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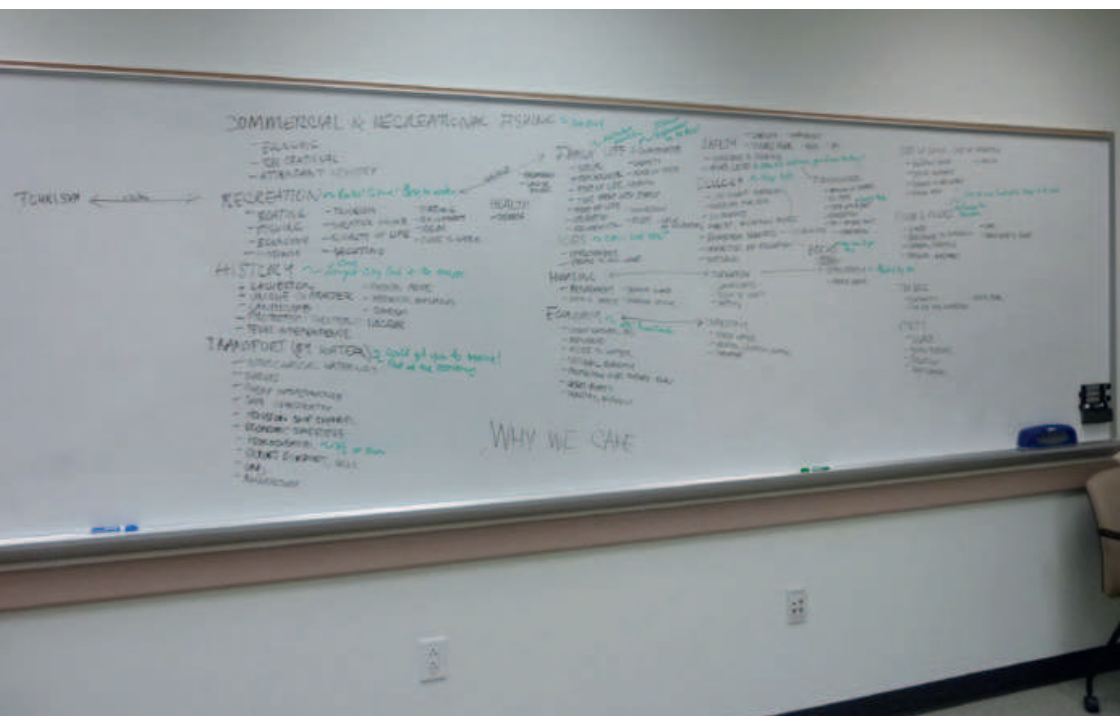
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Figure 1. Systems and values at stake in the Houston Galveston Bay area, as expressed by participants of CIGAS Workshop October 2014, Texas, USA.



Baukje Kothuis

STAKEHOLDER VALUE INCLUSIVE DESIGN

USING THE CONTESTED ISSUES GAME STRUCTURING APPROACH (CIGAS) IN TEXAS

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If we want to incorporate multiple functions in a flood defense structure, system or strategy, it is imperative that we consider the different and often diverging interests and values of involved stakeholders. Since these interests and values are not always self-evident, stakeholder consultations are a vital part of an integrated and sustainable design trajectory for a multifunctional flood defense (MFFD). However, consulting stakeholders can be done in many ways; this can range from 'informing' stakeholders to actually facilitating them to express their local knowledge and values, and deriving design strategies based on this input. In the Texas case, MFFD researchers had the opportunity to continue developing a new tool: the Contested Issues Game Structuring approach (CIGAS).

In the Houston Galveston Bay Region, many issues need to be addressed when designing a flood protection strategy: technological aspects, ecological and environmental factors, and social issues (Blackburn et al., 2014; Sebastian et al., 2014). Not surprisingly, the stakeholders represent a large and extremely diverse group. In 2012 - when the MFFD research group became involved in this case - several stakeholders were already vehemently arguing about the 'best solution' for the region. This heated debate was further inflamed by the local press, and representatives of local governments as well as politicians. On several occasions, individual stakeholders held bilateral consultations; and larger configurations of stakeholders met each other at hearings or informative meetings where emotions often ran high. The debate mainly focused on the pros and cons of structural solutions, such as building flood barriers in the Ship Channel at Houston Port and Bolivar Roads, or creating extensive levee systems along the barrier islands and the West Bay area. Although all parties seemed to want to find a solution that

protected the Houston Galveston Bay region and provided extra functions and benefits for the majority of stakeholders in, a solution that satisfied all or most stakeholders seemed far away. The decision-making process was at an impasse.

Discussing these issues with academic partners at Rice University and Texas A&M Galveston, the MFFD researchers saw similarities to other multifunctional flood defense development projects. For a project in South Africa, a stakeholder consultation approach was developed to address local values and interests and deal with contested issues of flood management (Slinger et al. 2014). Accordingly, the team proposed conducting a workshop along these same lines in the HGB region. The intention was two-fold: First, to approach the disputed issues in Texas from a different angle (value-based instead of solution-based), with the intention of creating commitment for joint action. And second, to explore the boundaries and merits of the CIGAS stakeholder consultation method in a new environment. The main stakeholders were kind enough to grant this request, and generously helped to facilitate the endeavor.

In October 2014, we conducted a CIGAS workshop in Houston and Seabrook City, Texas. Sixteen participants attended. The CIGAS approach strives to co-create insights regarding the contested environment, using action research, game structuring, and system modeling techniques in a two-day workshop. Since participants are understood to have different interests and values, the goal is neither to reach consensus nor to solve conflicts, but to explore the different values and interests held by the stakeholders, and to consider potential outcomes for the contested environment. As input, the workshop uses knowledge of the local biophysical and social systems,

The CIGAS-approach was first introduced in 2011 in South Africa in the Great Brak region by Jill Slinger, Scott Cunningham and Leon Hermans (see Slinger et al. 2014). The method was further elaborated for the workshop in Texas in 2014, as introduced here (for a full report see Kothuis et al., 2014). The approach has also been applied in the Netherlands (Energetic North Sea, 2015), on Texel (CoCoChannel, 2016), and in Ghana (Sustainable Port Development, 2017). Please contact j.h.slinger@tudelft.nl or b.l.m.kothuis@tudelft.nl for further information on applying it in your field.

We would like to express our gratitude to Jim Blackburn, who was indispensable to us in executing this CIGAS workshop.

Table 1 (below). Three major coalitions of stakeholders - CIGAS Workshop October 2014, Texas, USA.

Table 2 (below). Four outcomes on the Pareto Optimum - CIGAS Workshop October 2014, Texas, USA.

Three major coalitions of stakeholders - CIGAS Workshop October 2014

Local interests	National interests	Infrastructural interests
<ul style="list-style-type: none">- State and local government- Citizens on the water front- Citizens in the surge zone- Environmental and tourism interests	<ul style="list-style-type: none">- Federal government- U.S. Army Corps of Engineers- Industrial and port interests- Flood insurers- American people	<ul style="list-style-type: none">- Infrastructure provision- Emergency response teams

Four outcomes on the Pareto Optimum - CIGAS Workshop October 2014

Outcome	Description
An Enhanced and Rejuvenated Relationship with Nature	Flood protection is designed with principles of eco-tourism, and broad public access to environmental and recreational resources. A priority is given to ecological health over safety and urban development.
Self-Reliant Communities	Flood protection is designed in multiple layers, with an emphasis on the needs and contingencies of local communities. A priority is given to individuals and communities to assess their own risk and develop their own appropriate responses.
The Over-Engineered Solution	Flood protection is designed to be comprehensive and all-encompassing. The resultant designs involve large and capital intensive structures which emphasize hard infrastructure over soft. Safety is a high priority.
Waiting for the Next One	Flood protection is minimal, and primarily focused on industrial zones where there are obvious economic and environmental losses to be addressed. Urban expansion continues apace, with more and more citizens living and working in the flood zones.

and the effects that the infrastructure measures might have.

A brief description of the approach used in a CIGAS workshop is provided below. An extensive overview of the method can be found in Cunningham et al. (2014) and its application in Texas in Kothuis et al. (2014).

Building group trust is an important aspect of a workshop where sensitive issues are at stake. Asking participants to express their true values and interests in an environment where 'adversaries' are expected, is a delicate process, and will not occur when trust is absent. For this reason, the CIGAS method starts by personalizing the group to the individual scale. Participants are viewed as more than a representative of an organization or school of thought; they are also inhabitants, vacationers, home owners, who are connected to the Houston Galveston Bay region by family, tradition, sport, work, passion, religion, culturally, etc. The workshop facilitates this personalization by asking participants to introduce themselves to the group by drawing on a large map where they live, where they originally come from, and their area of interest and/or expertise (Step 1. 'Map-exercise', see Figure 2 next page). This step often yields unexpected personal connections at the individual level; and at the group level, it creates distinct visual insights into the composition of the current group. In the Texas case, it became immediately clear to the workshop participants that the east side of HGB was not represented; this was something they took into account in the remainder of the workshop when addressing and representing stakeholders.

The 'real' work then commences with participants deciding as a group what the main stakeholder configurations are (Step 2. 'Who cares?', see Table 1, page 156), and which systems and values are at stake (Step 3. 'Why do they care?' see Figure 1). Both steps help participants become further aware of complexities and multiple interests, creating the design space needed for step 4. In this fourth step, participants split up in smaller, multi-expertise groups and are requested to envision alternative futures for HGB, which reduce flood risk or protect the area. At this stage, they are asked *not* to consider the design or techni-

cal implementation of the defense. Instead, participants are invited to imagine the outcomes for the HGB they would happily dream about (utopian outcomes) and the outcomes that would represent their worst nightmares (dystopian outcomes). These outcomes may extend way beyond the current technological state-of-the-art, they do not need to be politically correct or please everyone, and they do not need to be feasible in the short term. The only limitation is 'physically impossible' (e.g., coloring the sea pink because it matches my swimsuit). In the Texas-group, some of the names given to the outcomes represent the broad out-of-the-box thinking this step induced for the participants: e.g., 'Waiting for the Next One', 'Yo-Yo Houston' and 'Cabaret'. This broad spectrum, although probably not directly translatable into actual designs, is nevertheless very important for flood risk reduction experts in that it stretches their imagination and extends their design space.

In Step 5 ('Outcomes') each group presents their outcomes to all workshop participants; this often produces laughter and recognition. Utopias and dystopias are described using drawings, maps, constructions, schedules, sometimes even poetry or songs, and are each given a distinctive name. In Step 6 ('Ranking'), the participants rank each outcome from the perspective of the stakeholders they identified in Step 2. Though every participant could rank outcomes according to their personal perspective, not all the identified stakeholders may be present in the workshop group. To provide a more inclusive listing, participants step in the shoes of the identified stakeholders and rank outcomes from each stakeholder's perspective. The disadvantage is that this generates perceived rankings, which will be less accurate; the advantage, on the other hand, is that it creates further awareness of the multiple interests and values at stake.

Next, Pareto-optima calculations are made of various combinations of these outcomes (Step 7. Pareto optima'). Potential conflicts are addressed by identifying the design space along the Pareto frontiers. Feasible coalitions of stakeholders and potential clusters of actions to reach a combined outcome are identified. The calculations and modeling in this step are done by the workshop facilitators

and presented to the participants the next day. In this last step (Step 8. Exploring joint action'), participants discuss the design space, feasible coalitions of stakeholders, and potential clusters of actions based on the workshop activities in Step 1-6. They thus explore the space for commitment to joint action.

Workshop Outcome and Follow Up
The workshop provided insight into the contested situation by exploring the following three central issues:

- 'Who is affected by flooding?'
Workshop participants identified eleven groups of stakeholders; in further discussion, participants grouped these stakeholders into three major coalitions (see Table 1).
- 'What do the stakeholders care about?'
Participants discussed and described the systems and values important to them, which are shown in Figure 1, page 154). Based upon the stakeholders and values involved, they subsequently designed the utopian and dystopian possible 'outcomes' of the Houston Galveston Bay region. These took the form of 'rich pictures' of possible flood control measures and their impact on infrastructure, the economy, citizens, and the environment. Four of the seven scenarios discussed in the workshop are outlined in Table 2.
- 'How are stakeholder values embedded in the outcomes?'
After developing the outcomes, participants rated the outcomes according to the needs and priorities of each of the stakeholders. Not surprisingly, representatives of the different stakeholders favored the outcomes to differing degrees. The perceived alignment in priorities across stakeholders led to a recognition of coalitions and common interests, and also an appreciation of the issues on which the various coalitions diverge.

The workshop revealed irreconcilable differences between stakeholders in terms of preferred outcomes. Of course, these differences must be treated with care, since choosing a single outcome may favor one stakeholder at the expense of others. The goal of the workshop is not to take sides, but rather to develop a common understanding of the

problem and a commitment to further action. One possible route forward is to eliminate the lose-lose outcomes, enabling participants to focus on the wins. Possible winning solutions (for at least one of the identified stakeholders) are identified in Table 1. The workshop also addressed the themes of coalition formation, bargaining and stakeholder management. A full report of the workshop can be found in Kothuis et al. (2014).

The workshop participants recognized the importance of developing joint action; in this sense, the workshop was a success. They also agreed that the workshop provided an incentive to form a platform where key-players could discuss the contested issues and come to an agreement to cooperate in the future.

For the researchers, applying CIGAS in the Houston Galveston Bay situation provided further information on the usefulness of the approach. It yielded insights on how it can be adapted for eventual further use. Nevertheless, much remains to be done: for example, a follow-up workshop focusing more on functional engineering requirements to further explore potential flood risk strategy design based on the values and interests expressed by the local stakeholders in the CIGAS-Texas workshop.

Figure 2. Map exercise at CIGAS Workshop October 2014, Texas, USA.

