

W74 + W78 seminar
24-28 October 1988
at Lund, Sweden,
session 'Classification'

Classification and coding, a necessary tool for improving the information flow in the building process. Developments in Sweden and within CIB W74

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Mr. Chairman, Ladies and Gentlemen,

During the 20 minutes I have got at my disposal I will describe how we in Sweden today regard the need for tools for an improved information flow in the building process and how we try to solve our problems. I will also touch upon the relation of this work to international development work.

The name of this session is 'Classification'. We have got some criticism for that as it hints at a more restricted subject than really intended. The aim of the work described during the session is to improve the information flow in the building process. Classification and coding are important tools for the realization of that goal but only tools, not ends. The title 'Classification' was chosen for brevity.

Improving the information flow is something very practical and the consequences may even be described in dollars or pounds or whatever currency you choose. Also the way we try to achieve our goals is down to earth. You must during the whole development work have a close relation to the users of our results.

Distribution of time:

- o 10 % preparation of proposal
- o 90 % getting the proposal accepted

Figure 1

But our work must rest upon sound principles - a theory.



I will discuss the following points:

- o **The building process**
- o **The SFB and BSAB systems**
- o **Uses of improved tools for information handling**
- o **Swedish development programme**
- o **Co-operation and mutual trust**
- o **EDI Electronic Data Interchange**
- o **International co-operation**

Figure 2

The building process

The agents in a building project

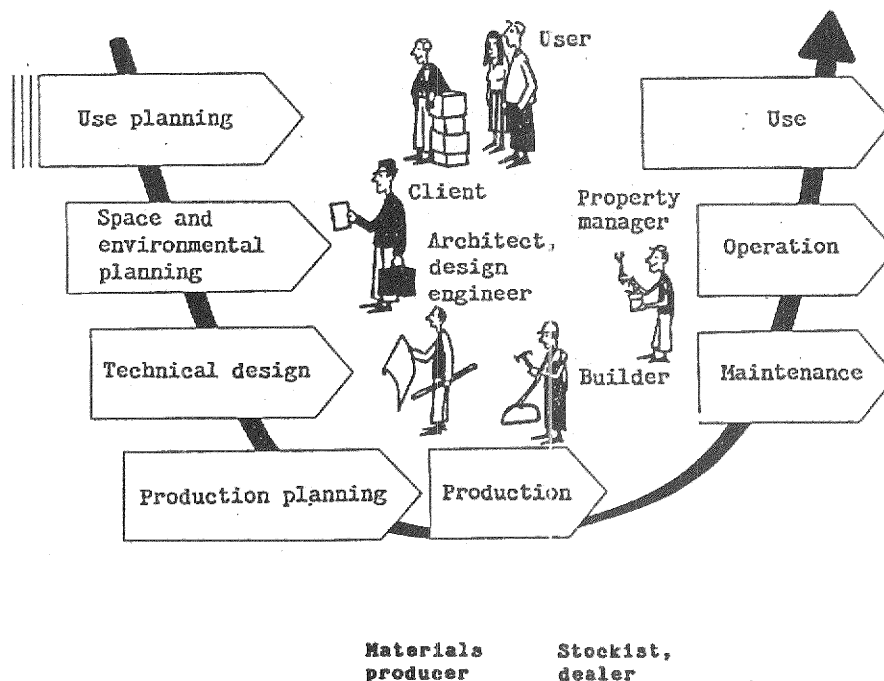


Figure 3

The building process may be illustrated in different ways. Figure 3 shows one way. The figure shows the main agents involved in a building project. The real number of specialities involved is increasing as a consequence of the increasing complexity of our buildings. In addition to what is shown in figure 3, central and local authorities, standardization institutes, information centres etc are involved. The agents are basically the same from project to project. The actual combination of persons involved changes, however, more or less totally from project to project.

The different agents must understand each other. This calls for a common language, a generally accepted way of structuring the information which flows from one agent to the other.

The first common language developed in the end of the 1940-ies was the SfB system.

The system was mainly intended for the contracting phase between design and production. It did not cover the earlier stages of the building process, nor did it fully cover the needs during production, not to speak of operation and maintenance. The need for a system with such a wide scope was not there, either, at that time.

The system used at present in Sweden, the BSAB system, was introduced 1972. Conceptually it is very similar to the SfB system but the structure of the tables was changed in order to accommodate service and installation systems and their constituent parts in a better way than the SfB system did. The background of this change was the ongoing technical development with the relative cost of service and installation systems of the total building cost increasing all the time.

From a theoretical standpoint the present BSAB system may have some weaknesses but the system is widely used and thus contributes to the efficiency of the construction industry. A wide acceptance is in my opinion a criteria for the success of a system.

Why is the system used? There are two main explanations, namely it is used in a very powerful document (the Swedish National Building Specification /AMA/ which is used in virtually every building project carried out in Sweden) and it is regularly promoted by a respected, neutral organization working as an integrated part of the construction industry (the Swedish Building Centre). The uses made of the BSAB system have a tendency to increase. New fields are for CAD systems and production planning and control systems. I mention this to remind us all that we are working for a real world with real needs.

Increasing needs

The construction industry is now entering the computer age. Information becomes a still more important resource. New enterprise forms and business ideas start to develop. The computer gives us better possibilities than earlier to manipulate the vast amount of information which is created in a project from brief over technical design and production to operation and maintenance so that losses of knowledge are minimized and so that everybody gets the information he needs to fulfill his task. Bearing in mind the enormous value of the building stock which we have to maintain, an improved information handling during the use stage as well as from design and production to it are of utmost importance.

Contrary to earlier thinking from at least some people it has proved that efficient use of the possibilities of computerization requires a common language for the different agents in the building process in the form of a well performing classification and coding system as well as rules for its use.

To avoid misunderstandings, classification is necessary for creating relations between objects in databases and for structured printed outputs. Searching in databases may be carried out with the help of the codes of a classification system but searching with normal words is also very important. Classification and coding and the use of natural language are not contradictory but complementing each other.

Uses of improved tools for information handling

I just list existing uses of today's generation 1983 of the BSAB system and some new fields of use for an improved construction industry system. We feel for the moment a strong pressure to offer tools for improved information handling both in existing and new areas. Time does not permit me to comment upon any of the individual fields shown in figure 4.

USES OF CO-ORDINATED CLASSIFICATION

Existing today

- o Briefing documents
- o CAD systems
- o Drawing numbering
- o Bills of quantities
- o Specifications
- o Cost calculation
- o Production planning systems
- o National Building Specification (AMA)
- o Standard rules of measurement
- o Product information
- o Cost handbooks
- o General requirements from the Board of Public Building
- o Swedish standards

New fields

- o Digital building models
- o Materials administrative routines
- o Instructions and other documentation for operation and maintenance

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increasing use within existing fields

Figure 4

Swedish development programme

The Swedish Building Centre and its Systems Committee have established a programme for the development of a common classification and coding system for the construction industry. The original task was to create a system for the total building process from use planning to operation and maintenance. Later on we have also been asked to try to include integrated solutions for general information used in the construction industry ('library systems') in our work. The chairman of this session - Lars-Magnus Giertz - is actually working on this latter subject. My comments today refer for time reasons mainly to the building process system. The programme was approved so that work could start in the begin of 1986 and will be completed around 1992.

I would like to mention some important factors which have influenced our programme.

FACTORS INFLUENCING DEVELOPMENT PROGRAMME

- o Flexibility & continuity
- o Evolution, not revolution
- o Roles of agents not influenced by organization
- o Common system to a certain level of detail

Figure 5

The construction industry shows and will also in future show a big span both concerning the size and complexity of projects and the size, area of specialization and competence of individual firms. Development will furthermore go step by step. An important requirement which we believe must be put on a system for information structuring is that it allows both computer aided and manual production and handling of information used in construction.

This calls for both flexibility and continuity in the system solutions which are created.

A basic principle is that a common classification and coding system should be designed in such a flexible way that parts may be removed and replaced by new parts without creating a need to change the whole system when new requirements occur. The system should also be capable of being used in more or less advanced ways.

It is furthermore important, not to introduce unnecessary changes in existing systems with a wide degree of use. The system solution which is being created should therefore as far as possible be based on evolution and not revolution.

I would furthermore like to emphasize that the roles of the agents in the building process, cf figure 3 once more, are in principle not influenced by the organizational form for the realization of the single project (package deal, early tendering, general contracting based on detail design, administration by the client himself etc). The most important questions from an information handling point of view are what information should be transferred from one agent to the other and how should this information be structured so that it could as simply as possible be transferred between the agents without loss of information. The information needs of the agents are not influenced by the organizational pattern applicable to a specific project e.g. if the design team works on a contract from the client or from the contractor.

The statement just made is of fundamental importance. The basic independence between the information needs of the agents and the organizational pattern of the individual project makes in reality the development of a common classification and coding system for the construction industry possible.

Needs for generally agreed conventions exist primarily for information which passes from one agent to the other, e.g. from design to production. Information within a trade may in principle be handled by the trade itself e.g. by the contractors. Experience shows, however, that it is important that the parts of the system which are specific to a certain trade fit within the framework of the generally agreed system if the full increase of efficiency should be achieved.

At the same time the system may never be felt as creating a straight-jacket but must be experienced as a useful tool not preventing desired competition based on sound conditions.

We try to create a common system for the different agents in the building process. A common system will reach a certain level of detail.

Through additions and further detailing special needs of the different agents themselves may be fulfilled. Further additions and detailing may be carried out by individual companies or by a group or an individual person within a company.

The same principle may also be applied 'upwards', i.e. certain parts of the system can and should be agreed internationally.

	International	National	Branch/Trade	Firm	Group or Individual
Basic concepts (chapter 7)	Basic concepts agreed and recommended 1) 1) 1)				
Classification tables (chapter 8)	2) Some agreed and recommended tables				
	Examples	Example of other classification tables	Additional tables or internal additions to nationally agreed and recommended tables		
Uses (chapter 9)	Some agreed and recommended uses (eg arrangement of specifications)				
	Examples	Examples of other uses, eg cost calculation	Other agreed and recommended uses		

Area of this report

- 1) Additional concepts may exist. They are not treated in this report.
- 2) Possibly international agreement and recommendation of one (or a few) tables.

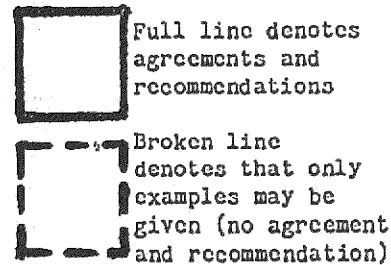
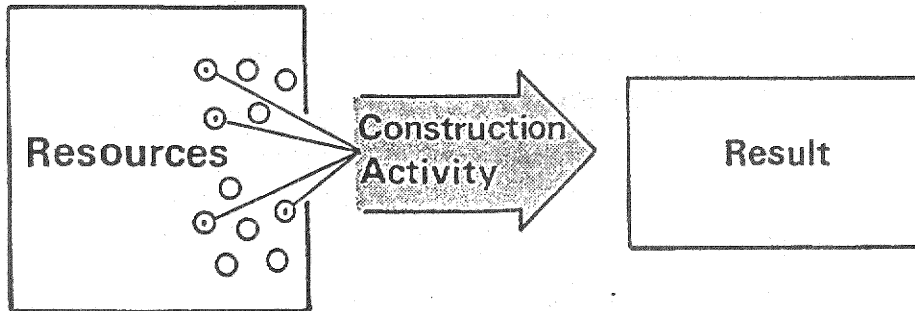


Figure 6

A first development step is to agree on some basic concepts. A basic concept already presented in CIB Report No.22 The SfB system, 1973 is that resources are transformed in activities into results. The illustration in figure 7 is taken from CIB Report No.55, which replaces CIB Report No. 22. This principle which is based on normal systems theory was to my knowledge first recognized as applicable to information handling in the building process in a development project carried out by a group of five Swedish contractors 1970. The SfB system which had been created twenty years earlier could be interpreted as adhering to the same principle. This may be one of the explanations why the SfB system has been successful. The BSAB system is also based on the same principle. Time restrictions do not allow me to elaborate further on this fundamental principle.



Basic Consideration of a Construction Activity

Figure 7

The next step is to agree on the classification categories needed. Examples of resource classes and result classes are given in figure 8.

RESOURCE CLASSES

- + Materials and components (to be built in)
- + Building plant and equipment
- Men
- Capital
- Site
- Information

RESULT CLASSES

- + Building types (by use)
- (+) Building types (by structure /possibly unnecessary/)
- + Spaces
- + Elements
- + Activity results/Constructions

+ = tables assumed to be agreed upon in co-operation between the different agents in the building process

Figure 8

A next step is to agree on the structure of individual tables, e.g. a table for materials and components or an elements table. The next step after that is to agree on the coding of the table. Lack of time makes it impossible for me to go into further details here.

Co-operation and mutual trust

The successful development and subsequent acceptance of a common classification and coding system presupposes that a need is felt from at least some key agents in the building process and that all solutions are created in close co-operation between those concerned. It is important that those who are expected to use the system feel that it is 'their system'. I once more refer to my first illustration on the distribution of time. In addition to that it is also recommendable that the system is used in an important document in the building process e.g. in a National Building Specification. It is furthermore important to the users of the system that well elaborated, well performing and generally known uses of the system exist.

It is furthermore important that the organization co-ordinating the development work is accepted by the different agents in the building process and that the organization will remain as a promoting centre also when the development work on the new system generation is finalized.

We feel that these conditions are generally fulfilled and we therefore feel rather confident.

EDI Electronic Data Interchange

Classification and coding are necessary but not sufficient tools for an improved information flow in the building process.

A new area with quickly increasing importance is **EDI** Electronic Data Interchange. EDI could very simply be described as communication of structured data from one computer system to the other, e.g. sending an electronic invoice from the seller's computer system to the buyer's computer system thus making it unnecessary for the buyer to key in the invoice information himself into his own system. EDI has a potentially enormous impact on information handling in the construction industry. Operational EDI-solutions exist in other sectors today, e.g. in transport, banking.

- o **EDI Electronic Data Interchange**

Standard recommendation:

- o **EDIFACT Electronic Data Interchange For Administration, Commerce and Transport**

Organization:

- o **EDIFACT Board implementing UN/ECE recommendations on EDIFACT endorsed by the Commission of the European Communities and by the EFTA**

Figure 9

I am convinced that generally accepted EDI solutions will be a key to the breakthrough for the use of information technology in the construction industry.

The term EDI is today mainly used for the transmission of alphanumeric information in the materials administrative field. However, CAD information exchange also belongs to the family of EDI. Contacts have to be deepened between those working in the CAD area (STEP, PDES, IGES etc) and those responsible for EDIFACT.

Development of EDI for the construction industry based on EDIFACT is going on in UK since early 1987. Work is now underway in Denmark, France and Sweden. More countries are joining. The Swedish Building Centre is the co-ordinating Swedish organization.

A European Development Group within the construction industry working within the framework of UN/ECE and sponsored by both EC and EFTA had its first meeting in Brussels 24 May. One further meeting took place in London 31 August and the next will be in Paris 24 November. The group is basing its work on EDIFACT but has already discussed bringing in CAD Data Interchange into its scope of work. I would be happy to assist in creating contacts with the group. I am sure that we will have opportunity to discuss this during this seminar.

International co-operation

I have tried to emphasize some strategic and tactical aspects on classification and coding as well as commented upon some theoretical aspects based on experience from the Swedish development work.

I would finally also like to give some comments on international co-operation and co-ordination especially within the framework of CIB. The increasing international economic co-operation manifested in the coming inner market within EC 1992 and with as close an integration as possible of countries outside of EC like Sweden means that the old thought of co-ordination over the borders has got a renewed interest and become more realistic. The increasing use of computers speeds up this development. The political will expressed from the EC and EFTA countries to remove technical trade barriers in Europe makes international co-operation more and more important. Obviously, international co-operation is more than European co-operation. How all this should be tackled is a question where i.a. CIB centrally has to engage itself.

It should at the same time be noted that there already exist in most countries well established rules for structuring information used in the building process as well as ways of handling general knowledge in libraries. Efforts to improve existing patterns exist in many countries, too. Solutions which are developed in international co-operation should therefore if possible be so flexible that they allow international co-ordination as far as needs and possibilities exist in each individual case.

I have already touched upon international development work on EDI within a special European working group under the auspices of UN/ECE and promoted by EC and EFTA. International development work within CIB W74 should furthermore be mentioned - and it will be during this seminar.

International development work regarding classification and coding is carried out within CIB W74 Information Co-ordination for the Building Process. The development work is carried out within a specific project group, the Systems Development Group, for which I have been asked to be the project leader.

It should be realized that international development work can only be carried out as far as there is an interest in it. In the case of classification and coding, interest exists from some countries but real, active contributions have so far been rather small.

The hypothesis used in the work of the Systems Development Group is that a internationally agreed system framework should be created. I refer to figure 6 which I have already shown. International agreements should primarily be reached on basic concepts, e.g. the division into the three classes resources, activities and results and on what classification categories are necessary within each of the three main classes. It could also be possible to arrive at international agreements regarding at least some classification tables, primarily an elements table and a product table.

There are still very very great obstacles to be overcome before co-ordinated ways of using the classification tables have been achieved, e.g. a co-ordinated way of presenting specifications. It is still very unclear whether such agreements could be achieved - or if they are at all desirable or necessary. The computer can overcome many of the problems we may get into through different ways of using classification and coding systems in different countries. If common principles are applied, translations between different ways of using the systems may be carried out when need arises. In any case, the work within CIB does not aim at creating co-ordinated uses of systems.

It should in this connection be mentioned that the long discussed ISO TC59/SC13 'Organization of Information in the Process of Design, Manufacture and Construction in Building and Civil Engineering' with Mr. Odd Lyng, the Norwegian Building Standardization Council as convener will have its first meeting 29-30 November. I will take part both as representative of CIB and of Sweden. It is quite impossible to state anything about the objects and working plans of SC13 at this stage.

Concluding remarks

I would finally only like to sum up some of the key points I have made during my presentation, figure 10.

SUMMING UP

- o Increasing needs because of computerization
- o Flexibility & continuity
- o Internationally agreed basic concepts, eg
Resources → Activities → Results
- o (Partly internationally) agreed
classification tables
- o Agreed uses (some; nationally)
- o Co-operation and mutual trust
- o EDI Electronic Data Interchange
- o International co-operation -
more need, more realism

Figure 10

Thank you, Mr. Chairman.