Workshops Day 1 – Maximization

Workshop I – Maximization

Introduction afternoon workshops

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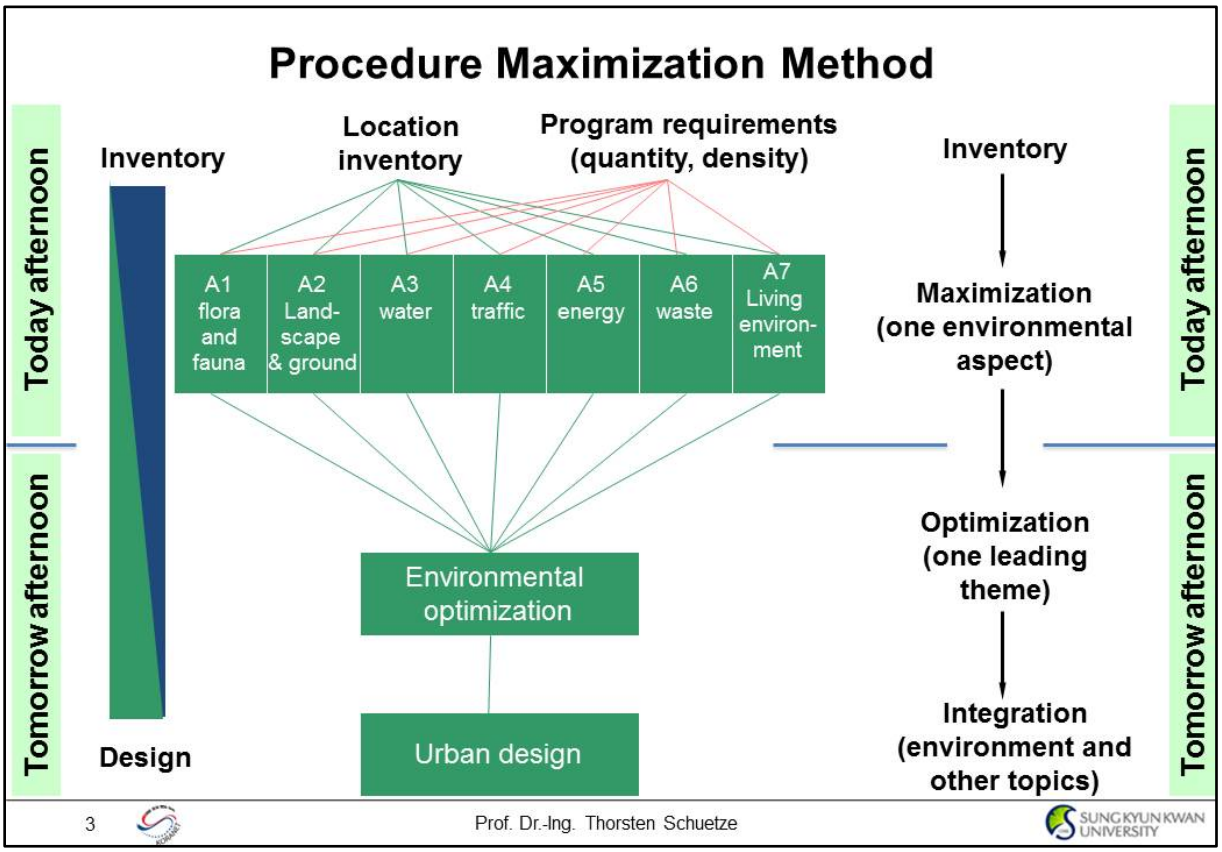
Introduction Maximization and Integration Method

- Method for complex planning tasks and urban design projects
- Clarifying the structuring influence of ecological themes and other topics in the design process.
- The method can be applied, using leading and structuring themes, such as:
  - **Energy**,
  - **Water/ sanitation,**
  - **Top soil, flora & fauna, landscape and ground**
  - Mobility/ traffic,
  - Material,
  - **Waste,**
  - Liveability, spatial quality
  - Happiness & health

2 Prof. Dr.-Ing. Thorsten Schuetze SUNG KYUN KWAN UNIVERSITY


Procedure Maximization Method
Today afternoon
Tomorrow afternoon
Inventory
Location inventory
Program requirements (quantity, density)
A1 flora and fauna
A2 Land-scape & ground
A3 water
A4 traffic
A5 energy
A6 waste
A7 Living environ-ment
Environmental optimization
Urban design
Design
Inventory
Maximization (one environmental aspect)
Optimization (one leading theme)
Integration (environment and other topics)
Today afternoon
Tomorrow afternoon
3
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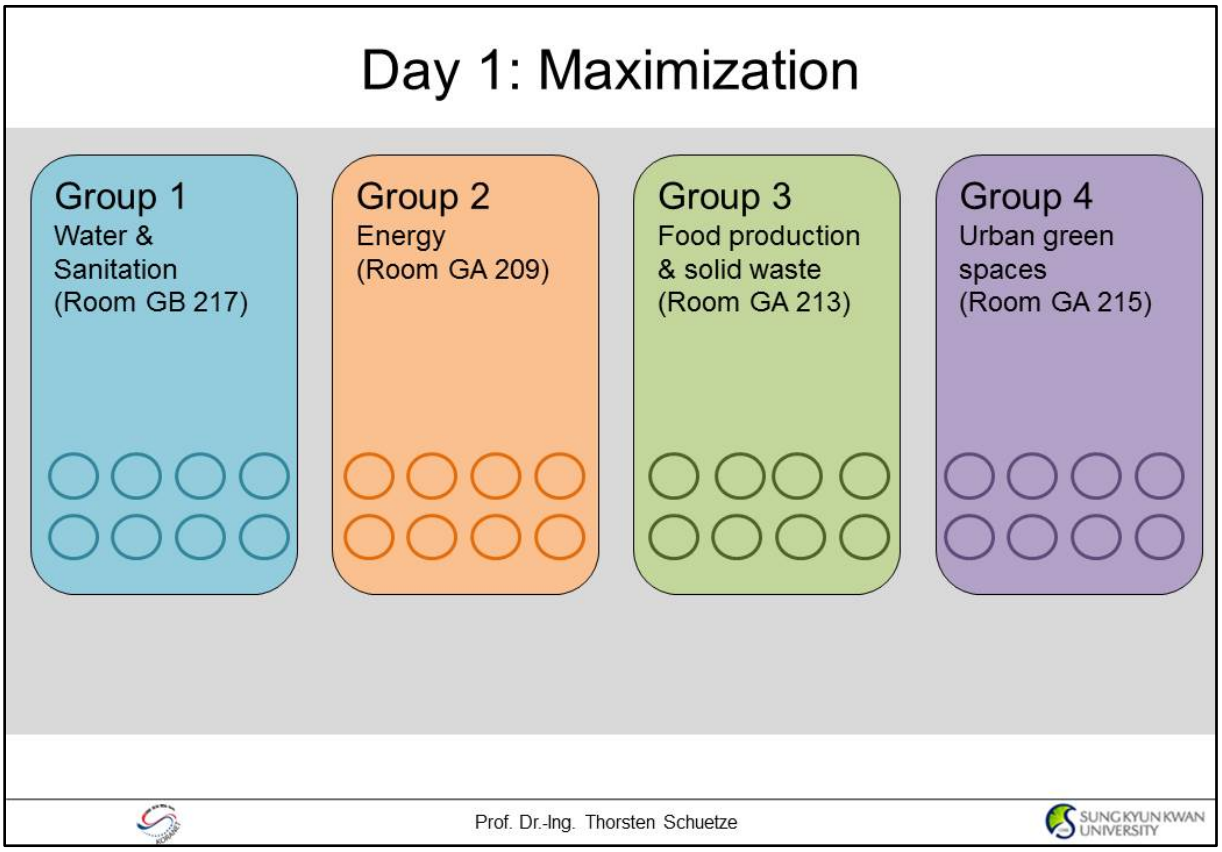
Day 1: Maximization
Group 1
Water & Sanitation
(Room GB 217)
Group 2
Energy
(Room GA 209)
Group 3
Food production & solid waste
(Room GA 213)
Group 4
Urban green spaces
(Room GA 215)
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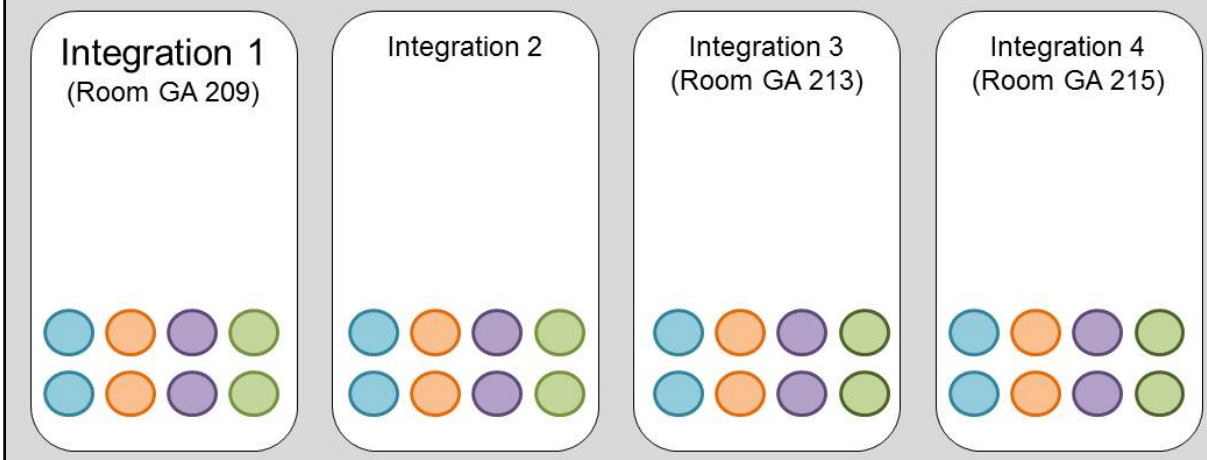
Day 2: Integration



Moderation: Andreas Schönborn
Protokoll: Kevin

Moderation: M. Regelsberger
Protokoll: Adrian

Moderation: Andreas Graber
Protokoll: Gabriel Gerner

Moderation: Thorsten S.
Protokol: Karin Frei

Thank you and good luck !

Minutes Workshop I – 21.08.14, ZHAW Wädenswil

Group: Energy

Moderator: Markus Hubbuch
Minutes: Adrian Kündig

Summary
The group followed a centralized approach where the moderator Markus was mostly speaking and the others listening, sometimes being consulted by Markus on topics of their knowledge.

14:35 Arrival/Organisation of material
Christoph starts conversation on the general topic
14:45 Main Topic: Building-shape, constraints given by assignment, Removal of old building, everyone agrees to remove it
Group dynamics: Markus is leading the discussion, mainly talking with two or three others about distinct topics. The rest is listening
15:00 Prof. Park remarks the limited amount of time
Group agrees to spend the first hour on layout and positioning of buildings, second hour on energy optimisation
15:20 Main Topic: Space constraints induced by the assignment, Christoph on above-ground parking.
15:30 Main Topic: Space constraints, Swiss regulations, no one seems to want to place the given paper buildings.
Prof. Park mentions time is running out
15:40 Main Topic: Swiss regulations restricting assignment
15:50 Main Topic Parking
16:00 Parking finished, Markus tries to shift topic to building shape by involving Ji-Eun but we actually agreed before to have coffee now
16:30 Main Topic: Photovoltaic, heat exchangers, thermal collectors, energy storage
16:49 Main Topic: Energy consumption/output

Calculations Energy Group:
Per boiler:
30 people:

- 1425 m^2 flat
- 388 m^2 commercials
- 12 kWh/m^2/a
- 21‘772 kWh/a heating
- 31'000 kWh hot-water
- PV = 6m x 40m

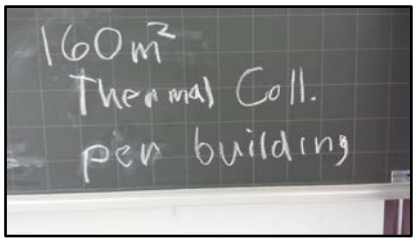
= 240 m^2→32 kWh→40 MWh/a

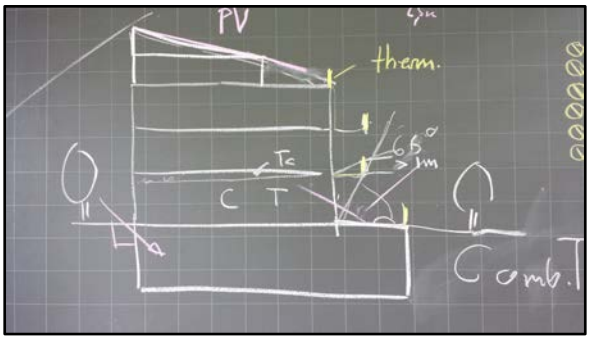
Energy group Presentation

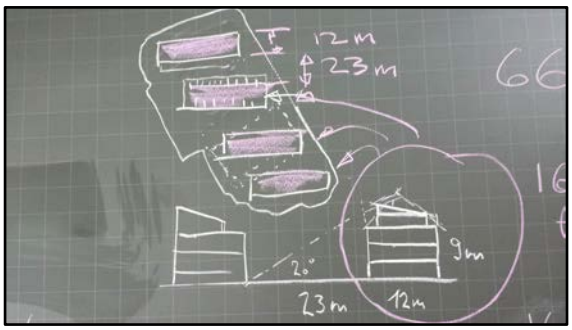
4 buildings, orientated toward south, 40m long and 12m wide, 23m away from the next building. In winter time the sun will still reach the ground floor. The buildings won't shade each other even in winter time. 3 full floors and a half floor with a bit of inclination.

The commercial units are on the ground floor, the garage is in the basement. There are thermal collectors on each balcony to generate hot water. Maybe vacuum tube thermal collectors.

Photovoltaics are situated on top of the building. Production: 12kWh/m^2/a, heating energy 21772 kWh/a and hot water 31000 kWh







Minutes Workshop I – 21.08.14, ZHAW Wädenswil

Group: Food Production & Solid Waste

Moderator: Andreas Graber
Minutes: Gabriel Gerner

Discussion:

- The whole parking space will be underground.
- Commercial flats will be built half underground to maximize the land use.
- Roofs will be used for food production / cultivation.
- All buildings will come to the northern part of the area close to the main street.
- Roof area ~7'300 m2, 15% commercial area and 55% flat area. 10'400 m2 total area.
- Less parking space, only 20%
- Less housings

Decisions:

- Close the loop on site, without including the sewage plant.
- Each flat will have a balcony. 200 m2 for balcony.
- Large leave trees on the south side in front of the houses provide shadow for cooling.
- Trees in pots for easy use und better mobility.
- Underground access to the house through the shopping mall to keep the space around the house for plants.

Vegetables/fruits:

- Horizontal growing: Berries, salads, herbs etc.
- Vertical growing: Fruit trees (apple, peach, pear, grapes, plum, apricot and cherry).
- Vegetables roping on stairs outside: tomato, cucumber, beans
- The first 3 m of the façade from ground level will be used for growth of climbing plants.

Numbers:

Nutrient demand by plants:

- We can grow on 5'400 m2 à 5 kg/m2/a = 27 t/a of vegetables and fruits. For this are needed nutrients:
  - 54 kg N/a
  - 5.4 kg P/a
  - 40 kg K/a.

Fertilizer from feces (440 persons):

- 17 m3/a feces produced by all person (30%) => 47 m3/a after composting.
- 5 cm layer for soil, in effect 2.5 cm/m2 = 25 L/m2. For this we can cover ~ 1'900 m2 of soil.

Fertilizer from urine:

- 250 kg N/a if 30% collected and 50% losses.
- 20 g N/m2 plant production per year => 12'000 m2 could be fertilized.

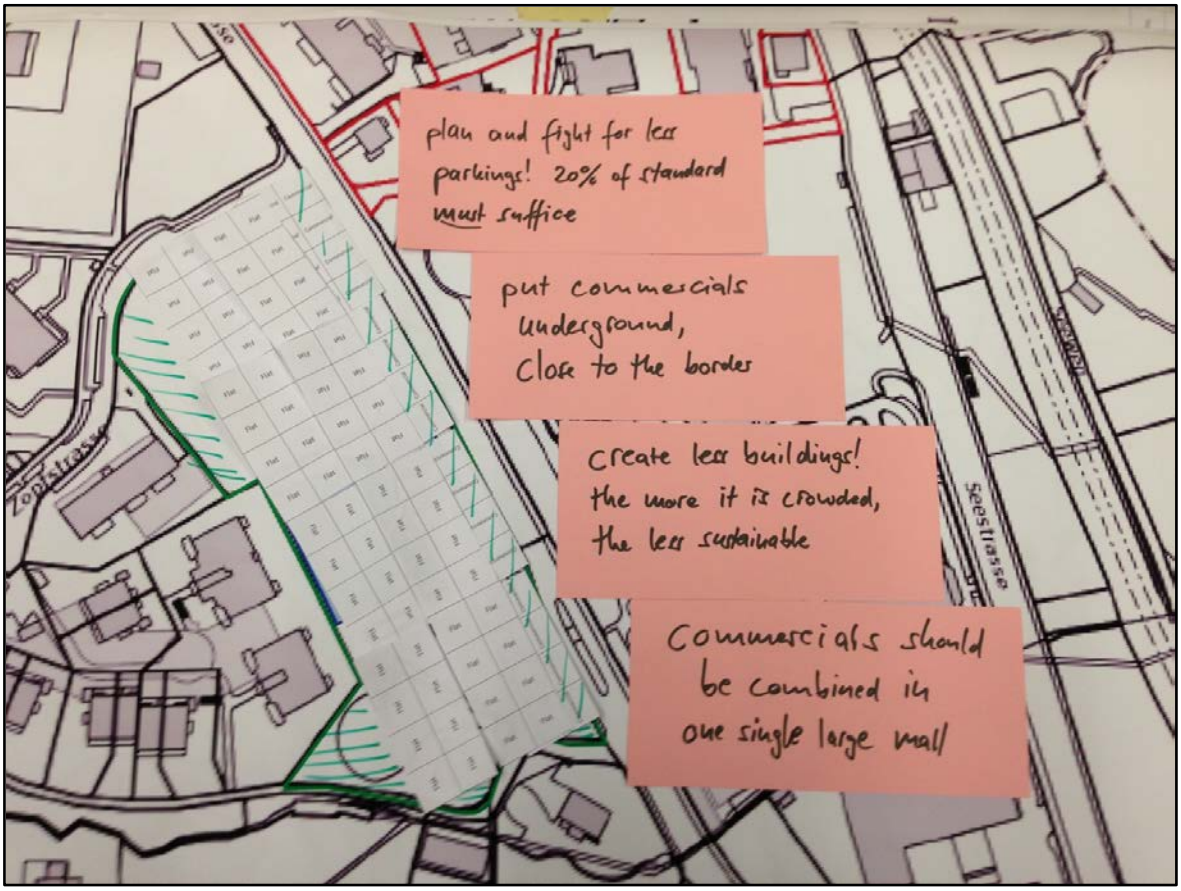
Food demand CH:

- 720 kg/person/a => for 440 person it will be 317 t/a.
- Supply from own production: 27 t/a = 8.5% of demand

Food group Presentation

The commercial units are combined in an underground mall, whereas the apartments are above ground. The access to the apartments is via the underground mall. The group decided on fewer parking spaces. Each flat should have a balcony. $1m^2$ is reserved for farming on the balcony and $1m^2$ for farming indoors. Farming also takes place on the façade and the roof – in total there is $5500m^2$ farming area. That is about 27t of food – fruit trees, vegetables, berries. Use vegetables for evaporative cooling. That is the potential. Normally we reckon with 140kg fruit and vegetables per person per year – 60t for all inhabitants. There will be $47m^3$ composted faecal matter to use for farming.


Zopfstrasse
Zopfweg
Im Gwad
Alte Landstrasse
Seestrasse


plan and fight for less parkings! 20% of standard must suffice
put commercials underground, close to the border
create less buildings! the more it is crowded, the less sustainable
commercials should be combined in one single large mall
Zopfstrasse
Seestrasse

Minutes Workshop I – 21.08.14, ZHAW Wädenswil

Group: Urban Green Spaces

Moderator: Thorsten Schuetze
Minutes: Karin Frei

Input moderator: The task is to develop the given site according to Zero Emission objectives. Our focus is the green spaces and their functions. Discuss which criteria the green structure should fulfil.

Inputs of the group members:

- enough green space
- the city has to be attractive enough so that people stay there even for leisure time
- as much green as possible, the quantity matters

Input moderator: What kind of green should the site have?

Inputs of the group members:

- as much biomass, green volume as possible
- native species, increasing the biodiversity
- open water → potential conflict
- as much as native vegetation as possible (forest)
- eatable landscape
- meeting places, accessible green
- green spaces which can be appropriated
- keep given values (existing trees …) use what exists and combine it with new green structures
- low maintenance
- permaculture
- terra preta

The moderator repeats all the „wishes“ of the group for the green space.

The moderator explains the conditions of the site according to the building laws.

The moderator instructs the two architects to start to scratch and make some suggestions.

Input moderator to the group: Collect now further arguments for the building concept.

Input of the group members:

- to put forest on the top of the building, a lot of soil would be needed, as well as water → conflict with low maintenance

Decision of the group members: Put trees on the natural ground.

Further points of discussion:

- Due to the problem, that in Switzerland more and more land is built up, the existing green area in the north of the site, that had never been built on, should stay unbuilt.
- only on one side houses, on the other side the green area
- Access problems: How can I get to the green place?
- Should social meeting places be public or private?
- A certain differentiation of access is needed.
- If the project is sustainable the places must be open for public as well.
- On the other hand, all these existing green places don‘t work because they cannot be appropriated.
- Use the existing building because of the grey energy in it and use all existing green spaces as green spaces.

The group starts to arrange the flat, commercial a parking units on the plan.

Input moderator: Is there an argument to keep the existing green area?

Input of the group members:

- the natural contact of the soil

Input moderator: Further ideas for the concept? How much of natural soil contact should be kept?

- Soil has a high value; we should keep at least a part of it.
- put the additional floors on the top of the existing building
- The first raw of houses close to the green space should be for living not for
- commercial and should have direct access to the green space.
- If we use the existing building, a light construction must be used, so it isn't
- possible to put a lot of soil on the top.
- Input moderator: What is the common sense for the existing building?
- If you take it away, you won't be able to build so close to the border anymore.
- Decision of the group members: We keep the existing building.

Input moderator: What should the basement of the buildings contain?

Input of the group members:

- Parking should be in the area of the existing building.
- There should be a layer of commercial rooms along the road, which protects from noise and some parking below the existing building.
- The destroyed area which is already built on should have more density, as the urban soil is already destroyed there.
- People might not want to live in a building where there is commercial as well.

Input moderator: How should the roof top of the existing building look like?

Input of the group members:

- Inside could be a small forest.
- This is too heavy for the existing structure.
- There should be plenty of boxes for vertical greening.

General awareness of the group: We are creating an urban center at an area which wasn't before an urban center.

Further suggestions of the group:

- The flats should be arranged like a puzzle and in the space in between there are trees.
- But this is not so efficient in terms of energy or density.

Input moderator: Think about the green. What kind of trees? Make a differentiation of the green, on the roof, at the façade…

Input moderator: To make people understanding the concept, it would be good to have a 3d design.

Decision of the group members: As there are too many housing, commercial and parking units, the group decides to reduce a part of the already arranged houses.

Input moderator: We make a summary of important points as there is no concept coming up:

- keeping the existing building
- increase the density by additional three floors on the top of it
- lightweight construction on the top
- existing natural soil should be improved by reforestation
- keeping as much of green spaces as possible

Further discussions for the green space:

- Does every flat has its own garden or should there be shared gardens?
- Public space or private space?

Decisions of the group members:

- **On the roof are private gardens, on the big green area there is a public green space.**
- **the whole ground floor should be public**

- **half of the area is built, the other half is garden**
- **connect the site with forestry surroundings**

Input moderator: Now draw each floor on a separate sheet, in particular the roof floor.

Final decisions:

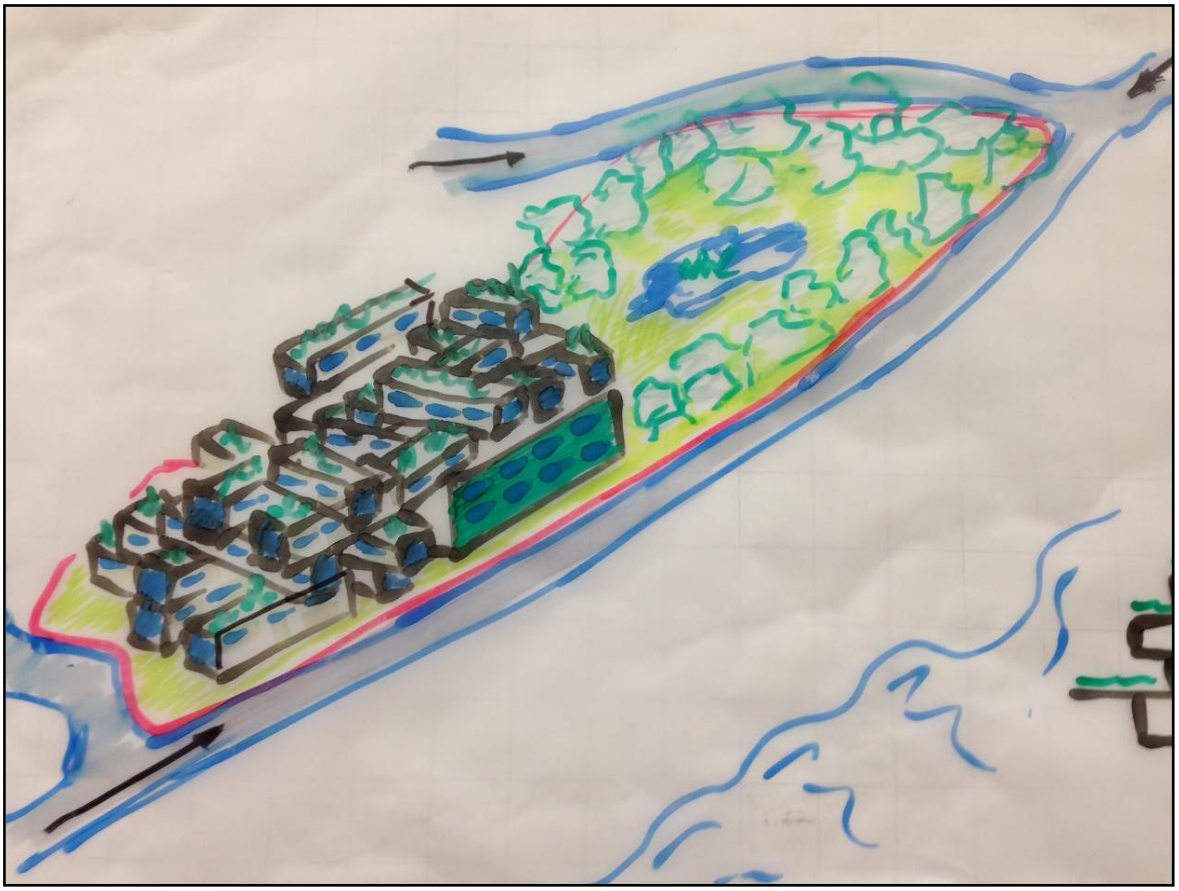
- **access must be visible**
- **keep the existing building, but put an atrium inside**
- **commercial on the ground floor, on the top flats**
- **vertical greening**
- **vertical PV**
- **a lot of meadows, low maintenance in the peripheral area**
- **groups of trees**
- **close to the building should be some lawn**
- **There should be some place for sport, connective space.**
- **as little closed surface as possible**
- **no path in the big green area**
- **different layers of roof tops all with gardens, some with vegetable, some with flowers, perhaps a greenhouse as well**
- **inside of the atrium are trees**

Presentation of Results of Urban Green Spaces group

Implement as much green on the site as possible and as much biomass as possible. Biodiversity is important. Open water as a possibility and forest or meadows, which it was in the past. Plan for eatable landscapes and a social meeting place. This means low maintenance need. For green space we need to split up the volume of the building. Cubes which are circulation, living and garden and forest or whatever we can imagine. In between the cubes you can meet each other.

Keep the existing building, don't take it away. Integrate the different spaces; connect them to the building that is there. The ground floor is reserved completely for commercial use and public access.


N
Public Commercial
GROUND FLOOR



Minutes Workshop I – 21.08.14, ZHAW Wädenswil

Group: Water & Sanitation

Moderator: Andreas Schönborn
Minutes: Kevin Richmond

Discussion:

- List of terms and technologies connected to water and sanitation, which came up during the duration of the discussion:

Rainwater / rainwater reuse	Storage capacity
Storm water	Anaerobic digestion
Green roof	TerraPreta
Irrigation	Charcoal pyrolysis
Infiltration	Toilet technologies
Aquaponic	HTC
Adiabatic cooling	Vacuum toilets
Drinking water	Grey water reuse
Wastewater	Constructed wetland
Source separation	

- Rainwater should be dealt with. About 1400-1500mm per year. Assumption that city will not force us to connect to sewage system. Possibility of adiabatic cooling or to have a pond. Not all if it will be used. That part should flow into a buffer, like a wetland or pond.
- Rainwater should be separated from the rest of the water system. Separate treatment for rainwater and wastewater, which in turn could be separated too: grey water, yellow water, black water. Minimise water use – less use, less amount that has to be treated, less costs.
- Assume that the site can be a test/pilot facility for certain treatment technologies.
- Centralised solution for all buildings?
- Do we have the possibility for grey water heat recovery? That would depend on the amount of people. With the given amount of people we don't have enough grey water for this.
- Vacuum toilets without separation of yellow and black water. This is collected and treated somewhere. What treatment options do we have? Pyrolysis or anaerobic digestion?

Decisions:

- 3 buildings with 3 storeys of 8 flats each.
- Parking lots underground
- Rainwater management: green roofs, in case of storms there is a pond and an overflow area, which normally is used as a playground. From there it flows back to the small river and into Lake Zurich.
- Vacuum toilets for collection of effluent from the toilets, without separation of urine and faeces. Experimental reactor to treat it – HTC.
- Constructed wetland to treat grey water from the buildings and the liquid that comes out of our valorisation unit. Since it's an experimental unit, we are not entirely sure what we will get as an end product – if it's a liquid we treat it in the wetland, if it's charcoal we can sell it.


Storm events
Drinking water
440 people
= 35 m³/d
Waste water
Saving devices
Adiabatic cooling
GW-treatment & reuse
Source separation
Aquapanic
Rainwater reuse
Grey-water
Vacuum toilet
Pond
Heat recovery
urine
feces
Irrigation
Storage capacity
Infiltration
toilet technology
anaerobic digestion
HTC
Terra preta technology
Green roofs
440 people
= 650 l Urine/d
Charcoal
Feces
= 65 l/d


Richterstrasse
Zopfstrasse
C. Wetland

Workshops Day 2 – Integration

Minutes Workshop II – 22.08.14, ZHAW Wädenswil

Integration Group 1

Input group water: basement parking, first floor commercial units, above the living space. The buildings from this group are on the remaining natural soil, which is a conflict for the urban green spaces group. There is also a conflict with the energy group – when the buildings are too compact, too close to each other, there is not enough radiation for PV and thermal collectors.

Increase surface to increase green volume on site. But then that's a problem to insulate – gets too thick. To have a zero emission building we only have limited energy.

Vegetables and fruit trees were considered for food production.

Ecological construction – energy, water, green spaces, waste

We need to think about where to put the buildings considering the need for sunlight for food and energy production. Not where we still have natural soil. If you dig it up you will destroy it (microorganisms etc.). Food production there would make sense, because that doesn't destroy it.

In Wädenswil in winter we have a problem with fog, meaning there is less solar radiation to heat the building. Question of whether or not we'll have enough.

Maybe grow plants that don't mind semi-shaded conditions. This would enable PVs that are vertical. This generates space in between where you have natural light, but maybe not all the time.

Let's decide if it's two or three floors high and then we decide how we want to use the roof.

Do we want to keep the existing building? Because it's an existing building it is hard to renovate in order to achieve low (zero) energy standards. But it's big and compact and therefore it might be possible. The decision is to keep it, with the basement mainly for parking and a rainwater storage tank to be used for irrigation. We need an additional building to accommodate all the apartments/residents that should live there.

Any balconies will be on the south side of the building, getting as much solar radiation as possible. In order to gain enough heat (with thermal collectors) we need to have 160m^2 of balconies.

From a city planning perspective it is better to keep the site open and not have a long building along the street, which cuts off the "view" or the access to the green space which would then be behind the building.

Would it make sense to have the lake in the green area for biodiversity? But if we want to grow crops in that area then there isn't enough space for a lake. Biotopes – wet and dry – can be created, which means you would have different species. (Biodiversity)

If the rainwater storage is outside, then it's exposed (to pollution). A technical solution would be better. Overflow could go into the pond? Infiltration is necessary. It would be better to use remaining water for irrigation of plants.

The water tank would have to be built in new building, because not possible in existing building.

The ground level between the two buildings is public, a social meeting space.

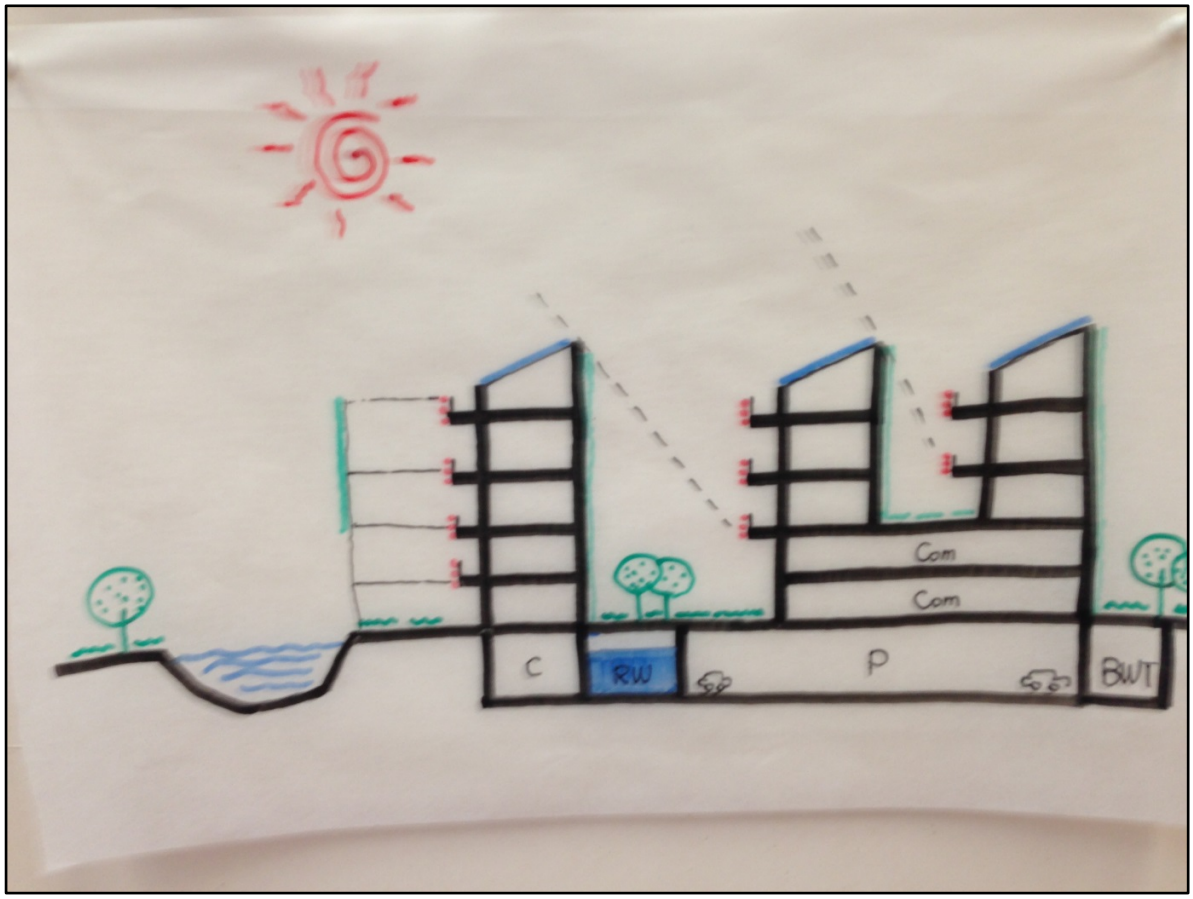
We need basements in both buildings to have enough space for parking, a water tank and storage. Idea of a shared basement, the existing building and the new building are connected. That would give enough space for parking, a storage area and a water tank. A decision was made that the two buildings should be connected underground.

On one side of the site we have a recreational area, between the two buildings is a social meeting space, and on the other side the existing field (green space) that will be used for food production.

Wastewater – separate grey water and black water. Have grey water treatment plant, vertical flow trickling filter. Maybe have a hybrid between a wetland and a more technical wastewater treatment system. You could dig it into the ground.

Instead of a pond, we have a trickling filter and then the water flows into a constructed wetland.

Introduce a water saving toilet. We could build a biogas production unit for black water. Have that underground between the two buildings.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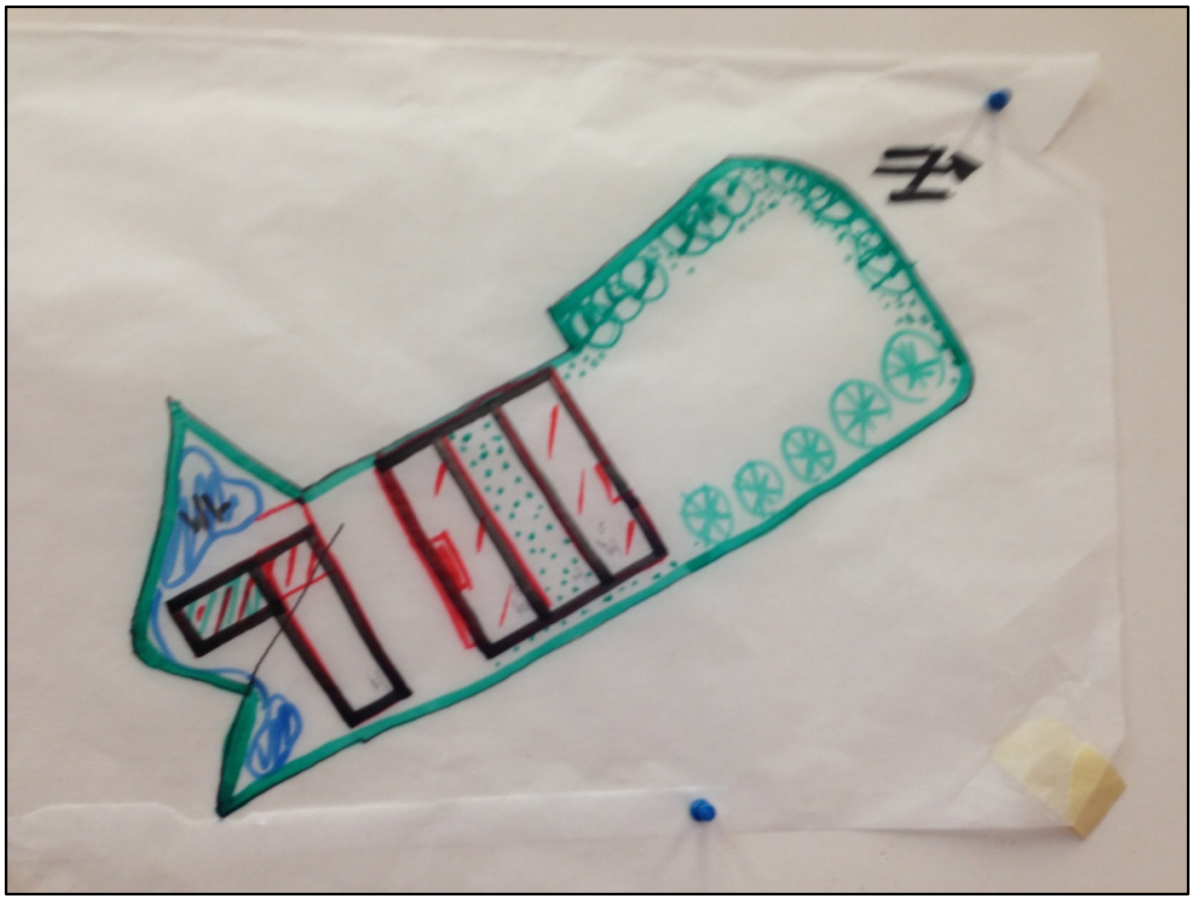
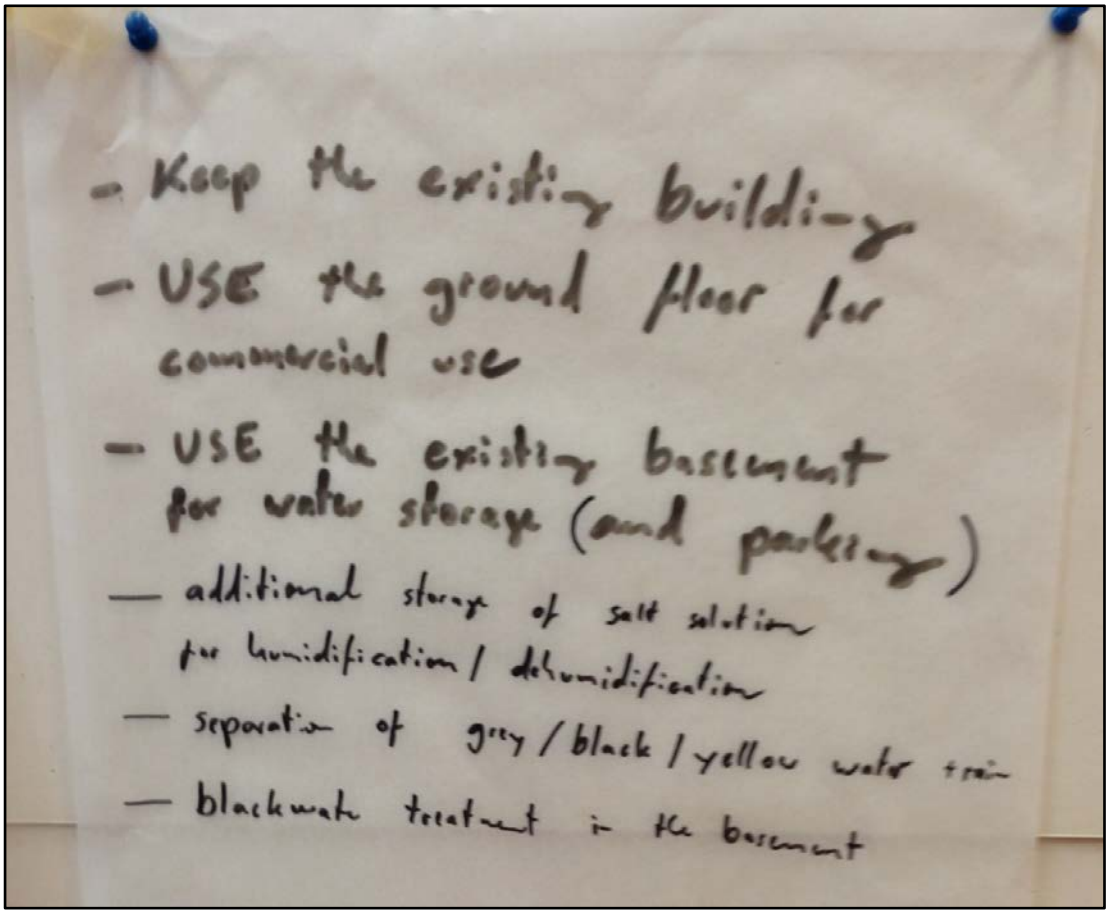



- Keep the existing building
- USE the ground floor for commercial use
- USE the existing basement for water storage (and parking)
— additional storage of salt solution for humidification / dehumidification
— separation of grey / black / yellow water train
— blackwater treatment in the basement

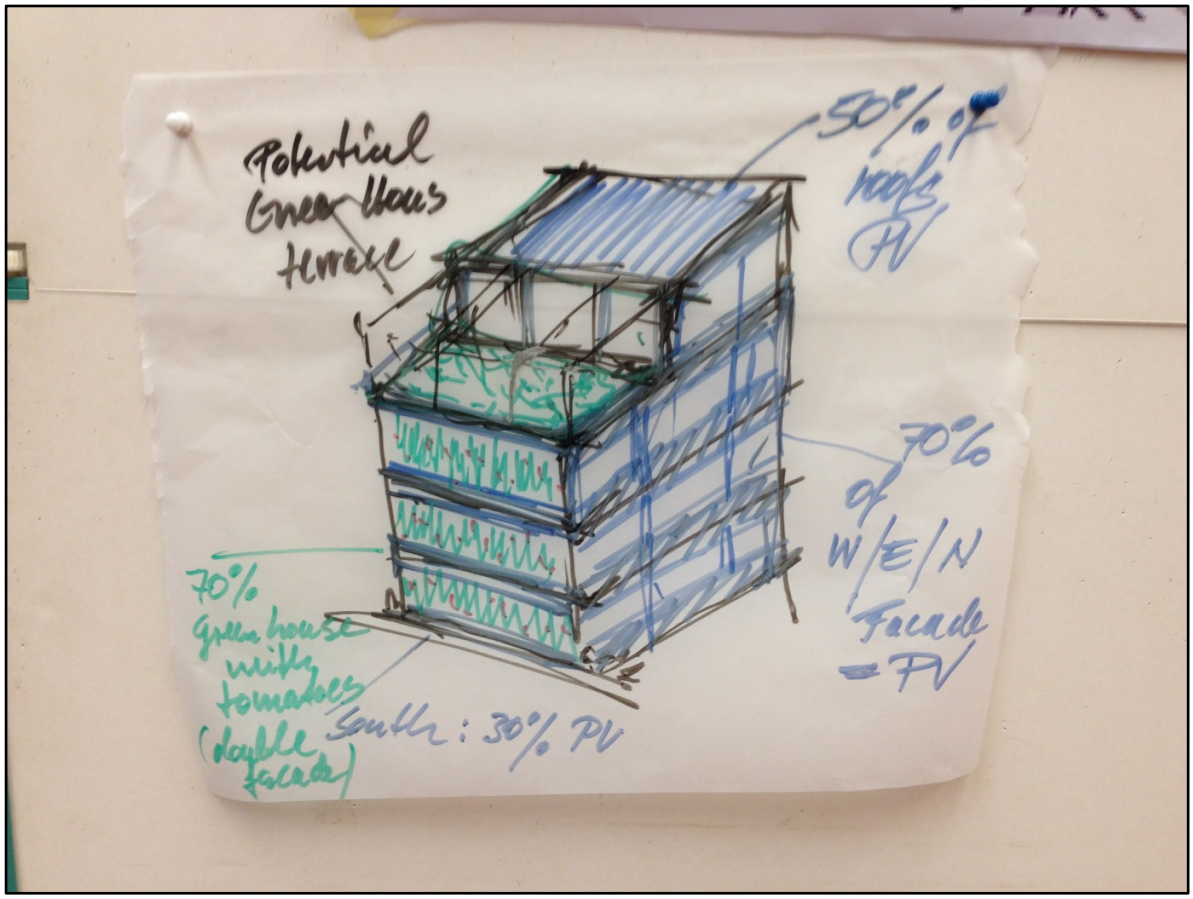
Minutes Workshop II – 22.08.14, ZHAW Wädenswil

Integration Group 2

Summary

They will keep the existing building. An atrium will be cut out in the existing building. The commercial area is on the ground floor. Half the building covered with photovoltaics. Not enough electricity production, so they decided to create a greenhouse for food production.

Rainwater is collected in a pond. This water can be used to irrigate the vegetables in the greenhouse. Additionally a constructed wetland will be used to treat grey water for toilet flushing. Black water – there is a station for the production of TerraPreta. Faeces are separated. Fertiliser for 5'000m^2 can be produced. But they only need 2000m^2 for vegetable production.




Seestrasse


Greenhous Walk
commercial + residential
Underground parking
ATRIUM
Seestrasse

Minutes Workshop II – 22.08.14, ZHAW Wädenswil

Integration Group 3

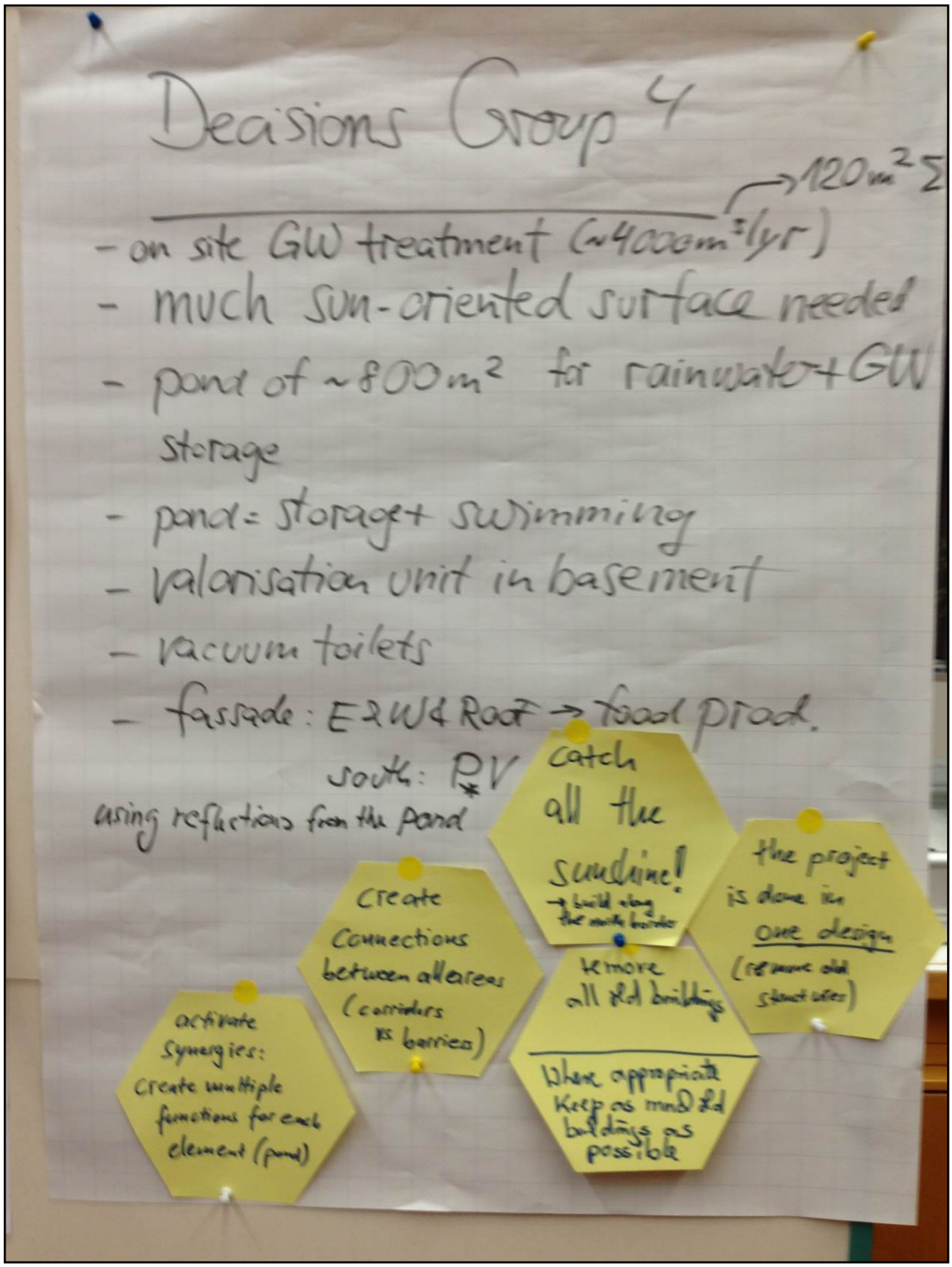
Since there was no designated moderator, the discussion was very unstructured.
Most of the time the group spent debating where new structures should be located on the site and if the existing building should be kept or demolished. This took almost the whole time. The result was:

Title of project: Syno-City

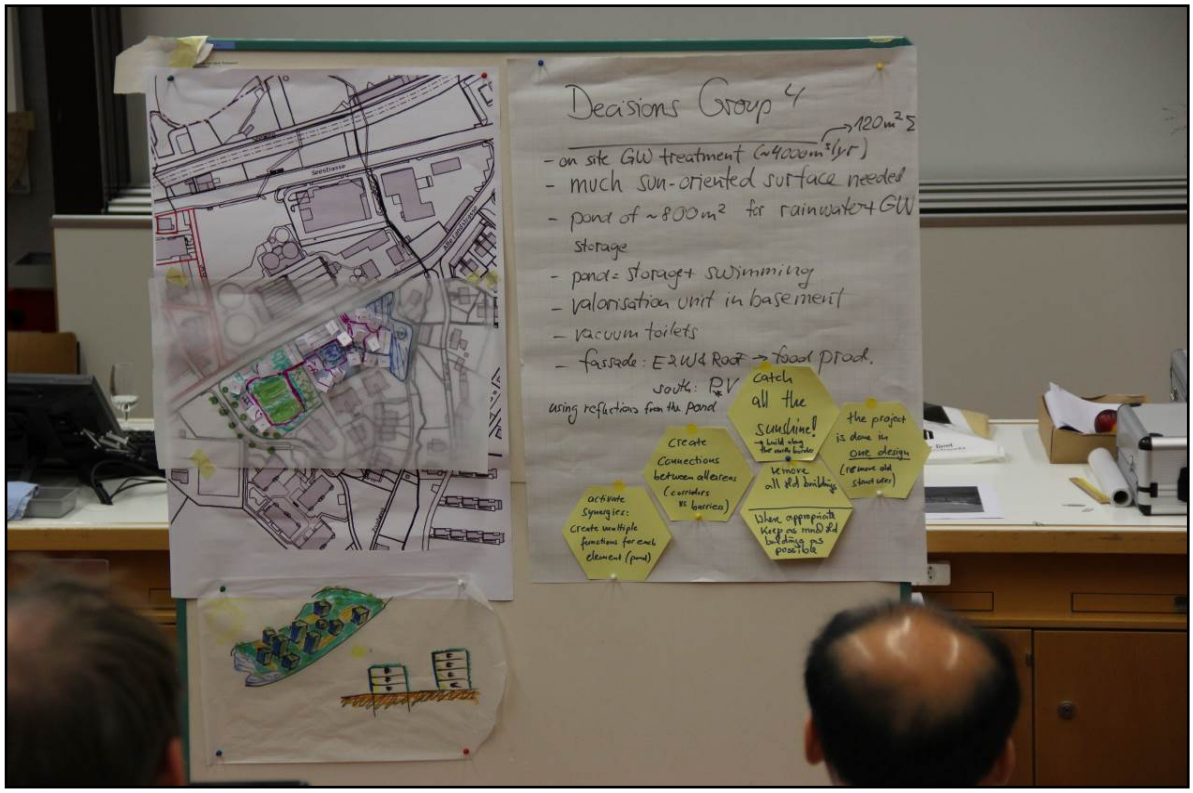
Cornerstones of the project:

- **integrate all aspects to a common design**
- **catch all the sunshine**
- **building facing south should be placed in the north area**
- **remove old building vs. keep as much as reasonable where appropriate (no consensus)**
- **comprehensive design for the whole complex is needed, green area, building…**
- **pond of around 800 m2 for rainwater, storage and swimming**
- **create a connection between all areas like a corridor**
- **generate synergies, all elements should have multiple uses**
- **valorisation unit in basement**
- **vacuum toilets**
- **food production: east, west and roof and the south façade for energy production**

Group 4 Summary of presentation
They had a long discussion over how to develop the site. There was also a discussion whether to keep the existing building or not. They decided to have food production on the old soil that was already there. A lot of façade area that can be used for solar thermal energy or PV.


Decisions Group 4
→ 120 m² Σ
- on site GW treatment (~4000m³/yr)
- much sun-oriented surface needed
- pond of ~800 m² for rainwater+GW storage
- pond = storage + swimming
- valorisation unit in basement
- vacuum toilets
- fassade: E+W+Roof → food prod.
south: PV
using reflections from the pond
catch all the sunshine!
→ build along the south border
the project is done in one design
(remove old shoot sites)
create connections between allareas (corridors as barriers)
remove all old buildings
Where appropriate Keep as much old buildings as possible
activate Synergies: Create multiple functions for each element (pond)


Alte Landstrasse
Seestrasse


Decisions Group 4
- on site GW treatment (~4000m³/yr) → 120m² Σ
- much sun-oriented surface needed
- pond of ~800m² for rainwater+GW storage
- pond = storage + swimming
- valorisation unit in basement
- vacuum toilets
- façade: E2W4 Roof → food prod.
south: PV
using reflections from the pond
catch all the sunshine!
the project is done in one design
create connections between allotments (corridors no barriers)
remove all old buildings
activate synergies: create multiple functions for each element (pond)
where appropriate keep as much old buildings as possible