Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences
Graduation Plan: All tracks
The graduation plan consists of at least the following data/segments:

### Personal information

<table>
<thead>
<tr>
<th>Name</th>
<th>Imardo de Blok</th>
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<tbody>
<tr>
<td>Student number</td>
<td>4408454</td>
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<td>Telephone number</td>
<td>+31 (0)6 344 803 08</td>
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### Studio

<table>
<thead>
<tr>
<th>Name / Theme</th>
<th>Graduation laboratory: Circular Urban Living Lab</th>
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</table>
| Teachers / tutors | 1st mentor: dr. ir. Erwin Heurkens *(Urban Development Management)*  
|                | 2nd mentor: dr. ir. Ruben Vrijhoef *(Design & Construction Management)*  
|                | External examiner: dr. ir. Marjolein Spaans *(OTB)*  
|                | Company supervisor: ir. Constantijn Berning *(OVG Real Estate)* |

### Argumentation of choice of the studio

In the spring semester of 2014, I graduated from my HBO studies into architectural engineering with a thesis about the Circular Economy. The relating research project was about the implementation of a circular business model into an adaptive re-use project towards a residential function *(Hereijgers & De Blok, 2014)*. Because I graduated from a studies into architectural engineering, the focus of this graduation thesis was on adaptivity, flexibility and the disconnection of the different ‘construction layers’ of Brand (1995). During this graduation I grew my enthusiasm and interest in the Circular Economy.

However, in this thesis the organizational, managerial and financial aspects that are involved in the Circular Economy were barely discussed. These are key aspects in the MBE-Mastertrack. Since the Circular Economy also plays an increasingly bigger role in the business world, gaining insight and knowledge about this concept might be of big value for my personal development and career.

Therefore I decided to start a research project with the general motivation of making the circular economy applicable to the real world while bringing it to a ‘next level’. It turned out that the organizational aspects formed the biggest obstruction for organizations in the real estate sector to shift towards a Circular Economy.
In the meanwhile I came into contact with OVG Real Estate (OVG) and got familiarized with their new business strategies. An user-cantered approach is a key element in this strategy, hereby OVG starts to acts a service provider.

The role of the service provider is very important in circular real estate development projects. Therefore, conducting a graduation internship at OVG provided me with the opportunity to (1) conduct a research into Circular Economy, (2) help to build on the new strategy of OVG and (3) conducting an internship at the leading real estate development company in The Netherlands.

**Graduation project**

<table>
<thead>
<tr>
<th>Title of the graduation project</th>
<th>Real estate developers as service providers</th>
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<tr>
<td><strong>Goal</strong></td>
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<tr>
<td>Location:</td>
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<tr>
<td>The posed problem,</td>
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<tr>
<td>research questions and</td>
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<td>design assignment in which these results.</td>
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And secondly, financiers have to be convinced of the added value of servitized real estate projects.

**Research objective:**
Explore possible instruments and means that could be used by real estate developers (1) to incentive suppliers to accept their new role and responsibilities and (2) to convince financiers to invest in servitised real estate projects.

**Main question:**
What is the role of a circular service provider within a real estate development project?, and how could real estate developers incentive actors to collaboratively deliver circular real estate development projects?

**Sub questions:**
1. What is known about service provision in the real estate sector?
2. What does the organizational system of [circular] real estate development projects look like?
3. How are organizations collaborating and interacting currently in circular real estate development projects?
4. What lessons can current circular real estate development projects learn from the proposed theoretical framework?
5. What instruments and means could real estate developers use to incentive actors to deliver circular services?

**Process**

**Method description**

**Conceptual framework**

Current organizational system ➔ Organizational system of circular RED projects
This research project is embedded in the presumed transition of the current real estate sector towards a real estate sector based on the principles Product-Service-Systems within the Circular Economy. This research takes a management approach and focusses on the organizational system of real estate development projects. Hereby the transition of the current organizational system towards an organization
system that fits in a Circular Economy is directed by the implementation of Product-Service Systems.

**Circular Economy → Product Service Systems**
The concept of Circular Economy is nowadays a very broad definition and there is no common agreement on the definition of it. Therefore the implementation of the Circular Economy in the construction sector can be seen from different perspectives. In this research, the focus of the implementation of the Circular Economy lies on the implementation of Product-Service-Systems in the real estate sector.

**Product-Service-Systems → Contract, Network, Sustainability, Design, Marketing**
The ‘business tactics’ companies could use to implement Product-Service-Systems in their business model, could be categorized into five categories. These tactics are categorized by Reim et al. (2015) into (1) contracts, (2) marketing, (3) networks, (4) product and service design and (5) sustainability operational practices.

**Organizational system → Financial, Legal & Organizational aspects**
The organizational system of real estate development projects could be described by categorizing the project into Financial, Legal and Organizational aspects (De Leeuw, 2002; Heurkens, 2012).

**Research design**
In order to answer the main research question and reach the objective of this research project, several research ‘steps’ are needed. This research is designed in such a way, that every sub-question refers to one of those steps:

1. The first question refers to literature research is therefore observational.
2. The second question conceptualizes the related knowledge and aims to build a theoretical framework.
3. The third question deduces the developed theories by applying it in practice.
4. The fourth question tests the hypothesis by comparing theory and practice.
5. The fifth question provides a synthesis between theory and practice by evaluating and validating the outcomes with experts.

**Step 1a: Observation**
The first part of the graduation process consists of an explorative literature review. The purpose of this literature review is to get an overview of concepts and theories related to Circular Economy and the related real estate development process.
An explorative literature review is sometimes referred to as a ‘narrative literature review’ and provides researchers “[…] an initial impression of the topic area that they intend to understand through research” (Bryman, 2012, p. 110). Next to this goal, the first stage of the literature review is to explore possible research gaps (Bryman, 2012, p. 98). During this phase, an initial problem statement was formed and a research direction was chosen.
Step 1b: Specification

Step 1a and step 1b linked to each other and show a lot of overlap. This because these steps were made during the preparations of the P1 and the P2. During these phases, the research subject was explored and the research problem was defined. During these early stages of a research project, the character of the process is very iterative.

The objective of step 1b and the related methodology differs from step 1a. The goal of step 1b is to gain knowledge of the research subject, gain insight in the perspectives of practitioners and to define the research problem clearly. This is done by a **systematic literature review** and **explorative interviews**. The explorative interviews were conducted in the form of **unstructured interviews**, as described by Bryman (2012).

Step 2: Induction

After the problem statement and the research objective are defined, the inductive phase of the research project will start. This inductive period aims to define the related concepts clearly and generate a theoretical framework. This theoretical framework will function as a hypothesis for the research.

The related research question refers to the development of the hypothesis, since the hypothesis is the outcome of the induction. In order to answer the research question a **systematic literature review** is used, the aim of this is to provide an account of the literature that is comprehensive. Since little academic literature is available about Circular Economy in relation to the built environment, a meta-ethnography method is used whereby master theses of former MBE-student were the main source (Bryman, 2012).

Step 3: Deduction

Deduction is “an approach to the relationship between theory and research in which the latter is conducted with reference to hypotheses and ideas inferred from the former” (Bryman, 2012, p. 711). The goal of this deduction is to test the developed theoretical framework – being the hypothesis from the second step – in practice. Hereby the goal is to create understanding of the application of Product-Service-Systems in the current construction industry.

In order to do this, **case studies** will be conducted to ‘investigate a contemporary phenomenon within its real-life context’ (Yin, 2014). Hereby a multiple-case study design is used where after a cross-case synthesis is conducted.

Step 4: Testing

The outcomes of the case studies provide a better understanding of the current practice of servitization and the application of circular principles in the construction industry. By comparing these outcomes with the before defined hypothesis, inspirational lessons can be drawn using **case-based lessons drawing** for these actors to move interact, behave and collaborate in a way that fits in a Circular Economy.
Step 5: Synthesis

The lessons learned from the former step should be validated in order to increase the trustworthiness of the findings. This is done by conducting two **expert-meetings** with experts in the field. Hereby one expert-meeting will be conducted with an ‘insider-panel’ consisting of persons involved in the projects that were subject to the case study research and an ‘outsider-panel’ which consists of persons that were not involved in those projects nor working for organizations involved in these projects.

Literature and general practical preference

**Literature review**

Not much academic literature is available about Circular Economy and its application in the built environment. Therefore, during the start of the research process, many master theses of former MBE-students were used to explore the topic. Examples are:


Afterwards, during the systematic literature review, the focus lay more on literature related to supply chain management and supply chain integration. Examples:


The literature used for theories and research methods was:


Case studies

Case studies will be used to deduce and test the developed theoretical framework in practice. Hereby case studies form the link between theory and practice. In this research, case studies will be used to answer the fourth sub-question, being: How are actors collaboration and interacting currently in circular construction projects?

The case studies in this research will be used to deduce the theoretical framework which is the outcome of the first and second sub question. The proposition that applies to the case studies in this research is therefore the theoretical frameworks. By doing this, a hypothetico-deductive approach will be used (Flyvbjerg, 2006).
‘Theoretical proposition’ will be used to rely on while analyzing the case studies. This deductive approach was also the original objective to conduct case studies. Hereby the theoretical framework guides the case study analysis and helps to organize the analysis (Yin, 2014, p. 136).

In this research three cases will be analyzed during the case study period. Since in the real estate sector, every project is unique and strongly influenced by its context, conducting a single-case study is out of the question. Moreover, since the concept of circular / servitised real estate development projects is so new, there are no representative cases available. That’s why a multiple case-study approach is appropriate and used in this research project.

After a criteria-based selection procedure, three cases were selected. These cases are:

1. New office building for the Triodos Bank – Zeist
2. Redevelopment of project ‘Basisweg’ – Amsterdam
3. Office building ‘Boutique’ – Amsterdam

The next sources of evidence, as described by Yin (2014), will be used while conducting case study research:

- **Participant observation:** As a graduate intern the researcher might become involved in the projects that are subject to the case study research.
- **Semi-structured interviews:** interviews with project team members, suppliers, financiers, consumers and other members of the project organization.
- **Documentation:** Case / project document analysis, administrative documents progress reports, internal records, proposals and other case related documents.

The unit(s) of analysis in the case studies are: *current circular real estate development projects.*

The objects of study are the way organizations involved in circular construction projects, these organizations should contribute in a certain way to the delivery of circular products, or servitised products.

The focus of this study implies the form of collaboration and interaction to deliver circular products. Therefore it is logical to focus mainly on the actors that have direct influence on this, these actors are:

- The real estate developer [service provider]
- The suppliers [service suppliers]
- Architects
- The financier
- The consumer [the client / end-user]
The strategy that will be used in this research is to ‘rely on theoretical propositions’. Hereby the next concepts of the real estate development projects are being generalized:

- Organizational structure: Tasks & Responsibilities
- Financial structure: Risks & Revenues
- Legal structure: Requirements & Rules

The analytic technique used in this research will be a cross-case synthesis (i.e. cross-sectional case study design) (Bryman, 2012; Yin, 2014). While analysing the case studies, the derived information will be linked to analytical model as explained above. Hereby the different case studies will be seen as individual research studies. Since the analytical model refers to the organizational system of a project organization, the outcomes of each case study will be a description of the organizational system of each case study. The outcomes of the individual case studies will be compared with each other. Hereafter a general overview of the current state of circular / servitised real estate development projects will be given. This conclusion will serve as input for Step 4: Testing. In this step, lessons will be drawn for the real estate sector using the ‘Case-based lesson drawing’-method.

**Case-based lesson drawing**

In this research, the comparison of the current state of actors in the real estate sector with the theoretical framework makes clear where actors stand concerning their shift towards a circular Economy. Hereby an overview of similarities and difference will be made. Hereafter, a discussion about possible new steps how these actors could behave, interact and collaborate in their shift towards a Circular Economy can be made. This method is based upon the ‘case-based lesson drawing model’ used by Huijbregts (2017, pp. 54-55)

**Expert panel(s)**

The outcome of the Step 4: Testing / Lesson drawing are lessons for actors in current real estate development projects. In order to enhance the credibility of these recommendations, validation meetings with experts will be held.

There are basically two methods to shape these meetings; (1) individual semi-structured interviews with experts or (2) an expert-panel in the form a focus groups (Bryman, 2012). Because group interaction in focus groups enhances quality of the outcomes, the second method is the most favorable.

The expectation is that the recommendations derived from the former step will apply to several actors in the supply chain. These recommendations are based on case studies, hereby a relatively small amount of actors are involved and probably these actors all have a similar mindset. This derogates to the external validity of the recommendations because the results are “generalized beyond the specific research context in which it was conducted” (Bryman, 2012, p. 711).
Next to this, it still remains important to validate the recommendations that apply to the organizations and actors that were object of research during the case studies itself. This relates to the internal validity of the outcomes. So, the members of the expert meeting should involve persons that are involved in the conducted case studies and expert which were not. However, in focus groups, people tend to influence each other and each other’s opinion. Therefore the most ideal solution would be to hold two different sessions:

- One expert panel with actors that were involved in the projects that were subject to research during case studies.
- One expert panel with actors that were not involved in the case studies, nor working for companies involved in those case studies.

Side notes:

1. As mentioned by Bryman (2012), focus groups are difficult to organize. If not enough time is available to organize two sessions or not enough persons can be found for both sessions, only one focus group / expert panel meeting will be held.
2. If the recommendations only apply to a small number of actors, it is better to hold individual semi-structured interviews to validate the proposed recommendations to prevent peer pressure from other actors.

As said before, the input for the expert meetings are recommendations for actors in the current supply chain. During the sessions, a quick overview of the research project will be given and the main concept be introduced. Then the recommendations will be presented in the form of propositions (in Dutch: stellingen). The validation of the recommendations will take place in the form of a discussion between the members of the expert meeting.

Reflection

Relevance

Societal relevance

The Dutch government launched in September 2016 a new government-wide program which focusses on the development of a Circular Economy. Main goal of this program is the transformation of the current Dutch economy into a circular one before the year of 2050 (Ministerie I&M en EZ, 2016). The construction sector is responsible for one third of the total global energy use, uses 40% to 50% of all the raw materials every year and produces 40% of solid waste streams (Antink, Carrigan, Bonneti, & Westaway, 2014). Since currently the real estate developer has a big influence on the organization of construction projects, this organization has a big influence on the sustainable performance of the real estate sector. A shift in the way the real estate developer manages, coordinates and organizes their projects could therefore have a big positive impact on the total global energy use, raw materials detraction and waste streams.
The concept of Product-Service-Systems [PSSs] plays an important role in the implementation of a Circular Economy in the real estate sector. This research supports the implementation of PSSs into the real estate sector by clarifying the roles of the service provider and other actors involved in the real estate sector.

**Scientific relevance**

Although the willingness of many parties is great to implement circular business models into their practice, not many building projects could be typified as ‘circular’. The biggest obstacles for the real estate industry to shift towards a Circular Economy can be found at the organizational level, around issues concerning responsibilities, liabilities and ownership. This because there is an ongoing discussion between the market parties about the occurring shift in responsibilities (Kazemi, 2016; Kok, Wurpel, & Ten Wolde, 2013).

In order to overcome these organizational barriers, a paradigm shift has to take place. This in the form of system optimization, new production process, new ownership relations, networks and chains. Moreover, the complexity of the development processes will increase while the need of different parties working together rises (Prins, Mohammadi, & Slob, 2015; Van den Brink, 2016). According to Aminoff, Valkokari, and Kettunen (2016, p. 629) this means that “companies need to build new collaborative networks for value co-creation”. Therefore a building that truly fits within the Circular Economy requires “[...] a systematic approach and will need new forms of cooperation among multiple actors operating in different parts of the supply chain [...]” (Kazemi, 2016; Prins et al., 2015, p. 455). Therefore the shift towards a Circular Economy implies an inter-organizational collaboration challenge (Van Staveren, 2016), whereby existing parties get new roles and new organisations will participate in the real estate development process. But since there is discussion and ambiguity among market parties, these parties do not succeed in delivering circular real estate development projects.

**Sectoral relevance**

The service provider plays an important role in the shift towards a circular construction sector because this organization is the central ‘spider in the web’ that should align demands of the clients with services provided by the service suppliers (De Grauw, 2015). In the interviews held by Van den Brink (2016) it was said that developers and contractors see themselves as the new service provider since they are already the coordinating and assembling party within the industry. In current real estate development processes the real estate developer is therefore already the ‘spider in the web’. Because they have already obtained the needed competences it can be hypothesized that real estate developers can change their role into service provider (Nozeman, Fokkema, Laglas, & van Dullemen, 2008). However, a research gap exist how to successfully implement PSS business models, this because the PSS literature has not discussed business models extensively (Reim, Parida, & Örtqvist, 2015).

Real estate developers themselves are willing to innovate and change towards service providers. Example of this is OVG Real Estate, which by introducing a new strategy
opts for a more user-centred approach. However, since other actors are not willing or capable to change their role, the real estate developer is hindered by changing its business model towards a PSS-business model. Real estate developers are generally spoken capable to drive this innovation since they are most often the client in the development process are therefore in the lead (Miles et al, 2000). Therefore real estate developers should find a way to provide incentives for other actors to enable and force change.

The biggest shift in responsibilities lies at the side of the suppliers. These organizations currently only deliver their products during the realisation phase of a project. Hereby they sell their products towards their clients and transfer their products – and related responsibilities – towards them. When shifting towards a Performance-Service-System, they remain ownership of their products and keep their responsibility to maintain, operate and re-cycle them. However, currently these suppliers are not willing to take their responsibility over their products and are therefore not willing to shift towards a servitised real estate sector.

The lack of innovation at the side of the suppliers is also caused by the fact that financial institutions such as investors or banks do not want to accept the concept of real estate as a service. In A CE, the responsibility and ownership of products remain at the side of the supplier. Therefore suppliers need more equity to keep supplying products, this equity should be provided by investors but they do not accept real estate as a service.

Relevance for the graduation company
In the different business models developed by Van den Brink (2016) it is assumed that the roles of the main-contractor and developer will disappear when a consortium is formed to realize circular construction projects. Currently, these parties play a central role within the construction process and it is highly probable that these parties do not want to forfeit their positions in the real estate industry. Therefore it is essential for real estate developers themselves to have knowledge about the possibilities to become service providers and what this implies for their operations.

Zuidema (2015) states that the power of public and private investors, developers and corporations has shifted towards a more bottom-up and end-user centred real estate market. De Ridder and Vrijhoef (2007) mention that in this end-user centred market, the aim is to create, deliver and capture value for the end-user by offering integrated scalable solution that are flexible to adapt to the demands of their users. In this, a shift takes place from a demand-driven supply towards a supply-driven demand.

In their new strategy, the graduation company sets this trends and transforms their business model “From a time-consuming client-driven process to a scalable user-centered product”. Hereby, products and processes will be standardized as much as possible and collaborations with key players will established to standardize products. This relates closely to the implications of offering service products in PSSs. The supply chain management literature suggests that when the real estate sector will implement integrated service models, supply chain integration will take place and
integrated product concepts will be developed (De Ridder & Vrijhoef, 2005; Vrijhoef, 2011).

## Time planning

<table>
<thead>
<tr>
<th>Steps</th>
<th>Question</th>
<th>Action + outcome</th>
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<tbody>
<tr>
<td>Step 1a:</td>
<td>Observation</td>
<td><strong>Explorative literature review</strong></td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td><strong>Shift to Circular Economy is hampered by organizational issues</strong></td>
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<tr>
<td>Step 1b:</td>
<td>Specification</td>
<td><strong>Explorative interviews</strong></td>
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<td></td>
<td>What is known about service provision in the real estate sector?</td>
<td><strong>Systematic literature review</strong></td>
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<td>Real estate developers are willing to shift, but suppliers and financiers hinder this</td>
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<td>Step 2:</td>
<td>Induction</td>
<td><strong>Systematic literature review</strong></td>
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<td>Organizational system of a circular real estate development project</td>
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<td>P2</td>
<td>Step 3: Deduction</td>
<td><strong>Case 1</strong></td>
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<td>How are organizations collaborating and interacting currently in circular real estate development projects?</td>
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<td>Cross-case synthesis</td>
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<td><strong>Current interaction in circular real estate development projects</strong></td>
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<td><strong>Drawing lessons</strong></td>
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<td>Step 4:</td>
<td>Testing</td>
<td><strong>Lessons for actors in circular real estate development projects</strong></td>
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<td>What lessons can current circular real estate development projects learn from the proposed theoretical framework?</td>
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<td>Step 5:</td>
<td>Synthesis</td>
<td><strong>Expert meetings</strong></td>
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<td>What instruments and means could real estate developers use to incentive actors to deliver circular services?</td>
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<td></td>
<td><strong>Possible instruments and means for real estate developers to incentive actors</strong></td>
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