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onl

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ONL [Oosterhuis_Lénárd], based in Rotterdam, is an innovative design studio internationally known for integrating advanced digital techniques into the design process and in the production process [artificial intuition, mass-customization, file to factory process]. ONL establishes a liberating connection – a true hot-line – between intuition in the collaborative design process and logic in the evolution of the parametric 3d model and the production process.

Kas Oosterhuis is professor for Architectural Design, Design Methods at the Delft University of Technology, director of the Hyperbody Research Group and director of the Protospace Laboratory at the Faculty of Architecture, focusing on buildings as Complex Adaptive Systems [CAS] and on multi-player gaming techniques for Collaborative Design and Engineering. Ilona Lénárd is a certified actress educated in Budapest and a certified sculptor trained at the Willem de Kooning Academy in Rotterdam.



ONL (奥斯特惠斯和伦纳德)是一家位于鹿特丹的创新设计工作室，他们以在设计和生产过程中融入了高超的交互式数字技术(人工直觉、大规模定制、档案到工厂的过程)而闻名国际。ONL创建了一种自由的联结——一个真实的热线——介于合作设计过程中的直觉和可编程三维模型的革新以及生产过程的逻辑之间。

卡西·奥斯特惠斯是代尔夫特技术大学讲授建筑设计和设计方法的教授，以及建筑学院超体研究小组和原型空间试验室的领头人，他的研究集中在建筑的复杂适应系统(CAS)，以及合作设计和工程上的综合工作技巧。伊莲娜·伦纳德是一位曾就学于布达佩斯的注册演员，她还是一位注册雕塑家，曾就读于鹿特丹的威廉·德·昆宁学院。

ONL is a multidisciplinary office where artists, architects and programmers meet on a digital platform. Our office is the result of the fusion [1989] of the two independent practices of visual artist [sculpture] Ilona Lénárd and architect Kas Oosterhuis. Ilona Lénárd has been trained as a stage actress in Hungary. Since 1990 we cooperate as one design studio for art projects, interactive installations, building projects and urban planning studies, and we have cooperated with many other artists, architects and urban planners as well. Together with urban designer Ashok Bhalotra we planned City Fruitful, with composer Edwin van der Heide we designed the ambient sound of the Saltwaterpavilion, and we closely cooperated with graphic designers on a number of books we have published. We have organized several bigger events [Synthetic Dimension 1991, Sculpture City 1994, Trans-ports 2001, Game Set and Match 2001 and 2006] where we cooperated with artists from a variety of disciplines and with academic and commercial experts. Our intention is always to cooperate with other creative disciplines from the very first beginning of a project. This is our way to innovate ourselves. The initiative to cooperate mostly comes from us, which basically means that we ask other parties to play our design game.

ONL combines visionary design strategies with expert knowledge of innovative mass-customization production methods, allowing for the construction of geometrical complex constructs where none of the constituting elements are the same. ONL builds the unique within predefined financial constraints.

1 Building body

First of all each building is regarded and developed as a building body. A building body is a consistent organism where most constituting elements are specifically developed for that body. The modern building body is no longer based on repetition but on a smooth interaction between unique components.

2 Powerlines

The building body is like a shaped container, a flexible box that is shaped by a set of curvilinear powerlines. The powerlines describe the path of development of the body, the folding lines in the surface of the volume, and/or the trajectories

of the users navigating through the building body.

3 Programming the Point Cloud

While the powerlines describe the exterior condition of the building body, the strategy of programming the point cloud organizes the reference points of the 3d model inside the volume of the building body. The reference points are directly translated into nodes of the construction, short-cutting the architecture to the engineering.

4 File to factory fabrication

The point cloud of reference points and the swarm of points specifying the architectural detail are programmed by ONL in customized scripts, establishing a direct communication between the pc's and the cutting machines of the steel and glass manufacturers. The F2F process of mass-customization allows for full control of costs and planning.

5 Real time behavior

ONL has developed a technique, based on multi-player game design, to feed adaptive constructs with data in real time. Adaptive constructs incorporate actuators listening to incoming data and changing their lengths accordingly. Adaptive structures respond to changing circumstances of the weather and adapt to changing use of their customers, able to save up to 20% for the weight of the construction.

Essentially we have chosen to look at the world from the point of view of Non Standard Architecture. This means that we take the exception as the rule. In other words we have quit the aesthetics as a by-product from industrial mass-production. Instead we are now putting together a new aesthetic based on the principle of mass-customization. In all our recent designs there is not a single building component that is the same. All elements are unique. They are CNC produced according to our innovative File to Factory procedures which links our parametric 3d models directly to the production machines. The big challenge of Non Standard Architecture is that it opens the ways for a new architectural language which is no longer based on repetition. But we must insist on the integrity of the design and the process. The new information artists / architects must understand the basic principles

of the new paradigm, otherwise they and their clients will be trapped in the dead end street of endless series of exceptions. Based on our recent executed projects like the WEB, the Cockpit, the Acoustic Barrier and the TT Monument we claim that we can produce a true Non Standard Art and Architecture for standard budgets.

In the last 15 years we have experienced two major paradigm shifts. The first leap was from repetitive industrial architecture towards Non Standard Architecture. This could happen thanks to computation. Of course complex geometries were made in earlier days by hand, especially by locals using their own hands. But these constructs were never regarded as geometry. Euclidean geometry two millennia ago and Newtonian geometry 3 centuries ago still form the basis for 99% of the actual architecture production. Some 10 to 20 years ago Non Standard Geometry finally left behind the automatism of constructing buildings as variations on platonic volumes using Newtonian logic, while the new software allowed us to work with boolean operations, subtracting one complex volume from another, and with complex surfaces using lofting techniques. Using computation in the design process paved the way for Non Standard Architecture.

More than 10 years ago we jumped into the world of Non Standard Architecture. We no longer could imagine our design in simple diagrams inside our head. We jumped out of the box. The very act of intuitive sketching by Ilona and 3D modeling by myself brings about the unexpected. It was no longer possible to have the 3D image of the design in your head before visualizing it. Now we have learned how to control the out of control intuitive and the unexpected. It is still there but we also have developed new techniques to communicate the complexity with the production. Now we feel completely comfortable with complex surfaces, since we know how to make it efficiently.

But there is more: the second leap forward has been our experimentation with game development software and the development of design environments in real time. We design with particles, the relations between the particles. With my Hyperbody Research Group at the Faculty of Architecture at the Delft University of Technology and in art installations we are now

building constructs which are behaving in real time. Now we look differently at constructs: in our practice ONL [Oosterhuis_Lénárd] we are building relations between components using parametric software rather than building isolated 3d objects. And in our art installations like the MUSCLE at the NSA show in Centre Pompidou we run the relations in real time. These constructs are running processes, input-output devices which are played by the users. Architecture has become a game to be played by its users. Here we are dealing with unpredictability and uncertainty in a complete new form. The behavior of many relatively stupid agents, think of the birds in a swarm, creates the bond between the elements, but not the overall shape. It is impossible to predict the shape the interactive construct will have at a certain moment. Of course it will be possible to bring the construct in a certain predictable state but then you sort of kill the process. Exactly like in quantum theory, when you observe the particle-wave system as a specific particle you are not able to observe it as a wave any more, the process is dead. Now we look at buildings as a running process. We literally observe our environment differently through a new mindset. We take a new point of view and look at the world as a swarm of billions of interacting complex adaptive systems. We are exploring new tools to deal with the interactivity in real time, we are becoming programmers of behavior instead of makers of dead objects.

I resist the notion that ONL has designed biomorph buildings. I agree that they sometimes display a resemblance to shapes as we know from natural history but we never start with that idea. We never try to superficially copy the appearance of a biological specie. Rather we try to invent new species which by its complexity and complex behaviour may eventually start to familiarize with living objects as we already know them. We always try to get as close as possible to the genes of our designs. In 1995 we have organized an international workshop taking place simultaneously in Vienna, Budapest and Rotterdam titled the Genes of Architecture. Biotechnology has not directly influenced our work. I see it this way: new technologies allowed for the invention of industrial muscles produced by Festo, a major player in the processing industry. To use these muscles in interactive installations was an act of the

artist in ourselves. The Festo muscles were not intended to be used in this way. The use of muscles as actuators is an evolutionary step in the proliferation of industrial muscles. We are happy that we could contribute to that evolutionary process. And from there we are tempted to build a new specie of behavioural architecture from our knowledge and experience with art installations. I dare to predict that within 5 years we will have realized a building where part of the building behaves in real time using actuators. And that building would probably be built in the Middle East region or in China.

ONL's approach to designing and building, both in art projects and in architecture, will not be mainstream yet in the coming years. But step by step it will replace the old system. It is evolution at work. The old system still depends on a market of mass-produced products available for ordering from a building catalogue. Once the market has transformed into a just-in-time production apparatus of mass-customized project specific components, where all components are unique and are assembled as a 3d puzzle, only then the traditional system will slowly come to an end. In the near future the old and the new will co-exist and compete. All we can do is to place our products on the market and wait and see what real time evolution is doing with it. It is fascinating to realize that we are living inside evolution. I am very aware of the fact that we as designers do have the power to slightly adjust the trajectory of evolution.

Kas Oosterhuis

ONL是一所囊括了多种学科的事务所，这里是艺术家、建筑师和程序员共同工作的一个数码平台。我们的事务所是视觉艺术家[雕塑]伊莲娜·伦纳德和建筑师卡西·奥斯特惠斯两者独立实践相互融合[1989]的结果。伊莲娜·伦纳德是匈牙利的职业舞台剧演员。我们从1990年开始以一个设计工作室的形式进行艺术项目、互动装置、建筑项目以及城市规划研究等等实践，同时我们也与许多其他的艺术家、建筑师和城市规划师进行了合作。我们与城市规划师Ashok Bhalotra共同规划了高效城市，与作曲家Edwin van der Heide共同设计了咸水馆的环境声，并且我们在已经出版的几本著作当中与平面设计师进行了紧密的合作。我们组织了一些较大规模的活动[1991年的合成维度，1994年的雕塑城市，2001年传输港项目，2001年和2006年的Game Set and Match]，其中我们与来自不同学科的艺术、学者以及商业专家进行了合作。从一个项目的开始，我们的注意力就一直集中在与其他创造性学科的合作上，这是启迪我们自身的一种方法。合作的原动力大部分来自于我们自身，这基本上就意味着是我们邀请其他人来参与我们的设计游戏。

ONL将梦幻性地设计策略与创造性地大规模定制生产方法的专业知识相结合，使构成元素各不相同的几何形复合结构的建造成为可能。ONL在预先确定的资金预算之内建造出独特的建筑。

1 建筑体

首先每一栋建筑都作为一种建筑体来看待和生成。建筑体是一个一致的有机体，她所包含的大多数元素都是为该有机体特别生成的。现代建筑体不再以重复为基础，而是以独特组件之间平滑的交互作用为基础构成的。

2 能量线

建筑体就像一个具有一定形状的容器，一个通过一套能量曲线定型的灵活的盒子。能量线描述了建筑体生成的路径、建筑体量表面的交叠，以及使用者通过建筑体的轨迹。

3 对点群进行程序控制

在能量线描述了建筑体的外部条件的同时，点群的程序策略对建筑物体量内部的三维模型所涉及点进行了组织。相关的点都是直接译成建造节点，形成了从建筑到工程的捷径。

4 档案到工厂

将建筑细部具体化的相关点的点群以及蜂群都是由ONL以个性化的脚本编写而成，这在电脑、金属切割器，以及玻璃制造商之间建立了直接的联系。大规模定制中的F2F进程使我们能够对成本和计划进行完全的控制。

5 实时行为

ONL开发了一种基于多人参与游戏设计的技术，来实时地将数据输入到适应性构造物当中。适应性构造物和传感器监听不断传来的信息，并随之改变它们的范围。适应性构造物对不断改变的气候环境产生回应，并且不断调试自身来适应其顾客的使用需求，同时能够节约近20%的建造负载。

本质上我们选择以非标准建筑的视角来看世界。这意味着，从规则上来说，我们包容特殊性。换句话说我们已经不再将美学作用归纳为大规模工业化生产的副产品。取而代之的是，我们现在提出了一种基于大规模定制原则的新美学思想。在我们最近所有的设计作品当中，没有一个建造组件是相同的，所有的构成元素都是独一无二的。它们都是CNC根据我们创造的F2F程序制造的，这将我们的三维变量模型与生产机器直接地联系起来。非标准建筑最大的挑战在于，它开启了通向一种不再以反复为基础的新的建筑性语言的道路。但是我们必须坚持设计与过程的融合性，新信息艺术家/建筑师必须了解新范例最基本的原则，否则他们与他们的业主将会陷入一条不断重复的死亡序列当中。基于我们近期执行的诸如网、座舱建筑、隔声屏障以及TT纪念碑等等项目，我们宣称我们能够在标准的预算之内制造真正的非标准艺术与建筑。

最近15年间，我们经历了两次主要的范例转换。第一次飞跃是从反复性工业建筑到非标准建筑。这件事情的发生归功于运算技术的发展。当然复杂的几何形在早期能够通过手绘实现，尤其是通过当地人自己的手来实现。但是这些结构从来都没有被看作是几何性的。两千多年前的欧几里得几何学和3个世纪前的牛顿几何学仍旧构成了99%的实际建筑产品。大概10至20年前，非标准几何学最终脱离了基于牛顿逻辑的柏拉图体量变异的建造自动化，与此同时，新的软件也允许我们利用布尔运算，从另一条途径消减了复杂体量，并使用放样技术来制造复杂的表面。设计过程中的运算技术的应用为我们开辟了通向非标准建筑的道路。

十多年前，我们投身于非标准建筑的领域，不再以头脑当中简单的图解来想象我们的设计，从束缚当中解脱出来。伊莲娜所制作的直觉草图和我的三维模型带来了出乎意料的结果。在可视化之前，你头脑中设计的三维图象已经不复存在。现在我们已经学会怎么样控制直觉的失控与出乎意料。虽然这种失控仍然存在，但是我们开发出了新的技术来将其复杂性与其生产联系到一起。现在我们对复杂的表面已经感到完全适应了，因为我们已经知道怎样使它变得有效。

更多的是：第二次飞跃则是对游戏生成软件以及实时环境设计软件的试验。我们利用粒子及粒子之间的关系来进行设计。我在代尔夫特技术大学建筑学系的超体研究小组正在利用艺术装置来建造实时行为的建构体。现在我们看到了一个不同的建构体：在ONL的实践当中，我们使用参数软件在组件中建立联系，而不是单单建造独立的三维物体。并且在诸如蓬皮杜中心的非标准建筑中所展示出的MUSCLE这样的艺术装置中，我们也实时地运行这种联系。这些建构体是正在运行的程序，它的输入/输出设备由使用者控制。建筑已经成为一种被其使用者所参与的游戏。这里我们需要应对全新形式的不可预见性和不确定性。相对众多愚蠢的代理商的行为，想想蜂群中的鸟儿，创建了元素之间的结合，但并不是在总体的形态上。在某一时刻，我们是有可能预测互动建构体的形状的。当然也就有可能将建构体引入某种可预见的状态，但是这样你就扼杀了整个过程。正像量子论一样，当你将波粒系统看成一个具体的微粒来进行观察的时候，你就不能再将之当作波动来看，整个过程也就冻结了。现在我们将建筑物作

为一个运行的程序来看待，通过一种全新的不同的观念来对我们的环境进行逐步的观察。我们采取了全新的视点，并将世界看作一个由上亿个复杂的适应性系统相互作用构成的群体。我们正在探寻新的实时交互处理工具，我们正在成为行为方式的程序编写者而不是毫无生气的物件的制造者。

我对于有关ONL设计的是生物形态建筑物的评论持反对的态度。我同意，这些建筑有时在形状上显示出了与我们所知道的自然历史的相似之处，但是这决不是我们创意的出发点。我们从未尝试浅薄地复制任何一种生物物种的外表。我们更愿意去尝试发明新的物种，通过其复杂性和复杂的行为方式开始去熟悉其他生物，就像我们早就了解了它们一样。我们总是不断尝试以尽可能地接近我们设计的基因。1995年，我们组织了一次同时在维也纳、布达佩斯以及鹿特丹进行的名为建筑基因的国际辅导站。生物技术并没有直接地对我们的作品造成影响。我这样看待它：新技术使Festo制造的工业肌肉——加工工业的主要参与者——的发明成为可能。在互动装置当中使用这些肌肉是一种发自我们内心的艺术家行为，Festo肌肉并非有意地被这样使用，肌肉作为传感器的使用是工业肌肉增殖当中革命性的一步。我们很高兴我们能够对这个革命性的进程做出贡献。由此，我们试图以我们在艺术装置方面的知识和体验来建造一座新类型的行为性建筑。我敢预言，五年以内我们将让一座这样的建筑成为现实：它的一部分使用传感器进行实时行为，并且这座建筑有可能建造在中东或者中国。

ONL以艺术和建筑两种态度同时在设计和建造方面的尝试在不远的将来也许不会成为主流，但是它将逐步地取代旧的系统，这是实践当中的演进。旧的系统仍旧依赖于能够从建造目录上预定的大规模制造产品的市场。一旦这个市场转化成为一个大规模定制项目的具体组件所恰好需要的生产机械，这里所有的组件都是独一无二的，并被组合成一个三维迷宫，传统的系统将会慢慢地走到尽头。在不远的未来，旧系统与新系统将会共生并且进行竞争。我们所能做的只有将我们的产品投放到市场当中，静静等待并观察实际的演进将会对它造成何种影响。意识到我们能够生活在这种演进当中，是一件令人沉醉的事情。我非常在意的事实是：我们作为设计师是肯定有力量来略微修正这种演进的轨道的。

卡西·奥斯特惠斯





Towards an E-motive Architecture

A conversation with marlon, virtual friend

E-motive Architecture: Inaugural Speech DUT

VIRTUAL FRIEND: rector magnificus, members of the board, fellow professors and other members of the university community, highly esteemed listeners, ladies and gentlemen, please lean back, relax and get ready for e-motive architecture.

KAS OOSTERHUIS (doing the Dutch honours): 'mijnheer de rector magnificus, leden van het college van bestuur, collegae hoogleraren en andere leden van de universitaire gemeenschap, zeer gewaardeerde toehoorders, dames en heren, maakt u zich gereed voor "e-motive architecture".'

VIRTUAL FRIEND: hey kaas, just look at you, what are you dressed up for? .

KAS OOSTERHUIS: virtual friend, i'm wearing black because today i'm representing knowledge . today i know how things are, tomorrow i'll get back to reflecting .

VIRTUAL FRIEND: i see i see, well, go ahead mr oosterhuys.

KAS OOSTERHUIS: in the coming half-hour i shall be presenting a number of firm beliefs which form the basis of my research at the faculty of architecture and of the practice of our firm ONL . the work our firm does can readily be described as the electronic fusion of art and architecture . one department, ONL_art, is led by my partner, visual artist ilona lénárd, while i myself am in charge of ONL_architecture and ONL_media . for the faculty i have launched the e-motive architecture research programme, one of whose aims is to actively position our ideas on intuitive, immediate, real-time architecture in the international architectural discourse .

PERSONAL BRAIN: statement #1: 'buildings are information-processing machines'

VIRTUAL FRIEND: hey kaas, what are you saying, is a building some sort of machine? .

KAS OOSTERHUIS: according to my working definition, a building is a set of fixed and moving components, a totality giving form and substance to the flow

of information passing through it . the moving parts are the doors, windows, switches . actually the doors are switches too, they are either on or off, open or closed . when they are open they let through information, when closed the flow of information is obstructed .

VIRTUAL FRIEND: what sort of information are you referring to? .

KAS OOSTERHUIS: i'm talking about information in whatever guise: image, text, the spoken word, electricity, water, gas, commodities, air, light . every form of information has its own carrier . people convey spoken language, books convey the printed word, television conveys images, tubes and ducts convey gas, air and light . information is continually on the move, information is like a package with no fixed residence or place of belonging . buildings absorb the incoming information, process that information and release it in another form . buildings have their own form of metabolism .

VIRTUAL FRIEND: so kaas, what you are actually saying right here and now is that a building is a sort of body... .

KAS OOSTERHUIS: buildings are bodies, building bodies . building bodies with a head, a trunk and a tail such as the elhorst-vloedbelt garbage transfer station i built in 1995 . this building is a rubbish-sorting machine . here i have regarded waste matter as a particular form of information: it's weighed, recorded, sorted, stored, filtered, cleaned . the building gets this process in order while the building's architecture communicates the process internally and externally . so that the architecture can itself be regarded as an information-processing contrivance, an input-output device .

VIRTUAL FRIEND: sure, architecture is an information carrier . and i bet we humans are all information carriers too, aren't we? .

KAS OOSTERHUIS: we hear, see, smell, feel, taste, we process the information in our brains and other organs, in turn producing images and sound and leaving other processed matter behind . we are metabolists by nature . information is always subject to a continuous process of transformation . in that process there's a moment when the information is 'carried' by a vehicle .

when, for example, we drive a car, the car carries the luggage and the driver, both of which carry information · at the same time the driver carries information that he/she has stored as well as information that he/she processes in real time · the information produced during the process of driving a car consists of signals sent out by the car to other vehicles: speed, direction, indicator, brake light, sound of the horn etc · now if we apply this manner of observing to buildings and architecture, then we can establish that buildings are continually absorbing information, processing it and then producing new information · all buildings together play an important evolutionary role in the worldwide process of transforming information ·

PERSONAL BRAIN: statement #2: 'e-motive architecture produces the hyperbody'

VIRTUAL FRIEND: sounds good as a one-liner, and i can understand that you draw the parallel between yourself as an information-processing vehicle and the concept of architecture as an information-processing vehicle, but how can we work with that as designers? what is a fucking hyperbody? are we talking architecture at all? ·

PERSONAL BRAIN: statement #3: 'a hyperbody is a programmable building body that changes its shape and content in real time and please don't swear' ·

KAS OOSTERHUIS: this definition needs explaining in greater detail · so i'll lay it on you one word at a time · a hyperbody is to architecture what hypertext is to written information · a hypertext is saturated with warp holes, you can jump from one universe to the next in a fraction of a second · it will soon be made clear to you how warp holes can be introduced into buildings · a hyperbody is a building body · a building can only go hyper if it has a body · this building body is the vehicle for processing information · information which has been dragged in by the user, and information fed into the building body by way of the umbilical cord · a hyperbody is a programmable building body · the building body is now programmable · we are seeing this process take place under our very eyes · take a good look around and you'll see what i mean · within the last ten, twenty years it has become possible to measure and adjust the services in

buildings by remote control · buildings themselves have been measuring their temperature and humidity in real time since time immemorial · architects have just never got round to actively deploying these techniques in the design process · the agenda is still dictated by a monocultural monopoly of the ideal climate · everyone knows that such a thing doesn't exist and yet it is accepted without protest as an incontestable given · a programmable building has no such givens · it is programmable, which means that you can create in it whatever climate you desire · it also means that architects can design experiences and that users can evoke experiences with their own particular climates · a hyperbody is a programmable building body that changes · until now architecture was a discipline of intractability · buildings were always meant to be as steady as a rock and give shape to the flow and, more importantly, resist that flow · let's imagine that buildings could move with changes in use, more so than was considered possible before now, that they could move with changing conditions · then architecture would become dynamic · and i'm talking about more than just moving windows and doors · here it's about the entire building · architecture would be able to move · a hyperbody is a programmable building body that changes in real time · nor am i talking about animation in the design process, but about animated buildings · buildings that are continually calculating, persistently fixing their position with regard to other real-time processes in and around them · i'm thinking about building parts that fix their position with regard to other parts of the same building · rather like an arm and the opposite leg balancing each other out · the building's components are a swarm of elements that can function individually but still belong to the same swarm · a hyperbody is a programmable building body that changes its shape in real time · i'm assuming that the building's structure will become programmable · until now designing the structure has always been aimed at resisting distortion · the most fantastic distortion diagrams are drawn up so that heaven and earth can be moved to rule out all distortion, and thus the beauty of distortion · a programmable structure never stops calculating, it keeps on fixing its position to preserve its balance or indeed to lose it, to relax or to brace itself · a real-time building body is always doing something · a hyperbody is a

programmable building body that changes its shape and content in real time. real-time building bodies feed on information, they process information and then separate it again. that information of course travels as hypertext does, via warp holes from one universe to another. when this information settles in the hyperbodies as a hypersurface, then our perception of the spaces in and around the hyperbody can be programmed and driven and is therefore a subject for design. architecture becomes a game and the users players. architects are the programmers of this game.

VIRTUAL FRIEND: well kaas, i must admit that this explanation impressed me, but again, how do you imagine that we as designers work with the idea of the hyperbody?

KAS OOSTERHUIS: now that we have a workable definition of a hyperbody, it's about time that we looked to see if such hyperbodies already exist somewhere in a rudimentary form. and then, what might a full-blown hyperbody look like? what evolutionary leaps forward can we expect in the next, say, ten to twenty years? and what, in this context, is the subtle difference between building and architecture? and for the field of architectonic design we have to ask the important question of what needs developing at the architecture faculty so that we can work on hyperbody research at an international level.

VIRTUAL FRIEND: kaas, it looks like you're presenting us with a true paradigm shift here? am i right? and you can't do that by yourself, can you? who are you working with? who is with you already?

KAS OOSTERHUIS: too many questions, virtual friend, so perhaps the sensible thing for me to do is first explain my perception of real-time evolution. the thing is, i feel that darwin's standard opus has led us up the garden path. in his book he exclusively discusses old nature, 'pre-nature'. he leaves aside entirely the fascinating evolution of thoughts, instruments and processes at present proceeding at full tilt. and this is symptomatic of almost every study on evolution. even kevin kelly barely gets round to the subject in his masterwork 'out of control'. in my opinion the only way to get a deeper insight into the matter is to study the current evolutionary output in its entirety and then conduct evolution as a process

in real time. evolution is a process that happens. evolution is something one does. let me give you an example from the car industry. when i see the headlamp of a new model, say the new peugeot 206, then i place that headlamp in the light of the development undergone by headlamps in the past century, i try to imagine how the information flow has proceeded so as to arrive at that design, and then try to extrapolate how the evolution of headlamps will continue in the future. my diagnosis, then, is that the headlamp that has actively ensconced itself in the car body in the last few decades will evolve further from a tacked-on element that converts electricity into light, into a kind of eye, a information-processing organ. the headlamp will evolve into an input-output device. an appliance that absorbs internal and external information, interprets it and generates new information. headlamps will become real-time instruments that can take account of other organs in the car body, and of the context in which they find themselves.

VIRTUAL FRIEND: and architecture? what is the relationship with architecture?

KAS OOSTERHUIS: although hardly a headlamp, a building is still an assemblage of comparable active components that work together to achieve a performance. for me the relationship with architecture is as clear as day, but it will take a lot more research and a lot more practical assignments on our part if the pledge of e-motive architecture is to be honoured. i would like now to show you my project 'trans-ports' which i embarked upon three years ago and that constitutes an initial step towards the paradigm shift from frozen architecture to architecture in real time. the idea for trans-ports grew out of a discussion i had with marcos novak in 1999 in los angeles at a conference in the getty museum. the initial concept was to link together the spaces in different port cities using wideband internet. the spaces in rotterdam, los angeles and tokyo could together form a single building, whose rooms are not built in physical juxtaposition. en-suite rooms, so to speak, but then virtual ones. the spaces are then 'delaminated' as marcos once aptly put it. trans-ports has yet to be realized in a physical form but i'm doing my best to change that both at tu delft and in my own practice. trans-ports will be the first truly e-motive building.

PERSONAL BRAIN: statement #4: 'e-motive buildings are amplifiers'

VIRTUAL FRIEND: a question which has been bothering me for some time now is: kaas, won't we get tired of all that motion, all that action, all those changes in real time? .

KAS OOSTERHUIS: e-motive buildings are programmable, they work as an amplifier of experiences and emotions . of course that doesn't mean that such buildings are always moving about wildly or making a lot of noise, or spewing out images . it does mean that the degree of movement, amount of action and speed of the image and sound on offer can be fully regulated, from zero to infinity . if we set the parameters of physical movement to zero, the building doesn't move at all . we can completely freeze it in terms of its software, so that it's colder and stiffer than a traditional building . so programmable architecture includes the traditional intractable architecture . my point of departure theoretically is that all values are possible, and that it's a question of choosing how much movement you want: much, a little or none . the building's genetic information - its formula - is embedded in the script, the script is orchestrated by producing and choosing parameters in real time . an e-motive building is an instrument played by its context and its users .

PERSONAL BRAIN: statement #5: 'interaction involves at least two active parties'

VIRTUAL FRIEND: how can you be so sure? and what exactly do you mean by programmable? .

KAS OOSTERHUIS: you can change the parameters of the game the building is playing, you can communicate with the building in real time .

VIRTUAL FRIEND: is that good? .

KAS OOSTERHUIS: communication is a positive thing, so why not communicate with your environment? .

VIRTUAL FRIEND: will the building talk back to you? .

KAS OOSTERHUIS: yes, sure, it responds directly to what you do or say, it may respond in many ways: talking, moving, refreshing information content, playing music, it all depends on the game you're playing .

VIRTUAL FRIEND: a game? is life a game? .

KAS OOSTERHUIS: it actually is, living in a building is a

life performance, where both the building and the users are players in a game . and the good news is that we don't know the rules .

VIRTUAL FRIEND: but how can a building and a user play the same game, isn't the building just the background where the game enfolds? .

KAS OOSTERHUIS: not necessarily, the building can become active, the building may act just as you as a person can act .

VIRTUAL FRIEND: will the building be obstinate like humans are? .

KAS OOSTERHUIS: they'll have to be, otherwise the conversations between buildings and their users would be quite boring .

VIRTUAL FRIEND: when people communicate you never know exactly what to expect, would that be the same with programmable buildings? .

KAS OOSTERHUIS: yes, right, now we're talking - you know, buildings must become as unpredictable as the weather .

VIRTUAL FRIEND: buildings will be windy, rainy and sunny then? .

KAS OOSTERHUIS: that too, but more likely they will move their floors and walls in unpredictable directions, and exhibit surprising capacities, they might even want to learn from you .

VIRTUAL FRIEND: sounds fantastic .

KAS OOSTERHUIS: it is, architecture will become really wild .

VIRTUAL FRIEND: not all the time i hope .

KAS OOSTERHUIS: sure, the building might want to take a rest from time to time, the programmable building has many speeds, it can choose to be boringly slow like a traditional building or to be violently happy .

VIRTUAL FRIEND: sounds just great .

KAS OOSTERHUIS: you play the game and set the parameters to match your desires .

VIRTUAL FRIEND: game set and match, kaas, you win, thank you kaas for being my virtual friend, goodbye for now, thank you e-lona, and thank you saander, chris, michael, thank you all, and especially thank you professor hans bunderman,

professor mick ayckhowt and professor layn van duyn who invited kaas and myself to do research at the technical university, and with whom it is a pleasure to work, i hope to see you all again at the game set and match conference at the faculty of architecture.

KAS OOSTERHUIS: thank you for your attention.

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章节1

趋向情态建筑

一次与虚拟友人马龙的谈话

就职演说，代尔夫特技术大学

VIRTUAL FRIEND(虚拟友人): 尊敬的校长，董事会成员，各位教授以及大学社区的其他成员，令人尊敬的听众们，女士们先生们，请向后靠并放松，为情态建筑做好准备。

KAS OOSTERHUIS(卡西·奥斯特惠斯): (进行德文致词)

VIRTUAL FRIEND: 嘿，卡西，看看你，你为何如此着装呢？

KAS OOSTERHUIS: 我的虚拟朋友，我身着黑色是因为今天我代表知识而来。现在我了解事情的状况，而明天我将重新回到反思的状态。

VIRTUAL FRIEND: 我明白了，那么请继续奥斯特惠斯先生。

KAS OOSTERHUIS: 在即将开始的半个小时当中，我将会呈现一系列我在建筑学系及ONL的实践基础中形成的坚定信念。我们的事务所所做的工作能够被很容易地描述为艺术与建筑的电子性融合。我的合伙人，视觉艺术家伊莲娜·伦纳德，负责领导ONL的艺术部门，而我则负责ONL的建筑与媒体部门。在学术方面，我开展了情态建筑研究项目，其目的之一，就是在国际性的建筑演说当中，将我们的想法定位在直觉、迅速的实时建筑上。

PERSONAL BRAIN(个人大脑): 陈述1: 建筑物是信息处理机器。

VIRTUAL FRIEND: 嘿，卡西，你到底在说些什么，建筑物难道某种机器吗？

KAS OOSTERHUIS: 根据我的工作定义，一栋建筑是一套固定和移动的组件，一个将形式与实质赋予通过其自身的信息流的总体。活动的构件包括门、窗和开关等等。事实上，门也是开关，它们或开启，或关闭。当它们打开的时候让信息通过，而关上的

时候信息就被阻碍住了。

VIRTUAL FRIEND: 你指的是什么类型的信息？

KAS OOSTERHUIS: 我所指的是任意形态下的信息：图像、文本、口头词语、电流、水、煤气、日用品、空气和光。每一种信息的形态都有其自身的载体。人群传递口头语言，书籍传递印刷词句，电视传递图像，输送管线传递煤气、空气和光。信息宛如一个没有固定居所或是从属位置的包裹，总是处于不间断的运动状态。建筑物吸收不断到来的信息，并将之进行处理并以另一种形态释放出来。建筑物拥有自己独特的新陈代谢形态。

VIRTUAL FRIEND: 那么卡西，你现在实际上是说建筑是一种类似于身体的东西。

KAS OOSTERHUIS: 建筑正是身体，建筑躯体，一个具有头部、躯干和尾部的建筑躯体，正像我于1995年建造的Elhorst-Vloedbelt垃圾转运站一样。这座建筑物是一台垃圾分类机器。这里我将废弃物作为一种特殊的信息形态：它被度量、记录、分类、储存、过滤和清洁。建筑物将这一过程秩序化的同时，其建筑则从内部与外部将整个过程联系起来。因而建筑物本身就能够被作为一种信息处理措施，一种输入/输出设备。

VIRTUAL FRIEND: 当然，建筑物是一种信息载体。并且我打赌我们人类也都是信息载体，对不对？

KAS OOSTERHUIS: 我们听、看、闻、感觉和品尝，在我们的大脑和其他身体器官当中处理信息，并依次生成图像和声音，并将其他已经处理过的物质排出，我们都是天生的新陈代谢者。信息永远是一个持续的转化过程的主体。这一过程，总是存在着一个信息被载体承载的瞬间。比如说，当我们家是一辆汽车的时候，汽车承载着行李和驾驶员，而这两者又都承载了信息。驾驶员在同一时间承载着他(她)储存下来的信息以及他(她)实时进行处理的信息。汽车驾驶的过程中产生的信息包含了它对其他机动车发出的讯号：速度、方向、指示器、刹车灯和鸣笛声等等。现在如果我们将这种观察方式应用到建筑物和建筑学上，我们就能够确定建筑物是在不断地接收和处理信息，并随后生产出新的信息的。所有的建筑物都在信息转换的全球性过程中共同扮演了一个重要的革命性角色。

PERSONAL BRAIN: 陈述2: 情态建筑制造了超体。

VIRTUAL FRIEND: 听起来不错，像句俏皮话，我能够理解做为信息处理载体的你自己与同样作为信息处理载体的建筑之间的关联，但是作为设计者，我们怎样才能在工作中应用这些结论呢？到底超体是什么东西？我们到底是不是在谈论建筑呢？

PERSONAL BRAIN: 陈述3: 超体是一种可编程的建筑物躯体，它能够实时改变自身的形状和容量。另外，请不要使用诅咒性的语言。

KAS OOSTERHUIS: 这一定义需要从更细的角度来进行解释。因而我将每次为你们解释一个词语。超体之于建筑，正如超文本之于手写信息。超文本中渗透着经向的孔洞，你能够在在一个分秒