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FROM WHERE DOES THE CONTENT OF A CERTAIN GEO-COMMUNICATION COME? SEMIOTICS IN WEB-BASED GEO-COMMUNICATION.

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This paper presents a new theory and a new method called 'Value-modelling', which makes it possible in a controlled and systematic manner to make the necessary selective analysis of real world phenomena as well as a controlled and systematic identification of the necessary, relevant information. The result of this 'value-modelling' is the input to the process of data-modelling. Normally the data-modelling presupposes that the content is already there. Data-modelling is about handling the given information, which still leaves the question open 'who decides the content and on which basis?' The process of value-modelling is based on a semiotic approach. The theory describes that the meaning of the real world's phenomena consists of three basic sign-elements: the object itself, a messenger, and the consciousness's apprehension.

INTRODUCTION

The word map was in the old days, which means before the World Wide Web, easily understood, although several definitions existed. Nevertheless, most people had almost the same idea of what a map was. After the change to a web-based infrastructure, the conditions, the forms of communication, and the contents have changed drastically. Consequently, the domain should be extended to make the description of the transmission of geo-information more precise. A map is no longer everything in the process of communication. Maps are only a part of geo-communication.

The purpose of a communication is to influence the behaviour of the user by means of the transmission of information. In order to transmit precisely the right kind of information for this purpose, an analysis of the 'reality', including the relations to the user, must be executed as the first thing. On the basis of the results of this analysis, the transmission is prepared. Without these preparations there is no rational, systematic basis for the transmission. The question is, however, how to perform the analysis of the 'reality'? There is a need for a theory indicating not only how to make more reliable and more conscious decisions when choosing the information for a given geo-communication, but also including a description of the premises on which these decisions are based. When I here speak of an analysis of the 'reality', it is really a crude simplification, because it is one of the main points of this book that one cannot analyse the 'reality' as such, but only the messages we get about the reality. It is fundamental to distinguish between the reality and the information we get about the reality.

WHAT IS GEO-COMMUNICATION?

As mentioned, the purpose of any communication is to change the behaviour of the user what is done by submitting detailed and precise information, on the basis of which the user may act. Decision and action is conditioned by this supply of information and the realisation of the connection with previous experience. In order that the producer may communicate the necessary information to the user, he must be able to analyse the phenomenon of which the communication consists and be able to describe the result of this analysis in detail. The purpose of the analysis is to select the kind of information that makes the user able to make decisions and act accordingly. Geo-communication is the transmission of this kind of information in writing or in graphical form.

The user may want a basis for decision on a possible trip, i.e. a suggestion of an itinerary, and he starts a web-service intended for this use. The user types the start point and the end point of the trip, date and time, and after a short time, he will receive a number of proposals for the itinerary. On this basis he has to make the decision, "Yes" or "No", to travel. Behind the interface of the web-service several things happen about which the user does not need to know. On the basis of the algorithms of which the web-service consists, a number of questions are sent to some databases about certain geo-information, such as timetables, maps, road work, etc. By means of other algorithms this information is controlled against one another, resulting in a number of tables, some text, and some graphics, which together acts as the wanted

itinerary. It is important to note that the user does not ask for a certain timetable or a certain map, but only for the meaning of these in relation to the trip he wants to make. The meaning for the user is to have a foundation on which first to make the decision to travel or not to travel, and if he decides to travel, then to know how to do it.

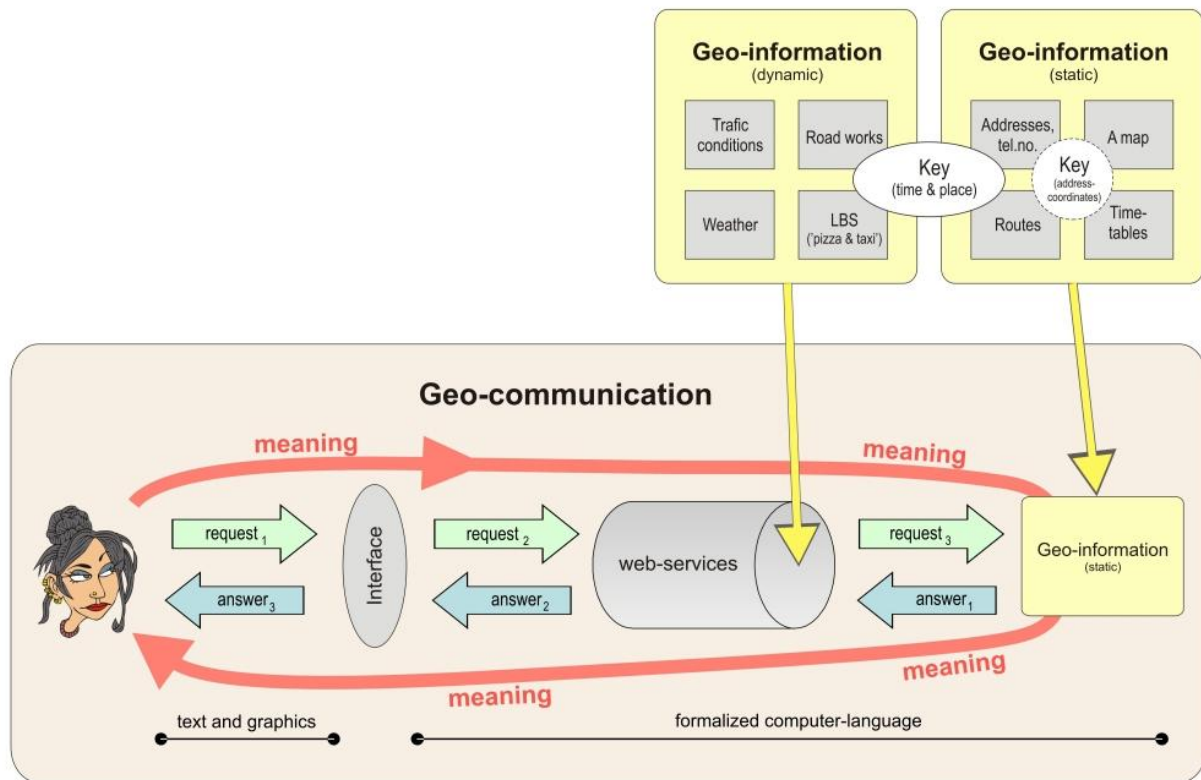


Figure 1. The elements of a geo-communication, including the user, illustrating the example of the planning of a trip. The user is seeking information enabling her to decide whether to take the trip or not. The primary problem for the producer is to catch this problem and to deliver the information having this meaning. The secondary problem is to master the complex network of processes and their mutual dependence. All processes may be iterative.

The fundamental questions are the following: Who decides the contents of a certain geo-communication?, on what basis?, and how can the producer identify the right information? Or in other words: Why is it contents A and not contents B that are included in a given geo-communication?

A THEORY IS NEEDED

Anyone wanting to be good in geo-communication has to learn the basic theory of how the phenomenon consists of signs and the different characteristics of these signs. Otherwise the effect of the geo-communication will depend on chance. This is mainly due to the enormous number of different kinds of data available as the basis of most geo-communications. The basic problem is that this number of data is so large that no human being has a brain with a capacity to contain all this information. Consequently, all these data have to be reduced into boxes, each containing a sufficiently small number of data that the brain of the user is able to cope with them in a convenient way. This need for a reduction of the data into conveniently small boxes is the reason why a theory is needed. A similar problem is the basis of statistics used to give information about the general trend in large amounts of data, but that is another story.

The increasing use of web-services and other networks makes it more and more difficult to perform precise geo-communications and avoid misunderstandings, calling for a better education of the producers if the ever increasing web-based possibilities should lead to the increase in the quality of geo-communications. This calls for a theory explaining the details of any geo-communication.

THE THEORY OF ANALYSIS

Semiotics is the study of production, transmission, reception, interpretation, response, and storage of meanings by means of signs. A sign is a means of expression, participating in the communication of some information from the environments into the brain of a person. Human culture is based on signs in words, spoken or written, in body language, in clothing, or in different kinds of art, but also - more interesting for the present book - by signposting, graphic sign systems, and by combinations of graphic signs such as in geo-communications. This is why semiotics is so important to geo-communication. A sign always refers to or points to something else. A sign is nothing in itself. A sign is detected

by our senses, and it is interpreted as a reference to something else. A sign is in general more handy than the thing it refers to, for instance in the case of feelings. The words we use to express our feelings are not the feelings themselves, but only a reference to them. Or we may look at the sign on a map, e.g. the signature for a railway station, which is a lot handier than the railway station itself. The signature is a sign referring to the railway station, but it is not the railway station itself. It is extremely important to differentiate between the sign and the thing it refers to. A sign is always a rather poor copy of a part of reality, what leads to a high probability of misunderstandings or insufficient information in communications.

The American philosopher Charles Sanders Peirce described in his writings how a phenomenon consists of three signs: the referent describing something about the object of the communication, the representamen being the messenger, and the interpretant, which is the image (a sign) in the brain of some person. Peirce also described how each of these three signs must be in one of three different categories: firstness, secondness or thirdness. Therefore there are nine classes of signs, each of which Peirce gave a special name (see figure 2). The definition of the three categories is not stated too clearly by Peirce. Therefore I have introduced the dimension (in an abstract room) of each sign, equal either to zero, to one, or to some number larger than one. This dimension gives a better indication of which state a given sign belongs to. Further, the introduction of the dimension easily leads to the very important rule that the dimension cannot increase when going from the referent to the representamen, or when going from the representamen to the interpretant. In other words, the three signs of which the phenomenon consists can only go horizontally or downwards from left to right, as indicated by the arrows in figure 2, but never upwards. This has the important consequence that there are ten classes of phenomena, and not seventeen as otherwise had been the possibility. This is a simple consequence of the rather obvious rule that the dimension cannot increase, because this would correspond to an increase in information during the elementary part of the communication described by a certain phenomenon. Thus, the introduction of the concept of dimension yields an operational quantity, giving a high degree of understanding of how phenomena act. The model of states given in figure 2 is important for the producer of any geo-communication, not only in analyzing any given phenomenon, but also to indicate what types of phenomena might be chosen in order to obtain a given interpretant in the mind of the user. It is also important for a certain geo-communication that all nine classes of signs are represented in the information given in the communication, so that all classes of phenomena are at the user's disposal.

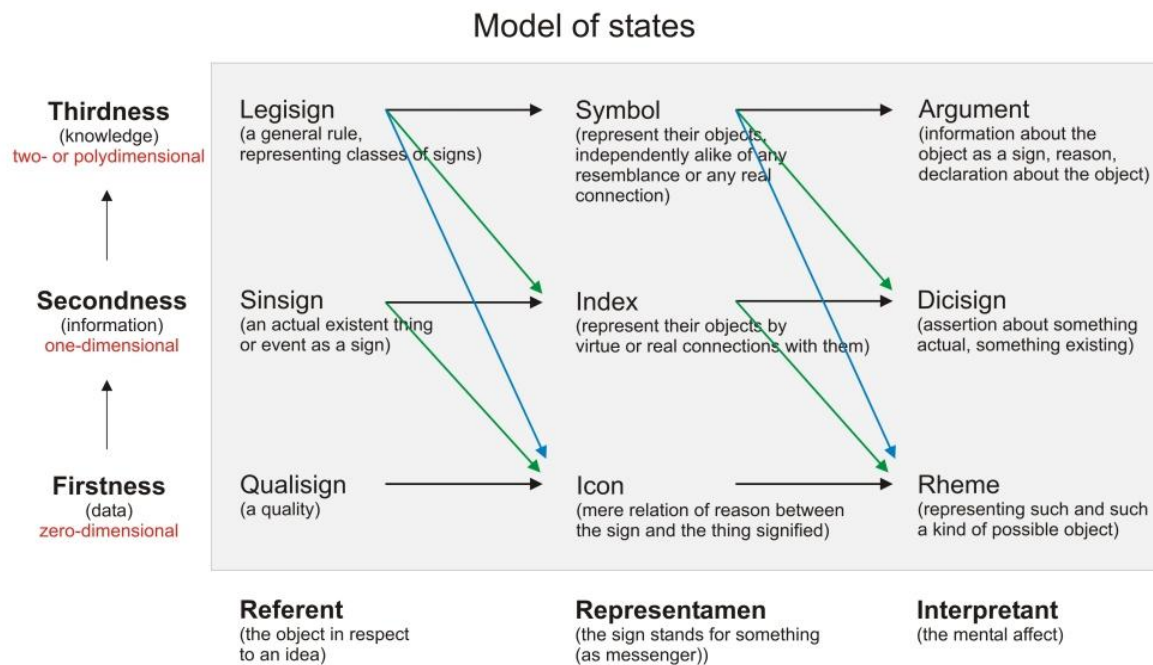


Figure 2. The model of states, used to analyze any phenomenon, and to identify the phenomena which may satisfy the user's need for some special information.

THE GEO-COMMUNICATION MODEL

Having now established the Model of States allowing all phenomena to be analysed, it seems natural to look for a general model of how any geo-communication is prepared and carried out in all detail. There is a need for another theory, including the contents, the semantics, and all the many processes. Quite often there is, roughly speaking, an assumption that the contents are given beforehand, or that the content to a beginning must be identified very thoroughly. However, it is not described how this should be done. The geo-communication model, as it is shown in figure 3, is mainly based on a previous cartographic communication model by Koláčny from 1969.

The essential point in the model is that all the processes shown must succeed in carrying through the total process, the essential and fragile meaning all the way to the user's decision and action. As pointed out already by Koláčný, there are many possibilities of distorting this meaning during the many processes. The purpose of the model is to minimize such distortions. The initial phases of the whole process are essentially to give the answer to the initial question of this book: "Where do the contents come from?". It is given by an analysis of the phenomenon, an analysis of the user in order to determine how he is going to use the information, identification of the relevant types of information, and finally a semantic generalisation as the last part of this process, where the meaning is worked on. The introductory phase of all this is called value modelling. The result of this is retained in the value diagram, describing the contents of the communication, thus answering the initial question in a positive way.

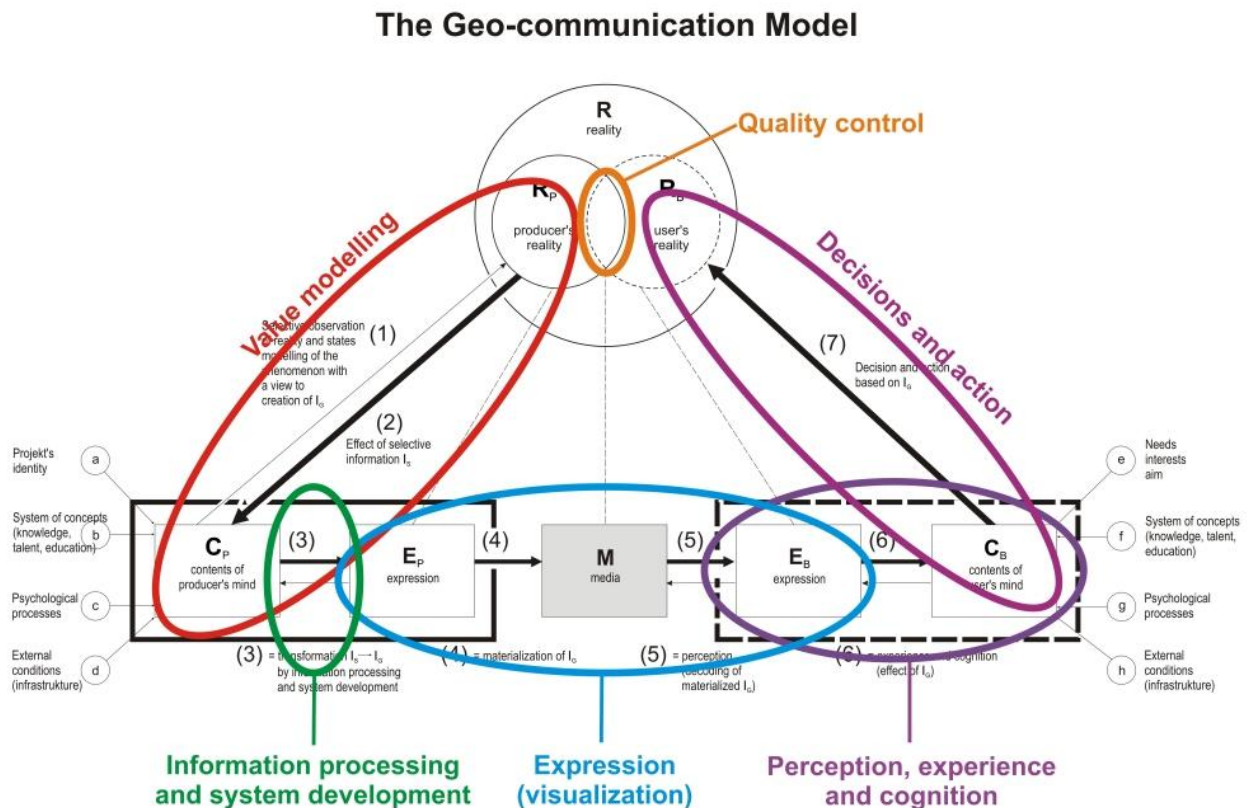


Figure 3. The geo-communication model showing how identification, transformation and the use of the meaning of the phenomenon are placed relatively to one another. The model consists of arrows, indicating processes, boxes, indicating contents, and letters, indicating premises.

CONCLUSIONS

The theory of analysis based on the model of states in figure 2 and the model of geo-communication in figure 3 supplement each other to a complete theory of the whole geo-communication process. However, it should be stressed that both models are a priori theories, developed on a purely logical basis. They are consequently completely general. When these theories should be used in actual projects, they cannot be applied directly, because they are too general. I think that it should be possible to find general methods for such an adjustment.

By use of the model of analysis and the model of geo-communication it is now possible to analyse the phenomenon and identify the relevant contents of any given geo-communication with until now unknown precision and consciousness. The importance of this is obvious when looking at the complexity in many web-based geo-communications. I think that this complexity is far from having reached its maximum. The problems which may arise from this are best met by working out theories and models for how the complexity is mastered by conscious and systematic work.

THE FUTURE

The subject of how to choose the contents of a given geo-communication is far from being fully explored by these theories. Outstanding is primarily to adjust the theory to practical applications, mainly by including the theory into the prac-

tical methods used in the preparation and the production of geo-communications, especially in relation to system development. Further, the theory should be tested in a number of practical applications, for instance through a cooperation between research within ontology, geo-communication, and geo-information. This means research of how to describe the relevant phenomenon for the use in practical applications.

As mentioned above, the theory developed here must be adjusted to practical applications, and the quality of the resulting models should be controlled by quality. It might be possible that the ten types of phenomena could be used as elements in the parameters in such a control.

The weak point in this and any other theory about geo-communication is the lack of knowledge of what happens inside the head of the user. The quality of a given geo-communication may be tested by practical use, but it is based on certain assumptions about the user. It might be of great value to have a theoretical foundation for these assumptions from the theory of cognition and related theories.