Housing crisis

Parallel planning: Applied

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Abstract

The Netherlands is dealing with a housing shortage. One of the main problems in the current system is the duration of housing development. The average length of housing development is 10 years (Volkshuisvesting en Ruimtelijke Ordening, 2023). A concept that has been introduced to shorten the length of the planning of development is called parallel planning. Parallel planning is a planning and working method that combines activities on the timeline to shorten the timeframe and introduce a new workflow for housing developments. However, the applicability of this tool has not yet been tested on completed projects. This research uses qualitative research to find the cause of the delays within the planning of housing development and tests if parallel planning would have helped mitigating these delays. The research is done by multiple case studies of housing projects with an irrevocable environmental permit. The data collection includes literature, archival data, internet documents and interviews. The goal is to test the proposed tool by looking at timelines and delays of already completed housing projects. This study will provide a comparison of these delays and the responsible factors with the working ingredients of parallel planning, to test the effectiveness of parallel planning in reducing the timeline of housing developments.

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Problem statement

The Netherlands is dealing with a housing shortage. The Dutch housing market faces significant challenges, with supply failing to meet demand over the past decade (Geis, 2023). In other words: a Housing Crisis. Currently the government is collaborating with different parties on solutions and implementations that are able to create a rise in the availability of housing in the Netherlands. The government of the Netherlands wants to stimulate the growth of all types of housing. The goal is to build approximately 900.000 additional homes by 2030 (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2022).

One of the main causes of the stagnation in housing development is the duration of housing development. The current average length of housing development is 10 years (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). To achieve the government goal of 900.000 homes by 2030, housing projects should have started 5 years ago. To gain insights into the duration of housing development the Dutch government issued research surrounding the development of housing. Government-issued research like the Rode Draad rapport or research by the STEC group about accelerating housing construction mostly assign the cause of the longer duration of a project to the planning and permit phase. This becomes clear in Figure 1, which states that the decision-making and planning phase takes years in comparison to months.

Phase project	Duration
Decision-making and planning phase (initiative)	Years
Procedure phase (zoning plan)	Weeks/months
Permitting phase	Months
Construction phase	Months

Figure 1: Phase and duration (Holt et al., 2022)

The plan of attack to fast-tracking housing developments (2023) acknowledges this problem of the duration of the planning phase of housing development and provides new ways of accelerating housing development; the report focuses on more efficient processes, increased coordination and collaboration, stimulating innovation, and adapting laws and regulations. One proposed way to accelerate housing development is the idea of Parallel Planning, researched by Fakton. The model is a way of planning that, according to Fakton (2021), aims to reduce project planning from 6 to 2 years. It integrates activities on the same timeline in contrast to traditional way of planning.

Traditionally planned projects tend to execute activities one after the other, expanding the timeline of a project. The applicability of this model is currently being tested with pilot projects (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, august 2024). The problem with testing the model is the duration. Like housing development, the pilot projects will take years to provide definite results.

Even though to the effects of parallel planning have not been confirmed, the Dutch government has stated in December of 2024 that parallel planning will become one of the standard terms and conditions included in location subsidies (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, December 2024). This statement accelerates the need to confirm the applicability of the model to reduce the timeline of housing development in the Netherlands.

This research aims to evaluate the model by defining the delays within the planning phase of housing development and research the applicability of parallel planning to reduce these delays. This will be achieved through an analysis of completed housing projects.

The projects are provided by BPD gebiedsontwikkeling. BPD is a big part of the housing development in the Netherlands, they are a main company that develops area developments. By participating in this research, they aim to define and reduce the number of delays they encounter within their housing developments.

Literature

Definition of delays

The dictionary definition of delay is referring to something late or slow, postponed or deferred (Oxford Dictionary, 2013). However, to analyse the definition of housing development delays the definition changes. Bartholomew (1998) has defined delay as slowing down of work without stopping it entirely. This is a type of delay that occurs in housing development. However, the definition used within this research is the delay definition: 'time is overrun from the planned or contract schedule' (Majid, 1997). This definition is most applicable for delays within the planning phase of development, which is the aim of this research.

Types of delays

It is important to note that in a lot of research, housing development gets referred to as a construction project or a residential construction project, often combining types of construction to conduct results. Considering this, the following parts will refer to housing development as construction projects. The consequences will be discussed later.

One of the earliest published articles about delays in construction is research by Baldwin et al. (1971), presenting 17 causes of construction delays. Since then, a plethora of research has been conducted and aimed to define delays of construction. With research assigning a range of different number of delays in construction, ranging from 11 (Kaming et al. 1997) to 293 (Aziz & Abdel-Hakam, 2016).

In 2020, Muizz et al. presented research that reviewed the cause of delays of the global construction industry, combining all previous research to create a global picture of delays. Unfortunately, there are numerous causes of construction delays, and the plethora of studies available in the research landscape testifies to this fact (Muizz et al., 2020). Thus, it can be argued that there is no consensus on what constitutes a major delay cause, resulting in varied perspectives on the subject matter by researchers (Sweis et al. 2008).

Even though a lot of knowledge is presented of the numbers of delays which can occur within projects, research keeps on being conducted, within different and more specific context to help define delays at different scales of project development. Defining delays, with context and factors constantly changing, remains important to prevent and mitigate delays in future projects and improve the timeline of projects.

Classifying delays

A way of organizing delays is by classifying them in different types. A multitude of research have used different ways of organizing to group different types of delays. Research by Chai & Yusof (2013) reclassed delays in housing development. They re-organised delay in structural, institutional and cultural delays. The aim of the research by Chai & Yusof (2013) is to provide a framework to mitigate delays on different levels of the development process. However, this way of classification creates a very broad understanding of delays.

Another more extensive research by Assaf & Al-Heij (2006) classified delays based on previously done research. They categorized delays in nine different factors, based on literature about construction/development delays, which concluded 73 different types of delays within housing. The 9 different factors are provided in figure 2. Research by Shreyash Desai & Renuka Purohit (2022) classifies delays only in 5 sub-categories: manpower related, equipment related, material related, design related, and authority related.

Nine-factors of construction delays
Labor-related factors
Contractor-related factors
Project-related factors
Owner-related factors
Consultant-related factors
Plan/equipment-related factors
Design team-related factors
Materials-related factors
External factors

Figure 2: Nine factors of delay by Assaf & Al-Heij (2006) (Made by author)

When looking into the classification of delays already constructed by research it becomes clear that most of the research searched for delays that happen during and after the permitting phase. They also look at housing development as construction projects which mostly excludes the design and planning phase of projects. The literature can be used as a basis to assign factors of the delays, however for this research another type of classification of delays needs to be developed to provide a broader overview of delays within housing projects. This new way of classification will encompass the factors of delays that are planning specific.

Origin of delays in the Netherlands

Like mentioned before, the type of delays and classification of delays all depend on the context of the project and its stakeholders. This research analyses case studies within Dutch context. A multitude of factors are the driving forces for the current restrains of housing development in the Netherlands. Factors that influence housing projects are factors like the complexity of the project, the method of financing, the quality of decision-making, the level of support for (or opposition to) the project, and the staffing of the agencies involved in decision-making and dispute resolution for environmental law projects also influence the speed at which implementation can begin (De Graaf et al., 2022). Korthals Altes (2006) also established that the urban policies based in the Netherlands conform well to the plan but perform badly in terms of improving current decision-making on the stagnation of housing production in the Netherlands.

However, with the housing demand rising and the stagnant amount of housing development, the government of the Netherlands issued research on a local level to find the origin of the lengthy duration of housing development. The research was done from a municipal perspective and looked for the lengthy duration of projects, trying to find the problems that originate the time span of projects.

The STEC group research published in 2021 introduced possibilities to accelerate housing development in the Netherlands. To define the factors on which to accelerate they first researched the main delays that happen in housing development. The cause of delays was explored by questionnaire and interviews spread over 88 municipalities of the Netherlands. The results state that around 40% of current projects in the Netherlands experience delays. Within the response municipalities this percentage entails around 6800 delayed new-built projects. The delays found are caused by financial, planning, preconditional, market and locational problems. See figure 3 for the overview.

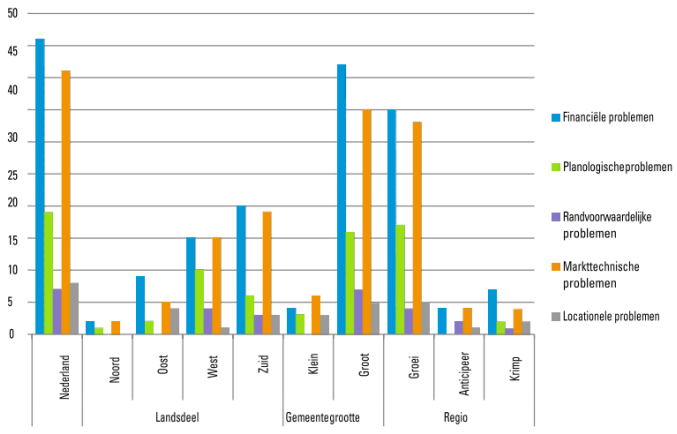

Figure 3: The possible causes of delays of project development, from the perspective of Dutch Municipalities (Geuting, E., Huiskens, L., & Thomasia, M., 2021)

The government also issued the Rebel report (2022), which assigned delays to the following factors seen in figure 4. A lot of these factors of delays are based on problems that are within the regulations of the Dutch housing system.

Factor	Explanation
Personnel capacity	Limited availability of manpower (quantity and quality)
Priority	Differences in priorities among actors; the urgency is not felt everywhere
Project and process planning	The steps municipalities and developers go through together
Setting frameworks	A lot of time is lost in determining what society specifically demands
Collaboration, attitude, and behaviour	Lack of skills to reach agreements quickly
Extensive research requirements	Increased complexity leads to significant research demands
Spatial planning instruments and procedures	Choosing the right procedure and progressing efficiently
Court and Council of State	Capacity shortages at the Council of State delay housing construction
System issues, laws and regulations	Sector-specific rules and laws have (unintentionally) had a strongly delaying effect on housing production in recent years
Coordination (by the national government or others)	Central coordination is essential to achieve ambitious objectives

Figure 4: Factors of delay housing development (by author, based on Holt et al., 2022)

Other research done from the perspective housing development by Dorris Derksen (2024), lays origin of delays of housing developments mostly by the issuing of the environmental permit (33%), followed by additional conditions of the municipality. Following this research, most of the delays are found in the procedure and permitting phase. However, they do not state the delays within the planning process of projects but do mention that their average amount per project is around 10 years. Figure 5 presents the most mentioned factors of delays for housing developers, the figure only mentions external delays.

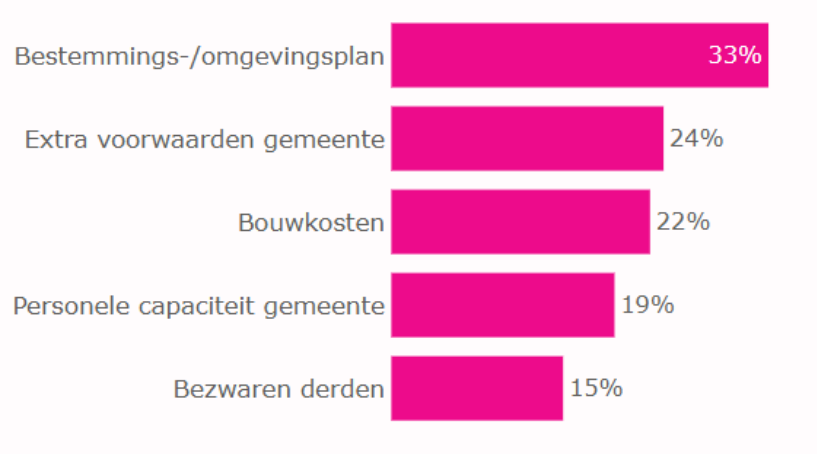

Figure 5: External delays of housing development of Dutch housing developers.

Drawing insights from these three reports, it becomes evident that multiple factors contribute to delays within the Dutch housing system. The most prominent factors lie within the permitting and processing phase, but also financing is mentioned as big factor of delay. However, a lot of research is based on experience from the government and its internal and external difficulties and the housing association, who provide only the external factors of delays. The perspective of housing developers is missing in this research.

Instruments to fast-tracking housing development

Over the past 15 years and beyond, the government and consultants have introduced a range of initiatives aimed at accelerating the development housing. Instruments that have been implemented are tools like inclusionary zoning, which stimulates the development of social housing, but also regional steering tables that aim to streamline permitting and subsidies that stimulate innovation and sustainability. Companies have also come-up with their own ways to accelerate housing development like, the NH-bouwstroom, which aims to approach the housing development challenge collaboratively with the market and government: equally, transparently, and inspiringly.

The same reports that analysed the most frequent delays within housing development in the Netherlands, also presented ways to stimulate the development of housing and came up with a variety of proposals. The STEC group (2021) focussed on solutions based on a municipal perspective. These included ways of coordination of housing construction by municipalities, realistic planning, enhancing the effectiveness and efficiency of the development of zoning plans. The Rebel report (2022) proposals include the same themes of accelerating, adding stimulating innovative ways of development that show acceleration potential, combining STEC groups' research with other research from Site (2022) and Taskforce New built Housing Associations (2022).

Next to these reports based on municipal data, the government instated Fakton in collaboration with Annius Hoekstra to propose ways of stimulating housing in the

Netherlands. This research was initiated by discourse between 20 directors of urban development. The conclusion related to the research mentioned earlier; if the government aims to develop 100,000 homes per year (an increase of <25%), with the same number of employees or fewer, they cannot simply continue doing what they are doing with slight improvements, it must be done radically differently (Fakton, 2021).

In 2023 the Dutch government presented: 'The plan of attack to fast-tracking housing developments', based on the issued research. Introducing points of improvement, and instruments they are aiming on implementing in the up-coming years. These included the earlier mentioned: efficient processes, increased coordination and collaboration, stimulating innovation, and adapting laws and regulations. The document also issued that Parallel Planning, a working-model presented by Fakton, will become the new way of working as part of efficient processes, but still stating that the usefulness is going to be applied on pilot projects first. With the acceptance of the government to be testing the new working model the question remains what the working method entails.

Parallel planning[1]

Parallel planning is a new planning method designed to accelerate housing development timelines, reducing project planning from six years to just two. The method is developed in 2021 by Evelin Rademaker and Annius Hoornstra, the approach aims to create more efficient housing developments with limited resources. The is introduce by overlapping tasks and harbouring collaboration from the start of the project. Parallel planning redefines traditional project workflows.

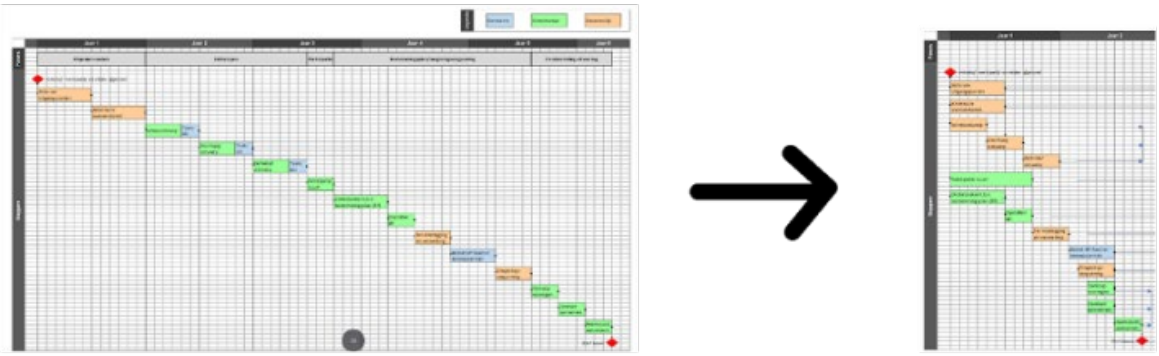

Figure 6: Visual representation of parallel planning (by author)

The method is inspired by Scrum. This is an agile methodology for product development that emphasizes incremental progress and adaptability (Wonohardjo et al., 2019). In parallel planning, roles are adapted to housing projects, replacing Scrum's product owners and developers with project planners, developers, and consultants. The daily

[1] The concept of parallel planning is one of the sub-questions of this research, but for the research proposal it is important to have a basic overview. The following text is a summary of the information found on parallel planning, the full text can be found in Appendix 1 of this research.

scrum meetings are replaced by weekly meetings, creating a collaborative and transparent environment. Like Scrum, parallel planning is based on three different pillars.

- Continuous Information Flow: real-time updates and early establishment of preconditions ensure transparency and prevent delays. Stakeholder participation starts early to streamline permitting and reduce conflicts.
- Standardization: standardized documents and decision-making frameworks accelerate zoning and environmental permitting processes, compensating for a lack of specialized professionals.
- Efficient Working: interactive collaboration and clear communication lines aim to prevent conflicts and keep projects on track.

Implementation of parallel planning
There are a few steps to implementing the parallel planning model, to reduce the timeline of housing development. These are the following:

1. Establish a physical “accelerating chamber” for collaborative teamwork.
2. Define project boundaries and create a participation plan.
3. Draft financial and operational plans.
4. Introduce digital tools for information sharing and feasibility checks.
5. Conduct weekly Scrum meetings with clear escalation protocols.
6. Evaluate and share lessons learned to refine the process.

Progress and Early Observations
The Dutch government adopted parallel planning in 2023 for five pilot housing and area development projects. Early results, presented in 2024, highlighted the importance of experienced planners, short cycle working methods, and pre-approved mandates to streamline processes. Adaptive programming was emphasized to address rising problems within urban development.

Scientific relevance

The research aims to find factors of delays within Dutch context of project development. This will be done from the perspective of project developers. The research adds to the gap in knowledge of factors of delays of housing development in the Netherlands. It will help find solutions for these delays in the future but also help test the current research in accelerating housing development like parallel planning. The testing parallel planning will also add academic knowledge about parallel planning.

Societal relevance

The research will add knowledge in defining the problems of the housing system in the Netherlands. With the housing crisis looming over the Netherlands, the government has been trying to stimulate housing development for the past years. There has been a lot of research of problems experienced by municipalities in developing housing. However, there is a need to look at the delays and stagnation from the perspective of developers. This research will aim to fill that gap and provide the problems to which to create new solutions. It will also accelerate the feasibility of applying parallel planning, the most recently introduced way of accelerating housing development tested in the Netherlands.

Conceptual model

The conceptual model combines the concepts of the literature about cause and mitigations of housing development delays. This literature combined results in the following conceptual model (figure 7).

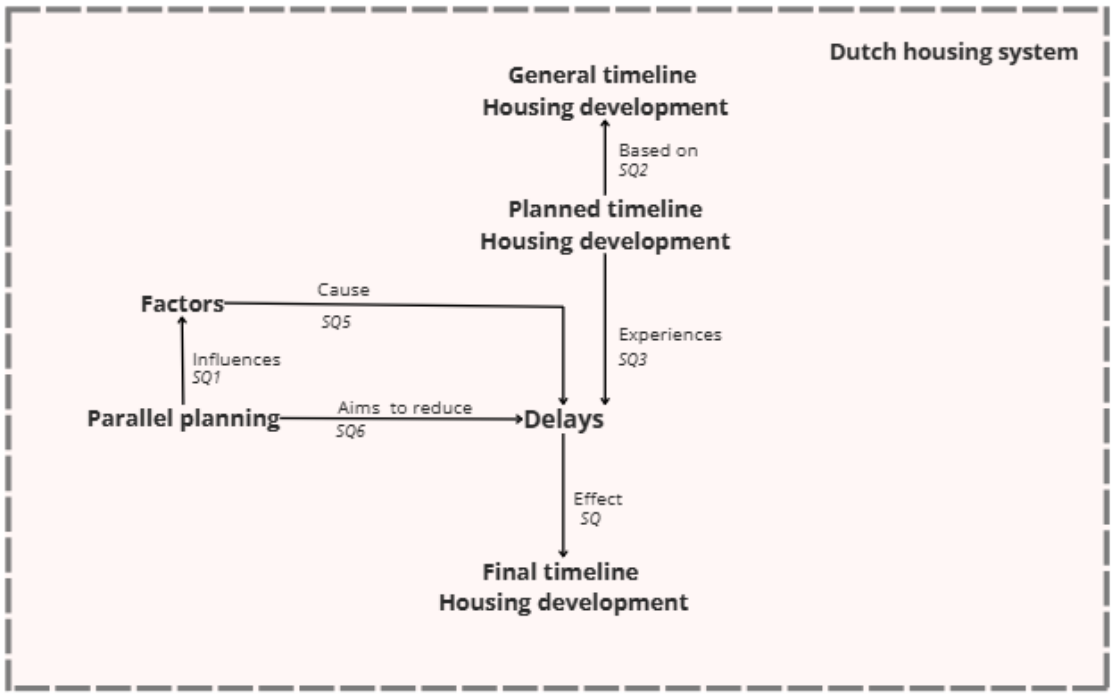

Figure 7: Conceptual Model (Made by author)

Research questions

Derived from the problem statement and the literature the following question is the aim of this research:

How can parallel planning address delays in housing development to reduce the planning phase?

With the following sub-research questions:

1. What is parallel planning?
2. What is general timeline of housing development?
3. What are the differences between the planned timeline and the final timeline of housing development?
4. What are the main delays in the timeline of housing development projects?
5. Which factors are responsible for these delays?
6. How can parallel planning principles reduce these delays?

Research method

The research aims to generate results trough qualitative research. The qualitative research contains a variety of different components. The background of this research is a literature study to define the problems and complexities creating delays in housing development and the main concept of parallel planning.

Since the research will aim to add knowledge to both the delays of housing development and parallel planning, the research can be divided in 2 main parts: defining delays of housing development in the Netherland and defining the main working ingredients of parallel planning. Both these parts are compared to provide the conclusion.

The delays of housing development are explored by doing case studies of housing development. The research will use the knowledge gathered from the literature as a basis for the analysis of 2 or 3 case studies of housing development, provided by BPD area development. The data aims to answer sub-questions 2 till 5.

The concept of parallel planning will be defined by literature combined with interview data to gain as much insight as possible, since there is only a limited number of documents available on the model. This data collection answers sub-question 1 & 6. These insights are the basis of the comparisons which aims to answer the main research question.

The sub-questions are answered by the following research methods:

1. What is parallel planning?

- *Type of Research:* Qualitative Research
- *Based on*: Literature combined with interviews.
- *Goal:* To create an understanding of the concept of parallel planning and identifying the working components of the model.
- *Used:* As basis for the final comparisons against the delays of housing development.

2. What is the general timeline of housing development?

- *Type of Research:* Qualitative Research
- *Based on*: Literature research combined with case study material.
- *Goal:* Provide an overview of the standard activities included in housing developments.
- *Used for:* To create a framework for the making of the case studies timelines.

3. What are the differences between the planned timeline and the final timeline of housing development?
- *Type of Research:* Qualitative Research
- *Based on*: Literature combined with case study material of different housing development.
- *Goal:* To find points of difference between the intended planning and final planning, to be able to define the delays.
- *Used to:* Create overviews of point of delays to answer sub-question 4.

4. What are the main delays in the timeline of housing development projects?
- *Type of Research:* Qualitative Research
- *Based on*: Literature combined with case study material of different housing developments.
- *Goal:* To find the delays in housing development.
- *Used to:* Create points for the comparison with the parallel planning model.

5. Which factors are responsible for these delays?
- *Type of Research:* Qualitative Research
- *Based on*: Case study material of different housing development.
- *Goal:* To identify the factors contributing to delays in housing development.
- *Used to:* The factors are also in the testing of the effectiveness of parallel planning.

6. How can parallel planning principles reduce these delays?
- *Type of Research:* Qualitative Research
- *Based on*: All information gathered by sub-question 1 till 5.
- *Goal:* To find the answer to the main research question.
- *Used to:* Find the way parallel planning addresses the delays of housing development and to find if it reduce the timeline.

Research Model

The main question can be answered by performing the following steps, see figure 8. The steps are based on the different sub-question. The basis of the research are literature review & case studies of housing development provided by BPD. The start of the research is doing literature review to establish a base line. The data collected is used as basis for selection criteria of the case studies. The case study criteria will be provided later in this research proposal. After selecting case studies, data will be collected through archival data, the internet and interview, to establish the planned timeline and the final timeline of the case. The difference in timeline of the different case studies will help find patterns of delays within the projects. Following the establishment of these the delays, the factors causing the delays will be researched. These factors are compared to the main working factors of parallel planning, to find the ability of parallel planning to reduce the planning of housing development. Hereby answering the main question of the research.

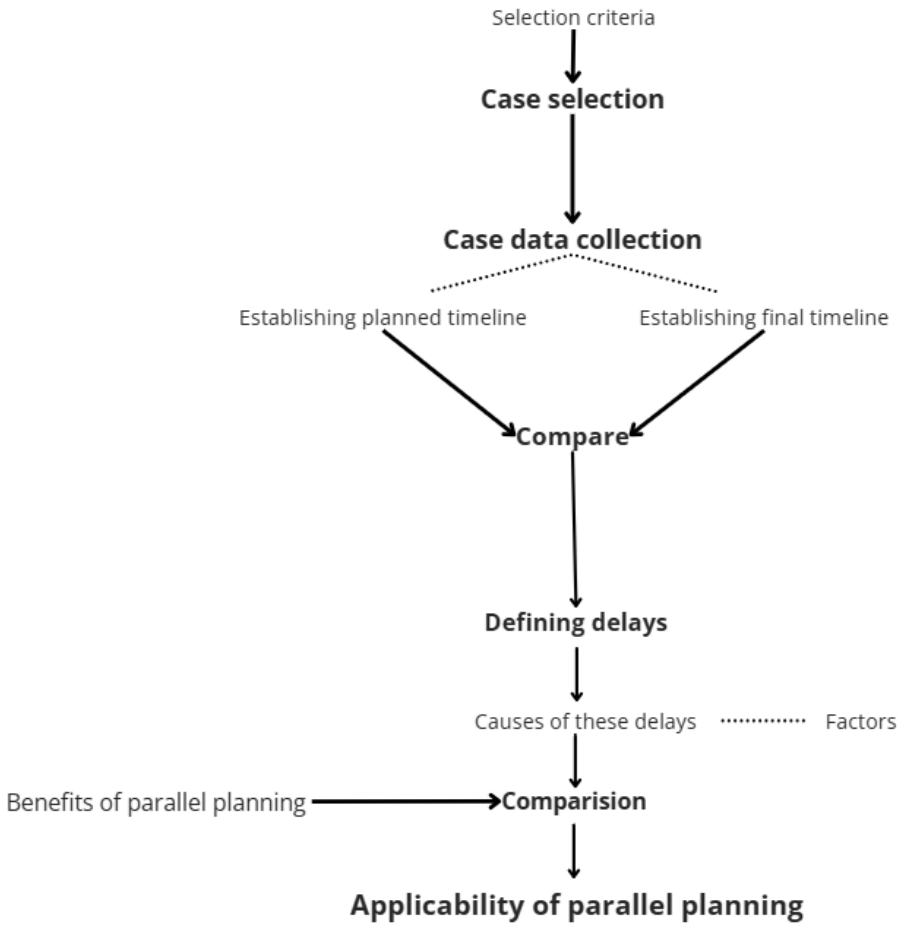

Figure 8: Research model (Made by author)

Research scope

To aim the question within a certain context a research scope is developed. The following research will be done within the scope of the Dutch housing system. The concept of parallel planning is developed to face the complexities within the Dutch context. Consequently, it will be most useful to test the model against projects within the context it was made for.

The Dutch housing system entails a big scope of different types of projects, suggesting not only different types of housing but also the density of the area. That is why this research will be aimed at a specific type of project. Since the duration of a project is not the only hindrance in the development of housing, the research will focus on projects within the context of urban areas. These are areas with high complexities but also have high demand for expanding their housing stock, finding the repeating obstacles within these projects would help relieve the pressure on the housing market more than other types of projects.

Case selection

The research is done based on case studies of housing development. The aim of the research is to test a new solution on already existing data, to accelerate the determination of the usefulness of parallel planning.

The case selection will be done by a long and short list. This will be based on archival data. From this long list of case studies, a short list will be conducted to find more specific information on delays, analysing problems not only using archival data but interviewing to find underlying issues and communications.

Following the research method and the questions at least 2 case studies need to be analysed to see recurring patterns of delay. The selection amount of these short-list cases will depend on the amount of selection criteria met, consisting of the following:

- Cases are a housing project with more than 50 houses on a plot, or a housing project that involves at least one apartment building (to be determined by BPD).
- Cases are part of an overarching urban development.
- Cases which have come across delays.
- Cases whose original planning is available and complete.
- Cases of which BPD is a part of, from initiative to environmental permit.
- Comparable Dutch cases, preferred within the same municipality.
- Cases with an irrevocable environmental permit.
    - Note: since the Environment and Planning Act has only come into force since January 1, 2024 (*General Information on Environment and Planning Laws*, n.d.), the amount of cases can be limited. If this is concluded other cases will be researched that may have gotten their permits under the old act.

These criteria are developed to create a selection of cases that are best able to answer the main and sub research questions.

Data collection

Data collection techniques include interviews, observations (direct and participant), questionnaires, and relevant documents (Yin, 2014). Since the aim of this research is to test a practice concept against existing data, the existing data first needs to be collected. This is done by the provided case studies. Case study research typically includes multiple data collection techniques and data are collected from multiple sources.

The data surrounding the case studies will be based on the documents and knowledge provided by BPD archival and the knowledge of their employees. The data about the case studies that can be found on the internet will also be added to the case analysed. The data of the case studies will be confirmed by doing interviews with stakeholders involved in the projects chosen as case studies. Concluding, the data as basis for the research is collected by literature with interviews, archival, and internet documents combined in case studies.

Archival database

Archival data base research will be provided by BPD. The data contains, if the right cases are selected: the planning of the project, the final timeline/dates of submissions of documents and meeting notes. It will also provide a clear overview of the types of consultants hired and other stakeholders of the project. The archival data also inserts information about the activities that happened during the project, including things like design progress and participation information. The data will be combined within timelines of the different case studies.

Internet documents

The internet will be used to, add, control, and fill in the gaps in the archival data. The documents found will also provide another point of view of other stakeholders within the case. On the internet data surrounding types of marketing, progress reports and other information will be researched and added to data collected from the archive. Since it is unknown what the case studies will be, it is difficult to define what exactly will be searched for on the internet.

Interviews

To fact check and add other points of view to the conclusions based on the archival and internet data, semi-structured interviews will be done. The interviews are a way to prevent potential bias within the analysis. The interviews will be conducted with the different stakeholders of the different projects. The aim is to conduct at least 2 interviews of each case study. These stakeholders include not only personal of BPD, but also other stakeholders. The interviewees will be approached via e-mail or in real life. Consent will be asked to audio record these interviews and the usage of quotes. The interview transcription data will be used to fill final gaps and control the data needed to answer the research questions.

Data analysis

The data collected can be divided in 2 different types: literature review and case studies, which include, archival, internet and interview data. The multitude of data sources will make the analysis objective and from multiple points of view.

Literature review

Literature found is analysed by combing previously conducted research to create the basis of the research. Most of the literature studies for the sub research questions can be found in the literature review of this proposal and in the appendix. The literature used, is a combination between scientific and grey literature. The analysis combines both types of literature to create an overview of already established factors of delays, instruments developed to prevent these delays and the concept of parallel planning. The analysis of literature will define key working components of known information about parallel planning needed for the final comparison of the research.

Case studies

The case studies will be analysed by creating timelines from the collected data. The timelines per case study will be created by using a Gantt Chart. The Gantt chart is named after its originator Henry Gantt and displays a timetable for each activity of the project (Vanhoucke, 2013). Each activity is represented by a scaled block or bar, illustrating its duration over time. The timeline typically runs horizontally, with various activities listed along the vertical axis. An example of the Gantt Chart is the example of parallel planning which can be seen in figure 9.

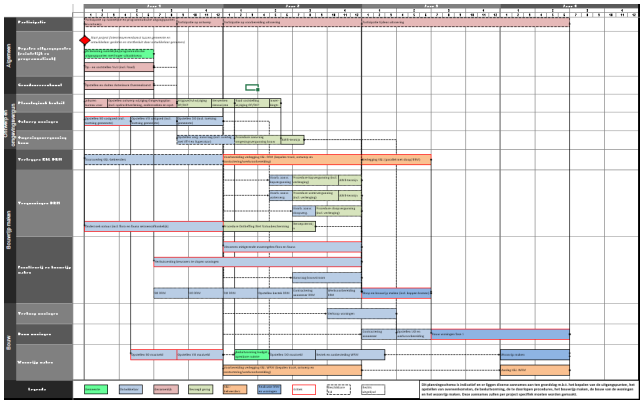

Figure 9: Example of a Housing project planning (Fakton, 2023)

This way of organizing the timelines of the project makes it easier to see time differences between different cases, but also between the planned and final timeline of projects and the actors responsible. However, these timelines only show the activities that often delay, not the factors that cause the delays. These factors need to be assembled after the comparison of timelines. These factors will be explored with more in-dept timelines, which will include more data surrounding the activities within the Gant chart, including data like meeting notes, dates of submissions, different types of stakeholders and other yet to discovered be discovered relevant data. This table will define the key factors of delays to compare these to the key working ingredients of parallel planning.

The main conclusion of the research will be based on a comparison analysis between the case studies and the literature. To be able to make this analysis from these two types of data, key factors of both delays and parallel planning will be defined.

Data management plan

The data management plan is made with the template (2025) of the TU Delft offered through the online platform: DMPonline. This filled-out template can be found in Appendix 3 of this document. The document provided in the appendix was last updated on 12/01/2025.

The data management of the research is done by using the FAIR principles. The FAIR principles in data management are guidelines aimed to improve: the findability, accessibility, interoperability, and reusability of data. To adhere to these principles the data will be all anonymized and be uploaded to the TU repositors. This is possible as this research does not require personal information to answer its questions. The data will be retained for a period of 10 years to use and replicate research by other researchers. Interviewers will be informed about this in the consent form in appendix 2.

All data collected in this research will be stored on the Personal data storage of the TU Delft. The data will be shared and temporarily stored on the SURFdrive. All data collected through the interviews and questionnaires will first be anonymized before the data is stored on the Project Storage of the TU Delft and the SURFdrive.

Legal grounds of data

The research uses four types of data: literature, archival, internet and interview. Literature and internet data do not require consent to be used. However, for the archival and interview data, consent is required. The archival data provided by BPD is limited to what data they consent to provide for research. The data will not contain personal data, if it does contain personal information, this data will be anonymized to maintain the privacy of other stakeholders of the case studies.

To be able to use the data gathered by the interviews, consent needs to be given. Before conducting the interview, the interviewee will be asked to provide consent with the form in Appendix 2. The consent form entails questions about transcriptions and recordings, but also about the contact information needed for administrative purposes. If consent is not given, the collected data will not be used in the research.

Ethical considerations

Even though the research does not explicitly use personal data, there are a few other ethical considerations that need to be considered before conducting the research. Ethical considerations surrounding topics such as stake holder impact, data privacy and confidentiality (see data management plan) and potential bias.

Stakeholder Impact
The research is based mostly on case studies, with a multitude of stakeholders involved. When evaluating the process of these projects, it is important to be transparent to these stakeholders about the research methodology and findings. Since all projects are public knowledge, stakeholders of the projects are easily trackable through the internet. To prevent negative light to shine on these stakeholders, factors of delays will not be assigned to specific roles within the case studies. To further protect the interviewed stakeholder participants of the research, identifiable facts will be removed, such as the name of the interviewee and the role of the interviewee. When the interviewee has consented to be quoted within the research results, these quotes will also be made unidentifiable.

Potential bias
Since most of the case data is provided from one stakeholder of case studies that entail a multitude of stakeholders, the research must be wary of creating an objective analysis of delays. To prevent this from occurring the interviews are held from other perspectives then the provider of the data. The research also needs to avoid framing findings to fit preconceived notions about parallel planning efficiency. Other ethical considerations can be seen in the HREC checklist. These are attached to this proposal in appendix 4.

Research output

The main goal of the research is to test the parallel planning method on already completed projects to see how it can be used to reduce the timeline of housing developments. This is done by researching and identifying delays of projects and testing if parallel planning could have prevented these delays from happening. The research will deliver data sets in the form of Gantt charts with timeline comparison, identification of the delays and the factors responsible and the comparisons of this data to parallel planning. It will also include transcripts of interviews conducted by the stakeholders involved in the case studies.

The research will be used to confirm existing knowledge and generate new knowledge. It can be used by project developers, housing corporations, the government and other stakeholders within the development of housing, to firstly gain information into the subject of parallel planning and, secondly, to see which delays can be prevented or confined by parallel planning and which may need another solution.

Personal study targets

By doing this research there are certain personal targets that I would like to achieve by the submission of my final research. These goals are separated into knowledge goals, skill goals and time-based goals.

Knowledge goals:

Understanding recurring causes of delays in project development: By doing this research, I would like to develop an understanding of the factors that lead to delays and repeated mistakes within project development processes. This research will not only improve the results of my current study but will also provide valuable insights for future applications.

Master the parallel planning model: I aim to become somewhat of an expert in the parallel planning model, understanding both its advantages and its limitations by doing this research. My goal is to confidently apply this model in future projects, leveraging its potential project timeline while maintaining a clear view of where its use may be less effective.

Skill goals:

Being able to apply prior knowledge to new concepts: Applying prior knowledge to future problems can be a skill that is useful for most things in life. I would like for this to study to help me gain the ability to see the useful parts of prior knowledge and apply this to new concepts.

Increase my writing skills: By doing this research I would like to become more capable in writing down coherent sentences more efficiently. Trying to become less broad and all-over the place and write with increased speed to benefit future research and documentation.

Time-based goals:

Plan bi-weekly goals: This goal is to stimulate making progress ever two to three weeks, to reduce stress for the final report and to keep supervisors up to date. This also helps reduce moments of stuckness, needing to finish certain goals. Since I am not good at asking for help, this would force me to ask questions.

Schedule defined study hours and meetings: Undefined hours in the week provide chances to procrastinate; by defining hours to certain tasks this would force activities. But this would also combine different tasks to create a varied workweek, seeing as I easily get demotivated by doing the same activity for days at a time. How I aim to plan these activities can be found in the research plan.

Research plan

The main tasks of the research are completing the literature review, collecting the data for the case studies and combining this data in the main components needed to answer the sub-questions. The components that need to be finished before answering the main-research questions are the general activities of housing development, the planned and final timeline of the cases studies, a list of delays and the factors causing these delays and the key components of parallel planning. The following activities need to happen to deliver these deliverables:

- Doing the literature review on the topic of delays, factors of these delays and the concept of parallel planning
- Establishing the general timeline of activities in a housing development
- Selecting cases for the case studies
- The planned and final timeline need to be established for these cases, these are based on archival and internet data mentioned earlier.
- Defining the delays by these timelines
- Planning the interviews with the stakeholders
- Prepare the interviews
- Transcribe the interviews
- Add the new interview data to the data about the delays
- Compare the data of the delays in housing development with the key concepts of parallel planning
- Writing the report about the findings

While doing the thesis there are some main milestones. The first main milestone is finishing the data collection. The second main milestone is the 70% deadline (p3), the aim is to finish all the case studies before this deadline, including the interviews, this includes answering sub-questions 1 till 5. The final milestone is the rest of the work combined with the feedback of the 70% deadline will be finished before the final report deadline of p4. A global overview of the milestones the interdependencies with activities can be seen in figure 10. In the appendix 5, a detailed time schedule is provided.

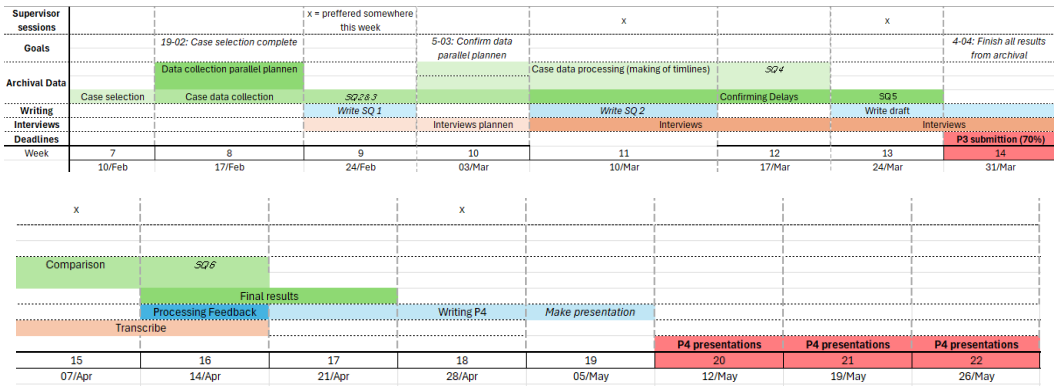

Figure 10: Ganth-chart research plan (Made by author)

Reflection

This is the reflection on how I experienced the AR3MBE100, the course from which this research proposal is one of the deliverables. AR3MBE100 started of back in September, with a week full of theme meetings, I remember feeling overwhelmed. It felt like I missed the part where we should have already chosen are thesis topic and which supervisors we were going to ask. There was a deadline at the end of the week in which you had to define your theme, topic and first supervisor. As someone who found the thesis writing process already very daunting, this was not a great first impression. It felt rushed and like I was already a step behind everyone. However, looking back at it know, I am grateful for the rushed start, because at least you start. Knowing myself I would have procrastinated starting, which would not have helped me with finishing my P1 or my P2.

After this first week submission, it however does not feel like your part of a course, it is kind of up to you, your supervisors and the theme coordinators. The housing crisis theme was great, and I really enjoyed being part of a small group of people with similar subjects. Unfortunately, there were not a lot of meeting after finishing my P1. I also felt like there were no progress deadlines and the deadlines set by the course were kind of forgotten within the theme's coordination. This was not only to blame on the course or theme, but it was also my own lack of attention. My supervisor however did a great job, and we scheduled progress meetings to keep me on track.

Final reflection on the course is that the manual lacks specificity, it was confusing to see what exactly was due on which date, especially surrounding the data management plan and the HREC-check. It also does not have a rubric or something like this to check if you are on the write track to completing your P2.

Overall, I experience this course as stressful but fulfilling, I learned a lot during the course about writing a research proposal, especially about framing and conducting literature and feel confident in starting my research this February.

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Appendix 1: Parallel planning

Parallel planning

Parallel planning is a new planning method, developed by Fakton executives lead by Evelin Rademaker and Annius Hoornstra. It was initiated by a meeting of some directors of urban development, in the summer 2021. The main question of the discussion was the acceleration of housing development. The result was a multitude of recommendations, concluding that if the government wants to develop more housing, with the same amount of manpower, radical change is needed. Which has only one con: it demands will-power. (Radermaker, E. & Hoornstra, A., 2022)

The concept of parallel planning is a way of planning that, according to Fakton (2022), aims to reduce project planning from 6 to 2 years. Parallel planning is a model tool that transforms a serial plan into one that stacks tasks on top of each other in a certain timeframe. Figure 1 provides a visual representation of this statement.

Figure 1: Visual representation of parallel planning (by author)

However parallel planning not only aims for the stacking of activities to reduce the planning phase of a project but also goes by a working model, to achieve this reduced timeline. The working tool is based on different pillars and preconditions. Combining all stakeholders from moment one to set boundaries and plan formation within a short timeframe.

Scrum

Parallel planning can be viewed s a Scrum approach that treats housing development as a big pressure cooker session (Radermaker, E. & Hoornstra, A., 2022). The Scrum-method which originated in it IT-world is an agile methodology for product development that emphasizes incremental progress and adaptability (Wonohardjo et al., 2019). Since the introduction of Scrum in the early 90s by Ken Schwaber and Jeff Sutherland, it has been developed to a tool that can be applied to all types of development, including construction. The Scrum-method framework exists of sprints that are planned and reviewed, working toward the final product development. The roles in the original Scrum-method are the product owner, the scrum-master and the development team.

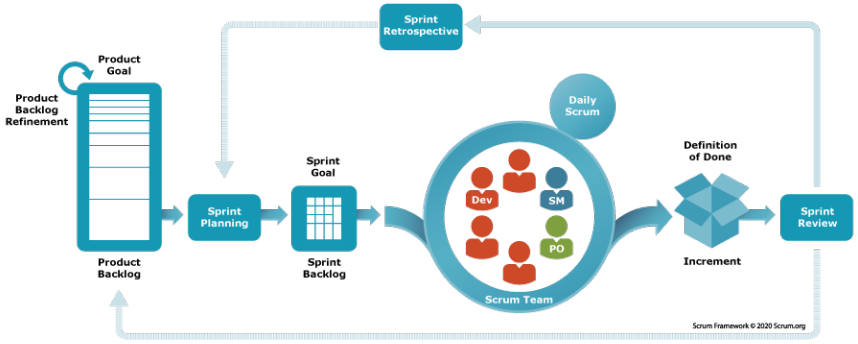

Figure 2: Scrum framework (Schwaber & Sutherland, 2020)

The framework is comparable with the model made by Fakton with these roles changing from scrum-master to professional planner, from product owner to project developers and the development-team transforming to a team of consultants and other stakeholders, like housing associations and municipalities. The daily scrum meetings are transformed to weekly meetings. These meetings are based on one location and start of being full days and transforming to half a day meetings. This is all implemented to make it possible to reduce the planning of housing development.

Pillars of Parallel planning

Next to translating the Scrum-method to accomplish parallel planning, there are a lot of other added preconditions to implement this new way of planning. Three dynamics are important to a have successful implementation according to Fakton. These are the following: a continuous stream of information, narrowing down the formal steps of decision-making processes through standardization, preparing 'hammer pieces' (zoning plan, environmental permit, investment decision), and working efficiently and unusually. These are combined in the three pillar principles that are the basis of the working model Parallel planning.

- *Continuous stream of information*
    - The original model is based on a project initiated by a housing developer. It starts from a basis of preconditions, set by the municipality. It involves an intensive first period where the preconditions will be tested, and a risk analysis will be done. Participation in the surrounding area will also begin at the same time. This will lead to a notion of preconditions (‘nota van uitgangspunten’) by the municipal council. These final conditions will be the boundaries, between which a municipality must develop the project plan. Following this principle, when the final plan and zoning plan meet these conditions, the municipality would have to sign of on the project. This nota is also the basis of the anterior agreement, between the other parties. Using and setting these values early will speed up the

negotiations between parties. The reimbursement plan between the different parties will also be set in this phase, all to prevent ongoing negotiations.
    - As part of continuous stream of information design is seen as fluent process without traditional division into preliminary, draft and final design (Radermaker, E. & Hoornstra, A., 2022), as long a design stays within the predefined framework. They also want a Quality assurance evaluator consistently present at the table to see conflicts with laws and regulations throughout the process.
    - Another important part is the added participation process with surrounding home/landowners. Being transparent will help the permitting procedures in the future.
- *Standardization*
    - Drafting the zoning plan also begins on day one, with the necessary parties. The aim is to create standard documents that accelerate the process of zoning permits. This is necessary because of the lack of research professionals in this field. Ideally by setting frameworks and introducing the design early the decision about the environmental becomes a formality.
- *Efficient working*
    - The parallel-planning model promotes an interactive process with all parties from initial meeting. The interactive process aims to avoid conflict. The scrum-method is the ground of the new efficient working method.

Implementation of parallel planning

To achieve the goals of parallel planning and introduce the working-model to projects, there is a six-step implementation model developed. Starting of with designing an ‘accelerating-chamber’, this is by preference a physical space which is dedicated to project collaboration which houses the development-team. The team includes at least the following functions: project developer, architect, representative of the neighbourhood, senior planner, director urban development, municipal executive, policy experts, permit coordinator, external advisors, independent process manager and a secretary.

After the conduction of the development team, a ruling by a municipal about the boundaries of the project is needed, this includes the requirement of a participation plan. These are the specific requirement to which the final design is tested. Following the guidelines a plan of attack is conducted and a financial plan or estimate of expected income and expenses is developed.

After the notion of intent (intentieakkoord) and the ruling are in place, it is time to create the open-source infrastructure and decision-making process. This includes implementing digital systems to create the open information conversation and a system to remain checking the feasibility of the plan. The project will continue with weekly scrum meeting and supervision. To implement these meetings, the municipality and the project developer needs to be committed to the project. Motivation is not from role but from a need to develop the best project together. The short communication lines are needed to keep on track, these are introduced by these meeting. Escalation boundaries are also introduced with a max time of 3 days and the daily progress is kept by process manager, municipality and developer. There is also a supervision to analyse the workings of the parallel planning model. Structurally, experience will need to be shared to see the progress and feasibility of the model.

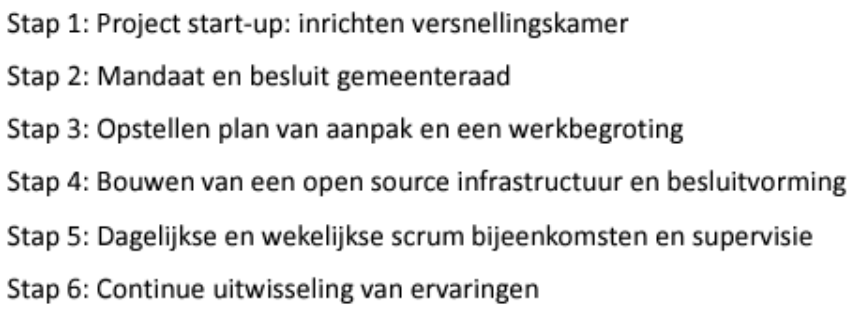

Figure 3: Steps to introducing parallel planning to a project (Rademaker, E. & Hoornstra, A., 2022)

Progress of parallel planning

In 2023 the Dutch government agreed to apply the Parallel planning method to 7 pilot projects. Four housing development projects (Alphen aan den Rijn, Den Bosch, Eindhoven & Sassenheim) and three area development projects (Tilburg, Utrecht & Dordrecht). A website has also been introduced to show to developer on how the can accelerate their projects. In July 2024, Fakton presented their first findings from the pilot projects.

First observations

Parallel planning in principle: The first things that have been discovered is that having a experienced project planner is unique, also that having a actual planning helps. The planner needs to be involved from day 1. The planning needs to be kept on 3 levels to have optimal success: overall-planning, risk planning and a 8 week-planning.

> Short cycle working: By combining the planning with capacity, the capacity becomes more reliable, this also work vice-versa. Also the engagement of the core-team is important combined with assigning which aspects of the planning are apart of the short cycle working method.

Open-stream of information: Still very necessary, but it is important to also evaluate things like group work and solution management. Succes is stimulated if the responsibility lies with all parties.

Standardization of decision making: Understanding the critical importance of granting a mandate in advance by the council/supervisory board/director instead of during the project. Review and choose the optimal path for planning procedures in consultation with a legal expert. Further acceleration can be achieved with standardized documents (such as preliminary agreements, development frameworks, council information briefs).

Adaptive programming (urban development): Plan stresstest about changing context. Explore multiple variations. Energy and water are future limitation, keep in mind while design a plan and setting ambitions. Work at the urban development at the same time as the first project.

However, with the first observations published and looking promising there are also a lot of pre-conditions that need to be in place to successfully introduce the model. Like Scrum, where successful implementation depends on team members' skills and knowledge, and can lead to increased productivity, creativity, and business value (Wonohardjo et al., 2019). Parallel planning also demands a lot will-power and collaboration.

Appendix 2: Interview consent form

Opening statement:

You are being invited to participate in a research called: Parallel planning: applied. This study is being done by Kes van Leeuwen from the TU Delft.

The purpose of this research study is to explore the effectiveness of parallel planning to reduce the development housing. This is done by establishing delays from case studies of already permitted housing development and comparing these delays with the key concepts of parallel planning. This interviews is done to provide further insight in the case studies used in the research.

As with any online activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimise any risks by making the questionnaire anonymous, no IP-address will be saved. The questionnaire will only not be anonymous if the consent is given to share data. This is only when your contact information is given if you want to be part of the interview part of this research. The data is secured on the secured Project storage of the TU Delft.

Your participation in this study is entirely voluntary and you can withdraw at any time.

Any questions or comments?

Contact the following researcher:

Kes van Leeuwen

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated 17-01-2025, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: being interviewed	☐	☐
5. I understand that the study will end (when the research is published)		

B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves the following risks that the information asked can be a sensitive subject. I understand that these will be mitigated by being able to quit the research at any time.	☐	☐
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII) (name; job; email address) with the potential risk of my identity being revealed.	☐	☐
8. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach (anonymous data collection, secure data storage)	☐	☐
10. I understand that personal information collected about me that can identify me, such as (*name; job; email address*), will not be shared beyond the study team.	☐	☐
11. I understand that the (identifiable) personal data I provide will be destroyed (when the research is published).	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
12. I understand that after the research study the de-identified information I provide will be used for (*research publications).*	☐	☐
13. I agree that my responses, views or other input can be quoted anonymously in research outputs.	☐	☐
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
16. I give permission for the de-identified transcript that I provide to be archived in 4TU.ResearchData repository so it can be used for future research and learning.	☐	☐

Signatures

_____ _____ _____

Name of participant [printed] Signature Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____ _____

Researcher name [printed]	Signature	Date
Kes van Leeuwen		

Study contact details for further information:

Kes van leeuwen

Appendix 3 : DATAPLAN MANAGEMENT PLAN

Plan Overview

A Data Management Plan created using DMPonline

Title: Parallel planning: applied

Creator:kes van leeuwen

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2025)

Project abstract:

The research investigates the applicability of the new working method: paralllel plannen in reducing the timeline of housing development. This is done by case studies of already permitted housing developments in the Netherlands. To find the applicability of the new working model delays of housing developements are defined. These are compared with key points of parallel planning to see the applicability of the model, and if can reduce the time of housing development.

ID: 167942

Start date: 02-02-2025

End date: 30-06-2025

Last modified: 12-01-2025

Parallel planning: applied

0. Adminstrative questions

BK faculty Data Steward: Janine Strandberg

- Yes, the only institution involved

I. Data/code description and collection or re-use

Type of data/code	**File format(s)**	**How will data/code be collected/generated?** *For re-used data/code: what are the sources and terms of use?*	**Purpose of processing**	**Storage location**	**Who will have access to the data/code?**
Archival data of housing developments	.xlsx files & PDF files	Re-use of already collected data by BPD.	To understand timelines of housing developments and define delays.	SURF drive	The company BPD and the project team of TU Delft
Informed constend forms	PDF	Informed consent forms signed digitally.	To obtain and document informed consent for the interviews and the collected data through archival data.	SURF drive	Kes van Leeuwen
Interview data	.mp3/.docx	Collected through semi-constructed interviews.	To gain a understanding of the origal causes of delays. The data collected is also around the definition of parallel planning.	SURF drive	Kes van leeuwen
Personal Identifiable Information (PII) Names and email addresses, used only for administrative purposes	.xlsx files	Collected at the start of the interviews with the persons consent..	To ensure proper informed consent procedures	SURF drive	Kes van Leeuwen

II. Storage and backup during the research process

- < 250 GB

- SURFdrive

III. Data/code documentation

- Metadata – I will adhere to the metadata standards used by the data repository where the data will be shared (see section V)
- Data – Methodology of data collection

IV. Legal and ethical requirements, code of conducts

- Yes – please provide details in the additional information box below

- Yes

- No, I will not work with any other types of confidential or classified data/code

The anonymous qualitative datasets underlying the published papers will be publicly released following the TU Delft Research Data Framework Policy. During the active phase of research, the suprivisors of the thesis (Gerard van Bortel & Marjolein Spaans) will oversee the access rights
to data (and other outputs), as well as any requests for access from external parties (e.g. for research verification).

- Telephone number, email addresses and/or other addresses as contact details for administrative purposes
- Names as contact details for administrative purposes
- Copies of passports or other identity documents
- Audio recordings
- Proof of consent (such as signed consent materials which contain name and signature)

Data subjects are the stakeholders involved in the chosen case studies surrounding housing development in the Netherlands.

- No

- Informed consent

Participants will be sent an invitation containing a study overview, followed by an Informed Consent form that outlines the purpose, data usage, confidentiality measures, voluntary participation, and publication plans. Consent will be asked digitally through a signed form, this will be combined with verbal confirmation will also be requested at the beginning of the interviews. Participants may withdraw at any time.

The proof of consent (digital copy of signed document) will be preserved on the TU Delft Project Data Storage (U:) drive.

- None of the above apply

- Anonymised or aggregated data will be shared with others

- Personal data will be deleted at the end of the research project

- In the informed consent form: participants are informed that their personal data will be anonymised and that the anonymised dataset is shared publicly

V. Data sharing and long term preservation

- All other non-personal data/code underlying published articles/reports/theses

- All anonymised or aggregated data, and/or all other non-personal data/code will be uploaded to 4TU.ResearchData with public access

- < 100 GB

- At the end of the research project

- Other – please explain below

The research is a Thesis project and is automatically placed under copyright.

VI. Data management responsibilities and resources

My supervisor Gerard van Bortel, Chair Housing management , Management and the Built Environment, with email address

4TU.ResearchData is able to archive 1TB of data/code per researcher per year free of charge for all TU Delft researchers. I do not expect to exceed this and therefore there are no additional costs of long term preservation.

Appendix 4: HREC-checklist

Delft University of Technology
HUMAN RESEARCH ETHICS
CHECKLIST FOR HUMAN RESEARCH
(Version January 2022)

IMPORTANT NOTES ON PREPARING THIS CHECKLIST

1. An HREC application should be submitted for every research study that involves human participants (as Research Subjects) carried out by TU Delft researchers
2. Your HREC application should be submitted and approved **before** potential participants are approached to take part in your study
3. All submissions from Master's Students for their research thesis need approval from the relevant Responsible Researcher
4. The Responsible Researcher must indicate their approval of the completeness and quality of the submission by signing and dating this form OR by providing approval to the corresponding researcher via email (included as a PDF with the full HREC submission)
5. There are various aspects of human research compliance which fall outside of the remit of the HREC, but which must be in place to obtain HREC approval. These often require input from internal or external experts such as Faculty Data Stewards, Faculty HSE advisors, the TU Delft Privacy Team or external Medical research partners.
6. You can find detailed guidance on completing your HREC application here
7. Please note that incomplete submissions (whether in terms of documentation or the information provided therein) will be returned for completion **prior to any assessment**
8. If you have any feedback on any aspect of the HREC approval tools and/or process you can leave your comments here

I. Applicant Information

PROJECT TITLE:	Parallel planning: Applied
Research period: *Over what period of time will this specific part of the research take place*	February 2025 – June 2025
Faculty:	BK
Department:	Management and Built Environment
Type of the research project: *(Bachelor's, Master's, DreamTeam, PhD, PostDoc, Senior Researcher, Organisational etc.)*	Master Thesis
Funder of research: *(EU, NWO, TUD, other – in which case please elaborate)*	TU Delft
Name of Corresponding Researcher: *(If different from the Responsible Researcher)*	Kes van Leeuwen
E-mail Corresponding Researcher: *(If different from the Responsible Researcher)*	
Position of Corresponding Researcher: *(Masters, DreamTeam, PhD, PostDoc, Assistant/ Associate/ Full Professor)*	Master student
Name of Responsible Researcher: ***Note:** all student work must have a named Responsible Researcher to approve, sign and submit this application*	Gerard van Bortel
E-mail of Responsible Researcher: *Please ensure that an institu documentation/ communications including Informed Consent materials*	
Position of Responsible Researcher : *(PhD, PostDoc, Associate/ Assistant/ Full Professor)*	Assistant Professor

II. Research Overview

***NOTE:** You can find more guidance on completing this checklist here*

a) Please summarise your research very briefly (100-200 words)

What are you looking into, who is involved, how many participants there will be, how they will be recruited and what are they expected to do?

Add your text here – (please avoid jargon and abbrevations)
The Netherlands is dealing with a housing shortage. One of the main problems in the current system is the duration of housing development. The average length of housing development is 10 years (Volkshuisvesting en Ruimtelijke Ordening, 2023). A concept that has been introduced to shorten the length of the planning of development is called parallel planning. Parallel planning is a planning method that combines activities on the timeline to short the timeframe and introduce a new workflow for housing developments. However, the applicability of this tool has not yet been tested on completed projects. This research uses qualitative research to find the cause of the delays within the planning of housing development and tests if parallel planning would have help avoid these delays. This is done by multiple case studies, with an irrevocable environmental permit. The data collection includes literature, archival data, internet documents and interviews. The goal is to test the proposed tool for the shortening of the planning stage housing development. Made possible through looking at timelines and delays of already completed projects. This study will provide an overview of delays that can be solved by parallel planning, concluding how the tool can reduce the timeline of housing developments.

b) **If your application is an additional project** related to an existing approved HREC submission, please provide a brief explanation including the existing relevant HREC submission number/s.

Add your text here – (please avoid jargon and abbrevations)
N/A

c) **If your application is a simple extension of, or amendment to,** an existing approved HREC submission, you can simply submit an HREC Amendment Form as a submission through LabServant.

III. Risk Assessment and Mitigation Plan

NOTE: *You can find more guidance on completing this checklist here*

Please complete the following table in full for all points to which your answer is "yes". Bear in mind that the vast majority of projects involving human participants as Research Subjects also involve the collection of **Personally Identifiable Information (PII)** and/or **Personally Identifiable Research Data (PIRD)** which may pose potential risks to participants as detailed in Section G: Data Processing and Privacy below.

To ensure alighment between your risk assessment, data management and what you agree with your Research Subjects you can use the last two columns in the table below to refer to specific points in your Data Management Plan (DMP) and Informed Consent Form (ICF) – **but this is not compulsory**.

It's worth noting that **you're much more likely to need to resubmit your application if you neglect to identify potential risks**, than if you identify a potential risk and demonstrate how you will mitigate it. If necessary, the HREC will always work with you and colleagues in the Privacy Team and Data Management Services to see how, if at all possible, your research can be conducted.

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
A: Partners and collaboration						
1. Will the research be carried out in collaboration with additional organisational partners such as: • One or more collaborating research and/or commercial organisations • Either a research, or a work experience internship provider[1] [1] *If yes, please include the graduation agreement in this application*	**x**		With working primarily with data from a commercial organization is that the data can create a potential bias in the results. The usage of this data could also bring negative light to the company, or being told not to use the negative data, which create biased results.	To mitigate these risk of not being allowed to use all the data a DTA will be signed. To prevent the potential bias, the archival data from the commercial organization will be controlled by outside sources.		
2. Is this research dependent on a Data Transfer or Processing Agreement with a collaborating partner or third party supplier? *If yes please provide a copy of the signed DTA/DPA*		**x**				
3. Has this research been approved by another (external) research ethics committee (e.g.: HREC and/or MREC/METC)? *If yes, please provide a copy of the approval (if possible) and summarise any key points in your Risk Management section below*		**x**				
B: Location						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
4. Will the research take place in a country or countries, other than the Netherlands, within the EU?		**x**				
5. Will the research take place in a country or countries outside the EU?		**x**				
6. Will the research take place in a place/region or of higher risk – including known dangerous locations (in any country) or locations with non-democratic regimes?		**x**				
C: Participants						
7. Will the study involve participants who **may** be vulnerable and possibly (legally) unable to give informed consent? (e.g., children below the legal age for giving consent, people with learning difficulties, people living in care or nursing homes,).		**x**				
8. Will the study involve participants who **may** be vulnerable under specific circumstances and in specific contexts, such as victims and witnesses of violence, including domestic violence; sex workers; members of minority groups, refugees, irregular migrants or dissidents?		**x**				
9. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children, own students or employees of either TU Delft and/or a collaborating partner organisation)? *It is essential that you safeguard against possible adverse consequences of this situation (such as allowing a student's failure to participate to your satisfaction to affect your evaluation of their coursework).*		**x**				
10. Is there a high possibility of re-identification for your participants? (e.g., do they have a very specialist job of which there are only a small number in a given country, are they members of a small community, or employees from a partner company collaborating in the research? Or are they one of only a handful of (expert) participants in the study?	**x**		Since the stakeholders of the cases studies can easily be tracked, the results of the research may effect image of the company and the personell.	To prevent this from happening, roles and factors of delays will not be assigned to specific roles. Interviews will be anonymized and will not be quoted.		
D: Recruiting Participants						
11. Will your participants be recruited through your own, professional, channels such as conference attendance lists, or through specific network/s such as self-help groups		**x**				
12. Will the participants be recruited or accessed in the longer term by a (legal or customary) gatekeeper? (e.g., an adult professional working with children; a community leader or family member who has this customary role – within or outside the EU; the data producer of a long-term cohort study)		**x**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
13. Will you be recruiting your participants through a crowd-sourcing service and/or involve a third party data-gathering service, such as a survey platform?		x				
14. Will you be offering any financial, or other, remuneration to participants, and might this induce or bias participation?		x				
E: Subject Matter *Research related to medical questions/health may require special attention. See also the website of the CCMO before contacting the HREC.*						
15. Will your research involve any of the following: • Medical research and/or clinical trials • Invasive sampling and/or medical imaging • Medical and *In Vitro Diagnostic Medical* Devices Research		x				
16. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants? *If yes see here to determine whether medical ethical approval is required*		x				
17. Will blood or tissue samples be obtained from participants? *If yes see here to determine whether medical ethical approval is required*		x				
18. Does the study risk causing psychological stress or anxiety beyond that normally encountered by the participants in their life outside research?		x				
19. Will the study involve discussion of personal sensitive data which could put participants at increased legal, financial, reputational, security or other risk? (e.g., financial data, location data, data relating to children or other vulnerable groups) *Definitions of sensitive personal data, and special cases are provided on the TUD Privacy Team website.*		x				
20. Will the study involve disclosing commercially or professionally sensitive, or confidential information? (e.g., relating to decision-making processes or business strategies which might, for example, be of interest to competitors)		x				
21. Has your study been identified by the TU Delft Privacy Team as requiring a Data Processing Impact Assessment (DPIA)? *If yes please attach the advice/ approval from the Privacy Team to this application*		x				
22. Does your research investigate causes or areas of conflict? *If yes please confirm that your fieldwork has been discussed with the appropriate safety/security advisors and approved by your Department/Faculty.*		x				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
23. Does your research involve observing illegal activities or data processed or provided by authorities responsible for preventing, investigating, detecting or prosecuting criminal offences *If so please confirm that your work has been discussed with the appropriate legal advisors and approved by your Department/Faculty.*		**x**				
F: Research Methods						
24. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		**x**				
25. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		**x**				
26. Is pain or more than mild discomfort likely to result from the study? And/or could your research activity cause an accident involving (non-) participants?		**x**				
27. Will the experiment involve the use of devices that are not 'CE' certified? *Only, if 'yes': continue with the following questions:*		**x**				
• Was the device built in-house?						
• Was it inspected by a safety expert at TU Delft? *If yes, please provide a signed device report*						
• If it was not built in-house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *If yes, please provide records of the inspection*						
28. Will your research involve face-to-face encounters with your participants and if so how will you assess and address Covid considerations?	**x**		The research may involve face-to-face interactions for a subset of participants invited for in-depth interviews. Low risk.	Although there are currently no Covid health measures in place, any future health guidelines will be strictly adhered to should they be reinstated. Additionally, participants will have the option to conduct interviews via video conferencing if they prefer to minimize physical contact.		
29. Will your research involve **either:** a) "big data", combined datasets, new data-gathering or new data-merging techniques which might lead to re-identification of your participants **and/or** b) artificial intelligence or algorithm training where, for example biased datasets could lead to biased outcomes?		**x**				
G: Data Processing and Privacy						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
30. Will the research involve collecting, processing and/or storing any directly identifiable PII (Personally Identifiable Information) including name or email address that will be used for administrative purposes only? (eg: obtaining Informed Consent or disbursing remuneration)	**x**		The research will gather limited personally identifiable information (PII), including names and email addresses, strictly for administrative purposes, such as obtaining informed consent and coordinating participation. Although essential for organizing the study, collecting and storing PII introduces potential privacy risks, such as unauthorized access or data breaches.	To minimize these risks, all PII will be securely stored, accessible only to authorized personnel, and kept separate from interview data to ensure confidentiality.		
31. Will the research involve collecting, processing and/or storing any directly or indirectly identifiable PIRD (Personally Identifiable Research Data) including videos, pictures, IP address, gender, age etc and **what other Personal Research Data** (including personal or professional views) will you be collecting?	**x**		The research will collect indirectly identifiable Personally Identifiable Research Data (PIRD), including participants' personal an preffesional views. This poses potential risk to the participants confidentiality and privacy.	Data will be securely stored on password-protected servers with access restricted to authorized researchers. Participants will be informed about the types of data collected and its intended use, and they will have the option to withdraw at any time. In line with data protection guidelines, all identifiable PII will be deleted upon the study's completion		
32. Will this research involve collecting data from the internet, social media and/or publicly available datasets which have been originally contributed by human participants		**x**				
33. Will your research findings be published in one or more forms in the public domain, as e.g., Masters thesis, journal publication, conference presentation or wider public dissemination?	**x**		The findings of this study will be publicly disseminated through a master thesis. This will public released in the TU Delft Repository. This risks participant privacy, as personal or professional views shared during the study could be identifiable.	To address these risks, all data will be anonymized before publication to ensure that individuals cannot be identified from the published findings. Furthermore, participants will be informed during the consent process that the findings will be published, enabling them to make an choice about their participation.		
34. Will your research data be archived for re-use and/or teaching in an open, private or semi-open archive?	**x**		Risk is to reveal personal information in our output.	Personal information will not be published or shared and will be deleted after 2 years.		

H: More on Informed Consent and Data Management

NOTE: *You can find guidance and templates for preparing your Informed Consent materials) here*

Your research involves human participants as Research Subjects if you are recruiting them or actively involving or influencing, manipulating or directing them in any way in your research activities. This means you must seek informed consent and agree/ implement appropriate safeguards regardless of whether you are collecting any PIRD.

Where you are also collecting PIRD, and using Informed Consent as the legal basis for your research, you need to also make sure that your IC materials are clear on any related risks and the mitigating measures you will take – including through responsible data management.

Got a comment on this checklist or the HREC process? You can leave your comments here

IV. Signature/s

Please note that by signing this checklist list as the sole, or Responsible, researcher you are providing approval of the completeness and quality of the submission, as well as confirming alignment between GDPR, Data Management and Informed Consent requirements.

Name of Corresponding Researcher (if different from the Responsible Researcher) (print)

Signature of Corresponding Researcher:

Date: 15-01-2025

Name of Responsible Researcher (print)

Signature (or upload consent by mail) Responsible Researcher:

Date:

V. Completing your HREC application

Please use the following list to check that you have provided all relevant documentation

Required:

- **Always:** This completed HREC checklist
- **Always:** A data management plan (reviewed, where necessary, by a data-steward)
- **Usually:** A complete Informed Consent form (including Participant Information) and/or Opening Statement (for online consent)

Please also attach any of the following, if relevant to your research:

Document or approval	Contact/s
Full Research Ethics Application	After the assessment of your initial application **HREC will let you know if and when you need to submit additional information**
Signed, valid Device Report	Your Faculty HSE advisor
Ethics approval from an external Medical Committee	TU Delft Policy Advisor, Medical (Devices) Research
Ethics approval from an external Research Ethics Committee	Please append, if possible, with your submission
Approved Data Transfer or Data Processing Agreement	Your Faculty Data Steward and/or TU Delft Privacy Team
Approved Graduation Agreement	Your Master's thesis supervisor
Data Processing Impact Assessment (DPIA)	TU Delft Privacy Team
Other specific requirement	Please reference/explain in your checklist and append with your submission

Appendix 5: Time-Schedule

		Activities:	University deadlines/milestones	Case selection	Data collection	Data analysis	Writing	Supervisor	**Notes**
	Data								
Week 7	10			Start long list of cases		Find main activities of housing development (general timeline)	*Start writing SQ1 & SQ2*		
February	11								
	12								
	13								
	14			Finish defining 2 a 3 Cases					
Week 8	17				Collect **data of 1st** case & Collect data for parallel planning				
	18					Start timeline case 1			
	19								
	20				E-mail stake holders of 1st case				
	21					**Finish finding main delays of this case**	***Finish writing draft SQ1& 2***		
Week 9	24						*Start writing SQ3 & 4*	x	x = somewhere this week
	25				Finish archival & data retrival for Case 1			x	
	26				Collect data of **2nd case**			x	
	27					Start timeline comparison case 2		x	
	28							x	
Week 10	3								
March	4								
	5								
	6				E-mail stake holders of 2nd case				
	7				Finish archival & data retrival for Case 2	**Finish finding main delays of this case**			
Week 11	10				Plan interviews in this week. Collect data of 3nd case *	If there is no 3th case this week will be used as extra week of case studie analysis			*only if 3 cases are analysed
	11								
	12								
	13								
	14				*E-mail stake holders of 3nd case*		***Finish writing SQ3***		
Week 12	17				Plan interviews in this week	Transcribe + prepare interviews		x	
	18							x	
	19							x	
	20							x	
	21				*Finish archival & data retrival for Case 3*			x	
Week 13	24				Plan interviews in this week	Transcribe + prepare interviews			
	25								
	26								
	27					**Finish timelines of case 1 & 2 + factors of delays**			
	28		**Submit p3 (70%) Aim to answer the first 4 out of 6 SQ's**				***Finish writing draft SQ3 & SQ4 submit draft***		
Week 14	31				Plan interviews in this week				
April	1								
	2								
	3								
	4					***Finish timeline of case 3 + factors of delays***			
Week 15	7					Transcribe + prepare interviews	*Process feedback*	x	
	8							x	
	9					Start comparison between parallel planning and delays	*Start writing SQ 5 & 6*	x	
	10							x	
	11							x	
Week 16	14								
	15								
	16								
	17								
	18								
Week 17	21						*Start conclusions & discussions*		
	22								
	23								
	24								
	25								
Week 18	28						Just write	x	
	29							x	
	30							x	
May	1							x	
	2						**Finish writing**	x	
Week 19	5		**Earliest submittions p4**					x	
	6								
	7								
	8								
	9								
Week 20	10		**P4 presentations**						
	11								
	12								
	13								
	14								
Week 21	19								
	20								
	21								
	22								
	23								
Week 22	26								
	27								
	28								
	29								
	20								
	31								