What do we expect from the project?
This is what we envision the project to be, and what would be the minimum requirements to finish the project.

1. **<mark>A literature review</mark>**

Based on scientific literature, the results from research you can find on migration patterns in the north of the Netherlands. In the end we want to answer the question: How can we explain moving patterns of inhabitants from the north of the Netherlands? Naturally, from this question it follows that you might want to address what the province and its municipalities can do to influence these moving decisions.

Discuss research on the same topic conducted in the Netherlands.
Discuss research conducted in other countries and how the outcomes of that research could be applied to the Netherlands.
Prior experience in other countries to prevent the population outflow in their regions.

2. **<mark>An interactive tool</mark> visualizing migration patterns in the Netherlands**

Based on the municipality level data that is available on moving decisions of the Dutch, it is possible to create an interactive online tool that visualizes migration for certain areas, periods, and levels of aggregation. For example, see this webpage that shows a very simple version of such a tool made in Rshiny, including the code that generated the interactive plot: https://datascience-enthusiast.com/R/Interactive_chord_diagrams_R.html

Under 'Chord diagrams in Shiny', you see a chord diagram that is interactive. It has a little selector ('select market') in which we can choose a specific market. In a similar way, you can program selectors that select the data that needs to be visualized based on the following criteria:

a. Level of aggregation (province, region, municipality). What is the level of the nodes in the chord diagram?
Make the chord diagram on provincial, regional and municipal levels.

b. Data selection (all, only certain areas). Which part of the adjacency matrix do I want to show? Do we show all data from the entire country, or only that of a certain province?
Data on migration between all Dutch provinces, municipalities and regions for 2011-2018

c. Selection of within geographical area moving (yes/no). Do we show also the within area moves?
Have an option to select the geographical level on the website (provincial, regional, municipal)

d. Period (year). What year do we want to show the pattern for?
2011 - 2018

<u>Optional extension:</u> Of course, you can do more than just the chord diagram. A shiny tool that generates chord diagrams is the start, but once you have a working piece of Rshiny code, it is relatively easy to include other plots too. Perhaps you can visualize the migration trends for certain areas here too. You have a lot of this code available already (included in the AR model script), so including those plots should be doable. Including these in a webpage about migration trends makes sense because to me it seems like a valuable addition.

What will be included in the proposal?

    1. Aim of the project

Describe <u>what</u> you aim to achieve with this project and <u>who</u> you want to reach with the generated information. Your project partner is the Urban Data Center, but more people may benefit from the project. What knowledge is going to flow out of the project?

Inform people and especially policy makers about the current migration patterns in the north of The Netherlands based on a combination of Dutch and international research on migration. On top of this, we want to visualize these migration trends to provide a clear overview of the past and current situation on migration. We want to explore questions such as:

- *What kind of migration trends exist in the north of The Netherlands?*
- *Are there differences in migration trends between Groningen and Friesland, or other regional/municipal differences?*
- *How can the scientific literature explain these trends?*
- *What does the literature say about the possible implications of these trends?*

Write about possible explanations for those migration patterns and what could be done to change the current state of affairs. We are going to construct policy recommendations based on the research we have conducted.

The Urban Data Center Groningen is working to give valuable information to policymakers to help them in making decisions. Therefore, the main audience we aim to reach is those policymakers. The deliverables consisting of a theoretical summary of migration and the visualizations of migration will allow them to get a clear overview of the migration system for their region or municipality. However, the audience is not limited to policymakers. Since we aim to host the visualizations on a public website, we hope to reach anyone who is interested in Northern migration trends.

    2. Clear description of deliverables

What will you deliver and in what form. Describe the deliverables in as much detail as you can right now.

Interactive chord diagrams that show migration pattern for different provinces. Upload the chord diagram on a website, have the option to view the diagrams for different years, municipalities and provinces.

A report containing a literature review on migration trends in the Netherlands with a focus on the north. It will contain a detailed overview of the relevant literature and theories on migration, from both an economic and social perspective. Following this, we will delve into how this literature is related to the north of the Netherlands, and what kind of explanations it can give us on migration in the area. In the final section

of the report this information is used to build policy recommendations on how to promote people move into regions and also how to encourage people to stay.

3. Division of labor

Make an overview of the division of labor. Who is going to work on which task. Make this overview as concrete as possible.

Sherzod - Economic literature review and policy recommendations.

Arnel & Doekele - Literature review on social aspects of migration, also analyzing all the relevant Dutch literature in general

Max & Mark - Creating interactive chord diagram that shows migration pattern for different provinces. Coding the website and getting the website hosted.

4. Timeplan

What is the time plan going to be, moving forward. Show what parts of the project need to be done when, and account for possible problems. Already we know that there are three meetings planned with me (Jan 6, 8, and 15). Describe what you want to discuss in these meetings related to the planning.

Complete the literature review and policy report by Jan 8 - Sherzod
Complete the literature review and policy report by Jan 8 - Arnel and Doekele
Complete the interactive chord diagram and code for website by Jan 6 - Max & Mark
Get the website online by Jan 15 - Max & Mark

Jan 6 meeting
- *General progress overview discussion*
- *Discuss findings of the literature review, what kind of conclusions we can draw and what kind of policy recommendations we can make*
- *Discuss the visualizations we have so far*

Jan 8 meeting
- *By now the literature reviews should be finished. We will have incorporated the previous feedback in making the policy recommendations which we will further discuss in this meeting*
- *Go over the final steps that we must do*

Jan 15 meeting
- *By now we should have completed our deliverables*
- *We will present our deliverables and go over possible final tweaks to be made before the deadline and presentation*