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**Thesis title:** Reconfiguring workspace configurations for a sustainable future: Understanding the links between new working trends and the sustainability of workspaces in a post pandemic reality.

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## Reflection

This thesis is part of the Management in the Built Environment track from the MSc in Architecture, Urbanism, and Building sciences (AUBS) at TU Delft. It aims to contribute to the creation of a more sustainable built environment- one of the main objectives of the master programme.

Its connection with the track Management in the Built Environment lies in its relation to the discipline of Real Estate Management (REM). The thesis attempts to understand the link between hybrid working processes and the energy consumption of a building, to optimize the management and utilization of workspaces such that it benefits CRE professionals, business owners and end users.

## Relevance

**Societal relevance:** Office buildings reflect the times we live in and the people who occupy them (Gillen, 2019). As Duffy (2001:216) noted, *“the meaning of the working environment cannot be taken for granted in times of change, because the office is such a precise mirror of attitudes.”* We are currently in a very transient period with workforces becoming more agile and office work becoming more collaborative. Increased digitization in recent years along with pandemic induced flexible working model are bound to affect both the design, occupancy patterns, operation of offices and consequently the human-building interaction (Mantesi et al., 2022). This study aims at providing new information about a dynamic topic that is starting to be critical. While there is research on the productivity impacts of hybrid working, this study attempts to offer a holistic understanding of hybrid working across multiple scales so that it can be valuable for built environment professionals as well as the end user of space.

The **scientific and professional relevance** of this subject lies in the fact that while the concept of remote working has been prevalent from the 1970's, the blended strategy of hybrid working is more recent and has completely overhauled work processes during the last four years. This thesis attempts to address the gap found in the literature review between this new working process and its impact on the energy consumption of the built environment.

Furthermore, COVID-19 is expected to affect how we use buildings in the future, thereby changing our approach to the design of such buildings. Given the increasing urgency of addressing climate change, it is important to study and understand this subject to contribute solutions of value. The findings can benefit both corporate real estate managers and business professionals to achieve a more efficient, user oriented and sustainable management of their building stock.

## Methodology

The thesis followed an inductive line of research, using a quantitative research design to establish links between hybrid working and the energy performance of workspace and was organised into three phases:

The **first stage** of the data collection involved an in- depth literature review to answer SQ1 and SQ2 and formed the theoretical basis, establishing links and interdependencies between the main concepts. These concepts were

mapped using across different stakeholders using Den Heijer's 4-perspective framework. The exhaustive literature review and theoretical framework laid the foundation for this thesis and were valuable to streamline to the next stages of the research.

The **second stage** of the research involved data simulation and data collection from synthetic modelling and case studies to quantitatively measure energy footprint of hybrid workspaces and employees, to answer SQ3 and SQ4. The stage began with aggregating data relating to spatial and energy standards (office and homes) for the Northwestern Europe and designing typical workspace templates. While this did not pose any major challenges, it did require some time due to my unfamiliarity with the standards in this context. This was then followed by data simulations performed using Energy Simulation Software TRNSYS. This was quite challenging and time consuming due to the steep learning curve associated with understanding this software. This stage concluded with the aggregation of data from two case studies, ING Belgium and Building 28 at TU Delft. ING Belgium served as a source of real time occupancy metrics while Building 28 provided energy usage data as well as occupancy data related to the hybrid working.

The **third stage** involved synthesis and conclusion of the findings. Each data source was individually analysed and evaluated using a SWOT analysis to position the findings. The data from the case studies was also evaluated in comparison to the results of the synthetic modelling, and together this analysis helped substantiate the answers for SQ3 and SQ4. The choice of two case studies which operate in different fields increased the generalisability of the findings. The findings from the case studies were fed back into the system mapping and helped answer the main research question as well as generate practical recommendations for built environment professionals.

### **Transferability**

The results of the thesis have been translated into practical insights for CRE managers, business owners and end users to enable a more conscious understanding and evaluation of their building assets at different scales, by basing it on current working trends. The study primarily targets corporate businesses with a focus on enhancing work processes by understanding the connection between spatial design, employee well-being, and energy efficiency. Additionally, real estate investors, managers, and developers stand to gain insights, especially considering evolving workspace and workforce demands. Moreover, multinational corporations managing global teams might find relevance in the research findings due to the increasing adoption of hybrid work models across different locations. However, there is also a significant societal and urban relevance of this study due to the broader macro level impacts that have been deduced from the results (as detailed in the discussion).

### **Connection to prior experience:**

The practical solutions at different scales which have been included in the conclusions was an attempt to connect my thesis to my prior experience in architecture. This process also made me realise that there are many ways besides practice that one can engage with architecture, and I am keen to explore this further in the future.

### **Personal reflection**

The first few weeks of the Graduation Lab were a bit challenging, but this soon settled with the realisation that my field of interest was Real Estate Management and hybrid working in particular. I found it difficult translating this topic into a viable research thesis due to the expansive scope of hybrid working and struggled to formulate research questions that would produce thought provoking results. However, repeated discussions with my mentors and the fortnightly brainstorming sessions with rest of Theme 08 participants were very helpful to refine the main research question, identify any missteps and organise my literature review and methodology.

While the methodology seems concise and apt for a Master Thesis, I do believe that the topic has the potential to be expanded with the help of supporting qualitative research from practitioners, both employers and

employees. Additionally, due to the broad scope of the study, this phenomenon can also be studied across other industries to increase the generalisability of the findings.

This thesis has challenged me but also rewarded me in ways I did not think possible. As someone with no prior experience in research, I am extremely grateful to have had been mentored by two experts in the field, who despite their extremely busy schedules have been very gracious with their time, access, resources and feedback. Their different perspectives also helped strengthen the quality of my work and have helped expand the boundaries of this research.

One the most surprising aspects has been how much I have enjoyed the process, with all its complexity. Besides the many academic skills I have gained during this year, I have also gained a lot of practical skills that will be invaluable in the next steps of my professional journey.