Adaptive City
The Chronicle

The Chronicle is a first, evidence based inventory of why the city should adapt, what can change, who can initiate change, when it will adapt, and how it could be more adaptable. Since the Adaptive City is everywhere, we chose our first meeting location to record our findings.
Why do we need adaptive city?

The Chronicle

frustrations, limitations, and conflicts

Statement

As global population increase, our cities become perpetually larger. As such, there are inefficiencies in spatial usage, spatial qualities, environmental factors, population and demographic changes, real-estate, and economic factors that would benefit from 'The Adaptive City'.

Find another way up because the door at the top of the stairwell denies access to the roof.

There are many activities in this area...

From outside it may look empty…but inside it's full!

Don't let the empty buildings fool you.

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Look hard because they obstacles aren't always physical.

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Look hard because they obstacles aren't always physical.
Just look at the rules of the city, they are all around us. Let’s take back our city!

I wouldn’t have to go up these stairs every time!!

If the bins? There is so much rubbish around!

Why can’t I cross the road here, because the tram in the middle of the street blocks the way.

Looking for a shortcut through this courtyard, I could have a picnic here!

Wish there were a shortcut through this courtyard.

The city should have an empty courtyard where I should be a door.

Look hard because the obstacles aren’t always physical.

The city shouldn’t have stereo, where there is too much noise from the balcony in autumn!

Don’t let the empty buildings fool you.

Every locked door and gate, empty sidewalk, and confusing signs are examples of inflexibility.

Now, let’s point out some of the obstacles you may encounter.

Notice how we rely on outdated notions of division of space.

Even as mornings get sunnier and warmer, the courtyard remains enslaved to its locked gate.

Notice how we rely on outdated notions of division of space.

Even renovating my own house requires permits and planning permissions.

The rules, the signs, the obstacles are diverse and overwhelming.

Why is there no access to the street!!

The city shouldn’t have a door, where there is no direct access to the street!!

There is nowhere to eat close by.

Why can’t I have a picnic here!

The city should have a shortcut, where it is blocking the lane.

I wish I could get to my car from theft?

Wish there were a shortcut through this courtyard.

I wish I could work in this unused shop.

Don’t let the empty buildings fool you.

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The city should have access to the street!!

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Don’t let the empty buildings fool you.

Every locked door and gate, empty sidewalk, and confusing signs are examples of inflexibility.
Just look at the rules of the city, they are all around us. Let's take back our city! The rules, the signs, the obstacles are abundant and overwhelming. Even renovating my own house requires permits and planning permissions. So what are some of these invisible problems?

\[\text{Conclusion}\]

The Chronicle highlighted the problems of a static city and the areas where adaptation could be of benefit. Though, more question were raised as a result:
- How can the city adapt?
- Why does the city need adaptation?
- What in the city needs to be adapted?
- When do these elements need to adapt?
- Who can initiate and who can hinder adaptation?
What if?

This is an initial exploration of the potentials of initiating the design of The Adaptive City from each of the 5 lenses without considering the implications of the used lenses.
What if ‘The Adaptive City’ was...

The Possibilities
exploring ideas for ‘The Adaptive City’

Statement
This collection of collages is a first attempt at envisioning ‘The Adaptive City’ in the test ground of Rotterdam without any limitations. It explores the endless possibilities from the first point of encounter with the test ground.

- We could frame and protect sitting areas
- We could have smart adaptable trees
- We could have flexible pop-up stores
- We could park anywhere we want.
- We could access to real-time information.
- We could hide roads when we don’t need them
- The road appears when I need it so I can drive along
- We could even live without roads…
- We could use the roads as signage
- We could avoid parking by sharing pods.
- We could only live in leisure.
- We could have access to real-time information.
- We could move our entire interior
- We could make the courtyards more accessible
- We could have a smart illuminated surface
- We could have personalized shopping
- We could physically adapt the space to the user
- We could bring our interior climate along
- We could have movable pots
- We could have resizeable residences
- We could have an adapting building skin
- We could use the roads as signage
- We could provide a virtual experience
- We could have smart illuminated surface
- We could have self movable trees
We could frame and protect sitting areas
We could have smart adaptable trees
We could move the courtyards
We could have flexible pop-up stores
We could park anywhere we want.
We could have access to real-time information.
We could hide roads when we don't need them
We could bring our interior climate along
We could have performative vegetation
We could use our furniture as a vehicle
We could ignore a grid system
We could shop online in public spaces
We could work anywhere we wanted.
We could use the roads as signage
The Adaptive City is everywhere, so why not start here?
We could have an adapting building skin
We could have resizeable residences
We could even have buildings move so that we're always at our destination.
This collection of collages is a first attempt at envisioning 'The Adaptive City'.
Exploring ideas for 'The Adaptive City' was always park in front of my parking adapts so I
leave for my tram because my smart phone informs me of the tram's location.

This is a very quiet and comfortable zone
The location of the road
always adapts to my need for shade
I can work anywhere.
I can spend all my meeting rooms.
temporary
I see a market
I move from rooftop to rooftop
The courtyard to access it
I see a market
The building automatically adapts to my specific needs
This store adapts
The Trees adapts to provide shade
automatically adapts to my specific needs
I am with people
illuminates based on the amount of surface
This statement unlocks the potential for endless possibilities.

The transport network adapts to where I want to go.
We could access public transportation from any location.
We could move the courtyard.
The façade transparency adapts to my desires.
The transport network adapts to where I want to go.
We could have an adapting building skin.
We could move the courtyard.
The Adaptive City is not one adaptation but a multitude of adaptations at different scales and speeds.
In our vision, The Adaptive City is everywhere, so why not start here?
Follow us as we explore the area and point out some of its peculiarities.
Who, why, what, when, how?
We could frame and protect sitting areas

We could have smart adaptable trees

We could have flexible pop-up stores

We could have adaptable leaves

We could park anywhere we want.

We could have access to real-time information.

We could hide roads when we don't need them and appear when I need it so I can drive along.

What if 'The Adaptive City' was always park in front of my destination.

The leaves of the trees adapt to provide shade when I see a market.

The Possibilities

The location of the trees automatically adapts to my need for shade.

The location of the courtyard adapts to my needs.

The transport system adapts to where I need one. The tram stops at my location! The transport network adapts to where I want to go.

This automated parking adapts so I always park in front of my destination.

We could avoid parking by sharing pods.

We could use our furniture as a vehicle.

We could shop online in public spaces.

We could move our entire interior.

We could make the courtyards more accessible.

We could have performative vegetation.

We could ignore a grid system.

We could only live in leisure.

I can spend all my time for fun because my droid does all the work.

This automated parking adapts so I always park in front of my destination.

We could move our entire interior.

We could have personalized shopping.

My room illuminates based on my movement.

This surface adapts to my specific needs.

The location of the trees is adapted to the users need and climatic conditions.

This automated parking adapts so I always park in front of my destination.

The transport network adapts to where I want to go.

The tram stops at my location!

We could access public transportation from any location.

On Sunday the 24th of March, we met in Rotterdam at the Westepaviljeon, at the intersection of Matheneserlaan and... City is everywhere, so why not start here?

Follow us as we explore the area and point out some of its peculiarities.

Conclusion

In our vision, The Adaptive City is not one adaptation but a multitude of adaptations at different scales and speeds unlocking the potential for endless possibilities. In 'The Adaptive City' every surface or the entire urban landscape responds to its inhabitants desires.
Dissecting the city processes into 4 ‘lenses’, each exploring the complexity of the city from a different angle.
Tool
The ghosted image
The ghosted image layers different moments (still images) into a single image. The tool is used for each of the 4 lenses in a different way. The logic of how the images are overlayed, changes from lens to lens.

Why
In the ‘why’ lens, the ghosted image shows how variation of dominant drivers leads to different adaptations. It exposes how adaptive our cities need to be in order to respond to multiple drivers with multiple design solutions in the same location.

What
In the ‘what’ lens, the ghost overlays different states of the same element, responding to different drivers, collective needs and individual desires.

Who
In the ‘who’ lens, the ghosted image highlights and overlays the different agents which are related to the adaptation of an element in the city.

When
In the ‘when’ lens, the ghosted image functions as an analogue camera, exposing the different timeframes of adaptation.

The ghosting technique is used by all 4 lenses. The logic of how the images are overlayed changes from lens to lens.
Why does the city have to adapt?

Drivers of the city

Why? Research Question

Why does the city have to adapt?

Statement

The first volume of this research investigates and catalogues the drivers, motivations and requirements that manifest themselves in the urban fabric.

Design solutions in the city respond either to individual desires or to collective needs. Neither of the two outweighs the other but they are dependent of each other!

Individual and collective interests can be collected and organized in a relation of ‘drivers’.

There is a multitude of those drivers and their value in the city constantly changes.

Current design solutions cannot respond to all of the necessary drivers at once. Therefore physical transformations are needed!
The current cities are full of conflicts since the urban designs can only consider the interests and desires of a limited amount of participants of the city. Should this courtyard be designed for the inhabitants of the surrounding residences, the occupants of the district or the citizens of the entire city? Should it be privatized for one individual? Clearly none of this options is fully convincing but an adaptive city could negotiate between individualistic desires and collective needs...

frustrations expressed by the users show the complex interrelation between drivers
Drivers for the city can be categorized in three groups: Resources, Place, and Human.
Relations between drivers are non-hierarchical. Each one can be temporarily dominant.
The courtyard fluctuates between private, collective, and public drivers. Opening a gate permits pedestrians to enter, take a swim in the pool, sell and buy at the temporary flee-market. Moments of a parking lot absorb vehicles, noise and danger from the roads. A highway extends the infrastructure network in the peak times of heavy use.
Conclusion

1. The design solution as a response to a needed driver can have many different forms depending on the setting.

   The addition of wind-turbines on a flat rooftop, solar panels on an inclined one, or hydro-power plants in the river responds to the demand for energy production.

2. The setting is composed of a set of elements. Every element is similarly incapable to adapt and requires a variety of design solutions. Therefore, no element can be prioritized for a driver!

   With current technologies, the temporary installation of wind-turbines on a roof is similarly impossible to the appearance of photovoltaic panels on an empty square during the hours of sunlight.

3. As such, all elements are interconnected the same as their drivers.

   Increased usage of rooftops for energy harvesting can temporarily free the urban squares from photovoltaic panels or vice versa.

   It becomes obvious that current design solutions cannot respond fast enough to all required drivers. Therefore faster forms of physical transformations are needed!
The second volume of this research catalogues and categorizes the elements, parts and pieces of the urban system that manifest themselves in the physical, urban fabric.

**Research Question**

What needs to adapt in the city?

**Statement**

Design solutions in the city respond to specific problems related to a set of elements that are materialized in the urban fabric. These elements can be categorized by their physical properties and their resistance to adaptation. There are multitudes of elements and sets that are linked together. Current design solutions provide specific adaptations to specific elements while ignoring the overarching system of the city.

### What?

**Elements of the city**
Since urban designs can only consider the interests and desires of a limited amount of parties, current cities are full of conflicts.

What if the elements of the city could adapt faster to different groups of users? A private balcony transforming into a public terrasse; a road that expands and contracts; continuously changing signage, targeting individuals and collectives...

Could elements of the city shift between responding to desires of individuals and a larger, collective need?

frustrations expressed by the users show the need for a constant transformation
The elements of the city can be distinguished into material and immaterial ones. Material elements are categorized into ‘Buildings’ (residences, offices, stores, terraces,...), ‘Courtyards’ (greenery, parking,...), ‘Transport elements’ (tram tracks, roads, pathways,...), ‘Vegetation’ and ‘Public utilities’ (Electricity network, street lighting, sewage system,...). Immaterial elements are categorized into parameters such as temperature, light, sound, and humidity.

All elements are not interrelated to each other to the same degree. The expansion of a road will affect its sidewalks and adjacent buildings but it will not affect the sewage system or internal courtyards of the buildings. Exploring the various levels of interrelation exposes which elements can be freely adapted and which ones require a more complex adaptation.
New forms of transport elements can improve the sound levels of the city and solve its parking issues.

Buildings can act as sound buffers. Sewage systems and water electricity networks have to adapt.

Immaterial elements show almost linear relations. Sound is primarily affected by vehicles and light by buildings. Greenery, temperature, and humidity change through modifications of buildings, weather protection, and vegetation.

Flexible electricity networks and water systems allow buildings to move and transform easily. Paths and roads can be rerouted in no-time.

Rapid changing signage in the city provides orientation in a network of constantly re-routed pathways. Shelters pop-up temporarily to protect from light, temperature, and humidity.

Courtyards can provide space for parking and free the roads. They can become green oasises of the city.

Intensified vegetation can create shade and increase air quality in the city.

New material elements can improve the sound levels of the city and solve its parking issues.
The courtyard fluctuates between private, collective, and public drivers. Opening a gate permits pedestrians to enter, take a swim in the pool, sell and buy at the temporary flee-market. Moments of a parking lot absorb vehicles, noise and danger from the roads. A highway extends the infrastructure network in the peak times of heavy use.
Conclusion

In the design process, after choosing drivers for the adaptive city, this investigation helps determine the corresponding elements of the city that need to adapt for a relative response in the drivers to be fulfilled.
Who?
Users, owners and regulators

The third volume explores relations between the actors of the city. It explores who uses the city, who owns it and who regulates it.

Research Question
Who uses, owns and regulates the city?
How many actors use an element of the city?
How would relations between users, owners and regulators have to change in order to enable a hyper-adaptive city?

Statement
The people who use the city are not the people who own it. ...
frustrations expressed by the users show the need for an improved negotiation between actors of the city.

conflicts between users, owners and regulators.

Since urban designs can only consider the interests and desires of a limited amount of parties, current cities are full of conflicts.

What if the elements of the city could adapt faster to different groups of users? A private balcony transforming into a public terrasse; a road that expands and contracts; continuously changing v, targeting individuals and collectives...

Could elements of the city shift between responding to desires of individuals and a larger, collective need?
The diagram combines data on owners, regulators, and users of elements with the amount of users per element. This gives a clear separation in the elements that can adapt to the specific needs of an individual and elements that need to adapt to multiple users. This defines the possibilities and limitations in how to deal with each element.

relation between actors in the city
The courtyard fluctuates between private, collective, and public drivers.
Opening a gate permits pedestrians to enter, take a swim in the pool, sell and buy at the temporary flee-market.
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This gives a clear separation in the elements that can adapt to the specific needs of an individual and elements that need to adapt to multiple users. This defines the possibilities and limitations in how to deal with each element.
The fourth volume extracts various scales of time out of the process. It relates the chronological intervals of occupancy in the city to a metric scale in order to expose the potential for reuse.

**Research Question**

*When can parts of the city adapt?*

*When and for how long are parts of the city obsolete?*

*For which time-frames do we design?*

**Statement**

More than 90% of the urban fabric is designed in a static way. But the intensity of usage of those elements is constantly fluctuating. By analyzing the intervals of low usage, patterns emerge! Different patterns of space usage can be recognized in a variety of nested cycles.

By understanding those patterns it is possible to identify potential locations and time-windows for adaptation.
time-conflicts of the city

Since urban designs can only consider the interests and desires of a limited amount of parties, current cities are full of conflicts. What if the elements of the city could adapt faster to different groups of users? A private balcony transforming into a public terrace; a road that expands and contracts; continuously changing signage, targeting individuals and collectives... Could elements of the city shift between responding to desires of individuals and a larger, collective need?

frustrations expressed by the users show the need for a faster response of the city
Processes of adaptation can only be measured and compared by observing them over time. The timeframes of change behave according to two different principles. Elements of the city transform in a soft manner periodically within cycles. A road adapts to the traffic within minutes by a change of state of its traffic lights. Periods of these states change from day to night and from weekday to weekend. A seasonal adaptation can be seen in the winter by the addition of gravel/salt in order to avoid people from slipping. However, drastic changes to the elements and modifications of the cycles do not repeat and can therefore only be described on a linear time-line. A redirection of a road, new technologies that replace the traffic lights and autonomously driving cars represent adaptations that the city will undergo once and that will not repeat.
Time scales need to be applied to metric scales to enable us to conclude on changes in the city. While structural adaptations can be observed the best on a large scale, behavioural adaptation and the transformations for an individual require a zoom-in into the city. By relating the various scales to different time-cycles clear patterns can be read. The adaptations of a sidewalk over the course of a day, an apartment throughout a year and of a metropolitan region over a decade...

...offer different insights into the invisible processes that underlay the city. Potential for intensification of the city can be discovered on each scale in a different way and would require different means of adaptation - from local to global.
Conclusion

1. Parts of the city hold a potential for intensification of usage on every scale.

   People use their apartment throughout 60% of the day. Offices and shops are used only for 8 to 12 hours a day. A building permit takes a full year on average. Political elections (and change) take place every 5 years.

2. Cities have reached a state where efficient densification can not solely be achieved by increasing amounts of square meters but rather by increasing space usage.

   If an office building is used 8 hours a day it could be reduced by two thirds of its size it was used 24 hours a day. Global operating firms and time-shifts between continents already demand workers to adapt away from the 9 to 5 day.
New high-tech communist society forcing space-usage quotas and taxing vacant private and commercial space per minute. First self-transforming space-machines constructed in Holland. City functions become dynamic, springing up in unused spaces. City blocks become dynamic models of changing functions which constantly becomes more efficient over time.

the loop repeats...
Can I design space with comfort/weather?

Should I design with the absence there off?
Tree structure

TROS WAAH MEUSEN
WONEN

SCHOOL: HUIS/TOREN.

UITGBREIDER. TYPES: (WONING)
+ IN TERZIE SCHODEN.
Tree structure
Tree structure
Hill structure
Hill structure
Street hills structure
Roman villa living

Outside shower.

Wouri N'zéao
Street 1304
Steep edge IN กรด

Roof catches water.

Voltage

Rain forest shower
Appartment living

Guiding theme:

1. Over-expressives.
2. Structure (content).

Bed under the stars.
Appartment living
Conclusions

Question
How would architecture change if we could deliver a ‘optimal climate’ on any place in any weather?

Part one, structure:
How would housing blocks/tower change to facilitate the ‘weather maker’s structure?

Part two, infill:
How would appartments/housing units profit from the absense of the need for a thermal barrier?

Structure
Any structure can quite easily facilitate the needed infrastructure to make the climate bubble from the weater maker possible

Infill
Living units ca be more freely configu-rated, but because the demand for privacy are still staying close to ‘normal’. More research is needed.
General design experiments
- Slaan op
- Ontkrek
- Slapen
- Openlucht
- Beschut tegen oorlog

Appartment
Question
How would architecture change if we could deliver a ‘optimal climate’ on any place in any weather?

Part one, sturcture:
How would housing blocks/tower change to facilitate the ‘weather maker’s structure?

Part two, infill:
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Structure
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