A Smart Community for Placemaking in Housing Complexes

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Abstract

One of the critical issues in housing is to develop and adopt effective strategies for enhancing a "sense of community" among residents, eventually revitalizing contemporary housing complex communities. Based on the assumption that the characteristics of contemporary communities might differ from those of traditional communities, this research aims to reinterpret strategies for the activation of communities in a current context. By incorporating a "smart paradigm", this paper introduces the concept of the smart community and considers the potential of mobile augmented reality as a strategy for activating communities. Mobile augmented reality is expected to extend people's interactions within the virtual world, combining with social networks to enable sustainable relationships among housing complex residents and producing collective intelligence that will contribute to a new type of community. This research conducted a questionnaire survey to investigate the conditions in current communities, residents' perceptions and demands on a smart community. Based on the results of the survey, persona scenarios were developed and a smart community model was then constructed by proposing applicable technologies and services extracted from the persona scenarios.

Keywords: placemaking; smart community; housing complex; mobile AR; user experience

1. Introduction

The housing complex has become one of the most popular types of housing in modern cities, but contemporary housing complex communities are not highly activated and relationships within such neighborhoods are weak. Accordingly, communities and neighborhood have currently emerged as challenging issues in contemporary housing policy and practice (Cowan and Marsh 2004). Researchers and practitioners working on the development of communities often adopt the concept of "placemaking" for promoting a "sense of place" in communities. Placemaking can be described as a historically contingent process involving participation in both "production of meaning and in the means of production of a locale" (Pred 1986; Lepofsky and Fraser 2003). Placemaking happens with or without place professionals and communities should have a role in placemaking. Broadly defined, place refers to territorialized local communities in which collective human actions are situated (Rios et al. 2012). Place is also the setting of the "struggle for homemaking". For residents in a housing complex, homemaking is constitutive of placemaking in the context of a networked world. "Home" has a strong tie to ideas of "dwelling" in creating a sense of "belonging" to a place. Based on the belief that contemporary communities should be redefined, this paper introduces the concept of the smart community in housing complexes by incorporating the "smart paradigm" into the notion of "placemaking".

The smart paradigm is often connected to the adoption of technologies in our lives and environments (Anilir et al. 2009; James and Nagasaka 2011; Lee and Lee 2013). The notion of the "smart home" encompasses residential spaces equipped with digital technologies and the realization of smart spaces has been an important research theme (Harper 2003). Undoubtedly, living spaces and lifestyles have been significantly changed due to developments in information technology (IT). Most studies have primarily researched enabling technologies and prototypes for smart environments (Lee et al. 2011; Ji and Jun 2014). The level of technological support in smart homes has extended to providing customized services for meeting residents' needs, based on monitoring data (Cook and Das 2004; Ricquebourg et al. 2006). We believe that the smart paradigm should be extended to the level of the housing complex to improve quality of life and thus argue for the strategic use of ICTs in this context.

The smart community emphasizes interactive participation of residents, extending the use of technology beyond home automation. With advances in information communication technologies (ICTs) people

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have been freed from constraints of place, thus physical proximity is becoming less essential to communication (Reffat 2008). Digital technologies increasingly reshape the way we perceive and use spaces, resulting in a more widely connected society. (Uzzell 2008). Communities in housing complexes can be supported not only by physical layout and human resources, but also by ICT infrastructure enabling public participation and engagement. ICTs facilitate collective life, enabling people to communicate and socialize at and from any location. Contemporary communities differ from traditional communities, thus strategies for activating housing complex communities should be reinterpreted in the current context. We found that excellent community connectivity can be facilitated by advanced ICTs (Coe et al. 2001). Communities have been networked through the strategic use of ICTs to create common spaces in housing complexes, demonstrating the value of cooperation among residents. Traditionally, a community could be defined as a group sharing a location and common values, creating social cohesion. However, the digitally wired age has removed geographical limitations, allowing people to share common interests by interacting virtually.

The purpose of this paper is to characterize "smart community in a housing complex" and to highlight the potential of this for revitalizing contemporary housing complex communities. It is expected that strategies for encouraging residents' social interaction and participation could bring forth the "sense of community" among residents and promote neighborship in housing complexes.

2. Related Work
2.1 Communities and Common Spaces in Housing Complexes

A housing complex community shares a spatial location and involves communal consciousness created through constructive participation and close contact among residents (Park et al. 2001; Kwak 2006; Hong et al. 2011). Common spaces in housing complexes are extensions of the living space of the home (Dillman and Dillman 1987). Such common spaces—subsidiary interior and external facilities supporting communities' activities—are supposed to encourage cultural exchange and relationships between residents, leading to the formation of community cultures (Taylor 1988). Uzzell et al. (Uzzell et al. 2002) noted that emotional significance of places, including "sense of community" and "place attachment", are likely to promote positive attitudes towards social interactions among residents. Through a case study of Latino communities' transformation of MacArthur Park, Rios et al. (Rios et al. 2012) suggest that public spaces in communities play a significant role in social integration, producing deep attachments relatively quickly.

The development of the housing complex in Korea has emphasized the elaboration of interior spaces in units as one of the marketing strategies of construction companies. This has occurred at the expense of common spaces such as playgrounds, community parks and assembly centers. Nam and Shin (Nam and Shin 2005) found that the physical layout of spaces in contemporary housing complexes produces a uniformly closed structure, which is often at odds with residents' living patterns. The private areas and common spaces in the housing complex are generally separated, not reflecting the interrelationship between residents and community and hindering the formation of neighborhood and community. Previous research on common space has mainly dealt with functional areas, such as corridors, elevator halls, access roads and outside playgrounds. Pockets between units have not effectively played their intended role as common space, and have generally been degraded to being just a passage.

Accordingly, there is a growing body of trials seeking to overcome the deactivation of common space. Further, this has a role to play in reducing depression in housing complex community activities. Social interaction appears to be limited in contemporary neighborhoods, and it is believed that more appropriate common spaces in housing complexes may facilitate greater interaction among neighbors (Al-Homoud and Tassinary 2004). Several strategies for activating common spaces have been proposed by researchers in the area of housing studies (Seo and Kim 2007). Initial research in this field focused on the accessibility of community facilities and efficient utilization of places, such as underground areas and corridors, as common spaces. Later research started to investigate residents' demands for community facilities in order to develop customized plans and further evaluated the condition and management of common spaces with a focus on residents' experiences (Lee et al. 2010). To summarize, existing research assumes that a community shares a physical location in which contact among community members needs to be encouraged through the use of common spaces.

2.2 Underlying Concepts and Enabling Technologies for Smart Communities

Collective intelligence is one of the important sociological concepts for representing an interactive experience within the smart community. The term "collective intelligence" was coined by Pierre Levey in 1994 to describe the impact of Internet technologies on the cultural production and consumption of knowledge (McGonigal 2008). With the development of telecommunication and the Internet, the scaling up of individual intelligence to collective intelligence is emerging through decentralization and social networking. Complex and intelligent behavior may emerge from the synergy created by simple interactions between individuals (Heylighen 1999). The notion of collective intelligence is based on the assumption that intelligence is located in the network of relationships that an individual has with the external environment and other individuals, and focuses on interactions embodied within this network.
Collective intelligence can facilitate a more collectively-generated decision-making process (Maher et al. 2010; Mahmoud and Arima 2011). The mechanism for collective problem-solving is that the communication environment is used as a shared medium for storing information so that it can be accessible to and interpreted by everyone, thus coordinating the actions of system users (Heylighen 1999). Those involved can build on each other’s achievements by elaborating, reinforcing or providing alternatives regarding parts of stored information. The basis of collective intelligence is mutual recognition and enrichment of individuals, where each individual plays a meaningful role in the network and makes valuable individual micro-contributions to a massively-scaled effort (McGonigal 2008). Community participation has been a common theme in most placemaking; community networking achieved through digital technologies can lead to social cohesion and participation (Hamdi 2011). Smart technologies and infrastructure can transform housing residents’ lives in fundamental and positive ways, and have the potential to revitalize communities.

With the emergence of wireless networking and the increasing availability of smart phones, interest in mobile Augmented Reality (AR) systems is increasing. AR overlaps computer-generated images onto real images in the physical world. As smart phones are equipped with an array of sensors such as cameras, GPS receivers, accelerometers, compasses and brightness displays various AR applications can be operated on smart phones, continuously updating information in correspondence with changing context in the environment (Reynolds 2008; Wagner and Schmalstieg 2009). Location Based Service (LBS) and context awareness relate to social settings in which interactions occur and are, therefore, emphasized in mobile AR (Pyssysalo et al. 2000; Henrysson and Ollila 2004). Mobile AR extends interactions beyond the desktop, creating interactions that are embodied in the wider world (Dourish 2004).

AR technologies are often combined with tangible user interfaces (TUIs), which employ physical objects that are directly correlated with digital information. Such TUIs are an alternative to typical computer input and output devices, creating more direct and natural interactions between user and device (Kim and Maher 2008). The affordances of TUI physical handles are inherently rich, facilitating two-handed interactions and reducing cognitive loads in interface handling (Fitzmaurice et al. 1999). TUIs produce a form of tactile influence on the manipulation of physical handles to virtual objects in real time by allowing direct, naïve manipulability and intuitive understanding (Wang et al. 2002). Interactions using TUIs can be explained as "augmented affordance", taking full advantage of the strengths of affordances in both virtuality and reality (Seichter and Kvan 2004). While housing complex residents engage in community activities, AR allows residents to interact seamlessly between physical and digital worlds; TUIs enable intuitive, multi-modal manipulation of IT applications. For example, mobile AR, one of the TUI integrated devices, could extend the boundaries of common spaces in housing complexes to the virtual world, supporting more efficient resident participation in community activities.

In the case study of MacArthur Park, Rios et al. (Rios et al. 2012) found that social practices of the community have remade the park into a cultural space with great emotional significance for its users, without changing the essential physical elements of the park. This case study suggests that we need to reconsider our emphasis on physical alterations of place as the primary method of transforming spaces in order to provide them with a "sense of place". Rather we need to increase understanding of the social, cultural and emotional significance of individual spaces, as well as local circumstances. The networked community has led to an effective mobilization of competencies. The notion of “the smart community” refers to the locus in which networked collective intelligence is embedded (Coe et al. 2001). We consider the potential of smart technologies for enhancement of communities.

3. Research Methodology

This research conducted a questionnaire survey to investigate the conditions of current communities, residents’ perceptions and demands on a smart community. A questionnaire was developed based on the literatures on communities and smart technologies. To enable the investigation into the perceptions and demands on communities with advanced technologies, five large housing complexes with community facilities and over 1,000 units were selected. Subjects for the survey were limited to smart phone users who live in the selected housing complexes and use mobile applications in their daily life. In the customized questionnaire, for the question items on new technologies and services that the subjects had no experience with, a more detailed explanation and related illustrations were provided to help the subjects to understand them. Through the site investigation, physical conditions of communities were analyzed.

3.1 Defining Smart Community in Housing Complexes

We firstly define a "smart community in the housing complex" with a focus on the strategic use of ICTs to harness collective intelligence. This is a new version of the smart paradigm for the housing complex, consisting of a territorial aspect and ICT infrastructure. The smart community in the housing complex is place-related as well as place-independent, offering the potential to stimulate placemaking by enhancing social interaction. It comprises a networked resident group based in a specific geographical location. The use of ICTs in such a community, however, means that residents are not subject to geographical constraints. Place attachment arises from everyday activities that are, in turn, associated with the places in which they occur (Rios et al. 2012).
Residents’ interactions can be augmented by incorporating smart technologies into housing complex common spaces. The connectedness afforded by ICT infrastructure would enhance the frequency of common space use, stimulating community activities and leading to residents’ feeling attached to their housing complex. Thus “homemaking” can be achieved through social networks as part of placemaking in the context of a globalized world. The smart community in the housing complex is associated with unlimited, networked virtual spaces and physical common spaces. There is also an emphasis here on the potential of mobile AR and collective intelligence.

### 3.2 Persona Scenario Method

The term ‘persona’ means imaginary persons who represent characters in a target group for a special service. By anticipating how representative persons respond to a special circumstance, various personas can be developed in the context of smart communities in housing complexes. It is difficult to define inhabitants’ behavior patterns in community facilities and programs. Thus, by developing persona scenarios in the smart community based on the survey, we identified inhabitants’ behaviors and intentions for the use of the community facilities and programs. As shown in Table 1., a persona scenario consists of three components; personal background, demand and behavior, and expertise and knowledge.

| Component                  | Description                                                                 |
|----------------------------|-----------------------------------------------------------------------------|
| Personal background        | To humanize a persona, personal background such as name, job and daily life need to be included |
| Demand & behavior          | To identify the requirements of the proposed scenario, the persona’s purposes, demands and behaviors need to be specified |
| Expertise & knowledge      | The persona’s expertise and knowledge need to be identified in order to verify the proposed scenario |

Each persona scenario consists of two sub-scenarios; context scenario and validation scenario, as shown in Table 2. The context scenario shows how each persona behaves in a community and then identifies current problems and promising solutions. The validation scenario presents representative personas’ behaviors in a specific plan by validating the promising solutions.

| Types               | Description                                                                 |
|---------------------|-----------------------------------------------------------------------------|
| Context scenario    | This sub-scenario identifies the persona’s current behaviors, problems and demands. |
| Validation scenario | This sub-scenario verifies the proposed persona scenario by developing promising solutions to the problems and demands. |

### 3.3 Result of the Survey and Site Investigation

We developed a customized questionnaire encompassing three levels to identify features essential to the realization of the smart community. These three levels were common spaces, residents’ perceptions and the demands of a smart community. The responses to the questionnaire were analyzed and interpreted with respect to factors necessary for planning a smart community in a housing complex. Firstly, the reliability of the questionnaire was evaluated by Cronbach's alpha. The Cronbach's alpha for variables' internal consistency is more than 0.8, thus the reliability of the questionnaire was validated. Secondly, general characteristics of respondents were analyzed. Of 119 respondents, 27 (31.1%) were men and 82 (68.9%) were women. In terms of the age range, 57 were in their 40s (47.9%), 29 in their 20s (24.4%), 24 in their 30s (20.2%) and 9 were over 50 (7.5%). The occupations were varied: 38 (31.9%) housewives, 36 (30.3%) office workers, 26 (21.8%) college students and 16 (13.4%) professionals. Thirdly, residents’ perceptions of common spaces and community facilities were investigated. Further, their demands for the community were identified. In general, residents do not use the community facilities often. Additionally, their satisfaction regarding common spaces and facilities, and interaction among the residents are very low. The reasons given are that they do not have enough spare time and they do not know their neighbors very well. Specifically, in terms of age, residents in their 20s usually show better satisfaction with community facilities; residents in their 30s prefer obtaining educational services; and residents in their 40s pursue greater convenience in housing complexes, for instance when acquiring information or notices about events in the complex. In terms of occupations, college students are generally satisfied with outdoor spaces, thus they frequently use them in addition to indoor educational spaces. Housewives are more interested in educational programs and the convenience of the facilities. They complain about the lack of community programs and facilities. Residents who have jobs pursue educational activities and exhibit a great deal of interest in events in housing complexes; however, they have difficulties in interacting with other residents due to their heavy workloads. In terms of unit size, residents who live in small units have difficulties in interacting with neighbors because they have too many tasks and few meetings or events take place in housing complexes. Residents living in larger units said that it is not easy or comfortable to communicate with other residents because they do not know their
neighbors very well. To solve these problems, more programs and space planning in community facilities were recognized as important necessary steps. Fourthly, residents’ demands for AR programs were investigated by proposing specific AR smart service technologies for the smart community. Most respondents said that smart communities in housing complexes are needed to provide more positive effects from the use of community facilities. In addition, female residents have less interest in AR programs than male residents, but they are more interested in things that are fun and get them together with neighbors than male residents are (for more detailed results, see (Cho et al. 2012)).

4. Persona Scenarios for the Smart Community
4.1 Developing the Smart Community in Housing Complexes

The purpose of common spaces in housing complexes is to provide residents with a venue for community activities. In the smart community, mobile AR combined with a social network enables sustainable relationships among residents, thus producing collective intelligence. The smart community housing complex can be basically proposed as consisting of augmented spaces. Common facilities in housing communities are currently centered on areas for relaxation or exercise; further, the number of such facilities is not large enough to meet residents’ needs. Recently, it has been argued that the size and amount of housing complex common spaces need to be increased in order to provide adequate community support. However, we hypothesize that instead of increasing the amount and size of common facilities existing common spaces could be extended and augmented by the use of ICTs characterized by novel interaction techniques.

An augmented community, that is an active information-oriented group, is proposed as an emerging aspect of the smart community in housing complexes. Housing complex environments could be augmented by intelligent ICT systems, through which community members can be connected in a real context. Various mobile AR applications can be provided to encourage ongoing contact between housing complex residents, calling upon everyday coordination skills. Rather than conceptualizing places as bounded territorial communities, places are always in the process of becoming (Rios et al. 2012). In response to demands for revitalization of housing complex communities, we have tried to develop a framework for the smart community by combining the two types of communities, physical and virtual, to produce a unified augmented community. The critical characteristic of the smart community is augmentation of spaces to create a hybrid environment.

4.2 Developing Persona Scenarios for the Smart Community in Housing Complexes

Eleven representative personas were constructed and their current problems were identified based on the result of the survey, as shown in Table 3. Each scenario assumes different purposes and problems of the community activities by considering residents’ characteristics drawn from the survey. Current problems were identified in the context scenario and then promising community programs and service technologies for the solutions were proposed. Through the validation scenario, the proposed program and technologies were applied and verified as shown in Table 4.

Through the persona scenarios, five interior community facilities—a fitness center, study room, library, community facilities, and multi-function room—are (for more detailed results, see (Cho et al. 2012)).

Table 3. Representative Personas and Current Problem

| Age  | Job               | Gender | Community facilities       | Purpose                          | Frequency | Problems                                                                 |
|------|-------------------|--------|---------------------------|----------------------------------|-----------|--------------------------------------------------------------------------|
| 20s  | College student   | M      | Fitness center            | Physical training/health check   | 1-2/W     | Insufficient exercise program, difficulty in checking real-time health condition |
|      | F                 |        | Study room                | Study meeting                    | 2-3/M     | No friend to study with, insufficient study spaces for a group             |
| 30s  | Housewife         | F      | Playground, walk path     | Children play/walk               | 3-4/W     | Deactivated playground, insufficient greenery                             |
|      | Office worker     | F      | Library                   | Children's education/ self-development | 1-2/W     | Insufficient study content for children difficulty in finding books       |
|      | M                 |        | Whole complex              | Checking/announcements/events for residents | 1-2/W     | Difficulty in identifying notices insufficient social events              |
| 40s  | Office worker     | M      | Parking lot community facilities | Car park/checking/announcements | 5/W       | Difficulty in finding car parking lot, difficulty in identifying notices   |
|      | Housewife         | F      | Whole complex              | Shopping                         | 2-3/W     | No information for shopping, no friend to share information with           |
|      | Office worker     | F      | Multi-function room        | Self-development                 | 2-3/M     | Insufficient program for hobby, insufficient unit space to accommodate hobby |
|      | M                 |        | Fitness center             | Maintenance service/health care   | 2-3/M     | Difficulty in conducting maintenance, no time to go to hospital           |
| Over | Housewife         | F      | Community facilities       | Social relationships & communication | 3-4/W     | Insufficient community program                                           |
| 50s  | None              | M      | Walk path senior citizen center | Walking/social relationships | 1-2/W     | Difficulty in finding a location, insufficient program for seniors         |

Table 4. Validation of the proposed program and technologies

| Purpose                          | Frequency | Problems                                                                 |
|----------------------------------|-----------|--------------------------------------------------------------------------|
| Exercise program                 | 1-2/W     | Difficulty in checking real-time health condition                        |
| Study content                    | 1-2/W     | Insufficient study content for children difficulty in finding books       |
| Checking announcements/events for residents | 1-2/W | Difficulty in identifying notices insufficient social events              |
| Car park/checking/announcements  | 5/W       | Difficulty in finding car parking lot, difficulty in identifying notices   |
| Shopping                         | 2-3/W     | No information for shopping, no friend to share information with           |
| Self-development                 | 2-3/M     | Insufficient program for hobby, insufficient unit space to accommodate hobby |
| Maintenance service/health care  | 2-3/M     | Difficulty in conducting maintenance, no time to go to hospital           |
| Social relationships & communication | 3-4/W | Insufficient community program                                           |
| Walking/social relationships     | 1-2/W     | Difficulty in finding a location, insufficient program for seniors         |
library, multi-function room and senior citizen center, and five exterior facilities—a playground, outdoor theater, walk path, garden and parking lot, were identified as community facilities to which smart community service technologies could be applied. Eighteen smart community services are proposed, such as exercise programs, education programs, hobby classes, game programs and green market programs, which could encourage residents to participate in community activities, facilitating social interaction and attachment to the community.

5. A Smart Community Model for Revitalizing Communities in Housing Complexes

A smart community model for a housing complex was developed, based on the persona scenarios, which is classified according to five categories: exercise/health, education, hobby/entertainment, convenience and harmony. The application of the smart community model is an alternative strategy to support the convenience of facilities and social interactions among the residents. Especially, this research emphasizes the potential of AR as an interface to support UX (user experience) in housing environments.

The following describes a proposal for a smart community model as shown in Fig.2.

Firstly, to support residents' exercising and health, a 3D virtual trainer program is provided and a mobile application for a health check to connect with exercise equipment in fitness centers. Further, a real-time remote health service is provided.

To support the residents' education, an AR remote education program is adopted for the study room or library. In addition to the e-book system that allows residents to access reading matter through tablets, AR zoo, and magic book systems which are physical books combined with AR are provided in a library. To support residents' hobbies and entertainment, cultural classes and hobby programs are held by the AR remote education program, and an AR furniture layout service through mobile phones is provided. Furthermore, AR games are provided for the elderly in senior citizen community centers and children in playgrounds, and AR movies are shown in outdoor theaters.

For residents' convenience, QR cords can be installed in gardens, so residents can obtain information on ecology through AR mobile applications. Smart badges are provided to the elderly and children in housing complexes to support awareness of their location and their way-finding, and tablet devices such as smart phones are distributed to provide parking information in parking areas. QR cords linked to newsletters provide residents with a large amount of information about the housing complex, where residents interact with their neighbors using mobile applications. Further, by providing a rental service for self-maintenance devices, residents could perform apartment maintenance themselves using AR mobile applications.

To encourage residents' harmony and interactions, green market programs for real-time shopping, clubs for volunteer services and fun activities, and environment campaigns are proposed through AR mobile applications. Thus, residents could gather opinions and information by organizing mobile communities using AR mobile applications.

We adopt TUIs for devices in the smart community such as tablets and books because the natural touch, tactile and grip interaction of TUIs would encourage residents' active use, which might contribute to the triggering of community activities. In future studies, more...
feasible TUIs incorporating AR will be investigated and provided, with detailed information. Although there are difficulties in integrating TUIs with AR, it is expected that more TUI devices combined with AR will be developed.

6. Discussion and Conclusion
The aim of this research is to develop a smart community model for revitalizing communities in housing complexes. There is a need for a strategic approach to community regeneration that takes into account ICTs. To foster successful placemaking in the contemporary housing complex, more innovative thinking is necessary. This research adopts a novel research method, persona scenario, for developing the smart community model. By anticipating how representative persons behave in an environment, several personas were developed in the context of smart communities based on the results of the survey. Through the proposed persona scenarios, we identified inhabitants’ behaviors and intentions concerning the use of the community facilities and programs. Further, this research examines the potential of the smart community-housing complex in the context of placemaking, by reviewing relevant works and discussing the introduction of new ICT technologies. Placemaking in the housing complex refers not only to the design of space but also to the creation of meaningful experiences within space, producing a convergence between space and community members. Two technologies considered to offer crowdsourcing, as a foundation for collective intelligence, are mobile AR and TUIs. The use of technology not only alters the way we interact with others but also changes the way we relate to our surrounding environment (Uzzell 2008). By using tangible and intuitive devices housing complex residents can interact with digital information in a natural way, and mobile AR systems can afford participation in community activities anytime, anywhere. These devices offer an exciting opportunity to augment and enhance the way that we operate in the built environment, the activities that we participate in and the direct relevance of the information that we receive as we communicate and socialize with others in a place.

We believe that the notion of the smart community-housing complex can be the basis for future development of sustainable community systems by initiating positive changes in communities. Placemaking occurs when people attach associations to and construct meanings concerning the places in which they live (Rios et al. 2012). Powerful networking and mobile technologies could provide housing complex residents with specific opportunities for meaningful community participation, producing collective intelligence. To capture the value of the smart community, residents’ demands for their communities and smart technologies were investigated through the survey research. We used the results to
identify main service categories relevant to the smart community, each service including potential programs for supporting community activities. This research ultimately developed a smart community model for housing complexes, which enables residents’ positive experiences through constructive interactions with humans to technologies and humans to humans by using AR in a human-centered design context. The residents would experience the convenience of community facilities and the sense of community in the smart community naturally. Therefore, this research has significance in proposing the potential of a smart community for revitalizing communities by encouraging interactions with technologies and residents’ behaviors. In future research, we plan to investigate and validate the concrete ground for connectivity between ICT technologies and activating communities, through an empirical study. We will also analyze the side and after effects of the smart community in terms of social relationships and quality of life from a cognitive perspective.

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