

ISSUES IN THE EARLY STAGES OF
CONSTRUCTION PROJECTS
CRISP COMMISSION – 00/8

January 2001

**University of Bristol &
Halcrow Group Limited**

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ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS CRISP COMMISSION

Contents Amendment Record

This report has been issued and amended as follows:

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Executive Summary

This report was commissioned by the Construction Research and Innovation Strategy Panel (CRISP) process group with the aim to better understand the nature of the issues that cause concern in the early stages of construction projects in the UK. This will enable CRISP to focus research to overcome these problems, which in turn, should improve the effectiveness and efficiency of the construction industry.

This research programme used an innovative technique called Kelly's repertory grid to elicit and gather the data used in the analysis. The strength of this technique is the avoidance of 'observer bias'. Kelly's repertory grid was developed in the 1930's and is still a highly respected psychology technique used in marketing and business development. A software programme called 'Enquire Within' was used to aid the grid analysis.

A combination of half-day workshops and questionnaires were used to gather practitioner opinions' and beliefs' about issues in the early stages of projects. The responses were analysed using grounded theory techniques and cluster analysis to converge on key themes.

It became apparent very early in the study, that the set of issues were very broad in nature, indeed much broader than was suggested in the briefing document, with soft issues surfacing throughout the responses. What was surprising was the narrow set of themes that developed through the prioritisation process. Perception of other roles, relationships, communication and resistance to change were the most pronounced themes. The common thread through these issues is, what we have described as *client-defined processes* (selecting the team, integrating processes, controlling value, cost and risk and managing the business case).

Our key recommendations are:

- The industry needs to move, as quickly as possible, towards a much more outward looking, customer-focused, high added-value position. The critical point to initiate this change is at the pre-project and project development stages.
- Research should focus on the priority concerns in the client-defined processes, which are team selection and development of the whole team to have excellent co-operation and communication capability.
- Other Constructors and Suppliers need to be involved much earlier in the project process, as it appears this group can help the team to understand better the needs of End Users.
- Mechanisms and processes need to be developed to effectively and efficiently engage End Users, Financiers and Owners in the whole process, but particularly at the early stages.
- There needs to be improved communication, commitment and shared values between the construction players. Research should focus on where blocks to co-operation and misconceptions exist and how these can be eroded.

Most of the findings in this report are not radical or new, indeed they are consistent with Egan recommendations. The industry practitioners appear to accept Egan principles but require more research and development into how they can be applied effectively. This report provides guidance on where to direct that research.

1.0 Purpose of the research

The aim of this research is to focus future resources where real understanding of practice and problems can be established. The objectives of the commission are:

- To identify areas of particular concern arising from the early stages of project development, common to many projects and contractual approaches.
- Place them in order of importance.
- Consider research that will address them.

An additional objective, not originally envisaged by the CRISP commission, is the review of Kelly's Repertory Grid technique as a rigorous tool for future elicitation and codification of opinions from the construction industry.

2.0 Methodology and Questionnaire Design

One of the major challenges of a study such as this, where one needs to extract opinions or attitudes is 'observer bias'. Whenever one tries to design questionnaires or conduct an interview of any sort, there is inevitably serious error introduced into the process by the fact that the designer or interviewer influences the inputs and hence the outputs. Indeed the bias is exacerbated when 'experts' try to predict what practitioners actually experience and believe.

These problems are not new and are common in the social sciences arena. One practical method that attempts to avoid serious observer bias is Kelly's Repertory Grid. Interestingly, Kelly was trained as an engineer before becoming a widely respected psychologist of the 1930's. The key elements of Kelly's theory are:

- Perceptions influence expectations, and expectations influence perceptions.
- The medium through which this happens is known as the construct system.
- Construct systems are unique to the individual and develop throughout life.

To measure accurately people's attitudes and beliefs it is first necessary to ensure the right questions are being asked. Repertory Grid is invaluable in helping to discover areas a questionnaire should cover and the best ways of expressing them on paper and in language practitioners recognise.

Kelly G. (1955), Personal Construct Theory, is used as the guiding principle for this study, with the application of the Repertory Grid technique adapted from Stewart V. (1981). In an ideal construct elicitation process a one-to-one interview is conducted, which would produce a set of elements, a set of structured constructs and a completed grid which ranks each element against each construct. Each construct is bipolar, that is they have two contrasting poles, e.g. 'familiar – strange'. Kelly suggests that these scales allow us to distinguish between our experiences and so help us decide how to act or make sense of the world. Elements can be people, objects, situations or events, depending on what you are trying to understand. For this study the elements are the main roles in the construction industry.

This classic Kelly process was modified to solicit a wider response by eliciting and ranking constructs in a group. Then, using a representative sample of these constructs, a questionnaire was compiled to test whether groups in the construction industry share these constructs. The details of this process are as follows:

- A set of nine elements was pre-selected by the researchers and CRISP steering committee, which were modified at the first workshop to include the Procurer role. The elements represent the key roles in the construction industry.
- Two half-day workshops were arranged with a cross-section of Construction Industry practitioners:
 - The first workshop was used to elicit constructs from individuals. This was achieved using Kelly's classic triad approach. The element triads, pre-written on cards, were rotated every 5 to 10 minutes so that each individual was presented with a full set of triads, 12 in total. 149 constructs were elicited in this manner.

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- These constructs were categorised using the 'Bristol' (Godfrey P. & Allan N.) project process model. From these categories representative samples were selected for use in the next workshop.
- The second workshop was used to prioritise the pre-selected constructs.
- The high-priority constructs were explored further using laddering techniques, which allowed additional constructs and statements to be elicited and recorded.
- From the list of constructs, prioritised constructs and statements the questionnaire was designed maintaining the original elicited language wherever possible.
- Section A of the questionnaire used a proportionally representative sample of the high and high-medium ranked constructs.
- Higher order constructs and statements elicited from the second workshop were predominantly used in producing the question for sections B of the questionnaire.
- In addition, questions were included in the Introduction and Section C of the questionnaire to explore opinions of how the early stage process could be improved.
- A number of pilot sessions were used to improve the clarity of questions and data entry.
- The final questionnaire in Appendix A was circulated to a set of industry practitioners in order to establish whether there is general congruence within the industry with the views elicited in the workshop.
- The computer program "Enquire Within" was used to help analyse Section A of the questionnaire that has been set up as a classic repertory grid.

3.0 Results

The results of the study fall into two broad areas:

- The workshop elicited constructs and statements.
- Returns from the three sections (A, B & C) of the questionnaire.

3.1 Workshop Constructs

Firstly, the visual inspection and categorisation of all the elicited constructs gives a rich picture of how the workshop members view issues at the early project stage.

The distribution of the constructs is shown below in Table 1 and graphically represented by the spider-charts (Charts 1 & 2). Clearly the group's beliefs about issues arising from the early stages of a project are not evenly distributed across the project processes.

Table 1 Frequency of constructs mapped onto project process map.

Bristol Project Processes	Frequency of constructs	Percentage of total
Managing the Business Case	16	11%
Controlling Value	6	4%
Controlling Risk	12	8%
Controlling Cost	8	5%
Sub-Total	26	17%
Planning	9	6%
Selecting the Team (and behavioural issues)	46	31%
Managing Design	8	5%
Managing Quality & Environment	16	11%
Protecting H&S	0	0
Managing the Construction	12	8%
Integrating the Processes	16	11%
Total	149	100%

The highest frequency occurred in the processes Selecting the Team and Controlling Value, Risk & Cost. None of the constructs related to Protecting Health & Safety, while Planning and Managing Design processes were both low scoring in occurrence.

Construct Frequency Distribution mapped onto the 'Bristol' Project Processes

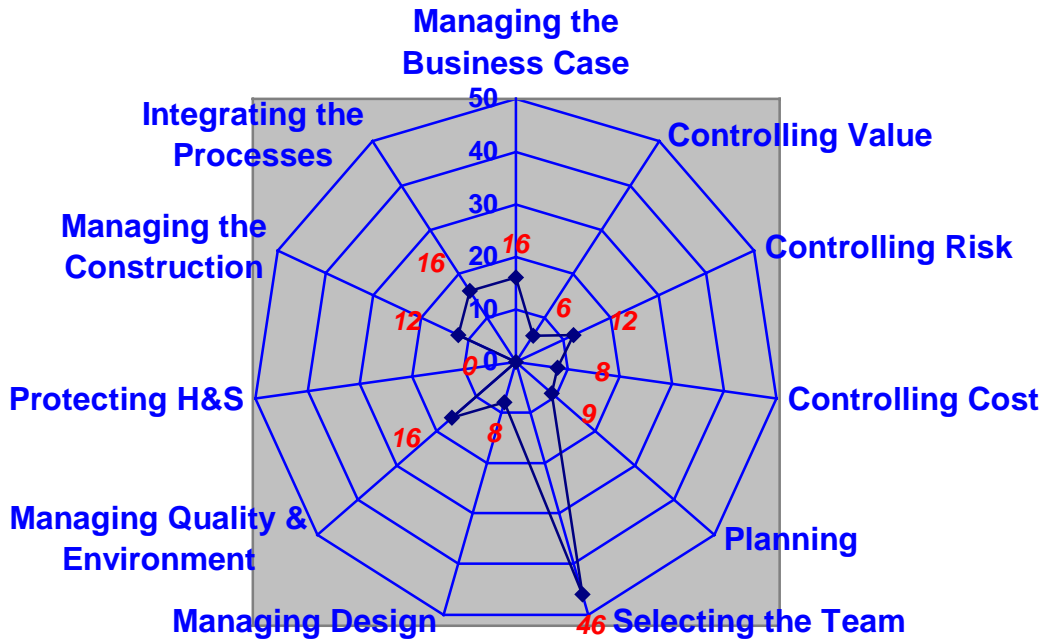


Chart 1

Construct Frequency Distribution mapped onto the 'Bristol' Project Processes (Value, Risk & Cost Grouped)

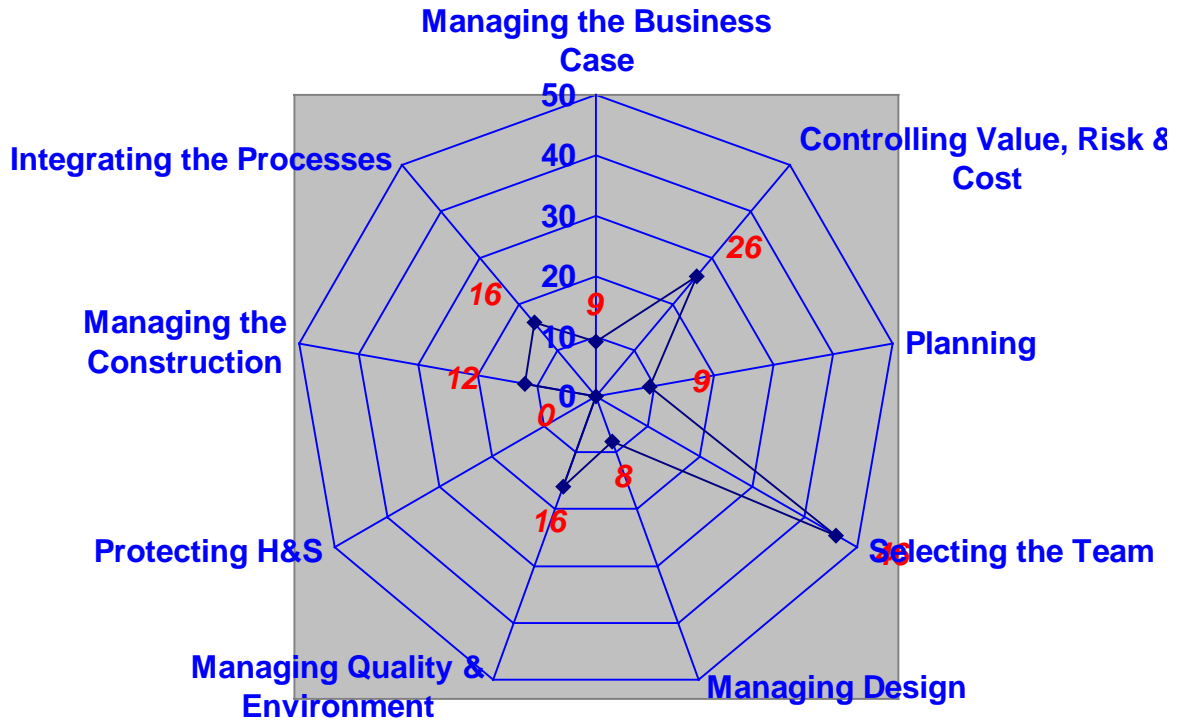


Chart 2

3.2 Questionnaire Returns

Fifty questionnaires were returned from a sample size of 149, representing 33% return rate. This is a good return rate, considering the nature and complexity of the questionnaire. The quality of the returns was excellent, there was not one spoiled questionnaire despite some complaints that it took much longer to complete than stated. The results are presented section by section and then later discussed in section 4.0.

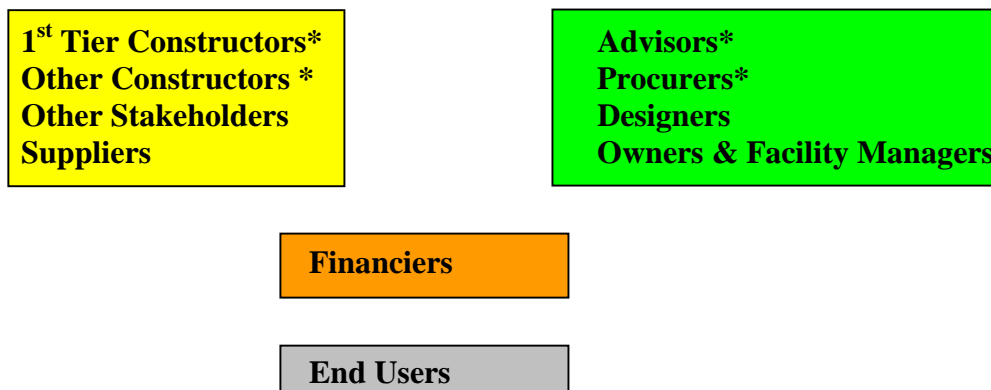
3.2.1 Section A

All the returns were tallied and summarised onto one grid using the mode of the sample. The summarised grid is shown in Appendix B. The intersections marked with an asterix indicate that these score were particularly strongly felt, with a clear differentiation.

A cluster analysis of the summarised grid was conducted with the assistance of a software package called “Enquire Within”, which allows one to see how elements relate, how constructs relate and also how constructs and elements relate. The results of the cluster analysis are shown graphically in Appendix C and are interpreted below: It is worth stressing here that the grid results represent a view of how the industry is perceived not necessarily how it is.

Element Cluster Analysis

The element cluster analysis revealed two main groups, but interestingly, Financiers and End Users are seen as separate and quite different from each other and also quite different from the two main clusters.



NB * Indicates that these roles within their respective cluster are very similar, i.e. 1st Tier Constructors and Other Constructor are viewed as being very similar. Likewise, Advisors and Procurers are viewed very similarly.

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Construct Cluster Analysis

The analysis of the constructs shows four main clusters, plus one isolated construct that did not really belong to any of the main clusters. The construct analysis reveals two things:

- which set of constructs or beliefs are perceived to be connected to each other,
- which roles are associated with each pole of the construct.

This is represented in the tables below, where Roles are shown alongside the relevant constructs for this group. The strength of connection between the construct is represented by the order in which they are presented in the table, e.g. the first two constructs are more highly linked than the fourth and fifth.

It should be noted that the cluster analysis may reverse construct polarity where this is appropriate to give closer correlation.

Construct Cluster A

Roles Associated with Left pole	Left Pole of Construct	Right Pole of Construct	Roles Associated with Right Pole
Designers Owners Facility Managers	Proactive, strategic thinkers	Passive with no interest in strategy	Financiers Other Constructors 1 st Tier Constructors Suppliers
	Employs linear thinking	Thinking uses feedback loops	
	Is strongly quality focused	Is strongly profit focused	
	Has narrow project focus	Strong end user focus	
	Pragmatic approach	Focuses on aesthetics	

Construct Cluster B

Roles Associated with Left pole	Left Pole of Construct	Right Pole of Construct	Roles Associated with Right Pole
All the roles (except Financiers and End Users) were viewed similarly on these constructs	Has strong commitment to the common goal and recognises the benefits of teamwork	Promotes self-interest	End Users Financiers
	Wants best value	Wants best product	
	Has major design responsibility	Has no design responsibility	
	Innovative	Resistant to change	

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Construct Cluster C

Roles Associated with Left pole	Left Pole of Construct	Right Pole of Construct	Roles Associated with Right Pole
Financiers Procurers Advisors Designers	Prefers agreed specification	Prefers flexible specification	Other Constructor Other Stakeholder (These were not extreme views)
	Tries hard to create certainty	Actively encourages uncertainty	

Construct Cluster D

Roles Associated with Left pole	Left Pole of Construct	Right Pole of Construct	Roles Associated with Right Pole
Financiers Procurers Advisors Designers Owners	Actively involved in the early stages of a project	Not normally involved in the early stages of a project	Other Constructor Other Stakeholder Suppliers
	Controls project finances	Has no real financial involvement	

Isolated Construct

Roles Associated with Left pole	Left Pole of Construct	Right Pole of Construct	Roles Associated with Right Pole
End Users Financiers Owners	Has long term involvement	Has a short term involvement	Other Constructor Other Stakeholder Suppliers Procurers

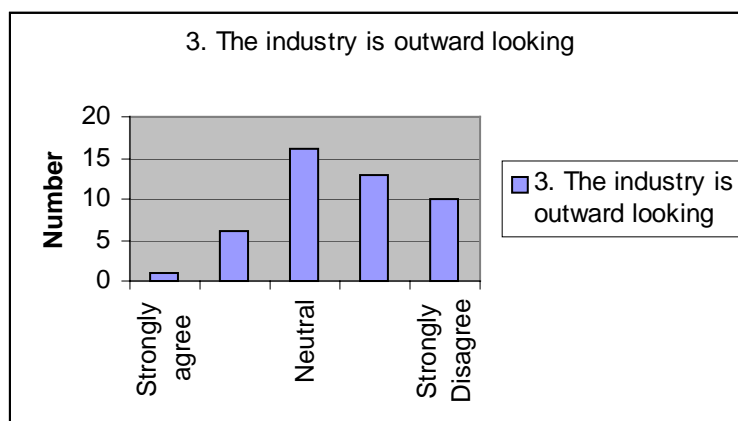
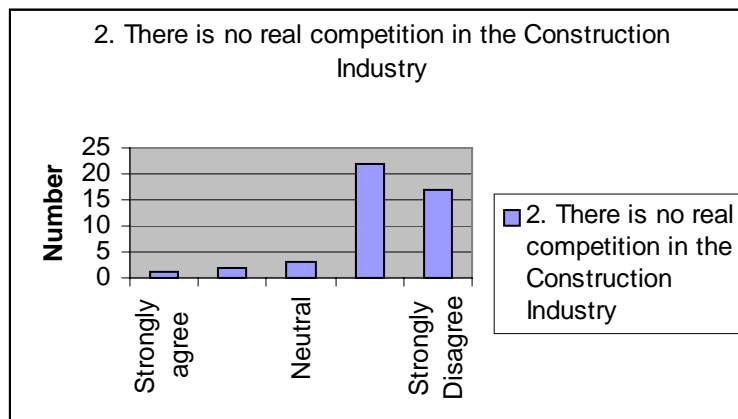
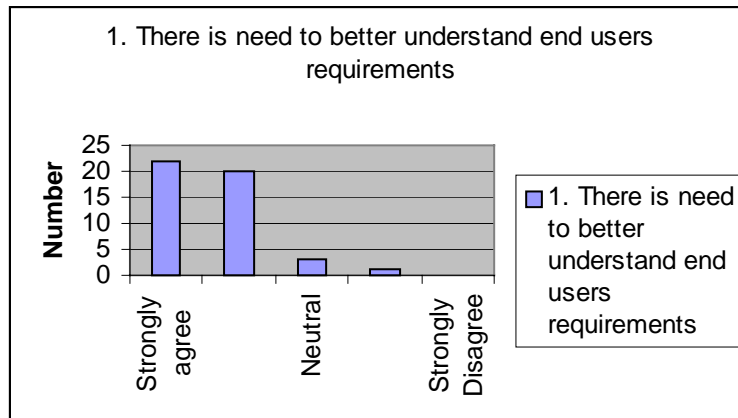
These clusters give a useful insight into how certain groups within the industry are perceived. The construct cluster B, supports the element cluster analysis in that Financiers and End Users are seen as quite distinct from the rest of the industry. Furthermore, they are seen as promoting self interest instead of teamwork, preferring best product instead of best value, having no design responsibility and resistant to change. This trend is seen again in the isolated cluster, which has End Users, Financiers and Owners perceived as having a long-term involvement and all the other players having only a short-term involvement.

Construct clusters C & D have quite similar groupings of roles. One might expect that Financiers, Procurers, Advisors and Designers would prefer agreed specifications and try to create certainty. It is also not so surprising that they are seen as actively involved in the early stages of projects and hence control project finances. More significant perhaps, is the grouping of Suppliers, Other Constructors and Other Stakeholders who are not involved early and consequently have no financial involvement.

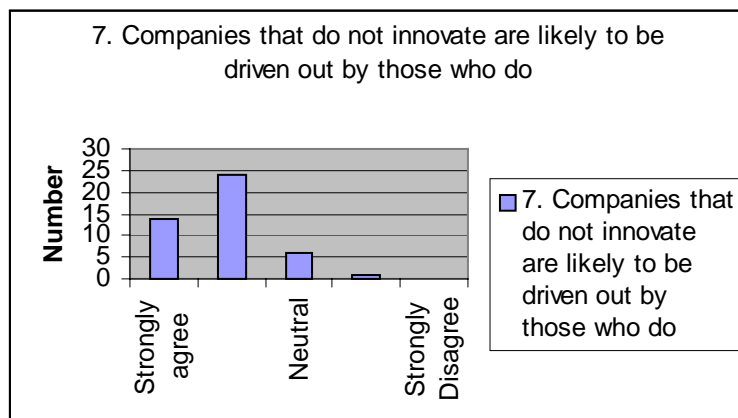
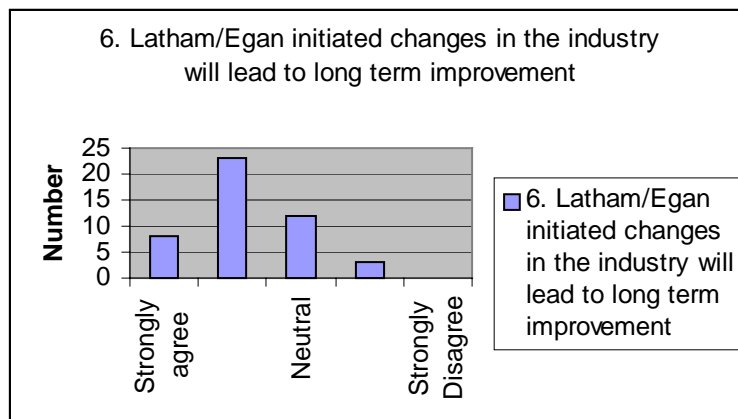
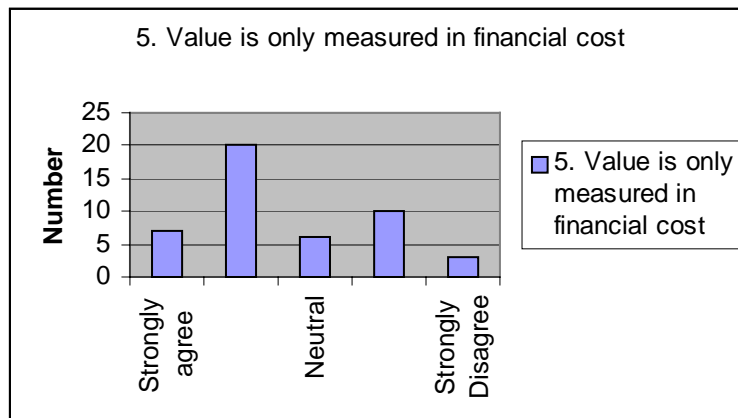
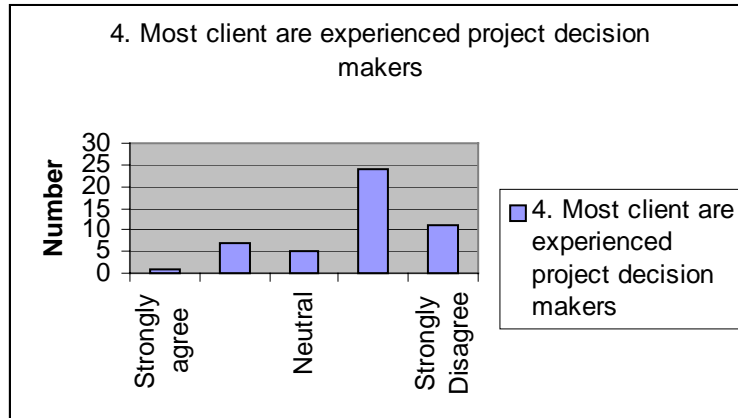
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3.2.2 Section B

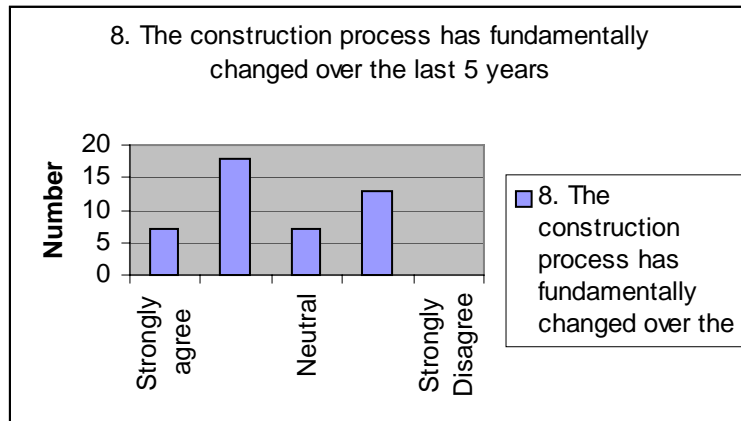
The statements in this section represent the strongly held beliefs of the workshop participants. It is important to note that some of these statements have been reversed to ensure a spread of negative and positive questions. The analysis of these questions was carried out using a simple scoring and tabulation system to determine the level of agreement or disagreement. The summary of each statement has been graphically represented below.



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3.2.3 Section C

This section of the questionnaire asked the respondents to give suggestions, which if implemented in the early stages of a project, would lead to:

- benefits for themselves and,
- improvements in the overall project delivery process.

The responses to the first question on what change would benefit themselves, were mapped onto the 'Bristol' project processes and the results are shown in Table 2 and graphically depicted in Chart 3.

Table 2 Frequency of responses to Question 1 mapped onto the project process map.

Bristol Project Processes	Frequency of constructs	Percentage of total
Managing the Business Case	4	9%
Controlling Value Risk & Cost	4	9%
Planning	2	5%
Selecting the Team (and behavioural issues)	18	40%
Managing Design	6	12%
Managing Quality & Environment	2	5%
Protecting H&S	0	0%
Managing the Construction	0	0%
Integrating the Processes	9	20%
Total	45	100%

Responses to Question 1 when mapped onto the 'Bristol' Project Processes (Value, Risk & Cost Grouped)

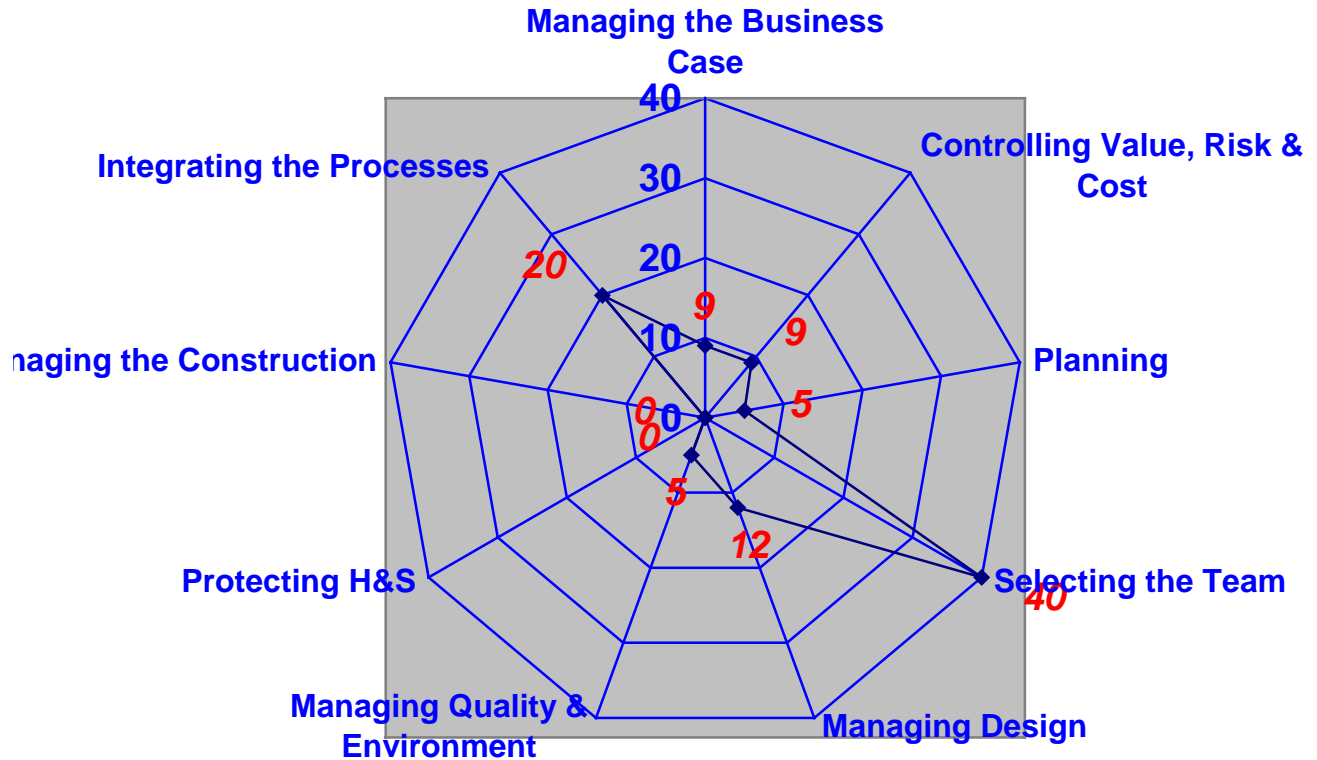


Chart 3

The responses were categorised using grounded theory to give themes. The results of this analysis are given in Appendix D and E.

The themes are given here in summary.

- **MAKING PRACTITIONERS MORE SUCCESSFUL BY IMPROVING:**
 - The process as a whole
 - The communication between construction players
 - The design and planning process
 - The procurement process.
- **IMPROVING CLIENT DEFINED PROCESSES**
 - Engaging the End User in the Process (5)*
 - Ensuring Stakeholder Participation (8)
 - Being a Better Client (1).
- **IMPROVING DEVELOPMENT PROCESSES**
 - Preparing the Brief (8)
 - Improving Front End Definition and Planning (8)

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- Programming (11)
- Value Management (11)
- Risk Management (4)
- Improving the Design Process (6).

- BEHAVING AS A TEAM
 - Co-operative Culture and Process (3)
 - Managing the Supply Chain Better (1).

- OTHER IMPORTANT PROCESSES
 - Learning From Projects
 - Employing the Right People for the Job (6).

* numbers in brackets are the ranking that reflects the number of respondents answers that were covered by the heading. See Appendix E.

4.0 Discussion of Results

The workshops elicited a large number of interesting constructs that were very broad and wide reaching in nature. Soft issues, such as teamwork, process integration, quality and value were clearly viewed as important by the participants. These themes continued to surface throughout the other results.

4.1 Comparison between workshop and introduction question

Bristol Processes	From workshop	From initial question.	Average
Selecting the Team	31%	40%	36%
Integrating Processes	11%	20%	15%
Controlling Value Cost and Risk	17%	9%	13%
Managing the Business Case	11%	9%	10%
Managing Design	5%	12%	8%
Managing Quality and Environment	11%	5%	8%
Planning	6%	5%	5%
Managing Construction	8%	0%	4%
Managing Health and Safety	0%	0%	0%

Around 80% of responses were focused on only four of the core processes. Of these, half were related to team selection. This indicates clear priority for the areas where R & D should be focused. These are client defined and project development process, rather than the delivery processes themselves.

4.2 Perception of roles

The repertory grid analysis provides a useful insight into the way certain roles are perceived, though these beliefs are a consensus, so do not represent the views of any one group. The questionnaire responses were not uniformly representative of all the roles, due to the nature of the CRISP database used. For example, there were more responses from Designers and Advisors than from Owners or Financiers. Consequently, the beliefs of the majority groups may have skewed the overall view. This could be overcome by supplementing and segmenting the data further. Nonetheless, these results do present a view of the industry and as stated earlier, no perception, no matter how balanced, can actually claim to represent reality.

4.3 Relationships

The cluster analysis presents a picture of a divided industry with Financiers and End Users particularly isolated from the team. This group also seem to be the most resistant to change and least embracing of best value as a concept. A view of self-interest seems to be frustrating best interest. Another sub-group consisting Other Constructors, Suppliers and Other Stakeholders are not seen as being part of the early stages of a project and have no real financial involvement, though on the whole, they are more End User focused and uses feedback more readily. There is a general feeling that the Other Stakeholders might have been viewed quite differently depending on who was considered at the time. The Health and Safety Inspectorate would be viewed differently from say academics. To generate better

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detail and segmentation there is a need to define and investigate the differences within this large and diverse group.

An interesting finding from the construct cluster B is the general recognition of team working, particularly when linked to design and innovation. However, again we see End Users and Financiers out of step with this view, or at least perceived to be out of step.

4.4 Response to change

Section B of the questionnaire depicts an overall view of an industry slowly changing and accepting Egan initiatives, but still quite inwardly looking. It is aware of the need to better understand End Users and clients recognise the need to innovate, but still sees value predominantly measured in financial terms only.

Section C results provide a rich set of concerns that are focused on a remarkably limited number of themes consistent with earlier findings. There is a strong view that client defined processes (such as engaging the End User, engaging Stakeholders and selecting the team) would benefit from research and development to make them more effective. This co-operative approach is reflected in the strongest theme, which is the need to improve processes for selecting and developing teams. This idea embraces nearly half of all the responses, both in the workshops and questionnaires. It extends to the need to improve the project development processes and the ability to transfer learning, particularly through the development of people.

5.0 Conclusions

The study has produced a very rich and thought provoking set of findings, which are broad in nature, but focused on remarkably few themes. Essentially, the common issues at the early stages of the project are similar to the set of issues that face the industry generally. Many of the findings are consistent with Egan and Latham findings and consequently do not appear radical or new. What is significant, however, is that all the questions and their responses were derived from practitioners, not from CRISP or the researchers, they have been impartially elicited. This is seen as one of the key strengths of the repertory grid approach.

We conclude that Practitioners accept the Egan and Latham principles and need research and development into how they can be applied. Future research should be focused on improving on what we have called the client-defined processes. The most important being team selection and behaviour. In saying this, we recognise the strong link that exists between the values established through the selection process and the consequent behaviours.

The repertory grid process shows considerable promise as a tool to better understand values and opinions in the construction industry. It is flexible enough to be used in group settings, but is most powerful when used on an individual basis or with discreet sets of people. The analysis of the grids produced a consistent and rich set of data and, though it was time consuming, this was eased by the use of currently available software. Software for group analysis has not been so readily available, and this should be investigated further before embarking on any other large-scale study of the nature.

The current data could be further analysed to give a segmented view of the roles. This will require some additional data gathering to ensure each group has a representative sample. However, it is suggested that this will provide a very detailed and perceptive view of the different roles.

6.0 Recommendations

The following are the researcher's recommendations:

- The industry needs to move, as quickly-as-possible, towards a much more outward looking, customer-focused, high added-value position. The critical point to initiate this change is at the pre-project and project development stages.
- Mechanisms and processes need to be developed to effectively and efficiently engage End Users, Financiers and Owners in the whole process, but particularly at the early stages.
- Research and development of processes associated with being a client will be beneficial to them and to the industry.
- The highest priority should be given to improving processes for selecting and developing teams with excellent co-operative and communication capability.
- Other Constructors (sub-contractors) and Suppliers need to be involved much earlier in the project process. This group can help the team to better respond to the End User's needs and also provide useful feedback on how to enable the delivery process to be improved as a whole. In return they need to be remunerated for the value they add at this stage.
- There needs to be improved communication, commitment and shared values between the construction players. Research should focus on where blocks to co-operation and misconceptions exist and how these can be eroded.
- This would be greatly assisted by generating a richer understanding of end user/client values (criteria by which choices are made)
- In turn techniques need to be developed to help teams innovate and co-operate in order to add value.

Finally, in order to improve the effectiveness of studies such as this, we suggest:

- CRISP updates its current database to include e-mail listings.
- The membership upon which the database is compiled should be updated to ensure a representative cross-section of the industry, and in particular, should also include: Quantity Surveyors, Financiers, End Users and a variety of other Stakeholders.

7.0 References

Kelly, G.A., *The Psychology of Personal Constructs*, (2 Volumes), Norton, New York, 1955.

Stewart, V., *Business Applications of Repertory Grid*, McGraw-Hill, UK 1981.

Godfrey P. & Allan N., *Bristol Project Process Map, 1998*. Reference to the 'Bristol' process map refers to a set of processes devised by Bristol University to provide a holistic framework for the development of Management of Construction teaching syllabi.

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Appendix A

Please note that the original questionnaire was formatted in landscape for ease of data entry, not portrait as presented below.

Dear Participant

Issues in the early stages of construction projects

Thank you for agreeing to participate in this CRISP sponsored research programme and to completing this questionnaire.

We have been commissioned to investigate common issues at the early stages of a construction project, to prioritise these issues and give recommendations for future research. Early stages of a construction project is defined as the time from project concept to the point when construction can commence.

Our target audience is practitioners who are actively involved in projects on a day-to-day basis. You will notice that the questionnaire is quite unusual. It has been designed using Personal Construct Theory (a psychological technique) which aims to avoid observer bias. The questions have been compiled using the ideas and issues elicited from workshops and individual interviews with construction industry practitioners. We are aiming to elicit core beliefs about issues in the early stages of construction projects from practitioners like yourself.

We ask that you **carefully read** the accompanying instructions before completing the questionnaire. If you do not understand what is asked of you or have any questions about the process, please call 0117 9545454 or e-mail us with your telephone number and we will get in touch with you as soon as possible.

The questionnaire should not take more than 20 minutes of your time to complete. Please note there is no right or wrong answers, it is your opinion based on your experience that we want to obtain.

The form and questions have been designed to be completed electronically, but you may find it useful to have a hard copy in front of you, particularly when tackling section A.

Thank you again for your participation.

Before we start the main questionnaire could you please answer the following question.

If you had the opportunity to improve any part of the construction process, in a way that would make you more successful, what part of the process would you change?

Professor Patrick Godfrey
Halcrow Business Solutions

Neil Allan
Engineering Management Group
University of Bristol

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Introduction

Before you start, we need to ask you the following personal details which will be held in the strictest confidence. Under no circumstances will individual or companies names be used in reports.

Name **Age** **Position** **Company**

Contact telephone number **E-mail**

No. of years in the construction industry

Current Role (choose only one that best describes your main function):

End User	<input type="checkbox"/>	Financiers (Banks, Investors, shareholders etc)	<input type="checkbox"/>
Designers	<input type="checkbox"/>	1 st Tier Constructors (Prime contractor)	<input type="checkbox"/>
Suppliers	<input type="checkbox"/>	Procurers	<input type="checkbox"/>
Other Stakeholders	<input type="checkbox"/>	Other Constructors (Sub-contractors)	<input type="checkbox"/>
Owners and Facility Managers	<input type="checkbox"/>	Advisors (QS, Lawyers, Economists etc.)	<input type="checkbox"/>
Other(please state).....			

Section A (refer to grid on page 3)

Please complete all the intersections in the grid. Rate each bipolar statement (rows) e.g. [Dresses Formally---Dresses Casually] against each role in turn given the ten columns e.g. End User, Designer etc.
Rate 1 if your belief is strongly in agreement with the left-hand column statement for this role.
Rate 2 if you moderately agree with the left-hand statement for this role.
Rate 3 if you cannot distinguish between the left-hand and the right-hand statement.
Rate 4 if you moderately agree with the right-hand statement for this role
Rate 5 if your belief is strongly in agreement with the right- hand column statement for this role.
Rate NA if you have insufficient knowledge to make such a judgement.

***How it works:** in the light-hearted example given in the first row of the grid, I strongly believe that Advisors & Financiers normally dress formally so I rated them **1**. On the other hand, I only moderately strongly believe that End Users and Procurers generally dress casually, so I rated them **4**. Similarly, I believe Suppliers are a variable group with some dressing formally and others casually, so I rated them at **3**. I did not rate Other Stakeholders but instead inserted **NA** as I have no general experience of this group to make any such judgement. Please note these are my views and perceptions, which may not match other people's views or indeed represent reality.*

***Please remember** that we are trying to obtain your views based on your experience at this moment in time, not as you might wish it to be. Also, we wish you to focus on the early stages of the construction process. We acknowledge that it is not easy to answer all the questions but please persevere.
For electronic entry click on each box and choose from the drop down menu.*

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

<p><i>NB Rate 1 if strongly agree with this statement.</i></p>	Roles										<p><i>NB Rate 5 if strongly agree with this statement.</i></p>
	End User	1 st Tier Constructors (Prime contractor)	Other Constructors (Sub-contractors)	Procurers	Advisors (QS, Lawyers, Economists etc.)	Financiers (Banks, Investors, shareholders etc)	Designers	Suppliers	Other Stakeholders (e.g. HSE, Universities)	Owners and Facility Managers	
Example: Dresses Formally	4	3	4	4	1	1	2	3	NA	2	Example: Dresses Casually
1a) Actively involved in the early stages of a project.											1b) Not normally involved.
2a) Pragmatic approach.											2b) Focuses on aesthetics.
3a) Has a strong commitment to the common goal and recognises the benefits of teamwork.											3b) Promotes self-interest
4a) Innovative.											4b) Resistant to change
5a) Has major design responsibility.											5b) Has no design responsibility
6a) Proactive, strategic thinkers.											6b) Passive with no interest in strategy
7a) Controls project finances.											7b) Has no real financial involvement.
8a) Prefers agreed specification.											8b) Prefers a flexible specification.
9a) Has long-term involvement.											9b) Has a short-term involvement.
10a) Tries hard to create certainty.											10b) Actively encourages uncertainty.
11a) Is strongly quality focused											11b) Is strongly profit focused
12a) Wants best value											12b) Wants best product.
13a) Has a narrow project focus.											13b) Strong end user focused.
14a) Employs linear thinking											14b) Thinking uses feedback loops.

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

Section B

Please mark X in one box only per question to indicate your broader views about the industry in general.

1. There is a need to better understand end users requirements.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
2. There is no real competition in the Construction industry.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
3. The industry is outward looking.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
4. Most clients are experienced project decision-makers.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
5. Value is only measured in financial cost.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
6. Latham/Egan initiated changes in the industry will lead to long-term improvement.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
7. Companies that do not innovate are likely to be driven out by those who do.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>
8. The construction process has fundamentally changed over the last 5 years.	Strongly agree <input type="checkbox"/>	Agree <input type="checkbox"/>	Neutral <input type="checkbox"/>	Disagree <input type="checkbox"/>	Strongly disagree <input type="checkbox"/>

Section C

Initial Question If you had the opportunity to improve any part of the construction process, in a way that would make you more successful, what part of the process would you change? (note this question was used as a starter question but is analysed as part of Section C.)

Please list three suggestions, which if implemented in the early stages of a project, would lead to improvements in the overall project delivery process.

1. I suggest that (click on box and type in response)
2. I suggest that (click on box and type in response)
3. I suggest that (click on box and type in response)

Please mark the box with an X if you object to a follow up telephone call.

Please mark the box with an X if you would like an electronic copy of the final report.

Thank you very much for your help. Please return to Neil.Allan@bris.ac.uk (Please save the electronic file before returning it to us in case there are transmission problems.) or alternatively mail a hard copy to Neil Allan at University of Bristol, Engineering Management Group, 81 Woodland Road, Bristol BS8 1US. Tel 0117 9545454

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

Appendix B

Summarised Grid using the mode

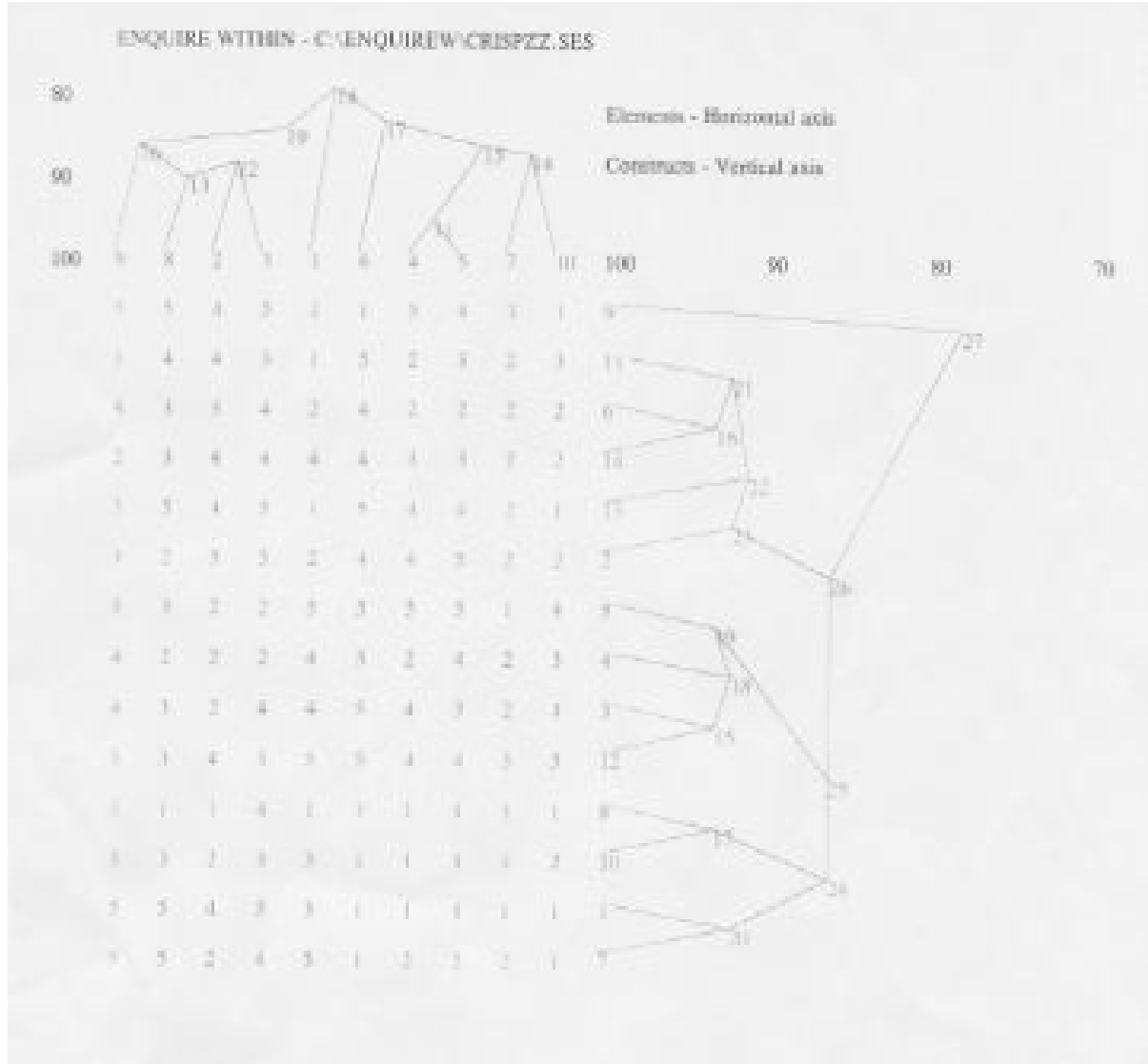
* Represents a strong correlation

	Roles										
	End User	1 st Tier Constructors (Prime contractor)	Other Constructors (Sub-contractors)	Procurers	Advisors (QS, Lawyers, Economists etc.)	Financiers (Banks, Investors, shareholders etc)	Designers	Suppliers	Other Stakeholders (e.g. HSE, Universities)	Owners and Facility Managers	
<i>NB Rate 1 if strongly agree with this statement.</i>											<i>NB Rate 5 if strongly agree with this statement.</i>
1a) Actively involved in the early stages of a project.	3	4	5	1	1	1*	1*	5*	5	1*	1b) Not normally involved.
2a) Pragmatic approach.	4	1*	1*	2	1	2	4	4	3	4	2b) Focuses on aesthetics.
3a) Has a strong commitment to the common goal and recognises the benefits of teamwork.	4	2	4	4	3	5	2	3	4	4	3b) Promotes self-interest
4a) Innovative.	4	2	2	2	4	5	2	2	4	3	4b) Resistant to change
5a) Has major design responsibility.	5	2	2	5	5*	5*	1	3	5	4	5b) Has no design responsibility
6a) Proactive, strategic thinkers.	2	3	4	2	2	4	2	3	4	2	6b) Passive with no interest in strategy
7a) Controls project finances.	5	2	4	2	2	1*	2	5	5*	1	7b) Has no real financial involvement.
8a) Prefers agreed specification.	1	1	4	1*	1*	1*	1	1	3	1	8b) Prefers a flexible spec
9a) Has long-term involvement.	1*	4	5*	5	4	1*	3	5	5*	1*	9b) Has a short-term involvement.
10a) Tries hard to create certainty.	3	2	3	1	1	1*	1	3	3	2	10b) Actively encourages uncertainty.
11a) Is strongly quality focused	1	4	3	2	3	5*	2	4	1	3	11b) Is strongly profit focused
12a) Wants best value	1	2	3	2	2	1*	3	3	3	1	12b) Wants best product.
13a) Has a narrow project focus.	5*	2	1*	2	2	1	3	1*	3	5	13b) Strong end user focused.
14a) Employs linear thinking	2	2	2	3	3	2	4	3	4	4	14b) Thinking uses feedback loops.

Appendix C

Cluster Analysis using Enquire Within Software.

(Note that some constructs have been reversed)



ENQUIRE WITHIN - Constructs

File Name: C:\ENQUIREW\CRISPZZ.SES

Registered User: Neil Allan
 User Company: University of Bristol

Construct: 1

Similar Pole

Actively involved in the early stages of a project

Contrast Pole

Not normally involved

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

Construct: 2

Similar Pole

Pragmatic approach

Contrast Pole

Focuses on aesthetics

Construct: 3

Similar Pole

Has a strong commitment to the common goal and recognises the benefits of teamwork

Contrast Pole

Promotes self-interest

Construct: 4

Similar Pole

Innovative

Contrast Pole

Resistant to change

Construct: 5

Similar Pole

Has major design responsibility

Contrast Pole

Has no design responsibility

Construct: 6

Similar Pole

Proactive, strategic thinkers

Contrast Pole

Passive with no interest in strategy

Construct: 7

Similar Pole

Controls project finances

Contrast Pole

Has no real financial involvement

Construct: 8

Similar Pole

Prefers agreed specification

Contrast Pole

Prefers a flexible specification

Construct: 9

Similar Pole

Has long-term involvement

Contrast Pole

Has a short term involvement

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

Construct: 10

Similar Pole

Tries hard to create
certainty uncertainty

Contrast Pole

Actively encourages

Construct: 11

Similar Pole

Is strongly quality focused

Contrast Pole

Is strongly profit focused

Construct: 12

Similar Pole

Wants best value

Contrast Pole

Wants best product

Construct: 13

Similar Pole

Has a narrow project focus

Contrast Pole

Strong end user focus

Construct: 14

Similar Pole

Employs linear thinking

Contrast Pole

Thinking uses feedback
loops

APPENDIX D MAKING PRACTITIONERS MORE SUCCESSFUL

The following is a presentation of the responses from some 50 Construction practitioners who were asked: "If you had the opportunity to improve any part of the construction process, in a way that would make you more successful, what part of the process would you change?"

The texts in *Italics* are the verbatim replies. They have been sorted so that similar ideas are close together. Headings have been added in **bold**.

Improving the process as a whole

- *Definition of value*
- *Client design team interface.*
- *Improve evaluation and appraisal of options through stakeholder participation and deliverability and sustainability appraisal.*
- *Improve communication of clients' functional requirements (i.e. expressed in terms of their core business) in construction procurement at the earliest stages.*
- *Supply Chain Management*
- *Risk management in the concept stage and then throughout the construction process.*
- *Change holistically – create virtual models and websites for projects and reduce paper products to practically zero – see a future with two computer screens – a CAD virtual model one and structural design real-time analysis*
- *Improve margins, both the contractor(s) and the designer(s).*
- *Training of construction personnel.*

Improving communication between construction players

- *Improved dialogue with contractors and others in the procurement process.*
- *To work more inclusively so that inefficiencies between the design and the construction were eliminated.*
- *The duplication of effort involved in different parties inputting from conception, through feasibility, design, procurement, construction, commissioning and handover, and the removal of the disruptive interfaces between all of the parties involved. That is, Client, designer, operator, 3rd party stakeholders, contractor and senior management.*
- *I would like to see an improvement in the communication process between designers (consultants) and the trade contractors. I believe that late information and questions about the design cause more problems than anything else at the early stages of a project, these mistakes generally manifest themselves as additional cost to the client and a high risk of delay to completion.*
- *Timing and quality (buildability) of design solutions.*
- *Communication and involvement with suppliers/end users who innovate (stop the distributor involvement).*
- *Quality of construction*

Improving the design and planning process

- *Design*
- *More time being devoted in the initial and design stages to wide issues such as buildability and value management*
- *Involve contractor (me) in preparation of the design brief, so that I could help to ensure sustainability of all aspects of the project (eg by ensuring on-site use of spoil, recycling "waste" materials, avoidance of damage to retained features, elimination of wasteful design features such as semi-mature trees, etc.*
- *Overhaul the UK planning system.*
 - *Improve planning consultation to include drainage strategy.*
- *Site investigation*

Improving the procurement process

- *Procurement and contract formation.*
- *Design and procurement phase.*
- *Up-front communication, procurement practices and an environment of trust*
- *Procurement arrangements, seeking non-confrontational contracts.*
- *Changes to the costly tendering process and procurement based on cost only.*
- *Drastically reduce the amount of abortive and expensive bidding work which the construction team is expected to do at no cost to the client.*
- *Innovation can be stifled if clients use the wrong form of contract. Company culture needs addressing if innovation and change to the overall benefit of the industry is to occur.*
- *The procurement of consultants services – less competitively tendered lump sum work*
- *Always to eliminate the lowest tender, or bid. This would substantially eradicate the temptation to try to do a good job for inadequate fees.*
- *Revise the procurement process to give consultants greater influence.*
- *Eliminate the middlemen (I think they're called consulting engineers).*
- *Change to most tender procedures to involve main contractor much earlier in project.*
- *Clients should generally involve contractors much earlier in the procurement process.*
- *Early involvement of key actors whose design and/or construction knowledge can influence project.*

APPENDIX E IMPROVEMENTS IN OVERALL DELIVERY PROCESS

The following is a presentation of the responses from some 50 Construction practitioners to a request for suggestions, which if implemented in the early stages of a project, would lead, to improvements in the overall project delivery process.

The texts in Italics are the verbatim replies. They have been sorted so that similar ideas are close together. Where one idea appears to be inside a bigger idea it has been indented. This presentation may be viewed as the basis for a mind map. Numbers of responses in each set are shown in brackets together with their percentage of the total. Each heading has been ranked by number of responses to indicate a consensus view of priority.

CLIENT DEFINED PROCESSES (33 = 29%)

Engaging the End User in the Process (8 = 7%) Rank 5

- *Involvement of end-user.*
 - *The requirements of the End User are identified, agreed and recorded early on in the project life*
 - *Research in user requirements should always precede design.*
 - *More involvement from end-user/operator, supplies and specialist sub-contractors with designer in development stage*
 - *Greater end user/contractor link is encouraged at an early stage.*
 - *Better understanding of end users requirements provided to D&B contractors.*
 - *Better opportunity to liaise with end user during construction process*
- *All team members should have a bonus linked to user satisfaction surveys.*

Ensuring Stakeholder Participation (6 = 5%) Rank 8

- *The complete involvement of all stakeholders.*
- *Effects of the project on the "public" are estimated and allowed for.*
- *Stakeholders follow a true project programme rather than a programme which suits their own needs.*
- *Careful evaluation of potential options with stakeholder participation is carried out at project identification stage*
- *Environmental damage (eg offsite disposal of spoil) is minimised*
- *Procedures for worker-participation in above (ed. public engagement and environmental improvement) are set up.*

Being a Better Client (19 = 17%) Rank 1

- *Greater clarity of building purpose.*
- *Clarity of requirements.*
- *Objectives of client are clearly articulated*
- *Clients should spend more time sorting out their objectives.*
- *Clients are encouraged to communicate their needs, and project teams their responses, in functional performance terms*

- *Clients should be clear about their requirements and avoid making changes except where really essential.*
- *A full understanding of the goals of the client is set down before commencement.*
- *Clients/promoters spend more time on improving knowledge of construction process.*
 - *We encourage longer term relationships with clients to gain the advantage of feedback and development which in turn creates better value*
- *Clients and End Users become more appreciative of the timescales required to complete projects and behave more pragmatically in recognising the activities and difficulties encountered by all the parties.*
- *Funders encourage serious consideration of the optimum balance between speedy delivery and effectiveness of procurement to meet business needs.*
- *Clients should be educated to adopt v.f.m. rather than cheapest price.*
- *Tendering costs are understood by the client and where these are high some financial recompense is made.*
- *Clients are alerted to the fact that negotiated procurement may sometimes serve them better than competitive tenders.*
- *Reality about what money will buy.*
 - *"Value for money" should mean just that and not "How can we get it most cheaply".*
 - *Cheapest not usually best adopted*
- *Whole life costing and capex/maintenance budget realignment – 'Best Value' procurement.*
 - *Better value is created in the commercial sector (as opposed to Govt/MOD) due to the acceptance that each contributor in the construction team is entitled to make a profit.*

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

PROJECT DEVELOPMENT PROCESSES (34)

Preparing the Brief (6 = 5%) Rank 8

- *Very early decisions about overall brief are made and confirmed*
 - *Greater time and effort is spent developing a brief than rushing headlong into the construction process.*
 - *Procurer should allow more time to formulate an accurate brief.*
 - *Facilities managers are actively involved in development of clients' briefs.*
 - *Cost control mechanisms are in place at the start.*
 - *Satisfactory site investigation.*

Improving Front End Definition and Planning (6 = 5%) Rank 8

- *Overall deliverability and sustainability of the project is assessed at project identification and appraisal stages.*
- *The statutory planning process is engaged at the outset.*
- *Consultants improve front end information.*
 - *More time and budget at front end – more meeting/communications/face-to-face contact/value engineering/workshop/time to create virtual model.*
- *Projects should (generally) have detailed resources, tables, published.*
 - *Trade contractors and management contractors invest more time into project planning interactive software – this should detail the entire project critical path to completion and improve interaction between the building works and mechanical/electrical works.*

Programming (3 = 3%) Rank 11

- *Realistic timescales.*
- *Some clients/promoters review unrealistic construction programmes and examine associated costs of difficulties created.*
- *Consistent assessment of progress (especially on site)*

Value Management (3 = 3%) Rank 11

- *Greater up front value engineering.*
- *The best engineering solution and not necessarily the “cheapest price” is used for a project.*
- *All projects should start with some kind of value management workshop.*

Risk Management (9 = 8%) Rank 4

- *Risks and opportunities are assessed at both project identification and appraisal stages.*
- *Risk management is employed.*
- *End User is more knowledgeable about risk mitigation and financial consequence.*
- *More focus on project risk analysis will enhance co-operation and creating project value*
- *Risk assessment (organisational, technical and financial).*
- *Uncertainty is managed more effectively.*
- *Agreement to share risk and manage it collectively.*
- *Virtual company model, shared risk, profit and decisions.*
- *Implement alliance contracting*

Improving the Design Process (7 = 6%) Rank 6

- *Better planning and management of the design process.*
 - *Greater involvement of contractors and suppliers in the design process.*
 - *More use is made of mechanical and electrical services commissioning management engineers are employed – this should be done at design stages of a project to provide a system commissionability review and it will also make more information available to the mechanical and electrical trade contractors when they commence their works.*
 - *Greater clarity of building detail and buildability.*
 - *Greater emphasis on reviewing the design at key stages with greater questioning of the assumptions upon which the design is based.*
 - *Completion of all design work before the project commences greatly enhances that project being completed on time and on budget.*
 - *Design is frozen.*

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

BEING A TEAM (34)

Co-operative Culture and Process (15 = 13%) Rank 3

- *The full project team agree common objectives for the project inputs including each party making a reasonable profit for a well delivered service.*
- *Better liaison between all parties.*
 - *Consultants work much more closely to deliver better projects.*
 - *Better designer/contractor interface.*
- *Replacement of combative contracts by partnership agreements.*
 - *Use of partnering contracts.*
 - *Partnerships are established between key suppliers/subcontractors and client.*
 - *Partnership contracts/strategic partnerships.*
 - *As many commercial agreements as possible (amongst those involved) are written to reflect partnering ethos; often partnering is espoused without real commercial commitment.*
 - *Use of long term strategic alliances.*
 - *Integration of all parties focus in early stages will increase (Dutch initiative IFD building).*
 - *An integrated team is co-located from the start*
 - *Team Building.*
 - *More use is made of human resources professionals as team facilitators.*
- *An open book policy, on all sides, be actively encouraged.*

Managing the Supply Chain Better (19 = 17%) Rank 1

- *Earlier involvement of the supply chain.*
- *Earliest involvement of construction subcontractors and suppliers.*
- *Supply integration is more common.*
- *A main contractor should be included in the client's advisory team at an early stage.*
- *Clients be in direct communication with contractors in order that the latter can better understand the needs and objectives of the former).*
- *The whole contract team is brought together as early as possible in the design process, before decisions are made which cannot later be reversed.*
 - *Appoint design/construct/project manager/contractor (single entity)*
 - *Subcontractors/suppliers involved early.*
 - *The understanding and clarification of communication lines.*
- *Contractor adds buildability*
 - *All projects are reviewed to see if the degree of fabrication could be increased.*
 - *All projects are reviewed to assess the degree of modularisation and standardisation which could be employed.*
 - *More standardisation.*
- *Supply chain integration/manu. involvement.*
 - *Key suppliers are involved after overcoming commercial concerns.*
- *The communication on all projects is via the web utilising project hosting.*
- *Implement open building.*
- *Implement performance approach*
- *Clear ownership of deliverables in terms of time, cost and quality.*

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS

OTHER IMPORTANT PROCESSES (11 = 10%)

Learning From Projects (1 = 1%)

- *Adopt improved process utilising new tech. so greater communication – to avoid reinventing wheel – include use of standard objects, adoption of 50% complete virtual models at start/web/based with interprogramme and organisation transfer of data so not reconsider same issues each time.*

Employing the Right People for the Job (7 = 6%) Rank 6

- *Employ a better project team – many teams lack expertise/engineering industry needs more excellence retained in order to successfully adopt egan/latham or there is a severe risk that the clients will give up on the industry players and the management*
- *consultants will be called in/innovation/effective communicators/points made above.*
 - *Hire a European or US project manager.*
 - *Hire a European, Asian or US contractor.*
 - *Larger margins for contractors, consultants, suppliers.*
 - *Training.*
 - *Increase best value to fund training and better skills.*

Other Issues (3 = 3%) Rank 11

- *Manage expectations*
- *Funding*
- *institutions should set higher quality standard*

Total Responses (112)

ISSUES IN THE EARLY STAGES OF CONSTRUCTION PROJECTS