Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before
P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	**Elena Grimbacher**
Student number	5626536

Studio		
Name / Theme	Metropolitan Ecologies of Places	
Main mentor	Dr. Dipl. -ing. Alexander Wandl	Department Urbanism Section Environmental Technology & Design
Second mentor	Dipl. -ing. Birgit Hausleitner	Department Urbanism Section Urban Design
Argumentation of choice of the studio	As an urban planner I am interested in research towards applicability of the urban planners practice and role. The way it impacts our daily lives and how the results of research could tackle future challenges. I am interested in engaging conversations between stakeholders to enable a future with integrated transition towards a more liveable, socially, and equal world. As for the present it would require a systemic change. Thus, the systemic design thinking, and methods for spatial circularity which is supported by the Environmental Technology & Design Section of the MEP studio is a great opportunity for me exploring the current and potential circular flows of our everyday life. I'm interested in complex systems, how they are interconnected, how society is changing, and the challenges that will be confronted in the future. Urbanization and daily living are under strain due to the challenge of resource scarcity in the future (Velenturf and Purnel, 2021). It calls for a change in our everyday life and rethinking. Asking how the public and private spaces, as well as their spatial reconfiguration, particularly in our day-to-day systems, might play a significant part in the co-creation of more circular systems. Using community initiatives in the design of circular systems to empower individuals to act as agents for change towards a more sustainable future (Berger and Ziemer, 2017). I would like to work on how to engage local people with their agency and values: cultural, social, economic, ecological, aesthetical (Leclercq and Smit, 2021; Velenturf and Purnel, 2021). Realising the potential they can play in the shift to a more circular economy. To do this, I want to comprehend the spatial consequences of regional organisational, economic, social, and environmental flows in what dimensions, and then design strategies for how the circular economy and new neighbourhoods might be spatially transformed locally.	

	My understanding of economic flows at the regional level is a key starting point for my research since it will help me address the systemic shift towards a circular neighbourhood. Staring by identifying the key social sustainability issues and values faced by our society as we move towards a circular economy (Mies and Gold 2021). And simultaneously analysing the urban metabolism of the neighbourhood within the social-ecological system. The MEP studio would be in line with my interest in a place-based and systemic approach, allowing me access to regional understandings. Assisting me in comprehending the fluxes from the scale of the region to the level of the neighbourhood. The studio supports me rethinking the way we currently approach systemic circularity and include material flow into our systems of everyday life. References: Berger, H. M., & Ziemer, G. (Eds.). (2017). New stakeholders of urban change a question of culture and attitude? (Ser. Perspectives in metropolitan research, 4). Jovis Verlag GmbH. Izdebska, O., & Knieling, J. (2020). Citizen involvement in waste management and circular economy in cities: Key elements for planning and implementation. European Spatial Research and Policy, 27(2), 115–129. https://doi.org/10.18778/1231-1952.27.2.08 Leclercq, E. M., & Smit, M. J. (2021). Waardevolle wijken: Het creëren van waarde in wijken door het gezamenlijk sluiten van grondstofkringlopen. Delft University of Technology. Mies A., Gold S. (2021). Mapping the social dimension of the circular economy, Journal of Cleaner Production, Volume 321. Obersteg, A., Arlati, A., & Knieling, J. (2020). Making cities circular: Experiences from the living lab Hamburg-Altona. European Spatial Research and Policy, 27(2), 59–77. https://doi.org/10.18778/1231-1952.27.2.05 Velenturf A.P.M. and Purnell P. (2021). Principles for a sustainable circular economy.

Graduation project	
Title of the graduation project	Circularity of the Everyday - Pattern language as a co-design method to approach the transition towards circular built environment of everyday life in Dutch post-war neighbourhoods
Goal	
Location:	Schalkwijk, Haarlem, NL
The posed problem,	The current expensive use of primary resources through production and consumption is wasteful and causes social and economic threats such as climate change, biodiversity loss and pollution of air, water and soil (PBL 2023). Therefore, the Dutch government has set a target to be 100% circular by 2050 (Government of the Netherlands, 2016). However, the urgency of the resource problem has further increased and without a radical system change this target is not achievable (PBL 2023). Global resource use is expected to double by 2060 if current policies remain unchanged (PBL 2023). However, current policies and improvements are taking place in the industrial sector (macro) and the materials sector (micro) (Prendeville et al. 2018). How and what role neighbourhoods play in accelerating the transition to a circular economy has yet to be determined (United Nations Environment Programme).

	However, neighbourhoods hold great potential for closing loops (Codoban & Kennedy 2008; Pomponi & Moncester 2017). The current approach to the circular economy focuses mainly on circular practices in business and industry. According to Williams, the Ellen McArthur Foundation's Resolve concept, a widely used approach to implementing the circular economy, is not suitable to be applied to a city and disregards the scales at which resources flow (Williams, 2019). This fails to acknowledge the socio-ecological systems in which the economy is embedded. Moreover, socio-technical systems need to be more integrated into the socio-ecological planning and there is a lack of integration of horizontal sub systems that provide the transition towards circular economy (van der Leer et al., 2018). However, building upon communities within local natural environments may create a new opportunity of planning and design for horizontal and vertical urban circular systems (van der Leer et al., 2018). Furthermore, we currently focus on individual consumption, which is part of the current linear consumption pattern that is unsustainable (Bärnthaler et al., 2021). There is a lack of public policies that enable a secure supply of basic goods and services (Bärnthaler et al., 2021). This shows the potential for the development of a co-creation process to develop public policies and spatial design principles that enable access to circular action in daily life. References Bärnthaler,R.;Novy,A.; Plank, L. The Foundational Economy as a Cornerstone for a Social–Ecological Transformation. *Sustainability* **2021**, *13*, 10460. https://doi.org/10.3390/su131810460 Codoban, N., & Kennedy, C. A. (2008). Metabolism of Neighborhoods. *Journal of Urban Planning and Development, 134*(1), 21-31. doi:doi:10.1061/(ASCE)0733-9488(2008)134:1(21) Government of the Netherlands. (2016). *Circular Dutch economy by 2050*. Website accessed on 11.062023. https://www.government.nl/topics/circular-economy/circular-dutch-economy-by-2050 PBL. (2023). *Integrale Circulaire Economie Rapportage* Planbureau voor de Leefomgeving. https://www.pbl.nl/sites/default/files/downloads/pbl-2023-icer-2023-4882.pdf Pomponi, F., & Moncaster, A. (2017). Circular economy for the built environment: A research framework. *Journal of Cleaner Production*, *143*, 710-718.https://doi.org/10.1016/j.jclepro.2016.12.055 Prendeville, S., Cherim, E., & Bocken, N. (2018).Circular Cities: Mapping Six Cities in Transition.*Environmental Innovation and Societal Transitions*, *26*, 171-194 van der Leer, J., van Timmeren, A., & Wandl, A. (2018). Social-Ecological-Technical systems in urban planning for a circular economy: an opportunity for horizontal integration. *Architectural Science Review*, 61(5), 298-304. https://doi.org/10.1080/00038628.2018.1505598 Williams, J. (2019). Circular cities. *Urban Studies*. https://doi.org/10.1177/0042098018806133
research questions and	Main research question:

	How can a **co-creation approach** lead **to spatial design** principles that enables **circular actions** of **everyday life** and facilitates a liveable **circular built environment** in Dutch post-war neighbourhoods? Aim: The research aims for a design of spatial principles with a co-creation process that supports the development of a pattern language for circular actions in a circular built environment in post-war neighbourhoods. Using pattern language as a co-creation approach, the study seeks to promote circular action sin the everyday life of the residents while addressing systemic spatial design for a circular neighbourhood. Sub research questions A: What is the ecological, social, aesthetically, economic and cultural value in the neighbourhood of Schalkwijk based on the circular activities of the everyday life? A – Aim : Identification and visual representation of current circular activities and values in post-war neighbourhood to define the focus area, the scope, and their boundaries for identifying leverage points of values, the everyday life, the foundational approach. B: What are the current social-ecological urban metabolic flows focussing on the water, food, energy NEXUS resources of daily activities on neighbourhood scale in Schalkwijk? B – Aim: Understand and Identify preconditions and dimensions of the social-ecological urban system on neighbourhood scale. C: What are the spatial circular patterns that can increase the circularity and enable access to circular actions in the everyday life? C – Aim: Developing the spatial design elements that address the leverage points for circular resource flows and circular actions in everyday life. Designing accessibility to circular activities in everyday life. D: How can the pattern language be translated to a spatial design proposal for a circular neighbourhood in Schalkwijk? D- Aim: Developing and testing how the pattern language can be translated into a spatial neighbourhood design for Schalkwijk and how that can be integrated into a co-design process.

	E: How can pattern language as a co-creation approach facilitate developing spatial neighbourhood design principles for enabling circular actions in Schalkwijk? E- Aim: Design and evaluate pattern language as a co-creation approach and process.
design assignment in which these result.	Main outcome: - A Pattern language as a co-design method to approach the transition towards a circular built environment of everyday life in Dutch post-war neighbourhoods - A catalogue with a pattern language that can guide post-war neighbourhoods to enable circular actions. - Patterns/ Spatial design that can be given to the Living Lab In Boerhaavewijk so they can include circularity in their proposal for the redevelopment of Schalkwjik. - Intermediate outcomes: A: Co-exploration and Leverage points identified/with its challenges and opportunities. Values spatially visualised. Beginning of Giga map. B: Social-ecological metabolism analysis Mapped system & network of stakeholders – the relevant actors are identified and engaged C: Development of pattern language and co-design Leverage points for spatial interventions identified Catalogue for Circularity of the Everyday in Schalkwijk D: Spatial proposal for the circular neighbourhood Design and strategy for circular actions in Schalkwijk E: Pattern language as a tested co-creation approach Activation and integration of the stakeholders
[This should be formulated in such a way that the graduation project can answer these questions.	

The definition of the problem has to be significant to a clearly defined area of research and design.]

Process

Method description

This project will be based on the approach of research through design. By researching qualitative and quantitative data and testing the research findings through design, in this case by developing a pattern language, the design can then be tested again in a research setting.
By using the pattern language as a research and design tool, an exchange of research and design can take place through a co-creation approach. The pattern language can serve as a research and design method. It can complement the co-creation approach by providing a structured and systematic way to capture and share knowledge. It can help identify and apply design patterns that take into account the complexity of social-ecological urban systems and facilitate the development of sustainable and resilient neighbourhoods.
The pattern language supports the development and exploration of the strategic approach.
The pattern language decodes the links between scale and theme. The ability to interpret and evaluate the pattern language helps to understand and design circular interventions at neighbourhood level.
In this paper, pattern language is used as a co-creation approach in systemic design to understand the theory and possible spatial implementations for a circular neighbourhood with circular actions in the everyday life of residents in Boerhaavewijk.
It will be evaluated in which way the pattern language can be used in a co-creation approach to develop a spatial proposal for a post-war circular neighbourhood.

The basis of this research and design process is the systemic design approach, as it also works together with the co-creation approach and takes into account the diversity and complexity of the project.

Methods being used to answer the research questions:

Circular Value Flower
A conceptual analysis model and design method. The Circular Value Flower method is a systematic analysis of initiatives to show how the resource cycles can be closed on local scale and creating various values. This method is great to integrate a place-based co-creational systemic design. It will be tested how it could be combined with the pattern language design. It will be used as a co-evaluation method for defining the values connected to circularity in the neighbourhood.

Policy Analysis
Analysing and reviewing various policy documents and visions and plans form the region, the city and the neighbourhood are being analysed to understand the former and planned transformation and policies and possible changes in connection with circularity that the neighbourhood is facing. Reviewing it with the national and European goals.

Fieldwork
Observing and analysing neighbourhood characteristics, spatial layout, and identity through on-site visits, photography, and qualitative research methods like snapshot analysis.

Interviews
Conducting interviews with randomly selected participants during field trips to gain deeper insights into everyday life, activities, values, and perceptions of the neighbourhood.

Micro Stories

Micro stories are a method of making the everyday life of the residents in the neighbourhood more tangible. Identifying the daily activities of the people and visualising them in stories to being able to identify with the life of the person.

Way of storytelling and creating persona's, and analysing the neighbourhood on a

Via social media it is easy to gain insight in life of people which I plan on analysing Facebook, twitter and Instagram and google maps to gain an insight and form that information gathering information creating a persona (Hobson,2020).

Micro stories take many forms, ranging from text to audio, visual, location, emotional state, and anything else people consider important. (Jain & Slaney, 2013).

Interactive Community Engagement/
Co-Exploration:

Engaging stakeholders in workshops for testing, evaluating, and co-designing circular initiatives.

Flow analysis

The goal is to identify, define and map the NEXUS (water, energy and food) flows in the neighbourhood of Schalkwijk in Haarlem and identify actions in everyday life that could aim for closing the resource loops and creates synergies in the management of the resources. It is part of the urban metabolism analysis.

1. Quantitative data analysis and literature review
2. Mapping data spatially
3. Creating systemic sections for resource flows and over layering, identifying synergies spatially, action wise and stakeholder wise.

Mapping/ Participatory Mapping

Understanding and visualising the spatial interrelations between the circular dimensions and the social and environmental aspects. And eventually even doing this in a co-creation session with stakeholders. This qualitative method is used to interpret the analysis conducted by field research, literature, data analysis and geodata and created a spatial overview on different scales. Identifying the places for transformation and synergies and opportunities and challenges by mapping.

GIGA-mapping

Provides an example of a method that is both systemic and designedly. GIGA-mapping creates an information cloud for visualising complexity from which a designer can derive innovative solutions (Sevaldson, 2011).

GIGA-maps are a visualization tool that helps depict complex information gathered during a systemic design inquiry. They provide a multi-scale, multi-layered framework to visualize system boundaries, connections, and interactions across different domains. These synthetic and flexible maps integrate various elements and offer a comprehensive representation of societal-level challenges, including proposed actions for improvement and potential future systemic effects (Ryan, 2014).

Ryan, A. (2014). A Framework for Systemic Design. *FormAkademisk - Forskningstidsskrift for Design Og Designdidaktikk*, *7*(4), 1–14. https://doi.org/10.7577/formakademisk.787

Sevaldson, B. (2011). GIGA-Mapping: Visualisation for complexity and systems thinking in design. *Nordes, (4).*Retrieved 11.6.2023, from https://dl.designresearchsociety.org/nordes/nordes2011/researchpapers/15/

Precedent Studies:

Analysing existing projects with circular activities to identify key roles, structures, and spatial elements that contribute to circularity. Site visits, interviews, and website analysis are conducted to gain insights.

1. Choosing references according to circularity aspects socially and spatially
2. Analyse the spatial and social and ecological aspects according to the NEXUS
3. Summaries the references
4. Develop design principles/ patterns accordingly
5. Test these patterns in a co-creation process
6. Evaluate the outcome of this process

Maximization Method:

By designing the most extreme scenario possible for one direction, the maximum potential for this possibility is being fulfilled. Especially with trying to achieve and identifying the biggest potential for a maximum flow in the neighbourhood this method could be used to develop extreme and explorative scenarios. This method can be used as 'on desk design' and could be conducted by the researcher and designer and then then to be evaluate and added by the involved stakeholders. The optimisation phase after the identified values of each stakeholder and their interest can be used to conclude to an optimises future circular scenario for the neighbourhood.

Personas

It is a description of a fictive person, that per se could exist in the neighbourhood and could be representative character for a human centred Design. It should feel like we could meet the 'persona' on the street, so it needs to be identifiable, thus I will use chatGPT to develop precise descriptions of the personas.

Stakeholder analysis

Identifying stakeholders in the neighbourhood and relevant for circularity I the area. Via Network analysis
(Literature review, policy review, social media research, fieldwork, interviews, analysis KIEM living lab)
Snowball method
Social-ecological network analysis (SENA)

Literature and general practical preference

Pattern language

- Nikos A. Salingaros (2000). The structure of pattern languages. *Architectural Research Quarterly,* 4, pp 149162 doi:10.1017/S1359135500002591

Analysis of the Pattern Language developed by the Cities of Making

- Hill, Adrian V (ed.). (2020) Foundries of the Future: a Guide to 21st Century Cities of Making. With contributions by: Ben Croxford, Teresa Domenech, Birgit Hausleitner, Adrian Vickery Hill, Han Meyer, Alexandre Orban, Víctor Muñoz Sanz, Fabio Vanin and Josie Warden. Delft. TU Delft Open, 2020.

Value flower as anlysis and design method:

- Leclercq, E.M.; Smit, M.J. (2023). Circular Communities: The circular value flower as a design method for collectively closing resource flows
- Expertise meeting with Els Leclercq

Precedent studies:

- Appendino F., Roux C., Saadé M., Peuportier B. (2021). The circular economy in urban project: a case study analysis of current practices and tools*. Transactions of AESOP,* 10.24306/TrAESOP.2021.01.006 . hal-03402042

Precedent studies of the Living Lab:

- Living Lab Boerhaavewijk: een nieuwe kijk op de na-oorlogse wijk – AP+E en Studio dmau, https://www.instagram.com/kiem.proeftuin/

Micro stories:

- Vecchio, G.M. (2020). Microstories of everyday mobilities and opportunities in Bogotá: A tool for bringing capabilities into urban mobility planning. *Journal of Transport Geography, 83*, 102652.
- Small stories and tangible examples, like the transformation of a traditional snack into a sustainable alternative, play a crucial role in illustrating and promoting everyday circularity (Hobson, K. 'Small stories of closing loops': social circularity and the everyday circular economy. *Climatic Change* **163**, 99–116 (2020). https://doi.org/10.1007/s10584-019-02480-z)
- Micro stories take many forms, ranging from text to audio, visual, location, emotional state, and anything else people consider important. (R. Jain and M. Slaney, "Micro Stories and Mega Stories," in *IEEE MultiMedia*, vol. 20, no. 1, pp. 86-90, Jan.-March 2013, doi: 10.1109/MMUL.2013.6.)

Snapshot Analysis:

- https://covid19.gehlpeople.com/files/report.pdf

Mapping

- https://geoapps.noord-holland.nl/kaartenportaal/apps/MapSeries/index.html?appid=e85fc52939f240ba9ef5164b5e203fb2&entry=2
- Wijk- en buurtkaart 2022
-
-

Space Syntax:

- https://www.smog.chalmers.se/tools

Giga mapping as tool for social-spatial analysis

- Chen Y., Davidová M., and Wuff F. (2020). Gigamapping as a Toolkit for City Analysis. *Proceedings of Relating Systems Thinking and Design*. URL: https://rsdsymposium.org

Flow analysis:

- Codoban, N., & Kennedy, C. A. (2008). Metabolism of Neighborhoods. *Journal of Urban Planning and Development, 134*(1), 21-31. doi:doi:10.1061/(ASCE)0733-9488(2008)134:1(21)
- REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism D3.3 Process model for the two pilot cases: Amsterdam, the Netherlands & Naples, Italy
- AMICE-data from REPAiR Project
- ESTAT

Foundational approach:

- Bärnthaler,R.;Novy,A.; Plank, L. The Foundational Economy as a Cornerstone for a Social–Ecological Transformation. *Sustainability* **2021**, *13*, 10460. https://doi.org/10.3390/su131810460

Policy analysis:

- PBL. (2023). *Integrale Circulaire Economie Rapportage* Planbureau voor de Leefomgeving. https://www.pbl.nl/sites/default/files/downloads/pbl-2023-icer-2023-4882.pdf

- Government of the Netherlands. (2016). *Circular Dutch economy by 2050*. Website accessed on 11.062023. https://www.government.nl/topics/circular-economy/circular-dutch-economy-by-2050

- Gemeente Haarlem (2022), *Omgevingsvisie Haarlem 2045, Toekomstbestendig, vergroenen, verbinden en ontmoeten.* Retrieved on the 11.06.2023 from https://www.commissiemer.nl/projectdocumenten/00008888.pdf

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

The relation between my final project "Circularity of the Everyday" and the MEP studio is that it is a systemic design and place-based approach that focuses on designing systems for places and daily life. Moreover, I am working within the social-ecological metabolic system, which is one of the MEP studio topics. This studio provides my project a context for studying ecological systems in metropolitan areas and their potential for fostering sustainable and circular practices.
Exploring the possibilities of co-creation and the development of pattern languages - the transformation to a circular economy - is a current topic at TU Delft, as the Circular Economy Hub has been in place for a few years (since 2017) and the bachelor's programme newly also focuses on the circular economy at

neighbourhood level. Therefore, this project is interesting for me because I think this is a relevant topic for the future and will continue to develop.
Moreover, the Dutch government's goal of moving to a 100% circular economy by 2050 has not yet been achieved, and according to recent reports, there is still a long way to go. So there needs to be a fast transition. Specifically in the circular economy, most of the focus has been on the regional and material level. In my field, urban design, it is possible to work this transition in the urban sector.
The Master track 'Urbanism' provides me with the necessary knowledge and skills needed for my thesis and connected me to inspiring fellow students and mentors. It enables me to work on the implications of circularity in the everyday life of people connecting the environmental technology with human-based design. The environment at TU Delft gives me the opportunity to research and investigate this topic, and the expertise I gained in the first year of my Master's degree in Urbanism has given me a comprehensive understanding of how planning can be done here in the Netherlands. This is also the reason why I chose the Netherlands as the setting for my project. The English-language Master's programme in the Netherlands gives me the opportunity and academic platform to study the environment and systems here in the Netherlands, which gives me an insight into the structure of this country.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework?

The relevance of my project is to contribute to the ongoing discourse of Circularity in the built environment, to fill the knowledge gap at the neighbourhood level and to explore the transformation of shared spaces into resilient and liveable communities based on circular action in daily life. And also educating people about circularity due to the co-creation approach engaging conversations about that topic.
Furthermore, this project is in line with the ongoing research and focus of TU Delft and the Circular Built Environment Hub and addresses the 'neighbourhood' lens of the Scales to Aspect Framework. The urgency and importance of the transition to a circular economy also makes this project relevant to the national goal of the Netherlands.
Furthermore, I would like to explore how the built environment and everyday space can change in the future to create resilient communities and liveable environments. So this project aims to design a future that creates a sustainable and liveable environment for future generations. By analysing current systems and identifying key challenges that could be improved, the aim is to create a more sustainable transition into the future as currently predicted.
Also relevant to the social framework is the extent to which the co-creation approach can engage real actors and what the outcomes are. The question arises to what extent co-creation influences the design part. The two methods - integrating the pattern language with the value flower method for integrating spatial elements - are also examined.
In general, the focus is on an integrated strategy through the application of a co-creation approach that focuses on integrating the social and environmental aspect into the concept of circular economy. The social relevance is to create awareness of possible transitions and to communicate the strengths and opportunities of interaction with urban development processes. Improve social mobility and reduce barriers to enable equal access to opportunities and circular activities.