CODING SYSTEM FOR ACT ADVANCED BUILDING INFORMATION SYSTEM

Tatsuo Terai, Dr of Eng. Building Research Institute
Ministry of Construction
Yujiro Kaneko, Building Center of Japan

Since fiscal 1983, the Ministry of Construction has been implementing a five-year comprehensive technological development project with a theme of " Development of Systems for Advancement of Construction Technologies through Utilization of Electronics." In this large R&D project, research on Integration of Building Production Information has been conducted on software-related technologies and integrated building information system called ACT, Advanced Construction Technology, has been established as a final result.

ACT system consists of several standardized sub-systems including classification code , computerized building model, database network, interface information and advanced production images toward 2000. Of those results, this paper summarizes the basic concept of standardized ACT coding system which should be utilized by various kinds of construction-related organizations throughout the building production phases from planning to use. It is yet on conceptual stage but the basic structure of individual tables are fixed.

1 ACT system

ACT project is a research to establish a basic structure or framework of advanced information processing systems in the whole building production phases from planning to use. An approach to be taken is not simply to improve the present situation but rather to realize an ideal image of information processing in the near future around 2000. Many of the current problems are caused by the lack of agreement for the common base to ensure adaptability and efficiency of relevant open data with better communication between many organizations to be concerned. It can then be said that the major goal is to fix several interface conditions required for smooth communication.

Individual information systems are often very closed to match with their own ways of design or construction. What should be done is thereby not to set up an integrated information system applicable only to one closed construction system, e.g. large concrete panel construction system. Integrated information system to be developed should be very open with various kinds of construction systems included. The system should particularly keep up two different integrations. One is the "integration through different phases of building production", and the other is the "integration over various systems of building production and supply" .

2 ACT coding system and the other elemental sub models

As a final result, the project has formulated a conceptual system model called ACT to be composed of four elemental sub system models described in the abstract. One of them is a standardized coding system to be described in detail in this paper as a key technique to realization of integration. As is shown in Fig. 1, the framework of the system fol-

ACT CODING SYSTEM

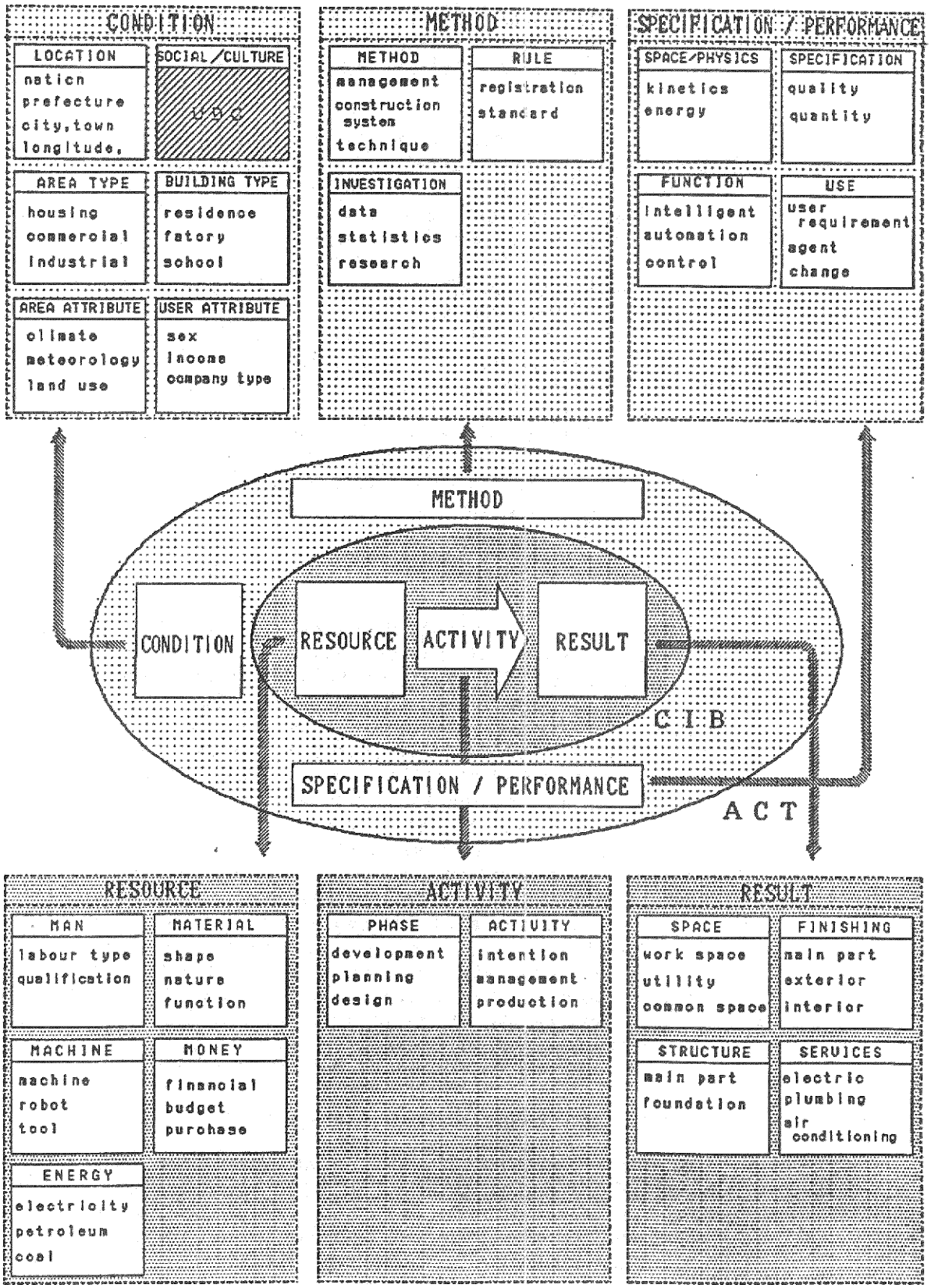

Fig. 1 ACT coding system

lows the basic facet concept of CIB information system.

ACT code consists of six sub-coding systems, that is, RESOURCE, ACTIVITY, RESULT, CONDITION, METHOD and SPECIFICATION/PERFORMANCE. It is clear that the first three should be the major elements both in ACT and CIB systems, but not a few notions are difficult to be classified into these three meta-notions especially in environmental areas. The last three have thus been added to keep away from unessential strictness for classification at the early stage. They should be merged into the first three ones in the long run.

Fig. 2 and 3 show the relationship between the coding system and the other two elemental sub system models, that is, the computerized building description model and the integrated database system. The former model is considered to be linked with ISO/STEP model and the latter to be connected with CIB/W74 concept again. Building data should be mainly divided into two different databases; PDB, project database, and GDB, general database. PDB grows to be a building description model proper to the project concerned in the related building production flow, which is formulated as a standardized information flow model.

3 Classification tables

Standardized coding system to be developed should not limit individuality of practical information systems which have usually their own coding system. In order to keep smooth communication between those systems, it must give them freedom for selection of sub coding systems required in their practices from the whole system of itself as shown in Fig. 4. ACT coding system is thus to be a congregation of sub coding systems as small balls in one large bowl. Each information system must declare what to select and how to use the balls or portion of them. How to fix declaration formats is yet left untouched in this project.

Explained below is a basic construction of the classification tables proposed in a concrete form for individual sub coding systems in this project. There are over 35 tables including reference sub tables. It has been determined that the ultimate goal of the project is the establishment of basic specifications required for actual system development. Therefore they are not completed up to compose a final coding book, but identification and ordering of major items in the sub systems are executed.

3.1 CONDITION

-Table 1.1 : location
nation-, prefecture-, city-, town-odes, etc.
longitude/latitude for absolute address

-Table 1.2 : area type
geographic and town use-like classification by inland laws (closed in Japan)

-Table 1.3 : area attribute
partly based on (H1) in CI/SfB Tab.4 and added manmade factors

-Table 1.4 : social culture
equal to UDC (or NDC of Japan based on UDC)

-Table 1.5 : building type

-Table 1.6 : user attribute
similar to (U) in Tab.4 of CI/SfB

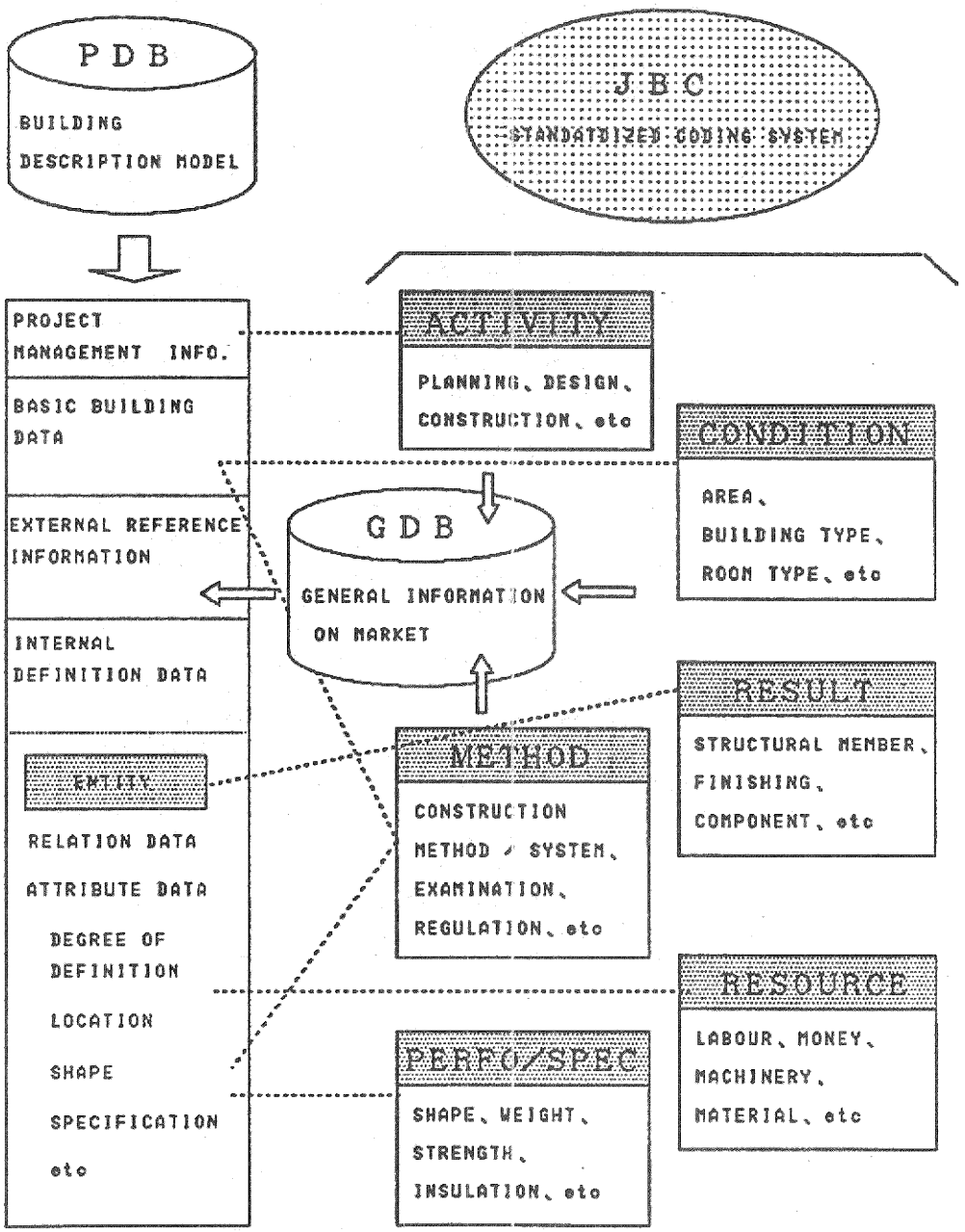

Fig. 2 ACT code and building description models

3.2 METHOD

-Table 2.1 : management
partly based on (A) in Tab.4 of CI/SfB
Y axis (axis of ordinates) is "phase"
-Table 2.2 : maintenance
fundamentally based on (W) in Tab.4 of CI/SfB
to be modified to match the current situation
-Table 2.3 : technique
fundamentally based on (E) in Tab.4 of CI/SfB
to be modified to match the current situation
-Table 2.4 : construction method/system
formulated to match labor type, material and building part
-Table 2.5 : work
fundamentally based on (D) in Tab.4 of CI/SfB
to be modified to match the current situation
-Table 2.6 : rule 1 (law/regulation)
formulated to cover only inland laws and regulations (currently closed in Japan)
-Table 2.7 : rule 2 (standard)
international-, national-, industry-, group-, etc.
-Table 2.8 : investigation/data
X axis (axis of abscissas) is "object"
Y axis is "phase"

3.3 SPECIFICATION/PERFORMANCE

-Table 3.1 : specification 1 (quantity)
shape, unit, grade, precision, etc.
fundamentally based on (F) in Tab.4 of CI/SfB
to be modified to match the inland situation
-Table 3.2 : specification 2 (quality)
style, texture, recognition, sense, scale, etc.
partly based on (G) in Tab.4 of CI/SfB
-Table 3.3 : performance 1 (space/physics)
partly base on CI/SfB and ISO/Performance Spec.
-Table 3.4 : performance 2 (function)
newly prepared for intelligence an so on in building
-Table 3.5 : use/maintenance 1 (user requirement)
fundamentally based on Tab.1 in ISO/IS 6241
-Table 3.6 : use/maintenance 2 ( )
partly based on Tab. 4 in ISO/IS 6241
-Table 3.7 : use/maintenance 3 (change in performance)
formulated to cope with changes in performance; aging, etc.

3.4 RESOURCE

-Table 4.1 : man (laborer)
X axis is "activity"
Y axis is "phase"
-Table 4.2 : man 2 (qualification)
X axis is "phase"
currently closed in Japan
-Table 4.3 : machine
fundamentally based on (B) in Tab.4 of CI/SfB

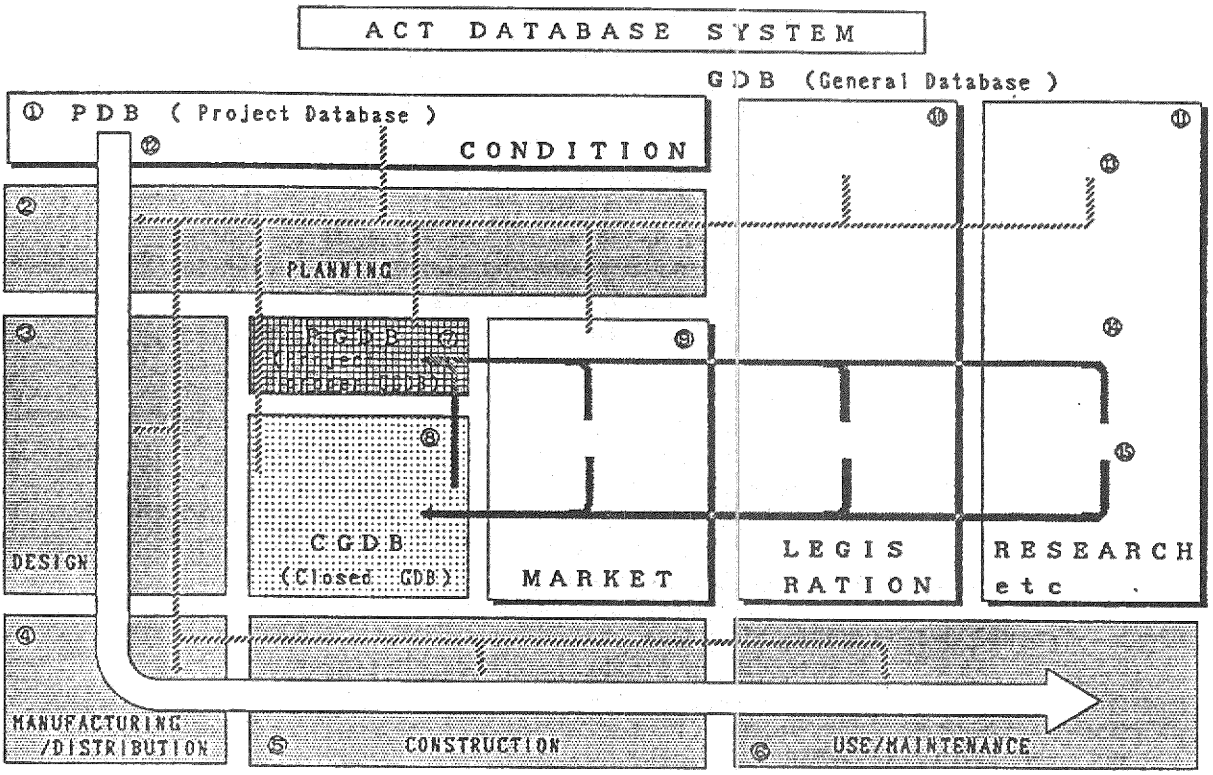

Fig. 3 ACT database system

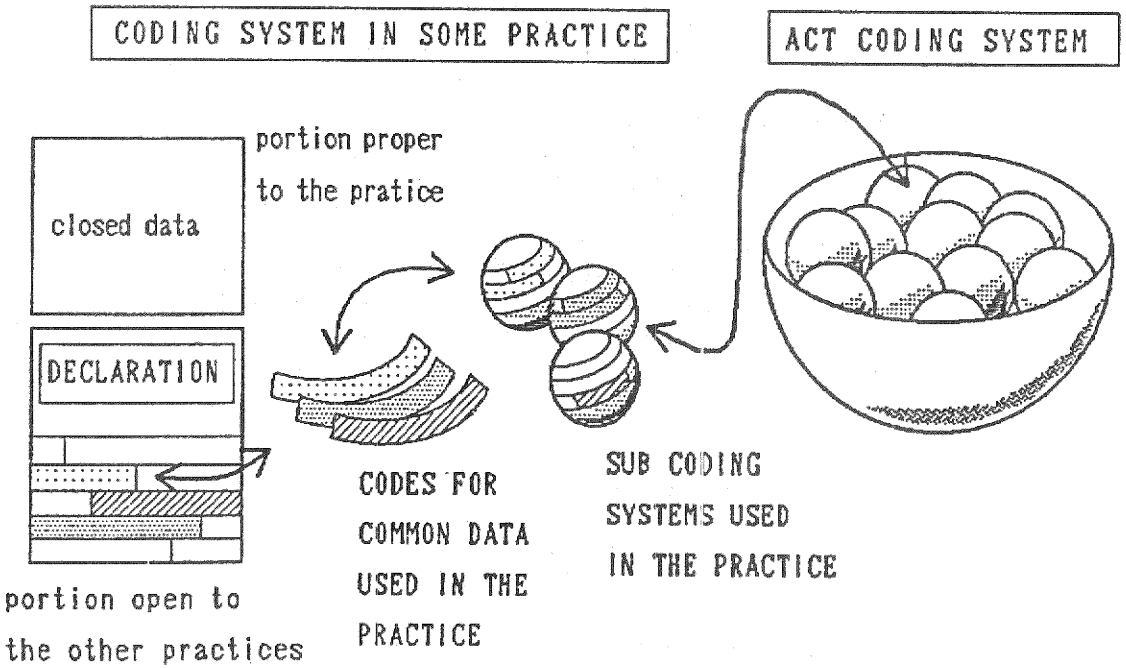

Fig. 4 Utilization of ACT coding system

co-existing with a closed Japanese classification table

-Table 4.4 : material 1 (function)
classified among building, exterior, installation

-Table 4.5 : material 2 (quality/shape)
partly based on Tab.3 of CI/SfB for Y axis

-Table 4.6 : energy
electricity, coal, formed charcoal,natural force, etc.

-Table 4.7 : money
X axis is "phase"
accompanied by a detailed sub table for money in site construction

3.5 ACTIVITY

-Table 5.1 : activity
formulated to match general activities derived from a thesaurus
X axis is "activity type"
Y axis is "phase/process "

3.6 RESULT

-Table 6.1 : functional space
room, part, area, etc.

-Table 6.2 : structural element
main element, foundation portion and axial portion

-Table 6.3 : finishing element
main element, exterior and interior portion

-Table 6.4 : partition/fittings
X axis is "function"
Y axis is "material"

-Table 6.5 : installation
electric-, sanitary-, air conditioning-, plant-, transportation-installation/devices

4 Conclusion

ACT project is intended to show an appropriate direction for better and advanced communication systems in the construction industry. Although such attempts have hardly been made so far in our country, the necessity for certain standard frameworks is gradually recognized in many fields. Some projects have been set up to establish a much more concrete standardized coding system in Japan based on this ACT coding system. It is hoped that the achievements of the project will make any contribution to the improvement in the current chaotic situation.