URBAN FLOwRA

design for an urban experiment in Vienna

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/ INTRODUCTION

"Faced with the necessity of building whole towns quickly, cemeteries of reinforced concrete - in which great masses of the population are condemned to die of boredom - are being constructed."
Constant Anton Nieuwenhuys

This project is a cross disciplinary approach to re-thinking the structure of urban spaces. It links current robotics technology with the idea of flexible urban space, unveiling the potential for new ways to engage with landscape in the urban arena. Driving this project is the desire to give the public different opportunities to move and interact within a public space.

Landscape is the one ephemeral and dynamic ingredient that can surprise and delight us in cityscapes that are dominated by fixed architectural forms and restrictive roadways. The pragmatic city infrastructure produces "leftovers" in the form of traffic islands, linear strips of lawn which hardly offer an aesthetic stimulation. These often trashed, crossed by desire paths, used as dog toilets, isolated and neglected or on the contrary - over-landscaped areas represent a high percentage of the city's green space. These spaces indicate on one hand a stagnated system that generates utilitarian greenswarding. But on the other hand they hint at a potential which this projects seeks to explore.

Urban Flowra is the design for an urban experiment in which the existing linear traffic structure of a public square in Vienna is radically transformed into a new interactive model. The existing "leftovers" of the square are turned into mobile green spaces, the *Flowra hybrids*, which move autonomously and interact with the pedestrians and the traffic. As a result a dynamic and constantly changing urban space emerges and engages the user into a playful interaction.

/ CONCEPT

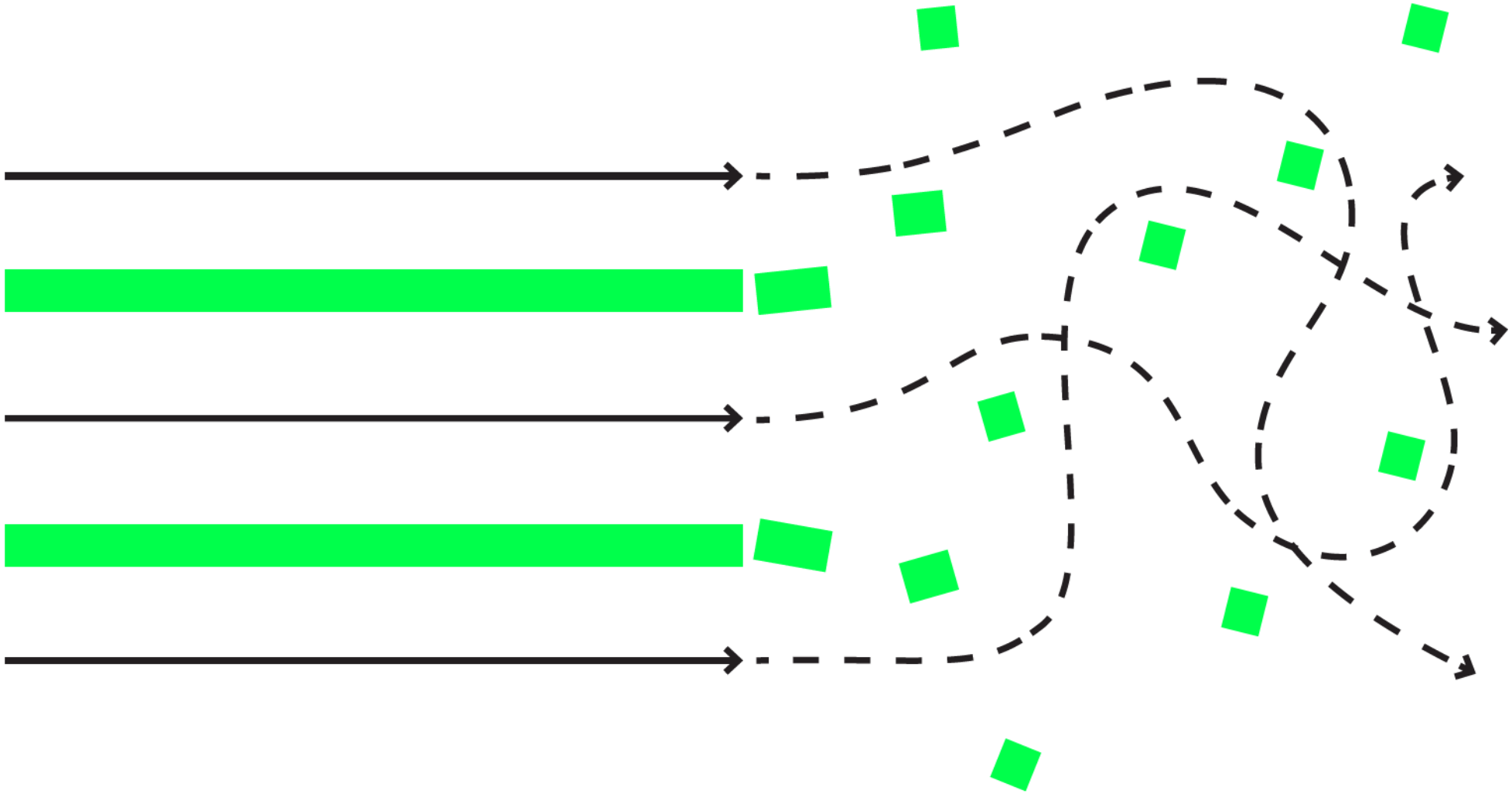
// Everything flows, all is in motion

The environment isn't static but it is a process we are being part of. All is in motion, it's a fact, but at various speeds. Everything surrounding us is moving, even plants or the dull appearing strips of green leftovers. Yet not as hyperactive as we humans. Time-lapse photography opens the perspective to landscapes, constantly moving and changing, but it is difficult for us to perceive this on an everyday basis. This discrepancy in speed can be traced logically also in space - even the cities we build and inhabit can hardly adapt to our fast pace. Even though they are being providently planned according to statistical interpretations of the near future, the result is often a poured-in-place, a stagnated image of a wrong prediction. An example would be the already mentioned "leftovers"or the "carefully planned" green areas, crossed with desire paths.

These observations made me question the way our traffic system, the way we move are planned - streets or squares are demarcated into straight lanes for walking, driving, cycling; crossings have predetermined priority. Instrumental pragmatism dominates everyday urban life and the design of city spaces. The pedestrian walking on the straight lane, with plugged earphones, staring at a smart phone reflects a stagnated system, where every actor is an isolated entity, perceiving as little of his surroundings as possible.

Henri Lefebvre sees the "cities as a projection of society on the ground"(Kofman, Lebas, p. 109). Would a change in the city also naturally reflect in the society? Or as Buckminster Fuller once said, "I would never try to reform man—that's much too difficult. What I would do was to try to modify the environment..." (in an interview with the New Yorker in 1966)

Looking at the "leftovers", a product of a stagnated system, I recognized a potential of reorganizing spaces merely by switching them from passive to active traffic entities. The result will be a space, where everything moves - no boardwalks, no lanes, no static islands. Linear and hierarchical order structures are dissolved, everything is flowing.



// Aim

The aim of my diploma is to develop a design for an urban experiment for a public space in Vienna, which comprises leftovers. The means of the experiment are to dissolve the existing structure of the space and transform the static green areas into autonomous mobile participators in an interactive model of circulation. The intent is to strengthen the awareness of interrelations (action-reaction) in the environment and the perception of its dynamic behaviour by engaging the user in a playful relationship with the public space.

// The Urban Flowra Experiment

/// Test Site

From my study of public spaces in Vienna (see p. 30), which comprises isolated green areas, or "leftovers", I will be considering one representative example in detail. This will be the Mozartplatz in the 4th district of the city.

Mozartplatz has an area of 1239 m2, 302 m2 of which currently are green area.

/// Shared Space

Shared space is currently a much tested urban design principle for reducing the demarcation of urban spaces and blurring priority rules which consequently brings about a reduction of speed and increased awareness of all traffic participants.

In the *Urban Flowra* experiment I am adopting the shared space principle of homogenizing the speed of pedestrians and vehicles, but also expanding it by adding the green spaces to the circulation as automated smaller entities, autonomously mobile and equal to the user actors. By removing the established traffic regulations, control will be displaced, allowing "a more complex ensemble of interacting parts (...) in a feedback loop with one another". (Shepard, p. 162)

Mozartplatz, Vienna

/// A Simple Rule of Motion

The spatial distribution of plants is roughly determined by two factors - unoccupied space and optimal thriving conditions. The new principle of motion, which will be established at the test site Mozartplatz, will follow the same rules of distribution.

The test site of the experiment, Mozartplatz, covers an area of 1239 m2, a quarter of which is green space. The green area will be divided into smaller autonomously mobile entities - the *Flowra hybrids* - which will distribute themselves over the whole Mozartplatz. These hybrids will move according to other actors (pedestrians, cars, etc.) within the test site. For example, if a car approaches, the *Flowra hybrid* will accordingly move away from it and towards the next free space, allowing the car to pass. If the *Flowra hybrid* enters the reactional radius of another *Flowra hybrid*, the latterwill react in the same manner and trigger further chain reactions.

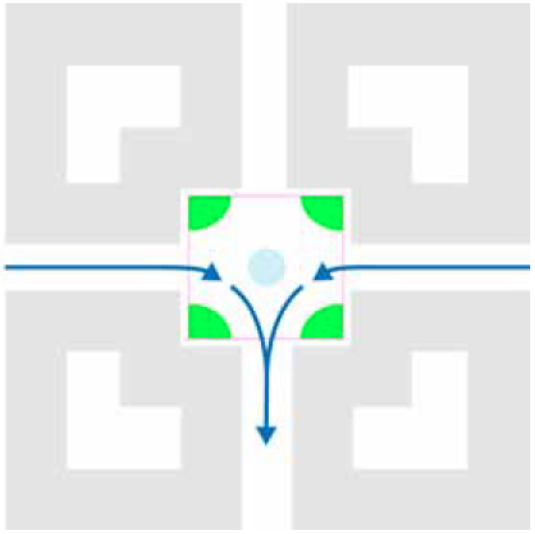
Action-reaction is the one simple rule of interaction in the *Urban Flowra* experiment. It allows the actors to choose their own path through the space and develop their own strategy for moving.

Priority isn't predetermined, control is eliminated. A simple rule resolves the segmentation and the stagnated circulation on the square. A playful urban space emerges.

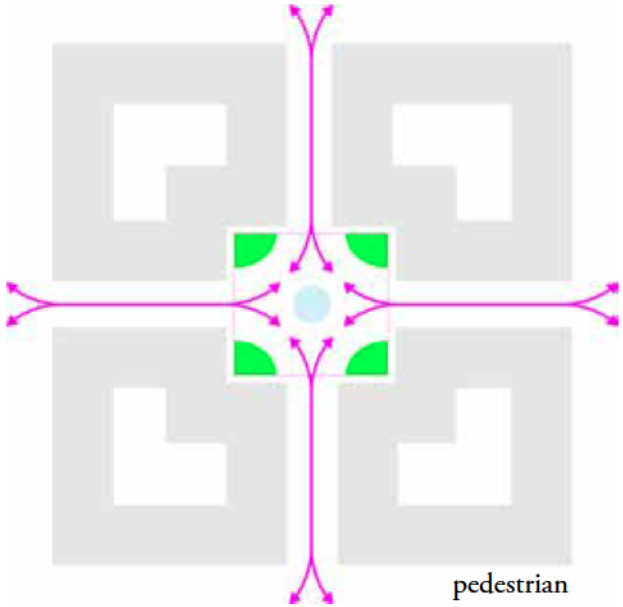
/// A Playful Urban Space

The playful interaction will transform Mozartplatz into a ludic urban space. This approach allows the elements of surprise and unexpectedness - "an acceptable and desirable risk"(Borries, p. 333). The square becomes unique through its ephemeral and hybrid nature - a space where organic rhythms become visible and interfere with the linear path of everyday life. Play as a method is "more powerful and adaptable than conventional engineering techniques"(Borries, p. 338). It allows "evolutionary and self organizing dynamics". (Borries, p. 343)

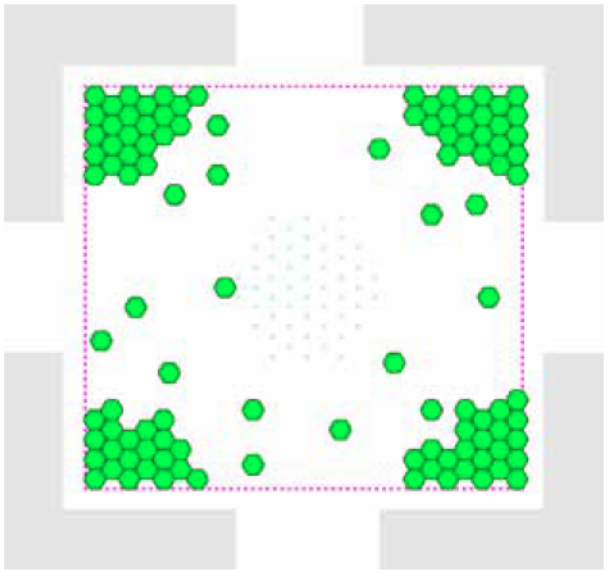
Urban Flowra is an experiment of experiencing. The users' intuition and intellect are stimulated, while passing through Mozartplatz. They actively construct the space in a spontaneous and intuitive manner and also develop their own strategies of movement. These strategies may be guided by the wish to interact as little or as much as possible with the *Flowra hybrids*. As a result, various patterns of motion will emerge and disappear, depending on factors like time, number and type of actors.



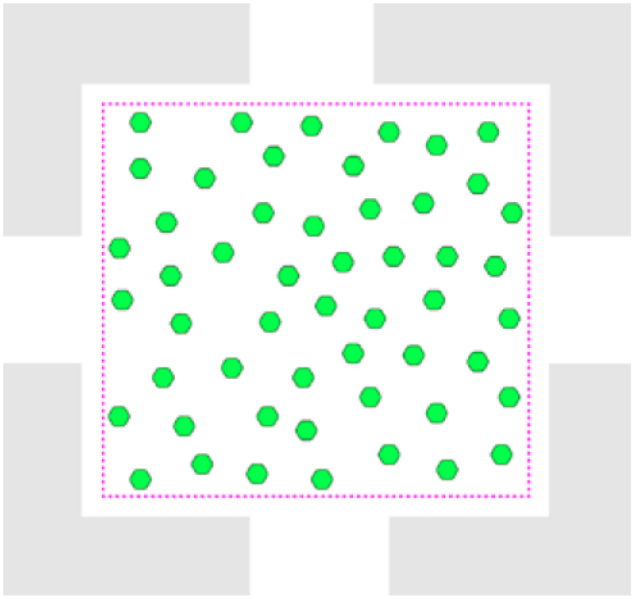
Mozartplatz: traffic



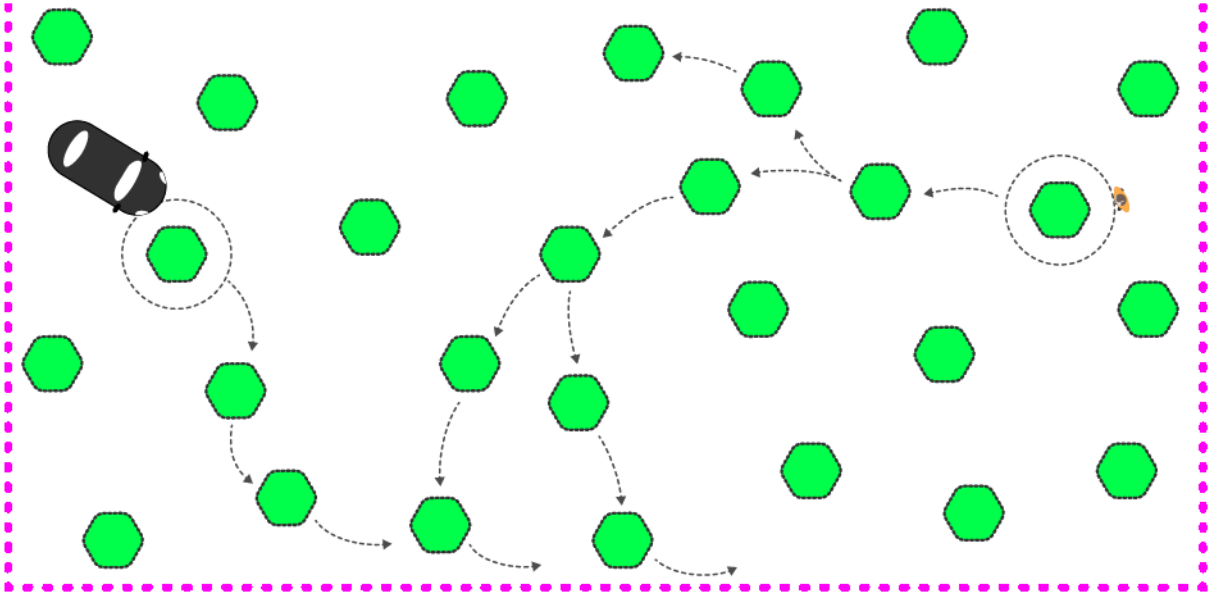
pedestrian



dissolving the existing



the new Mozartplatz



chain reactions

/// Patterns

The patterns, formed by the *Flowra hybrids* on Mozartplatz, are the data generated by the experiment. The space will be continuously monitored - patterns will be traced and the information processed and evaluated. With time, analysis of the patterns will give insight within time of any changes in behaviour of the users and can be an argument in favour of or against the established system of planning similar public spaces.

/// Augmented Space

Mobile devices like smart phones, enable individual tracking of interaction. The motion patterns can be brought back as personal feedback to the user by accessing the virtual dimension. The space becomes "multidimensional" - an augmented space - and its potential to evolve on a personal level is activated.

/// Duration

The longer the experiment takes place, the further this approach can be optimized and more far-reaching results and observations can be retrieved.

"The movement that is the game does not end with the achievement of some goal,
but rather renews itself in constant reiteration"
H.G. Gadamer, 1960

/// Outcome

The questions I am pursuing with this experiment are:
What will be the natural response of the public?
Will people try to follow the former traffic system even though it no longer exists on the test site?
Or will they embrace the new dynamics of Mozartplatz?
How would a change like this in urban space be reflected in social and political relations?
How would such an experiment influence our psychogeographical perception?
I expect that the answers of these questions will inspire future design strategies for urban spaces.

I am aware of the discrepancy between the present paradigm - the striving for the fastest, easiest and most obstacle free way of reaching a goal - and the concept of *Urban Flowra* - to consciously perceive the surroundings with every step, instead of rushing blindly towards a destination.

If people wouldn't be willing to adapt to the new dynamic scheme of Mozartplatz, it would naturally become an obstacle, a place they would avoid.

I believe, however, that the intuitional response of the user to the playful character of the space will be one of interest and curiosity.

/ DESIGN

In this section I will give a detailed overview of the design process for the *Urban Flowra* experiment.

// Motion Study

The motion study consisted of different attempts to better understand the complex dynamics of the space produced by very simple rule of interaction. It began as a type of board game simulation which then necessarily evolved into a computer simulation. The computer simulation is a useful tool to analyse the test site and to illustrate the interaction. It gives insight to potential problems and solutions. For example, one can easily adjust the number of interactors and analyse the consequent situations.

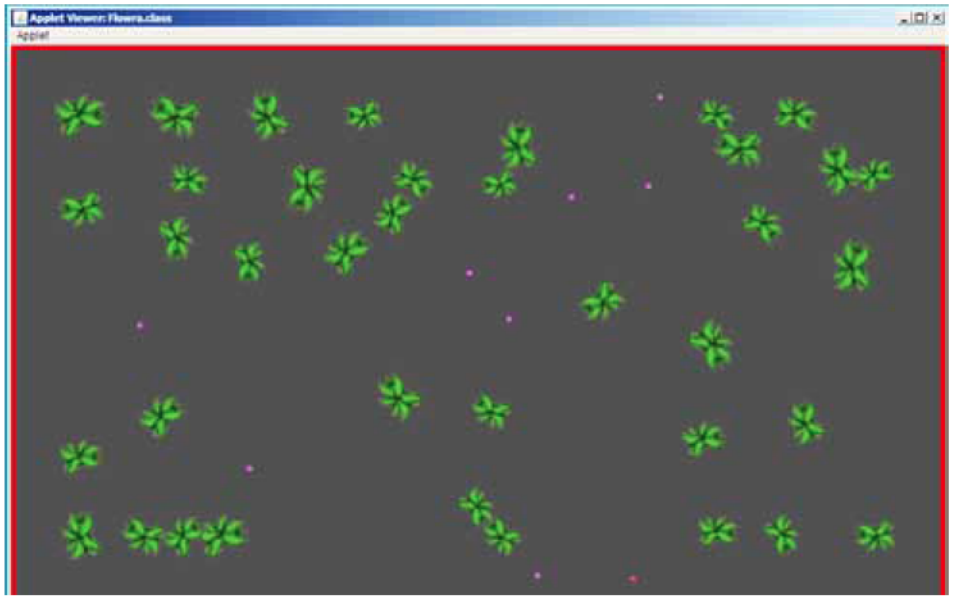
However, the computer simulation is just a tool and not the experiment itself. Although programmed behaviour may seem natural, it is an interpretation. It can never fully correspond to behaviour emerging during real interaction. This is simply because human reactions are the result of spontaneity, emotions and playfulness, which cannot be programmed. Therefore it is necessary for the experiment to be set up in reality.

// Shape Study

The main functions of the shape of the *Flowra* is to carry the plants and the technology, protect them, be energy efficient and water permeable. Therefore a key factor was to design a lightweight shell, that is able to withstand being hit without breaking or causing damage to others.

I went through different options, inspired by the following shapes and structures:

+ succulents - show various ways of protecting themselves from the environment
+ fungi - have porous and intelligently developed tissue
+ corals - have an exoskeleton which holds the soft body of the coral
+ pollen - carry and protect the genetic material of a plant
+ plant cells - the hexagonal shape of the plant cell walls provides structural support



motion simulation

sea urchin

succulent

funghi

The pattern of interconnected cell walls out of harder but permeable material, which enclose a softer substance became the guiding principle for the design of the *Flowra* shell.

With the help of the Voronoi method for tesselation, I generated a cell structure over a hexagonal base shape for the shell. The borders of the cells became the frame of the shell enclosing a space with softer "bubbles" which keep the shell light and shock-proof.

// Material

/// Frame

The frame of the *Flowra* needs to be made of firm but flexible and unbreakable material such as hard rubber.

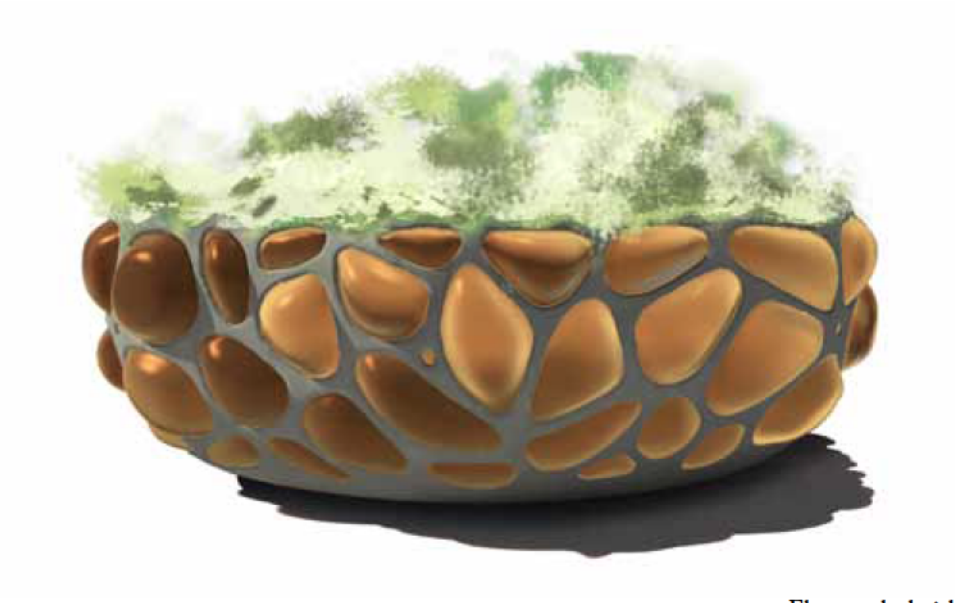
/// Bubbles

The enclosed bubbles are meant to be a lightweight bumper. Therefore, they are to be manufactured out of an inflated membrane which can withstand a collision. There is a wide range of elastic membrane-like materials, even self-healing ones (e.g. elastomers). Tests need to be run before the right choice is made.

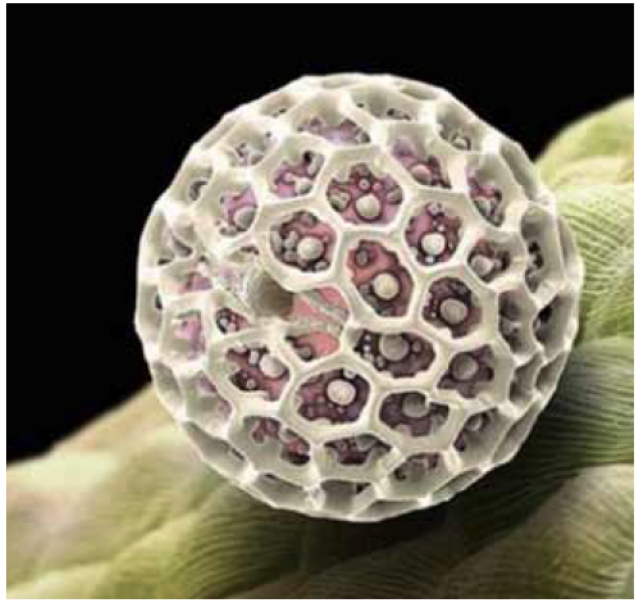
The bubbles should glow in the night. In this way the objects will be well visible during night time. This will reduce the need for lighting on the square and create a unique atmosphere.

// Plants and Behaviour

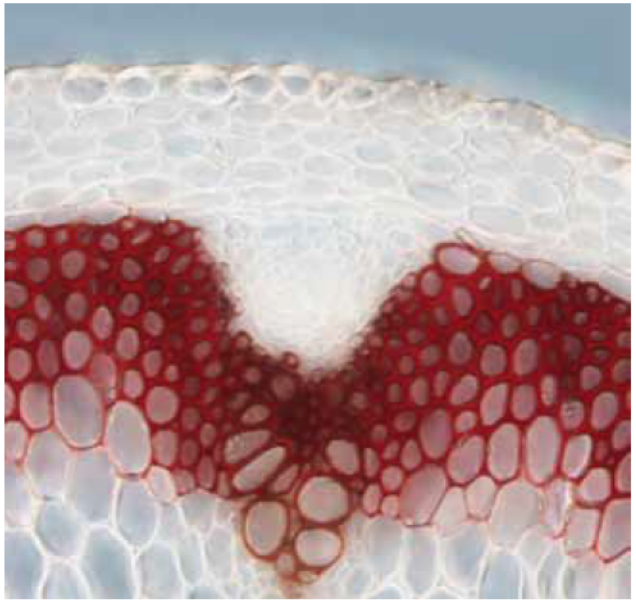
The plants are the main component of the *Flowra hybrid*. They define the character and behaviour of the hybrid. The chosen plants are of two types - shade-tolerant and sun-tolerant plants. The idea behind this choice is to optimally distribute the hybrids in the space. Each hybrid will have a self-monitoring system which helps it seek an optimal location within the square, according to the needs of the plants.



Flowra hybrid



pollen



plant cells in section

plant cells in section

/// Circadian and Seasonal Rhythms

The *Flowra hybrids* also follow the logic of plants' seasonal and circadian behaviour. They will be active during the summer and overall warmer months and hibernating during cold and wintertime.

Daytime is playtime, while nighttime will be a passive phase which is also the time for processing energy and irrigation. The passive phase means the *Flowras* will gather together in a static formation on the central part of the square.

// Energy, Charging, Irrigation

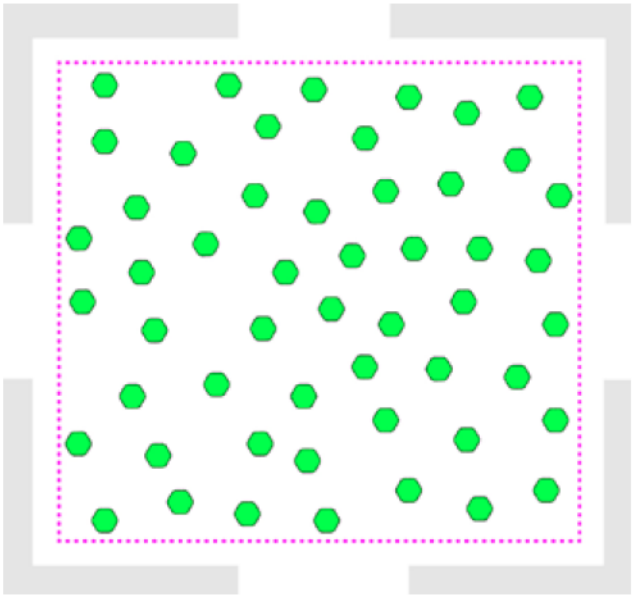
The energy for the *Flowra hybrids* will be fed into the network during daytime from solar panels placed on the roofs of the surrounding houses. During night time the hybrids will be retrieving the energy from the network through wireless inductive charging. To achieve this, special surface spots will be needed at the central part of the square, where the hybrids will be hibernating at night.

Irrigation will also take place during night time. The *Flowras* will have access to water through connector spots on the ground while in hibernation mode.

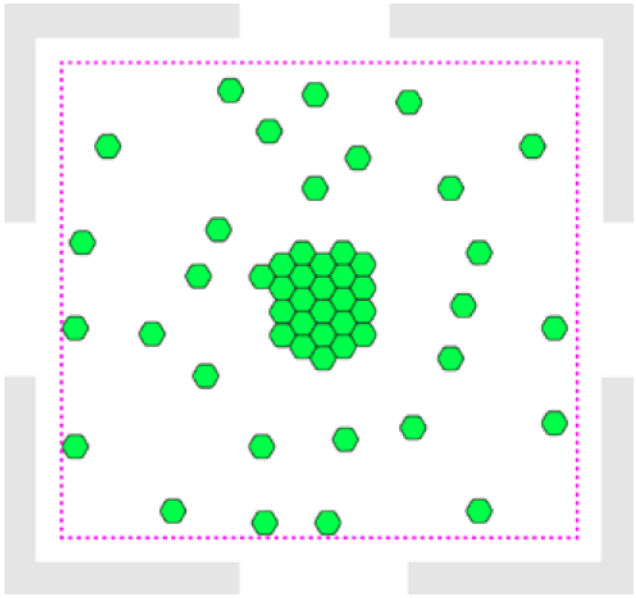
// Sensorics

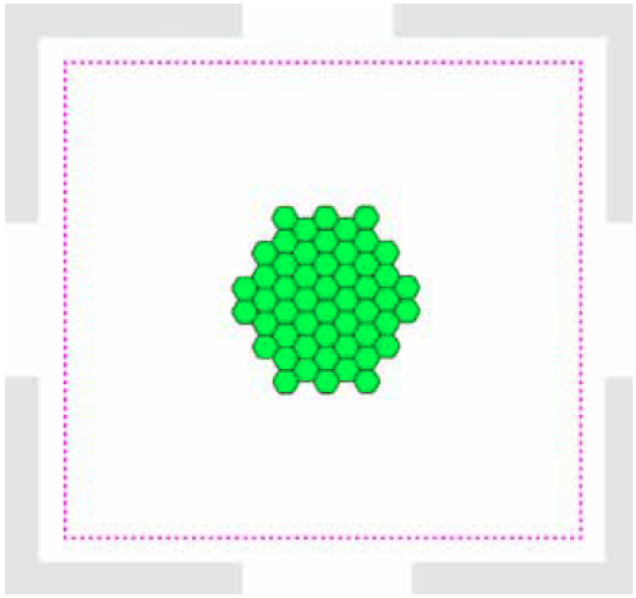
For the *Flowra hybrids* to be able to sense their environment and interact accordingly, ultrasound sensors will be needed. They will be measuring the distance between the *Flowra* and the surrounding objects. Their reaction will be triggered at a certain radius. If something enters their reactional radius (e.g. 2m), they will try to move away.

Sensorics give also make it possible to recognize one's own kind which allows a hybrid to behave in a special way towards other hybrids, hence to get closer to each other, than the reactional radius.



Mozartplatz: day time





Mozartplatz: night time

/RESEARCH

// The Movement of Plants

Plants are in constant motion, but they live on a time-scale that is different from ours. They are developing, searching for light and nutrients, avoiding predators, exploiting neighbours and reproducing. With the tool of time-lapse photography we can observe and study the secret life of plants.

The following kinds of movements of plants can be observed:

+ germination
+ general growth
+ blossoming
+ seed dispersal
+ tropisms - directional movements in response to an environmental stimulus like sunlight, gravity, chemicals, water, temperature, contact.
    - phototropism - the movement of plants towards sunlight, e.g. sunflower.
    -thigmotropism - climbing plants like vines and morning glories coil around a support. Their tendrils spin around until they contact another object and then twine around it.
+ nastic movements - non-directional movements in response to environmental stimuli like touch, light, darkness, temperature, water, chemicals.
    - thigmonasty - response to touch, e.g. mimosa pudica or the “touch me not” plant folds its leaves when touched or shaken. Other examples are carnivorous plants like the Venus flytrap.
+ circadian responses:
    - sleep movements - closing of flowers, repositioning of leaves
    - growth - dark phase of photosynthesis increases the water intake during night time, increasing turgor pressure in the cells, hence growth.

thigmonasty: mimosa pudica

phototropism

thigmonasty: drosera capensis

thigmotropism

/// Gilles Clément

Around 1985 Gilles Clément, famous french gardener and landscape architect, developed the concept of the garden in movement (le jardin en mouvement). Fascinated by the dynamics of nature his core philosophy was to support its autonomy. In his vision the gardener should actively maintain movement, aiding nature rather than enacting rigid plans. Clement's approach is to keep the fluidity of a landscape, let it evolve over time in a nearly autonomous way. He doesn't plan the final result of a project, but rather creates a plan of action for systematically maintaining the garden's growth.

"Plants travel... Unthinkable landscapes are already being designed in the sky."
Gilles Clément

// Play as Design Approach

In this section, I would like to point out some works which are based on the concept of a game and/or the activity of playing and have been important references for the Urban Flowra project.

/// SpaceFighter

SpaceFighter is an interactive multi-player game model which generates and explores chains of planning processes. The project seeks to simulate the production of space through time-based competitive urban developments. The aim of this game is to excel in scenario making by means of an interactive evolutionary model.

SpaceFighter was developed by Winy Maas in collaboration with the Delft School of Design, the Berlage Institute in Rotterdam, cThrough in Eindhoven and the MIT Department of Architecture in the years 2005-2006.

Gilles Clément

/// Constant Nieuwenhuis

Constant Nieuwenhuis (1920-2005) is a prominent Dutch artist-architect who also participated in the CoBrA and Situationist International movements. Between 1959-74 he designed an utopian city megastructure called "New Babylon" which was inhabited by Homo Ludens - Man the Player. Labour is automated and people live a nomadic life, free to play, explore and create.

"Any restriction of the freedom of movement, any limitation with regard to the creation of mood and atmosphere, has to be avoided." Constant

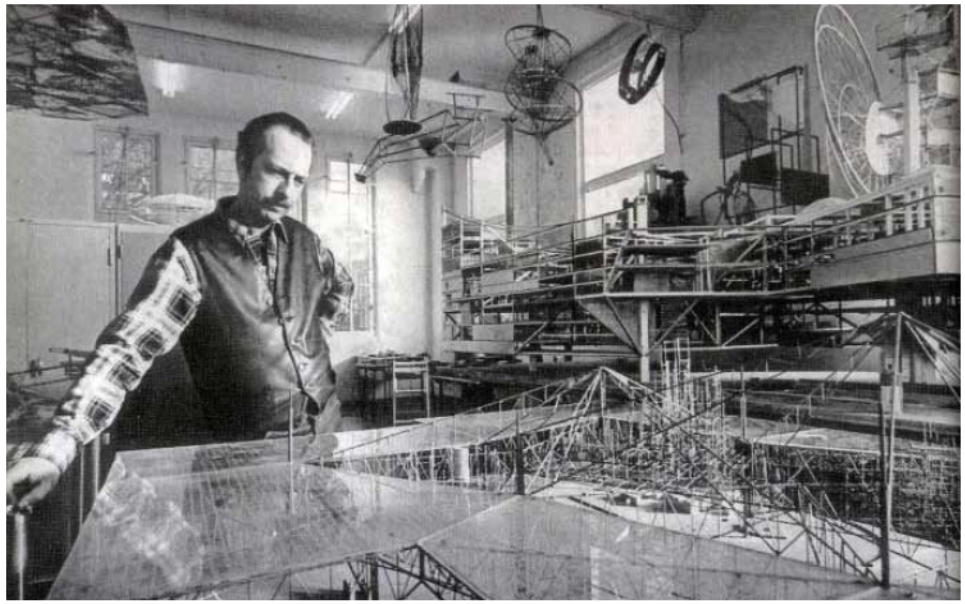
/// Buckminster Fuller

In the 1960s the famous inventor Buckminster Fuller proposed the concept for "The World Game". The game was supposed to be a design tool for a scientific approach to solving the problems of the whole world. By naming this tool a "game" he implied its accessibility to everyone. Continuous monitoring of the world would supply the latest data and statistics to the players. He stated the aim of the game simply:

"Make the world work, for 100% of humanity, in the shortest possible time,through spontaneous cooperation, without ecological offense or the disadvantage of anyone."
Buckminster Fuller

/// Pervasive Games

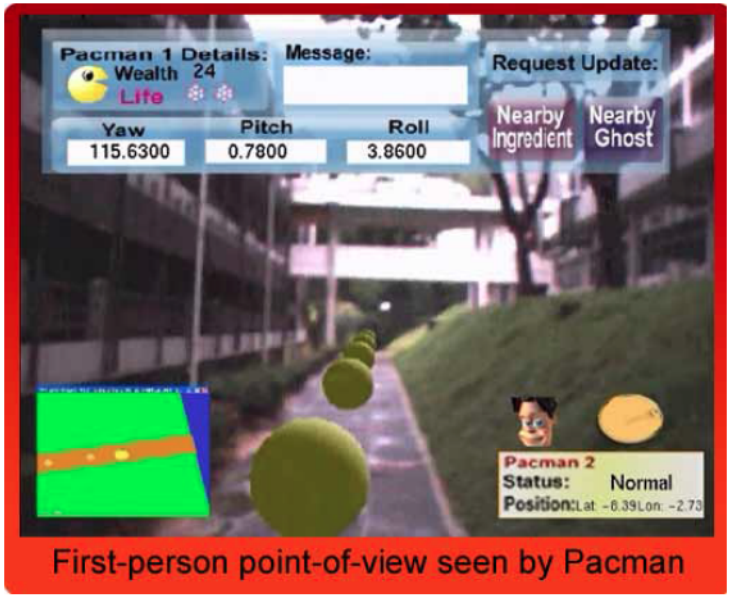
Game playing evolved in several phases in the last century. First with the computer, then the internet, and then with the increasing use of wireless and GPS technologies. The virtual dimension extended into physical space. They are also called alternate reality games, ubiquitous games, location-based games, "create an alternative, ludic reality" (Borries, p.11), and change the perception of the (familiar) urban realm. Through this blending of virtual and physical space the boundaries of the "magic circle"(defined by Johan Huizinga as the boundary of play) are blurred. (Borries, p.13)



Constant Nieuwenhuis

Buckminster Fuller

Can You See Me Now



Human Pacman

Here are a few examples of pervasive games:

+ Human Pacman, 2004 - an example of a classic computer game, mapped onto a real setting.
The player becomes the incarnation of his avatar.

+ Pirates!, 2001 - a game depending on social interaction

+ Can You See Me Now?, 2003 - a game of chase in which online players are being chased in a virtual model of a city, while the chasers are running through the actual city to capture them.

// Interactivity

/// David Rockeby

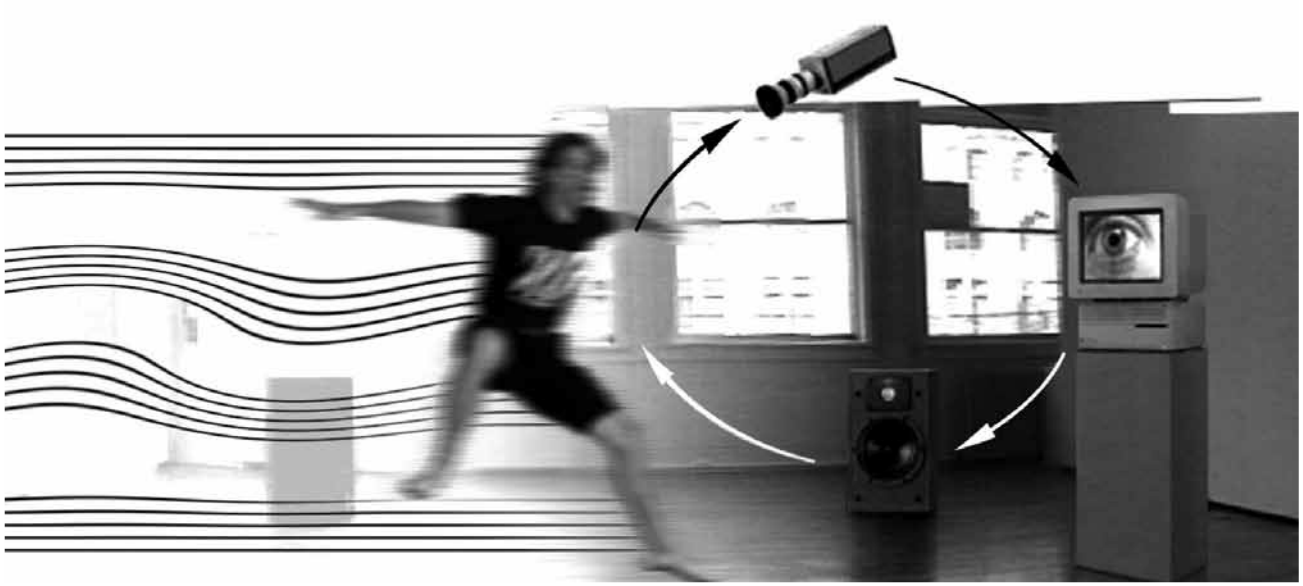
David Rockeby is an artist whose project "Very Nervous System" (1982-1991) is a notable work of interactive art. VNS is an installation where the interactor enters a feedback loop relationship with the system, while his gestures are instantly "mirrored", or to be precise, interpreted in sounds.

/// Scott Sona Snibbe

Scott Sona Snibbe is another artist in the field of interactive art. His work "Boundary Functions" (1998) is an interactive installation which deals with the question of personal space. When more than one person walk over an interactive surface, they are divided by a border line. The borders are generated though a Voronoi diagram which calculates the "personal space" on the surface according to the number of participants. The installation implies "that personal space exists only in relation to others, and changes without our control."(Snibbe)

/// Christa Sommerer & Laurent Mignonneau

The artist duo is acknowledged as pioneers in the sphere of interactive art. Their installations like "Interactive plant growing" deal with evolutionary systems in which an intuitive interaction like touch is transferred over a natural interface (e.g. a plant) onto a virtual object. Keywords such as: complexity, iteration, artificial life, evolutionary computing, autonomous systems, emergence, self-organization, network, open systems characterize their work.



David Rockeby: Very Nervous System

Sommerer & Mignonneau: Interactive Plant Growing

Scott Sona Snibbe: Boundary Functions

// Space Study Vienna

At the beginning of my work I studied public spaces throughout Vienna which contain traffic islands or green islands - “leftovers”.

/// Criteria

The criteria I considered in these spaces were as follows:

+ location
+ area and shape
+ “leftovers” - amount and condition
+ location
+ traffic - pedestrian, cycles, motor vehicles, public transport
+ mobility - terrain
+ accessibility
+ social and cultural activities

/// Examples

I have observed the following spaces with regard to the mentioned criteria.

+ 1. District
  - Albertinaplatz
  - Neuer Markt
+ 2. District
  - Ilgplatz
+ 3. District
  - Esteplatz
  - Sebastianplatz
  - Zehrerplatz
  - Juchgasse
+ 4. District
  - Mozartplatz
  - Favoritenstrasse / Gußhausstrasse
+ 5. District
  - Siebenbrunnenplatz
  - Zentaplatz
+ 10. District
  - Favoritenstraße / Sonnwendgasse
+ 12. District
  - Niederhofstrasse / Böckhgasse
  - Meidlinger Platz
  - Hufelandgasse / Theresienbadgasse
+ 15. District
  - Sparkassaplatz
  - Kriemhildplatz
  - Akkonplatz
  - Schanzstrasse
+ 20. District
  - Wallensteinstrasse / Nordwestbahnstrasse
  - Friedrich-Engels-Platz

Space Study Location Map

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