# Media Biotope: Media Designing Analogous with Biotope

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Abstract: A model is proposed for the application of the media biotope concept, in which the structures of communication media are discussed using the analogy of an eco-biotope. Communities are created using local media that are connected with and that mutually influence each other. The model consists of three layers representing communities, psychological laws, and sociological laws. Simulations using this model can be conducted to investigate the relationships between media and communities. Example applications demonstrate how communication media based on the media biotope concept can be used to revitalize the communication among residents in a region, help travelers learn about sightseeing spots and communicate with residents, and revitalize communities through the local transportation system. These media are designed to increase the residentsfrespect for their hometowns by promoting awareness of others in the region.

*Keywords*: Media biotope, communication medium, community, society.

# I. Introduction

The appearance of new information media throughout history has led to changes in society. For instance, the appearance of newspapers generated public opinion, and the popularization of television promoted consumption. More recently, the appearance of highly digitalized communication media, e.g., the Internet, has made it possible to transmit information at high speed. While on the one hand these media connect people in distant places, on the other they weaken the connections between residents of local communities [1]. As a result, local residents often become indifferent to one another. Furthermore, the loss of enthusiasm for their region is seen as a reason for the decreasing civil participation in suburban cities [7]. In Japan, the major television stations are based in and broadcast programs from a Tokyo perspective. As a result, diversity in the Japanese sense of values has been diminished, and many people across the country aim to be "like people in Tokyo." Many young people have gone to the actual Tokyo, causing the population to be excessively concentrated there.

As a result, the concept of "media biotope" [2] is attracting attention. In the media biotope concept, the structures of communication media are discussed using the analogy of an eco-biotope. Biotope, a word coined from "bio" and "topos," means a small area suitable for living things. In many cases, it indicates a small region with a uniform ecosystem, e.g., a pond, a public square, a deserted house, or a grassy meadow. Furthermore, the activities maintaining such regions are also called biotopes in Japan.

A media biotope can be thought of as the biology of information media, and the concept suggests that we focus on small local media, e.g., cable television, local free newspapers, and community radio, because they can easily be used. We can use local media to create communities that are connected and that mutually support each other.

In this paper, the concept of media biotope is discussed from the viewpoint of system informatics. Then, a model of communities created by using information media is proposed. Next, four examples of how the media biotope concept could be applied are presented. The paper concludes with a summary of the key points.

# **II.** Media biotopes

#### A. Media and community

In this section, the concepts of communication media and community are described in order to discuss the media biotope concept.

#### 1) Communication medium

The word "communication" has various meanings, and even the transmission of data can be considered communication in certain contexts. Here, communication is defined in accordance with the concept of communicative action as put forth by J. Habermas [3]: actions taken with the aim of understanding each other.

Generally, "communication medium" means a singledirection medium, e.g., television, newspapers, and radio, or an interactive medium, e.g., cellular phones and e-mail. However, we can also obtain much information from off-line chats and office rumors and make decisions in accordance with such information. Furthermore, we can see the actions of others even in such things as graffiti on a wall or a can left on a bench. Consequently, a medium can be thought of as something that can be perceived by one or more of the five senses and that influences our actions. Of course, the technologies or techniques used in the medium are irrelevant.

#### 2) Community

The word "community" also has various meanings. It could be a neighborhood association or a homeowner's association. Communities are also formed through intangible connections like those among people who went to school together or who use the public areas of an apartment building.

They can arise among people who share the same hobby or the same sense of values. In these cases, there is no physical aspect such as a school or apartment building, and the individual connections are conceptual. That is, communities can be formed by people who share an identity, e.g., values, ideology, or history.

Hence, there are two kinds of communities: those based on something physical and those based on relationships. Here, we discuss the second kind because it can also include the first kind.

# B. Properties

"Small," "connectivity," "generality," and "design" are mentioned as properties of eco-biotope [2]. "Small" means that the scale of biotope should be small. "Connectivity" means a situation in which each biotope is connected to and affects the others mutually. "Generality" means that the biotope are not sealed off and that they behave as a part of our life space. "Design" means that the biotopes are designed so that they continue to perform as a biotope. We follow these definitions here.

### 1) Scale

The range of the medium must be comparatively small in the media biotope concept as it is for an eco-biotope. National newspapers and nationwide televisionstations can be called "big media" while notices for circulation in a region and bulletin boards at a train station can be called "small media." But what about a CATV channel that reports local news? The categorization is case dependent.

The important factor is not the size of the area reached by the medium but the number of residents who can act through the medium. The motivation of residents to act for the good of the community decreases as the possibility of each member affecting the community through the medium decreases. This means that the influence of each person should be ensured in order for a media biotope to form. However, if an individual has disproportionate influence, there is risk that the biotope will reflect mostly the values and interests of specific person. As a result, each person's influence must be fair, and as many people as possible must be able to act through the medium.

#### 2) Connectivity

If a community created through a medium with a scale as described above becomes isolated from other communities, it might become ruled by a specific sense of values. This means that communities must be able to influence each other so that various senses of values are permitted.

#### 3) Generality

The ability of many people to freely participate is also an important factor. Communities created through network games or social network services that require invitations cannot be called media biotopes because not everyone can participate freely. For instance, a gated community [12] cannot be called a media biotope because it is closed even though it satisfies the conditions of scale and design.

# 4) Design

The meaning of information transmitted through a medium is understood not only from the contents but also from the structures of the medium [4]. It is difficult to form a community with the properties of a biotope if the medium is designed to simply transmit semantic information speedily and easily. When designing a new medium, the characteristics of the community and of its members should be analyzed, and the medium should be designed in accordance with the results.

#### C. Autonomy of communities

Communities created using a media biotope must be autonomous and stable like a bio-system created as an ecobiotope. The autonomy and stability of a system should be maintained not by effects from outside the system but by the results of the system's behaviors. That is, the media information should be recycled instead of being simply broadcast. This flow mechanism should be incorporated when designing communication media.

Furthermore, a community that is completely stable is not good because it could become isolated. Communities should be able to adjust in accordance with changes outside the community while maintaining their autonomy.

# III. Structure of media biotope

# A. Proposed model of media biotope

The previously proposed process-oriented hierarchical model of artifacts from alethic, teleological, and temporal aspects, which is called the Alethic/Deontic/Temporal(ADT) model [8], can be used to view artifacts as a communication medium between the designer and the users. This model consists of three layers: main, top, and base. The main layer reflects possible states and operations, the top layer reflects the designers' intentions, and the base layer reflects physical laws.

This model can be easily expanded to represent other kinds of systems by replacing the physical laws on the base layer with other ones. For instance, it can be extended to represent business processes [9].

Figure 1 illustrates the use of media to create communities in the ADT model.

On the base layer, psychological laws are described using conceptual networks based on relevance theory and emotion theory. The laws correspond to the causal necessities of agents' behaviors. Thus, the actions of agents on the main layer are controlled by the laws.

On the top layer, restrictions on people's behaviors such as



Figure. 1: Use of media to create communities in ADT model.

laws, morals, and common sense are described. The restrictions correspond to the teleological necessities of agents' behaviors.

On the main layer, the agents' actions and the relationship among agents are represented. This layer reflects the "possible world" of modal theory. Communities emerge on this layer. The hemispheres represent the areas in which agents are influenced by the media. These media convey the restrictions on the top layer to the agents on the main layer.

The layers interact with each other. The laws on the base layer are changed by information received from agents on the main layer. The restrictions on the top layer emerge through the actions of the agents. These interactions are the process through which several media create communities. Using this model, we can carry out simulations to investigate the effects of a new medium.

#### B. Communication media as an interaction system

People behave in accordance with their self-image. For instance, a man might not try what he thinks is too difficult but will likely try something he thinks he can do. And the results of the action influence his self-image. This feedback system maintains his mental image and is called the "interaction system." Of course, the system includes other people. Consequently, the reactions of these other people influence his mental image as well. Figure 2 illustrates an example interaction system. Person A acts in accordance with to his mental image, and the reaction affects his self-image. His action also affects person B's image of him.

This process, i.e., controlling one's self-image from the perspective of others, is an important social skill. However, in a society with highly complicated media, the presence of others is not as strongly felt, so the ability to control one's selfimage from the perspectives of others' decreases [5]. As a result, a man's self-image is formed only from his own viewpoint, and he becomes increasingly narcissistic. For example, it has been reported that personal audio-video media, e.g., the iPod and one-seg TV tuner, and self-promotion media, e.g., MySpace and YouTube, increase a user's con-



Figure. 2: Scheme of interaction system.

cern for him/herself, and the user becomes increasingly narcissistic [6]. A lack of empathy is one of the symptoms of narcissistic-personality disorder caused by excessive selfgratification. Consequently, the number of people who cannot eympathize with others has been increasing even though they are connected with them through the Internet [7]. Thus, mechanisms are required that promote respect and empathy for others.

In the media biotope concept, the interaction systems of residents overlap, creating a large stacked multi-layered interaction system. This promote communication among residents and the natural formation of a community. The communication media of a media biotope should be designed to create such a stacked multi-layered interaction system by making others visible and to promote empathy for others. However, the relationships among residents would gradually deteriorate if the interaction worked negatively even if such an interaction system was formed. In contrast, the relationships



Figure. 3: Images of community activities on a pedestrian bridge.

would gradually improve if the interaction worked positively. The communication system should thus have a mechanism that forms positive feedback by promoting empathy for others.

This feedback system is described on the main layer and base layer of the proposed model (Fig. 1).

#### C. Problems with broad-based media

The "benefit of inconvenience" (*fuben-eki*) is the concept of "spending time and effort to create a new value." Kawakami et al. proposed using the idea for several methods of system design [10].

From the viewpoint of saving time and labor, mass media and high-speed digital communication media are very convenient. However, several problems have been reported. For example, the messages distributed by mass media reduce community diversity [11]. Furthermore, there is the Internet paradox: people with poor communication skills frequently use the Internet for communication and receive more negative feedback than the positive feedback needed to promote social involvement and psychological well-being.

Problems with hardware, e.g., the coverage areas of cellular phones and the rates of data transmission, have mostly been solved in the telecommunication fields. In the next phase, we should consider the things lost due to using convenient media. The use of the *fuben-eki* concept should lead to effective solutions.

# IV. Example applications of media biotope concept

#### A. Traditional events

These are many traditional events in Japan that function as a media biotope. A good example is the Feast of Lanterns ( "Obon" ). During this time, many people return to their hometown to visit the graves of their ancestors. It is a good opportunity for them to see relatives and catch up on the news back home. Local festivals and the new year holidays function the same. However, interest in these events has waned, so communication media that take their place could be designed using the media biotope concept.

#### B. Community pedestrian bridges

Figure 3 shows images of community activities on a pedestrian bridges designed using the media biotope concept.

There are flower beds on this "community pedestrian bridge" and people in the neighborhood can freely plant flowers there (Fig. 3 (A)). The residents are encouraged to take care of the flowers together, to view the flowers, to visit the bridge, and to relax there. The pedestrian bridge is used by the residents not only as a place to cross the street but also as a place where they can plant flowers and get community news.

Several such bridges could be placed in a rural area, and the residents could learn about developments on the bridges



Figure. 4: Images of community activities on a bus.

by checking a web site. Visitors to the web site could see photographs taken on the bridges (Fig. 3 (B)), and these photographs could be regularly refreshed. The residents using the bridges could share photographs and news about the bridges with the public by posting to the web site (Fig. 3 (C)). Publicizing photographs and news about the bridges on the web would enhance communication among the bridge communities (e.g., someone viewing the flowers on the bridge of another community could meet and talk with people from that community about common topics such as taking care of and observing flowers. Such interaction corresponds to an "exchange of local information" in the media biotope concept and should mutually activate the communities. Moreover, fixed cameras on the bridges would help prevent crime on and around the bridges.

In addition, residents could naturally participate in the community for their local bridge because the bridges would be set up in common areas of passage. Generally, pedestrian bridges, which enable people to easily cross the road, are set up near hospitals, elementary schools, etc. Constructing these community bridges would thus promote communication between the elderly and grade schoolers who tend to use such bridges with the result that they would get a chance to greet each other on the bridges (Fig. 3 (D)). Consequently, two generations, the grade schoolers and elderly, would be brought closer together.

Constructing such bridges could make the scenery in the region more beautiful. The external appearance of such bridges would be greatly influenced by the climate and culture of the local area. Therefore, the features of the climate and culture in the region would be made more visible through these bridges. The long-term benefits include an increase in the residents' respect for their hometowns and a stronger bond between generations.

#### C. Communicative buses

Figure 4 shows images of community activities on buses designed using communication media, i. e., a "communicative bus." Two functions are incorporated: transportation for residents and travellers and enhanced communication between residents and travellers.

Local products, e.g., sweets and special lunch boxes, could be sold to the travellers at each stop, as shown in Fig. 4 (A). Travellers could then enjoy lunch or a snack on the bus (Fig. 4 (B)). The name of the next stop and the special product sold there could be announced before each stop. The passengers could buy the local products they like as they use the bus for transportation. As a result, the travellers would natu-



Figure. 5: Images of community activities at a bus stop.

rally improve their understanding of the region while enjoying their trip.

Electronic message displays could be set up 1) on the front of the bus, 2) on the side near the back doorway, and 3) above the driver (Fig. 4 (C)). Passengers could freely send brief messages like a "Twitter message" about their impressions, memories, etc. of the trip and about local products to these displays by using their cellular phones.

The messages would be displayed until another user sends a message or until a fixed time has passed. These message displays would enable passengers to share their thoughts and feelings and would entertain people outside the bus.

Furthermore, because travellers are typically interested in local products and historical places, they would get a chance to communicate with the local people by buying their products. As a result, the memories of their trip would become stronger. Travellers who ride together could use these messages as a means to communicate. In addition, communities and industry in the region would be invigorated, and the attractiveness of the region would increase as a result.

Of course, many support systems for travelers have been proposed [13, 14]. However, these systems were developed from the travellers' perspective. In contrast, the communicative bus would be designed from the communities' perspective.

#### D. Communicative bus stops

Figure 5 shows images of community activities at a stop for communicative buses.

Generally, a community bus is a shuttle bus managed by a public administration, e.g., a city or town, or a nonprofit organizations that helps elderly residents to go out by themselves. In many cases, a community consisting of people who use the bus frequently emerges. However, these communities are closed to others because there is no pathway among such communities.

The basic idea of communicative bus stops is to revitalize communities by creating new communication pathways, as shown in Figure 5 (A). A community bus usually has a single closed route. The route is designed to have common transfer points with neighboring community bus systems. Making these transfer points communication pathways would enable the passengers on a bus serving one community to interact with ones on a bus serving another community. (Fig. 5 (B)). Of course, they can transfer to a bus serving another community at the common transfer points. This would expand the size of the area that can be accessed by elderly residents. In addition, they would get a chance to communicate with people from other communities. Consequently, they would become aware of the existence of different manners and as-

pects of thinking, and other regions would feel more familiar. Furthermore, they would notice the values of their own region by comparing them with others, so their enthusiasm for the region would increase.

# V. Conclusion

The concept of media biotope was discussed and a model of creating process of communities was proposed. The proposed model for applying the media biotope concept is aimed at creating communities by using local media that are connected with and that mutually influence each other. Simulations using this model, with its three layers representing communities, psychological laws, and sociological laws, can be conducted to investigate the relationships between media and communities. The example applications demonstrate how communication media based on the media biotope concept can be used to revitalize the communication among residents in a region, help travelers learn about sightseeing spots and communicate with residents, and revitalize communities through the local transportation system. The result should be increased respect by the residents for their hometowns.

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