Urban Village

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1 ABSTRACT

This paper is about a concept "Urban Village" as a new perspective for layered building in the densified city of tomorrow. The concept is a development of Living Lab 040 in Eindhoven. This paper explains the Living Lab 040 initiative, discusses the currently appliedapproach of appartment buildings and methods of densification as well as the reasons why innovation is desired here. And of course the concept itself will be presented and explained in images and in words, This includes the status quo, the context and the R&D ambitions. Finally there is a callfor companies and knowledge institutions to join forces in developing this concept.

Keywords: Experiment, Densification, Livability, Industrial, Innovation

2 LIVING LAB 040

The initiators of Living Lab 040 (including the author of this paper) have extensive experience in building innovation. From that position, a plan was developed with the municipality of Eindhoven in which a space of 8,500 m2is made available for experiments with the aim of gaining insights relevant to the city of tomorrow.

Experiments touch all current transformation topics that trigger accelerated change among consumers, in society and thus the market. It is challenging to speed up change within existing construction frameworks. Innovation requires courage, risk-taking, and letting go of traditional boundaries. In practice this is hardly possible and many projects started with firm ambitions, end up with a strongly reduced innovation agenda. That's why a protected zone (a living lab) is crucial. A place where initiators are allowed to discover and to learn from failures. The Living Lab 040 is unique because of its holistic approach but also because it's part of a real neighbourhood where ordinary people live in developed experimental homes, contributing to learnings.

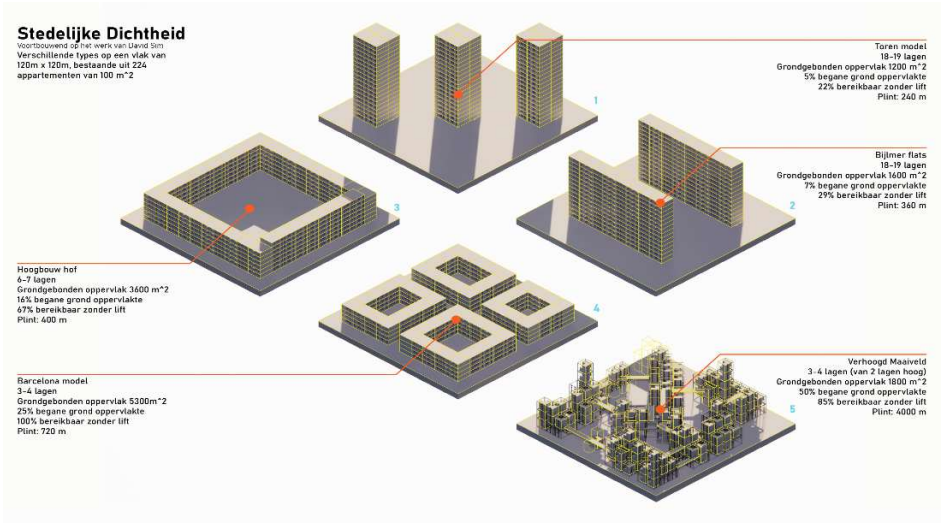

Fig 1: Impression of the Living Lab 040 to come. The first 10 houses are meanwhile realised

The experiments can be technical in nature, focused on products or processes, but certainly also have a strong social character. Consider themes such as energy, carbon reduction, climate adaptation, biobased, affordability, biodiversity, security, mobility, sustainability, circularity, etc., but also social challenges such as how to promote social cohesion. It is for this reason that the lab eventually becomes a small neighbourhood with almost 120 inhabited houses. The lab only started recently, right now 10 experimental houses have been realised.

The realisation of experiments takes place from two angles. Namely, the "bottom-up" approach, where one or a few companies propose an experiment, develop an R&D programme for it and then proceed to

realisation and further development. These experiments are then embedded in the overall development of the area.

A second approach is “top down”, in which a vision-based usually disruptive concept is developed from a core team, municipality or from third parties. And only then involving businesses and other stakeholders. This top-down approach is a reaction to the fragmentation in the market, with parties acting exclusively from their own parten detailed topic and thus not being able, nor having the power, to develop solutions on a holistic level.

The lab will ultimately accommodate approximately 120 test homes and innovations at district level. Some of the homes targeted at suburban (low-rise) developments and some at multi-storey inner-city developments. The projects landing in the lab comprise mostly small numbers. No more than is necessary to achieve the set learning objectives. This creates room for many and diverse experiments.

In this innovative lab environment, the Urban Village concept, subject of this paper, will be realized as a first pilot. Referring to the above, the concept touches on many of the current trends and challenges. The scope of the experiment includes 24 houses and additional collective facilities, it is mainly focused on inner-city development (multi-storey). Furthermore, it is one of the top-down experiments in the lab, born from a vision from the core team, supported by the municipality of Eindhoven and other stakeholders like Amvest, industrial parties, knowledge institutions, designers and a group of citizens (the Citizens Think Tank).

3 CONVENTIONAL APPARTMENT BUILDINGS

High-rise and apartment buildings in cities are basically using the third dimension to achieve densification. In the past, apartment buildings consist of stacked houses with necessary accesses (galleries, corridors, staircases, lifts) to provide access to the apartments. Often downstairs with a collective front door with mailboxes and doorbells. The said accesses are herewith collective and not public. Actually, the conventional apartment concept arose from technology and cost efficiency (the stacking and minimising collective space). A major objection to such objects is that they often promote social problems such as loneliness. By nature, people have no mutual contact in such buildings and therefore no sense of ownership, causing the collective area and its surroundings to deteriorate. In many places this leads to insecurity and crime. And all these problems entail a lot of social costs, due to deployment of social workers, health organisations and the necessary attention of the municipality, the owner and the police. In addition, this form of high-rise construction contributes only little to the densification task. Much less than one would expect. Stand-alone apartment buildings should keep some distance. This is because of daylight, views, greenery and parking space. In this context, high-rise and apartment concepts have been compared. In figure 2, this is done for several typologies (after David Sim) in which the Urban Village as a fifth typology was added. All five situations having the same number of housing units, the same number of people living there and the same surface/area. What is striking is that the fifth typology seems to be the least dense.

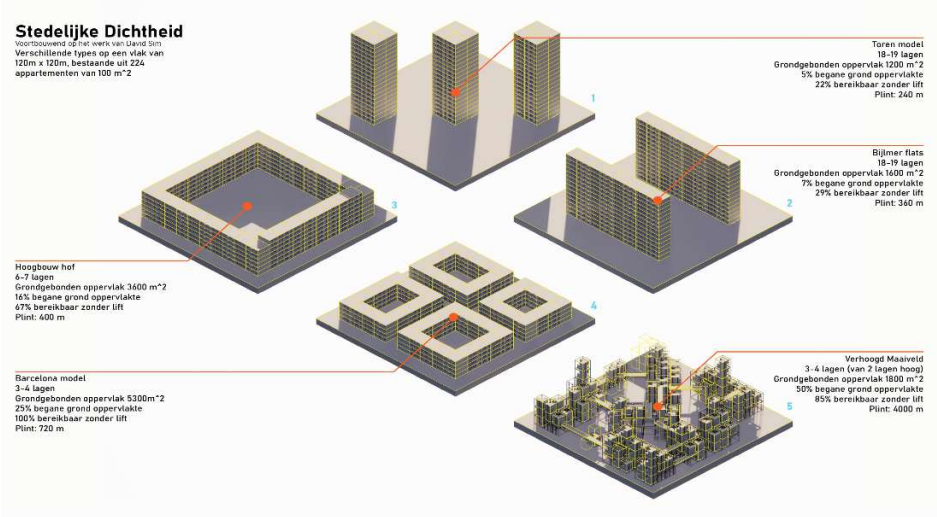

Fig 2: Comparison several densifying approaches. They all have the same surface and number of dwellings/inhabitants. Down-right the Urban Village concept. After David Sim (The Urban Village was added).

4 URBAN VILLAGE

Compared to conventional apartment buildings, the Urban Village has some different characteristics. Access to the building does not consist of a traditional stairwell, but residents gradually walk up via a path (trail). The houses are all located along this path. This creates the feeling of living on a street even on higher levels. This feeling is reinforced by assigning more functions to the path, such as meeting places, playgrounds, view points, small shops, like a hairdresser's, shared spaces, etc. Residents are thus challenged to move around more and furthermore the opportunity to meet each other, is substantially increased. The path up or trail is a public area where also non-residents are welcome to go up and enjoy the view. Maybe they can even buy a cup of coffee upstairs or enjoy an exhibition. During the development, comparisons with a Mediterranean mountain village were frequently made as an image, and because such a residential structure can start to function as a village in the city, the project was named "Urban Village".

Another starting point is the carrier-infill conception by Habraken (Habraken, 1961) and the division in building layers by Slimbouwen (Lichtenberg, 2005). This means that the building consists of a carrier (a system of columns and beams with plateaus), the path upwards (the trail) including all main services The infill consists of the dwellings and housing clusters and also the collective functions and street furniture, that are placed on the plateaus or can be hung in the carrier (rack).

Fig 3-5: Impressions of the Urban Village concept: living at a street next to a garden and playgrounds also on higher floor levels

The split between carrier and infill is an important starting point for industrialisation, as the carrier can be systematized very well, and the same appears to work well for the trail (outcome of research by design). For the houses, the idea is that they can be developed specifically for the concept, but also existing concepts meant for building on a building plot at ground level can probably also be used for this purpose. As a result, the concept of plateaus has also been given a second name, namely "elevated building lots". Apart from the

industrial advantages of the separation carrier-infill, this concept also provides much more flexibility regarding future adaptations.

Where traditional buildings are rigid, in this concept it is possible to make structural adjustments in case of non-functioning or desired changes in use, such as extending the support, moving the trail, creating a plaza, etc. The reason for change can also be the changes in the environment, for example in inner cities. The concept is able to fill in empty spaces and to be realised against or on top of existing structures. And so the Urban Village can be a tissue in motion that folds organically into the city.

What also can be seen is a development, where residents want to move their homes. Within the very same structure or to take them elsewhere. Perhaps in another similar structure or on a foundation on a traditional building plot, where they are able to extend it.

There are opportunities for temporary housing. For instance, there are many sites in the city, which need to be developed with larger buildings, but where the preparation phase often take a long period, typically 8-10 years. So those sites remain undeveloped for a long time. In those cases, an Urban Village is also suitable for temporary realisation. Indeed, the aim is to be able to relocate the houses and make the support structure demountable (circular). After a first life the structure can then be dismantled and, as like with K'nex and Lego, given a second life in a different location in a different configuration.

An additional interesting option for cities is to make the carrier also fulfil a bridge function, thus covering sections of roads, canals and railways, contributing quite directly to the densification of the city. After all, in the conventional world, roads and canals are places where no living space are planned. Such overpasses can also create connections (ecoducts for humans/fauna) between now often strictly separated areas of the city.

Fig 6 Images from design research result based on shaping the trail and the collective areas, based on a developed catalogue of outer spaces (see fig 8).

5 RESEARCH

The design of the Urban Village is quite different from the conventional design of high-rise buildings. Therefore an R&D step is necessary. In a normal project development, risk elements would be eliminated and ambitions would be pushed aside. This would in case of the Urban Village affect the concept to such an extent, that only a weak copy of the total concept would be realised. That in itself could become the reason, that the concept in that limited form, does not work and would then be discarded on incorrect grounds. It is therefore logical to realise the first Urban Village in a lab environment, where mistakes are allowed, where we can refine the concept for a couple of years. Testing and discovering what the values of the concept are.

Whether an effect can be measured as a basis for valorisation of values and thus feeding the business case regarding this concept.

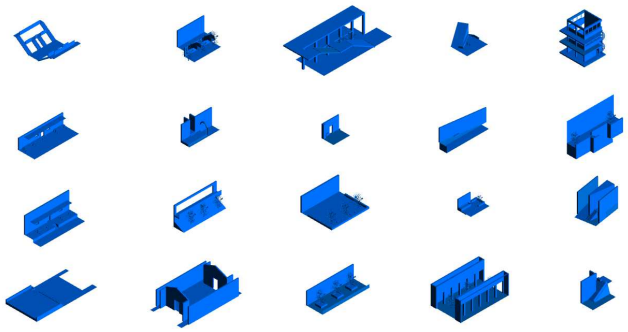

Fig 7 and 8 In this approach (also presented in fig 6) the outside area was standardized based on a number of outer sceneries (the catalogue of outer spaces).

The images accompanying this article are part of research by design conducted since late 2022 on how the concept can land in the city and what we need in the pilot to pick up learnings. One question, for example, is to what height the concept is feasible and how porous the building mass should be, so that enough effective daylight can enter the lower layers, in order to provide also there a comfortable and healthy living environment. Design studies indicate as a first conclusion that one can build at least up to a height of about 20-25m.

The R&D programme includes in a nutshell:

- Social experiments
- Impact analysis (on surroundings, environment and effects on e.g. health)
- Technical development (e.g. wind, noise, fire, light, odors, ...)
- Process development (assembly, disassembly, reassembly)
- Development of the (Circular) business case including legal aspects

6 STATUS QUO

The status of the concept (the experiment) is that the desk studies are in completion, feedback has/is been collected from stakeholders, such as the municipality that embraces the potential of the concept. The sketch design of the configuration as we intend to realise it in the lab is currently being elaborated. Realisation of the carrier will start within a year. The pilot is expected to be realised by the end of 2026. R&D will take place throughout the process. Design research is already being carried out now, but process development and product development will also take place prior to and in parallel with the realisation, including measuring and thus gathering evidence to research questions and hypotheses. In particular, R&D will continue for several years during the utility phase, focusing on social aspects. It is also foreseen that, if measurement results warrant it, a major adjustment will take place after a few years.

During this process, the concept will be released. The ongoing R&D will then still yield optimisations, but the concept can then be rolled out in the market.

This does not mean that the very same buildings are going to appear everywhere. It is the system, especially of the carrier and the trail, that will find its way to the market in all kinds of configurations. Compare it to Lego or K'nex, where with a limited number of parts, completely different structures can be realised. And then there is the fact that especially the infill (houses and collective facilities) can lead to a completely different character per building. For example, detached objects are possible, with a lot of freedom of form, or the building consists of pre-designed units, which may also adjoin each other in clusters like a group of terraced houses. Not to mention the use of different materials and colours.

7 CONCLUSION

We are on the eve of starting to land the ideas as presented here in the protected environment of the lab. The purpose of realisation is "learning" and optimisation. With that, the Urban Village is in this phase, a test

object. Its funding will be raised by the participants, such as producers, developers and/or housing corporations. We are now at the stage of involving parties in the project and the lab. Different parties are involved for the carrier the trail, the installations and the houses and other objects. The investment is reduced, because during, say, 10 years of residence time, there are also rental returns and the object has a high residual value due to its disassembly and reuse. The municipality can, for example, at this stage designate a place where the structure to be realised now, in modified or unmodified form, can be given a second life.

The enticing prospect for participants is, of course, that this kind of project can be scaled up. Invest now, benefit later. This paper is therefore also aimed at parties from industry, municipalities and scientific research institutes, which may be interested in applying the concept in the future and to contribute to this R&D project.

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