Some tools for knowledge integration in a multidisciplinary research program

Kothuis, B.L.M.

Publication date
2017

Document Version
Final published version

Published in
Integral Design of Multifunctional Flood Defenses

Citation (APA)
Kothuis, B. L. M. (2017). Some tools for knowledge integration in a multidisciplinary research program. In B. Kothuis, & M. Kok (Eds.), *Integral Design of Multifunctional Flood Defenses: Multidisciplinary Approaches and Examples* (pp. 132-133). Delft University Publishers.

Baukje Kothuis

SOME TOOLS FOR KNOWLEDGE INTEGRATION IN A MULTIDISCIPLINARY RESEARCH PROGRAM

Various interesting tools were used and/or developed to stimulate knowledge integration in the Multifunctional Flood Defenses program. This chapter will present a diverse collection of these tools, hopefully stimulating others to consider using some of them in future.

REFLECTION DAYS
During the five years of the MFFD program, Reflection Days were planned every three to four months. They were organized in rotation, each time by two or three researchers. In this way,
- All researchers had to think of the potential needs and the inputs of others in the team (creating awareness of the full range of research being done);
- Everyone was responsible, at least at one time or another, for the integration process (promoting a group process);
- A wider range of activities was developed than if only one person had organized all the RDs (which also made it more attractive and fun to participate);
- All the universities were visited, including those where fewer researchers were based (creating a more equal recognition of contributions).

Every Reflection Day included the following:
1. A visit to a local MFFD. This permitted everyone to become personally acquainted with the subject of the program, in this case the multifunctional flood defense in its different manifestations. These visits include meetings with local practitioners, policymakers and/or other involved stakeholders, who served as guides and explained the MFFD. The intention was to see and learn something new, create shared experiences (building collective memories and trust), and connect to the 'real world' where our academic designs are supposed to land.

2. Activities to communicate specific knowledge about the discipline
These activities permitted researchers to share knowledge content with their colleagues in the program (accommodating steps 1 & 2 in the WAKI process, see page 128). For example:
- *Mini lectures.* These started with two or three researchers per Reflection Day presenting their discipline-specific knowledge concerning design of a MFFD. Later in the program, these mini lectures become presentations about the cases and research findings in the project. The lectures were kept short to allow ample time for discussion.
- *Speed-dating Plus.* These were five minute two-person meetings to explain research and/or a case-study to a colleague; after the meeting, participants had five minutes to write at least three things they had learned from their colleague, after which they found a new partner. After three meetings, we joined in a plenary setting, where everybody shared the 3x3 things they had learned, followed by discussion,
- *World Café* - see the following page for an extensive explanation.

3. 'Informal' activities: The goal of these activities was to develop personal ties and mutual trust, vital factors for collaboration in integral design. The activities could be of any kind, as long as they require different skills, negotiating, and active collaboration, and as long as they have a tangible collective outcome. A simple but effective example is 'cooking a full course dinner in teams': Start with the whole group deciding on the dinner theme, then split in smaller groups for different courses and have these small teams go out to buy the food within a budget. Subsequent negotiation about use of kitchen space, order of courses, time management, table laying and setting, and all things that (almost) go wrong, automatically provokes multiple interactions and requires different skills and knowledge. Enjoying the final dinner together provides a collective story for the duration of the program.

CO-DESIGNING TANGIBLE OBJECTS
In the course of the MFFD program, several groups of researchers from different disciplines designed tangible objects, and unanimously declared this had helped them most to more fully understand and integrate knowledge from their various backgrounds. During Reflection Days, this tangible co-design was also attempted as a group-exercise. Two examples of these co-design efforts became games:

MFFD-Decisions Lego© Game
This game aims to make MFFD design decision-making tangible and visible. How do you quantify which function brings which safety risk and how much can that function cost? What alternative will make the most people happy? The developers wanted non-engineers to understand the concept MFFD. They developed a game played with up to four teams, each trying to design the most optimal MFFD model, within a certain budget. The different functions like flood risk reduction, environment and nature, recreation, and housing, all involve different costs, but don't have the same priority for everyone. The game components consist of Lego© blocks, and as on-site budget calculations took up too much time and slowed down the game, a simple software-program was developed. The teams have to survive three rounds of flooding problems.

Not only did the game teach the researchers to combine their governance and civil engineering knowledge, it also gave them a better understanding how MFFD stakeholders think. In practice, players are more interested in winning then in learning. As one of the developer said: 'Sometimes they can even become angry because they want to achieve something that is not possible, just like in real life. Or because they do not agree with the criteria, for example, if the environment can take priority over safety'. The game was used in several workshops with professionals, and on policy information days.
(Project by Julieta Matos Castaño and Juan Pablo Aguilar-López.)

Figure 1.
Explaining 'Wind turbines on a dike' technology & planning strategy game.

Figure 2.
The 'MFFD-Decisions' Lego© game in initial development stage.

'Wind turbines on a dike' game
Wind turbines on dikes are economically attractive, but the wider consequences of such structures are relatively unknown. To address this, not only the risks of technical failure were discussed while developing this game (Hölscher investigated the effect of vibrations, Chen studied wave run up, and Aguilar-López transition constructions); and governance challenges were addressed (Kothuis considered stakeholder and policy issues, and Anvarifar investigated the deep uncertainties and flexibility issues in design and planning).

Based on this combined knowledge, the researchers co-designed an 'Electro© Game' with 25 potential locations ('holes') to put three wind turbines. The goal is to find the optimal combination of locations. Each location presents various challenges and every combination means new challenges. Each of these challenges lights up with a green or red light as soon as the player puts the turbine in one of the 25 holes. Knowledge integration was realized in two ways:
1. Internal: amongst researchers while developing the model, by discussing technology, governance and planning for the design, and then rating of scores.
2. External: in discussions with stakeholders, explaining what the game does and how it could be used in their field.

(Project by Paul Hölscher and Baukje Kothuis)

WORLD CAFE
The aim of the World Café is to promote a substantive discussion with a large group of people, using the diversity of participants. First, a problem or topic is discussed and reframed in constantly changing small groups, and finally it is presented from multi-disciplinary perspectives in a plenary session, permitting further elaboration and discussion.

The World Café starts by defining a shared problem (this might also be set on beforehand), which is then posed as a question by the facilitator. Small groups, seated at distinct tables, discuss the problem. At each table, there is a secretary, who may join the discussion, but spends most of the time recording the progress of the discussion in succinct comments. After 15 minutes, the facilitator asks the participants at each table to reflect a minute on what they are discussing at that moment, to think of a new question, something intriguing, a puzzle of sorts that flows from their discussion. For instance, participants may find themselves disagreeing about something, be discussing an exciting new idea, or they may conclude they don't find the issue that important. The participants then have five minutes to frame a question that captures this new point. The secretary writes down the question.

The facilitator, who keeps track of time, interrupts again after five minutes (making 20 minutes in total). He/she asks the people to move to new tables, reshuffling the groups. Each participant is now sitting with new people (try to avoid sitting with others from the previous group). The secretary, however, stays at the original table and informs the new participants of the question left by the previous group.

This cycle is repeated for three or four rounds, until each participant has spoken with every other participant, or until we run short of time. Then, the facilitator announces a plenary session and writes the initial question on a whiteboard. With the help of the group, the various evolutionary paths that the question took are traced. The white board fills with different questions revolving around the project. The facilitator asks the members of the group how they arrived at a particular question, or the question may be discussed in the plenary session.

The purpose of the World Café is to diffuse ideas, and make people more aware of different ways that other disciplines view things, which in turn gives each participant a new perspective on his or her own research. This creates an environment where all WAKI-steps (see previous chapter) can be covered in a 'pressure-cooker' setting, dealing with a single, relevant subject. The World Café turned out to be a strong catalyst in the MFFD research program, initiating the knowledge integration process, and provoking recurring discussion about concepts and definitions. In our case the starting question was: 'What is a Multifunctional Flood Defense?'
(See also: Juanita Brown (2005). The World Café. Shaping our futures through conversations that matter. San Francisco: Berrett-Kohler)