Focusing on perception and functionality aspects of urban intervention

Chair: Design Informatics  
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Understanding the Dutch City

History of Flood and Drought

1809
- Large part in Meuse, Waal, Merwede and IJssel river areas flooded
- Approx. 200 victims
- The lock at Gorinchem collapsed
- 1,300 km² area in Alblasserwaard flooded

1820
- Serious dyke breaches and flooding in Groningen, Friesland & Overijssel
- More than 800 dead

1825
- High water levels in Vlissingen
- Enormous damage in Zeeland and Betuwe region, Flanders
- Noord Brabant and Gelderland, all the area from Rhenen & Wageningen up to Amersfoort & Zuiderzee flooded

1855
- High water levels
- Storm surges and high river discharges
- Dyke breaches at tens in Zuiderzee

1860
- Breached Meuse dykes
- Flood in Limburg

1893
- Flood in Meuse
- Evacuation of 250,000 people

1906
- High water levels in Meuse & Rhine
- Breached Meuse dykes
- Flood around Meuse
- High water levels in Vlissingen
- Enormous damage in Zeeland and Flanders
- High water levels in Betuwe region, Flanders
- Noord Brabant and Gelderland, all the area from Rhenen & Wageningen up to Amersfoort & Zuiderzee flooded

1916
- Storm surges and high river discharges
- Dyke breaches at tens in Zuiderzee

1926
- Dry summer
- Significant agricultural damage
- Breached Meuse dykes
- Flooding & threat of dyke breaches

1953
- Dry summer
- Significant agricultural damage
- Breached Meuse dykes
- Flood in Limburg

1955
- High water levels in Vlissingen
- Enormous damage in Zeeland and Flanders
- Breached Meuse dykes
- Flood in Limburg

1966
- High water levels in Vlissingen
- Enormous damage in Zeeland and Flanders
- Breached Meuse dykes
- Flood in Limburg

1976
- High water levels in Meuse & Rhine
- Flooding & threat of dyke breaches
- Breached Meuse dykes
- Flood in Limburg

1993
- Dry summer
- Dyke breach in Wilnis (Utrecht)
- Economical damage, Residential area flooded

1995
- Flood around Meuse
- Evacuation of 250,000 people

1996
- High water levels in Meuse & Rhine
- Flooding & threat of dyke breaches
- Breached Meuse dykes
- Flood in Limburg

2003
- 4.83 m above Amsterdam
- Highest ever level for Delfzijl

2006
- Large part in Meuse, Waal, Merwede and IJssel river areas flooded
- Approx. 200 victims
- The lock at Gorinchem collapsed
- 1,300 km² area in Alblasserwaard flooded

Map showing areas affected by flooding and drought.
Understanding the Randstad City

Flood and Salinization Risk
Understanding the Randstad City

Dunes Situation
Understanding the Randstad City

Transportation System

- Water Canals
- Railway
- Automobile
Understanding the Randstad City

Densification
Densification already in process  Need for housing  International competition/comparison
Understanding Den Haag

Silhouette
Understanding Den Haag

Functional Zoning

Zones  Characteristics of the zone
Understanding the Site

Public Areas

Plazas  Water element  Green areas
Understanding The Site

Transportation Routes

Intersection of transportation routes
Understanding the Site

Entrance of the Site

Entrance to people coming from outside  Historical entrance  Transportation hub
Entrance Analysis

Definition of an Entrance

Entrance performance

- different activities
- exciting events
- no. of people
- space usability
- solid - void
- traffic safety
- light/dark
- neighbourhood
- different quality of space
- width of the entrance
- landmark

liveliness
space quality
safety
people

Welcoming

Entrance performance

- High Distinguishable
- Highly Distinguishable

Weights

0.444
0.529
0.556
0.471
0.444

Logical Operation

Input Value

0.444

Membership Functions
Entrance Analysis

- Dark space
- No events take place
- Crowded
- Low pedestrian safety
Entrance Analysis

Volumetric Analysis

- volume perceived

- volume dedicated to pedestrians
Entrance Analysis
Entrance Analysis

Evaluation of the Entrance

different activities
exciting events
no. of people
space usability
solid - void
trafic safety
light/dark
neighbourhood
different quality of space
width of the entrance
landmark

liveliness

space quality

safety

people

Welcoming

Entrance performance

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<th>Logical Operation</th>
<th>Weights</th>
<th>Membership Functions</th>
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Entrance Analysis
Design of the Entrance
Design of the Entrance

Volumetric Analysis

-volume perceived

-volume dedicated to pedestrians
Design of the Entrance

- Small Harbour
- Exhibition area
- Green area
- Service area
- Bicycle shed
- Horeca

Transportation hub  Alternative transport  Cooling effect in the area
Movement path           Resting area
Green roof
Design of the Entrance
Design of the Entrance

Evaluation of the Design

- different activities
- exciting events
- no. of people
- space usability
- solid - void
- trafic safety
- light/dark
- neighbourhood
- different quality of space
- width of the entrance
- landmark

Input Value
Logical Operation
0.444 Weights
∑ Membership Functions

Comparison of existing vs. new design
Design of a Plaza
Design of a Plaza

Location of the Plaza

Intersection of pedestrian movement paths
Design of a Plaza

-auditorium
-foyer
-administration
-horeca
Green & exhibition connection with Escher museum
Smaller plaza  Weather protection  Safe pedestrian movement  Green connection
Connection of 2 levels  Performance space
Design of the Entrance

Masterplan

Urban deck  Divertion of the car traffic  Give back to pedestrian use
Design of the Entrance
Relation with the Street

Creation of different levels  Separation of traffic  Resting spaces  Spatial quality
Different enclosure levels  Different space qualities  Light manipulation
Design of a Plaza & Entrance

Materialization

Stability  Direction  Contrast between different traffics
Stability  Movement direction  Contrast between different traffics  Different space qualities  Light manipulation
Design of the Tower
Design of the Tower

Preliminary Design Concept
Design of the Tower

Neural Fuzzy Tree

program

tower’s Width

storey’s Height

no. Storeys

joint perception (tower)

joint perception (other buildings)

tower’s Length

total height

elevation to square proportion

floor plan proportion

elevation to street proportion

Shape performance

Height performance

Perception

0.444 Weights

Input Value

Logical Operation

Membership Functions
Design of the Tower

Optimization Process

- Elevation to Square: 3.69
- Elevation to Street: 2.41
- Floor Plan Proportion: 1.53
- Height: 60
- Joint Perception of Tower / Joint Perception of the Environment: 0.22

Values: How happy I am
Width = 20
Length = 20.25
Height = 90
No. Storeys = 15
Storey Height = 6.00

Shape performance = 0.418
Height performance = 0.163
Perception = 0.913
Tower performance = 0.388

Choice 1 from Pareto front
Did not fit the scale
Width = 17.431
Length = 24.89
Height = 56
No. Storeys = 14
Storey Height = 4.00
Shape performance = 0.892
Height performance = 0.9997
Perception = 0.910
Tower performance = 0.984
Width = 16.251
Length = 24.92
Height = 60
No. Storeys = 15
Storey Height = 4.00
Shape performance = 0.9999
Height performance = 0.992
Perception = 0.903
Tower performance = 0.993

Choice 3 from Pareto front
Design of the Tower

Outcome of the Optimization Process

Quality of space    Rigid    Blocks urban connections
Design of the Tower

Urban connectivity  Public areas  Connection with the city  New Panorama Mesdaag
Design of the Tower

Floor Plans
Floor Plan +9.50
- reception
- service area
-Floor Plan +13.00
-gift shop
-Floor Plan +19.00
-exhibition area
-Floor Plan +23.00
-Maurthuis collection
-Floor Plan +32.50

-exhibition area
-Floor Plan +35.50
-green area (dune)
Floor Plan +38.50
- Gathering space
- Exhibition area
- Service area
-Floor Plan +42.50

-library
-Floor Plan +47.00

- resting area
-Floor Plan +52.00

-horeca
-service area
Design of the Tower

Vertical Circulation
Design of the Tower

Structural System

Stable to lateral forces  Does not draw attention
Design of the Tower

Vertical penetration of spaces   Communication between spaces
Design of the Tower

Facade Design

Simple  Daylight control  Flexible use
Facade Design

Exterior

Simple Daylight control Contrast with surrounding
Facade Design

Interior

Flexible use

Different qualities of space
Interior Light Design

Natural Lighting
Different periods of the year
Interior Light Design

Artificial Lighting

-Floor Plan +8.50 ,+13.00

General lighting ->follows the plan  Spot lighting ->follows the materialization
Evaluation

Perception
- Material qualities

Optimization Process
- Time constraint

Fuzzy Neural Trees
- Structures the thinking process
- Deals with complexity & quantifies outcome
- Helps in comparison

Overall Design
- Fits the context
- Coherent from Urban scale to Detailing
End

Questions