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## Get smart: the importance of urban facilities management to smart neighbourhoods and their citizens in a project's early stages

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# Get smart: the importance of urban facilities management to smart neighbourhoods and their citizens in a project's early stages

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**Abstract.** The purpose of this paper is to demonstrate how citizen participation as part of Urban Facility Management both as a consideration and practical application can contribute to the positive development of human-centred Smart Neighbourhoods. Through a combination of desk research and data from an ongoing research project in Norway, this paper will use literature to provide a theoretical link between these concepts whilst also showing how this link can be demonstrated in real work projects in the Norwegian Municipality of Lier. The findings illustrate that Facilities Management-focused urban planning processes allow for citizen-optimized communities, well planned and easy-to-implement maintenance strategies that ensure the long-term viability of Smart and Sustainable Cities. The results of this paper can be important for the development of Urban FM as a field, the reorientation of FM as not just a building level concept, but community level and has applicability to the fields of FM, architecture, urban planning, and Smart Cities.

## 1. Introduction

Sustainable considerations in the fields of urban planning and facilities management (FM) require not just a rethinking but in many respects a reimagining of the values, processes and conduct of the processes in the present day.

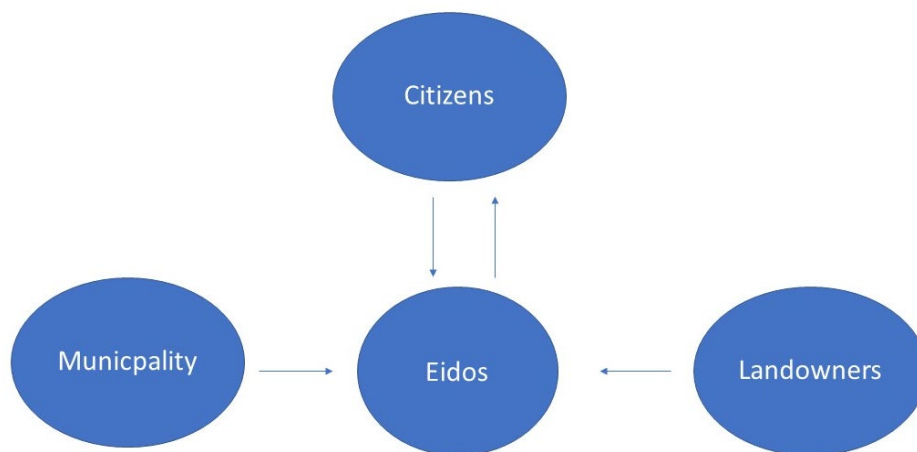
Facilities Management (FM) is more commonly associated with the built environment, however, it is now finding its relevance in the urban environment and bringing its principles into sustainable urban development. It is hard to talk about sustainable urban development in the present day without talking about so-called '*Smart Cities*', an emerging city construct that incorporates technology, data, digital governance and sustainable considerations [1]. A reimagining of what constitutes the city also presents an opportunity for scholars and the industry to rethink urban development. This can involve radical and progressive inclusions such as Urban FM to entrench FM into the Urbanscape, while also fostering the development of Smart Neighbourhoods. This paper will investigate these links from the perspective of one project, in particular, the Smart Neighbourhood project of 'Fjordbyen' situated between the Norwegian municipality of Lier and the city of Drammen (Norway's 6th largest town).

The municipality of Lier is approximately 187 square miles with a population of just over 27,000 people. Located approximately a 30-minute drive from the Norwegian Capital of Oslo, Lier is situated economically as a part of the greater Oslo areas (as is the case with its neighbour city Drammen, in



which a small part of the Fjordbyen project is also located) however it is self-administered and governed. The Fjordbyen project is located on the shoreline of the Oslo Fjord and represents in effect the development of a new large neighbourhood within the boundaries of both the Lier and Drammen municipal authorities. This new development project aims to attract at least 16,000 new residents and 16,000 jobs in a zero-emissions urban area that is green and future-oriented [2]. The work of involved municipalities is supported by consulting companies which are responsible for parts of the participatory process' implementation and analysis. While Eidos, the firm leading the project has been in charge of proposing a preliminary plan to the Lier municipality, the final word of the planning process will be under the responsibility of the Lier municipality [3].

In the development of Smart Cities from a holistic perspective, a *'human-centred'* approach is essential in ensuring that such a neighbourhood is fit for its purpose. Whilst numerous Smart City definitions and studies exist, they mostly focus on the technological and governmental aspects of a city or neighbourhood [4]. As illustrated in section 3.2, there is a need to focus more specifically on the operational level human factors within the development of Smart Cities. Except for a few scholars (see e.g. the work of Lindkvist *et al.* (2020)), the breadth and quantity of such research in this area are limited [5]. This constitutes a driving factor for this paper to further enrich the state of the art. An aspect of the unique nature of this case and its approach is the way that the project is approached in terms of its organisation. The project is led by a company created for the task called *'Eidos'* that operates as a people, private, public partnership (PPPP).



**Figure 1** – “Eidos”- the developer responsible for the Fjordbyen development project

As shown in Figure 1, Eidos is a company that is funding and meets the immediate needs of the municipalities involved in Fjordbyen, as well as the landowners of the land where it currently stands. However, rather than be entirely motivated by the needs of these bodies and their associated profits, they are also heavily accountable to the needs and requirements of prospective Fjordbyen citizens. Furthermore, this is a bilateral relationship where the citizen participation processes provide feedback to the project and Eidos which in themselves result in changes. This exemplifies Eidos as PPPP due to having the citizens themselves as accountable stakeholders.

When looking at what will constitute Urban FM and the Smart Neighbourhood of the future, the consideration of the needs of the citizens that will inhabit ‘Fjordbyen’ is of paramount importance. From resource management to privacy management, to well-being and sustainable places to live and work, a Smart Neighbourhood should be a human-centred experience, and it needs to be included in the planning from the very beginning.

The purpose of this study is to look at how citizen participation can play its part in the creation of a human-centred approach to the positive development of Smart Neighbourhoods. This study will also look at how this is part of the Urban FM scope.

This paper intends to answer the following research questions:

RQ1: In what ways can Urban Facilities Management contribute to the development of Smart Neighbourhoods?

RQ2: Can Urban Facilities Management facilitate citizen participation and the adoption of a human-centred approach to Smart Neighbourhoods?

This paper will begin with the methodological approach to the study, before presenting the results and then answering each research question in turn before concluding.

## 2. Methodology and Research Design

The methodological approach of this paper focuses on three distinct data sets. The first is desk research primarily from academic literature, the second part consists of two surveys conducted by the Fjordbyen project and the third consist of semi-structured interviews focusing on mapping and evaluating the participation processes.

### 1.1. Literature Research

The overarching theoretical underpinning of this paper along with secondary data comes from literature research relevant to the topic. This is primarily sourced from a combination of online searches in Scopus and Google Scholar, as well as books, papers and research from the research project that the paper is affiliated with. In terms of engagement with Scopus and Google Scholar, the primary search terms that were used were “Urban FM”, “Smart Cities” “Urban FM Smart Cities”, “Smart Cities Citizen Participation” and “Urban FM Citizen Participation”. The overall yield is too large to be manageable for the scope of this paper, resulting in significant and relevant pruning being conducted that was specified solely within the context of the subject matter of this paper. With this in mind, the researchers were selective and only used the papers that at a cursory search were relevant for inclusion in this paper.

The research project to which this paper is affiliated with the Nordforsk funded project ‘*Citizens as Pilots in Smart Cities*’ (CaPs) has published several relevant papers which have also been considered in the context of the overall data analysis.

### 1.2. Citizen Survey and Interviews

During the planning stage of Fjordbyen were two large Citizen surveys conducted by Eidos and their consultants. For the project leaders from Eidos, it was important for citizens’ views not just to be considered, but to form a core part of the development of this new neighbourhood from as early in the concept phase as was feasible. In 2020, two surveys were conducted with residents of Lier about what qualities they would consider to be most important in a future neighbourhood or city development.

The first survey was conducted in April 2020 with “young people” (aged between 13-19 years old) and received 233 responses. The second survey consisted of 2407 respondents with half of them being between 46-65 years of age and spread mostly equal in terms of gender balance. The older demographic could also see themselves living in Fjordbyen for 5-7 years

The survey was widely advertised on Facebook and Instagram for two weeks in 2020, using short videos that presented the possibility for young people to participate in the development of Fjordbyen and ending with the link to the online survey. 372 people clicked on that link and 233 of those completed the survey. Most of the respondents were aged 16-19 years old with a majority of female students and claimed that they would consider living in Fjordbyen for 5-7 years [6].

**Table 2** – Overview of Survey Sample

Location	Case	Participation Method	Number of participants/respondents	Municipal stakeholders' goal	Main highlights from the citizens' perspective
Fjordbyen - Lier	Urban redevelopment project. Transforming an industrial area into a sustainable mixed-use neighbourhood to attract capital and citizens	Citizen Surveys (a. on youth aged 13-19; b. general population)	Sample a. 233 Sample b. 2407	Unveil local citizens' expectations for the new development area	A strong focus on wellbeing, better connection to and easy access to municipal services such as Kindergartens

The surveys were mostly using quantitative indicators combined with qualitative elements and were conducted online by general invitation via the local school network for the first survey on youth and by text message to all citizens with a registered address in Lier for the second, wider survey.

### 2.3. Interviews from the Companies and Municipality

Interviews were conducted with Eidos and related stakeholders (such as concept stage architects) on the narrative behind the development of Fjordbyen as well as the challenges and opportunities presented by the citizen participation processes and the project more broadly. Four interviews were conducted in total (three individual, and one group interview) with six individuals in total. Four of the interviews were with Eidos staff, one was with an architect related to the early stage of the project and one member of staff related to the municipality. The interviewees were selected based on their level of expertise and their accessibility concerning the project with which the authors are affiliated. The interviews were qualitative and ranged from 45 minutes to an hour in length. The interviews covered the overall story behind the development of the Fjordbyen project, the narrative behind the participatory processes and the role of citizens in the project's ongoing development, such as future surveys or interviews with prospective future residents. Interview data were rotated through a combination of transcripts and memo-based notes.

## 3. Theoretical Discussions on Urban FM and Citizen Participation

The following section presents the result of the literature study, divided into three theoretical contexts used to frame the discussion part.

### 3.1. Citizen Participation as part of developing Urban development projects

In terms of what constitutes a 'citizen', this can be broadly defined as "*citizens are viewed as empowered actors with resources with which they can contribute to the resilience of their communities*"<sup>iii</sup> [6]. This can be developed to state that Citizen participation is the "*participation of citizens in the planning and administrative processes of government*" [8].

In terms of theoretical frameworks that support these ideas, one of the most widely cited is Arnstein's (1969) model called '*The Ladder of Citizen Participation*'.

According to Arnstein, '*Citizen Power*' rests very much in the qualities of '*partnership*', '*citizen control*' and '*delegated power*' at its most empowering, with many of the other thematic results falling into the less empowering categories of '*Tokenism*' and '*Non-Participation*'. In essence, this framework illustrates the extent of citizens and the types of end products this power will result in. This however isn't a linear '*power = result*' framework which has challenges to this power resting within its perceived simplicity. For example, citizen access to power can be considered as a major depicter of success, it is important to know who has this power, and also how and whether the community will get access to it. Secondly, this power comes in '*grades*' not all of it being empowering [9].

### 3.2. Urban Facilities Management

Urban FM is a concept that is entangled both practically and theoretically within the fields of FM, expanded to the needs and possibilities at the community and neighbourhood scale, not just that of

individual buildings and their portfolios. The use of digital data on FM services on a city scale increases the scope of Urban FM scaling up services traditionally linked to the singular organizational/building scale to the city scale. Technological developments in terms of sustainability create linkages between buildings and districts. Urban FM aims to improve the quality of the physical environment by ensuring inclusivity of communities in an effective, collaborative and interactive governance of urban spaces [10], and design and management of services in the urban environment. The connection between the design of the built environment, the quality of life of individuals, the social structure of society and business development are closely linked together. The Urban FM approach addresses the challenges by acting as an intermediary between diverse stakeholder interests in the built environment and ensuring social value is embedded in with economic and environmental concerns. Urban FM creates new opportunities within the discipline to be an intermediary between public, private and people [10] to reach a balanced relationship contributing to the highest SDGs [11]. The contribution of urban FM to the improvement of the quality of life for the citizens could be realized by stimulating and facilitating their synergistic participation in processes. Smart FM approaches on a city scale can grant the higher well-being of citizens by empowering citizens to create smart and sustainable urban spaces.

Whilst also relatively new as a concept in itself, Urban FM is seeing increasing recognition in academia and practice as being worthy of both research and implementation. The genesis of the term can to some extent be found in Facilities Management. According to the European Committee for Standardisation (CEN), FM can be defined as the “*integration of processes within an organization to maintain and develop agreed services which support and improve the effectiveness of its primary activities*” [12]. This definition was expanded by the International Standardisation Organisation (ISO) which says that FM practices consist of: — *improve quality, productivity and financial performance*; — *enhancing sustainability and reducing negative environmental impact*; — *developing functional and motivating work environments*; — *maintaining regulatory compliance and providing safe workplaces*; — *optimize life cycle performance and costs*; — *improve resilience and relevance*; — *project an organization’s identity and image more successfully* [13].

When combining these two, FM on a broad scale can be considered to be the infrastructure and services of a building that operates to support that building’s primary function.

Urban FM shares many of the qualities of FM but expands to the needs and possibilities at the community and neighbourhood scale, not just that of individual buildings and their portfolios. Urban FM in this sense can also be found to have roots in ‘*Community Facilities Management*’ (Community FM). Community FM can be defined as being the role that facilities and their management plan in community life [14]. Urban FM on the other hand extends this further, by integrating the provision of public service accommodation and community support services [15].

In terms of a more in-depth look at what Urban FM is, Temeljotov-Salaj et al (2020) note that Urban FM is in many respects the result of FM aligning itself to a new sense of what constitutes the ‘*physical place*’. Urban FM’s efforts to improve the quality of the physical environment is its primary focus, whilst ensuring that there is an encompassing and holistic link between the citizens that live in this physical environment, as well as the services that support them [10]. Urban FM also has a place for fostering further innovation in this sector. In Urban FM thinking, it can be considered to be a viable platform for urban communities and citizens to benefit from innovative possibilities and settings offered by the public and private sectors, whilst also considering how these communities are connected at the wider city scale, along with the sustainability impact that comes with it [5]. The impact of Urban FM on sustainable urban development can also not be ignored [1]. With the United Nations Sustainable Development Goals prominently featuring the importance of people and buildings (UN 2020), the possibilities for Urban FM to holistically ‘*stitch these aspects together*’ offers further scope not just to utilize Urban FM in real-world projects [5], but also to innovate to meet the challenges of today, and the challenges we may face in the future.

In terms of how Urban FM fits in in this Fjordbyen project and its participation processes, these processes shape the way that Urban FM will operate. Eidos are keen not just on building a new smart neighbourhood, but also on ensuring that is accountable and optimized for its citizens for the longest

period possible. Whilst community maintenance and management are common in most urban areas in Europe, Fjordbyen aims to take this a step further. By ensuring that ‘facilities management’ thinking is at the heart of the ongoing development of the neighbourhood concept, Fjordbyen can meet the needs of today whilst being sufficiently malleable to prepare for the needs of tomorrow. Whilst expert thinking and competency can help prepare for these challenges, it is only by involving the needs of citizens that these ongoing processes can meet the real needs of Fjordbyens citizens, and not just the common practicalities found in other urban areas and development projects. This is especially crucial during the project development stages to ensure that well-resourced, malleable and citizen-centred Urban FM can be factored into the project at the first possibility.

### 3.3. *Smart Cities*

The study of Smart Cities is becoming increasingly established as a discipline, however, it suffers from the challenges associated with not having a universally accepted definition. For this paper, the definition by Deakin and Al Waer (2011) is adopted. They consider a city to be smart based on four factors. Firstly, such a city should include the implementation of an extensive range of digital and electronic technologies in cities and their communities. Secondly, the usage of information technology to change the lives and work of people living in these areas. Thirdly, implementing a wider spread of the use of these technologies and others at the government level. And finally, using technology to bring people together to innovate and enhance knowledge [17]. In terms of a definition associated with sustainability, the Horizon 2020 project CityKeys published a report in 2017 in which they proposed that follows the triple bottom line of sustainability of social, economic and environmental. In terms of what constitutes a Smart City and thus also the neighbourhood, they state that it must improve the quality of life for its inhabitants (including commuters, students and visitors) (social), improve resource efficiency to decrease pressure on the environment (environmental), a green economy focused on innovation (economic) and develop local democracy and governance (social) [18].

## 4. **Citizen Participation in Smart Neighbourhood**

The following section will outline the citizen survey and the interviews and how this can be linked to an approach to including citizen participation in the development of a smart neighbourhood.

### 4.1. *Citizen Survey*

The project leaders were interested in knowing the views of young people to make sure that the project was planning not just for the needs of its population for the next decade, but for the next several decades to come. The first survey showed that young people wanted access to restaurants, school cycle routes and festivals, as well as easy access from Fjordbyen to Oslo and Drammen (Fjordbyen 2020).

The respondents from the second survey were interested in the possibilities of hiking and green areas. There was also considerable emphasis placed on the importance of having neighbourhoods designed to be safe for families and the elderly. The proximity of schools, childcare and healthcare services were also of paramount importance.

The results of these surveys were summarized by one of the project's partners, Link Architecture, and then fed into the next planning stage of the project as part of the design and development considerations. This survey is relevant to matters concerning Urban FM, as citizens' needs and the project's broader strategic intentions will be key in developing the overall Urban FM strategy. The respondents were not briefed on the Urban FM implications of the survey, the answers nonetheless helped lay the groundwork for citizen-focused aspects that Urban FM would have to consider in practice.

An important but secondary consideration is how the survey outcome impacted changes in the project more broadly. According to Eidos, for the most part, the survey reinforced the needs and requirements of prospective residents that had been considered in their planning processes. However, the survey did yield some surprises in the data. For example, prospective citizens had been less interested in Fjordside living than they had anticipated earlier in the planning process.

#### 4.2 Interviews with Eidos and the Municipality

The interviews conducted with Eidos and the municipality, as well as supporting literature from Andersen (2020) provide an overview of the citizen-centric considerations of the project and how Urban FM can contribute to their operational level application.

There had been considerations concerning citizens' well-being from the early stages of the project. According to an interview with one of the early-stage planners, Eidos had anticipated before the citizen survey that prospective residents would greatly value good possibilities for recreation and leisure in Fjordbyen. Early concept drawings of the leisure facilities showed a Fjordside harbour filled with leisure boats [3], however, the overall ethos of the project was to make a neighbourhood for all demographics, thus this aspect was dropped for being overly gentrified. Instead, more inclusive leisure possibilities were incorporated into the project such as parks, a coastal walk, good bicycle routes, an artificial island and areas optimised for bathing [3]. When considering what this means for Urban FM, this requires a more concise 'zoning approach' due to the lower density of living spaces to accommodate a large number of leisure spaces. Financially, this lowers the amount of possible purchasable real estate. On the other hand, it fits in with a key tenant of Urban FM, that of improving the health and wellbeing of citizens.

Energy efficiency has been important to the Fjordbyen project from its early days and was heavily emphasised during the group interview with Eidos. One of the interviewees stated that "*this project is all about sustainability. Low carbon emissions, low electricity use, all of it*" and further emphasised that from the cities' design to the procurement processes, sustainable thinking was at the heart of all of these processes. A key aspect of this is microgeneration and using nature to supply some of the neighbourhood's power. This has the potential to present challenges for Urban FM consideration from two separate perspectives. Firstly, the technical aspects related to generating, abstracting, and delivering energy to a population in ways as innovative and unpredictable as naturally sourced renewables. The second challenge associated with this approach is that of wellbeing. According to the results of the group interview, the project presented a considerable challenge in ensuring that Fjordbyen had low consumption of energy whilst also ensuring that the energy cuts did not substantially impact the quality of life of residents. This is partially mitigated through relatively low residential density and lots of natural open spaces to enjoy, but it could still present a neighbourhood issue going forward.

The interviews and supplementary book by Andersen (2020) covering the history of the area and the development of the project emphasise that the '*construction in phases*' approach to this project is a core part of ensuring the best possible holistic approach to its development. What is meant more specifically by this is that starting with the development of the hospital and fjord dredging, Fjordbyen will be built in specific and planned steps [19]. A degree of cost mitigation is a positive outcome of this approach. It also presents possibilities for creating a citizen-optimised community. By working on each step of the project separately it affords the possibility to meet the needs of the stage in which it is built, better ensuring that it is futureproofed. This also presents an opportunity for improved Urban FM operational processes. Ensuring a well-cared-for highly technical smart neighbourhood with a good quality of life will also require a high level of Urban FM infrastructural support to work in tandem with it a possibility better afford a multi-stage neighbourhood development project.

The interview with the project architect for Eidos and the group interview with Eidos also opened discussions about creating a synergy between the occupational and residential aspects of Fjordbyen to strategise their sustainability and proximity. The project advertises that Fjordbyen will host 16,000 residents and almost as many jobs [2] ("Fjordbyen Lier og Drammen" 2021). The interviewees stated that the compatibility of these districts and their sustainability go hand in hand. Firstly, transport infrastructure is incredibly important. A core aim of this project is to allow people to easily live and work in Fjordbyen, as well as still be able to easily travel to Lier, Drammen and Oslo without having to rely on a car [3] (Andersen, 2020). Whilst cars are not banished from Fjordbyen, the project does aim to allow for all these possibilities without using one, and even goes as far as to claim in the interview with the project architect that it would be easier to transverse the city without one. By using bus-orientated



transport hubs for Metroland travel by a good rail link to Lier, Drammen and Oslo, Fjordbyen can become more attractive to residents and businesses by making the area highly accessible.

## 5. Discussion and Conclusion

In the concluding section of this paper, we will address the core research questions that drove the study in turn before concluding.

### 5.1. *Urban Facilities Management's contribution to the development of Smart Neighbourhood*

The surveys and interviews for this study illustrated that the complexity of the project and the three-way division between residential, occupational and recreational areas place Urban FM at the very heart of the operational stage of this project's life. A large emphasis on sustainability, recreation and the demands for high quality will require not just a well-rounded vision going forward, but a high level of infrastructural support. There are obvious needs for neighbourhood maintenance to ensure that Fjordbyen can be a high-quality neighbourhood from a longitudinal outlook. This is a quality entrenched in the previously discussed concept of '*Community Facilities Management*', where the maintenance of groundskeeping of a community or neighbourhood should also reflect the type of routines and standards that are reflected in the indoor built environment. Urban FM offers many possibilities within the scope of its concept, its routine and systems for maintenance and care for a neighbourhood such as Fjordbyen cannot be underestimated.

As mentioned in the previous section of this paper, Fjordbyen intends to be a development project conducted in defined stages over many years. This is a context in which Urban FM can show its strength not just as a malleable construct in neighbourhoods at the operational stage, but also during the planning stages. Interviewees stated that a stage-wise process can control costs, but also allow the neighbourhood to adapt to changes (technological or otherwise) in the years between planning and construction. Involving Urban FM practitioners and systems at this stage can ensure that is possible. Deakin et al (2011) state that a core tenant of a Smart City is that it brings people together to enhance and innovate in the development of a new city, and thus also a community. Urban FM can contribute here by applying its expertise to create citizen-optimised smart communities through good urban planning, early state maintenance routes and implementing strategic longer-term focuses such as maintaining a high level of wellbeing for citizens.

### 5.2. *Urban Facilities Management contribution to the human-centred approach to Smart Neighbourhoods*

Whilst Urban FM is often considered maintenance and infrastructural construct, its definitions (diverse as they are), Lindkvist et al (2020) are clear that it also holds wellbeing to be a core part of the role it has in Smart Cities and neighbourhoods. The interviews and supplementary book by Andersen (2020) indicate that a focus on recreational areas (sometimes at the expense of building more properties) is a core part of the Fjordbyen project where a high level of happiness and wellbeing is vital. The citizens' surveys also reflected this, with all demographics stating their preferences for recreational possibilities in Fjordbyen, ranging from barbeque areas to cycle routes, to places to hold festivals. All of these qualities don't need vision at the level of the development team, but guiding strategic ideas that positively impact the human experience. Urban FM can ensure that recreational areas are vibrant and well maintained to continue to be attractive and welcoming, that streets are clean, and oversee buildings' maintenance. A positive environment such as this is conducive to a high level of well-being where Urban FM's role is critical in the long term.

It is also important to state the link between Urban FM and citizen participation and smart governance. According to Deakin and Al Waer (2011), a high level of technologically supported smart governance is an important quality of a Smart City. This was reflected quite substantially in the Fjordbyen project where Urban FM was a part of the overall feedback process. As seen in various sections of this paper, surveyed individuals were asked directly about their preferences that would have

a direct impact on not just the planning of Fjordbyen, but also the Urban FM infrastructure to support this. Whilst the survey for the most part confirmed the pre-existing plans for the project, it did bring to the foreground some surprises such as the lack of interest in fjord side living stated earlier in this paper. According to Eidos, these types of results were not the ‘tokenism’ present in Arnstein’s (1969) ladder of participation but were a genuine attempt to ensure that the needs of prospective citizens were best met. If a smart neighbourhood’s primary task is to be best optimised for the needs of its citizens, understanding where people want to live and how they want to live is key. Urban FM has an important role to execute its more malleable functions by assisting in these types of plan changes as they go forward, better ensuring that the highest levels of citizen wellbeing can be reached.

### 5.3. Concluding Thoughts

In conclusion, the Fjordbyen project has implemented aspects of Urban FM at the development stage of the project, as well as in the citizen surveys aimed at developing a smart neighbourhood that best reflects the needs of prospective citizens and businesses.

The findings illustrate that FM-focused urban planning processes allow for citizen-optimised communities and allow for well-planned and easy-to-implement maintenance to ensure the long-term viability of Smart and Sustainable Cities. The results of this paper can be important for the development of Urban FM as a field, the reorientation of FM beyond the building level concept, towards the community level and has applicability to the fields of FM, architecture, urban planning and Smart Cities.

What is clear from the data presented here is that the Urban FM has three roles within the project – maintenance (routine and reactive), service and quality optimisation, and ensuring the well-being of citizens.

This paper reflects a specific project in Norway, but the findings present a high level of external validity. Maintenance, service and wellbeing are equally relevant aspects to consider in large urban development projects, as well as smaller community projects and the renovation of older districts. The possibilities offered by Urban FM can also present application in more traditional FM features in the indoor built environment, where the qualities of maintenance, service provision and well-being are also in focus.

In terms of future research, it would be scientifically interesting to test the external validity of these findings and see how they can be reflected in similar projects, larger projects, refurbishments and even individual buildings. If this study could state one core aim, it is malleability. As technology changes, disruptive events intervene and new demands are placed on a planner, having malleable concepts such as Urban FM that impact various development stages are not luxury constructs but are potentially vital in securing a smart community with a high level of overall quality and an excellent standard of citizen wellbeing.

### References

- [1] Lindkvist C M et al 2021 Defining a niche for Facilities Management in Smart Cities IOP (Conference Series: Earth and Environmental Science (EES), 2019. 352(1): p. 1-8).
- [2] 2021 Fjordbyen Lier og Drammen [cited 2021 24th June]; (Available from: <https://fjordbyenlierdrammen.no/>).
- [3] Andersen R 2020 Fra Tømmerterminal til Fjordby Dramman, Norway: Eidos Eiendomsutvikling AS
- [4] Collins D et al 2021 Brought by Degrees: A Focus on the Current Indicators of Lean ‘Smartness’ in Smart Cities (IGLC)
- [5] Lindkvist C et al 2020 Exploring urban facilities management approaches to increase connectivity in smart cities *Facilities*
- [6] Link 2020 Digital medvirkning for ungdom Oppsummering Spørreundersøkelse Innbyggerportal *Link Arkitektur: Lier, Norway*
- [7] Mees H L et al 2019 From citizen participation to government participation: An exploration of the roles of local governments in community initiatives for climate change adaptation in the

- Netherlands *Environmental Policy and Governance*, 2019. **29**(3): p. 198-208
- [8] Simonofski A et al 2012 Investigating context factors in citizen participation strategies: A comparative analysis of Swedish and Belgian smart cities. *International Journal of Information Management*, 2021. **56**: p. 102011
- [9] Arnstein S R 2019 A ladder of citizen participation *Journal of the American Planning Association*, 2019. **85** (1): p. 24-34
- [10] Salaj A T et al 2020 An interactive tool for citizens' involvement in the sustainable regeneration *Facilities*
- [11] Xue Y A Temeljotov-Salaj and Lindkvist C M 2022 Renovating the retrofit process: People-centered business models and co-created partnerships for low-energy buildings in Norway. *Energy Research & Social Science*, 2022. **85**: p. 102406
- [12] (CEN), E.C.f.S., EN15221-1: 2006, in Facility Management - Part 1: Terms and definitions. *European Committee for Standardisation (CEN): Brussels*.
- [13] ISO, ISO 41011:2017(en), in Terms related to facilities management. 2017, ISO: *iso.org*.
- [14] Heywood C and Smith J 2006 Integrating stakeholders during community FM's early project phases (*Facilities*)
- [15] Roberts P 2004 FM: new urban and community alignments (*Facilities*)
- [16] UN. Sustainable Development Goals. 2020 [cited 2020 16th June]; (Available from: <https://sustainabledevelopment.un.org/?menu=1300>)
- [17] Deakin M and Al Waer H 2011 From intelligent to smart cities. *Intelligent Buildings International*, 2011. **3**(3): p. 140-152
- [18] Bosch P S J Vera Rovers (TNO) Hans-Martin Neumann (AIT) Miimu and A a A H (VTT) 2017 CITYkeys indicators for smart city projects and smart cities *CityKeys in conjunction with the EU Commission and Horizon 2020: dataplan.info*
- [19] Fjordbyen. Utviklet sammen med innbyggerne. 2020 [cited 2021 6th December]; Available from: <https://www.fjordbyenlierdrammen.no/fjordbyen-medvirkning/utviklet-sammen-med-innbyggerne>.

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