Gamified Information Systems for Assisted Living Facilities – Relevant Design Guidelines, Affordances and Adoption Barriers

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Abstract. Gamification and gamified information systems (GIS) apply video game elements to encourage the work on boring and everyday tasks. Meanwhile, several research works provide evidence that gamification increases efficiency and effectivity of such tasks. The paper at hand investigates the health care sector, which is challenged with cost pressure and suffers in process efficiency. We hypothesize that GIS may improve the efficiency and quality of care processes. By applying an interview-based content analysis, the paper at hand evaluates gamification elements in an assisted living environment and provides three research contributions. First, insights into relevant GIS affordances and application examples for assisted living facilities are given. Second, assisted living experts evaluate GIS design guidelines. Both the relevant affordances and design principles comprise a basis for the development of a GIS for social workers in assisted living facilities. Third, potential adoption barriers and design guidelines for GIS in assisted living are presented.

Keywords: gamification, GIS, assisted living, nursery, health care.

1 Introduction

Computer games have become a substantial part of everyday life. Meanwhile the gap between gamers and non-gamers is getting smaller and smaller [1]. Gamification comprises the "use of game design elements in non-game contexts" [2]. One of the fundamental goals of gamification is making banal and boring everyday tasks more attractive and compelling [3]. Against this backdrop, Liu et al. [4] suggests investigating the design and use of Gamified Information Systems (GIS) from different perspectives and against different theoretical backgrounds in this comparatively young research direction [5]. For the research work at hand, we take-over the perspective of the care sector, particularly of facilities for assisted living and evaluate the usage of gamification elements for tasks in an assisted living environment.

In Germany, around 550,000 people with disabilities and around 60,000 children and adolescents live in facilities for assisted living [6]. Assisted living facilities care about those people in order to promote their self-determination and equal

15th International Conference on Wirtschaftsinformatik,
March 08-11, 2020, Potsdam, Germany

https://doi.org/10.30844/wi_2020_f3-eggert

participation. At the same time, health care organizations are forced to improve the process efficiency and cut costs [7]. In order to address these challenges, IS research investigates information systems, e.g. in order to monitor elderly people or to implement digital infrastructures in health care [8–12]. So far, the investigation of gamification in assisted living for process improvement remains an open research topic.

By applying an interview-based content analysis approach [13], we aim at closing that research gap and providing a substantial insight into the application of gamification affordances [14], design elements [4] and barriers in inpatient care facilities for disabled and youth welfare services. Thereby, we hypothesize that gamification has the potential to improve both care processes and the quality of home care resident's life. For example, when a social work expert is motivated by a GIS to complete necessary administration tasks faster, he might have more time for resident's care. We validate this hypothesis by answering three research questions:

1. Are GIS affordances relevant for employees of assisted living facilities?
2. How do assisted living facilities perceive GIS design principles?
3. Which barriers exist to implement a GIS in assisted living facilities?

Our research contribution is threefold. First, we provide insights into relevant affordances and related application examples for assisted living facilities. Second, we present relevant design guidelines and its perceptions by care professionals. Both the relevant affordances and design principles enable the development of a GIS for assisted living. Third, an overview of potential barriers is explicated, providing a basis for the development of a theoretical GIS adoption model.

We structure the rest of the paper into four more sections. The following section comprises related literature about information system usage in assisted living and gamification. In Section 3, we extensively describe our research design. Section 4 contains the relevant affordances, design principles, adoption barriers and GIS design guidelines for assisted living facilities. In Section 5, we summarize the results and give an outlook about further research.

2 Related Literature

2.1 Assisted Living

In Germany, the term *assisted living* is used to describe ways of life, in which old people, people with mental, physical or psychological disabilities or even young people are supported by social workers, psychologists, therapists or caregivers. People in need of help should be enabled to live a life that is as self-determined as possible. Assisted living aims at people who live in their own flat or in a shared flat. *Ambulant assisted living* explicitly refers to the care of disabled people. Educational supervisors help the people in their own homes, for example with their money management, accompany them to the authorities or support them in managing the household [15].
Another way is the so-called *inpatient living*, in which people with disabilities live together in residential groups. Depending on the type of disability (e.g. physical and/or mental disabilities, dependency diseases), different forms of housing and

https://doi.org/10.30844/wi_2020_f3-eggert

underlying concepts exist. In contrast to ambulant assisted living, the persons in need of help are cared for 'round the clock' because they are not yet able to lead an independent life [16].

2.2 Gamification

The term gamification originated in the digital media industry [2] and was firstly mentioned by Nick Pelling in 2002 [4]. From the second half of 2010, the term has gained wider recognition due to presentations at scientific conferences and industry adoption [3]. Many of the underlying concepts are not new and have already been used for decades as "hedonic-, persuasive- and intrinsically motivating information systems" in information systems [17]. Meanwhile, a number of other definitions that further specify the means, objectives and application context of gamification appeared [4]:
Fitz-Walter et al. [18] define gamification as "adding game elements to an application to motivate use and enhance the user experience". Other definitions include the "use of game design elements (e.g., points, leaderboards and badges) in non-game context to promote user engagement" [19]. According to Houtari and Hamari [20], Gamification is an improvement process of a service with affordances for gameful experiences to support the overall value creation of users.
All above-mentioned definitions have in common that GIS require a certain user behavior and goals. The way to achieve these goals is to select Gamification Design Elements (GDE). Liu et al. introduced a taxonomy for design elements, which distinguishes fundamentally between gamification objects (GO) and mechanics (GM) [4]. GOs are the basic building blocks of a GIS, which typically include objects, characters, scripts, visual objects, and others. Based on a literature search, Koivisto and Hamari identified 46 affordances for GIS [14]. GM refers to the rules governing the interaction between users and game objects [21]. For example, in a system that uses points to give feedback to the user, a game mechanic could include the rules for giving points (i.e., how and when the points are awarded to the user). Liu et al. [4] introduce six gamification design principles to develop GIS. We summarize them in Table 1.

Table 1. Gamification design principles [adapted from 4]

Gamification Design Principle	Description
Task Congruence Principle	To be effective, GDE must match the target task.
Personalization Principle	GDE must match users' characteristics.
Technology Affordance Principle	GDE must fit with the target system technologies.
Dynamism Principle	GDE must match desired user–system interactions.
Recurrence Principle	GDE must match the expected recurrence of system use.
Meaningful Engagement: The Dual-Outcome Principle	Enhanced experiential outcomes should be associated with higher levels of instrumental outcomes.

McGonigal [1] uses several practical examples to illustrate how the use of computer game elements can make people do things they wouldn't do under other circumstances. For example, the author describes the use of a fitness tracker and app

https://doi.org/10.30844/wi_2020_f3-eggert

as “running faster than ever before” in her entire life. She was motivated by "better real-time feedback and the promise to receive online rewards at home" [1].

2.3 Information Systems in Assisted Living

Research for information systems, applied in assisted living environments currently follows two research streams. The first focuses on the development of solutions for monitoring elderly people in order to detect dangers and anomaly, risky behavior. Goonawardene et al. develop a sensor-based elderly monitoring system for assisted living [8]. By applying an action design research approach, Mettler et al. design a low-cost monitoring system for elderly people [9]. In order to motivate elderly people to increase movements, Struzek et al. [10] present a widget in form of a flower. This flower grows with the number of steps elderly users take.

The second research stream investigates digital infrastructures for information system usage in health care. For example, Furstenau et al. [11] investigate the digital infrastructure development for an integrated care provider. Their results support decision makers of health care providers in understanding how organizations can become first mover in developing digital infrastructures in challenging environments with many adoption barriers. Kaijzer-Broers et al. [12] propose an online platform in the health domain. The platform matches service supply and demand and should “enable end-users to enhance self-management” in aging-in-place. So far, to our best knowledge no research about the relevance of GIS in assisted living facilities has been published, which motivates us to close that research gap by the study at hand.

3 Research Design

3.1 Planning the Research

Our research method follows the approach by Vogelsang et al. [22] and comprises four research process phases (cp. Figure 1). First, we plan the research steps and define the research question and sampling strategy as well as choosing an appropriate research design. Second, we prepare an interview guideline and conduct interviews. Third, we prepare the analysis of the interview transcripts and identify relevant statements, which we encode to core-statements and categories. Fourth, we deduce the results, rank each coded core statement category and interpret the results.

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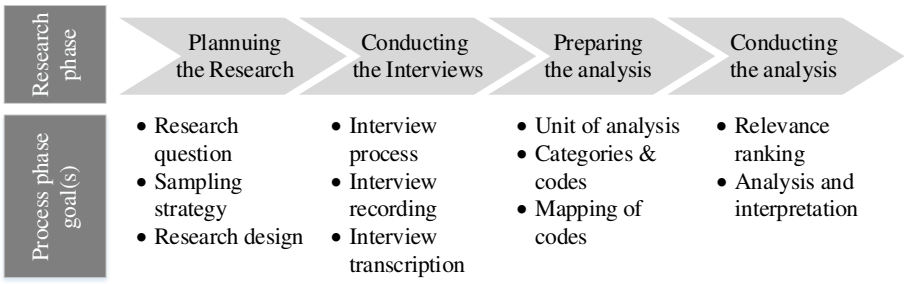

Figure 1. Research process (adapted from [22])

For investigating the perceptions of gamification design principles, affordances, and GIS barriers, we chose a qualitative research design and plan to conduct semi-structured interviews. Regarding the sampling strategy, we decide to interview solely respondents that work for an assisted living association and have at least three years of job experience. Furthermore, we want to receive insights into at least three different types of assisted living, such as ambulant care or dormitories for teens in need of assistance.

3.2 Conducting the Interviews

In order to receive data to follow our research goal, we develop a semi-structured interview guideline. The target group consists of social work experts of assisted living facilities. Since that target group may most likely have no experience in gamification, we assume an information asymmetry between the interviewer and the interviewee [23]. In order to obtain the desired findings, it is necessary to name the individual affordances [14], i.e. explaining technical terms from the games industry. With regard to facilitating the common understanding, we show each respondent a short film[1] about gamification at the beginning of each interview. During the interview, we present illustrations with the individual affordances for the respective thematic blocks to further stimulate creativity [24].

Table 2. Interview guideline

Warm-up	
1	Do you regularly play computer-, console- or mobile games?
2	Have you ever heard of gamification?
3	What is your function, how would you describe your professional life?
4	Do you already use an electronic system for task management and/or documentation?
Main part	
5	Which tasks of your everyday business could be integrated into a "game"?
6	Which design elements do you consider suitable/less suitable to increase task feedback?
7	How to set, evaluate and assign tasks?
8	Which of these design elements would you include in a game and why?

[1] The film is a shortened reproduction of https://www.youtube.com/watch?v=lPF8HNGyWpU and https://www.youtube.com/watch?v=BpiQkXoti9k.

https://doi.org/10.30844/wi_2020_f3-eggert

9	In what form can you imagine the use of narrative elements?
10	To what extent should game design promote competition?
11	What do you think of this approach?
12	How could a game be structured to promote cooperation?
13	Do you think individual adaptability is useful? How do you think could it be structured?
14	Give examples in which the training of employees is supported by playful elements.
15	Which of these additional elements could you imagine being used in a game?
16	Which goals or improvements do you suggest with regard to the quality of living?
Cool-down	
17	What do you think about the gamification approach after the interview?
18	Is there anything else that has not yet been mentioned and should be considered?

We follow Alsaawi [25] and structure the interview guideline into five phases. The main part of the interview is surrounded by an introduction and warm-up phase, which intends to create a relaxed discussion atmosphere as well as a closure phase to thank for the contribution [25]. The questionnaire is based on the research framework and design principles suggested by Liu et al. [4]. However, the interviewer has the possibility to steer the answers of the interviewee towards the selected field of investigation by using different question techniques [23, 26]. One interviewer with moderate interview experience conducts the interview. Table 2 contains the question guideline, which we pretested with one social work expert.

A digital recording device records all interviews. The audio files are then transcribed using a software editor. We apply a simplified transcription system, which means that the language is smoothed in favor of readability and focus on content.

In total, we conduct eight interviews at three different forms of assisted living facilities. All facilities deal with assisted living tasks and have the same job description. The respondents are experts in social work and have at least three years of job experience. In order to gain insights into different perspectives [22], the respondents are selected from different facilities, whereby different qualifications, ages and functions are taken into account. Table 3 provides the demographics of all respondents.

Table 3. Respondent demographics

Res	*Gender*	*Qualification*	*Age*	*Job exp.*	*Function*	*Type of living*	*Carrier*
A	f	Social pedagogue	45	> 20 y	Management	Do	IS
B	m	Curative nurse	34	> 10 y	Deputy management	Do	IS
C	m	Social worker	24	> 3 y	Living group leader	Do	IS
D	m	Sen. social worker	47	> 20 y	Living group leader	Do	IS
E	f	Part time social worker	27	> 5 y	Diverse caring functions	ELG	IS
F	f	Curative nurse	25	> 5 y	Caring employee	Do	IS
G	f	Assistante Sociale	34	> 10 y	Management	Do	YW
H	m	Sen. socal worker	36	> 10 y	Team leader	AmCa	YW

Res = respondent; Job exp. = job experience (in years); Do = Dormitory; ELG = Exterior living group; AmCa = Ambulant care; IS= Integration support; YW = Youth welfare

https://doi.org/10.30844/wi_2020_f3-eggert

3.3 Preparing and Conducting the Analysis

We perceive the interview transcripts as analytical units of research [22]. According to the formal structuring approach [13], the core statements are firstly extracted from the statements of the interviewees. In a second step, we assign each statement to a category. The categories used are the selected affordances [14], which have already determined the interview guidelines as well as the GIS design principles [4]. In addition, statements without a reference to any of the affordances are summarized in the category "General Gamified System". Based on these statements, we identify adoption barriers, such as data privacy issues and employee performance control.

In a next step, we determine the frequency and relevance of the individual categories. The frequency reveals the number of different respondents mentioning statements of the respective categories directly or implicitly. In order to determine the relevance, as suggested by [22], we classify statements into negative (-1), neutral (0), positive (1). In order to aggregate the results, we allocate all statements to the design principles and the resulting research areas [4] as well as affordances [14] and adoption barriers. In this way, we aim at interpreting the results from different perspectives.

4 Results

4.1 Relevant Affordances

By conducting the qualitative content analysis [13], we extract 372 core statements, which we categorize among 25 relevant affordances, derived by [14], five design principles [4], as well as statements regarding the barriers to adopt GIS. In total, 224 core statements provide insights into the value and applicability of the affordances for assisted living facilities. Table 3 provides the categorized and ranked affordances according to the content relevance. In the following, we describe each affordance category and provide inspiring statements from the interviews. For referencing to a certain interviewee, we use the corresponding interviewee letter from Table 4.

Table 4. Relevant affordances

Relevant Affordances	*Frequency*	*Content relevance*	*Direction (+/o/-)*
Achievement / progress			
Challenges, Quests	8	17	+
Badges, achievements	6	16	+
Progress, status bars	5	13	+
Points, Score, XP	6	8	+
Quizzes, questions	7	6	+
Leaderboards, rankings	5	3	+
Performance stats	6	2	+
Levels	8	1	+
Timer, speed	3	0	o
Social			
Commenting	8	2	+

https://doi.org/10.30844/wi_2020_f3-eggert

Kudos	5	2	+
Peer-rating	2	2	-
Social networking features	3	1	-
Immersion			
Avatar, virtual identity	6	9	+
Narrative, storytelling	4	9	+
Virtual world, 3D world	6	6	-
Role play	4	3	-
Non-digital elements			
Realworld/ fin. reward	1	2	+
Miscellaneous			
Reminders	6	16	+
Assistance, virtual helpers	3	4	+
Penalties	5	4	-
Augmented Reality	2	2	+
Virtual pets	2	1	-
Virtual currency	4	0	o

Achievement / progress: From the respondents' point of view, numerous *tasks* are suitable for integrating into a GIS. Tasks can be classified into the ones that require resident participation and tasks that are rather household work (A; B). Interviewee H said: "there are a number of tasks that [...] are handwritten in our calendar, that are recurring, that actually fall into the category 'annoying'". He further mentions many tasks "that can be controlled" by applying affordances. Examples for such tasks are watering flowers and washing laundry (H). Interviewee F, who is currently structuring her day-to-day work using a handwritten checklist, is pleased when she successfully completes a task and may tick one entry on the task list. She is convinced that "in the end, everything I put on the list can be integrated into such a game" (F). Assisted living tasks might be completed relatively quickly, but are repeated steadily at regular intervals (daily, weekly, monthly...) (A). Others, especially the resident related tasks, are much more complex, for example if a resident expresses the wish to reduce his body weight. In this case, different offers, consisting of many different units, lead to that goal (nutrition offers, exercise offers). The goal "losing weight" could be a mission and the individual educational units could be the quests that contribute to the achievement of the mission goal (E). Assisted living aims at the increase of self-responsibility of residents to be cared for. Against this backdrop, an interviewee mentions "leading to self-reliance" could be the primary game goal, which would be the "final enemy" (B).

According to Interviewee B, *badges* fit for activities that would otherwise not be praised (e.g. taking out garbage, washing laundry, dish washing) (B). They may also motivate an employee and help highlighting their own skills (C). From the management's point of view, the development steps of the employees would be traceable in this way (B). The usage of badges for further training proofs and certificates (A) or for preparation of an assistance plan, which represents an unloved activity for some employees (F), is conceivable. In particular, for achievements of tasks related to resident contact, which is the main task of assisted living (F), badges are perceived as useful (A). Interviewee C perceives the planning of resident

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measures, which employees develop in regular intervals together with the residents as "an achievement".

Interviewee C states that a steady progress should be noticeable. *Progress bars* are clear and easy to follow (D) and are suitable to visualize the daily target (D). A *skill tree* could be used to show the development steps of the individual employees or to give an overview of the existing and needed skills, such as handling medicines or hygiene standards (A; B). A deputy manager suggests the application of skill trees for the individual planning of skills to be acquired by a resident (B). Additionally, Interviewee A states: "Your goal is to move out. What are skills that you must have for this".

Points are controversially discussed by the respondents. Interviewee E suggests using quests for everyday tasks, for which a player receives points (E). For the direct interaction with residents, an employee should get the most points (C). The GIS should enable employees to receive "extra points" for the speedy completion of routines (e.g. having insurance card read in) (A). According to interviewees A and E, tasks may be weighted differently, depending on the employee's requirements. "Not every task is equal [...]. Some things are, of course, more difficult and time-consuming. [...] Many points may result in a level-up" (E). However, we also receive critics to points. Interviewee F critically mentions that points always lead to one player, which is the "worst" one, even if teamwork stands in the foreground (F). An incentive could be to award extra points for teamwork (C). The setup of points for individual activities in order to trigger competition might lead to a missing conscientiousness. Interviewee C states that "sometimes it is only a matter of collecting as many points as possible as quickly as possible and perhaps no longer paying attention to individual matters at all".

Social: Comments are a simple way to implement social GDE in a GIS (E) and to support communication among each other (D). It is also possible to obtain a quick opinion (H). Using comments together with Kudos to acknowledge good work results may encourage further performance (C). The head of a youth welfare institution sees a commentary function as a central element of a GIS: "I imagine it to be just like a team Whatsapp group, but then as an app, where you can see certain tasks that are currently pending in this gaming app" (G). However, someone could use the comment function for critical comments, which in turn could demotivate users (A; F).

The interviewees perceive *kudos* as suitable to briefly express appreciations (B; D; E). A living group leader comments: "In general, to like or comment on things from other employees is not bad. One can already appreciate the work by saying "well done" (C). Interviewees A and D explicitly mention that there should be no "dislike-button".

Immersion: Avatars are suitable to represent someone's own personality and identity. The majority of interviewees perceives the usage of avatars as beneficial (C; E; G; F; H). Using avatars to demonstrate achievements (e.g., by receiving artifacts, such as a sword or a coat), may additionally incentivize employees. Avatars may also indicate employee's special competencies and capabilities (C). Solely, interviewee B is critical about avatars and perceives them as to playful for a professional environment.

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Two of the four interviewees who comment on *storytelling* would not integrate a background story into a GIS, as it is too playful (B; E). One interviewee develops the idea that when goals are reached, individual elements of a background story are unlocked. She says that this "can be a reward system" (F). Furthermore, the interviewee states that such a visualized background story could also be adapted to the individual preferences of the users ("car, workshop, vacation, horse").

Some respondents, which we classify as non-gamers, are not familiar with the narrative elements and cannot imagine the use of *virtual or 3D worlds* in a GIS (A; G). But even experienced players consider this approach as too far leading (B; C). Interview participant D expresses this as follows: "To design my avatar [...] and then see myself working as a comic book man, is a bit exaggerated". As with the virtual worlds, the use of *role-play* elements is considered as too playful for the professional assisted living context (B; E) or as not appealing (A). Regarding role-playing games, one interviewee mentions: "I could imagine that this might be a bit too much" (H).

Non-digital elements: Interview participants do not comprehensively discuss the topic of non-digital elements. However, a living group leader develops an idea for non-digital elements within a GIS for assisted living and suggests sponsoring company trips. Interviewee C states that "if you really think that you can achieve things together as a team and then somehow get a bit more subsidies for a company trip [...] then I think the residents will also benefit" (C).

Miscellaneous: In general, *reminders* are perceived as good, meaningful (A; B) and also suitable for recurring tasks (e.g. putting out trash cans, having insurance cards read in) (A). In this way, important things are not forgotten (D). For one interviewee, the reminder function is the central element of the GIS: "Reminder functions, no matter how they might speed up my work, [are] always good if they can be implemented playfully. [...] As long as the app can do that, that's a huge advantage" (D). An interviewee can imagine to actively putting remainders for colleagues: "If colleagues can then give each other tips, [...] I could imagine that as very useful." (C).

However, we also received critical statements to reminder functions. Interviewee C states that the reminders should be set carefully because of the risk of an overwhelming frequency of reminders: "If you already have a lot to do, things fall by the wayside, because something more important has to be done somewhere, and if there is another timer: 'so here you have to do this and that again'. This would be stressful" (C).

All Interviewees who comment on *penalties* agree that this affordance is misleading (A; B). Penalties discourage and are not appropriate because the dynamics of the work context do not always allow meeting a daily target (F; G).

4.2 Relevant Design Principles

In addition to the perception and applicability of affordances, we let the interviewees evaluate the GIS design principles [4]. We receive relevant feedback to five design principles. Table 5 contains the coding analysis results. In the following, we summarize the qualitative interview results and focus on highlights.

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Table 5. Relevant design principles

Design principle	*Frequency*	*Content relevance*	*Direction (+/o/-)*
Task Congruence Principle			
Increase task stimulation	7	30	+
Increase task feedback	6	12	+
Personalization Principle			
Personalized design	8	12	+
Dynamism Principle			
Encourage cooperation	8	16	+
Immersion	8	10	+
Facilitate social influence	8	8	+
Encourage competition	7	12	-
Recurrence Principle			
Expected recurrence	4	5	+
Meaningful Engagement: Dual outcome principle			
Instrumental outcomes	8	26	+
Experiential outcomes	7	16	+

Task Congruence Principle: Along with the theoretical basis, the affordances of the category performance and progress serve to increase the *task stimulation*. The interview participants share this view in their general statements to GIS (A; B; F; H). In the context of employee training and GIS, a team leader at a youth welfare agency says: “[...] I notice that the transfer of training content [...] into the institution is always very difficult. And I believe that this would be one way to simplify that transfer [...]” (H).

In addition to clear tasks, the interviewees mention quests and missions as well as badges in order to increase task stimulation (A; B; C). Interviewee C expresses: "[...] I think that when you do quests like this or get small rewards like that […] it motivates you". Reminders that may help to ensure that employees do not forget important tasks are also useful for task stimulation (B; F).

By using GDE to increase *task feedback*, employees receive immediate feedback on the completion or progress of their tasks. The affordance category "progress, status bars, skill trees" is positively associated with task feedback for eight times. The badges are also associated several times with the increase in task feedback. On the one hand, badges increase task stimulation if the prospective badge is the incentive. On the other hand, a badge enables feedback mechanisms about someone’s individual performance.

Personalization Principle: In general, the interview participants welcome the possibility of personalizing a GIS. Interview participant E wishes to design and set up the user interface according to personal preferences. The virtual helpers and assistants could be adapted to individual needs (B). The integration of avatars into a GIS, which is supported by the majority of interview participants, leads to a stronger identification with one's own profile (C) and supports personalization (G). Interviewee F requires to individually developing a background story according to the preferences of the users.

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Dynamism Principle: Interviewees B, D, and G perceive the commentary function as an appropriate way to strengthen *cooperation*. The team leader of a youth welfare institution considers the combination of a commentary function with the ability of voting and explains this as follows: "With a comment function, I could place a topic, then everyone could have a look at it and at least think about it in advance. [...] In my eyes, this would definitely speed up and simplify the processes" (H). In addition, the increase of the task transparency can influence the cooperation in a positive sense, since using a GIS makes it visible who performs which task. The employees could then begin a conversation to support or relieve each other (E). Interviewee C suggests that reminders or virtual helpers may help passing on important information to other employees and thereby give each other useful tips.

The interview participants mention the affordances of the category *immersion*. It is essential to preserve the seriousness of the GIS (E). Interviewees C, E and F perceive the use of avatars to achieve immersion as positive. Interviewee F develops a concrete idea for the use of a background story. It is also conceivable to embed the tasks presented as quests and missions in a background story (A; B). As stated above, role-play elements as well as virtual and 3D worlds do not correspond to the ideas for the use of a GIS in the field of assisted living.

Social influence: The interview participants confirm that the social environment of a GIS may shape someones behavior. Interviewee E mentions that the publication of performance statistics may be useful to provide orientation. In addition, it can also be an incentive to "present" one's own progress (C). In order to present one's own personality and identity, interviewee H suggests avatars.

The design principle of encouraging *competition* is the only principle, which respondents evaluated negatively. Thereby, interviewees discuss the question of how a GIS deals with the performance weaknesses of coworkers. According to interviewee E, this becomes clear by the use of Leaderboards. In addition, it comes out that GIS for assisted living are challenged to find a fair and comprehensible evaluation of the heterogeneous tasks that arise in this area.

Recurrence Principle: In the area of assisted living, tasks exist that recur at regular intervals (H), although there should still be a steady increase in requirements (C). Interviewee F states that a background story may develop over a longer period of time (F) in order to maintain motivation. The requirement for dynamic scoring described by interviewee C also opens up the possibility of adjusting the difficulty level at regular intervals to the needs of the users in order to bring dynamism into the game.

Meaningful Engagement, Instrumental Outcome: If a GIS releases capacities to deal more intensively with the individual support of the residents, it serves to achieve the overarching goal of inpatient assisted living facilities (B; D; F; H). Improving cooperation, for example through common goals or by increasing the transparency of tasks, also benefits the facilities' residents (C; G). In particular, routine activities might be integrated into a GIS (A; C; E; G; H). If the affordances of the category "performance/progress" increase task stimulation and task feedback and employees are encouraged, this also indirectly serves achieving the instrumental goals (A; H).

Experiential outcome: The idea of a GIS for assisted living arouses curiosity, sometimes even enthusiasm, among most of the interviewees. The feedback generated

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during the completion of tasks, for example through recognizable progress, a level-up, a bonus point or a badge, may trigger a positive emotional user experience (A; C; E; F). Interviewee G jokingly mentions that: "a speech bubble where you can get upset about the teenagers and where you can 'blow off steam' that no one else notices" (G) should be built into a GIS.

4.3 Adoption Barriers and Guidelines

During the interviews, we receive statements regarding the barriers of applying GIS in assisted living. We combine them to four categories of adoption barriers: Simplicity and *comprehensibility*, *competition*, *data privacy and labor performance control*, as well as *lack of direct communication*.

Several interviewees have repeatedly stated that a GIS for assisted living facilities should remain *simple and understandable* (A; D; E; G). Interviewee A stated that, the user interface should be designed in a way that the use of the application does not take up too much working time. Interviewee E can imagine a sensible use "if you don't put in too many gimmicks [...]". Interview participant B emphasizes the requirement for the reliability of the GIS: "You have to rely on the thing, it has to work" (D).

An essential element of the GDP for dynamics is the area *competition vs. cooperation* [4]. As emphasized in Section 4.2, interviewees perceive competition between users as critical and to some extend reject it categorically (E; G). If GIS implement the concept of competition, it must take place according to clearly defined, fair rules and in balance with the concept of cooperation (C). Interview participants B and C point out that a winner implies a loser and ask about its treatment (B; C). A team leader of a youth welfare organization sees the danger "that the one who has the least points [...] will be stigmatized" (H). Residents' competition has to be excluded because of the different clientele and the restrictions due to resident's illness (B).

The ability of facility managers to obtain an overview of the employee's activities represents a kind of *labor performance control* and may violate *data privacy*. GIS need to prevent its misuse as a monitoring instrument (C). One of the facility managers criticizes: "How is it with data and data protection? You would have to look at that, especially if you want to involve the residents in some way. How can you implement it? Do you do that voluntarily?" (A). Additionally, a deputy facility manager states: "I would have concerns that the employee would then become transparent for the management level […]. I can imagine that for some employees this looks like control and encounters resistance" (B).

In general, the interviewees perceive *direct communication* as very important. The head of a youth welfare institution states that a GIS "takes a bit out of communication or direct cooperation. And that is actually what really matters here, this togetherness and mainly talking and not sitting in front of his mobile phone and typing in quickly what he has done today" (G). Interviewee C mentions: "electronically it's nice if you have it on your mobile phone somehow. But if my boss were to tell me personally: 'You did a good job' I'd still prefer that".

Based on the results, we suggest the following guidelines for developing an GIS for assisted living facilities:

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1. Develop challenges and quests, whose successful completion leads to an improved status on a status bar and the collection of a badge.
2. Use an Avatar in order to increase the identification of facility's staff with the game character.
3. Implement commenting functions to strengthen the ties between players and to increase motivation.
4. Do not apply a roleplay setting as leading game concept.
5. Prevent competitive tasks and focus on team play elements.

5 Discussion and Outlook

The paper at hand aims at investigating relevant affordances, design guidelines and adoption barriers for the application of GIS for assisted living facilities. We interview eight assisted living professionals working at three different types of assisted living facilities. Based on the foundational work in the field of gamification [4, 14], we collect feedback to the applicability of common affordances and design principles as well as potential adoption barriers.

Our study results confirm the most important affordances that have been studied in other GIS research works. According to [14] the most investigated GIS elements are points, scores, challenges and badges, which are also the most frequent elements of the study at hand. Beyond that, reminder elements seem to play a much more important role for assisted living facilities as for other GIS studies, where they have been investigated nine time so far [14]. Interestingly, real world and financial rewards play almost no role for the social work experts. Kovisto and Hamari found out, that these elements are the most investigated non-digital game affordances [14].

Our research contribution is threefold. First, we provide insights into the relevance and applicability of the affordances, introduced by [14]. Second, our research results provide insights into the applicability of common design principles for GIS [4]. Both the affordances and design principles are evaluated at the first time in context of assisted living facilities and foster discussions about the utility and applicability of GIS in the care sector. Third, the elicited adoption barriers provide basic constructs for the development of a theoretical adoption model for GIS in assisted living.

Practitioners benefit from the results in two ways. They receive a blueprint for the development of a GIS for the care sector. Several application examples support the selection of relevant affordances. Second, potential game designers know which principles to follow for the development of a GIS. For example, competitive elements are perceived as negative and should not stand in front of the GIS to develop.

However, the expressive scope of the study is limited. We interviewed eight respondents, who are located in the same region. Thus, the generalizability of our results to other assisted living facilities is limited. In addition, some of the participants did not have any experience with computer games and might be biased by the gamification video and illustrations shown to them. Finally, we did not present a real showcase, such as a prototype. Thus, respondents solely evaluate the applicability of GIS elements based on the explanations of the interviewer.

https://doi.org/10.30844/wi_2020_f3-eggert

The paper at hand provides the basis for further design science work. We encourage the setup of a design science [27] project in order to develop and evaluate a GIS prototype in the domain of assisted living and to retrieve application experience.

References

1. McGonigal, J.: Reality is broken. Why games make us better and how they can change the world. Penguin Press, New York (2011)
2. Deterding, S., Dixon, D., Khaled, R., Nacke, L.: From Game Design Elements to Gamefulness: Defining "Gamification". Proceedings of the 15th International Academic MindTrek Conference Envisioning Future Media Environments. ACM, New York, NY (2011)
3. Thiebes, S., Lins, S., Basten, D.: GAMIFYING INFORMATION SYSTEMS - A SYNTHESIS OF GAMIFICATION MECHANICS AND DYNAMICS. In: 22nd European Conference on inforamtion Systems (ECIS), Tel Aviv, Israel (2014)
4. Liu, D., Santhanam, R., Webster, J.: Toward Meaningful Engagement: A Framework for Design and Research of Gamified Information Systems. MISQ 41, 1011–1034 (2017)
5. Schlagenhaufer, C., Amberg, M.: A Descriptive Literature Review and Classification Framework for Gamification in Information Systems. In: 23rd European Conference on Information Systems (ECIS), Münster, Germany (2015)
6. destatis: Staat & Gesellschaft - Sozialhilfe - Statistisches Bundesamt (Destatis), https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Soziales/Sozialleistungen/Sozialhilfe/Sozialhilfe.html (Accessed: 26.01.2019)
7. Ho, S.Y., Guo, X., Vogel, D.: Opportunities and Challenges in Healthcare Information Systems Research: Caring for Patients with Chronic Conditions. CAIS, 852–873 (2019)
8. Goonawardene, N., Leong, C., Hwee-Pink, T.: An Action Design Research of a Sensor-Based Elderly Monitoring System for Aging-in-Place. In: Thirty Ninth International Conference on Information Systems (ICIS), San Francisco (2018)
9. Mettler, T., Bächle, M., Daurer, S., Judt, A.: Parental control reversed: Using ADR for designing a low-cost monitoring system for elderly. In: Thirty Eighth International Conference on Information Systems, South Korea (2017)
10. Struzek, D., Müller, C., Boden, A.: Entwicklung einer alltagsnahen persuasiven App zur Bewegungsmotivation für ältere Nutzerinnen und Nutzer. In: International Conference on Wirtschaftsinformatik (WI2019) (2019)
11. Furstenau, D., Wessel, L., Gersch, M.: How Organizational Path Constitution Prepares Digital Infrastructure Innovation: A Case Study of Integrated Care. In: Twenty-second Americas Conference on Information Systems, San Diego (2016)
12. Keijzer-Broers, W., Florez-Atehortua, L., Reuver, M. de: Prototyping a Health and Wellbeing Platform in a Living Lab Setting. In: Information Systems Development: (ISD2015 Proceedings), Hong Kong (2015)
13. Mayring, P.: Qualitative Inhaltsanalyse. Grundlagen und Techniken. Beltz, Weinheim (2015)
14. Koivisto, J., Hamari, J.: The rise of motivational information systems: A review of gamification research. International Journal of Information Management 45, 191–210 (2019)
15. Wissenschaftlicher Dienst des Bundestages: Betreutes Wohnen für behinderte und pflegebedürftige Menschen, WD-6-130-16,

https://doi.org/10.30844/wi_2020_f3-eggert

https://www.bundestag.de/resource/blob/487128/2e3197c7eca1fc4a8f06ffc82605a396/WD-6-130-16-pdf-data.pdf (Accessed: 03.10.2019)
16. LWL: Stationäres Wohnen: Gemeinsam leben - einzeln betreut, https://www.lwl-psychiatrieverbund.de/de/Pflege_und_Behindertenhilfe/Behindertenhilfe/Stationaeres_Wohnen/ (Accessed: 3.10.2019)
17. Bui, A., Veit, D., Webster, J.: Gamification – A Novel Phenomenon or a New Wrapping for Existing Concepts? In: Thirty Sixth International Conference on Information Systems (ICIS), Fort Worth (2015)
18. Fitz-Walter, Z., Tjondronegoro, D., Wyeth, P.: Orientation Passport: Using gamification to engage university students. In: Stevenson, D. (ed.) Proceedings of the 23rd Australian Computer-Human Interaction Conference, pp. 122–125. ACM, New York, NY (2011)
19. Mekler, E.D., Brühlmann, F., Opwis, K., Tuch, A.N.: Disassembling Gamification: The Effects of Points and Meaning on User Motivation and Performance. In: CHI '13 Extended Abstracts on Human Factors in Computing Systems, pp. 1137–1142 (2013)
20. Huotari, K., Hamari, J.: Defining gamification: a service marketing perspective. In: Proceeding of the 16th international academic MindTrek conference (2012)
21. Teh, N., Schuff, D., Johnson, S., Geddes, D.: Can Work Be Fun? Improving Task Motivation and Help-Seeking Through Game Mechanics. In: 34th International Conference on Information Systems (ICIS) (2013)
22. Kristin Vogelsang, Melanie Steinhueser, and Uwe Hoppe: A Qualitative Approach to Examine Technology Acceptance. In: 34th International Conference on Information Systems (ICIS) (2013)
23. Brinkmann, S., Kvale, S.: Doing interviews. SAGE (2018)
24. Harper, D.: Talking about pictures: a case for photo elicitation. Visual studies 17 (2002)
25. Alsaawi, A.: A Critical Review of Qualitative Interviews. SSRN Journal (2014)
26. Qu, S.Q., Dumay, J.: The qualitative research interview. Qualitative Res Acc & Man 8, 238–264 (2011)
27. Gregor, S., Hevner, A.R.: Positioning and Presenting Design Science Research for Maximum Impact. MIS Quarterly 37, 337–355 (2013)

https://doi.org/10.30844/wi_2020_f3-eggert