BRIDGING THE GAP BETWEEN CLIENTS AND DESIGNERS: UTILISING DATA AND PROCESS MODELLING FOR BRIEF DEVELOPMENT

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ABSTRACT

Clients often have difficulty in identifying and communicating their actual requirements to designers and vice versa. This is mainly due to the difficulty in comprehending the huge amount of information and knowledge with which the parties have to cope. In order to enable this immense magnitude of information to be addressed effectively to the client during the briefing process, this paper presents the data and process models for the development of the client's brief. The information is first modelled into structured data models using EXPRESS-G technique. The processes involved during the development of the brief is then modelled using IDEF0 technique. The developed models establish the foundation for the development of a prototype, which utilises an object oriented environment. The implemented object oriented data models then form the framework for the presentation of the client's brief. These models, when implemented into the computerised environment, would significantly enhance the communication channel between the project participants from a very early stage of a construction project. The outcome is not only an improved brief which fulfils the client's time, quality and budgetary constraints, but also one that narrows the gap between the client and the designer.

Keywords: Brief, briefing process, computerised environment, information modelling and process modelling.

Introduction

Background

Previous studies carried out by Graham (1983), Hudson et al (1991), Barrett and Stanley (1996), Barrett et al (1996), and others suggests that the client's brief is often inadequate, poor or not sufficiently explicit. Furthermore, it may not truly reflect the client's requirements. This may be due to a lack of experience on the part of the client with respect to construction projects, or his inability to identify and convey his actual needs accurately to the project team. Another contributory factor could be the lack of mutual understanding or trust, and common objectives between the parties involved. Most crucial, however, is the immense magnitude of project information that needs to be considered during the briefing process.

The situation can be improved by encouraging clients to participate fully or to a greater extent during the briefing process. This can be achieved by increasing the client's level of awareness through effective presentation and manipulation of the project information and the associated processes. The client's knowledge of the entire briefing process can then be enhanced considerably. Clients and other project participants can then work together harmoniously, both to identify a clear range of opportunities available for the development and to highlight any possible problems which require a solution (Gray et al, 1994). Through such discussions, a closer rapport between the parties involved will be established. This will lead to an increase in understanding and sympathy for each other's objectives. On this basis, it is presumed that the communication channel between the client and other project

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participants, in particular the designer, can be improved significantly. This will ultimately pave a way towards better briefs to support the clients' requirements.

The Brief

The *brief* documents the client's percieved needs and requirements and the feasibility of the proposed venture within overall budgetary constraints. The brief can be expressed as a definitive written statement prepared during the briefing process, which sets out the client's requirements for a construction project. It specifies at any point in time the relevant needs and aims, the resources of the client and user, the context of the project, and any appropriate design requirements within which all subsequent briefing and designing can take place (BSI, 1995).

The Briefing Process

The *briefing process* refers to either:

a) a stage or stages in the design or construction process, or as part of the overall life cycle of the project.
b) a systematic method of enquiry by which client's requirements are made explicit. It is the process of eliciting or "brief-taking" (Barrett and Stanley, 1996) the information or requirements from clients. Briefing is defined by the British Standards Institution (1995), as a process of identifying and analysing the needs, aims and constraints (the resources and the context) of the client and the relevant parties, and formulating any problems that the designer is required to solve. The briefing process, thus, involves the gathering, organising, analysing, identifying, interpreting, compiling, and documenting or presenting all the essential information required for a construction project.

This paper adopts the second reference of the *briefing process* and considers the *brief* as the output of the briefing process.

Sources Of Information

An examination of relevant documents which support the briefing process and the contents of the brief has been carried out. Such documents include O'Reilly (1987), Duerk (1993), BCO (1994), Gray et al (1994) and BSI (1995). From the analysis, the majority of the selected publications were found to contain valuable and vital information for the formulation of the brief. However, none of the sources was found to be flexible enough to allow information to be articulated precisely enough to facilitate the process of information modelling. This being the case, more than one source of information or publication is necessary.

Useful and relevant information were extracted from the selected publications with the aim of reproducing a set of information which not only represents that essential for inclusion in the brief, but is also flexible enough to be modelled. A structured framework for the presentation of the brief is established, which will also aid the process of modelling the information. The framework should contain robust information that is common to most of the reviewed guidelines which demonstrate the client's genuine requirements.

Table 1: Structured Framework of the Brief Presentation

Project identification	**Project Resources**	**Design and performance requirements**
• Project identity • Project Purpose • Project scope • Identity of project	• Financial • Time • Project management	• Site and surroundings

participant organisations • Identity of related group organisations **Project Aims** • Intended effects of the project	**Project Context** • Intended occupancy in detail • Regulatory issues • Background and historical influences • Site and surrounding influences • Client's future enterprise	• The building as a whole • Building fabric • Spaces in detail • Grouping of spaces • Plant, equipment and furnishings

The structured framework is divided into five main sections: 'Project Identification', 'Project Aims', 'Project Resources', 'Project Context' and 'Design and Performance Requirements'. The title of these main sections have been adapted from the selected publications. In doing so, the individuality of each section will allow a more flexible and manageable approach to the process of modelling the information. Further more, the identity of each section will be better defined in terms of assisting clients to distinguish and identify the needs and requirements of a project. Table 1 shows the structured framework of the brief presentation.

Information Modelling

The EXPRESS-G modelling technique (Schenck and Wilson, 1994) has been adopted to model the entities which correspond to the contents of the brief along with their attributes and relationships.

Context Diagram

Figure 1 depicts a framework for the brief presentation. It illustrates that the brief, represented by the 'Brief' entity, is a statement which describes a construction project. The project itself, represented by the 'Project' entity, has particular relationships with specific related entities such as 'Project Identification', 'Project Resources', 'Project Aims', 'Project Context' and, 'Design and Performance Requirements'. These main entities represent the information which is essential for inclusion in the brief. These entities were then further sub classified according to their subtypes or relationships with other entities (Yusuf, 1998; Yusuf and Alshawi, 1999).

Lower Level Diagrams

The modelling process proceeds by decomposing the context diagram into lower level diagrams. A level 1 and a level 2 diagrams are shown in this paper to illustrate the modelling concept. Figure 2 depicts the subtypes of the 'Design and Performance Requirements' and the entities linked to it. Figure 3 illustrates the entities and attributes linked to the 'Spaces in Detail' and 'Grouping of Spaces' subtypes shown in Figure 2.

Process Modelling

The IDEF0 modelling technique (Ross and Schoman, 1977; Ross, 1977; Sanvido, 1990) has been adopted for the purpose of modelling the develop brief process. A top down approach has been adopted where high level processes are modelled first, followed by low level

decomposition of the relevant activities. IDEFO diagrams have the advantage of not only portraying the main activities involved during the development of the brief, but also identifying the data constraints between these activities in the form of inputs and outputs, the controls and the mechanisms required to carry out these activities.

The activities have been identified within the context of the development of the forthcoming prototype computer environment with respect to two viewpoints; the system architecture of the prototype and the information to be acquired at every stage of the development of the brief, to suit the structured framework of the textual brief presentation (Yusuf, 1998; Yusuf and Alshawi, 1999).

Context Diagram

Figure 4 shows the A-0 diagram for 'Develop Brief'. This is the highest level of the IDEF0 diagrams. The input is represented by the 'Client Requirements' and the 'Construction Industry Know-how'. 'Client's Requirements' refer to all the needs and requirements of the client with respect to the project while 'Construction Industry Know-how' refers to project related information (supporting information) available within the construction industry. The controls comprise the 'Brief Domain', the 'Data Models' used to build up the knowledge representation within the prototype, and any 'Technology Limitation' associated with the mechanisms used such as the 'Software Applications' and the 'Multimedia Tools'. The 'User' also represents one of the mechanisms. The output is the 'Brief' which can be presented in various forms.

Lower Level Diagrams

Further decomposition of the 'Develop Brief' process have been carried out based on the two stated viewpoints until the achieved level of detail is considered to be sufficient for the application of the model for the prototype development. This paper only presents the level 1 diagram for each viewpoint. Figure 5 portrays the SA/A0 node which represents the system architecture viewpoint. The 'Develop Brief' process has been decomposed into two sub-processes; 'Consultation' and 'Generate Brief'. The input, output, control and mechanisms for the parent activity (the context diagram) are maintained. The 'Stored Valid CR' represents the output of the 'Consultation' process which then serves both as input and control into the 'Generate Brief' process. This is portrayed as a control in Figure 5.

Figure 6 illustrates the activities associated with the overall collation of information for the brief development. The 'Develop Brief' process has been decomposed into six sub-processes namely; 'Obtain Project Identification', 'Establish Project Resources', 'Establish Project Aims', 'Establish Project Context', 'Establish Design & Performance Requirements', and 'Compile Contents of the Brief'. 'Client Requirements' and 'Construction Industry Know-how' constitute the types of input into the first five processes and 'Software Applications' and 'User' maintain the mechanism for all six processes. The output of the 'Obtain Project Identification' process, i.e. 'Project Identification' becomes the input into all the remaining processes, whilst the outputs of the second, third and fourth processes transform into the controls for the fourth process, i.e. 'Establish Design & Performance Requirements', thus highlighting their crucial role in determining the eventual product. 'Multimedia Tools' represents part of the mechanisms of the fourth, fifth and sixth processes since it is essential to provide for information presentation and visualisation prior to decision making in terms of the output of the 'Design and Performance Requirement' process. The outputs of the first five processes then serve as the input and control into the final process, 'Compile Contents of Brief'. This is represented by the 'Stored valid CR' as shown in Figure 5. This final process generates the brief, based on the structured framework established earlier, by compiling all the necessary information essential for inclusion in the brief.

Further diagrams at lower levels of abstractions were produced (the diagrams are not shown in this paper). The 'Establish Design & Performance Requirement' process, in particular, was examined in detail and decomposed further to illustrate the related sub-processes further down the hierarchy and to visualise the actual flow of information at every stage of decomposition. This is an essential procedure which serves to establish the kind of information that needs to be presented to the client and indicates how and from where this information can be obtained quickly and efficiently.

The Impelemented Computer Environment

The models developed above play an important role in establishing a conceptual model for a computer-aided information system prototype since they can be mapped directly onto an object oriented environment with multimedia support. In such an environment, information can be manipulated and presented to users in a timely and effective manner. Such a system can operate as an intelligent mechanism for capturing the client's input in terms of his or her requirements, interpreting those needs, retrieving the necessary information required for the decision making process, and checking and building the brief as the dialogue continues.

A system architecture has been proposed for the suggested computer prototype (Figure 7). The system architecture comprises the Interface, the Core Engine and the External Resources.

The Core Model which is an object oriented development environment, contains all the necessary information which is required by the brief, as represented by the developed data models. Using the EXPRESS-G data models, entities and their subtypes will represent objects within the object oriented environment while their attributes will be represented either by the attributes of the data model or their attributes' subtypes. The relation between the various aspects of the brief's data will be drawn from the data models, as represented by the relationships between the entities. On the other hand, the developed process models will provide the necessary procedures which are required by the system. By incorporating the data models with the process models, the total behaviour of the system can be defined. The external response to user requirements can be monitored and controlled intelligently by the data models, while the internal reaction to the various input criteria can be dictated by methods attached to the objects.

The internal behaviour of the system will be vital to the briefing process because of the diversity of the briefing process and the related information. For example, when the data models are supplied with project information, say the design criteria, the attribute values of each 'Design Criteria' will be checked to ensure its compatibility with the relevant 'Performance Criteria' attribute and vice versa. So, if a curtain wall is selected for a specific design criteria, the system will automatically ensure that this solution will not conflict with previously defined performance criteria such as maintenance and energy loss. Not only will this allow the relations between various entities of the brief to be easily controlled and monitored during the briefing process but it will also have a significant impact on maintaining consistency and accuracy between the various parts of the brief.

Multimedia technology (Burger, 1993; Luther, 1994; Bunzel and Morris, 1994) can be used to control the way in which information is displayed in the Visual Media part of the Interface. Objects can be supported by video clips, images, sounds, and so on, which are accessed as and when required. If, for example, the Core Engine recognises a specific data input as a request for presenting other information which is required for the design making process, the necessary functions will be triggered within the Core Engine, thereby resulting in the retrieval of the required information. This information will then be displayed in the appropriate media. These functions may interrogate internal and/or external databases as well as accessing on-line services or the Internet, thus allowing users to retrieve up-to-date information during the briefing process. This presentation of information not only increases

the users' knowledge and level of awareness but also improves the users' understanding which, in turn, has an impact on the decision making process.

The system architecture proposed for the prototype will enable it to provide on-the-spot advice, consultancy and visualisation of project information to clients or other users during the briefing process. The prototype can also be considered as a comprehensive and an intelligent front end to commercially available CD ROM products. If developed effectively, it would not only be an essential part of the briefing process in the construction industry but would also widen the market for these products to cover clients, designers, and other construction professionals who might be involved in any aspect of the brief.

Discussion And Conclusions

This study has modelled the vast amount of information which is essential for the development of the client's brief. Information has been classified and the relationships between various entities have been established. The main processes involved in the development of the brief have also been identified and modelled. The data and process models have then been used to establish a system architecture for a computerised environment to support the briefing process. Multimedia technology will be utilised to represent the project information, thereby serving as an effective means of communication between clients and designers.

The research recognises the weaknesses inherent in most currently available briefs, which are often produced without first clarifying and identifying clearly and carefully the client's actual requirements and objectives at the outset of the project. It has aimed to develop a comprehensive brief which is suitable for all parties involved. This is not to imply that the boundaries stated by the brief need to be static. In fact, the briefing process can logically be considered as evolutionary rather than static: the process may be characterised by a series of interactions, with solutions being tested for effectiveness at each stage of development. The process continues until the solution satisfies the client's requirements. In essence, therefore, the data and the process models, together with the prototype development, create a situation which serves to overcome the weaknesses of existing briefs by producing a well-documented brief that reflects the client requirements.

Moreover, through more individual input and participation on the part of the client, and by being able to acknowledge and visualise the essential information required for a project, the client's understanding can be improved. The client will be able to identify and convey his or her true requirements in a more efficient manner, thus enabling the designer to interpret these requirements effectively in the form of a well-defined brief which will provide the basis of an appropriate and effective design solution. Value for money can be accomplished in the shape of a design solution that satisfies the client's requirements within the proposed budget.

In conclusion this research makes a significant contribution to the construction industry by combining data and process modelling to establish the platform for a computerised environment as a means for improving the brief. This could bridge the gap between clients and designers, thereby eventually improving the effectiveness of the communication channel between them. As well as reducing the shortcomings of existing briefs, the computerised system would also ensure consistency in the interpretation of the brief amongst clients and the design team. The improved brief will play a crucial role in improving the entire briefing process and this, in turn, will eventually pave the way towards greater client satisfaction.

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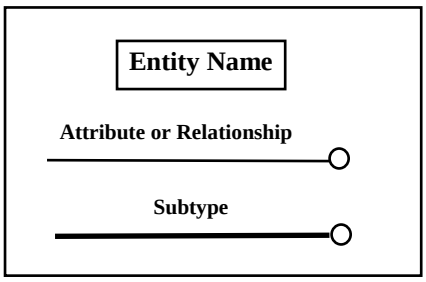
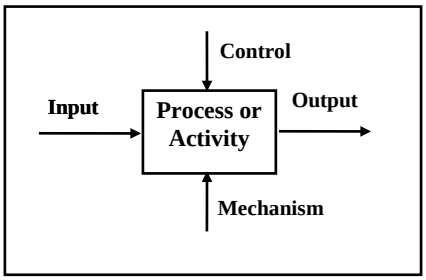
Captions

Figure 1 : A Framework for the Brief Presentation (Page 1 of 3)
Figure 2 : Subtypes of the 'Design and Performance Requirements' (Page 2 of 3)
Figure 3 : 'Spaces in Detail' and 'Grouping of Spaces' Subtypes (Page 3 of 3)
Figure 4 : A-0 Diagram for 'Develop Brief'
Figure 5 : SA/A0 Diagram for 'Develop Brief'
Figure 6 : I/A0 Diagram for 'Develop Brief'
Figure 7 : System Architecture for the Proposed Computer Environment

Legend for Figures 1, 2 and 3:



Legend for Figures 4, 5 and 6:



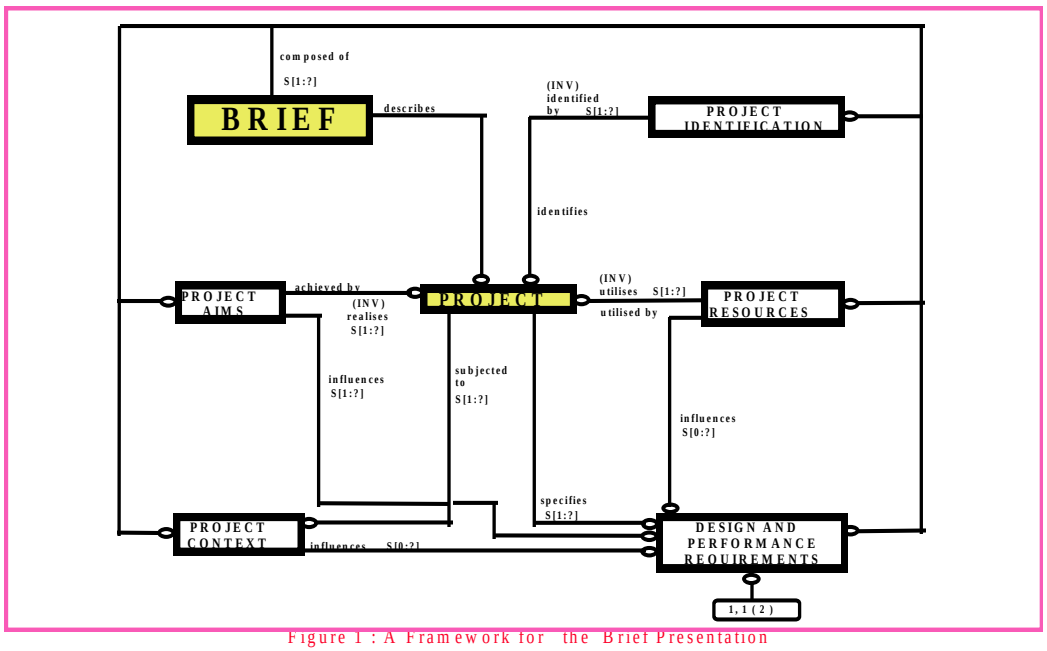


Figure 1 : A Framework for the Brief Presentation (Page 1 of 3)

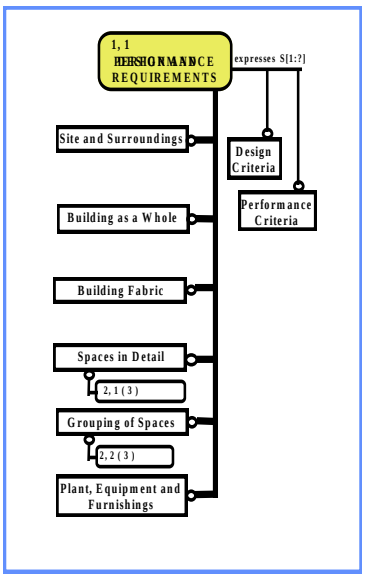


Figure 2 : Subtypes of the 'Design and Performance Requiements' (Page 2 of 3)

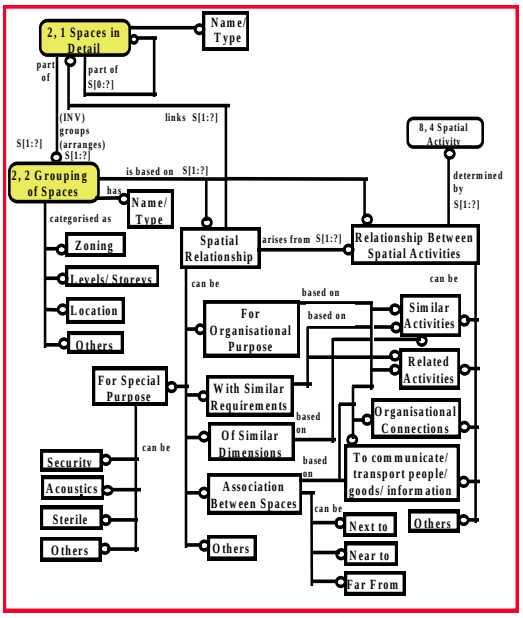


Figure 3 : 'Spaces in Detail' and 'Grouping of Spaces' Subtypes (Page 3 of 3)

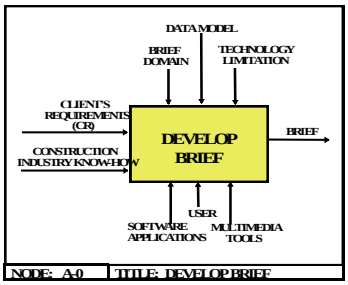


Figure 4 : A-0 Diagram for 'Develop Brief'

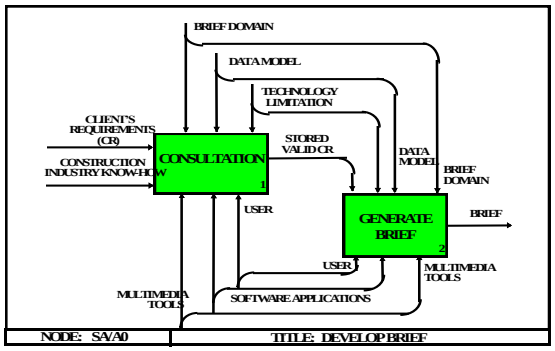


Figure 5 : SA/A0 Diagram for Develop Brief (System Architecture Viewpoint)

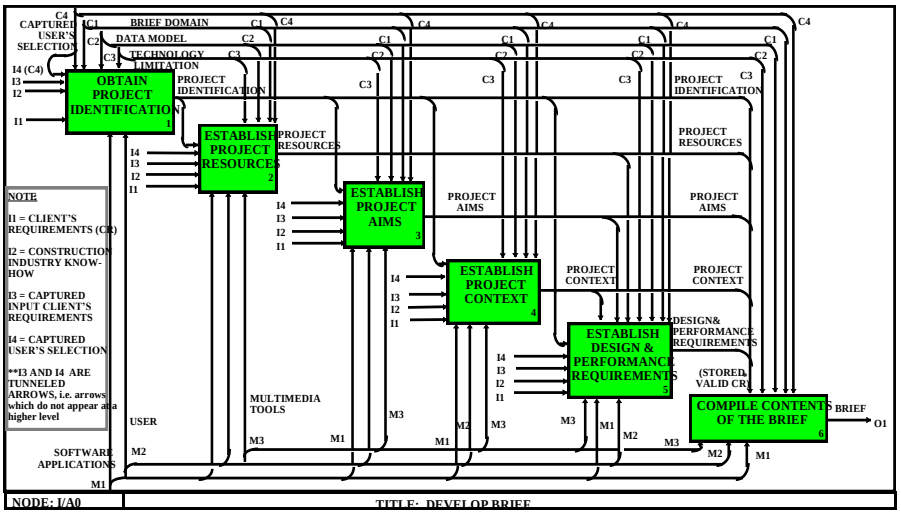


Figure 6 : I/A0 Diagram - Develop Brief (Information Viewpoint)

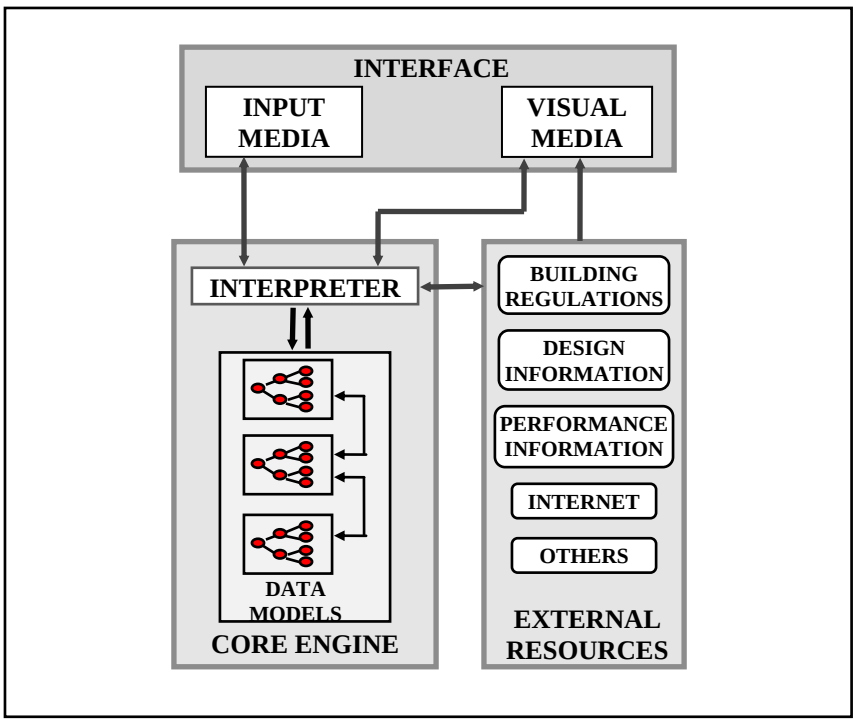


Figure 7: System Architecture for the Proposed Computer Environment