Interpretation differences of actors in collaboration processes

ABSTRACT: Differences in interpretation occur in everyday life. In projects, a set of requirements is developed to achieve a defined goal. Specifying these requirements may establish consensus on how to turn requirements into a preferred solution. However, this consensus achieved cannot hold. We argue that the perceptions, or ‘Modes’ actors have also occurred within working fields. Interpretations of actor-networks are based on the ways of knowing, in these perceptions objects are recognized by all actors. This suggests that objects can be used to minimize interpretation differences. By appointing a spokesperson to an object this might limit interpretation differences, or at least acknowledges that they exist.

Key words: Actor-Network Theory, Interpretation differences, Project management, Qualitative Data Analysis, Parliament of things

1. Introduction

Dad asked his teenage son to mow the lawn if he has time to do so that day. His son replied to his dad that evening, when his dad asked why he has not mowed the lawn, that he had been busy all day, because he was playing videogames. This example shows that the requirement was open to interpretation, or in fact it was not even a question. By adding the part “if you have time”, dad made this question seemingly unimportant to his son, while dad had a task in mind, instead of a question. Communication problems occur in our everyday life. When people work together similar communication issues will take place.

All over the world people work together to establish goals. Railroads, harbors, airports, and bridges are built. These constructions determine what our landscape looks like. Water management projects, worldwide, create and develop water systems; e.g. irrigations schemes with deep water well extraction in the Middle East, California and Africa yield typical spherical green areas. These green fertile areas would not have been there if humans did not start pumping deep ground water. Same goes for the Dutch dike and polder system as we know it nowadays, the dikes create a safe and livable area below sea level. Human efforts shaped these landscapes over centuries (Keller, 2012; Kitchen, 2000). Natural process and human processes interact and have created the world as it is today.

The shaping of landscapes takes place when people work together, a common approach to develop is a project. The scientific literature often discusses large complex decision making projects (Edwards, 2010; Hertogh, Baker, Staal-Ong, & Westerveld, 2008; Janáč & Vleuten, 2015; Koppenjan, Veeneman, van der Voort, ten Heuvelhof, & Leijten, 2011). Shaping landscapes, however, is not only dependent on mega projects. Local residents and authorities shaped most of the environment over time, in projects. A project is defined as: “a temporary undertaking to establish a set of goals or requirements to deliver a defined product” (de Bruijn, Ten Heuvelhof, & In ’t Veld, 2010). And as such can be either large or small in size, time frame, and number of participants. Within these projects people work together to achieve a set of goals or requirements. Collaboration between people and communication problems are going together, since, when working together there is always disagreement. Collaboration between team members brings along interpretation differences; i.e. communication problems in where the same thing is said or written it can mean something else to someone else (Bredillet, 2009; Garel & Lièvre, 2010; Geraldi et al., 2008; Hagen & Park, 2013; Sharon, De Weck, & Dori, 2011). For these interpretation differences, things never work as designed. Things never work as stated, to make them work restrictions are built around them, to make things function as desired. For example airports,
hospitals all have strict rules in what to do when you arrive, check-in and proceed to the next stop, before you reach the thing intended, the plane or to get better. Of course there are also more loose restrictions; e.g. the one in restaurants and bars. Projects might be situated somewhere in the middle of these two, the team is in charge to design new ideas and solutions, but is restricted and guided by project management methods and other social bounds.

To structure these communication processes in projects, project management methods are used. Within these methods, multiple communication and agreement tools are present. A widely used tool in project management is the second reader. When a product is written a second project member checks the text on correctness. The most obvious problem with this tool to structure the project is the inflexibility to change. When the report is checked by the second reader, and a new insight occurs, the change again needs to be examined. Since projects are limited by time and costs this caused problems, not everything was checked twice.

Project management tries to minimize the changes in project goals, new ideas are excluded by this approach, to prevent delays in planning. A main problem in project management is inflexibility, this is often why project management fails, because it refuses to make use of opportunities posed by unstructured and unexpected decision making processes (de Bruijn et al., 2010). Unexpected and unstructured processes are called instable, and can be caused by internal or external forcing; internal due changes in project approach, external by stakeholders trying to involve in the process (de Bruijn et al., 2010). Stakeholders with means can speed up the process when agreeing on the project goal, or delay, if not satisfied (de Bruijn et al., 2010). Not acknowledging the dynamic environment in which a project takes place and, not taking into account new ideas, is part of the problem in arriving at an agreement in projects.

Many stakeholders involved cause communication issues in projects. Especially in the plan phase, which is identified as instable, where many stakeholders try to engage with the problem (Commissie Elverding, 2008). New information is constantly entering the project by new actors entering the negotiation process. New information can be a problem when the project structure is unable to cover these requirements in the project, since stakeholders will not accept the created solution, if not for accounted their requirements. Reasons for not being able to establish an accepted solution might be a too inflexible project structure to include new information. Another cause might be an to open team, which is unable to achieve goals within time and budget. Literature on this topic suggests that this is good project management, or based on personal leadership (Themistocleous & Wearne, 2000; Turner & Müller, 2005). For interpretation differences occurring between all project team members, and even outside project teams; e.g. the father and son story, this explanation for being dependent on project management is not satisfying. We want to make these relations and interactions between the project members visible, and how new requirements are incorporated in the ongoing process towards a solution visible. For companies knowing how these interpretation problems occur is highly valuable, since it can save time if recognized sooner. How interpretation differences occur, or form is therefore analyzed with Actor-Network Theory.

Actor-Network Theory argues for studying science and technology in action (Latour, 1987), because it wants to study how things emerge or are created. With ANT we are able to study these interactions between different perspectives (Sheehan, 2011). Therefore, this study emphasises on the possibilities ANT creates for identifying the interpretation difference in the project. ANT enables to establish and build analysis on the interpretation differences in the project, wherein communication takes place. ANT enables us to identify interpretation differences by the project team members. Before
communication can be made visible, the process in which these interpretations differences and communication problems occur is analyzed. ANT as stated, has the possibility to study things in action, the beauty of this is all the relations and interactions between things can be identified over time. Showing the changes in interpretations that take place in the project.

With a focus on how a project in the plan phase is shaped, in close interaction between a water board and engineering company, the results in this study are built on one central question: Can we show why interpretation differences occur, when people work together? With ANT we will propose a new perspective on how to approach different interpretations in projects. Before applying ANT (studying the process in action) the characteristics of the case study project are appointed, the project phase and the method of analysis are clarified, followed by the results, discussion and conclusion.

2. Case study

In the Dutch water management sector a shift from traditional management methods to product specific management methods is observed. This originates from the wish to have an end product; i.e. waters system that fulfils the expectations. But what are these expectations? These expectations are based on requirements formed by the commissioning party and the stakeholders involved with the water system. The project team is responsible for addressing the requirements in such a way that the desired end product is met. This type of project takes place between a water board and another company; e.g. engineering company, contractor or consultancy firm. A project team is formed between the two parties, to fulfil an outlined task in the total development of the water system.

The case study project used to identify interpretation problems in the project between a water board and an engineering company. The goal of the project was to identify the preferential solution for improving the water safety nearby Etten-Leur. This area is situated in the south of the Netherlands, where two canals discharge on a small regional river, which discharges in a large (brackish) estuarine lake in the south west of the Netherlands. The project focus is on the two canals, both with a length of approximately 7 km. The levees alongside the canals are no longer in compliance with national water safety standard. Within a timeframe of a couple of months, the alternative solutions were investigated to improve the situation. Three possible solutions were identified; improve the dikes, install barriers or create water storage. While specifying and detailing the alternatives, wishes on the solution were collected. These wishes originate from municipalities, residents, the harbour exploiter and environmental organisations. The water board itself has requirements on the solution as well on maintenance, costs and durability and most important to fulfil the 1 in a 100 year flood safety requirement. The water board is, by law, responsible for development of new plans and designs, to meet the new standard. All these wishes are collected and specified into requirements on the preferential solution. To establish the project team’s goal, alternatives were compared, to define the best solution for the water board’s board of directors.

The 1:100 year flood safety requirement is typically a technical requirement in the project and is dealt with by the technical manager (TM), who is responsible for the technical interfaces (Rijkswaterstaat, 2008). Combined with the stakeholder requirements, the technical requirements form the customer requirements (Werkgroep Leidraad Systems Engineering et al., 2013). In this method the customer is defined as all stakeholders in the project. The requirements function as input for developing a solution, which meets the customer expectations. The environment manager (EM) is responsible for incorporating all stakeholder wishes and environmental characteristics in the project. Interpretations of requirements and communications on this topic between specialists are found interesting for in depth research. The process of handling new and adverse requirements is analysed in this research. To better
understand how different interpretations appear in the project. Both, handling requirements and interpretations, are based on the roles team members have within the project. These roles need some clarification first.

Roles are divided among the team members, based on Integrated Project Management (IPM) approach (Rijkswaterstaat, 2008). The water board followed this approach and assigned 5 roles to 5 persons in the project. The engineering firm chose to have a smaller team, cost saving arguments were the main driver for this decision. The five roles were given to four persons instead of five. The brief description below on the roles is necessary for understanding how the team members collaborate. The technical manager (TM) is responsible for managing the interfaces between the technical disciplines in the project. The TM communicates with specialists; e.g. hydrologists and hydraulic engineers. The Environmental manager (EM) in turn is responsible for the environmental interfaces in the project. EM is also in charge of collecting the stakeholder requirements. The Project Manager (PM) is ultimately responsible for the integration of all the components in the project and the final product quality. The two other roles are less visible in this research since their contribution was smaller. The Contract Manager (CM) was responsible for all the legal aspects in the project and the Project Controller (PC) managed all processes and planning, but only does this internally for the water board. The PC was not actively involved in communication between water board and engineering company.

The TM, EM and CM were the persons concerned with handling requirements in this project. The requirements were technical, process related or based on external stakeholder wishes. Some of these wishes can be interpreted in multiple ways, specifying the requirements to elucidate these were used in this method. When specifying and thus making the wishes more explicit, caused interpretation problems and may even lead to contradictory requirements. To illustrate this an example is given based on the case study project:

*The trees alongside the dikes are cultural history, according to some. Others interpret trees as intruders, since horses used to tow the ships, via the tow path besides the canal.*

The requirements may be contradictory, therefore negotiations between the stakeholders should take place. The negotiation ideally results in one requirement to use. Different interpretations of requirements by the specialists occur easily because of the different specialists and backgrounds involved. To prevent contradictory interpretations project management methods have tools for dealing with requirements and interpretations by the involved actors (Locatelli, Mancini, & Romano, 2014). Customer Requirements Specification (CRS) is a tool designed by Rijkswaterstaat, which supports the requirement negotiations among stakeholders (Werkgroep Leidraad Systems Engineering et al., 2013). CRS is a project management method for collecting, specifying and negotiating the requirements in the project. This management method divides the complex cohesion in subparts. After specifying them the subparts are integrated again. Before integrating, the parts are managed based on their interfaces. For example when designing a bicycle lane in a polder, the technical interface that occurs is how to bridge the canal and connect it to the road on the other side. To cross the canal a bridge is needed. Some authors, such as de Bruijn et al. (2010) argue that creating blocks and subsystems increases the complexity in projects. This is one of the contradictions within project management methods. Achieving desired products within time and budget, limits the flexibility in the process due strict planning. Therefore project management methods often lack flexibility to adapt to unexpected changes (Koppenjan et al., 2011).
3. Obligatory Passage Point

ANT has a great history in describing projects, this gave us multiple possibilities to analyse the communication problems within projects (Callon & Law, 1992; Callon, 1986; Ertsen, 2016; Fatimah & Arora, 2016; Latour, 1996; Wallace, 2012; Young, Borland, & Coghill, 2010). The ANT literature on projects started from the pure technological perspective, with Aramis (Latour, 1996) and the Life and death of an aircraft (Callon & Law, 1992). These studies focused on large technological systems, analysed from the idea that technology does not innovate itself. It is due the social interactions that large technological systems change. As pointed out before, things never work as designed, a set of conditions or rules make them function in an acceptable way. At this point in history ANT was seen as a framework for analysing large technological systems (Law 2008). This study started with some basics from the technology approach in ANT. The Obligatory Passage Point (OPP) distinguished from the life and death of an aircraft (Callon & Law, 1992), was used.

The Obligatory Passage Point defines points of consensus, a more or less stable situation of the actor-network. On this point there is a certain consensus established however this does not imply that different interpretations cannot occur, it can be that the actors are not aware of the interpretation differences. In literature this point is defined as a connection between ‘two sides’ of the actor-network; the local network and the global network (Callon & Law, 1992; Heeks & Stanforth, 2014). The local network is, where actions take place and regulation is interpreted, determined to create or develop something. Where the global network is eager to influence the development. However, the naming local and global suggest that there is a sort of hierarchy in ANT, while there is not. Callon and Law (1992) identified the project goal as an Obligatory Passage Point (OPP). They state that when project management is not able to create a solid OPP the local network, as they call the project team cannot develop solutions, claim successes or achieve goals (Callon & Law, 1992). This suggests that project management is based on ‘good management’ where de Bruijn (2010) states that project management fails because of inflexibility to changes, this suggest that the OPP is not a solution for creating a desired project result. It is a point of balance, or temporary stable state, where all actors have agreed on at that time. And most importantly, it can be made visible in our project analysis. In this study it is used for identifying the point where consensus is reached between the project members. This technology driven phase in ANT history gave us the possibility to define a point on which the project team members agree. This OPP best be imagined as a funnel shape where the existing actor-network is at the top of the funnel. When actors want to participate or interrupt in the prevailing actor-network the OPP needs to be passed (Callon, 1986). Figure 1 shows the passage of the funnel over time. When the actors pass the OPP the new defined actor-network is created.

![Figure 1 Obligatory Passage Point represented as a funnel](image-url)
The Actor-Network consists of a heterogeneity of actors, human and non-human and how they relate in physical and non-physical relations. Changes in actor-networks are called translations. This occurs when a new actor is involved in the actor-network. This can be again a human or non-human actor. With new input the actor-network translates to a new temporary stable state. Translation consists of multiple phases, in which the identity of actors, the ability to interact and the boundaries wherein movement can take place are formed and negotiated on (Callon, 1986). The stability of the Actor-Network is based on the importance of the central actor. To illustrate a translation, we use requirements by an environmental organisation, on an ecological zone. This zone should connect the stretches of nature in the region. The project team however was not certain how to implement this in the ‘improving the dikes’ solution. When one of the project members drew a sketch of how it could look like, the team had an idea how to include this in the design. This drawing changed the actor-network of not knowing were to position de nature stretch to an agreement on the requirement. This is an example of translation in the project, by adding a new way of representing information, the drawing, the actor-network was translated to its new state. The actor-network forms a temporary stable situation, similar to the requirement analysed, a project or in the long term society can also be imagined as stable actor-network (Law, 1992). The beauty of ANT is that it has no a priori order, and does not change the objects studied (Bredillet, 2009). This gives the researcher the ability to study the process relatively unbiased. While studying the actor-network, one can start anywhere, since there is no defined top down or bottom up strategy while using ANT.

Earlier we pointed out that this view on technology shifted to more a sociological view when ANT developed as a theory. Science, politics, religion all were introduced in the ANT theory, where the most recent work by Latour (2013) can be seen as the most theoretical. In his ‘modes of existence’ he introduces the ways of knowing. Ways of knowing can be imagined as perceptions the different actors have on the actor-network. These perceptions are based on ones background in sociology, technology, science, politics or religion. To conclude, the obligatory passage point is used to address points of agreement in the case study. When these points occur the current actor-network is temporary stable, because there is an agreement in the negotiation between the actors. Furthermore, modes appointed the meaning of the background an actor has. This influences its ability to negotiate with other actors. Interpretations can be completely different when being influenced by a different discipline. Therefore the consensus is not necessarily ruling out the interpretation differences.

4. Qualitative Data Analysis (Methodology)

For applying the theoretical framework on the case study, a method is used to analyse the project processes in more detail. Changes in interpretations became visible by applying Qualitative Data Analysis. QDA is enables the researcher to link data, and make relations visible over time. These relations between information were based on the project documents. The project documents, all collected with support of the engineering company, even including personal e-mail conversations, is regarded as the data set. The QDA applied on the dataset was based on structuring of the data in three steps (arrange, code and finding links) and analysing the data in two steps (descriptive and explorative) (Friese, 2012; Miles, Huberman, & Saldana, 2014; Miles & Huberman, 1994; Swanborn, 2010). The analysis steps are carried out with Atlas.ti; a program which allows the researcher to label and structure data in a uncluttered manner (Friese, 2012; Van Bueren, Klijn, & Koppenjan, 2003).

With this analysis we derived detailed links in communication between the project team members and the interpretations on requirements by the team, but not on individual level yet. This is
due the fact that slight nuances in interpretation are difficult to define based on pure textual documents. Due to double checks, the text is made consistent on a textual level. Nuances are easier to identify in speech or intonation in words. Therefore, the interviews offer a solution in identifying interpretation differences. The perceptions by the team members are then in turn placed in the ANT perspective and Modes is used for building the analysis.

5. Results
Project management methods define the problem definition as fixed statement. It is established at the start of the project and obeyed throughout the entire project (Carroll, Gardner, & Prince, 2016). The project team is committed to the problem definition during the entire timespan of the project. However, when analysing the case, actors actively try to control the problem definition by projecting their own view on the problem. The most indicative example for this behaviour by actors was seen when the residents appointed waterlogging to the problem definition. The problem definition defined by the project team was: the water safety in the area, not waterlogging. The solution had to improve the water safety standard, but was unable to improve the waterlogging situation. In their perspective the water problem, irrespective of the cause, is a problem and therefore needs to be solved. The residents have a strong opinion in the project, since they are the ones living in the area, the water board needs to incorporate this wish in the project. To accomplish this, the project manager added solving waterlogging problems, if it would be possible, to the project goal. At this point an agreement on the project goal was developed.

The obligatory passage point in ANT literature is such an agreement between actors. This is point is seen as a temporary stable state for the actor-network. After passing this point, the funnel is widened again. Passing this point associates the actor to the problem definition held by the project team or primary actor (Latour, 1987). For our case the project manager is identified as the primary actor, speaking on behalf of the project team, the project manager includes the requirement by the residents in the project goal. Adjustments in the OPP on regular basis causes the actors to diverge. When this happens, alternative actor-networks occur, as actors project their own problem definition (Alderman & Ivory, 2011). When divergence from the OPP is to wide, the team is unable to achieve developments or at least unable to claim successes on these achievements (Callon & Law, 1992), since the agreement on the OPP can no longer be achieved.

The problem definition is recognised as Obligatory Passage Point, all the actors involved agreed on the problem of water safety and the waterlogging is also recognised as a problem by the project team. However, when looking at the definition to solve this, we found: ‘solving the water safety problem in the region and include solutions for waterlogging, if possible’. Have we not seen this before? When dad asked his son to mow the lawn, if he has time, a comparable addition was added to the phrase. The son did not mow the lawn, did the project team solve the water logging problem?

Communication on the waterlogging issue was found for a particular place in the water system. This place, a diver, in the most upstream part regarded in the project, caused troubles with high water flows during intense rainfall events. The waterlogging occurring in this area, should be solved when installing the barriers and pumps to close off the canals. This view was shared by the Environmental manager and the residents. However, when the hydrologist calculated if this was theoretically speaking possible to solve with this solution, he found out that this was impossibly the case. The influence by the pumps did not reach as far upstream as imagined by the other project team members. Yet, when discussing this solution with the residents, the larger part of the waterlogging problems would be solved.
by this. Of course the residents did interpret this as a solution for this specific relation, rather than solving some of the waterlogging problems in the area. The team fulfilled its job, solve waterlogging problems if possible. For the residents, this job was not fulfilled. While both committed to the same project goal before.

Of course this interpretation difference occurs in a fashion as described by Latour (2013). In this situation residents, politicians and engineers were involved. Naturally these perspectives by the disciplines do not match. The disciplines are biased by their own background, or ways of knowing. In the negotiation both where happy with the result because in their perspective, this was what they had aimed for. For the residents a water problem is a water problem, for the engineers these two are completely different things; water safety and water logging have a different cause and different location.

Within the team different perceptions were encountered as well. On the project goal all team members had a slightly different definition on the negotiated project goal. For we stated the contribution of interviews earlier in the methodology part. The interviews showed that the supposedly similar perception on the project goal by the team members, varied when asked to clarify the goal. Their perception on the project goal all slightly differ, as presented in box 1. These variations, minor as they seem, cause interpretation problems in the project.

The actors’ definitions are highly related with the national standards for water safety and waterlogging. As seen, the greater number of definitions contain an interpretation of the standard. Developing the alternatives and especially the ‘barriers’ alternative generated discussion within the project group on the meaning of this standard. At the start, the water board did not include the waterlogging problem caused by pluvial flooding in the scope of this project. The foremost point is the complexity of the technical material, this is hard to grasp for non-specialists and certainly has caused communication problems within the project team. The 1 in a 100 year water level safety standard applies to ‘regional’ dikes. When the barriers are going to be build, the canal dikes classify no longer as ‘regional’, but are classified as ‘other’. ‘Other’ dikes have no guidelines for water safety, but do have standards for waterlogging. Since this is a different standard, this is confusing and possibly not helpful in solving the problem.

This can be explained because the standard itself is an agreement between science, technology and politics, therefore, applying this in the project will create new discussions. Some actors have the perspective of the standard as a guideline others see it as a law enforcement. Interpretation problems are easily seen by an outsider, but are hard to identify while participating in the process. The differences in interpretation between the project team members are noticed in the project when deadlines occur.
When this happened the negotiations were speeded up to reach an agreement before the deadline. When determining the budgets on the alternatives, one of these deadlines appeared and created an discussion on the water storage alternative.

Described in the project characteristics, the scope of the project was set to the two canals of approximately 7 kilometres long. When water storage was suggested by the project team as a fruitful solution, the response by other actors was enthusiastic. The environmental manager suggested some locations for this solution to the project team and to the residents and environmental organisations. The last two carried away with it and identified different locations and ideas for this solution. These ideas were no longer bound to the set scope by the project team. For water storage downstream, the project scope was not endangered because the actors engaged with the statement by the project manager, to not involve the downstream area. The reason for not involving the downstream area, however doubtful, was the large water problems already prevalent downstream. Because of this, downstream solutions were seen as impossible to realise. For water storage upstream, however, the actors involved were encouraged, and deliberating on where the storage should be positioned. The environmental manager and her team defined the scope different than the other project team members, while informing and involving the environment. The project manager eventually ruled out this opportunity. Acceptance of this ruling out was harder to accept then, the statement of not taking into account the downstream area.

The perceptions of the residents and environmental organisation were different than these of the project team. These stakeholders, besides the project team, saw the physical watershed as their room for solutions. As a result, the solutions originating from actors involved do not always match the project scope, since these boundaries did not coincide with the physical boundaries of the watershed. As pointed out, humans engage with their environment and shape it. Not coinciding boundaries with these physical boundaries are, therefore, hard to maintain when residents are involved in the development process. Increasingly more difficult is the interpretation on all the requirements desired by the actors involved. Within the team, the CRS is used for specifying all the requirements collected.

The team members engaging with the CRS is similar to the ‘rugby ball’ metaphor. The ball is in constant move as players throw the ball and the next player receives it (Latour, 1987). A force is exercised on the ball with every movement, but only lasts until the next player catches it. Latour describes the movement of power with this metaphor in social settings such as organizations (King & Lawley, 2013). This passing of the rugby ball happens multiple times in the play. CRS as the ‘rugby ball’ is passed on from the environmental manager, to the technical manager, back to the environmental manager and in the end to the contract manager. Changing in shape and direction but still recognizable for the players as the ball. From the interviews we retrieved the perceptions on the CRS by the different team members, when linking these to the translations of the CRS we get a description on the CRS during the project: The environmental manager was the first playing the ball. The CRS was used as a process description for collection stakeholder requirements. The EM included all the requirement reports in the CRS, before the ball was caught by the Technical Manager. The TM had to include the requirements collected in the CRS to develop technical solutions for solving the water safety problem. The TM used the requirements and passed the CRS on to the Contract Managers, who uses the CRS for constructing the contract. However, the requirements where not specified enough to include in the contract. The CRS is influenced during the process by all the human actors involved. Besides this ANT accounts agency for non-human actors.

The CRS is not only changed by the interference of human actors, but also by non-human actors. The requirements force the CRS to take shape, in a way that they can be incorporated in the CRS. An example of a requirement that forces the CRS is the navigability of one of the canals. This requirement is not made public, since it causes a focus shift on ‘again’ the problem definition, according to the project
team. The team wants to work towards solutions. The requirement on navigability in turn was included in the CRS, but hidden in the document, before passing the CRS to the next actor. By this requirement the CRS was forced to drop one of its main characteristics: creating transparency to all project members. The CRS itself is a non-human actor, therefore also influences the actor-network.

The CRS is an object, a non-human actor in the actor-network. This is highly interesting by seeing the perception of the environmental manager at the end of the project concerning the CRS. “The CRS is not a process; it is a product we have to deliver.” This statement shows that the environmental manager, who originally designed the CRS process is no longer convinced of the CRS being a process. The EM sees the CRS as a product.

To conclude the CRS is a non-human actor, an object, which has agency to influence other actors. All different interpretations are based on actor perceptions. Giving the social part in project a highly important position regarding this analysis. Nonetheless the CRS as object seems to change the EM during the project. Non-human objects may, therefore, be used to help or structure interpretations by the human actors.

6. Discussion and conclusion
When people work together, communication may become a challenge. This is what we have seen in this project. Within the project, most communication problems occurred when the project team was discussing the requirements of the project result. Whether it concerned requirements by the residents, technical requirements or standards, team members showed different interpretations of these requirements. The requirements were formed in negotiations between the water board and other stakeholders, and documented in requirement reports. At times, requirement reports were unclear or the reason why a requirement was defined could not be found. The CRS, a tool especially designed for handling these requirements, had not been used, as a process before by the technical manager. As a result, the tool itself was also a point of discussion.

Next to this new tool, writing checks (a basic project management method) was used in the project to reach consensus on the content of the documents created in the project. Agreement on a product was constructed by two checks: one by a second reader and one by the project manager. The goal of this double check was to reduce contradictions in writing products from different authors within the project team. In the case study, no communication problems were observed in the project documents. As such, we can conclude that this basic project management method managed to reach agreement among team members. The project documents did not give reasons for team members to assume, that there were contradictions in the interpretations between the project members.

The interviews with the project members, however, showed that the agreement encountered in the documents would have hidden differences in the definitions and perceptions on the project goals. The interviews gave us clues on (possible) communication problems in the project that the project documents did not offer. Especially when project deadlines came up, these different interpretations emerged. A deadline can be seen as a narrow point on which actors need to agree before the process can continue. When deadlines occurred, discussions and negotiations on project goals were reopened by the team members. Discovering these hidden communication problems in the project suggest that such interpretation problems occur even in situations where basic project management tools are applied.

We would suggest that many of these interpretation differences originate from the different perceptions actors have on the project and its environment. Following Latour’s ‘Modes of Existence’ (2013), these perceptions could be described as ways of knowing, closely related to someone’s background. Differences in modes are based on the discipline of actors, like policy, technology, science or religion. The project itself can be understood as one discipline or one field; i.e. engineering which can
be argued as science. This means that these communications errors on ways of knowing also occur within one discipline. However, when we look at the individuals in the project, the actors, all have different backgrounds founded in technology, science and politics. To conclude, within one field, engineering, we can find different modes in one team. The project is an ongoing process of negotiations and discussions, with occurring communication problems between actors.

This study suggests that communication problems occur even when specific methods are applied to prevent them. Writing, checking and double checking textual products did not solve this communication problem: the problem is not in writing words down, but is caused by the different perceptions actors keep having on the written consensus. ANT showed us this, can ANT also provide a solution to the different interpretations and communication problems that comes along with it? ANT is a theory founded in sociology, anthropology and technology studies. This may appear as unrelated to a practical field like project management. As we have seen, however, ANT can be applied to projects, so perhaps we can use it to improve communication in projects. The theory allowed us to address the communication problems in detail. Can it also give a clue on how to deal with the ‘modes’ in projects? Generally speaking, communication problems need to be identified while working on a project: clues or identification of communication and interpretation issues when still in the process would desirable in order to deal with them. It is likely that misunderstandings occur when discussing requirements, or in other words when descriptions of desired objects are discussed.

We know that actors act within projects based on their perceptions on the actor-network. These actor-networks always contain objects, in our case for example dikes. To reach consensus, the topic needs to be understood the same by all the actors involved. Project management might benefit from those objects (things) being recognized as the same thing by all the project members – or at least from shared different interpretations among project actors. Objects often have a solid shape and similar characteristics, and at least are named the same by the project members. Following ANT, we may try to exploit this characteristic in order to reduce communication problems.

Within projects, we could imagine that an explicit step would be to ask the “matter” in projects (like a dike) to convince the team of its shape, function or meaning. For this to happen in practice, the dike would need a spokesperson: a human actor that is appointed to speak on behalf of the non-human actor. If this approach is applied, the non-human actor has a perspective of its own, even though it is the perspective of the human actor on the non-human actor. We may imagine that the dike is represented by the geotechnical specialist and the water level is represented by the hydrologist, but other combinations could be fruitful as well. In such a way, objects become project team members on their own. When representing objects, there would be no need for talking with funny voices on behalf of the objects, or other ways of acting. Exploring the role of objects in projects would allow addressing the interfaces between project issues in another way. With objects being represented by the human actors, interfaces will emerge when the actors (human and non-human) negotiate.

Giving objects spokespersons is not new, in the ‘parliament of things’, people were invited to put themselves in the position of an object (Latour, 1993; Swainson, de Loë, & Kreutzwiser, 2011). Speaking on behalf of matter is seen in the debate on horizon pollution. Here the horizon is given a voice, stating that he wants more space for himself, instead of becoming increasingly filled with objects, like humans climbing mountains, windmills, airplanes. This is different approach to the horizon pollution problem. For interpretation on requirements we used a similar approach. So let the human and non-human actors negotiate: CRS: “I would like you, TM, to check with the municipality if this requirement is correct.” On which the TM replies: “I already checked this the moment I met them, then I wrote it down on you, it is ok
“Thank you TM, for confirming”, then the CM interrupts “I need to have this validated in writing, so you have to get this checked again TM, send the municipality an e-mail. They have to agree on the contract, later on”.

References


