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THE DEVELOPMENT OF A STRUCTURE

FOR THE

DESIGN OF HAZARD AUDITS

by

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in accordance with the requirements of the degree of
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ABSTRACT.

Hazard auditing, which is a formal, systematic, critical examination of a situation or set of circumstances to identify hazards, is fundamental to hazard management. Auditing is facilitated by "an audit" that details activities, procedures, systems and artefacts, where hazards might be identified. This thesis describes the development of a structure, in the form of a hierarchy, that can be used in the design of hazard audits. An examination of systems such as manufacturing and process plants, for hazards, is usually undertaken by examining the subsystems, (i.e. activities, systems, and procedures). Existing audits therefore, tend to be specific, as for example, audits of unsafe acts, unsafe conditions, technical functioning of materials and machinery, management. This type of audit restricts the examination to a closed system within observable and well described physical and organisational boundaries. It is argued in this thesis that examinations for hazards should go beyond this closed system and also look for hazards within the larger systems of society and industry. An examination of hazards can be seen as a search for evidence of proneness to failure.

The hierarchy developed in this research focuses on hazard auditing for a construction project. Construction, which is associated with the construction industry, is only one phase in a larger system, the project, which encompasses development, use, and withdrawal from use. It is argued that evidence of proneness to failure of a construction project may be found in these systems, (project and industry), in the larger system of a social environment, and in the subsystems that are part of a construction project. These hazards are described in terms of concepts, and presented in the form of a hierarchy that indicates inter-dependencies between concepts. This hierarchy is a basic structure to be used in the design of hazard audits.

The concepts incorporated into the hierarchy are discussed and described in terms of their potential to provide evidence of proneness to failure. Sections of hierarchy are built up and presented at appropriate positions in the thesis.

It is proposed that this approach to hazard auditing will allow for flexibility in dealing with specific situations, yet provide for the identification of hazards that can exist and develop outside of those situations. It is suggested that such an approach should be regarded as a specialist activity of hazard management. Further, it is argued that the activity of hazard engineering should be recognised as a separate discipline within its own right.

DEDICATION

To my Mother

ACKNOWLEDGEMENTS

I wish to express my thanks to all those who have made this work possible, and in particular the following:

Professor D. I. Blockley for his guidance and encouragement,

members of the civil engineering systems group,

the people who agreed to be interviewed for this research,

the Science and Engineering Research Council for the award of a studentship.

DECLARATION

The work on which this thesis is based was carried out between October 1989 and November 1992 under the supervision of Professor D. I. Blockley of the Department of Civil Engineering, University of Bristol.

It is entirely due to the author except where acknowledged in the text, and has not previously been submitted for a degree or diploma of this or any other University or examining body.

Signed.....

Date.....

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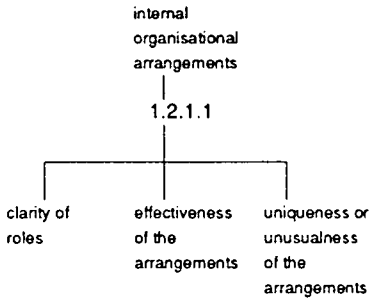
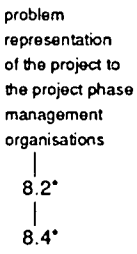
NOTATION

Specific examples are used here to illustrate the reference system for hierarchical expansions that are included in this thesis.



The reference number, (e.g. 1.2.1.1), will be used to represent the hierarchical development shown below 1.2.1.1, irrespective of context.

The hierarchical expansion of the concept above 1.2.1.1* develops in terms of the concepts shown below 1.2.1.1



The hierarchical expansion of the concept above 8.2* develops in terms of the concepts below 8.2.

The hierarchical expansions of each of the concepts represented by 8.2* develop in terms of the concepts shown below 8.4.

WOL	World Outside the Laboratory.
WIL	World Inside the Laboratory.
Use	Uncontrolled tests in the WOL.
Prototype tests	Controlled prototype tests in the WOL.
Proof tests	Controlled proof tests in the WOL.
Laboratory tests	Controlled laboratory tests in the WIL.