



# What.

## What is the project about?

The OS (OpenStructures) project explores the possibility of a modular construction model where everyone designs for everyone on the basis of one shared geometrical grid. It initiates a kind of collaborative MECCANO® to which everybody can contribute parts, components and structures. It hereby envisions a new standard for sustainable design that facilitates the re-use of parts and components and allows us to build things together.

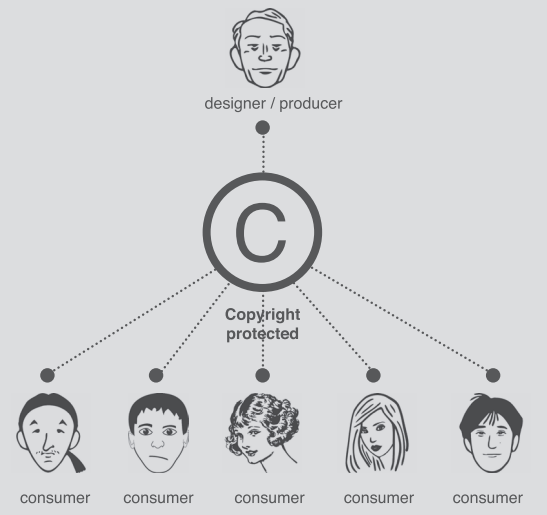
The OS ecosystem is built up according the Wikipedia model, where different people all contribute to a bigger thing (rather than each building their own thing) with this difference that in the OS system people don't contribute articles, but modular parts.

## The basic concept

The OS (OpenStructures) project explores the possibility of a modular construction model where everyone designs for everyone on the basis of one shared geometrical grid. It initiates a kind of collaborative MECCANO® to which everybody can contribute parts and objects.

## The classical design model

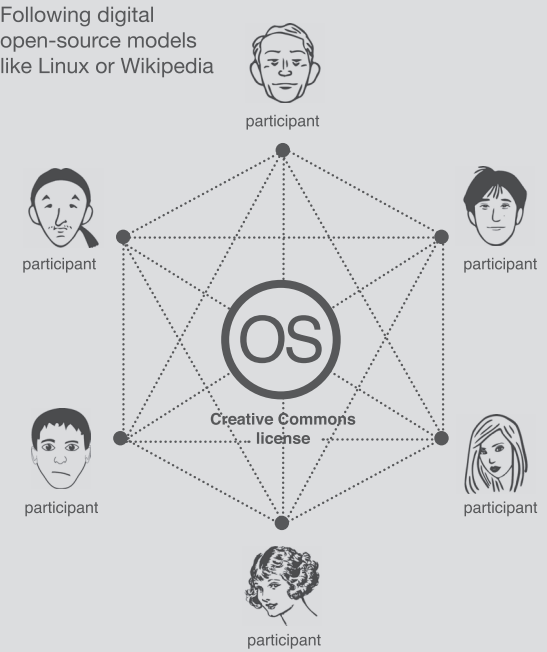
Hierarchal / vertical / centralized / top down / copyrighted.



- one entity designs a complete system for all
- the end user is passive he / she mainly consumes
- the product is static the end user can't really change or improve the object or system because it is copyright protected

## The OpenStructures design model

Network based / horizontal / decentralized / bottom up / partly copyrighted.



- all design a small part of a common system
- the end-user is active he can participate in the design- and production process by adding or reviewing parts and structures
- the product is dynamic the end user can adapt or improve parts or structures

# Why.

## What is its purpose and goal?

**What is the purpose of this project?**  
The purpose of this experiment is to investigate what the opportunities and limitations of an open modular system are and under which conditions it will prove to be most efficient and favorable.

**What is the goal of this project?**  
The ultimate goal is to initiate a universal, collaborative puzzle that allows the broadest range of people – from craftsmen to multinationals – to design, build and exchange the broadest range of modular components, resulting in a more flexible and scalable built environment for all contributors.

**What is the potential of this project?**  
An open modular system has the potential to generate flexible and dynamic puzzle structures rather than uniform modular entities. It will generate objects that have the ability to evolve and integrate old, new, cheap, expensive, original, bootlegged, manufactured and crafted components over time. It will introduce variety within modularity, hereby not only stimulating re-use cycles of various parts and components but also enabling collaborative (and thus exponential) innovation within hardware construction.

**Why another modular system?**  
Because nature itself has proven that in complex systems, modular designs are the ones that survive. About 500 million years ago, single-celled organisms were able to advance into multi-celled ones that offered far superior characteristics, and therefore, were able to spur evolution. As human beings, with trillions of modules (cells) per person, we are modular from head to toe and experience the benefits of modularity every single day. Modular cell structures enable us to scale and grow, simply by adding new modules (cells) that interact with existing ones, using standard interfaces. They have the ability to rapidly adapt to their environments. By adding, subtracting, or modifying cells, incremental design changes could be more quickly tried and either adopted or rejected. And finally, they enjoy the benefits of fault tolerance. With cell redundancy, individual cells can fail without degrading the system, other cells carry on while repairs are made. (source: Neil Rasmussen, Suzanne Niles, Modular Systems: The Evolution of Reliability)

But also in man-made structures, modularity is a known phenomenon. In an attempt to streamline efficiency and enhance structural flexibility, architects and designers have cranked out countless proposals for modular structures in the past. Nevertheless, we find ourselves today with an abundance of closed, incompatible modular systems that often generate impersonal uniform structures. So, if we want to improve the concept of modularity, we need to shift from closed and hierarchical systems, in which each system introduces its own standard, towards more open and decentralized systems in which common standards are shared.

Within the realm of digital creation, we have already witnessed the emergence of such open architectures. These digital constructions are no longer invented and designed by one person or entity, but rather take shape through the minds and contributions of all its peers. Global collaborative efforts, like Wikipedia, are challenging and outperforming the individual achievements of some of our brightest, leaving us with no other choice than to acknowledge the limits of our individual projects and participate in larger collective processes.

Physical open-source codes will allow us to build our hardware like we are currently constructing our software. Shared design guidelines will envision closed-loop systems, in which old components will feed new frameworks, thus creating an endless variety of hybrid structures and facilitating the re-use of individual components. The resulting 'open' structures, ranging from simple cabinets to multistory buildings, will thus become truly scalable, flexible and diverse.

If we want to communicate we need to use the same vocabulary, if we want to exchange files, we need to work with the same formats. If we want to co-create, we need to build with the same bricks.

**Why now?**  
Because our contemporary networked infrastructure makes it easier for us to exchange and share. Next to that, easy-to-use 3D software (like Google Sketchup) and affordable computer steered manufacturing techniques (like lasercutting and 3D printing) enable us, as non-professionals, to design and reproduce complex objects at home. These current developments are radically democratizing the design- and production process and force us to rethink the way we make things. It's exactly into this new, widely dispersed design- and production power that the OS model wants to tap by initiating a system that demands input from the end user in order to evolve and expand.

## Tapping into the crowds.

With online forums, free and easy-to-use 3D software and affordable, computer steered production techniques the end user now has all the tools he/she needs to get truly involved in both the design- and production process.

# Join us in designing the most diverse modular system in the world.

# How.

## How do I participate?

Everybody who wants can contribute to the OS project by adding their own modular parts or structures on to the OS parts database.

**1. Design and produce a part from the OS grid**  
In order for these new parts to be compatible with the existing ones they need to be designed from the OS grid (also see next column: 'How to apply the OS grid?'). And because all resulting designs are conceived as interdependent, dynamic puzzles, they should be designed for disassembly.

To streamline this design process a number of common design guidelines have been developed. These are rules of thumb that need to be considered while designing any OS part or structure. (see below)

**2. Upload and trade your part on the OS database**  
Once parts are designed and produced they can be uploaded on to the online OS database (www.openstructures.net). This database is the digital marketplace for all parts and structures that were created by applying the OS grid. It also serves as a central sharing point for the whole OS community. All part designs can be up- or downloaded in order to be discussed, reviewed, ranked, copy/pasted and traded among its users. This vivid exchange of parts will allow the parent structures to adapt, expand or shrink according to current needs. It will also stimulate continuous upgrades over time through a phased interchange of parts.

## The OS design guidelines.

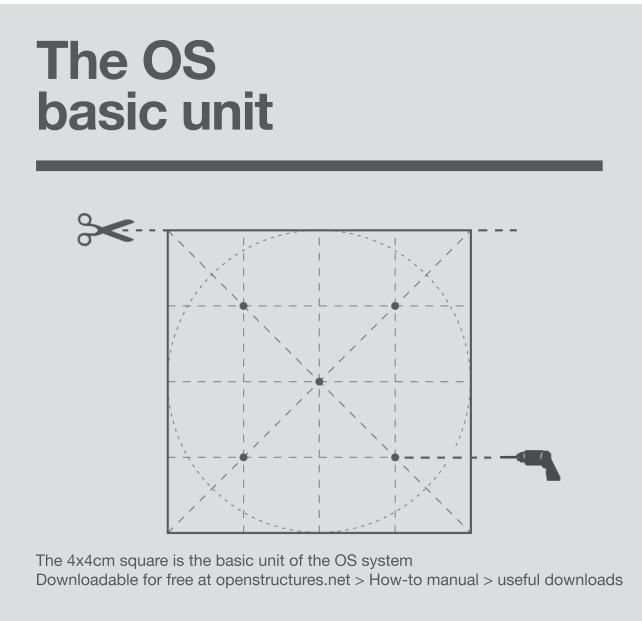
- Design parts and structures from the grid**  
When designing a part, position the assembly points of your part according to the grid, and choose dimensions that are derived from the OS grid in order to maximize compatibility with other OS parts.
- Assemble for disassembly**  
When assembling parts, favor assembly techniques that allow deconstruction without damage or loss in order to facilitate the re-use of individual parts.
- Favor recyclable materials**  
When choosing materials, favor 100% synthetic or natural recyclable materials for your parts in order to support infinite material cycles.

## How to apply the OS grid?

**The OS grid**  
The OS grid is the centerpiece of the whole OS system. It's the common metrical tool that is shared among all participants, which allows them to design interchangeable parts, components and structures independently from each other.

This grid is freely accessible on the OpenStructures website and is either used physically as a ruler or digitally as a three dimensional grid.

The OS grid is built up out of 4x4cm squares. The borders of these squares mark the cutting lines, its diagonals mark the assembly points and its enclosed inner circles define common diameters. (for more info go to openstructures.net > how-to manual > OS grid)



## Frequently Asked Questions.

**Who can participate?**  
Everybody.

**Does every individual part of my object needs to be designed from the grid?**  
No. Within the database we make a distinction between OS parts and Hybrids. OS Parts are building blocks that were designed within the OS dimensional framework. Hybrids are objects that contain OS parts but that are not fully designed within the OS grid. Both can be uploaded on to the database.

**How to protect an OS design?**  
Every designer retains ownership of all intellectual property rights for their products and product plans (full copyright). Apart from the limited license to display the products and product plans, OS is not given any interest in them. However, while uploading a component, every designer is encouraged to open up his design to the community through creative common licensing. This will allow other users to download and build further on these designs within a non-commercial context.

Different levels of shared use are proposed, for general information on these creative commons licenses go to [http://nl.wikipedia.org/wiki/Creative\\_Commons](http://nl.wikipedia.org/wiki/Creative_Commons)

**How to trade OS designs?**

Once a part or structure is uploaded, it can be offered for sale online.

**How to recognize an OS design?**  
OS parts can be recognized on sight by their typical assembly point patterns and / or dimensions. Apart from that, every part receives a serial number, a QR-code and an image of the OS logo after uploading it on to the OS database. The designer of the part can then decide to add this OS logo or serial number onto the part. This will then allow other users to look up additional part information by typing in the serial number on the OS database. The QR-code is an optional shortcut that hyperlinks people directly towards the online profile page of the part.

**How to interact with other designers?**  
Various opportunities to communicate with other participants are offered on the OS database. You can contact designers, leave comments, rate parts and structures etc.

**How is the OS model different from existing modular systems?**  
Unlike most existing modular systems, the OS model doesn't follow the classical top-down approach in which one person designs a complete (modular) system for everybody, but rather favors a system where everybody designs a small part of one shared system.

**Doesn't the OS model envision a totalitarian, all-encompassing grid?**  
The OpenStructures project doesn't impose its grid system, it proposes it. It invites people to experiment with it and hopes to learn from their outcomes. Rather than trying to spur a radical revolution, imagining whole OS cities from scratch, it puts its beliefs in the project's evolution, in the emergence of organic OS communities over time. The OS model doesn't aim at convincing everybody but hopes to unite a tightly knit network of likeminded enthusiasts. If the OS grid proofs to be relevant to people it will be picked up and expand, if not it will slowly dissolve.

**Isn't the OS model very restricting?**  
Modularity is a dimensional restriction by definition, but it also offers new opportunities because of the shared dimensional framework it proposes. And within this restriction, variation is endless. The OS project wants to investigate under which conditions such a shared framework will be most favorable.

**Isn't the OS model very primitive?**  
Every evolutionary process started with only a few blocs to build from, frequently resulting in rather primitive designs. But with every cross-pollination more pieces were created, and with every piece more complexity was added to the overall system, finally sophisticated constructions and creations emerged. Since the OS system is conceived as an evolutionary model, it doesn't consider its designs to be static end results, but rather sees them as updates of existing versions, phases within a broader cycle. Apart from that, the OS model wants to introduce variety within man-made modularity, welcoming different signatures to the design of its individual parts, ultimately aiming at producing a modular system that is so diverse that its modular characteristics can hardly be observed.

## Designing hardware like software.

The OpenStructures project is not about one designer who designs a complete system for everybody. It's about everybody designing a small part of a common system.

**Why would I want to use this system?**  
The OS model will offer a more flexible environment to the end user, allowing his built environment to adapt (grow, shrink or update) more easily. Increased compatibility will also facilitate the re-use of components, hereby prolonging their life cycle and reducing their environmental impact. Next to that, the consumer will develop a different, more active relation with his or her products, no longer judging objects for what they are, but rather imagining what they could become. If we shift from project to process, each design object becomes a prototype, an update, a new version. Failure becomes opportunity and criticism becomes feedback, a perspective that is needed to further develop and improve our ideas. If we see our society as 'under construction', rather than 'accomplished', we will free up space for progress.

**How do you see this project evolving?**  
Currently the OS model is being 'beta tested' by both students, professionals and enthusiasts in order to detect possible bugs and improve the overall system. The resulting parts, components and structures not only reveal the limits of the system but also demonstrate various synergies that emerge between different components. As a whole it displays a vivid patchwork of various personalities, materials, inspirations and motivations.

During several workshops and commissions, a number of people were introduced to the concept after which the first prototypes emerged. These prototypes are now passed on to again other people who are building further on the ideas and designs of their precursors. The resulting continuous collaborative editing process will allow the OpenStructures to evolve and self-correct over time. Concept outlines will be adjusted, objects designs improved and individual parts added or perfected within structures that constantly expand, shrink and adapt.

*Notes:*  
*The OS guidelines are conceived as a living document, meaning that it is open for edits and improvements.*  
*All comments and remarks concerning this document can therefor be sent to [info@openstructures.net](mailto:info@openstructures.net)*

*The OpenStructures project is a collaborative process.*

*It was originally conceived by Thomas Lommée at the Institute without Boundaries in 2007 and is now being further developed and tested by Lommée's design studio Infrastructures in association with various partners.*  
*The initial experimental fasses of this design research have received both productional and structural support from Z33, House for contemporary Arts. The first outcomes of these fasses have been presented at Z33 in september 2009.*

*For more info on the project, please visit:*

[openstructures.net](http://openstructures.net)  
[infrastructures.net](http://infrastructures.net)

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## From project to process.

Continuous collaborative editing will allow the OpenStructures project to evolve and self-correct over time. Concept outlines will be adjusted, objects designs improved and individual parts added or perfected within structures that constantly expand, shrink and adapt.

## Thinking inside the box.

If we want to communicate we need to use the same vocabulary, if we want to exchange files, we need to work with the same formats. If we want to co-create, we need to build with the same bricks.

[www.openstructures.net](http://www.openstructures.net)