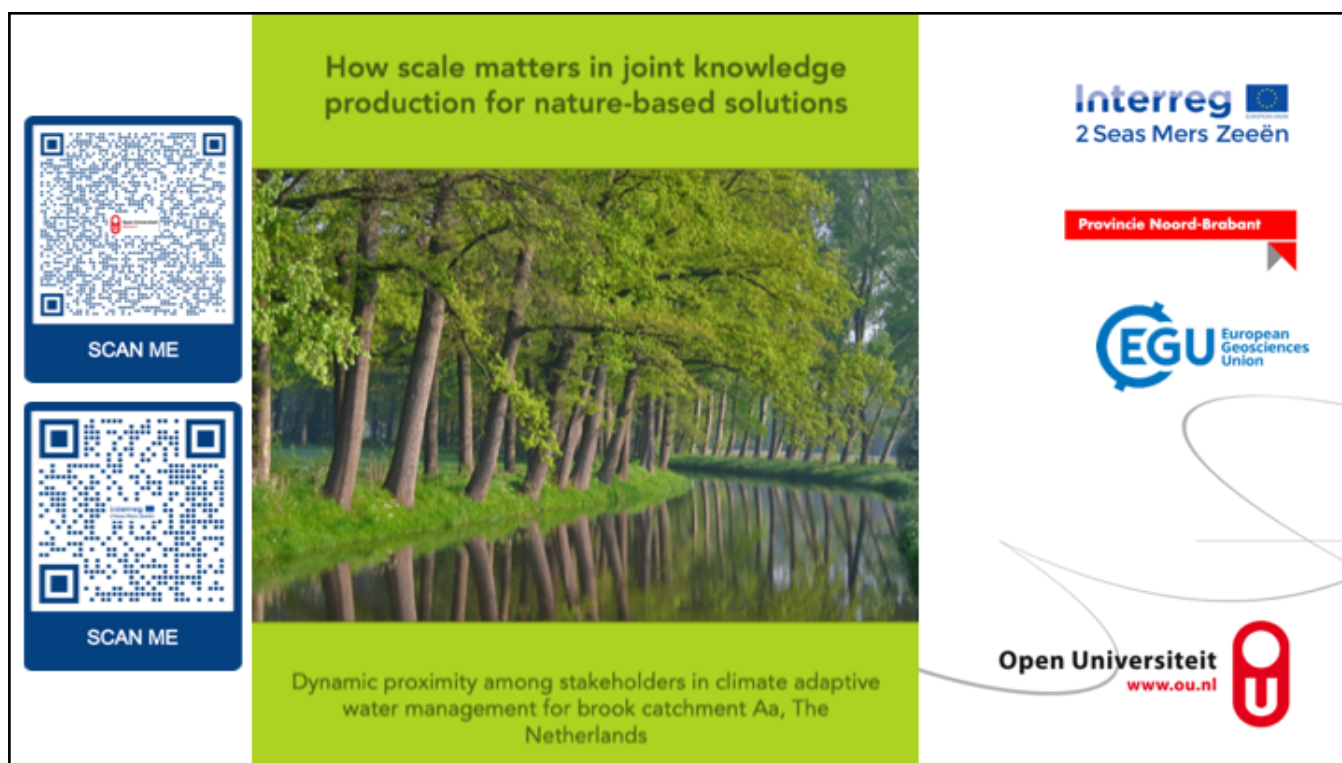


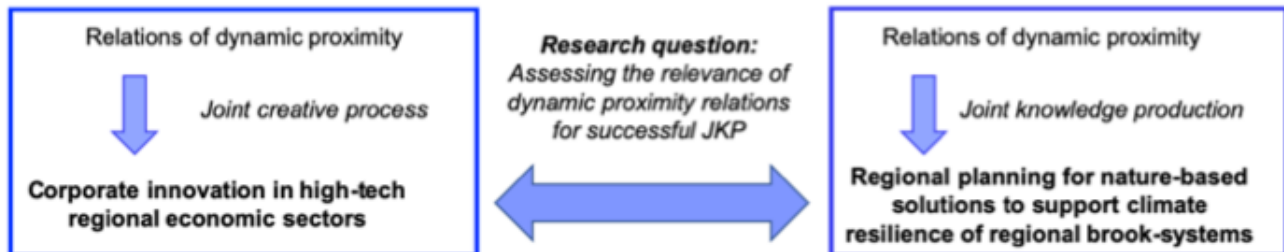
How scale matters in joint knowledge production for nature-based solutions

*Dynamic proximity among stakeholders in climate adaptive
water management for brook catchment Aa, the Netherlands*



In the spring of 2020, upon starting this research, we had an introductory meeting with the supervisor at the Province of North-Brabant, Frank van Lamoën. We were going to define the exact topic of the research in the context of the EU 2-Seas Program 'Co-Adapt'. One remark mr. Van Lamoën made during this meeting stayed with us during the entire research trajectory: "Could you explore what differences in scale in fact do within such regional climate adaptation projects?" He had noticed that it was not always easy to communicate knowledge on a worldwide scale, on climate change and land-use change, in local or regional projects on, for example, climate adaptation and brook-restoration. Interests and urgency were often felt quite differently on the regional scale. This for us was the reason to start looking into the *proximity* between stakeholders in the process of a regional project aimed at climate adaptation as the central theme of this research.

Problem definition and research question



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In the search for climate resilience of brook catchments stakeholders collaborate. Those collaborations involve dynamic proximity, and if all goes well, this gives rise to innovative, creative solutions using natural hydrological and landscape processes. Dynamic proximity is known from innovation research in the field of high-tech regional economic development. The question we have asked ourselves, is whether dynamic proximity of the stakeholders in a knowledge network influences the success of joint knowledge production as well. And if this is the case, to determine which forms of proximity are most of relevance. In trying to answer that question, we have focused on a more *low-tech*, or *nature-tech* context of regional economic development: creating nature-based solutions to support climate resilience in a regional brook-catchment.

Partial research questions

- *Who are the stakeholders?*
- *Did they consider the project as successful?*
- *How can I describe the dynamic proximity relations among them?*

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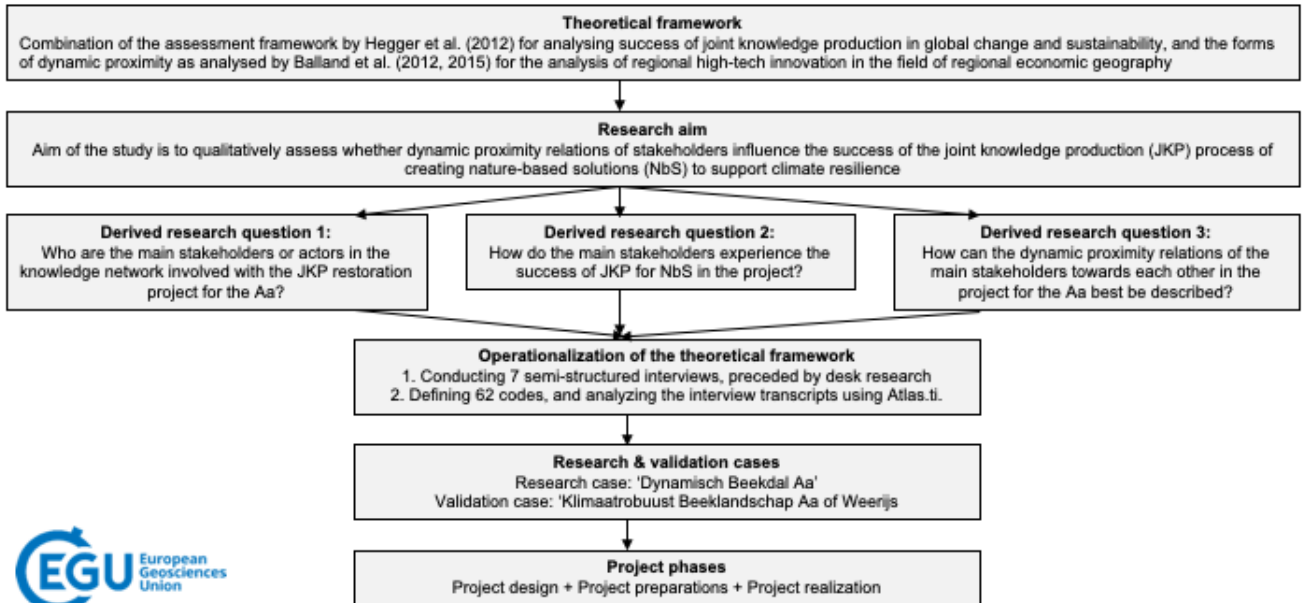
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We have broken up the main research question into 3 sub-question with the aim of structuring the research process:

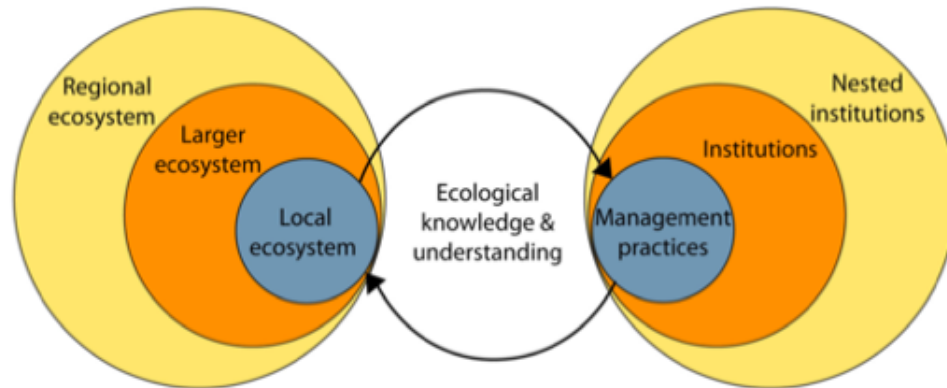
1. Who are the main stakeholders in the knowledge network, what are their roles, and can their network relations be graphically shown?
2. How do the main stakeholders experience the success of joint knowledge production for nature-based solutions in the knowledge network?
3. How can the dynamic proximity relations of the main stakeholders among each other in the knowledge network best be described?

Relation between research questions, theoretical framework and research approach



The diagram shows the relation between research questions, theoretical framework, and research approach we followed. We will explain this further.

Theoretical framework (1)



Folke and Berkes, 1998
Colding and Barthel, 2019

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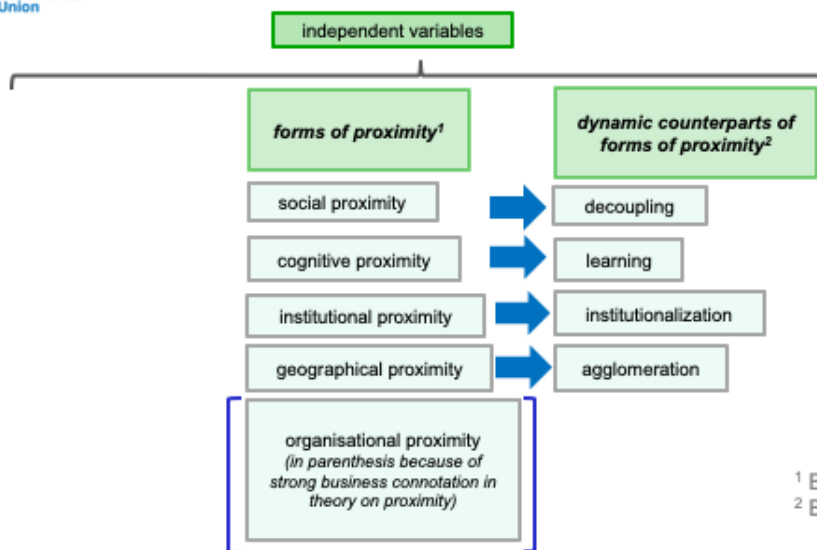
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Starting-point and presupposition for this research is that a regional brook system can be considered a social-ecological system on different, *nested* scales, in the sense Folke and Berkes gave to it. The social-ecological system consists of the natural system (left hand side of figure), which may consist of a number of nested sub-systems. For example think of a brook's drainage basin, containing a number of nested watershed ecosystems. The social-ecological system also consists of the social system (right hand side of figure), which is again a nested system. It may consist of the local management practices of farmers by the brook on the small scale, to larger-scale institutions such as the European scale of administration, issuing regulations like the Water Framework Directive. The linkage between both system-types lies in the ecological knowledge and understanding of the user's resource base. This knowledge and understanding is critical. Without it, a sustainable use of the resource base is not likely, according to Folke and Berkes.

Following this line of thinking, it matters to study human behavior in brook-catchment restoration, because in the social-ecological system the social system is as important as the natural system. Without productive human behavior there is no healthy brook-system.

Theoretical framework (2)



¹ Boschma, 2005
² Balland et al., 2015

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Now how is the production of ecological knowledge & understanding influenced by the scale on which the knowledge production takes place? That issue is being studied in economic geography and regional economics on *proximity*. How does the proximity among stakeholders, in various meanings of the word, influence knowledge networking, innovation, and regional development? Balland, Boschma en Frenken (2015) have distinguished 5 forms of dynamic proximity. This framing is the starting point of our research. These authors, like we will, speak of *dynamic* proximity, because they consider the *process* of knowledge networking as the central issue for study. Proximity is not just something that arises through external influences; but by collaborating, proximity between stakeholders originates and changes.

Decoupling points to the ‘becoming autonomous’ of personal relations through time; that is when a relation among stakeholders can be decoupled from its original context and ends up existing for itself.

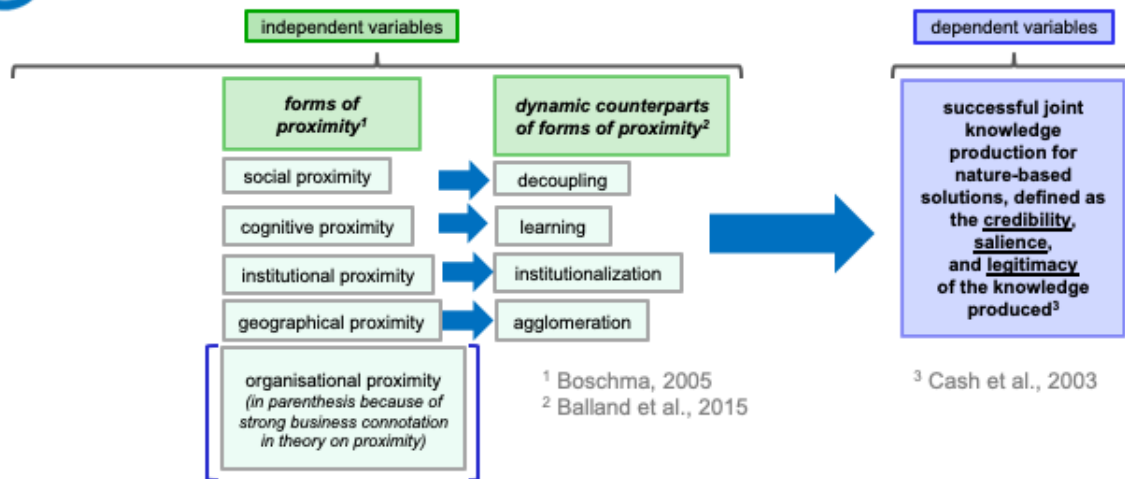
Learning is the creation of new overlap in knowledge bases.

Institutionalization is the progressive integration of rules and values in stakeholders’ behavior, which arises from the socialization process of individuals and organizations.

Agglomeration is the choice of location of organizations.

I have not used the form of **Organisational proximity** in my framework, because it is strongly associated with a business context in the theory on proximity.

Theoretical framework (3)



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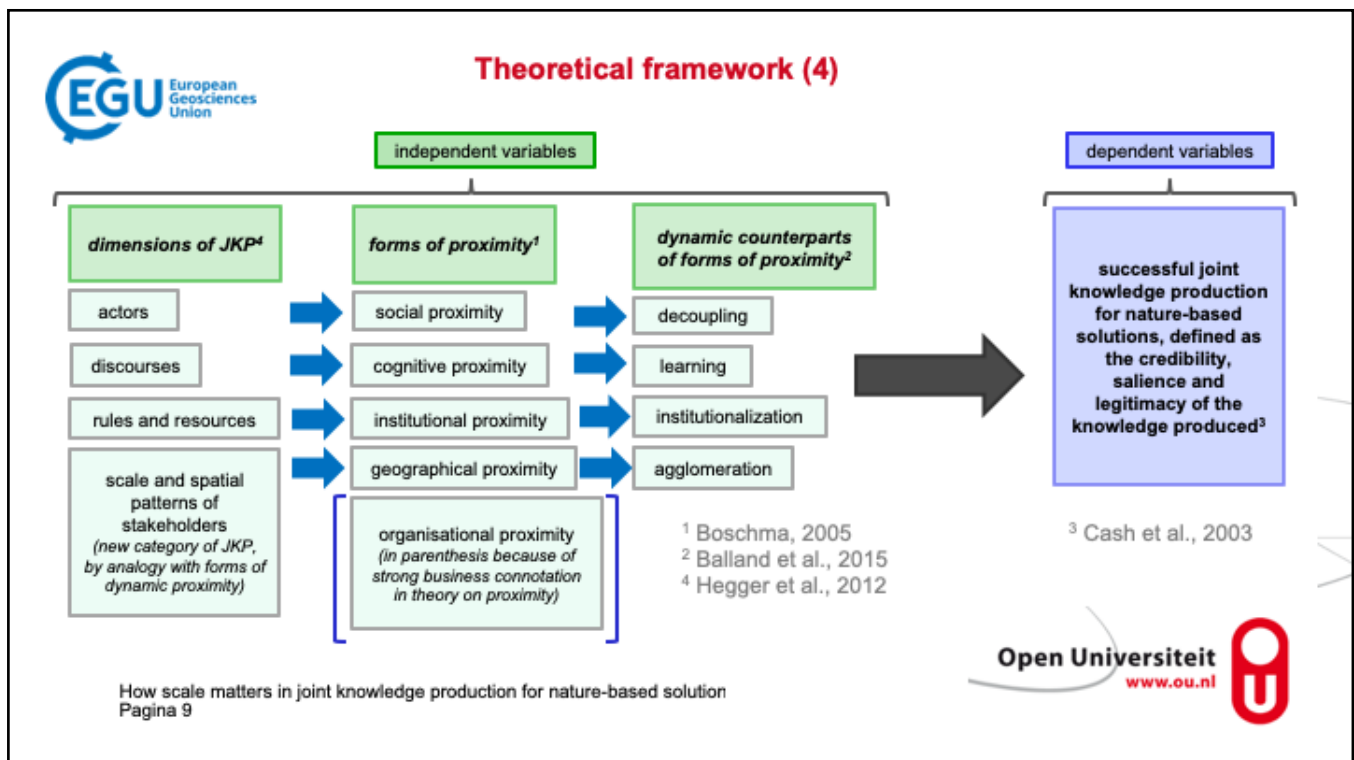
As we have chosen to focus on the *process* of knowledge production, the question is: What is an appropriate process to produce viable knowledge within the social-ecological system, and how can that be assessed? This question has been subject of research in the field of environmental governance and policy studies. Cash and co-authors have suggested that science and technology can best be mobilized for sustainability when they manage the boundaries between knowledge and action, which can be assessed by evaluating the salience, credibility, and legitimacy of the knowledge produced.

Credibility should be understood as the perceived adequacy of the knowledge produced.

Salience should be understood as the perceived relevance of the knowledge produced.

Legitimacy should be understood as the extent to which knowledge production has been respectful of the divergent values and beliefs of stakeholders, unbiased and fair.

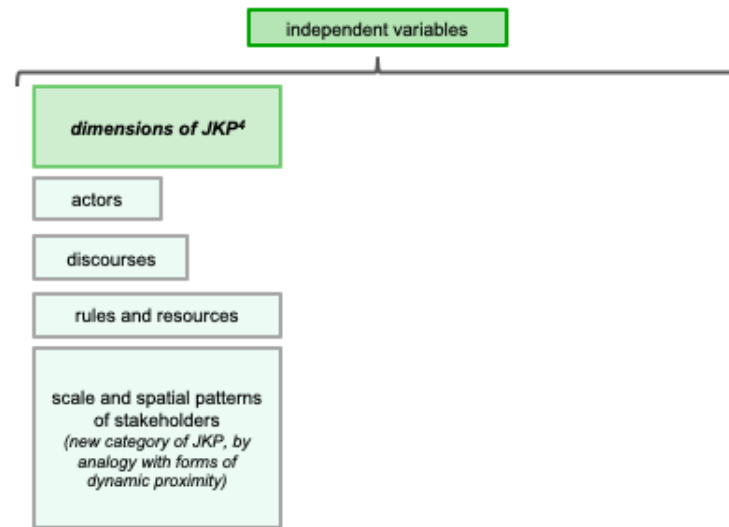
In our research these concepts function as the *dependent variables*.



Hegger and co-authors have operationalized Cash' insights by presenting a research model for use in empirical research. They study projects in which science and public policy collaborate to produce knowledge in the field of global change and sustainability. They term such projects *joint knowledge production (JKP)* projects. They pinpoint success conditions, the fulfilment of which leads to credibility, salience and legitimacy of knowledge produced.

We have chosen to combine the forms of dynamic proximity, with the dimensions of joint knowledge production as defined by Hegger and co-authors into the theoretical framework of my research. We do this, because we feel this is a way to assess the main issue: whether dynamic proximity among stakeholders can be said to influence the success of joint knowledge production processes. These combined forms of dynamic proximity, and success conditions for joint knowledge production form our independent variables.

Theoretical framework (5)



⁴ Hegger et al., 2012

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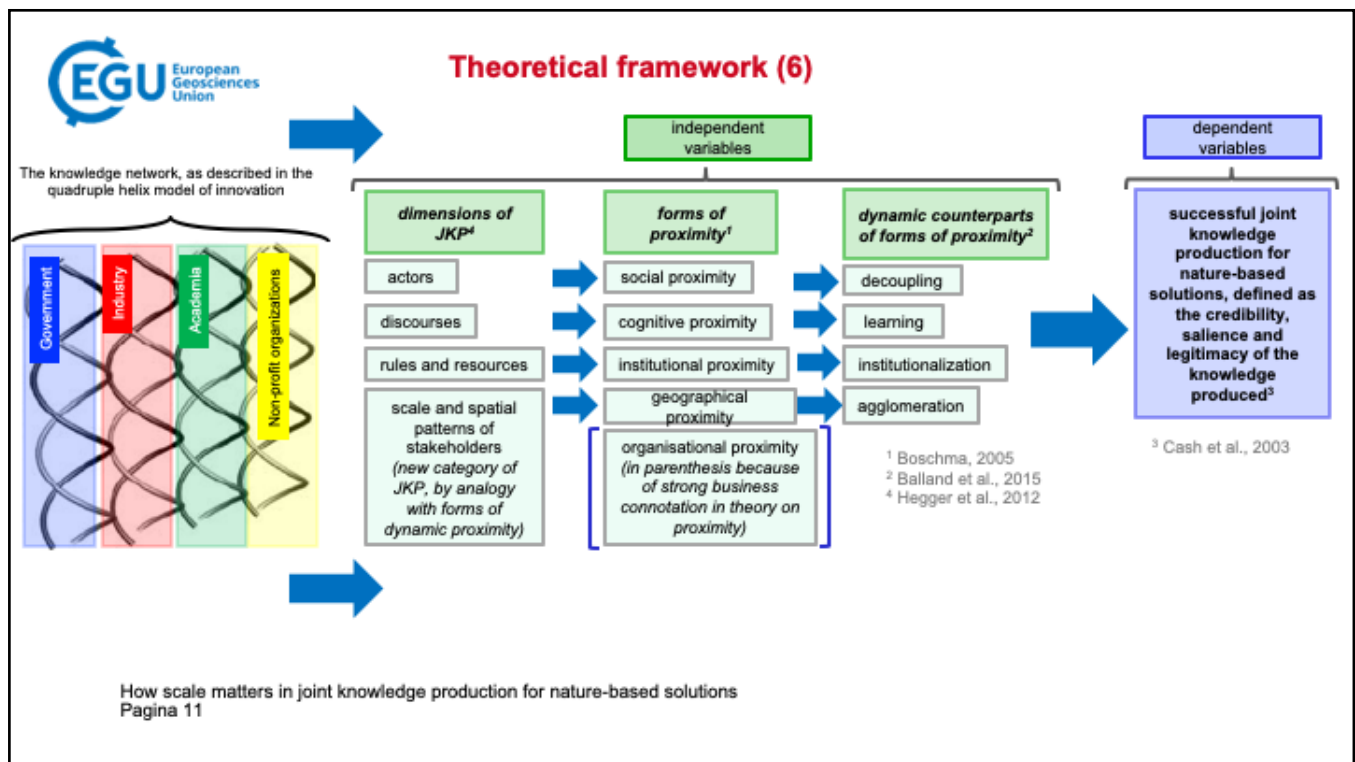
We need to focus in a little more on the meanings of the new success conditions for joint knowledge production, as brought in by Hegger and co-authors:

Under the **dimension ‘Actors’**; the main success condition is the presence of the broadest possible stakeholder coalition in a knowledge network.

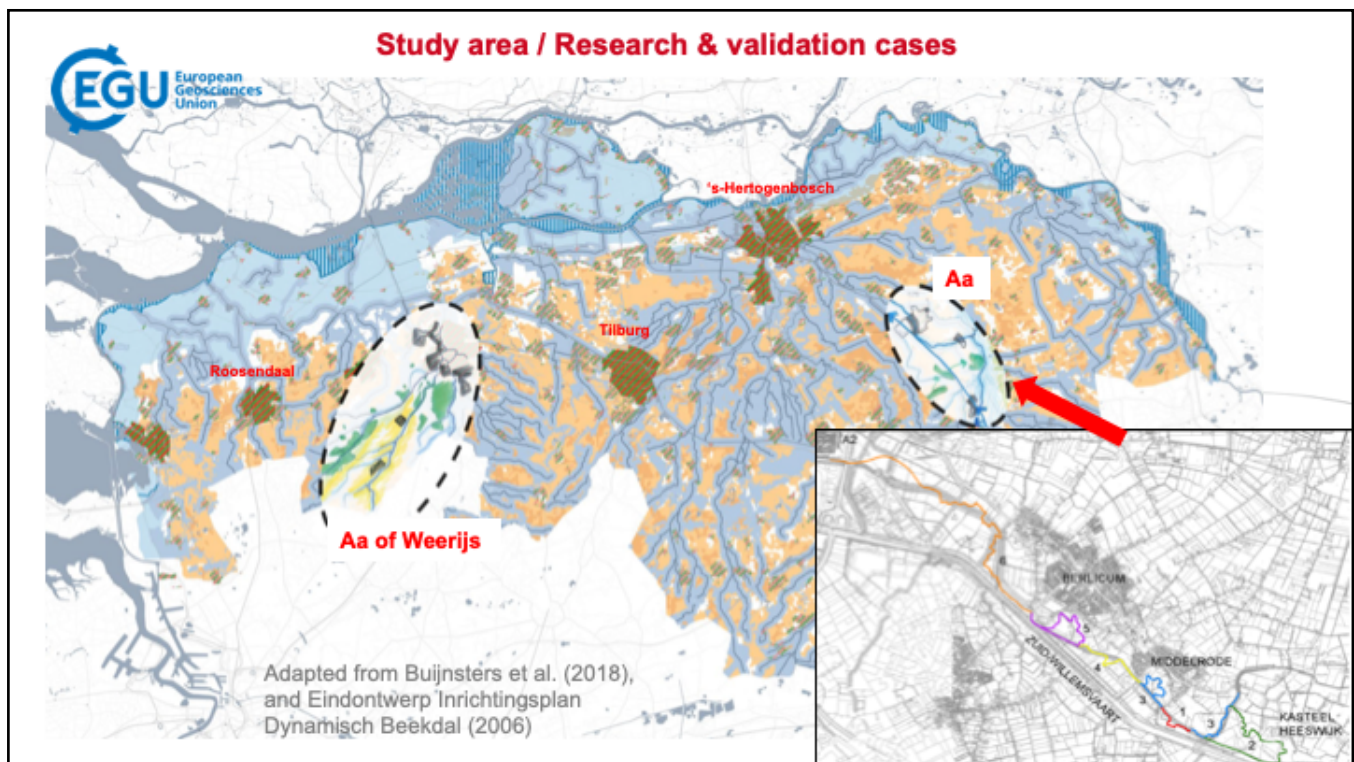
Under the **dimension ‘Discourses’**; success conditions include a shared understanding of goals and problem definitions of the knowledge network.

Under the **dimension ‘Rules and resources’**; success conditions include having organized reflection on division of tasks by stakeholders, and the availability of resources.

Under the heading **‘Scale and spatial patterns’** a dimension is created, not mentioned by Hegger and co-authors. I introduce this dimension as a new dimension of joint knowledge production, analogous to ‘agglomeration’ in the context of the forms of dynamic proximity.



This leads us now to the complete theoretical framework as used in the study. Stakeholders positioned within the quadruple helix, as described in the quadruple helix model of innovation, act within a knowledge network. The quadruple helix model of innovation stresses the relevance of the participation of a variety of stakeholders in society in research and innovation. Because this principle fits well with the framework of this research, we also frame the stakeholders in the knowledge network in terms of the quadruple helix model. The relations of dynamic proximity among them in their right balance support high-tech innovation, and possibly *nature-tech* innovation as well, in creating nature-based solutions to support climate adaptation.

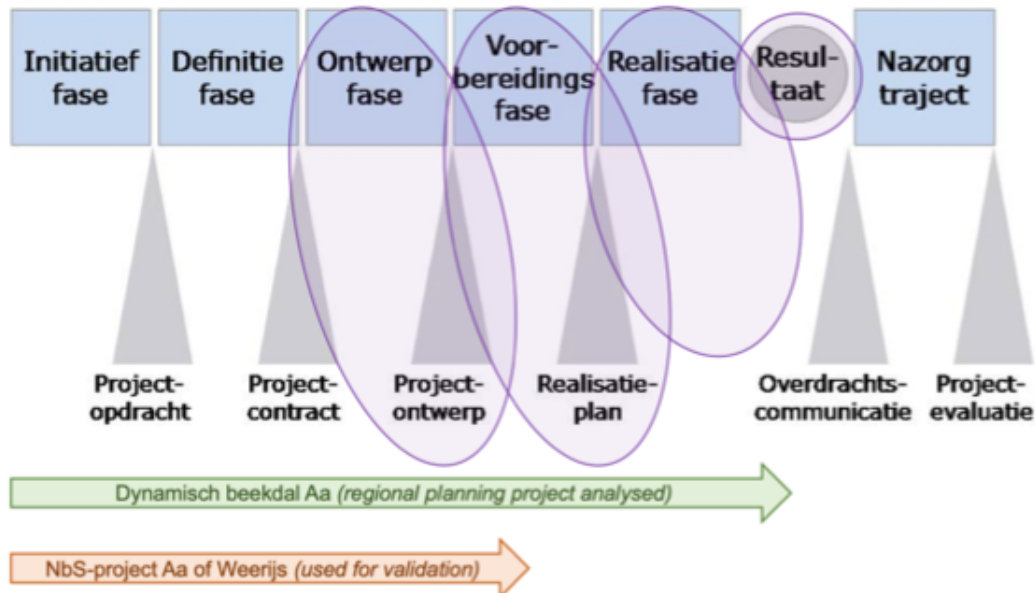


As research case, we have chosen the project 'Dynamisch Beekdal Aa', an initiative of the Water Authority (*Waterschap*) Aa en Maas, in which it cooperated with the two municipalities within the project area Sint-Michielsgestel and Bernheze, and the Province of North-Brabant. Following the big river inundations in the south of the Netherlands of 1995, the design phase of the Aa-project took place over the period of 1998 to 2005. In the design of the project dating from 2006 the project was divided into six phases intended to be carried out successively; *as shown on the sheet*. In the period from 2011 to 2013 the entire project proceedings until that moment were repeated, because project results over the 2005-2011 period were considered disappointing. This time around, project preparations lead to an adapted plan for the project. And during this 2011-2013 period, an agreement was reached with most of the stakeholders in the area. In 2016 the Aa-project between the Castle of Heeswijk and 's-Hertogenbosch was completed.

We have validated the findings from the 'Dynamisch Beekdal Aa'-case against the project 'Klimaatrobuust beeklandschap Aa of Weerij's, which concerns the catchment of the Aa of Weerij's-brook from Zundert to Breda, and focusses on the area around Zundert. This project has only recently been started up and has not reached the implementation phase yet.

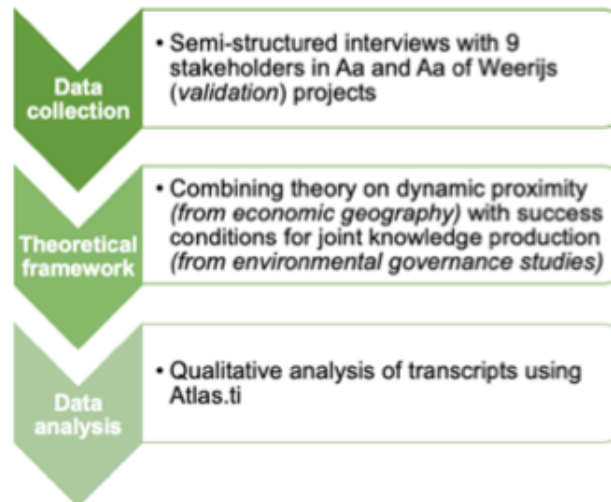
In the picture, stream valleys are indicated in blue, dry sandy soils indicated in orange, and urban areas in red and green.

Phases of the research case



In terms of the project management for these regional planning processes, our research focusses on the selected project from the phase of its' design, up to and including the actual realization phase. The monitoring of results is not part of the analysis. The initiation and definition phases of the project (more strongly associated with the process of policy making) are also outside the scope of the study.

Research approach (1): Open questions for the respondents concerning dependent variables



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We collected the information we needed by conducting 7 semi-structured interviews (with a total of 9 respondents), preceded by desk research to form a first picture of the situation. We have selected relevant stakeholders for the interviews in an iterative manner, starting from desk research and progressively obtaining information about central stakeholders during the first interviews. We selected at least one stakeholder from industry, academia, government and non-profit organizations, following the 'quadruple helix model of innovation'. We have chosen to conduct semi-structured interviews, because this type of interview allows for open-ended responses and in-depth qualitative information from respondents.

Research approach (2): Open questions for the respondents concerning dependent variables

Credibility	What were your interests in the project, and to what degree were your interests met in the course of the project?
Salience	What were your passions in relation to the project? And looking back at the process and results of the projects, was it worth being passionate about? In what sense?
Legitimacy	Do you feel the science-policy cooperation in the project has been a fruitful one?

We have asked questions relating to the *dependent variables* of this research, *as projected on this sheet*. We have treated these three notions in an actor-specific way, assessing the ideas of the stakeholders interviewed on the credibility, salience and legitimacy of the process' results.

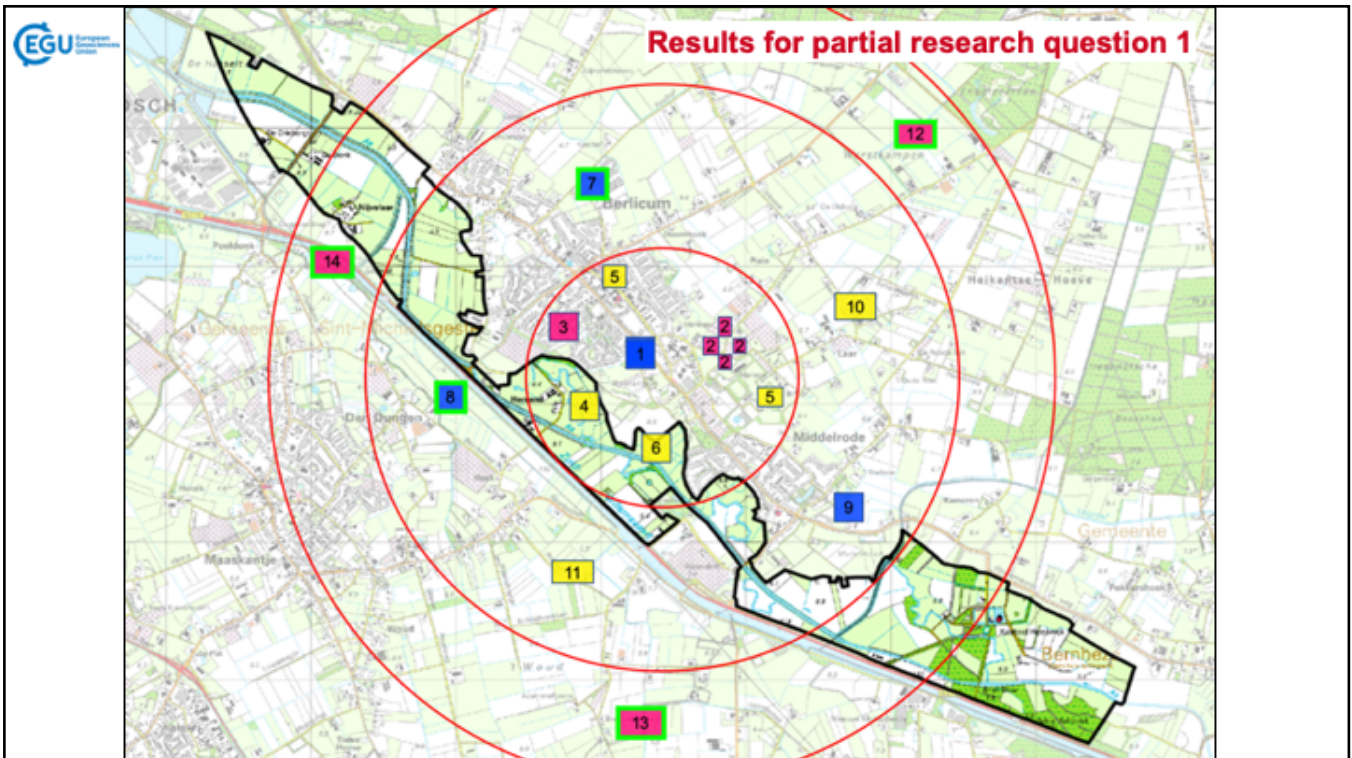
Relating to the independent variables, we have asked more questions, all focusing on the four forms of dynamic proximity and the way they were felt to exist among the stakeholders in the process studied (*for reasons of conciseness, questions not included on the sheet*).

Research approach (3): Defining the code-book for Atlas.ti

Qualifying the four forms of dynamic proximity for the respondents (using social proximity as example)

1. **What seems to be** social proximity in the way the respondents speak about it? (definitions)
2. **What can be done in relation to** social proximity according to the respondents, when the aim is to stimulate joint knowledge production? (possible instruments)
3. **(How) are these aspects helpful** in the view of the respondents? (experiences of success)
4. **What are potential problems** the respondents see in relation to social proximity? (experiences of failure)

We have analyzed the transcripts of the seven semi-structured interviews using Atlas.ti, to produce a qualitative analysis of the transcripts. For this purpose, we have made a code-book for use in Atlas.ti, further specifying the 4 forms of dynamic proximity. Subsequently we have coded the data according to the code-book. We have started the work on the code-book by paying attention to four questions, the answers to which qualify the meaning of each of the four forms of dynamic proximity, in the way the respondents speak about them. *In the sheet we have mentioned the four questions for the social form of dynamic proximity as an example.* In an iterative manner, we have subsequently phrased 62 codes to be used for coding in Atlas.ti.



Findings for partial research question 1:

Who are the main stakeholders in the knowledge network in 'Dynamisch Beekdal Aa', what are their roles, and can their network relations be graphically shown?

To graphically show the main stakeholders in the knowledge network, we have first looked at their geographical proximity, interpreted as the geographical distance between the location of the stakeholder and the location of the catchment system studied. Our schematic representation of geographical proximity among stakeholders consists of drawing three imaginary circles around the catchment system studied: one for local stakeholders, a wider one for regional stakeholders, and a still wider one for nationally or even internationally active stakeholders.

Schematically visualizing geographical proximity in this way is inspired by visualizations used in geographical social network analyses, working with nodes and links. The nodes (*cubes in the picture*) represent the stakeholders involved in the project. Nodes are placed within a coloured frame, representing their belonging to a "helix" of the quadruple helix model. A blue coloured frame represents a government stakeholder. A red coloured frame represents a stakeholder who is associated with a company. A green coloured frame

represents a stakeholder who will likely contribute scientific or engineering insights to the project. A yellow coloured frame represents a stakeholder of a non-profit organization, or private interests.

Conspicuous in the visual representation is the fact that there are no purely green nodes present, indicating that no representatives of academic organisations, such as universities or other research institutes, were involved in the project implementation. This may be a characteristic of the way regional planning is organised in the Netherlands, where consultancy and engineering firms are important for including science and engineering into regional planning.

Results for partial research question 2 (first result)

	R1	R2	R3	R4	R5	R6	R7	Endtotal
Failure	55	43	14	28	37	48	21	246
Neutral	72	75	128	204	92	256	175	1002
Success	2	5	31	46	17	50	36	187
Endtotal	129	123	173	278	146	354	232	1435
Value for S/F ratio	0,04	0,12	2,21	1,64	0,46	1,04	1,71	0,76

Findings for partial research question 2:

2. How do the main stakeholders experience the success of joint knowledge production for nature-based solutions in the project?

First finding

Focussing on the respondents' experiences of success or failure, in a broad sense the scores show that respondents experience the results of the Aa-project more strongly as a success than as a failure.

The table shows the number of times each code has been scored for every respondent, and the codes have been sorted into three categories: codes indicating success-experience ('*success*'); failure-experience ('*failure*'), and normatively neutral experience ('*neutral*').

The bottom row shows the success (S) / failure (F)-ratio: a score of 1 means: the respondent reported just as many experiences of success as experiences of failure. A score higher than 1: indicates relatively more success-experiences. A score lower than 1: indicates relatively more failure-experiences.

Results for partial research question 2 (first result)

	R1	R2	R3	R4	R5	R6	R7	Endtotal
Failure	55	43	14	28	37	48	21	246
Neutral	72	75	128	204	92	256	175	1002
Success	2	5	31	46	17	50	36	187
Endtotal	129	123	173	278	146	354	232	1435
Value for S/F ratio	0,04	0,12	2,21	1,64	0,46	1,04	1,71	0,76

So, respondents scoring over 1 we consider as experiencing the Aa-project as successful on the whole.

Results for partial research question 2 (second result)



	Failure	Neutral	Success	End total	Ratio S/F	Ratio div.
R1	10	13	2	25	0,20	0,40
R2	10	19	3	32	0,30	0,52
R3	8	33	12	53	1,50	0,85
R4	9	35	11	55	1,22	0,89
R5	10	24	6	40	0,60	0,65
R6	9	37	11	57	1,22	0,92
R7	10	38	10	58	1,00	0,94
End total	66	199	55	320	0,83	0,74

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Findings for partial research question 2:

Second finding

The respondents who experience relatively little success in relation to the project-results, generally also show relatively little variety in their scores on the various codes. Reversely, those experiencing relatively more success in relation to the projects-results, generally score on a relatively wider range of different codes.

Results for partial research question 2 (second result)

	Failure	Neutral	Success	End total	Ratio S/F	Ratio div.
R1	10	13	2	25	0,20	0,40
R2	10	19	3	32	0,30	0,52
R3	8	33	12	53	1,50	0,85
R4	9	35	11	55	1,22	0,89
R5	10	24	6	40	0,60	0,65
R6	9	37	11	57	1,22	0,92
R7	10	38	10	58	1,00	0,94
End total	66	199	55	320	0,83	0,74

In this table, it is not the number of scores on a specific code which has been counted, but only whether the respondent has scored on a specific code or not. In this way, the table scores *diversity* in the use of codes by respondents.

In the code-book 12 codes indicating an experience of success are used, 12 codes indicating an experience of failure, and 38 codes indicating a normatively neutral experience. Therefore the S/F-ratio in a 0/1-count is meaningful, as it starts out from 12 possible scores on both success- and failure-experiences.

Results for partial research question 2 (second result)

	Failure	Neutral	Success	End total	Ratio S/F	Ratio div.
R1	10	13	2	25	0,20	0,40
R2	10	19	3	32	0,30	0,52
R3	8	33	12	53	1,50	0,85
R4	9	35	11	55	1,22	0,89
R5	10	24	6	40	0,60	0,65
R6	9	37	11	57	1,22	0,92
R7	10	38	10	58	1,00	0,94
End total	66	199	55	320	0,83	0,74

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The 'Ratio div.' is a number for the degree of diversity in codes scored on, for each respondent. A score of 1 is the maximum, meaning that the respondent has scored on every code in the code-book during the interview.

The Ratio S/F in this table indicates the use of *different* 'success'-codes, divided by the use of *different* 'failure'-codes. A score of 1 or less means the respondent tends to think in terms of 'failure'; a score higher than 1 means the respondent tends to think in terms of 'success'.

Both columns together show that each respondent who scores higher than 1 on Ratio S/F, also scores 0,85 or more on Ratio div. Reversely, each respondent who scores less than 1 on Ratio S/F, also scores less than 0,65 on Ratio div.

Respondent: "Ik ben best wel trots op het resultaat, en wat we met elkaar hebben bereikt. Ik ben nooit tevreden; dat is een beetje mijn aard. Ik zie vanuit reflectie en zelfreflectie zie je altijd dingen die beter hadden gekund, of efficiënter hadden gekund... ik heb in dit proces weinig combinatie van echt wetenschappelijke kennis nodig gehad. Ik merk dat dat nu meer komt. Ik heb een paar stikstof vraagstukken op mijn bord liggen. Daar heb je dat meer hè. Maar dan, dan gaat het nog niet eens zozeer om de kennis, maar veel meer om het proces: welke kennis gaan we eigenlijk met elkaar erkennen? Gaan we net doen alsof er geen stikstofprobleem is? En welk van de rapporten vinden wij leidend in dit gesprek? En gaan we daarop varen of niet? Dus, eh, dat komt wel meer en meer."

Findings for partial research question 3:

3. How can the dynamic proximity relations of the main stakeholders towards each other in the project for the Aa best be described?

First finding

We have taken specific quotes from the interview-transcripts to study this partial research question. Qualitatively analyzing the interview transcripts, some quotes seem to indicate that it is possible to overdo an aspect of proximity, in such a way that it gives rise to adverse effects.

Respondent: "Ik ben best wel trots op het resultaat, en wat we met elkaar hebben bereikt. Ik ben nooit tevreden; dat is een beetje mijn aard. Ik zie vanuit reflectie en zelfreflectie zie je altijd dingen die beter hadden gekund, of efficiënter hadden gekund.. ik heb in dit proces weinig combinatie van echt wetenschappelijke kennis nodig gehad. Ik merk dat dat nu meer komt. Ik heb een paar stikstof vraagstukken op mijn bord liggen. Daar heb je dat meer hè. Maar dan, dan gaat het nog niet eens zozeer om de kennis, maar veel meer om het proces: welke kennis gaan we eigenlijk met elkaar erkennen? Gaan we net doen alsof er geen stikstofprobleem is? En welk van de rapporten vinden wij leidend in dit gesprek? En gaan we daarop varen of niet? Dus, eh, dat komt wel meer en meer."

Possible trade-off between geographical and cognitive proximity



In this example, the respondent seems to point to a focus within the Aa-project on reaching "consensus with the area" (geographical proximity), and less on the use and creation of knowledge (cognitive proximity), which may be considered as a trade-off between geographical and cognitive proximity.

A possible explanation for this may be that in the Aa-project there has been relatively much attention for stakeholders' interests and for available project-resources, given the difficult start of the project. This may have favoured the attention for 'geographical proximity' during the process.

We found this "overdoing" while stakeholders spoke about the institutional or geographical forms of dynamic proximity. We did not find "overdoing" while stakeholders spoke about the social or cognitive forms of dynamic proximity. Possibly this has to do with the setting of the type of project studied. In regional planning projects, there is automatically a great variety of stakeholders. The existence of this multiplicity of stakeholders possibly prevents a social comfort-zone (or: too much social proximity) from emerging easily. The same variety of stakeholders involved is likely to entail a variety of interests different stakeholders wish to defend, and a diversity in knowledge they wish to spread, preventing an "overdoing" of the cognitive form of

dynamic proximity.

Respondent: "Ja eh, dan moest je; soms had je de bestuurders nodig om ambtenaren 'ja' te laten zeggen. Of onder de kont te laten schoppen thuis. En dan moest je, dan gingen we wel eens een keer koffie drinken bij een [city official, red. EB] ja, in [name of municipality, red. EB] ook en zo. [Name of private person, red. EB] hadden we; en die deed dat ook goed. Maar, ja, dan moest je ook soms, hebben we gewoon mensen laten wisselen, want die willen we niet meer zien. Ja, ja, ik bedoel dat moet dan, als je niet in dat proces mee kunt. Dat was bij [administrative authority, red. EB] ook, de grondverwerver, ja een goede mens, maar totaal ongeschikt voor zo'n proces. Ja, die hebben ze toen ook geparkeerd, en."

Interviewer: "En dat is.. waar zit hem dat dan in?"

Respondent: "Ja, de houding hè. Van, uhm, niet zich kunnen verplaatsen in het gevoel van de ander. En als je de grondverwerver van [administrative authority, red. EB], dat was een eh... en die van [name of Municipality, red. EB], dat waren boerenzonen, van huis uit."

Interviewer: "En dat hielp?"

Respondent: "Dat helpt, want die snappen het probleem."

Possible
trade-off between
institutional and
social proximity

In some quotes, institutional proximity seems to be used to exclude certain stakeholders (social exclusion), which can be considered as a trade-off between institutional and social proximity.

Interviewer: "In die tijd dat u erbij betrokken was, was uw gevoel toen dat alle mensen die belang hadden bij de uitvoering van het project, dat die ook inderdaad bij het project 'Dynamisch Beekdal Aa' betrokken waren?"

Respondent: "Weet je, als je zo'n gigantisch, vreemd project, hè... voor de meesten was; Dynamisch Beekdal is één van de eerste grotere projecten in het kader van waterbeheersing, hè. Dan uh, ja dan is dat voor een heleboel mensen is dat toch nog, ja lastig om te begrijpen. Dan krijg je uhm, vooral via het waterschap, is dan toch zeg maar meer de, hoe zeg je dat, de trekker, de duwer, om toch iets te gaan doen. Nou, dan komen daar een heleboel partijen bij, de gemeente, waterschap, natuurclubs, nouja, uhm, misschien, hoe heet het, de heemkundekring, nou, historische vereniging noem het maar op hè. Dus mensen van allerlei pluimage. De landbouw ben ik nog vergeten, één van de belangrijke partijen. Nou en dan moet je proberen om, eh, die groeperingen, om die allemaal een beetje naar, één richting in te krijgen. Die moet je overtuigen van het nut dat er zo'n gigantisch project, waar zoveel geld mee gemoeld is, waar zoveel landbouwgrond mee gemoeld is, hè. Want uiteindelijk zaten best veel boeren langs dat Dynamisch Beekdal. En die moet je, eh, die moet je meekrijgen. Het belang van economisch-ecologisch, hè. Want als je, zodra het je lukt om economie en ecologie in balans te krijgen, dan ben je een heel eind."

Interviewer: "Ja."

Respondent: "Nou, da's echt eh, een bloed-zweet-en-tranen traject geweest."

Interviewer: "Ja?"

Respondent: "Ja. Eh, omdat, wat je net zegt: er spelen zoveel verschillende belangen. En leg dat maar eens goed uit; waarom hier boeren moeten wijken, omdat [name of municipality, red. EB] geen natte voeten meer mag krijgen in de toekomst."

Possible
trade-off between
institutional and
cognitive proximity

In other quotes, institutional communication-channels seem to be used to “push” stakeholders towards a discourse, preferred by one, possibly dominant institutional stakeholder, which can be considered as a trade-off between institutional and cognitive proximity.

Respondent: "want [name of a municipality, red. EB] moest bijvoorbeeld zijn bijdrage; die hebben heel veel gronden en die verpachten ze elk jaar. En we hadden afspraken gemaakt dat er voor die boeren daar [same municipality, red. EB], ik geloof 15, 20 hectare of zo, vrijgehouden zou worden. Die zij dan konden gebruiken, hè, voor dat.."

Interviewer: "Ja, als ruil?"

Respondent: "Om [one specific phase of the project, red. EB] te kunnen maken, het laatste stuk grond tegen het kanaal enzo. Dat was hun inbreng. Ja, dan, als je dan een technéut, mee begonnen ze daar op Economische Zaken, want dat is allemaal, dat moet aanbesteed worden elk jaar opnieuw en dat is, dat zijn enorme.."

Interviewer: "Ja, ja."

Respondent: "En je kunt niet voortrekken, en weet ik het niet meer. Nouja, dan moet er dus iemand zitten, die zegt van: 'Jswearing, red. EB], ik heb dit, en je kunt die boeren...' Dat moet daar in dat huis moet dat opgelost worden."

Interviewer: "Ja, dat is ook een vorm; misschien een kwestie van betrouwbaarheid. Dat je afspraken.."

Respondent: "Ja, maar dat kan niet. Die 20 hectare reserveren voor.."

Interviewer: "Nee, want dan zit je met Europese aanbestedingsregels?"

Respondent: "Nee, dat kan wel, als je het maar wilt."

Possible
trade-off between
geographical and
institutional proximity



In again other quotes, local interests and conflict-solving on the one hand and larger-scale institutional rules (such as European tendering procedures) on the other hand seem to conflict, which can be considered as a trade-off between geographical and institutional proximity.

Respondent: "Ja, deelprojecten. Even kijken.. Je ziet hoe hoogwaardig het gebied is gewaardeerd in de, in het formele beleid. Maar goed, het werd in acht stukken gehakt. Die werden als, die werden als stand-alone plannen werden die ontwikkeld door het waterschap, en door het waterschapsbestuur beoordeeld. En wat was nou de keuze die wij gemaakt hebben? ... Ze hadden twee keuzes. Die keuzes zijn, we gaan, want het was in het kader van droge voeten voor [name of municipality, red. EB], we gaan ervoor om die beek, het beekdal weer te laten functioneren zoals het vroeger was. Want deze genormaliseerde beek, die zat helemaal tussen dijken. Dus dat betekende gewoon: het dal kon niet meer overstromen. We gaan het weer terugbrengen zoals vroeger. We gaan het dal weer terugbrengen als een waterbuffer om te voorkomen dat [name of municipality, red. EB] natte voeten krijgt. Of, B, we gaan naar gestuurde waterberging. Dan gaan we toch weer gebruik maken van dijken, maar dan maken we daar sluisjes in en dan kunnen we, als de nood eraan komt, trekken we een sluisje open en dan kan er ergens een stuk van het beekdal onder water lopen, dus gestuurd. Maar dat zou betekenen dat het niet meer natuurlijk zou functioneren. Natuurlijk is gewoon: daar stroomt een beek, die meandert er. Er komt water toevloed. De beek stroomt over en de toevloed van het water wordt geborgen in het beekdal... En je had dus de gecontroleerde. Nou, er is een MER rapportage gemaakt, en die zei: als je terug wilt naar het natuurmodel, wordt de natuurwaarde het best gediend door een vrij stromend model. Dus de dijken weg, weer hermeanderen, laat de natuur zijn werk maar doen. Dat is eigenlijk automatisch: hoog water, loopt vol; laag water, loopt leeg... Toen heeft [administrative authority, red. EB], moest beslissen: waar gaan wij voor? Voor onze boeren is het beste als we naar het gestuurde model gaan. Maar de MER heeft geleerd dat daar de milieuwaarden minder mee gediend worden dan met het andere. **Toen hebben ze gezegd: we brengen een offer; wij vinden ook dat de boeren maar een offer moeten brengen.** Wij besluiten te kiezen voor het vrij stromend model."

Possible
trade-off between
institutional and
geographical
proximity

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Or sometimes, just the reverse seemed to happen: local interests seem to be "pushed away" by institutional means, which may be considered as a trade-off between institutional and geographical proximity.

Respondent: "Want je kunt er heel veel mensen bij roepen. En we hebben het eerst eigenlijk hier, ons, ehm, de boeren zeg maar. Die ronde hebben we eerst afgewerkt. Daar waren we eigenlijk mee rond, en toen zijn we pas naar de burgers gegaan."

Interviewer: "Oh, hmhm."

Respondent: "Dat vonden ze minder leuk."

Interviewer: "Wie vond dat minder leuk; de burgers?"

Respondent: "De burgers. Want ja, iedereen wil natuurlijk iets zeggen."

Interviewer: "Ja. En de burgers, dat was inclusief [name of municipality, red. EB]?"

Respondent: "Nee, dat was eigenlijk hier meer [name of another, smaller municipality, red. EB] eigenlijk. Kijk, wij zitten hier zeg maar, maar dan heb je een hoop mensen die grenzen weer aan die rand en iedereen heeft een zegje; dat mag ook. Dus toen waren wij op een gegeven moment rond, en toen hebben ze een grote bijeenkomst in het dorps huis gehouden en daar mocht dan ook iedereen uit [smaller municipality mentioned, red. EB] mocht daar ook komen, en die mochten dan de plannen kijken, en dan mochten ze ook hun zegje doen en noem maar op, en ja. Er waren wel een paar puntjes die, ja, die wat minder waren, of minder vonden en ja... Was eigenlijk hetzelfde als waar wij ook mee begonnen zijn. Ja, die dijk en dit en dat. Want je hebt ook mensen hier bij de protestantse kerk. De protestantse kerk is een hoger gedeelte van [smaller municipality mentioned, red. EB] zeg maar. Want dat lieten ze vroeger ook niet onder water lopen. Dat wisten ze wel waar ze het moesten bouwen. Die hadden een hoger stuk, en daar langs hebben ze ook allemaal wel gebouwd, maar die liggen allemaal lager. Dus toen moest er eigenlijk ook een beetje een natuurlijke dijk komen, en met die mensen zijn ze toen eigenlijk in gesprek gegaan zeg maar. 'Maar hoe gaan we dat proberen op te lossen', of eh, dit en dat. Maar dat was pas de tweede ronde in principe eigenlijk, en daar zijn ook nog wel een paar puntjes uitgekomen, dat we eigenlijk in eerste instantie niet wilden, maar uiteindelijk dan toch, ja, voor het dorp, dan toch wel gedaan hebben."

Possible trade-off between geographical and social proximity

Or in other quotes, the most geographically near stakeholders (living closest to the Aa) seem to participate in the earliest roundtable discussion, already taking some important decisions before other stakeholders (geographically a bit further away) are involved, which can also be considered as a trade-off between geographical and social proximity.

Respondent: "[The project leader, red. EB] had een training gevolgd, MGA, mutual gains approach, en had bedacht: als we het op dezelfde manier blijven doen als we die 17 jaar gedaan hebben, bereiken we misschien geen doorbraak. Misschien moeten we het eens op een hele andere manier gaan doen. En toen is in een tijdsbestek, ik denk dat dit ongeveer 2012 was, die periode, in een tijdsbestek van een, iets meer dan een jaar, zijn we gekomen tot overeenstemming met het gebied, van: zo gaan we het doen. En ik denk dat het daarna nog een jaar of twee geduurd heeft, voordat ook alle individuele contracten er lagen, en de aanbesteding met de aannemer rond was. En misschien toen nog een jaar of twee jaar uitvoering. Zoiets, dus dat... en mijn betrokkenheid was vooral dat ene jaar om tot overeenstemming te komen met de partners." ...

Respondent: "Ik ben best wel trots op het resultaat, en wat we met elkaar hebben bereikt. Ik ben nooit tevreden; dat is een beetje mijn aard. Ik zie vanuit reflectie en zelfreflectie zie je altijd dingen die beter hadden gekund, of efficiënter hadden gekund. Ik heb in dit proces weinig combinatie van echt wetenschappelijke kennis nodig gehad. Ik merk dat dat nu meer komt. Ik heb een paar stikstof vraagstukken op mijn bord liggen. Daar heb je dat meer hè. Maar dan, dan gaat het nog niet eens zozeer om de kennis, maar veel meer om het proces: welke kennis gaan we eigenlijk met elkaar erkennen? Gaan we net doen alsof er geen stikstofprobleem is? En welk van de rapporten vinden wij leidend in dit gesprek? En gaan we daarop varen of niet? Dus, eh, dat komt wel meer en meer."

Possible trade-off between geographical and cognitive proximity

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And finally in some quotes, the respondent seemed to point to a focus within the Aa-project on reaching "consensus with the area" (geographical proximity), and less on the use and creation of knowledge (cognitive proximity), which may be considered as a trade-off between geographical and cognitive proximity.

Cognitive instruments	R1	R2	R3	R4	R5	R6	R7	End total
11 cognitive/MGA	1	0	7	13	3	6	9	39
12 cognitive/joint fact finding	0	0	2	1	0	7	2	12
13 cognitive/situation assessment	0	0	1	2	1	4	1	9
14 cognitive/science-practitioner	0	0	0	0	0	8	1	9
15 cognitive/vizualise science on local scale	0	0	1	2	3	11	4	21
32 social+cognitive/roundtable for reluctant stakeholder	0	0	1	0	0	2	1	4
33 social+cognitive/introduce discourse reluctant stakeholder in project	0	0	0	0	0	3	1	4
37 cognitive+institutional/take time for clear rules in planning & realisation	0	4	4	6	1	6	4	25
38 cognitive+institutional/use process management in planning & realisation	0	4	5	5	1	3	4	22
59 cognitive+geographical/balancing the combination of local & large-scale knowledge	0	1	4	9	6	16	9	45
60 cognitive+geographical/incorporating local knowledge into general models/scenarios	0	2	4	9	5	10	9	39
Total quotes cognitive instruments	1	11	29	47	20	76	45	229
Total quotes	129	123	173	278	146	354	232	1435
Ratio cognitive instruments quotes / total quotes	0,01	0,09	0,17	0,17	0,14	0,21	0,19	0,16
Ratio cognitive success vs. success total	0,00	0,20	0,48	0,41	0,47	0,56	0,53	0,48

Findings for partial research question 3:

Second main finding

The interview-transcripts give important clues as to how knowledge production can be enhanced in this type of regional planning projects. In the interviews, various instruments are discussed which specifically aim at promoting knowledge production in the project.

The table shows a list of all codes without a normative component, within the broad family of cognitive proximity-codes (*rows*).

From the instruments mentioned, only the mutual gains approach (MGA; code 11) should be excluded, as this instrument exclusively aims at negotiating interests. The table shows how respondents were **not uniform** in the way they spoke about their use of knowledge production instruments (*columns*). Red colour shows a respondent did not use a specific code at all; yellow-to-green colour shows increasing use of a specific code.

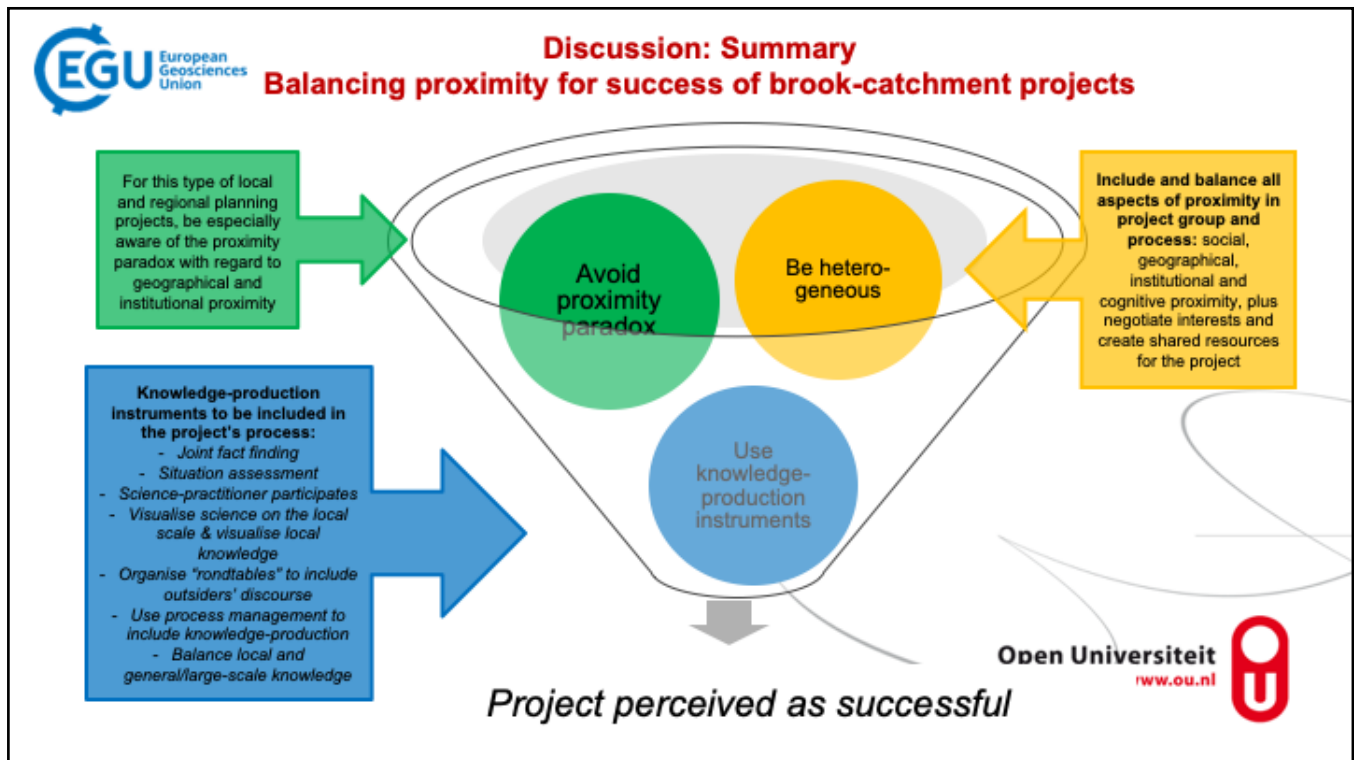
Code	Code-title	Meaning
12	Cognitive/joint fact finding	Practice joint fact finding with all stakeholders who hold an interest in the project, and be conscious of who commissions the joint fact finding. (When a representative of one specific interest initiates the joint fact finding-exercise, results may be compromised in advance.) ¹
13	Cognitive/situation assessment	Make a situation assessment and share it with all stakeholders.
14	Cognitive/science-practitioner	Have a science-practitioner participating in the project who can suggest and filter relevance of scientific insights. ²
15	Cognitive/visualize science on local scale	Translate scientific insights to the local scale and visualize them on that scale for all stakeholders. ³

¹ See for example Karl, Susskind, & Wallace, 2007

² See for example Kunseler, Tuinstra, Vasileiadou, & Petersen, 2015

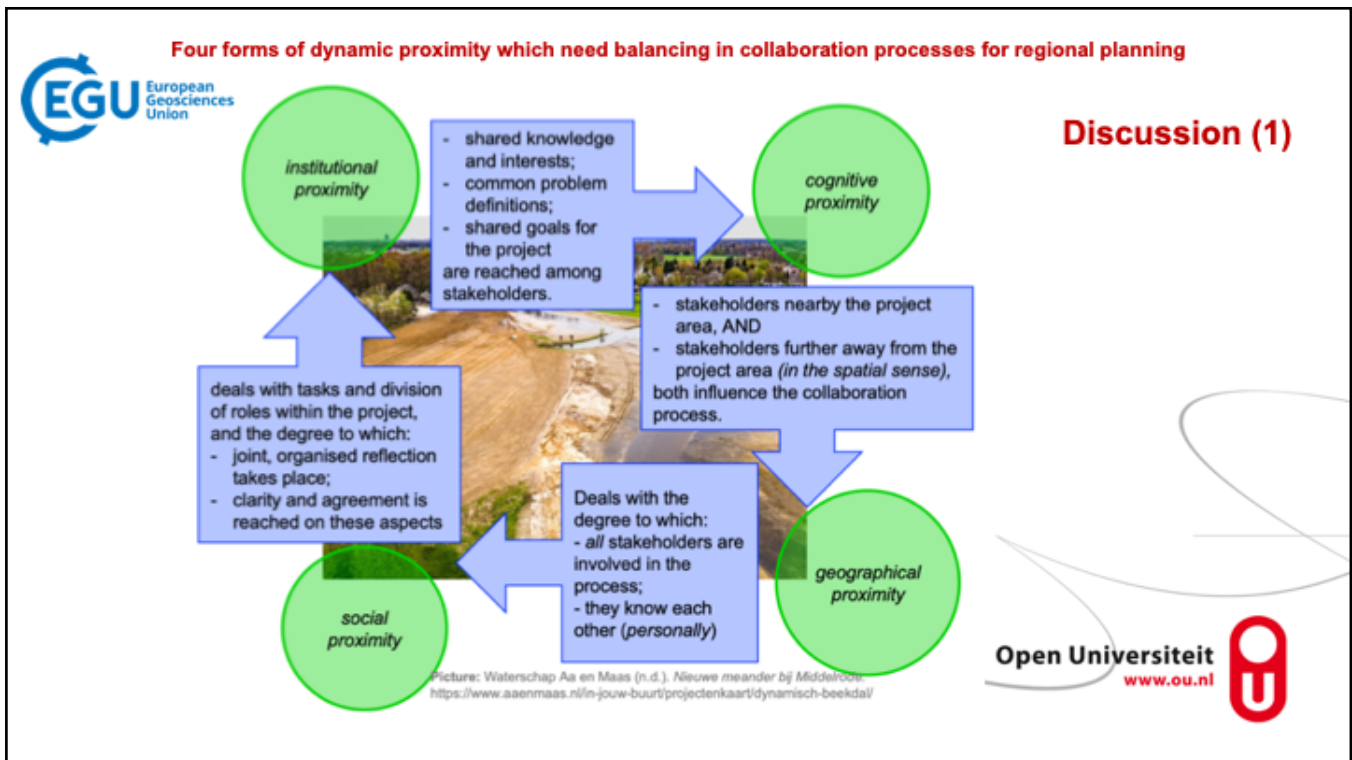
³ See for example Shaw et al., 2009

Instruments that can be explicitly mentioned in this respect, are: the practice of joint fact finding, consciously make a situation assessment within the knowledge network, have a science-practitioner participating in the process, and the visualisation of scientific insights on a local scale during project meetings.



Discussion (general)

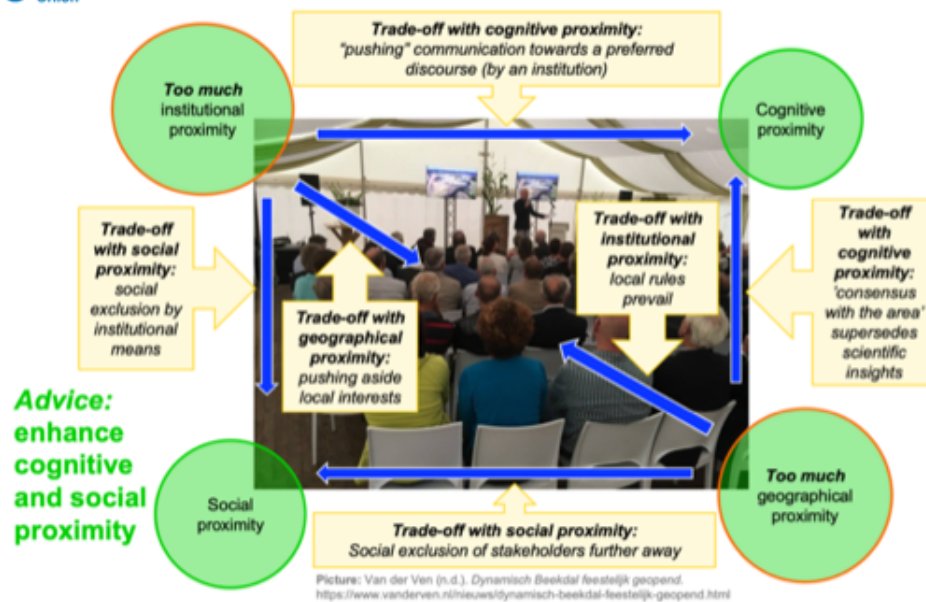
The sheet shows a summary of three central findings that we will discuss.



Discussion 1

We first found that the respondents who experienced relatively more success in relation to the process-results, also generally scored on a relatively wider range of different codes than the respondents who experienced less success.

We interpret this finding as meaning that those stakeholders who are able to vary the using of different forms of dynamic proximity in a process are better equipped to experience a process gone through as successful, or to see various successful aspects of it. This finding is reflected in the literature on proximity and heterogeneity in the field of regional innovation and development. For example Mattes (2012) notes that learning and innovation rely on proximity, but are also closely connected to heterogeneity.



Discussion 2 & 3

Secondly, we found that it seemed possible to “overdo” certain aspects of proximity, or in other words: to get *too proximate* in some respect(s). In the project studied, this ‘getting too proximate’ primarily showed on the aspects of institutional and geographical proximity, and less on the aspects of social and cognitive proximity.

Within the field of economic geography this mechanism has been described as the *proximity paradox*. In the literature on the credibility, salience and legitimacy of knowledge production a comparable point is being made in terms of *trade-offs* between the credibility, salience and legitimacy of knowledge produced. And a comparable concept appears in the literature on the historical-institutionalist approach to political science, namely the concept of path dependence. A specific form of path dependence, relevant in the context of this study, is that of *lock-in*. The relevance of the concepts of proximity paradox, trade-offs and of lock-in for this study, is that they all describe a “too much of one thing”. Knowledge production, and innovation, apparently require being proximate to each other to enable knowledge transfer, and at the same time they require heterogeneity, a distance, or an openness to new and diverse influences to enable innovation and knowledge production.

Thirdly, we found that if knowledge production is an aim of the project, as distinct from for example negotiating different interests of stakeholders, than knowledge-production instruments should be used.

Discussion (3) & Validation
'Klimaatrobuust beeklandschap Aa of Weerijs'



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Addition to Discussion 3: Validation

Respondents in the validation phase of the research *qualified* a productive use of knowledge production instruments in regional planning projects. This was an important addition to the findings of the research, coming from the Validation.

Discussion (3) & Validation 'Klimaatrobuust beeklandschap Aa of Weerij's'



1. Knowledge or science should not become a delaying factor;
2. Only visualization of the knowledge of local people, early on in the process;
3. More general, larger-scale scientific knowledge can help, but must be presented practically, not too abstract. Be careful with the use of multiple scenario's;
4. Joint fact finding on the local scale of often very productive to create mutual understanding.

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Addition to Discussion 3: Validation (2)

Respondents mentioned 4 preconditions for applying the knowledge production instruments mentioned:

Make sure knowledge or science does not become a delaying factor in the process;

Visualization should primarily be the visualization of knowledge local people brought into the project group, preferably early on in the process;

More general, larger-scale scientific knowledge (such as for example climate scenario's) may help, but only when presented in a practical framework, not getting too abstract. Presenting multiple scenario's should be used with restraint, as it may lead to resistance in stakeholders;

Joint fact finding on the local scale may be very productive as an instrument to enhance mutual understanding between stakeholders.

The validation was a final step in the methodology: we have tested results of the analysis of the 'Dynamic Brook-Valley Aa'-process against the project plans for the process 'Klimaatrobuust beeklandschap Aa of Weerij's'. We have done this, by conducting a semi-structured interview with two key stakeholders in the project for the Aa of Weerij's.

Conclusions: Scientific contribution

Having shown how relations of dynamic proximity between stakeholders influence the perceived success of the JKP process, I can now state that my contribution to the scientific debate on joint knowledge production (JKP) for nature-based solutions lies in showing the usefulness of supplementing the JKP-framework by Hegger et al. (2012) with the forms of dynamic proximity as analysed by Balland et al. (2015).

Conclusion (scientific)

Our findings have shown that relations of dynamic proximity between stakeholders influence the perceived success of the joint knowledge production process. Therefore, our contribution to the scientific debate lies in showing the usefulness of supplementing the joint knowledge production framework with the theory about the forms of dynamic proximity.



Conclusion (contribution to regional practice)

We conclude that the findings of this study may be fit for use in preparing regional planning projects. This conclusion is supported by the validation interview, in which stakeholders in the Aa of Weerijs-project recognised the central findings of the study.

On the basis of the findings and discussion in this study we have produced a proximity tool (*which is a separate set of sheets and a summary of this presentation*).

The proximity tool is the contribution of this research to the practice of joint knowledge production for nature-based solutions to scaffold the climate resilience of regional brook-systems.

De “checklist van nabijheid”

Op basis van het model dat in de studie is gebruikt, is het advies om tijdens de voorbereidingen van een gebiedsproces aandacht te besteden aan **de vier vormen van nabijheid**:

1. Zijn alle belanghebbenden betrokken en hoe wordt sociale nabijheid gefaciliteerd, met name tussen belanghebbenden die functioneren op verschillende schaalniveaus? *(sociale nabijheid)*
2. Welke (kennis)instrumenten worden ingezet, bij voorkeur vanaf het begin van het gebiedsproces, met het oog op gezamenlijke kenniscreatie? Zowel de lokale inzichten en belangen als de kennis van een hoger schaalniveau moeten daarbij tot hun recht komen. *(cognitieve nabijheid)*
3. Is in de samenstelling van de projectgroep(en) een goede balans gevonden in betrokkenheid van belanghebbenden die dichtbij het gebied wonen en werken en de belanghebbenden die daar verder vandaan wonen, maar wel een rol spelen? *(geografische nabijheid)*
4. Hebben alle institutioneel betrokkenen een rol in de projectgroep(en), waarbij de relevante institutionele belangen en regels voldoende aan bod komen, maar niet overheersend worden? *(institutionele nabijheid)*



From the research follow a number of recommendations for practice. They deal with the question of how joint knowledge production can best be achieved among the various stakeholders “across various scales”. They pertain to the preparation phase of regional water management projects. In Dutch, and phrased for use in the Dutch practice, the proximity tool, or ‘checklist van nabijheid’ is presented.

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