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WEEK 2 – INTRODUCTION TO LIVABLE CITIES

Data

"Data is a set of values of qualitative or quantitative variables; restated, data are individual pieces of information. Data in computing (or data processing) are represented in a structure that is often tabular (represented by rows and columns), a tree (a set of nodes with parent-children relationship), or a graph (a set of connected nodes). Data are typically the results of measurements and can be visualized using graphs or images. Data as an abstract concept can be viewed as the lowest level of abstraction, from which information and then knowledge are derived.

Raw data, i.e., unprocessed data, refers to a collection of numbers, characters and is a relative term; data processing commonly occurs by stages, and the "processed data" from one stage may be considered the "raw data" of the next. Field data refers to raw data that is collected in an uncontrolled in situ environment. Experimental data refers to data that is generated within the context of a scientific investigation by observation and recording.

The word data is the traditional plural form of the now-archaic datum, neuter past participle of the Latin dare, "to give", hence "something given". In discussions of problems in geometry, mathematics, engineering, and so on, the terms givens and data are used interchangeably. This usage is the origin of data as a concept in computer science or data processing: data are accepted numbers, words, images, etc.

Data is also increasingly used in humanities (particularly in the growing digital humanities) the highly interpretive nature whereof might oppose the ethos of data as "given". Peter Checkland introduced the term capta (from the Latin capere, "to take") to distinguish between an immense number of possible data and a sub-set of them, to which attention is oriented.[1] Johanna Drucker has argued that the humanities affirm knowledge production as "situated, partial, and constitutive" and that using data may therefore introduce assumptions that are counterproductive, for example that phenomena are discrete or observer-independent.[2] The term capta, which emphasizes the act of observation as constitutive, is offered as an alternative to data for visual representations in the humanities."

Wikipedia. *Data.* [online] <http://en.wikipedia.org/wiki/Data> [Accessed 24 March 2014]

Information

“Information (shortened as info or info.) is that which informs, i.e. that from which data can be derived. Information is conveyed either as the content of a message or through direct or indirect observation of something. That which is perceived can be construed as a message in its own right, and in that sense, information is always conveyed as the content of a message. Information can be encoded into various forms for transmission and interpretation. For example, information may be encoded into signs, and transmitted via signals.

Information resolves uncertainty. The uncertainty of an event is measured by its probability of occurrence and is inversely proportional to that. The more uncertain an event, the more information is required to resolve uncertainty of that event. The ‘bit’ is a typical unit of information, but other units such as the ‘not’ may be used.

Example: information in one "fair" coin flip: log2(2/1) = 1 bit, and in two fair coin flips is log2(4/1) = 2 bits. The concept that information is the message has different meanings in different contexts. Thus the concept of information becomes closely related to notions of constraint, communication, control, data, form, instruction, knowledge, meaning, understanding, mental stimuli, pattern, perception, representation, and entropy.”

Wikipedia. *Information*. [online] Available at: < http://en.wikipedia.org/wiki/Information>
[Accessed 19 September 2014].

Information architecture

For physical architecture, we use physical materials. For information architecture, new types of material are needed. Data, information, and knowledge could be those materials. Abstract in nature, they need structure, space and interfaces so that we can use them for design support purposes. Other disciplines, such as medicine, are constructing their body of knowledge with the same elements to come to a better understanding of the functioning of the human system.

“Information architecture (IA) is the structural design of shared information environments; the art and science of organizing and labeling websites, intranets, online communities and software to support usability and findability; and an emerging community of practice focused on bringing principles of design and architecture to the digital landscape. Typically, it involves a model or concept of information which is used and applied to activities that require explicit details of complex information systems. These activities include library systems and database development. Historically the term “information architect” is attributed to Richard Saul Wurman. There is currently a growing network of active IA specialists who comprise the Information Architecture Institute.”

Wikipedia. *Information architecture*. [online]
<https://en.wikipedia.org/wiki/Information_architecture> [Accessed 15 September 2014].

Schmitt, G. Information Architecture. *Information Cities*. Zürich-Singapore: ETH-Zürich *, pp. 11-12*

Information city

Information city describes the extension of information architecture to the urban scale. In analogy to information architecture, information city has two main meanings: (1) making the invisible visible on the scale of a city and thus helping to understand the functioning of an interaction between components of the city, and to design new cities; (2) information city might become a metaphor for the structuring and ordering of vast amounts of data, created increasingly by the city‘s inhabitants and its infrastructure. With information city we do not mean the various Info Cities projects that focus on the seamless integration of information and communication technologies. We also do not mean completely virtual cities.

Schmitt, G. Information Architecture. *Information Cities*. Zürich-Singapore: ETH-Zürich

Information territory

The territory forms a system on its own. It is composed of urban systems and their hinterlands, which in turn consist of building systems and their infrastructure. The territorial system is composed of natural and man-made components. It is also an intellectual system that changes its character and boundaries over time. The information territory is the metaphor that connects information architecture with the information city.

Schmitt, G. Information Architecture. *Information Cities*. Zürich-Singapore: ETH-Zürich , pp. 133

Knowledge

“Knowledge is a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning. Knowledge can refer to a theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic. Knowledge acquisition involves complex cognitive processes: perception, communication, association and reasoning; while knowledge is also said to be related to the capacity of acknowledgment in human beings.”

Wikipedia. *Knowledge.* [online] <https://en.wikipedia.org/wiki/Knowledge> [Accessed 25 March 2014].

Modeling

“Scientific modelling is a scientific activity, the aim of which is to make a particular part or feature of the world easier to understand, define, quantify, visualize, or simulate. It requires selecting and identifying relevant aspects of a situation in the real world and then using different types of models for different aims, such as conceptual models to better understand, operational models to operationalize, mathematical models to quantify, and graphical models to visualize the subject. Modelling is an essential and inseparable part of scientific activity, and many scientific disciplines have their own ideas about specific types of modelling. There is also an increasing attention to scientific modelling in fields such as philosophy of science, systems theory, and knowledge visualization. There is growing collection of methods, techniques and meta-theory about all kinds of specialized scientific modelling.”

Wikipedia. *Scientific modelling.* [online] <http://en.wikipedia.org/wiki/Scientific_modelling> [Accessed 16 September 2014].

Simulation

Simulation in the sciences is becoming an important method in addition to theory and experiment. In architecture, simulation has been used for decades, mainly to predict structural behavior, energy consumption or life cycle cost. In urban design, simulation is gaining importance in exploring future scenarios in pedestrian movements, vehicle mobility, or land use alternatives. And in territorial planning, simulation helps to predict the functioning of large-scale operations in transportation or energy supply. “Simulation is the imitation of the operation of a real-world process or system over time. The act of simulating something first requires that a model be developed; this model represents the key characteristics or behaviors/functions of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games. Often, computer experiments are used to study simulation models. Simulation is also used with scientific modelling of natural systems or human systems to gain insight into their functioning. Simulation can be used to show the eventual real effects of alternative conditions and courses of action. Simulation is also used when the real system cannot be engaged, because it may not be accessible, or it may be dangerous or unacceptable to engage, or it is being designed but not yet built, or it may simply not exist.

Key issues in simulation include acquisition of valid source information about the relevant selection of key characteristics and behaviors, the use of simplifying approximations and assumptions within the simulation, and fidelity and validity of the simulation outcomes.”

Wikipedia. *Simulation.* [online] <http://en.wikipedia.org/wiki/Simulation> [accessed 16 September 2014].

Urbanization

The term urbanization means a population shift from rural to urban areas. This shift causes a gradual increase of the people living in urban areas. The physical growth of urban areas is also a result of the population growth.

Urbanization is relevant to a wide range of disciplines : geography, economics, public health, urban planning etc. The phenomenon has been closely linked to modernization, industrialization, and the sociological process of rationalization. Urbanization can be seen as a specific condition at a set time (e.g. the proportion of total population or area in cities or towns) or as an increase in that condition over time. So urbanization can be quantified either in terms of, say, the level of urban development relative to the overall population, or as the rate at which the urban proportion of the population is increasing. Urbanization creates enormous social, economic and environmental changes, which provide an opportunity for sustainability with the "potential to use resources more efficiently, to create more sustainable land use and to protect the biodiversity of natural ecosystems." Urbanization is not merely a modern phenomenon, but a rapid and historic transformation of human social roots on a global scale, whereby predominantly rural culture is being rapidly replaced by predominantly urban culture.

Wikipedia. *Urbanization.* [online] <https://en.wikipedia.org/wiki/Urbanization> [accessed 4 June 2015]

Stocks and flows

The stocks and flows concept originated in economics in the 1960s. Stocks are quantities that do not move, whereas flows are quantities that move. Flows are measured in quantities per time. This differentiation between statics and dynamics makes the principle applicable to architecture, urban design and territorial planning.

Among the stocks and flows needed to understand the functioning of a city are those of people, water, material, energy, finances, health, density, information and livability. The stocks and flows this course focus on are climate, energy, water, ecology and their contribution to livability (G. Schmitt, 2015).