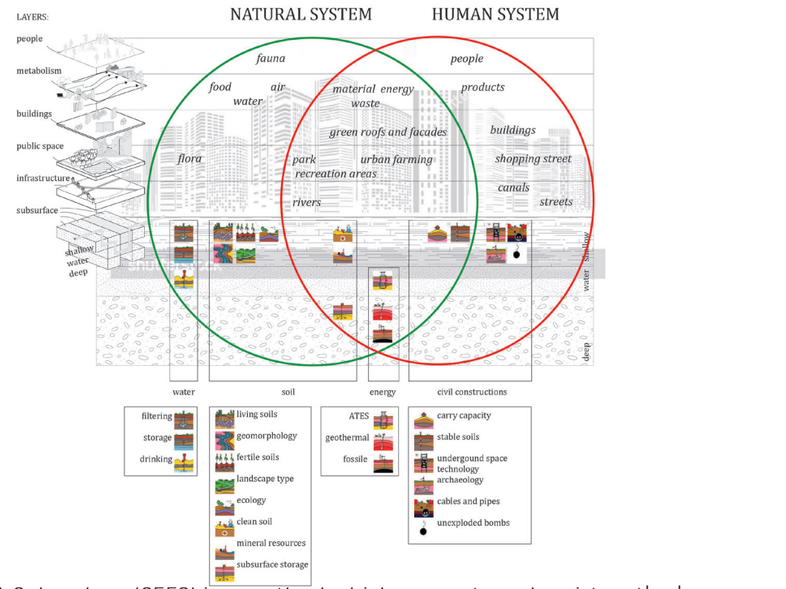
	information	specialists
	Subsurface qualities	Maps
Civil Construction	A Cultural historical importance and archaeology	A Archaeology en cultural historical maps
	B Unexploded ordnance (UXO)	B UXO map
	C Underground structures /foundations (see E)	C (see E)
	D Cables and pipes	D Cables and pipes: sewerage, electricity, cable television, district heating, gas, telephone, drinking water.
	E Basis for building activities / stable ground	E Available geotechnical information, overview required filling and cables and pipes, expected settings cables and pipes, expected settings, dry building excavation, depth foundations, risks wooden foundations, subsurface objects, height ground level, actual height and difference between actual height and distribution of ground level .
Water	Water filtering soil	Average hydraulic head
	Water storing soil	Seepage and infiltration
	Resource drinking-water	Hydraulic conductivity
		Soil structure / aquifers
Energy	Aquifer Thermal Energy Storage (ATES)	ATES potential map
	Geothermal energy	Geothermal potential map
	Resource fossil energy	Potential map recoverable fossil energy
Soil	Healthy and clean soil	Soil quality map
	Resource minerals	Extractable minerals
	Crop capacity	Crop capacity map
	Living soil	Geological values
	Geomorphology / diversity landscape	Historical information
	Ecological diversity	Ecological map
	Storage of materials	Potential subsurface storage map

Linda Maring Deltares @ linda.maring@deltares.nl
Fransje Hooimeijer TUD @ f.l.hooimeijer@tudelft.nl

project site: https://publicwiki.deltares.nl/display/SEES/HOME+English

SYSTEM EXPLORATION ENVIRONMENT & SUBSURFACE



What is it?

The System Exploration Environment & Subsurface (SEES) is a method which supports and registers the knowledge exchange between experts of different fields. The method gives an overview of the urban system: it relates the “above ground” layers of people, cycles, buildings, public spaces and infrastructure to “subsurface qualities” divided in four themes: civil constructions, water, energy and soil. The method is related to the Japanese LEAN thinking, that by focussing on quality direct communication, and making and keeping clear appointments and therefore not on impossibilities, avoids mistakes. This System Exploration Environment & Subsurface enables smarter producing if it is performed in an early stage of a development process.

What is this SEES for?

The System Exploration Environment & Subsurface is meant to be used in project teams, working on urban development. It guides the dialogue between the representatives of the technical and natural boundary conditions and the aboveground specialists that represent the social-economic requirements. It offers a systematic overview that enables the consultation of all necessary specialists and fields and gives to opportunity to search for clever connections. Because the subsurface is taken into account, (see backside of this folder) and gathering and discussing all information in a systematic way in the planning process, it is possible to make smarter urban designs. Smarter urban designs lead to more climate proof, (think about the water issue), to energy-saving (soil energy), more sustainable (the identification of cycles) and to cheaper (earlier identification of benefits, problems and costs) designs.

What do you need?

1. Large print of the System Exploration Environment & Subsurface (see inside folder)
2. Good panel chairman (m/f) who keep track of the time and asks questions
3. The stakeholders of all layers (urban designer, project leader, landscape architect, traffic expert, housing corporation, plan economist, archaeologist, cable and pipe expert, water-, energy-, soil experts etc.)
4. Information of the stakeholders/ specialists (see backside of the folder) for the project area.

How to perform the SEES?

The steps :

1

The panel chairman gives an introduction of the SEES
(10 minutes)

2

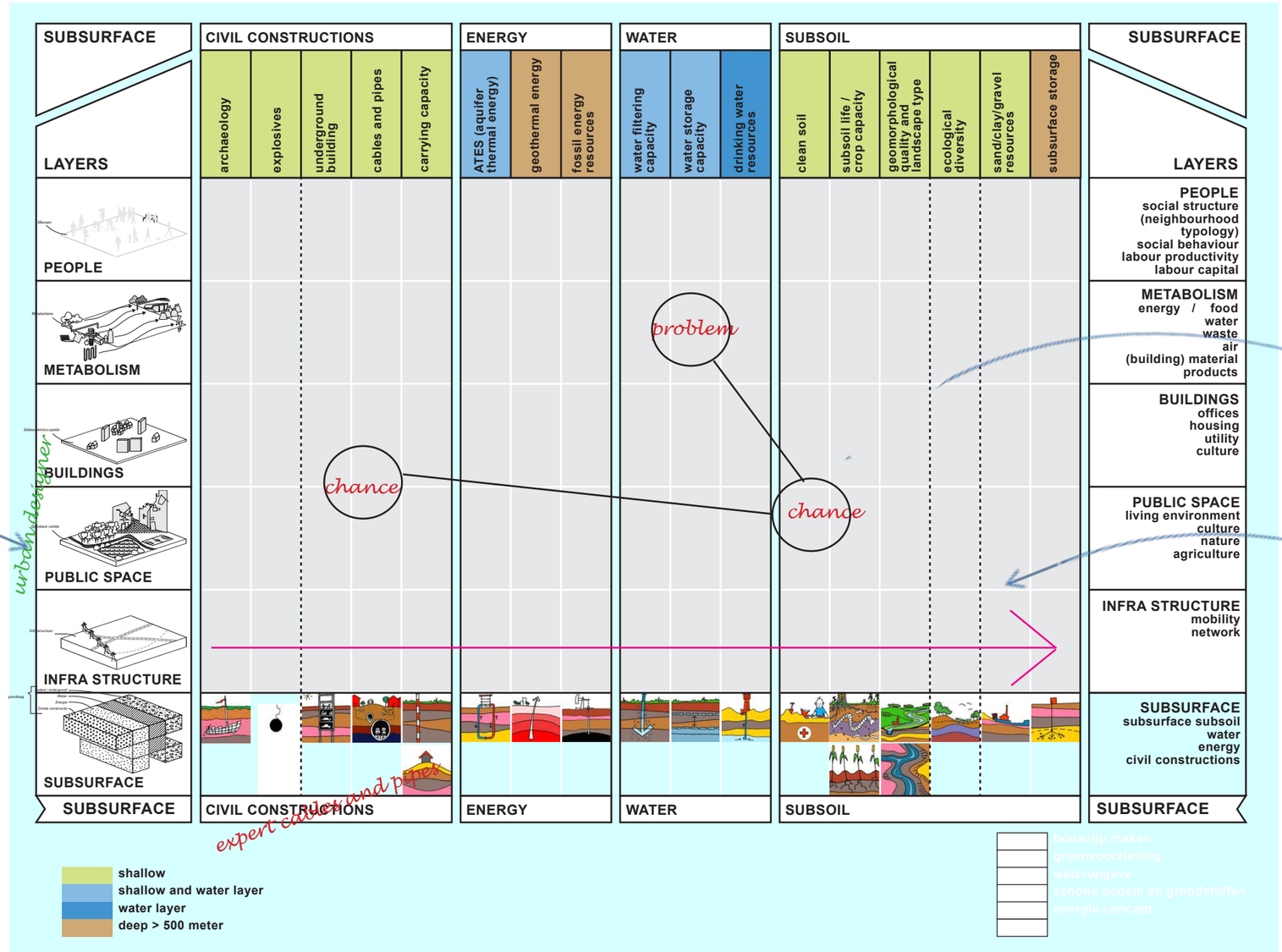
Each participant introduces him- or herself and locates indicates his/her domain in the system (15 minutes)

3

Give an explanation about the characteristics of the area, the social-economic ambitions and the plans
(15 minutes)

4

Go through the natural and technical boundary conditions in a systematic way with (per theme):



5

Start a conversation about the chances, obstacles, points of attention and requirements boundary conditions.

6

Make connections: enter the headlines in the system exploration

7

When all subsurface qualities are discussed, they can be evaluated per aboveground layer.

Civil construction: Archaeologist, specialists on explosives (when expected), cables and pipes and geotechnical information in relation to subsurface building and carrying capacity.
Energy: ATES and Geothermal energy specialists.
Water: Geohydrological and water management specialists.
Soil: soil experts and ecologist.

What is the result?

◊ An overview of chances, obstacles, points of attention and boundary conditions in the area.
◊ The possibility of cheaper, climate proof and sustainable producing.
◊ Contact between all necessary stakeholders and specialists.
◊ A dialogue, in which the specialists from the aboveground and subsurface are involved and have the opportunity to understand each other.