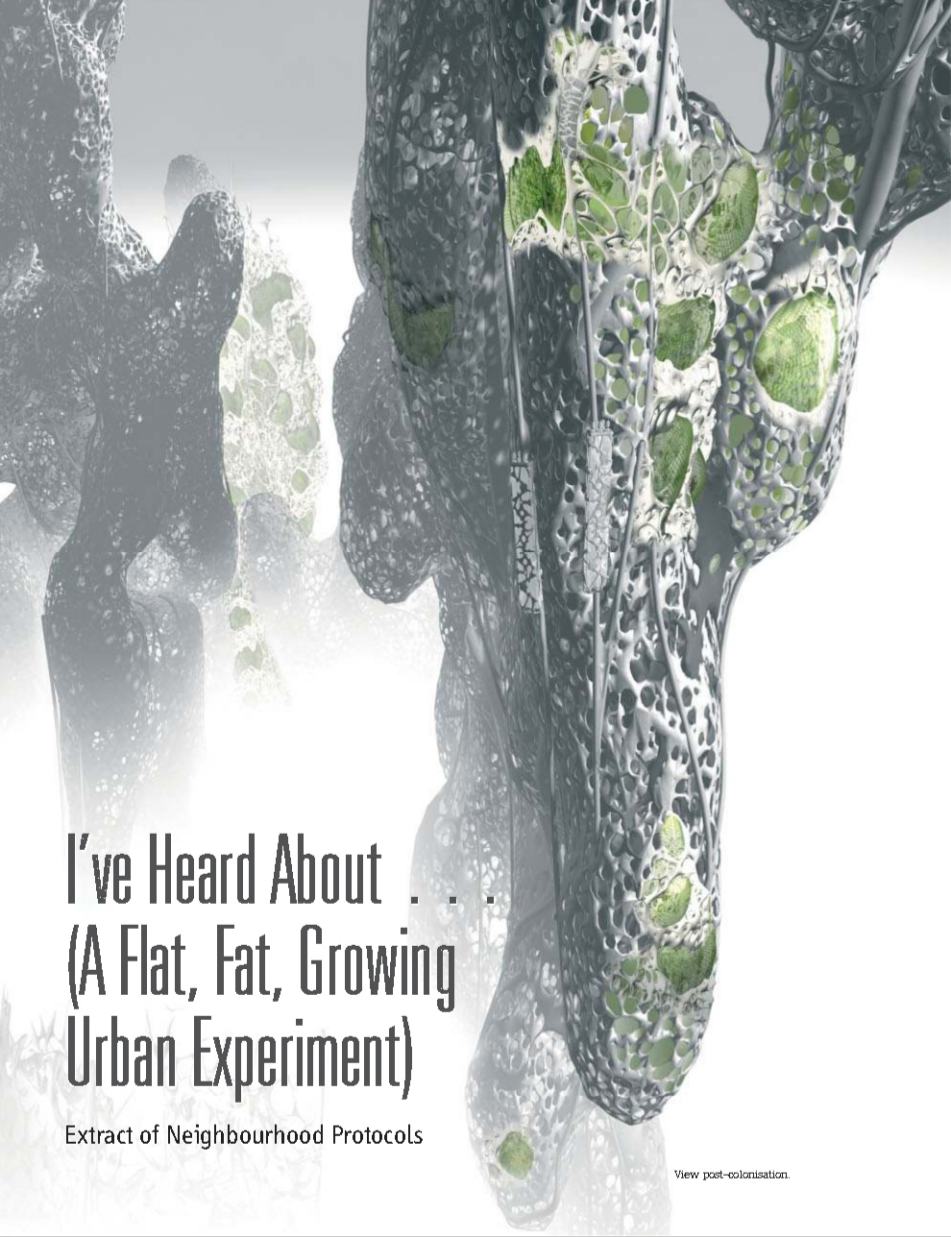




Digital Cities

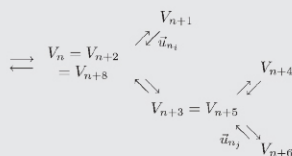


I've Heard About . . . (A Flat, Fat, Growing Urban Experiment)

Extract of Neighbourhood Protocols

View post-colonisation.

Urban models are conventionally planned and intended to control urban systems. François Roche's vision is to the contrary: it is for an unpredictable organic urbanism. A biostructure develops its own adaptive behaviour, based on growth scripts and open algorithms. It is entirely reflexive, responding to human occupation and expression rather than being managed or operated at human will.



$$\bar{u}_t(q) = V(\rho_i(q), \varepsilon_i(q) | c(q))$$

Neighbourhood protocol

Current state approved by e-pulse 25292-45-34

The urban structure 'I've heard about' is a habitable organism. It develops by means of adaptive, transitory scenarios in which the operational mode is uncertainty. It is written based on growth scripts, open algorithms, that remain permeable not only to human expressions (expressions of individuality, relational, conflictual and transactional modes, etc), but also to the most discrete data such as the chemical emissions of those who inhabit it. This biostructure becomes the visible part of human contingencies and their negotiation in real time. Due to its modes of emergence, its fabrication cannot be delegated to a political power that would deny its exchange procedures and design its contours in advance, either through mnemonics or coercion.

Generative Schemas

1 Entropies

1.0 The habitable structure is the result of an ongoing movement. It is an adaptive landscape, a biotopism based on local growth procedures that are themselves in a constant state of evolution. This is a general principle.

1.1 The primary function of the biostructure is to serve as a dwelling place. Its secondary function is to be reactive rather than proactive.

1.1.1 As an organism, the biostructure is not only receptive to human vicissitudes, it is their nerve ending.

1.2 The construction engine called Viab is a constituent part of the structure itself. It secretes the landscape where it is located and through which it moves. It is the vector of political and territorial self-determination operating in two modes: variability and viability.

1.2.1 The Viab generates the reticular structure using a process modelled on contour crafting (see [Processes]).

1.2.2 The growth of the reticular structure takes place through local accretion occurring arhythmically, not planned in advance but taking into account viability, ie all the varieties of structural constraint (see [Processes]).

1.2.3 At any given time, the construction algorithm is the same for all the engines present in the biostructure. Each Viab proceeds according to this algorithm, but conditioned by data, requests and local disturbances that are inherently variable.

1.2.3.1 Thus the variability of the Viab arises from the script that drives it, and this script itself undergoes a ceaseless reparametering as defined in [1.4].

1.3 The resulting form is uncertain and even unpredictable. It is the political antidote to the anticipatory modes that make space a system of control.

1.3.1 Consequently, the process is undeterminist.

1.3.2 Since the space involved in construction is indeterminat, it is assumed to be unfinished. If the opposite is the case, see [5.2 / 5.2.1].

1.4 The construction algorithm responds to two kinds of data inputs, internal and external.

The external inputs comprise the pre-existing urban morphology, modes of accessibility, structural limits, available natural light, the dimension and thickness of the habitable cells, the ensemble of parameters of the local biotope, etc.

The internal inputs are of two types:

- 1) Chemical: physiological empathy, endocrinal secretions, bodily emissions, prepsychisms. See [Self-Alienation].
- 2) Electronic: individualisms, personal commitments, subjectivities (information and decision-making network). See [Biopolitics].

1.4.1 The alchemy of the various inputs achieved by the construction algorithm determines the Viab's actions. The miscibility of the data is what gives rise to the collective body.

1.5 The algorithm is open source. Its variability results from experiences, sharing and negotiations. See [4.5].

1.6 The biostructure expands without eradicating the pre-existing tissues. The process does not start from a tabula rasa, nor does it lead to patrimonialisation. The structure behaves like a graft, or better said, a parasite. It operates in previously urbanised zones, seeps into interstices, places and environments, etc.

1.7 The biostructure is regionalised. The construction algorithm takes into account the supply of raw materials as a construction variable, and depends directly on the physical qualities of the substances used.

2 Bio-Citizens

2.0 The mere fact of being present in the biostructure confers citizenship rights. This is a general principle.

2.0.1 Consequently, the nature of the compact is territorial.

2.0.2 Citizens may appropriate a space, extend and transform it, and even destroy it.

2.1 Citizens of the biosphere agree that their requests (for growth, transformation, repairs, etc) be submitted to the influence of the chemical stimuli of the multitude.

2.2 The protocol for exchanges between citizens and the biostructure is freely renewable. It is cancelled if the citizen leaves.

2.3 All citizens are ipso facto owners.

2.4 Rules [1] to [8] apply to everyone as long as they reside in the biosphere.

2.5 For operating instructions and departure procedures, see [6] and [Processes].

3 Self-Alienation

3.0 Citizens agree to become part of a particular social body so as to share physiological information.

3.1 These prepsychic stimuli constitute the second type of inputs, ie internal.

3.1.1 These stimuli arising from the chemical secretions of the multitude of bodies affect the construction logic of the Viab. They are the vectors of its shared reality.

3.2 'Harvesting' takes place through the intermediary of nanoreceptors dispersed throughout the confines of the biostructure and inhaled by the citizens. The functioning of these chemical receptors is described in [Processes].

3.2.1 Their life span is 24 hours. Once this timeframe is over they automatically deactivate and are eliminated by the organism.

3.2.2 The anonymity of chemical data is a general principle.

3.3 Visitors to the biostructure disturb its equilibrium by the mere fact of entering its atmosphere.

3.4 Biostructure citizens are agents making up a reticular mode of political organisation. The resulting unstable equilibrium produces a social mode for which the neighbourhood protocol is both a precondition and a movement.

3.5 The induced behaviour is comparable to a kind of collective intelligence called swarm intelligence. See [Processes].

3.6 The chemical interface with citizens, ie the Viab, infuses, amalgamates and contractualises this political biochemistry.

4 Biopolitics

4.0 The social structure conforms to the territorial structure.

4.1 Creative individualism is a general principle.

4.2 Cohabitation is not based on static principles, but rather on a constant interaction between citizens, non-citizens and the biostructure.

4.3 No one may oppose the arrival of a new citizen and the resulting growth. This is a general principle.

4.3.1 In the same way, no one may oppose the voluntary departure of a citizen, or invoke a protocol rule against a citizen or a group to demand their departure.

4.4 Each citizen is free to choose their degree of participation and involvement in the life and growth of the biostructure.

4.5 Citizens have access to the data that condition the evolution of the biostructure in all its social aspects. They may propose a modification on the local, meta-local or overall level, and submit it to the multitude by means of the electronic networks running throughout the structure.

4.5.1 Accessing the data means interacting with the structure and being statistically recorded.

4.5.1.2 There are no preconditions for access to the database.

4.5.1.2 The database is a reactive interface: it serves simultaneously as a databank of all entered proposals, a receptor of individual feedback and space where the induced growth can be visualised.

4.5.2 The resulting ensemble of feedback is transmitted to the Viab.

4.5.3 This ensemble constitutes the city's morphological script.

4.6 Individual proposals via the networks can be made at any time. They are purely voluntary and not occasioned by any predetermined programme.

4.6.1 In any proposal, the elements of a situation are brought together on an experimental basis – proposals are speculative tools.

4.6.2 A proposal may be submitted anonymously via the biostructure network. The collection of individual feedback in electronic form is a general principle.

4.6.3 A proposal is an operative tool. It can only be applied dynamically. This makes the movement – social experience – a precondition.

4.6.4 A proposal is also a biopolitical tool. It cannot be formulated in a way that implies a delegation of political power in any form. This is a general principle.

4.7 The collection of feedback makes it possible both to judge the pertinence of the proposal and to call for its adoption or rejection. However, approval or disapproval are not the only possible results in this mechanism. The absence of feedback by more than a third of all citizens renders the proposal null and void.

4.7.1 Nevertheless, no proposal can be permanently rejected. Its reformulation is considered a legitimate renegotiation with the biostructure.

4.8 Any proposal may be presented in two forms simultaneously: one constitutive and permanent, the other experimental and temporary.

4.8.1 Any proposal dismissed in its constitutive version but temporarily approved can be applied on an experimental basis for a period to be defined in the proposal itself. The biostructure is to be consulted again at the end of the experiment.

4.8.2 A group of citizens may choose the manner in which to put an approved experiment into practice. By definition, this will require specific growth.

4.8.3 In this case and only in this case, the experiment and the rhizomes thus generated can be rejected only by the residents of these rhizomes.

4.8.3.1 The preceding is valid as long as these rhizomes do not overturn any general principles.

4.8.3.2 The concept of a rhizome extends beyond its physical existence.

4.9 Because of the social and territorial modifications implied in any proposal challenging one of the basic principles, in order to be adopted (see Open Source [5.2.1]) such a proposal must be reapproved on two occasions, and stated the same way as the original proposal.

4.10 To be approved, a proposal must be shared by a relative localised majority at a time (t).

4.10.1 A relative localised majority is comprised of a group of n citizens living contiguously.

4.10.2 The structure as a whole as well as all of its subgroups are by definition sets of relative localised majorities.

5 Open Source

5.0 Open source is a political and geographic tool.

5.0.1 To recapitulate, the Viab's construction behaviour is generated by a growth algorithm which itself is the result of the miscibility of the two inputs: the chemical and the electronic. See [Entropies].

5.1 All citizens may access the source code upon establishing residence in the biostucture. The source code contains the operating rules: the growth process and the transactional rules. General principles can only be modified under the restrictive conditions defined in point [4.9].

5.1.1 The accessibility of the Viab's source code makes it possible to avoid the implicit pitfalls entailed by its very existence. See [Anomalies].

5.1.2 The modification of the source code within the framework of transactions provided for requires an e-proposal. The implementation of the code modifications thus decided is the only way the Viab is to be reprogrammed.

5.1.3 All operating rules, no matter what kind, can only be understood as variables (environmental, social and construction) modifiable via collective proposals. They are approved electronically and chemically perturbed – see [Self-Alienation].

5.2 Any reprogramming of the Viab that violates this principle or one of the general principles challenges the very structure of society.

5.2.1 If this hypothetical step is taken, the Viab ceases to function in terms of construction and repairs. It becomes deactivated, a residue of the structure.

5.2.2 Nevertheless, following a prolonged deactivation the citizens may reinitialise the Viab's parameters. By exercising this option they return to the neighbourhood protocol 'I've heard about'.

Resultant Schemas

6 Uses

6.1 The dimensions of the structures and their growth along X-Y-Z coordinates depend directly on their localisation and the structural limits of the arborescences.

6.2 A new citizen may adopt one of two residence modes:

- Entropic, which consists of negotiating growth with the structure.
 - Nomadic, which consists of borrowing an abandoned cell.
- In both cases, the Viab is to carry out the transformations.

6.3 The economic transaction production/transformation takes place through the purchase of a 'time credit' allowing the utilisation of the Viab.

6.3.1 A time credit may be acquired in exchange for induced services, the latter being a production mode of transaction contractualised with the biostucture.

6.4 All citizens are obligated to develop a three-storey habitable space comprising an underground cellar and an attic above the ground floor, no matter how small. Flat, single-storey residences are prohibited. This is a general rule.

6.5 The first phase of residence is nomadic. A cell is developed using a habitability kit. This includes, among other things, a light polymerisable envelope that adapts to the morphological configuration of the empty cell. See [Processes].

6.6 Citizens are completely free to modify, transform or adapt this initial envelope or even to solidify it with the material of their choice. Note that only vertical walls are permanent. The Viab can modify and perforate horizontal structures (ceilings and floors).

6.7 Any use of these cells is allowed, for private or public use or services.

6.8 The transformation of a residence for a different use is negotiable with the adjoining cells. A new mini-neighbourhood protocol is drawn up.

6.8.1 This mini-neighbourhood protocol serves to define the ensemble of shared sensorial elements. The duration of the validity of this contract depends on the effective and corporal presence of the signatory parties.

6.9 When they leave a cell, citizens are obligated to return it to its original state, or in other words to destroy all of the permanent structures they have erected during their residence. An explicit agreement signed by the new resident of a transformed cell derogates this requirement.

7 Scripts

To recapitulate, the structure's morphogenesis is driven by collectively reprogrammable Viabs. Thus the details of the construction algorithm are only provisionally valid.

7.1 The Viab's general principle is structural maintenance.

7.1.1 The Viab infers local structural constraints from the data furnished by the information network that runs through the biostucture.

7.1.2 A structural inability to respond to a request leads the Viab to emit (and possibly itself process) a request for supporting growth.

7.1.3 Available natural light is taken into account, as is power transmission, in the processes of growth by local aggregation and secretion. Growth is particularly facilitated in the structure's convex regions and density is limited by diminishing energy. See [Processes].

7.2 The algorithm of the Viab's movements is described in terms of two levels of abstraction of the reticular structure: wire frame representation and its combinatoric graphing.

7.3 Citizens' requests for growth or maintenance and requests for structural reinforcement (support) originated by the Viab are spatialised by the electronic network. Emitted in one place, they are distributed along the topology of the reticular structure in a gradient whose intensity grows over time.

7.3.1 The Viab acquires requests through these intensity gradients transposed into the pre-existing combinatoric graph of the neighbourhood.

7.4 The primacy of structural maintenance leads the Viab to constantly inspect the structure. The gradients linked to requests and the chemical stimuli respectively act as drift factors and disturbances in this sweep.

7.4.1 The Viab's current technological limitations make a phased movement algorithm necessary. During this movement, the Viab uses a virtual Ariadne's thread anchored in a base point in the biostructure. See [Processes].

7.4.2 The impossibility of even a relatively short-term plan introduces an aleatory element into the Viab's algorithm for spontaneous movement.

7.4.3 The Viab's regular coverage of the entire structure is ensured not despite, but because of, this aleatory element in the movement algorithm. See [Processes].

8 Anomalies

8.0 The Viab is directly affected by the vibrations produced by the superimposition of two types of stimuli. See [Entropies].

8.0.1 Consequently, their heterogeneous combination disturbs the construction algorithm and engenders topological, aesthetic and structural disturbances.

8.0.2 These aberrations, deviations and hybridations, the disorders generated by the Viab's morphological speculations, are intrinsic to its operation.

8.1 There are several types of morphological pathologies:
– Malformations due to deficiencies, cysts, cankers, protuberances, occlusions, etc.
– Degeneration due to necrosis, erosion, fissures, disaggregation, etc.

8.2 These malformations modify the nature of the constructed secretions and alter the definition of familiar geographies.

8.2. Nevertheless, the only malformations the Viab seeks to repair or deprogramme are those that endanger the stability of all or a part of the biostructure.

8.3 Any other physical or aesthetic deformation is to be considered a result of the neighbourhood protocol.

Processes

Accretion n.m. -1. Growth of a region through the inflow and deposit of material. The biostructure's growth is also similar to the polypytch growth of coral.

Biotropism n. (from the Greek *tropos*, direction) -1. Spatially oriented growth among stationary plants and animals under the influence of external stimulus (biological, organic or chemical). -2. Intrinsic characteristic of 'I've heard about'.

Contour Crafting (CC) n. -1. A computer-driven construction method that is a mega-scale 3-D printing technology invented by Behrokh Khoshnevis at the University of Southern California. This process of computer-driven construction or, more precisely, secretion, uses an injection nozzle to simultaneously carry out the formwork and the pouring of the walls.

Entropy n. (physics) -1. Magnitude that makes it possible to measure the degree of disorder in a system.

Nanoreceptors n. (physics, from nanos: $1\text{nm} = 10^{-9}\text{m}$) -1. Nanoparticles (NP) used to capture and detect the presence of a chemical substance in a particular atmosphere. -2A. Nanoreceptors can be inhaled, making it possible to 'sniff' the chemical state of the human body. -2B. Functioning like pollens, they are concentrated in the bronchia and attach themselves to the blood vessels. This location makes it possible for them to detect traces of stress hormones (hydrocortisone) carried by the haemoglobin. As soon as they come into contact with this substance, the phospholipid membrane of the NP dissolves and releases several molecules, including formaldehyde (H₂CO) in a gaseous state. The molecules rejected by the respiratory tract are detected using cavity ring-down spectroscopy (CRDS). This is a method of optical analysis using laser beams programmed to a particular frequency, making it possible to measure the density of airborne molecules. The wavelength used for the detection of formaldehyde is around 350 nanometres. -3. Consequently, the nanoreceptors keep the Viabs informed about the ambient stress level.

Prepsychism n. -1. Preverbal state of consciousness of an individual in which the self has no importance, a body that does not think but senses its surroundings and lets itself change to let itself be touched and felt, to 'become porous to every breath'. By extension, the necessary condition for chemically sharing, and reweaving the biochemical citizen through nanoreceptors in the 'I've heard about' structure.

Swarm intelligence n. -1. Term designating a form of behaviour characterised by the absence of central control or overall architecture. By extension, the 'local growth stimuli' produced by individual requests for the extension of the structure and the chemical data which together determine the actual construction work performed by each Viab. These growth stimuli are the result of individual behaviours, determined at the local level (particularly by negotiations between next-door neighbours and nanoreceptors).

Viab n. (contraction of variability-viability) -1A. A reactive and autonomous construction machine employing secretion. Developed for the first biostructure, the Viab launches a robotic algorithm that allows it to build architectural structures based on the principles of indeterminacy: its open-source programming makes it permeable to external inputs. Its basic script defines protocols for action, movement and all sorts of constraints, but also entirely integrates environmental variables that could affect its primary function. -1B. An explanation of its functioning: the support rail on which it moves, similar to a crane track, is secreted by the Viab itself. Articulated pneumatic arms move the secretion heads. During pouring the assembly is rigidified as the heads lock into the structure to be extended. The formwork is generated using a telescopic arm with a nozzle at the end. This system incorporates the variation between the diameters of the various structural sections. Pouring is carried out simply by filling this shell. As the machine advances the secretion head moves by the alternate inflation and deflation of three pneumatic valves. At the end of a particular construction phase, the articulated arm retracts into the Viab. The latter can move along the rail to reach a future growth zone. 

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