Carlo Ratti had a presentation about sensing and actualizing cities at the Royal Institute of Technology, KTH, in Stockholm in October 2011. With sensing and actualizing he revives Geddesian surveying and planning and transcribes them in something that we can call emerging information society. But the change in words is more refined. It is a change from plan to action and realizing. The synonyms of actualize, make real and carry out action, associate with involvement in or doing and experiencing, eventually living. It is also a continuous process, without beginnings and ends. Planning has much more, but slightly different synonyms, think out, prepare in advance, forethought, foresightedness, arrange, organize, draft, draw, outline, systematize, estimate, put in order, form, give shape, have in mind, determine (http://www.thesaurus.com/). The association with planning is more towards product, a plan, which ends a process or it is recurrent process of production or replication.

There is representation segment in Ratti’s sensing and actualizing cities cycle. The city is space and time as situation (sensing the city to representation) shaped by actions (representation to actualizing or random actualizing the city, sensing the city to representation). The Figure 1 is inspired by Turner’s (1977:167) scientific and political sphere diagram and Ratti’s surveying and planning cycle. In this essay I reflect on the representation.
segment in the diagram and it relations, the representation of urban spaces and times and the role of the actuator, the forthcoming shaper of cities in the information society.

Patrick Geddes in *Evolution of cities* urges for synoptic view in *survey and planning*, but today’s theory about cities, places, spaces and times is very specialized in the sciences. It is often conflicting, even useless from one to another viewpoint. I compiled a very concise urban theory review in *Appendix: The wonderful chaos in urban theory* and I barely scratched the surface of a mountain of books and writings from various sciences and their definitions of city. Almost every theory is influenced by some science or art behind and without doubts there are as many urbanisms probably as there are urbanists as urban theoreticians and practitioners. I studied architecture in a school in Macedonia that nurtured Le Corbusian urbanism and in a school of participatory planning in Sweden, much inspired by Ralph Erskine and Patrick Geddes. My work, thinking and this essay are largely biased by my architectural background and these schools of urban thought. Thereafter I make a multifaceted definition of the city and urban. None of these definitions are exclusive, but they must coexist together and serve as background for representation of cities. The city and urban is:

- Constituted by charter, decree, political decision, by fiat (Spiro Kostoff);
- Defined by population size, density and social heterogeneity or diversity (Louis Wirth, Manuel Castells);
- Political struggle, game of politics, concert of actors (Peter Hall), in participation with experts as citizens and citizens as experts (Patrick Geddes);
- Artefact, monument, collective artwork (Lewis Mumford, Spiro Kostoff, Aldo Rossi, Leonardo Benevolo);
- Central place, core (Johann Heinrich von Thünen), association with political autonomy (Max Weber), point of maximum concentration (Lewis Mumford);
- Enclosure (Camillo Sitte), fort (Max Weber) or sanctuary. (ur) means roof, to shut or protection in Sumerian and the stem ur has been found in a synonym of a city in almost all Indo-European languages. Roof is in the Chinese sign 市 (shi) for city. Some examples are (iri, eri, urn) for city in Sumerian and Akkadian (http://psd.museum.upenn.edu), (pur) in Sanskrit (http://www.sanskrit-lexicon.uni-koeln.de/), urnu in Hittite, paru in Old Persian, urbs in Latin, baurs in Gothic, gradu in Old Slavonic;
- Economical, political, ecological, biological, social or spatial system: in complexity (Alan Wilson, Michael Batty); with urban dynamics (Jay Forrester); through social networks (Nicholas Christakis); through general equilibriums, inputs and outputs, masses and gravitational forces (George Kingsley Zipf, William Alonso, Ira Lowry, Paul Krugman); through dynamic microsimulation (Guy Orcutt, Paul Waddell); through gaming simulation (Richard Duke, John
Taylor); open ecosystem (European Commission); of urban (artificial, inaccessible) and natural patches and links (Andreas Zetterberg); of actors (community, bureaucracy and politicians) (Peter Hall); of morphologies (Michael R.G. Conzen); of elements (Kevin Lynch); of permanencies and urban dynamics as processes of transformation (Aldo Rossi); of streets and patterns (Stephen Marshall); of syntax (Bill Hillier); as organism (Francesco di Georgio ‘city and its parts and the human body and its parts’ quoted in (Kostoff, 1991:52)) in evolution, (Patrick Geddes), of cells or buildings (Elial Saarinen);

- Design, idea, pattern, conception, (Hippodamus of Miletus, Plato, Antonio Sant'Elia, Le Corbusier), dogma, expression (Elial Saarinen), utopia (Thomas More), ideal (Peter Kropotkin, Ebenezer Howard), a drift (Guy Dabourd);
- Situation (Guy Dabourd), surprise (Joel Garreau) or randomness (Michael Batty);
- Sensation, feeling or spirit, feeling inside (Kevin Lynch, Gordon Cullen), sense of belonging (Clarence Perry), locus or place, archetype, locus solis or singular place (Aldo Rossi), genius loci or local spirit (Christian Norberg-Schulz);

**Representation of cities**

The *representation* of cities has been ubiquitous focus, especially attractive in architecture, geography, sociology, economy, transport and computer sciences. Thrift (1996:256-308) argues that ‘we now live in an almost, but not quite world, a world of almost, but not quite subjects, almost, but not quite selves, almost, but not quite spaces and almost, but not quite times’. The city is not only space, not only time, not only architecture, not only geography, not only economy, not only transports, not only ecosystem and not only society, but multifaceted space and time that should incorporate all the definitions of the city mentioned before. Each discipline strangely excels in its own domain in *sensing* and *representing* space, time and society, but there is nothing that connects them.

The *representation* for architects is often spatial formation, a shapeable space out of time, excerpt or a detail of a city that can be added. The architects evolved the *representation* to full 3D and it was a recent event. With emergence of Building Information Modelling (BIM) and Graphisoft’s ArchiCAD in the end of the 1980s the *plan* (advocated by Le Corbusier as fundament) evolved in *objects in space*, the fundament of BIM. BIM allows full *representation* of architecture in 3D with simple modelling toolbox that did not existed in the 2.5D of the CAD programs or in the 3D modellers.

The geographic *representation* is concerned with the Earth’s surface. It turns space in a area with attributes (paraphrased from Longley et al., 2007:67-70). The fundamental
conception is a *location*, or *geographically referenced area*. The full 3D representation is necessary only in areas with overhanging cliffs or caves (ibid., 2007:72) and today’s Geographical Information Systems (GIS) are principally planar or 2.5D (*rasters* or *vectors*). The geographic *representation* is Cartesian and it revolves around the *First Law of Geography* by Waldo Tobler that “everything is related to everything else, but near things are more related than distant things”. The laws of geography fail in the city. The city consists of heterogeneous spaces, fixed and mobile, distorted by infrastructures that destroy the continuity of spaces with temporal warps. These distortions are common and exist almost in every place. Some online maps like Google Maps have begun to insert temporal relationships for example between bus stops neglecting the spatial geography of the bus routes. But the relationships between spaces go beyond the scope and interest of mainstream GIS scientists and geographers.

Figure 2: 2D *representation* of spaces and 2D *representation* in GIS (*vectors*)

The *representation* of the city in economy transport science shown on the figure below neglects the spatial element and displays only the relational geography. The space is generalized simply by points, or *centroids*, and the relationships between. The relationships are represented by *matrices* and the fundamental measurement between the *centroids* is time.
The human sciences are also interested in cities, places, spaces and times. The tendency there is not to represent, but to describe societal, cultural, historical, anthropological, psychological, evolutionary, local, global, individual, public, private, semiprivate, virtual, real or unreal spaces and times. Very often these sciences neglect the spatial, but these humanistic tags to the spatial dimensions can be very important.

The 3D, objects in space, in architecture, the location in geographic representation and the relationships in the representation in economy and transport science, the human dimensions are the segments that have to be merged in the representation of cities. Which objects and which spaces in the cities are part of the scientific sphere of sensing and actualizing cities.

**Perspectives on spaces**

There are two perspectives on looking at the cities, within or inside the city, or from the top of the city (broadened from Cecchini and Rizzi, 2001). Stories, narrations, descriptions, paintings, photographs, movies are products of walkabouts in the cities. The top perspective includes maquettes, models or plans. There are tries to merge these perspectives like Lynch (1960) with his wayfinding where he combines within with top perspective by representing things within on a plan, but they are undoubtedly top perspective.
The emergence of information technology and 3D computer graphics enables within or inside the city perspective. The first full 3D models of cities emerged in first person computer games. There is however no city-building computer game that was developed in first person.

The human sense of space and time

Immanuel Kant in *Critique of Pure Reason* argues that space and time are forms of sensible intuition. With computers and information technology we managed to significantly define and manipulate the visual element of space beyond Kant’s intuition. In reality the space is transformation of images, touches or echoes. We locate and conceptualize spaces by triangulation of the images and ultimately by touching. We think in images or sequences of images that we wrap in *spatial objects*, exactly as in 3D computer graphics. The information technology today captures only sight\(^1\), but our perception on space is predominantly photographic, or rather cinematographic. We are cannot really make objects out of spaces if there are not enclosed. The empty space is deluding us. But if we detect enclosed spaces we sense the edges of the *environment* and the *objects within*. We make instantaneous relationships (over, under, beside, inside, outside, far, near), locating exits and impermeable spaces. We will also add attributes to the *objects* (for example immobile, predictably or autonomously mobile) and categorize them (for example benches, trees, garbage cans, bus stops, kiosks). Gordon Cullen in *The concise townscape* writes about relationships as *serial vision* and describes *exiting view* and *emerging view* in *places with content*.

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\(^1\) There is however ongoing research on man-machine interfacing as tangible user interfaces (TUI) (Carlo Ratti, SENSEable City Lab, [http://senseable.mit.edu/](http://senseable.mit.edu/)) or as neuroprosthetics or the possibility to transfer conciseness and senses to robots in real and avatars in virtual environments (Henrik Ehrsson, [http://www.ehrssonlab.se/](http://www.ehrssonlab.se/)).
We literally sense and conceptualize the spaces in the city as environments, objects within and exits and entrances. Without vehicles there would be a straightforward network of exits and entrances with relationships only between neighbouring spaces. There will be no spatial displacement in the relationships as between spaces 2, 3 and A in the case on the left side in Figure 5. But the vehicles, as mobile environments, bypass this by making arrays of relationships in a spatial network as in the case on the right side in Figure 5. The infrastructure opens exits and entrances in different environments and the vehicles acts as new environments. We enter a mode of two environments, one as referential and the other obscured. The outer environment has been a confusing element because it dodges our cinematographic conceptualizing. But in a sense of Cullen’s serial vision we exit environment, enter new environment (vehicle), exit and enter environment. The vehicles bypass other environments that will be completely obscured if the travel is very quick or our view is blocked. The city has to be mapped as space (environments and objects) with its relational infrastructure (exits and entrances) for better understanding and representation. The relational mapping as centroids and origin-destination matrices is extensively used in transports. There the centroids however tend to neglect the spatial with the star system models shown in the case on the bottom right on Figure 3.

Biologically we do not really possess a sense of time and that completely deludes any time representation. We sense motion and we use the cinematographic effect to represent time, for example as mechanical clocks or we scale time in simulations through series of images or stages. However actualizing cities is simultaneously manipulation and representation of time as ‘cities are product of time’ (Mumford, 1938:4). We can talk of simulation and living as actualizing processes.
City information modelling (CIM)

To bring closer the representation of cities with human perception there is a need to systematize 3D, objects in space, the location and the relationships. There is a need to make a system of Cartesian and relational geometry and change in representation from 2D to 3D. The mix will not only make reference to the location of spatial objects, but also model and attribute the interrelationship (exits and entrances) between and within various fixed and mobile spatial objects (environments and objects within).

I have used ArchiCAD, the first BIM program, from the late 1990s and I was thinking about making urbanist analogy or city information modelling (CIM) for several years. In my master thesis I wrote about city of spatial plots and a city archive (inspired by Patrick Gaddes outlook tower) serving as cadastre for spatial objects. Some conceptualizing on spatial or 3D cadastres is ongoing about and if the 3D cadastre is objective of the sensing and representation, the CIM is the objective of representation and actualizing. There is also a difference between BIM and CIM. BIM uses static Cartesian 3D, whereas CIM should include Cartesian and relational 3D. CIM should be a multilayered viewer of networks of environments comprised of objects in 3D.

CIM should be conceived as 3D expansion of GIS (3DIS) with levels (representing spaces as environments), infrastructure (representing the relationship matrices between environments) and level designer toolbox (for manipulation space and relationships in 3DIS). The designer toolbox should include typologies for various levels, infrastructure and building typology on neighbourhood level, and infrastructure and neighbourhood typology on city or regional level. The multilayered representation is common tool in online maps. They reduce details in higher scale. The same principle is applicable for spaces. When we think about one neighbourhood, we think about the edges, where the entrances and exits are and what is inside. When we think about cities we disregard the content of the neighbourhoods.

The people are imitative and docile writes Marcus Vitruvius Pollio. The first buildings were imitations or mimes of the nests of swallows and their methods of building. The building as space did not evolve dramatically throughout the history. In a building typology we can categorize single buildings and combinations of single buildings as spatial units in blocks, enclosed blocks, towers and complexes.
The building typologies and the buildings’ configurations have fairly high explanation coefficients in general linear models (GLM) for population, work places and floor areas per hectare according to my own research in 55 neighbourhoods in the city of Karlstad (I have included the typologies in Appendix: Typologies in the city of Karlstad). The results show that the neighbourhood typology that encompasses the social element, the community or function slightly improves the building and building configuration typologies or the functional categories. The sample of neighbourhoods is rather small and the research is ongoing, but Rådberg and Johansson (1995) had similar results in the research about neighbourhood typologies in Västerås in the 1990s.

<table>
<thead>
<tr>
<th>Category</th>
<th>Population per hectare</th>
<th>Work places per hectare</th>
<th>Floor area per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building typology</td>
<td>0.579</td>
<td>0.764</td>
<td>0.812</td>
</tr>
<tr>
<td>Buildings’ configurations typology</td>
<td>0.568</td>
<td>0.776</td>
<td>0.782</td>
</tr>
<tr>
<td>Neighbourhood typology</td>
<td>0.717</td>
<td>0.781</td>
<td>0.848</td>
</tr>
<tr>
<td>Function of the neighbourhood</td>
<td>0.407</td>
<td>0.642</td>
<td>0.681</td>
</tr>
</tbody>
</table>

We can basically use neighbourhood typology to quantify not only spatial aspects, but also social and that is very important in conceptualizing CIM. The city or region level can be defined by neighbourhood types as significant descriptors not only spaces, but also the community and function. The use of neighbourhood typology in Sweden was suggested by Rådberg (1988), but it has been used earlier by Michael R.G. Conzen, a reflection of the German morphogenetic tradition from the beginning of the XXth century (Whitehead, 1987).
Similar understanding can be used to capture the infrastructure. If we see infrastructure as segments of space there are several types, single or mixed mode thoroughfare and intersecting spaces. The upper level structuralizes the segmentation on the lower by transport modes. The infrastructures are composite spaces that open exits and entrances. The infrastructure is space on the level below and segment of relationship on the levels above.

**On CIM and perception of space**

Why CIM, 3D and relationships? We consume and conceive space in first person. We give direction by pointing out the exits. To get there (place) walk straight turn on the third street left (third exit left), then walk straight (diffuse space) and you will be there (the entrance to the new place). The city representations should be as levels in a first person computer game with geographically referenced environments, exits and entrances with relational jumps (detours).

How complex should the 3D be? In 3D game design the tendency it to decrease the number of polygon and increase texture detail to achieve better photorealistic experience.

**Actualizing and learning from gaming**

The representation is background for actualizing, but the actualizing itself is part of the political sphere (see Figure 1). Hall (2002b:228-9) writes that the planning has to be exploratory, instructive and informative. The city without doubts is shaped by politics as a concert of actors (Hall, 1980): the community, bureaucracy, politicians and the developers (Lefebvre, 2000) and without cooperation between the actors the process is prone to oversights, misunderstandings and injustices.

The planning or actualizing process includes rules and models (Chaou, 1997). The rules are procedures for conceiving and generating space and models are prototypes, a model space or a model of space. The rule (as treatises or commandments) is operator that realizes in indefinitely variable spaces according to circumstances and desires, whereas the model is condemned to be replicated in perpetuality. In reality the models prevail. There are schools of replications or imitations as Marcus Vitruvius Pollio argues and the rules are often there to support the models of these schools. The cities are aggregation of places (spaces shaped in times) which are products of replications (Johan Rådberg uses planning doctrines or paradigms). That is why the neighbourhood typology is so significant. The models, not the rules, of these schools are the backbone of the city level toolbox in CIM.
The rules are needed in the actualizing and living sensible cities. They must depict the urban dynamics of development and the concert of actors (Hall, 1980) behind that. Why not to learn from computer games? It is nothing easier then to play with objects and CIM deals with spatial objects and environments similarly like in 3D computer games. The games and Homo Ludens, the man who plays, and changes its environments that emerges in the information society can be very handful technology in enabling actualizing as multiplayer action. Today we have the technology to enable that, just sadly I have no experience or deep interest in programming to box up the CIM.

The historical roles and the actuator

In this essay I assume that the evolution to informational urbanism of actualizing is imminent and I want to bridge an existing gap between various sciences, their roles and initiative. The evolution of the roles includes the ascendancy from designer (human), regulator (human), surveyor (human) or/and planner (human), computer (machine) and system analyst (human), process executive and conflict manager (human), to a cybernetic hybrid between sensor (machine)\(^2\) and actuator (human).

Will that happen in near future? The future is a ‘tricky business’ (something that was written by Paul Waddell, the creator of UrbanSim), full of surprises, but also full of opportunities.

\(^2\) The sensing is supported by programming and I use sensor (machine) as sensor (machine) and program (machine) in some automated future. Today we are in embryonic stage of the information society when the sensor is hybrid consists of sensor (machine) and programmer (human). I also doubt that programming will be replaced only by program. Once I talked about programs with my friend who is a programmer. He said: ‘Yes, it is possible to make a program that works perfectly. But what will we do later?’
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Appendix: The wonderful chaos in urban theory

In the beginning of the XIXth century only 2% of the world population of 1 billion or around 20 million people were living in cities on the planet Earth. The urban population increased tenfold, to 220 million, during the XIXth century and fourteen times, to 2.8 billion, by the end of the XXth century. The traditional, ancient or medieval, cities built before the XIXth century, thus are only tiny part of the urban agglomerations that are wrapped around the planet Earth today. But their image and monumentality remains strongly imprinted in human subconscious. The cities before the XIXth century were fortified with gates and tolls that separated the urban life from the countryside. The urban borders were visible. Designed by fiat or spontaneously developed in a political struggle between the nobility, clergy and citizenry (paraphrased from Max Weber, 1966) they were ultimate testaments of human defiance to Nature.

The industrialization and capitalism transformed and expanded these walled artefacts with complex orchestration of time and space (Mumford, 1938:5). Françoise Choay (1969:7-15) argues that the XIXth century not only revolutionized the organization of the city, but also the mentality of the citizens (Georg Simmel calls it metropolitan individuality) and the initiative of the planners. The clock is the key machine in the modern industrial age (Lewis Mumford in Parkers and Thrift, 1980:45). The XIXth century constituted time as fundament of ‘modernity’ and dramatically change the human life, while the ‘modern’ citizen surrounded by new technologies sunk in anonymity, loneliness and depression, driven by perpetual time schedules and pursuit of higher wages. The railways, telegraph and newspapers will allow greater mobility and gradually supplanted space in its previous informative and associative role (Choay, 1969:ref). The ‘cyborg culture’ in its embryo will emerge. Donna Haraway (1991) writes about ‘cyborg culture’ of ‘creatures simultaneously animal and machine, which populate worlds ambiguously natural and crafted’.

The higher wages in cities and wider employment opportunities caused rapid and haphazard growth of cities from the XIXth century. The medieval citizenry, Karl Marx bourgeoisies and capitalists, profited from the urbanization pressure. Adam Smith’s ‘invisible hands’ of various interests turned the cities in scandalously disordered urban mess. The need to put order in the urban chaos (Choay, 1969:7-15), the revolutions, anarchism and the continuous threat of insurrection (Hall 2002:24-28), mobilized the public administration and strengthened the position of the bureaucracy in the urban development from the middle of the XIXth century. They will be an agreement with the private sector, each recognizing their domains. The bureaucracy limited the complete freedom of the private enterprise, but it clearly guarantied within the limitations. They established building regulations and carried out public works. It
exercised minimum control over the city to function properly, while the private sector was responsible for the rest (Benevolo, 1980:765-6). Paris is the first city that introduced regularization, formulated and executed by Georges-Eugene Haussmann or Baron Haussmann. Its explicit purpose was to regularize the spontaneous urbanization and disorder of the medieval Paris.

The European society was fascinated and perturbed by this novel and contradictory mix caused by injection of ‘modern’ technology in the medieval core. This new urban model of regularity and order had immediate and lasting success. Regulators from various backgrounds will turn to their sciences to conceptualize urban systems and classifications. The quality of life and public health, thus improvement of the living conditions will become imperatives. The second priority will be the traffic and mobility of the masses (Choay, 1969:27). When Baron Haussmann envisioned the future Paris he was thinking far, about a meaningful city for increasingly mobile population of millions. He superposed a network of boulevards over Paris, demolished large portion of the medieval city to open space for traffic, water and sewers systems and other public infrastructure (ibid., 1969:15-22).

The new public infrastructure allowed for further development, expansion and compaction within the fragmented medieval city and on its fringes. This transformation increased densities and caused excessive overcrowding (Benevolo, 1980:765-840), pseudurbanization and sharp division between the poor and the rich (Choay, 1969:8). Peter Hall (2002a:14-47) describes a city of dreadful night in the end of the XIXth century where depression, violence, disease, crime, vice and poverty flourished in the slums, spreading their contaminating influence across the city. The city became a point of attraction and fascination, City of Light, where the life is rich, diverse and vibrant, while in a same time dangerous, contaminated, lethal City of Darkness. The city provoked reactions of escape (Choay, 1969:27). The railways will accommodate the journey of daily fascination and escape from and to the city, from and in the countryside in the XIXth century and the motorcars will democratize the access beyond the buffers of the stations. Françoise Choay (1969:27-9) calls rightly these new extensions of the city pseudurbias instead of suburbs. They were and are scraped of various functions like trade and industry impoverishing the vocation of urban. The only functions allowed were the ones considered essential to residential needs like train station, post office, schools, church and shops for vital commodities.

The escape from the city can be traced to Jean-Jacques Rousseau and his belief that the life in the countryside is a cure for the unnatural and imperfect urban society. Consequently many will depict new forms of society, cooperatives in nature, completely tranquil visions out of the horrific urban realities of the XIXth century, like Robert Owen’s Harmony, Charles Fourier Phalanstere, Benjamin Ward Richardson’s
Hygeia or City of Health or Peter Kropotkin’s utopia in Fields, Factories and Workshops. These oasis of prosperity, harmony and hygiene, carefully planned agricultural smallholding colonies, fusing the qualities of the city and the farm, were complete opposition of the squalor and filth of the industrial city. These social utopias will be integrated in the Ebenezer Howard’s Garden City, but only the Garden element will be realized (following literally Rousseau’s naturalist precept) and on a grand scale in the XXth century (Benevolo, 1980:733-64; Hall, 2002a:87-141). Its supreme achievement was Hampstead Garden Suburb designed by Richard Barry Parker and Raymond Unwin in 1907 (Choay, 1969:27). The intention was complete isolation from whatever might recall the noises of the city. The pseudurbias reflect the core of industrial life. The replicated houses shelter busy individuals on a permanent move from a social hive, the commercial or industrial core as ideal working atmosphere, to a house in purifying Nature, a refuge needed for relaxation and procreation, the ideal environment for raising children. The isolated home in the picturesque pseudurbia is a temple, exactly as a monk cave in medieval monastery. Georg Simmel’s metropolitan individual is there alone and daydreaming.

The city in the XIXth century became interest of sociologists, biologists and evolutionarists, doctors and hygienists, philosophers, architects and artisans, historians, geographers, writers, politicians that came with fragmental urban theories with attached ‘urban’ or ‘human’ attributes to their disciplines. Patrick Geddes was first that urged for a comprehensive science of cities under politology that will summarize and integrate the fragmented research around the industrial city and its citizens (1904, 1915). But the tendency was specialization. The science of cities3 was never established, or existed as unitary. Geddesian broad and slowly realizing politology4 will be neglected

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3 Patrick Geddes (1915) suggested politology for science of cities and politography for survey of cities, but the words city or polis (πόλις) and logos (λόγος) were never fused in reality. One reason is probably that politology is confusingly similar to politics or politikos (πολιτικός). Asti (αστι) is another word that means city in the material sense, differently from polis or citizenry as body (http://www.perseus.tufts.edu/). Asti (αστι) seems derives from sta- or stu- etymon meaning to stand or place in Proto-Indo-European (PIE) (http://www.utexas.edu/cola/centers/lrc/). Astulogy or astutics can be another coinage for a science of cities that sadly sounds awful to the ear.

4 Geddes politology revolves:
1. Situation, topography and natural advantages (geology, climate, water supply, soils, with vegetation, animal life, rivers or sea fisheries and access to nature);
2. Means of communications, land and water (natural and historic, present state and anticipated development); industries, manufactures and commerce (native industries, manufactures, commerce, anticipated development);
3. Population (movement, occupations, health, density, distribution of well-being, education and culture agencies, anticipated requirements);
4. City conditions (historical: phase by phase, from origin onwards, material survivals and associations, recent: areas, lines of growth and expansion, and local changes under modern...
as modernist urbanism emerged in the XXth century slowly marginalizing the other viewpoints on the city. Urbanizacíon was introduced and defined by Ildefons Cerda in 1867 as the process of urbanization and urbanism, a normative discipline with scientific pretensions (Choay, 1997:234). Cerda’s neologism urbanism would have probably stayed anonymous if Le Corbusier’s persuasive book Urbanisme stayed unpublished.

Opposite of Geddesian politology, Le Corbusian urbanism offered clear and quick solution from the filth and despair of the industrial city of the XIXth century. His solution was brilliant, and pushed the quality of life beyond anything that was available in the industrial city. He declared urban and architectural revolution where the house is a ‘machine to live in’ and divided the human day on work, repose and sleep. His future city was grandiose and avant-garde. It had three functionally separated parts the City, the Industrial city and the Garden city. The pure geometrical forms of the blocks and towers were washed in the Sun. He preached dogmatic order, standardizing the quality of life and the behaviour of the modern human. His urbanism was based on elementary geometry, simple mathematics and statistics and it spread quickly especially in the schools of architecture. He advocated eternal ideals as obscurely sketched visions of the future that depicted the Nature and ‘machine’ in harmony. Some of his visions realized and multiplied globally by the newly educated architects trained by the modernist doctrine during the XXth century. Le Corbusier was a superstar and became a stereotype of architect that is brilliant, arrogant and persuasive. His ascendancy was supported by a practice in a global studio of diligent associates and apprentices and many avant-garde connections. He was adored by many architects and artists, but hated by the others, especially by public administrators.

Le Corbusian city was like a machine, it was an intuitive created. It was a system of architecture. It was ‘scientifically’ sound, finished, static, not evolving, timeless vision. Le Corbusier copyrighted the city and left it unchanged to eternity. It was a vision globally ‘tested on human guinea pigs’ (Hall, 2002a:261) and it was advertised as urbanism. He basically sealed the faith of urbanism as science of cities. The lack of ethics, empathy and understanding, narrowness and arrogance of the Le Corbusian stereotype will demise and degrade the disciplines of architecture and urbanism today.

conditions, of streets, open spaces, amenity, local government areas, municipal, parochial, present: existing plans, in general and detail, streets and boulevards, open spaces, parks, internal communications, water, drainage, lighting, electricity, housing and sanitation of localities in detail, existing activities toward civic betterment, both municipal and private); 5. City planning (suggestions and designs, examples from other cities, home and foreign, contribution and suggestions toward planning scheme as regards: areas, possibilities of expansion (suburbs), possibilities of improvement and development, suggested treatments of these in detail with alternatives when possible).
But he and his followers established a strong school of architecture multiplying the insolent and brilliant stereotype of architect. But the superstar architects have lost the right on the city as a whole. The modern urbanists and their scientific discourse forgot completely on the political processes, situations and struggle in the city and the critique was strong. ‘Do not confuse me with facts, my mind is made up’ (Turner, 1977:167) was and is the common reply by politicians and public administrators. No Le Corbusian disciple dares to draw visions or negotiate future cities and that makes the once very avant-garde movement, very regressive and repetitive.

The Letterists and Situationists (Chtcheglov, 1953; Nieuwenhuis and Debord, 1958; Nieuwenhuis, 1974; 1980) criticized the order and uniformity of the modernism immediately as it mainstreamed. They declared boredom in the modern city and industrial society. They argued of an emergence of Homo ludens, the human who plays, who is free of all work due to automation of labour, opposite of the industrial Homo faber, a human that makes, manufactures or produces. But Homo ludens and the automation of labour is still in its embryo.

The second critique came from real life. Jane Jacobs (1961) will witness and criticize the clearance of slums enforced by Robert Moses in New York, simplicity of modernist conceptions of planning, sprawling of the American cities and disappearance of urban life. She will remind the world of the qualities of dense and diverse urban life. She writes about a human as a neighbour in an urban neighbourhood with its history and associations. She will shift perspective from top to inside, from universal to unique, very much like Camillo Sitte in his art of cities as ‘enclosed places of diversity, irregularity and asymmetry’ (Choay, 1969:104-6).

Today we are strangled in postmodernism where everything is possible without predetermination and prescription. ‘Modern’ and ‘postmodern’ have rather different meanings in sociology, economy, architecture and planning. This makes the wonderful chaos in urban theory.

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5 Michael Foucault in his interview declares ‘After all, the architect has no power over me. If I want to tear down or change a house he built for me, put up new partitions, add a chimney, the architect has no control. So the architect should be placed in another category – which is not to say that he is not totally foreign to the organization, the implementation, and all the techniques of power that are exercised in a society. I would say that one must take him – his mentality, his attitude – into account as well as his projects, in order to understand a certain number of the techniques of power that are invested in architecture, but he is not comparable to a doctor, a priest, a psychiatrist, or a prison warden’
Appendix: Typologies in the city of Karlstad

Neighbourhood is ‘something vague and indefinite’ (Perry, 1929:29). The notation is qualitative rather than quantitative and the neighbourhood usually does not have visible borders (ibid., 1929:29-30). Kevin Lynch defines sections of the city with ‘common identifying character’, which is always recognizable from the inside. (Lynch 1960:47) The ‘modern human’ changed not only scale and reach (Lefebvre, 2000:82), but also existence, practices, experience and perceptions. ‘Personalities’, ‘communities’, ‘villages’ and ‘cities’ exist in multileveled realities and social agglomerations interconnected by various communication and transport technologies.

The railways principled the discontinuity of the ‘city’ and faraway coexistence of ‘neighbours on wheels’, while the cars democratized and sprawled it widely. Henry Ford’s ‘world on wheels’ became reality and for an alien observer the cities today
would look like as they are inhabited by metal boxes (Safdie, 1998; Urry, 2007). These urban agglomerations have inherited the ‘city’ property to form associations (Weber, 1966) and juxtapose (Amin and Graham, 1997:418) these various real and virtual existences. For the subway passengers the ‘city’ is obscured from entrance to exit. A car driver perceives a sequence of blurred images of neighbourhoods as a movable background. The recognition of neighbourhoods as ‘city’ sections fails. There is no direct touch or experience. On the other hand, the social connections, ‘personality’ and ‘communities’ thrive in the discontinued ‘city’. ‘Communities’ fluidize and disperse on many levels and in different spaces. The neighbours tend to travel and socialize beyond the rigid neighbourhoods where they live. They assess the nearness by relationship (exits and entrances) and predominantly by time. My sister lives around twenty blocks from the ocean or 10 minutes away (by car as one entrance and one exit). I walked twenty blocks with one entrance and twenty exists along the way to get to the ocean (or 50 minutes by walking).

But strangely many neighbourhoods are morphologically alike, because there is a continuous process of imitation and reproduction places in cities. The latter of Swedish neighbourhoods and cities, from wooden to stone and brick and concrete city, from vernacular, classical, modern to post-modern, from the small wooden city, villa city, garden city, Stockholm’s subway city, the modernism, the Miljonprogramme and prefabricated, to the emergence of ‘car society’ and its city with sprawling road hierarchy is comprehensively described with similar neighbourhood types by many authors. Rådberg (1988) describes the planning doctrines or paradigms behind the neighbourhoods and develops detailed urban typology in regard to them (Rådberg, 1995). The city of Stockholm developed a neighbourhood typology in the 1990s. A matrix of neighbourhood’s types was also developed by Arken Architects and Ekologigruppen Ekoplan, together with Jerker Söderlind and Håkan Jersenius. The buildings and cities in Sweden are encyclopaedically and chronologically described in the Så byggdes (translated: That is how was built) trilogy. The current comprehensive plan for Stockholm includes neighbourhood typology.

In the city of Karlstad I used building typology, categories by function and configurations of building as well as neighbourhood typology

**Function of the neighbourhoods**

Figure 8 displays the neighbourhoods by function and location. I use the Swedish and British land use classification systems to categorize the functions in the various neighbourhoods as:

- **Mixed** (translated in Swedish: blandstad)
- **Agricultural and forestry** (translated in Swedish: lantbruk)
The configurations of buildings and building typology
The configurations of buildings include detached buildings, semi-detached, in rows, in blocks, as diagrams or in quasi-blocks and complexes and I use five building types (single, block, enclosed block, tower and complex). Figure 8 also shows the neighbourhoods by configurations of buildings, building typology and location.

Neighbourhood typology
In Karlstad I categorize the neighbourhood mainly according to Johan Rådberg’s typology, expanding the list with vernacular and postmodern neighbourhoods.

The vernacular neighbourhoods above occurred randomly in many forms. They cannot be pinned to certain age or have no planning paradigm behind. These neighbourhoods include haphazardly grown and agglomerated villages and transformed and unplanned city cores.

- Urban by (1-2 storeys, ~10%, far 0.10) (translated: urban village)
- Trästad (1-3 storeys, 25-50%, far 0.25-1.50) (translated: wooden city neighbourhoods)
- Stenstad (3-7 storeys, 50-90%, far 1.5-6) (translated: stone city neighbourhoods)
- Ursprunglig stadskärna (1-8 storeys, 50-90%, far 0.5-5) (translated: embryonic, irregular or unplanned city core)

The classical and neoclassical neighbourhoods are product of regularization and replication of the rectangular grid.

- Småstadskvarter (2-4 storeys, 50-90%, far 1-3) (translated: small scale city neighbourhoods in urban blocks)
- Storstadskvarter (4-8 storeys, 50-90%, far 2-5) (translated: large scale city neighbourhoods in urban blocks)
- Storstadsstorgårdskvarter (4-8 storeys, 50-90%, far 2-5) (translated: large scale city neighbourhoods in urban blocks with spacious courtyards)
Skyskraper i kringbyggda kvarter (18-110 storeys, 50-90%, far 10-44) (translated: city of skyscrapers in urban blocks that does not exist in Sweden, but it is the final evolution today of the classical city of urban blocks).

The pseudourban neighbourhoods emerged as response to the overcrowded, unhealthy, polluted and dangerous industrial city that kept its classical and neoclassical form with staggering densities and poor conditions of life.

- Trädgårdsstad (1-3 storeys, 10-50%, far 0.10-0.50) (garden city neighbourhood with mix of functions)
- Villastad (1-3 storeys, 10-50%, far 0.10-0.50) (translated: area with detached houses in regular, rectangular internal street network without cul-de-sacs)
- Småhusområde (1-2 storeys, 10-25%, far 0.10-0.25) (translated: area with detached houses with hierarchical street network often with many cul-de-sacs reaching each house or cluster of houses)
- Radhusområde (1-2 storeys, ~25%, far 0.25-0.50) (translated: area with row houses)
- Gårdhusområde (1-3 storeys, ~75%, far 0.70-2) (translated: area with quadrangles)

The modernist neighbourhoods emerged in the 1920s and mainstreamed after World War Two. The early modern neighbourhoods had small scale and they were located peripherally to the historical cities. After World War Two the modernism became a leading planning paradigm. The architects and planners cleared the slums of the historical cores and improved the standards of life, but on the other side the standardization caused uniformity and boredom. Heavily criticized from the 1960s it has strong roots even today in its neo and high technological revivals. There is incredible creativity and variety of urban patterns within the modernist paradigm. The buildings were almost always arranged as diagrams or as complexes, striving to monumental timelessness. The neighbourhoods were envisioned and authored as completed, closed and efficient systems for living, working and leisure on smaller or larger scales. They stand very rigid to changes and often out of context. The modernist neighbourhoods can be conceived as a whole, functional entity or modernist city or as functional parts.

- Storskalig funktionalistisk stad (over 3 storeys, 10-30%, far 1-10) (large scale modernist city neighbourhood with mix of functions)
- Småskaligt funktionalistiskt bostadsområde (to 3 storeys, 10-30%, far 0.30-1) (small scale modernist residential area)
- Storskaligt funktionalistiskt bostadsområde (over 3 storeys, 10-30%, far 1-10) (large scale modernist residential area)
Centrum (1-30 storeys, 10-50%, far 0.10-10) (modernist centres)
Köpcentrum eller handelsområde (1-3 storeys, ~10%, far 0.10-0.25) (shopping centres and areas)
Industri- eller arbetsområde (1-30 storeys, 10-30%, far 0.10-10) (commercial or industrial parks, areas or complexes)
Idrottspark eller rekreationsområde (1-3 storeys, ~10%, far 0.10-0.25) (sport, recreational or leisure parks, areas or complexes)
Institutionspark (1-10 storeys, ~10%, far 0.10-1) (community services parks, areas or complexes)

The postmodernism emerged as critique of the boring modernism and it is deeply eclectic selectively choosing pieces or returning completely to some of the preceding paradigms. Large part of the planning is deeply neomodernist today still enriching the extensive database of urban diagrams and patterns. There is one striking hybrid that reaches into the classical and liberated the enclosed urban blocks with arrangements as quasi-urban blocks. They are timeless and fixed as the most lucid modernist diagrams and therefore are as inflexible to changes. The other historical reminiscence besides the redesign of traditional urban core is the improvement of the modernist block in nature that has great reputation and liveability attractiveness in Sweden. The neomodernist block is refurbished with balconies and wider windows.

Nyare kvarter- eller kvasikvarterstad (3-6 storeys, 30-50%, far 0.90-3) (translated: city neighbourhoods in quasi-urban blocks)
Neofunktionalistiskt bostadsområde (3-6 storeys, 30-50%, far 0.90-3) (translated: small scale neomodernist residential area)

Figure 8: Various typologies in the city of Karlstad