Coping with Urban Dynamics
Tauw bv

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Fout! Geen gegevens voor lijst met figuren gevonden.

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Glossary/ Definitions / Acronyms:

Aspects (theory):	
Urban Dynamics:	**Events and processes** (dynamics) in the **context** of specific water problem, which **influence the implementation of the specific solution** and therefore need to be taken into account.
Attractor	A special condition of a system. If the position (or condition) of a system finds itself in the vicinity of an attractor, it will undergo an evolution in the direction of that attractor. The distinguishing characteristic of complex adaptive systems is that there is a question of stable conditions far removed from static balance. Without the presence of external influences, they fall back to this state of static balance. The stable conditions are as far removed from the static balance as the static balance is from the attractors.
Basic water management:	Form of water management that aims at optimizing the water system on the basis of physical, chemical and economic criteria. A core concept in basic water management is control. Assumed is that damage can be prevented by good control of the physical and chemical processes in the system.
Complex adaptive system	A complex adaptive system displays the same fancifulness as the practice associated with integral projects. There is a question of non-linear dynamics, in which small changes can have large consequences. In this way, the behaviour of a complex adaptive system is often unpredictable, but even so, patterns are visible. These patterns in the system behaviour originate from the large quantity of known and unknown rules of behaviour that form the basis of a complex adaptive system. This sprouting of patterns is designated as the concept of emergence. This means that “the whole is more than the sum of the parts”.
Complexity (theory):	A theory in which the practice of complex projects is not idealized, but is described as a complex adaptive system.
Context:	The context includes the processes and interests of the existing inhabitants of both the spatial and social environments of the system, as well as the political processes and interests.
Contextual water management:	Form of storm water management. Contextual water management is not so much aimed at the optimization of the water system, but at making a contribution to an optimum living environment in which the values of water are utilized

	as far as possible. The interaction between the system and the context is not neglected or reduced, but is used to create an optimum living environment. However, this results in increasing management complexity.
Decision making process:	All activities employed by a storm water manager in order to achieve storm water goals, such as prevention of flooding and pollution. By employing activities the storm water manager tries to influence other stakeholders and to liberate means for achieving his goals.
Functional water management:	Just as for basic water management, functional water management is aimed at the prevention of damage by controlling the system. But for this consideration is given to the context and possibilities will be sought in which to fit water. Optimization of the water system means here that the system is attuned as well as possible to the different functions of the system.
System:	System is the natural and man-made water system and the water chain, including all infrastructural constructions.

1 Introduction

1.1 Why Urban Dynamics?

1.1.1 The former successes USWM

Nowadays USWM is the field of technical experts. By law, they have the responsibility for the water management in the urban area (D3.2). To practice the water management, they have at their disposal: legal responsibilities, a funding structure, planning tools, technical alternatives and, very important, technical knowledge on water management. This has led to a significant improvement of storm water control in cities all over Europe. The one-aimed approach of USWM has been quite successful.

1.1.2 The need for recognizing the context in nowadays USWM

But, the one-aimed approach is not sufficient anymore. Especially when working on source control in urban areas. This requires explicit tuning with other types of land use and cooperation with non water professional stakeholders. Storm water managers have to widen their scope from ‘optimizing the water system’ to ‘improving the quality of the living environment’. The water system is just one of the many factors determining this quality. The challenge of USWM should be to contribute with

Commentaire [ple1] : Duide lijk maken voor welk type maatregelen dit opgaat: in een woonwijk, een drukke verkeersstraat of een retention pond in een stedelijk uitloopgebied?

the water system to the overall quality of the living environment. Therefore, two steps are essential:

1. Define the 'quality of the living environment' in a certain situation
2. Contribute with water management to this quality

'Quality cannot be disputed' is a famous saying. To define the quality of the living environment it is necessary to discuss this with people, having a stake in the land use of a certain area in which source control should be realized. Inhabitants mentioning a parking problem in a residential area, or maintainers who are responsible for green areas. In this playing field of different (and possibly conflicting) stakes, source control has to conquer its own position. The perceived quality by stakeholders is the first dimension of this playing field.

The second dimension is the current type of land use of a certain area, since an urban area is not empty when starting with source control. Source control has to fit within an existing type of (combined) land use. Rain pipes of houses need to be disconnected from a sewer system, or the surface of parking places are made permeable. The central concept for integrating source control measures in urban areas is multi functionality.

The playing field with these two dimensions (perception of stakeholders & multi functionality), is called *Urban Dynamics*. The urban dynamics form the context in which source control needs to be implemented. Since source control is in the capillary of the water system, stakeholders have little attention for water and there is a lot of urban dynamics.

The main problem of Urban Dynamics is selection: which urban processes might influence the implementation of source control? The current formal organization of USWM is not very suited to cope with *Urban Dynamics.* The main reason is that the focus of USWM is too much on the technical part of water management and too less on urban dynamics. This deliverable wants to support storm water managers to recognize urban dynamics and to cope with it.

Commentaire [ple2] : Gelijk in dit hoofdstuk al een voorbeeld geven wat aansluiting bij de context betekent: door met bewoners over water te praten, ontstaat vertrouwen en wordt herstructurering volt getrokken, ook voor verkeer en housing.

1.1.3 Coping with Urban Dynamics: a new approach

Coping with Urban Dynamics influences the whole traditional way of dealing with storm water. Involving and interacting with stakeholders is an important element when implementing source control, so there must be attention for cooperation with all kinds of stakeholders. Another new element is the funding which is required to change from a traditional technical system (discharge via sewer system) to a new system (discharge via infiltration or surface waters). Coping with urban dynamics will

prevent the development of plans describing ambitious goals on source control, but which fail in the implementation phase.

1.1.4 Urban Dynamics: New opportunities

Coping with urban dynamics is not only necessary for successful implementation of source control, it also offers new opportunities for USWM. New funds become available, or the public acceptance and familiarity with the need of source control enlarges. These opportunities arise when the spatial quality is taken as a starting position and water management as a way to contribute to the spatial quality.

1.2 The position of this report

This report is a logical follow up of the two previous reports in this WP. The first report, D3.1, gives an analysis of USWM among the different end users in the Daywater project. In this report, the concept urban dynamics is explained with use of a sandglass figure, see Figure 1.1.

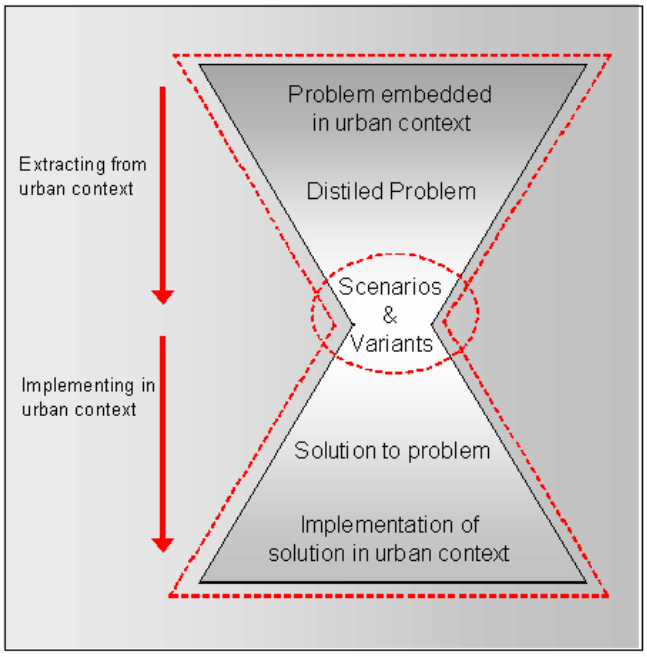


Figure 1.1 Sandglass figure, positioning Urban Dynamics in USWM.

Finding technical solutions in USWM forms the centre of the sandglass. The centre is the smallest point in the figure. To come to this solution the urban dynamics must be reduced. The sand flows from a broad entrance to the small centre. To implement the solution, it must fit in the urban dynamics. The sand flows down to the bottom. This analogy learns that the urban dynamics give the pre-conditions for implementing source control and that coping with urban dynamics cannot be reduced to technical modelling, which happens at the centre of the sandglass figure. The report concludes that end users experience problems when they have to cope with urban dynamics. This conclusion has formed the basis for further research in this WP.

Coping with urban dynamics is strongly related to the decision making process, which is defined as the activities a storm water manager employs to implement source control. D3.2 describes the decision making process for several end users by defining the legal framework, the involved stakeholders and the phasing. This report helps end users to describe their decision making process and to analyse problems which occur on the road to source control. Case studies inspire end users to find solutions for these problems.

1.3 Content of D3.3

This deliverable elaborates the concept Urban Dynamics: what is it and how to cope with it? The subject of the next chapter is the definition of Urban Dynamics. The third chapter develops an instrument to identify the relevant context for USWM by means of the aspect theory. The fourth chapter gives a strategy for coping with urban dynamics, which is called Interactive Implementation. The fifth chapter illustrates the theory on urban dynamics by a number of case studies. The sixth chapter sums up the urban components, placed on the ADSS and the last chapter draws some conclusions.

2 What is Urban Dynamics?

2.1 Urban Dynamics: back to reality

Urban Dynamics is the 'implementation environment' for USWM

Urban Dynamics is one of the topics asking for attention of the urban water manager, but often neglected in USWM. The main reason is that in urban dynamics is encountered in the last two phases of the decision making process: the implementation and the maintenance phase. In this phases technical solutions have to be put back in reality. Dealing with urban dynamics only in this phase can be too late. Storm water managers cry out: 'They don't understand!' That is true, but 'they' have not gotten the chance to know the importance of USWM. By the way, stakeholders have a lot problems, water is just one of them. The Urban Dynamics form the 'environment' in which source control is implemented. This environment is dynamic: there are a number of different types of land use and the people living there the people trying to influence the types of land use have different stakes, often not water-friendly.

Fitting source control in the mind set of stakeholders

The challenge of Urban Dynamics is to fit source control in the mind set of stakeholders. They have to 'value' the water. In other words: they have to see why water management is important for them.

Mutual dependency

Source control is only one of the many topics asking for attention and (financial) support of stakeholders and in their eyes often not the most urgent one. The only exception is when they experience flooding due to a bad functioning water system, but this is quickly forgotten. The success of implementing source control is dependent of cooperation of these stakeholders. They cannot be forced, it is out of the legal influence of USWM. It is also not desirable to force stakeholders since the real source is the behaviour of stakeholders themselves. Source control needs to be part of a 'sustainable awareness' of stakeholders. So, all kind of stakeholders need to be invited to cooperate with implementation of source control. This requires interest of the urban water manager into the context.

Urban Dynamics forces the urban water management to reckon with the stubborn reality.

2.2 General Urban Dynamics problems

We conclude that the main problems of coping with urban dynamics are:

- Integrating source control with urban dynamics (urban renewal projects, maintenance of the municipality, parking problems, etc.)
- Cooperation with stakeholders (citizens, politicians, environmentalists, etc.)

The problem of coping with Urban Dynamics has become more urgent since the implementation of source control. Measures of source control are suited at the start of the technical water system. On this places there is little water and a lot of urban dynamics. Implementing source control is not a matter of optimizing the water system but of integrating with other types of land use and within the valuation of stakeholders. Source Control measures are much more 'above the soil'

2.3 Positioning Urban Dynamics

2.3.1 Introduction

The focus of urban dynamics is on the urbanized area. The focus on urban areas is not by coincidence. Because of historical development, the aim of USWM is to discharge the water as soon as possible out of the city, for example to prevent epidemics. This strategy has led to flooding problems in and outside the city. These problems will grow because of climatological change. The challenge is to hold and store more water in urban environment. But how? Water storage requires a lot of space, but there is little. Also, the water infrastructure is made for quick discharge and not directly suited for source control.

The concept dynamics stands for ongoing processes in urban areas. These processes may concern political changes as a consequence of elections or the victory of the local football club. To describe these processes, there are some clues to get grip on them:

1. The development of the process in time. Sometimes slow, sometimes fast.
2. People initiating the process and interacting during the process.

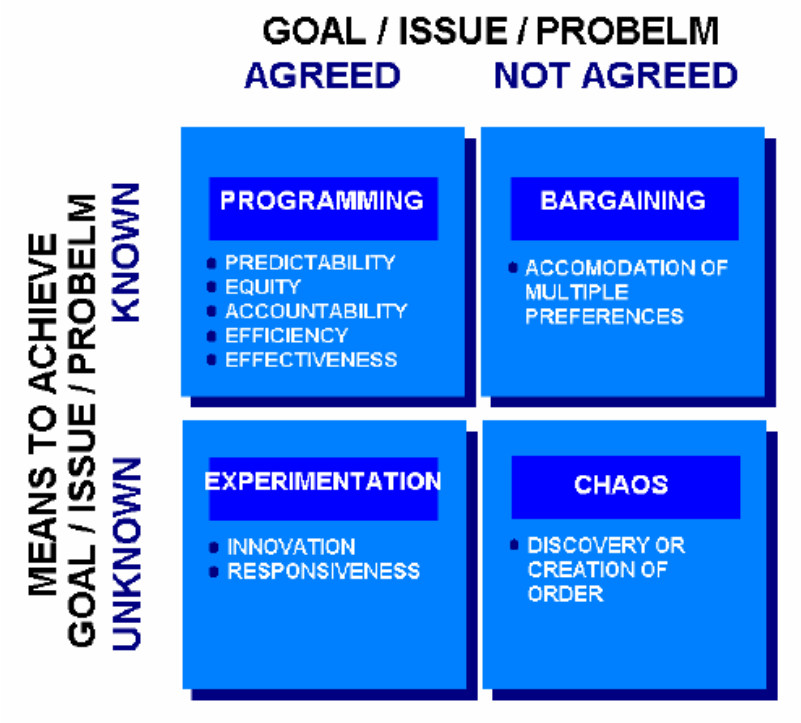
As said before, urban dynamics are those processes which might influence the implementation of source control. The definition of these processes cannot be to strict, since storm water managers must have an open view to identify these processes and to utilize them for source control.

2.3.2 Four quadrants – characterising the dynamics

The concept of Christensen (1985) is helpful for understanding the drivers for urban dynamics and to derive a strategy for coping with these dynamics. Dynamics occur when several mutual dependent stakeholders have to cooperate in order to reach their goals. The problem is that stakeholders might disagree on the goal of their cooperation and that they have little understanding of the possible means to reach these goals.

This description of dynamics is recognizable for implementing source control. To solve the problem of CSO causing pollution of the receiving waters, water managers may choose to build a retention basin, gathering storm water runoff. But to realise this, they have to cooperate. Some stakeholders are: public maintainers in the future responsible for the maintenance of the basin area, residents for connecting storm water run off from their properties to the basin and to prevent pollution of the water. But all these stakeholders have a different perception of the problem to solve and thus on the goal to reach. Maintainers may want to have higher budgets and residents may want to solve the parking problem in the area. Stakeholder perceive different problems. Furthermore the mean 'retention basin' for preventing pollution might be doubted. Realizing source control in urban areas, means cooperation with stakeholders who have different views on how the urban environment should look like. Sometimes even the means for reaching their goals might be unknown or disagreed. These factors result in urban dynamics

The question is what strategy might help to cope with the urban dynamics. See the next figure.



Christensen advices a strategy for bargaining in case of disagreed goals and a strategy of experimentation when means are not very clear. But, historically determined, nowadays USWM mostly happens in the first quadrant 'programming' with tight goals and known means, based on a tight organisation of the decision making process. Water managers need additional strategies for coping with urban dynamics. Strategies focussing on dealing with stakeholders and not only on realising technical water measures.

In a dynamic environment, the effects of a mean cannot be well predicted. A meeting with residentials as a mean to result in enthusiasm and cooperation, might end in an argue. The programme of the meeting cannot guarantee a successful outcome. Thus, uncertainty increases. The challenge is to accept and to deal with this uncertainty.

2.4 Content of report

Coping with Urban Dynamics takes the local situation as a starting point. To support water managers to deal with Urban Dynamics, four typical problems are identified and some strategies for solving these problems.

The discovery of urban dynamics happens not behind a desk but in interaction with stakeholders. Therefore, coping with urban dynamics requires a certain attitude of the urban water manager. The local level of scale and the importance of the attitude of the water manager make it hard to develop general guiding principles for coping with Urban Dynamics. The success is very much at the hand of the individual urban water manager. We hope to inspire him or her with examples.

This report contributes to cope with urban dynamics as follows:

- Developing an instrument for gaining insight into Urban Dynamics in a specific situation.
- Developing an instrument for gaining insight into the perception of different stakeholders
- Offering conditions or guiding principles for coping with urban dynamics / uncertainty
- A planning concept enabling cooping with Urban Dynamics: Interactive Implementation
- Examples which illustrate how storm water managers did cope with urban dynamics and how they succeeded or failed.

The instruments developed in this report give not a guarantee on success. Standard solutions are not possible, the solution ‘emerges’ while implementing source control. Coping with urban dynamics does a request on the effort and creativity of the storm water manager.

3 Aspects and values of water

3.1 Why aspect theory?

Knowing the definition of Urban Dynamics, it is important to know which processes are relevant for implementing source control. To scan the urban dynamics, the aspect theory is helpful.

Aspect theory helps to:

1. Take the step from a specific water problem to urban dynamics. How is the water problem related to all kind of other events / processes? This requires a sharper categorizing of problems (which problems are suited for enlarging scope and which aren't?). The definition for mentioning problem related events is: an event which could possibly influence my water problem. The water problem is taken as starting point, and all kinds of aspects are elaborated.
2. Define perception of UD-stakeholders – how will they perceive the water problem and thus what can or will they do in order to influence the water problem? Valuation! (In ambition reflection the perception of uwm is worked out in 3 forms of USWM, in this way, it counts also for other stakeholders). Insight in stakeholders perception is related to advising on cooperation.

3.2 Aspect theory

What are the values of water? This question has been asked frequently as part of this investigation. It turns out to be a mobilizing draft: Everyone has an idea of what is meant by the concept "values", but the interpretation remains vague and differs from one person to another. In order to be able to say more about the values of water, use is made of *aspect theory*.

Water has many different characteristics or aspects. Water consists of molecules that are made up of two hydrogen atoms and one oxygen atom. In the water live fish, and trees and plants draw water from the ground. A dive in the sea provides cooling on a hot summer day, but the same water is life-threatening during floods.

There are different ways of looking at water and the perspective is the determining factor for how characteristics are experienced (wet in the swimming pool or wet in a shower of rain). The perspective differs per person and depends on the relationship between the person and the water. A couple of examples. The manager of a café on

a canal in Amsterdam has a terrace that has extra allure for tourists. Two anglers at the water's edge are involved in a good discussion while fishing. An artist tries to reproduce the beauty of the water on canvas. With the arrangement of the water system, an urban planner wishes to strengthen the historical character of a town centre. Different characteristics of water are visible from different perspectives. The same characteristics are interpreted in different ways.

Dooyeweerd (Kalsbeek, 1983) developed the theory of aspects in order to provide insight into reality by indicating the versatility and variety in this reality. Aspect theory divides this into fifteen different aspects (see Table 2.1). Each of these throws light on another side of reality. So the anglers experience the *social aspect* of water at the water's edge, the manager has an eye for the *economic aspect*, the artist sees the *aesthetic aspect* and the urban planner gives form to the *historical aspect* of water.

The aspects cannot be transformed one into the other, but the way they are experienced is very similar. A retention area is laid out taking safety considerations (moral aspect) into account. The beauty (aesthetic aspect) of nature (biotic aspect) is a reason to fit the retention area into the surroundings (physical aspect), however not without considerations (logical aspect), in which the extra costs (economic aspect) are taken into account.

The coherence of aspects has to do with the sequence; this is not arbitrary. The aspects in the sequence of Table 2.1 can be compared to Russian Matjroska dolls, in which a higher aspect surrounds the lower one. The *spatial aspect* is carried by(surrounds) it *arithmically*, the *kinematic* aspect is carried by the *spatial* and the *arithmetic*, and so on. In other words, the higher aspects are supported on the foundations of the lower ones. This is referred to as *encapsis* .

In Table 2.1 the *essences* of the aspects are shown. Essences indicate how the aspects come to be *opened up*. In other words, how the aspect is distinguished in reality. In the table, essences are applied to water and in addition the aspects are made concrete for water.

Table 3.1: The aspects according to Dooyeweerd.

Aspect	Essence	Aspects of water
Pistic	World opinion	Water as a component of the way the world is seen Ritual washing - Moslems Washing in river the Ganges - Hindus Baptism - Christians
Moral	Views concerning good treatment	Views concerning good water management Safety, or the prevention of damage

Aspect	Essence	Aspects of water
		Sustainability
Legal	Law	Regulations for water Issue of permits for sewer overflow Authority and responsibilities of water partners
Aesthetic	Beauty	The beauty of water Reflecting water Sunset by the sea
Economic	Way of saving	Economic water management Do the costs of water projects weigh up against the benefits / values? No wastage of ground water Purification charge by the water board
Social	Dealing with people	Meeting by the water Discussion by the drinking water well in Africa Resident's evening concerning disconnection project
Linguistic	Symbolic significance	Writing about water Poems Water leaflet Navier-Stokes flow comparison
Historical	Management by free forming	Intervention in the water system Land reclamation Delta Works Space for the river
Logical	Analytical distinction	Thinking about water Thales: “Everything is water”. Organizing the water chain Ground water models
Psychological	Perception	Water stimulates the senses Water is wet A stinking quagmire Splashing water Delicious drinking water A view of the sea
Biotic	Life processes	Water as the first condition for life A person can survive for a maximum of 3 days without water Fish live in water
Physical/chemical	Matter	Water has a chemical composition and satisfies the physical laws of nature. The molecular formula for water is H_2O

Aspect	Essence	Aspects of water
		Water quality parameters Water flows downhill.
Kinetic	Uniform movement	Water flows A river carries melt and/or rain water to the sea Throughput in a water system
Spatial	Uninterrupted extendedness	Water occupies space The percentage of surface water in a district is 6% A pond contains 1,000 m^3 of water
Arithmetic	Discrete quantity	The expression of water in numbers 5 litres of water

The coherence between the various aspects is greater than just the fact that the higher rests on the foundation of the lower. There also exist so-called *analogies*. For an analogy, two aspects must be related to each other, so that aspects are given a deeper meaning. An example of this is the concept of spending limit, in which the spatial aspect is connected with the economic. In this case there is a question of referring back (retrospection). For drinking water there is a question of looking ahead (anticipation), the biotic aspect is then connected with the physical. For anticipation a development of the lower aspects takes place. This means that lower aspects receive meaning and expression in a higher one, so that the core of sense of the lower aspect will be deepened. Thus, within every aspect all other aspects can function. This observation will be worked out later in this section.

3.3 From aspects to values

Now with the aid of aspect theory, water can be typified by fifteen aspects, and it is possible on the basis of these fifteen aspects to define the values of water. In this investigation the values of water are defined as the positive recognition of unlocked (recognizable) aspects of water. This recognition is subject-related. For inhabitants, water is a component of their living environment, and they unlock particularly the psychological, social and aesthetic aspects of water. For the inhabitants, water has value when they unlock these aspects in a positive way. Water partners value water from their position of responsibility for the quality or the quantity of water. From a professional perspective, water partners therefore unlock the physical and biotic aspects in particular and see especially the values of water that are connected with these aspects.

The strength of the arrangement proposed by Dooyeweerd is that it presents a complete picture and reveals the great richness of aspects. For the further development of the values of water in the DayWater project the list has been shortened to ten values on pragmatic grounds. Those aspects that are less relevant

for water management have been grouped or removed. The lowest aspects are taken together in a physical or technical one and the chemical aspect, refer respectively to the quantitative and qualitative aspects of water management. The logical and pistic aspects have been removed and the historical and linguistic aspects have been combined in the cultural aspect. Figure 3.1 contains the list with values of water as they are used in the DayWater discussions so far. For the characterization of the three forms of water management we will use the complete list of fifteen aspects.

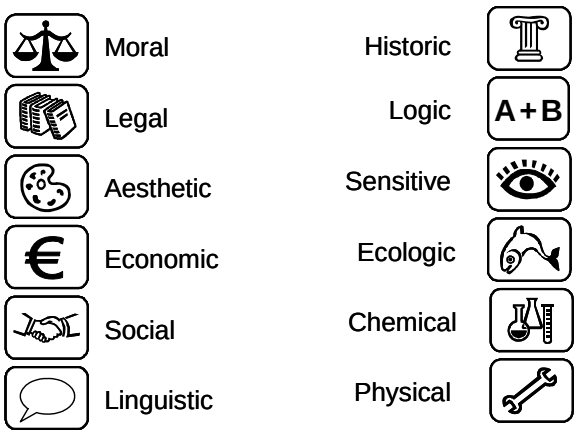


Figure 3.1: Ten aspects of values of water

3.4 How to use aspect theory?

3.4.1 Recognizing perception of stakeholders

The aspect theory helps to identify the perception of urban several stakeholders. To come to fruitful cooperation, it is essential to know the different perceptions and to bind them together. The aspect theory offers an integrative framework For further details, see www.daywater.cz.

4 Interactive Implementation

4.1 Introduction

Interactive Implementation is a helpful planning concept for coping with Urban Dynamics. This chapter introduces this concept.

4.1.1 Implementation as starting position

Urban Dynamics is complex. It is impossible to obtain an overview of all processes and to produce a full and structured description in the planning phase. The complexity is discovered in practice. Ignoring Urban Dynamics in the decision making process will result in a beautiful plans on source control, but stagnation during the implementation. So, it is important to integrate Urban Dynamics in the planning process, but not by writing plans, but with interacting with practice.

In order to arrive the right balance between planning and implementation, in the concept of Interactive Implementation it is not the planning phase but the implementation that is placed centrally. Around the implementation, people become enthusiastic and are able to deal with uncertainties. Some nerve is necessary on the part of the water partners. The absolute control of the water system is given away, in order to define and carry out water measures through interaction with society. The result of this interaction is not always certain, but when it succeeds, the costs of water management are shared and the revenues for water and society are maximized.

4.1.2 Why Interactive Implementation?

There are several good reasons for applying Interactive Implementation.

- In order to have plans also carried out in an urban dynamics context.
- Because it is impossible to foresee the total implementation at the planning stage.
- In order make use of valuable individual practical knowledge of involved stakeholders. Mutual strengthening of management and design.
- To preserve the knowledge and insights of the whole decision making process.

4.2 What is Interactive Implementation ?

The four principles of Interactive Implementation are developed in this report:: parallel working, switching between scales, learning while doing and the snow ball effect.

4.2.1 Parallel working

In practice, policy, planning, design, implementation and management are placed in series. There is, as it were, a question of passing on a relay baton. A problem is reported, for which policy makers make policy. This policy will be incorporated in plans, on the basis of which designs will be made. These designs are translated into a specification, after which it will be carried out. The result will be transferred to managers. The interaction between the various parties in the chain is a minimum: in the chain there exist so-called cold welds (see figure x).

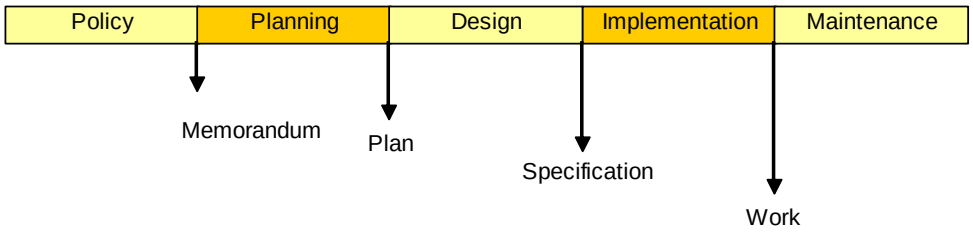


Figure 4.1 Static and linear chain from policy to management.

Where this concerns one project and one implementation process, this working method is logical. However, where many processes are concerned together and measures are taken at different times and on different space scales, this process functions too rigidly (see Cristenson). For integral, complex projects therefore, the linear approach often fails. Many integral plans are made using interactive plan formation, in which many persons are involved for the realization of a plan and by means of which the support increases. However, support for a plan does not automatically mean support for carrying out that plan. Plans disappear in the cupboard or are carried out in stripped-down form. This leads to frustration and is a great obstruction for the creative process.

For complex, integral projects, a management process is necessary that connects better with dynamic processes in reality. This management process is designated Interactive Implementation. The essence is that planning, design, implementation and management are not placed in series but are interwoven with each other (see **Erreur ! Source du renvoi introuvable.**). Immediately after setting up a view, the first experimental projects are defined and carried out. Policy makers participate actively in the implementation and managers enter into a dialogue with designers.

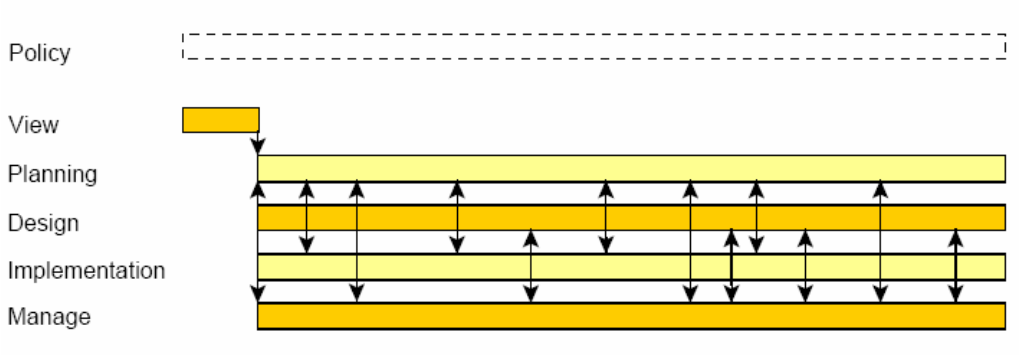


Figure 4.2 The different phases in the process run in parallel in Interactive Implementation .

This process is for example used in the municipality of Nijmegen. Here, the water partners produced a vision. The vision acts as a guide for all measures in the coming years. Now it became possible, using accurate models and extended interactive planning sessions, to elaborate measures for the Nijmegen Waterplan. In this way the uncertainties with regard to implementation of the plan could be reduced. Almost immediately after formulating the vision, a start was made on implementing the experimental projects. Planning, design, implementation and management for the different projects ran in parallel. This working method prevents plans being “thrown over the wall” as a result of the implementing parties and managers being involved too late in the process. This meant that it was never completely clear what the result of the process would be, but the enthusiasm keeps the plan on going.

Where storm water projects are interwoven with processes involving soil clean-up, traffic nuisance, renovation of dwellings, decontamination of industrial sites and programmes for education and integration, such as for municipal renewal, a similar parallel working method is a necessary condition. The water partners cannot determine the tempo. They must make their contribution at the right moment in order to be able to bring the sense of urgency an the values of water into the picture in the best possible way. This right moment cannot be determined beforehand. It is determined by the context.

4.2.2 Switching between scales

The second principle is based on the fact that USWM has to influence different levels of scale: the implementation of a BMP an a small scale, the discharge of storm water of a city on a large scale. Interactive Implementation enables to switch between these levels, in stead of translating the USWM to one specific scale.

Table 4.1 Consideration at two scale levels.

Small scale	Large scale
Concrete	Relatively vague
Short term dominates	Longer term dominates
Natural integration through intervention in the living environment (water, soil, traffic, social safety, etc.)	Focus on spatial coherence
Many differences in outlook	Possible consensus at an abstract level

Table 5.1 gives several characteristics of processes on large and small scales. On a large scale - the scale of the city of Nijmegen for example - the water system can be pictured as a whole and a view of sustainability can be set up. However, it remains vague because of the scale level. This vagueness can have the result that “everyone is in agreement”. Who does not want to have a durable water system? Viewing on the large scale level is necessary in order to discover the spatial coherence. However, it is impossible to bring about full integration with other environmental themes at this scale level. That is possible at the scale level of street or dwelling. At this level all the environmental themes come together. The radius of 100 metres around one project spot, is a suitable position to actually couple the themes and realize synergy. Reducing noise pollution, cleaning up contaminated ground, satisfying the Building Decree for the renovation of dwellings, setting up a centre for the homeless and disconnecting a paved surface, everything comes together at a small scale level. This scale level is dominated by short-term thinking and differences in viewpoints must be resolved, because it is extremely concrete. In Interactive Implementation, a link is forged between the different scale levels. No pains are taken to describe all measures on one scale level (so that they can be compared with each other), but there is an alternating treatment and reflection at small and large scales. A considerable difference between the large and small-scale level is reflected in the involvement of inhabitants. In practice, water projects at neighbourhood level seem to arouse a great deal of enthusiasm amongst the inhabitants. This enthusiasm flows from the fact that water projects are carried out in their immediate living environment. It gives vitality to a neighbourhood and a street and it has a certain appeal. When inhabitants are given more responsibility for the design and the management of the water in the district, the water will be more highly valued. In this way the involvement of the inhabitants is increased. This can be a starting point for tackling many more deeply rooted problems.

The switch between scales can also be significant for the development of a new housing development plan. In the Netherlands, an urban development project is organised as follows. At first one looks on a regional scale, after which structures

are set up at district level. Water can be introduced at this level. After global exploitation calculations have been made at district level, parcelization studies are carried out at neighbourhood level. Ideas for durable water management can then still be kept standing. Only after some time will – together with contractors and architects – the descent be made to the scale level of the street and the dwelling. The plans for making ready for development are then worked out and more accurate exploitation calculations are made. It then appears that many ideas for durable water management are put at risk, are scrapped or simply prove not to be possible. For example, a construction without a crawl space appears not to be possible because the contractor has a long-term contract with a flooring manufacturer. By switching between scales and already in the initial phase exploring at the scale level of street and dwelling, problems can be discovered early and agreements concerning the arrangement of the water systems can be better anchored.

4.2.3 Learning by doing

Where everything depends on everything else, processes display many uncertainties. “Do the measures have the desired effect?” “Will the inhabitants participate?” “Can we rely on political support?” These uncertainties are resolved by building experience by carrying out projects. These projects – often designated as pilot projects – must be undertaken where there is a big chance of success. The success of one project can lead to support for another project.

For initiating a pilot project, the next conditions must be considered.

Shared sense of urgency

This sounds evident, but often the problem is not communicated when initiating a project. If communication takes place, it is about possible solutions and not about the problems. In particular, politicians demand a clear problem definition. In order to get approval of the local council an alderman the “sense of urgency” needs to be stated. For example: “If we do not take water management really seriously, once in 10 years the district will be under water with significant damage on houses.” Or: “The chance that children will become ill if they swim in this water is unacceptably high”.

Mutual dependency

When stakeholders are mutual dependent there is a need for cooperation. For example, if a water partner wants to disconnect storm water form a paved area on private property, he is unilaterally dependent on the voluntary cooperation of the landowner. If the landowner doesn’t want to cooperate, the project has a great chance to fail, since the water partner does not have legal authority to force

landowners to cooperate. However, for topics such as road safety and parking, inhabitants are dependent on the local authority. By taking all these topics together, lines of mutual dependence become visible and opportunities for carrying out water projects occur. For example a project aimed at disconnecting storm water can simultaneously contribute to an extension of green areas in a street. If there is mutual dependency, there is a basis for means that negotiations, since both stakeholders have an interest. To create mutual dependency, it helps urban water managers to have insight into the valuation of water by elaborating the aspects of water.

Trust

The condition for a successful project is the presence of trust between the parties concerned. Experience teaches that when inhabitants have little trust in the local government, they do not react to information, but to so-called peripheral stimuli. These stimuli are over-simplified messages and signals from all kinds of sources, often with an emotional component. Inhabitants distrusting the local government can exhibit a strong and violent reaction because of these stimuli. For example the peripheral stimulus that 'disconnected paved area will result in overflow of cellars', summoned by a reluctant inhabitant, can result in massive resistance of other inhabitants to the local government despite all kinds of rational arguments proving the message not to be true. Thus, only when there is trust, participation on honest arguments is possible. One of the ways to increase trust is to follow the principle of "do what you say and say what you do". A principle often neglected resulting in a lot of distrust.

Do not avoid conflicts at all costs

Projects seldom result in win-win-situations, even though designers often create this impression. There are always winners and losers. It is fatal to a project if dormant conflicts are brushed aside. It is better to discuss points of conflict at an early stage of the project. Then there is still sufficient time to find solutions. By making ideas concrete quickly and by learning by doing, points of conflict soon become apparent.

No optimal but best solutions

For integral projects, optimum solutions are always sub-optimum. For the water partners, this understanding is of particular importance, because all too often the best solution for the present water problems in a large area is determined with the aid of model exercises. This solution is then applied generically to all projects. This will not work. The trick is to determine the best solution for each different project, a solution that reinforces the identity of an area. Water partners often are afraid of creating a precedent: "If we do that in one place, we have to do it on other places also". The more integrally an area is looked at, the stronger will be the justification for doing something different in each place. Optimum solutions are not determined in advance, but emerge in a surprising manner in an interactive process, by doing it.

4.2.4 Making little successes known to the world

Only when plans are carried out most people become really enthusiastic and space for water is created both literally and figuratively. Enthusiasm is contagious. A gleam in the eye of a co-worker can result in an enthusiastic project group. From experience gained in Nijmegen it appears that water projects only get off the ground when the positive results of experimental projects are visible and widely distributed. While writing the water plan of Nijmegen, it turned out by an enquete (the so-called population monitor environment) that more then half of the inhabitants were familiar with the new water policy. This familiarity has grown by communicating the positive results of pilot projects. The fact that the new policy was known to a significant part of Nijmegen inhabitants, caused politicians to support the new policy. In Leeuwarden – another Dutch city - a great deal of a transition to new water policy was released around the Interreg-project Water City International, as a result of collaboration with partners from other European countries.

Enthusiasm originates when a water partner with ‘a gleam in the eye’ is given the room to carry out his or her ideas and to involve others in the process. These may be colleagues in other departments, but may also be other water partners or administrators. The collaboration between municipal civil servants in different departments helps water partners to integrate different goals in a specific project. For example, a municipality can take the initiative in developing educational packages concerning the environment for use in elementary schools. An opportunity for water partners to explain the importance of sustainable water management to the youngest generation and to awaken their enthusiasm.

5 Coping with characteristic Urban Dynamics problems

This chapter supports in solving four typical Urban Dynamics problems. These problems are:

- Funding of water management
- Involving inhabitants
- Attaining political attention
- Building cooperation among water partners

The presented solutions are not a panacee. Each local problem requires a local solution. But, the elaboration of the solutions gives a framework for working on a solution on a local situation.

5.1 Funding source control

Funding is one of the major problems of source control. Some reasons for lacking money are:

- Source control is regarded as experimental, not as standard. Structural money is not reserved for experimental kind of measures.
- Source control is *on the short term* more expensive, for source control requires structural change of the technical water system. A separate system for discharging and storage of disconnected storm water needs to be realized. But, on the long term Dutch studies point out source control and traditional USWM are equal in cost, or even lower.
- Source control on private land must be financed by private actors.

5.1.1 Funding by valuation by stakeholders

Coping with Urban Dynamics offers new opportunities for funding, as contribution to the standard funding structures of USWM. Both, structural and Urban Dynamics funding need to be taken into account.

The main idea of funding is: when stakeholders valuate the (disconnection of) water, they are ready to pay for it. The challenge is to highlight the contribution of water to other values, or to make connections to these values. In fact, the broadening of the valuation of water is not that hard, since

- Water problems are (for inhabitants) often related with other problems in the living environment: (street) litter, traffic, social segregation and safety

- Source control forces to activate a wider range of stakeholders.

No guarantees for funding

At forehand, it is important to understand that it is not possible to guarantee that coping with urban dynamics will result in funding. It depends on the valuation of stakeholders, and the activities employed by the urban water manager, based on his attitude (D3.4). But, it is better to work with the uncertainty of funding by coping with urban dynamics than to work with the certainty of not funding source control. Furthermore coping with urban dynamics enables the urban water manager to come up with innovative and durable solutions.

5.1.2 The fundamentals of funding

There are three conditions for a sound base of funding:

1. A shared problem perception on the sense of urgency of source control
2. A socially broadly based tackling of source control.
3. A fair distribution of costs and benefits among stakeholders

A shared sense of urgency

One or more of these conditions are often not subdued. In the first place, the sense of urgency is omitted and the urban water manager jumps to conclusions. Most of the time is spent to model on different alternatives of BMPs, when there is the aim of source control. This work is important, but before starting thinking of solutions, the problem must be known. This sounds easier then it is in reality. First, the problem is not only 'to realize the spearhead of a policy', but the water related problem happens in a certain place, time and situation. The local situation needs to be taken into account:

- Place: a street in a residential area (level of scale)
- Time: the pavement of the street is in bad condition, caused by an arrears of the municipal maintenance department
- Situation: inhabitants of the street have complained to the municipality because of the street, but the municipality hasn't responded on these complaints.

If the condition of the road is not taken into account by the urban water manager, implementation of source control will fail because of distrust and unwillingness of cooperation of inhabitants. So, in this example, the water problem is connected to the problem of the condition of the road. This example also illustrates the second element why it is not easy to formulate a problem: different stakeholders must have a shared perception of the case sense of urgency. In this case, inhabitants perceive disconnecting the street not as most important problem, but the condition of the road. An even bigger problem of inhabitants is the distrust in local government,

since they do not listen to complaints. The challenge for the urban water manager is to connect the problem of disconnecting the street to the problem of the condition of the pavement and to the problem of distrust. Otherwise cooperation and possible funding of stakeholders on source control stays out of sight. And in reality there are even more stakeholders: A project manager responsible for urban renewal of the residential area, where the street is part of, the department responsible for maintenance of public space, etc.

In order to come to funding by stakeholders, it is important to break through the *self-reference* of the urban water manager.

Social based solutions

Not only the perception of the problem needs to be shared, also the recommended solution. A shared problem perception is a sound base for formulating a shared solution. It is important for the urban water manager to understand, source control does not only have a technical dimension. Source control can have an esthetical and ecological dimension, for example a swale. Also source control can support to the structure of an area. The space a gutter can take in a street, can reduce the space for cars and bv that the intensity of traffic.

The difference in *aims*, *planning* and *culture* of source control and other policy fields makes it hard to come up with shared solutions. In the first place, the aim of source control can conflict with the aim of ecological development, or traffic. All these functions take space and space is scarce. In the second place, to come to social based solutions, planning processes of different municipal departments need to be connected. This is quite a task, because the linear planning of USWM and the more dynamical planning of other departments, like urban renewal do conflict. In the third place, the difference in culture is hard to overcome. USWM has a strong normative approach. This prevents coming to fruitful cooperation, since norms do not allow negotiation.

Just distribution of costs and benefits

As mentioned before, the costs for source control are on short term higher then standard solutions. The benefits of a better water quality by reducing sewage overflows, a reduced risk of flooding downstream, improvement of the efficiency of WWTS, less storage capacity of the sewage system, the possible contribution to ecological development, etc. come to other stakeholders and mostly on the long term. This makes it hard to come to a just distribution. Agreements and cooperation with profiting stakeholders is essential to give a better balance to cost and benefits.

5.1.3 Partnership and valuation

The two building bricks for funding by coping with urban dynamics are: partnership and valuation.

Partnership

Commentaire [ple3] : Link to the cooperation problem mentioned before. Cooperation is also an important topic for Urban Dynamics.

Partnership is a fruitful concept when thinking of funding. Partnership is a specific type of cooperation, enabling stakeholders to come to a shared perception of problems and solutions and to make agreements on a just distribution of costs and benefits. Partnership is a type of cooperation between a hierarchical and a market structure. The hierarchical structure isn't suited, because the urban water manager is mutual dependent and cannot force source control solutions. The market structure isn't suitable since there is no clear supply and demand. Partnership is an elaboration of the network model and it combines the advantages of the hierarchical an market structures. The big advantage of partnership is that stakeholders can contribute, without having a *direct* return. The contribution enforces the relation between stakeholders. Stakeholders invest in each other because of mutual dependency.

The four C's

The success of partnership is based on the next four conditions, called the four C's (Eijk, 2003). Firstly, the *concept* needs to be sound. As mentioned before the concept, or proposed solutions should be shared among stakeholders, based on a collective problem perception. Secondly, the *contacts* between stakeholders need to be clear. Good communication is essential for the success of partnership. Thirdly, the condition '*contract*'. Progress should be committed in agreements. Fourthly, the continuation of the partnership needs to be guaranteed. *Continuation* by the same people taking part of the partnership and by activities, initiated by the partnership. Practical experience learns that most problems occur with contract and continuation condition.

Adaptive attitude

The right attitude of stakeholders in a partnership is an *adaptive* attitude. Adaptive means 'to be interested in the environment'. One the one hand a stakeholder needs to act based on a clear vision and clear goals, but on the other hand a stakeholder must open to opinions of other stakeholders.

Valuation

Commentaire [ple4] : Link to the aspect theory.

Partnership and valuation are complementary. Partnership tells how to cooperate, valuation tells why to cooperate. Valuation stands for the value stakeholders attach to the subject of cooperation, source control. Source control can be valuated

differently. National government puts the sustainable aspect central, local administrators the pay ability and the prevention of water trouble, urban water manager lay accent on technical functioning of source control. The aspect theory lays open all these valuations, systematically.

Table 5.1 Examples of different values.

Aspect	view	view
Moral	of water should not affect the ecological system	The use or The use of water by men is most important
Economic	Costs and benefits need to be financially balanced	Non-financial benefits as beauty need to be taken into account
Technical	Results of modelling determine the type of BMP	The contribution to the living environment determines the type of BMP

5.1.4 Funding in Nijmegen

In the 'old' sectoral approach the city of Nijmegen had tot invest € 17.000.000 to build a storage facility for storm water into the mixed sewage system in order to comply with national law regarding water-quality of river-systems (reduction of uncontrolled overflows from mixed sewage-systems into surface water). By creating a extra sand-filter on the Waste Water Treatment Plant (owned by the Regional Water board) the same effect on water quality is effectuated. This measure only costs about € 3.500.000. So € 13.500.000 of means have been fallen free for a further integrated storm water approach with emphasis on source measures instead of sectorally implementing the planned end-of-pipe measures.

For carrying out this new approach, new financial resources had to be created. So, the investments in end-of-pipe techniques proposed in the 'old' sewage programme for Nijmegen have been reconsidered. And, as a result of working together with the other partners in the water chain, financial gains have been realised.

5.2 Involving inhabitants

Source control requires the involvement of inhabitants. The use of permeable pavement is on their parking place. An infiltration grid must be connected to their rain pipes. Inhabitants have to buy and install a rain barrel. The problem is that inhabitants mostly are not that willing to cooperate. It takes time and may result in investments. Therefore inhabitants must be motivated to join in. Furthermore, if inhabitants do cooperate, it proves to be hard to come to a common shared solution on source control for several reasons.

Basic views on involving inhabitants in source control

- Cooperation in disconnecting is essential
- Participation of inhabitants is a structural uncertain. The uncertainty is known, but you cannot tell in advance if participation will succeed.
- In practice we learn that barrier capacity of citizens for a plan does not mean that citizens will cooperate with the implementation.
- How to involve citizens in such a way that successful participation is stimulated?

5.2.1 Solution

How to motivate inhabitants? Inhabitants may be motivated by a problem they want to solve. Mostly this problem is not related to water, but to other problems in their living environment. These problems may be physical, social or economic. Inhabitants may also have problems with the policy of the municipality. Since water managers represent government in their eyes, they try to bring in their problems. If water managers do not have an eye for the motivation of inhabitants if they want to involve them, it will flop.

Inhabitants may also be motivated if they see a chance. This is a positive motivation. They may see an opportunity in guiding money to their residential area when source control is implemented.

If inhabitants are not motivated enough, and this is often the case, the water manager may think of ways to motivate them. Several strategies are possible:

- Doing a pilot on source control, on a place which is seen by many inhabitants, for example on a school yard. Important conditions are to pay special attention to the esthetical aspect en to give information on the pilot project also when it is realised. People may become curious or see opportunities for their place.

- Involve key inhabitants in a residential area. Each residential has its own. If they see possibilities, they may mobilize others.
- Connect the water problem to another one, who inhabitants do find more important. By building open discharge gutters along a footpath, parking places must be reorganised. This offers good opportunities to solve parking problems.

Before writing a plan, do pilot projects in active cooperation with citizens. They will notice what the plan really comes down to

Discussion

An important lesson when involving citizens is to start at first with listening to their problems, mostly not water related. In the second place, involving citizens requires working on the relationship. There has to be a situation of trust, so peripheral stimulus will be silenced. Only after listening and building on a good relationship there is a suited environment for discussing source control. While involving inhabitants in this way, there may be a risk that trust won't grow. Successful participation cannot be guaranteed. However, the mentioned strategy does enlarge the change on success.

5.2.2 The theory of focus groups

The organisation of focus groups has appeared successful in involving inhabitants.

What is a focus group?

A clear definition of what a focus group is has been given by Powell et al (Gibbs, 1997). They define a focus group as a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research. So focus group research can be seen as an organised discussion with a selected group of individuals to gain information about their views and experiences on a topic. Focus groups are particularly suited for obtaining several perspectives about the same topic. They may be most useful in early stages of a project in which the problems are not well known, for example needs assessment studies and formative evaluations.

A focus group consists of 6 to 10 individuals, representing a variety of stakeholders from the area of concern, such as fishermen, hikers, environmentalists, etc. These people will stay on the focus group during the entire project, so that after a few meetings all participants feel at ease and are willing to give an honest opinion on the subject. The heterogeneous composition of the group will secure different perspectives on the topic.

The organisation

The organisation of focus groups requires more planning than other types of interviewing: for in stance, the group must meet at neutral places, to avoid negative or positive associations. This may be people's homes, rented facilities or local community centres.

Also, the composition of the group is an important issue. If a group is too homogeneous, diverse opinions and experiences may not be revealed. On the other hand, if a group is too heterogeneous, the differences may have impact on the contributions of the participants. The aim is to make them feel comfortable with each other: meeting with others of whom they think have similar characteristics or levels of understanding about a given topic will be more appealing than meeting with those who are perceived to be different.

Recruiting the participants can be a very difficult task, especially if the topic has no immediate attraction to people. People will have to be attracted by word of mouth, advertising or existing social networks. Usually, compensation like gifts needs to be offered to stimulate people to participate.

The role of the group leader, called the moderator, during the meetings is very important. The moderator will lead the meeting and has the task to provide a clear explanation of the purpose of the meeting. He or she must help people feel at ease and must stimulate interaction between group members when needed.

The moderator must encourage every individual to speak, but must not show too much approval, to avoid favouring particular participants. He or she must prevent giving their personal opinion, to avoid any influence on the participants (Gibbs, 1997).

Potential and limitations

The main purpose of focus group research is to draw upon the respondents' attitudes, feelings, beliefs, experiences and reactions in a way that would not be possible using other methods like one-to-one interviewing or questionnaire surveys. These attitudes and feelings are more likely to be revealed during the social gathering and interaction caused by the focus group. A focus group enables the researcher to gain a larger amount of information in a shorter period of time, for example information about why specific issues are important to people, and what is the importance about it. As a result the gap between what people say and what they do can be better understood.

Interaction is a very important issue in focus group discussions, because it highlights the participant's view of the world, the language they use about an issue and their values and beliefs about a situation. People start interacting according to the different roles they are most comfortable with. This more closely simulates what they do in the real world, where people rarely act in isolation. Not only the opinions are important, but also the people behind the opinion, how they are expressed and on what values they are based (Silverman, 2000a).

Another very interesting benefit is that the focus group can also be used for other aspects during a project. Including people into more parts of the project, causes people to get more involved and will lead to more trust in the project.

There are also some limitations to focus groups. Many of these drawbacks can be overcome by good moderating, but others are unavoidable and very specific to this approach.

For instance, a researcher has less control over the outcome of the discussion, than in a common interview. Other than keeping participants focussed on the topic, the moderator has little control over the interaction. Focus group research is open ended by nature (Gibbs, 1997).

Next to that, assembling a focus group can be very difficult. As a result, the people in the groups may not be the most suitable ones. For shy or inarticulate people for instance, focus groups may not be satisfactory.

Another problem may be that some of the participants do not express their real opinion. There are many reasons for this, for instance when people base their opinion on old facts, or on the opinion of their company or community. The moderator and the researchers have the task to help participants get in touch with deeper motivations, in order to get beneath the superficial ones. (Silverman, 2000b)

5.3 Political attention

Source control is not the most popular among decision makers and the question is how to involve them in a way they might fund water management.

5.3.1 Rhythm & Beat projects

The collaboration between civil servants and administrators is important in order to obtain the necessary political attention and thus the budget for the water policy. Factors which draw the attention of politicians:

- Intensive and fruitful cooperation with water partners.
- Successful results of pilot projects
- Familiarity of water policy of citizens
- Projects in a European context.

Therefore, the next strategy is helpful. Define rhythm & beat projects. Beat projects are the main projects of source control. Often they require significant investments. Rhythm projects are projects with the aim to bring source control positively under attention to inhabitants. For example a project where the showers used by the local football team are functioning on harvested rain water. This project will not have huge effects on the water system, but it will bring water under the attention and it enables politicians to score.

5.4 Building cooperation among stakeholders

Cooperation starts to be interested in the interests of stakeholders. Not only functional cooperation: “I need you, so I cooperate with you”, but reciprocal cooperation: “how can we create synergy by cooperating.”

So, a pre-condition for cooperation is insight into what other stakeholders want (their goals) and their problem perception (i.e. the sense of urgency). The problem perception is determined by the valuation of the stakeholder. These factors determine the mutual dependency.

Next to this content related information, also the relation between stakeholders is important. (otherwise cooperation should be a matter of optimization). This relation is determined by trust or distrust. Also power is very important

Specific problems in cooperation:

- Funding – who is going to pay? Content: Costs and benefits of a measure. Relation: trust
- Communication – Content: insight into problem perception of stakeholder. Relation: building and maintaining the relationship between stakeholders
- Involvement of stakeholders

A condition for collaboration is that organizations and departments are interested in each other and there is a feeling of shared responsibility. This shared responsibility can be laid down in a vision.

6 Conclusions

To cope with urban dynamics, the problem storm water manager has to adapt from a one-aim approach to a multi-aim approach. Therefore his perception of USMW has to alter. From a focus on water management aim to the focus of contributing to the spatial development. This has a direct influence of the design of the decision making process, or to in other words, the activities he must employ to succeed in the implementation of source control. The perception and attitude of the storm water manager is the subject of D3.4. D3.5 consists of the tools developed on www.daywater.org which support water managers to cope with Urban Dynamics.