Urban milieus are places of fast change, where nowadays media architecture is playing an increasingly important role. Exploring these creative processes, the "intelligent skin" project adopted the hypercycle as a pivotal concept. The visible part of "intelligent skins" are large facade-like displays, which operate in a quasi-species mode through their informational autonomy. They are conceived as a cross-over of concepts from media theory and artificial life, architecture and biology, for investigating the possibility to establish new hypercycles from a media architecture perspective. The displays are like a skin/fur of house-beings, Oikoborgs, which develop individuality while growing as a center of gravity for new modes for negotiating codes in dynamic urban spaces. Those new codes and consistencies emerge in a mixed-species setting according to a logic of the circumstantial. As a living example of social genesis, Oikoborgs add a further "mediatrophic" level, which we describe in terms of basic ontic elements. Taken together, reaction-diffusion, compartmentalization, topological "randolations," and hypercycles are not concerned just with nature any more. They describe synthetic openness as Deleuzean virtuality in mindful cultures as well, and so the possibility for foamy urban co-habitation in new semio-spheres.

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1. Intelligent Skin - towards an architectural logics of the circumstantial

These animals are amazing [sepias]. These animals are amazing too [Oikoborgs]. Throughout the next 30 minutes we will attempt to develop and explore a theoretical frameset that allows to speak of both – ongoing biological speciation, and architectures’ ongoing way to differentiate and expand into the virtual – within a common theoretical framework. Biological matter, physiological organization, as a condensed concrete version of our hypotheses, could be conceived to follow the same principles as the emerging urban media-spheres.

For virtual architecture, as for example Marcos Novak has accentuated, encompasses forms of expressions as yet-unnamed alien hybrids of spatial compartmentalization, biological bodiliness and evolutionary mutability.

Two concepts will be crucial for our suggested frameset: firstly, the model of the Hypercycle and the quasi-species, developed by the biologist Manfred Eigen, and secondly, the philosophical concept of virtuality developed by Gilles Deleuze among others. Both concepts, to sketch an initial common goal, address the question of the emerging new. To differentiate the world in its richness according to properties and similarities is one thing. It can only ever be done retrospectively. Descriptively. To account for the forces causing adaptation as well as continuity of any “ordered system” is something quite different, it is about expectation, outsets. Both our pivotal concepts from biology as well as from philosophy suggest that there is the possibility to speak about the sphere of the pre-specific, of the pre-significant in a structured way.
For architecture exploring virtuality, it is this realm of the pre-specific they are currently investigating. What we mean by speaking of architectures’ virtualization has to do with how hybridity, mixtures, dynamics, transformation, relationality, adaptation suddenly become key values for architecture, which traditionally has been focusing on stability, statics, and fixed orders. Thus the organization of inhabitable spaces seems to no longer be adequately described by the functional category of compartmentalization alone. Building chambers for our different activities, functional units, walls and fences to organize separated areas, is increasingly gaining in complexity. Architectonic compartments tend to integrate not only many functions at one and the same time, but also many addressees – the Dutch architectural studio MVRDV for example dedicatedly proclaims the topic of density to be their guiding theme. Their recent book *KM3 – Excursions on Capa-Cities* is an impressive manifestation of spatiality as architecture sees itself confronted with today. With its emphasis on capacity it accentuates well that it is the dispositives of forces and potentials that are increasingly playing a role for architectural design along the predominant forces of gravity and the respective reaction of resistance. Density as a key factor of contemporary spatial design introduces a converging vertical dynamics accentuating notions of transformation and adaptation along to the horizontal dynamics of specialization and compartmentalization. This leads some architects to actually speak of their work in terms of quasi-biological processes, and not only in a metaphorical sense - for example people in Graz, Austria, like to call their new Kunsthaus designed by Peter Cook as the “friendly alien”; or Farshid Moussavis’ speaking of practice as “breeding architecture”. There may be involved more than just a fashionable way of speaking when people like Greg Lynn, Marcos Novak or Foreign Office Architects are referring to their buildings
as *alien species*, *allo species* or simply *animate architecture*. A virtual house, so the postulate by John Rajchman, would be a house allowing for the most previously unconceived relations to emerge. Architecture *spurring spontaneous growth of relationalities*, and along with that, of patterns and behaviors, might indeed best be referred to as animate architecture, and at once asks for according principles of evolution.

What models are there to account for diversification and speciation in evolutionary biology? Traditionally, the species were viewed within a classificatory framework that focused on a definition based on observations of similar qualities (morphological, chemical [including DNA], genetic) linking all its individuals. Yet despite our increasing powers of description, from the macro to the micro levels, we have difficulties grasping the dynamic operations underlying these comprehensive descriptions. Edwina Taborsky asks in her inspiring essay “The virtual mode: a different look at species” from a semiotic point of view, whether there may be more to a species than what can be understood within the two classificatory tactics of “individual” and “collection of individuals”. As Taborsky points out, in addition to a species definition tied to classification, there is a need to explore a definition that enables us to address the initial as well as the ongoing formation of that species. Of a particular interest thus are the moments of beginnings.

It has of course been a key concern within biology to find models for the beginnings of speciation: how can it be explained, that from the pre-biotic spheres of life different species began to develop? Manfred Eigen has
dedicatedly addressed this issue with his model of the Hypercycle in the late 70ies. He tries to account for the process of initial bio-chemical beginnings, and he addresses the question of the emerging new in quite a fundamental sense. What might be the benefits of the model of hypercyclic structures for reflecting about contemporary architecture, and what might it explain with regard to the current “virtualization of architecture”? In rather simple terms, the Hypercycle is a cycle of dependencies within a reaction-networks. As such it is, according to Eigen, one of the principles or mechanisms of organization capable of accounting for integration in biological evolution. As a principle of structural integration, accounting for the emergence of the new within biological systems, it might be suitable also to serve as a conceptual frame for describing the current tendencies of architectures’ engagements with virtuality.

2. **Compartmentalization and Hypercycles – forms of integrative organization**

For Eigen there are mainly two principles of organization capable of accounting for integrative systems of order – compartmentalization is the traditional approach to do so. Yet compartmentalization alone cannot account for the emergence of the new from within its ordered components. What needs to be explained is both evolution on the molecular level, on a pre-biotic scale, and also the process of accumulation of information. Biological cross-generational variation is commonly explained in terms of the melting and exchange of different DNA throughout history. But in the pre-biotic spheres of life, there were no distinguished sets of genomes available yet, consisting from the
genes and the whole cell-physiological machinery – different genomes are only the result of this development.

Let us focus closer on what Hypercycles are according to Eigen’s original concept.

Put briefly, a Hypercycle is a concept consisting of two main ingredients. The first is, that there are communities of individuals belonging to a small number of different types. Secondly, the members of the types are conceived to be related in a certain way. In particular, the individuals of any of the types are partially dependent on the members of other types by means of their the output, their produces. Partially dependent here means that this dependency allows for a differential surplus of reproductive success.

In their interplay, individuals of different types form a circle of dependencies. Such “inner circles” are in a “hyper”-position to the individual and to the types. As a whole, the community of all the coupled types may behave and evolve as if they belonged to a single type, or species. Accordingly, Eigen has coined the term “quasi-species”. He even was able to set up biomolecular Hypercycles laboratory experiments, strongly suggesting that this particular kind of biochemical evolution may have preceded life. Hypercycles for Eigen have been conceptualized to describe “creative milieus of RNA molecules” – which per se is a paradox because by themselves, RNA molecules like viruses, proteins or DNA in solution, are “dead” and can be regarded as belonging to the abiotic or pre-biotic sphere of live.
Taken together, Eigen’s experiments showed that evolution by mutation and selection can take place also in the realms of the actually non-living, of the abiotic. The principles of mutation and selection do not need living structures made from biological matter to get involved. Just the possibility for being copied and a circular dependency is needed, to enable for accumulation of new information ruling processes and structures.

Another property of the concept is, that it links the scale of a population with that of individuals. Hypercycles are established as individuals, they are selected as meta-individuals, and appear in global distributions as secondary maxima in frequency distributions.

This might be taken as a strong hint for trying to apply this model to the current developments of hybridization between the artificial and the natural, the “technological” and the “biological”. Indeed, it would be quite interesting to develop this approach further into Richard Dawkins’s direction of the extended phenotype. Also Donna Haraways category of “companion species” would be part of a phenomenological model to approach these question.

3. The driving force in hypercyclic evolution is de-optimization

Such a postulated multiscalality among an individual “composite-population” (a Hypercycle) leaves greater degrees of freedom to explore adaptive pathways on top of changing surroundings. It is this increase of degrees of freedom to do things differently that we associate with virtualization, when talking about intellectual, medial processes. Virtualization has to do with the capacity to explore, very basically. Now, explorations into the open require a
secure ground which can be taken for granted – as long as we have to make large efforts in maintaining this ground secure on an individual scale, we cannot invest a big effort in exploring the unknown. Explorations require habituation, the support of a respective “infrastructure” to act quickly and effectively. Just remember how much the luxury of having so-called spare-time has to do with the supply of energy through easy-to-be-gained food, energy that in some parts of the world can be taken for granted for lighting, water, warmth, transport and velocity in moving from one place to another, telecommunications et cetera. Entering into cycles of mutual dependencies lets you share your interest and need for basic supply with others – which means that you can benefit from their engagement in maintaining them, which leaves you with a lesser engagement of your own.

The interesting aspect of Eigens’ theory from this perspective is that the driving force for mutation and evolution may not be located foremostly in competition, but also in, and probably even predominantly in, cooperation. How can this be accounted for? From a certain point of view, mutual co-dependencies seem to hinder a certain population to optimize its capacities for survival. There is a tension regarding the fitness of species between the conservative optimization of specific patterns and traits and functionalities, and the required flexibility to adapt to changed environmental conditions. From the point of view of the concept of fitness landscape, as made popular by Stuart Kaufman, it is those species that are highly specialized, and thus in some way, highly optimized, which are most endangered. Evolution therefore should favor those arrangement of genes (quasi-species) which are able to smoothen their own fitness landscape. High optimization requires a clear
profile of the surrounding landscape posing the daily challenges. Fitness landscapes are characterized by ruggedness, where the species have to find their respective positioning. The realms that are most exposed leave fewest possibilities for exploration, guiding the species ecologically inhabiting these places into increased separation, which asks for even further optimization of the inherited principles of survival. Such, entering into mutual co-dependencies results in a seemingly paradox dynamics of de-optimization, a process which, as I will develop in the following, bears close affinities to virtualization.

4. Virtual philosophy as the creation of problematic complexes

The conception of virtuality, as developed for large parts by the French philosopher Gilles Deleuze, addresses the problem of the beginning in philosophical terms. Put very briefly, for Deleuze philosophy begins when something starts to appear as problematic. Deleuze insists - against a philosophical tradition that is still very powerful - that philosophy is concerned with the posing and characterizing of problematic complexes instead of finding solution for “problems”. So conceived, philosophy itself is an utterly creative discipline: what philosophy literally creates are concepts. The crucial category distinguishing Deleuze’s philosophy thus comes to be that of virtuality. For him, virtuality is the structure of the real. It is not some sort of artificial duplication in any sense. Unlike the possible, which is something static and already constituted, the virtual is a kind of “problematic complex”, the knot of tendencies or forces that accompanies a situation, an event, an object or entity of any sort, as Pierre Lévy has formulated. The virtual is that which
invokes a process of resolution: the actualization of something in the first place. Virtualization according to Deleuze can thus be said to deal with differentiation and speciation in the realm of the conceptual.

5. Expanding into the virtual - thinking and building the Outside.

Deleuze's philosophy is driven by an Outside. In *La Logique du sense*, he seeks to develop a new conception of transcendental philosophy, new in that it moves beyond the centrality of the subject. For Deleuze, the transcendental field is conceived as a topological surface inhabited not by the I, the Cogito nor by the synthetic unity of apperception. The topological field of transcendence is populated by “populations of pre-individual singularities” which constitute the entire field as a “sense producing machine” (1969:130-1; 1990: 107) driving the process of differentiation and speciation of knowledge. Transcendence, in Deleuzes philosophy of the virtual, is conceived as a metaphorical engine, generating the world as it unfolds: the genealogical lineages of sets, classes, and types constituting the actualized reality, the biotic sphere of the living and existing, mutate into semi-ordered series when engaged in transcendental encounters. What seems to be at issue here is analog to what is at issue with Eigen’s theory of how the transition from pre-biotic to biotic spheres may take place: Eigen also was in need to conceive of some notion of pre-individuality and evolutive openness, this is what he came up for with his notions of the quasi-species and the Hypercycle.
6. **Pre-individuality, trans-speciation and meta-directed finality**

This sphere of the pre-concrete is, in the wording of Deleuze, characterized by semi-ordered series. A series differs from sets, classes and types. In contrast to them, a series remains open to outside forces of divergence and deviation, which alter not only the course of development, but also the sorts of things to which a series can be related. The components of series can thus not be referred to as particulars of specific, more general types and kinds of universal. Components of series might more appropriately be conceived as singularities that have entered lines heading towards an outside, towards an openness. Virtualization is the introduction of new temporalities and spatialities, after all. Such lines of flight, characteristic for all explorations, are directed and yet. Their finality is uncertain – Deleuzes name for them, lines of flight, seems to be quite an accurate description. Since while fleeing, we are heading in specific directions, but where this direction will finally lead to depends on our ways of constructing consistency, of making sense of the situation, of mediating our surrounds.

The transcendental for Deleuze is providing new semio-spheres for us to inhabit, new virtual potentials to be actualized. Deleuze’s philosophy tries to think about thinking. For thinking to take place at all, an outside must be involved according to Deleuze. It is the insisting outside within the world that forces us to think. Thinking is concerned with that which we cannot yet conceive.
7. **Media Architecture is capable to introduce new inhabitable Semio-Spheres**

That which we might not yet conceive. While philosophy and logics has mostly been interested in theorizing about abstractions, it has been the cultural techniques of agriculture and architecture that has for a long time been engaged in actually building the abstract. Basic mental operations like creating sets, distinguishing one thing from another, describing relations between the differentiated compartments, thinking about and plan for „unnatural“ inter-relations between the differentiated compartments, can be traced back throughout the cultural history of architecture and agriculture which have rendered these mental capacities experiencible. It is only in this mutuality, that practices of abstraction have become practices of virtualization – the material translation of concepts only turns them into mental infrastructure, subsequently, allowing for novel explorations.

The extended limits of what is available and negotiable for social, technological and productive interventions through the new and networked information-technologies introduce new ways of virtualization. In many regards, architecture has always been functioning as media. Why then postulate a „medial turn“ in architecture? If there is something to that postulate, then it will no doubt be concerned with what we are logically not yet accustomed to integrate into our way of thinking.
8. **Intelligent Skin – towards an architectural logics of the circumstantial**

To speak of media architecture is meant to denote a further level of abstraction: media architecture thinks about how we can start to house in the realm of mediality. Literally spoken, the semantic compound of media and architecture may be regarded as denoting “the installation of infrastructure for communalizing the inhabitation of meta-positions”. This is what we have in mind when speaking of an architectural logics of the circumstantial.

Of course, it sounds utterly paradox, at first, to think “the installation of meta-positions” possible. For if meta-positions can be characterized at all, then evidently not as something that finds a ”specific” location. Mediation, which is always a movement of abstraction, is commonly being related to generalizations. If instead, mediation is being related to virtualization, that is, not to specialization but to speciation in terms of the logics of the hypercycle as we have been arguing in our paper, then mediation could be characterized as a process which decenters what has previously been functioning as the metrical point of reference. This is why meta-positions cannot actually be localized. Meta-positions are where we project ourselves, when we are circumstancing our proper circumstances. Media architecture is thus literally building immaterial – providing objective meta-positions to project ourselves, it is preoccupied with the synthetic aspects of communication. What it virtually builds, are instances of semiotic materialization.
9. **Oikoborgs – a common sense membrane for quasi-species in the social**

As a possible way to conceive this, our suggestion with “Intelligent Skin” is to propose the externalization of the process of signification. We regard our media façades as the organs of some sort of “Common Sense” remembering the meaning that Kant has identified for this “faculty”. For him, common sense was conceived as some sort of “social apriori”, possessed by every individual. Our idea with “intelligent skin” is to translate the concept onto a pre- or trans-subjective level. We are planning of installing it as a possible locus to externalize the process of signification. That means, the intelligent membrane of common sense will have its proper relational autonomy, and it will be the milieu where the multi-modal series of sensory inputs will be projected to and synthesized. Due to the complexity of this concept, we conceive of Intelligent Skins as the common-sense-membrane comprehending some sort of quasi-species, of alien species that are involved within the process of ongoing organisming, for which we have coined the term of the Oikoborg. Oikoborg stands for Oiko-biotic-organism, which resemble proto-biotic quasi-species in the social sphere of semiotic materialization. In our conceptions they are instances of socially competent artificial life, communicating via transformation of arbitrary images in a quasi-organismic manner. As with sepias, of which we only have a vague idea so far of how they are using their screening expressivity for social interaction, we also only have a vague idea of what kind of social codes Oikoborgs as our urban co-inhabitants will introduce into our relationship regarding future living. But we are indeed very curious about what it will feel like, if houses start to court each other in springtime.