TEMPORARY HOMES FOR A MOVING SOCIETY

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devoted to
my parents who financially and morally helped me along all my study career

CONTENT

PROJECT TITLE	Temporary Homes for a Moving Society
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PREFACE

Temporary Homes for a Moving Society is not just an architectural project, it is a new methodology of thinking about a solution for a new developed target, result of a technological and digital world, where the time for everything is speed up.
It is a Net-Worked system of architecture spread all over the world which can help the young moving generation to temporary live inside the proposed architecture since they establish a permanent work settlement.
It is a Net-Worked system of temporary and changeable possibilities, which can become a perfect solution for people to meet and exchange knowledges, accellerating both the process of finding/establish or create a work position and the process of developing in a wider way the progression everywhere, whithout lose dare personalities inappropriately.

**A future without personality and meritocracy is not worth.
Not anymore.**

THE IDEA - THE EXPERIENCE

Am I an architect?
This is the question I ask to myself now that I am near to close my studies. I am not alone.
Once a young student finish his career, entering the real working world it is not so easy, and especially, it is not always what one has always dreamt to do.

Being a passive pawn in a work that does not match the valuable skills and competencies of a worker it is the normality. The exception is what, instead, it should be the normality.
While a eager student can acquire a great amount of knowledges during his student career, hardly is for him to find a working place where he can grow and expand his potentialities and thus where he can properly gain, mentally and materially.
Indeed, not always, a country can give to its eager workers the right position that they deserve. And not always a student can move to find another country that can correctly use and develop his competencies.
However changing a country, means changing plans, changing mentality, that bring both positive and negative features, but it can also means: changing possibilities.
Changing is for the ones who want to change, for the ones that can't be satisfied of the work they have found near home, and that can't give them the potential credit they aimed to get. Changing than, means sacrifices and privations.

Nevertheless all the privations that one can afford are not always enough to achieve what one planned to reach, that means that not everybody can afford all the costs to get the desired working position.
Changing a country, indeed, means capital investment, means different monetary system and monetary control, different life cost, and more one aim at finding a qualified place, the more are the sacrifices he has to do and more expensive.

It is also important to consider that today the most widespread work is the temporary one, with short-term contracts. The question that arise after a work of this typology is: what to do now?
If one is eager and ready to challenge himself, and willing and able to invest in privations to reach his desires, can move to a new solution somewhere else. Otherwise he is resigned to stay in the place he is, working to live, waiting to have some awards.
And if in the first case, after a temporary experience in a new place, he has to move again, the problem is still persisting. Start over. One can think to have started a new long-lasting experience in a place where he could grow his own family and have his own house, instead, he has to move again his shell.

Therefore, how can the architects face this phenomena?

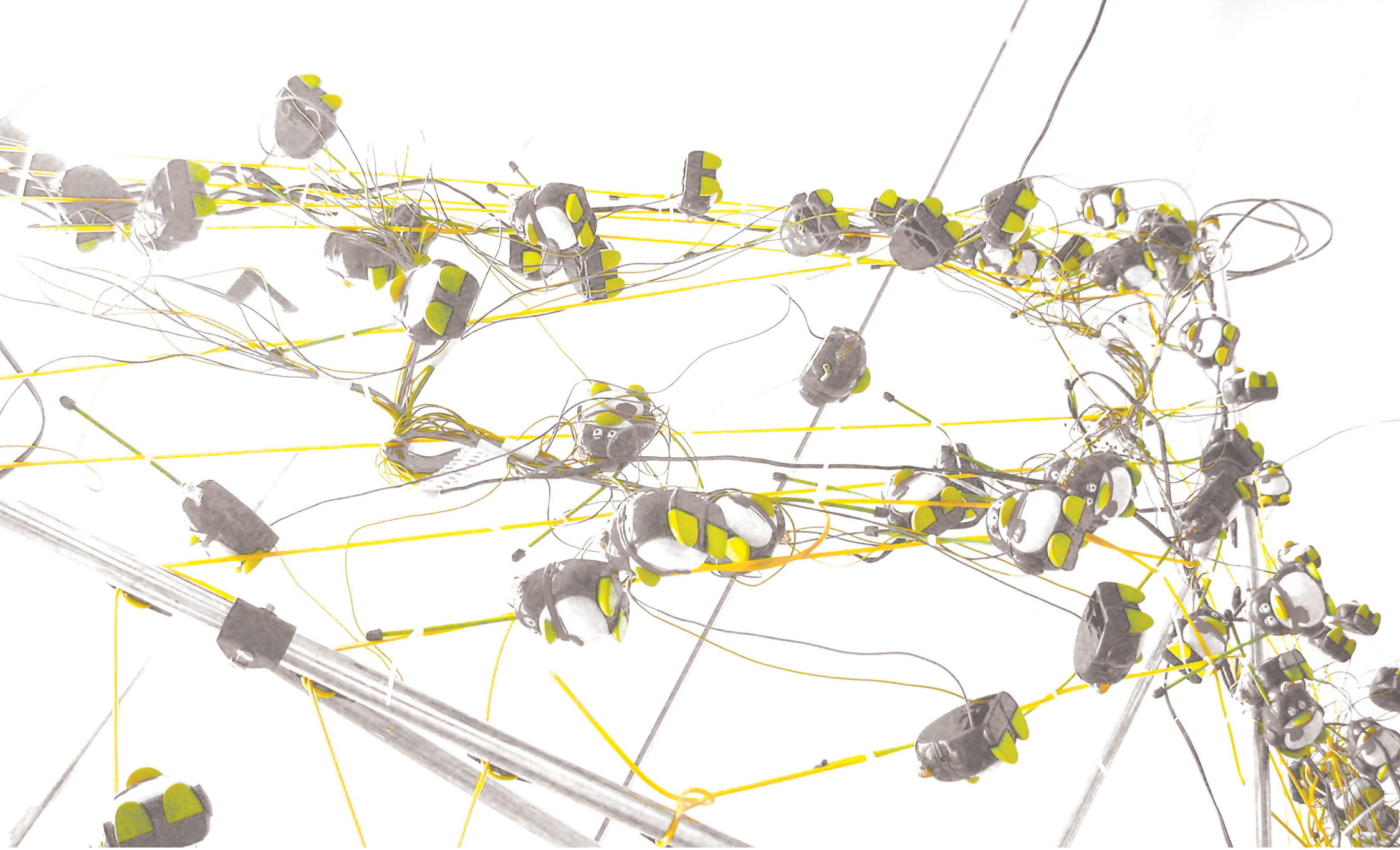
We, as architects, have firstly to understand that nowadays The Architecture has to be an architecture of change, in step not just with the technology and the sustainability but especially with this changing society.
The precariousness of this new dare society generates movement and the search for a place to live and work permanently. Consequently the search for a house is strictly related to the job search. That means that if the job is temporary, the house is temporary too.
Why not to help the new moving and precarious society through a new architecture typology that can fit their social-economical-technical needs?

Thus, my aim is to create a "network-architecture" which guarantees a house for a resourceful precarious whenever he is going to move, a house where he can always feel at home and which full fills all his temporary needs, and necessities.

A chain of building complexes spread in a large scale, worldwide, with temporary rents.

A network-architecture with different types of houses for different targets and needs.

A complex of typologies that can present the same quality-quantity-price level of a similar complex belonging to the same network, but in a different country.



[ill. 1]

PROBLEM STATEMENT

[ill. 2]

INTRODUCTION

The topic I am going to analyse and develop is a wide proposal of a series of building complexes that could be evolved (in a large scale) in different cities and countries, creating a "network" between them, both in an architectural, technical and administrational manner.
A network is a series of components, systems or entities interconnected between them. And as "network-architecture" I intend a series of building complexes spread worldwide that can be interconnected. Furthermore a "net-work-architecture" means also an interconnection between architectures worldwide that aims to integrate the needs of the new eager moving society, allowing them to create a net of working opportunities.

In this researching part of my thesis I want to clarify all the aspects that moved me to think about the project idea. Aspects that are both coming from my experience as a member part of this new society, and from statistical analysis, social behaviours, architectural-technological-anthropomorphous essays.
This "visionary" theme wants to arise a concrete problem, that has always been underestimate, creating debate on the architectural field, as the CO_2 issue and the technology are doing.
The new fast growing society, its precariousness, its increasing movements in the globe, the globalisation phenomena, all of them are connected to the main issues that nowadays the architectural world has to develop.

So, why do not start a discussion and a close-examination of this problem, and find one of possible solutions that can proliferate from these considerations?

ANALYSIS READING GUIDE

The analysis start focalising the technological matter, and its immaterial ubiquitous.
This has positive and negative incomes: a public control of the individuals, a fast development of the mass, a develop-span of the society faster than the growth of the physical city, an omnipresent possibility of upload the individual knowledges.
The technology has to be seen as a factor of change, therefore.

The second analysis turns upon the new society's habits, coming not just as a consequence of the technology.
It is pointed out a changed typology of living not more related to a particular place and traditional living style.
The new society is surpassing the material line-time of a traditional city's growth, a city that is becoming a living and kinetic place.
This has as well positive and negative features, and the architect has to consider them in the organization and planning phase.
This analysis will bring to the choise of the project's correct target, as well as the analysis of the global workforce and the network society coming from the globalization.

Freelancers, global workforces and a network society have positive and negative features in the working field. The last analysis is therefore analysing the difficulties and the opportunities of the young people who face a temporary and global working world.

To summarize all the research done in a more clear way, a diagram shows the problems and the main questions arising from the analysis. A scheme that help to better understand the project approach.

At the end of the chapter, some case studies have been inserted to clarify some aspects of the analysed problems, and to clearly understand the further design process.
The organization and growth of student houses will help to better understand the difference between this typology and my design proposal. As well as the temporary houses: their beginning and motivations of their establishment. The Japanese metabolist architecture, the Archigram philosophy.

These case studies are not just related to the architectural field, since the phenomena is involving different spheres, the case studies want to give a global understanding of the theme.

" Architecture is a form of communication... of knowledge. Architecture is a way to understand our world, and also possibly to have some effects on it. It doesn't necessary has to be through buildings – it has to do with ideas that involve our immediate environment, our physical space.
Any way to use that physical environment, that architectural context, as a means to discuss issues I think is very appropriate. "

[Bernard Tschumi 1]

Thinking about Architecture it is an extended issue that it is not related to a single isolated field. Indeed it is related to the surrounding society: the way the society tend to think and to live, and all the aspects that belong to its growth.
Thereby the architect has to consider his work as a social work for a specific society, a society that is nowadays growing faster than the growth of a physical city. Thus, the architect has to forecast the social and living tendencies, analysing the aspects that have brought to a change, before designing a solution.

How people live and dwell today? Is the city and its services suitable for the new society?

Is people feeling good in the environment it is living? What are the social and physical needs today?

In which way does people feel at home? Does the term home exist anymore?

When the architect look at Architecture in a social light, buildings and dwellings appear more suitable and conform to the anthropological, social, physical and technological requests.

Writing technology, as part of the social aspects the architect has to consider, it is not absurd! Indeed it is through the introduction of the technology that the life-style of the humanity has rapidly changed.

A NEW ARCHITECTURE FOR A NEW SOCIETY
needs to analyse all the aspect that changed the society

1 TECHNOLOGY AS A FACTOR OF CHANGE
its ubiquitous and the way it modifies + and - the society

2 SURPASSING THE MATERIAL LINE-TIME
the changed traditional habits are not just due to the technology, a kinetic vitality that make the city:

3 LIVING CITY

other aspects that have to be analysed, coming as cause/consequence of the 3 above

4 GLOBALIZATION & MULTINATIONALS

5 GLOBALIZATION = NET-COMMUNITY AND NET-WORKERS

6 FREELANCERS: CONSEQUENCE OF COMPETITIVENESS

7 WORK OPPORTUNITIES AND DIFFICULTIES

1 TECHNOLOGY AS A FACTOR OF CHANGE

Nowadays the ubiquitous computing is one of the main factors of the design and use transformation of buildings and cities.

Through the technologies the new generation have grown faster than two generations ago. The knowledge have been spread rapidly through the new technology than through the material books, for example. And the introduction of a new sophisticated system can now be surpassed after a small period by a new update. Updates by updates allow the knowledge to be rapidly revise and spread to everyone.

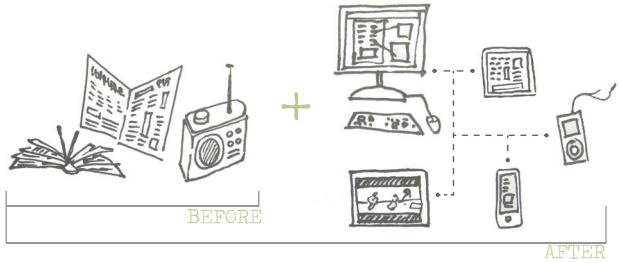
" The cities are increasingly assemblages of non-topographic and non-urban components, where interactions and exchanges are automated by algorithms. " [Saskia Sassen]

Thereby, in a time when digital technologies seem to progressively de-materialize the world surrounding us (digital photos, digital books, digital connections, ...) the question that an architect has to pose is how the buildings and cities can approach the impact.
How will they work and look like, and who will benefit from it?

The material city, therefore, with its slower time-span, has to face the growth of its inhabitants.

" cities are smart and getting smarter as information processing capacity becomes embedded within and distributed throughout ever-broader regions of contemporary urban space." [Mark Shepard 1]

CCTV cameras, WiFi areas, and digital control softwares are populating the urban environment and the infrastructure of our cities, monitoring in these ways their and our behaviours, but also informing and enhance our knowledge. The rule that was once in the hands of the urbanists is now going into the interests of the commercial and law agencies. Indeed it is much more easier by them to design the city background in step with the time-span of the inhabitants, using de-materialized and high technological methods that can be fast replaced.
Mark's sentence can let the architects think about their role, and the way they have to arise their position again, challenging it in a new way, leaving the tradition behind their backs.



[ill. 3] Only 50 years ago the information was mostly spread through radio, newspapers and books, today every electronic device can do it. One can for instance read electronic newspapers on his iPhone or laptop, everywhere and anytime.

key words

fast intelligible growth
fast spread of knowledge
fast updates
smarter cities

dematerialized world
consider tech effects in architecture

CASE STUDY

THE MOBILE DEVICE
Mobile devices (as phones, iphones, ipad, personal computers, internet WiFi, Gps, mp3s,...) create, each time a user is using them, one's own room or personal space and atmosphere, even making one social place a personal one.

" The city becomes a network of nodes and pathways through which we circulate like data packets. - The city is here for me to use – is the logic. " [Mark Shepard]

The digitalized communication, the music, the informations, everything you need or want, can be reach through the only use of these devices.

2 SURPASSING THE MATERIAL LINE-TIME

Furthermore as P. Sloterdijk highlighted, the tradition has been surpassed not just into the architectural and urban sphere, through new technologies and organizational plans, but especially the social habits are progressively and rapidly changing, thereby changing the traditional typology of "living".

" Today, we are not tied to permanent life modes defined by traditions for the founding of a family, our professional legacy, geographical origins and gender role distribution. "
[Peter Sloterdijk]

How can Architecture, than, full fills the needs of this not permanent life style?

In a smart and fast developed society, where the traditional concept of historical continuum between cities and citizens is broken, how can the Architecture be in step with the changes?

In addition " the rise of the middle class, the expansion of public education, the flowering of mass culture, the movement of the population to the suburbs, the shift from an industrial to a service economy, none of these would have happened without the cheap current generated by utilities " [Carr]

By saying so, how can the architect face what is the result of this process in a responsible way?

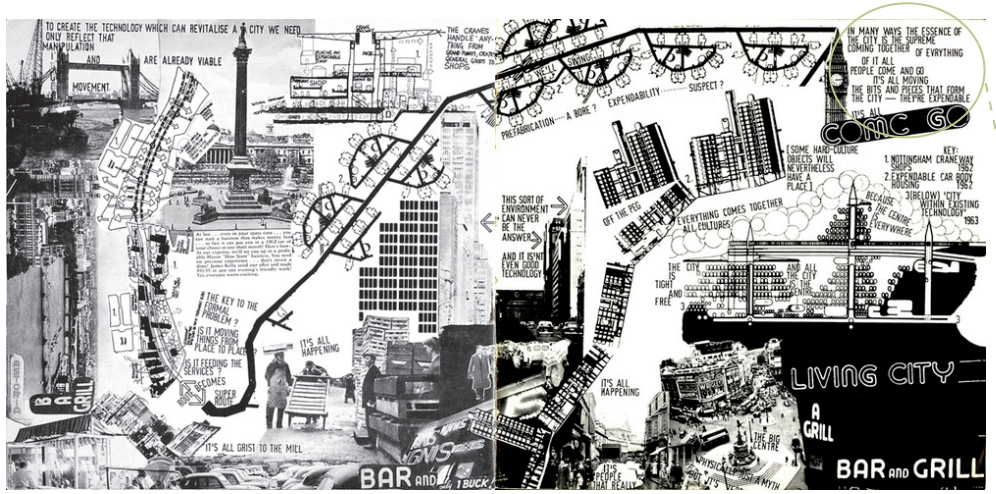
And moreover, can these new utilities be a tool for the architect to create a coherent life-building-environment?

While in a traditional habit the development was in step with the time, with a new kinetic-living habit the development is faster than the material line-time. This is not happening just through the fast progression due to the technology: the expansion of the public education indeed could spread the knowledge to more people. Allowing more people to enter in service works instead of industrial ones.

With a greater amount of educated people the different countries had to adapt to a new level of enterprise's upgrade. Unfortunately not all the countries can well insert the educated professionals into an adequate working place that fits their grades. Whether for political and organizational, economical or administrational reasons, the majority of this young society is not inserted in a correct working system.

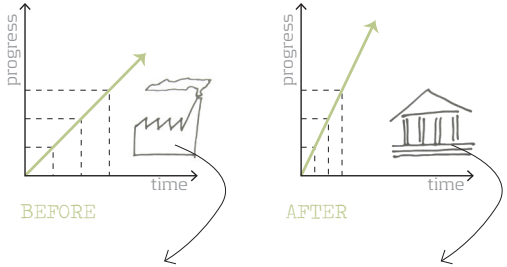
A consequence of this aspect is the increasing phenomena of the emigration of talented people from the homeland. Looking for a suitable and durable working settlement.

THE MOBILE DEVICE | pag 9
May Day | http://euromayday.org/



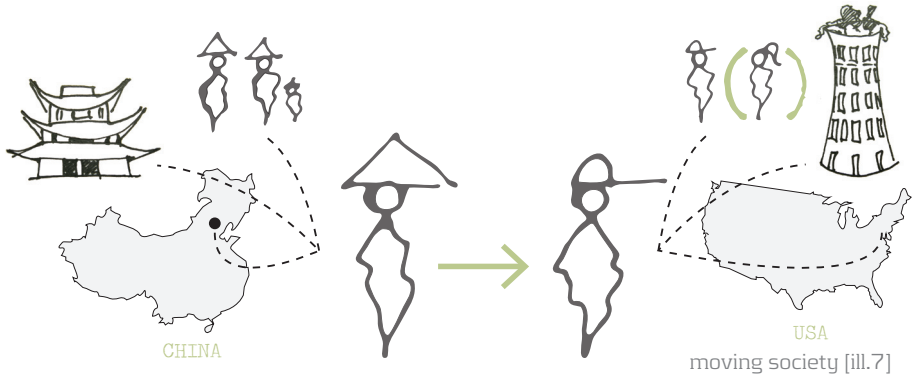
[ill.4] Living City Gloop _ Archigram, 1963

In many ways the essence of the city
is the supreme coming together of everything
of it all, people come and go, it's all moving
bits and pieces that form the city are expendable



[ill.6]

[ill.5] Living City, Gloop 4 _ Archigram, 1963



moving society [ill.7]

3
THE LIVING CITY

The Archigram group in the 1963 began the debate on the aspect of the contemporary city, predominantly occupied by life, movement and technologies.
" static communications + motile communications + verbal and non-verbal communications + signs + symbols + watch it happen + listen to the sound + see it flow " [Living City, Gloop 4, Warren Chalk and Ron Herron, 1963]

The city is nowadays not more interested in the traditional futile details and formal articulation and demarcation of space and material, instead as a vernacular urbanity it is more focused on the ambient, immaterial and kinetic forces that make it living. The less determinate and more ephemeral are possibly more important and adaptable to this moving society and living cities.

Furthermore there is not more distinction between cities and countries in a networked and multicultural space and also in this now global undifferentiated extension of the built space
" People can inhabit anything " [Rem Koolhaas]

[ill.7] today the life of a single is not dependent to his origins and traditional lifestyle or the creation of his own family.

THE MOBILE DEVICE | pag 10
CASE A | New Dreamers | pag 18-19
The Metabolism // The Archigram | pag 20-21

key words

changed social habits
changed living typology
broken historical continuum
development faster than material-time

rise of middle class
expansion of public education
flowering of mass culture
from industrial to service economy

bad work integration for young people
emigration of talented people

vernacular urbanity
multi-ethnic metropolies
networked and globalized countries

4 GLOBALIZATION & MULTINATIONALS

It is important, at this point of the research, to analyse the role that the globalization had in the development of the technologies and the knowledge all over the world, and in the resulting global living-working space. Furthermore, examining the logistic strategy of a company is determinant to better understand how the architecture of an enterprise works in a world in constant transformation, keeping it as a case study.

Globalization refers to the progressive growing phenomena of relations and exchanges in different fields, at a world level. The first effect of this phenomena is a direct economic and cultural convergence between the countries involved.
The term appears for the first time on 1981, when it was used by the economists to refer at the phenomena of economic relationship between countries and commercial enterprises. Today the term extended its meaning in reference to new social, technological and political changes that have been grown starting from the 80's. [web 1]

The globalisation it is correlated to a positive achievement of Multinational Corporations in the World Economy, that manage their production or deliver services in different countries, spreading their economical and commercial features on a global level.
Even the multimedia sources have enabled to spread knowledge and culture all over the globe. Nevertheless since that sources and companies operates in more than one country, they are exposed to different cultures, and therefore to have success, they must have a global mindset, and to be able to recognize and adapt to the differences. [web 2] ex: Mc Donalds

Nowadays furthermore it is important to supervise, anticipate and check the sales, prefiguring the market tendencies.
The enterprise is fully involved in this action, from the marketing to the logistic. Especially through the introduction of new networks and Internet, the logistic it is determinant and strategic in the process of economical growth of the enterprise.
Thereby, because supply chains are constantly changing and evolving, a company has to develop logistical strategies suitable to specific products, countries or costumers. [web 3] This will allow the company to optimize the production and distribution.
To this regard, the main aspects that a company may examine, to ascertain whether any potential cost benefits can be achieved, are:

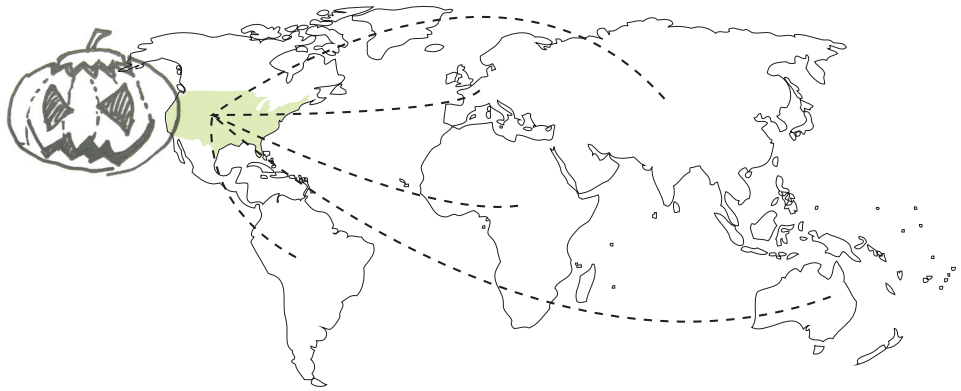
Transportation: does it helps service levels?

Logistic systems: do they provide the required level of data?

Competitors: review what they offer.

Information: is it real-time and accurate?

Strategy review: are the objectives of the logistic organization in line with the objectives of the company? [web 4]



[ill.8] The Globalization phenomena spread specific country's cultures and habits at a worldwide level.

key words

technology as a globalization source
multinational: a globalization source

economical-cultural globalization
recognize & adapt to the differencies
supervise & anticipate the tendencies

global work for global workforce
global system networking & production
war for talent
technologies spread talents

just 21% is fully work-engaged
energyzing works under pressure
86% say that tech is helping to work

5 GLOBALIZATION = NET-COMMUNITY & NET-WORKERS

In a world where the individuals can recognize themselves as a part of a globality, the regular and permanent jobs for a specific worker and place are decreasing in favour of global work for a global workforce.
The global workforce is the pool of workers employed by multinationals and connected through a global system of networking and production. [web 5]
As of 2005, this global labor pool consisted of approximately 3 billion workers. [web 6] Due to the various and multicultural composition of workers in a company, the workforce and the single worker are competitive as ever. This competitiveness is due to the achievement of specialized works worldwide, and the introduction of connective systems and communication technologies that enable the distribution of talents all over the world.
Some go as far as to describe it as "A war for talent." [web 7]
These newer technologies not only benefit the workers, but the companies can now easily find highly specialized workers that are very skilled, not just in their local territories.

Towers Perrin studied the Global Workforce [web 8] through 18 countries and questioned 88,000 full-time workers around the world.
This research basically studied a three parts method of evaluation to determine and calculate engagement's levels of the workers and their type of connection to their companies and jobs: "think, feel, act". The online survey quantifies employees rationally (to think) emotionally (to feel) and through motivations (to act).

From this study (june 2007) emerged how people "desired" to do a good job in their field and how more people eager to be the best in their field.

However, in the real work, just 21 % is "fully engaged" emotionally, rationally and with motivation in the work, but the majority 41 % is partly engaged, defined as "enrolled", they do their work just to have it done without involve their emotions in doing it. 30 % is "disenchanted" their score is lower in all the three ways of engagement, and dramatically low in the emotional one. 8% is "disengaged". [web 9]

Furthermore, the study broke many of the myths that surround today's workforce:

Total respondents:	88,612
Belgium	1,026
Brazil	1,551
Canada	5,076
China	5,070
France	5,061
Germany	3,058
Hong Kong	1,050
India	4,662
Italy	1,040
Japan	4,141
Korea	1,003
Mexico	1,044
Netherlands	2,553
Poland	1,062
Russia	1,570
Spain	1,017
Switzerland	1,022
U.K.	5,120
U.S.	42,486

- The stressed out workforce appear to be overstated: 68 % of the surveyed reported being comfortable and even positively energized in respond of work-related stress, indeed they appear more motivated to do the challenging job, and more concentrated throughout the daily work.

- "The near-ubiquitous presence of cell phones, laptops and personal electronic devices means that employees can now access e-mail, voicemail, calendars, documents and presentations from virtually anywhere, anytime," said Caldwell. Indeed 86% feel that the technology is helping them in their work and demands in a global business environment, despite being a "virtual prison". [web 10]

Total respondents:	88,612
Ages 18-24	10,068
Ages 25-34	29,430
Ages 35-44	24,528
Ages 45-54	17,399
Ages 55 and over	7,187

[ill. 9]

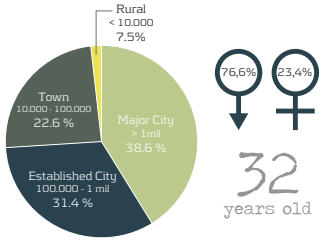
Global Workforce Study, 2007, Towers Perrin

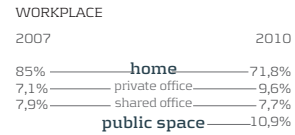
The global workforce is now growing in power and ability and will continue to progress as the technology enables its progression. Furthermore a consequence of this competitiveness is the growth of a new phenomena: the freelance global workers.

6 FREELANCERS: CONSEQUENCE OF COMPETITIVENESS

"Freelance" is somebody who is self-employed, ad is not committed to a particular long term employer. These typology of workers is usually run by a "virtual" company or agency (outsourcing marketplace) that help them in the research of a temporary employer or a work, after an online registration. [web 11]
Freelancers are declared public contractors who specialize in many different field, that have in common internet as work-engine. Some examples of freelance works are: music, journalism, publishing, screenwriting, filmmaking, acting, photojournalism, video editing, editing, event planning, event management, copy editing, copywriting, graphic design, computer programming, web design, translating.
Freelance practices are various: some require clients to sign a written contract, others work based on verbal agreements, others may require a written estimates of work and deposits from the client.
Sometimes a freelance will work with another or more freelancers to form a "virtual" agency to serve a particular short-term client's need.

As the demand and supply for a one-off project will increase the freelancer opportunities and the future prospects for marketplaces will raise.
This doesn't mean that, even if the future will require more flexibility and upgrade of knowledges and methods, the "virtual" freelancers will completely replace the workers of the companies. To hire freelancers indeed is another form of outsourcing, with all its typical problems, where the employer has to revise legal issues, quality and handling of resources.
Issues that are much easier to handle with an own employee.
Furthermore the advantages such as independence and flexibility in time and place have been often discussed, and not everyone can cope with the pressure to market himself and to acquire new projects.
Instead, a great possibility comes from the union of freelancers, this reduces the risk of isolation and it provides the chance to take over larger projects. [web 12]

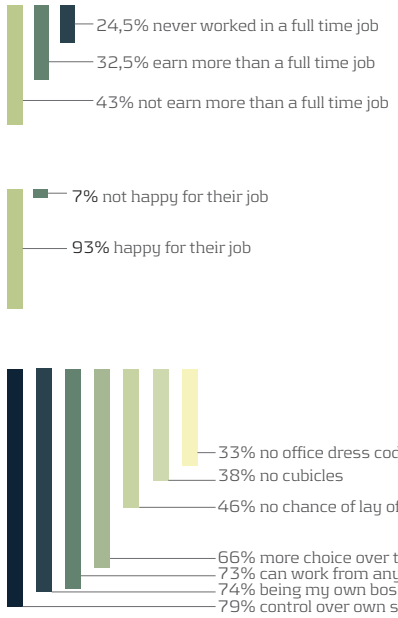




TOP 5 REASONS TO BE A FREELANCER

1. more flexibility
2. creative control over the projects
3. work from home
4. more money
5. grow an own business

[ill.10] main freelencer's features: gender, age, living place, working place, incomes, happiness, top 5 reasons to be a freelancer, motivations that brought them to be freelancers. [art.2-3]



7 WORK DIFFICULTIES & OPPORTUNITIES

" 9 out of every 10 workers in the world want to take on challenges, are eager to learn, and ready to put discretionary effort into their jobs. Unfortunately, only two employees in 10 do so. While this discrepancy may seem a de facto standard, it doesn't have to be. Employees have shown us how to close the gap, and organizations that act on this input see performance soar. "
[Julie Gebauer and Don Lowman, in Closing the Engagement Gap] [web 13]

More and more often people want to excel in their jobs and they look for companies that can ensure their progression.
In a company where they can feel fully engaged, not only they show up, but they consistently do exceptional jobs. Bringing innovation and superiority to the company, helping it to make more profit. [art. 1]

The possibility to have in the market a great amount of valuable degree personalities has to be more and better considerate by the companies. Instead the phenomena of precariousness between this young and updated society is progressively raising, especially in countries with less specific enrolments in service works.
The consequences are: professional personalities who work in different fields from their specialization and the raise of temporary jobs, that allow the employee to work finally in what they aimed, but with determinate contracts. These incongruences are due to political, administrational and economical reasons.

Another possibility that has to be considered is the union of freelancers, which could bring bigger projects and more working security to the single worker. As well as a possible formation of a networked company.

Furthermore, in a global world, with global interconnected works, the multinationals companies are faster growing their enterprises, progressing and updating their production. Thereby, the workforce has to be considered as a great potential that each company, global and not has to consider for their growth.

key words

freelancer: a personal financed job
job's independence and flexibility
union of freelancers = › chances

will of challanges and excel at work
fully engagement = exceptional jobs
› specific enrolments in service work
› global interconnected works

May Day | http://euromayday.org/

ARCHITECTURE FOR A SOCIETY
that is evolving more than the physical growth of a CITY

the architect has to:

FORECAST THE TENDENCIES
analysing the aspects that involved the society's growth under different aspects.

1.1 ? How can buildings and cities approach the tech-impact

1.2 ? How will the new proposals look like and Who will benefict from it

2.1 ? How can the utilities be a tool to create a coherent life-building environment

2.2 ? Where & How the new professional figures can be spread in a global system

1 TECHNOLOGY AS A FACTOR OF CHANGE

its ubiquitous and immateriality allow → the society to develop a FAST KNOWLEDGE to spread the information the knowledges and the different cultures in a GLOBAL way

→ a different use and a different design of the city

the city-embedded technology made the city SMART
but this is mostly a commercial/control monitoring

2 SURPASSING THE MATERIAL LINE-TIME

the traditional habits changed into a new "kinetic-living" habit → tradition = development in step with the time

→ technology = fast development not in step with the material time

→ society not tied to ORIGINS - FAMILY - PROFESSION SITE - GEOGRAPHY

SERVICE work against industrial work allow → expansion of public education

→ > people attending universities

3 LIVING CITY

a "vital" city where people can inhabit ANYTHING and EVERYWHERE

1.3 ! Technology as a source of progress

1.4 ! the architects have to face this situation in the planning - design - use of a city or building

2.3 ! be in step with the changes

2.4 ! not permanent life-style

4.1 ! recognize & adapt to the differencies

4.2 ! prefigure the market tendencies

5-6 ! work = most important factor for an individualistic society

6-7 ! union of freelancers = ‹ difficulties in the market

4

GLOBALIZATION & MULTINATIONALS

exchange of relations and knowledges in different fields
social-cultural-economical-commercial-technological-political

this exchange-phenomena is not just a consequence of the technology but also of the MULTINATIONALS

5

NET-COMMUNITY & NET-WORKERS

GLOBAL WORK for global workforce against specific work for individuals

COMPETITIVENESS and distribution of talents worldwide

global system of NETWORKING and production

6

FREELANCERS: CONSEQUENCE OF COMPETITIVENESS

exchange of relations and knowledges in different fields
social-cultural-economical-commercial-technological-political

this exchange-phenomena is not just a consequence of the technology but also of the multinationals

7

WORK DIFFICULTIES & OPPORTUNITIES

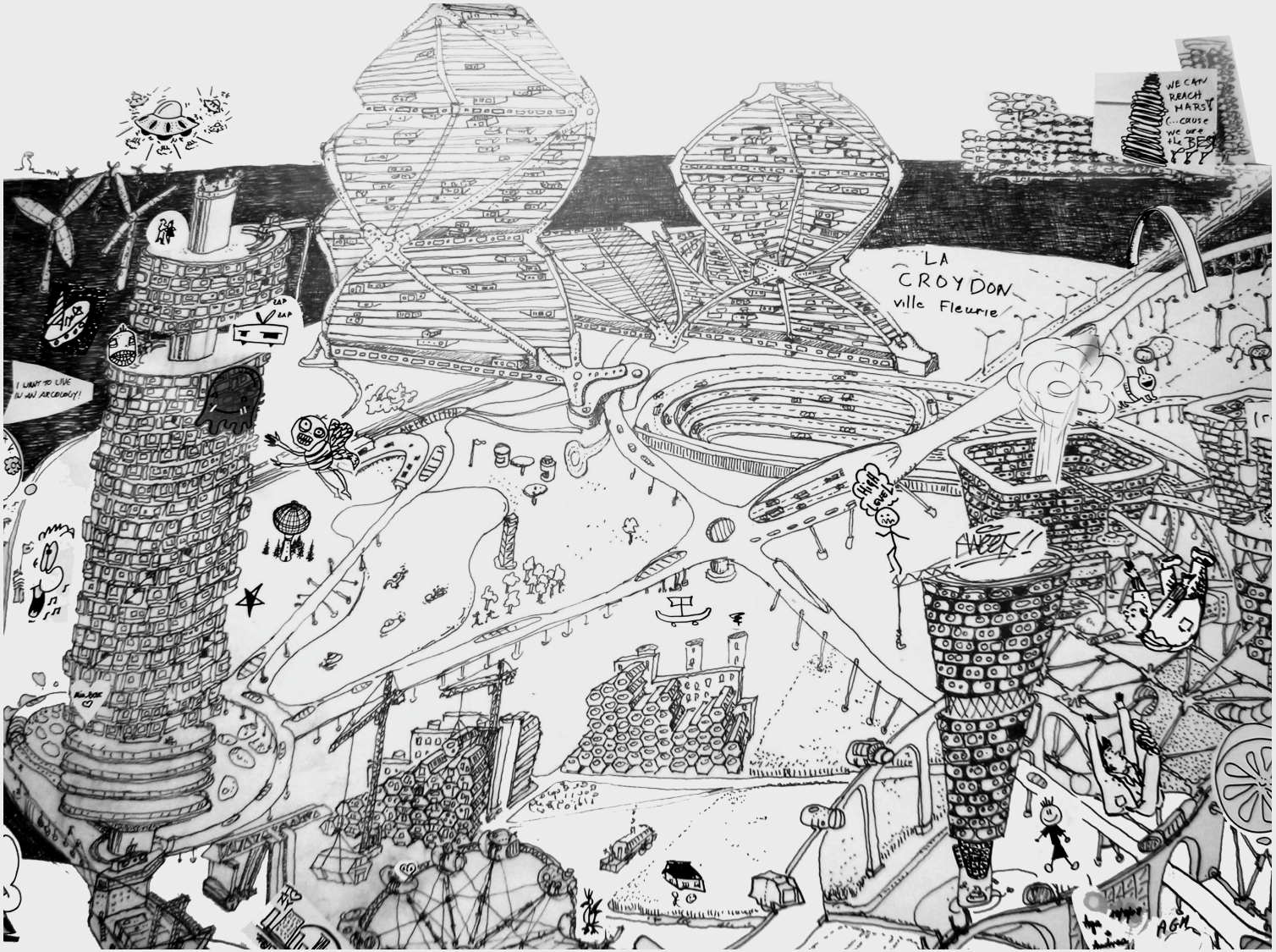
- less work for the professionals in countries with not specific enrollment in service works
- professionals work in different fields from their specialization
- TEMPORARY JOBS
- political disorganization & PRECARIOUSNESS

+ more universitary students = more intellectual resources
+ union of FREELANCERS = > workforce
+ GLOBAL WORKFORCE = fast progress of the enterprise

CASE STUDIES A

" Visionary urban plans often serve as utopian projects to formulate certain social ideals. This phenomenon is more conspicuous in societies that are undergoing dramatic transitions, politically, economically or aesthetically. Italy in the early Renaissance, France during the Great Revolution, and Europe as a whole in the twentieth century [...] "

[City as process, Zhongjie Lin]



[ill. 11]

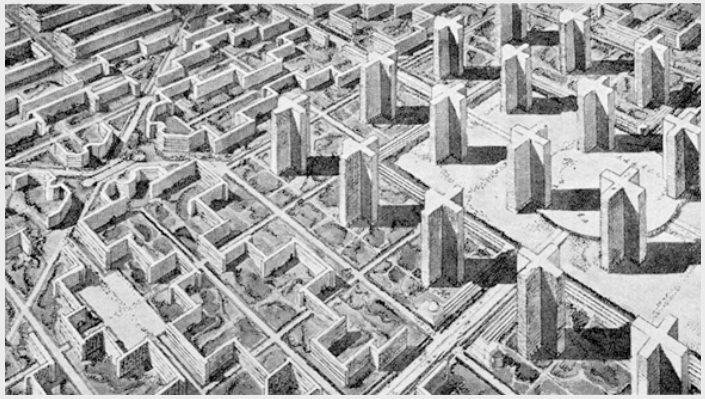
RATIONALIST UTOPIA

Mayor representatives: Le Corbusier, Saint-Simonien's, Ledoux,

ORDER as a key word for the organization of the city and the society, a centralized and large scale organization.

SOCIAL HIERARCHY
CENTRALIZED DEMOCRACY

a democracy that is subordinated to the need for a central planning, concentration and regulated pattern



[ill. 12]

LIBERTARIAN UTOPIA

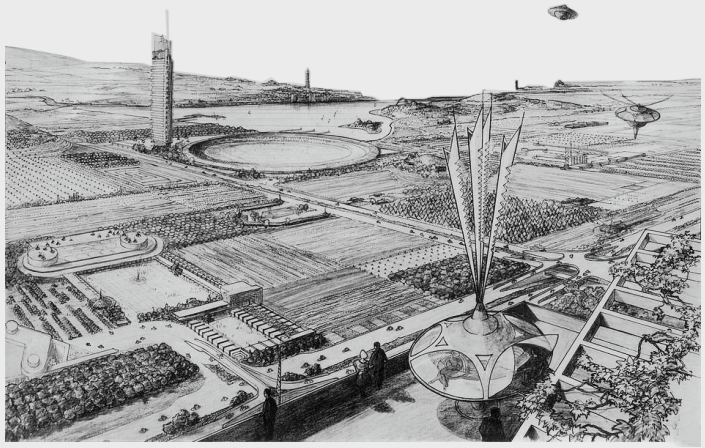
Opposed to rationalism, emphasizing the power of decentralized and local solidarity.

FREEDOM as a key word for the organization of the city and the society, giving local autonomy and enhancing the individual creativity.

Ebenezen Howard's Garden City
F.L. Wright's Broadacre City

DECENTRALIZATION
EQUALITY & DEMOCRACY
spirit of modernity (Utopia, T. More)

possibility for everyone to live according to his chosen life style on a personal property
network of highways to connect the scattered elements.



[ill. 13]

METABOLISM UTOPIA

RATIONAL PLANNING
+
SOCIAL DEMOCRACY

ARCHIGRAM UTOPIA

FREE PLANNING
+
SOCIAL DEMOCRACY

THE METABOLISM

In the decades after the II World War, Japan experienced a strong economic growth and a self-consciousness after the shock of the western occupation. Furthermore its contact with the western world and its will of modernisation and acknowledgment as a developed country raise progressively.

In the 1950s after the conservative party's policy for the stabilization of social welfare, the population began to concentrate in big cities. Overcrowding occurred within the cities expansion, and the metropolis had to dissolve their previous boundaries.

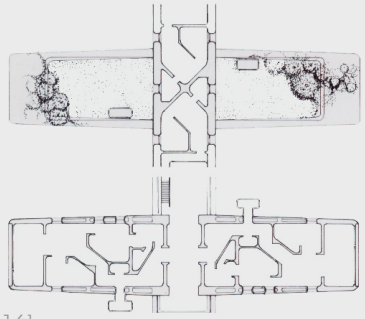
In 1960, a group of young japanese architects published their manifesto - Metabolism: The Proposal for New Urbanism – at the World Design Conference in Tokyo. Their manifesto was a proposal of radical reconfiguration of the modern city in the post-industrial age.

Their backgrounds were sky or sea sites, and their proposal had a close similarity to the transformation and evolution of an organism. The time in which they developed their ideas was propitious: both the economical welfare and the technology helped in the response of a dynamic transformation and urbanization of the japanese cities.

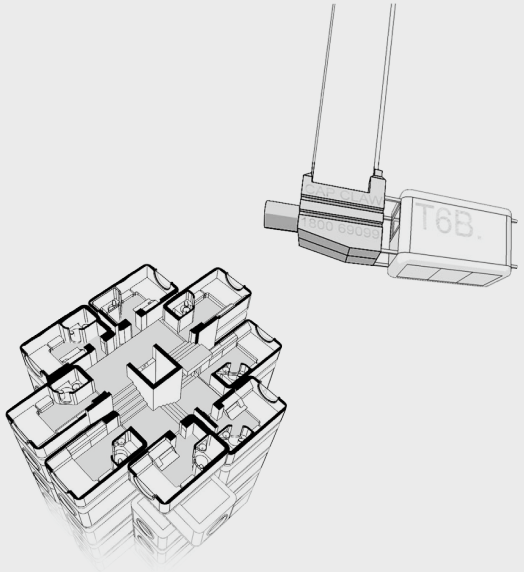
Their urban vision wanted to be a guide for the reformulation of the urban city in the new post-war age, where their speculation of the future environment was strictly combined with radical ideals of social progress. [Peter Herrle]

The "city as a process", with rapid expansion and unpredictable changes, inspired their proposed patterns, which could be placed and planned anywhere anytime.

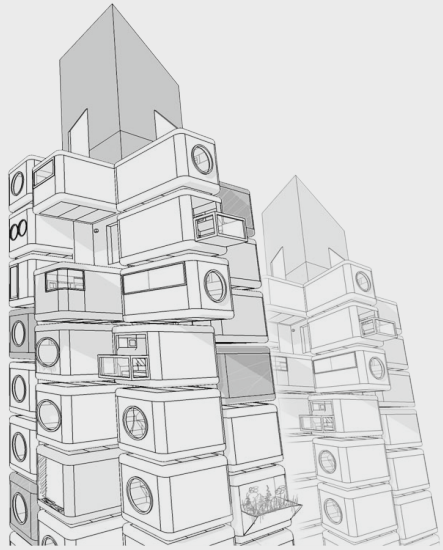
The "city as an organism", with different metabolic cycles, and different frequencies for each of them, was evidential in their projects, composed of prefabricated elements, easy to change and comfortable for a fast life-cycle modification of the city.



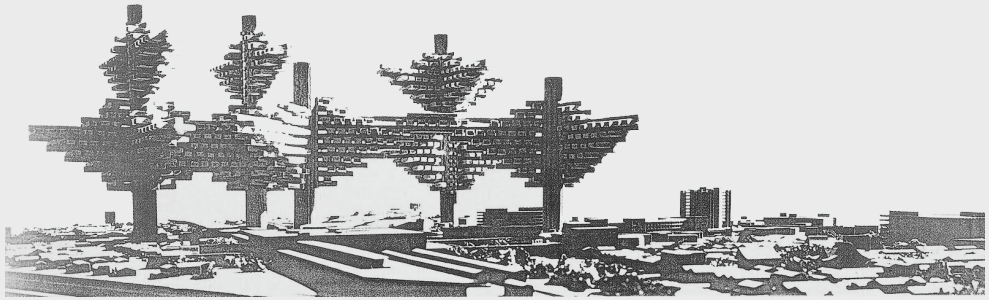
[ill. 14]



[ill. 16]



[ill. 17]



[ill. 15]

" I think that architecture is not a permanent art; something that is completed and fixed, but rather something that grows towards the future, is expanded upon, renovated and developed. This is the concept of Metabolism (metabolize, circulate and recycle). "

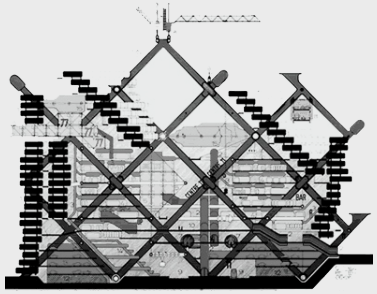
[Kisho Kurukawa, from the Age of Machine to the Age of Life]

THE ARCHIGRAM

They looked for ways that could make the technicity of the architecture dependent on the behaviour, needs and activities of its inhabitants. Their language changed, as the computing terminology grew, from categories such as Man and Situation to those of Network and Software. [Hadas Steiner]

PLUG IN CITY
which proposed a mega-structural framework to be in-filled by its inhabitants, as they saw fit.

ISTANT CITY
a kit of parts and a set of procedures for delivering temporary entertainment infrastructures to sleepy English suburbs. With this project the Archigram aimed to give life to the suburbs through the outcome of information flows, and to deposit a vibrant urbanism across a greater urban network, as well as reduce the difference between structure and information.



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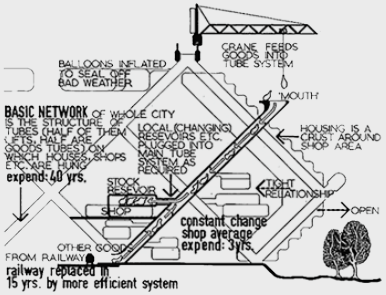

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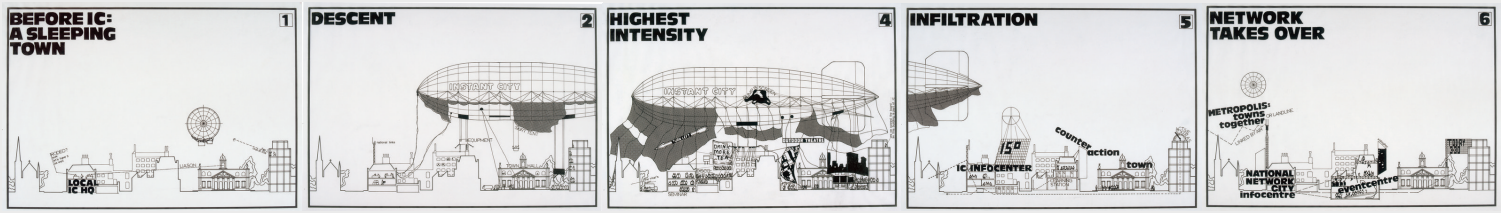


[ill. 20]

BAR/LAUNDROMAT HYBRID

The popular bar/laundromat is an example of hybrid and disjunctive architecture that is, by design, indeterminate and provokes new uses and activities when it is required.
Bernard Tschumi and Rem Koolhaas, according to the generic program of the buildings and their unspecific occupancy, designed projects that broke the normative roles in favour of an adaptable architecture. [Mark Shepard 2]

[ill. 21]

" Architecture only survives where it negates the form that society expects of it. Where it negates itself by transgressing the limits that history has set for it "

[Bernard Tschumi 2, Architecture and Disjunction, 1975-1990]

" Architecture is the ultimate erotic act. Carry it to excess and it will reveal both the traces of reason and the sensual experience of space. Simultaneously. "

[Bernard Tschumi 2, Architecture and Disjunction, 1975-1990]

PROJECT DELINEATION

INTRODUCTION

In regards to the research part, some questions arose and the problematic themes resulted clearer and understood.
The step after was to find answers to those matters and consider the remarks coming from that studies as a starting point through which draw the first guidelines for the project.

In the first pages of this chapter, indeed, all the upcoming results were grouped together in a general brainstorming, the further passage was to better define these previous considerations, in a concreter way. The delineation of the project started, in this accordance, to be defined.

[ill. 22]

« A goods train won't move by pushing it,
or even by getting ten others to help in pushing it.
But our action may inspire someone to get an engine. »

[Vinoo Kaley]

ARCHITECTURE FOR A SOCIETY
that is evolving more than the physical growth of a CITY

the architect has to:

FORECAST THE TENDENCIES
analysing the aspects that involved the society's growth under different aspects.

1.1 ? How can buildings and cities approach the tech-impact

1.2 ? How will the new proposals look like and Who will benefict from it

2.1 ? How can the utilities be a tool to create a coherent life-building environment

2.2 ? Where & How the new professional figures can be spread in a global system

1

the city has to be designed for the new society and its needs

TECHNOLOGY AS A TOOL TO ORGANIZE THE LIFE AND WORK OF THE SOCIETY

1.4

technology at home
technology at work

NETWORK OF HOMES =
NETWORK OF KNOWLEDGES
1.3

? WHAT

A "network-architecture" which guarantees a house for a resourceful precarious whenever he is going to move, a house where he can always feel at home and which full fills all his temporary needs, and necessities.
A chain of building complexes spread in a large scale, worldwide, with temporary rents.
A network-architecture with different types of houses for different targets and needs.
A complex of typologies that can present the same quality-quantity-price level of a similar complex belonging to the same network, but in a different country.
A net of working opportunities.

EVERYTHING IS NOT FOREVER!

TEMPORARY WAY OF LIVING

2.4

the temporality of a house, like an utility, is more adaptable and changable with the new updates

2

FIND A WORK FOR THE ONES THAT ARE LOOKING FOR A SPECIFIC EMPLOYMENT

allow them to travel finding a workplace in the field of their interest

give the possibility to the researchers to develop more their RESEARCH through new knowledges exchanges
2.3

1.3 ! Technology as a source of progress

1.4 ! the architects have to face this situation in the planning - design - use of a city or building

2.3 ! be in step with the changes

2.4 ! not permanent life-style

4.1 ! recognize & adapt to the differencies

4.2 ! prefigure the market tendencies

5-6 ! work = most important factor for an individualistic society

6-7 ! union of freelancers = ‹ difficulties in the market

4

THE SHAPE IS NOT THE IDEA

a NET-WORK-ARCHITECTURE that has the SAME VISION WORLDWIDE but with different styles

4.1

HOW THE NEW SOCIETY WANTS TO LIVE is the MAIN POINT

the architecture has to be FLEXIBLE to the market tendencies

4.2

CELL-NUCLEAR TYPOLOGY

the house is for the PRIVATE LIFE of a singol or a small familiar nucleo

the new society preferes to WORK than to create a FAMILY (that they can't afford as they would)

5-6

WORK as a CORE TO LIVE

WORK NEAR HOME
WORK IN THE NET-WORK-ARCHITECTURE

NET-WORK

6

CUT DOWN THE COCOONING (mostly freelancers tendency) allowing the PHYSICAL INTERACTION

6-7

GETS MORE WORK also for the ones who will administrate it

WHAT
work
live

key words

network = connection & cooperation
network between:
- young society
- work opportunities and formations
- exchange of knowledges
- social relations
network of home = network of knowledge
raise the progression
discipline the flow of young minds
concentrate & spread the potentialities
find a fix working position
work sustainable

working = living
temporary work = temporary house
temporary house for individual society

from temporality to permanently
from social living to private living
from the individual to a family growth
through the Net-Work-Architecture

CONNECTIONS & NETWORKS

" Network struggle...does not rely on discipline: creativity, communication and self-organized cooperation are its primary values "
[Michael Hardt and Antonio Negri]

The discontinuity and disorganization of the urban environment, due to political conflicts and incompetences, uncontrolled social developments, humanitarian disasters, wars and migrations, do not help the correct establishment of the new generation.
The architect has to be an important part of a re-organizational group that invest different fields, a personality that is able to structure the society in a new urban and architectural way.

Therefore: discontinuity needs structure!

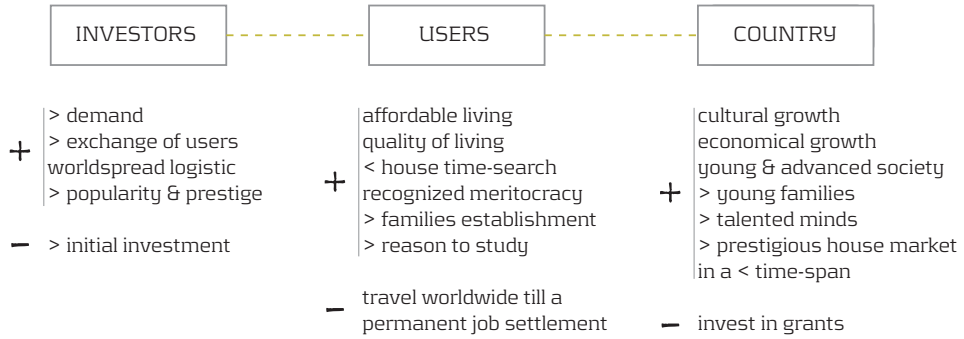
Networks can both structure and constitute an operational field for these proliferating entanglements of people, places, interests and works. [Gabriel Dypuy]
The architect must forecast the tendencies of this geo-cultural development, investing the task of designing an architecture of connectivity - Network Architectures - between: young society / working places / exchanges of knowledges / social relations. A network that gives rise to new connections and thereby drafts a mobile geography of self-determined utilizations of services, spaces and cultures.

Therefore the project aims neither to present a particular connection between these factors, nor to show this phenomena as a contained and determined movement.

Indeed it aims to show the undetermined flow of personalities worldwide, and how can the architecture be a tool to discipline and drive them!

The networks, as form of transitional political initiatives, global economies, new technologies, have made the cities, regions and countries not as fixed territories, but as movable and global entities.
Thereby the aim of the project is to enhance this globality in a conscious way, making all the cities as reachable territories by the new individual society.

[ill.23] In a managerial way the Net-Work-Architecture wants to create a direct connection between investors, users and country, giving to both the one who are using the architecture and the ones who administrate and host them positive incomes.



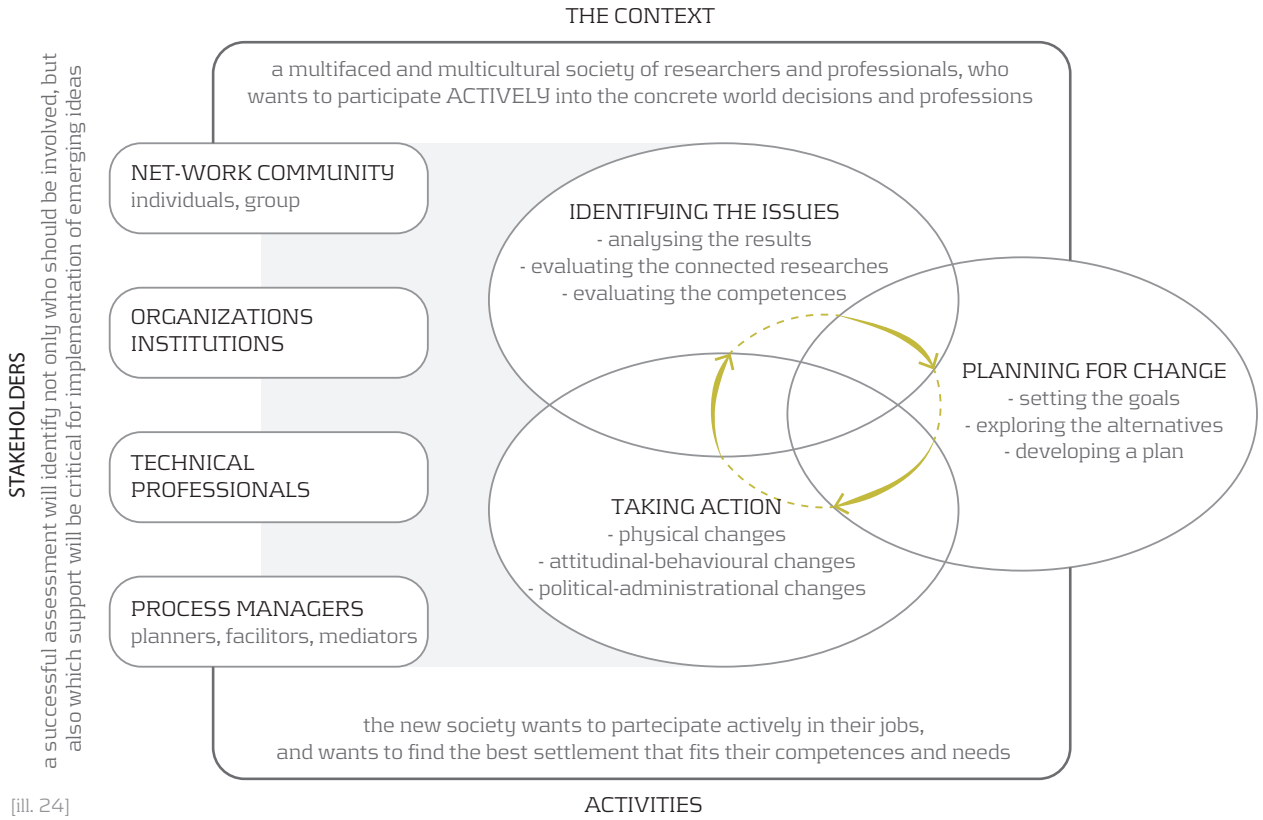
NET-WORKING

“ Networks constitute attractive actions alliances not because they form a closed power structure, but because they premise the possibility of transformation. ”
[Peter Mortenbock and Helge Mooshammer]

Network as connection between different cultures, allows exchanges and links potentialities with one another.
Important to allow a good establishment of relations is a logistic oriented to the intensity, range and quality of the relationships, generating form of knowledges and valuable group of works through conversations, interactions, dialogues and interventions.

Furthermore a Net-Work place has the aim and possibility to expand the working possibilities, giving voice to the new social deals, raising the progression. To the eager singles it is given the chance to work in what they strive for during all their studying career, finding an adapt and long-lasting working place.

Brutally to work means to earn money, to work means to live, if the work is not fruitful the life is continuing to be not more than a middle-class one, and if the work can pay just the life of a single the concept of family is difficult to be established.



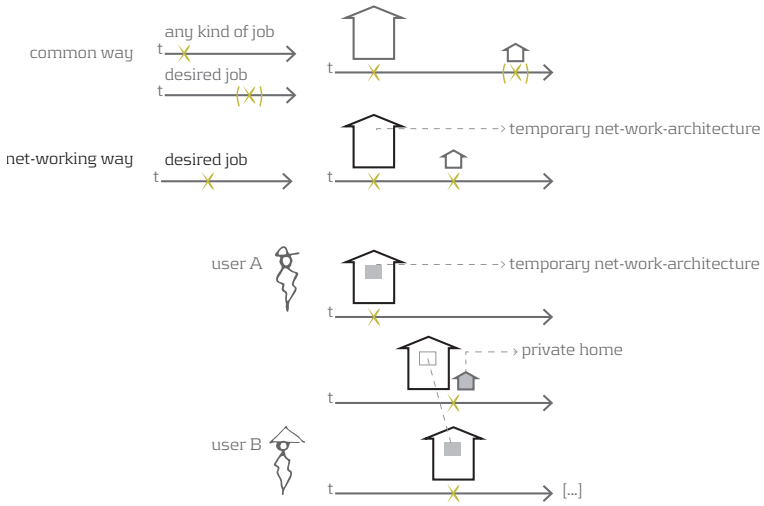
[ill. 24]

THE TEMPORALITY OF LIVING

The Net-Work-Architecture is not just a connecting working place, indeed it is also a living building, which can be temporarily used by the young society since they get a permanent job, and therefore a possibility to finance the growth of more family's members, and their next private house.

The features of this architecture are single cellular houses for singles, couples and minimum nucleus of families, with common facilities. Temporary home-cells that can be used since the job is guaranteeing a more permanent lifestyle.

[ill.25] Today finding a desired job is difficult, and a young has to work for any kind of job, living usually in a renting house for all his life. The Net-Work-Architecture gives the possibility to temporary live in it till the user finds his desired job, leaving at that point his house to another user.



WHY TO WORK IN OFFICE BUILDINGS

In this new environment, the new society seems no more working without the use of Internet, where the most social interactions and knowledges are done through social networks like facebook, twitter, skype, videoconferencing and so on, where the information is mostly and rapidly spread. Thereby if most of the offices and researching works are done using these digital devices, and if almost any place in the cities is provided with WiFi areas, work outside the office building seems not more a problem.

The ubiquitous devices can activate almost any urban location as a potential worksite, breaking the historical relationship between work and urban spaces, creating new forms of open source collaboration and organization of production anywhere and worldwide.

" Creative and productive anytime and anywhere work is possible "
[Breakout!, situating knowledge work in contemporary public spaces]

The working place have to stimulate knowledge and work in a favourable and inspirational context where many different flows of people converge and many different skills and knowledges can be set. An inspirational place outside the office can indeed remove the traditional boundaries and schedules of the office, highly stimulating the workers.

Why not to use then the Net-Work-Architecture as a comfortable place to promote the progress in the self-organized and self-employed collective works?

A Net-Work-Architecture is not just allowing the users to find their adapt working place, indeed it can also create an engine that guarantees them and the employers to establish a job-searching-offering-system, and a place which can enable some of the users and employers to meet, discuss and create a new working company.

And why not to create a good sustainable and stimulating working place?

CASE STUDY

BREAKOUT!
Is an association that studied the behaviour of the workers that were placed to work outside their working offices, in a more social and stimulating environment.
The co-working spaces of Breakout! Enable work to take place via shared resources.

WHAT
compactness

key words

more insulation = increased FAR
less energy used for transportation
less materials used for construction
less building heat conductive surface
less energy used for hot water
small footprint on planet Earth

DENSITY AND COMPACTNESS

Today the demographical analysis point out how people tend to live in big cities rather than rural areas. An estimation shows how by 2050, 70% of the world population will live in large cities. For instance the New York's population is growing by about a million people every 15 years.
These great flows of people to the cities are directly connected to the Carbon Cycle and Carbon Flows. Indeed increases in density of humans generally lead to decreases of Carbon emissions. For instance, at the same average people in New York generates one third of the emission than the ones of another city in the US. [D. Benjamin & S. Yang]

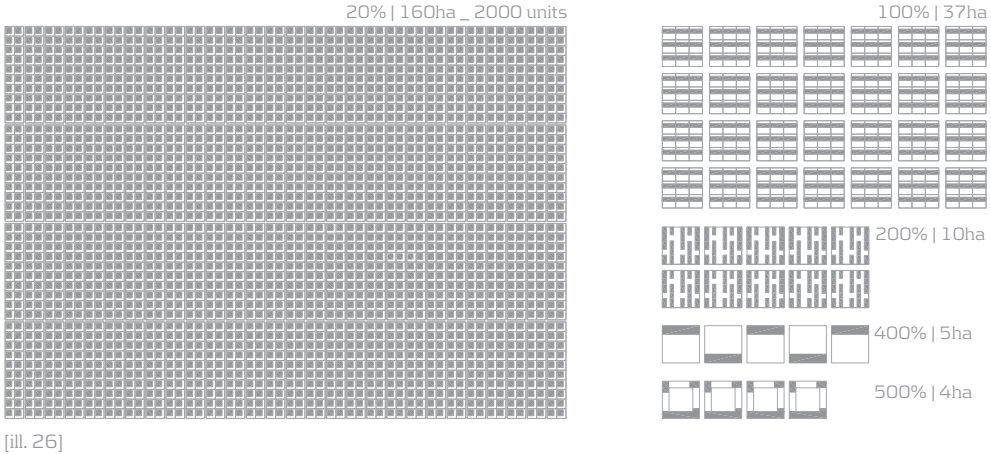
Thereby dense cities can conserve the energy through the heating and cooling of small, stacked, party-wall residences, minimizing the area consumption. Even the public transportation help to reduce the Carbon emissions. And thus a concentration of functions.

Compact and high density buildings optimises the use of land, reduces the needs for transportation and creates cities with increased social-cultural-economical interaction.

Compactness support sustainability!

At a building level, the sustainability is translated to a lower surface area in relation to volume, and therefore lower energy and material usage, as well as a good set of installation and optimized construction materials and structure. [P.B. Pedersen]
Compactness then, it is not the only factor to reduce energy consumption, orientation and other factors (shown afterward) have to be considered.

FAR= Floor Area (m2) / site Ratio (m2)



[ill. 26]

WHAT
quality convenience

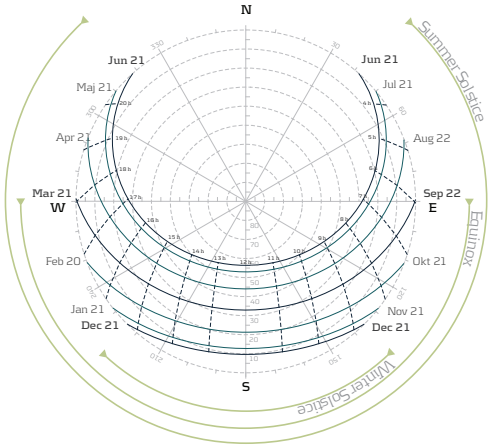
key words

sustainability of quality
low resources consumption & well-being

sustainability of convenience
recycling & standard material for an economical sustainability

sustainable density +
sustainable quality +
sustainable economy =
challanged in a social & creative way

In this project, sustainability and quality, as well as convenient residences, have to be combined and studied together. The analysis and development of the approach have to take into consideration: compactness, low resources consumption, high degree of utilization, recycled and recycling materials and their life-span; as well as qualitative factors such as: good daylight conditions, good indoor air exchanges, spatial quality, attractive open areas.



[ill.27] The solar diagram shows a potential to obtain passive heating from south, however summer overheating occurs if not proper balance between windows size and orientation is not obtained.

SUSTAINABILITY OF QUALITY

A good indoor environment is required to create a successful and satisfying residential building.
Working with a compact and of quality typology, it is important to analyse the adequate amount of daylight, advantageous open spaces, and good wind conditions, that guarantee both quality and low energy consumption.

DAYLIGHT

The lighting and access to daylight, as well as a good view to the surrounding are the requirements for a good indoor environment. Furthermore, daylight it is strictly related to the physical and psychological well being of the inhabitant.

On compact building plots, daylight potential increases with minimisation of the building footprint. The slimmer it is, and detached from shading buildings, the greater is the possibility for good daylight conditions. However, the orientation play an important role.

Furthermore, open spaces at different levels of the building, can guarantee not just qualitative public areas through all the building height but also a good daylight distribution.

According to the openings in the rooms, the Danish Building Legislation affirms that:

- the kitchen and all the accommodation spaces must have windows

- at least one window in each room for daylighting and views

- windows size that fit the well-lit of the room
- a daylight factor (DF) of 2% or more for working places

- a glazing area of the façade mounted windows at least 10% of the floor area of the room

- a light transmission factor of the glazing of at least 0,75. [P.B. Pedersen]

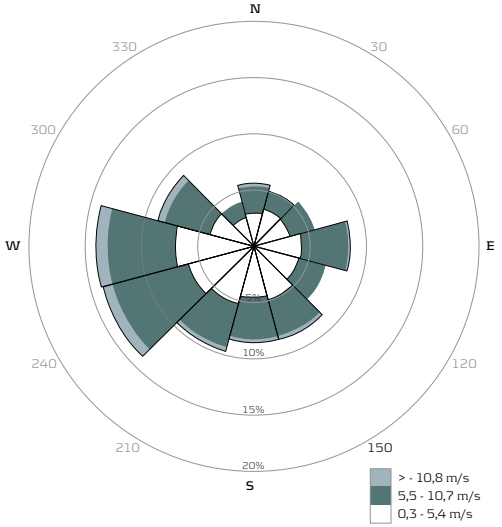
WIND

Air quality and air exchange, are important as the daylight factor to guarantee a good indoor climate and thermal condition.

Furthermore, open spaces through the building's height have to be shaped with attention to wind conditions.

On compact building plots, the most comfortable outside wind conditions are found in the more closed buildings types. Thereby, in cases with strong winds, provisions for exterior shelters should be made. [Edward Ng]

In addiction wind velocities increase with the height. This means that the use of terraces in height would require the establishment of provisions for shelter.



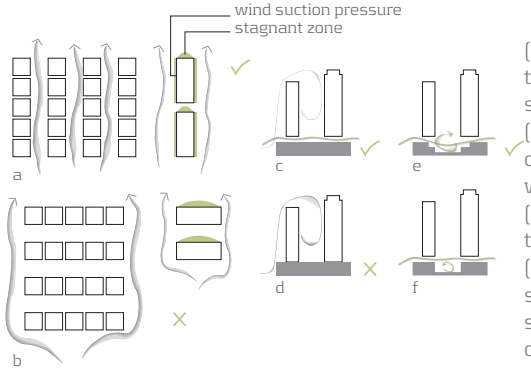
[ill.28] In København the main wind direction is from west or south-west.

PASSIVE HEATING
minimise conductive heat flow:
use insulation techniques to retain heating
promote solar gain:
use sun-heat and sun-heating techniques
allow the influence of thermal mass:
through a correct relation volume-space

NATURAL VENTILATION
minimise infiltrations reducing the heat lose:
through insulations
promote ventilation:
air cooling through natural ventilation

PASSIVE COOLING
minimise solar gain:
use shading and solar protections
reduce the excess of heating
(occupation, equipments, artificial lights)
promote natural cooling

DAYLIGHTING
minimise solar gain:
use shading and solar protections
avoid the use of artificial lights:
in favour of natural light
chose the correct relation space-volume



[ill. 29]

(a) streets parallel to the prevailing wind direction ensure penetration of wind suction pressure on the façades of the buildings.
(b) streets perpendicular to the prevailing wind direction does not ensure wind penetration and would flow above the building (d).
(c) breaking up building podia is better for ventilation, than (d).
(e)improving air volume near the ground with stepping podia allows the wind to wash the street out, without this variation the air can recirculate (f).

At the end, working with a temporary target, who needs quality and convenience of his house, it is important to focus which materials and technologies should be used in the construction.

SUSTAINABILITY OF CONVENIENCE

Construction waste is an important issue to take into consideration, while designing a sustainable building. Per year a person waste ½ tonne of domestic garbages and 1 ½ of building's ones. [Cindy Harris & Pat Borer]
As architect we should then minimize the amount of waste created by reducing, re-using, recycling or specifying the building material.

It is important to consider that the evaluation process of the materials' impact on the environment is almost always a balance of pros and cons, and it is usually difficult to evaluate. Still, there are some general indications which can be used as guide in the chose of the materials, to limit the impact:

- the nearer a material is to its natural state, and less processed it is, the more environmentally benign it is;

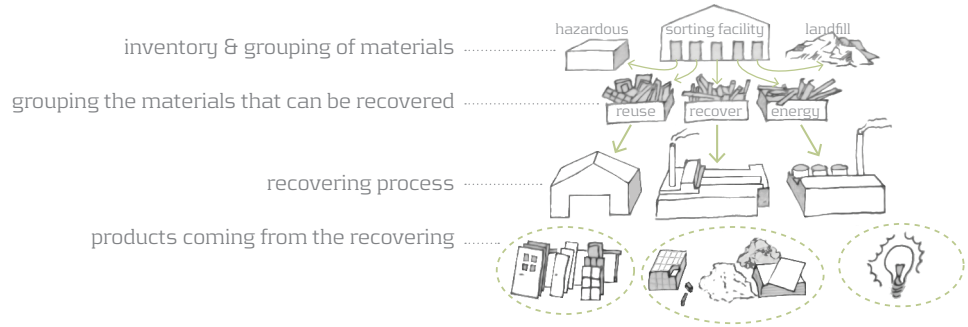
- the nearer a material is to the building site, the less Km it has to take

- minimize new resource consumption through re-use

- standard building materials, can create massive savings in construction costs

- think about a standard material design that can be easily removed or replaced, limit the amount of reprocessing

- some materials can be reused to serve a totally different purpose from their original one (ex. paving made with recycling glass)



[ill.30] Construction waste material should be grouped into 5 categories:
hazardous waste that is eliminated
construction material that can be reused
construction material that can be recycled and made into new one
combustible material that can produce energy
construction material that is posed in landfill sites [V. Bokalders & M. Block]

Energy used in processing virgin and recycled materials			
		Energy needed to process (BTU/pound)	Amount of Energy saved by recycling
Material	Virgin ore	Recycled material	
Steel	8300	7500 (40%scrap) 4400 (100% scrap)	10,00%
Aluminium	134700	5000	96,00%
Copper	25900	1400-2900	85-95%
Glass containers	7800	7200	8,00%
Plastics	49500	1350	97,00%

[ill. 31]

STANDARDIZATION AND MODULARITY

The impact of design decisions on waste minimization may be the cause of 30% of the construction's waste. [Cindy Harris & Pat Borer]

Waste arising from construction process may be minimised by design concepts such as: implementing dimensional coordination and standardization, modular design, minimizing temporary works and avoiding late design modifications.

The use of off-site manufacturing techniques such as prefabrication can significantly reduce waste on site. Thereby reducing the amount of waste coming from excessive cuttings of building material on site.

The most commonly used prefabricated elements are precast façades, staircases, partition walls, semi-precast slabs and, more recently, structural walls.

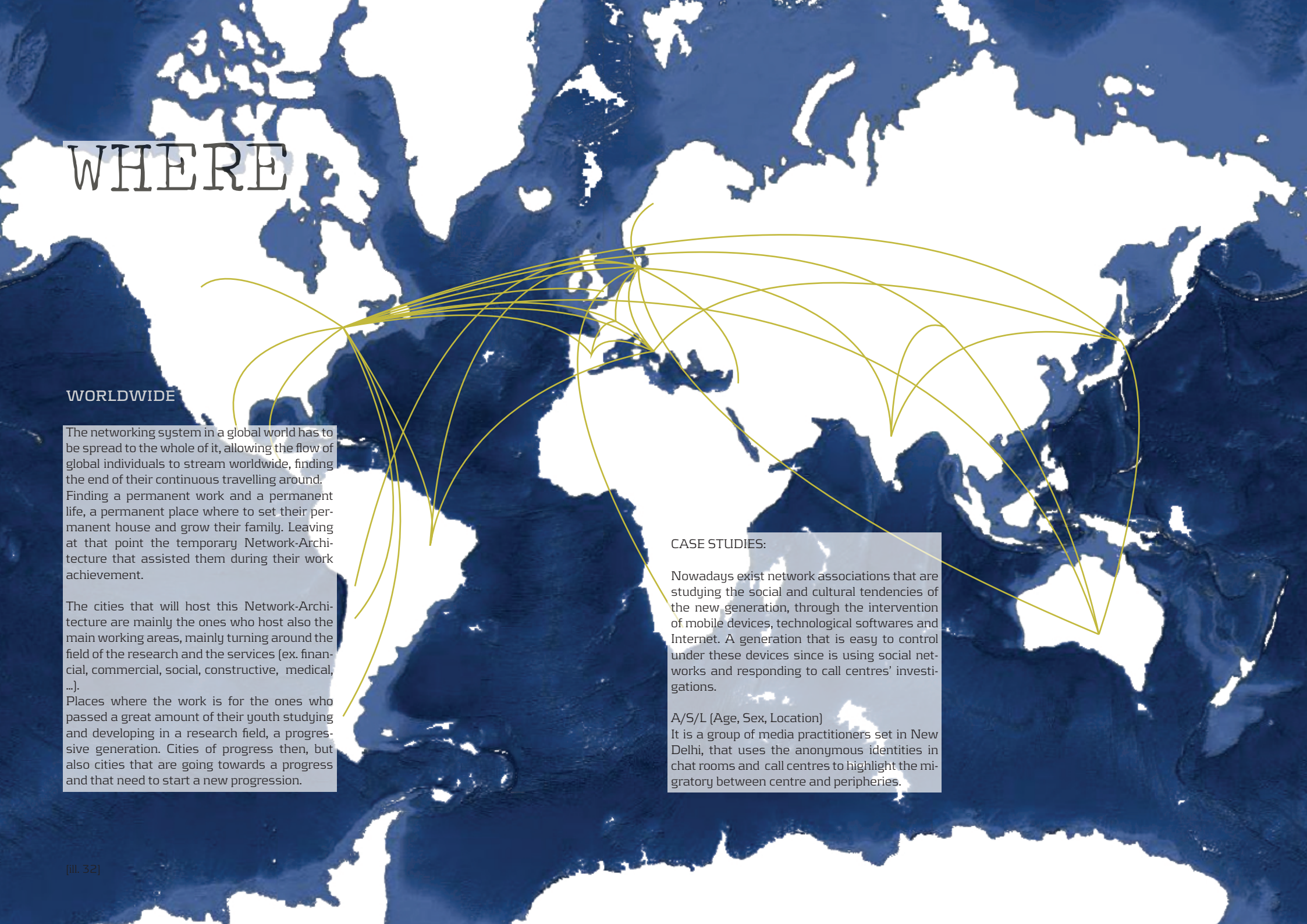
CONCLUSIONS ON STANDARD & DENSITY

Is a dense building a satisfying place where to live?
The pure statistical ratio of people per unit area is not the most important factor in determining how people feel about living in high-density buildings and cities.
It is what is in these places and how space is designed that matters.

Arranging the space to create feeling of private retreats, is likely to have very positive outcomes. Such as the availability and quality of common and public facilities, a sustainable transportation, the provision of open spaces and contacts with nature.

Therefore, the density, coming from a social-environmental sustainability, and the standardization, coming through an economic sustainability, have to be interpreted and challenged in a more qualitative and creative way.

WHERE



WORLDWIDE

The networking system in a global world has to be spread to the whole of it, allowing the flow of global individuals to stream worldwide, finding the end of their continuous travelling around.
Finding a permanent work and a permanent life, a permanent place where to set their permanent house and grow their family. Leaving at that point the temporary Network-Architecture that assisted them during their work achievement.

The cities that will host this Network-Architecture are mainly the ones who host also the main working areas, mainly turning around the field of the research and the services (ex. financial, commercial, social, constructive, medical, ...).
Places where the work is for the ones who passed a great amount of their youth studying and developing in a research field, a progressive generation. Cities of progress then, but also cities that are going towards a progress and that need to start a new progression.

CASE STUDIES:

Nowadays exist network associations that are studying the social and cultural tendencies of the new generation, through the intervention of mobile devices, technological softwares and Internet. A generation that is easy to control under these devices since is using social networks and responding to call centres' investigations.

A/S/L (Age, Sex, Location)
It is a group of media practitioners set in New Delhi, that uses the anonymous identities in chat rooms and call centres to highlight the migratory between centre and peripheries.

[ill. 32]

From a World Bank report it appear how København is the best location for doing business in Scandinavia. Ranking 183 countries in 2010, Denmark is at a sixth place for easy of doing business.

[web 14]

Denmark

easy of doing business 6
trading across borders 5
closing a business 5
protecting investors 28

freelancers

where do they live?

[art. 4]

Canada

easy of doing business 7
closing a business 3
protecting investors 5
trading across borders 41

USA

easy of doing business 5
protecting investors 5
closing a business 14
trading across borders 20

UK

easy of doing business 4
closing a business 7
protecting investors 10
trading across borders 15

Norway

easy of doing business 8
closing a business 4
trading across borders 9
starting a business 33

Singapore

easy of doing business 1
trading across borders 1
closing a business 2
protecting investors 2

Hong Kong

easy of doing business 2
trading across borders 2
getting credit 2
protecting investors 3

New Zealand

easy of doing business 3
starting a business 1
protecting investors 1
trading across borders 28

[ill. 33]

ØRESTAD | COPENHAGEN

The area chosen to develop a smaller scale project, that can better show in an architectural scale the topic, is Ørestad.
Ørestad is a 10 years old business, cultural, researching and residential area on the south east of København.
The area was the result of a plan of economical growth for the city of København, burdened with a low economic growth and a high unemployment around the end of 1980s. Thus generate pessimism and no attraction for families and companies to live the city.

Therefore Restadsselskabet was established in 1993 to plan both the new Ørestad and the building of the new metro. The aim of the corporation was therefore to create a master plan for the whole area as a basis for the future work.
To this end, an international architectural competition was announced in 1994.
The masterplan suggested to divide the area in 4 districts where it was possible to create tall and dense building mass, with green and water areas integrated in between the buildings. Furthermore an adequate infrastructure, high architectural quality and access to nature make it attractive for new residents and companies.

In Ørestad there is room for buildings that would not fit into any other quarter of Copenhagen due to their size, design or function, and this has resulted in a number of innovative, modern and architecturally inspiring buildings in the areas. The new office buildings create the perfect framework for modern and internationally oriented businesses. [art.5]

[ill. 34]

[ill. 35]

Ørestad is one of the districts in Copenhagen that has seen the highest growth in the renting of office premises in 2010. And according to Nybolig Erhverv, the Nybolig estate agents chain specializing in servicing business customers, Ørestad has developed into a hub for international companies in particular. [web 15]

12.000 ca. people work in Ørestad today
80.000 ca. people will work here in 15 years
5.000 ca. people live in Ørestad today
20.000 ca people will live here in 15 years

3.2 km² total area
600 m wide
5 km long

5 km from København historic centre
4,5 km from Kastrup Airport
35 km from Malmö

E20 motorway + Metro + Train


MONSANTO
NØRRE CAMPUS
MAERSK
FREDERIKSBERG CAMPUS
CITY CAMPUS
SAND
SØNDRE CAMPUS
FERRING
Carlsberg
S.train
Metro
National train
one of the world's largest shipping companies
130 countries. 108.000 employees
Nordisk Film.
The oldest film production company
research-driven biopharmaceutical company
operates in the fields of infertility, obstetrics,
urology, gastroenterology, endocrinology
international fashion house
agricultural sustainable company
innovation and technology to help farmers
around the world to produce healthier foods
the world famous brewery
with secondary production of soft drinks
NØRRE CAMPUS
Health faculty
Natural Science faculty
Pharmaceutical faculty
CITY CAMPUS
Natural Science faculty
Social Sciences faculty
Law faculty
Theology faculty
FREDERIKSBERG CAMPUS
Life Sciences faculty
SØNDRE CAMPUS
Humanities faculty
IT faculty
Sweden
CPH airport

[ill. 36]

[ill. 37]

Many international companies have offices in this part of Copenhagen – they find the infrastructure and the closeness to the airport, central Copenhagen and the bridge to Sweden particularly attractive.

OTHER PRESTIGIOUS COMPANIES

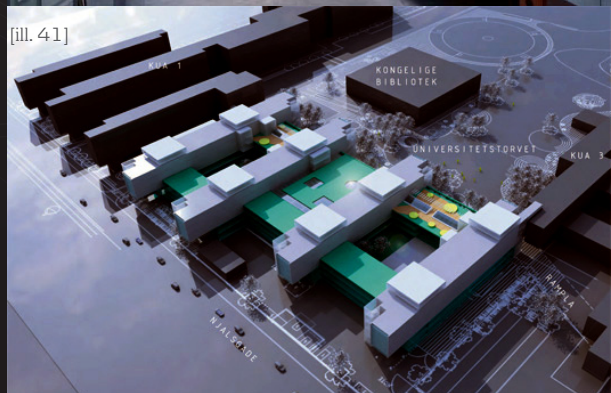
Accenture, Atkins Danmark, Bella Center, Biogen Idec Denmark, Dansikring, The Confederation of Danish Industry, Dell, Ericsson Denmark, Ferring Pharmaceuticals, GlaxoSmithKline, Handelsbanken, IFS Danmark, Masterfoods, Medicon Valley Alliance, Medtronic, Nikon Nordic, Novo Nordisk Scandinavia, Ramboll Group A/S, Sandoz, Shell Gas Danmark, Skandia Danmark, Sophus Berendsen, UCB Nordic and Zurich Nordic [web 16]

[ill. 38]

[ill. 39]

[ill. 40]

[ill. 41]



WHO

" We have not yet made this city what it could be or should be just by painting some houses and planting some gardens for free ... we have created hope that didn't exist before. We know what the future could be and we have the desire to make it come into being. "

[Julia Pointer, youth volunteer, Detroit]

FREELANCERS willing to create aggregations, and thereby physical working groups.

PHD STUDENTS

GRADUATES PRECARIOUS

SMALL COUPLES belonging to the category above

SMALL FAMILIES belonging to the category above

All of them aiming to continue the researches they have done and the wills they have studied for. Aiming thereby to design their future under new basis.

It sounds easy than to everyone exceed to this Net-Work-Architecture. That means losing of time and money from the ones that want to finance the system.

Thereby a control of the entries has to be done! Just the valuables and the eager ones can make use of it, this does not mean that just the ones that have financial facilities can enter.
Who access to the Architecture has to be motivated, independently on his economical budget, and guarantee that he is entering for an aim, doing his best to reach that deal.
There should be a graduation, like there is a graduation to be able to enter into an erasmus program for instance, or into a student house.

HABITS

They are not more tied to a traditional family life style.
They are part of an individualistic society.

Young people represent a significant portion of most urban populations. They are valuable members of the society, now and in the future. Thereby, investments made in developing their knowledges, skills and social responsibility are the best action towards creating a better future.

They have to participate actively in the settlement of the most important decisions and projects, since these are made for the near future and they are the protagonists of the new society. However, the reality it is often regulated by the old generation that tell them what to do and manipulate them into acting in support of their initiatives.

Thereby the participation of the young people, in the decisions has to change from passive to:
active
leading
interactive
responsible
sustainable.
Indeed, an effective participation program provides multiples opportunities for inputs, involvements and progression allowing the youth to give a specific contribute, based on their ability, needs and interests.

It is then time that the old generation surrender the responsibilities to the new eager one.

« If the difference between your preference and your choice is great, you may be unsatisfied with your residence and it may be never develop into a home »

[Gifford Robert]

In a society that is characterized by cultural diversity, the demand for different atmospheres has to be taken into consideration while designing a social architecture that aims not just to a well-being of its occupants, but also to adapt to their preferences.

Then, if people is different why are all apartments alike?

Furthermore homing is what an individual do inside his dwelling, thereby create a home is not just a matter of physical settings, but also a comprehension of the practices we associate with “being at home”.

Privacy is another factor to take into consideration, while creating a home, or rather a dwelling lived in its intimacy.

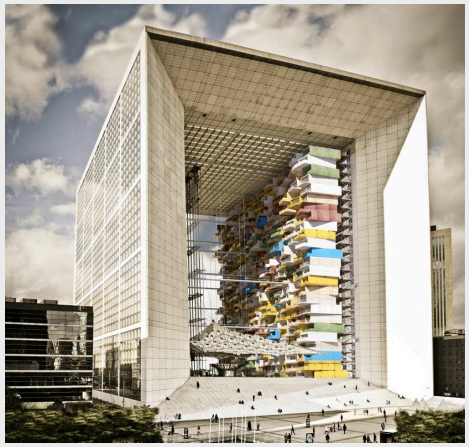
CASE STUDIES B

" In its material sense, the cube is a symbol of stability. As for its mystic meaning, the cube is symbol of wisdom, truth, moral perfection, at the origin itself of our civilization. "

[Moshe Safdie, Habitat 67]

MODULAR ARCHITECTURE

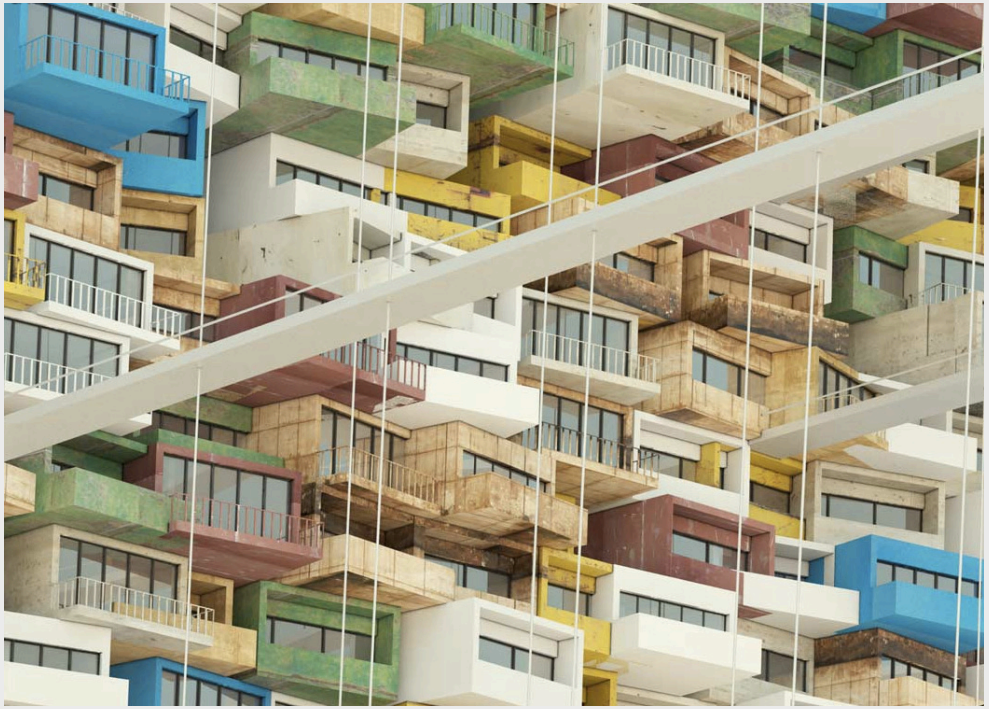
In these pages some modular architectures were analysed to better understand how the project design could be developed.
The modularity is part itself of the prefabrication and seriality of building, therefore it was a useful case study.



[ill. 46]

POKET OF ACTIVE RESISTANCE

It is a utopistic social scenario elaborated by Stephane Malka Architecture. The PAR system is a modular complex providing an alternative to the defiant lifestyle, by positioning itself in a permanent state of insurrection.
Its growth is articulated by the vitality of its spontaneous community.

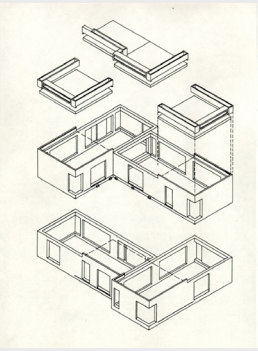


[ill. 47]

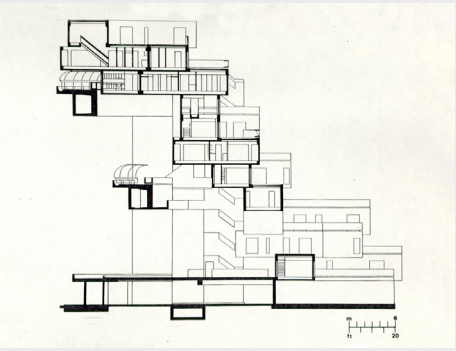
HABITAT 67

This experimental housing block coming for the Expo of 1967 is an example of modular and prefabricated construction.
It is composed of 354 prefabricates cubes (of 8 varieties) combined one on top of the other to form 148 residences, each with a view on three sides.
Futuristic interiors, links, pedestrian streets and suspended terraces, aerial spaces, skylights of different angles, large plazas and monumental elevator pillars explores the potentials of a modern technology era, of mass production and motor-car industry. [web 16]

[ill. 48]

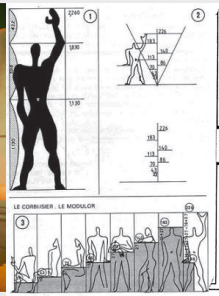


[ill. 49]

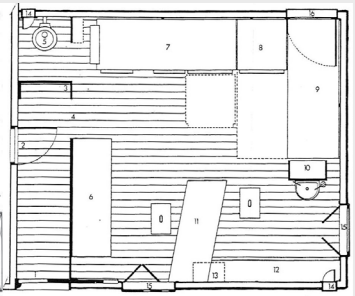


[ill. 50]

[ill. 51]



[ill. 52]



[ill. 53]

LE CABANON

Le Cabanon is a modular small volume, a minimum living cell, based on modular human standard measures. It has an area of 16 m^2, made of wood and industrial materials, built in 1952: one piece, two small openings, a turntable, the cupboards, a narrow bed, a sink in stainless steel. Some color still with a yellow ground and a green ceiling. [Le Cabanon]

Other modular examples were examined to understand the logic of both organization of the inside functions in a modular element, and to have a view of possible modular combinations.

From this analysis resulted clear how the modularity does not mean restriction of possibilities, rather it makes the design process more challenging and the research of possibilities more enjoyable.
This case studies brough to a further accurate research on how the temporality of living can be connected to the building's shape.

Other case studies were:

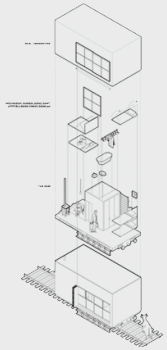
Sou Fushimoto, Tokio apartment, 2010
Sou Fushimoto, Final Wooden House, 2008
Rintala Eggertsson Architects, Box Home, Oslo, 2007
Nightingale Associates, Glasgow General Hospital

CASE STUDIES C

These examples of temporary dwelling offer suggestions on how to organize the minimal spaces of prefabricated houses.

TEMPORARY RESIDENCES

Temporary residences are usually created as a new prototype of architecture for a possible living style, however few of them are concretely realized. Their main use is for students, in other cases they are new sleeping shelters' proposal of hostels.



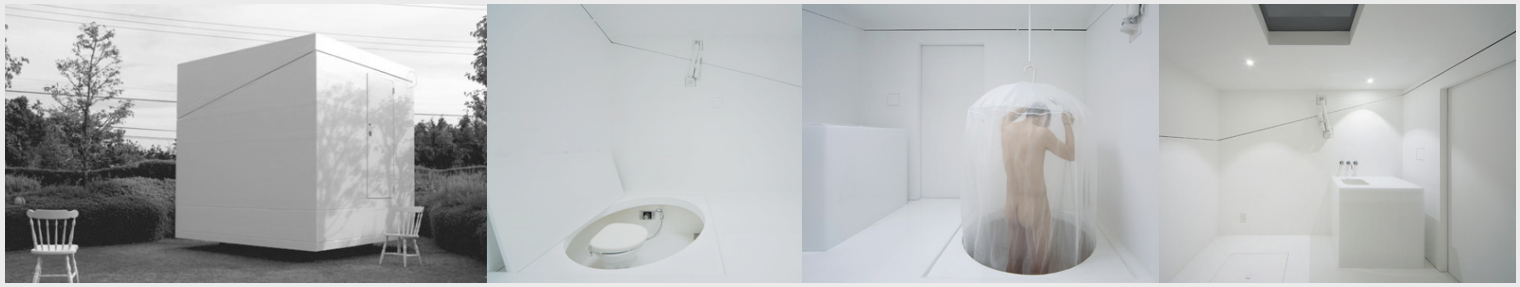
ROLLING MASTERPLAN

The swedish studio Milton realized for the city of Åndelsnes a rolling master plan which wanted to use the old industrial rail tracks to set a rolling hotel, and other rolling facilities connected to it and the city. The buildings are simple and modular, and can be connected between them, forming bigger building modules.

[ill. 54]

PACO CUBE

Jo Nagasaka designed this prefabricated compact home that makes optimum use of the limited 3x3x3 space. The cube offers the possibility of a minimalist dwelling or a holiday home.



[ill. 55]

CASE STUDIES D

" Campus areas are places full of life. Foreign students and researchers are drawn there by a vibrant environment. If we want to attract the best foreign capacities, we have to start by focusing on the campus area. "

[Finn Junge Jensen. Rector of Copenhagen Business School. theme meeting at the UBST]

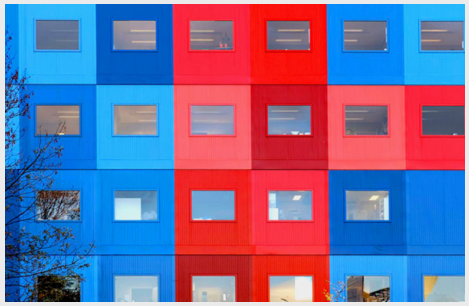
STUDENT RESIDENCES

During the early years of the university, institutionally provided student accommodations did not exist and it was common for students to rent a room from local citizens or to rent a house to share with other students.
The ratio of students to local inhabitants in many cases must have dominated the university's towns, and different ways of accommodation started to raise. [J. Thomsen]

During recent years, a large numbers of projects have been designed to provide residential accommodation for students, and a considerable body of information has been gathered about the needs and costs of building of this type. According to the RCU: the Residential Costing Unit, which represents an allowance for the students own living, studying and entertaining area, the cost implicates on varying sizes and proportions of study bedrooms, and a percentage of the common areas. Therefore, the calculations reflects the changes in the quantity of external-internal walls, floors and roofs, as well as the quantity and size of windows varying in relation to the floor area. [UGC]

Many projects have been made for student residences, trying to create the most attractive and international places were this young target can temporally live. However, the design of a cheap place to live, often results harder to process. The most interesting projects were not related to a cheap being.
Cheap hardly means of aesthetical quality. The Tietgen Kollegiet was a great example of quality and functionality, suitable in its whole, for a student lifestyle, anyhow not cheap.
In this analysis I wanted to understand how can cheap student residences be qualitative places where to live. Thereby the cases below gave me some considerations to avoid and to take in account.

[ill. 56]



[ill. 57]

[ill. 58]

HVDN Architecten, Qubic Amsterdam,
MVRDV, Student residences, Amsterdam
SpaceBox, Utrecht

The modularity of boxes and their cheap prefabricated being can hardly create architectural quality. This is reached through the choice of colours, the variation of openings and overhanging, but hardly these examples can be seen as a desirable place were to feel at home.

THE APPROACH

INTRODUCTION

Once the topic is defined, and the answers to the analysed problematic themes are theorized, a more physical approach could start.
In this phase, the area of the site, the typology of target, and the design criteria influenced all the approaches' calculations and aims:
- for the urban approach, the site was the mainly peculiar factor;
- in the architectural approach, all the previous considerations coming from the project delineation were decisive;
- in the sustainable approach, again, all the considerations coming from the project delineation helped to better define the sustainable rules to follow and the goals to reach.

[ill. 59]

DESIGN CRITERIA GUIDE

URBAN APPROACH:

30% green
comparison of the site-area to existing buildings
connections (see analysis)
networked system (see analysis)
compressed and heterogeneous (=dense and varied buildings)
attracting multifunctionality, establishment of critical mass of people and activity.
sustainability of quality!

ARCHITECTURAL APPROACH:

room program
models with sqm percentage
growing architecture, cheap, networked, > importance to the hard main structure of work and social
spatial quality of all the functions
urban qualitative life at multiple levels
attractive open areas 30 % min
underground (and 1-2 floors north) ventilated parking area

SUSTAINABLE APPROACH:

Compactness:
FAR=200% min, 300% max.
(researches models in the "ideation" chapter)

low resources consumption:
material insulation
orientation
natural heating and cooling

high degree of utilization:
mixed functions
common area of high usage, avoid heating of unused areas

recycled materials and their life-span
easy to recycle
easy to remove, and separate the different material components
easy to instal on the main structure
economical

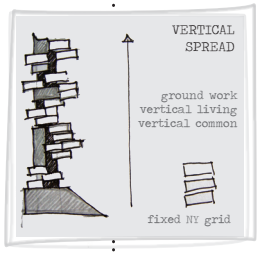
good daylight conditions
orientation
minimization of building footprint
openings through windows
openings in the structure: cutting into and through the building volumes, create also new passages and attractive spaces also at high building levels (that can not easily reach the outside recreational areas).

good indoor air exchanges
natural ventilation
indoor humidity of 40-60 %
orientation

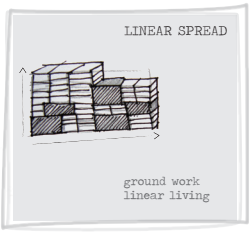
HOW
urban approach

The Net-Work-Architecture is a chain typology of buildings spread all over the world. And like the multinationals do, it has to consider the tendencies and the differences between the countries where it could be settled. Here some examples of different spreads according to the main features of different cities.

MANHATTAN

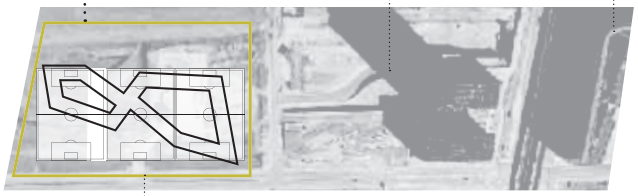


SOVIETIC BUILDING



HAMBURG PORT

[ill. 60]



SITE AREA
2,4 football fields
1 otte tallet
26.000 sqm
225% FAR

SITE AREA - 26000 m2
(1 football field= =2,4 football fields)

F.A.R = 225 % min.
(considering living + common areas + working area)

F.A.R. = 300 % max. (taking as reference the urban development in the area, however this is not going to be developed in this thesis)

NUMBER OF FLOORS - 9 max
(of the living + common areas)

LIVING + COMMON AREAS
(m^2 calculated according with the design chosen at pag. 70-71)

inhabitable floors	8			
north slab	1st inhabitable floor	3000 - 1100 (parking in the slab)	= 1900 m^2	
	2nd to 8th floors	3000 x 7	= 21000 m^2	
south slab	1st and 2nd inhabitable floors	7300 - 1560 (south opening-entrance)	= 5740 m^2	**16000 m^2 common**
	3rd to 8th floors	3650 x 6	= 21900 m^2	**34540 m^2 living**
total area			**50540 m^2**	
F.A.R.			**195 %**	

WORKING AREA

total area	**8000 m^2**
F.A.R.	**30 %**

GREEN AREAS - 17500 m^2 (= 65%)
min 30% of the plot area =7800 m^2

PARKING AREA - 6300 m^2
1100+1100 (possible parking in the north slab or outside) + 4100 (underground parking)

key words

connections worldwide
networked system
compressed and heterogeneous
attracting multifunctionality, establishment of critical mass of people and activity.

30% green min.
comparison site-area/existing buildings

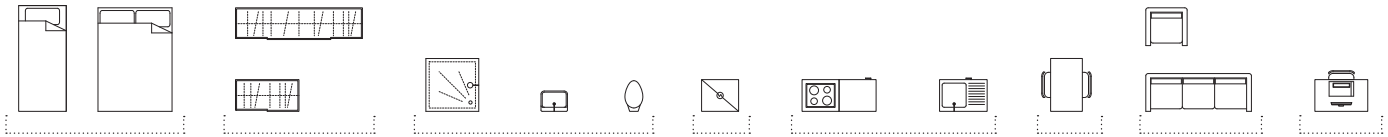
HOW
architectural approach

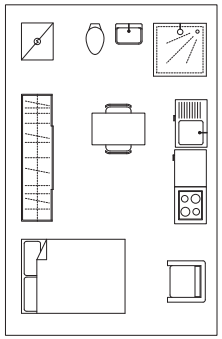
" A network society is able to share resources and therefore get MORE FOR LESS "

[Vicente Guallard, Sociopolis]

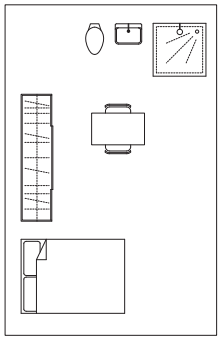
LIVING UNITS

The project centres on defining the rules for the cell-living units with shared resources.

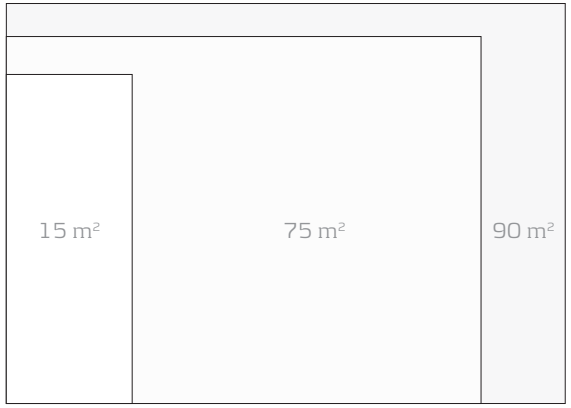




25 m²
minimum area for
all the resources



If the resources are shared between 18-20 people
it can be possible to obtain a greater useful surface
area for private use.

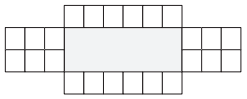


with sharing
each individual owns 15 m² minimum
each individual shares 75 m² minimum
each individual enjoys 90 m² minimum

apartment development:
15 m2 25 m2 50 m2

18 people are sharing:
200 m2 minimum

24 people are sharing:
400 m2 minimum



ROOM PROGRAM

living-cells units - 35000 M² (for 1300 users)

	area	min. room height	users	use	activity level	public relevance	flow	daylight min.	air change min.	temp. summer	temp. winter	CO^2 level
TYPE 01 - 15 M² (for singles)												
Bathroom	3 m²	2,5 m	1	Shower, toilet, storage	+	+	Access from corridor	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Bedroom	4 m²	2,5 m	1	Sleeping, desk, clothes storage	+ +	+	Access from corridor	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Technical equip.	-	-	>1	Ventilation			Next to bathroom	50 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
(Outdoor area)	2-3 m²	(2,5m)	1	Gardening, relax	(+)	+ + +	Access from bedroom	-	-	-	-	350 ppm
TYPE 02 - 25 M² (primarily for couples)												
Bathroom	3 m²	2,5 m	2	Shower, toilet, storage	+	+	Access from corridor	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Bedroom	10 m²	2,5 m	2	Sleeping, desk, clothes' storage	+ +	+	Access fromcorridor or dining area	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Technical equip.	·	-	>1	Ventilation			Next to bathroom and kitchen	50 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
(Kitchen + dining area)	8 m²	2,5 m	2	Cooking, dining and storage	+ +	+	Access from corridor	500 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
(Outdoor area)	2-3 m²	(2,5m)	2	Gardening, relax	(+)	+ + +	Access from bedroom	-	-	-	-	350 ppm
TYPE 03 - 40/50 M² + BALCONY (primarily for small families, couples)												
Bathroom	6 m²	2,5 m	>2	Shower, toilet, storage	+	+	Access from corridor	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Master bedroom	13 m²	2,5 m	2	Sleeping, clothes' storage	+ +	+	Access from living area	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Bedroom	4 m²	2,5 m	1 or 2	Sleeping, desk, clothes storage	+	+	Access from corridor	200 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Technical equip.	·	-	>1	Ventilation			Next to bathroom and kitchen	50 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Kitchen + dining area	20 m²	2,5 m	2	Cooking, dining and storage	+ +	+	Access from corridor	500 lux	0,5h⁻¹	23-26°	20-24°	660 ppm
Outdoor area	4 m²	(2,5m)	2	Gardening, relax	+ +	+ + +	Access from bedroom	-	-	-	-	350 ppm

HOW
architectural approach

key words

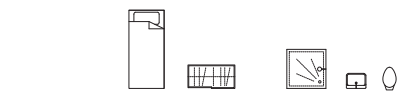
growing architecture, cheap, networked hard main structure of work and socialization

spatial quality of all the functions urban qualitative life at multiple levels

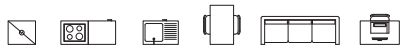
attractive open areas 30 % min underground (and 1-2 floors north) ventilated parking area

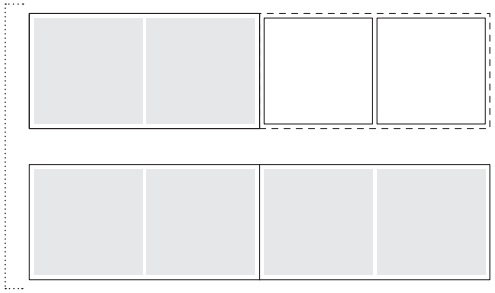
COMMON AREAS

In a sharing architecture, to enjoy more space at lower costs, some resources need to be shared. This promotes social interaction between the users and prevent young people from living in cramped housing, allowing them to spend there only their minimum amount of daytime.



private living unit (15 m²)





minimal common area (200 m²)

1st solution: 100 m² kitchen + 100 m² dining
2nd solution: 100 m² living + 100 m² cafè

standard common area (400 m²)

1st solution: 300 m² living + 100 m² cafè
2nd solution: 100 m² kitchen + 100 m² dining + 200 m² living

Here above a minimal solution for a common area of 200 m² and another considered standard, with an area of 400 m².
For each area 2 functional solutions have been given.

CONNECTION
Furthermore, to avoid the creation of getthoes in each common area, between a group of 18-24 people (minimum), the distribution has to be studied in a way that allow the direct connection between all the common areas.

FIX vs MOVABLE
While the private living cells can be moved from city to city and from an area to another of the building (according with the requests and the amount of users in a certain period), the common areas have to be developed as fixed structures, recognizable also in a formal and material manner.

FLEXIBILITY
In a period of less crowding, not all the common areas will be used, thereby they can be organized in a flexible way, so that they can easily change function according to the city's requests (exhibitions, concerts, ...).

WORKING AREAS

Like the common areas, the working ones have to be fixed structures, useful not just for the users of the building but for all the city. The formal identity and the flexibility are going to be considered as well.

ROOM PROGRAM

public functions

	area	min. room height	users	use	activity level	public relevance	flow	daylight min.	air change min.	temp. summer	temp. winter
COMMON AREAS Common shared facilities											
Kitchen	100 m^2 200 m^2	<3 m	<18 <25	common/single cooking, common/private storage	+ + + +	+ + + +	Access from common north corridors and internal connection	500 lux	0,5h^{-1}	23-26°	20-24°
Dining areas	100 m^2 200 m^2	<3 m	<18 <25	Public meeting point, dining, day and evening activities	+ + + +	+ + + +	Access from common north corridors and internal-external connection	500 lux	0,5h^{-1}	23-26°	20-24°
Café	100 m^2	<3 m	>20	Public meeting point, dining, drink	+ + + +	+ + + +	Access from common north corridors, internal-external connection	500 lux	0,5h^{-1}	23-26°	20-24°
Living areas	200 m^2 300 m^2	<3 m	<18 <25	Public meeting point, day and evening activities, relax, electronic connections	+ + + +	+ + + +	Access from common north corridors, internal-external connection	500 lux	0,5h^{-1}	23-26°	20-24°
Car parking	6300 m^2	<3 m	1500	Private/public parking for housing units, offices, grocery, visitors	+ + + +	+ + + +	Access from street	-	-	23-26°	20-24°
Bicycle parking	400 m^2	-	-	Private/public parking for housing units, offices, grocery, visitors	+ + + +	+ + + +	Access from street	-	-	23-26°	20-24°
Outdoor & green areas	19000 (17500+ 1500) +m^2	-	-	Public grounds for outdoor activities + highrise common green	+ + + +	+ + + +	Access from common areas, corridors, street	-	-	23-26°	20-24°
WORKING AREA Working activities and meeting rooms for the net-work-architecture inhabitants and exteriors (will not be further detailed)											
Offices	8000 m^2	<4 m	-	Rentable meeting areas, rentable offices space for small firms, net-working	+ + + +	+ + + +	Easy access to cafe and parking	-	-	23-26°	20-24°
Commercial areas	650 m^2	<4 m	-	Shopping	+ + + +	+ + + +	Easy access to street and parking	-	-	23-26°	20-24°

HOW
sustainable approach

key words

low resources consumption:
material insulation, orientation, natural heating and cooling

high degree of utilization:
mixed functions, common area of high usage, avoid heating of unused areas

recycled materials
easy to recycle-remove-separate, easy to instal on the main structure, economical

good daylight conditions
orientation, minimization of building footprint, openings through windows and in the structure (that create also new passages and attractive spaces also at high building levels)

good indoor air exchanges
natural ventilation
indoor humidity of 40-60 %
orientation

(more data/requirements are here shown)

QUALITY OF INDOOR CLIMATE

The quality of the indoor climate is an extremely important factor regarding the health and well-being of the occupant, especially in Denmark, were people spend most of their time indoor. A good indoor climate has furthermore a positive impact on the abilities of the occupants to concentrate, work and relax. Indeed, when the temperature, CO_2 level and daylight factor in a room become too high, the sense of well-being decreases and the productivity drops, and there could be an increased risk of illness. The natural daylight has also to be considered.
Therefore a good indoor climate can be achieved through the presence of factors such as: natural daylight, thermal comfort, air quality and good acoustic, which evoke positive sensations. The combination of design and technical appliances included glazed areas, ventilation principles, overhangs and heating system, have to be carefully studied.

DAYLIGHT

Well-lit rooms are not only a question of high illumination or high daylight factor, but the light's properties (direct or diffuse light source) are also important factors regarding light distribution in a room. Windows shape and location of the facade have important influence for the light distribution: an high located window allows the light to deeper penetrate into the room, and to be uniform, but it can also be a problem according to uncomfortable views of the outside and overheating effects. Furthermore, for deep rooms, the material and colour of the surfaces are playing a great role to reflect the light.

The acoustic is another parameter to reach for indoor quality, and also in this case, materials, room dimensions and insulation are important.

THERMAL COMFORT

The thermal comfort is about preserving a certain temperature in the room, which makes it comfortable to be in and it is determined by:
- the air and the temperatures of the surfaces
- the air velocity and turbulence intensity
- humidity and human activities in the room

If the temperature is too high, people will feel uncomfortable in the room, and the ventilation and shading have to be considered at that point.
During winter is desirable to have a warm and comfortable room, so rooms should be oriented south to gain profit from the sun heat.
The difference in temperatures from summer and winter (in the requirements below) is based on people's clothing at these times, as the outdoor temperature is different.

AIR QUALITY

The occupants in a space have two requirements of air:
- the health risk of breathing the air should be negligible, avoiding illness
- the air should be perceived as fresh and pleasant, rather than stale, stuffy and irritating.

The air quality can be perceived differently from person to person, and it is not constant: it is indeed influenced by changes in building operation, occupant activities, outdoor climate. [art. 6]
When using natural and mechanical ventilation to achieve a good indoor air quality, aerating and renewing it, factors like CO_2 levels and sensory pollution has to be considered. Different ventilation strategies will be further explained.

Required daylight factors:
main rooms: 5% average
secondary rooms: 2%average

[BR, 2008]

Recommended temperature:
winter: +22°C
summer: <25°C if mechanical ventilation
<26°C if no cooling system

[miljorigtigtindeklima, 2011]

Air requirements:
air flow rate: 0,5 h^{-1} (=0,3 l/s m^2 per 2,5m high)

[BR, 2010]

ENERGY STRATEGY

The wish is to create a low energy class building, this can be reached by lowering usual energy consumption through a natural ventilation, orientation of the building, daylight factors, material insulations, material U-values, renewable materials. To reach this goal there were taken into account the requirements set in the Building Regulations 2015 for low energy buildings, which indicate a energy consumption of heating, cooling, DHW, ventilation of 30 kWh/m^2 in Denmark.

There are several types of energy saving solutions. The one that will be developed for this project is a low energy class solution: which do not produces energy directly, but it greatly lower the possible energy consumption of the building. This solution is mainly based on considerations of the placement of the building and relation to the site:
- southern orientation of the building
- shading to prevent overheating (stable indoor temperature)
- well made layout to prevent neighbour shading
- thermal mass (stable indoor temperature)
- natural ventilation (wind direction, wind suction)
- super insulated compact structure
- centralized technical shafts to reduce heat loss along ventilation pipes

[Brunsgaard: 4-7]
[komforthusene.dk: 24]

Energy frame:
low energy class 2015: 30 kWh/m^2
DHW: 250 l/m^2
appliances: calculated in accordance with Sbi_2005:12, ISBN 87-563-1235-0

[BR, 2010]

NATURAL/MECHANICAL VENTILATION

The use of natural ventilation has advantages like no energy consumption, improved indoor climate in summertime, however it may lead to discomfort like slow air movement, poor air quality and noise from the outside. It also limits building layout possibilities and makes it harder to provide thermal comfort during winter.
A mechanical ventilation system with heat recovery can come then in addiction.
[art.6]
The requirements to reach a good natural ventilation are:
- room dimension, relation room height/depth shouldn't exceed 5 units in cross ventilation case
- open layout diffuses air slower than closed one.

Natural ventilation:
main wind from W-SW, but avoid windy outdoor spaces, consider proportion and layout

Mechanical ventilation:
Airmaster system

IDEATION

INTRODUCTION

This is the last process of the thesis, where the design of the project is fully expressed and explained, and it is finally presented in all its parts: urban planning, architectural, and technical.
The process is shown in a logical and chronological manner, starting from the first impression of the place, and gradually processing into the detail of the architecture, coming from a general setting of the vision.
Differently from any conventional project, this was elaborated starting from the main theoretical aim of the first two chapters, nothing was lost from that research, everything was not vain, rather everything was the base to develop any design consideration.
Indeed, for instance, the design and organization of each function inside the dwellings, or the common areas, was just the second step of every thoughts: the function was not defining the shape, on the contrary the shape and the modular fixity of the dimensions, were dictating the organization.

The ideation was thereby taking as starting point and as aim what were the first expectations, coming mainly from my personal experience and generation goals.

[ill. 61]

IDEATION READING GUIDE

Here a chronological overview of the upcoming design criteria:

01 - the experience of the place, before any concept development, and FAR researches in accordance with the chosen site

02 - the explanation of the concept in the chosen place and in the vision

03.1 - the explanation of the choice of frame's containers, their modular conformation and their pros and cons

03.2 - from the cons of the previous choice some structural considerations arose, and the structural matter became an aspect of primary necessity to be solved (before any room design)

03.3 - experimentation of container frame's combinations, with an explanation of their flexibility, their variation with the amount of people effectively living, the effect of the remotion on the general structural grid.

04 - the first building development made in a schematic way, which shows in a quantitative manner the previous tests and visualize the effect and distribution of the common areas.

05.1 - plan development of the living cells: from the modular structure to the interior quality

05.2 - multitask furnitures as an aspect of the inside flexibility (not just of the outside then), daylight factors studies, facade configuration and details of the chosen shading devices.

06 – combination of the living units, with their distribution system and technical anchorages

07 – plan development of the common areas, their fix structure and flexible organization, the distribution systems and visibility outside-inside and inside-natural park.

08 – the second building development which sum up all the previous design solutions

09 – facade configurations

10 – possible working area developments

11 – the master plan and the site distribution, paths and parking areas, as well as shadow studies.

12 – technical results

01
the place

BEFORE THE CONCEPT: EXPERIENCING THE PLACE

The ideation could finally start, after the set up of the main ideas of how this project can work in a big scale (in the analysis phase), and in regards to the data calculated and expressed in the approach chapter.
The first step of the ideation was then the consideration of the main vision of the Net-Work-Architecture, as flexible, temporary and working/living/social place, and the consideration of the site features where it was going to be designed in an aesthetical, functional and technical way.

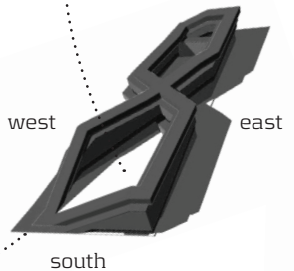
After the rational idea described in the chapters before, and expressed through diagrams, facts, data, and analysis, here the physical idea is going to be shown, starting from the experience of the chosen site.

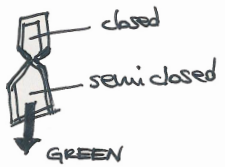
**As explained previously, if the general idea of the project is having the same vision worldwide, is not going to have the same structural physicality and experience of the place.
Each place has indeed physical, cultural and personal appearances.**

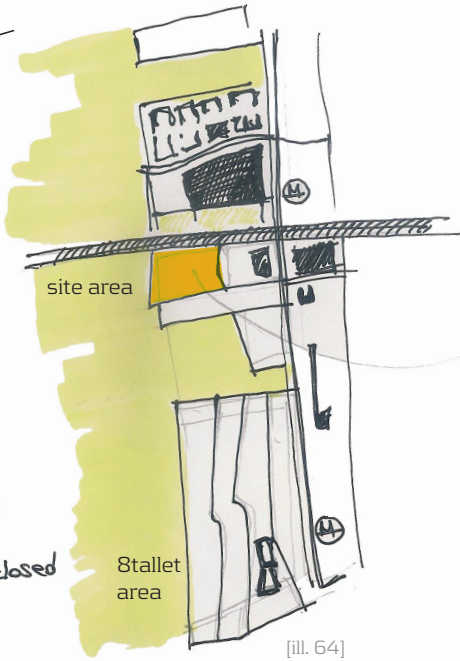
A general analysis of the place, as expressed in the second chapter, was not enough to define a suitable architecture. Thereby before any sketching and modelling phase, it was necessary to experience the place, feeling his positive and negative features. Starting from these to enhance the project capabilities, and avoiding any unsuitable aspect.

[ill. 62]

[ill. 63]







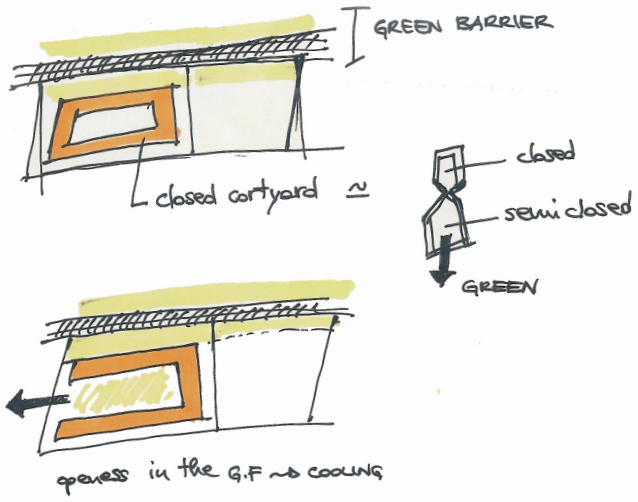
[ill. 64]

The linear development of this new urban area of København, is preserving on its west side the wild nature of an uncontaminated park. Entering in one of the newest building of the area, the 8tallet, the relation between the occupants and the context was greater in the south open courtyard than in the north closed one. This openness was reached just through a decrease of the roof's height.

F.A.R.

Considering the studies done on the FAR, the second phase was to simulate through models the effects of the building configuration and orientation, concerning of: daylight quality, wind exposure, placement of inner working area.
The chosen solution is the best in terms of relation with the context, FAR, wind exposure and wind suction effect (with protection of the inner courtyard through the working area), orientation towards south, south-east and south-west of the living and common units.

* the openess in the groud floor has to be checked, due to a high wind exposure



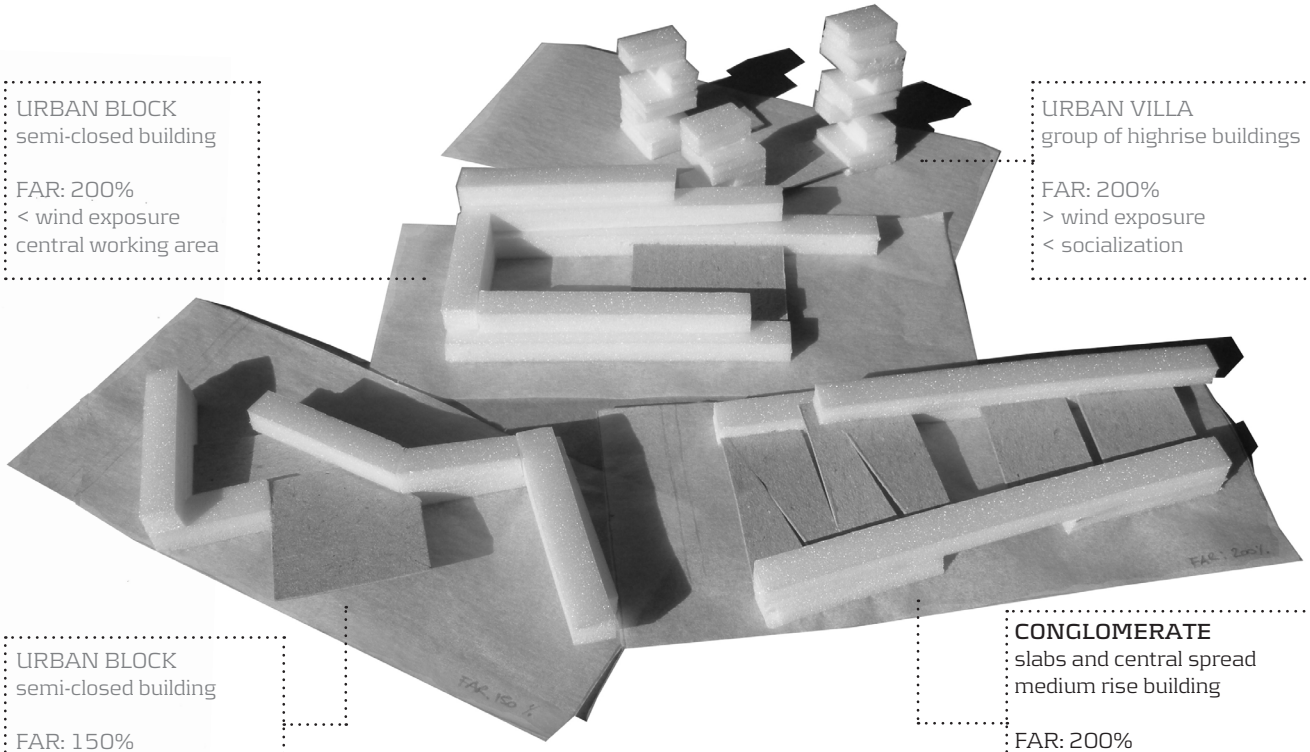
Therefore what I firstly considered important in the development of the building plan were the orientation and a strict relation with the preserved nature.

URBAN BLOCK
semi-closed building

FAR: 200%
< wind exposure
central working area

URBAN VILLA
group of highrise buildings

FAR: 200%
> wind exposure
< socialization



URBAN BLOCK
semi-closed building

FAR: 150%
< wind exposure
central working area
various daylight exposure

CONGLOMERATE
slabs and central spread
medium rise building

FAR: 200%
< wind exposure through
the central-high working area
south daylight exposure

[ill. 65]

02
the concept

In the following two pages the concept is shown in its urban context and essence, or "Highest Common Factor", coming from the general vision of flexibility, temporality and social living and working.

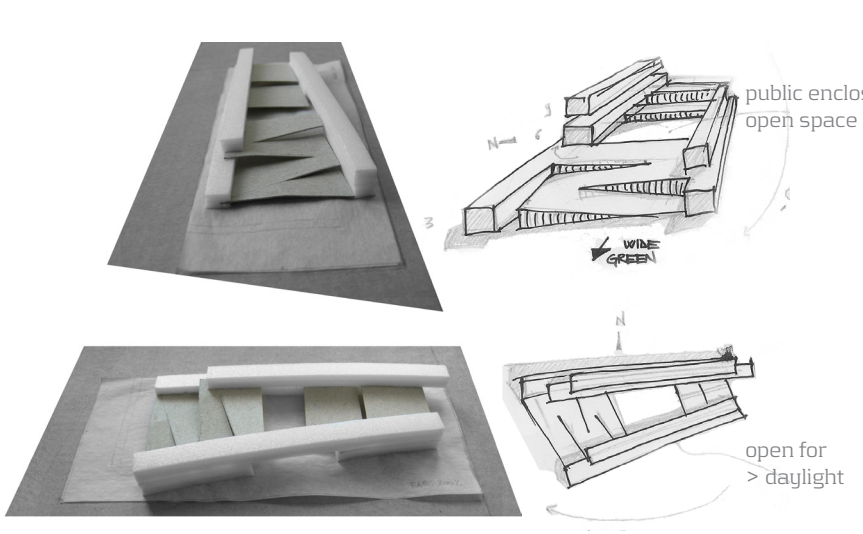
CONNECTION WITH THE PLACE

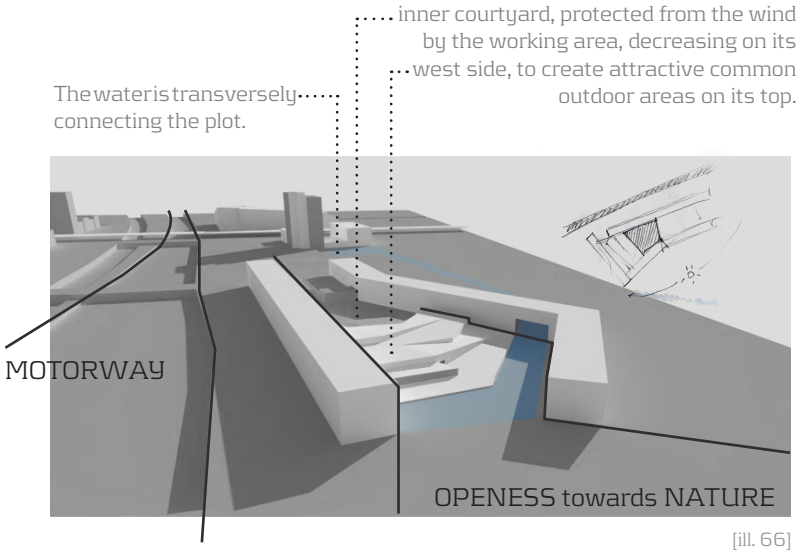
From the modelling phase the further step was to develop and better enhance the main features coming from the previous building concept.
Different sketches have been made to evaluate the choice in terms of:

- **RELATIONSHIP WITH THE SURROUNDING:** the 200% FAR (225% as shown in the final synthesis and volume studies of the approach phase) were split in two separated slabs, with a maximum height of 9 floors. The northern slab is orientated along the motorway's direction, to create an anti-noise barrier on the inside of the whole complex plan.
Considering the experience of the place, the view to the wild natural park on the west was allowed through a wide opening in this direction, created through the simple slabs' guidelines. The nature can in this way be better seen from the decreasing top of the working areas. Further studies at pag. 82.

- **ORIENTATION:** the slabs are facing S, S-E and S-W, allowing the living units to benefit from the greatest sun exposure during the 8 long cold months of the year. In the previous model the choice was restricted to one direction (south), while in this phase the orientation changed both to give sunlight to the occupants who are using mostly their home during mornings (S-E) or during evenings (S-W) and to give more outdoor wind protection on the top working area.

- **PLACEMENT OF WORKING AREA:** in the previous f.a.r. modelling step, and in the urban approach, the main architectural features were related to the arrangement of the living, common, working and social areas in the building complex. In this step and choice, the working area was placed in the middle, between the two slabs, in a way where its top could be easily used for recreational and social outdoor activities, controlled and reached from both the slabs. Furthermore the placement and the west decreasing shape of it, was allowing the creation of a protective barrier against the western wind, in the inner ground floor courtyard. Another aspect related to the working area is the physical construction of it: a fixed building (in shape and construction materials) that can be utilized as a basement, or hard core, where the flexible slabs can be anchored.



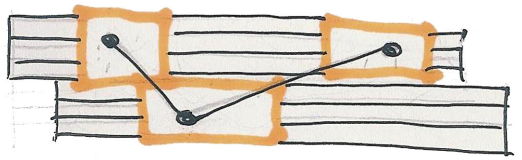


[ill. 66]

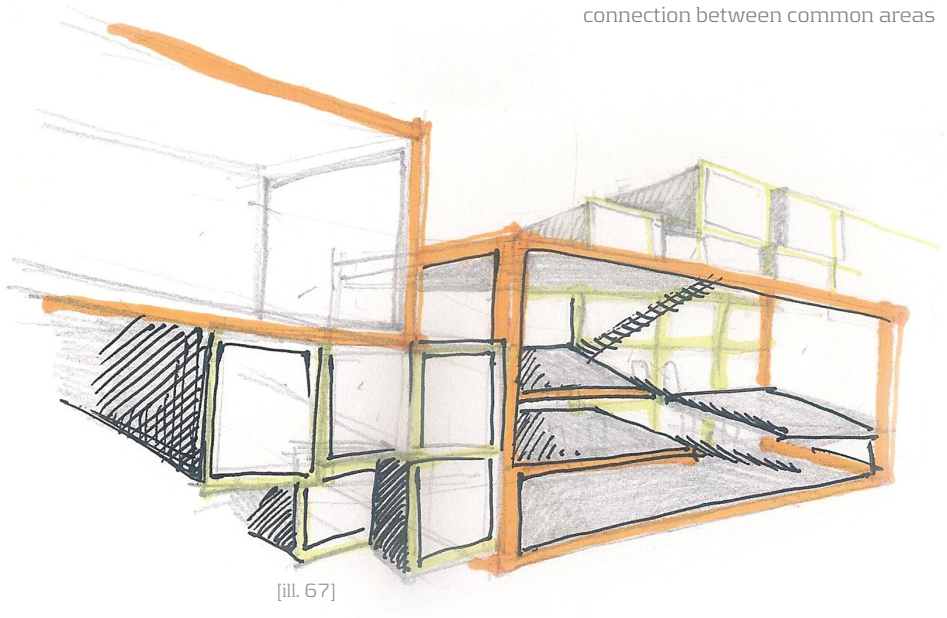
THE VISION

As pointed out before, the relation with the context is different from one Net-Work-Architecture to another, and this property can characterize the shape and the relationship with the surrounding. But the main idea, the main vision, wants to be the same, worldwide. In the urban approach I gave an expression of this idea, but here I am going to summarize and highlight all the criteria of this vision.

The Net-Work-Architecture:
- has to allow all the users, companies and external stakeholders to join of the working service it is offering (see project delineation)
- the working area has to be accessible to everyone from the outside and it is seen as a permanent structure and as an hard core for the anchorage of the living slabs, as well as a place upon which it is possible to have recreational and social activities
- has to allow all the users to temporary live in it
- the temporality of living has to be evaluated in a quantitative (m^2), fast producing (standardization of prefabrication), inexpensive (just private m^2 in each living unit, prefabrication and recycled building materials), qualitative manners
- since the living is temporary, the occupancies flows have to be considered and the possibility of removing living units when not needed and transfer them where they are needed has to be evaluated in a structural-time-cost-transportation way
- the remotion and addiction of living units is changing the configuration of the building, enhancing its flexible and temporary nature, differently from a conventional building, here it can be possible to recognize how many people are effectively living inside
- since the cost of m^2 is reduced (reducing the amount of functions inside each living unit) the common areas have to be designed not just in a qualitative and functional way, but also guaranteeing a comfortable distribution: from outside to inside common areas to living units and from a common area to other common areas
- the communication between all the common areas can then guarantee a more social environment throughout all the building, avoiding the creation of “ghettos” inside it
- structurally, the living units are the only elements that can be removed and transported, due to their limited dimensions; common areas and working areas have to be fixed structures (where the living units can be anchored), with different utilization and thus with a different distribution system
- in the case where the amount of common areas is bigger than their necessity, their design can allow them to be flexible and reused with different functions (ex. Laundramat or Living City)
- the cranes which are going to be active during the settlement of the living units could be used in a different and interactive way when they do not need to place the prefabricated modules (ex. carrying stages for concerts, lighting system, exhibition modules,...)



connection between common areas



[ill. 67]

03
the modularity of the living units

MODULAR CONTAINER'S FRAME SYSTEM

As decided in the analysis phase, the prefabrication was considered the most suitable and sustainable solution for this temporary project. Prefabricated modules indeed, when well studied in all their components, can easily be removed or recycled from their native building.
Furthermore, considering the fast growth of this worldwide project, due to a fast movement of the new society, the temporality is well reached in an architectural manner through a prefabricated and predesigned solution, fast to make in a serial way and fast to instal on site.

Due to the main aims of the project _ temporality and rapidity of building _ the design process started to firstly analyse the possible technological solution for this scope, rather than starting from the definition of the inside organization of functions for each dwelling.

Knowing the minimum dimensions to live for a single or a couple belonging to the studied target category (architectural approach), the minimum, standard and maximum volume dimensions were fixed and studied in a modular and prefabricated way.

THE SUSTAINABLE APPROACH

The chosen prefabricated system is coming from the analysis of the shipping containers first, and in particular their costs and the great availability of them in disposal areas, mainly near docks or inland freight transit terminals, and Copenhagen offers this availability.

Considering that 90 % of the world's trade goods are moved in containers, the availability of them, after a few times they have been used, it is great. Indeed, after their usage period, they have no more effective cost, and it is cheaper to manufacture new shipping containers than to transport the empty ones back (one estimate is $900 per container's return).

Since the shipping container industry continues to produce more of them every year, the great growth of disposal, can be regarded as potential building material.

COSTS

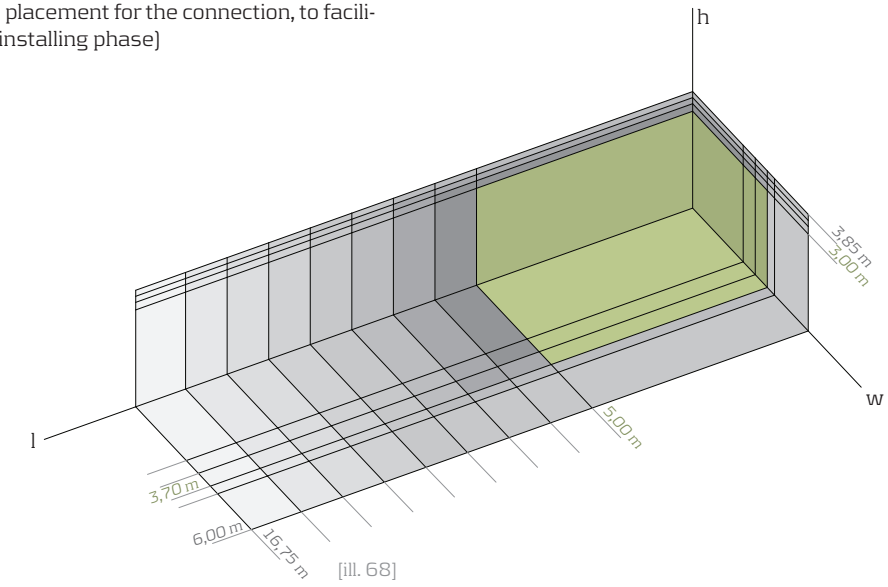
From 600-700 € per m^2 to 1500-1700 € max per m^2 (excluded foundation and insulation costs)

TRANSPORTATION & MOUNTING TIME

They can be transported through flat-bed trucks, mounted in situ after a planning and construction period of max 8 weeks (when not recycled from another Net-Work-Architecture);
mounted in 2-3 days through a movable crane placed on site;
1 week max for all the fittings, finishing and furnishing, and attachment to the electricity, water and sewage grid (the connection to it will be further described, and for each module there is a fixed placement for the connection, to facilitate the installing phase)

DIMENSIONS

max dimension: 6x16,75 (due to transport's reasons)
The frame are usually tailor-made and are available in widths that can be freely chosen between 2,62 m and 6 m, the chosen width for the project is 3,7 m.
The height can reach maximum 3,85 m, the chosen one is 3 m.
The maximum length is 16,75 m, the chosen ones are 5,7 m and 3 m. [Container Atlas]



[ill. 68]

CONSTRUCTION PHYSICS

The thermal bridges in the frame areas are avoided by pre-mounting the building envelope.

The standard of a conventional building are achieved as regard to construction physics, fire protection and indoor quality.

Superstructure: 8 beams with possibility of rail and external floor anchorage on the 4 top beams, and 8 corner supports for the installation phase on the main building structure.

Substructure: external steel essential (container standard corrugated texture)
stainless steel fire treated (0,02 m, lambda: 16, R: 0,001)

external wall: cotton wool insulation (0,30 m, lambda: 0,029, R: 10,34)
inner vapour & acoustic barrier (included in the cotton wool insulation, int. side)
gypsum board cladding (0,02 m, lambda: 0,48, R: 0,04)
U-value: 0,1

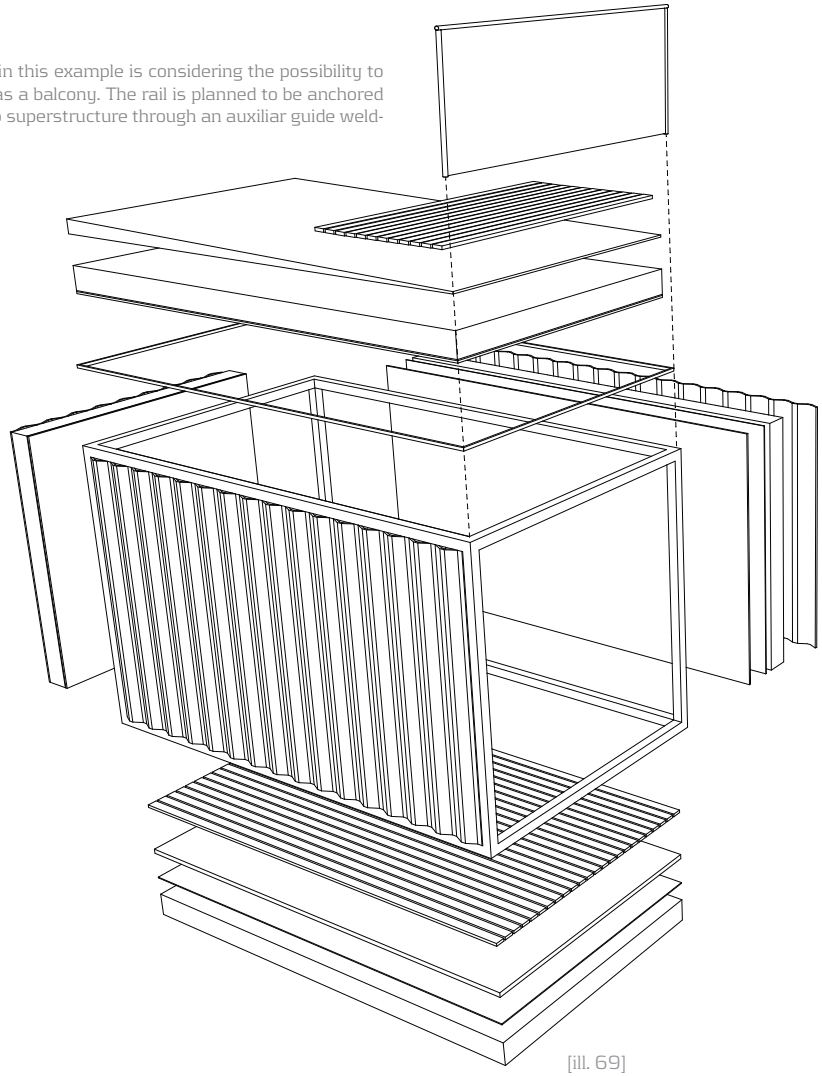
floor (facing out.): cotton wool insulation ((0,30 m, lambda: 0,029, R: 10,34)
inner acoustic barrier (included in the cotton wool insulation, interior side)
wood floor, oak (0,05 m, lambda: 0,17, R: 0,29) on top of a supporting board
U-value: 0,09

roof: when there is no need for a protective slope roof (with walking availability):
sealing of the sheet of substructure (not corrugated steel sheet)
cotton wool insulation (0,35 m, lambda: 0,029, R: 12,06)
inner vapour & acoustic barrier (included in the mineral fibre insulation, int. side)
gypsum board ceiling (0,02 m, lambda: 0,48, R: 0,04)
U-value: 0,08

When the roof is facing outside and can be used as a balcony it needs a protective slope board (anchored on the guides of the top superstructure) which support a wood external floor.

When the roof is facing outside but is not used as a balcony, it only needs a protective slope board for rain draining.

The roof in this example is considering the possibility to be used as a balcony. The rail is planned to be anchored to the top superstructure through an auxiliar guide welded on it.



[ill. 69]

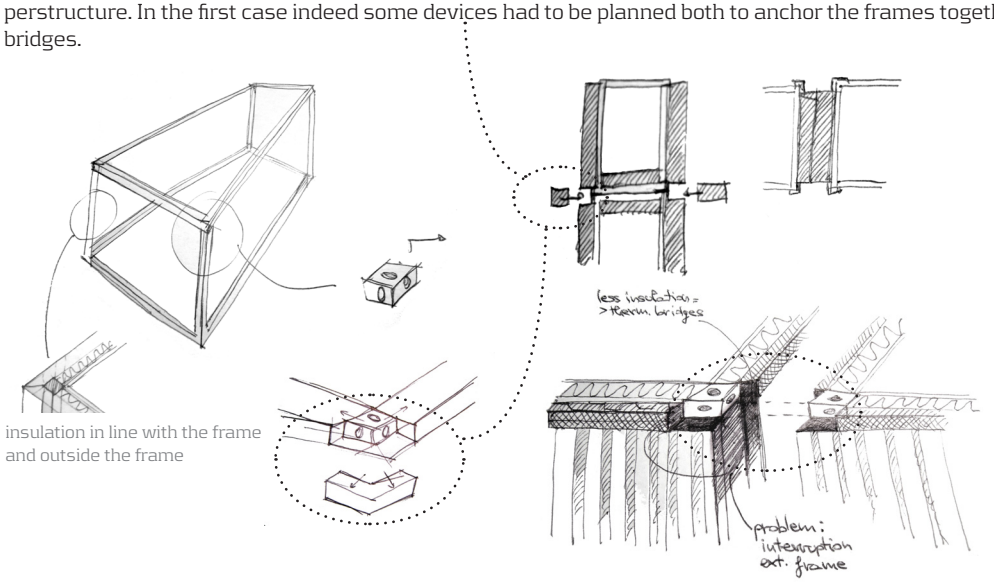
03
the modularity of the living units

ASSEMBLING & TECH CONSIDERATIONS

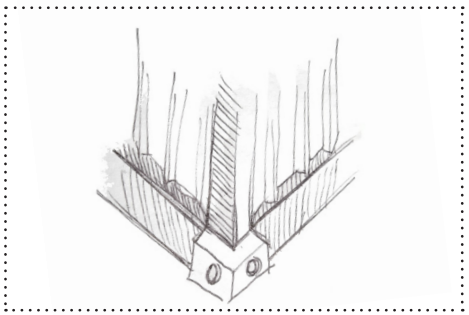
Considering the cons, a research was done on resolving the doubling of filling material, however due to construction requests, this problem persisted in favour of a more stable building solution.
Having indeed all the filling placed outside the structure, covering it, the assembling of more frames units resulted harder than having them inside the superstructure. In the first case indeed some devices had to be planned both to anchor the frames together (or to an external structure) and to avoid thermal bridges.

PRO (economical and environmental):
less material waste in site, cheap and fast construction times, all components can be separated, recycled and reused with minimal effort. The size of the building system can be extended or reduced according to the amount of inhabitants in a certain period.
The inner walls of the bathrooms are not load bearing and like the windows and the shading can be easily removed, while other walls are moving panels and curtains.
The fire protected frames can be reused to make a new living module.

CON:
high material used due to the doubling of components



insulation in line with the frame and outside the frame

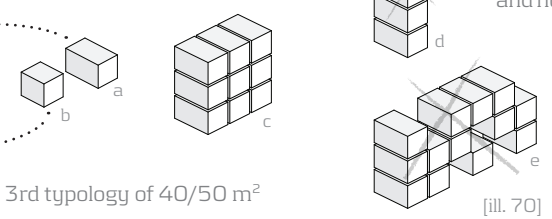


The studies on external filling, brought to problems related to insulation, creating thermal bridges at the corners of the modules.
Thereby it was considered, as final solution, to have the insulation and filling panels inside the frame, in this case not only the thermal bridges were avoided, but the connection could be fast realized and prefabricated.

In accordance with the room program the dimensions chosen for the frame's containers were based on elementary private functions needed for each user typology.
While the not private ones were concentrated on common areas.

container's frame A:
3,7(w) x 5,7 (l) x 3(h) used as 1st typology of 15 m²

container's frame B:
3,7(w) x 3 (l) x 3(h) used as 2nd typology of 25 m² and 3rd typology of 40/50 m²



c) perfect assemblage of container's frames
d-e) stacking of more than 6 container's frames and holes in the combination have to be avoided

A GENERAL STRUCTURAL GRID HAS TO BE CONSIDERED

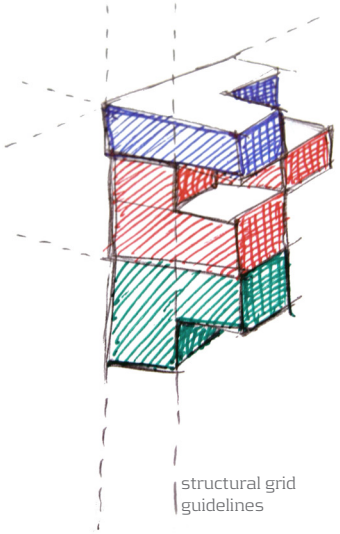
[ill. 70]

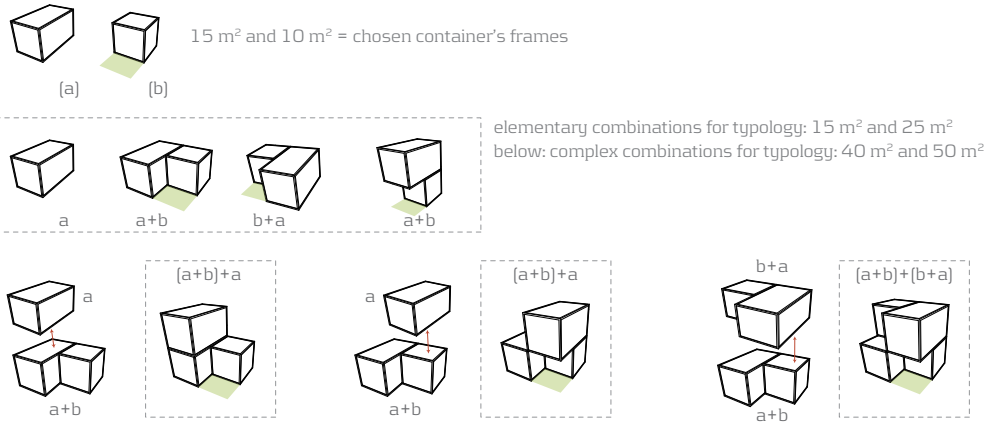
COMBINATIONS AND STRUCTURAL GRID

After having chosen the dimensions of the two frames typologies (A-B) the further step was to combine them, creating more solutions, also in therms of increasing of livable area.
In this way it was possible to reach the 25m², 40 m² and 50 m² typologies' proposals showed in the room program. (pag. 55)

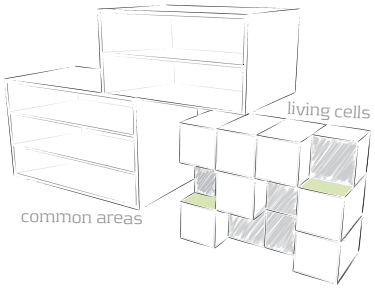
Combining the solutions belonging to the 4 living typologies, become more clear the vision of the project: to have a building composed of single small cells, which are creating a facade movement on its horizontal axis, and bigger common areas, whose movement is generated in a vertical axes (c). (common areas' studies will be shown in 04-08 phases)

In accordance with the previous studies of assemblage and structure, in this passage it is clarified the establishment of a general structural grid, for the anchorage of the container's frames. It was considered important that each frame could have at least four anchored points. Which means that each structural module can contains 6 single units overall: 3 on each of its vertical structure, and 2 on each of its horizontal structure. Increasing the possibilities to contain units would meant an increment of structural and access problems, as well as a restriction of flexibility in removing and adding units according with the vision (d).
Furthermore, the width of the structural grid, was designed to fit with the edges of the smallest frame's module (b), showing in this way its presence in facade in a less heavy way, leaving the faces of the living and common units to be the predominant ones.

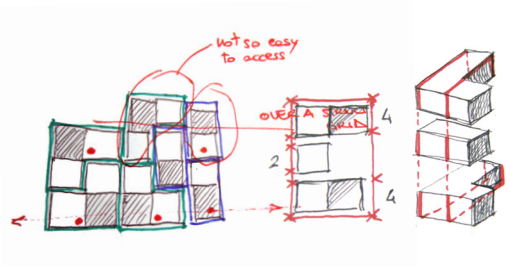




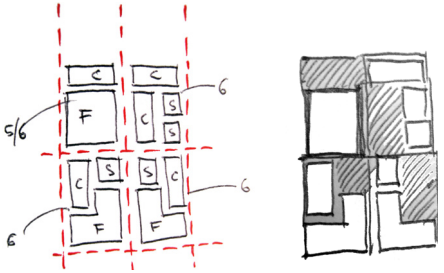
[ill. 71]



c) General vision of the combination of the living units, compared with the features of the common areas. The movement in facade is due to the two different modular frames chosen.



d) A random disposition of living units in the building could not exhist without considering a structural grid, where they and a distributional system can be anchored.

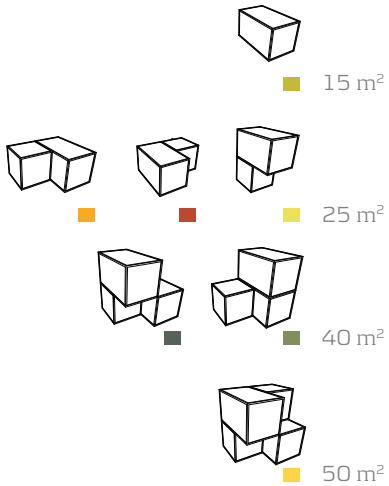


e) Example of living units' distribution in the structural grid, where its layout can allow the best anchorage of all the units, guaranteeing the flexibility of the easy remotion and addiction.

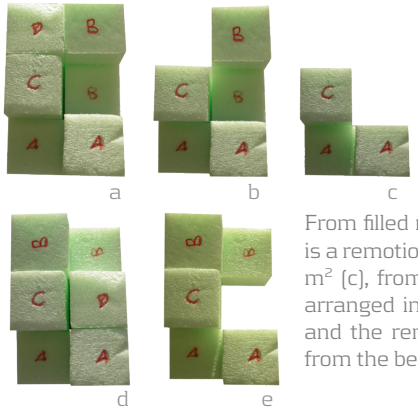
03

COMBINATIONS TESTING

In these pages there are materially shown the possible combinations of the living units: 15 m², 25 m², 40 m² and 50 m², as well as the relation of them to the structural grid. There are also some examples of how the structure underneath can be seen when the modular units are going to be removed, creating holes in the building. Which will serve as common outside areas in the building height.

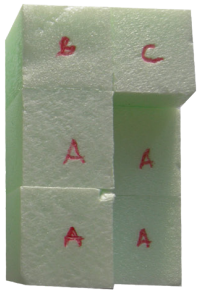


Here an example of how a grid is going to work in terms of flexibility:



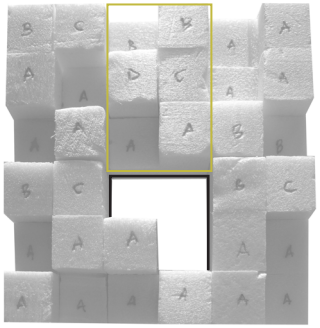
a) 2x15 m² + 2x25 m²
b) 1x15 m² + 2x25 m²
c) 1x15 m² + 1x25 m²
d) 2x15 m² + 2x25 m²
e) 1x15 m² + 2x25 m²

From filled modular grid (a) the second step is a remotion of 15 m² (b), and then other 25 m² (c), from this step the whole can be re-arranged in a completely different way (d), and the remotion of parts will be different from the beginning configuration (e).



2x15 m²
2x25 m²

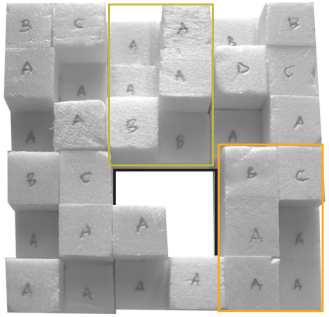
2x25 m²
1x25 m²



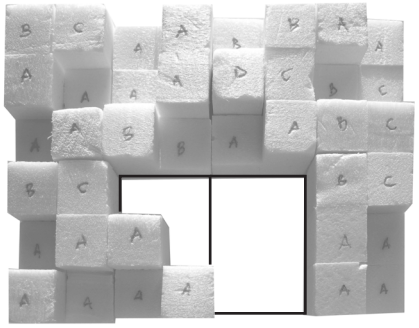
25 m² | 25 m²
15 | 15 | 25 m²
25 m² | 25 m²

in each single modular grid there can be changes in living units positioning.

The hole in this two cases does not enhance the str. grid visibility.



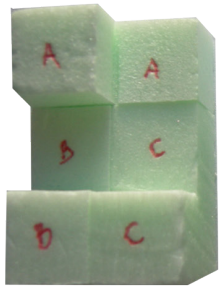
in orange it is highlighted the living combinations in an entire str. module that are going to be removed in the next solution, allowing the structural grid visibility.



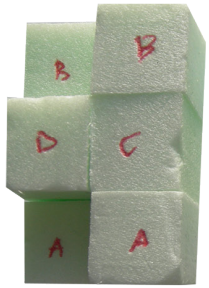
2x15 m²
1x25 m²
1x25 m²

1x25 m²
1x50 m²

2x15 m²
1x50 m²

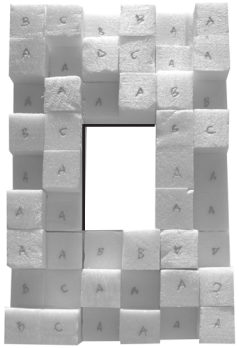


1x25 m²
2x25 m²

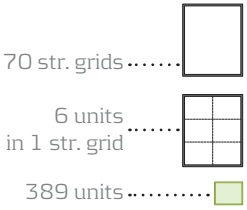


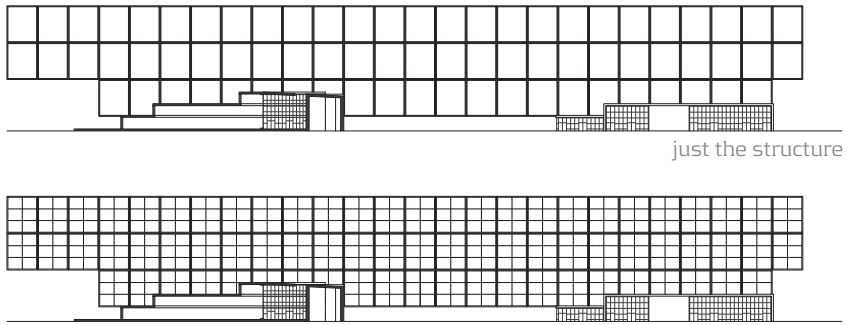
1x25 m²
2x15 m²
1x25 m²

[ill. 72]



The cleanest solution is having holes in the building with the same size of the structural grid, allowing in this way to concentrate more the emphasis on the overhanging living units.
In (ill. 73) the structural system is generally shown throughout the building, in this phase the common areas have not been expressed yet.





[ill. 73]

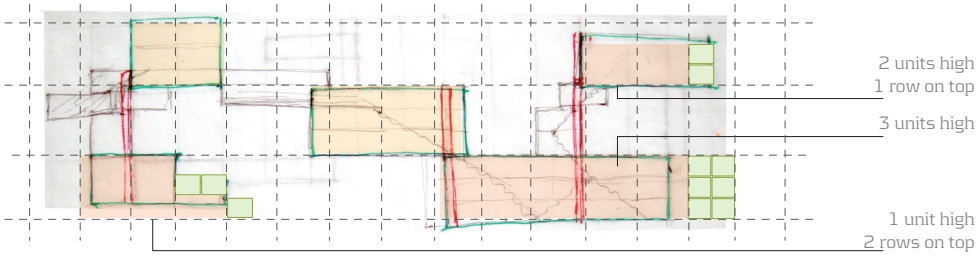
04
building development #1

COMMON AREAS & LIVING DISTRIBUTION IN THE BUILDING

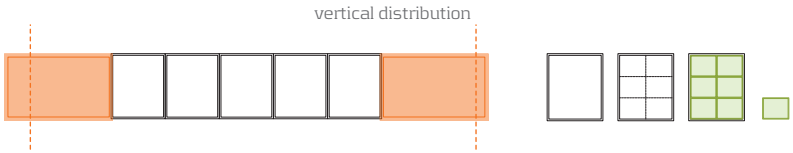
In the room program the area needed for common use was fixed according to a 100% of building occupancy. In the design process, the first step - regarding the distribution of common spaces in the north slab – was to compare the amount of common areas needed and living units. Finding the correct balance and having in this way the correct quantity of both. This passage was not so simple, and the aim was not only to guarantee the correct amount of common area, but also to distribute it in a comfortable way. The distribution was then the hardest point to solve, harder more in a qualitative way than a quantitative one. This passage will be further developed.

According with the room program, the final amount of common area was fixed, and distributed in a comfortable way throughout the whole north slab.

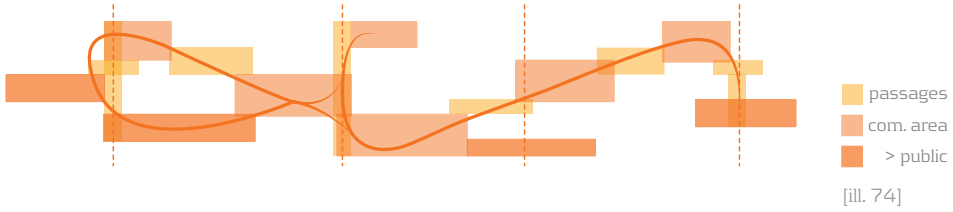
In these pages it is shown the methodology used to create a functional and qualitative distribution, together with the aim of a flexible and shape/function changing architecture.



The structural grid, used to anchor the living units, was considered as a guiding grid to collocate the common areas. However, counting the common areas as fixable volumes in the building, they can be auxiliary structure for the anchorage of the living units, that brought to a more free design of their configuration in the grid. Furthermore, some of them could not follow the grid rules, hosting in this way, on their top or on their sides the frame's containers.

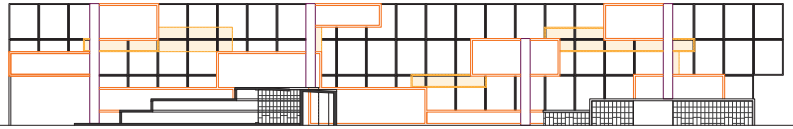


In a quantitative way, the distribution was fixed each 5 modular grid components minimum, that means (6x5)+(0,5x5) = 32,5m

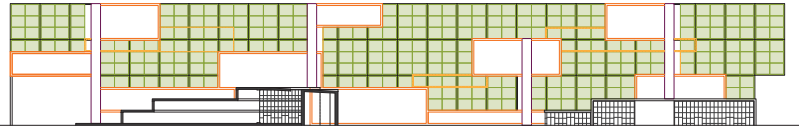


The common areas are divided in 3 groups and 3 levels, respectively: living-kitchen-dining areas, passage north facing areas, laundries or more social areas at the bottom. The connection of them is guaranteed vertically, but mainly through a dynamical inside distribution, which allow the connection of all of them, without any interruption.

[ill. 74]

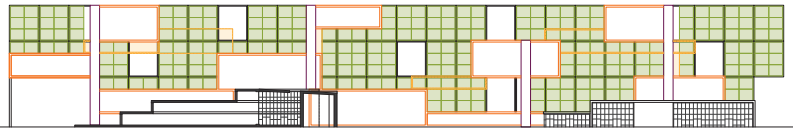


The structure and the common areas' disposition



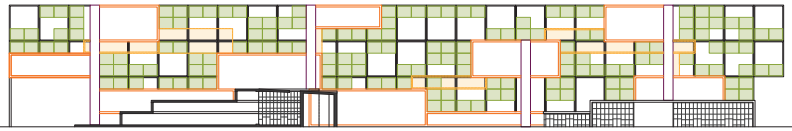
100% occupied, living units = 276, common areas = 113

Some studies on the living units' distribution, revealed a flexibility into the building visualization, according with the amount of people that is going to occupy it. Some thoughts had been made on the construction itself, which could be removed and transported, like the living units, in sites where they are requested. That possibility gave to the building a further design transformation.
The above diagram shows the maximum occupancy, while the last one shows the inhabitated solution (0% of living units).



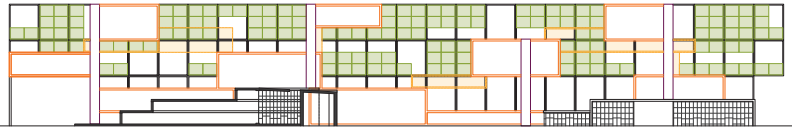
This is the cleanest solution, where the holes exactly correspond to one modular structural grid.

87%, l.u=240, c.a.=113



The random solution allows to the common passages to have a double-facing facade.

50%, l.u=138, c.a.=113



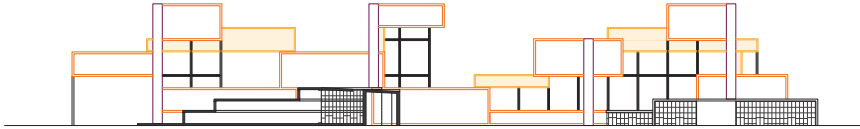
This solution differs from the one above, because the bottom area can be more used for public functions.

50%, l.u=138, c.a.=113

The common areas have been designed as double-facing solutions, with some connections (paggages) which are facing north when no living units are placed in front of them.

20%, l.u=55, c.a.=113

20%, l.u=55, c.a.=113



0%, l.u=0, c.a.=113

[ill. 75]

05

from the modular structure to the interior quality

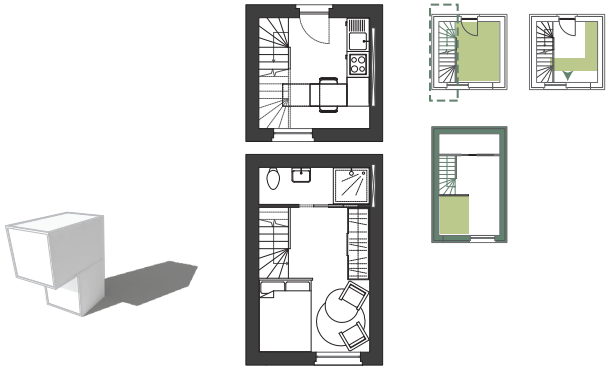
The predetermination of the shell does not have to mean restriction of inside qualitative solutions, it means instead: challenge the organization of the inside going beyond the conventionality, allowing a more free and personal experience of the indoor.

PLAN DEVELOPMENT

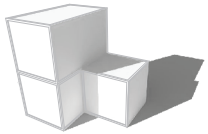
The organization of the functions inside this spaces was then the second phase of the design, which aimed to give an aesthetic quality of the inside, together with a technical analysis which aimed to research the best well being of the indoor in therms of air quality, illuminance, thermal aspects. Thus, differently from designing a conventional building, deciding the shape from the organization of the inside, in this proposal the inside organization and quality came after a predefined shell.
In an aesthetic point of view the quality of the inside had to challenge the restriction of a fixed space, finding solutions that where using the furnitures themselves and the materials to create visual quality.

a) space division: service area vs living area (facing outside)
b) linear distribution of the spaces guarantee a better visuality of the outside
c) multitasked forniture which include kitchen, studio, sliding doors, shelfs, wardrobe (and bed+desk in the 15 m² solution and some of the composed ones)
d) the private space is not facing the outside, due to the window's configuration

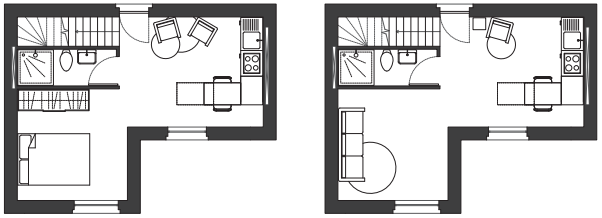
[ill. 76]

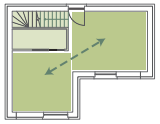


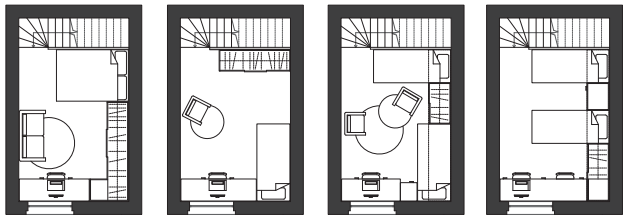
The 15 and 25 m² solutions, are the ones chosen for the development of the indoor climate studies and a better analysis of the indoor spaces' organization.
15 m² solution _ the space is divided equally in two areas: a service area (access+bathroom) and a living one (relax+study+bed), in which the bed is positioned in an upper level, guaranteeing more space below; in axis with the bathroom this create a linear distribution of the spaces and clear vision of the outside from the entrance, throughout all the length of the room.
25 m² solution _ the service area is restricted in the darkest corner of the apt. allowing a transversal connection livingroom-bedroom, this last one can be separated through sliding doors coming from the middle-multitask furniture.



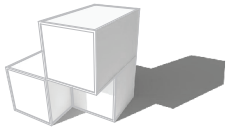
1







upper floor's solutions for both combinations



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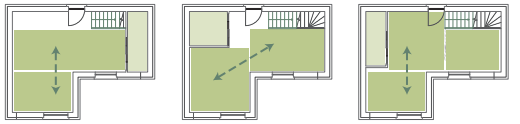

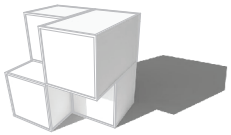

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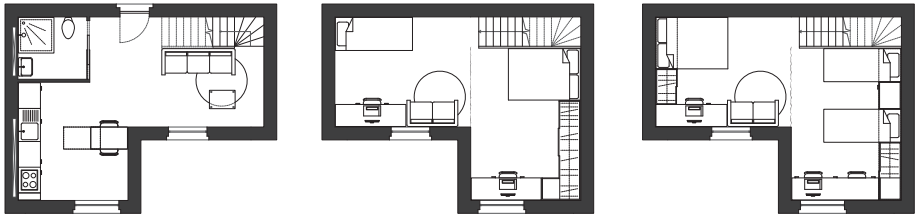
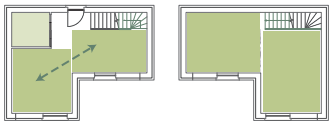


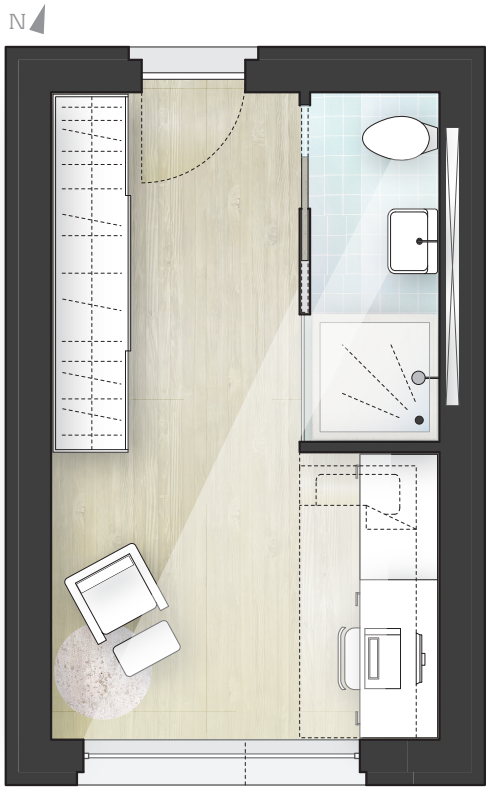


In the combinations the position of the stairs was the first and obvious step, and together with the fixed dimension, characterize the space in fixed areas. According with the utilization of multitasked furnitures and curtains, the space could be further divided and personalized. Furthermore, in the second solution (2), the position of the bathroom could create three different organizations of the inside.

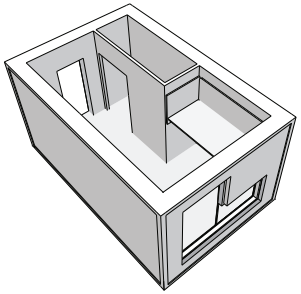
05

15 M² LIVING UNIT

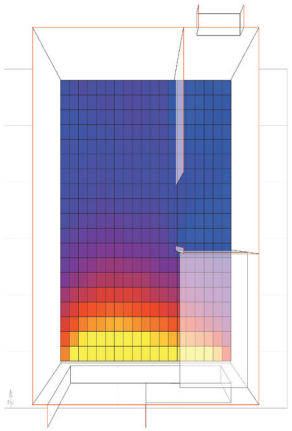
In this page all the qualitative analysis and results have been grouped together, to give an overall of the inside feeling. The room organization was not the only factor that could guarantee a good indoor quality, the choice of the materials and the daylight studies as well as the indoor climate ones where a further tool to reach this aim (see appendix 01 to 04 and pag.103-104). The quality of the light and its distribution inside the space was regulated through both the configuration and position of the windows, analysed also in facade, and the introduction of a shading device that was aesthetically having the same features for all the living units, visually grouping them (differently from their colour or window's orientation) and differentiating them from the common areas.

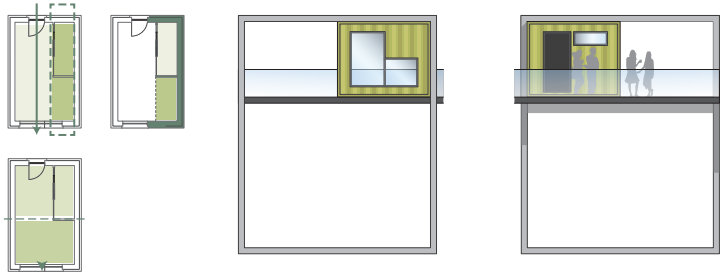


plan 1: 50, area 15m², 1 bathroom, 1 bedroom



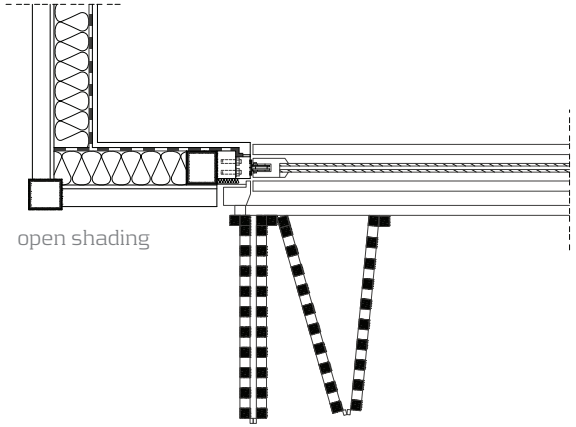
room visualization and daylight factor result:
d.f. average: 4,92%
south window: 52,6%, 4,83m²
(appendix 01)



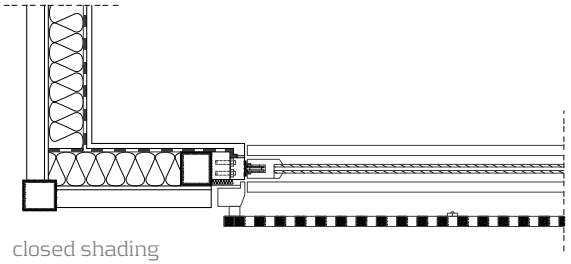


diagrams of inside organization and facade configuration and anchorage

The shading device and its functioning in facade, the color, and its factors were influent on a good indoor climate: (appendix 02)



open shading



closed shading

[ill. 77]

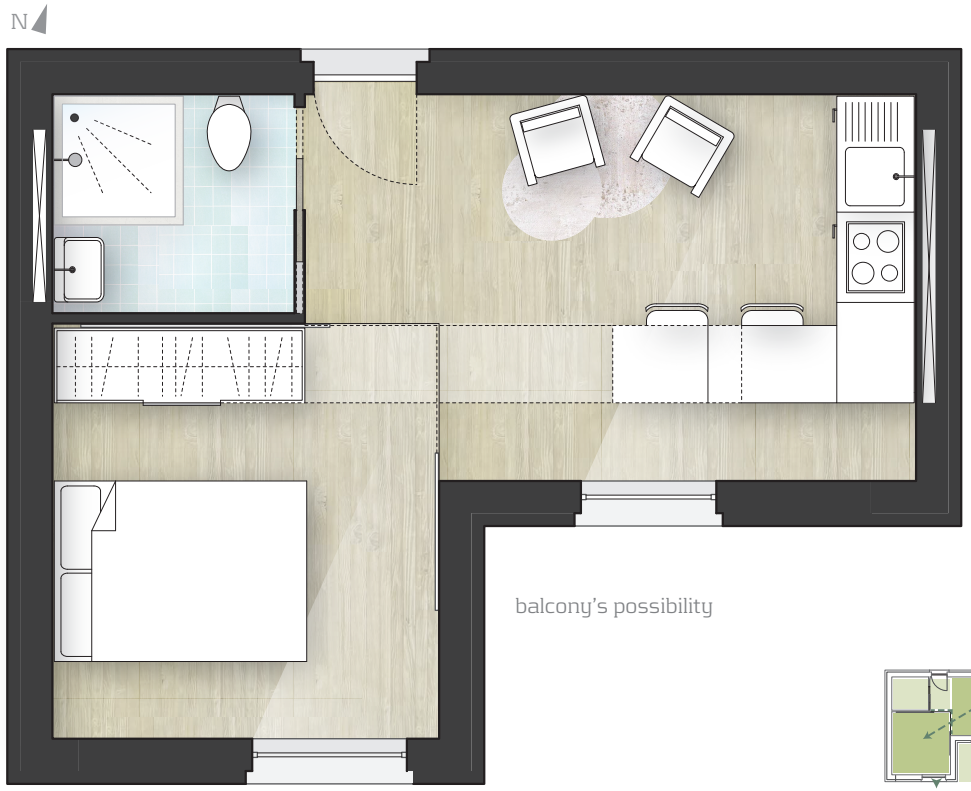
In the spacial visualization of the room, it is possible to observe how the organization of the functions, the daylight distribution and the colours of the materials inside could avoid the compact feeling of the volume. Indeed the positioning of the bathroom and the bedroom on the same side, and the division from service area to living area, gave the possibility to create a more vital and bigger availability of space for living activities. Furthermore the window configuration could guarantee a high visuality of the outside and a protection of the privacy for the sleeping area and the bathroom, in which an opening facing the access corridor guarantee a daylight distribution, respecting the privacy of its inside.

[ill. 78]

05

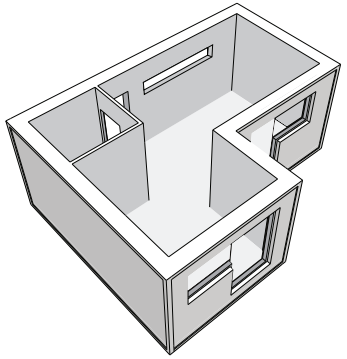
25 M² LIVING UNIT

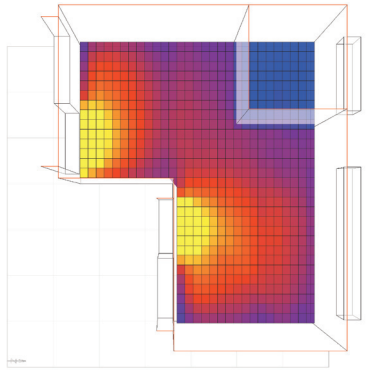
The dimension of this solution allows the distribution of more functions and the “L” shape of the inside could guarantee a wider choice of space organizations. Here it is shown the most atypical and dynamic one, where the bathroom in one corner gives the opportunity to create a bigger space which connect private and social areas. The introduction of a multitasked furniture enable the possibility of having in 25 m² more functions, which can appear when they are needed, like a foldable table, moving walls that can close the private bedroom from the rest of the house when needed, shelves and a wardrobe. This create a visual connection of all the parts of the unit. The “L” shape of the window is better explained in appendix 01.



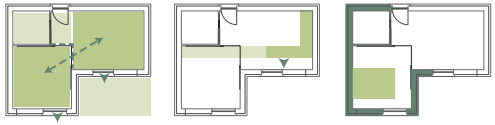
plan 1: 50, area 25m², 1 bathroom, 1 bedroom, 1 kitchen+dining+studio

balcony’s possibility

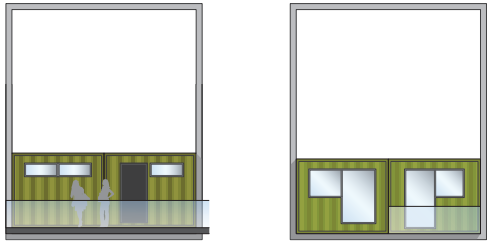




room visualization and daylight factor result:
d.f. average: 5,58%
south windows: 52,6%, 9,66m²
(appendix 01)



diagrams of inside organization



diagrams of facade configuration and anchorage

[ill. 79]

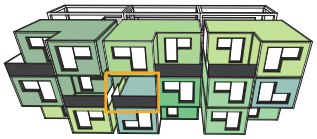
The visualization of the inside of the living unit shows the part of the house reserved to the living activities: kitchen, dining, studying, relaxing. The only fixed furnitures here are the ones belonging to the multitasked linear furniture, which can host the kitchen, the shelfs, with maybe an anchorage for a television, a foldable and extensible table with a direct view of the outside (but not so closed to the window, avoiding a direct light in some living units). From the outside the multitasked furniture is barely seen, giving a clean vision of the inside, as well as the dark corner created thanks to the shape of the window, where some house tools can be hidden from a direct and disturbing view. The availability of two windows facing south and the organization of the inside to create a wide connecting space, permits a great distribution of natural light in the whole living unit.

[ill. 80]

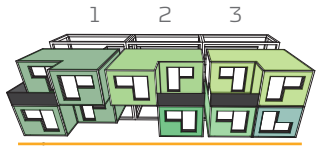
06
combinations of living units

MODULAR STRUCTURE OF COMBINATION

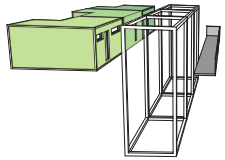
After an experimental combination of living units, expressed in chapter 03, it is in this pages shown their architectural combination.
A composition of 3 modular structural grid represents the way the living units are organized, their distribution and access system as well as structural considerations on anchorages, protected technical shafts, technical pipes of each unit concentrated in specific prefabricated sides for a better connection to the technical shafts, creation of public outdoor spaces at high levels in the building which guarantee an outdoor space for the units that do not have the possibility of having a balcony. The combination of two different frame's containers allow the creation of a dynamic facade facing south, while the northern one results flatter, and the only movement in facade will be created through the introduction of the common areas and their fixed passages at north.



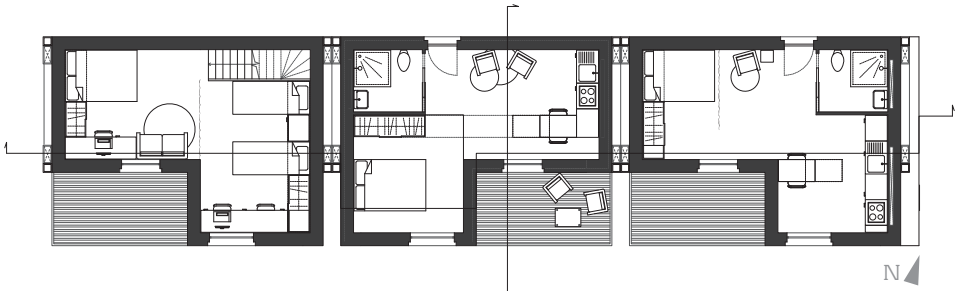
Combination of living units in 3 modular structural blocks. The chosen block shows possible combinations of 7 different living units developments.

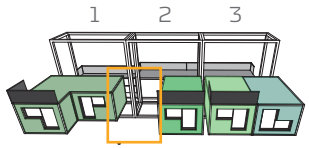


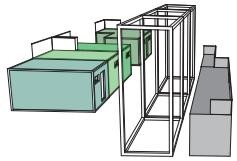
the below line of living units can allow the creation of balconies for the above ones



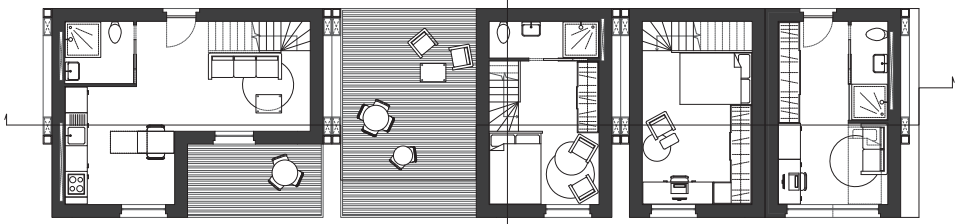
a) movable prefabricated balcony, anchored on the structure



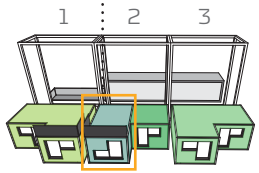


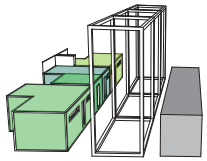


b) the north common area's fix connection can be used on its top as a distribution element

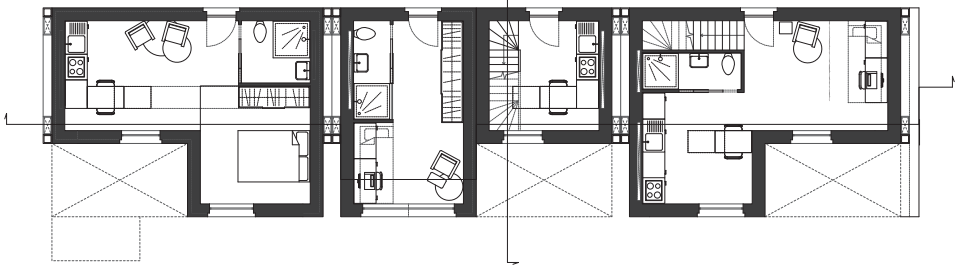


the missing living unit and the one below its location, create a public outdoor space available to all the users.





c) distribution inside the north common area's fix connection



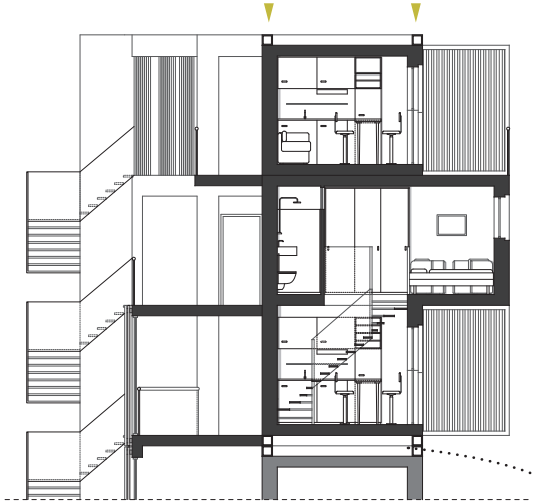
[ill. 81]

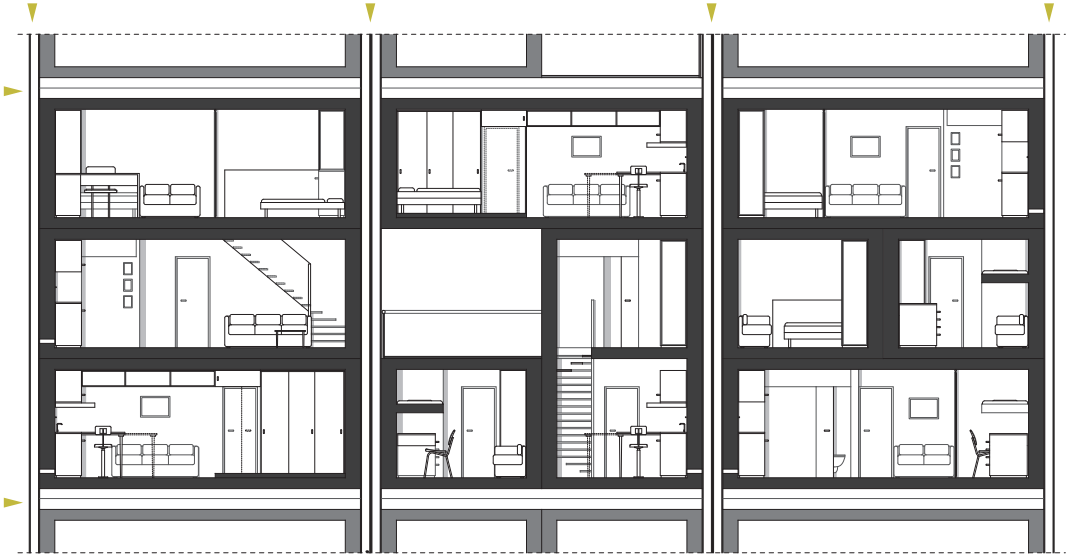
a) movable prefabricated balcony, anchored on the structure

b) the north common area's fix connection used on its top

c) distribution inside the north common area's fix connection

d) northern vertical distribution



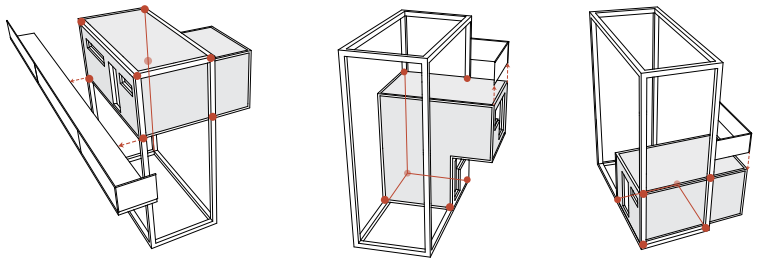


[ill. 82]

the technical shafts are kept in the inner side of the structural grid to avoid great loss of heating

The building is providing a north vertical distribution (d) for the direct access to the living units, with movable balconies which can be anchored to the main grid structure when needed (a).
The connection of the common areas can allow a secondary access to the living units from them, and it is of two types: a vertical connection on south and an inside connection, through stairs (see pag. 86-87). This last one is guaranteed also through north fixed passages (c), which can be used on their south side to host living units. Therefore it can function both as a direct access to the living units from the northern distribution and a direct connection for the common areas themselves.

[ill.83] Anchorages to the main structural grid of the living units and balconies. The chosen is the middle block of living units.



[ill.83] Each structural module can host from 3 till 6 living units. In the chosen block the living units are 3: the upper one of 25 m^2can be anchored to the main structure in 8 points; the below living unit of 25 m^2 is anchored in 6 points, where 4 of them are placed on its horizontal plane; the bottom one of 15 m^2 lie on the horizontal plane of the structural module and it is anchored in 6 points.

The superstructure of the living units as well as the one that is supporting them need to be further detailed and re-dimensioned, to reach the correct requirement according to structural calculations, as well as some wind bracing systems would be needed to strengthen the grid.

07
common areas

After the previous considerations of the necessity of a structural grid, on which the containers and a distribution could be placed, in these pages it is better analysed the design process of the common areas. And thereby their being areas with common functions (kitchen, dining, relax, café, living) and structural aid to the main structural grid.

Other considerations have been processed according to distribution, flexibility, visibility, and are going to be hereby explained.

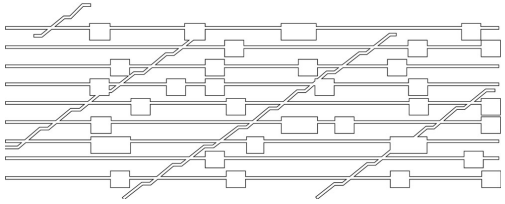
FLEXIBILITY: MOBILITY vs FIXITY

The dimensions of the living units were fixed to the frame's containers chosen, and the necessity of sqm coming from the room program analysis, moreover their distribution could be easily applied when needed on the structural grid. Thereby their nature was set to be the most flexible as possible in therms of "MOBILITY".
Instead, the common areas' dimensions were fixed according to both the room program, and their approach of being flexible for other functions when not used for the building's inhabitants needs.
Furthermore, their dimensions (due to the necessary sqm needed for the nearest surrounding living units), their structural aims (auxiliary to the movable structural grid), and their nature of being flexible in therms of "other functionalities" (in case of low occupancy in the building) were setting their being as "FIXED" components.

The distribution for the common areas from the previous considerations, could not be the same movable that was serving the living units.
Furthermore as mentioned in the vision: since the cost of m^2 is reduced (reducing the amount of functions inside each living unit) the common areas have to be designed not just in a qualitative and functional way, but also guaranteeing a comfortable distribution.
To help into this process some references were studied, and taken into account in the developed design.

SANAA
Kitagata Housing, Japan, 1994-2000

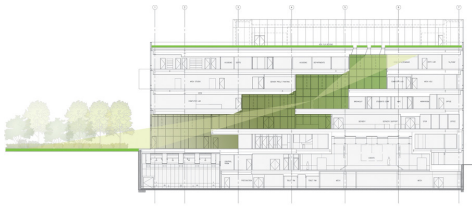
This collective housing has the particolarity of avoiding the privacy of the common spaces and distributions, showing them interely from the outside.
The idea was taken into account in further reflections, common spaces were made the most clear as possible, and the distribution was seen as an important architectonic element.



[ill. 84]

Weiss/Manfredi
Barnard Nexus, New York, 2003-09

This universitary's building shows in a clear way its inside through a glass void visible from the outside. The void follows the main direction of the inside distribution, and in the great space which this void creates are used for the most social activities, like architectural's workshops, dance and drama workshops, teaching spaces of visual arts.



[ill. 85]

The concept of visibility inside-outside, making the outside share in the inside activities, was an aspect that I wanted to take into consideration, as well as the possibility of recognize from the inside what is going on throughout all the building.

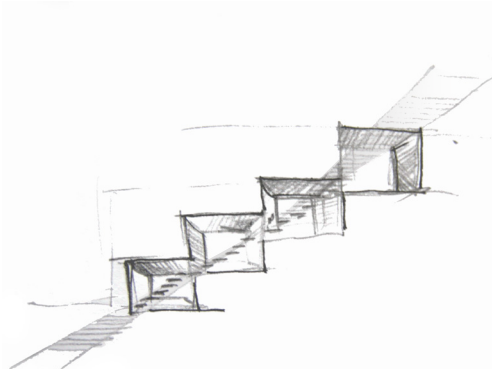
[ill. 86]

DISTRIBUTION

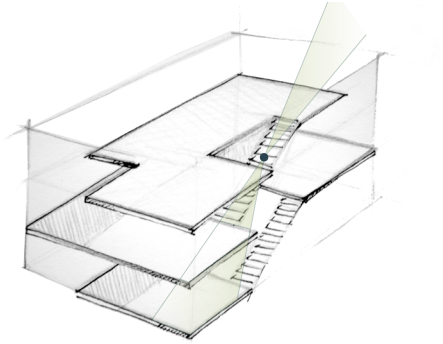
From these analysis arose the idea to have a double distribution:

- an internal distribution which could connect the common areas together, avoiding the creation of single detached entities (ill.87).
In this case the internal distribution has the further aim to clearly make visible what are the functions inside each common area (ill.88).

- a vertical and fast distribution which could just serve the "common areas", and in case of low density, their conversion into "public areas" (better express at pag. 86-87).
- a north vertical distribution for the direct access to the living units (already expressed in the previous chapter and pag. 86-87).

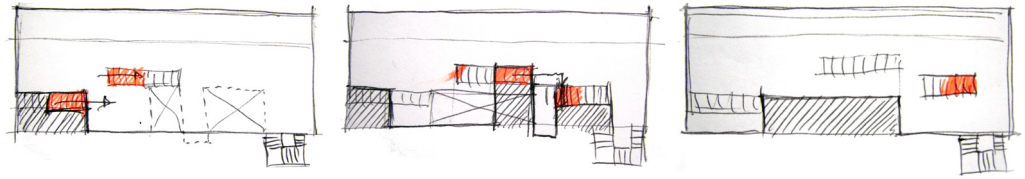


[ill.87] Internal distribution which visually and physically connects all the common areas, avoiding the creation of detached entities and guaranteeing a more social environment throughout all the building.



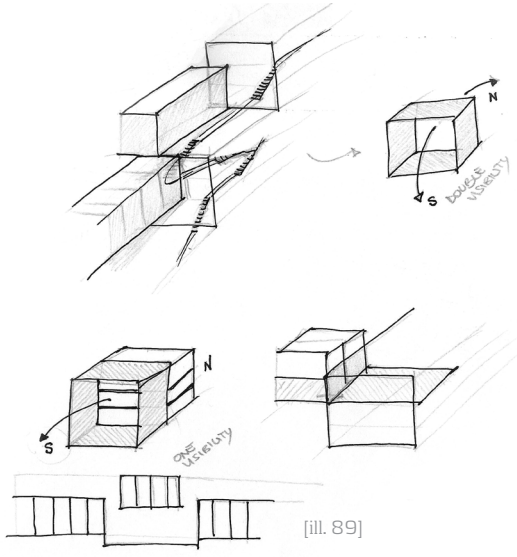
[ill.88] Internal distribution inside one single common area. The distribution allows who is making use of it to have a general understanding of the inside of each common area, and its functions' organization.

The distribution inside each common area is organized linearly, guaranteeing, thanks also to the introdution of halls in the floors, a better visuality of the whole contained functions.



STRUCTURAL AID

Differently from the movable living units, the common areas have been designed to be fixed structures, which could help the movable grid to host containers on their structural sides. Some considerations had been made to understand how the living units could be attached to the common areas, and a new design parameter arose from this analysis: the double visibility of the common area from its north-south sides, which could give more visibility of the inside from the outside and viceversa.

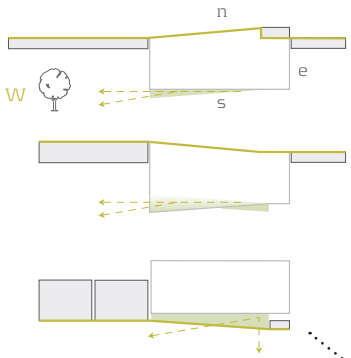


[ill. 89]

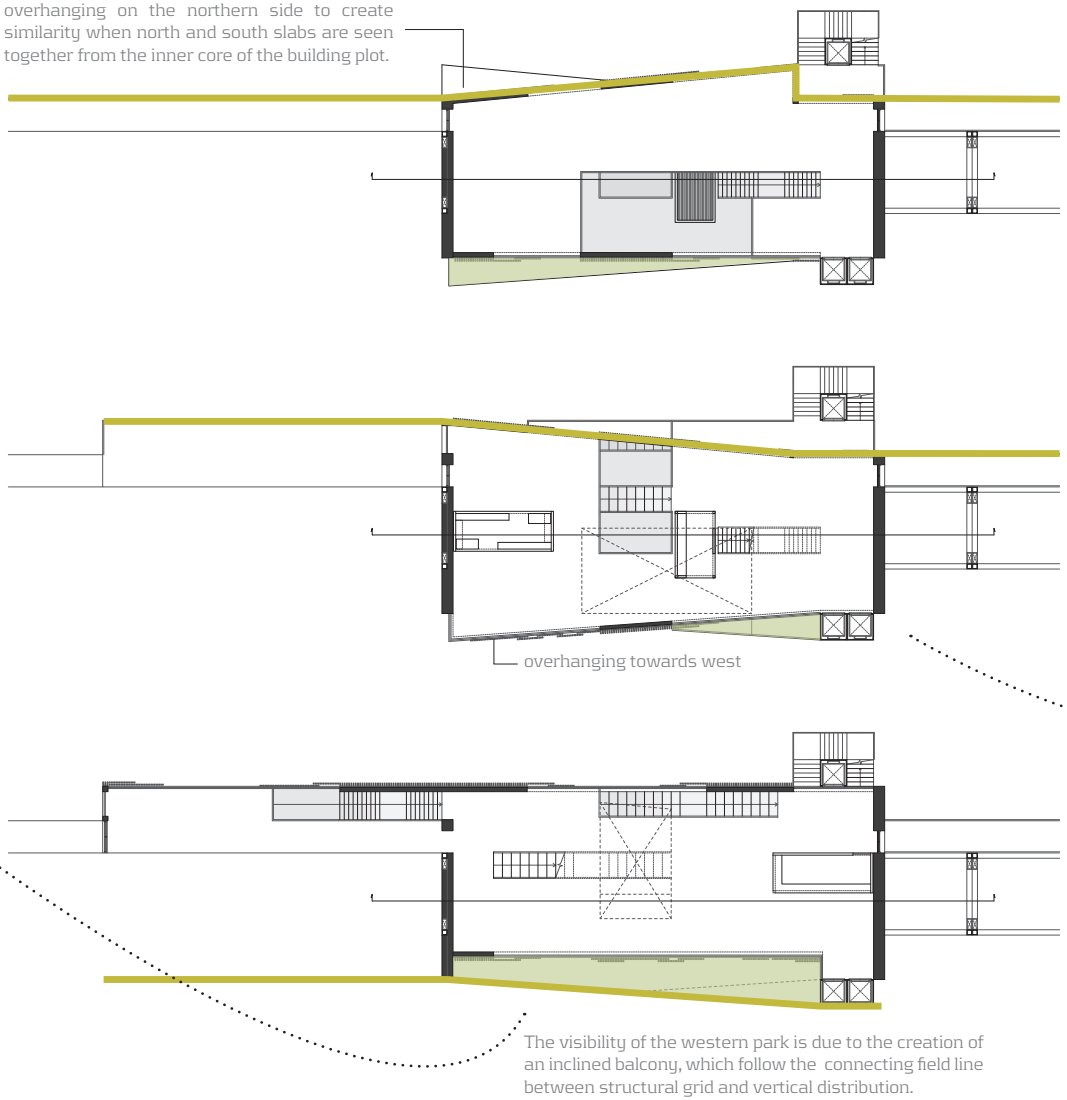
07
common areas

VISIBILITY

Furthermore, due to the first consideration of this project, in the specific natural place, I wanted to express the feeling of it and make it visible from the most common areas of the buildings, and not only from holes, or private balconies.
The orientation of the north slab, to block the noise from the motorway in the inner courtyard, was making difficult to reach a good visibility of the western natural park. Thereby some inclined overhanging were created to reach this goal.



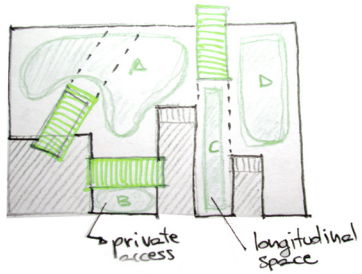
[ill.90] The overhanging of the common areas follow a sinoseus line which combine volumes on different positions (north balconies, south elevators, structural grid), when there is the availability. And create a better visibility on their south side to the western natural park.

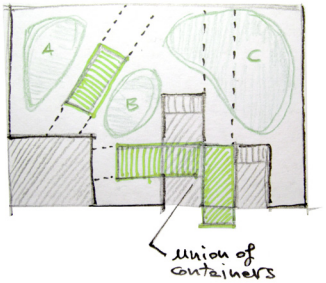


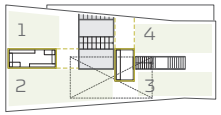
HOW TO MAKE FLEXIBLE A FIXED COMPONENT

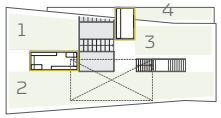
CREATE SPACES WITH VOLUMES

In regard of a flexible area's aim, the organization of the inside space had to be planned considering that a traditional way of division in spaces through static walls was not suitable. Thereby the idea of distribute the space and change it according to the amount and typology of functions needed, had to be taken into account.
The space could indeed be divided through volumes, sliding on tracks, like sliding walls. The volumes that were most suitable for this aim resulted to be the containers themselves, used inside for other smaller functions and designed in different ways. Various designers are nowadays using this volume solution to develop their modular concepts. Thereby the space I am going to design can allow other designers to develop their creations inside it, reaching in this way the aim of flexibility and mutability of the space thanks to attractive containers.

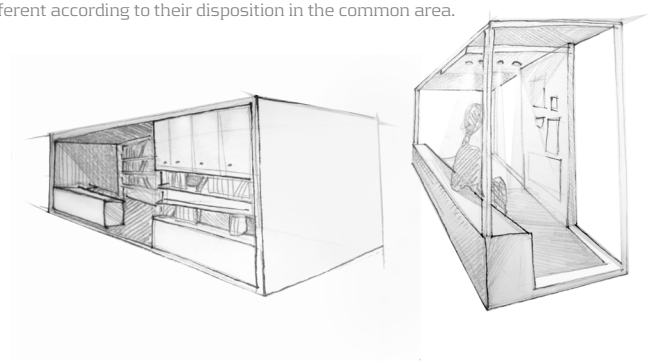


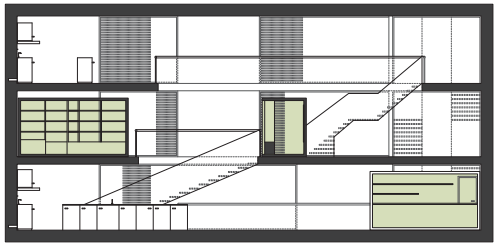






[ill.91] Movable shipping containers, which can host inside small functionalities, and create spaces always different according to their disposition in the common area.





section of the analysed common area, containers disposition

[ill. 92]

[ill. 93]

FLEXIBILITY OF FUNCTIONS

An adding explanation must be given when mentioning FLEXIBILITY of functions.
Considering the bottom of the building as the nearest to the public ground, it was necessary in case of low occupancy, to develop a system that could:
- convert some of the unused common areas to public needs
- give to its few inhabitants both a correct amount of common sqm, and a comfortable distribution. (pag. 86-87)

The system of distribution was than studied also considering this points, as well as the organization of the inside common spaces, to be easily transformed, and to easily create different spaces.

here two examples of realized projects using shipping containers:

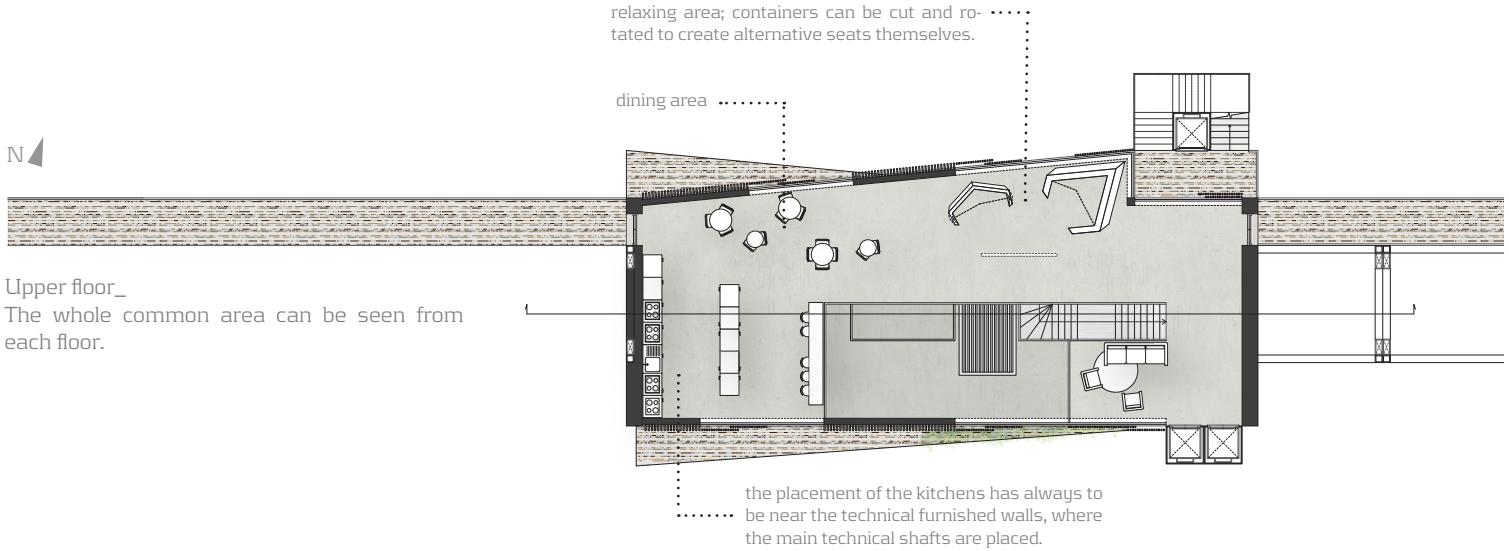
0 Antidoto
Dinahostingoffices, Santiago de Compostela
offices, working spaces, exhibition rooms and cafeteria were created using freight containers and temporary placed in an existing gymnasium

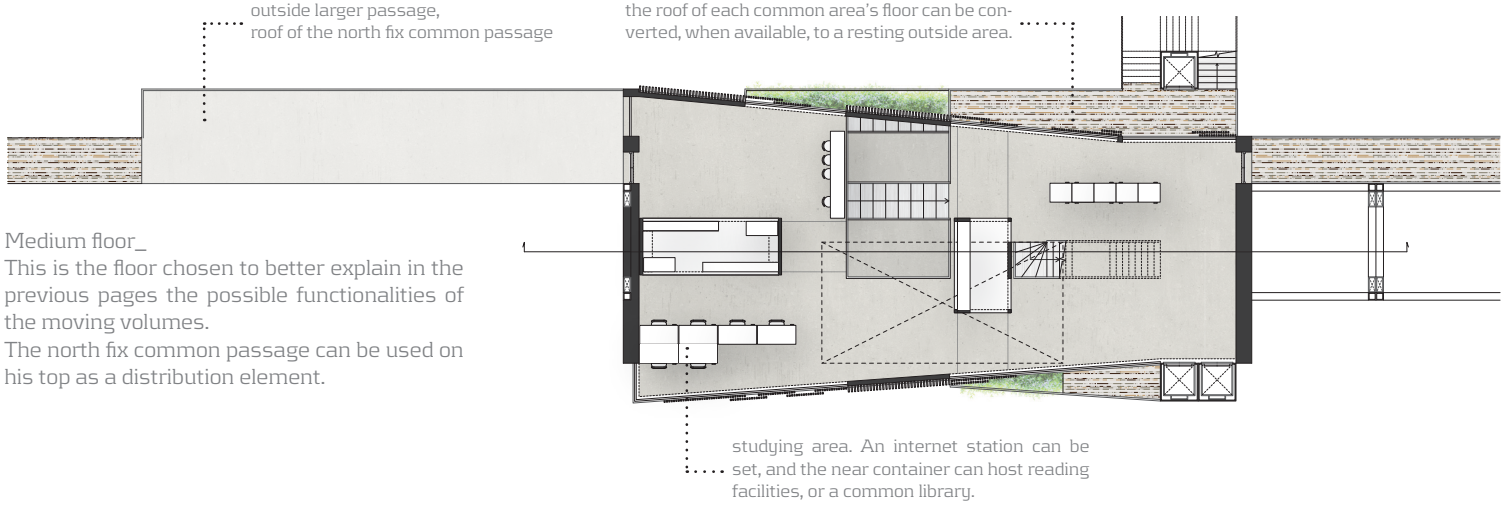
Adam Kalkin
Illy Café, Venezia, Italy
a cafeteria was created using a shipping container, where its foldable sides can make wider the space needed for this function.

07
common areas

Once the main design concept of the common areas is established and taken as a rule for the design of the whole building, a detailing phase of the inside could take place.

In these pages the inside quality had to be related with the previous thoughts and in particular the aim of inside flexibility due to an easy alteration of functions organization.

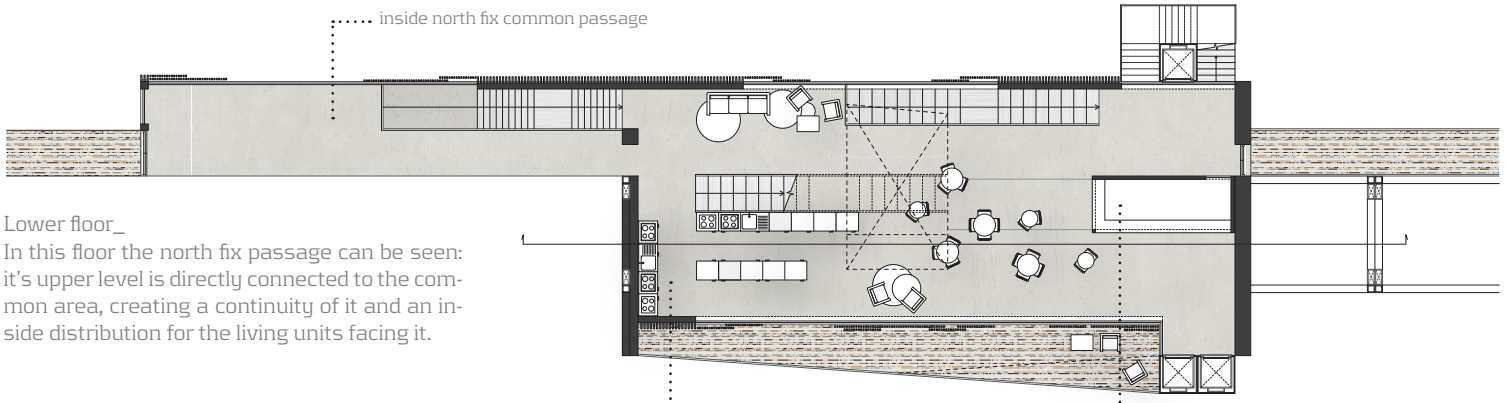




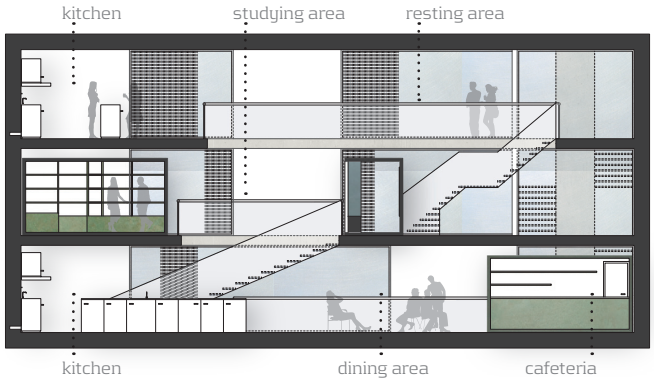
FLEXIBLE SPACES

Considering again the possibility of low density of the site, the inside of the common spaces was studied in the most unsettled and variable way. No walls were used, and the volumes of the shipping containers were the only partition element that could help to create fictive areas for temporary functions.
The only fixed elements are the distributions and the openings in the floors, as well as the technical shafts placed along the external load bearing walls.

[ill. 94]



Lower floor_
In this floor the north fix passage can be seen: it's upper level is directly connected to the common area, creating a continuity of it and an inside distribution for the living units facing it.



Longitudinal section_
From the section the visual connection of the 3 floors can be better seen. The disposition of the containers' volumes can vary, and thereby also the organization of the inside functions.

08
building development #2

In all the design process, since its beginning, common areas and living areas have been studied together, and the distribution was not considered as a consequence of the union of the two design, but as a methodology to combine them in the most effective and comfortable way.

ACCESS COMMON -LIVING

changeable distribution:
the living cells can be accessed directly from the outside building plot through a vertical fix distribution each 45 m maximum.
Movable balconies can allow the distribution when needed.

fix distribution:
on south which directly serve the common areas and secondly the living units.

inside distribution of common areas:
the distribution is linear and through stairs, allow > visibility of the inside thanks to their disposition and openings in the floors.

[ill. 95]

DISTRIBUTION'S SYSTEMS

As stated before, the distribution was considered important in the design of the whole building, both in a functional and conceptual way.

There is indeed a concept also behind the design of the distribution (which is coming together with the one of the common and living areas).
Therefore it had not only to guarantee the connection of the two areas, and the access to both of them from the outside, but also to consider the flexibility and mutability of the building, which means variability of the distribution as well.

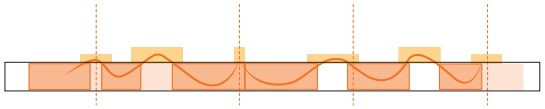
There are two main distribution systems:
- a fixed system.
- a changeable system

The fixed system can be divided in two:
- a inner distribution which connect all the common areas, composed only of linear stairs. Common north fix passages had to be created to reach this aim. [ill.96]
- a south vertical distribution, just composed of elevators. [ill.97]

The changeable system is the one which directly serves the living areas (it can be only a north distribution). Through this system it is indeed possible to access the living cells directly from the building plot, through stairs or elevators. This system can be used as fire escape for the whole building itself. [ill.98]

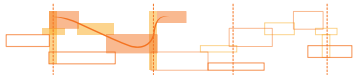
the inner distribution of each common area, allows also the connection of all of them, throughout the building, creating a winding movement in elevation.

common fix passages on north
common areas
lower common areas, available for > public functions



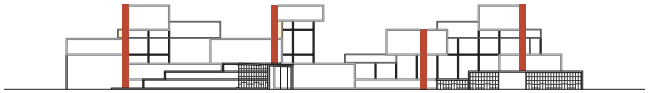
the lowest common areas have a fixed access to the public ground, and therefore can be easily converted when needed for a public utilization.

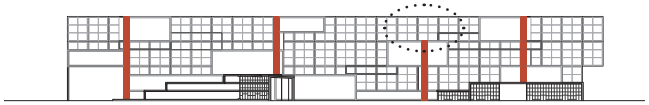
the system of common areas can be selected when needed, according with the utilization: in case of low density the common areas can be concentrated in one area, while the rest can be used for public functions



the inner distribution, guaranteed also through fix common passages, creates a winding movement also in the planar disposition of these two typologies.

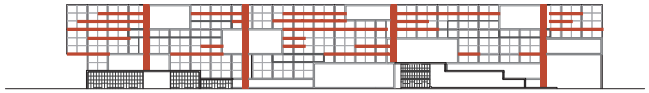
[ill. 96]





the second distribution system for the common areas, connects them in a vertical way.
The connection is through elevators, thereby it is faster than the inside one, but does not allow a continuous connection of all of them, since it is a punctual typology.
In elevation this system is placed on the south side of the north slab, in front of all the common areas, leaving free of obstruction the living cells, which can continue to be placed also over the elevators direction's line. This creates a sort of movement of vertical lines in facade.

[ill. 97]



at north the distribution has been made to serve mainly the living units. It is a fix vertical distribution, with movable balconies which can connect it to the accesses of the living units, when it is needed.

[ill. 98]

[ill. 99]

materials:
living units' exterior: corrugated shipping container's steel panels
living units' shading: black laminated shading
movable structure: fireproved steel structure
common areas' exterior: concrete panels
common areas' shading: light wood laminated shading

From this visualization, the movement effect of the living units can be seen. This is created thanks to the two frame's containers chosen and combined together to form living cells of 25-40-50 m^2.
Furthermore the facade dynamism allows a various range of daylight distribution.
In case all the structural module is not occupied, a flexible combination system guarantees a creation of openings which can be used as outdoor common spaces. Some examples of common outdoor halls in high rise building which were considered are: Kitigata Housing by Sanaa, Mirador by MVRDV and Ascot Residence by OMA. In these examples the common spaces handle the same concept of outdoor space in height, but show different effects: from more restricted and spread ones to wide areas and halls which create dynamism and different arrangements of the building's interior.


[ill. 100]


[ill. 101]


[ill. 102]

[Ill. 103]

From this visualization it is possible to see the north facade configuration: it was initially considered to have a more dynamic distribution, coming from the reference ill.104, that was further discarded because not so easy to be flexible in therms of “mobility”. A system of horizontal movable balconies linked to a vertical distribution system was then adopted. In this facade the living units are kept on the same level, due to the chosen distribution, while the common areas are creating dynamism. Moreover, if the dynamism of the northern facade is due to the linear overhanging of the common areas, on the south facade the same effect is guaranteed thanks to tilted overhanging, which allow a good visuality of the west natural park. Some examples of this effect are coming from the reference pictures ill.105 and ill.106.

[ill. 104]

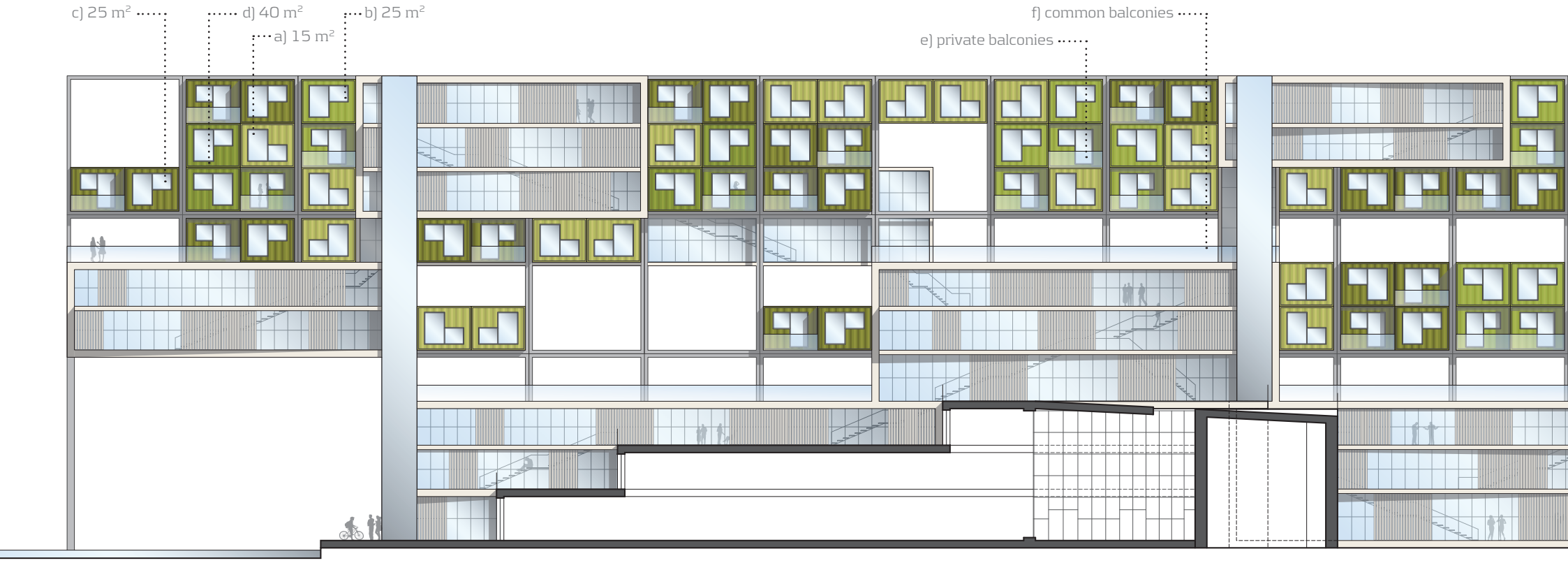
[ill. 105]

[ill. 106]

09
north slab

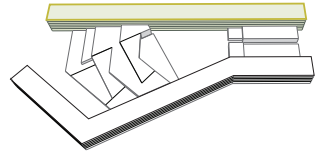
SOUTH FACADE

This can be considered as the most “livable facade”, where the majority of the living activities are concentrated, therefore the openings are greater on this side than the northern one. It is here possible to visualise the effect of the “L” openings that characterize the living units, which together with the gradation of colour of their skin can make more recognizable their sqm typology’s belonging (a-b-c-d).
According with the various combination possibilities, on this facade some private balconies are created (e), and when possible some common ones, on top of the common areas (f) or when a living units is missing in a structural module (g).
In the common areas, the great amount of window facing south, had to be limited through the introduction of walls and shading devices, the first ones were covered with the same material of the shading devices, creating homogeneity in facade.



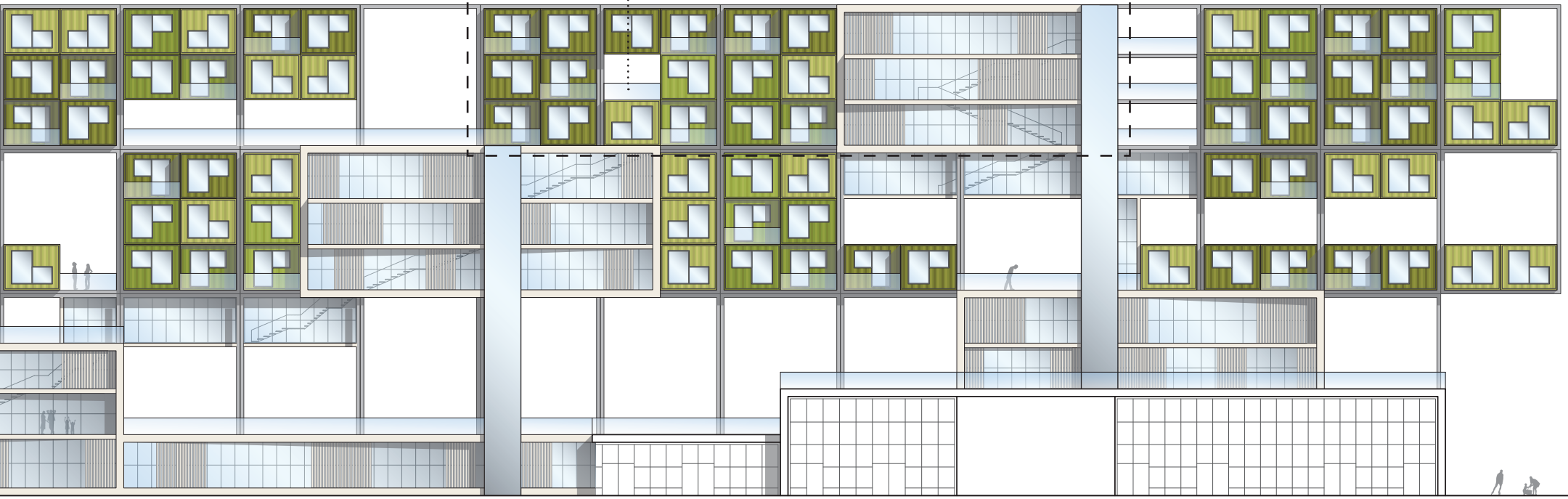
[ill. 107]

chosen north slab,
analysed in plan, section, facade



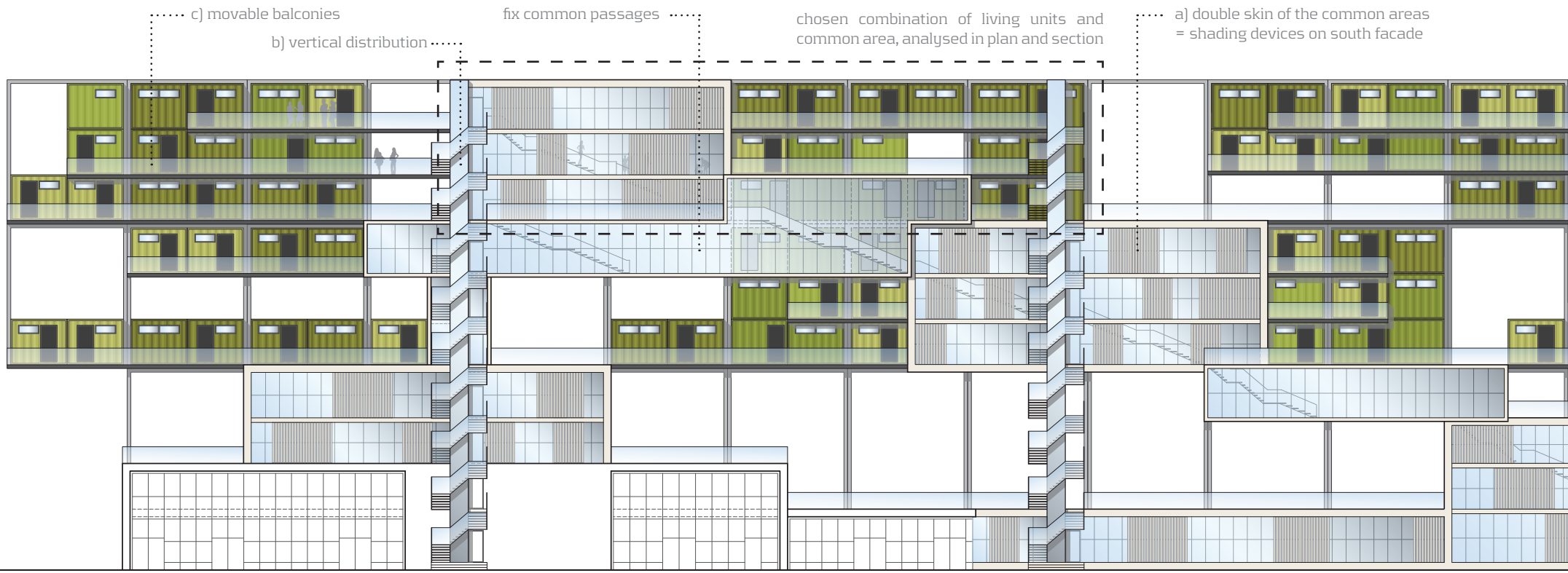
g) common balconies

chosen combination of living units and
common area, analysed in plan and section



1:400

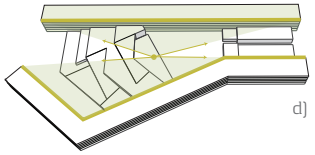
09
north slab



[ill. 108]

NORTH FACADE

Considering the whole building, as composed of two slabs: one north and one south, with one common outdoor space in their inner core, it was appropriate to visually associate the two facades as formal belonging to the same building, when observing them from the inner core. Indeed, in that position, north and south facades can be both seen (d).
The distribution and the different openings could not be changed for this aim (according to previous considerations), the only elements that could help to visually create a similarity were the common areas movements on both sides (more visible in 3D illustrations and plans). In Facade this similarity is further created thanks to the material utilised for the shading, that is in this facade mainly used as a second skin for the external walls (a).
Furthermore the second typology of distribution, which directly serves the living units, is here visible. It is composed of fix vertical links (b) and movable prefabricated and modular balconies (c). Where not needed the balconies can be removed.
The overall looking of this facade is the linearity created thanks to the balconies and the small windows, in 3d it can instead be possible to see the over-hanging of the common areas, which create a visual balance with the ones on the opposite facade.



d)

1:400

10
working area

POSSIBLE WORKING AREA DEVELOPMENTS

One of the conceptual ideas of the project was concerning the possibility of organizing the stakeholders in a working environment where they could met each others and establish a networking system. However the working areas were not the main aim of the design process. Indeed it was considered more important to better develop the living and common areas, which are designed to have the same system and inside organization in every place where a Net-Work-Architecture could be placed.

[ill. 109]
OMA
Chu Hai College, Hong Kong, 2009

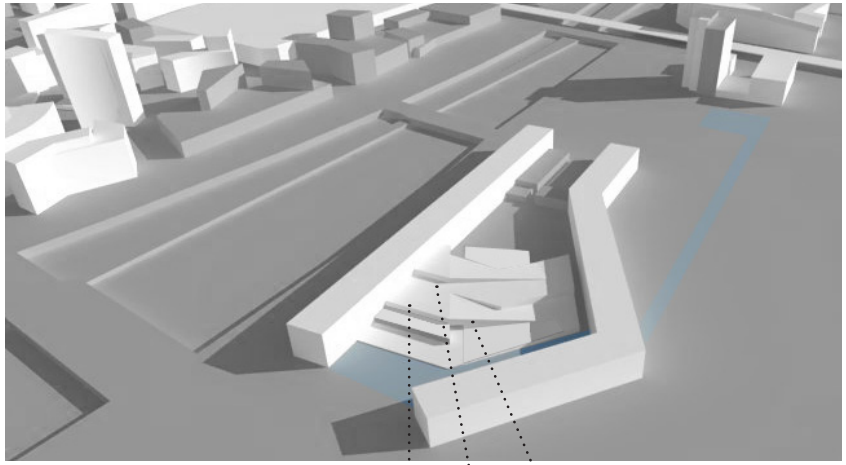
between two slabs a basement creates an attractive outdoor space, for public use. Its decreasing opens towards the surrounding, which is therefore clearly seen.

[ill. 110-1]
Dominique Perrault
Ewha Woman University, Seul, 2009

Here again, the theme of using the decreasing of the inner part of the building creates a sort of amphitheatre which has as a scene the surrounding.

These inner passage, like a cut in the building allows to visualize its inner functions, and the possibility of using the stairs and the roof for outdoor public activities.

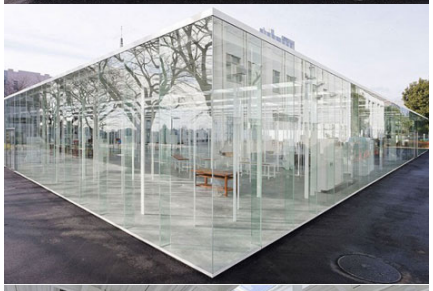
THE EFFECT
the amphitheatre effect in the inner courtyard gives importance to the outdoor area, and its decreasing let the courtyard have the same function of a stage set, where to rest and enjoy the scene.



FLEXIBLE ORGANIZATION

INSIDE DIVISIONS' SYSTEMS

THE EFFECT, how the working area can be conceived and utilized on its top



[ill. 112-3-4]

Junya Ishigami
Kanagawa Institute of Technology,
Kanagawa, 2008

This reference was taken into consideration for the free organization of the inside, as a unique open space, were every function can be seen also from the outside.

"I wanted to make a space with very ambiguous borderlines, which has a fluctuation between local spaces and the overall space, rather than a universal space like that of Mies. This allows a new flexibility to emerge, revealing reality rather than shaping it."

[Junya Ishigami]

The luminosity of this wide space is coming from linear windows placed on the top. This can be a suggestion on how to light the working area, which is mainly facing west.

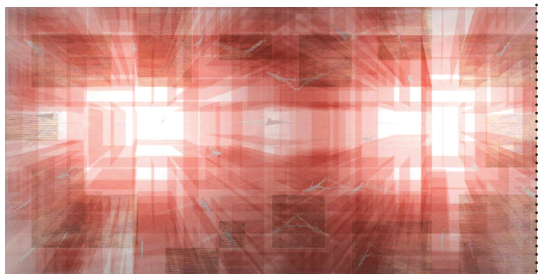
volumes or movable walls can be used to create the needed spaces

THE INSIDE ORGANIZATION

Like in the common areas, also the working ones had to be seen as fix elements with changing of functions' organization. Thereby the flexibility of the spaces was reached thanks to movable devices or sliding volumes, which could allow the easy and fast creation of operable areas.

[ill. 115]

Established and Sons
FuoriSalone 2008



[ill. 116]

Martino Berghinz & Patricia Urquiola
Moroso Stand
Fiera Milano Rho, 2008

[ill. 117]

Martino Berghinz
Now/here No/where
Gijon, Spain, 2007

11

[ill. 118]

N

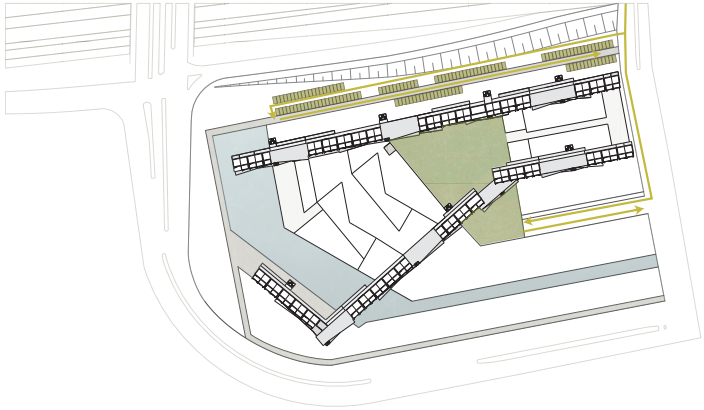
1:1000

MASTER PLAN

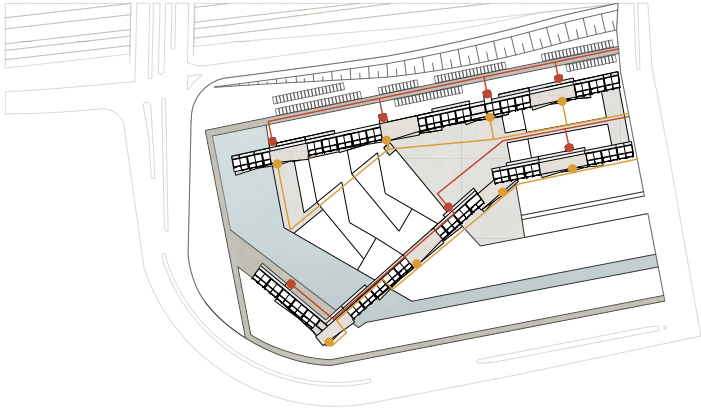
At last, the site plan has been update with all the previous considerations not only regarding the design, but also the orientation (thereby the natural daylight gain for all the living units and the openness towards the nature), the distribution (from the lot to the slabs and underground parking area) and parking areas.

These diagrams shown a possible displacement of the parking, according with the area calculated in the room program. However, further parking areas could be placed on the lower part of the site plot if needed, for example in case of high use of the area when converted for more public usage. The possibility of having a fix crane in site for the placement of the living units can be converted and designed as an attraction point or anchorage for lighting systems for concert or public attractions.

The parking development was not the priority of the whole project, therefore was not technically, structurally and organizationally developed, anyhow, some consideration about its access, distribution and area collocation were made.



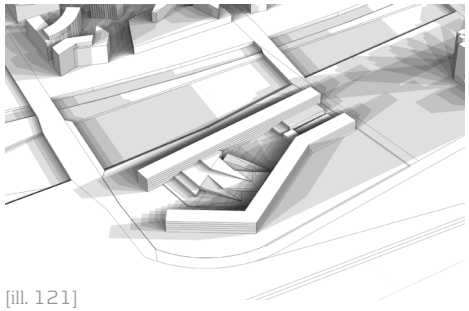
[ill.119] The main accesses to the site plot are from its eastern side, leaving the opposite one visually free to face the natural park. The water itself help to create distance from the planned road at west. The estimated parking areas can be of two typologies: one north outside (facing the motorway), and one south, underground. The inner courtyard can provide the placement of ventilation ducts (which can be part themselves of a furnishing system for the plaza).



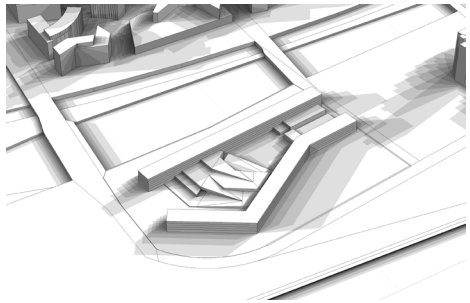
[ill.120] As stated in the distribution chapter, reguarding the common and living units, here the main paths are shown:
orange path: distribution site plot/vertical distribution serving the common areas. In the inner courtyard cuts have been made in the working areas to both guarantee the accesses and the ventilation flow.
red path: site plot/living cells' direct distribution. The western wing access is made through a bridge over the water channel.

Shadows analysis were made for the whole building, composed of two living slabs and one central working and outside social area (top of the working area and inner courtyard). They show how the slabs can receive the better advantage from the natural light, and also how the top of the working area can receive enough light for outdoor activities.

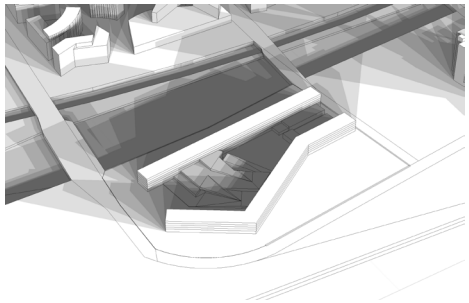
21st March. 8:00-20:00
All the plot is well lit.



21st June. 6:00-20:00
All the plot is well lit.



21st December. 8:00-20:00
The inner courtyard can be better lit up considering more openings on that side of the south slab



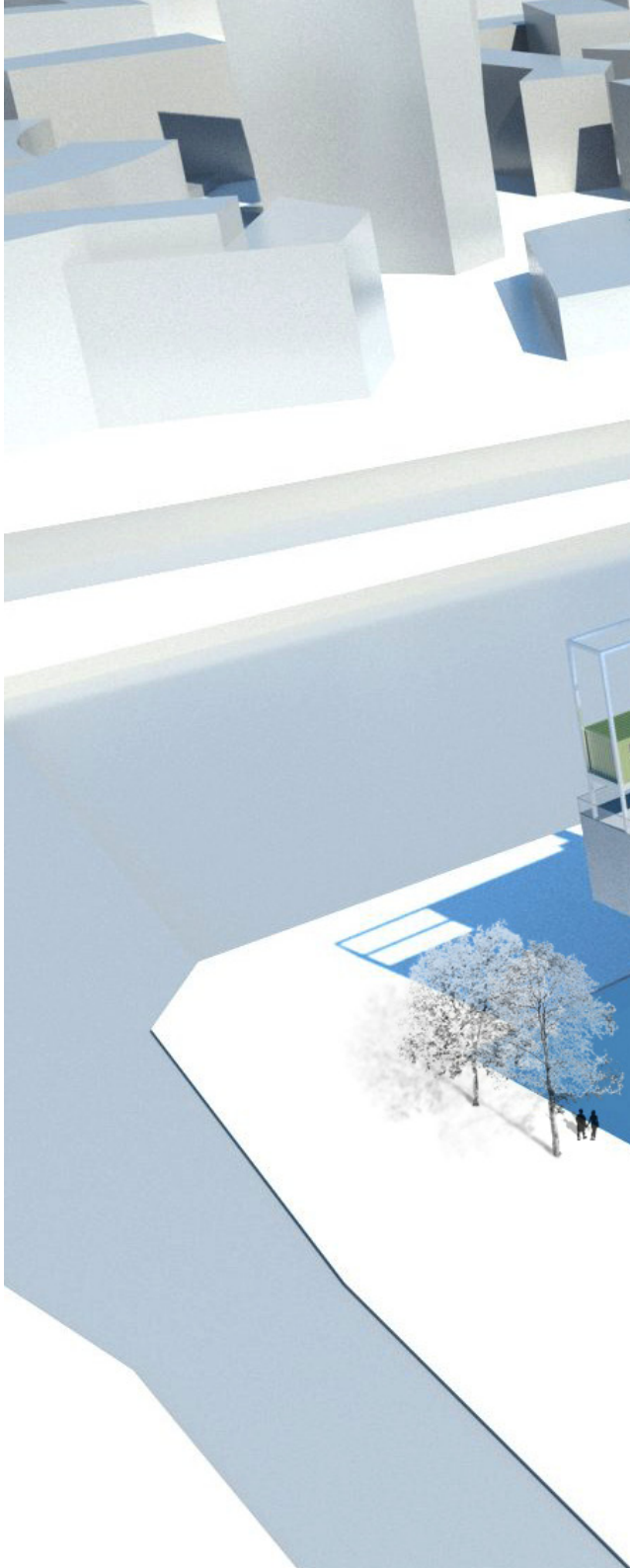
[ill. 121]

THE LOGISTIC

[ill. 122]

[ill. 123]

The projected living units have been designed for a specific climatic condition, therefore the logic beside their mobility is involving places which have these similar climatic features. Thereby the transportation as well, needs to be planned just in these similar areas. In all the other places of the globe different insulation systems and window openings could be planned and diffused in similar climatic areas. The effect that is then arising is a similarity of the main concept, but a difference in disposition in situ and windows' shape; also the colour graduation of the living units can change from one site to another, creating, when they are moving, a combination of different colours in a site which is assisting to this mixed combination. However some restrictions can be made, and each specific climatic area can develop just graduations of chosen similar colours. Moreover some cranes needs to be placed in each site, and can be used with different functionalities when they do not need to place the living cells. Some chosen examples are Il Bigo di Genova (ill.123), in regards of possible shape and functionality of the crane and Ferropolis (ill.122), as an example of alternative use of machines.
When a site is not fully inhabited common areas can have different functions as well, and the living units present at that time can be grouped around necessary common areas, leaving the rest ones free to be alternatively used. The possibility of moving the cells from site to site according with the requests, allows to effectively recognize how many people are living in the site.



[ill. 124]

12
I.C. and energy achievements

Indoor climate, technological aspects and energy consumption, are integrated in the design of the chosen dwellings.

In these pages the achievements are shown, while structural considerations have been only stated in previous pages (67-69, 72, 81) and are not going to be the main analysed part and goal of this thesis.

INDOOR QUALITY ACHIEVEMENT

As part of the integrated design process, it was important to have technical considerations at an early stage of the design process. Indoor climate, daylight, energy consumption as well as technological matters were taken into consideration while processing the design of the living cells.
In a technical point of view the living cells are the ones that are going to have the same shell whenever they will be placed, all over the world. However, according to climate conditions and backgrounds, their fillings are planned differently according to the places where they will be mainly planned to be inhabitable. This is not just a point of reflection about the materials used and their thermal capabilities, it is also a matter of energy consumption and daylight, therefore all these requirements and the shape of the dwelling are tightly linked:
the use of incorrect materials in a specific climate situation, as well as an incorrect position and shape of windows, or orientation of the whole dwelling, can lead to high energy consumption for heating, or diseases for an incorrect aeration of the dwelling, as well as uncomfortable indoor temperatures.
Everything is linked both in a technical, technological and architectural matter.

The chosen living units for architectural, technical and technological studies were the 15 m^2 and 25 m^2 ones, as well as a modular combination of two living units of 15 m^2 and two of 25 m^2.

DAYLIGHT

The daylight reached factors for the 15 m^2 and 25 m^2 living units are respectively:
4,92% and 5,58%.
Considering that the main living part of the 15 m^2 unit is the one facing the outdoor on south the requirement was for this dwelling reached. The second living unit requires a good level of daylight and direct light illumination as well, according with the window placement, and shape.

Detailed explanation in appendix 01

THERMAL COMFORT

According to early calculations made with 24 hours average, the indoor temperature required was reached. However, in that calculation, the inserted inputs were not enough to define the correct thermal situation. With Bsim, more inputs were added, and it resulted necessary to insert a cooling system during the summer season (june-july-august), to avoid overheating. That implied an increase of the yearly energy consumption.

Detailed explanation in appendix 04

AIR QUALITY

Air flow rate calculations have been made both considering the pollution and the CO_2 levels inside each living units. Preliminary calculations have been made, and the results have been used in the Bsim simulation. A mechanical ventilation with heating recovery unit was needed to avoid uncomfortable air quality during winters, guaranteeing both thermal and athmospheric comfort.

Detailed explanation and calculations in appendix 04 (pag 108-109)

Required daylight factors: main rooms: 5% average secondary rooms: 2%average	Recommended temperature: winter: +22°C summer: <25°C if mechanical ventilation <26°C if no cooling system	Air requirements: air flow rate: 0,5 h^{-1} (=0,3 l/s m^2 per 2,5m high)
requirement of 5% d.f. average is met	requirement met thanks to a cooling system	the minimum requirement of 0,3 l/sm^2 is met the requirement of maximum 660 ppm is met

NATURAL/MECHANICAL VENTILATION

Ventilation rate calculations have been made based on sensory pollution, CO_2 and thermal comfort.These were necessary to get the minimum air change rate during the different periods of the year.
It is necessary to mention that in winter period the crucial effect on indoor climate is the occupancy (CO_2) while during the summer period the main impact on indoor climate is thermal load. Therefore, ventilation was an useful input to create comfort and indoor quality.

To provide proper natural ventilation that benefit from venting derived by wind pressure, windows have been placed on the windward side of the living cells. In this area that is mostly south-east and south-west.
The second system, used in winter times, is a mechanical ventilation with heat recovery.

see appendix 04, ventilation inputs (pag.111)

Natural ventilation:
main wind from W-SW, but avoid windy outdoor spaces, consider proportion and layout

Mechanical ventilation:
with heat recovery system

ENERGY STRATEGY

The goal is to make a low energy consumption building. Therefore it was important to chose the most energy saving ventilation during the different seasons, guaranteeing a good quality of the indoor air all over the year, as well as a good thermal comfort during summer.
The first step was analysing through the “month average spreadsheet” the reached energy consumption, due to basic inputs. The further step was a more detailed introduction of inputs through Bsim (appendix 04).

From the energy saving point of view, through Bsim simulations, ventilating naturally during wintertime resulted not efficient, as it increases the need for heating, and thus energy consumption. Thus a mechanical ventilation with heat recovery was added as further input to lower the energy consumption and guarantee a good air change.

During summertime the ventilation rate based on thermal comfort, is fulfilled with natural ventilation, as there is no heating. In this case natural ventilation resulted to be an energy saving ventilation method, however the thermal quality is not fully achieved for all the living units. Therefore a further input was added: a cooling system for the months: june-july-august. This implied an encrease of energy consumption, which still was not exceeded the limit for low energy class stated in BR10.
Before stating the necessity of a cooling system, some simulations have been made, to verify if there were other possibilities to decrease the heat in summer. External shading systems, as well as a rearrangement of the windows area and their thermal capibilities have been made, reaching a better but still not enough result.
A good decrease of heat during summer was reached thanks to small changes in the venting setpoint. This lowers the natural ventilation during summer, but slightly increases the values of both qHeating and HeatCoil.

Detailed results and graphs in appendix 04 + attached CD for Bsim overview

Energy frame:
low energy class 2015: 30 kWh/m²

requirement of low energy class quite met

REFLECTIONS

This project was generated from the willing of resolving a personal and generational question concerning living and working today in a global and individualistic society. That was the intention. The ambition was indeed trying to make a project that could be a starting point for others (not only architects) to think about a new typology of architecture, and a new way of thinking, or somehow re-thinking it.

To better explain what I mean with this, it is important to mention a personal consideration about the process of learning nowadays:
in a global and technological world, the information is spread faster than the time one takes to think. This is the new generation paradox: the technology is fastening the time for knowing and updating (+), but it is often reducing the time for thinking (-), it seams that there is less time for this, one better prefer to update than to consider.
In my architectural opinion, this brings to a homogeneous way of learning for a great portion of the new generation, were the architecture is studied as it looks and as it works, rarely as it is made for: an Architecture for a specific society.

> My research was bringing alive some thoughts about thinking architecture, or better re-thinking architecture. Nothing is new! Everything is re-thought! However, nowadays the great tendency is mostly to act than to re-think, this is again due to the different situation were the architectural environment is set (see project delineation).
> A situation largery different from the time of the great manifestos of the '20 or '70. Where architects were thinking more about architecture, than acting. That learning period was thereby producing more utopian projects than real ones, since their first aim was to let the architects think about their main role: use the Architecture as a tool to REACT to substantial questions and concrete social phenomenas.
> The researches that were arising from those thoughts are still alive, and are still a useful reference nowadays and in the future. From the age of the machine to the age of life (as Kisho Kurukawa stated in the homonym article) those architects could recognize and analyse their period, and act according to its requests.
> Therefore, what I aimed, firstly whit my research, and secondly whit my project proposal, was re-thinking to the way of doing architecture as those architects did: understand the situation, understand the social phenomena and use the architecture as one of thousand tools to resolve it.
> I would then say that: UNDERSTANDING is the first step of doing a coherent architecture.

Nowadays, when an architect is dealing with a residential typology project, the final effect he aims is mostly an architecture of appearance, a cool place where everyone would like to live, and an eco-friendly place as well. Stating that I do not want to restrict the abilities of many contemporary architectural groups. But if we stop a while to think, and not to update our knowledge in this field, just for a while, how is the new generation concretely living today?

Many well though projects have been made, and they are taken as example, as architectural case studies to consider, but if we stop a while and think: who is living inside there? when the majority of the global population nowadays does not have neither a own home nor a proper working settlement.

> Especially now, in an economical and organizational crisis period, the new generation, not yet settled, is the most exposed to the outcomes of this crisis.
> Despite of the improved and updated abilities and knowledges of this new society, its majority can not be part of suitable settlements: working and living ones.
> Therefore, concerning their living settlements, renting, low costs or shared accommodations are the most spread. Hardly they can afford the prices of the most interesting architectures which the renowned studios are developing. The MVRDV example of student residences itself, not published in their own website, it is designed, without any projectual effort, by stacking containers on top of each others.

Thereby, as architects, why are we induced to think less about our main aim: the society, reducing the coolest residential architectures we produce just for a certain elite?
Why, as young architects, do not we start to think about our new society and how we are nowadays living and how instead we would like to live?

This project, since its beginning, is then following a specific logic which goes from a deep understanding of the situation to a researched analysis of the possibilities.
If understand is the first step of this process, react is the following one.
The reaction aims to create debate on the architectural field. The project itself intend to create the same effect which the Archigram's Istant City, for instance, reached in 1969: makes architects and other stakeholders think about their role in this society.

> I do not want to impose my thoughts and my project as the most correct solution to follow in resolving a substancial situation. Rather I wanted to make theoretical and designing CONSIDERATIONS. Which aim to create a reaction, a debate, a question mark in everyone's mind.

The ambition of this project is then: think how we, as new generation, can use all the updates we have to do a coherent architecture for us.
A residential architecture which can help us to live, but mainly through which we can find a fix settlement or built our future through knowing other personalities which can follow our aims.

Without an appropriate research, and motivated remarks I could hardly reach this ambition. Furthermore, an architectural survey and design process were not enough to establish a considerable design position, that is the reason why the strong idea processed is the theoretical one.
How this architecture can work on a wide scale wants, thereby, to be the most considerable intuition of this project, and a cue for others to reflect upon.

Reaching the end of my studies it was also appropriate to review what I learned and what I could claim to have personally reached. This design itself, is a consequence of what the architectural background gave me: all the critics, reviews, lectures, and personal studies, were contributing to raise a personal belief about "The Architecture".

With this project I then wanted to express in the most freely, but researched, way one of my personal believes, starting the project without having the certainty of a good result, but with the willing of challenge a own proposal.

I would then affirm that, although any possible inconvenience and design lack, what I wanted to make was a thesis that could be recognize in its wholeness as a provocative architectural, managerial and behavioural project.

FURTHER DEVELOPMENT & CRITICS

Due to the short time of this thesis typology, many were the design proposals that could not be fully developed. Hereby I would mention all of them, with critics upon some given solutions.

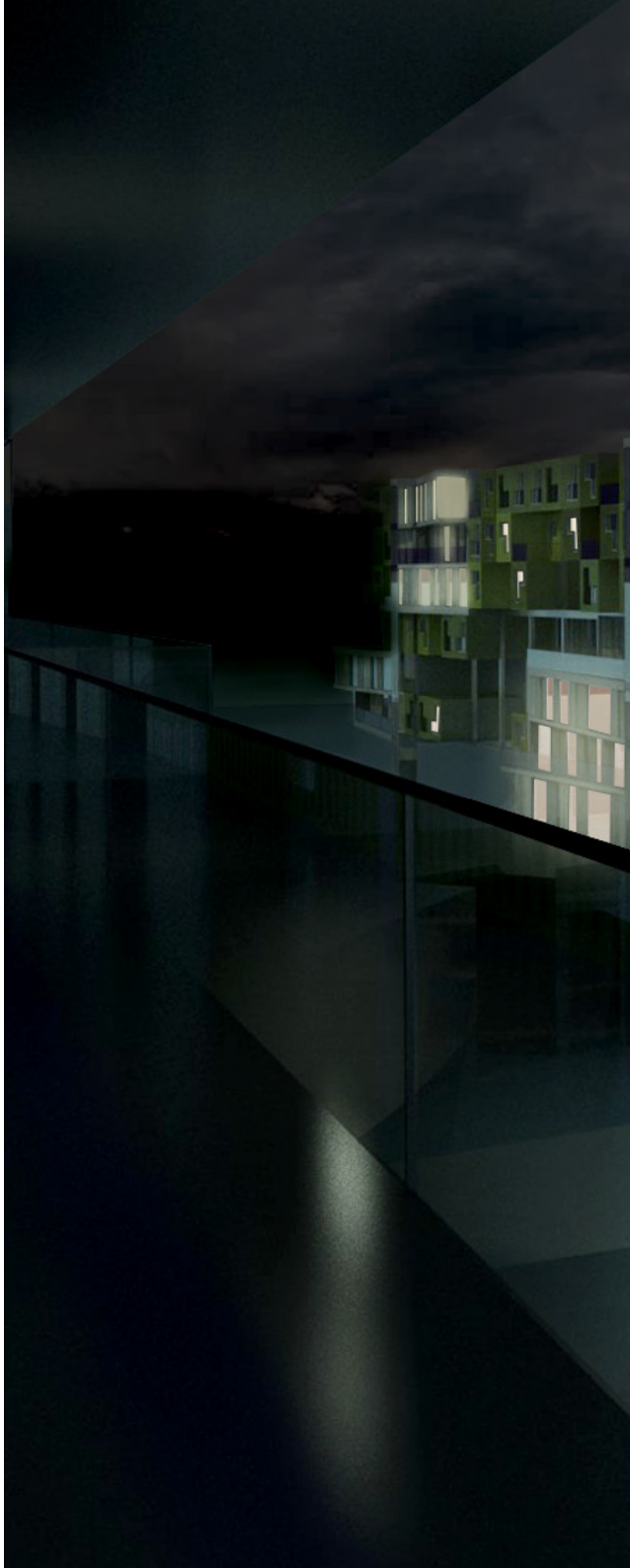
On a urban scale the project could have been designed more accurately according with some building requirements actively present in the chosen area. However due to the experimental aim of the project those requirements were deduced analysing the surrounding buildings' features.

On a more architectural scale, the chosen sector that wanted to be developed was the residential one: with living and common areas. These were analysed in an overall technological way, that could be further developed, especially with regard to the anchorages of the frame containers' superstructure to the main structural grid system.
Moreover, structural calculation can better prefigure a precise dimension for the structural elements, and thereby could vary the gap between two structural modules. Furthermore, due to a flat urban location of the building, exposed to high wind levels, some wind-breaking elements are necessary for the structural stability of the whole.
A system of transportation and placement in situ of the living units can be processed, and the positioning of a crane, or a series of them can be better studied.
The crane when not used for its main aim, can be alternatively used for other scopes, mainly attractive ones. Therefore some studies can work up also in this design.
The parking and distribution systems of the whole project can be further expressed and analysed.
The working areas can be evolved in detail as well as the outside courtyards, creating an interesting social outdoor area for workers and inhabitants. Some ventilation systems can here end up in the inner courtyard and used as furnitures for it.
Further development of the inside living units and common areas can be made, and in the first ones some further studies on the furniture's design and materials colours, having as aim a personalization of their features according with the customers desires. Some sketches and thought have been done with this regards, but have not be expressed in detail in this report.

According with the technical research, some others analysis can be done according the acoustic level inside each living and common areas, to complete the requirements of indoor quality.
Some further researches about the insulation system had been initially done, but later changed due to price costs (ex. vacuum insulation), other were the analysis made on mechanical ventilation's systems, then gave up because of lack of technical data. However more time can be involved to refine the simulations results especially for the thermal indoor quality, without using a cooling system, and therefore improving the natural ventilation through thermal buoyancy (in the 25th and 40th m^2 living cells) or including in the calculation the effect of a cross ventilation. Moreover other materials in facade can be studied, both in an architectonical and technical way.

[ill. 125]

Visualization of the whole complex from the natural park.
The openess of the plan and the decreasing of the working area can be better seen from this view.



Visualization of the northern slab by night from a movable balcony of the south slab.
Common and living areas can here be experienced thanks to artificial lights.

[ill. 126]

APPENDIX

01

DAYLIGHT FACTOR STUDIES

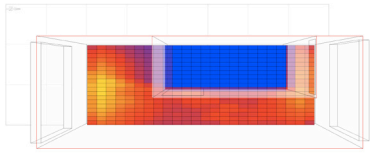
These studies are made to understand if the proportion depth-width-height and amount of windows, can guarantee a good indoor daylight quality in therms of daylight factor and shadows-direct sunlight.

The daylight factor does not takes in account the orientation of the building and the time of the day, but describe the relationship (%) between the outdoor and indoor natural light.
Thereby, through these diagrams it can be understand the distribution of the natural light inside a room.

Due to fixed dimensions of the container's frame, the studies aimed to set the best window's distribution. In particular in the preliminary analysis the room width is fixed to 2,5 m and the length to 6 m of internal floor. While in a second analysis the internal dimensions were fixed to 3 m x 5 m.

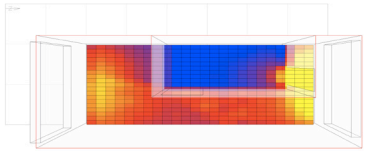
CONSIDERATIONS:

from this investigation it seems possible to obtain good daylight condition in a room module of 3x5m (inside) with 50% of horizontal openings from both sides (apt.1), and 35% of vertical openings from both sides, with a decreased amount of exposed area (apt.1.4).
Furthermore the functional quality of the window was taken into consideration also in an aesthetic quality when considering the configuration of the facades and the organization of the function inside each living unit.



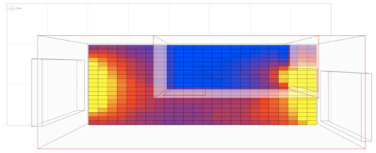
apt. 1

50% south 50% north
1500x1800
horizontal in the bathroom
avarage value 5,93 %



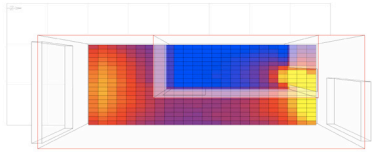
apt. 1.1

50% south 50% north
1500x1800
vertical in the bathroom
avarage value 7,36 %



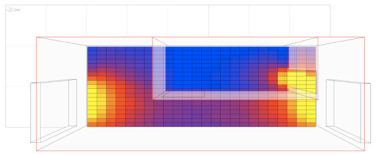
apt. 1.2

50% south 50% north
2250x1200
vertical in the bathroom
avarage value 7,14 %



apt. 1.3

50% south 35% north
1500x1800s.1800x1050 n.
vertical in the bathroom
avarage value 6,14 %



apt. 1.4

35% south 35% north
1800x1050 s. 1800x1050 n.
vertical in the bathroom
avarage value 5,59 %

According to the last consideration the shape of the window facing south was due to some functional factors: the aim was indeed to guarantee the better visuality of the outside, keeping the privacy of some functions inside the living unit. In instance the 15m² apartment's window guarantee the privacy of the sleeping area, as well as a protection from the direct light, while in the 25m² apartment the windows guarantee a privacy both of the sleeping area and of some corners where service utilities can be placed.

In the facade the "L" shape of the windows has the same logic for all the living cells, but is changing in orientation according to the parts of the dwelling that need more privacy, as well as the orientation of the dwelling itself.

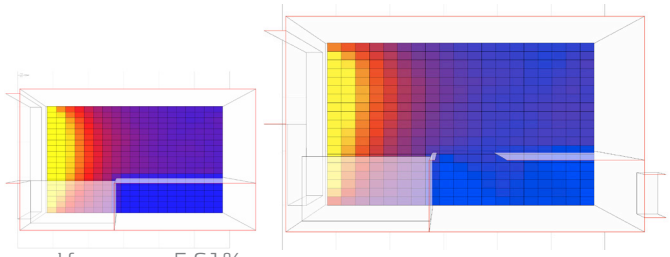
DIRECT LIGHT STUDIES

These studies allow to understand the experienced quality of life and investigation of luminance for the optimal daylight factor processed.
The studies are made for 21st March, 21st June, 21st December, in order to include condition throughout the year, with a time interval set each hour from 8:00 to 19:00.
The rooms have the proportion and the openings of the ones chosen in the daylight factor studies, and since the orientation is important in this analysis, it was set with an angle of 20° north-south. From this illustrations it can be seen how the orientation guarantees a good illuminance of the living spaces, leaving the dark corners for bathroom and service areas. It can be noticed how in the 15 m² the direct light is avoided in the bed area thanks to its "L" shape.

below: second analysis

below: final solutions

the "L" window, in the final solution was restricted and a north window + a void were added in the bathroom, to better distribute the natural light in this area (reaching an average of 2%). The overall d.f. average is of: 4,92% , not bad, considering that the living part of the dwelling is well lit.



d.f. average: 5,61%

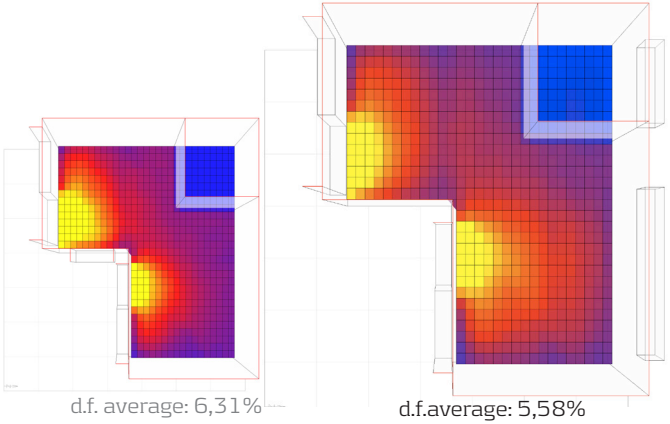
d.f.average: 4,92%

21st March, 8:00-19:00

21st June, 8:00-19:00

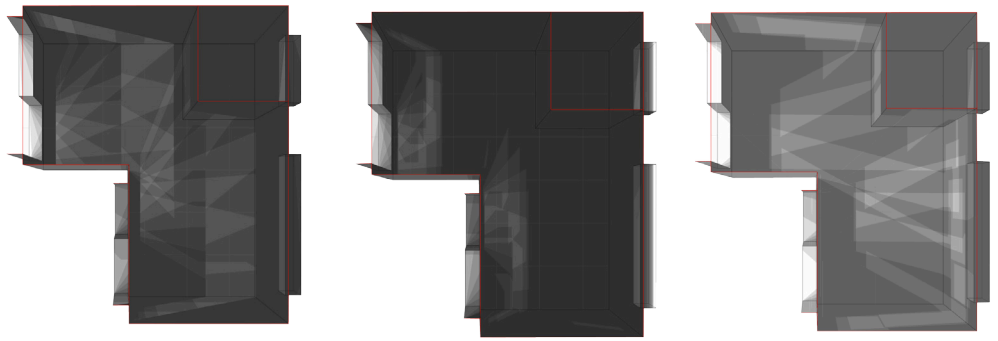
21st December, 8:00-19:00

in the second analysis there were 2 windows facing south and 1 east. In the final solution 1 window was added on the north side and the est window was avoided to keep more privacy when another living unit is added on this side. The average in the final is 5,58.



d.f. average: 6,31%

d.f.average: 5,58%

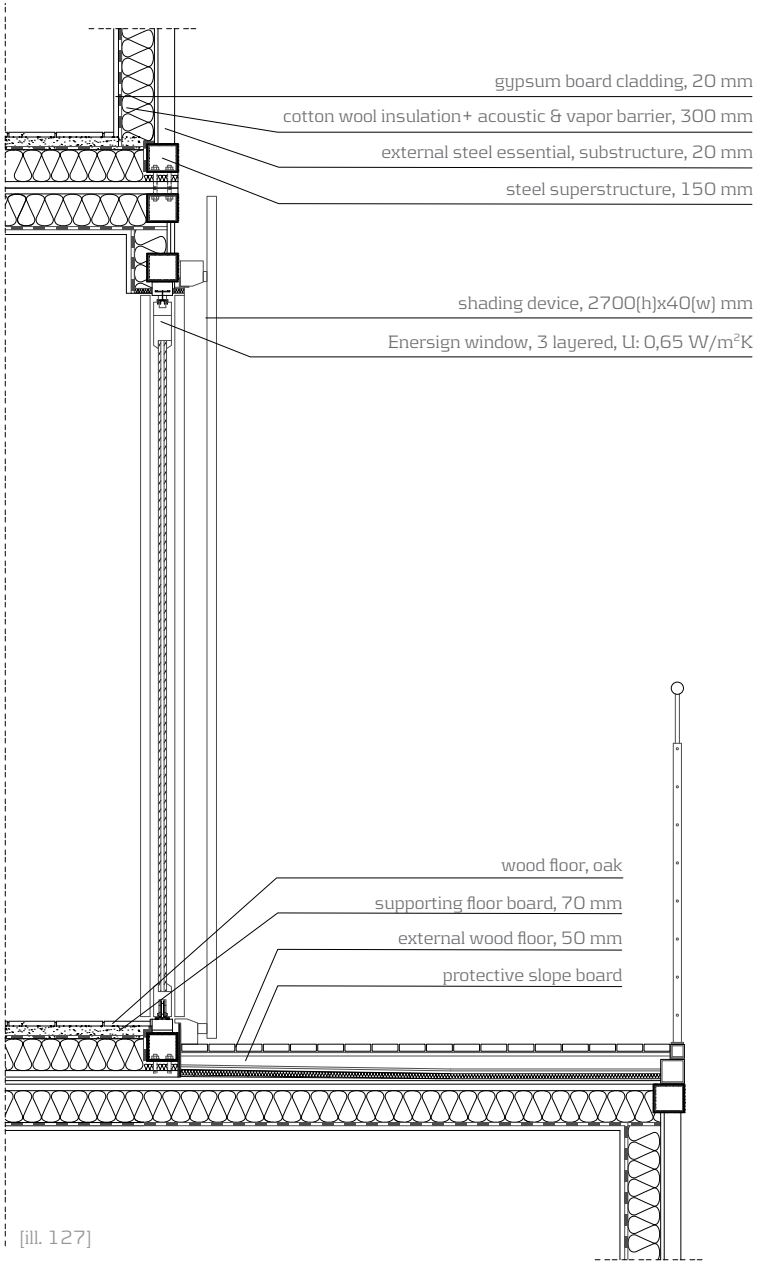


21st March, 8:00-19:00

21st June, 8:00-19:00

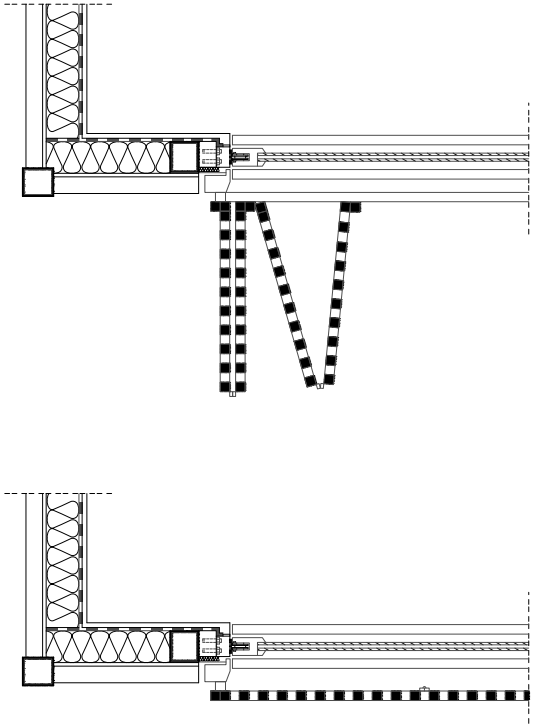
21st December, 8:00-19:00

02



[ill. 127]

DETAILS OF THE SHADING DEVICE
1: 40
longitudinal section of a living unit solution with balcony (25 m², 40 m² or 50 m²)
planar sections of the device functioning.



U-values calculations

U= 1/R
R= $\sum R_i$
R= e/λ

element detail	materials	thickness m	lamba W/(mK)	Resistance (m^2K/W)
external wall				
	stainless steel fire treated	0,02	16	0,001.
	cotton wool insulation	0,3	0,029.	10,34
	inner vapour & acoustic barrier (included in the mineral fibre insulation, int. side)			
	gypsum board cladding	0,02	0,48	0,04
	U-value = 1/(10,34+0,04+0,01)			**0,1**
floor				
	stainless steel fire treated	0,02	16	0,001.
	cotton wool insulation	0,3	0,029.	10,34
	inner acoustic barrier (included in the mineral fibre insulation, interior side)			
	wood floor, oak, on top of a supporting board	0,05	0,17	0,29
	U-value = 1/(10,34+0,29+0,01)			**0,09**
roof				
	stainless steel fire treated	0,02	16	0,001.
	cotton wool insulation	0,35	0,029.	12,06
	inner vapour & acoustic barrier (included in the mineral fibre insulation, int. side)			
	gypsum board ceiling	0,02	0,48	0,04
	U-value = 1/(12,06+0,04+0,01)			**0,08**
windows	ENERsign			
	U-value			**0,65**

http://enersign.com/dk/Enersign_Fenster/index.php?auswahl=Bau.php

Windows ENERsign

Description

Glazing
- High-performance triple insulating glass
- Heat transfer of glass 0,53 W/m^2K as per EN 673
- Spaces between panes filled with argon gas
- Windowpane fitted with warm edge
- Glued glazing with inner natural rubber seal Construction technology

Construction technology
- The fibreglass profiles are screwed to the frame to a force fit.
- The glass unit is permanently glued to the fibre glass
- Construction depth 127 mm
- Together, the frame, fibre glass and window pane form a static window unit
- **ENER**safe the concealed window furniture with four locking pins and a loadbearing capacity of up to 130 kg
- Interchangeable sealing profiles
- Joint porosity and driving rain tightness as per DIN 18055
- Stress group C

U-value (W/m^2K)	0,65
G-value	52%

03

FIRST THERMAL COMFORT CALCULATION

Calculation of 24-hour average temperature

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ARCHITECTURAL ENGINEERING

Project:
living unit 15m²

Description of the room

Constructions towards outdoors

Nr	Surface	A m²	U W/m²K	Bu W/K
1	outer wall	21,09	0,10	2,11
2				0,00
3				0,00
4				0,00
5				0,00
	Total	21,09		2,11 = Bu,con

If comments not are shown
they can be activated under "view"

Windows towards outdoors

Nr	Surface	Number stk	A m²	U W/m²K	Bu W/K	Orient degree	Inclination 90/45/0	g-value [-]	f(beta) [-]	f(shade) [-]	f(shadow) [-]	f(glass) [-]	Fsun [-]
1	window south	1	4,10	0,65	2,66	180	90	0,52	0,90	0,15	0,60	0,90	0,03
2					0,00								0,00
3					0,00								0,00
4					0,00								0,00
5					0,00								0,00
	Total	1	4,10		2,66	= Bu,win							

Total specific heat loss towards outdoors, Bt: 4,77 = Bt = Bu,con+Bu,win

Constructions towards ground and surrounding rooms

Nr	Surface	A m²	U W/m²K	Br W/K	tr °C	Br*tr W
1	Floor	15,00	0,90	13,50	21,00	283,50
2	Ceiling	15,00	0,80	12,00	21,00	252,00
3				0,00		0,00
4				0,00		0,00
5				0,00		0,00
	Total	30		25,50		535,50 = Br*tr

Total specific heat loss towards ground and surrounding r: 25,50 = Br

Ground temperature for area chosen und
7,6 °C

Ventilation

	Type	Air change h⁻¹	Room volu m³	Air flow m³/s	Density kg/m³	Heat kap. J/kgK	BL W/K
1	Ventilation	1,50	54,35	0,023	1,2	1006	27,34
2	Infiltration	0,10	54,35	0,002	1,2	1006	1,82
	Total	1,6		0,024			29,16

Total specific heat loss for ventilation, BL: 29,16 = BL

Control
Total air flow
litre pr. m² floorarea
1,4

Heat accumulation

	Choose heat accumulation	Therm. cap W/K pr m²	Floor area m²	Ba W/K
1	Medium heavy	11	17,25	189,75

Samlet specifik varmeakkumulering Ba: 189,75 = Ba

Description of chosen inner structure
Several heavy structures, e.g. concrete slabs with clinker and brick or clinker concrete walls.

INTERNAL HEAT GAINS
Go to sheet "Internal Heat Loads"

Results

Project:
living unit 15m2

Choosen month:	July	tu =	21	°C

If the ventilation air has same temperature as outdoor air

24-hour average	ti =	24,9	°C
Temperature variation	Dti =	2,9	°C
Max. Temperature	timax =	26,3	°C

Additional calculations

If the ventilation air has the same temperature as the outdoor 24-hour average temperature

24-hour average	ti =	24,9	°C
Temperature variation	Dti =	1,5	°C
Max. Temperature	timax =	25,7	°C

Calculation where the ventilation air has a constant inlet temperature which is Dt = 2 °C lower than the outdoor 24-hour average temperature

If the ventilation air has a constant temperature of 19 °C

24-hour average	ti =	23,9	°C
Temperature variation	Dti =	1,5	°C
Max. Temperature	timax =	24,7	°C

24 hour average temperature - spreadsheet

This calculation tool was used to have a preliminary view of the monthly indoor temperatures in a room. The results are displayed as monthly average along the temperature variation. The calculations are based on outdoor temperature, building details, and internal heat load hourly. Since the inputs were limited, further calculations were made with Bsim.

(see CD for internal heat loads and living unit 25 m² living unit spreadsheet)

FIRST ENERGY CONSUMPTION CALCULATION

Month average - spreadsheet

This tool was used to have a preliminary understanding of the energy consumption calculated monthly and yearly.
However the calculation was considering only the energy used for heating and cooling.
For this reason the total energy consumption pr m^2 floor area is 29,6 kWh/m^2 per year, much lower than the value required for low energy class. This has to be re-evaluate through more accurate calculations and more effective inputs. The result, thereby has not to be considered as the most effective one, because lighting, mechanical ventilation and equipments are playing a great role in terms of energy consumption, thus Bsim was used to improve the results.

(see CD for detailed data, internal heat loads, characteristic of building, and 25 m^2 living unit spreadsheet)

The ventilation rate for winter has the same values and average ventilation rate as the ones for summer. The service hours have been calculated considering CO_2 and pollution.
(see next page)

Month Average Calculation

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Building data

Roomtemperatur in case of heating, °C	20
Roomtemperatur in case of cooling °C	26
Ground temperature, °C	7,6
Net area, m²	80
Gross area, m²	111,74
Heated build-up area, m²	111,74
Service life, hours/week	168
Relative service life	1,000

Weather data

Choose destination
Copenhagen

If comments not are shown
they can be activated under "view"

Heating and cooling demands of the building

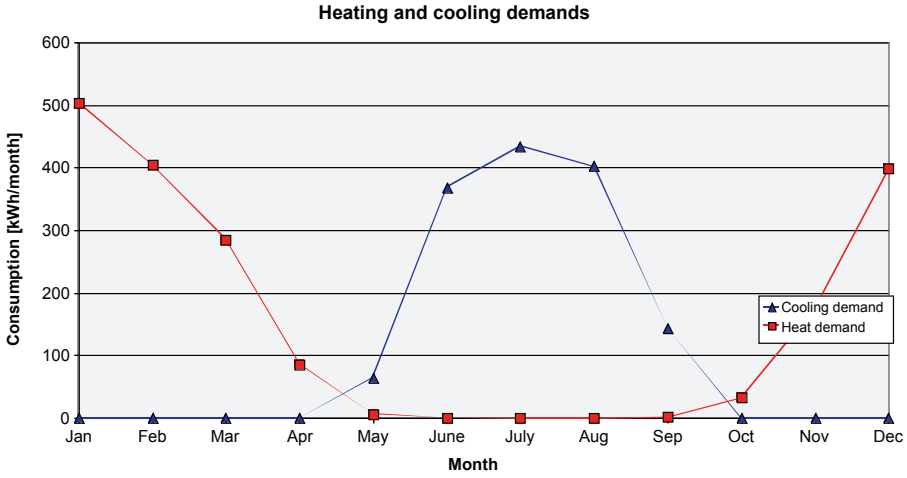
Month	Number of days	Cooling demand kWh/month	Heat demand kWh/month	Ventilation loss W/K	Utility factor	Solar gain kWh	Internal gain kWh	Gains caused by tu>ti kWh	Heat loss with winter temp. kWh	Heat loss with summer temp. kWh
Jan	31	0	504	53	0,975	37	1029	0	1544	1992
Feb	28	0	405	53	0,968	59	929	0	1362	1766
Mar	31	0	285	53	0,937	91	1029	0	1335	1783
Apr	30	0	86	53	0,825	129	996	0	1014	1447
May	31	65	6	53	0,568	171	1029	0	687	1135
June	30	368	0	53	0,313	171	996	0	366	799
July	31	434	0	53	0,262	166	1029	0	313	761
Aug	31	402	0	53	0,278	148	1029	0	327	775
Sep	30	143	2	53	0,476	106	996	0	526	959
Oct	31	0	32	53	0,727	71	1029	0	831	1279
Nov	30	0	175	53	0,903	41	996	0	1111	1544
Dec	31	0	398	53	0,964	25	1029	0	1414	1862
SUM		***1413***	***1894***			***1215***	***12116***	***0***	***10831***	***16100***

Result

Energy consumption for heating pr m² floor area, kWh/m² år	16,9
Energy consumption for cooling pr m² floor area, kWh/m² år	12,6
Total energy consumption pr m² floor area, kWh/m² år	29,6

For comparison

Energy frame, dwellings	67,3 kWh/m² år
Low energy class 2015	38,9 kWh/m² år
Energy frame for schools, office	86,1 kWh/m² år
	49,9 kWh/m² år



Ventilation

Ventilation rate, summer

Service hours, l/s m2	0,55
Outside service hours, l/s m2	0,42
Average ventilation rate, m3/s	0,04

04

Preliminary hand calculation of air change:
what 0,3 l/sm^2 means in h^{-1}

min rate **0.3 l/sm²**	15 sqm apt.	25 sqm apt.	6 units block	units
	15	25	90	m^2
	15x0,3= 4,5	7,5	27	l/s
	15x2,5= 37,5	62,5	225	m^3
	37,5x1000= 37500	62500	225000	l
	37500/2,5= 15000	25000	90000	l/h
	15000/37500= **0,40**	**0,4**	**0,4**	**h^{-1}**

AIR CHANGE RATES

Simple calculation of air change values based on BR10 requirement 0.3 l/s per m^2 have been hand calculated, and used as a reference to what the Bsim values could be.
The calculation aims to understand what 0.3 l/s per m^2 means in h^{-1} for the 15 m^2 and 25 m^2 living units, and a building block composed of 3 living units of 25 m^2.

Further calculations have been made, according to sensory pollution and Co_2. The results were compared and the max value was used as input supply for the ventilation input in Bsim and for the average ventilation rate in the previous preliminary calculation of energy consumption through the Month Average Spreadsheet.

(see CD for details on calculations for both Co_2 and pollution air change rates)

Air change rate (Comparison)

15 sqm apartment	Air change rate (CO2)	Air change rate (pollution)	Air flow rate (CO2)	Air flow rate (pollution)
Facilities	Air change (h^{-1}) per unit	Air change (h^{-1}) per unit	Total RVR (m3/s)	Total RVR (m3/s)
Bathroom	0,129	0,132	0,001	0,001
Bedroom	0,688	0,834	0,004	0,005
Total	0,465	0,553	0,005	0,006

25 sqm apartment				
Facilities	Air change (h^{-1}) per unit	Air change (h^{-1}) per unit	Total RVR (m3/s)	Total RVR (m3/s)
Living area	0,387	1,185	0,003	0,008
Bathroom	0,129	0,263	0,001	0,001
Master bedroom	0,688	1,668	0,004	0,010
Total	0,434	1,138	0,008	0,020

Building block				
Facilities	Air change (h^{-1}) per unit	Air change (h^{-1}) per unit	Total RVR (m3/s)	Total RVR (m3/s)
Small apartment	0,83	1,16	0,0344	0,0485
Big apartment 1	0,99	3,16	0,0688	0,2195
Total	1,86	4,82	0,1032	0,0485

Air Change rates inputs (for CO_2 and pollution calculations)

inputs	units	15 sqm living cell	25 sqm living cell
occupants	prs	1	2
total area	m^2	15	25
room height	m	2,5	2,5
volume	m^3	37,5	62,5
CO_2 concentration in the people exhalation air	ppm	0,04	0,04
CO_2 concentration in the ventilation air	ppm	350	350
chosen limit of CO_2 (cat. B)	ppm	660	660

Air change rates and air change flows for both pollution and CO_2 concentration are compared in the

RVR per unit in the air change rate (pollution) has been calculated according with the necessary ve
and then converted from l/s to h^{-1} per each room (ex. bathroom, living, bedroom)
(see spreadsheet "air change rate pollution", on CD)

The windows values were modified according to the chosen typology: EnerSign.
Analysing the outdood temperature during the year, the shading devices were scheduled as active all the year.

BSIM

Bsim was used to calculate the energy consumption of a block of the building, and of two living cells (15 m^2 and 25 m^2). It was also used to refine the calculation of the indoor environment quality of this two categories of living units, considered the most used typology in the building.
The program allows the introduction in the calculation of more inputs than the preliminary calculations through spreadsheets, and thus it is much more accurate.

The inputs inserted were:
people load, equipments, heating, infiltration, ventilation, venting.
Site: København, open flat country
Orientation: 20°, 7 m heigh (for both the 15 m^2 and 25 m^2 living units)

At first the living unit geometry was modelled, and windoors were added as well as the materials were made in SimDB and added to the geometry. Secondly a site, a thermal zone and an orientation of 20° were given. The CO_2 for the site was set to 350 ppm (and in the venting input a SetPoint Ctrl of 660 ppm was given), the terrain type was set to open flat country.
All the inputs are scheduled, and the day profile and time are set. The moisture loads have not been considered nor in the simulation neither in the ventilation: no humidifier was indeed set (as well as a cooling coil).

inputs	15 sqm living cell	25 sqm living cell	block of 2x15 sqm + 2x25 sqm	references and comments
windows				
natural ventilation				for all windows
Cd	0,65	0,65	0,65	
Cnt	0.5 (50%)	0.5 (50%)	0.5 (50%)	
Afrac	1	1	1	all window area can be opened
Ka	5	5	5	
solar shading				for southern windows
type	simple	simple	simple	
shading coeff.	1 (100%)	1 (100%)	1 (100%)	
max sun	150 W/m^2	150 W/m^2	150 W/m^2	
max wind	15 m/s	15 m/s	15 m/s	max wind speed for activity if external
refl.	0.5 (50%)	0.5 (50%)	0.5 (50%)	reflectance of slates
transm.	off	off	off	transmittance of shading
position	external	external	external	
control	Sensor Ctrl	Sensor Ctrl	Sensor Ctrl	
shading coeff.	1 (100%)	1 (100%)	1 (100%)	
shade close	10000 lux	10000 lux	10000 lux	light lever for blinds closing
shade open	2000 lux	2000 lux	2000 lux	light lever for blinds opening
sf4 close	0.05 (5%)	0.05 (5%)	0.05 (5%)	
sf4 open	1 (100%)	1 (100%)	1 (100%)	
scheduled	always	always	always	active all year when needed

04

inputs	15 sqm living cell	25 sqm living cell	block of 2x15 sqm + 2x25 sqm	references and comments
People				
number	1	2	6	according to room program
type	normal	normal	normal	

the people load is set to 100% when they are at home and awake, 90% when sleeping, 0% when not at home

Equipment				
heat load (kW)	0,24	0,37	1,21	Sbi_2005:12, ISBN 87-563-1235-0
part to air	0.9 (90%)	0.9 (90%)	0.9 (90%)	most of the energy is transferred by convection
scheduled	100% always	100% always	100% always	

the equipment includes also the lighting in the living cells, the calculation of the heat load was done considering the living units as apartments:
340 kWh + m^2 apt. x 11 kWh + n° people x 690 kWh

Heating				
max power (kW)	10 kW	10 kW	10 kW	according to tech.supervisor
fixed part	0.00 (0%)	0.00 (0%)	0.00 (0%)	100% of the heat is regulated
part to air	0.5 (50%)	0.5 (50%)	0.5 (50%)	According to table in Bsim User manual
control	HeatCool Ctrl	HeatCool Ctrl	HeatCool Ctrl	
factor	1 (100%)	1 (100%)	1 (100%)	all the power is available
set point	20°C	20°C	20°C	according to BR10
design temp	-12°C	-12°C	-12°C	max power for this temperature or less
min power	10 kW	10 kW	10 kW	according to tech.supervisor
Te min	15°C	15°C	15°C	
Sensor Zone	ThermalZone	ThermalZone	ThermalZone	
scheduled	october to may	october to may	october to may	

Max power can be regulated, if the heating system cannot keep up with the temperature, it might have to be higher
Min power is generally used when “Te min” or more, in this case max power = min power, so Te min is not so decisive

Infiltration				
basic air change	0.13 h^{-1}	0.13 h^{-1}	0.13 h^{-1}	according to tech.supervisor
temp factor	off	off	off	
temp power	off	off	off	
wind factor	off	off	off	
scheduled	100% always	100% always	100% always	

Ventilation

Fans				
input supply	0,01	0,02	0,05	based on air change comparison
pressure rise	250 Pa	250 Pa	250 Pa	resistance in ventilation system in DK
total efficiency	0.7 (70%)	0.7 (70%)	0.7 (70%)	according to tech.supervisor
part to air	1 (100%)	1 (100%)	1 (100%)	power transferred to air as heat
output return	0,01	0,02	0,05	the same as input
pressure rise	250 Pa	250 Pa	250 Pa	the same as input
total eff.	0.7 (70%)	0.7 (70%)	0.7 (70%)	the same as input
part to air	0	0	0	fan after the heat exchanger
Recovery unit				
max heat rec.	0.85 (85%)	0.85 (85%)	0.85 (85%)	max temp. that can be achieved by heat transfer
min heat rec.	off	off	off	(min=0.65) According to Bsim User manual
max cool rec.	off	off	off	
max moist rec.	off	off	off	
Heating coil				
max power	1 kW	1 kW	1 kW	
Control 1	VAV Ctrl	VAV Ctrl	VAV Ctrl	
VAV max factor	2.25 (225%)	2.25 (225%)	2.25 (225%)	middle or normal value recommended by Bsim
min inlet temp.	16°C	16°C	16°C	lower level for the inlet temp
max inlet temp.	22°C	22°C	22°C	max level for the inlet temp
set point indoor air	22°C	22°C	22°C	
set point cooling	26°C	26°C	26°C	when it is low it is taken
set point CO_2	660 ppm	660 ppm	660 ppm	accepted CO_2 level
air hum.	off	off	off	deactivated because no humidifier defined
Scheduled 1	when at home	when at home	when at home	not active from week 19 to 39
Control 2	Inlet Ctrl	Inlet Ctrl	Inlet Ctrl	
part of nom.flow	0.7 (70%)	0.7 (70%)	0.7 (70%)	
Point 1 Te 1	-12°C	-12°C	-12°C	
Tinl 1	20°C	20°C	20°C	
Point 2 Te 2	15°C	15°C	15°C	
Tinl 2	18°C	18°C	18°C	
slope before 1	0	0	0	
slope after 2	0	0	0	
air hum.	off	off	off	
Scheduled 2	always	always	always	

Venting

natural ventilation	automatic	automatic	automatic	based on window opening
set point	26°C	26°C	26°C	max limit for temp. (miljorigtigtindeklima,2011)
set point CO_2	660 ppm	660 ppm	660 ppm	accepted CO_2 level
factor	1 (100%)	1 (100%)	1 (100%)	
scheduled	always	always	always	

The ventilation setup consists of 3 systems. The first is the infiltration, which is not controlled. The second consists of mechanical ventilation, which is used during winter when people are at home (air change in the living cells) and recover the heat.
The third is the natural ventilation which is used during summer.

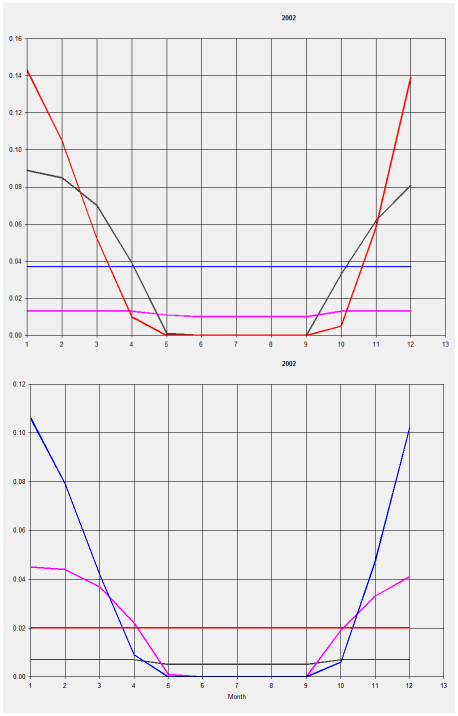
The mechanical ventilation has two controllers on it. The first is a VAV control, which controls the ventilated air volume based on CO_2 levels and thermal zone temperatures. This allows better control of ventilation based on needs, but may lead to the ventilation turned off completely when the CO_2 levels and the temperature requirements are met. Without natural ventilation this would leave infiltrations to be the only air supply, which is not acceptable. To overcome to this there is a second controller added for the mechanical ventilation (inlet Ctrl). This allows a smaller amount of air to be let into the building, even if the VAV controller does not see any need.

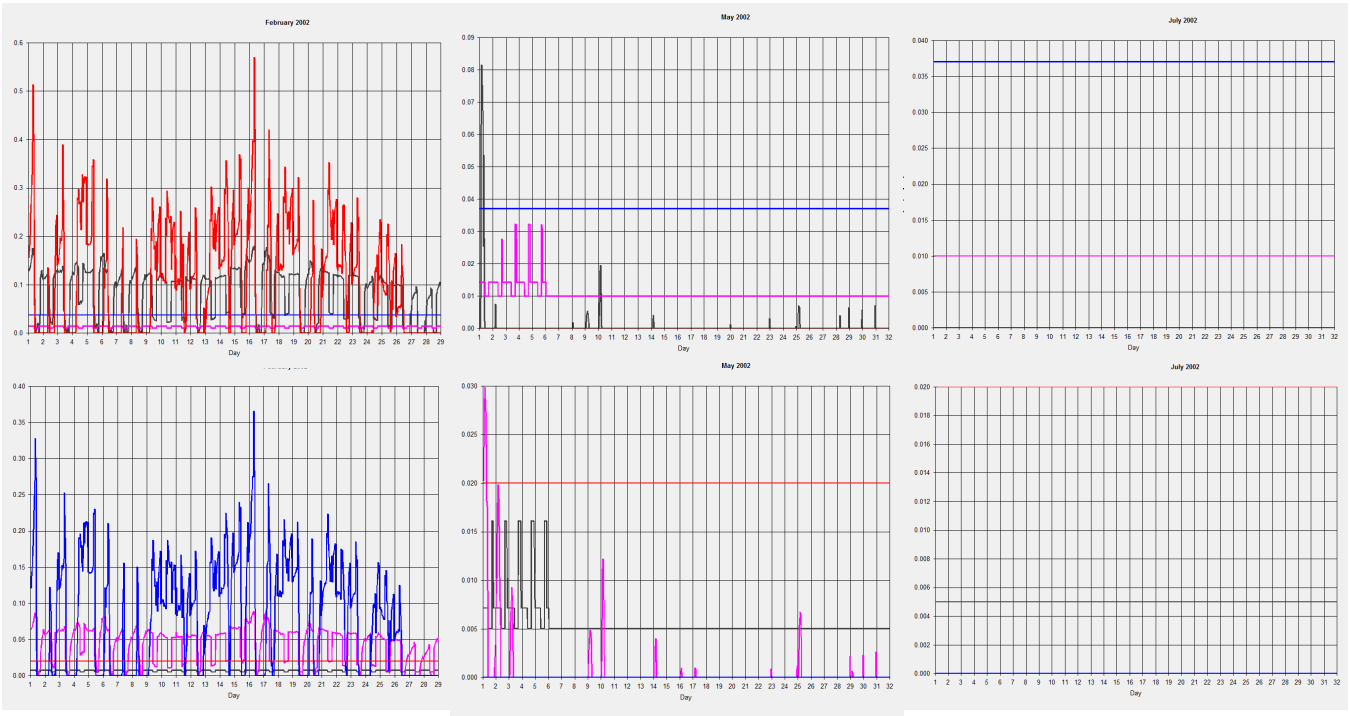
BSIM SIMULATION

The simulations are made with all simulation options on except of Moisture Transport and Multizone Model, with 10 time steps, layer thickness 0.01 m and Perez solar rad. model. The timeline of the simulation is the whole year 2002.

These graphs are showing how the energy is yearly and monthly used in a 25 m^2 and a 15 m^2 living units.
The used parameters are: qHeating, qEquipment, FanPower and HeatingCoil.
During wintertime there is the greatest energy use for heating, heating of ventilated air, mechanical ventilation, equipment and lighting. In particular the FanPower and HeatCoil are reduced in the middle of the day, when the inhabitants are mostly at work. The chosen month for a detailed analysis is February. May have been chosen to see the differences between the two seasons. Here some energy is still used for heating of ventilated air.
During summertime there is only energy use for equipments, lighting and some ventilated air. The chosen month for a detailed analysis is July.

25 m^2





25 m^2

(kW)

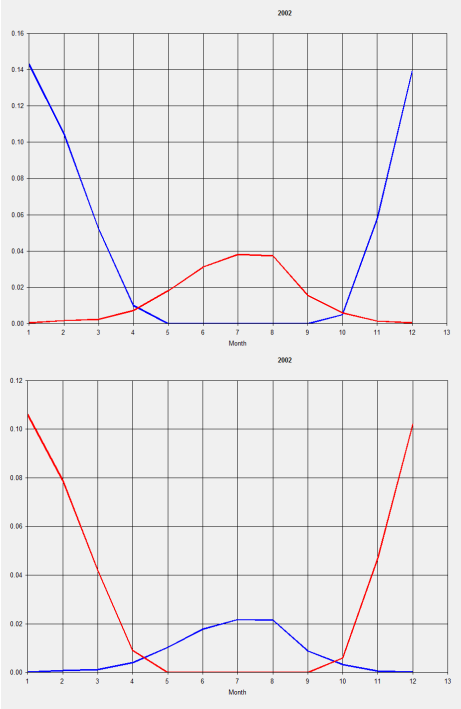
red: qHeating
blue : qEquipment
mag.: FanPower
grey: HeatCoil

15 m^2

15 m^2
(kW)
blue: qHeating
red : qEquipment
mag.: HeatCoil
grey: FanPower

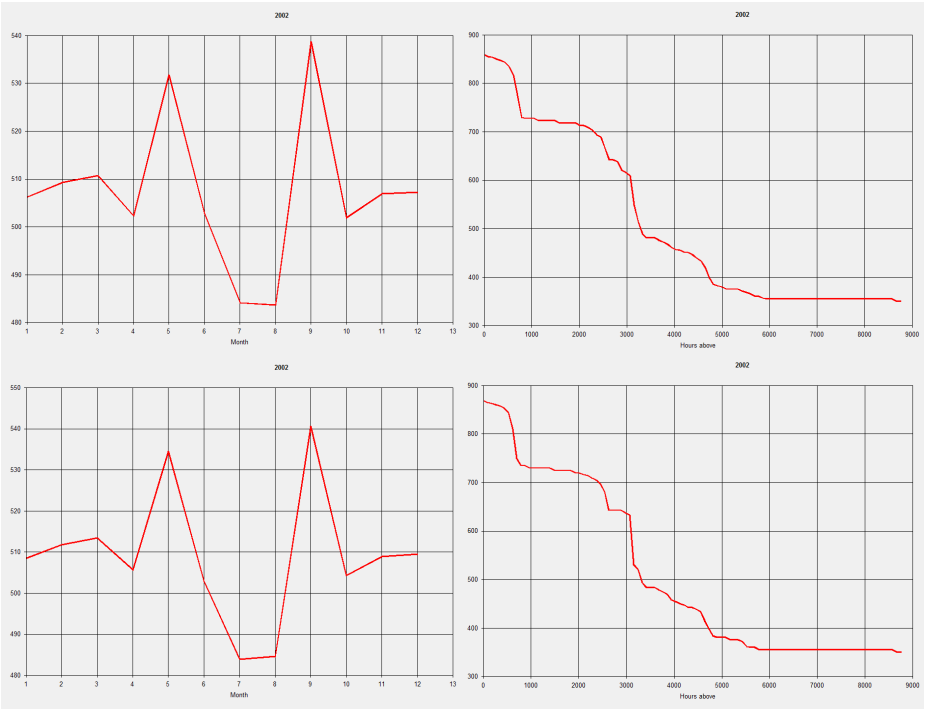
In the previous analysis resulted clear how the energy used in the 25 m^2 was almost doubling the one of the 15 m^2, especially the ones used for the heating of ventilated air and the equipments, while the energy used for heating and mechanical ventilation were higher but not doubling.

In the graphs below it is better shown the relation heating vs natural ventilation: heating (kW), (blue in the first and red in the second) is mostly used during winter, and replaced by natural ventilation (m^3/s) during summer.

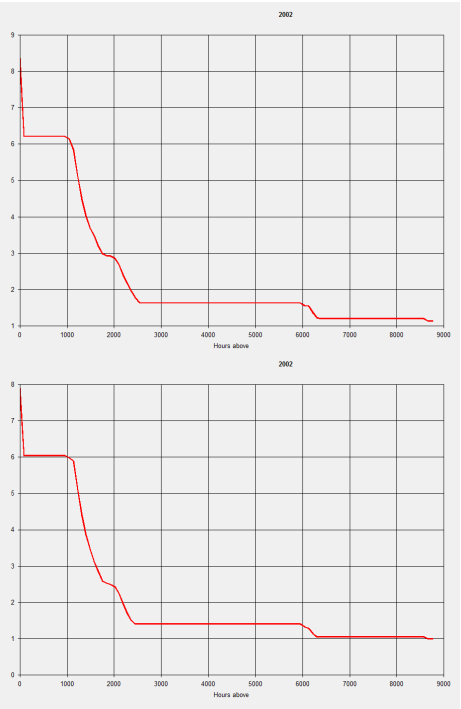


Some analysis have been made for the quantity of CO_2 generated yearly in each dwelling, and how many hours above 660 ppm are in a year. The aim of having less than 1100 ppm per year is reached. The values of CO_2 for both the living units never reach 1100 ppm, and their values are lower in summer, thanks to a natural ventilation and thus a higher possibility of air change.
Per almost half of the year, for both the living units, the ppm level is kept between 350-450 ppm.

Other analysis have been made to better understand how the air change resulted to help in lowering the ppm values throughout the year.



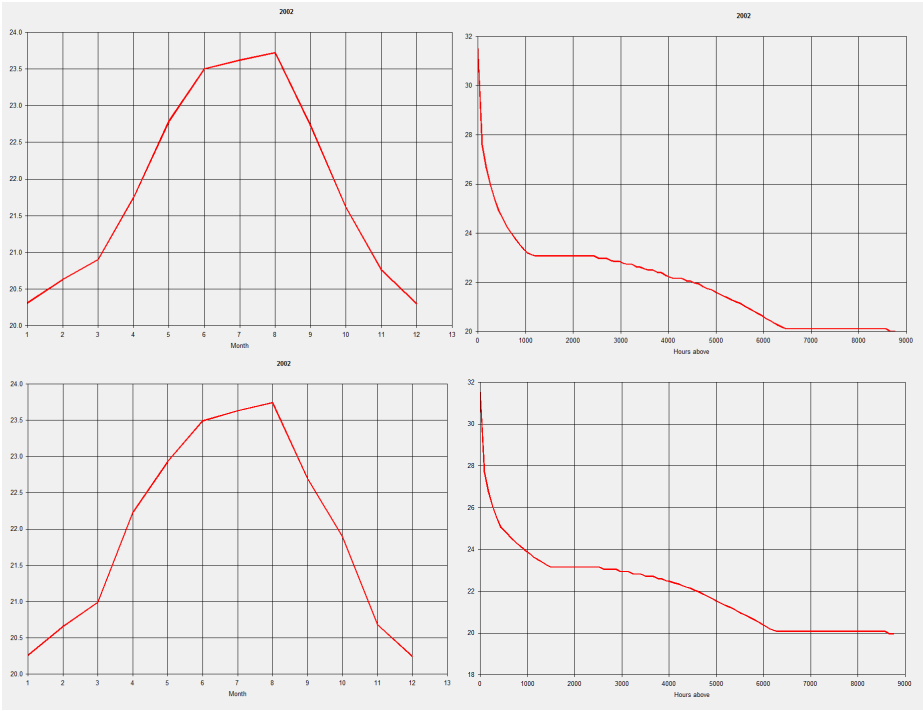
As a result of the higher temperatures during summer, there is also a higher need for air change in the dwellings. The below graphs show how the air change is kept stable between 1 and 1,7 h^{-1} for almost 6000 hours per year in both the dwelling, with a higher increase in the 25 m^2 living units, occupied by two people.
The high level of air change value can raise the inside temperature during summer time, therefore some devices have to be defined to avoid overheating.



In accordance with the previous consideration on the air flow rates, a check was made on the Top Mean Temperatures in both the dwellings.
Naturally the indoor temperature is higher during summer than winter, but the average resulted kept between 20-24°C in both the living units. The peak of 30°C is caused by letting hot outdoor air into the apartment, when venting during summer. This can be avoided by deactivating the natural ventilation at an earlier point when the outdoor temperature is rising.
It needs to be mentioned that for this results, shading inputs were already inserted into the calculation, as well as the EnerSign windows.
The further step was then trying to reduce the heating hours during summer, reducing at first the venting input and secondly introduce a cooling system.

25 m²

15 m²



ThermalZon	Sum/Mean	2 (365 days)
qHeating	283.54	283.54
qCooling	0.00	0.00
qInfiltration	-156.23	-156.23
qVenting	-502.80	-502.80
qSunRad	1175.84	1175.84
qPeople	264.60	264.60
qEquipment	175.20	175.20
qLighting	0.00	0.00
qTransmissic	-1128.73	-1128.73
qMixing	0.00	0.00
qVentilation	-111.43	-111.43
Sum	0.00	0.00
tOutdoor me	7.8	7.8
tOp mean	22.0	22.0
AirChange/h	2.1	2.1
Rel. Moistur	37.4	37.4
Co2(ppm)	507.1	507.1
PAQ	0.4	0.4
Hours > 21	5440	5440
Hours > 26	276	276
Hours > 27	156	156
Hours < 20	2501	2501
FanPow	52.05	52.05
HtRec	994.02	994.02
ClRec	0.00	0.00
HtCoil	174.82	174.82
ClCoil	0.00	0.00
Humidif	0.00	0.00
FloorHeat	0.00	0.00
FloorCool	0.00	0.00
HeatPump	0.00	0.00
HeatPumpE	0.00	0.00

Simulation results, for 15 m² (without cooling system)

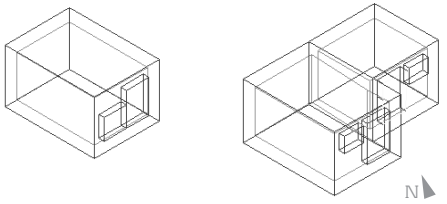
ThermalZon	Sum/Mean	2 (365 days)
qHeating	371.28	371.28
qCooling	0.00	0.00
qInfiltration	-265.37	-265.37
qVenting	-909.59	-909.59
qSunRad	1990.60	1990.60
qPeople	529.20	529.20
qEquipment	324.12	324.12
qLighting	0.00	0.00
qTransmissic	-1779.43	-1779.43
qMixing	0.00	0.00
qVentilation	-260.81	-260.81
Sum	0.00	0.00
tOutdoor me	7.8	7.8
tOp mean	21.9	21.9
AirChange/h	2.3	2.3
Rel. Moistur	37.5	37.5
Co2(ppm)	509.0	509.0
PAQ	0.4	0.4
Hours > 21	5565	5565
Hours > 26	256	256
Hours > 27	144	144
Hours < 20	2253	2253
FanPow	103.63	103.63
HtRec	1934.15	1934.15
ClRec	0.00	0.00
HtCoil	335.22	335.22
ClCoil	0.00	0.00
Humidif	0.00	0.00
FloorHeat	0.00	0.00
FloorCool	0.00	0.00
HeatPump	0.00	0.00
HeatPumpE	0.00	0.00

Simulation results, for 25 m² (without cooling system)

From these charts it was possible to understand the most critical values for the inside temperature throughout the year.

The 15 m² living unit is having 156 hours above 27°C, the maximum 25 hours above 27°C requirement is fully surpassed, as well as the maximum 100 hours above 26°C.
The same uncomfortable result during summer is reached also from the 25 m² living unit (with 144 hours above 27°C).

To resolve this, as stated before, the first step was reducing the venting input for both the dwellings, from 26°C to 23°C, with this setup the overheating was reduced: from 156 to 140 above 27°C in the 15 m² unit, and from 144 to 123 in the 25 m² one.
The venting could lower the overheating during summer, but slightly increases the values of both qHeating and HeatCoil.
A cooling system was then the further step to prevent overheating.



[ill.126] These are the two analysed living units, oriented to 20°. A complex modul analysis was made as well, but considering its variability in the arrangement and presence of living units, those ones were considerated as single entities to be better analysed without any combination. Their external structure was planned, thereby, to afford itself the outdoor condition, without considering any combination in the simulation, getting in this way an analysis of the worst possible cases.

ThermalZon	Sum/Mean	2 (365 days)
qHeating	316.78	316.78
qCooling	-512.20	-512.20
qInfiltration	-142.68	-142.68
qVenting	-256.51	-256.51
qSunRad	1175.84	1175.84
qPeople	264.60	264.60
qEquipment	175.20	175.20
qLighting	0.00	0.00
qTransmissic	-1002.07	-1002.07
qMixing	0.00	0.00
qVentilation	-18.96	-18.96
Sum	-0.00	-0.00
tOutdoor me	7.8	7.8
tOp mean	20.7	20.7
AirChange/h	1.7	1.7
Rel. Moisture	41.6	41.6
Co2(ppm)	505.3	505.3
PAQ	0.5	0.5
Hours > 21	3279	3279
Hours > 26	49	49
Hours > 27	18	18
Hours < 20	4404	4404
FanPow	51.99	51.99
HtRec	971.16	971.16
ClRec	0.00	0.00
HtCoil	198.15	198.15
ClCoil	0.00	0.00
Humidif	0.00	0.00
FloorHeat	0.00	0.00
FloorCool	0.00	0.00
HeatPump	0.00	0.00
HeatPumpE	0.00	0.00

Simulation results, for 15 m² (with cooling system)

ThermalZon	Sum/Mean	2 (365 days)
qHeating	371.86	371.86
qCooling	-538.36	-538.36
qInfiltration	-258.17	-258.17
qVenting	-486.98	-486.98
qSunRad	1990.60	1990.60
qPeople	529.20	529.20
qEquipment	324.12	324.12
qLighting	0.00	0.00
qTransmissic	-1727.10	-1727.10
qMixing	0.00	0.00
qVentilation	-205.18	-205.18
Sum	0.00	0.00
tOutdoor me	7.8	7.8
tOp mean	21.4	21.4
AirChange/h	1.8	1.8
Rel. Moisture	39.1	39.1
Co2(ppm)	522.6	522.6
PAQ	0.4	0.4
Hours > 21	5010	5010
Hours > 26	41	41
Hours > 27	15	15
Hours < 20	2418	2418
FanPow	103.64	103.64
HtRec	1933.19	1933.19
ClRec	0.00	0.00
HtCoil	335.84	335.84
ClCoil	0.00	0.00
Humidif	0.00	0.00
FloorHeat	0.00	0.00
FloorCool	0.00	0.00
HeatPump	0.00	0.00
HeatPumpE	0.00	0.00

Simulation results, for 25 m² (with cooling system)

With a cooling system the requirement of less than 25 hours above 27°C is reached.
In particular, for the 15 m² living unit the are 13 hours above 27°C and 49 above 26°C, for the 25 m² they are respectively: 15 and 41 hours above.
Also the air change is now lower, than the previous simulation, this can guarantee less cold air inside the dwellings during winters, but in case of uncomfortable aeration a mechanical ventilation should be activated.

The introduction of a cooling system and a mechanical ventilation during some days in summer, can generate an encrease of energy.
However some further consideration needs to be regarded.

The whole design has indeed to be considered. The calculation just taken alone does not give an exact understanding of the indoor experience.
Indeed it has to be considered the disposition of the dwellings in their whole modular grid: this allows the creation of movement in facade. The movement is guaranteing shaded areas, which are avoiding direct sun during some periods of the days, and according to the orientation of the slabs, in the wind direction, wind suction areas are created, as well as a variation of its motion and thereby a varied aeration. The summer ventilation strategy depends on the wind force and the wind pressure in the rooms, and therefore is not the same all over the years

Furthermore, considering the sever climate, of this site, during winter their disposition on south, south west and south east, guarantees both a good daylight factor and avoid a considerable use of heating.

At last considering the temporality of these houses for a specific target of people, their time routine needs to be taken into account, and expecially the fact that they are mostly using their living units as a private and sleeping shelter. While they are going to spend a great amount of time in common and working areas. The society who is living there is indeed a society in motion, a society which does not have time to be sedentary, rather needs to do its great effords to find as soon as possible a fix job settlement and thereby a new home.

Saying that, the quality of the inside doesn not have to be undervaluated, that is why technical requirements were considered.

Further graphs comparing the two simulations can be found in the attached CD.

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http://blog.socialcast.com/e2sday-freelance-at-a-glance/
http://www.freshbooks.com/blog/2011/07/12/infographic-why-do-people-become-free lancers/
[ill.11] own picture, Biennale di Veniezia 2006
[ill.12] Le Corbusier, La Ville Radieuse, 1933
http://eliinbar.files.wordpress.com/2011/04/radiant_20city_img_1.png
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http://www.fabiofeminofantascience.org/RETROFUTURE/broadacreA.jpg
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http://workjes.files.wordpress.com/2008/01/clusters-in-the-air.jpg
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http://4.bp.blogspot.com/_II7vB6Rfop8/SopQMOyXbfI/AAAAAAAADrE/S9LGM9ceDys/s1600-h/nakagin-4.jpg
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[ill.18] Peter Cook, Archigram, Plug-In City, 1964
http://www.archigram.net/projects_pages/plug_in_city_8.html
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http://www.archigram.net/projects_pages/plug_in_city_4.html
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ref. The Whole House Book, ecological building design and materials _ C. Harris and P. Borer
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[ill.38] Lundgaard & Tranberg, Tietgen Kollegiet, København, 2006
http://www.e-architect.co.uk/images/jpgs/copenhagen/tietgen_dormitory_lta070708_cjenslindhe_1.jpg
[ill.39] Aart a/s, Bikuben Student Residences, København, 2003-06
http://www.e-architect.co.uk/images/jpgs/copenhagen/bikuben_student_residence_aart190107_1.jpg
[il..40] Henning Larsen Architects, IT University, København, 2000
http://game.itu.dk/cig2010/wp-content/uploads/2009/12/3-central-atrium.jpg
[ill.41] Arkitema, KUA2 (Købenavns Universitet Amager), 2010-13
http://www.cphx.dk/files/upload_2/20090921_154513_Fremlaeggelse_25022209_arkitektur_1.jpg

[ill.46] Stephane Malka Architecture, Poket of Active Resistance, 2010
http://www.stephanemalka.com/en/2010/05/auto-defense/
[ill.47] Stephane Malka Architecture, Poket of Active Resistance, 2010
http://www.stephanemalka.com/en/2010/05/auto-defense/1.jpg
[ill.48] Moshe Safdie, Habitat 67, Montreal, 1967
http://traubi.com/blog/wp-content/uploads/2010/03/habitat67-montreal.jpg
[ill.49] Moshe Safdie, Habitat 67, Montreal, 1967
http://www.norving.se/wp-content/uploads/2011/06/hab67assemb.jpg
[ill.50] Moshe Safdie, Habitat 67, Montreal, 1967
http://cac.mcgill.ca/safdie/habitat/images/matrix-images/original/hab67-section.jpg
[ill.51] Le Corbusier, Le Cabanon, Roquebrune, Cap-Martine, France, 1952
http://www.woodindesign.com/wp-content/gallery/lecabanon/Le%20Corbusier%20-%20Le%20Cabanon%206.jpg
[ill.52] Le Corbusier, Le Cabanon, Roquebrune, Cap-Martine, France, 1952 _ module
http://jucalou.over-blog.com/article-34649030.html
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http://www.athenaeum.ch/photos/2009b/cabanon2.jpg
[ill.54] Jagnefalt Milton, Rolling Masterplan, Åndalsnes, Norway, 2010
http://www.jagnefaltmilton.se/rolling1.jpg
[ill.55] Jo Nagasaka + Schemata Architecture Group, Paco Cube, 2009
http://www.designboom.com_cms_images_ridcue_sche01.jpg
[ill.56] HVDN Architecten, Qubic student house, Amsterdam, 2003-05
http://farm4.static.flickr.com/3195/3004867178_04d2503cba.jpg
[ill.57] MVRDV, Student Residences, Amsterdam
http://imgs.abduzeedo.com/files/archi/archi-day-mvrdv/cancer.jpg
[ill.58] Space Box, Utrecht, 2004
http://www.spacebox.nl/index.cfm?lng=nl&mi=3&pmi=8

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[ill.59]Living, Frontiers of Architecture, Louisiana Museum of Modern Art, pag. 50-51
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THE IDEATION

[ill.61] Junya Ishigami + Associates, Institute of Technology Workshop, Kanagawa, Japan
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http://inhabitat.com/wp-content/blogs.dir/1/files/2010/07/new-612.jpg
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http://birgittejm.files.wordpress.com/2011/08/ottetallet1.jpg
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http://www.supermanoeuvre.com/blog/wp-content/uploads/2010/04/sanaa.jpg
[ill.85] Weiss/Manfredi, Barnard Nexus, New York, 2003-09 _ section
http://www.archdaily.com/97256/the-diana-center-at-barnard-college-weiss-manfredi/section-diagram-2/
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[ill.101] MVRDV + Blanca Lleó, Mirador, Madrid, 2005
http://24.media.tumblr.com/9bW8l6j4mpe2ozjlokjmPwNxo1_500.jpg
[ill.102] OMA, Ascot residence, Ascot UK, 2003
http://www.elcroquis.es/media/photos/Magazines/134_135/Ascot.jpg
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[ill.104] Sanaa, Kitagata Housing, Japan, 1994-2000
http://www.japan-photo.de/D-GIFU-KITAGATA-APARTMENTS59.jpg
[ill.105] Herzog & De Meuron, Helvetia extension of head office, St.Gallen, Switzerland, 1999-01
http://www.herzogdemeuron.com/index/projects/complete-works/151-175/168-helvetia-south-and-east-wing/IMAGE.html
[ill.106] Farshid Moussavi Architecture ,Housing for Jardins de l'Arche, Paris, 2011
http://static.dezeen.com/uploads/2011/10/dezeen_Housing-for-Jardins-de-l%E2%80%99Arche-by-Farshid-Moussavi-3.jpg
[ill.107] own drawing _ north slab, south facade
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[ill.109] OMA, Chu Hai College, Hong Kong, 2009
http://oma.eu/contentimages/projects/2009-CHU-HAI-COLLEGE/Chu-Hai-chc-render-mat_big.jpg
[ill.110] Ewha Woman University, Seul, 2009
http://www.e-architect.co.uk/images/jpgs/korea/ewha_candremorin_dpa_adagp_7.jpg
[ill.111] Ewha Woman University, Seul, 2009
http://www.e-architect.co.uk/images/jpgs/korea/ewha_candremorin_dpa_adagp_1.jpg
[ill.112] Junya Ishigami, Kanagawa Institute of Technology, Kanagawa, 2008
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[ill.113] Junya Ishigami, Kanagawa Institute of Technology, Kanagawa, 2008
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Lotus 137, I Saloni
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http://www.martinoberghinz.eu/files/gimgs/48_nowhere-now-here01.jpg
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http://www.imagehosting.me/photos/medium/43371-5e35gzzt3yg6x45f93rs.jpg
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http://card.zenazone.it/sconti_genova/wp-content/uploads/2011/01/porto_antico2.jpg
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BOOKS & APHORISMS

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[Bernard Tshumi 1]
Melbourne radio show, The Architects.
[Saskia Sassen]
Unsettling Topographic Representation, in Sentient City by Mark Shepard, pag.182-189
[Mark Shepard 1]
Sentient City, ubiquitous computing, architecture, and the future of urban space, pag.10-14

[Peter Sloterdijk]
Living, Frontiers of Architecture, Louisiana Museum of Modern Art, pag. 50-65
[Carr]
Sentient City, ubiquitous computing, architecture, and the future of urban space, pag.8
[Rem Koolhaas]
Sentient City, ubiquitous computing, architecture, and the future of urban space, pag.18
[Zhongjie Lin]
Kenzo Tange and the Metabolist Movement, Urban Utopia of Modern Japan, City as Process, pag.1-6
[Kisho Kurukawa]
From the Age of Machine to the Age of Life, 1959, offprint by Arca 219
[Hadas Steiner]
Systems, Objetcified, offprint by Sentient City, ubiquitous computing, architecture, and the future of urban space, pag.38-45
[Bernard Tshumi 2]
Architecture and Disjunction, 1975-90, pag.28-33

PROJECT DELINEATION

[Vinoo Kaley]
quoted in Rajni Bakshi, Bapu Kuti: Journeys in Rediscovery of Gandhi, New Delhi, 1998
[Michael Hardt and Antonio Negri]
Multitude: War and Democracy in the Age of Empire, 2004
[Julia Pointer, youth volunteer, Detroit]
Dana's Mystical Tunnel: Young People Designs for Survival and Change in the City, by Myrna Margulies Breitbart
[Gifford Robert]
Environmental Psychology, principles and practice, 2002
[Moshe Safdie, Habitat 67]
http://www.habitat67.com/concept_en.html
[Finn Junge Jensen. Rector of Copenhagen Business School]
theme meeting at the UBST

THE APPROACH

[Vicente Guallard]
Sociopolis, project for a city of the future
all the other pictures are author made

WEB, ARTICLES & BOOKS

PROBLEM STATEMENT

[web 1] http://it.wikipedia.org/wiki/globalizzazione
[web 2] http://en.wikipedia.org/wiki/Multinational_corporation
[web 3] http://it.wikipedia.org/wiki/Gestione_della_catena_di_distribuzione
[web 4] http://logistics.about.com/od/supplychainintroduction/a/strategy.htm
[web 5] http://en.wikipedia.org/wiki/Global_workforce
[web 6] Sloan Foundation _ http://wfnetwork.bc.edu/glossary_entry.php?term=Global%20Workforce,%20Definition(s)%20of&area=All
[web 7] BusinessWeek _ http://www.businessweek.com/magazine/content/08_04/b4068034072937.htm?chan=magazine+channel_in+depth+-+davos+special+report
[web 8] Towers Perrin _ http://www.towersperrin.com/tp/showhtml.jspurl=global/publications/gws/index.htm&country=global
[web 9] 2007 Global Workforce Study _ Key Facts and Figures .pdf
[web 10] http://www.towersperrin.com/tp/showdctmdoc.jsp?country=global&url=Master_Brand_2/USA/Press_Releases/2008/20080220/20080220.htm&country=global
[web 11] http://en.wikipedia.org/wiki/Freelance_marketplace
[web 12] http://www.themanager.org/Resources/Freelancer.htm
[web 13] Julie Gebauer and Don Lowman, in Closing the Engagement Gap _ http://www.towersperrin.com/gap/index.htm

[art.1] Global Workforce Study, 2007, Towers Perrin HR Services
[art.2] Internet Marketplaces for Freelancers _ www.themanager.org/Resources/Freelancer.htm
[art.3] Why do people become freelancers? _ http://www.freshbooks.com/blog/2011/07/12/infographic-why-do-people-become-freelancers/
[art.4] Freelance at a Glance _ http://blog.socialcast.com/e2sday-freelance-at-a-glance/

[Peter Herrle]
Architecture and identity by Peter Herrle, Metabolism 1960: The proposals for a New Urbanism, pag.92-96
[Mark Shepard 2]
Sentient City, ubiquitous computing, architecture, and the future of urban space, pag.16-37
[Bernard Tshumi 2]
Architecture and Disjunction, 1975-90, pag.3-23

PROJECT DELINEATION

[Peter Mortenbock]
Network Cultures, Parallel Architectures and the Politic of Space _ Peter Mortenbock and Helge Mooshammer
[Gabriel Dupuy]
Urban Networks-Network Urbanism _ Gabriel Dupuy _ Techne Press 2008
[Breakout!]
Situating knowledge work in contemporary public spaces, Breakout! Escape from the office
[David Benjamin & Soo-in Yang]
New interaction partners for environmental governance, Amphibious Architecture
[Poul Bæk Pedersen]
Sustainable Compact City _ Poul Bæk Pedersen _ 2009
[Edward Ng]
Designing High-density cities, for Social & Environmental Sustainability _ Edward Ng _ 2009
[Cindy Harris & Pat Borer]
The Whole House Book, ecological building design and materials _ Cindy Harris and Pat Borer _ 2005
[Varis Bokalders & Maria Block]
The Whole Building Handbook, How to Design Healthy, Efficient and Sustainable Buildings _ Varis Bokalders and Maria Block _ 2004
[Le Cabanon]
Living, Frontiers of Architecture, Louisiana Museum of Modern Art, pag. 38-39
[Judith Thomsen]
Student housing, student homes? Aspects of student housing satisfaction _ doctoral thesis at NTNU, 2008.
[UGC]
Student Residence_ University Grants Committee, Department of Education and Science London, 1967 UTILE PER PIANTE MINIME 6865U

[web 14] World Bank Report _ http://www.doingbusiness.org/rankings
[web 15] Ørestad _ http://www.orestad.dk/da-DK.aspx?sc_lang=en
[web 16] Leading Companies _ http://www.copcap.com/content/us/doing_business/copenhagen_locations/copenhagen/leading_companies
[web 17] habitat '67 _ http://www.habitat67.com/concept_en.html

[art.5] Copenhagen Growing, The story of Ørestad

THE APPROACH

[BR, 2008] http://www.sbi.dk/br08/6/5/2
[miljorigtigtindeklima, 2011]
http://miljorigtigtindeklima.dk/arkitekt/miljorigtigt-indeklima/termisk-indeklima.aspx
[BR, 2010] http://www.ebst.dk/bygningsreglementet.dk

[art.6] European Collaborative Action, Indoor Air Quality and its Impact on Man, report 11, 1992

[Container Atlas]
Container Atlas, a practical guide to container architecture, Slawik, Bergmann, Buchmeier,2010