5TH INTEGRATED PRODUCT DEVELOPMENT WORKSHOP
IPD 2004 SCHÖNEBECK/BAD SALZELMEN b. MAGDEBURG
SEPTEMBER 23-24, 2004

DESIGN INFORMATOLOGY IN IPD

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Keywords: IPD, design informatology, information theory

1 Introduction

Designing an object of the physical-material world, for fulfilling its certain function, has a professional, logical process from recognizing the problem to produce the object as the solution. The necessary knowledge for the product development can be divided into two sets:

- The knowledge describing the elements of the physical-material world, which are the input and the output data of the design process.
- Design is a data and information processing operation and for this we need the knowledge described as rules, standards and algorithms, and the human creativity.

Design informatology analyses the design process in the light of the information theory. In the first approach it examines the forms and the contents of the products in each phase of the life cycle and the way of producing. In the second, design informatology focuses on the methods of organizing the knowledge, and make it searchable and processable in information networks and knowledge bases.

2 The structure of design knowledge bases

In a design knowledge base the information should be represented in a higher level format instead of a simple set of data. This unit of knowledge is the message. Message includes both processed data and logical steps from the previous message. Once the messages are created they form a network, where the nodes stand for the messages, the links mean the logical steps between the nodes. This network appears in a multidimensional message space and can be too complex. To handle this problem an octagonal system can be used as a frame for the network. This is the existential octagon [1] (Fig. 1.).

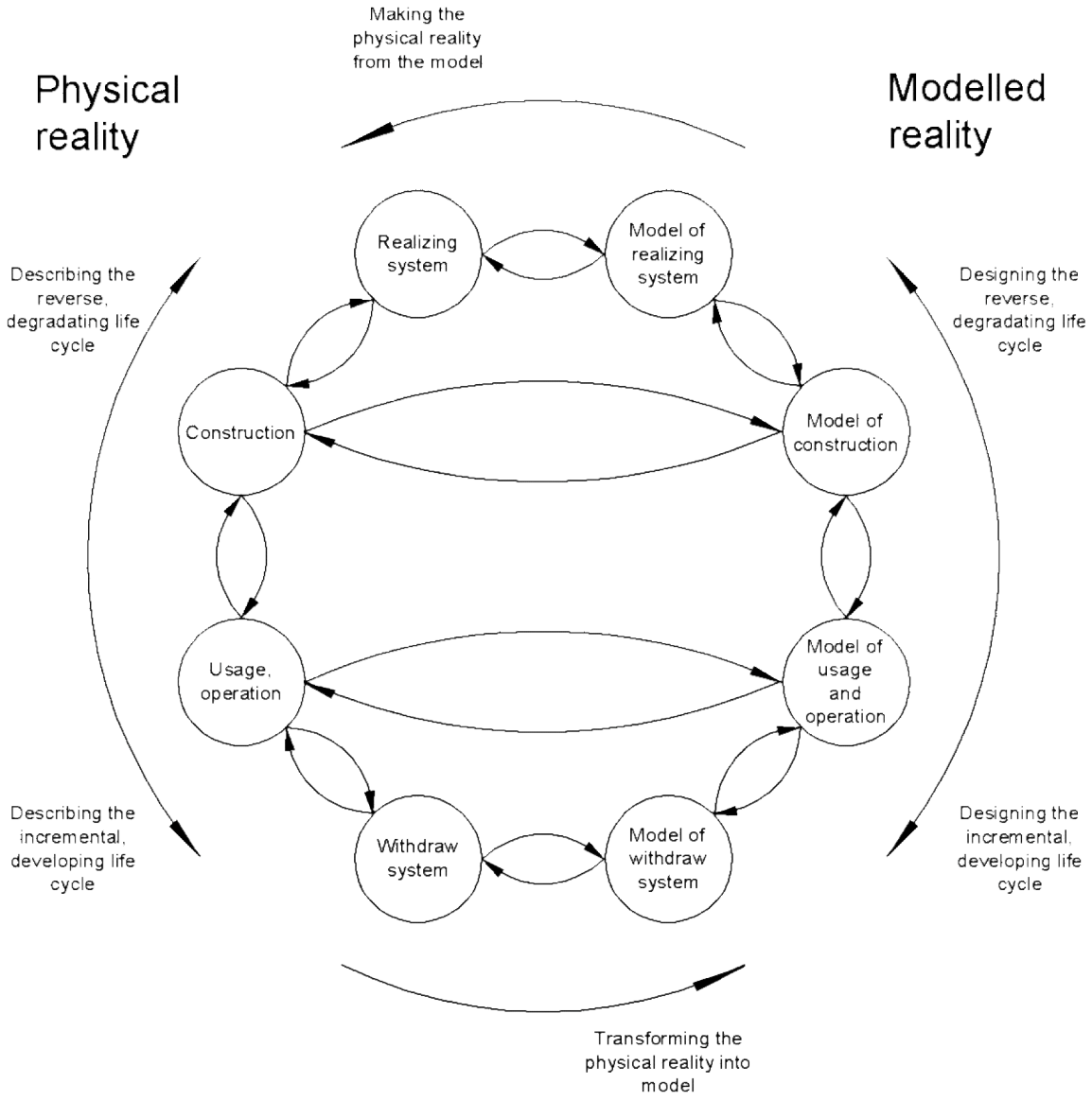

Figure 1. The existential octagon

There are two sides of the octagon: the physical and the modelled reality. On both sides there are 4 nodes, which are representing the realization, the construction, the usage, and the withdraw system. The existential octagon is defined on each level of the design process (Fig. 2.).

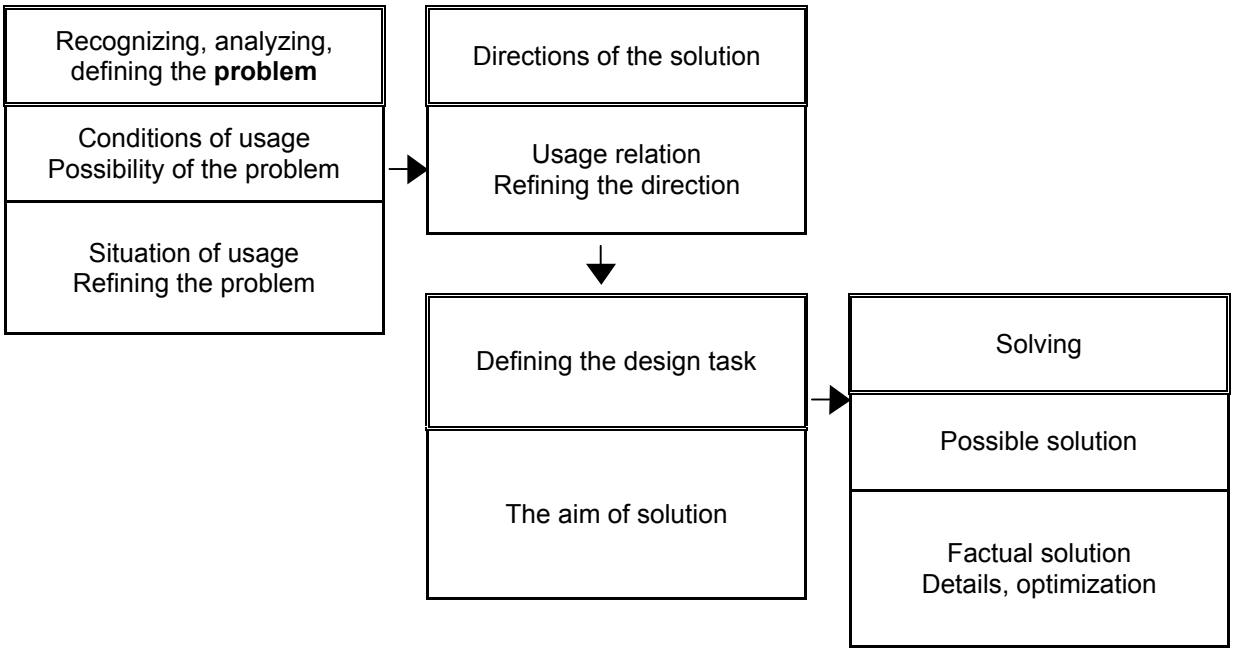

Figure 2. Levels of development [1]

Putting the octagons of the levels of development above the previous one, forms the message space (Fig. 3.). Now the frame can be filled with the messages and connect the nodes to each other to get the network. Researches show that the network is scale-free, the most of the nodes have only a few connections, but there are some nodes, which have several links [2]. Once the centers of the network (the nodes that have the most connections) are identified, the critical areas of the product are known. If there are problems in these areas, the product will be probably disadvantageous, because these nodes take effect on several other nodes. Nevertheless, if we pay more attention for these areas, we will get a better result. Using this method, we can avoid spending too much time and energy for the details, which are irrelevant, and we can work on the important problems that have the most effect on the final product. The advantage of this method is that it can be used in the early phase of the design process, so the design process can be cost-effective and the development time can be shorter. The application of the methods of the design informatology in design knowledge bases allows the user to search for existing solutions for a similar problem, and it shows if there was a dead end in a previous design work. Since the system has memory, it can learn and store all ways of development of every user, who have ever used it. Of course, this needs huge storage capacity and strong

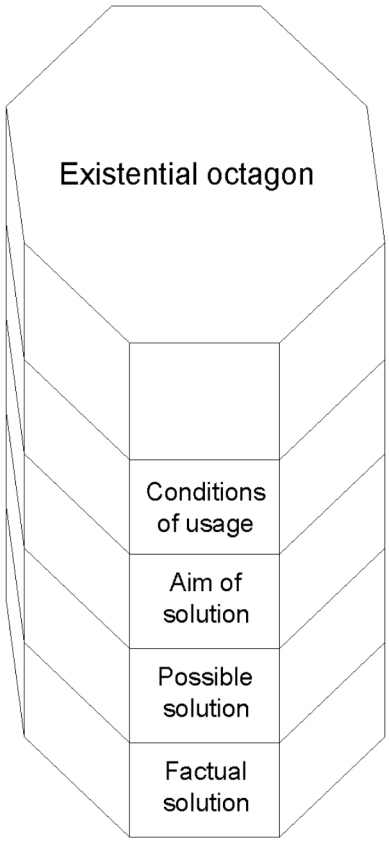

Figure 3. The structure of the message space [1]

hardware, but nowadays, using the latest technologies of computer networks and artificial intelligence systems, this problem can be solvable.

3 Conclusion

The effective and competitive product development needs the searchable and processable storage of design knowledge. The design knowledge bases supported by the elements of the design informatology give us the method to clear up the high priority message nodes. Paying more attention on them, we can develop successful and cost-effective products.

References

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[2] Barabási, Albert-László.: Behálózva, 2003, (Magyar Könyvklub)

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