



## *Living with Flood Risk in a Changing Climate*

### **FLOWs report WP2A - 5**

### **Interactive Learning Groups**

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The Netherlands  
and Germany



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## **Foreword**

Interactive learning groups are a way to communicate complex issues with people new to that issue.

Using the ideas of David Kolb's learning cycle, i.e. experiencing, dreaming, thinking and testing, participants of the interactive learning groups showed great interest in the topic of the increased risk of flooding in the areas they lived.

As two of the organizers, the enthusiasm of the participants is something you will never forget, as well as the lessons learned from the group sessions. The most important one is that it is possible to discuss complex matters as the effect of climate change on water systems and land use with inhabitants of the area in such a way that they understand the choices to be made.

The project is strongly considered innovative, as it shows, how confrontational situations in flood plain management can be handled in aiming for cooperation and by doing so, might even disappear. Dialogue, cooperation and communication, stepping up to the citizens, integrating them instead of informing them, or simply communication instead of information is to be found rather seldom interface between authorities and citizens. But what really makes this approach innovative, are the aim and results in generating Hazard awareness in an artificial manner.

Bert Kappe – Province of Flevoland

## **Summary**

This report contains the results of the Interactive Learning Group sessions in the provinces of Flevoland and Fryslân, and those held in the city of Hamburg. An interactive learning group, ILG, is an interactive learning process on a certain topic, in this case flood risk, consisting of several workshops and based on the David A. Kolb's theory on experiential learning. In all three cases the ILGs proved to be an entrance to the risk awareness of participants. The awareness of the participants is measurably raised, as is their trust in their own knowledge and ability to act in case of an emergency. The process is encouraging and rewarding, both for participants and organizers.

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## **1 Introduction**

This report contains the results of the Interactive Learning Group (ILG) sessions in the provinces Flevoland and Fryslân. It is the Dutch and German report of the FLOWS INTERREG project 2a. The ILG are used as an interactive approach to communicate on the complex policy issue of flood risk. The process followed can be seen as a means to both give insight and understanding on this issue to a group of people and to get as policymakers, understanding of the knowledge, views and perceptions of the public. The ILGs consisted of several workshops and were based on the David A. Kolb's theory on experiential learning. This interactive approach has been used as an alternative for the Focus groups which were held in Norway and the UK. The outcome of the ILGs is used as input for project 2d, theory development on risk perception, a scientific study of the understanding of how people perceive risks

### **1.1 Position within the FLOWS project**

The main objective of the Interreg III B FLOWS Project (Flood plain Land use Optimising Workable Sustainability) is to improve all aspects of flood management with special emphasis on spatial planning. Work Package two (WP2) focuses on the social aspects of flood risk like perception and the communication of flood risk. To get insight into the actual perception of flood hazard by citizens and decision makers, focus groups and expert panels have been set up and polling carried out in all the five participating countries (Norway, United Kingdom, The Netherlands, Sweden and Germany).

### **1.2 Background**

The results from the international questionnaire and the focus groups in England and Norway show an underestimation of flood risk and passive attitudes towards flood problems. Most important outcome is that only less than half knew that they lived in an area at risk of flooding, and many people seem to feel safe due to expected low risk of flooding as well as trust in measures taken. The results also indicate that members of the public have misconceptions about flooding. People recognized insufficiently planned development of new housing areas in flood prone areas to be a main problem. There are more similarities than differences between the countries in the way people perceive flood hazards.

### **1.3 Structure of the report**

In chapter two the aim and background of the Interactive Learning Groups, in short ILGs, are explained.

In the third chapter the methodology of the ILGs are described, the selection of the participants as well as the results of the ILGs. Chapter four gives in short the result of the scientific interpretation of the results of the interactive learning groups, using a theory which is also used in the field of social psychology.

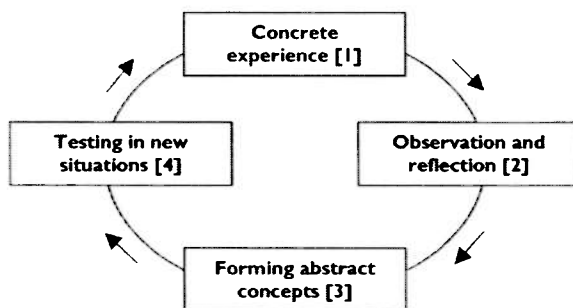
## 2 Aim and background of the Interactive Learning Group

In this chapter we describe the aim of the ILGs, the conceptual background and its application.

### 2.1 The Learning Cycle of Kolb

The basis for the Interactive Learning Groups is given by David A. Kolb's ideas and theory on experiential learning, motivated by his interests in exploring the processes associated with making sense of concrete experiences - and the different styles of learning that may be involved.

David A. Kolb created his model out of four elements: concrete experience, observation and reflection, the formation of abstract concepts and testing in new situations. He represented these in the experiential learning circle:



Kolb argues that the learning cycle can begin at any one of the four points - and that it should really be approached as a continuous spiral. However, it is suggested that the learning process often begins with a person carrying out a particular action and then seeing the effect of the action in this situation: making an experience as starting point of a learning process. Following this, the second step is to understand these effects in the particular instance so that if the same action should be taken in the same circumstances it would be possible to anticipate what would follow from the action. In this pattern the third step would be to understand the general principle under which the particular instance falls, meaning that understanding is taken off the particular circumstance to a more abstract level.

This generalizing may involve actions over a range of circumstances to gain experience beyond the particular instance and suggest the general principle.[...] [Or it could be triggered by targeted activities on the field of the respective experience, by discussions and presentations.]

When the general principle is understood, the fourth and last step should be its application through action in a new circumstance within the range of generalization. In some representations of experiential learning these steps, are represented as a circular movement. In reality, if learning has taken place, the process could be seen as a spiral. The action is taking place in a different set of circumstances and the learner is now able to anticipate the possible effects of the action. By doing so a new experience on a higher level is gained, starting the process over again.

(Source, modified: David A. Kolb on experiential learning, <http://www.infed.org/biblio/b-explrn.htm>)

## **2.2 Transfer and implementation into Interactive Learning Groups**

Those four elements or fields of learning describe the frame of the four workshops of the Interactive Learning Groups (ILGs). Participants are ten to fifteen persons from different backgrounds of interest, education and flood experience. The workshops take place once per month and last for approximately three hours to half a day.

According to Kolb's suggestion and in accordance with statistical investigations and own reflections, the cycle of workshops is started in the field of concrete experience, giving the participants the "hands on" approach of flood hazard. The second workshop features talks on the previously made experience, aiming for an understanding. And as it is not possible to provide a multitude of different experiential situations, as suggested by David Kolb, the third workshop features a widening of this understanding by introducing vivid information on the background of flooding and the topics of water and flood management.

In this manner the workshop will follow the cycle through all four steps, as described in the succeeding chapters. But as it is not meant to be educational merely for the participants, questionnaires for evaluation are to be filled out at the beginning of the first and at the end of the last workshop.

## **2.3 Aim of the ILGs**

The aim of the ILG in Germany and the Netherlands was to give insight and understanding on flood risk to a group of people and to get as policymakers, understanding of the knowledge, views and perceptions of the public. Furthermore, getting experience with the ILG approach can be seen as an important secondary objective, as the approach can be used in future public participative processes on other issues.



### **3 The Interactive Learning Groups (WP2A)**

This section describes the results of all three ILGs organized in Hamburg, Fryslân, and Flevoland.

#### **3.1 Selection of participants**

##### **3.1.1 Workshops**

The learning cycle of Kolb is explained in chapter 2.

The four elements of the cycle are the basis for four workshops of the Interactive Learning Groups. In the three ILGs, the workshops are organized around the themes experiencing, dreaming, thinking and testing. The workshops themselves are described further on in this paragraph.

##### **3.1.2 The participants**

In Flevoland, the participants were selected on the basis of their being active in a local organisation, as described in the guides of the local councils. The people are approached by phone and were asked whether or not they are interested in participating.

In Fryslân a group of approximately 160 people were invited to volunteer in the process. These people had run for a position in the Waterboard election, but weren't elected. Half (!) of these gave a positive reaction of which 12 were selected on the base of address, age and occupation. Among these 12 persons were farmers (3), teachers (2); students (2) and one accountant. Unfortunately only one woman participated.

In Hamburg, at an early state during the project's lifetime, the intended strategy for obtaining participants appeared not to be suitable for the purpose. It had been planed to invite residents to the workshop, who were known to the authorities because of their active participation in social and political issues . But all the names provided by respective parties belonged to people engaged in water management in some way, whereas the target group for the ILGs were the ordinary uninformed residents who do not appear on any list of complaint at the city council.

Different ways were tried to reach these residents, with only restrained success:

- Invitations in newspapers produced very little useful resonance, as the people aimed at were the once not familiar with the topic. Two of the three respondents were in some way involved with the topic of flooding; the third one took part in the project.
- 150 leaflets in the post-boxes of residents in designated flood plains brought about 6 responses, 2 of which actually took part.
- One woman brought her daughter, another one brought her husband .
- presentations in front of all together 700 students brought two more applicants
- An "experience reporter" attended the workshops, out of interest.

Altogether 6 participants were not considered enough, as the original idea had considered 9 persons per ILG, but with regard to the time spent it was decided to start.

## **3.2 Flevoland**

### **3.2.1 Introduction**

Flevoland consists of three polders which were made in the previous century. The polders were gained from the sea by building dikes in the former Zuiderzee and pumping away the water behind the dikes, which leaves an area of 1500 km<sup>2</sup>, four to five meter below sea level. Risk of flooding exists all the time and depends on the strength and height of the surrounding dikes and the possibility of a storm. Protection-levels are prescribed by national legislation. New is the increased risk of flash flooding, caused by the subsidence of the soil and climate change.

Aim of the ILGs in Flevoland was to involve citizens in the matter and, given the information which is used by policy-makers, ask them to reflect on the choices made by national, regional and local governments and to give recommendations to the policymakers based on their findings. A group of 15 people were selected by using the information on local organisations as described in the council-guides. The members of the ILGs are all in some way or another involved in public life.

### **3.2.2 Session 1: Learning by doing and experiencing**

Aim of the first session on November 25 2004 was to get to know each other and to learn about flood- and flash flood protection policy by doing and experiencing. At first the group as a whole was taken to the nearby dike-reinforcement scheme. People were asked if they were aware of the fact that Flevoland lies behind dikes and below sea level. With laughter the whole group answered that they were very well aware of the situation.

The approach chosen for the remainder of the session was to play a specially developed, monopoly type of game in five competing groups. All groups had the task to rethink the spatial planning of the Province of Flevoland, given the increased risk of flash flooding as a result of climate change and given the subsidence of the soil caused by the oxidation of peat in the subsoil. The play board was a map of Flevoland on which higher and lower lying areas were indicated as well as the boundaries of the water systems in Flevoland, together with an indication of the time needed for evacuation.

Each group was asked to decide where to position the different land-use types: agriculture, nature, both also in combination with recreation and urban areas.

Result of the process was that the 5 groups played the game very intensively under professional guidance of a game-master. During three hours people were very much involved in the decision-making process in such a way that it surpassed expectations. One of the first dilemmas put forward to the group as a whole was the question whether or not the spatial plan had to aim at maximising agricultural and industrial produce or that the land use should be deliberately suboptimal in order to give way for temporary water-storage, thus increasing the protection against flash flooding and accepting a lower economic output at the same time. The group decided unanimously to develop Flevoland in a sustainable way, taking the increased risk of flash-flooding into account.

The group is asked whether or not the risk of flooding caused by failure of the protective dikes should be addressed. The group decided to pay as a whole for a collective insurance by the government for the costs of evacuation in case of a disaster. The game is played and each group is trying to optimise their score by placing the different types of land-use with the most points on the

map. Final question is if the groups want to take and pay for an insurance for the disaster to come. Some groups decide to insure agricultural and urban land use. Then the disaster takes place. The dike near Lelystad, the regional capital, breaches. Scores are calculated. Taking insurance was a wise decision, so it appears.

The players played the game remarkably well. All groups ended up with high scores and little damage by flash-flooding

One of the participants states that she has a better understanding of the choices a province has to make: sometimes you want a different type of land-use, but your choices are limited. Also, you are forced to make sub-optimal decisions. Sometimes there are no alternatives.

The group applauds spontaneously for the organizers of the meeting.

### **3.2.3 Session 2: Dreaming**

Aim of the session dreaming was to enable people to dream and reflect about the event of a flood in order to make suggestions for governmental action.

The approach. How do you let participants experience such a disaster? We decided to use the power of storytelling. Two storytellers, Tom and Corry Draisma tell the story about a flood caused by a North Sea storm and a flash flood caused by heavy rainfall. By doing so, they make the disasters tangible for their public. Tom tells the story of civil engineer and professor Hadewijn who has foreseen a huge disaster because the Dutch government is not acting upon the weakening of our national flood defence caused by the disappearance of part of the island of Texel during a previous storm. A chain of disasters take place, climaxing in the flooding of the Noordoostpolder, the northern part of Flevoland.

Corry Draisma tells the story of a woman who waits for her husband to come home from work but does not return because of the heavy rainfall. When she wakes up she is relieved that her husband lies next to her, but the ground level of the house appears to be flooded.

Vivid story telling is followed by a group discussion led by Bert Kappe on the question how real these threads are. Some members of the group are really afraid that our homes will be flooded in the near future. People living in the town of Almere do not realize that they live below sea level. There is a huge trust in technique. One group member always makes sure that his car has enough petrol and that he has an oil lamp at home. He was born in Zeeland, the area of Holland that was struck by disaster in 1953.

Another group member is not at all afraid. The water will rise to a level of 2 meter above street level, so she has learned, which leaves her first floor untouched, so that she can survive a disaster. The necessity of peoples own responsibility is stressed. The group thinks it possible that in the future the Dutch leave part of the Netherlands because the water management measures become too expensive for the society. The reinforcement of flood defences is considered important.

Also, the government should not allow building in flood prone areas. And government should react in a pro-active way. The story of the sea flood makes most of the group members think about safety. People in Flevoland live in a bathtub. The difference is that you cannot pull the plug out, because there is none. People do not fear a repetition of the Zeeland disaster, because they have better information and better transport. They expect less casualties, although the trust in emergency plans and operations is low.

Half a year before the Zeeland disaster took place in 1953, an engineer, Johan van Veen, from the ministry of transport and public works, responsible for the safety of the Dutch levees, stated that

the dikes in Zeeland would not resist a storm surge of 4 m above sea level. People would not listen. Half a year later a flood occurred with a height of 3.85 m.....

The group thinks that in essence the present situation does not differ from that 50 years ago.

Although it is acknowledged that we are well protected against flooding in Flevoland: the chance of a threatening situation is 1/4000 year.

Openness of the government is thought necessary. Weak spots in the dikes should be communicated to the public at large, so that actions can and will be taken in accordance with the risk. Good factual knowledge is also considered important. A national discussion about these matters is thought important when national safety is at risk. But it will be difficult to get the interest of the public that rather watches popular television broadcasts, so is the opinion of the group.

### **3.2.4 Session 3: Thinking and testing**

Aim: to rethink the new approach to flash-flood risk and to check the views of the member of the provincial board of governors responsible for water management policy with the newly gained insights.

Three lectures were given: on flood risks in Flevoland, on risk of flash-flooding and risk and society.

The groups were given the assignment to solve the 'water task': they have to find a solution for the event a calculated volume of 14 million cubic meter of water will temporarily rise above ground level. The groups had to choose a set of measures from a given table with measures. Measures include:

- the retention of water,
- the temporary storage of water on arable land,
- the development of new lakes for recreational use or use as a nature reserve
- the increase of surface water in cities.

The groups had to optimize their solutions, taking into account the costs of the measures, their effectiveness and its sustainability. Their solution, their newly developed water policy, had to be presented and defended before the board member of the regional parliament in charge of water management.

The groups took quite some time to develop their water policy, although they had some experience with the topic now. It was difficult for them to communicate their views to the board member.

### **3.2.5 Session 4: Evaluation**

The aim of the evaluation was to make an inventory of views and lessons learnt by the group members. This is what impressed the participant the most:

- 'The disaster [told by the storyteller] followed by the question: will this happen again? At that moment I realised: it *can* happen again.'
- You should try to create quietness around the subject. In a period of upheaval you cannot solve the problem. Solve the problem when it is still solvable.
- The game. It is an issue of great complexity. Whatever you do, it is always to the disadvantage of some of the stakeholders. It is difficult to be a policymaker or a regional politician.

- The electrical wiring of our homes, the plugs and switches: why are they not placed on the first floor?
- The Tsunami. I thought: it can really happen. It is not so far from my own bed.
- The conviction that we can survive a disaster. I did not know the level to which the water can rise in the polder.
- Very, very interesting. I learned so much, so many different approaches to the subject. My compliments! Very good, the visit to the pumping station and the wharf of the Batavia, thank you!
- The game. You think you have taken care of things, but then another aspect is neglected. I hope we have many specialists to take the right decisions.
- Am I going to change my behaviour? No. but I would like to have a canal in front of my house, in order to water my garden in summertime.
- The appreciation of the fact that many things can go wrong.
- Concern. Look how long we take to talk about measures. Consider the village of Tollebeek [flooded by a flash flood in 1998, resulting in a damage of € 23 million]. When do we take action? The disaster can repeat itself any moment.
- The polder-feeling. I didn't know a thing, but am aware now that I live in a polder. I learned a lot, also about flash-flooding. It is more dangerous than I expected it to be.
- Everyone has his own approach. There are so many approaches!
- You look at a Tsunami from a different perspective.
- The first session everyone looked upon the problem from his own point of view. You didn't want the water on your agricultural land or in your town. The second session we learned that it is possible to do something about it. Some of us were talking about carpets and wooden floors, or the electricity cupboard. But the third session we all went for the general interest.
- I am more aware, also from the fact that people in England cannot get insurance because of flood risk. My view is more balanced.
- The fact that your environment is changing. You have a responsibility yourself. Also the insight that increasing the number of pumping stations does not solve the problem was new to me. Also outside the sessions the topic keeps me occupied. There is a lot of comment on the water board, but I have discovered that alternatives fail. And I tell my neighbours and friends about it. I appreciated it very much.
- I am convinced that it is possible to achieve a lot by means of raising awareness. But how do you get the people involved? What is the contribution of these sessions?

#### Discussion of results

The Interactive Learning Groups in Flevoland were a success. People enjoyed their participation and gained insight in the different aspects of water management and flood protection.

Although the matter is regarded as complicated, it is possible for the participants to get hold of the issues involved and to suggest sustainable water management policies.

They see a role for themselves and a distinct role for governments and water board.

The participation in Interactive Learning Groups creates a form of constructive awareness which makes your citizens, your clients, potential salesmen and women of your policies.

### **3.3 Fryslân**

#### **3.3.1 Introduction**

Large parts of the province of Fryslân can be potentially flooded. The most catastrophic event thinkable is a collapse of sea dikes during an extreme storm event. This event could lead to the inundation of almost two-thirds of the province. The chance this will happen is fortunately rather small: 1/4000 yrs. On a more local scale the collapse of minor flood defences alongside regional waters is possible. The chance this will happen is estimated ranging from 1/100 yrs- 1/300 yrs with very little chance on loss of life of man or cattle. The primary urban centres will most likely not be vulnerable to this kind of flooding. Thus chances on a catastrophic event are minimal and chances and effect of a regional flood are limited as well. Considering this, it was felt there was little need to make the public aware of the exact risks of flooding as has been the principal objective of FLOWS project 2A.

There was however a need to get experience in involving the public in decisions concerning water-management. These kind of decisions are often complex. Often it is about abstract issues, long term perspective, including a range of interests and aspects. The challenge is to achieve understanding of the issue, as to make a good decision. Basically the processes to achieve awareness or understanding are the same. As a means to structure and optimise the process the learning method as formulated by Kolb was chosen.

To evaluate the method, it was applied to the issue of adapting the regional water system to the effects of climate change. In this text we will call this the WB21 policy. This issue is strongly related to the FLOWS project. During extensive studies the effects of climate change and possible measures to adapt to it are investigated. This has been a process in which Water board and Province have involved a range of stakeholder organisations. Several meetings have been organized to give the general public the opportunity to have a say in the policy process. Involvement of the public has however been limited. As the decision making process will be finalized in 2005/ 2006 the question arises how to communicate on these issues.

#### **Objectives:**

- gaining experience in involving layman in complex-decision making
- gaining insight in how to communicate on WB21 policy measures

#### **Basic Outline**

The basic outline of the project was to organize four meetings in line with the four phases of learning; doing, dreaming; thinking and testing. Each meeting would consist of a fun-element, which should be related to the theme and a more serious part. With each following meeting complexity could be increased. The definite planning would be made just in advance of each meeting to be able to take the learning's of the previous meeting in account.

#### **3.3.2 Session 1: Learning by doing (27-09-2004)**

The first session had a twofold objective. The first objective was to give the participants a closer feeling for flooding and the second objective was to show a natural water system.

The Waddensea is a shallow sea between the coast of the northern Netherlands, northern Germany, western Denmark and a series of barrier islands. At low tide the sea transforms in a vast area of

tidal flats separated by stream-channels. The presence of the tidal flats allows for (guided) walks during low tide. Several routes make it possible to walk to the islands. The Waddensea is considered as one of the most natural waters in the Netherlands. It is relatively undisturbed, empty, has a rich birdlife and houses a population of seals.

The central activity of the meeting was a guided tour on the tidal flats near Noordpolderzijlvest in the province of Groningen. The intention was to place a marker in advance at low tide to visualize how much people were below mean sea-level during the walk, but a storm-induced high water prevented this preparation.

Before the walk the programme consisted on a general introduction of participants and organizing committee, a presentation on the method of Kolb, a presentation on the WB21 policy, and afterwards as an extra bonus a presentation on the local situation and a visit to the pumping station.

In this first session there wasn't foreseen a very active role concerning the WB21 policy of the participants. They got information and the pleasure to walk the tidal flats, but there wasn't the intention to discuss or debate. During the walk with excellent weather conditions the participants had ample time to get acquainted with each other and with the organizing committee. So the speak; there was a lot of personal interaction. After the walk there was again a presentation on the local situation. The keeper of the pumping station had a slideshow covering more than twenty years of the local situation. In this period the dike had been raised considerably and an outlet, using gravity flow, had been replaced by a modern pumping station. Interesting slides indicated that before the raise waves during heavy storms could overtop the crest of the dike; a critical situation which people could hardly imagine today. A large disadvantage of the abandonment of the gate and the change from gravity flow to pumps is that fish migration is hampered. The stock of much prized eel has crashed as a result.

The last presentation was an extension on the programme, which was communicated as well. Not withstanding the extension of the programme with two hours, the majority of the participants had a keen interest in this last presentation and the visit to the pumping station.

The value of the first session lies in the opportunity the participants got to get acquainted and get enthusiastic for the project. The relation to the subject was less clear.

During the evaluation at the end of the session the participants indicated to that they wanted to have more information on the WB21 policy.

### ***3.3.3 Session 2 Learning by dreaming (18-11-2004)***

The aim of the second session was to get the personal uninfluenced ideas from the participants on the water management in Fryslân, to clarify underlying motives.

As a teaser and for inspiration as start of the program a boat excursion was organized through a large and magnificent lowland-swamp nature reserve ("de Âlde Feanen). The tour was guided by people of the regional conservation organisation. The central part of this meeting was a discussion in groups and a plenary discussion in the cosy atmosphere of a local restaurant.

The guides explained a lot on the geology, ecology and management of the area. Especially issues on the management practices in this area already evoked discussion. What is nature if it has to be

managed? One key issue of one of the participants was that money should be reserved to compensate for damage as a result of deliberate flooding in case of emergency.

In the restaurant the participants were split up in three groups. The aim was to develop visions for the water management of Fryslân. The first group should develop a vision from a nature point of view, the second from an economic point of view and for the third group the approach was open. Maps were available to draw upon.

### **3.3.4 Session 3, Learning by thinking (16-12-2004)**

The aim of the third session was to create a vision building process in which all participants would have as much insight as possible in effectiveness and efficiency of their proposals concerning water management.

In the Frysian WB21-policy process a decision-support system in the form of an Excel spreadsheet was developed in which the results of various reports were summarized. The spreadsheet delivers for each year between 2000 and 2030/ 2100 and for each frequency of occurrence the discharge to the water system. By implementing measures, the user can influence the frequency of failure of the system. Present value of cost of the measures and the effect on water board taxes are given instantaneously for each package of measures. This spreadsheet has been used to develop several packages of measures which are used in the decision making process.

This same spreadsheet was presented- in a more user friendly version- to the participants. The participants were asked to answer 7 questions to compose a measures package. Each question was accompanied by an explanation on the question, an illustration, and a table and figure to give insight in cost and effectiveness of the choice.

The session was located at the Wouda-pumping station near Lemmer. This is an impressive monumental pumping station built in 1920, operating on steam and still used several times a year. A guided tour through the pumping station was part of the program.

After the tour through the pumping station, the participants came together in a smaller adjacent office. Several lap-top computers were available, on which the spreadsheet could be used. After a short introduction the participants split up in several groups to develop their measure package, using the spreadsheet.

Some time was necessary for the participants to get a feel for the spreadsheet as well as for the organisation to solve some inevitable IT-problems. But after this all the participants were concentrated working and experimenting with the spreadsheet. Doing this they came up with several questions concerning underlying assumptions made in the spreadsheet. These assumptions were about the operational order of measures and the calculation of cost. One of the other comments made was that although the costs were clear, not all secondary benefits of measures like increasing the area of surface water were included. These should be incorporated in the decision making process as well. All the participants made it a sport to come up with the cheapest package. Doing this, they came up with packages that differed from the ones decided upon by the decision-makers. In general the participants valued the need to prevent inundation of agricultural grasslands lower than the decision-makers, but valued added area of surface water almost as high.



### *Evaluation*

The session has been very intense and demanding for the participants. They were really put to work on a very complex issue, given very little time. All participants were active in the process and enjoyed finding their best package. The questions asked showed increased insight in the issue.

#### **3.3.5 Session 4 Testing (03-02-2005)**

The aim of the official last session was to inform colleagues and politicians on the project, to present the views of the participants and to discuss these.

As a location of the fourth session one of the historical rooms in the provincial office was chosen. The room is decorated with old paintings and furniture, providing a more formal atmosphere. Four presentations were scheduled: the WB21 policy; the Kolb method; the ILG process and the last one on the views of the participants. The presentation of the participants was prepared by the organisation, based on material of the second and third session (maps and tables), but presented by two of the participants.

The discussion was organized by forming panels of politicians, experts and public. The first panel consisted of the County Council Deputy for Water, the Chairman of Wetterskip Fryslan, and a representative member of both organisations. The expert panel consisted of experts of both organisations and consultants who were involved in the WB21 process. The public panel consisted of four of the participants.

Considering the knowledge level of the session's public session it was chosen to have a discussion on public participation rather than on the more technical aspects of the WB21 policy. To reach a public, the meeting was advertised on the intranet of water board and province and directly by email to Flows contacts and colleagues of neighbouring provinces. The meeting was led by a process manager of the water board. The duration of the session was approximately two hours followed by a closure with a drink.

Approximately 50-60 persons attended the meeting which filled all the space available.

Considering the KOLB method, it was found to be an interesting and enjoyable method for public participation. One of the key problems however is that such a method can hardly be used on any larger group, let alone the public in general.

In the discussion that followed the key issue was the involvement of the public. The argument of the participants was that the waterboard should do more to involve the public in its decision making. The waterboard argues that it does arrange meetings for people to express their views but attendance at these meetings of the public in general is minimal. The public shows interest in projects which affect peoples surroundings in the short term, but for policy issues attention is really minimal.

Several participants advocated the idea that a public advisory board for water affairs should be implemented to discuss and advise on water related issues. This was considered an interesting idea by the panel of politicians. However one of the key arguments against this as posed by the provincial representative is that such a board could not fulfil the designated tasks of elected officials. This was followed by a message that membership of a political party provides the opportunity to influence and participate in debate. Of course this message can be seen in the light of ever decreasing membership figures of political parties.

### Discussion of result in Fryslân

The Kolb learning cycle as a process has been an eye-opener. Working in organizations which are heavily based on abstract thinking the insight is often absent that there are more ways to learn and by combining learning methods you gain more and quicker insight.

By means of the Interactive Learning Groups the organization has been much more conscious of the process. Only part of this has been related to the Kolb method.

The first meeting for example has had very little meaning for the learning process itself; however it was invaluable for getting the participants motivated and acquainted. The aim of the meeting was that people would become aware of the consequences of flooding, but it was not recognized as such by the participants.

The third meeting was perhaps the most interesting. Although the theme of the session was "thinking", it could better be described as "active experimenting". This active experimenting is a process itself. Much of the process is like trial and error: try something; is it good?; yes/no?, why?; try something else. You do something, you reflect on the result; you judge, you think about how you can improve it; and then you take the next step. In the third session this approach was possible because a decision support system was available and the organization mastered the issue. We got the impression that as a result of the third session the participants gained a lot of insight, perhaps already more than most of the decision makers.

In the fourth session a gap became apparent in the views of policymakers, politicians and public. The politicians and policymakers were new to the process. The lesson learned is that they should participate in the ILGs from the beginning, in order to have the same basis for discussion.

We conclude that Interactive Learning Groups are an approach which enables experiential learning and can be very valuable in getting a grip on complex issues, both for experts and for layman.

## **3.4 Hamburg**

### ***3.4.1 Introduction – the four workshops***

Each workshop was intended to last about three hours, each contents being planned to support one of the four steps of the learning cycle.

The first workshop aiming at experience, at real encounter of flooding was understood to be of crucial importance for the aim of the whole project. It was the most difficult one to accomplish and the most complex one in preparation requisites.

As former studies have revealed, the "natural" way to sound flood hazard awareness leads through flooded homes. In most cases this has been the only way to a real change in paradigm. A floodable model house was and still is the approach of first choice to get as close to this real experience as possible. But this having been out of reach, more abstract methods had to be found. The results are different impressions of a "hundred year flood" at the same object and location: three-dimensional visualisations with flood pipes in front of the flood prone house, a real life flood simulation with a flood box next to the house, inundation maps of the very situation and a vivid personal description of flood experience by one resident.

The newly designed flood pipes, a set of vertical acrylic cylinders filled with river water up to the expected flood level, create a three-dimensional impression of the flood situation. Standing amongst them in front of their homes, seeing and sensing the water, people can grasp the impact of such an inundation. The notional transfer to expectable damages inside the houses is fostered by the impression of the flood box, the second channel of experience. A model of a "living room" was filled with river water up to the predicted flood level. People can watch the floating furniture, see

books and photographs sink into the muddy water and, after the box has been emptied, inspect the damage to the whole interior. The impressions resemble very much those well known from sites of real floods.

To further widen the impression of the impact, inundation maps of the area are handed out, depicting the water depth around the house in different shades of blue, giving people the opportunity to grasp the whole scale of the possible disaster.

The fourth channel of experience, the story of one resident about their experience with different floods, takes the listeners on a journey through all the attempts for protection, through all the sleepless nights, all the fears and thoughts about selling the house. This narration can trigger compassion in the listeners, allowing them to sympathise with all the emotions the narrator had lived through.

The first workshop agenda was rounded up by a short group work session, asking the two to three groups for their impressions of the day. The statements of their findings can result into a lively discussion, causing the impressions to sink in deeper and point out the direction of the following workshops to the organisers.

The second workshop, aimed at reflection of the experiences of the former, was held at the University, far from waters and floods. It was characterised by talks on the impressions from the first workshop on the background of floods at that specific location and on problems at the level of local and regional boards dealing with that issue.

A description of the river system, its historical development, the (mainly anthropogenic) factors influencing the development of floods, and methods and possibilities for mitigation took the participants deeper into the subject, allowing to grasp the difficulties of change.

Representative of the local and the city board of river management offered insight into their struggles and impediments in working for better flood protection and preparedness, lending an open ear to the worries of the participants. Last point on the agenda again was a discussion on the issues of the day.

The third workshop moved closer to the scenes of flood action again, its location having been the pump hall of the "Schartor Schleuse", the main shiplock and pumping station between the river Elbe and the inner city lake Alster. The foreman of the sluice demonstrated the functions of the enormous pumps, explained their capacity, the necessary preconditions for successful operation and therewith depicted the vulnerability of this core part of the cities drainage system and flood protection.

The following talks on inundation hazard by heavy precipitation, a video showing scenes from the 2002 floods in Hamburg, caused by heavy rainfall and illustration of possible damages and protection methods aimed at widening the concept of flood hazard.

A second presentation focused on causes of floods and also aimed at widening the concept of flood hazard by introducing its complement, the strategies and methods for protection and damage mitigation. The whole session was strongly supported by the impression of the location, its purpose and the amphibious surrounding.

The fourth workshop was held at the very location. Conceptually aiming at testing, some remains from the third workshop had to be carried out before the actual testing part. Respectively it was divided into two parts. The presentation on strategies of flood protection for the house, known from

the first workshop was directly linked to the last part of the former workshop, applying to a detailed example, what had already been introduced in general.

The testing phase consisted of an active and a passive part. The active task was to design a flood protection or adaptation for an object, only known to the participants from sketches, photographs and some explanations of the presenter. This should be accomplished, while cruising on lake Alster, along the low and flood prone banks. The passive part was, to understand the vulnerability of the locations, to discover different aspects of flood hazard. This task was not explicitly explained as such, merely some announcements were made to draw the attention to significant areas.

The workshop and the ILGs were finalised by a round of group work for feedback and a short presentation of the results.

### **3.4.2 Results and discussion**

The project, the ILGs in Germany, has been a success in both senses. It has provided a better hazard awareness to the participants, and delivered insights into the developing process and necessary conditions. But it also showed, that there is still capacity to further strengthen the method to intensify its impact. The success became evident at the end of the last workshop. During a boat trip along the low banks of the lake Alster, that actually turned out to be an implicit evaluation event for the workshops, the participants watched the scenery and found, that many of the houses along the lakeside must be very easily affected by a slightly higher water level. They observed many more details in connection with the flood prone situation of these locations. The significance of these observations is, that to all of them the area has been well known for many years, as they were (with one exception) all residents of Hamburg. One of them even verbalized his own astonishment: "Surprising, that we have only now discovered this!"

A change in consciousness had taken place; people were viewing an old situation with "new eyes", being aware of the potential harm a rising water level could cause.

An insight from the first workshop supports sceptical thought, that the strict conceptual division into four separate areas of learning might not be directly transferable to four workshops, each of them solely comprising the respective area of learning. Each new impression / experience must and does trigger the whole circle. A workshop aiming purely at "direct experience" is not possible: Impressions must be discussed, the participants actively integrated; each single experience will be processed in accordance with the learning circle right away.

Anyhow the order of workshops in accordance to the learning circle proved to be quite useful, as the following result implies.

To enable as closed an experience to undergoing a real flooding as possible, which is essential for the necessary change in paradigm, the participants must be personally and emotionally affected in the highest possible way by each visualisation, each symbol, each description used for raising hazard awareness.

This appears to be the best opening to a series of workshops aiming at flood hazard awareness. It can create the necessary openness and understanding for the things to come. If people are touched by their personal experiences, by their emotions, the touching matter might be "granted excess", might really reach them. Following discussions on flood hazard then will not just be on "intellectual issues", but can involve the whole person to really make a difference in his/her view to the world.

The path to flood preparedness is often blocked by questions of responsibility. People tend to hold authorities liable for the unpleasant state they find themselves in. Accordingly they are not willing to take steps towards improvement on their own cost let alone take responsibility for the situation. To induce a readiness to act, for self protection and adequate flood preparedness, a very open dialogue with "the other side", the authorities must be offered. Real representatives of the board in charge, who attend the workshops and manage to show their own interest and engagement in the topic of flood hazard and damage reduction. Listening to the needs and worries of the participants, let them see behind the curtain, revealing the obstacles, they have to work around in their endeavour for change, can do very much to change this attitude.

If these two preconditions are fulfilled, the openness might be achieved necessary for reaching people with the 'pictures' that might give them a notion, an awareness of the hazard and find the willingness to take responsibility, to act and to adopt to this newly perceived situation.

### **What means being "emotionally affected"?**

The flood pipes and the flood model were set up in front of a house. The people showing the strongest interest were the residents of the house. They walked around, projecting the water level onto their house, discussing the possible consequences, while the participants stayed rather passive, listening to what they were told about these installations. To them, it was just information without a personal or emotional relation, while for the residents it contained a direct link to their property, to their lives.

Consequently, flood pipes and flood model will reach the highest impact as flood information symbols, when presented in front of peoples homes, visualising realistic flood levels . For the flood model, the aim for emotional relations might be approached by certain requisites as photographs of children, personal letters etc, hinting to unrecoverable losses.

The flood model gained the attentiveness of those participants, who found a likeliness to object of their own homes. Again, the personal relation causes a piece of information to stand out from the others, to gain importance.

The experience report has touched every one. When asked, what part of the first workshop had been most impressive, the participants unanimously named the report. The vivid and authentic narration, the reliving of worries and fears by the narrator caused the listeners to sympathise, to feel with him. Emotions of another person can come very close to one emotions, if there is any personal or emotional link to that person.

The biggest resonance to the invitations was caused by the explanation that they "personally are living in an area prone to flooding".

People participated in the first workshop and attended the following ones because they felt, it had something to do with them, with their property, with their lives. Two participants did not come join the following sessions, the students. Not being bound to their actual place of living, not owning the house they live in, there was not much personal relation to keep them interested, though they realised, that flooding could appear virtually everywhere and that even by moving, they could get into a situation prone to flooding. But this was only perceived intellectually, not emotionally and as long as there is the possibility to choose, other things might be more important. Hazard awareness is always depending on motivation . This is the difference a real flood makes, it leaves no place for choice. Being confronted by an inundation, rational and emotional arguments become the same and

motivation is high. Only as time goes by and memories diminish, the option of choice reappears and then it is difficult to weigh rational arguments against emotional ones.

The active testing task of the fourth workshop, planning a flood management strategy for an historical object, was only carried out half hearted. It did not matter to the participants either what the results would be or what the strategy would cost. Again, it was a question of personal relation. One of the participants put it into words during the feedback session: Highest motivation would have been assured the same task, if the object in question had been their own house, providing real perspectives of protection and gains compared to real costs.

While this was not possible for this group of resident from different areas, it can be realised for an information workshop in a certain neighbourhood, known flood levels provided.

### **Leading an "open dialogue". What are the benefits?**

One main attitude of the participants was resentment. Having bought the premises as building property and received a permission to do so, people in flood prone areas tend to hold authorities responsible for their nuisance, when learning of the potential hazard.

In addition it can be difficult to get in touch with someone of any board, who feels and acts responsible, offering some kind of help, advice and understanding.

There was no open talk about these problems and all the participants shared the impression of being left alone, of being the only ones having these kinds of troubles. They were very surprised to find anyone else to be interested in their problems and to see, that other people have the same trouble.

The resentment and charge towards the allegedly responsible board absorbs many ambitions for activity, obstructing the will to take responsibility and to work for protection and preparedness.

Such was the atmosphere at the end of the first workshop: "why are no deputies of the relevant authorities present at this event?" And this was uttered in a rather aggressive tone...

They kept a noticeably passive and sceptic attitude towards the whole event, leaving their further participation uncertain. Only the promise of official attendance could alleviate the opposing attitude.

It was impressive and surprising to the organisers, how completely changed the atmosphere of the second workshop appeared, when the two guests from the most relevant departments, the "Baubehörde" and one "Bezirksamt" were presented.

Both of them were very authentic and open, described the problems from their points of view, sketched their own engagements for bettering the situation and outlined the obstacles and difficulties they encounter, offering a precious view behind the scene to the participants. By asking for their help and assistance and offering cooperation on the field of flood protection and preparedness, they had accomplished to resolve the resistance completely, turning it into the willingness to work together, to act and to take responsibility.

The participants seemed taken aback by the fact, that two deputies of the authorities found it worth spending part of their weekend to discuss these matters with a hand full of citizens. This had opened the door for communication, while the authentic and open appearance gave the chance for a dialogue and for cooperation. One participant stated to "never have believed, that he might consult the "Baubehörde" directly on these matters.

These opportunities are quite delicate in the beginning and any kind of drawback can cause people to retreat to their former attitude. As reaction to the plea for cooperation and assistance, one of the participants sent a fax to the district authority of his area, informing them about disturbance in a

nearby river, but did not get any kind of reply. Such attempts will presumably cease, if they do not receive supporting attention.

### **Concluding summary**

The "open dialogue" appears to be the main entrance to hazard awareness. It solves the confrontational attitude towards authorities that keeps people passive, opening the path to responsibility and taking steps in protection. The resulting openness seems to be a precondition for the real experience.

This real experience then can be produced by demonstrations of floods and their effects, aiming to reach people's emotions, causing them to understand coherences and dangers and transfer them to their own situation. It can encourage them to let the awareness of their own hazardous situation evolve with all its implications, producing motivation for risk awareness, an important part of "safety psychology": Do I want to let this realisation get so close, that I have to consider it, have to take into account the hazards, that might concern me, have to react, to take steps of prevention? Or are there more important things for me to take care off? A Question of motivation.

If the barriers set up by "refusal of responsibility" and "filtering of information" can be overcome in this manner of permanent dialogue and cooperation, even factual information might reach its recipients, provided it is mediated in some personal way. Before that state is reached all media approach will remain insignificant. This seems to be a general principle for the success of flood management activities.

### **Practical approach**

After the first workshop it was obvious, that the original concept was too sophisticated, too philosophical, as it contained e.g. epistemological work on the ideas of flood and hazard in the third workshop, in accordance to Kolb's idea of "forming abstract concepts". Instead, the participants expected "how to" instructions on individual flood protection. They did not seem willing to engage themselves any further, not taking responsibility for the situation. Best, they wanted a "law on how to build in flood prone areas", rather handing over the responsibility, instead of aiming the best protection.

The content of the workshops was adjusted accordingly, giving more weight to methods and strategies of flood protection and damage mitigation in the third and fourth workshop, taking rather practical examples than abstract ones for whatever was to be discussed.

### **Deputies of the authorities**

As described above, it was necessary to invite the "other side", the authorities to workshops; otherwise the participants might have stayed away, terminating the project at that point. But since this had the described positive effects, participation of deputies of the authorities is integrated into the concept.

Despite these changes, the overall concept stayed the same and it will also stay the same, if the workshop cycle is adopted to the needs of spatial planning, though the contents will undergo certain changes.

As said in the summary, the "open dialogue" can serve as door opener in the process of generating or improving hazard awareness. This implies, it should mark the beginning of the cycle. This might be considered for future applications.

## **4 Scientific analysis of the ILGs (Summary of WP2D)**

This section presents the summary of the WP2D report “The Public Risk Perception of Flooding and Flood Risk” (Terpstra and Gutteling, 2006). The aim of WP2D was to put the activities carried out in WP2 in a scientific perspective. For that matter, the Province of Flevoland – the Dutch lead partner – contracted the University of Twente (Faculty of Behavioural Sciences, Department of Communication Science) to perform this investigation. The study has been performed in the period between June 2004 and January 2006, and was carried out as the first part of a PhD research. Based on this report, the authors aim to distillate two official peer reviewed publications in international journals. These two articles will reflect respectively the chapters three and four of the 2D report:

- Development of an instrument to measure perceptions of Flooding and Flood Risk – chapter 3,
- The Interactive Learning Groups – Analysis of changing risk perceptions – chapter 4.

### **4.1 Introduction**

“We live in a risk society, and therefore we will have to learn to live with these risks. And, in a democratic society consisting of emancipated citizens an important role for communication about these risks is put aside. These two sentences are open doors, which form the entry to a minefield through which one – as a government, business or citizen – inexorably has to walk.” (Groen, 2005; translation from Dutch). This is how a recent article in the Dutch journal ‘Tijdschrift voor Externe Veiligheid’ started, which suggest a rather sombre picture of the potential of risk communication. Possibly this may be true as well for communication about flood risks. Risk communication is a way to inform the public and to make people aware of flood risk, to help them prepare for an imminent flood and to increase their self-reliance during a flood event. Although these goals themselves are clear, the road towards these goals is clouded by the complexity of the communication process. In this process many factors of social, political and psychological nature may play their role in influencing the effectiveness of the communication. And to make it even worse – societies, politics and people are ‘dynamical systems’, which change as time evolves. Unfortunately, the principle of ‘one-size-fits-all’ will not work as uniform messages neither take the specific characteristics of the type of risk into account, nor the characteristics of the senders and receivers in the communication process. Therefore, risk communication should be tailored to a specific situation.

In the report – “The Public Perception of Flooding and Flood Risk” – the aim was to set the first steps in unravelling the interwoven factors that make the risk communication process so complex. As the title will have made clear already, we particularly focus on the risk perception of members of the general public. According to Sjöberg et al., (2004) “...risk perception is the subjective assessment of the probability of a specified type of accident happening, and how concerned we are with the consequences. To perceive risk includes evaluations of the probability as well as the consequences of a negative outcome.” These authors further argue that risk perception goes beyond the individual, and is a social and cultural construct reflecting values, symbols, history, and ideology. In this report, we have set the ambition to investigate a limited number of factors (risk characteristics) and their relation to how flooding and flood risks are perceived by members of the general public. More specific, we investigated how perceptions of flooding and flood risk change through discussing them with local authorities. These discussions took place in so-called



Interactive Learning Groups, which is a new developed concept within the project. The members of the general public are in this study represented by citizens of three Dutch provinces: the provinces of Flevoland, Fryslân and Groningen. Due to the explorative character of the study, its results are neither representative for the populations in the three provinces, nor are they directly suitable to be transformed into a solid risk communication strategy. Rather, the results provide a basis for further research. Nevertheless, some implications for risk communication are proposed.

## **4.2 The Public Risk Perception of Flooding and Flood Risk – summary -**

### **4.2.1 Literature study**

Research has shown that risk communication is a complex process. Communicating technical and statistical information of risks fails to reach a large part of the general public, while the societal context in which risks are discussed is interwoven with issues of a communicative nature and with considerations of political and normative nature. Moreover, continuous changes in the societal context further increase the complexity of effective risk communication. For instance, the increasing attention which is drawn to terrorist attacks has implications for risk communication on other terrains as well. It has been argued that risk communication should be regarded as a continuous interactive process between citizens and other parties in stead of a simple, onetime and one-sided message. This implies that it is unlikely that there exist universal messages which can be applied in different contexts. One factor that is particularly important for effective risk communication, is the existence of a durable relation between the authorities, the public and other stakeholders; just telling the ‘objective truth’ about risks is not sufficient to establish such a relation. In that respect, it is important that parties involved in the communication process understand how and why risks are judged in the way they are judged. In other words, there is a need to understand how different people *perceive* risks. Insight in risk perceptions should provide the knowledge to develop a communication strategy which not only aims to increase awareness of a risk, but also aims to help people prepare for disasters and to help them increase their self reliance during a disaster situation. Although not exhaustive, our efforts so far seem to indicate that risk perceptions of natural hazards and in particular of flooding have not been investigated deeply yet. In addition, it seems that only one study applied theories from the field of risk perception. This makes it particularly difficult to compare results between these studies. Moreover, there is the risk that by comparing results from such studies, views on risk perception of flooding are adopted that are not based on solid empirical research. Whereas research on perception of flooding and flood risk is already fragmented, the link to risk communication seems to lack completely.

### **4.2.2 Investigation of public perceptions of flooding and flood risks by organizing ILGs**

#### *Methodology*

With our study, we aimed contribute to the insight in public perceptions of flooding and flood risk by investigating whether and how risk perceptions of flooding and flood risk change through group discussions and activities related to this risk. We organized different types of group discussions and activities which are referred to as ‘treatment’. Three groups were treated. Two of these groups were treated according to a new developed concept referred to as ‘Interactive Learning Group (ILG)’. An ILG can be best described as a group of people consisting preferably of between 10 and 15

individuals who engage in four sessions together with public authorities with the aim to learn from each other. These four sessions reflect a 'learning cycle' in analogy with the four stages/elements of a learning process as described by Kolb (1976, 1984): concrete experience (1), observation and reflection (2), forming abstract concepts (3) and testing in new situations (4). One ILG was set up in the province of Flevoland (the Flevoland-ILG;  $n = 13$ ) and one in the province of Fryslân (the Fryslân-ILG;  $n = 11$ ). Over a time span of approximately four months, the participants of the ILGs took part four times in discussions and activities related to flood risks. Participants of the third treated group joined once in a focus group session in Groningen (the Groningen Focus Group;  $n = 16$ ). Furthermore, a Control Group ( $n = 40$ ) was used as a bench mark for maturation effects of the treatments on risk perception. Whereas focus groups usually aim to obtain insights in public perceptions, the ILGs extend to raising awareness through interactive learning. Based on the conceptual differences between the ILGs and the focus group, we were interested two aspects: Does the *treatment* of the participants in the ILGs and focus groups affect their perception of flooding and flood risks?

Does the *intensity of treatment* (ILGs, focus group or no treatment) discriminate between the magnitude and direction of changes in group risk perceptions?

In order to assess the effects of the treatments, we developed a questionnaire based on a theory known as the psychometric paradigm. According to the founders of the psychometric paradigm (Slovic and colleagues) 'risk' is a subjective concept: "a 'risk' does not exist 'out there', independent of our minds and cultures waiting to be measured. Instead, the concept 'risk' has been invented to help people cope with the dangers and uncertainties of life" (Slovic, 2000b). The psychometric paradigm is based on the assumption that many determinants of risk perception and their interrelationships can be quantified and modelled. Empirical research with the paradigm on the perception of technological risks has shown that two determinants are of particular importance in explaining risk perceptions: the amount of dread (fear, emotional unrest) that is evoked by a risk and the degree to which a risk is known. These two determinants have shown to be relatively independent and each relates to a number of other determinants. Quantitative judgments of these determinants are obtained by developing statements about a hazard which are subsequently rated by respondents. The questionnaire we developed was validated on a separate sample ( $n=49$ ) in the summer of 2004 in the provinces of Flevoland and Fryslân. This validation process resulted in the identification of eight risk perception determinants, while one new determinant was added. The adjusted questionnaire was not validated on a separate sample again. In stead, we performed a second validation using the questionnaires completed by our participants of the ILGs, focus group and the control group ( $n_{\text{total}} = 80$ ). This second validation process resulted in the identification of seven risk perception determinants, which have been used to assess the effects of the treatments on risk perceptions. These seven determinants are:

- 1) the extent to which the risk is perceived as 'increasing' (Increasing Risk),
  - 2) the extent to which the risk evokes fear, emotional unrest, stress (Dread),
  - 3) the extent to which people belief they 'know' the risk (Known to Exposed),
  - 4) the extent to which risk reducing measures are perceived to be 'supported' in society (Support),
  - 5) the extent to which authorities are 'trusted' in their information dissemination about a risk (Trust),
  - 6) the extent to which the risk is perceived as 'known to experts / science' (Known to Science),
- and

- 7) the extent to which the people perceive to have control over the risk and/or their safety (Control).

Risk perceptions were measured by questionnaires twice. Participants of the ILGs completed the questionnaires approximately two weeks before the first and two weeks after the fourth session. Participants of the focus group completed the questionnaire approximately two weeks before and two weeks after the focus group session. The Control Group was split in two parts: one part of the Control Group completed questionnaires following the time span of the ILGs, while the other part ran parallel to the Groningen Focus Group. Recordings and notes of the group discussions were used to explain the observed differences between the questionnaire pre- and post-test.

### *Results and conclusions*

Although the results of this investigation are not representative for the public risk perception of flooding and flood risk in each of the three provinces, they provide first insights which are invaluable for further systematic research. As expected, we found significant statistical evidence pointing at changes in risk perceptions as a result of the group discussions in the ILG sessions as well in the focus group sessions. In other words, participants that were exposed to the ILG treatment as well as participants that joined in the focus group revealed significant changes in risk perceptions, while the Control Group participants on average remained remarkably stable. In addition, as hypothesized, the participants from the Fryslân-ILG and the Flevoland-ILG on average showed substantial and great similarity in their change patterns, which could be distinguished from the change patterns exhibited by the focus group participants in Groningen. Whereas perceptual changes of participants in the ILG groups seem to be consistently and predominantly in one direction as result of a learning process, the focus group participants became sometimes more extreme in their views in the direction of their initial views: discussing new information and the sharing of different views between participants during the focus group session seems to have been utilized to confirm already existing views. This process of 'polarization' in the Groningen Focus Group was observed on two risk perception determinants: the determinants 'trust in the openness of authorities' and 'confidence in the degree to which flood risks are known to science'. In general, from the findings (based on statistical analyses of questionnaires and statements made by participants during group discussions), we argue that the ILG sessions have contributed to an increased awareness of flood risks and related aspects resulting in a systematic change of risk perceptions. In that respect, the ILGs seem to provide a learning environment in which risk communication aimed at increasing awareness can be effective. The table below summarizes this general conclusion and our observations and conclusions on the individual risk perception determinants. Nuances and further explanations can be found in the conclusions of chapter 4 of the original report.

<b>Overall Measure</b>	<b>Stable perceptions</b>	<b>Increasing and Decreasing risk perceptions</b>		<b>Polarization</b>
Absolute Mean Factor Change (AMFC = mean change measured over all determinants)	As expected, the Control Group remained on average over all determinants remarkably stable.	On average over all factors, the Flevoland-ILG and especially the Fryslân-ILG revealed substantial instable risk perceptions. Change patterns of these ILG-groups were most often unidirectional, suggesting a 'learning effect of the ILG sessions'.		Although on average the Groningen Focus Group was equally instable as the Flevoland-ILG, change patterns were in general different from shifts of the ILG groups; on two factors could be characterized as 'polarization'.
<b>Individual determinants</b>	<b>Stable perceptions</b>	<b>Increasing perception</b>	<b>Decreasing perception</b>	<b>Polarization</b>
Degree to which risk is perceived as 'Increasing Risk'	In general individuals from all groups were well aware of climate change which was believed to increase risks of flooding.			
'Dread' (evoked fear or emotional unrest)	Flood risk in general does not evoke dread: participants from treated groups did not believe it can actually happen.			
Degree to which risk is perceived as 'Known to Exposed'		Participants of the Groningen Focus Group became more negative with regard to their own perceived knowledge of flood risk.	The participants of the ILG groups became more positive with regard to their own perceived knowledge of flood risk. The Control Group became a little less negative.	
'Support' for risk management in society	The Groningen Focus Group and Control Group remained stable and did not hold a strong opinion.	Participants of the ILG groups became less confident in society to support risk mitigating measures.		
'Trust' in the openness of authorities.	The Flevoland-ILG and to a lesser extent the Control Group expressed to have trust in the openness of their authorities and remained stable.		Fryslân-ILG: shift from 'distrust' to 'trust'. The intensive supervision of the representatives of the organizing local authorities may have contributed to this.	Although the Groningen Focus Group in general showed an increased trust, participants who initially expressed 'distrust' became even more negative.
Degree to which risk is perceived as 'Known to Science'	The Control Group in general held a slightly negative view with regard to how well flood risk is known to science and remained stable.		The Fryslân-ILG: became substantially less negative and the Flevoland-ILG became slightly more positive with regard to their perceptions of how well flood risk is known to science.	Although the Groningen Focus Group in general revealed a more positive perception of how well flood risk is known to science, participants who held initially a negative view, became even more negative.
Perceived 'Control' over one's safety	Control Group: held a slightly negative view and remained stable.	The Groningen Focus Group participants on average shifted from 'control' to 'no control', although these expressions were not firm.	The Fryslân-ILG became substantially more confident in self-control; the Flevoland-ILG shifted substantially from 'no control' to 'control'.	

#### **4.2.3 Implications for risk communication**

With the results described in this report – which concern investigations of seven risk perception determinants and our experiences with Interactive Learning Groups – we have set only the first steps in understanding the perceived risk of flooding and flood risk. Therefore they provide only a narrow basis for developing a risk communication. On the other hand, as we are aware there is a need for communication about flood risk, we provide some considerations following from our study that may contribute to developing a communication strategy.

The results imply that risk communication aimed at an increased awareness of flood risk and self-efficacy may not be achieved through a simple and single message. To increase the public's self-efficacy it may first require the public to understand and to be aware of flood risk in their environment. Thus, explaining how flood risk manifests locally and how it threatens the environment may be important. In addition, risk communication may only be effective if members of the target group of a communication first perceive that flood risk is of personal importance. A pitfall in this is, that although people may be aware of risks, there is a variety of psychological factors which cause people to believe that risks do not affect them personally. As a result they are not motivated to take risk mitigating actions.

Furthermore, in the process of risk communication it is critical to establish a sustainable trusting relation between authorities, the public and other stakeholders. From our results it could be observed that both participants of the ILGs and focus groups expressed a higher degree of trust after the sessions they participated in. However, due to conceptual differences between ILGs and focus groups it is hard to indicate which minimal efforts must be made in a risk communication strategy to establish this result for a large group of citizens by means of a risk communication strategy. Establishing and maintaining a sustainable trusting relation likely requires continuous efforts rather than single, occasional actions. Just telling the 'objective truth' about risks is not sufficient to establish such a relation. For instance, during one of the focus group sessions in this study it became clear that in case the 'objective truth' substantially differs from the 'perceived truth' – which was the case when the inundation depth in the city of Groningen was explained (up to 3 metres) – communication may fail to be effective (participants did not believe the 'objective truth'). Communication about flood risk should therefore start from the point of how the risk is perceived.

## **5 General Discussion**

Based on the discussions per region in the above, and referring to the general objectives of workpackage 2A and the ILGs in particular, the outcomes are discussed.

### **Conclusions**

The results of this project are on the one hand the ideas and findings as result of the study as outlined above in central parts. On the other hand the cycle of workshops itself is, in the revised way, a result, a product of the project. It can be applied as a whole as information and education method in the way it has been carried through in the project and in parts e.g. in schools.

A general conclusion is: communication, not information, is necessary when striving to raise hazard awareness.

Even though this is not a new insight, it's application is still to be achieved.

Not an unilateral but a bi-directional flow of information is needed, a real exchange of information has to be achieved.

Mere information, placed in front of the targeted receiver will not reach him, is destined to stay impersonal, as long as the openness of emotional understanding is missing. Before that, other media should be scarcely used.

### **Flevoland**

The Interactive Learning Groups in Flevoland were a success. People enjoyed their participation and gained insight in the different aspects of water management and flood protection.

Although flood risk is regarded as complicated matter, it is possible for participants to get hold of the issues involved and to make suggestions for sustainable water management policies.

Participants see a role for themselves and a distinct role for governments and water board.

The participation in Interactive Learning Groups creates a form of constructive awareness which makes your citizens, your clients, potential salesmen and -women of your policies.

### **Fryslân**

In Fryslân application of the Kolb learning cycle as a process has been an eye-opener. Working in organizations that are heavily based on abstract thinking the insight is often lost that there are more ways to learn. By combining learning methods you gain more and quicker insight.

By means of the Interactive learning groups the organization has been much more conscious of the process. Only part of this has been related to the Kolb method.

The first meeting for example has had very little meaning for the learning process itself; however it was invaluable for getting the participants motivated and acquainted. The aim of the meeting was that people would become aware of the consequences of flooding, but it was not recognized as such by the participants.

The third meeting was perhaps the most interesting. Although the theme of the session was "thinking", it could better be described as "active experimenting". This active experimenting is a process itself. Much of the process is like trial and error: try something; is it good?; yes/no?, why?; try something else. You do something, you reflect on the result; you judge, you think about how you can improve it; and then you take the next step. This approach in the third session was possible

because a decision support system was available and the organization mastered the issue. We got the impression that as a result of the third session the participants gained a lot of insight, perhaps already more than the gross of the decision makers.

In the fourth session a gap became apparent in the views of policymakers, politicians and public. The politicians and policymakers were new to the process. The lesson learned is that they should participate in the ILGs from the beginning, in order to have the same basis for discussion.

We conclude that Interactive Learning Groups are an approach which enables experimental learning and can be very valuable in getting a grip on complex issues, both for experts and for layman.

### **Hamburg**

In Hamburg, it was found that it is difficult to reach people with a topic they are not interested in. If ILGs are to be application as communication means, ways must be found either to oblige people to participate or to suggest to them that the topic is of concern to them. For this purpose, flood maps appear to be the basis but not more, considering the meagre interest found in the flood plains.

The concept of the project rather aims at residents, who are completely unaware of any flood hazard. Therefore the strategy for acquiring participants will have to be adjusted accordingly.

Residents with some knowledge or awareness might have the feeling of being in the wrong event.

The really unaware residents of a neighbourhood, for which the vulnerability to flooding has not been known formerly, this would be the right target group.

Additionally, the concept might be adopted to serve for warming up memories, for reactivating slumbering flood hazard awareness.

The "open dialogue" appears to be the main entrance to hazard awareness. It solves the confrontational attitude towards authorities that keeps people passive, opening the path to responsibility and taking steps in protection. The resulting openness seems to be a precondition for the real experience.

This real experience then can be produced by demonstrations of floods and their effects, aiming to reach people emotions, causing them to understand coherences and dangers and transfer them to their own situation. It can encourage them to let the awareness of their own hazardous situation evolve with all its implications, producing motivation for risk awareness, an important part of "safety psychology": Do I want to let this realisation get so close, that I have to consider it, have to take into account the hazards, that might concern me, have to react, to take steps of prevention? Or are there more important things for me to take care off? A question of motivation.

If the barriers set up by "refusal of responsibility" and "filtering of information" can be overcome in this way of permanent dialogue and cooperation, even factual information might reach its recipients, provided it is mediated in some personal way. Before that state is reached all media approach will remain insignificant. This seems to be a general principle for the success of flood communication activities.

## **Overall**

In all three cases the ILGs proved to be an entrance to the risk awareness of participants. The awareness of the participants is measurably raised, as is their trust in their own knowledge and ability to act in case of an emergency.

The process is encouraging and rewarding, both for participants and organizers.

## **5.1 The lessons from the ILGs**

### *Awareness and perception*

- It is a way to create awareness, to get insight in perceptions and a way to change perceptions

### *Complex issues – policy making, the use of games*

- It's a way to communicate complex issues and a way to get people involved in policy making.
- A learning process like an ILG is needed before people can handle complex issues like flood risk, climate change and landuse.
- It shows that citizens are able to grasp the concepts of flood protection in a short period of time and are able to make sound decisions based upon it.
- The use of games shows to be powerful in getting across these complex issues. A basic spreadsheet decision support system can be used for simulation of the effect of measures.

### *Trust, confidence,*

- It is a way to restore trust between government and the public, to improve the climate between authorities and inhabitants.
- It gives people confidence in their own abilities to judge risks.
- In a group process it takes time to get to know and trust each other. When this is reached, confidence in authorities can be restored.
- It is a way to create ambassadors for local governments or water boards.

### *Communication is necessary to enable people to take up responsibilities*

- You need a dialogue to create ambassadors, to get people accepting responsibilities. ILGs can be the first step in sharing responsibilities between government and public.

### *Fun and time*

- It's fun, entertaining, for them, for the organizers, but it takes time to organize the meetings.

### *Target groups.*

- It is difficult to reach the main target group at risk of flooding, the ones who should take measures to defend themselves.



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**Reports from FLOWS project 2A:**

**WP 2A -1: Perception of Flood Hazard in Countries of the North Sea Region of Europe**

Author: Irina Krasovskaia, Norwegian Water Resources and Energy Directorate (NVE)

**WP 2A -2: Expert panel study**

Author: Irina Krasovskaia, NVE, Norway

**WP 2A -3: Qualitative studies of the public's comprehension of flood risk**

**Case studies from the UK and Norway**

Author: Melita R. Hasle, NVE, Norway

**WP 2A-4: Combating flooding together**

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