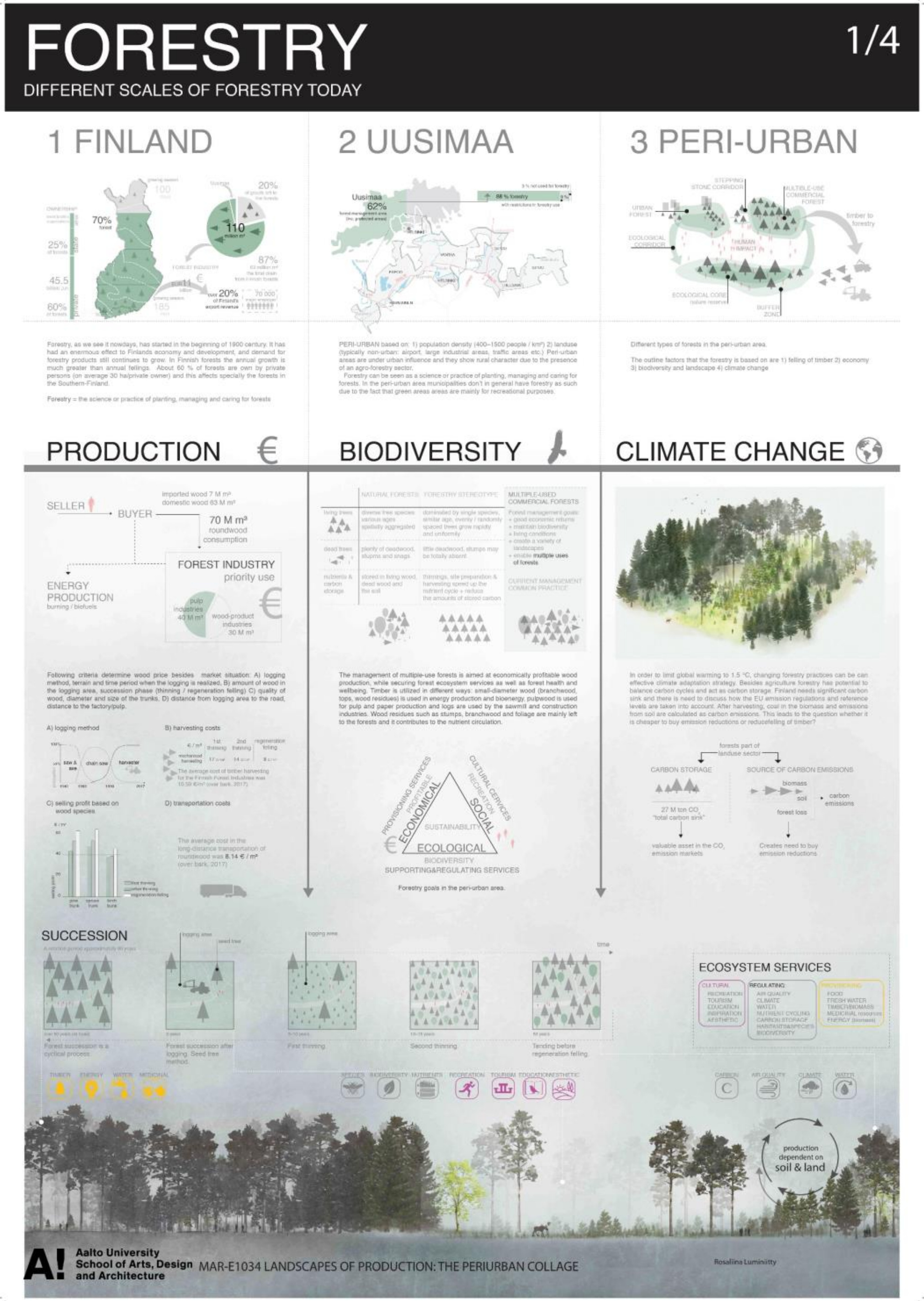


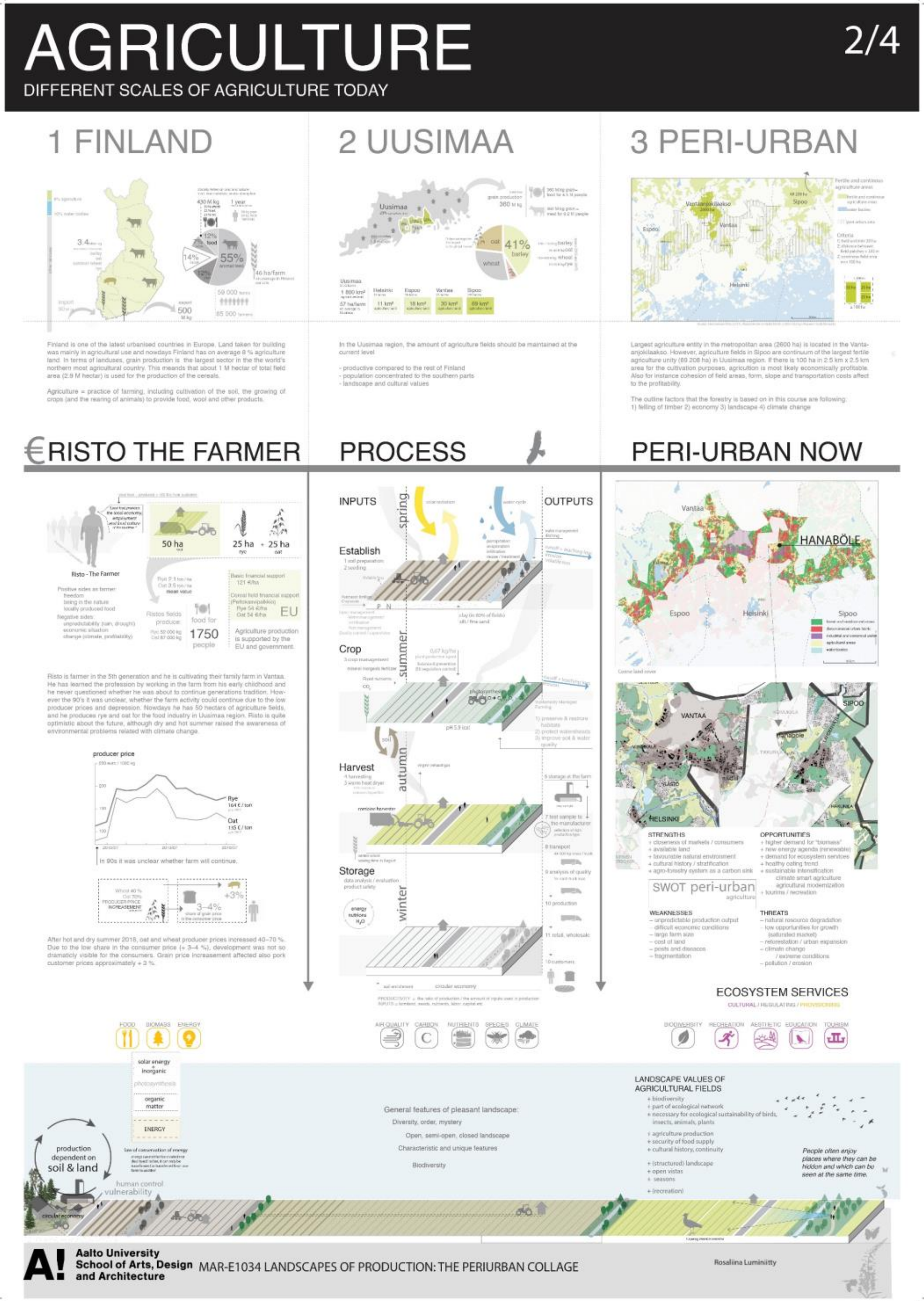
STAFF TRAINING SEMINAR TELOS project
(Rome, Italy, 11-13 July 2022)

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS
(11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

STUDIO COURSE: 'LANDSCAPES OF PRODUCTION' (Aalto University, 2018)

Student: Rosaliina Luminiitty
Teacher: Juanjo Galán)



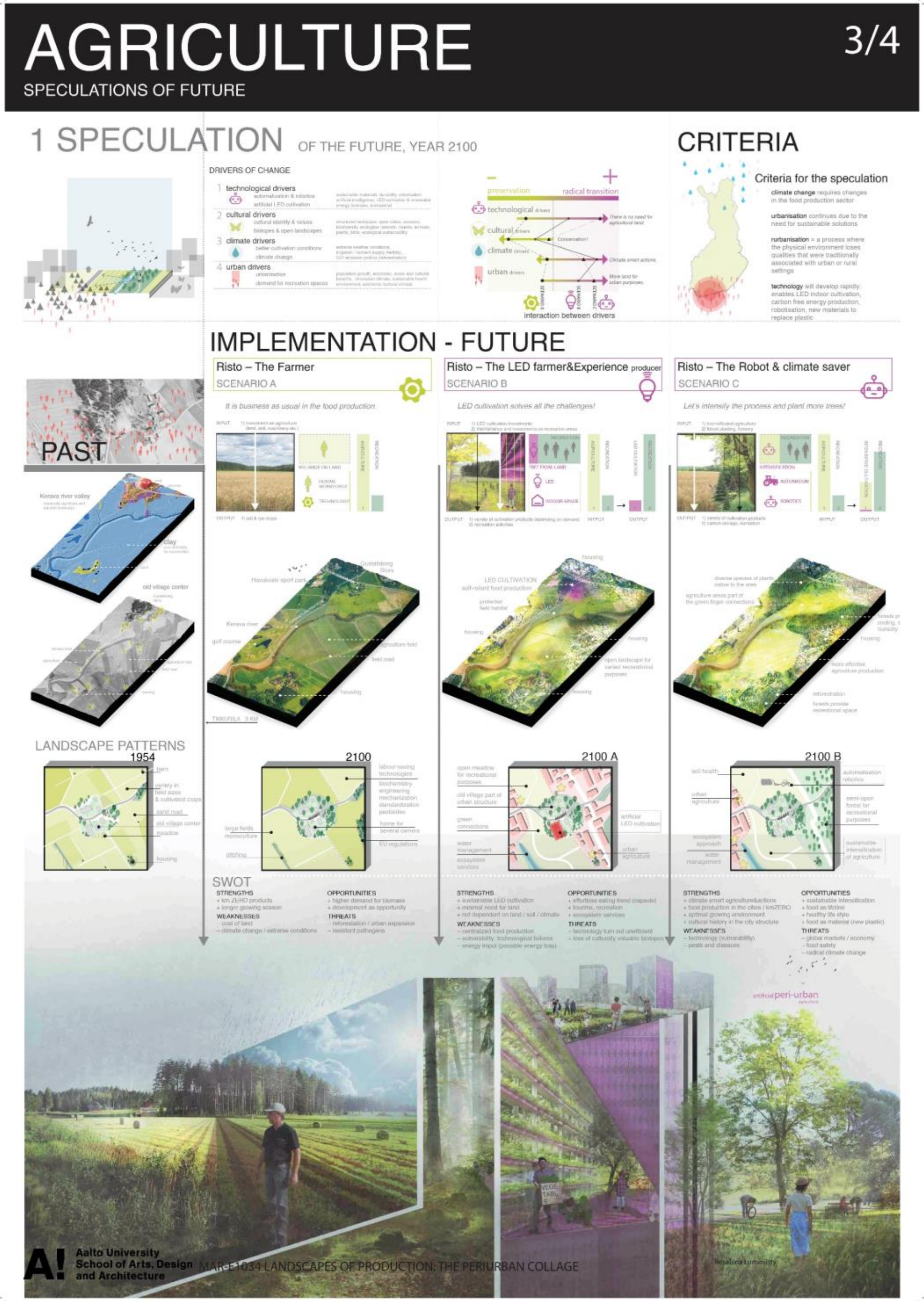


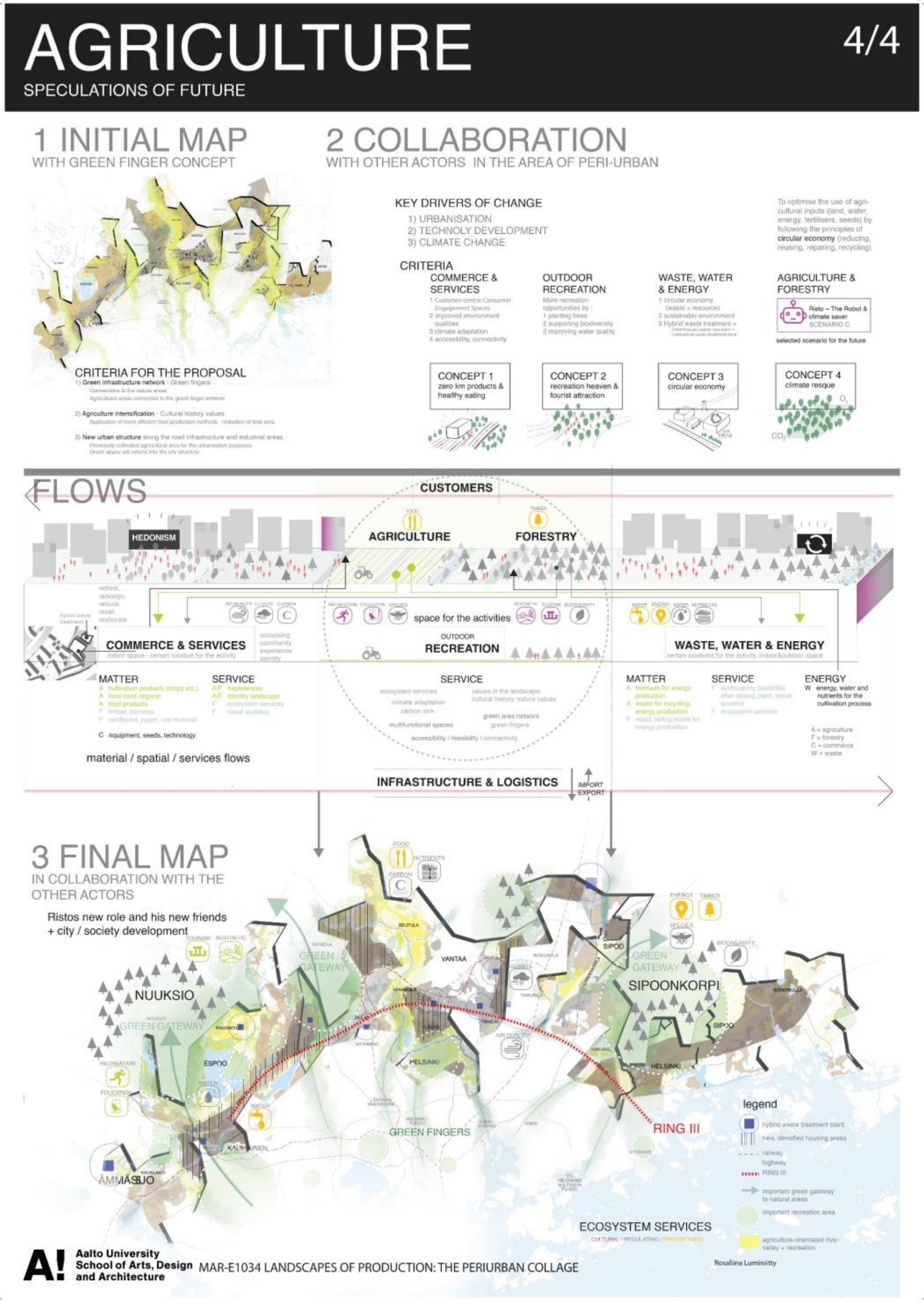
STAFF TRAINING SEMINAR TELOS project
(Rome, Italy, 11-13 July 2022)

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS (11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

STUDIO COURSE: 'LANDSCAPES OF PRODUCTION' (Aalto University, 2018)

Student: Rosaliina Luminiitty
Teacher: Juanjo Galán)





STAFF TRAINING SEMINAR TELOS project
(Rome, Italy, 11-13 July 2022)

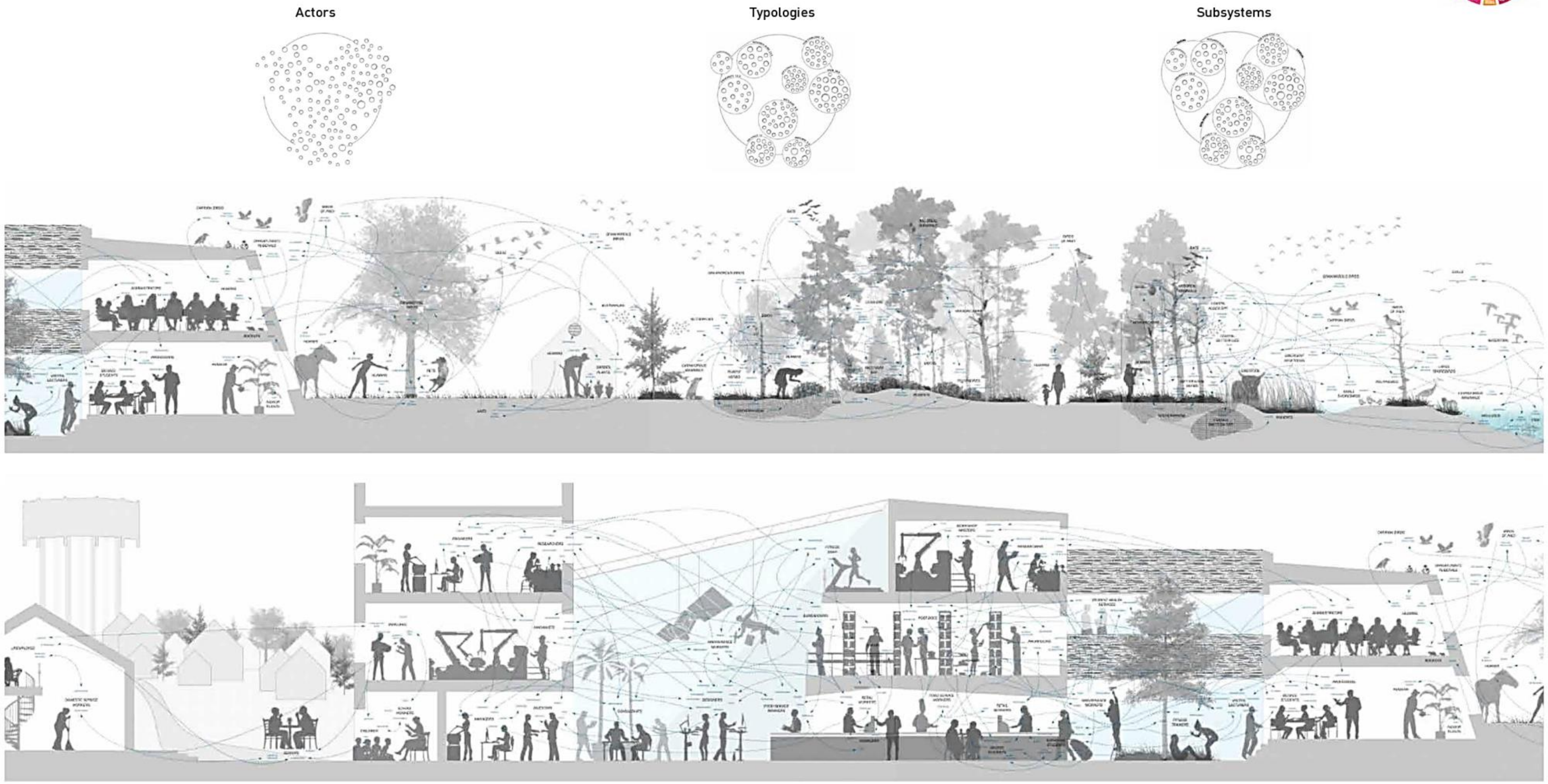
4d. Some examples

LANDSCAPE PLANNING AND ECOLOGY

STUDIO COURSE: 'LANDSCAPE PLANNING AND ECOLOGY' (Aalto University, 2019)

StudentS: Allan Delesantro, Elka Lupunen and Kati Efraimsson
Teacher: Juanjo Galán)

Otaniemi: Embracing Complexity



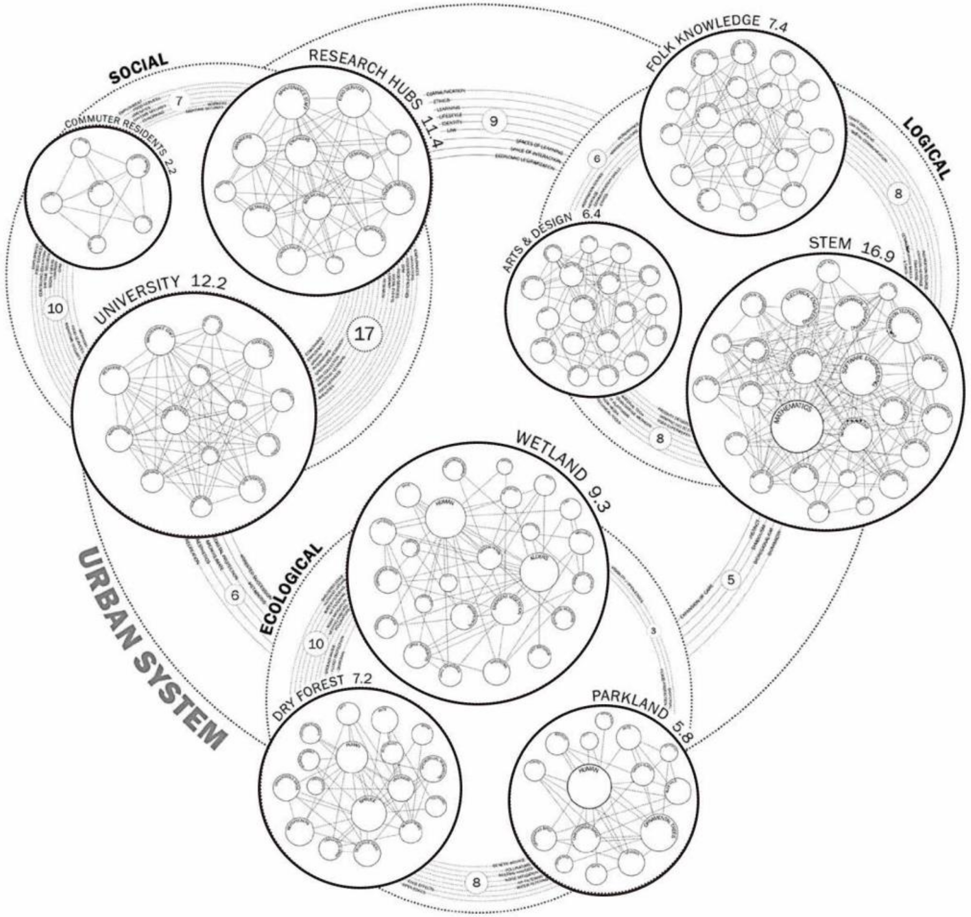
Country / City	Finland, Helsinki
University / School	Aalto University - School of Arts, Design and Architecture
Academic year	2019-2020
Title of the project	Otaniemi: Embracing Complexity
Authors	Allan Delesantro, Elka Lupunen, Kati Efraimsson

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS
(11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

STUDIO COURSE: 'LANDSCAPE PLANNING AND ECOLOGY' (Aalto University, 2019)

StudentS: Allan Delesantro, Elka Lupunen and Kati Efraimsson
Teacher: Juanjo Galán)

Measuring & Mapping Complexity



Complexity value of a patch = 1. (actor connectivity score x patch size) + 2. (typology connectivity score x perimeter) + 3. (subsystem connectivity score x adjacencies)

Connectivity Scores & Spatial Modifiers

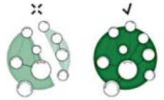
Actor Connections

Actor connections occur internal to each typology. We have identified connections in which one or both actors have a benefit. Fot the purpose of our value system we ignore negative connections, like parasitism, predation or herb ivory to focus on those connections which contribute the most to resilience.

Actor Connectivity Scores

Actor connectivity scores are the sum off all connections found within a typology. A one-way connection receives a score of 0.1 points. A mutual connectios receives a score of 0.2 points.

→ **Patch Size**



In the mapping of complexity values, actor connectiity scores are weighed by the size of the patch in which they occur. This takes into account the importance of large and contininuous patches that allow all these actors to come into contact and thus actualize these connections. While these connections are still possible between fragmented patches, they are made more diff icult and fewer. Thus our scoring process generalizes that they are weaker because of this fragmenation.

Typology Connections

Typyology connections occur when one typology within a subsystem offers or receives a benefit from another system. These are different than actor connections because they are created and transmitted not by individual actors, but by the functioning of assembly as a whole unit.

Typology Connectivity Scores

Each pair of typologies receives a connectivity score based on the number of connections between them. Each connection is worth 1 point.

→ **Edge Effects**

In the mapping of complexity values, typology connectivity scores are weighted by the length of the perimeter where the two typologies are in contact. This takes into account that direct contact allows the two typologies to participate in their connections more readily and promotes successful interactions of actors internal to those typologies.

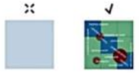
Subsystem Connections

Sybsystem connections occur when the functioning of an entire subsystem, consisting of all three typologies contributes a benefit it or service to another subsystem. These require translations between different realms of the material, social and cognitive and are thus often abstract.

Subsystem Connectivity Scores

Each pair of subsystems receives a connectiviy score based on the number of connections between them. Each connection is worth 1 point.

→ **Mosaics**

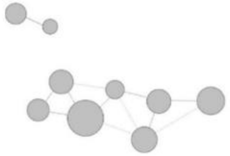


In the mapping of complexity values, subsystem connectivity scores are weighted by the number of patches from other systems that the core patch comes in contact with. This takes into account the value of heterogeous patterns of land-use allowing more complexity and exchange of connections across systems.

Hypotheses

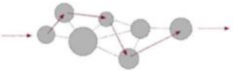
Complexity

Connections are mutual interactions between actors.



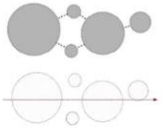
Resilience

Complexity leads to resilience through redundant connections.



A problem of valuing

Capitalist valuing leeds to reduced complexity.



STAFF TRAINING SEMINAR
TELOS project
(Rome, Italy, 11-13 July 2022)

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS
(11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

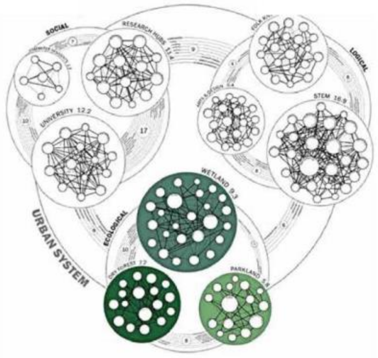
STUDIO COURSE: 'LANDSCAPE PLANNING AND ECOLOGY' (Aalto University, 2019)

StudentS: Allan Delesantro, Elka Lupunen and Kati Efraimsson
Teacher: Juanjo Galán)

Envisioning New Connections

1 (actor connectivity score x patch size)	1+ 2 (typology connectivity score x perimeter)	1 + 2+ 3 (subsystem connectivity score x adjacencies) (subsystem connectivity score x adjacencies)

Ecological Subsystem



Diagnosis

Complexity performance is weak throughout the campus areas. Parkland benefit from adjacency to large forests. Forest suffer greatly due to fragmentation. Wetlands and forest produce a strong combination.

Spatial improvements

Forest network | Unified green campus | Wetland restoration

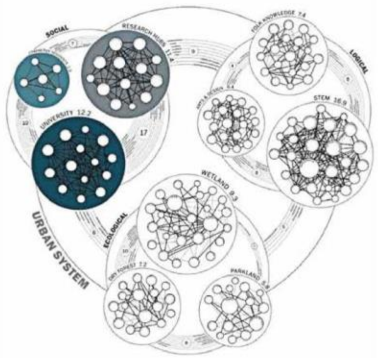
Connectivity Score improvements

Dry meadow herbs
Pest management
Stormwater management
Cervids

Garden plants
Understory management
Spawning grounds
Water filtering

Bees
Psammophytes
Ecology as a study
Livestock

Social Subsystem



Diagnosis

Complexity performance is strongest in the large campus core which combines university and research typologies and benefits from adjacency to forest ecotopes. Fragmentation and segregation of research and university patches on the edges of Otaniemi causes weak scores.

Spatial improvements

Unified campus | Mixed housing | University expansion

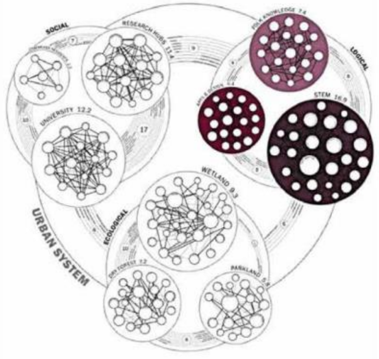
Connectivity Score improvements

Produce
Food workers
Prototyping
In-situ manufacturers

Resident scholars
Informal transit
Nature-based learning
Participatory research

Entertainers
Nightlife
Co-working
Crafts people

Logical Subsystem



Diagnosis

Complexity performance is strongest where all three logotopes interact since they have relatively equal typology connectivity scores. The high strength of STEM atitivies is increased by their spatial concentrations.

Spatial improvements

Expanded research | Arts on Tech campus | Residence hall workshops

Connectivity Score improvements

Practice-based design methods
Culinary Arts
Designed experiments
Oceanography
Rune singing
Storytelling

Agricultural science
Cultivation knowledge
Living Arts
Partarticipatory-based design methods
Diffuse production
Food science

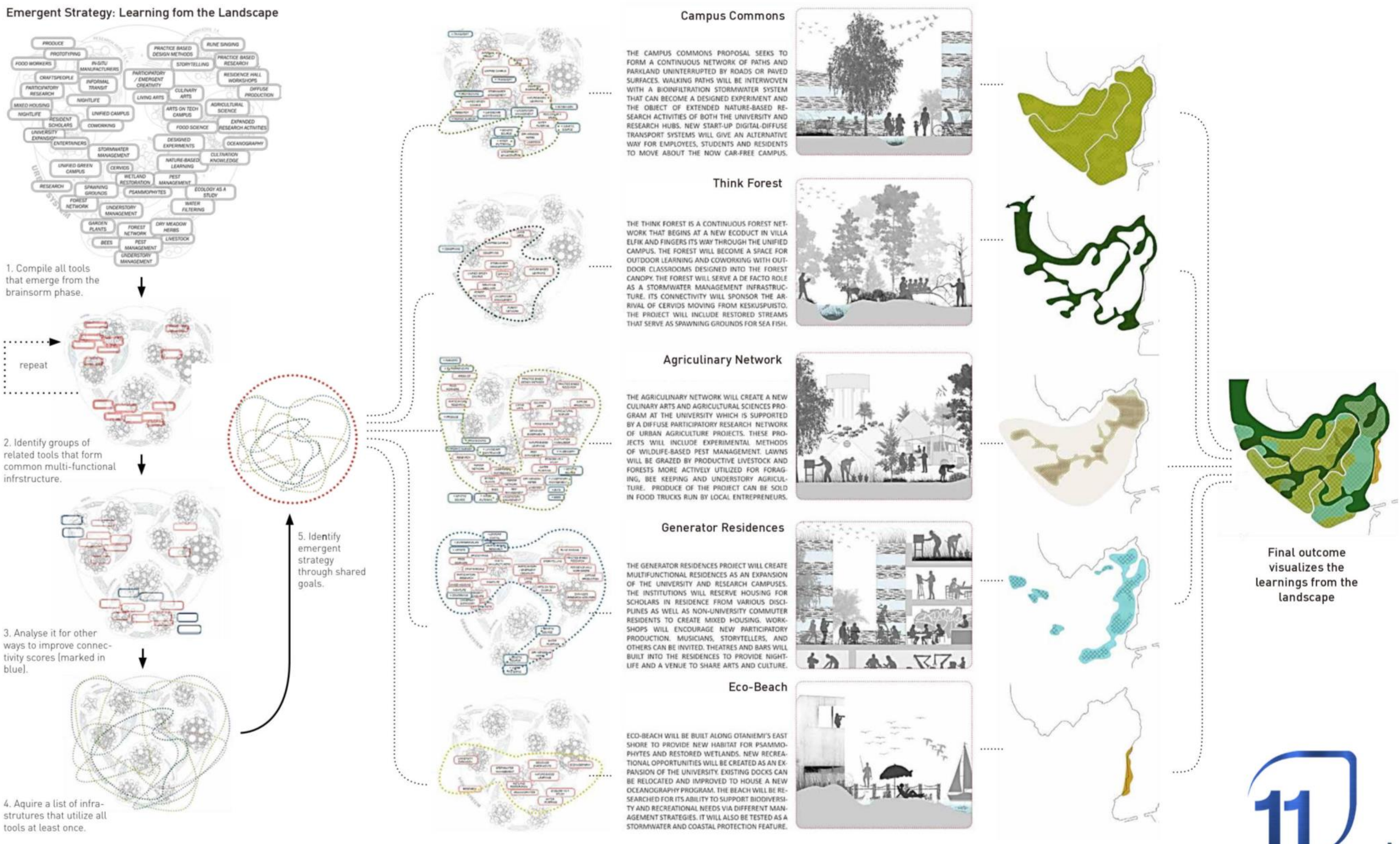
STAFF TRAINING SEMINAR
TELOS project
(Rome, Italy, 11-13 July 2022)

VISUALIZING LANDSCAPE SYSTEM RELATIONSHIPS
(11.07.2022, Juanjo Galan Vivas, Polytechnic University of Valencia)

STUDIO COURSE: 'LANDSCAPE PLANNING AND ECOLOGY' (Aalto University, 2019)

StudentS: Allan Delesantro, Elka Lupunen and Kati Efraimsson
Teacher: Juanjo Galán)

New Strategy for improving Complexity



Thanks!

(Juanjo Galan Vivas, juagavi@urb.upv.es)