

Plan of action

The application of the C2C approach to the Dutch case study of Dordrecht

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Report Information

Interreg Project: Cluster for Cloud to Coast Climate Change Adaptation (C5a)

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1. Introduction

This document is an Action Plan for the C5a workshop in Dordrecht. It provides some background on the project, what the goals of the workshop are, an outline of the workshop itself, and context to the case study.

1.1. The C5a project

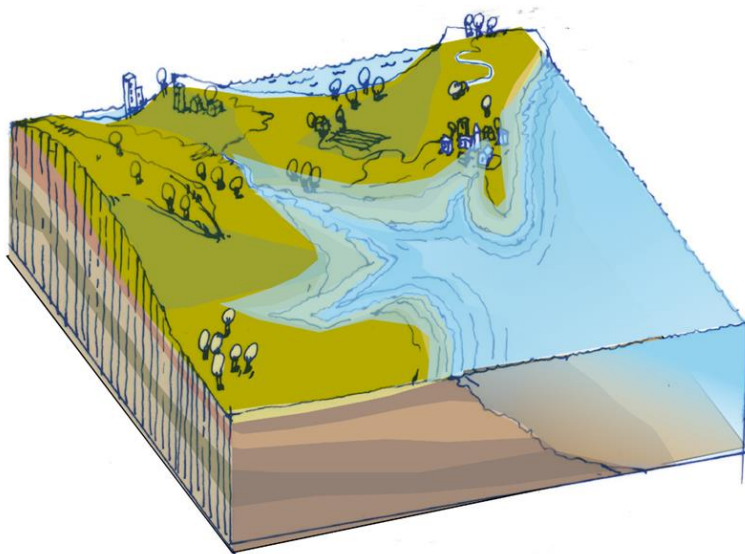
C5a (Cluster for Cloud to Coast Climate Change adaptation) is an Interreg North Sea Region project, with the goal to make the whole of the North Sea Region more resilient to the effects of climate change.

To do so, the project will develop a Cloud-to-Coast (C2C) approach. The C2C approach aims at a whole system, long term perspective. An approach that recognizes all drivers of water-related risk and responds with a portfolio of measures and instruments 'from Cloud to Coast'. A droplet of water travels from the clouds through the catchment area, where it encounters cities, infrastructure, farmland and nature, before it enters the estuary in a delta towards the coast. C2C recognizes that in each of these stages, measures can be taken in each of these fields, to increase resilience of the system. In the Interreg project of C5a we unite the knowledge developed in seven founding Interreg projects, to cluster knowledge and enable the Cloud-to-Coast adaptation dialogue. The goal of the C2C method is to facilitate a conversation between different fields (siloes), zoom in and out on project scales (to look from 'cloud to coast') and identify uncertainties that may be of influence for future developments.

To build the C2C approach, we will organise 7 workshops around the case studies. One of the case studies is the city of Dordrecht. For more context on the Dordrecht case, see chapter 3.

1.2. Dordrecht in the context of C5a

Dordrecht is not just a city, it's also an island. Due to its location in a transition area between the sea and major rivers, the Island of Dordrecht is extremely vulnerable to flooding. The city of Dordrecht is looking to improve the measures that protect it from flooding, but also to deal with its consequences. After all, its flood safety strategy has to take into account the unlikely possibility of dikes breaking and the city flooding. This means that the Island of Dordrecht provides a contemporary example of a delta city threatened by flooding (see figure below). As such, this case lends itself well for the application and testing of the C2C approach.



In the Dordrecht case, we invite the four fields of water safety, nature and ecology, city planning and accessibility of the area (confront the siloes). We look to the project area of De Staart, but also to the larger catchment area up until the coast (zoom in and out). We look at short term goals and long term challenges (look into the future), for example: what does future Sea Level Rise mean for current building standards? What does increased salinization in the future mean for current measures for nature conservation? These are questions that will be addressed in the Dordrecht case study.

1.3. About the workshop

The workshops make sure that the C2C approach can be developed with a case in practice. The reflection workshop(s) should emphasise co-creation during the entire process. In the project, co-creation is generally understood as mutual, iterative, and collaborative dialogues to discuss, develop and evaluate climate change adaptation towards a whole-of-system flood risk management. Co-creation is a central theme in the development of the C2C approach.

It is understood that each case study will have its own maturity level¹. Maturity level is defined by how ready a case study is to be initiated and the tensions between the stakeholders. The cases were divided into two batches: the building batch and the testing batch.

Dordrecht is part of the building batch. These are cases that are mature enough, they can be initiated soon and have few conflicts of interest. They will help to build the C2C approach by reflecting on the own process and exploring further opportunities that the C2C approach offers. Therefore, workshops will take place between March to June 2020.

2. Action plan

2.1. Goals of the workshop

The goal for the Dordrecht workshop is twofold:

- a) building and co-creating the C2C approach and;
- b) b) developing a vision for De Staart area which helps the municipality of Dordrecht move forward.

Building the C2C approach

One of the goals of the workshop is to build the C2C approach. The C2C approach aims at a whole system, long term perspective. An approach that recognizes all drivers of water-related risk and responds with a portfolio of measures and instruments 'from Cloud to Coast'. In the workshop, we will investigate how this best works in Dordrecht. Central to this is the question: **how can we facilitate a dialogue between different disciplines and create a common approach?**

Reflect upon the developments in Dordrecht

For the city of Dordrecht, the goal is to **create a vision and adaptation pathways towards a vision of De Staart**. We will investigate how promising the different developments in de area of De Staart are. Do they take into account all angles and possible developments? Input is the vision provided by the International Architecture Biennale Rotterdam (IABR). For more information on this, see chapter 3.

¹ CGM3 Meeting in Esens, 2019

Project indicators

The C5A project has several indicators per case study:

Indicator	Target	Unit	Definition
Increased number of multi-benefits (functions / services / outcomes) delivered	3	No. of additional functions of the targeted infrastructure / system	By counting the number of functions provided by the targeted infrastructure. Baseline for the current approach is set at 1 (mono functional infrastructure) and the result of the C2C approach is derived from the case study report.
Improving long-term risk reduction for less whole life investment	5	Benefit-Cost-Ratio (BCR) of the investment in flood protection, in percentages of increase	Through an assessment of the percentage improvement in the estimated whole life BCR with the C2C approach in comparison to the current BCR. Baseline is set before the workshop commences and the result is derived from the case study reports.
Increased adaptability of flood management approaches	3	No. of additional adaptation pathways available to the decision maker to choose from	Increased no. of adaptation pathways, i.e. a decision-making strategy that consists of a sequence of measures over time to achieve a set of pre-specified objectives under uncertain conditions, available to decision makers, before and after using C2C.

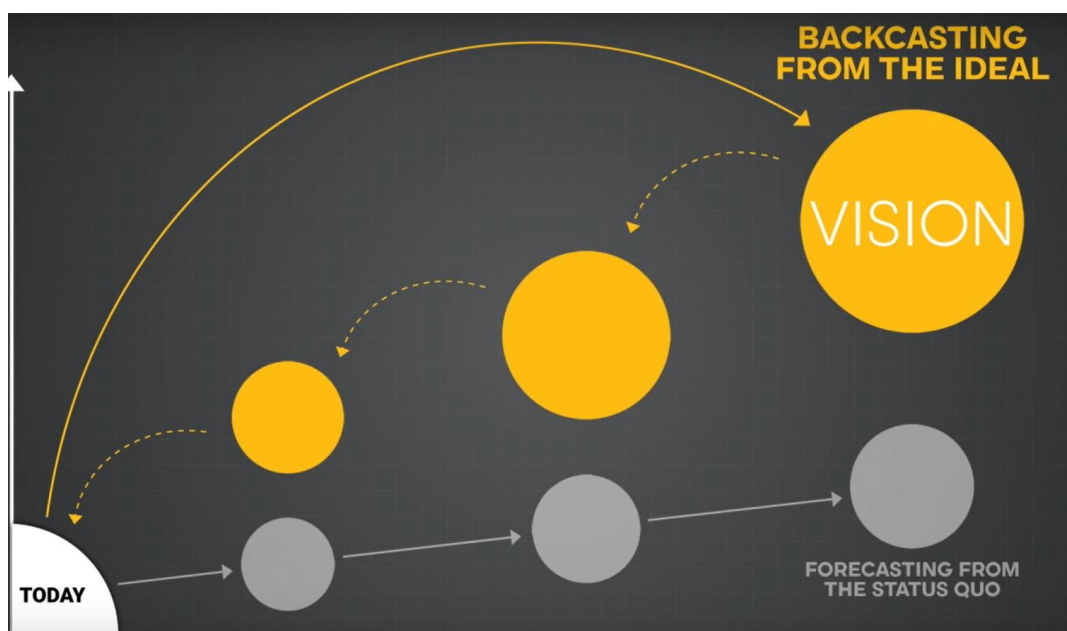
We need to establish a baseline for Dordrecht:

Indicator	Target	Unit	Baseline
Increased number of multi-benefits (functions / services / outcomes) delivered	3	No. of additional functions of the targeted infrastructure / system	<p>The baseline is the development of De Staart according to the business as usual approach. This is the approach taken for the new development at the edge of De Staart, known as Stadswerven. This area has been built with a single function, which is a residential area. Hence, the baseline for the current approach is set at 1.</p> <p>In the new vision, the future developments on De Staart will gain at least one new function: shelter. Additional functions could be ecosystem services and recreation.</p>
Improving long-term risk reduction for less whole life investment	5	Benefit-Cost-Ratio (BCR) of the investment in flood protection, in percentages of increase	<p>In the baseline no additional measures will be implemented on De Staart to reduce the flood probability, reduce the consequences of flooding or improve the recovery capacity for the Island as a whole.</p> <p>The new vision counts with additional measures, which are mostly directed to reduce the consequences of flooding or</p>

			improve the recovery capacity for the Island as a whole.
Increased adaptability of flood management approaches	3	No. of additional adaptation pathways available to the decision maker to choose from	Establish no. of pathways before C2C. This is set as 1, as the baseline approach is based on a single plan into the future. The plan for Stadswerven is to build at a (perceived) safe level to flooding, which is set at 3,3m above datum (NAP).

2.2. Workshop method

The workshop will use the method of visioning and back casting to work on the goals. In visioning and back casting a vision for the future is posited and from there, the steps which need to be taken are extracted. The stages that lie in between are also imagined: what are necessary steps to reach the vision? This will create a vision for a resilient city and adaptation pathways towards that vision.



The workshop will have the following steps:

1. Creating a vision for the future: what does a resilient city look like?

The vision for the future is a description of what De Staart will look like in 30 years. The guiding question is: what does De Staart need to look like in order to make Dordrecht more resilient? In the interest of time we can present a vision and have the participants react to the vision from their respective siloes.

The following choices have been made initially regarding the visioning process:

- Reflecting upon and enriching the (concept) vision per silo;
- Exploring synergies and trade-offs between the siloes;
- Term of the vision: 2040, with sub goals for 2030
- Concentrate the vision on De Staart

2. Creating the in-between images

Starting from the vision, the participants will create in-between images in two combined (interdisciplinary) groups. The in-between images consist of a set of sub-goals that the stakeholders would like to achieve by 2030 (that is, in the mid term). For example, a sub goal might be that half of the required sheltering capacity should be realised by 2030. The in-between images will eventually lead to the state described in the vision. This step will be discussed in the silos in rapid manner (say 10 minutes), and then reported back with post-its on the brown paper (that is, the timeline). This is followed by a plenary discussion.

3. Creating the steps we need to take and adaptation pathway(s)

In interdisciplinary groups, we will discuss which measures need to be taken short term (programming), middle-to-long term (agenda-setting) and long-term (researching). Doing this, we can project one or more possible adaptation pathways into the future. This will be done above a map of De Staart on which the measures will be sketched. The goal of working in interdisciplinary groups is to confront siloes with each other and look for synergies and possible trade-offs or conflicts. By drawing the measures on the map, the conflicts for available space between the silos may be identified in an early stage.

4. Confronting the pathways with uncertainties

After creating the paths into the future, we confront these with long-term and larger-scale developments (until 2100). For example, closing off the sea side of the delta with a lock to provide enhanced flood protection will have negative consequences for nature development in the fresh water tidal area, including the river Wantij. The participants will discuss what the implications of future scenarios are for the vision and adaptation pathways that they have created and if the adaptation pathway have to be adjusted and how.

2.3. Stakeholders

The goal of the C2C method is to facilitate a conversation between different fields (siloes). In the Dordrecht case, we have identified four siloes we want to invite:

- Nature and ecology;
- City planning / housing / energy;
- Accessibility;
- Water safety.

Invitees will be from Rijkswaterstaat, the City of Dordrecht, the Province, ProRail, the water company Evides, the Safety Region and Staatsbosbeheer. For the invitees per silo, reference is made to the invitation list (Appendix A).

2.4. Programme

The workshop will take place in two parts, both times in Dordrecht:

- On the 30th of June 13:00 – 16:30
- On the 15st of September 13:00 – 16:30

The proposed programme is as follows:

30th of June:

- 13:00 – 13:30 Walk-in
- 13:30 – 13:45 Introduction of the workshop
- 13:45 – 14:00 Introduction of the case study and the vision

- 14:00 – 14:30 Reflecting upon and enriching the vision in different siloes
Define the most important goals for 2040 (15 min)
Report back on the brown paper with the time line (3 min / silo)
- 14:30 – 15:00 Back casting: what are the in-between images?
Define the intermediate goals for 2030 (15 min)
Report back on the brown paper with the time line (3 min / silo)
- 15:00 – 15:15 Coffee break
- 15:15 – 16:00 Which measures do we need to take? In two interdisciplinary groups
Identifying the measures to achieve the vision
Drawing the measure on the map of De Staart
Prioritising the measures: what do the pathways look like?
- 15:15 – 16:00 Plenary feedback of the two groups and comparing the pathways
- 16:15 – 16:30 Closure

15st of September:

- 13:00 – 13:30 Walk-in
- 13:30 – 14:00 Summary of the first workshop
- 14:00 – 14:15 Explaining the role of uncertainties
Example: scenario's from the sea level rise programme
- 14:15 – 15:00 Discussing the uncertainties
What uncertainties do we have to deal with?
What do the uncertainties mean for the vision we created in the first workshop?
- 15:00 – 15:15 Coffee break
- 15:15 – 16:00 Creating ways to deal with the uncertainties
What do we need to do to be ready for 2100?
- 16:00 – 16:15 Plenary discussion on uncertainties
- 16:15 – 16:30 Closure

2.5. Workshop outputs

After the workshop, we will make a case study report. The report will contain the following outputs:

Goal	Output	For whom?
Dordrecht	A description of the case study, outcome of the 'thermometer' and an adaptation pathway for De Staart.	Workshop participants, IABR, Municipality
C5a: building the C2C approach	Application of the adaptation dialogue, reflection and lessons for the C2C approach.	WP3 and 4
C5a: indicators	Change with respect to the baseline.	WP1

3. Context of the case study

3.1. The Island of Dordrecht, where the river meets the sea

The Island of Dordrecht is located in the transitional area of the Rhine-Meuse delta in the Netherlands. In this area, the water levels are influenced by the river runoff as well as the sea level. The Island covers about 9,000 ha and comprises one municipality (the city of Dordrecht) and one dike ring area (dike ring 22). It is surrounded by the Beneden Merwede and the Oude Maas in the North, the Nieuwe Merwede in the East, the Hollandsch Diep in the South and the Dordtsche Kil in the West. The Island is divided by the river Wantij, which has an open connection to the Beneden Merwede and the Nieuwe Merwede. Dyke ring 22 is South of the Wantij. The areas between the Wantij and the Beneden Merwede, De Staart and the Sliedrechtse Biesbosch, are outer dyke areas. The focus of the case study is on these outer dyke areas.

The Island of Dordrecht was largely reclaimed in the 17th century after the St. Elizabeth Flood of 1421. This disastrous flood event destroyed 72 villages around the city of Dordrecht, and caused between 2,000 and 10,000 casualties. Only the city itself was spared and it provided a shelter for the flood victims from the surrounding villages. This disastrous flood formed the inspiration for Simon de Myle's painting "The Noah's Ark on Mount Ararat" in which the Ark symbolises the ancient City of Dordrecht. Between 1700 and 1930 the polders in the south were diked, and these dykes now function as regional flood defenses. To the north of these regional flood defenses lies the urban area, and to the south sits the agricultural and natural area. The city has approximately 119,000 inhabitants.

The island has both a protected part, which is protected by a single series of primary flood defences, and an unprotected part. The north of the island is an urban and industrial area, and the south is mostly used for agriculture. The governance structure is relatively simple: one municipality, one regional water authority, and one regional emergency management authority are each responsible for one aspect of flood risk management. These are, respectively: prevention through spatial planning, protection by flood defences, and preparedness for emergency response.

Climate change offers a series of challenges to the Island. Since it is a tidal area, it has to deal with sea level rise. In addition, increased runoff from rivers and increased precipitation also put the island at risk of flooding. In the event of a flood, the island is difficult to evacuate. Only about a fifth of the inhabitants can be evacuated in the case of a dyke breach. The challenge is to find a better strategy in the case of a flood.



3.2. What have we done so far?

The Delta programme Rijnmond-Drechtsteden has started a process for finding solutions for the Island of Dordrecht, based on the concept of Multi-Layer Safety.

The initial proposal was to create a safe haven on the Island itself. For this, the dyke ring would have to be reinforced above the national norm. Because this would be outside of the national norm, there would be no financial support available on the national or regional level. This means this strategy is not financially feasible.

In the MIRT-research Dordrecht (part of the Delta programme) another strategy was proposed. This strategy was evacuation and further response for hospitals and vital infrastructure. The proposed evacuation strategy is vertical evacuation, which means that people have to stay in the flooded area, either in their own house or a public shelter.

A number of organisations are working on the measures following from this strategy: the Municipality of Dordrecht, the Province Zuid-Holland, the Veiligheidsregio (Safety Region) Zuid-Holland Zuid and the Omgevingsdienst (Environmental Service) Zuid-Holland Zuid.

3.3. Where do we stand now?

There are drawbacks to the vertical evacuation strategy. This strategy is not an option if people have to stay in the area for longer than a week. Then people will have to be saved, which can lead to delays and dangers.

An alternative is evacuating to a higher outer-dyke area. De Staart, an area to the east of the old city center is a higher area, which will not overflow in the case of high water. It also serves well as a starting point for further evacuation. In addition, the area contains some essential infrastructure, such as a drinkwater company and a waste power plant.

The question is how De Staart can be developed as a shelter area. The area is not only a living area, but also contains heavy industry and parts of National Part the Biesbosch. The city also has to build at least 6000 houses within the current city, and wants to create jobs and facilitate the transition towards renewable energy. These challenges can all be combined.

Together with the International Architecture Biennale Rotterdam (IABR), the City of Dordrecht investigates how the necessity of developing a shelter area can serve as a leverage for other developments in the area. This leads to a vision on sustainable development in the area.

Four themes (multi benefits) of this vision:

1. Housing in already built areas: Multi-Layer Safety;
2. Living environment: bluegreen infrastructure, water, tidal park;
3. Mobility: connections, public transport, evacuation;
4. Energy transition: renewable energy.



Appendix A: Invitation list

Name	Organisation	e-mail
Nature/Ecology:		
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