TOWARDS COLLABORATIVE KNOWLEDGE OF THE RESIDENT EXPERIENCE IN SUSTAINABLE RENOVATION PROCESSES

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ABSTRACT

This research is focused on a social housing renovation process. We as academics develop tools to support the stakeholders in collaborating towards resident acceptance and a zero-energy balance. This paper reports a preparatory step in which we developed and evaluated visualisations. These serve to engage the stakeholders in collaboratively focusing on the residents' experience of the renovation process. We evaluated the visualisations with residents, housing association professionals and building professionals. Academic learnings are that the visualisations evoke stakeholder reflections on the residents' experience of the process that help us to later develop tools for the process. Stakeholder learnings are: the visualisations helped tenants reflect on their experience of the process, they helped housing association professionals reflect on their communication, and they helped building company professionals listen to residents. The visualisations are abstract and general, limiting their usefulness throughout a renovation process, but they form a basis for the further development of tools.

INTRODUCTION

This paper reports on research conducted prior to an innovative building renovation process in social housing. Multi-story social housing is being renovated to become Net zero-energy, which means that on balance, the building and its residents produce as much energy as they consume (Sartori, Napolitano and Voss, 2012). This has rarely been achieved to date for this type of housing. The outcome crucially depends on how residents live in their homes, for example, whether they open windows while the heating is on. The desired outcome of the process is therefore: 'satisfied residents in a renovated, zero-energy building'. To achieve this in the upcoming renovation process, the stakeholder group needs to develop steps and concurrently research how to facilitate the residents in this. We contribute as academic partners by developing tools to help stakeholders collaborate in this development and research. This paper presents an experience account of the early part of the development of these tools. This paper focuses on these collaborating stakeholders:

- the residents
- housing associations: the clients,
- the building company: the contractor,
- academic researchers developing tools to support the other stakeholders.

We call the latter three the 'organisational' stakeholders, to differentiate their activity from that of the residents, which is living their private life. All parties agree that the residents play a central role in the renovation process. However, they differ in their perspectives of their process towards this outcome.

We show in this paper that a set of process visualisations helped tenants become *aware of their own experience* of a renovation process, and enabled the organisational stakeholders to be more attentive to *when to communicate,* and to *listen* more to the residents' experience.

THEORY

VISUALISING PROCESSES

Visualisations have previously proved useful to stakeholders in communicating about their service provision. In a project aiming to design ways to enable service provider teams to manage the clients' service experience, Blomberg et al (2010) report how visualisations served the ethic of Participatory Design by pointing "to the importance of acknowledging workers' own knowledge as the experts in their work domain", and of embedding this knowledge into a designed artefact. The challenge was to support team members' awareness of the wide range of interactions taking place with clients so that the teams could improve the overall client experience.

ACCEPTANCE: GETTING A 'YES' FROM RESIDENTS

In the case reported here, visualisations have a slightly different role: that of communicating about the residents' experience with stakeholders (such as the residents themselves, a housing association and a building company) in a renovation process. The decision to use visualisations in this way was based on our earlier identification of the acceptance process as key in promoting zero-energy performance and later liveability of the dwelling (Boess, 2015). Social housing renovation depends on the residents in a crucial way: Dutch law requires a go-ahead from residents. This differs from product development where users encounter a finished product. Here the resident acceptance process is itself a key object of design.

THE RESIDENTS' EXPERIENCE OF A RENOVATION

In previous in-depth research with ten residents of reference housing (homes of the same build as the social housing that was to be renovated), we invited the residents to talk about their past experiences with home renovations (Guerra-Santin et al, 2017). Some of the participants were tenants and some were owners. From these residents we heard stories of uncertainty and stress ahead of a renovation about what would happen, we heard about unwelcome surprises during renovations, experiences of damage to parts of their home they valued (such as plants), and feelings of not having control. We heard of feeling treated unfairly, not being given sufficient information by their housing association (in the case of the tenants), and we observed their usability problems with new, sustainable home climate systems such as ventilation and heating. These findings suggest risks for resident satisfaction. The challenge for us was thus to communicate about the residents' perspective with the organisational stakeholders in such a way that they could take it into account in the process.

THE RELATIONSHIP BETWEEN ORGANISATIONAL AND RESIDENT STAKEHOLDERS

Given our findings about resident experiences, we aimed to facilitate that the organisational stakeholders learn from the residents. Lee (2008) sketched a continuum of possible relationships during participation processes (Figure 1), directing our attention to the way that the partners interact. The process interaction towards renovation as currently envisaged by the stakeholders is organisation-led: its main goal is innovating to meet European goals for CO2 reduction.

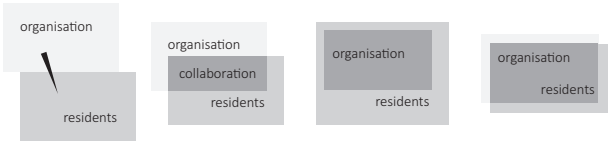

Figure 1: Lee's (2008) visualisation showing these types: left, organisation-led. Second from left, collaborative. Third from left, emancipatory. Right, resident-led.

To facilitate organisational stakeholders in learning from the residents, we sought to shift the process from organisation-led to collaborative, so that the residents' perspective and voice can be heard at each step of a renovation. We present and evaluate three general visualisations we developed that serve to communicate about the necessity of this shift with the stakeholders.

METHOD

VISUALISATIONS

We developed visualisations to facilitate learning about the residents' experience of renovation. We aim to use them in discussion with all stakeholders. We developed the visualisations before any specific renovation project and evaluated them with a representatives of the relevant stakeholders. The visualisations were not developed collaboratively as Blomberg et al (2010) advocated, but by the authors on the basis of prior in-depth interviews and role play activities with residents. We started with a generic visualisation of the building management perspective that would be recognisable for the organisational stakeholders who drive the process. In practice, building management is often organised by a building company serving as contractor on a project. Figure 2 shows a generic example of such a process (based on Wamelink, 2009).

Figure 2. A simplified representation of a standard building management cycle (e.g. Wamelink, 2009). Current Building Information Management process visualisations (BIM) are more detailed, but are also often cyclical and show the same calm and regular progression as this one (for example, Eastman et al., 2011).

We then developed Figure 3 to show the same process depiction as that shown in Figure 2, but from the perspective of the experience of the residents. It shows that in the residents' experience, 'residing' mostly consists of the 'use & repair' activities that are also present in Figure 2, but less prominently. The other three phases of Figure 2 are also present in Figure 3. However, residents encounter them as quite a sudden disruption of their main activity of residing. The outward increase of the segments represents the intensity of experience of the process for the residents and the abrupt transition from the disruption back into their normal life. With Figure 3 we intended to make visible the mismatches between the perspective of the residents and their needs with the organisational stakeholders' perspectives:

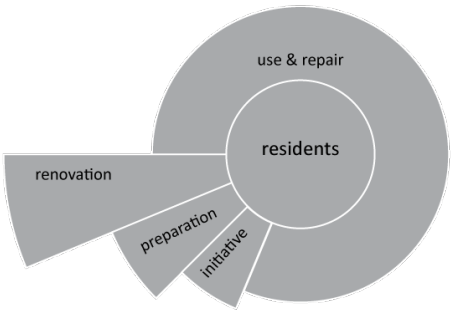

Figure 3. A generalised depiction of the residents' experience of the building management cycle, as a contrast to Figure 2: as a fairly sudden disruption of their activity of 'residing', and as an abrupt increase in intensity of involvement in the renovation, which comes with the need to respond and manage it for oneself.

Having made visible the mismatches, the next aim was to involve the stakeholders in developing learnings on how to bridge the mismatches in a renovation process. In order to potentially shift the process towards a more collaborative one that could take into account the residents' experience of the process and also give the residents more chances to communicate about it, we created a third figure that integrates the organisational perspective and the residents' perspective of a renovation project. The development of this figure was also based on insights from our research mentioned earlier. These were that the process should be extended beyond the direct building measures and include, for example, the direct surroundings of the dwelling because their quality might matter more to residents than, say, dwelling insulation (Boess et al, 2016). Based on these insights, the figure is enriched with more steps to smoothen the process and transition for residents and process managers alike (Figure 4), to make it more fine-grained and to indicate how residents can be enabled to anticipate on next steps.

Figure 4. An enriched general depiction of the residents' experience in the building management cycle (compared with standard process in Figure 2 and the disruptive process in Figure 3).

EVALUATION

The first author conducted the first two evaluation activities. All were involved in the third one. They are:
1. an evaluation of the process experience with tenants. Three tenants in their twenties who are part of the target group but not of a specific project were asked to recall and visualise an experience from their recent past when a major building change was made to their home. They were junior colleagues of the first author of this paper but had no work relation with this author. They were selected because they had experience of a home renovation that was organised by their landlords, and because they worked in design research and were thus familiar with the notion of visualising experiences. The evaluation took place in a 1.5-hour session in a conference room with drawing materials available and was video recorded. I first asked the participants to describe their past experiences with renovations, and then, to evaluate the usefulness to them of representing these experiences in the visualisation, and what they learned from the session. The results are below.
2. an evaluation of the residents' process experience with housing association representatives. I recruited two housing association professionals who cater to social housing tenants through the project network. I asked them too to recall and visualise an experience from their recent past when a major building change was made to their own home, and then to evaluate the usefulness to them of representing these experiences as a process and what they learned. This too was done in a 1.5-hour session in a conference room with drawing materials available and video recorded. The results are below.
3. an evaluation of the residents' process experience with professionals of a building company. This evaluation was conducted in a more informal way than the other two. It took place over the course of several meetings just before the start of a collaboration on a renovation process. It was not possible to record all of these discussions. We presented the visualisations in order to evaluate their appreciation and utility and engaged in conversation with the building company partners on how to structure the process of resident participation. The contact with the building company was extensive, yet the opportunities to implement and evaluate the academic partners' tools were limited, for

two reasons: firstly, because the housing association client set out a short timescale for the renovation process. Secondly, because these stakeholders brought their own perspective and experience to the process, which in turn created valuable opportunities for discussion and insight.

RESULTS

1. EVALUATING THE RENOVATION EXPERIENCE WITH YOUNG TENANTS.

During this 1.5-hour session, the three tenants were first asked to recall a recent experience of renovation and visualise it in the way they saw fit. The experiences they chose to talk about were replacement of windows, repair of wall leakage, and replacement of heating technology. The visualisations they made are shown below, in Figure 5. Each is different. On the left, the tenant drew a cartoon showing a progression of situations (seeing a renovation progress). The middle picture is a drawing showing a pivotal moment (coming home to find the home interior in a mess). In the picture on the right, the tenant drew a schematic showing the steps of the stakeholders. In short, the representations were diverse.

Figure 5: representation choices of young tenants when asked to provide personal stories of a renovation experience

In order to evaluate whether our visualisations presented earlier were meaningful to the tenants and represented their experience, we next showed the tenants the visualisation in Figure 2, above, and requested of them to use this as inspiration to represent the progression of their own renovation experience again, but now in the form of a cycle of use, initiative, preparation and renovation. The result is in Figure 6.

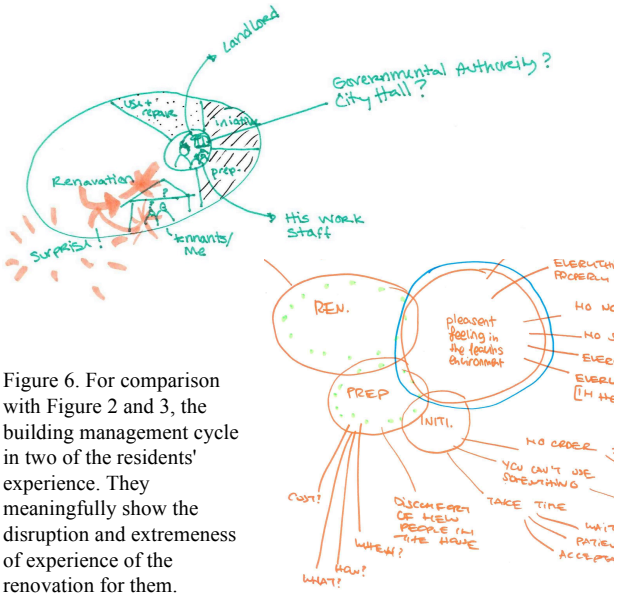

Figure 6. For comparison with Figure 2 and 3, the building management cycle in two of the residents' experience. They meaningfully show the disruption and extremeness of experience of the renovation for them.

Figure 6 shows the visualisations that two of the tenants produced. The tenants' visualisations in Figure 6 show the process out of balance and fraying with surprises and uncertainties on what is happening. The drawing reflect both the suddenness and the intensity of experience brought on by the disruption that the renovation caused in their lives, similarly as depicted in Figure 3. Additionally, the residents were able to pinpoint causes of their concerns, such as uncertainty about how to interact with the municipality. From this session we learned that process visualisations that indicate the resident experience supported the residents in expressing their experiences. We have shown indications that the residents learned to relate their experiences to a process perspective of renovation, which potentially made them better able to communicate with the organisational stakeholders.

2. EVALUATING THE RENOVATION EXPERIENCE WITH HOUSING ASSOCIATION PROFESSIONALS

During this 1.5 hour session, two housing association professionals were first asked to recall an experience of renovation to their own home and visualise it in the way they saw fit. This served to evoke the experience of undergoing a renovation for them. The experiences they recounted were replacement of windows and a major home technology overhaul. The two specialists were a resident advisor and a manager who leads building processes on the client side. Having sketched their own recent renovation experience, they both reflected on uncertainties, stress, inconveniences and unexpected developments that had bothered them in it. They shared experiences similar to the tenants, but because these were about their own homes, the experience of imposition from a housing association as external party was not present in their account. Instead, they reported family conflicts because of joint decision-making. We then showed them the smooth, regular process in Figure 2 and asked them to compare this with the extreme experience in Figure 3. The resident adviser commented on an experience she had in her professional capacity:

"Indeed, this makes me think of a recent (renovation) process that was nearly done, and I was working on the reporting and I thought hey, did we even keep up with the communication on this project? When did we send the last newsletter? It can be very abrupt that it's finished. So I recognise this very well."

The building client added:

"Yes, and it can also go the other way round, you think you'll be finished and then stuff still needs to be done, and you don't really know what to communicate. It can go really weird then."

The resident adviser:

"Things can turn out worse than you thought with an old building, for example if there is more fungus than expected. It means you can get a whole extra process."

The building client, a trained architect, then drew a process herself in which she reflected on how the experience could have strong impact in different ways for different stakeholders, again in reflection on her own prior experience. She drew it with similar peaks as shown in Figure 3 and commented on the intensity of those peaks in her experience. From this session we learned that the visualisations were helpful for housing association professionals to integrate the experience of the residents in the process run by organisational stakeholders such as them. We have shown indications that they learned that they could be more attentive to the residents' experience in their communication processes about renovations.

3. EVALUATING THE RENOVATION EXPERIENCE WITH BUILDING INDUSTRY PROFESSIONALS

In the run up to an actual pilot renovation process, we discussed Figures 2-4 depicting resident experience and organisational perspective with the building company. In this project, the authors mostly collaborated with the marketing manager in charge of the resident communication process and the building manager in charge of the technical renovation process. The building professionals too experienced our process visualisations as insightful, as our previous research participants had done. Throughout the process, 'listening to their experience' would become an often evoked theme in the collaboration. However, the building professionals brought a number of stakes to their evaluation of the visualisations' usefulness. Firstly, in shaping their process they focused on the product to be delivered for the residents: the renovation. Their concern was mainly how to communicate the technical make-up of the solution in a reliable and comprehensible way to the residents. This meant that it was an additional load for them to think in terms of experience, and they sometimes saw it as muddying up rather than supporting their task. Secondly, the building company professionals did not want to allude to any kind of problem with the residents. They wanted to introduce the process to the residents as one of great certainty and care, with a view to obtaining the go-ahead for the renovation from them. They saw the resident participation process as having these steps: 1. 'fetching': 'what are your needs', then 2. 'bringing': 'this is what we offer you', 3. obtaining the 'yes', and 4. keeping close personal contact with the residents to guide them through the inconveniences of the renovation. A third stake of the building professionals was that they wanted to actively avoid some steps proposed in Figure 4, such as 'extend' which would address quality of life in a wider sense, and 'co-creation'. This was not because they wanted to exclude the residents from decision making. Rather, they responded from their prior experience that 'extend' steps (addressing, for example, the safety of the street which would mean involving the municipality) can lead to complications that threaten the feasibility of processes. The company had experiences of municipalities not keeping promises. Regarding co-creation, the company argued that this, particularly early on in the process, would overwhelm residents and create uncertainty and stress. Later, this would turn out to be a valid assessment. When the process of renovation started, the residents demanded a great deal of certainty early on in the process on what would be done. The Dutch requirement to obtain a 'yes' from residents has a side-effect of motivating a building company to remove anything problematic or uncertain from the communication with residents. In the building company's view, 'participation' meant the moment residents say 'yes'. Only when the residents had been reassured and given as much concrete information as possible, did they become more open towards thinking along with the planning process. From this collaboration we learned that processes of renovation have contingencies that quickly go beyond the grasp of general visualisations. We have shown indications that the building professionals learned to listen more to the residents' experience.

DISCUSSION

We have presented an experience account of our efforts to align residents' needs with the process conducted by organisational stakeholders in a renovation project. We developed some visualisations, shown in Figures 2-4, to support the conversation about the process with residents, housing association professionals and building company professionals. The visualisations supported a conversation with each of the stakeholders about the residents' experience of a renovation process. We have shown that a set of process visualisations helped tenants become *aware of their own experience* of a renovation process, and enabled the organisational stakeholders to be more attentive to *when to communicate,* and to *listen* more to the residents' experience. The authors held this conversation separately with each type of stakeholder and it took place ahead of an actual renovation process. It was a knowledge creation process that included all stakeholders, but not yet collaboratively. The conversations brought learnings for each of the stakeholders, including us as the academic partners, that are useful to integrate in future tools for collaborative research among stakeholders. An example of such a tool would be a temporal alignment of process steps and resident communication steps. Only few representatives were involved of each stakeholder. To gain more saturation in the findings, the participant group could be enlarged. For example, only young tenants with experience of visualisations were consulted. The research should be extended to a diverse tenant group.

The findings serve as preparation for an actual renovation process, in order to further pursue the co-creation of knowledge that has industrial as well as academic relevance. Our contribution to knowledge on the collaborative co-creation of knowledge lies in demonstrating how the stakeholders' understandings change by studying process visualisations of the

organisational versus resident perspective of a renovation process, and in identifying *reflection on experience, timing of communication* and *listening* are valuable aspects of collaborative knowledge creation.

While Blomberg et al (2010) advocate "build(ing) ongoing participation into the artefacts", our work presented here had a more preparatory aim: to build acknowledgement of the resident perspective into the process before it starts, and to collect insights from the stakeholders on how to practically achieve this. We contribute to knowledge on this by showing the key learnings of each stakeholder and how they could affect the overall process. Especially the third conversation, with the building company professionals, contextualised the research for us in terms of its usefulness in an actual building process. The organisational stakeholders' actions also remain informed by their organisational experiences (housing association) and technological aims (building company). An issue for future research is how to translate the visualisations we developed into the tools each stakeholder uses throughout the process, and how these could present an integrated picture for the residents. A renovation process consists of a series of steps, of building segments (moving ground, insulating, replacing windows) that have a beginning and an end and need to be checked off. These are much more detailed than our visualisations could cover. Similarly, resident advisers are not usually continually in communication with residents. They time a set of communication steps to coincide with next building steps, though not necessarily completed ones. Visualisations such as ours are valuable in starting up a collaboration and a structured conversation, but are of limited practical value in the process itself. Regarding the resident side, a key discovery in the subsequent process was that they demanded as much certainty as possible at the start of the process, just as the building company professionals had predicted. Our previous research (Boess, 2015) provides a clue as to why this happened: residents often experience housing associations as communicating with insufficient respect or information, while making ineffective repairs to homes. This would explain the residents' strong expressed need to be treated and informed in a trust-building way.

Another practical aspect for the development of tools is the media used. Botero and Saad-Sulonen (2010) pointed out stakeholder issues in a similar process that are due to different media being used. These "in-between infrastructures" as they call them, influence the communication between stakeholders. For example, they found that the municipality in their case study mainly used spreadsheets, which made it difficult to incorporate qualitative insights from residents. In our work the focus was not on the media already in use with stakeholders, but on the possibility of achieving a shareable idea about the process. This was successful. Exploring future tools as "in-between infrastructures" for the stakeholders' communication needs will be interesting for next steps in our work.

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