By 2050 three quarters of the world population will live in urbanized areas; cities will face major challenges, socially, economically and environmentally speaking, while architects and planners, along with the public sector and private stakeholders have to provide solutions towards a common and sustainable development.

The exploitation of land and resources will lead us to a necessary re-evaluation of our planning and building strategies. The densification of our urban areas and a tendency towards the verticalization of the built environment can respond to part of these problems but a holistic view is of the utmost importance.

The concept of Sustainability is defined in three different aspects: economic, environmental and social. All are interconnected, equally important and all need to be taken in consideration when designing the future vision of our cities.

The city of Göteborg is going through a massive process of urban renovation and development which consists of multiple phases and will eventually render it one of the most sustainable cities in Europe, if not the world. One of the main projects the municipality is carrying out is the Älvstaden, the “River city”: the aim is to renovate the areas along the river Göta, in order to give value and render visible one of the most significant and trademark elements of the city, bringing citizens closer to the water and its attractions.

The renovation of the Frihamnen area, currently a commercial harbour, will create a new urban area consisting of an abundance of apartments, offices and other facilities, which will be the main starting point for the development of the city on the other side of river.

The consolidation centre as a vital part of the future city

The construction of a dense urban area will require strategic services regarding the delivery of goods and waste; in order to eliminate the heavy traffic deriving from these activities, the municipality of Göteborg has planned to build a Circular Consolidation Center, a logistic facility which will be established right on the border of the new Frihamnen development.

The consolidation centre is a concept still in development in Europe and, while few examples can be found, none of them adds more values to the cities than an efficient organization of the delivery of goods and the dismiss of waste. The goods are stored in the CCC and then delivered to people and companies by electric cars, thus eliminating heavy traffic and air pollution from the part of the city the CCC is serving. The electric cars pick up the waste from the households and commercial activities to bring them back to the CCC, where it will be collected and then brought to the designated sorting centre.

A research on the possible application of Consolidation Centers in cities has been carried out by prof. S. Behrends, showing that the most positive outcomes would come from the creation of a system of CCCs throughout the city, covering it in its entirety. Multiple CCCs should be then scattered in the city of Göteborg, creating a network which could bring added values to the area they would be established in. The possibility of contextualizing the CCC comes therefore as a necessity along with its replicability, its flexibility in terms of morphology, ergo its modularity.

This is certainly a contradictory statement. How can a modular/replicable structure be contextualised at the same time?

A modular structure is easy to assemble and can be replicated infinite times. The use of a dry construction system facilitates this process and responds to a necessity of flexibility that the cities of the future are facing: buildings require to be modified, expanded, shrunk, disassembled.
and assembled in different ways and locations in order to adapt to new conditions and needs. However, the adaptability and contextualization of the building are not confined only by its capability of changing shape, as the materials used for the construction and the functions which take place in it play a fundamental role.

The choice of the materials comes from both the current and future surroundings of the structure, depending on the context, varying from steel, wood, prefabricated concrete etc.

A Consolidation Centre isn’t usually a facility which is openly showcased in the city and easily matched with other functions: as an added value to the new concept of the CCC, the research of a maximized interaction between the centre and public activities has been carried out, and the development of a regular and flexible structure can only help achieving this goal. Possible functions can be chosen according to the needs and the characteristics of the surrounding area and placed in modular elements easily inserted within the main structure.

The proposal is therefore the prototype of the new concept of Circular Construction Center, thought in order to serve the needs of the future city, providing a flexible, replicable and at the same time contextualized solution in order to achieve a fully sustainable urban intervention.

While all the different aspects of this project are equally important along with the implications and the impact of any actions taken through this intervention, a focus was needed in order to effectively address a larger issue. Contextualisation, material reuse, verticalising providing flexibility through the lifespan of the building, as well as its afterlife, and opening a new field for interaction by mixing uses seemingly incompatible are at the core of this proposal.

**THE CONSOLIDATION CENTRE OF FRIHAMNEN**

Concerning the application of this prototype to the Frihamnen study case, the proposal consists of a vertical structure, comprised of 18 modules, minimizing the land use and devolving the majority of the site area to a public park, rendering the previously inaccessible and cut-off area, to an oasis in the centre of the city. The steel structure is perceived as a sort of scaffolding, assembled in order to form a cylindrical shape, hosting the CCC and a series of added functions which take place in modular elements: the containers. It creates a dialogue between the surrounding area and the main landmark along the river: Lilla Bommen, widely known as “the Lipstick”.

Frihamnen and the adjacent area of Rönö, where the project is supposed to be established, are both characterized by a strong industrial identity, which could constitute the link between the past and the future vision of the area. The use of containers as building elements offers multiple advantages other than a simple remembrance of the main feature of the site: they are inexpensive, easy to assemble and have standardized dimensions which allows flexibility in their arrangement. Moreover, the steel used for the main structure is the result of the dismantling of the old bridge on the river Göta. It could be easily said that this building is already present on site, it just needs to be assembled!

- minimise land use
- re-introduce the land to the city and its people
- recycle/upcycle materials found on site
- modular structure/replicability
- design for disassembly
- design for dry construction
- flexibility of use
- promote vertical growth
- reduce building footprint (actual & CO2)
- introduce cradle to cradle

**Sustainability matrix**

The logistic organization of the CCC is designed around a single main element, the traverse: this consists of a steel structure able to lift, rotate and move containers throughout the building, becoming the protagonist in the experience of the tower by the public and allowing a flexibility of movement and space far from the conventional conception of a consolidation centre.

- movement of goods
- function flexibility
- reusing local materials

Envisioning the future city of Göteborg, the use of electric cars will be substituted by the one of drones, leaving more space in the building to host public functions.
The containers, then, represent a common element between the CCC and the public functions: they contain goods and waste, but they also contain activities. The main ones that were identified as suitable for the current site would be: second hand shops and market places, which could have a close relation to the CCC and the possibility of recycling materials from it, offices and co-working spaces, due to the lack of this kind of facilities on that side of the river and their future need after the development of Frihamnens, along with cafés, bars and other social spaces.

But why shipping containers?

The use of shipping containers as building elements is an emerging trend in architecture for many different reasons. Big progress has been achieved since their invention in the 1950s by McLean and now they are used for different purposes that go beyond the mere aim of transportation. In a world where sustainability is severely threatened by the building industry, it is on the latter that it is necessary to act in order to reduce its negative impact, being the environmental, social or economic. Containers are worldwide available, relatively cheap compared to other materials and they can host a variety of uses.

The building is located on the board walk, close to the river in order to easily deliver the waste to the boat. A vehicle lane, passing along the back side of the building allows the trucks to carry the goods to the CCC, representing the only vehicle traffic accepted in the area. The ground floor is completely permeable, not interrupting the boardwalk, leaving the choice to the public of going up through three staircases or two elevators.

The permeability of the building proceeds in its vertical development thanks to its scaffolding structure, enhancing the interaction, both visual and physical, between the different functions.

Since the building is essentially a verticalised city street, open and permeable by anyone, anytime, full of different functions, energy consumption (heating, cooling etc.) takes place only within the containers (closed spaces). As far as the construction of the CCC is concerned, through the use of the old steel of the bridge, we minimise the use of new material and make the best of what the site currently offers.

From the moment of its construction, the new Circular Consolidation Center can be perceived as a constant work in progress: thanks to the way it’s designed, it can change and adapt to the possible needs and challenges the city will face in the future. Functions can be interchanged or substituted, floors can be added or taken away, the CCC itself could be turned into something else in case its concept would turn out unsuccessful. Due to its elevation above the water level, the building could even defy the threat of the sea level rise, which the Göta river is likely to experience.

Overall, this ambitious design, if carried out, will introduce a new way of managing city logistics through a grid of modular, easily customised CCCs scattered around the city, while answering to the each area’s needs. A link between replicability and contextualisation is found through the mix of the functions and there-use of materials, thus bridging the gap between change and conservation, between new and old.

Between future and past.

Thank you,
Miran, Giovanna, Allegra, Effrosyni, Naji

https://link.springer.com/chapter/10.1007/978-3-319-21266-1_23