Urban Design as an helping hand to promote Bike-use;

Urban Pattern based Design Steps

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INTRODUCTION

Over thirty years ago, in his treatise The Heart of Our Cities, architect-planner Victor Gruen warned us to adopt a "sensible pattern of behavior toward the automotive population" in order to minimize the detrimental ramifications of automobile dependence (1). These include but are not limited to: urban landscapes littered with expressways, urban sprawl perpetually fed by uncontrollable congestion, deterioration in the quality of the built environment, and the consumption of and reckless disregard for the natural environment. Gruen's visions, which were not entirely unsubstantiated, are a total reality. In fact, these problems represent an essential element of the role, the bicycle can play for a contemporary city.

The intent of this probe is to awaken an interest in and affection for town living by enhancing those factors which make the central areas of cities unique by it's 'paths', 'places' an 'bike routes'. These form the basis of a richly textured and symbolically meaningful urban existence. This is needed more than anything else at the present time, along with decisions about where best to direct political decisions and public investment. The ubiquity of the automobile has, in fact, made our lives less independent and more dangerous in other ways: Hillman (2) states that:
"The lives of pedestrians, especially children and old people, are put at risk by the fact that the 'pavement network' for them is interrupted at every road intersection". The same statement can be made for bicycles.

1 FAVOR SPECIFIC URBAN PATTERNS BIKE-RIDES ?

1.1 Planning Concept for Channeling Urban Movement

One of the characteristics of praiseworthy urban areas and centers is the concentration of people in the collective, public space. Jan Gehl (3) developed a series of 6 strategies to increase and promote outdoor human activities. These are:

*Assemble or Disperse,
*Integrate or Segregate,
*Invite or Repel.

Nowadays, the logic and the simplicity of the grid makes this planning concept the most widespread for built-up areas and their associated (infrastructure) networks. But grid-networks dilute ! This is excellent for car-traffic and other means of transportation. But by diluting, one loses a special quality people like - the so called 'symbiotic-effect', making things appear much more dynamic when only slightly more people and attractive activities are injected in the public space. Niek de Boer suggests that the best quality of urban life is guaranteed through the activities (4):

*People meeting People,
*People meeting Information,
*People meeting Products.

Another useful planning-tool for creating 'symbiotic-effects' is to locate destinations that 'inject' people in the public space precisely on the movement axes of pedestrians. A bike-park, a railway-station or many bus-stop should be carefully situated on this movement/bicycle-axis.

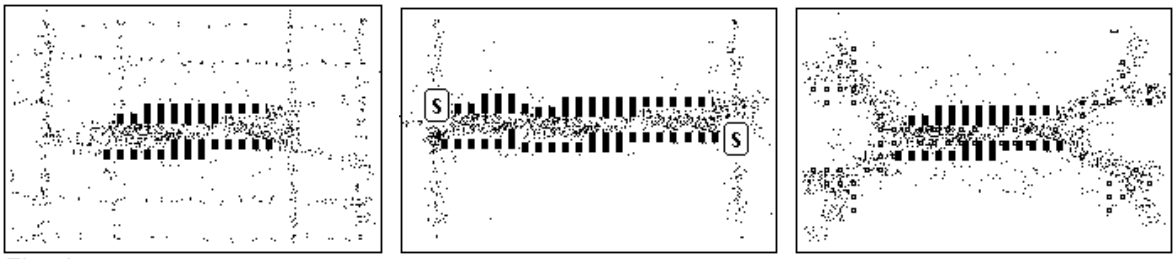

Fig. 1
LEFT Main Bike Routes 'channel' human presence
MIDDLE Stretched linear channel between high-speed transit stops [S] reinforces axial movement
RIGHT Partly radial Main Bike Routes maximizes central urban linear axis
(Copyright: M. 't Hart 'On-the-Way registration-system')

2 CLIMATE PROTECTION PUSHES THE BIKE MODAL SPLIT

The large scale public research project for the Region of Eindhoven (5) mentions that protection from both weather and wind would be helpful and be positively received by cyclists. This suggests that if either reduction or stabilization of car use is to be integrated within future policy, then improvements in the design of public transport facilities, interchange stations, cycle tracks and pedestrian movement systems will be imperative.

2.1 Bicycle Movement through Sheltered Streets and Public Spaces

In extreme climatic conditions, protected space will be essential. When providing such protection, it is imperative that the open channels of the streets and public urban spaces retain their dominant roles.

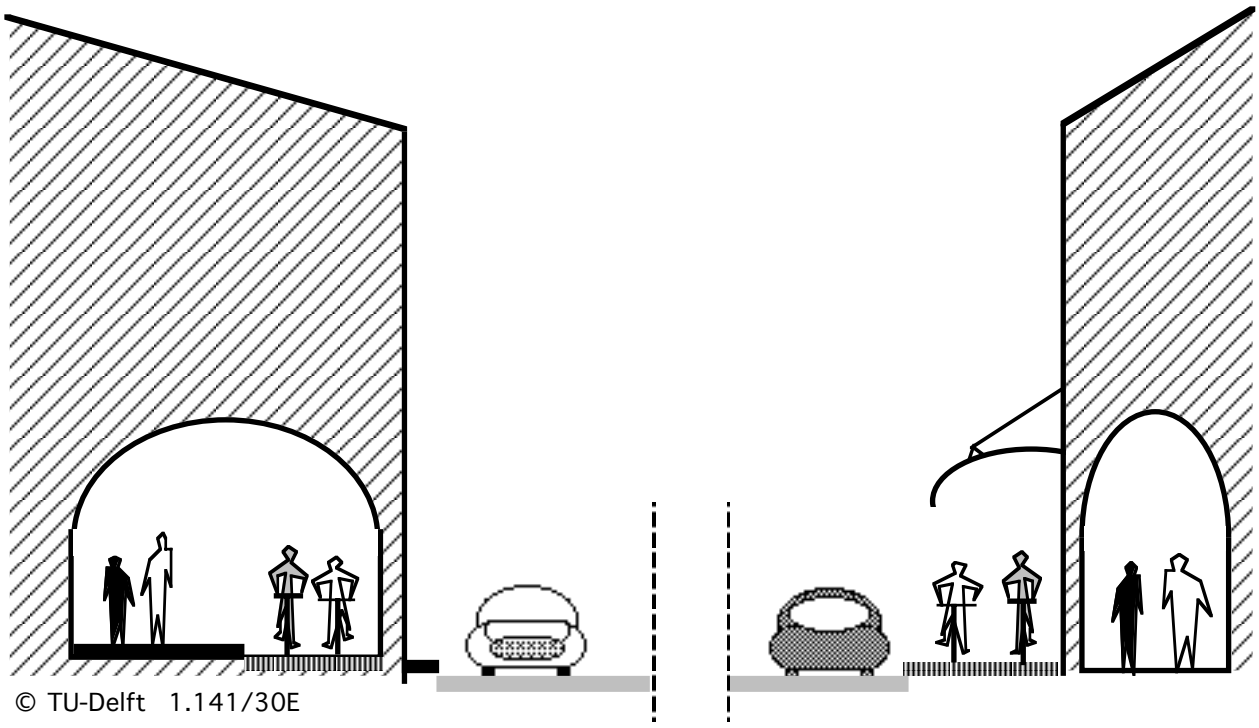

Fig. 2
LEFT Arcade accommodating both pedestrians and cyclists.
RIGHT If arcade is too narrow, a canopy can be added for cyclists.

2.2 High Modal Split requires high structural and detailing qualities

Overhead protection for both cyclists and pedestrians is desirable in proximity to tram or bus stations so that cycles can be protected and people waiting for trams have overhead covering especially from rain - or even occasional snow (cold or temperate climate zones) and also from solar radiation in hot or hot/humid climates (6).

The greater the level of cycle use in the journey chain, the higher the quality of facilities needed in order to compete with the car facilities, both to and from, and parking at destinations. This means that the bicycle should still be parked safely on return to collect it, and preferably with a dry saddle and near the arrival point of the public transport vehicle.

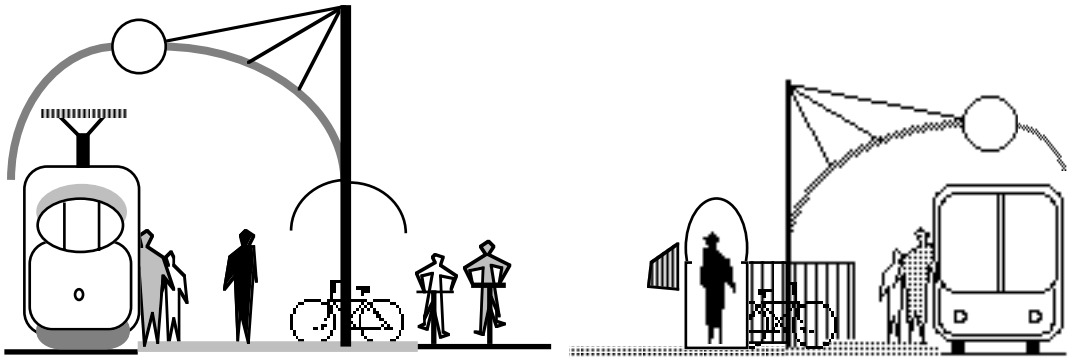

Fig. 3
Promoting (urban) cycle traffic requires from the users point of view, the same level of comfort afforded by the car; on the transfer point, cycles are in need of rain-protection and frame-lockers

Given the vulnerability of the cyclist for climate, hills, and dangers of the road, just one missing link might dissuade them altogether from using the bicycle for their journey.

A basic finding pertaining to thermal comfort in public open spaces and alongside sidewalks is that sunlight and wind conditions play a critical role (6, 7). During hot, humid summer conditions it is essential to create ventilation corridors for cooling and to minimize sunlight exposure. In the case of winter conditions, it is crucial to offer protection from wind and maximize solar exposure.

2.3 Climate specific aspects

2.3.1 Cold climate Areas

Shelter from wind should be achieved by the use of planting (vegetation, hedgerows, walls, fences, coniferous trees e.g. pine), in order to reduce wind chill. Overshadowing by buildings should be minimized wherever possible and orientation for maximum reception of solar radiation should be accepted development policy. Where ramps exist they should be heated, provided the lengths of the ramps are not excessive. Cycle-paths and areas of intense pedestrian use should not be located close to the corners of high-rise buildings where wind turbulence has a tendency to reduce the comfort level.

2.3.2 Hot-Climate Areas

In this context, the creation of shade through tree planting should be developed. An option is to concentrate cycle-movement in a wide path on the north-facing side of the street, thus obtaining a 'cooling effect' through elimination or reduction of southern exposures.

Further cooling possibilities exist by utilizing heat-reflecting materials combined with overhead shelter systems covering primary pedestrian paths and cycling areas. The basic principle is to avoid the absorption of heat and to provide maximum areas of shade.
Additionally, the provision of green areas (with a low ratio of paved surfaces) induces a cooling effect - since through the process of ‘evapotranspiration’ these have a lower capacity for heat storage (6).

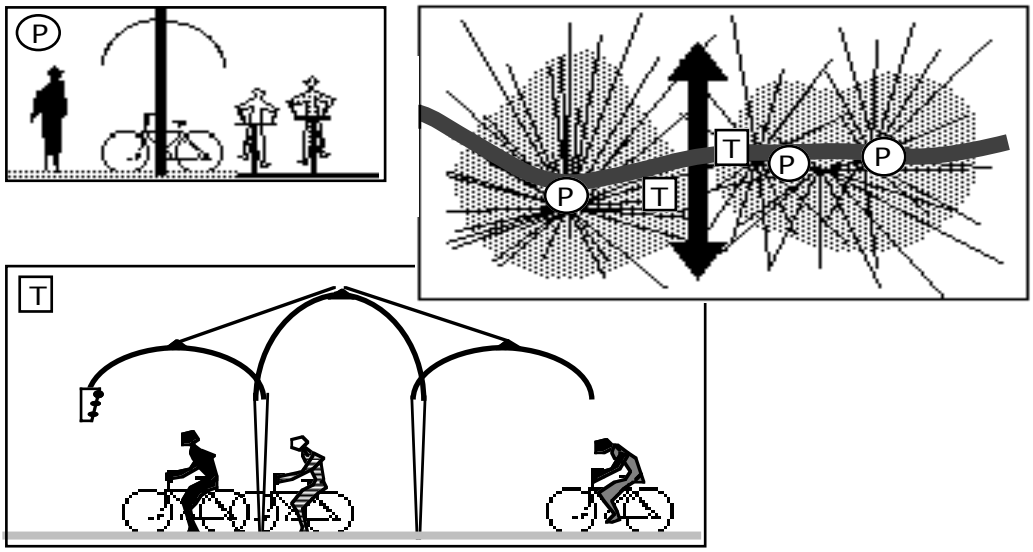

Fig. 4
The Urban points towards desirable locations for sheltered cycle-parking [P] and climate protected cycle traffic lights [T] at the intensively used routes and nodes.

3 BIKE AS CUMMUTER MAKES DEMANANDS ON THE STATION VICINITY

3.1 Station vicinity and routes design to promote Mass Transit use

The station is primary approached as a part of the functioning of the city. For the vicinity of a station, different scales of design should be taken in account. Each level/scale has its own crucial/essential field of attention for which typical design decisions (or tools?) are required. Two important variability's play a role here: the route and the program.

The route is necessary for commuting. It is therefore important that the design of the route is consequent en consistent through the different scales. As a stimulance for before- and after commuting by bike, it is of big importance that the whole route until the platforms are reached, is clear, direct and save. In practice this means that within a radius of 1200 meter a limited number of radials are preferable. Within the vicinity of the station (600 meters) a concentration of different routes wished.

Constructing a number of radial route sections and eliminating every occurrence of deviation (e.g. in one-way systems), increases the radius of cycle accessibility considerably for relatively little money.

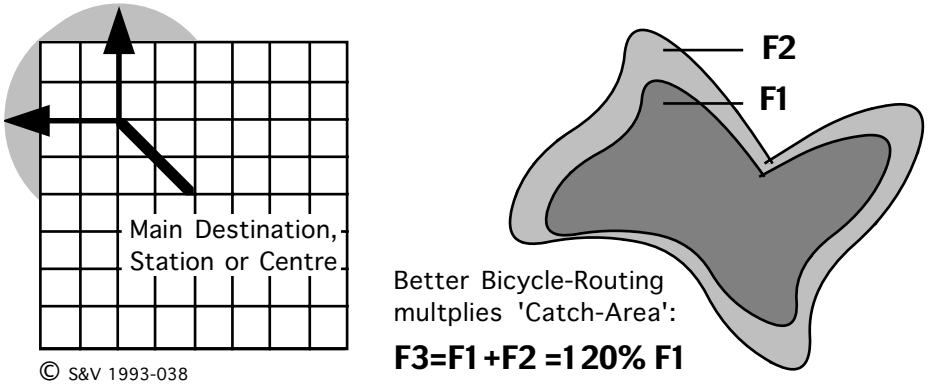

Fig. 5
Radial parts in the main cycle-way increase the catch-area F1 of a central destination with F2

3.2 Configuration to increase bike-trips to central locations

Because of the moderate speed of bicycles, even partial radial (bikeway) axes considerably enlarge -in a grid pattern- the 'catch' any central location. In 1980 Jan Wittenberg (8) connected three planning-tools to enlarge the catcharea of a center or a railway station within a grid layout. To increase, simultaneously, the liveliness of the public space and the (potential) use of the station, he recommends insertion, at the same time, of:

*Radial pedestrian & cycle-axis towards the main station entrance;
*Increased density of dwellings and activities within the 1250m (optimal) radius for cyclists;
*Location of the station in the center of a circular or actual square built-up area.

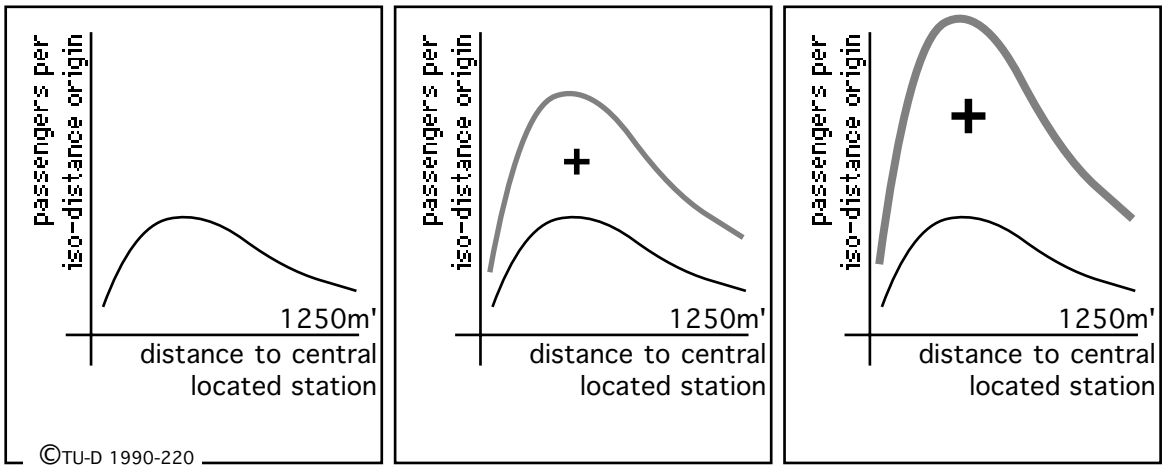

Fig. 6
Magnifying the catch of central locations by urban structure:
LEFT Increase in passengers by central location in a square grid-pattern
MIDDLE Increase in passengers by radial shortcuts
RIGHT Extra increase by higher building-density within a 800m (optimal pedestrian) radius

3.3 Urban Program to stimulate bike-rides

The program determines a great part of the potency of a station: the station should be the focus point of activity. On the one hand to attract enough passengers, on the other hand to give facilities in the vicinity of the station enough clientele. A mono-functional station vicinity is not desirable. It is not attractive to stay, to hang out, and is socially unsafe, especially during the late hours. But also from the point of view of the exploitation of the railroad, it is necessary to have all hours of the day 'IN- & OUT-GOIING travelers. In the vicinity of the station and along the (main bike) route, the 'Person Space Index' and the 'Floor Space Index', should be high (9).

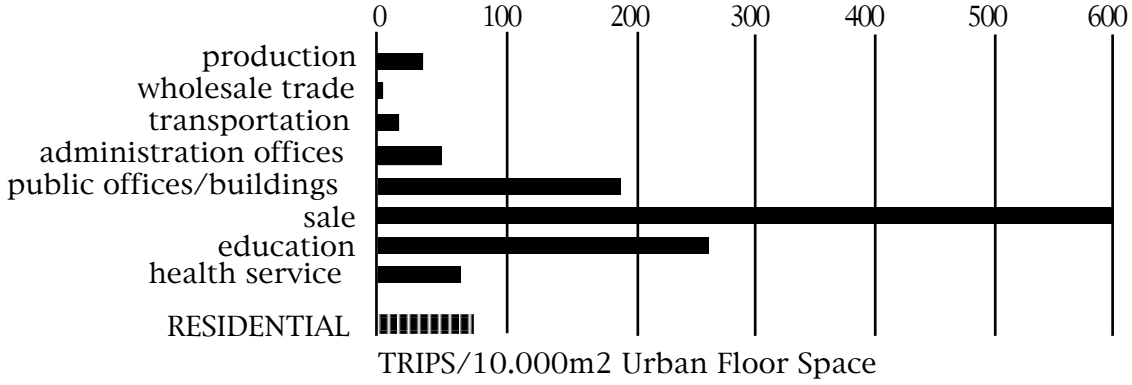

Fig. 7
Relation between Person/Space-use and the Urban Function Program in the 'Catch-area' a around a rail stations of the recent Amsterdam Ring-Line

This means functions in the vicinity which generate a high modal split for bike-trips and bikes commuting to station: sale, education en offices with a public character. There should always be

dwellings in the vicinity of the station: at least 30% of the developed floor/space with a maximum of 90%. Doors and windows orientated towards the street are necessary for the social safety.

It is possible to verify whether the current or future use of the station-vicinity is in use in accordance with the potency of this area. Therefore a design-tool like an ‘overlay’, is developed (10).

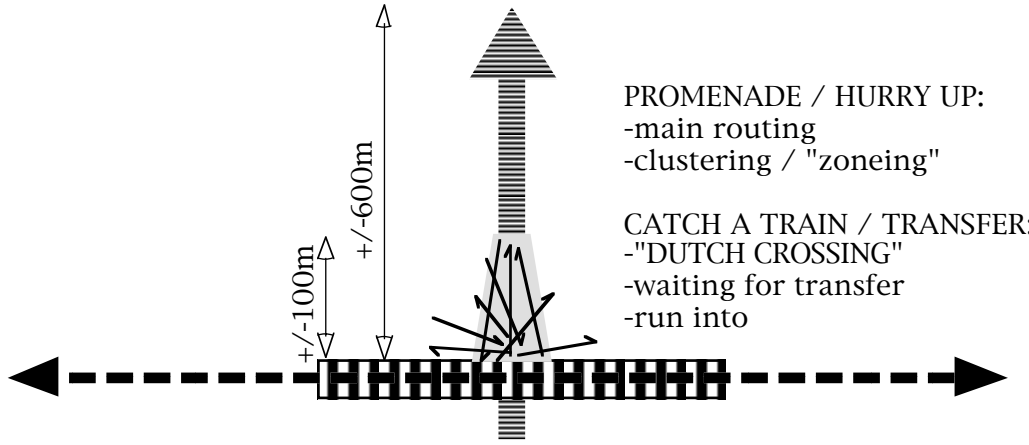

Fig. 8
A ‘Station Vicinity Overlay’ based on NO hindrance by arterial roads within the final destination (shortcut) in front of a station for bikes and pedestrians
(Station = ‘Slow-Mode Design Priority Area, respectively an area for an 'opposite design order')

4 AN 'OPPOSITE DESIGN ORDER' (ODO) PREVENTS BIKE UNFRIENDLY DESIGN

4.1 REVERSE THE ORDER DESIGN; Actions & Impacts in relation to the Urban Map

4.1.1 Urban Structure

Especially from historic European cities, one might say that the complexity is considered to be one of the major assets.

Recent infrastructures such as the ‘car-system’ or anticipated forms of Private Rapid Transit have an impact on the urban fabric. The building period of a city influences the urban fabric in two ways:

*Characteristic pattern of spaces with a typical density, urban form and orientation
*Characteristic infrastructure for the mobility of that period.

Recognizing these characteristics makes it possible to develop very specific and structural concepts for long-term improvement of the road systems as well as for urban quality and mobility.

The introduction of the car with its demand for space, enormous parking lots and a grid shaped network to make all locations equally accessible, was often not based on carefully considered impacts of heavy use, high volumes and unrestricted use. Also, the additional effects of speed, noise and pollution caused by virtually unlimited car use has often been underestimated.

To achieve or retain bicycle-friendly urban growth and development, design principles are required that consider the character and importance of every aspect that can potentially create 'urban quality. Basically these aspects are so diverse that ranking them in importance is nearly impossible. However, urban design has for a long time applied complex methods like 'sieve analysis'. The advantage of this method is that completely different elements can be placed on maps. On a map ,four basic characteristics can be illustrated:

*Location,
*Direction,
*Quantity
*Spatial shape (form, configuration, height etc.).

When designers assemble the elements that result in urban quality (for example in with ‘GIS’ or in the more direct activity of drawing, 'transparent' layers), potential conflicts as well as combinations that could bring more synergy, become obvious. The next step is to ask each discipline involved in

shaping and maintaining a city to translate its (infra)structure, land-use and concepts in the same way. These analyses and concepts clearly show friction-points or potential design-directions that will create the city's form and overall character.

4.1.2 Today's car-based practice

In most countries, components such as roads, sports & recreation facilities, lighting & urban furnishing the public space, location of local schools, shops, bike-ways, meeting points for the elderly etc., are the responsibility of specialized authorities. Sometimes only final designs of such sectorally- responsible groups are shared. Too often, a road network or its reconstruction is designed without any research or even assumption of the needs of local inhabitants, and their pattern of 'desire-lines' to nearby (cycle-able) destinations. Simply widening roads which carry heavy traffic or adding 'stop-signs' or even ''speed-humps' where accidents have occurred, is a process that GRADUALLY will diminish or even destroy urban quality.
Furthermore, extending infrastructure for the 'car-system' dilutes urban quality, often makes trips longer, inducing more people to switch for the bike to the car. It could be that designing for the car by car-oriented traffic planners might structurally eliminate all the qualities for which the city has historically been admired.

4.2 The sustainable Opposite Design Order (ODO) for urban quality

If we see today's practice as layers of information, we could question the practice of starting with a grid and with car accessibility as just one of the possible design orders. It is just as simple to start the design process with the elements (or layers) that are normally considered last. We could call such a design and decision-making process the **Opposite Design Order (ODO)**

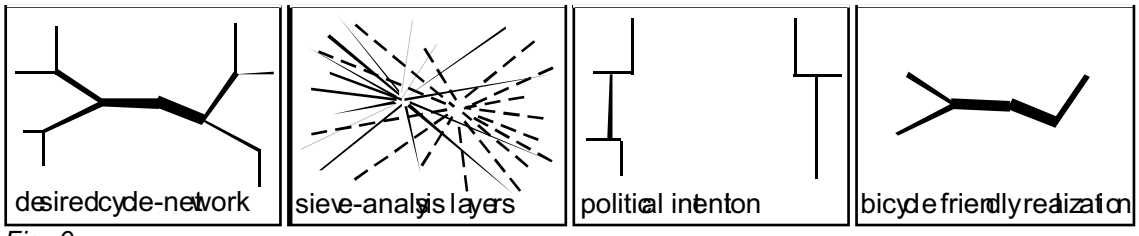

Fig. 9
LEFT *Desired potential main cycle-network*
MIDDLE *Confrontation with a (summon of) sieve-analysis layer(s)*
RIGHT *The 'ODO' process proofs the importance NOT to start the realization of a main bicycle-network at locations FREE of political contradiction, but preferable at central-locations where a lot of cyclists are expected*

Formulate with the politically responsible parties and actual or anticipated users those elements that may be important. The closer the order of interests comes to the following rank ordering, the better the balance will be between sustainability and urban quality:

1 Pattern of Urban Spaces & Long Lines (see K. Lynch & New Urbanism e.g.)
2 Location of Mass Transit Stations
3 Pattern of daily (potential) pedestrian & cyclist-WISHES
4 (Potential) Cycle/Pedestrian Network(s)

Still there is 95% freedom for the:

5 Location of Car-Parking
6 Distributor Car-Network
7 Arterial Roads

NOTES & REFERENCES

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4) Niek de Boer as quote by B. Bach in: Stedenbouwkundig Ontwerpen & Mobiliteit 2000+, Publicatie Buro, Delft University of Technology.

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