Abstract. A questioning of the hybrid city concept is made in the light of network paradigm and the re-emergence of localism. Urban hybrid networks are either centrally controlled or emerge from a multiplicity of locally initiated activities integrating a commons’ approach. Network technologies support both directions, uncovering the hybrid dimension of the city. It seems that locality has a double character defined by a network / digital aspect on one hand and a material / local aspect on the other. Locality lives an insoluble tension between an obsession for its own identity definition and the multiple identities assigned to it through the bundles of networks it participates. A Commons’ approach could shift the negative sign of this tension to a positive one.

Keywords: network, locality, digital commons, design commons, open city

I. INTRODUCTION

Could we define a hybrid locality without referencing to the networks it participates?

Could the hybrid city be defined by its networked localities?

Does hybrid means networked?

Local activities with clear boundaries are constantly destabilized by their hybrid character, seeing their boundaries blurring and their identity reduced to that of a network’s node. Accepting the locality’s network dimension leads us to the acceptance of a larger context in which a commons’ definition of the hybrid would be possible. We must nevertheless take into account the fact that localism reemerges as a strong factor in a globalized society.

Centrally controlled urban digital networks opened up the possibility for distributed small interventions coordinated towards a multiplicity of commons goals to exist. At the same time, local space interventions are connected through management and design applying a collective intelligence perspective.

If hybrid city is finally a multiplicity of networked distributed activities, urban design can no longer be supported by a total design concept, as promoted by the modern condition. A global post modern design perspective seems more adequate, managing the multiplicity of networks and their synapses.

II. NETWORKED REGIONALISM

A re-emergence of localism is attested. In the global production field, one of the most crucial ones, Fred Curtis and David Ehrenfeld note that an “effort to manufacture more products locally” is growing in importance. Manufacturers tend to relocate production closer to major markets trying to minimize transportation costs. “Relocalization strategies include local currencies, community land trusts, decentralized alternative energy development, water conservation and reuse, local food production, and new, locally oriented business networks”. Global trade will not disappear but the importance of local production will increase. Michel Bauwens sees an inevitable localization of globalization.

The localization trend is clearly supported by the development of distributed manufacturing. Personal fabrication is gaining in importance, lowering the local industry’s scale threshold and repositioning it in the global production system. The proliferation of 3d printing technology fantasy works in that direction. We can produce locally what is conceived and controlled elsewhere in accordance with local demand’s fluctuations and without transportation fees.

Fab Lab Athens started its activity in the context of the international Fab Lab network, but with the,  

---

4 http://fablabathens.gr Partners: NTUA (hosting organization), GFOSS, Technical Chamber of Greece, P2P Foundation, Mycity.me.
more precise, objective to promote open design and manufacturing in a crisis environment. One of its priorities is the support of distributed - localized production units. As the focus of common production is moving from immaterial production to material production, we are allowed to imagine networks of local micro-factories linked to global open design communities.7 Those factories tend to be situated in the urban tissue, near the final user, proposing with the digital support of design communities, a novel form of hybrid city embracing the small – local production, coordinated by digital networks.

Distributed activity organization is also attested in the cultural – educational institutions; Their locality is redefined in a network perspective they produce and develop. Each of the conventional cultural institution activities, cannot be treated only through its physical location in the urban tissue, but as a network of places digitally connected.

Distributed cultural activities’ cognitive map could be drawn by placing them simultaneously in three axes, the physical – virtual one, the fixed – mobile and the open - closed one.8 “The first set of terms, "physical" and "virtual" describes two ends of a continuum of "locations" where the term "physical" identifies a material location and the term "virtual" identifies a digital location. The second set of terms refers to the boundaries of the experience. The term "fixed" suggests that the experience is bounded by a particular location; the term "mobile" means that the experience can be accessed as a person moves among locations. The third set of terms is used to describe the creative expanse of the activity. The term "closed" is used when the activity is scripted or explicitly organized for a participant. The term "open" describes activities that can be modified, changed, or expanded by a participant.9

It is accepted that physical space is only one part of the whole activity’s development. Finally as the hybrid status of activities becomes hegemonic, the differentiations between different institutions and their spaces are blurring, also because of their network interconnections. Museums for instance integrate knowledge dissemination and educational activities, while libraries include educational features and commercial ones, whereas libraries develop museum activities and educational ones.

Networks of hybrid places structure each activity. The hybrid city takes the form of interconnected through synapses activities’ networks with no clearly defined identity and borders.

The network paradigm seems to be opposed to the definition of unique identities, clear borders and discrete artifacts. As Christopher High points out, architecture and urbanism can no longer be seen as a problem of containment and boundaries. They are dissolved in a network of dispersed places and distributed activities. Network propinquity is overlapping physical proximity. “The discourses surrounding networking and globalization invoke a plethora of tropes about the erasure of border: smoothness, free markets, spaces of flows, networking itself”. Network intensity promotes new forms of social governance, but also new forms of social actions and thus challenges urbanism in its conventional form of practice.

Each local activity with clear boundaries is constantly undermined by its hybrid character, seeing its boundaries blurring and its identity transformed to that of a network’s node constantly evolving.

Hybrid is by essence problematic, not being able to escape a network dimension that constantly destabilizes the local, the defined, the node in its ontology. Networks are dynamic with ever-changing finalities and configurations. We cannot define a hybrid locality without referencing to the networks it participates or it would virtually participate. Hybrid means in fact networked.

III. A TENSION BETWEEN LOCAL AND NETWORK IDENTITY

Digital regionalism was initiated by a theoretical intention questioning a fact: while digital technologies proclaimed a technological revolution in total shift with the existing local conditions, in fact they were integrated to it, changing it in the beginning gradually and only in the depth of time totally. While theories for or against new technologies have been given battles on an imaginary field they have themselves defined, the ground on which they stood was continuously changing precisely because of digital technologies.

On an evolving local ground, any architectural intention defining a stable approach directly related to an a priori form led to theoretical impasses. The only way seemed to be to conceptualize the local as it is evolving through the digital. That is, to design the conditions of continuously changing localities and not the ultimate Form when the changes will supposedly occur. To think, in other words, of a digitally existing local witch in fact is a networked local in a translocal condition.

Digital regionalism would not aim to the design of local architectural identities digitally augmented, as an architectural opposition to globalization. Regionalism


Susana Bautista and Anne Balsamo, «Understanding the Distributed Museum: Mapping the Spaces of Museology in Contemporary Culture», http://www.museumsandstheweb.com/mw2011/papers/understanding_the_distributed_museum_mapping 1

Ibid.


Ibid., p. 108.


vi

vii

viii

ix

x

xi
in this case, refers to localities considered through their constant agencement, as events, in continuous tension, as symptoms of ephemeral equilibrium of forces in presence. What seems stable contains the possibilities of its change. Digital refers to the network paradigm as a hegemonic scheme through which we consider our relation to our conditions of being. Through digital regionalism, localities are seen in constant tension between place and network, between *omoi-poiesis* and *etero-poiesis*.

The tension occurring between local and network identity, proliferates through networks at a translocal scale. Digital regionalism is in fact networked regionalism.

Hybrid city is constituted by a multiplicity of networked distributed activities. Hybrid activities and their corresponding hybrid spaces are in fact digitally networked activities and spaces. Urban design can no longer refer to the total physical design of the city, as promoted by the modern condition, but to the global design of a multitude of networks of interconnected activities disseminated in the urban fabric. The sets of open interconnected networks promote a continuous re-writing of the (hybrid) city.

Antonio Negri referring to Bigness and Junkspace of Rem Koolhaas describes the postmodern condition of the metropolis as an extraordinary complex circulation of commodities, webs of information, continuous movements and radical nomadism of labour that is also an excess of the biopolitical power of the multitude with regard to the controlling ability of dominant institutions. That is, metropolis is seen as productive space including all population but at the same time redistributing it to mobile, flexible and precarious functions with no relation with each other. Control is operated by disjunction. One cannot have a total view of the networked city. As Negri points out, metropolis is a *disjunctive exclusion space*.

Will the hybrid city dissolve to the multitude of activities’ networks constituting metropolis as the biopolitical body without organs? Or in the same body without organs, that is also the body of the multitude, there is a possibility of activities’ interconnections towards common oriented goals?

IV. NETWORKED SINGULARITIES AND COMMONS

How could we build a bottom up network commons oriented?

A whole activity can be disseminated to a number of nodes located in the urban tissue, cooperating towards a common goal. The networks of micro – architectures, as the exact opposite of big interventions, promote a new concept of design in the crisis era. The minimization of each intervention is combined with the maximization of the global impact through their digital cooperation. They are discreet elements inserted and operating into the urban fabric at the same way as Ambient Intelligent (AmI) Components are inserted and operate into the buildings’ space. Although there is normally no centralized control structure dictating how individual monads should behave, local interactions between such agents could lead to the emergence of common global behavior. The multiple ways of defining those interactions responds to the parametric change of local monads, linked to a parametric change of urban space. When they act as multitude, their mutations and changes also activate the space they occupy, causing different qualities to emerge, temporary fields to be formed, and multiple unpredictable relationships to be built.

Those flexible, reprogrammable and extendable hybrid networks could act as catalyzators of both local and global change controlled by bottom up economics.

Those micro-interventions in the metropolis, catalyze finally *collective activities and events*. They support the possibility of change to those parts of the urban that are considered, not really empty or un-built, but “at disposition”.

As swarms space interventions are informed by ambient networks, they are transformed to multitudes, “commons” constantly actualized. A population of monads is formed interacting at a global level with one another and at a local level with their environment.

The search for connected localities at a city or a territorial level had already begun in distributed library network, e-democracy spaces, NGO distributed spaces, cultural info points, disposing interconnected local and global behaviors.

The architectural context in witch we are working is that of connected localities. The field of design development is that of *swarm micro architectures*. We are referring to activities that up to now used to be hold together in one building, and now they are distributed in space forming *swarms of interconnected localities*.

We are reaching questions concerning the political ontology of dispersed / distributed activities, where the notion of *swarm* in activities’ formation and space design is becoming very popular, as it proposes a bottom – up action of elementary monads, producing an emerging global behavior through local interactions. In most cases where a swarm approach is present, a technical ideology obscures the fact that architecture is not a mere technical object but a socially produced catalyst of collective activities. As a critic to that approach we propose a theoretical shift from the notion of *swarm* to that of *multitude* in the direction of Eugene Thacker: Swarm must be considered as a bio-

---

39 Ibid.

technical notion, whereas multitude as a political one, the commons being the production of the multitude. Following Spinoza, Thacker underlines the multitude’s instability and the role played by intention and scope in the coercion of distributed organizations.

Networked micro architectures are singularities cooperating for the creation of common (translocal) spaces. Is it an urbanism slightly out of control or a novel form of utopia “inserted” into the existing urban fabric?

Those cooperating connected micro-interventions show the way for a radically different mode of intervening in the city, in contrast with large scale interventions, who do not take into account the existing urban fabric and social relations, belonging to a mode of space production no longer sustainable in a crisis era.

V. DESIGN COMMONS

Information circulation and coordination, knowledge production and sharing, design development and sharing is, from a technical point of view, what holds together those micro-interventions. They form an essential part of the “hybrid” dimension of the distributed activities in the city fabric.

In the distributed small fabrication already mentioned when we made reference to Fab Labs, a knowledge-intensive instead of capital-intensive approach paves the way for the development of smaller-scale production units, while design software projects are being collaboratively developed. Going one step further, we could imagine conjunction of different open manufacturing processes forming clusters, while design adopts the principles of free/open source software production. The aim of such a shift would be twofold. On the one hand, this could lead towards the creation of Digital Commons concerning manufacturing, i.e. a common repository of algorithms for micro-constructions or parts of a larger construction that could be produced with the aid of digital manufacturing techniques. On the other hand, during the lifetime of a certain building the user could have at its disposal a corpus of digital files related to certain parts to be replaced, improved or fixed if needed. The as-build-designs would include the aforementioned files which could be implemented by a local small scale manufacturing modules. In this context an open continuum of design-manufacturing-utility would come to the fore with architecture as a peer-to-peer participatory creative process in which every peer, from the architect to the final user, would be included⁶⁴.

Towards this direction, design has to reconfigure its space of knowledge into practices where building (normative) objects will continue to be only one part. Architecture and Urbanism are not declining but see their boundaries blurring. Design is conceived through code creation as a continuous knowledge producing activity⁶⁵. In this context design overflows the particular space location it is primarily invested in and finds itself distributed in networks of design. Design overflows the limits of isolated works and, through the implementation of open source algorithms, declares its continuous deterritorializations and reterritorializations in a series of projects. It tends to be ubiquitous and forms a code flow circulating among all possible situated architectural projects acquiring a common character towards the forming of (Digital) Design Commons⁶⁶.

Design Commons are related to informational resources created and shared within voluntary design communities. They are populated by (architectural) digital design components elaborated through open software development and applications. Code creation is one of the activities that reconfigure architecture’s space of knowledge. Through code creation, architecture is conceived as a knowledge producing activity not attached to a particular architectural work that is, not related exclusively to the sole creativity of the architect working on a specific project. Code is, of course, normally produced for the purpose of a particular project but, being objectified as writing⁶⁷, it is detached from the project as an abstract design component. It constitutes a partial (collective) intelligence that through a nebulous form circulates from project to project.

Could the formation of this distributed but partial intelligence help us support collaborative design practice? Or, in other words, how do we structure a (collaborative) practice that sees the ubiquitous design (the design that escapes the boundaries of a specific project) turn into commonwealth through the creation of digital design commons?

Design commons could support the networks of distributed activities collaborating towards a common goal. In fact they are their common horizontal liaison, while each activity is localized and singular.

Hybrid city seen from the small interconnected spaces’ networks perspective does not only questions the object of architecture and urbanism, but also their subject:The network dissolves the object’s boundaries.

Michael Hardt notes that architecture does not decline but sees its boundaries blurring, sees its activity overflow the walls of the institution. “Will architecture respond by fortifying its boundaries or will reconfigure


⁶⁶ Franco Berardi, The soul at Work, from Alienation to Autonomy, Semiotext(e) / Foreign Agents, 2009, p. 61.
its space of knowledge into different practices where building (normative) objects will be only one part

VI. OPEN (HYBRID) CITY

An open hybrid city would be the distributed activities networks and their digital collaboration operating on a common urban ground. A multiplicity of networked local interventions would be supported by global technologies integrating open ubiquitous design networks.

Two general trends must be taken into account:

The first, a more general one, refers to the internet’s evolution during the last 15 years. “The continuous evolution from the static Web to the Social Web, the Real – Time Web, the Semantic Web, and eventually the Intelligent Web in the near future, widens substantially the option for constructing the digital space of cities.” Open urban data access and real time spatial intelligence are key futures of this 3d wave Web.

The second trend, related to the first one, seeks a changing implementation attitude towards a new scheme of top – down / bottom – up relationship. Technology push initiatives are developed in accordance with application pull ones. Bottom up initiatives, closely related to the planning of specific urban areas, must be synchronised to the top down strategies of cloud computing or Internet of Things (IoT). It is a necessary direction to follow as we are working in the context of pre-existing urban spatialities and design intentions are at first formulated locally, as we have seen at the beginning of the paper with the re-emergence of localism.

Involving communities of citizens is a necessary condition, expecting from them to actually contribute to the change of their environment following objectives locally defined, underlining priorities specific to their immediate situation and context such as healthcare facilities for a heavily populated area.

Communities’ involvement is related to collective intelligence production through collaborations, co-design and capitalization of experiences, knowledge and applications.

A necessary condition for an effective development of collective intelligence is open data creation and open collaboration platforms design and implementation. Thus common knowledge assets on urban spatiality are produced.

For the moment, and if we approach the city in its totality, a number of applications’ fields emerge not necessarily in relation with each other. We could mention among others:

- Smart mobility.
- Energy management
- Environmental monitoring.
- Home car services.
- Distributed production.
- Parks and garden control
- Public installation management (i.e. public lighting)

Future Internet technologies supporting those fields are cloud computing, IoT, location aware technologies, sensors’ networks. Cloud computing, IoT and sensors’ networks ontologies have a hegemonic position providing the backbone of spatial intelligence of cities.

Fields of application are networks of located urban spatialities. Thus hybrid city will be a networked city, hybrid meaning networked, as a possible answer to the question we have formulated at the beginning of the paper. Nevertheless, he question of interconnectivity of all fields remains open.

Does the multiplicity of networks tend to constitute a structure of unity defining a novel subjectivity for the hybrid city?

The answer to the question does not seems obvious since the different application field are developed in relative independence from each other, the only but not less important factor linking them being the core technologies of global “technology push” initiatives. Trying to answer the above question we will make reference to one research and one research direction of Architectural Technology Research Unit (ATRU) of the School of Architecture N.T.U.A.

The first one, Dynamic Lighting Design (DLD), a EU funded Aristeia research is about dynamic lighting as a tool to achieve amenity and sustainability in networks of open public spaces. The research’s outcome is DLD software, a dynamic tool for interactive design and control of public spaces’ lighting.

Dynamic lighting projections could impact on amenity and people’s engagement in public space, oriented towards a socially sustainable development, and then to create a parametric tool that designs, demonstrates and improves the quality of the public spaces.

---


Ibid., p.52

http://atru.arch.ntua.gr

Dynamic Lighting Design (DLD), EU funded Aristeia research is about dynamic lighting as a tool to achieve amenity and sustainability in networks of open public spaces. The research’s outcome is DLD software, a dynamic tool for interactive design and control of public spaces’ lighting.

http://atru.arch.ntua.gr/digital-design-fabrication/research/47
controls those dynamic lighting patterns in public space.

There is a positive aspect of implementing dynamic lighting in open space. Dynamic lighting is present in urban relighting evaluations that have reported improvements in the general perception of the environment and generally making the environment psychologically more inviting, in essence providing sustainability.

We establish at first, a formalized way to analyze architecture, dynamic lighting technology and digital 3d projection technology by merging theory and technology in the field of study. Then we look for key design parameters of light and space by reviewing theories and by analyzing and documenting some case studies that integrate dynamic lighting design.

The outcome is to design the D.L.D. digital tool, which will analyze, demonstrate, design and control patterns of light and projections on public space. As an example, the D.L.D. tool will be used to create dynamic lighting effects for an open area in the center of the city of Athens, a public square.

The software will be capable of controlling, through either specific or intelligently evolving interaction scenarios, the lighting installations of a number of urban public spaces. Depending on the number and topology of the spaces in question, ‘DLD’ (software) will handle them by constructing an intelligent network where information and ‘interactions’ will flow between spaces (locations). The term users refers to either single users or clusters of people that are using, crossing or are otherwise connected that the public space. It could also refer to people that are not physically in the public space with the potential that the software offers, transformation scenarios of public space lighting. The term user could also refer to the authority that controls the lighting of the public space. The user can be either located (interaction through mobile or specific interaction element in the space), or to act remotely (interaction through the internet).

DLD links all actors involved in dynamic lighting decisions of a public space. Not only authorities, but also pedestrians and ad hoc groups of citizens creating an event, negotiate and decide the lighting pattern through a common digital platform. Real time decisions on sustainability issues can be taken through the same platform. Moreover, DLD covering a network of public spaces gives the possibility to extend dynamic decision making to larger urban areas.

A second research direction, a collaboration of ATRU with Hellenic Open University and the Computer Technology Institute, was presented at Intelligent Environments 11 conference. At “Using pervasive computing and open space design to transform the schoolyard into an educational setting”, educational process’s experimental implementation with the support of Information Communication Technologies (ICT) was integrated to the elective course "Principles of Environmental Sciences" of the Second High School Class that combines environmental education, principles of space design, introduction to information technologies’ applications in ecology, introduction to "green" ICT, and to sustainable development through the digital management of planting and the integration of precision agriculture. The experimental implementation is realized in collaboration with the professors of the 1st General High School of Agios Dimitrios.

Temperature, humidity and illumination sensors are placed in structures parametrically designed according to the bioclimatic conditions of the school yard space and have been sited in accordance with the operational needs of the complex. Students interact with plants and offer maintenance services when plants request it.

Later on we have detached, with Achilles Kameas, the e-plants concepts from the School application and formulate it in a more general application direction referring to the urban space.

An Urban Commons approach was developed starting from the private and the public and leading to the commons.

http://atru.arch.ntua.gr/digital-design-fabrication/research
The development of a livable urban green network aimed at:

- Reclaiming the urban landscape through networks of urban e-Plants connecting individual and collective spaces in a *common sustainable urban environment*, through

- The development of a framework for common local decisions, and common knowledge on a sustainable *urban e-plants space* development based on

- Urban Ambient Intelligence (U-AmI)\(^{xxv}\)

The concept was developed following the rationale that, in actual urban spaces:

- Public green spaces, are owned, managed, supported by public or local authorities
- Private gardens are disseminated on private verandas and terraces.

The current effort and politics aiming at the multiplication and strengthening separately of both private and public initiatives meets the following constraints:

- For the public green spaces, a difficulty to find enough public owned space and a budget limits.
- For the private green spaces, an obvious limit to the available open space.
- For both, public and private, a dissemination of green “spots” (bigger for the public spaces, smaller for the private spaces), with no apparent global strategy over the city.

Yet, private green spaces seem to be more dynamic (relatively low cost, everybody has some plants to his apartment), but of minor impact on the city as they are small, isolated and constrained by the available private space’s surface. They are in fact, isolated green spots.

We proposed to start linking all those isolated private green spots, each one trying to be extended, on light constructions, towards its neighbors, to the adjacent terraces, to the green spots across the street, down the road to a small public place.

The domestic plants are equipped with ambient intelligence, exchanging information with users. The users *form local communities* that discuss and take decisions on:

- The possible extensions of plants’ spaces (between the properties and towards public spaces)
- The ways this extension could improve the micro climate of the neighborhood.
- The provision with water (possible grey water) and the management of the plants.

A web platform supports the whole operation hosting information about the plants, decision making tools (on space design, plants’ choices, sensors and actuators, expected functionalities), parametric space design tools, energy evaluation, grey water – public water management.

The starting point of the urban e-plants network is the *habitat – school network*. Schools are public establishments linking public and private in common and they also have an educational - dissemination role.

From the two research examples, DLD and e-Plants we could assume that:

- They can use the same sensors’ network that is in fact an urban data sensors’ network on environmental conditions.
- Both DLD and e-Plants started from a local application and have been extended to cover larger urban areas.
- They both function through an open software platform giving the possibility to develop additional applications and to be implemented in other places. An open knowledge / innovation network can be developed.
- They involve users / citizens / communities opinions and decisions from the beginning and throughout the whole process of design – use.

Hybrid city structured through the implementation of urban hybrid networks could not only relay physical planning or top down digital technologies. A hybrid city urbanism has to integrate horizontal digital commons, linking all located networks and developing common knowledge assets and common design tools.

\(^{xxv}\) [http://www.archsign.gr/writings/famagusta/famagusta.html](http://www.archsign.gr/writings/famagusta/famagusta.html)