Designer's Perception of Safe Design and its Potential for Innovation
by

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Safe design to influence construction and maintenance worker safety is a concept that has been around for many years in the United Kingdom and Australia. The concept is that designers can influence the safety of the project during the design phase. This study aims to determine whether designers consider this concept an aid or a hindrance. The extent to which safe design is implemented, its timing within the design process, and the tools and processes employed could well be related to designers' perceptions. If the designers' fundamental tenet is their technological and intellectual disposition to prepare and execute safe designs then the core question has to be, do designers view safe design as a pleasure or a pain? This study will focus on designers from the United Kingdom and Australia since 'design safety' legislation has been implemented there for several years and both jurisdictions provide an element of guidance on safe design practices. The purpose of the study is to determine if thinking about worker safety in the design process enables or restricts innovation and creativity in the design process. The analysis will compare safe design approaches in the two regions to see if there is any correlation between them.

The thoughts and practices of designers from the both countries are explored to determine, among other things, their perceptions of the value of safe design. The primary methodology for this study is a questionnaire, followed up with a more detailed interview, conducted on a sample group, comprising design engineers and architects across a range of industries, with differing

levels of experience. The expectation is to find some innovations that stem from the safe design process. The expected results could impact the view of safe design and safe design regulation, particularly useful in the year that United Kingdom is reviewing its approach to regulating construction, design and management. In the United States there are no such safe design regulations in the foreseeable future. However, the National Institute for Occupational Safety and Health has a safe design initiative, and these results could provide insight to the concept's adoption in the United States.

Designer's Perception of Safe Design and its Potential for Innovation

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TABLE OF CONTENTS

LIST OF TABLES ix

LIST OF FIGURES x

CHAPTER 1: Introduction 1

CHAPTER 2: Literature Review 3

What is Innovation 3

Types of Innovation 5

Measuring Innovation 7

CHAPTER 3: Methodology 9

Population 9

Data Collection Method 11

Analysis Methods 12

CHAPTER 4: Results 14

Data Breakdown 14

Architect-Civil Enginnering Comparison 17

UK – Australia Comparison 20

NVivo Results 20

CHAPTER 5: Conclusions and Future Studies 23

REFERENCES 25

APPENDIX A: IRB Approval Letter 27

APPENDIX B: Survey 28

APPENDIX C: SPSS Output 31

APPENDIX D: Transcribed Interviews 81

APPENDIX E: Other Comments from Survey 98

APPENDIX F: NVivo Output 101

LIST OF TABLES

1. Possible Range of Options 10
2. Civil Engineer and Architect Breakdown 14
3. Years Completed 14
4. Types of Industries 14
5. Positive/Negative Results for All Designers 15
6. Positive/Negative Results for United Kingdom Designers 15
7. Positive/Negative Results for Australian Designers 15
8. Positive/Negative Results for Civil Engineers 16
9. Positive/Negative Results for Architects 16

LIST OF FIGURES

1. Ability to effectively utilize the hierarchy of controls (Behm et al. (2014) 18

2. Ability to influence safety vs ability to recognise hazards 19

Chapter 1: Introduction

When do we think about worker safety and health in the life cycle of a project? Is worker safety a limit to innovation – something regulated that design professionals have to do? Or is worker safety something different for a designer that could spark innovation and creativity by thinking differently?

Although safe design has been part of legislation since the early 1990s it is only recently that it is being considered a tool that can be used during the design stage as a source of innovation rather than a legislative procedure that needs to be done. A Health and Safety Executive study in 2003 showed that when looking at accidents in construction that "clients and designers give insufficient consideration to health and safety, despite their obligations under CDM regulations (2003)". The aim of this study is to determine whether the concept of safe design that has been instilled by this legislation is considered to be a tool by the designers that enable innovation and creativity or one that restricts innovation and creativity in the design process.

In 2007 legislation was revised in the United Kingdom to enforce safe design throughout the construction industry. The legislation is known as The Construction (Design and Management) Regulations 2007 (CDM), and is a combination of the CDM Regulations 1994 and the Construction (Health Safety and Welfare) Regulations 1996. Australia has similar regulations (NOHSC, 2005). The Australian regulations were harmonized in January 2012 into one consistent piece of legislation; the purpose being to minimize confusion between different states and territories across the country.

The UK and Australia have been chosen for this research because they have had safe design legislations in place for a number of years. The study will compare the safe design regulatory process in the UK with the equivalent regulations in Australia. As well as comparing the UK and Australian equivalents there will be a comparison made between the opinions of engineers and architects regarding the legislation's ability to enable or restrict innovative designs.

Chapter 2: Literature Review

What is Innovation?

Ling et al. (2003) defined innovation when talking about construction as “a new idea that is implemented in a construction project with the intention of deriving additional benefits”. It was Asad et al. (2005)who said that innovation is a “pre-requisite to any competitive advantage” (p.1216). It gives advantages to both the individual and the organization as a whole. Innovation is considered as a leading cause for success of a company whether it is in the design of products, processes, services or organizational ideas. Asad et al. (2005) considers that innovation is becoming an increasingly important practice within the construction industry in the United Kingdom as construction companies needing “to innovate in order to adapt continuously to complex and changing conditions”. The main benefits that can be considered thanks to innovation in construction are the improvement and development of “leadership, customer focus, integrated process and terms, quality and commitment to people”.

Culvenor (2000) considers that the main motivations which influence safety efforts are “ethical/moral, legal/social and financial”. It seems that the safety culture is motivated by negative outcomes and the desire to prevent these, such as “guilt; legal sanctions; and monetary loss”, rather than by positive reinforcement. In order to encourage innovation there must be a change in the mentality of people that safety efforts can have positive outcomes in regards to their companies.

Culvenor (2000) states that health and safety laws “were overly prescriptive, impossible to keep current, too numerous, and too hard for people to access and understand”. This may be one

reason behind the Atkinson and Westall (2010) statement that “building designers are influential, but do not know how to design for buildability and safety”.

Culvenor (2000) says that there are three basic steps to workplace safety being creative. These include “proactive thinking; divergent thinking; and judicial thinking”. Proactive thinking is the focus on prevention and planning. Divergent thinking is breaking the “habit gravity” which is a thought process that causes people to stick to their past habits. Judicial thinking is thinking about the “practicability” of the safety aspect. Judicial thinking is defined by “severity of hazard; effectiveness of the solution; cost of the solution; and other benefits and opportunities”.

Culvenor (2000) proposes that as “most hazards don’t occur naturally” and they come about as part of the design process that therefore the control of the hazards has its priority in the “elimination” in the design phase. It was previously stated by Culvenor in his earlier paper (1996) that “the first problem lies with the common understanding of the word accident.” Although that it is perceived that accidents cannot be prevented as they are “unexpected”, “unfortunate”, “unplanned”, “unintended” or “uncontrolled” this may be misleading. Culvenor (1996) believes that figures relating to unsafe acts causing accidents may be misleading and manipulated.

From the hierarchy of controls the source of the hazard is the main focal point and the focus is then on working in conjunction with the process until the last stage is the step that is reliant on the end user. This was supported by De la Garza and Fadier (2005)when they said “design does not end on completion of the development stage for the product forming the working equipment, but involves also its instillation and commissioning”.

There is a focus on using passive rather than active countermeasures. The reasoning that active is inherently unreliable is because of its focus on the user's behavior. It considers the user's behavior to be the weakest link in the system and therefore it is the factor for accidents happening. Whereas passive countermeasures do not rely heavily on user behavior therefore it is the failure of the entire system before it is the failure of the human that creates the risk. Using this system of passive over active countermeasure will make accidents "plannable, controllable and predictable". Therefore the structure, the operation or the process has the potential to be designed or managed to avoid accidents rather than accepting an accident as being an unexpected event.

Newton (1999) believed that construction innovation could be considered as a "fourth performance dimension" and ranked alongside "cost, quality and time". This is because of an increasing pressure from clients to "improve quality, reduce costs and speed up construction processes", a difficult combination to achieve and innovation is therefore essential for these to flourish. Although it is seen that innovation is essential for these to flourish Gambatese et al. (2005) said that "project cost and schedule were mentioned most often along with limitations being placed on design creativity".

Types of Innovation

Sniderman (2012)states that there are five different types of personalities when considering innovators. These include movers and shakers; controllers; star pupils; experimenters; and

hangers-on.‘Movers and shakers’ are the leaders of the group and tend to have a “strong personal drive”. They are the ones within a corporate structure that are the creators and drive forward the projects. The ‘experimenters’ are described as “persistent and open to all new things”. They are the members who tend to work hard and take pride with the work that they put into projects. ‘Star pupils’ can be considered the ones that spend time “seeking out and cultivating the best mentors” and putting the methods to the best use for the project. The ‘controllers’ are those who enjoy structure and tend to shy away from risks as they like to be in control of their domain. They “focus on concrete, clear-cut objectives” so they know exactly how they stand. The main job of the ‘hangers-on’ is to “bring everyone back down to earth”. Although they do not enjoy unstructured environments and they tend to use conventional wisdom and tried and tested processes over the new and untested.

Construction innovation is categorized into either ‘organizational innovation’ or ‘technical innovation’. ‘Organizational innovation’ takes place throughout the structure of the company whereas ‘technical innovation’ takes place as part of the product or the process.Asad et al. (2005)considered the two types of innovation as radical and incremental. Radical is in response to a crisis or pressures from an external environment and incremental is step-by-step changes. Incremental is the process in which step-by-step changes are added. Of these two types incremental is the more common. In the case of the construction industry “organizational innovation” and “technical innovation” exist. Organizational innovation is changes from the organizational level by “advanced management techniques and implementation of new corporate strategic orientations”. Technical innovation is either “product or process”, with this being a new product or process.

Asad et al. continues that while innovation has two types it can be in three different forms. These are integrative, appropriate and contingency. Integrative considers management of the innovations by looking at interdisciplinary and multifunctional resources. Appropriate says that different viewpoints should be taken into account. The contingency approach looks at considering each solution depending on the situation. This is known as innovation management, finding the appropriate solution for a problem.

De Waele (2014), writing in 'New Civil Engineer' indicated that the "open and competitive nature of the UK construction market drives a constant need to do things differently". In the same article De Waele indicates that legislation specifically that relating to sustainability and environmental governance is an innovation driver within ground engineering. Behm et al (2009) hold that projects cannot be considered sustainable where safety and health is not a central tenet.

Measuring Innovation

Corona et al. (2005)discuss that one of the key components of any organization is innovation. This is the process that allows creative thinking and therefore the development of new products. The difficulty is how to measure innovation and if it is measurable, how to go about doing it in an objective way. In order to do this innovation must be defined. Corona et al. (2005) define innovation as "a change, which leads to obtain improvements".

Griffin and Page (1996) developed and proposed a series of indicators to measure the success or failure in the development of a new product. It worked with the aspects of a company's management, "project strategy, business strategy, level of project measures and level of company measures (Griffin & Page, 1996)". It is believed that safe place controls give a mechanism of prevention that is more reliable. This is because they focus on the source of the hazard and use passive controls that "operate independent of vigilant behavior of those at risk (Griffin & Page, 1996)". "Thinking out" safety problems are considered a more effective term than "engineering out" the problems. Culvenor (2000) indicated that "thinking out" gives the term a more creative connotation for the designers.

Chapter 3: Methodology

Population

The sample group for this study was made up of civil engineers and architects; the principal designers from the United Kingdom and Australia. The groups were sampled using a purposeful snowballing method. Professional contacts within the United Kingdom and Australia were used initially to discover civil engineers and architects. These initial participants were asked to forward the survey onto professionals that they feel would be relevant to the study. Purposeful sampling was used rather than random sampling because the criterion for the study was set to specifically civil engineers and architects in the United Kingdom and Australia, and there was no access to such a list of possible respondents.

These two countries were chosen because of their prior experience with legislated design safety. This experience will give more realistic results. The designers' answers are based upon their experiences rather than prejudices that may occur if there is no implemented safe design legislation or if the legislations were newly implemented. The survey was sent out to as large a number as possible in order to gauge the opinions of as many levels of experience as possible across as large a range of industries. This is to get a more wide spread opinion of the safe design processes that have been instilled due to legislations being implemented.There was a range of possible opinions that may come about through this study. These are illustrated in Table 1.

Country	Design Profession	Opinion of creativity potential
UK	Civil Engineer	Positive
UK	Civil Engineer	Negative
UK	Architect	Positive
UK	Architect	Negative
Australia	Civil Engineer	Positive
Australia	Civil Engineer	Negative
Australia	Architect	Positive
Australia	Architect	Negative

Table 1 - Possible Range of Opinions

It was estimated that 1-2 participants from each possible opinion will be willing to participate in the interview section of the study. This would have provided 8-12 qualitative interviews. This number was planned to be adjusted depending on the level of saturation and meaningful data that has been acquired to provide examples of positive and negative effects of safe design thinking. Saturation occurs when the information that is being gathered appears to have reached a common consensus. In the end, all respondents who agreed to an interview were followed-up with to provide their view on safe design. Six respondents were interviewed.

Data Collection Method

This study was conducted using an anonymous questionnaire which was followed up by more detailed interviews from designers. The questionnaire was designed to be able to gauge a comparison between the opinions of the different designers. This interview was designed to stimulate further discussions during the interview stage.

A focus group of designers was considered over these however it was deemed that a focus group had the potential to provide a bias towards one opinion and this is to be avoided. The desired outcome is to see if the designers have an individual difference on safe design principles. There was an interest in Australian perspective to partake in interviews. The researcher spent time in the UK, but travel to Australia was not possible during this study.

The questionnaire was constructed using Qualtrics software. This software allowed for the questions to be put into an electronic system. The questionnaire was broken down into two sections – background questions and closed questions on the designer's opinions of safe design processes. The second part of the questionnaire was designed to solicit a richer discussion during the subsequent interview. As the prior questionnaire was designed to solicit discussion this removes any bias that the research may have towards safe design having a positive or a negative effect on the design allowing for the opinion of the designers or architect not to be affected. For example, the training question could elicit discussion regarding safe design tools and processes, which can lead to innovations. This allows for a more detailed interview and it more detailed results.

The interviews were conducted through three different mediums which were based on logistics. The first method was face-to-face. This will be for interviewees that are on hand and can be reached at minimal cost. The second methods is telephone interview, this is for those who are harder to reach. These first two methods will be recorded using a Dictaphone so they can be transcribed. These two methods will be used for interviewees in the United Kingdom as the researchers spent 2 months there in Summer 2013. The final method is online using Saba software. The Saba software has the ability to record the interview; this will be used for transcribing. This method will be used for the Australian interviewees due to the difference in time zones.

The interviews will include a series of questions that had been tailored using the Qualtrics survey and participants were explained that the interview would last no longer than 20 minutes. This was to get specific information and to avoid a large amount of data that will be needed to be transcribed and analyzed.

Analysis Methods

Once the questionnaire was closed the data was imported directly into SPSS statistical analysis software where it was analyzed to determine statistical significance within the data (Appendix C). The test conducted on the data is a chi-squared test of independence to determine whether there were any statistical significant relationships between categorical variables. Cramer's V statistic, which was calculated using SPSS, measures the strength of relationship between the categorical variables that exhibited statistical significance. For example the designers discipline and whether they felt that safe design has a positive or negative influence on design would be an

example of a possible relationship. The level of significance set for this study was a p value of 0. 05. This standard was adjusted to 0.10 due to the small sample size and exploratory nature of the study. Therefore in addition to the traditional 0.05 alpha level, discussion comments are made in the Results section about p-values greater than 0.05 but less than 0.10.

The transcribed interviews (Appendix D) were analyzed using NVivo software. This allowed for the major themes from the interviews to be extracted. Once the major themes were determined then the comparison between United Kingdom and Australian opinions as well as between the civil engineer and architect opinions to see there the differences lie. The software provided a synopsis of how the designers interviewed felt about safe design. This software compliments the statistical data extracted from the Qualtrix survey through the use of SPSS.

The study received University and Medical Center Institutional Review Board (IRB) approval (UMCIRB 13-001058). See Appendix A.

Chapter 4: Results

Data Breakdown

	UK	Australia	Total
Civil Engineers	42	19	61
Architects	19	10	29
Total	61	29	90

Table 2 - Civil Engineer and Architect Breakdown

Years Completed	Count
0-4	15
5-9	13
10-14	13
15+	49

Table 3 - Years Completed

Industry Type	Count
Commercial	34
Industrial	18
Heavy Civil	36
Residential	25
Other	22

Table 4 - Types of Industries

Tables 1-3 show the demographic breakdown of the data gathered through the Qualtrix survey and analyzed using the SPSS software. Table 1 shows the split between civil engineers and architects and how they are spread between the United Kingdom and Australia. Table 2 shows the levels of experience that the designers have. More than half the designers have 15 or more years experiences. In Table 3 the industry in which the designers work is broken down. The "Other" section includes transport, infrastructure, hospitality and the tower crane industry.

Answer	Response	Percentage (%)
Positive	74	81
Negative	17	19

Table 5 - Positive/Negative Results for All Designers

Answer	Response	Percentage (%)
Positive	51	84
Negative	10	16

Table 6 - Positive/Negative Results for United Kingdom Designers

Answer	Response	Percentage (%)
Positive	23	77
Negative	7	23

Table 7 - Positive/Negative Results for Australia Designers

Answer	Response	Percentage (%)
Positive	56	90
Negative	6	10

Table 8 - Positive/Negative Results for Civil Engineers

Answer	Response	Percentage (%)
Positive	18	62
Negative	11	38

Table 9 - Positive/Negative Results for United Kingdom Designers

Tables 5-9 show the breakdown of the question 'Do you feel that safe design has a positive or negative influence on innovation and design creativity?' It can be seen from this series of tables that the designers, regardless of discipline and nationality, feel that the safe design legislations have an overall positive influence of their ability to innovate.

In order to analyze this data using a chi-square test the variables must be broken into independent variables and dependent variables. The independent variables include:

- Discipline
- UK civil engineers
- Australian civil engineers
- UK architects
- Australian architects
- Pure design vs design-build
- 0-14 years vs 15+ years

- Conceptual design – yes vs no
- Formal education – yes vs no

The dependent variables include:

- Safe design is a good incentive in terms of my time?
- Safe design is a good incentive in terms of my budget?
- Training/education prepared me for implementing safe design?
- Training/education encouraged me to be creative?

With this breakdown of the independent and dependent variables the data is ran through SPSS using a chi-squared test in order to find categorical relationships. The level of significance that is normally used is 0.05 but because of the size of the sample this study p-values less than 0.10 are also discussed. They may offer an insight into areas that may be potentially interesting.

Architect-Civil Engineering Comparison

- Do you feel safe design has a positive or negative influence on innovation and design creativity – $p = 0.002$
- Safe design is a good incentive in terms of my time? – $p = 0.095$
- At what stage(s) during the design process is safe design implemented by your company (conceptual vs other)? – $p = 0.095$

- United Kingdom only – Do you feel safe design has a positive or negative influence on innovation and design creativity? – p = 0.031

From these results the initial thoughts is that civil engineers feel that safe design legislations is a more positive influence on their design creativity compared with architects.Although it is civil engineers who are most positive about safe design and its use it is the architects who implement safe design earlier in their design process. Theoretically, there is a greater potential to influence safety earlier in the design process.

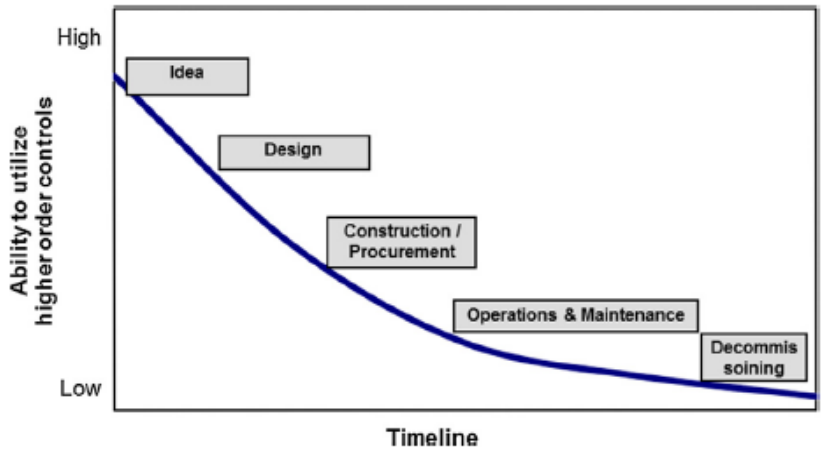

Figure 1 - Ability to effectively utilize the hierarchy of controls (Behm et al. (2014))

Figure 1 is an adapted version of Szymberski's time-safety influence chart by Behm et al. (2014) that shows that hierarchy of controls can be used to eliminate, substitute and engineer to reduce hazards in the design phase more so than the construction and operations phases.

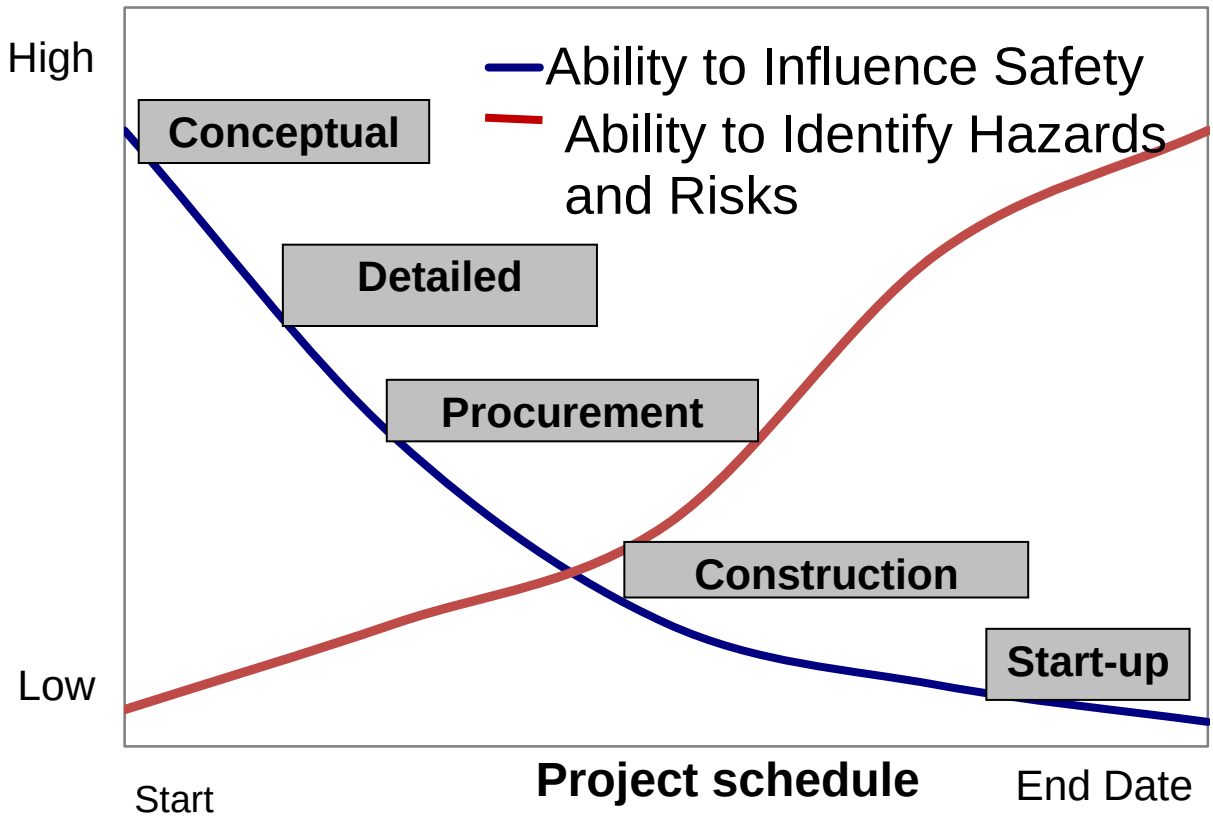

Figure 2 - Ability to influence safety vs ability to recognise hazards

Figure 2 shows that as the project goes further into the project schedule the ability to identify hazards increases as the ability to influence safety decreases. This backs up the data that shows that architects implement safe design processes earlier during the design stage however they do not feel that safe design is as influential in the process. This is because there are fewer opportunities to identify risks that are site specific. There may not be enough information to identify risks or the safe design processes may not be refined enough at the early stages of the design, consequently they will not be able to identify hazards. In other words, the theoretical ability to influence safety is highest the earlier it is in a project you begin thinking about safety, but the achievability of actually doing so, and doing so correctly and judiciously is tenuous.

One possible reason for this belief was posited by Tatum (1991) and that is that "engineering and construction firms need to innovate to win projects". This would give the civil engineers a feeling that the safe design legislations can be used in a positive way in regards to innovation. Whereas the architects do not feel that the development of innovative processes is an important factor in the design stages. That safe design can be implemented later on in the build process.

UK – Australian Comparison

- Safe design is a good incentive in terms of my budget? – p = 0.028

UK designers feel that is it a good incentive in terms of their budget compared to their Australian counterparts. This results stands out because the United Kingdom's safe design legislation is being revised for the second time in seven years whereas the Australian regulations haven't been revised for several years. Behm et al. (2011) considered that this may be because "safe design in Australia has a longer history than the regulations". This means that the ideology of safe design was instilled in Australian designers long before it was a mandatory part of their design process. The Australian designers may not have a concept of budgeting safe design into projects.

NVivo Results

The transcribed interviews (See Appendix D) were placed into NVivo software and analyzed to determine if any themes and trends emerged throughout the interviews. The word tree results show that the most commonly used words in the interviews were "design", "safely" and "safety". This is expected.

When looking at positive and negative themes and determining how prevalent they are in the interviews the analysis showed that one interview had some negative examples, which covered 3.97% and the other comments from the questionnaire, resulted in 6.10% coverage. One example of this negative trend is “giving only minimal thought to the practicalities of their designs”. One individual stated that they regarded safe design “as a negative influence on innovation in design”. This person is a civil engineer, which goes against the general population of civil engineers, discussed earlier in this chapter. One UK interviewee was positive to innovation but felt that safety wasn’t a driving force behind it stating that “one of the drivers of innovation is saving money”. This supports the result that says UK designers feel that safe design is a good incentive in terms of their time.

There is a contrast when looking with the positive themes and trends throughout the interviews and additional comments from the questionnaire. All 6 of the interviewees had positive comments about safe design and the additional comments section had 5.83% coverage for positive themes. One example of how safe design helped innovate designs for worker safety is “designing windows that open inwards for cleaning”. This reduces the need for people to work at heights, which would create another hazard. One Australian interviewee stated that one of their examples involving returning to job sites because they were difficult to construct and this change “enabled a faster and easier construction but it was really driven by safe design in the first instance”. The same designer admitted that “we’re not highly skilled in safe design” but that it is “often learnt from the building site” and that is then taken “to a future site”. This goes back to the question of where they have learnt to implement the safe design principles, and from this example it seems that it is on the job learning rather than being implemented at a university level.

One other interviewee stated that “the engineers are looking to design it to be safe”. This statement, again, backs up the data that was gathered from the questionnaires in comparison to civil engineers and architects. The same person felt that architects have the potential to influence safety, saying “architects can have a little bit more control over how it can be safety used as far as the layout and traffic management…goes”.

One UK civil engineer states that his company “gained that particular project using safe design principles”. This shows that is has the potential for benefits for the company for another reason other than saving money with the construction. Effective safe design principals within a company can gain clientele and help the company expand.

Chapter 5: Conclusions and Future Studies

This study shows that there is a fundamental difference between civil engineers and architects on their opinions of safe design legislations and the ability that these legislations give to be innovative with their designs. The civil engineers are more positive to the legislations ability to help with their creativity when compared with the architects. From the Figure 2 shown in the results chapter this is due to the potential to identify hazards is more in the area of the construction timeline where the civil engineers do most of their work. Whereas the architects are only involved with the conceptual design, which is indicated in the results, and they have little influence of the design after the conceptual and initial design stage.

In the comparison between designers in the United Kingdom and Australia the statistically significant result was that UK designers felt that budget was more important than the Australian designers. This may be because the Australian designers have had the same legislations in place since the earlier 1990's so they consider budget as part of their design rather than as an extra expense. Where the United Kingdom have updated their legislation several times in the same time period and it makes the designers more aware that safe design could influence the budget of the project.

From the differences determined in this study between both civil engineers and architects and the difference between United Kingdom designers and those from Australia it could be said that the difference could be due to educational differences.

This study shows the potential for a use of safe design standards placed on designers in other areas of the world. The results show that the designers that are currently using similar standards in place feel that they have a positive effect on their potential to innovate.

The study had one major restriction that may have made the study better is the lack of designers who are negative to the safe design legislations. One potential reasoning behind this is that the designers who have bought into the idea of safe design and have linked it to their ability to innovate are more willing to discuss. Whereas those who have a negative outlook feel that it is best not to express their opinions in a public setting. This gives room for another researcher to determine where these people feel the gaps in the safe design legislations are and how they feel that it could be made better to enable innovative designs. This limitation may have come about due to designer's reluctance to give a negative opinion even though it was an anonymous survey. This made it even more difficult to find a person with a negative opinion on safe design to be interviewed.

Another restriction for the research was the relatively small sample size. This could be increased by simply opening the survey for a longer period of time and sending the survey out repeatedly. Although due to the specific population that was needed for the study it made it difficult to find a large sample so when the data was broken down further into variables the sample sizes became even smaller. The same sample size is one potential reason behind some of the data not being statistically significant but it was tending towards significance.

Overall the research was considered successful. It has shown that the general population of the designers agree that safe design legislations is a positive on their daily work and it allows them the potential to be innovate in their designs. The study has shown that although designers feel that they are not being as innovative as they can be they see that the legislations has the potential to help them innovate if it is tailored in such a way that it is more susceptible to innovative design rather than another exercise that they need to do in their daily work.

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APPENDIX A: IRB Approval Letter

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Ronan McAleenan
CC: Michael Behm
Date: 5/20/2013
Re: UMCIRB 13-001058
Comparative Study between UK and Australia on opinions of safe design

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 5/19/2013 to 5/18/2014. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

The approval includes the following items:

Name	Description
consentletter.doc | History	Consent Forms
Informed-Consent-Template-No-More-Than-Minimal-Risk-03-28-2013 (1).doc | History	Consent Forms
Proposal_v4.docx | History	Study Protocol or Grant Application
thesis_email_v2.docx | History	Recruitment Documents/Scripts
thesis_interviewquestions.docx | History	Interview/Focus Group Scripts/Questions
thesis_surveyquestions.docx | History	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: Survey

Dear Participant,

I am a student at East Carolina University in the Department of Technology Systems. I am asking you to take part in my research study entitled, “Civil Engineers and Architects Approach to Safe Design".

The purpose of this research is to establish opinions of the concept of safe design between UK and Australia. Your participation is voluntary. For the purpose of this study "safe design" is defined as the concepts that are used in the design phase that allow safe construction.

You are being invited to take part in this research because you fall into the category of either civil engineer or architect. The amount of time it will take you to complete this study is approximately 5 minutes.

You are being asked to fill in this short survey based on safe design and, if you are willing to be contacted, a short interview will be conducted.

Because this research is overseen by the ECU Institutional Review Board, some of its members or staff may need to review my research data. However, the information you provide will not be linked to you in any way unless you consent to an interview following the survey. Therefore, the anonymous responses cannot be traced back to you by anyone, including me. In the case where an interview is being conducted I will take precautions to ensure that anyone not authorized to see your identity will not be given access.

If you have questions about your rights as someone taking part in research, you may call the UMCIRB Office at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of UMCIRB Office, at 252-744-1971

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, please continue on with the survey below.

Thank you for taking the time to participate in my research.

Sincerely,

Ronan McAleenan, Principal Investigator

1. Which is your discipline?
    - Civil Engineer
    - Architect
2. Which is your country of work?
    - United Kingdom
    - Australia

3. How many years of design experience do you have?
    - 0-4
    - 5-9
    - 10-14
    - 15+
4. What industry do you typically design for? Check all that apply
    - Commercial
    - Industrial
    - Heavy civil
    - Residential
    - Other
5. If other, what industries have you been involved with?
6. What type of firm do you work for?
    - Pure Design
    - Design-build
7. At what stage (s) during the design process is safe design implemented by your company? Check all that apply
    - Conceptual
    - 30%
    - 60%
    - 90%
8. Who at your company is involved in the safe design processes? Check all that apply
    - Designers
    - Consultants
    - Safety Professionals
    - Construction Professionals
    - Other
9. Did you receive formal training of occupational safe design?
    - Yes
    - No
10. Where did you receive formal training in safe design? Check all that apply
    - University/college
    - Training course
    - Other
11. If other, where did you receive the training?
12. My formal education and/or training prepared me to implement safe design.
    - Strongly Agree
    - Agree
    - Neither agree nor disagree
    - Disagree
    - Strongly Disagree
13. My formal education and/or training encouraged me to be innovative when implementing safe design.
    - Strongly Agree
    - Agree
    - Neither agree nor disagree

- Disagree
- Strongly disagree

14. Do you feel that safe design has a positive or negative influence on innovation and design creativity?
    - Positive
    - Negative
15. Safe design is a good incentive in terms of my time?
    - Strongly Agree
    - Agree
    - Neither agree nor disagree
    - Disagree
    - Strongly disagree
16. Safe design is a good incentive in terms of my budget?
    - Strongly Agree
    - Agree
    - Neither agree nor disagree
    - Disagree
    - Strongly disagree
17. Do you believe your professional body encourages safe design?
    - Yes
    - No
18. Do you have any other comments on safe design?
19. If you are willing to participate in a 10-15 minute follow-up Skype or telephone interview please enter your name, email address, and other pertinent contact details below.

APPENDIX C: SPSS Output

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Which is your discipline? * My formal education and/or training prepared me to implement safe design. collapsed	46	52.9%	41	47.1%	87	100.0%

Which is your discipline? * My formal education and/or training prepared me to implement safe design. collapsed Crosstabulation

			My formal education and/or training prepared me to implement safe design. collapsed		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	18	13	31
		Expected Count	17.5	13.5	31.0
	Architect	Count	8	7	15
		Expected Count	8.5	6.5	15.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.092[a]	1	.762		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.092	1	.762		
Fisher's Exact Test				1.000	.503
Linear-by-Linear Association	.090	1	.764		
N of Valid Cases	46				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.52.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.045	.762
	Cramer's V	.045	.762
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Which is your discipline? * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
Which is your discipline? * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
Which is your discipline? * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
Which is your discipline? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%
Which is your discipline? * At what stage (s) during the design process is safe design implemented by your company? Check all that apply	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	18	13	31
		Expected Count	17.5	13.5	31.0
	Architect	Count	8	7	15
		Expected Count	8.5	6.5	15.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.092[a]	1	.762		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.092	1	.762		
Fisher's Exact Test				1.000	.503
Linear-by-Linear Association	.090	1	.764		
N of Valid Cases	46				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.52.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.045	.762
	Cramer's V	.045	.762
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	42	16	58
		Expected Count	38.7	19.3	58.0
	Architect	Count	16	13	29
		Expected Count	19.3	9.7	29.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.586[a]	1	.108		
Continuity Correction[b]	1.869	1	.172		
Likelihood Ratio	2.538	1	.111		
Fisher's Exact Test				.148	.087
Linear-by-Linear Association	2.556	1	.110		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.67.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.172	.108
	Cramer's V	.172	.108
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	35	23	58
		Expected Count	32.7	25.3	58.0
	Architect	Count	14	15	29
		Expected Count	16.3	12.7	29.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.145[a]	1	.285		
Continuity Correction[b]	.707	1	.401		
Likelihood Ratio	1.141	1	.285		
Fisher's Exact Test				.360	.200
Linear-by-Linear Association	1.132	1	.287		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.67.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.115	.285
	Cramer's V	.115	.285
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
Which is your discipline?	Civil Engineer	Count	52	6	58
		Expected Count	46.7	11.3	58.0
	Architect	Count	18	11	29
		Expected Count	23.3	5.7	29.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.358[a]	1	.002		
Continuity Correction[b]	7.686	1	.006		
Likelihood Ratio	8.872	1	.003		
Fisher's Exact Test				.004	.003
Linear-by-Linear Association	9.250	1	.002		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.67.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.328	.002
	Cramer's V	.328	.002
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Check all that apply		Total
			Conceptual	Other	
Which is your discipline?	Civil Engineer	Count	45	13	58
		Expected Count	42.0	16.0	58.0
	Architect	Count	18	11	29
		Expected Count	21.0	8.0	29.0
Total		Count	63	24	87
		Expected Count	63.0	24.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.330[a]	1	.127		
Continuity Correction[b]	1.618	1	.203		
Likelihood Ratio	2.267	1	.132		
Fisher's Exact Test				.137	.103
Linear-by-Linear Association	2.304	1	.129		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.164	.127
	Cramer's V	.164	.127
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Which is your country of work? * My formal education and/or training encouraged me to be innovative when implementing safe design.	31	53.4%	27	46.6%	58	100.0%
Which is your country of work? * Safe design is a good incentive in terms of my time? collapsed	58	100.0%	0	0.0%	58	100.0%
Which is your country of work? * Safe design is a good incentive in terms of my budget? collapsed	58	100.0%	0	0.0%	58	100.0%
Which is your country of work? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	58	100.0%	0	0.0%	58	100.0%
Which is your country of work? * At what stage (s) during the design process is safe design implemented by your company? Check all that apply	58	100.0%	0	0.0%	58	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	14	12	26
		Expected Count	15.1	10.9	26.0
	Australia	Count	4	1	5
		Expected Count	2.9	2.1	5.0
Total		Count	18	13	31
		Expected Count	18.0	13.0	31.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.178[a]	1	.278		
Continuity Correction[b]	.349	1	.555		
Likelihood Ratio	1.271	1	.259		
Fisher's Exact Test				.368	.285
Linear-by-Linear Association	1.140	1	.286		
N of Valid Cases	31				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.10.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.195	.278
	Cramer's V	.195	.278
N of Valid Cases		31	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	33	9	42
		Expected Count	30.4	11.6	42.0
	Australia	Count	9	7	16
		Expected Count	11.6	4.4	16.0
Total		Count	42	16	58
		Expected Count	42.0	16.0	58.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.890[a]	1	.089		
Continuity Correction[b]	1.880	1	.170		
Likelihood Ratio	2.750	1	.097		
Fisher's Exact Test				.109	.087
Linear-by-Linear Association	2.840	1	.092		
N of Valid Cases	58				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.41.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.223	.089
	Cramer's V	.223	.089
N of Valid Cases		58	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	29	13	42
		Expected Count	25.3	16.7	42.0
	Australia	Count	6	10	16
		Expected Count	9.7	6.3	16.0
Total		Count	35	23	58
		Expected Count	35.0	23.0	58.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.819[a]	1	.028		
Continuity Correction[b]	3.591	1	.058		
Likelihood Ratio	4.762	1	.029		
Fisher's Exact Test				.038	.030
Linear-by-Linear Association	4.736	1	.030		
N of Valid Cases	58				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.34.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.288	.028
	Cramer's V	.288	.028
N of Valid Cases		58	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
Which is your country of work?	United Kingdom	Count	38	4	42
		Expected Count	37.7	4.3	42.0
	Australia	Count	14	2	16
		Expected Count	14.3	1.7	16.0
Total		Count	52	6	58
		Expected Count	52.0	6.0	58.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.111[a]	1	.739		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.107	1	.744		
Fisher's Exact Test				.664	.534
Linear-by-Linear Association	.109	1	.742		
N of Valid Cases	58				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.66.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.044	.739
	Cramer's V	.044	.739
N of Valid Cases		58	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Check all that apply		Total
			Conceptual	Other	
Which is your country of work?	United Kingdom	Count	33	9	42
		Expected Count	32.6	9.4	42.0
	Australia	Count	12	4	16
		Expected Count	12.4	3.6	16.0
Total		Count	45	13	58
		Expected Count	45.0	13.0	58.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.085[a]	1	.771		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.084	1	.772		
Fisher's Exact Test				.739	.512
Linear-by-Linear Association	.084	1	.773		
N of Valid Cases	58				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.59.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.038	.771
	Cramer's V	.038	.771
N of Valid Cases		58	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Which is your discipline? * My formal education and/or training encouraged me to be innovative when implementing safe design.	38	62.3%	23	37.7%	61	100.0%
Which is your discipline? * Safe design is a good incentive in terms of my time? collapsed	61	100.0%	0	0.0%	61	100.0%
Which is your discipline? * Safe design is a good incentive in terms of my budget? collapsed	61	100.0%	0	0.0%	61	100.0%
Which is your discipline? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	61	100.0%	0	0.0%	61	100.0%
Which is your discipline? * At what stage (s) during the design process is safe design implemented by your company? Check all that apply	61	100.0%	0	0.0%	61	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	14	12	26
		Expected Count	14.4	11.6	26.0
	Architect	Count	7	5	12
		Expected Count	6.6	5.4	12.0
Total		Count	21	17	38
		Expected Count	21.0	17.0	38.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.067[a]	1	.796		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.067	1	.796		
Fisher's Exact Test				1.000	.539
Linear-by-Linear Association	.065	1	.799		
N of Valid Cases	38				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.37.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.042	.796
	Cramer's V	.042	.796
N of Valid Cases		38	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	33	9	42
		Expected Count	30.3	11.7	42.0
	Architect	Count	11	8	19
		Expected Count	13.7	5.3	19.0
Total		Count	44	17	61
		Expected Count	44.0	17.0	61.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.782[a]	1	.095		
Continuity Correction[b]	1.849	1	.174		
Likelihood Ratio	2.680	1	.102		
Fisher's Exact Test				.126	.089
Linear-by-Linear Association	2.737	1	.098		
N of Valid Cases	61				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.30.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.214	.095
	Cramer's V	.214	.095
N of Valid Cases		61	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
Which is your discipline?	Civil Engineer	Count	29	13	42
		Expected Count	26.9	15.1	42.0
	Architect	Count	10	9	19
		Expected Count	12.1	6.9	19.0
Total		Count	39	22	61
		Expected Count	39.0	22.0	61.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.529[a]	1	.216		
Continuity Correction[b]	.900	1	.343		
Likelihood Ratio	1.504	1	.220		
Fisher's Exact Test				.257	.171
Linear-by-Linear Association	1.504	1	.220		
N of Valid Cases	61				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.85.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.158	.216
	Cramer's V	.158	.216
N of Valid Cases		61	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
Which is your discipline?	Civil Engineer	Count	38	4	42
		Expected Count	35.1	6.9	42.0
	Architect	Count	13	6	19
		Expected Count	15.9	3.1	19.0
Total		Count	51	10	61
		Expected Count	51.0	10.0	61.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.643[a]	1	.031		
Continuity Correction[b]	3.173	1	.075		
Likelihood Ratio	4.312	1	.038		
Fisher's Exact Test				.057	.041
Linear-by-Linear Association	4.567	1	.033		
N of Valid Cases	61				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.11.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.276	.031
	Cramer's V	.276	.031
N of Valid Cases		61	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Check all that apply		Total
			Conceptual	Other	
Which is your discipline?	Civil Engineer	Count	33	9	42
		Expected Count	30.3	11.7	42.0
	Architect	Count	11	8	19
		Expected Count	13.7	5.3	19.0
Total		Count	44	17	61
		Expected Count	44.0	17.0	61.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.782[a]	1	.095		
Continuity Correction[b]	1.849	1	.174		
Likelihood Ratio	2.680	1	.102		
Fisher's Exact Test				.126	.089
Linear-by-Linear Association	2.737	1	.098		
N of Valid Cases	61				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.30.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.214	.095
	Cramer's V	.214	.095
N of Valid Cases		61	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Which is your country of work? * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
Which is your country of work? * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
Which is your country of work? * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
Which is your country of work? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%
Which is your country of work? * At what stage (s) during the design process is safe design implemented by your company? Check all that apply	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	21	17	38
		Expected Count	21.5	16.5	38.0
	Australia	Count	5	3	8
		Expected Count	4.5	3.5	8.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.141[a]	1	.707		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.142	1	.706		
Fisher's Exact Test				1.000	.511
Linear-by-Linear Association	.138	1	.710		
N of Valid Cases	46				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.48.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.055	.707
	Cramer's V	.055	.707
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	44	17	61
		Expected Count	40.7	20.3	61.0
	Australia	Count	14	12	26
		Expected Count	17.3	8.7	26.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.743[a]	1	.098		
Continuity Correction[b]	1.982	1	.159		
Likelihood Ratio	2.675	1	.102		
Fisher's Exact Test				.136	.081
Linear-by-Linear Association	2.711	1	.100		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.67.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.178	.098
	Cramer's V	.178	.098
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
Which is your country of work?	United Kingdom	Count	39	22	61
		Expected Count	34.4	26.6	61.0
	Australia	Count	10	16	26
		Expected Count	14.6	11.4	26.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.808[a]	1	.028		
Continuity Correction[b]	3.829	1	.050		
Likelihood Ratio	4.804	1	.028		
Fisher's Exact Test				.035	.025
Linear-by-Linear Association	4.753	1	.029		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.36.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.235	.028
	Cramer's V	.235	.028
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
Which is your country of work?	United Kingdom	Count	51	10	61
		Expected Count	49.1	11.9	61.0
	Australia	Count	19	7	26
		Expected Count	20.9	5.1	26.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.286[a]	1	.257		
Continuity Correction[b]	.703	1	.402		
Likelihood Ratio	1.231	1	.267		
Fisher's Exact Test				.375	.199
Linear-by-Linear Association	1.271	1	.260		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.08.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.122	.257
	Cramer's V	.122	.257
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Check all that apply		Total
			Conceptual	Other	
Which is your country of work?	United Kingdom	Count	44	17	61
		Expected Count	44.2	16.8	61.0
	Australia	Count	19	7	26
		Expected Count	18.8	7.2	26.0
Total		Count	63	24	87
		Expected Count	63.0	24.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.008[a]	1	.928		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.008	1	.928		
Fisher's Exact Test				1.000	.574
Linear-by-Linear Association	.008	1	.928		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.17.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.010	.928
	Cramer's V	.010	.928
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
What type of firm do you work for? * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
What type of firm do you work for? * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
What type of firm do you work for? * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
What type of firm do you work for? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%
What type of firm do you work for? * At what stage (s) during the design process is safe design implemented by your company? Check all that apply	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
What type of firm do you work for?	Pure Design	Count	15	14	29
		Expected Count	16.4	12.6	29.0
	Design-build	Count	11	6	17
		Expected Count	9.6	7.4	17.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.735[a]	1	.391		
Continuity Correction[b]	.302	1	.583		
Likelihood Ratio	.742	1	.389		
Fisher's Exact Test				.540	.293
Linear-by-Linear Association	.719	1	.396		
N of Valid Cases	46				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.39.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.126	.391
	Cramer's V	.126	.391
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
What type of firm do you work for?	Pure Design	Count	36	17	53
		Expected Count	35.3	17.7	53.0
	Design-build	Count	22	12	34
		Expected Count	22.7	11.3	34.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.097[a]	1	.756		
Continuity Correction[b]	.006	1	.938		
Likelihood Ratio	.096	1	.756		
Fisher's Exact Test				.818	.467
Linear-by-Linear Association	.095	1	.757		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.33.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.033	.756
	Cramer's V	.033	.756
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
What type of firm do you work for?	Pure Design	Count	30	23	53
		Expected Count	29.9	23.1	53.0
	Design-build	Count	19	15	34
		Expected Count	19.1	14.9	34.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.004[a]	1	.947		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.004	1	.947		
Fisher's Exact Test				1.000	.561
Linear-by-Linear Association	.004	1	.948		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.85.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.007	.947
	Cramer's V	.007	.947
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
What type of firm do you work for?	Pure Design	Count	43	10	53
		Expected Count	42.6	10.4	53.0
	Design-build	Count	27	7	34
		Expected Count	27.4	6.6	34.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.039[a]	1	.843		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.039	1	.844		
Fisher's Exact Test				1.000	.527
Linear-by-Linear Association	.039	1	.844		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.64.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.021	.843
	Cramer's V	.021	.843
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Check all that apply		Total
			Conceptual	Other	
What type of firm do you work for?	Pure Design	Count	40	13	53
		Expected Count	38.4	14.6	53.0
	Design-build	Count	23	11	34
		Expected Count	24.6	9.4	34.0
Total		Count	63	24	87
		Expected Count	63.0	24.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.635[a]	1	.426		
Continuity Correction[b]	.304	1	.582		
Likelihood Ratio	.628	1	.428		
Fisher's Exact Test				.467	.289
Linear-by-Linear Association	.628	1	.428		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.38.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.085	.426
	Cramer's V	.085	.426
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
At what stage (s) during the design process is safe design implemented by your company?_Collapsed * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
At what stage (s) during the design process is safe design implemented by your company?_Collapsed * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
At what stage (s) during the design process is safe design implemented by your company?_Collapsed * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
At what stage (s) during the design process is safe design implemented by your company?_Collapsed * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
At what stage (s) during the design process is safe design implemented by your company?_Collapsed	Conceptual	Count	19	16	35
		Expected Count	19.8	15.2	35.0
	Other	Count	7	4	11
		Expected Count	6.2	4.8	11.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.298[a]	1	.585		
Continuity Correction[b]	.039	1	.844		
Likelihood Ratio	.301	1	.583		
Fisher's Exact Test				.732	.425
Linear-by-Linear Association	.291	1	.589		
N of Valid Cases	46				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.78.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.080	.585
	Cramer's V	.080	.585
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
At what stage (s) during the design process is safe design implemented by your company?_Collapsed	Conceptual	Count	45	18	63
		Expected Count	42.0	21.0	63.0
	Other	Count	13	11	24
		Expected Count	16.0	8.0	24.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.330[a]	1	.127		
Continuity Correction[b]	1.618	1	.203		
Likelihood Ratio	2.267	1	.132		
Fisher's Exact Test				.137	.103
Linear-by-Linear Association	2.304	1	.129		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.00.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.164	.127
	Cramer's V	.164	.127
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
At what stage (s) during the design process is safe design implemented by your company?_Collapsed	Conceptual	Count	37	26	63
		Expected Count	35.5	27.5	63.0
	Other	Count	12	12	24
		Expected Count	13.5	10.5	24.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.538[a]	1	.463		
Continuity Correction[b]	.242	1	.623		
Likelihood Ratio	.536	1	.464		
Fisher's Exact Test				.479	.310
Linear-by-Linear Association	.532	1	.466		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.48.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.079	.463
	Cramer's V	.079	.463
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
At what stage (s) during the design process is safe design implemented by your company?_Collapsed	Conceptual	Count	53	10	63
		Expected Count	50.7	12.3	63.0
	Other	Count	17	7	24
		Expected Count	19.3	4.7	24.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.953[a]	1	.162		
Continuity Correction[b]	1.199	1	.273		
Likelihood Ratio	1.843	1	.175		
Fisher's Exact Test				.225	.137
Linear-by-Linear Association	1.931	1	.165		
N of Valid Cases	87				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.69.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.150	.162
	Cramer's V	.150	.162
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
How many years of design experience do you have? * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
How many years of design experience do you have? * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
How many years of design experience do you have? * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
How many years of design experience do you have? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%
How many years of design experience do you have? * At what stage (s) during the design process is safe design implemented by your company?_Collapsed	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
How many years of design experience do you have?	0-14 years	Count	9	7	16
		Expected Count	9.0	7.0	16.0
	15+ years	Count	17	13	30
		Expected Count	17.0	13.0	30.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	1	.978		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.001	1	.978		
Fisher's Exact Test				1.000	.610
Linear-by-Linear Association	.001	1	.979		
N of Valid Cases	46				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.96.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.004	.978
	Cramer's V	.004	.978
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
How many years of design experience do you have?	0-14 years	Count	30	10	40
		Expected Count	26.7	13.3	40.0
	15+ years	Count	28	19	47
		Expected Count	31.3	15.7	47.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.314[a]	1	.128		
Continuity Correction[b]	1.672	1	.196		
Likelihood Ratio	2.345	1	.126		
Fisher's Exact Test				.172	.098
Linear-by-Linear Association	2.287	1	.130		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.33.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.163	.128
	Cramer's V	.163	.128
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
How many years of design experience do you have?	0-14 years	Count	24	16	40
		Expected Count	22.5	17.5	40.0
	15+ years	Count	25	22	47
		Expected Count	26.5	20.5	47.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.407[a]	1	.523		
Continuity Correction[b]	.177	1	.674		
Likelihood Ratio	.408	1	.523		
Fisher's Exact Test				.665	.337
Linear-by-Linear Association	.403	1	.526		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.47.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.068	.523
	Cramer's V	.068	.523
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
How many years of design experience do you have?	0-14 years	Count	32	8	40
		Expected Count	32.2	7.8	40.0
	15+ years	Count	38	9	47
		Expected Count	37.8	9.2	47.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.010[a]	1	.921		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.010	1	.921		
Fisher's Exact Test				1.000	.566
Linear-by-Linear Association	.010	1	.921		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.82.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.011	.921
	Cramer's V	.011	.921
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Collapsed		Total
			Conceptual	Other	
How many years of design experience do you have?	0-14 years	Count	31	9	40
		Expected Count	29.0	11.0	40.0
	15+ years	Count	32	15	47
		Expected Count	34.0	13.0	47.0
Total		Count	63	24	87
		Expected Count	63.0	24.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.959[a]	1	.327		
Continuity Correction[b]	.545	1	.460		
Likelihood Ratio	.968	1	.325		
Fisher's Exact Test				.349	.231
Linear-by-Linear Association	.948	1	.330		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.03.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.105	.327
	Cramer's V	.105	.327
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Did you receive formal training of occupational safe design? * My formal education and/or training encouraged me to be innovative when implementing safe design.	46	52.9%	41	47.1%	87	100.0%
Did you receive formal training of occupational safe design? * Safe design is a good incentive in terms of my time? collapsed	87	100.0%	0	0.0%	87	100.0%
Did you receive formal training of occupational safe design? * Safe design is a good incentive in terms of my budget? collapsed	87	100.0%	0	0.0%	87	100.0%
Did you receive formal training of occupational safe design? * Do you feel that safe design has a positive or negative influence on innovation and design creativit...	87	100.0%	0	0.0%	87	100.0%
Did you receive formal training of occupational safe design? * At what stage (s) during the design process is safe design implemented by your company?_Collapsed	87	100.0%	0	0.0%	87	100.0%

Crosstab

			My formal education and/or training encouraged me to be innovative when implementing safe design.		Total
			Agree	Did not agree	
Did you receive formal training of occupational safe design?	Yes	Count	26	20	46
		Expected Count	26.0	20.0	46.0
Total		Count	26	20	46
		Expected Count	26.0	20.0	46.0

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	46

a. No statistics are computed because Did you receive formal training of occupational safe design? is a constant.

Symmetric Measures

		Value
Nominal by Nominal	Phi	.[a]
N of Valid Cases		46

a. No statistics are computed because Did you receive formal training of occupational safe design? is a constant.

Crosstab

			Safe design is a good incentive in terms of my time? collapsed		Total
			Agree	Did not agree	
Did you receive formal training of occupational safe design?	Yes	Count	30	16	46
		Expected Count	30.7	15.3	46.0
	No	Count	28	13	41
		Expected Count	27.3	13.7	41.0
Total		Count	58	29	87
		Expected Count	58.0	29.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.092[a]	1	.761		
Continuity Correction[b]	.006	1	.939		
Likelihood Ratio	.092	1	.761		
Fisher's Exact Test				.822	.470
Linear-by-Linear Association	.091	1	.763		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.67.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.033	.761
	Cramer's V	.033	.761
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Safe design is a good incentive in terms of my budget? collapsed		Total
			Agree	Did not agree	
Did you receive formal training of occupational safe design?	Yes	Count	27	19	46
		Expected Count	25.9	20.1	46.0
	No	Count	22	19	41
		Expected Count	23.1	17.9	41.0
Total		Count	49	38	87
		Expected Count	49.0	38.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.224[a]	1	.636		
Continuity Correction[b]	.066	1	.798		
Likelihood Ratio	.224	1	.636		
Fisher's Exact Test				.670	.399
Linear-by-Linear Association	.221	1	.638		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.91.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.051	.636
	Cramer's V	.051	.636
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			Do you feel that safe design has a positive or negative influence on innovation and design creativit...		Total
			Positive	Negative	
Did you receive formal training of occupational safe design?	Yes	Count	38	8	46
		Expected Count	37.0	9.0	46.0
	No	Count	32	9	41
		Expected Count	33.0	8.0	41.0
Total		Count	70	17	87
		Expected Count	70.0	17.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.287[a]	1	.592		
Continuity Correction[b]	.070	1	.791		
Likelihood Ratio	.286	1	.593		
Fisher's Exact Test				.602	.395
Linear-by-Linear Association	.283	1	.594		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.01.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.057	.592
	Cramer's V	.057	.592
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			At what stage (s) during the design process is safe design implemented by your company? Collapsed		Total
			Conceptual	Other	
Did you receive formal training of occupational safe design?	Yes	Count	35	11	46
		Expected Count	33.3	12.7	46.0
	No	Count	28	13	41
		Expected Count	29.7	11.3	41.0
Total		Count	63	24	87
		Expected Count	63.0	24.0	87.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.659[a]	1	.417		
Continuity Correction[b]	.327	1	.568		
Likelihood Ratio	.659	1	.417		
Fisher's Exact Test				.476	.284
Linear-by-Linear Association	.652	1	.420		
N of Valid Cases	87				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.31.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.087	.417
	Cramer's V	.087	.417
N of Valid Cases		87	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

APPENDIX D: Transcribed Interviews

Interview 1

Researcher: Why do you feel that safe design has made it easier or less easy for the design process?

Interviewee 1: Well my view is that it actually makes it easier. Em, the reason why. I think it gives that there is a necessity for that focus that maybe wasn't there in the past. You know what I mean? Em, certainly since the introduction of CDM, where there is a responsibility to incorporate that into design it has produced a focus that certainly design operations where they do, everything they do they basically do the risk assessment on it. Is it safe to build, operate and demolish? It very much is as the code would require.

Res: Do you have any examples where safe design has enabled innovation?

Int1: That is a very good question. I don't know. I know it does happen; it's just there is nothing springing to mind, in my own field. I suppose being out of the construction process maybe a bit too long. Em, if I think of anything that does come to mind as I send it to you later on?

Res: Yes that is not a problem.

Int1: off the top of my head. It is basically where safe design has led to innovation in the design process?

Res: No problem. You can get back to me if you have any ideas.

Int1: I mean there are sort of typical things that are about, simple things like designing windows that open inwards for cleaning. Aids maintenance.Limits hoists and things as part of the construction.Things that aren't left as somebody else's problem. Those examples aren't any great innovation but they do go some way to making the whole structure safer.

Res: What do you believe your role as an engineer is in safe design?

Int1: As a design engineer, my role is. I would say, basically a very simple statement that the project can be built, used, maintained, demolished without causing harm to anybody that is either in the building, or maintenance or demolishing of it or anybody using it or general public for that matter.

Res: Do you feel that other people could be involved in the design process and how do you think that they would have an effect on it?

Int1: Other people as opposed to designers? Maybe end users and that getting involved in the design. Is that what you are getting at?

Res: Yes.

Int1: Yes. Certainly going back to the beginning of the process where the client is, may be the end user, or acting on behalf of the end user. So there is already I suppose some involvement. And I mean on the design brief as such from the client is going to say quite a lot in terms of leading the design. What you are actually looking for. Certainly if there is a lot of knowledge out there that probably isn't utilized. I haven't though in depth of how it best could be utilized, but I do believe there is a scope to do so.

Res: How valuable do you believe that the CDM coordinator is?

Int1: Whenever they stick within their remit, I believe they have got a valuable role. Now that certainly in the past, not just as bad now. We had a time where CDM coordinators, generally the old planning supervisors, who just interfered in the whole process. You know what I mean? Stepping outside what they are actually there to do, which is coordinate the design functions. When you had some of these people acting as site supervisors, QS's and all sorts of things that were neither properly capable of doing or qualified to do. So, yea. Acting totally within their own remit, yes they do provide a valuable function, I think.

Res: If safe design wasn't enforced, do you still think you would utilize it?

Int1: Yes. I think, certainly any responsible designers would do. And have done. Even before the production of CDM or any other regulations that have appeared. Really they are stating what they should have been doing all along. And a lot of people did do all along. So I think yes, for the most part it would continue to happen.

Interview 2

Researcher: Why do you feel that enforced safe design makes it easier or less easy for the design process?

Interviewee 2: Enforced safe design makes it easier or harder for the design process. It depends of what angle you are looking at. Are we talking about the user, or are we talking about CDM, or is it both?

Res: Both.

Int2: we have to take safe design into consideration whether there is regulations or not. Obviously we are building roads, we are building roads and footpaths and structures that the public has access to so we have to build it safely even if there is no legislation there we would have to, I suppose, invent something so we have the added, I suppose we have the added difficulty with things like CDM about how we go about constructing it. It does take a little bit longer; it does maybe involve a little bit more expense. But I think we have, as an organization, we have always been very conscious of safety in design and in use anyway. It's just that it is a wee bit more regulated these days. There are things like safety audit these days, which has been introduced in the last few years. Now that does add a wee bit of extra expense but it is still not a big hindrance to the process. Just adds a little bit more to the process. So I don't think it's been a, safe in design is kind of built into our processes anyway, it is just a little bit more formalized in recent years. Obviously with the technical designs, the technical standards, DMRB, the standards are there anyway. So I don't see it being a particular problem or a hindrance really. If you're going to build a road, you're going to build it safely, so it doesn't really matter. The only angle we would have to keep an eye on is the cost. If, obviously if, design restraints would occasionally mean that the cost of the scheme increases and there are occasions were we have had to walk away. And say "look, we cannot provide this safety and therefore we can't do it". But the other argument, the argument that has to go on there is do nothing better than do something which is slightly substandard rather than doing the full standard design. So that is a debate that does on continually.

Res: Do you have any examples yourself where safe design has enabled innovation?

Int2: No. I can't think of any. I do know of safe designs; funnily enough there is when I was talking to a structural guy today because they've got an AQW for it. And it involved, initially started out as providing safety fencing onto a recently introduced ramp standards and the problem with fitting the safety fence was that we needed extra road width. By the time we had cost that it ended up most sensible forgetting about that and just widening the bridge, widening the structure. So we started off as a safety element

just basically road safety, basically, and it ended up being a large structural scheme because it made more sense and there was other spin off benefits although it was more costly. I don't really; I wouldn't really see that as innovation as such. That was just a series of events, analysis of the safety situation through safety which led to a particular outcome which may not have come about. In other words we wouldn't have straightened that road, straightened that bridge if the ramp standards hadn't have been there. We would have put up the old standard safety fence and that would have been the end of it. So I suppose it's a bit like what we were talking about earlier, it was a more cost thing than anything else. I'm trying to think of innovation. What do you have in mind when you're talking about innovation?

Res: Just anything that has made you think differently and change how you would have done it normally.

Int2: well that's a case where we have done something differently there, but I wouldn't have described that as innovation. That was kind of working your way through various steps and leading to an outcome. Many years ago the outcome would have been the provision of a safety fence onto the road under the previous standards, in this situation because ramp standards are quite tight it then lead to a whole rebuild of an existing structure and road realignment. I wouldn't credit that as innovation as such. There are other things we do such as using modular designs in structures, retaining walls. We are doing one in a scheme at the moment in Banbridge but that's come about from other reasons. When you are talking about design there are so many different influences. It is hard to say a particular thing had a big influence on the design. I mean cost is obviously a big influence. That modular wall, some people may describe it as innovative. But we have to do it because it's quicker; it's actually fairly cost effective because we have restricted access to the site. And there is a safety element as well because we don't have a large pour. You don't know if the shuttering and all the support mechanism you have to put in that. And we're close to some businesses so in that case it would be a combination of safety, costs, accessibility, ease of build would have all come together. So it is very difficult to think of a particular instance where safety along drove us down a particular route or towards a particular design. At least I can't think of one. Not of the top of my head I can't anyway. It's normally much more complicated than that, there are normally a lot of different things in there.

Res: What do you believe you role as a civil engineer is in safe design?

Int2: Again, Road Service, and the nature of the work we do it is just inherent. We have to do things safely. It is not a case of thinking about it or having a role. If you're building a structure for people driving 60/70 miles an hour or to walk along it has to be safe and is has to be to a particular standard. We just happen to use DMRB at the moment which I think is a wee bit on the high side at times. But we can get departures from standards for that. Our role certainly is, well it multi-tasked again. It is not a

straight forward answer. I'm sorry; I am maybe being a bit convoluted. But when we go in you are wearing many different hats. It's not just the safety hat, it is the budget manager's hat, and you have to look at it in terms of the political element as well. You have to deal with the people who are giving you the money. The Assembly these days has a big influence as well. So there is many different angles and certainly safety is always going to be one of those and we do have a responsibility because of the nature of the work we do it has to be safe. It has to be as safe as we can get it. There is obviously times where you are going to have to make compromises because sometimes it's the nature of the ground, sometimes it's the nature of the site, sometimes it is cost, sometimes there are other reasons. But my role would essentially be to insure that we have a scheme designed that is fit for purpose and it is the best we can get under the circumstances we find ourselves in whether that's safety, money, land availability, nature of the ground, whatever. And certainly safety would be one aspect of that. And we do have a system as well in place were particular schemes are safety audited as well. I think, off the top of my head, I think it is schemes in excess of £200,000 or schemes that have a particular safety aspect to them. We have to go through a process that is independently audited. That is something I used to be involved with years ago. So schemes are actually scrutinized. Stage 1 and stage 2 are design stages. Stage 3 and any stages after that is post design and at that stage we are supposed to pick up any safety issues are supposed to be addressed before the design is completed or before work starts. The safety audit is slightly different again. That is from the user point of view, particularly vulnerable users, so you have to consider the scheme in terms of vulnerable adults or children or people using alternative forms of transport like people walking or people cycling or whatever. And build those measures into the scheme as part of the design. That would be our responsibility as well, to ensure that that happens. At the end of the day, safety is just one part of a very large picture.

Res: In your survey you said that designers and consultants were involved in the safe design process. Do you feel that anybody else could be involved and how would their role affect the design?

Int2: well actually the safety auditors are outside that process so schemes over 200k or where there is a particular safety issue are scrutinized independently. Eyeing a fact even in the structural work a lot of the structures are signed off by somebody outside the process. And we would scrutinize it here as well. Maybe not as closely, we are not as close to the design regs and standards maybe as the designers but we would scrutinize it as well. And before that again is what we call an 'A group' which is basically an approval committee which considers every scheme before it goes out through the door. So there are lots of different layers built in there and right from the very start, in fact our assessment process, even when we start from the very start if you ask me for a road scheme today we have a number of assessment processes but they all have a safety element in it. Obviously from an assessment point of view it would be what benefits would you have in terms of road safety if you did the scheme compared to doing these other schemes so road safety is one of elements of it. So there are other people involved in the process other than just ourselves and the designers. There's the 'A group', safety audit and occasionally there is independent consultants as well.

Res: How valuable do you believe the CDM coordinator is?

Int2: now that is a difficult one for me to answer because I have never been in that position of being the CDM coordinator. So that is one probably best for the designers because they're more involved in that day-to-day. We're very rarely the CDM coordinator for a scheme. So I have limited experience. I'm sorry for that one.

Res: If safe design wasn't enforced do you think you would still utilize it?

Int2: yes. I think we would have to. There are many things which drive a design for anything, especially the public sector, and there is always, actually I always think a lot of the time one of the drivers of innovation is saving money, rather than saving lives and reducing liability and claims. So when we have, you've roads for example the Northway carries up to 40,000 vehicles a day during the busier times of the year you need to have that to a particularly high standard or just people walking along the side of the road you have to have those standards in place of else so the whole thing falls to… So that's why I'm saying Road Service is kind of peculiar in a way, I suppose it's not, I mean architects designing for a building and people have to use that building. That is a similar idea. It would not make sense to construct something unsafe knowingly.

Res: in the survey you indicated that you felt that safe design was not a good incentive in terms of budget. Could you elaborate?

Int2: Safe design can be costly at times, as I say that example of the bridge. Safe design as part of that bridge started as something that was maybe £20,000 worth of work and ended up at maybe £500,000. And there are times you think to yourself "well, would the £20,000 scheme not have done and be just as effective? Or did the safety rules force us down the road of building a bridge". And there are occasions were we've walked away from schemes and I've thought to myself "really, is that whole argument about do you do nothing or do you do full standard?" There is room for something in the middle sometimes. That would be practical. Ok, you can't achieve the full standard but it's better than doing nothing. We've a wee scheme and it's a vertical road alignment. Vertical road alignments are very hard to deal with, especially if there is a large vertical involved, lowering a road is extremely costly and can be very difficult. You have all the accesses and services and all things to deal with and this is such a case. But it is a very, very quiet road; it's not a very busy road so we're trying to persuade the people who deal with

the standards can we go for a very substandard design rather than do nothing and we haven't finished the debate yet. But our initial feedback is 'no'. So there are certain cases where perhaps because we cannot meet the design standards or the safety standards that we walk away from it and do nothing, I'm not sure that's the best outcome. That does happen occasionally. That case of the bridge somebody could have decided, for instance, that we can't put the safety fence in because it doesn't meet ramp standards. It could very well easily have been the case where someone says 'well we don't have half a million to fix the bridge' and walk away. So there are cases were there should be a wee bit of scope for a bit more flexibility on occasions. There has to be something between 'do nothing' and 'do full standard' on occasions and that's not there.

Interview 3

Researcher: Why do you feel that enforced safe design makes it easier for the design process?

Interviewee 3: It sets limits and those limits allow us to proceed on certain basis. So everyone at every desk knows what they're doing. If we set 12 ton limit we can look at our standard precast sizes, we can say it has a maximum dimension is any of its smaller dimension of 4.5 to be truckable, to be liftable and we can say that's the maximum size. And I feel that that prevents people from having larger curved pieces, pieces that go around corners, things of that nature which might look attractive on a drawing, from the point of view of reducing the number of lines on the façade but in fact open a can of worms in some other areas.

Res: Do you have any specific examples were safe design has enabled innovation?

Int3: I feel that we have gone back to a few of our buildings believing that they were difficult to construct because of the lack of safety railing at a time when we've poured a deck. We've reinstituted the idea of having the pre-cast wall break line well above the deck level. So that when you go back there is instantaneously a parapet for the upper level. I feel that that has enabled a faster and easier construction but it was really driven by safe design in the first instance.

Res: What do you believe your role as an architect is in the safe design process?

Int3: We're not highly skilled in safe design; it is something we pick up piece by piece during the process. We often learn from the building site and take something we've got from the building site back to a future site. Safe design has evolved during my career because of the technology of craneage and lifting has evolved tremendously particularly in lifting larger sheets of glass. It's more a thing that works interactively with building sites and the subcontractors than something that can be simply taught at university. It has evolved too quickly.

Res: Do you feel that the safe design process that your company uses gains more clients?

Int3: We're right at the top of the Australian building industry with another several players, in area with is really more compliance competitive than just cost competitive. The issue for us is that the costs of

some of the things that we need to do have an officer on site that makes sure that everybody has a way to lift, a way to deliver; a way to install that is safe. Quite simply places costs on our subcontractors that finally adds to the budget. However for the sensitive government site they really don't want to be in the newspapers with an accident so I feel that it does win us some work but in only one little piece of the industry.

Res: If safe design wasn't legislated and you weren't forced to do it, do you think you would still use the skills you picked up in this is everyday design?

Int3: I certainly would. I also do small private works for small clients and I am now much more aware of safe roof access and safe gutter cleaning and safe window cleaning on those smaller domestic jobs than I was previously. It has certainly enlightened me in that area. However overall, if it wasn't for good legislation I am confident that the building industry would see more deaths.

Res: In your survey you said that designers, consultants, safety professionals and construction professionals were involved in the safe design process. Do you think there could be anybody else instilled in this and what effect do you think they would have on the design?

Int3: there is one other area that I didn't speak about which state government and local government is building offices that are involved in safe design in the broad in that the issue permits and things of that nature. In particularly, one of the areas in safe design that we all have to consider is safe delivery and offloading. There are various permits we get off government departments to allow oversized trucks etc. to park outside building sites while things are being lifted off them. All of that is an issue as well. Cooperative with those people, particularly the road traffic authority with also local government is very important in the safe instillation.

Res: You said that you neither agreed nor disagreed that safe design is a good incentive in terms of time. Can you explain why you think this way?

Int3: Well good design always works well time wise because good design allows plain dimensions so the things can be constructed off site and then delivered and installed instantly, that sort of thing. So we can have multiple work phases operating simultaneously in different sheds, in different places to allow quick assemblage. Safe design is both an assistant and a disincentive for that process of offsite construction because it places limits on the size of instillation. But limits that we can deal with. Standard crane sizes

can be worked very well. There was a period in the building industry where the cheapest way to do things was to hang a man off a rope, we now try to get most of our building finishes pre-done before they're installed on the outside. I feel in total that's been to the advantage but one has to say that every time you go back to repair something which is quite necessary you still have to hang a man off a rope somehow or another.

Res: You said that you agreed that safe design is a good incentive in terms of budget. Can you explain why you think this way?

Int3: The costs of any kind of accident are so great that it is worth vitiating against it if it possible. That's the first observation. The second one is a simple one, if you start losing people because even something as simple as a splinter in the eye or a cut in the eye you have to get someone else in who has to start from scratch to figure out what he should be doing with that piece of joinery or that window instillation. So in total its best for people to take their time and do things properly once. That it is for us to deal with ever changing personnel.

Res: What do you think generally of safe design?

Int3: I think it's fundamental of how we operate at this end of the building industry here in Australia and I am very much in favor of it. It is something we need to look at continuously and improve.

Res: Is there any ways you feel it can be improved?

Int3: I'm still concerned about trenching works. I feel that they are still a high risk. But in terms of work at height we have gotten on top of that. I don't see a lot of accidental fall deaths in Victoria unless people do very silly things.

Interview 4

Researcher: Why do you feel that enforce safe design makes it easier for the design process?

Interviewee 4: It becomes part of the process. People are thinking of it and they know it has got to be done. So therefore they are getting their defenses in in advance, if that makes any sense at all. Because they know they've got to do safe design they're thinking about it from day 1. It becomes second nature, they're not even thinking about it.

Res: Do you have any examples were you have used safe design to enable innovation?

Int4: Yea, it has happened on a few occassions. I think the best example ive got is we had a fairly prestigious headquarters building in Manchester. It was a strange sort of curvy triangle shape and we were struggling to get the cleaning and they were looking at cradles they ended up saving quite a lot of money going over the abseiling as a method of cleaning it. That was just through thinking of the best way of doing it and what would be the safety way.

Res: What do you believe you role as a civil engineer is in the safe design process?

Int4: Central to it. Safety should be part of your design, in the conversation. You should be … safe.

Res: In your survey you said that the designers, consultants, safety professionals and construction professionals are all involved in the safe design process. Do you feel that there is any other people that should be involved in it and what affect would they have?

Int4: The client should be. And also the FPM.

Res: How do you believe they would have an effect on the overall design itself?

Int4: They know what they want. And that could help you to be better in terms of safety.

Interview 5

Researcher: Why do you feel that the enforced safe design has made it easier for the design process?

Interviewee 5: Accountability. It is unfortunate but history has shown that people tend sometimes to not comply and there is different behavior even in relation to designers and what they believed to be acceptable in terms of norms. For example, even if you look at the Hyatt Regency hotel disaster where the skywalk actually collapsed you had designers back then where it was the norm that the designer believed, that there was a perception that the steel structure and that the steel manufacturer actually designed the joints and now we know that that is not the case, the structural designer does the design. There have been instances where there was basically mismanagement of processes, accountability problems and the big thing for me is; in any system for it to actually work correctly you need to know who is responsible for what and when. And if you don't know that, in my opinion, then you are going nowhere.

Res: Do you have any examples where you yourself have used the safe design to enable innovation?

Int5: Yea. There is a few places. We were involved, well I was involved personally, in a scheme in Northern Ireland, I'd rather not say the scheme specifically, part of it was demolition and part of it was new build and we actually gained that particular project using safe design principals in terms of step by step, what work was going to be done, what could go wrong and what we could be as designers in order for the people working on it, the structure itself and other people that are going to be effected. How theu could be affected and what processes we could then put in place. What I would say is what we did do is we looked at risk assessment, design risk registers first and we used design risk registers to actually program the work in terms of doing it safely. So the driver for the program, the driver for the method because the design risk registers which for me was a big part of the safe design.

Res: As a civil engineer what do you believe your role is in the whole safe design process?

Int5: To first of all, I was the link to CDM. I would see my role whether if it is the designer I would see my role as first of all following my responsibilities as set out in CDM which would be to make the client aware first of all of their duties, I would also see my role as making sure that I am competent and any people that I have hired or any subcontractor designers are actually competent to what we are supposed to do and also engage if there is other professionals, for example a CDM coordinator in the case of the UK, it would be a project supervisor of construction stage and supervisor of design process for example in the Republic of Ireland. Each country may have different interpretations but the key role I

would make sure as a civil engineer that I was communicating with those people, communicating effectively, going to meeting, emailing and I would also ensure that whatever checks and balances would need to be in place from my point of view that I come up with the design that I have actually looked at what the alternatives are. I would also look and see that I am taking consideration of people that is going to be constructing, people that is going to be involved in the maintence, people that is going to be involved in the demolition possibly in the future. I would see the designers role as being a role that is slightly lacking in terms of the bigger picture in terms of sustainability. For example, CDM would not be a designer happen to think about retro fitting and safe design is a design that encompasses, I think, not just the construction, demolition, user friendly but also for retro fitting the building in the future. I actually see that we could be and should be integrating, even for the demolition stage, retro fitting, even if that is just putting in tie off points on the structure for the people that may end up working at height. Tie off points for netting systems. So that is the type of things that I feel as a civil engineer. I should be competent, others involved should be competent and communication is key and I don't just think about how I can get this completed and away and get my fee. As unfortunately I believe, it is in my opinion that some people have that attitude. I need to be thinking about the long term.

Res: In your survey you said that consultants and safety professionals were all involved in the safe design process. Do you feel that any other people should be involved and if you do how do you feel they would affect the overall design?

Int5: in the overall design, consultants absolute. However I think that consultants is a board search and that also can encompass temporary works coordinators and I think temporary works coordinators are sometimes not considered as consultants and sometimes they are not regarded as designers. The definition of design, again, is very broad ranging and temporary works coordinators are specifying rather than designers and I think that is a key role that is certainly underestimated. The CDM coordinator another key role, particularly in the UK and in the Republic of Ireland the same role being the project supervisor in the construction stage. Those roles are pivotal to get consultants and get clients and designers and get other bodies that should be involved, involved. And that could be as simple as talking to your local fire brigade in relation to emergency exits. Or talking to environment agency in relation to civil engineering projects where you are looking at pipelines and again you are considering things like climate change. I think to a certain extent, not just because I am in academia that the professional bodies have a key role to play and academia have a key role to play in helping to come up with a sustainable solution for design projects that take social, environmental, economic, health and safety issues into the fore.

Res: You were talking about the CDM coordinator. How valuable to do think that position is?

Int5: absolutely pivotal. A key role and without it the industry in my opinion would be back where it was in the 80's and early 90's. Where we had disjointed contracts in terms of isolation, the problems that were associated even that the black spot construction report brought up in the 70's in relation to the disjoin between client, disjoin between contractor and subcontractors. That role is pivotal, it is a coordination role and I am glad they changed it to CDM-C as opposed to planning supervisor because back in the 94 CDM regs there was a misconception by some people that the CDM supervisor was basically someone who planned out the work and hand out what was happening when which was incorrect. The CDM-C allows the free flowing of information between people so that the parties; design, client, the contractor and the specialists involved know who is doing what, when they are doing it, who is responsible for doing it, why it's being done. And that records are being kept, why records are being kept. Changes that are being made, why the changes are being made, and that all relevant parties are informed of the changes as and when necessary. I think that in the civil engineering/construction the role of the CDM-C, in my opinion, is the key role.

Res: If the safe design regulations weren't actually enforced, do you think you would still use the safe design methods?

Int5: as a chartered engineer, yes. As somebody who takes safety seriously, yes. However that question is just directly my person opinion, no comment in relation to the industry at all. I would yes.

Res: Do you feel that the safe design process actually gains more clients for your company?

Int5: I think yes, absolutely because I think that maybe people that are not using safe design systems I would imagine that they would not have a record as good as the people who are. And from that point of view any company that explains to people that they really are into doing things right as opposed to just following procedures, ticking boxes. I think that makes a difference, definitely. And I think people do notice that and people will come back to you. Your base will actually increase in terms of client.

Interview 6

Researcher: Why do you feel that enforced safe design makes it easier for the design process?

Interviewee 6: I think it encourages people to do it, which they may not have been doing before. And it makes them think more about it.

Res: Do you have any specific examples where safe design has enabled you to be innovative in your work?

Int6: Yes, because at the moment I am mainly doing safe design consulting and I am architect as well. Certainly I know with our clients a lot of them have been innovative with their solutions. With my own projects it has made me think about it more. I don't know whether I have used it to come up with any creative solutions as of yet. Probably in the use, as far as use goes yes definitely but considering safe design for the use of that building, for the purpose. That is where I have found that it probably helps the most. Not so much the construction safety. The use safety, yes. But the construction and demolition safety I don't think that has a big impact on the creative part of the design, so far I've noticed myself.

Res: What do you believe your role of an architect is in the safe design process?

Int6: I think to eliminate the hazards early on in the process.

Res: Do you think that is a different role that the civil engineers have or it is the same sort of role and they go hand in hand?

Int6: I think with the design architecture side I think that is more about how the building is going to be used rather than how it stands up with the structure. I think the engineers are looking to design it to be safe, to be safely engineered. Whereas I think the architect can have a little bit more control over how it can be safely used as far as the lay out and traffic management and all that kind of stuff goes.

Res: If the safe design wasn't enforced by legislation and standards do you think you would still use the same ideas that came out of these standards?

Int6: I don't know if I'd probably know about them if they weren't in the legislation. I think that that is something that people are finding out now because we have been doing a lot of education around it that they didn't know a lot about it before and now they are thinking about it more as part of the process.

Res: You listed in your survey that designers, consultants, safety professionals and construction professionals were involved in the overall design. Do you think that anybody else should be involved in the design process and how do you think they would affect it?

Int6: The client. That is quite a big part of our legislation is the clients involvement and the responsibility that client has to ensure that the building is safe and they have a legislative requirement as well as the designer. That is probably the main person, the client. And also the other people like interior designers and fire safety professionals and people like that.

Res: You said in one of your questions that your formal education of safe design didn't actually encourage you to be innovative. Is there any way you can expand on that?

Int6: I think it was mainly the formal education was based around the legislative requirements. Which I think are not really geared towards creativity. But having that kind of systematic process it is good to have that process to follow but it is not very good for architects because architects don't tend to think in a structured way like that. So I don't think it's quite geared towards architects. Maybe engineers or people that is a bit more practical.

Res: In another one of your responses you said that you were sitting on the fence that safe design was a good incentive in terms of your budget. Again, can you expand on this?

Int6: What I've read it seems to say that it should save more money in the long term but I guess the architect just sees the cost to put things in in the first place. But the extra benefit is more the saving later on in terms of litigation. For a benefit later on to prevent injuries and things like that.

APPENDIX E: Other Comments from Survey

- Should be implemented in early stages of any project and continued through each phase. Client acceptance and approvals essential.
- Working with historic buildings, as we mainly do, we frequently encounter conflicts between the obviously safe route (eg put railings round something to keep people off) and the historic or aesthetically best solution. We can usually resolve issues through management policies but it can be difficult. As an aside, I do get the impression that the safer we make an environment the more risks people will take!
- The profession is taking it seriously but client bodies wish to have it without extra cost and this is causing the best professionals to be priced out of work to those paying lipservice to safe design
- Is now a fundamental part of design, just as fire protection or structural stablityis.
- It should be second nature, why would anyone design something that isn't safe?
- The UK CDM Regulations have been in force for nearly 20 years. They have become part of the design process for everyone.
- Its recently become a legislative requirement in Australia to have this documentation. As it is only 18 months old, it is still very ambiguous as to what exactly should be incorporated to the main report, and the consultants subsequent sub reports as opposed to the general design risk management matrix.
- Safe design is obviously to be applauded and will have tremendous benefit in terms of improvement on injuries / health of contractors and users. However it iat a cost in respect of the time taken and cost of designer's time. So there is a price to pay for it.
- Safety was at the heart of the design process within Roads Service (my old employer) and while the paperwork was fiddly it was a must
- The practices should be embedded into the design classes at University level
- Safe design should always be favoured over cost - experienced design teams can find ways however to design safely and efficiently.
- It is vital for our industry. We are certified to OHS 18001.
- As a rule designers pay 'lip-service' only to the principles of 'safe-design', treating the regulations as a 'tick-box' excercise and giving only minimal thought to the practicalities of their designs.
- It seems to be well implemented by junior engineers who are willing to learn about how they can design safely but is less well "formally" adopted by more senior engineers
- A safe design concept promotes ease of construction therefore in many cases a lower construction cost may be reflected
- Safe design must be considered for during and after construction, but also when considering future inspection and maintenance
- Safe Design is an essential Whole Life Cost measure.
- Re choices above, I do not believe safe design is an incentive to anything other than safety. In terms of "time" I can therefore neither agree not disagree but in terms of "budget" my rating

reflects that I believe that safer options, while always taken, are rarely cheaper alternatives. The latter is why, on balance, I regard it as a negative influence on innovation in design.

- Safe design leads to whole life benefits and as such should be a fundamental concern of the designer.The risk is that people assume that they must slavishly follow codes and proceduers in ways which are tried and tested and fail to use their imaginatio and innovate.
- The concept is right. The legislation and guidance makes it a bit complicated to decide whether to go for a standard design approach or to try something a bit more creative. I think this is largely down to most designers and their advisors not fully understanding the statutory requirements. Many have no formal training, many have not read the fundamental requirements and I believe many quote back what they have been told without checking back to the source. This leads to alt of misinformation and stymies any chance of real innovation, which address safety, health and welbeing of construction workers and those who will eventuall make use of the structure. Perhaps in UK as they review CDM regulations there is a change that some of these issues can be addressed.
- Interpretation and application of safety legislation can tend to inhibit innovation
- Safe Design Consultant in Australia
- Safe design in regard to "design for purpose" is useful however we are also required to provide safety assessment in terms of construction risks. This is a complete waste of time
- Done properly it allows the design product to meet the operational requirements, satisfy the stakeholders, reduce costs and time to completion, and requires little or no reworking
- There is often a reluctance to adopt new procedures or products based on risk of defense against potential legal claims due to lack of president. This can impact on design innovation particularly for large state bodies such as state or national transportation, Road / Rail bodies who's default position is to be highly risk averse.
- Overall, safety in design is critical, as many workers are still killed or maimed each year. BTW, I suggest your survey should have included a 'neither agree nor disagree' option for all selections. Good luck with your project
- The process of conducting 'safety in design' workshops with all stakeholders often initiates further innovation outside of the safety spectrum, either in the construction phase or for the end user of the building. When innovations are revealed through this process, those with reticence toward safety in design are often converted.
- safet in design is a mandatory process that is implemented by my employer and the consultants we engage on our projects. safety in design in most cases provides a more fit for purpose product/asset that is safer to constrcut, operate and maintain.
- We cannot afford total safety in design so we need to know what are the appropriate requirements for safe construction
- safe design is essential but requires time and money to implement therefore idont think its a 'good incentive' with regsrd to time or money. butits about the value of the upfront time and money to improve worker or public sagety and this is why it is a good initiative.
- It should be a normal part of review process to ensure the design can be built, used and maintained then later removed safely.

- I have found that Safe Design leads to a lot of documents being created that never get properly completed or even looked at by construction site personnel - I have been involved in the assessment of many projects that have a Safety in Design manual that requires a number of consultants, clients and builders to complete part of the forms but they never are and in some cases the project team doesn't know where to find them.
- London Underground implement safety in design strongly, via safety design decision trees, design assumptiom registers, design risk registers and concession schedules.
- In Australia it is a legislative requirement. This often gets forgotten.

APPENDIX F: NVivo Output

Word	Length	Count	Weighted Percentage (%)	Similar Words
design	6	130	4.01	design, design', designed, designer, designers, designing, designs
safely	6	59	1.82	safe, 'safe, safely
safety	6	56	1.73	safety, 'safety
think	5	54	1.67	think, thinking
people	6	44	1.36	people
buildings	9	32	0.99	build, building, buildings
things	6	31	0.96	thing, things
process	7	30	0.93	process, processes
just	4	26	0.80	just
well	4	26	0.80	well
works	5	25	0.77	work, worked, working, works
road	4	24	0.74	road, roads
construction	12	23	0.71	construct, constructed, constructing, construction
cost	4	23	0.71	cost, costly, costs
standards	9	23	0.71	standard, standard', standards
know	4	22	0.68	know, knowingly, knows
role	4	22	0.68	role, roles
use	3	22	0.68	use, used, useful, using
scheme	6	21	0.65	scheme, schemes
terms	5	20	0.62	term, terms
time	4	20	0.62	time, times
cdm	3	19	0.59	cdm
involvement	11	19	0.59	involve, involved, involvement
get	3	18	0.56	get, gets, getting
particular	10	18	0.56	particular, particularly
something	9	18	0.56	something
structure	9	18	0.56	structural, structure, structured, structures
client	6	17	0.52	client, clients
innovative	10	17	0.52	innovate, innovation, innovations, innovative
part	4	17	0.52	part
actually	8	16	0.49	actually
bit	3	16	0.49	bit
certainly	9	16	0.49	certain, certainly
one	3	16	0.49	one
going	5	15	0.46	going
look	4	15	0.46	look, looked, looking
makes	5	15	0.46	make, makes, making
case	4	13	0.40	case, cases
lot	3	13	0.40	lot, lots
requires	8	13	0.40	require, required, requirement, requirements, requires
risk	4	13	0.40	risk, risks
also	4	12	0.37	also
different	9	12	0.37	difference, different, differently
end	3	12	0.37	end, ended

even	4	12	0.37	even
project	7	12	0.37	project, projects
site	4	12	0.37	site, sites
way	3	12	0.37	way, ways
yes	3	12	0.37	yes
back	4	11	0.34	back
engineer	8	11	0.34	engineer, engineered, engineering, engineers
many	4	11	0.34	many
maybe	5	11	0.34	maybe
really	6	11	0.34	really
see	3	11	0.34	see, sees
good	4	10	0.31	good, 'good
consultants	11	10	0.31	consultant, consultants, consulting
coordinators	12	10	0.31	coordinate, coordination, coordinator, coordinators
legislation	11	10	0.31	legislation, legislative
like	4	10	0.31	like
now	3	10	0.31	now
stage	5	10	0.31	stage, stages
believe	7	9	0.28	believe, believed, believing
best	4	9	0.28	best
nature	6	9	0.28	nature
place	5	9	0.28	place, places
start	5	9	0.28	start, started, starts
suppose	7	9	0.28	suppose, supposed
take	4	9	0.28	take, takes, taking
user	4	9	0.28	user, users
basically	9	8	0.25	basically
big	3	8	0.25	big
come	4	8	0.25	come
considering	11	8	0.25	consider, considered, considering, considers
day	3	8	0.25	day, days
done	4	8	0.25	done
example	7	8	0.25	example, examples
happen	6	8	0.25	happen, happened, happening, happens
industry	8	8	0.25	industry
issue	5	8	0.25	issue, issues
key	3	8	0.25	key
money	5	8	0.25	money
need	4	8	0.25	need, needed
obviously	9	8	0.25	obviously
responsible	11	8	0.25	responsibilities, responsibility, responsible
sometimes	9	8	0.25	sometimes
talking	7	8	0.25	talking
always	6	7	0.22	always
architects	10	7	0.22	architect, architects
assessment	10	7	0.22	assessment
bridge	6	7	0.22	bridge, bridge’
changes	7	7	0.22	change, changed, changes, changing

feel	4	7	0.22	feel
first	5	7	0.22	first
however	7	7	0.22	however
limits	6	7	0.22	limit, limited, limits
little	6	7	0.22	little
may	3	7	0.22	may
mean	4	7	0.22	mean
nothing	7	7	0.22	nothing, nothing’
point	5	7	0.22	point, points
put	3	7	0.22	put, putting
quite	5	7	0.22	quite
supervisor	10	7	0.22	supervisor, supervisors
walk	4	7	0.22	walk, walked, walking
whole	5	7	0.22	whole
years	5	7	0.22	year, years
allow	5	6	0.19	allow, allows
benefit	7	6	0.19	benefit, benefits
completed	9	6	0.19	complete, completed, completion
deal	4	6	0.19	deal
fitting	7	6	0.19	fit, fitting
got	3	6	0.19	got
kind	4	6	0.19	kind
large	5	6	0.19	large, largely
leads	5	6	0.19	lead, leading, leads
operate	7	6	0.19	operate, operating, operational, operations
outside	7	6	0.19	outside
piece	5	6	0.19	piece, pieces
probably	8	6	0.19	probably
rather	6	6	0.19	rather
regulations	11	6	0.19	regulated, regulations
rmcd	4	6	0.19	rmcd
still	5	6	0.19	still
view	4	6	0.19	view
000	3	5	0.15	000
access	6	5	0.15	access, accesses, accessibility
along	5	5	0.15	along
area	4	5	0.15	area, areas
audit	5	5	0.15	audit, audited
away	4	5	0.15	away
bodies	6	5	0.15	bodies
cleaning	8	5	0.15	cleaning
demolition	10	5	0.15	demolition
difficult	9	5	0.15	difficult
element	7	5	0.15	element, elements
fence	5	5	0.15	fence, fencing
government	10	5	0.15	government
high	4	5	0.15	high, highly
implemented	11	5	0.15	implement, implemented

influence	9	5	0.15	influence, influences
mainly	6	5	0.15	main, mainly
much	4	5	0.15	much
often	5	5	0.15	often
opinion	7	5	0.15	opinion
problem	7	5	0.15	problem, problems
provide	7	5	0.15	provide, provides, providing
registers	9	5	0.15	registers
relation	8	5	0.15	relation
saving	6	5	0.15	save, saving
service	7	5	0.15	service, service', services
simple	6	5	0.15	simple
therefore	9	5	0.15	therefore
top	3	5	0.15	top
trying	6	5	0.15	tried, try, trying
wee	3	5	0.15	wee
whether	7	5	0.15	whether
anything	8	4	0.12	anything
anyway	6	4	0.12	anyway
australia	9	4	0.12	australia
become	6	4	0.12	become, becomes
built	5	4	0.12	built
civil	5	4	0.12	civil
competent	9	4	0.12	competent
continually	11	4	0.12	continually, continue, continued, continuously
creative	8	4	0.12	creative, creativity
david	5	4	0.12	david
effective	9	4	0.12	effected, effective, effectively
else	4	4	0.12	else
ensure	6	4	0.12	ensure
essential	9	4	0.12	essential, essentially
extra	5	4	0.12	extra
eye	3	4	0.12	eye, eyeing
find	4	4	0.12	find, finding
follow	6	4	0.12	follow, following
formal	6	4	0.12	formal, formalized, formally
full	4	4	0.12	full
fundamental	11	4	0.12	fundamental
future	6	4	0.12	future
initial	7	4	0.12	initial, initially, initiates, initiative
instance	8	4	0.12	instance, instances
later	5	4	0.12	later
lifting	7	4	0.12	lift, lifted, lifting
made	4	4	0.12	made
management	10	4	0.12	management, manager
meet	4	4	0.12	meet, meeting
occasions	9	4	0.12	occasions
old	3	4	0.12	old

opposed	7	4	0.12	opposed
outcome	7	4	0.12	outcome
practical	9	4	0.12	practical, practicalities, practices
product	7	4	0.12	product, production, products
professionals	13	4	0.12	professional, professionals
properly	8	4	0.12	properly
public	6	4	0.12	public
purpose	7	4	0.12	purpose
ramp	4	4	0.12	ramp
right	5	4	0.12	right
safer	5	4	0.12	safer
scrutinize	10	4	0.12	scrutinize, scrutinized
size	4	4	0.12	size, sizes
solution	8	4	0.12	solution, solutions
somebody	8	4	0.12	somebody
sort	4	4	0.12	sort, sorts
state	5	4	0.12	state, stating
step	4	4	0.12	step, stepping, steps
subcontractors	14	4	0.12	subcontractor, subcontractors
sure	4	4	0.12	sure
systems	7	4	0.12	system, systems
total	5	4	0.12	total, totally
towards	7	4	0.12	toward, towards
without	7	4	0.12	without
neither	7	3	0.09	neither, 'neither
absolutely	10	3	0.09	absolute, absolutely
acting	6	3	0.09	acting
adds	4	3	0.09	add, adds
addressed	9	3	0.09	address, addressed
alternatives	12	3	0.09	alternative, alternatives
angle	5	3	0.09	angle, angles
another	7	3	0.09	another
argument	8	3	0.09	argument
around	6	3	0.09	around
based	5	3	0.09	base, based
better	6	3	0.09	better
budget	6	3	0.09	budget
close	5	3	0.09	close, closely
communicating	13	3	0.09	communicating, communication
contractor	10	3	0.09	contractor, contractors
definitely	10	3	0.09	definitely, definition
demolish	8	3	0.09	demolish, demolished, demolishing
dimension	9	3	0.09	dimension, dimensions
driver	6	3	0.09	driver, drivers
early	5	3	0.09	early
easier	6	3	0.09	easier
every	5	3	0.09	every
evolved	7	3	0.09	evolved

fact	4	3	0.09	fact
far	3	3	0.09	far
fire	4	3	0.09	fire
general	7	3	0.09	general, generally
giving	6	3	0.09	gives, giving
goes	4	3	0.09	goes
hat	3	3	0.09	hat, hats
head	4	3	0.09	head
health	6	3	0.09	health
help	4	3	0.09	help, helping, helps
improve	7	3	0.09	improve, improvement
independently	13	3	0.09	independent, independently
installed	9	3	0.09	install, installed
instillation	12	3	0.09	instillation
ireland	7	3	0.09	ireland
lack	4	3	0.09	lack, lacking
level	5	3	0.09	level
local	5	3	0.09	local
long	4	3	0.09	long
maintained	10	3	0.09	maintain, maintained
maintenance	11	3	0.09	maintenance
mind	4	3	0.09	mind
moment	6	3	0.09	moment
must	4	3	0.09	must
never	5	3	0.09	never
normally	8	3	0.09	normal, normally
number	6	3	0.09	number
occasionally	12	3	0.09	occasionally
overall	7	3	0.09	overall
pay	3	3	0.09	pay, paying
person	6	3	0.09	person, personally
phase	5	3	0.09	phase, phases
pivotal	7	3	0.09	pivotal
planning	8	3	0.09	planned, planning
rail	4	3	0.09	rail, railing, railings
reasons	7	3	0.09	reason, reasons
recently	8	3	0.09	recent, recently
records	7	3	0.09	record, records
reducing	8	3	0.09	reduce, reducing
regard	6	3	0.09	regard, regarded
report	6	3	0.09	report, reports
retro	5	3	0.09	retro
second	6	3	0.09	second
sense	5	3	0.09	sense
set	3	3	0.09	set, sets
side	4	3	0.09	side
slightly	8	3	0.09	slightly
someone	7	3	0.09	someone

temporary	9	3	0.09	temporary
tend	4	3	0.09	tend
vertical	8	3	0.09	vertical
wall	4	3	0.09	wall, walls
whatever	8	3	0.09	whatever
window	6	3	0.09	window, windows
within	6	3	0.09	within
workers	7	3	0.09	worker, workers
yea	3	3	0.09	yea
'tick	5	2	0.06	'tick, ticking
academia	8	2	0.06	academia
acceptable	10	2	0.06	acceptable, acceptance
accident	8	2	0.06	accident
accountability	14	2	0.06	accountability
added	5	2	0.06	added
adopt	5	2	0.06	adopt, adopted
ago	3	2	0.06	ago
agree	5	2	0.06	agree
alignment	9	2	0.06	alignment, alignments
answer	6	2	0.06	answer
anybody	7	2	0.06	anybody
approval	8	2	0.06	approval, approvals
aspect	6	2	0.06	aspect
aware	5	2	0.06	aware
balance	7	2	0.06	balance, balances
battman	7	2	0.06	battman
box'	4	2	0.06	box', boxes
bramall	7	2	0.06	bramall
broad	5	2	0.06	broad
businesses	10	2	0.06	businesses, busy
causing	7	2	0.06	causing
checking	8	2	0.06	checking, checks
claims	6	2	0.06	claims
code	4	2	0.06	code, codes
comment	7	2	0.06	comment, comments
competitive	11	2	0.06	competitive
complicated	11	2	0.06	complicated
concept	7	2	0.06	concept
concern	7	2	0.06	concern, concerned
consideration	13	2	0.06	consideration
deaths	6	2	0.06	deaths
debate	6	2	0.06	debate
decide	6	2	0.06	decide, decided
deck	4	2	0.06	deck
defense	7	2	0.06	defense, defenses
deliver	7	2	0.06	deliver, delivered
describe	8	2	0.06	describe, described
disagree	8	2	0.06	disagree, disagree'

disjoin	7	2	0.06	disjoin
dmrb	4	2	0.06	dmrb
documentation	13	2	0.06	documentation, documents
drive	5	2	0.06	drive, driving
ease	4	2	0.06	ease
education	9	2	0.06	education
either	6	2	0.06	either
employer	8	2	0.06	employer
encompass	9	2	0.06	encompass, encompasses
engage	6	2	0.06	engage
environment	11	2	0.06	environment
especially	10	2	0.06	especially
everyone	8	2	0.06	everyone
ewing	5	2	0.06	ewing
expense	7	2	0.06	expense
fairly	6	2	0.06	fairly
fall	4	2	0.06	fall, falls
finished	8	2	0.06	finished, finishes
focus	5	2	0.06	focus
force	5	2	0.06	force
forms	5	2	0.06	forms
found	5	2	0.06	found
function	8	2	0.06	function, functions
geared	6	2	0.06	geared
great	5	2	0.06	great
ground	6	2	0.06	ground
group’	6	2	0.06	group’
hang	4	2	0.06	hang
hard	4	2	0.06	hard
height	6	2	0.06	height
hindrance	9	2	0.06	hindrance
historic	8	2	0.06	historic
idea	4	2	0.06	idea
impact	6	2	0.06	impact
incentive	9	2	0.06	incentive, incentive'
incorporate	11	2	0.06	incorporate, incorporated
increase	8	2	0.06	increase, increases
information	11	2	0.06	information, informed
injuries	8	2	0.06	injuries
interpretation	14	2	0.06	interpretation, interpretations
introduced	10	2	0.06	introduced
keep	4	2	0.06	keep
kept	4	2	0.06	kept
larger	6	2	0.06	larger
learn	5	2	0.06	learn
led	3	2	0.06	led
life	4	2	0.06	life
line	4	2	0.06	line, lines

lower	5	2	0.06	lower, lowering
luke	4	2	0.06	luke
man	3	2	0.06	man
matter	6	2	0.06	matter
maximum	7	2	0.06	maximum
mcdermott	9	2	0.06	mcdermott
measure	7	2	0.06	measure, measures
method	6	2	0.06	method
michael	7	2	0.06	michael
modular	7	2	0.06	modular
murphy	6	2	0.06	murphy
necessary	9	2	0.06	necessary
new	3	2	0.06	new
norm	4	2	0.06	norm, norms
notice	6	2	0.06	notice, noticed
officer	7	2	0.06	officer, offices
onto	4	2	0.06	onto
open	4	2	0.06	open
option	6	2	0.06	option, options
parties	7	2	0.06	parties
past	4	2	0.06	past
perhaps	7	2	0.06	perhaps
permits	7	2	0.06	permits
personnel	9	2	0.06	personnel
pick	4	2	0.06	pick
picture	7	2	0.06	picture
play	4	2	0.06	play
position	8	2	0.06	position
possible	8	2	0.06	possible, possibly
pour	4	2	0.06	pour, poured
pre	3	2	0.06	pre
prevent	7	2	0.06	prevent, prevents
previous	8	2	0.06	previous, previously
price	5	2	0.06	price, priced
procedures	10	2	0.06	procedures
program	7	2	0.06	program
question	8	2	0.06	question
quick	5	2	0.06	quick, quickly
rarely	6	2	0.06	rarely
read	4	2	0.06	read
reflected	9	2	0.06	reflected, reflects
regs	4	2	0.06	regs
remit	5	2	0.06	remit
republic	8	2	0.06	republic
review	6	2	0.06	review
rodney	6	2	0.06	rodney
rope	4	2	0.06	rope
route	5	2	0.06	route

rule	4	2	0.06	rule, rules
scope	5	2	0.06	scope
seems	5	2	0.06	seems
seriously	9	2	0.06	seriously
simply	6	2	0.06	simply
situation	9	2	0.06	situation
small	5	2	0.06	small
smaller	7	2	0.06	smaller
sophie	6	2	0.06	sophie
sorry	5	2	0.06	sorry
stakeholders	12	2	0.06	stakeholders
steel	5	2	0.06	steel
straightened	12	2	0.06	straightened
substandard	11	2	0.06	substandard
sustainability	14	2	0.06	sustainability, sustainable
taken	5	2	0.06	taken
team	4	2	0.06	team, teams
technical	9	2	0.06	technical
thought	7	2	0.06	thought
tie	3	2	0.06	tie
today	5	2	0.06	today
traffic	7	2	0.06	traffic
transport	9	2	0.06	transport, transportation
tremendous	10	2	0.06	tremendous, tremendously
unfortunate	11	2	0.06	unfortunate, unfortunately
university	10	2	0.06	university
utilized	8	2	0.06	utilized
valuable	8	2	0.06	valuable
various	7	2	0.06	various
vulnerable	10	2	0.06	vulnerable
want	4	2	0.06	want
widening	8	2	0.06	widening
worth	5	2	0.06	worth
yet	3	2	0.06	yet
'lip	4	1	0.03	'lip
18001	5	1	0.03	18001
200	3	1	0.03	200
200k	4	1	0.03	200k
500	3	1	0.03	500
abseiling	9	1	0.03	abseiling
accidental	10	1	0.03	accidental
achieve	7	1	0.03	achieve
adults	6	1	0.03	adults
advance	7	1	0.03	advance
advantage	9	1	0.03	advantage
advisors	8	1	0.03	advisors
aesthetically	13	1	0.03	aesthetically
affected	8	1	0.03	affected

afford	6	1	0.03	afford
agency	6	1	0.03	agency
aids	4	1	0.03	aids
already	7	1	0.03	already
although	8	1	0.03	although
ambiguous	9	1	0.03	ambiguous
analysis	8	1	0.03	analysis
anyone	6	1	0.03	anyone
appeared	8	1	0.03	appeared
applauded	9	1	0.03	applauded
application	11	1	0.03	application
approach	8	1	0.03	approach
appropriate	11	1	0.03	appropriate
aqw	3	1	0.03	aqw
architecture	12	1	0.03	architecture
aside	5	1	0.03	aside
ask	3	1	0.03	ask
assemblage	10	1	0.03	assemblage
assembly	8	1	0.03	assembly
asset	5	1	0.03	asset
assistant	9	1	0.03	assistant
associated	10	1	0.03	associated
assume	6	1	0.03	assume
assumptiom	10	1	0.03	assumptiom
attitude	8	1	0.03	attitude
attractive	10	1	0.03	attractive
auditors	8	1	0.03	auditors
australian	10	1	0.03	australian
authority	9	1	0.03	authority
availability	12	1	0.03	availability
averse	6	1	0.03	averse
bad	3	1	0.03	bad
banbridge	9	1	0.03	banbridge
barrett	7	1	0.03	barrett
basis	5	1	0.03	basis
beginning	9	1	0.03	beginning
behalf	6	1	0.03	behalf
behavior	8	1	0.03	behavior
bigger	6	1	0.03	bigger
black	5	1	0.03	black
board	5	1	0.03	board
break	5	1	0.03	break
brief	5	1	0.03	brief
brigade	7	1	0.03	brigade
brought	7	1	0.03	brought
btw	3	1	0.03	btw
builders	8	1	0.03	builders
busier	6	1	0.03	busier

call	4	1	0.03	call
capable	7	1	0.03	capable
career	6	1	0.03	career
carries	7	1	0.03	carries
cast	4	1	0.03	cast
central	7	1	0.03	central
certified	9	1	0.03	certified
chance	6	1	0.03	chance
chartered	9	1	0.03	chartered
cheaper	7	1	0.03	cheaper
cheapest	8	1	0.03	cheapest
children	8	1	0.03	children
choices	7	1	0.03	choices
circumstances	13	1	0.03	circumstances
classes	7	1	0.03	classes
climate	7	1	0.03	climate
collapsed	9	1	0.03	collapsed
combination	11	1	0.03	combination
committee	9	1	0.03	committee
company	7	1	0.03	company
compared	8	1	0.03	compared
compliance	10	1	0.03	compliance
comply	6	1	0.03	comply
compromises	11	1	0.03	compromises
concession	10	1	0.03	concession
conducting	10	1	0.03	conducting
confident	9	1	0.03	confident
conflicts	9	1	0.03	conflicts
conscious	9	1	0.03	conscious
constrcut	9	1	0.03	constrcut
constsruction	13	1	0.03	constsruction
contracts	9	1	0.03	contracts
control	7	1	0.03	control
conversation	12	1	0.03	conversation
converted	9	1	0.03	converted
convoluted	10	1	0.03	convoluted
cooperative	11	1	0.03	cooperative
corners	7	1	0.03	corners
correctly	9	1	0.03	correctly
country	7	1	0.03	country
cradles	7	1	0.03	cradles
crane	5	1	0.03	crane
craneage	8	1	0.03	craneage
created	7	1	0.03	created
credit	6	1	0.03	credit
critical	8	1	0.03	critical
curved	6	1	0.03	curved
curvy	5	1	0.03	curvy

cut	3	1	0.03	cut
cycling	7	1	0.03	cycling
decision	8	1	0.03	decision
default	7	1	0.03	default
delivery	8	1	0.03	delivery
departments	11	1	0.03	departments
departures	10	1	0.03	departures
depends	7	1	0.03	depends
depth	5	1	0.03	depth
desk	4	1	0.03	desk
difficulty	10	1	0.03	difficulty
directly	8	1	0.03	directly
disaster	8	1	0.03	disaster
disincentive	12	1	0.03	disincentive
disjointed	10	1	0.03	disjointed
domestic	8	1	0.03	domestic
dont	4	1	0.03	dont
door	4	1	0.03	door
drawing	7	1	0.03	drawing
driven	6	1	0.03	driven
drove	5	1	0.03	drove
due	3	1	0.03	due
duties	6	1	0.03	duties
earlier	7	1	0.03	earlier
easily	6	1	0.03	easily
economic	8	1	0.03	economic
efficiently	11	1	0.03	efficiently
eliminate	9	1	0.03	eliminate
emailing	8	1	0.03	emailing
embedded	8	1	0.03	embedded
emergency	9	1	0.03	emergency
enabled	7	1	0.03	enabled
encounter	9	1	0.03	encounter
encourages	10	1	0.03	encourages
enforced	8	1	0.03	enforced
enlightened	11	1	0.03	enlightened
enough	6	1	0.03	enough
environmental	13	1	0.03	environmental
etc	3	1	0.03	etc
events	6	1	0.03	events
eventuall	9	1	0.03	eventuall
ever	4	1	0.03	ever
everybody	9	1	0.03	everybody
everything	10	1	0.03	everything
exactly	7	1	0.03	exactly
excercise	9	1	0.03	excercise
excess	6	1	0.03	excess
existing	8	1	0.03	existing

exits	5	1	0.03	exits
experience	10	1	0.03	experience
experienced	11	1	0.03	experienced
explains	8	1	0.03	explains
extent	6	1	0.03	extent
extremely	9	1	0.03	extremely
fail	4	1	0.03	fail
faster	6	1	0.03	faster
favor	5	1	0.03	favor
favoured	8	1	0.03	favoured
façade	6	1	0.03	façade
fee	3	1	0.03	fee
feedback	8	1	0.03	feedback
fiddly	6	1	0.03	fiddly
field	5	1	0.03	field
figure	6	1	0.03	figure
finally	7	1	0.03	finally
fix	3	1	0.03	fix
flexibility	11	1	0.03	flexibility
flowing	7	1	0.03	flowing
footpaths	9	1	0.03	footpaths
fore	4	1	0.03	fore
forgetting	10	1	0.03	forgetting
forgotten	9	1	0.03	forgotten
forward	7	1	0.03	forward
fpm	3	1	0.03	fpm
free	4	1	0.03	free
frequently	10	1	0.03	frequently
friendly	8	1	0.03	friendly
fully	5	1	0.03	fully
funnily	7	1	0.03	funnily
gained	6	1	0.03	gained
glad	4	1	0.03	glad
glass	5	1	0.03	glass
gone	4	1	0.03	gone
gotten	6	1	0.03	gotten
guess	5	1	0.03	guess
guidance	8	1	0.03	guidance
gutter	6	1	0.03	gutter
guy	3	1	0.03	guy
half	4	1	0.03	half
hand	4	1	0.03	hand
harder	6	1	0.03	harder
harm	4	1	0.03	harm
hazards	7	1	0.03	hazards
headquarters	12	1	0.03	headquarters
heart	5	1	0.03	heart
hired	5	1	0.03	hired

history	7	1	0.03	history
hoists	6	1	0.03	hoists
hotel	5	1	0.03	hotel
hour	4	1	0.03	hour
hyatt	5	1	0.03	hyatt
iat	3	1	0.03	iat
imaginatio	10	1	0.03	imaginatio
imagine	7	1	0.03	imagine
important	9	1	0.03	important
impression	10	1	0.03	impression
included	8	1	0.03	included
incorrect	9	1	0.03	incorrect
inherent	8	1	0.03	inherent
inhibit	7	1	0.03	inhibit
inspection	10	1	0.03	inspection
instantaneously	15	1	0.03	instantaneously
instantly	9	1	0.03	instantly
insure	6	1	0.03	insure
integrating	11	1	0.03	integrating
interactively	13	1	0.03	interactively
interfered	10	1	0.03	interfered
interior	8	1	0.03	interior
introduction	12	1	0.03	introduction
invent	6	1	0.03	invent
inwards	7	1	0.03	inwards
isolation	9	1	0.03	isolation
ive	3	1	0.03	ive
jobs	4	1	0.03	jobs
joinery	7	1	0.03	joinery
joints	6	1	0.03	joints
junior	6	1	0.03	junior
killed	6	1	0.03	killed
knowledge	9	1	0.03	knowledge
land	4	1	0.03	land
last	4	1	0.03	last
latter	6	1	0.03	latter
lay	3	1	0.03	lay
layers	6	1	0.03	layers
least	5	1	0.03	least
left	4	1	0.03	left
legal	5	1	0.03	legal
less	4	1	0.03	less
liability	9	1	0.03	liability
liftable	8	1	0.03	liftable
link	4	1	0.03	link
lipservice	10	1	0.03	lipservice
litigation	10	1	0.03	litigation
lives	5	1	0.03	lives

london	6	1	0.03	london
longer	6	1	0.03	longer
losing	6	1	0.03	losing
luck	4	1	0.03	luck
maimed	6	1	0.03	maimed
maintence	9	1	0.03	maintence
manchester	10	1	0.03	manchester
mandatory	9	1	0.03	mandatory
manual	6	1	0.03	manual
manufacturer	12	1	0.03	manufacturer
matrix	6	1	0.03	matrix
mechanism	9	1	0.03	mechanism
middle	6	1	0.03	middle
might	5	1	0.03	might
miles	5	1	0.03	miles
million	7	1	0.03	million
minimal	7	1	0.03	minimal
misconception	13	1	0.03	misconception
misinformation	14	1	0.03	misinformation
mismanagement	13	1	0.03	mismanagement
months	6	1	0.03	months
multi	5	1	0.03	multi
multiple	8	1	0.03	multiple
national	8	1	0.03	national
nearly	6	1	0.03	nearly
necessity	9	1	0.03	necessity
negative	8	1	0.03	negative
netting	7	1	0.03	netting
newspapers	10	1	0.03	newspapers
northern	8	1	0.03	northern
northway	8	1	0.03	northway
nowhere	7	1	0.03	nowhere
no’	3	1	0.03	no’
observation	11	1	0.03	observation
occassions	10	1	0.03	occassions
offloading	10	1	0.03	offloading
offsite	7	1	0.03	offsite
ohs	3	1	0.03	ohs
order	5	1	0.03	order
organization	12	1	0.03	organization
others	6	1	0.03	others
oversized	9	1	0.03	oversized
paperwork	9	1	0.03	paperwork
parapet	7	1	0.03	parapet
park	4	1	0.03	park
peculiar	8	1	0.03	peculiar
perception	10	1	0.03	perception
period	6	1	0.03	period

persuade	8	1	0.03	persuade
pipelines	9	1	0.03	pipelines
plain	5	1	0.03	plain
players	7	1	0.03	players
policies	8	1	0.03	policies
political	9	1	0.03	political
post	4	1	0.03	post
potential	9	1	0.03	potential
precast	7	1	0.03	precast
president	9	1	0.03	president
prestigious	11	1	0.03	prestigious
principals	10	1	0.03	principals
principles	10	1	0.03	principles
private	7	1	0.03	private
proceduers	10	1	0.03	proceduers
proceed	7	1	0.03	proceed
produced	8	1	0.03	produced
profession	10	1	0.03	profession
promotes	8	1	0.03	promotes
protection	10	1	0.03	protection
provision	9	1	0.03	provision
qualified	9	1	0.03	qualified
quicker	7	1	0.03	quicker
quiet	5	1	0.03	quiet
quote	5	1	0.03	quote
ranging	7	1	0.03	ranging
rating	6	1	0.03	rating
real	4	1	0.03	real
realignment	11	1	0.03	realignment
rebuild	7	1	0.03	rebuild
regency	7	1	0.03	regency
regsrd	6	1	0.03	regsrd
reinstituted	12	1	0.03	reinstituted
relevant	8	1	0.03	relevant
reluctance	10	1	0.03	reluctance
removed	7	1	0.03	removed
repair	6	1	0.03	repair
resolve	7	1	0.03	resolve
respect	7	1	0.03	respect
restraints	10	1	0.03	restraints
restricted	10	1	0.03	restricted
retaining	9	1	0.03	retaining
reticence	9	1	0.03	reticence
revealed	8	1	0.03	revealed
reworking	9	1	0.03	reworking
roof	4	1	0.03	roof
room	4	1	0.03	room
round	5	1	0.03	round

safet	5	1	0.03	safet
sagety	6	1	0.03	sagety
satisfy	7	1	0.03	satisfy
saying	6	1	0.03	saying
schedules	9	1	0.03	schedules
scratch	7	1	0.03	scratch
search	6	1	0.03	search
sector	6	1	0.03	sector
selections	10	1	0.03	selections
send	4	1	0.03	send
senior	6	1	0.03	senior
sensible	8	1	0.03	sensible
sensitive	9	1	0.03	sensitive
series	6	1	0.03	series
several	7	1	0.03	several
shape	5	1	0.03	shape
sheds	5	1	0.03	sheds
sheets	6	1	0.03	sheets
shown	5	1	0.03	shown
shuttering	10	1	0.03	shuttering
signed	6	1	0.03	signed
silly	5	1	0.03	silly
similar	7	1	0.03	similar
simultaneously	14	1	0.03	simultaneously
since	5	1	0.03	since
skilled	7	1	0.03	skilled
skywalk	7	1	0.03	skywalk
slavishly	9	1	0.03	slavishly
social	6	1	0.03	social
somehow	7	1	0.03	somehow
source	6	1	0.03	source
speak	5	1	0.03	speak
specialists	11	1	0.03	specialists
specifically	12	1	0.03	specifically
specifying	10	1	0.03	specifying
spectrum	8	1	0.03	spectrum
spin	4	1	0.03	spin
splinter	8	1	0.03	splinter
spot	4	1	0.03	spot
springing	9	1	0.03	springing
stablity	8	1	0.03	stablity
stands	6	1	0.03	stands
statement	9	1	0.03	statement
statutory	9	1	0.03	statutory
stick	5	1	0.03	stick
straight	8	1	0.03	straight
strange	7	1	0.03	strange
strongly	8	1	0.03	strongly

struggling	10	1	0.03	struggling
stuff	5	1	0.03	stuff
stymies	7	1	0.03	stymies
sub	3	1	0.03	sub
subsequent	10	1	0.03	subsequent
suggest	7	1	0.03	suggest
support	7	1	0.03	support
survey	6	1	0.03	survey
systematic	10	1	0.03	systematic
tasked	6	1	0.03	tasked
taught	6	1	0.03	taught
technology	10	1	0.03	technology
tested	6	1	0.03	tested
theu	4	1	0.03	theu
though	6	1	0.03	though
tight	5	1	0.03	tight
together	8	1	0.03	together
told	4	1	0.03	told
ton	3	1	0.03	ton
training	8	1	0.03	training
treating	8	1	0.03	treating
trees	5	1	0.03	trees
trenching	9	1	0.03	trenching
triangle	8	1	0.03	triangle
truckable	9	1	0.03	truckable
trucks	6	1	0.03	trucks
type	4	1	0.03	type
typical	7	1	0.03	typical
underestimated	14	1	0.03	underestimated
underground	11	1	0.03	underground
understanding	13	1	0.03	understanding
unless	6	1	0.03	unless
unsafe	6	1	0.03	unsafe
upfront	7	1	0.03	upfront
upper	5	1	0.03	upper
usually	7	1	0.03	usually
value	5	1	0.03	value
vehicles	8	1	0.03	vehicles
via	3	1	0.03	via
victoria	8	1	0.03	victoria
vital	5	1	0.03	vital
vitiating	9	1	0.03	vitiating
waste	5	1	0.03	waste
wearing	7	1	0.03	wearing
welbeing	8	1	0.03	welbeing
whenever	8	1	0.03	whenever
whereas	7	1	0.03	whereas
width	5	1	0.03	width

willing	7	1	0.03	willing
win	3	1	0.03	win
wise	4	1	0.03	wise
wish	4	1	0.03	wish
words	5	1	0.03	words
workshops	9	1	0.03	workshops
worms	5	1	0.03	worms
wrong	5	1	0.03	Wrong

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