List of Appendices


| | | |
|---|---|---|
| Chapter 1 | | There are no Appendices for this Chapter |
| Chapter 2 | 2.1 | Examples of Global Design Project Briefs: Swinburne and Malta….Aiii |
| Chapter 3 | 3.1 | Consent to use Material from Global Design Project…….……...….Aiv |
| | 3.2 | Ethics Approval Paperwork (+ Information Sheet and Consent Form)……...…….……Av |
| | 3.3 | Case Study Protocol……Aix |
| | 3.4 | Coding to keep Track of Data…….……Axi |
| | 3.5 | Example of A Case Record……...…….……Axii |
| | 3.6 | Glossary of Information Terms used when Interviewing……...Axviii |
| | 3.7 | Marked up Examples of Instances of Information Content…….…..Axx |
| | 3.8 | Examples of Quantifying of Information Content…….…….Axxiii |
| | 3.9 | Initial Questionnaire on Information Storing……..Axxvi |
| Chapter 4 | 4.1 | Context Detail for Student Team Case Studies…….…….…….Axxxi |
| | 4.2 | Where information was stored across the Case Studies……Axxxiii |
| | 4.3 | What information was stored across the Case Studies: Formal and Informal information……..……...….Axxxiv |
| | 4.4 | What information was stored across the Case Studies: Top 5..…..Axxxv |
| | 4.5 | What information was stored across the Case Studies: Amounts……..…Axxxviii |
| | 4.6 | Information Carriers across the Case Studies……...….Axl |
| | 4.7 | What information was valued across the Case Studies…….…….Axli |
| | 4.8 | Mindmap Summary of Case Study 1 Findings and Issues……..…..Axlv |
| | 4.9 | Mindmap Summary of Case Study 2 Findings and Issues……..Axlvi |
| | 4.10 | Mindmap Summary of Case Study 3 Findings and Issues…...…..Axlvii |
| | 4.11 | Mindmap Summary of Case Study 4 Findings and Issues…...….Axlviii |
| | 4.12 | Mindmap Summary of Case Study 5 Findings and Issues…….…..Axlix |
| | 4.13 | Mindmap Summary of Case Study 6 Findings and Issues……...……Al |
| Chapter 5 | | There are no Appendices for this Chapter |
| Chapter 6 | 6.1 | Students' Principles Focus Group Outline Plan……..…….…Ali |
| | 6.2 | Coding for Focus Group Participants……..…Alii |
| | 6.3 | Results from each of the Student Focus Groups on the Principles…Aliii |
| | 6.4 | Results from each of the Staff Focus Groups on the Principles…...Aliv |
| | 6.5 | *Principles for d-DIS Guidance Document*…….....Alv |
| Chapter 7 | 7.1 | *Educators' Principles* ….…..…..……..…...Alxvii |
| | 7.2 | *Principles* and *Framework*……...…..Alxviii |
| | 7.3 | Evaluation Plan for Principles…….…….…….Alxx |
| | 7.4 | Validation Methods used including Data Sets……..…..…...Alxxi |

7.5 Principles Validation Questionnaire……..……..…Alxxii
7.6 Focus Group Plan for Principles Validation…….…...…..Alxxiv
7.7 Coding for Analysis of Principles Feedback…….…...Alxxv
7.8 Results of Closed Statement Questions: UK/Swinburne…..…..…Alxxvi
7.9 Results of Closed Statement Questions……...…Alxxviii
Chapter 8 There are no Appendices for this Chapter

# 56521 Global Design
## Task 1 – Asynchronous Design

University of Strathclyde Engineering

### Overview
This is an asynchronous design task to be completed in conjunction with colleagues from Swinburne University in Australia. It will introduce you to the particular tools and practices necessary to complete a design task in the distributed environment and, in particular, across time zones. It is designed to be a quick, fun task which will highlight the issues of communicating design information adequately. Reflective discussions on the successes and failures of your team will take place in class.

### Brief
The rise of the coffee shop is an international phenomenon: there are many variations and cultural issues surrounding how people buy and consume coffee. A component of this is growing trend of 'coffee-on-the-move'. Therefore, as a global team you are required to design an innovative paper solution for carrying multiple cups of coffee in the UK and Australia. Your coffee cup holder must be able to do three things:

- Hold up to six coffee cups
- Be foldable for re-use and convenience
- Leave one hand free for opening doors etc.

Teams will be using different tools in order to broaden the collective experience. The assigned tool will be used to transmit all the required design information, and this will affect the approach your team takes to the asynchronous design task.

- Teams 1 &2: the 'Social Text' online wiki tool
  http://www.eu.socialtext.net
- Teams 3 & 4: Google Documents
  http://docs.google.com
- Teams 5 & 6: YouTube global team account, supplemented by email and photos where necessary.
  http://www.youtube.com

### Format
The task will be carried out within 6 hours – three hours at Strathclyde and three hours at Swinburne – and should be broken down as follows:

- Part One – to be carried out by Strathclyde Team Members:
  develop concepts, desktop modelling with paper and card, initial layout drawing with dimensions, rationale for choice of design. Handover to Swinburne team mates by collating all required information using your team's allocated collaboration tool.
- Part Two – to be carried out by Swinburne Team Members:
  manufacture of model according to layout drawing, testing and evaluation, review of design and rationale. Hand back to Strathclyde the review of the design project by collating all required information and sending using your team's allocated collaboration tool.

There will then be two further 1 hour reflective sessions:

- Strathclyde – review final design, comments on any changes, issues with the information passed over to Swinburne, usefulness or otherwise of shared workspace, suggestions for alternative approaches
- Swinburne – review of problems faced building model, issues with information presented by Strathclyde team, usefulness or otherwise of shared workspace, suggestions for alternative approaches

Coffee cups and appropriate model making equipment will on hand. Digital cameras and some video recording equipment will be available, and you are encouraged to take pictures wherever possible to help communicate their design. All feedback will be compiled and presented to reveal the problems with asynchronous design.





**Malta Task – Synchronous design**

### Overview
This is an synchronous design task between 5th year students at the University of Strathclyde and X year students at the University of Malta. It will introduce them to the particular tools and practices necessary to complete a design task in the distributed environment It is designed to be a quick, fun task which will highlight the issues of communicating design information rapidly with technological constraints. Further discussions (relating to alternative design tasks etc.) can be built around this in class.

### Brief
Current water stations for marathons, half-marathons and fun runs are unsatisfactory – they are messy and inefficient. Often consisting of a simple table or a group of helpers, they typically rely on cups which spill or bottles which are thrown away half full. There is also the problem of large numbers of runners trying to grab a limited number of drinks as they pass through. Your job is to develop a proposal for a new system and layout for distributing water at these races.

This task will be carried out in your synchronous design team using the tool you have been assigned as the primary medium of communication. You must organise the meeting, conduct your design work, and record the outcomes accordingly. The task will be carried out in 3 hours through intensive team working, and should achieve the following:

- Review project brief and background research
- Generate and discuss concepts
- Select one and refine
- Prepare proposal with rationale

How you organise and conduct the meeting, however, is for the team to decide.

There will then be a further 1 hour reflective sessions carried out by each side independently to discuss how the meeting went from their perspective. This will be followed by a final joint session to communicate these feelings and discuss lessons learnt.

- Independent session: how successful was the design outcome, how effective was the communication, issues with the tool used, differing perspectives at each side, how could the meeting have been organised differently, etc.
- Joint session: Review of lessons learnt, and all feedback compiled and presented to reveal the problems with synchronous design.

To broaden the collective experience, teams will be using different tools:

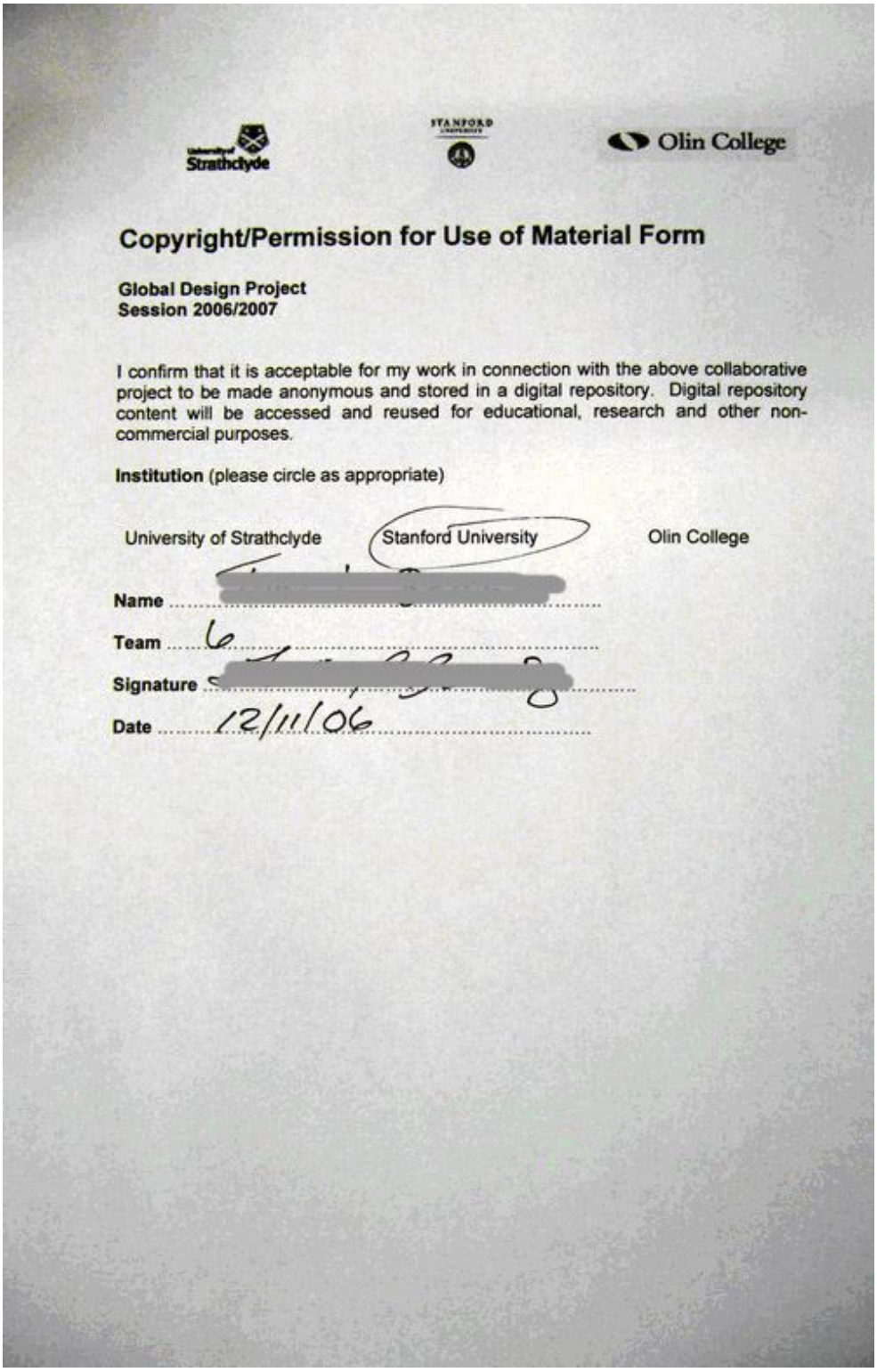
Teams 1 &2: Polycom

Teams 3 & 4: Flashmeeting

Teams 5 & 6: Thinkature

Teams 7 & 8: Skype

All students undertaking a Global Design Project were asked for consent to use material.



University of Strathclyde

STANFORD UNIVERSITY

Olin College

## Copyright/Permission for Use of Material Form

**Global Design Project**
**Session 2006/2007**

I confirm that it is acceptable for my work in connection with the above collaborative project to be made anonymous and stored in a digital repository. Digital repository content will be accessed and reused for educational, research and other non-commercial purposes.

**Institution** (please circle as appropriate)

University of Strathclyde | Stanford University | Olin College

**Name** .....

**Team** ..... 6 .....

**Signature** .....

**Date** ..... 12/11/06 .....

## (i) Supervisor and Student Ethics Checklist

**Project Title:** Information Storing in Distributed Teams: Where, what, how, when and why is information stored in distributed team projects?
**Participants (staff/students carrying out investigation):** Global Design Class students, 2007-2008 (3 University of Strathclyde, UK + Swinburne University, Australia teams; and, 3 University of Strathclyde, UK + University of Malta teams). Researcher – Hilary Grierson.
**Investigation Content:** Examination of information and knowledge stored/recorded by students in distributed design team projects. Projects: UK/Australia - the design of Coffee Cup Holder; UK/Malta – water bottle dispenser. Involves data analysis of shared workspaces/digital repositories/email and structured interviews and emailed questioning.

Does the investigation involve, any of the following (mark as appropriate):

1) Harm, discomfort, physical or psychological risk (esp. pregnant women, elderly, the young). yes☐ no☑
2) Participants whose ability to give voluntary consent is limited (cognitively impaired, prisoners, persons with chronic physical or mental conditions). yes☐ no☑
3) Invasive techniques (DNA testing, collection of body fluids/tissue). yes☐ no☑
4) Extensive degree or duration of exercise or physical exertion. yes☐ no☑
5) Manipulation of human responses (cognitive or affective) which may involve stress or anxiety. yes☐ no☑
6) Administration of drugs, liquid/food additives. yes☐ no☑
7) Deception of the participants which might cause distress or effect their willingness to participate in the research. yes☐ no☑
8) The collection of highly personal, intimate, private or confidential information. yes☐ no☑
9) Payment to the participants (other than travel/time costs). yes☐ no☑

**If the answer to <u>any</u> of the above questions is yes you <u>must</u> submit a protocol to the 'Ethics Advisory Committee' unless previous consent has been granted for practising the 'generic' procedure involved. The protocol for such submissions to the 'Ethics Advisory Committee' can be found in Appendix A of the 'Code of Practice on Investigations of Humans Beings'.**

Supervisors Signature(s)
..... Date 21/2/08.
..... Date .....

Students/Researchers Signature(s)
Hilary Grierson Date 21/2/08
..... Date .....



## (ii) Checklist for Department Approved Investigations

**Project Title:** Information Storing in Distributed Teams: Where, what, how, when and why is information stored in distributed team projects?
**Participants (staff/students carrying out investigation):** Global Design Class students, 2007-2008 (3 University of Strathclyde, UK + Swinburne University, Australia teams; and, 3 University of Strathclyde, UK + University of Malta teams). Researcher – Hilary Grierson.
**Investigation Content:** Examination of information and knowledge stored/recorded by students in distributed design team projects. Projects: UK/Australia - the design of Coffee Cup Holder; UK/Malta – water bottle dispenser. Involves data analysis of shared workspaces/digital repositories/email and structured interviews and emailed questioning.

**It is the supervisor's responsibility to make students aware of these guidelines and the students to provide the supervisor with the required documentation from affected investigation components. Signed copies should be maintained by the supervisor and student(s) for departmental records.**

☑ **Consent**. Obtain informed consent of all volunteers. A consent form <u>must</u> be signed by all volunteers.

☑ **Protection**. Protect all volunteers from possible harm and preserve their rights. <u>No</u> investigation should involve significant risks to mental or physical well-being of its participants.

☑ **Inducement**. Provide no financial inducement nor other coercion (actual or implied) to persuade people to take part in the investigation.

☑ **Withdrawal.** Volunteers must be free to withdraw at any stage, without giving reason.

☑ **Termination.** The investigation should stop <u>immediately</u> if volunteers report any problems (physical, mental or otherwise) during it. The problems must be reported to the appropriate ethics committee.

☑ **Recruitment.** Volunteer recruitment should wherever possible be via letter, notice (or orally - if through a group approach). However, random street or doorstep surveys are acceptable.

☑ **Staff Participation.** The motives for staff/students to participate as a volunteer in an investigation should be taken into special consideration i.e. neither declining nor agreeing to participate in an investigation should affect academic assessment in anyway.

☑ **Special Consideration**. Special consideration should be given to the young, adults with any cognitive disabilities or learning difficulties and to all persons who live in or are connected to an institutional environment (in such cases the investigator should refer to **Appendix C** of the 'code of practice on investigations on human beings').

☑ **Pregnancy.** Women of child bearing age must not be recruited for any investigation which could be harmful to fertility/pregnancy (in such cases the investigator should refer to **Appendix C** of the 'code of practice on investigations on human beings').

☑ **Selection.** Submissions based on the investigation should include details of the basis for volunteer selection i.e. questionnaires and/or other measures in the selection process.

☑ **Justification.** Investigators must justify the number/type of subjects chosen for each study.

☑ **Confidentiality.** Confidentiality and privacy must be maintained. Any waiver of confidentiality should be justified and consent must be given, in writing, by the volunteer(s). In addition, the investigator must comply with Data Protection Legislation.

☑ **Informing Volunteers.** Each volunteer must be provided with an information sheet providing full relevant details of the nature, object and duration of the proposed investigation and a contact for further queries (whom is independent of the investigation normally the secretary of the ethics advisory committee).

☑ **Deception.** There shall be no deception that might affect a person's willingness to participate in an investigation nor about the risks involved.

☑ **Unusual Symptoms.** Volunteers will be encouraged to note any unusual or unexpected symptoms arising during the investigation. These should be reported to the appropriate ethics committee

☑ **Location.** Places where investigations take place should be appropriate to the type and risk factor of study undertaken. Further, the ethics committee are entitled to carry out spot checks.

☑ **Records.** Full records of all procedures carried out should be maintained in an appropriate form. A register of all volunteers should be taken and a note of the population/sample from which they were drawn.

☑ **Queries.** Post investigation queries from a participant should be directed to an appropriate professional (supervisor, head of department etc.).

☑ **Insurance.** It is the responsibility for the applicant to seek extended insurance if the investigation scope falls out-with the University's Public Liability Policy (in such cases the investigator should refer to **Appendix B** of the original 'code of practice' document).

Additional general guidelines exist for biological, psychological and sociological investigations - in such cases refer to **Sections 6.2 and 6.3** of the original 'code of practice' document.

Supervisors Signature(s)

..... Date 22/2/08

..... Date .....

Students/Researchers Signature(s)

Hilary Grierson Date 21/2/08

..... Date .....



University of Strathclyde
Engineering

## Consent for Use of Data from the Global Design Class and Participation in Interviews

**Global Design Tasks: Coffee Cup Holder and Water Dispenser**
**Session 2007/2008**

**Consent**
I confirm that it is acceptable for the project information and knowledge recorded in connection with the Global Design Tasks to be studied and examined for research purposes.
I also agree to take part in structured interview sessions and/or a questionnaire/survey. Anonymity will be guaranteed for any participants, and for the work of the Global Design Tasks. Any analysis, findings or results will only be used for educational and research purposes.

**Team**.....**Signature(s)**.....

.....

**Team**.....**Signature(s)**.....

.....

**Team**.....**Signature(s)**.....

.....

copy of consent form to be used for thesis studies.

Hilary Grierson,
DMEM, Strathclyde University, Glasgow.
h.j.grierson@strath.ac.uk
0141-548-4346

The Ethics Committee of the Department of Design Manufacture & Engineering Management, The University of Strathclyde, Glasgow, can be contacted should you have any concerns about research process for this study (0141-548-2839).



Avi

Example of Information Sheet and Consent Form used for all Semi-structured Interviews and Focus Groups. Example shown: Principles Focus Groups

**Development of Principles, Guidelines and Framework for distributed design information storing in student project work.**

University of Strathclyde

**Information Sheet**

You are being invited to participate in a research study. Please read and consider the following information about the study and do not hesitate to ask for clarification if anything is not clear.

**About the study**

My name is Hilary Grierson and I am undertaking a PhD at the University of Strathclyde. I am currently studying the storing of design information by distributed student teams. Based on these detailed studies I have developed a set of Principles, Guidelines and a Framework to support distributed design information management.

The work explores how students in distributed teams store project information; what they store, where, when, how and why. The purpose of the study is to obtain your feedback on the generated Principles, Guidelines and Framework

You are being asked to take part because you have taken the Global Design Class module and as such have experience of distributed project work and information storing and sharing.

Focus groups will be the main method for gathering research data. You will be expected to give written responses individually to some questions, and to take part in small group discussion.

Participation in this short study is entirely voluntary. If you are not comfortable with the process of research at any time, you may stop participation and you do not have to give a reason for withdrawing participation.

**What will happen to the information collected?**

The data collected will only be used for research purposes and it will not be passed on to any third party. The data collected will be used to inform the production of written work for PhD studies, journals and conferences. Any reference to you within research notes will be anonymised using a pseudonym or code identifier. I may ask to audio record conversations – however, this will only be done with your prior permission. In any recording: all references to you will be anonymised; digital files will be transferred to a password protected and encrypted computer facility; hard copy files will be stored securely.

1

**Further questions or information**

The study has been approved by the DMEM Ethics Committee at the University of Strathclyde. If you have questions about the research study, please contact me at the details below:

Hilary Grierson,
Department of Design Manufacture and Engineering Management,
University of Strathclyde,
James Weir Building,
75 Montrose Street,
Glasgow, G1 1XJ.

Landline telephone: *0141-548-4346*
Email: h.j.grierson@strath.ac.uk

If you have any concerns about the conduct of this research study, you may contact my supervisor:

William J.Jon,
Department of Design Manufacture and Engineering Management,
University of Strathclyde,
James Weir Building,
75 Montrose Street,
Glasgow, G1 1XJ.

Telephone: *0141-548-2901*
Email: w.j.jon@strath.ac.uk

2

**Development of Principles, Guidelines and Framework for distributed design information storing in student project work.**

University of Strathclyde

**Consent Form**

Researcher: Hilary Grierson (Registration number - 2004 60893)
Department: Design manufacture and Engineering Management
Course/Class: PhD Research Studies

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

3. I understand that the recording of any data will be done so only with my prior approval and consent. I confirm that for any recorded interviews, where a transcript is produced, a pseudonym or code identifier will be used, and reference to me as an individual will be removed. I understand that any photography of the physical aspects of the research setting will not feature images which can be used to identify me. I understand that any recorded data will only be used for the stated research purposes.

4. I understand that any data I provide through taking part in this research will be held in accordance with the Data Protection Act 1998.

5. I **agree / do not agree** (delete as applicable) to take part in this Research.

_____
**Signature of participant**

_____ _____
**Name of participant (please print)** **Date**

***Introduction***

The Case Study investigation addresses the First of the PhD Research Questions – ***How do students store and share design information and knowledge in distributed design team-based project work?*** The Case Study Protocol is intended to guide the research through the gathering of data; analysis and presentation of results. It adds to the reliability of case study research. The findings from the Case Studies will support the PhD research work further by, informing a method or tool for implementation in distributed design project work to support student experience and learning – the Second of the PhD Research Questions - ***How can students be encouraged to record project work in a distributed design context*****?** The findings will also inform the contents for a Project Memory for distributed design information storing – the Third of the PhD Research Questions - ***What should a Project Memory to support distributed design contain?***

***Aims and Objectives***

Since there are few studies on student information storing behaviour in distributed contexts, studying each case will give a greater insight into the First of the thesis Research Questions - *How do students store and share design information in distributed teamwork?*

- *What do they store? Where do they store it? When do they store it? Why do they store it?*
- *What formal and informal information is stored?*
- *What do they value?*

***Case Study Context***

All Case Studies will take place in the context of a distributed design project. The thesis Case Studies will involve distributed student teams from the Global Design Project, part of the Global Design Class at the University of Strathclyde, Glasgow, UK. Initial partners are Stanford University, CA, and Olin College of Engineering, MA. Additional partners may be sought in future years. The project task will be relatively simple with the emphasis on the process of designing collaboratively. The project duration is 3 weeks.

***Data Collection***

All students (UK and partners) will be asked for written consent for their work to be used for research or educational purposes at the beginning of each class. A team, with any student for whom no consent has been received or consent has been withheld, will be excluded from a Study. Two to three teams should be selected for study depending on student agreement and availability. Names need to be anonymised. Data collection methods involve –

1. Archived online project sites and emails – all student web sites to be archived electronically, once project work is complete. Paper copies to be retained also. With student agreement, any emails relating to project work, to be collected for examination of information content.
2. Questionnaire – students participating in the Case Studies are to complete a questionnaire on *what amount of information was stored; where it was stored; how it was stored; why it was stored; when it was stored* and *what value it was to students.* Questionnaires will be completed by local sides of teams, i.e. 2 questionnaires returned per global team.
3. Examination of Secondary Data/Documentation – Examination of UK Reflective feedback and report writing will further add to the Case Studies.

Records of all data collected to be maintained both electronically and in paper copy.

***Data Analysis***

Analysis is to take place, following completion of the Global Design Project and gathering of all data. Coding and Clustering methods are to be used to keep track of the data and to manage the emerging issues as the material is analysed. Coding schemes to be developed. Analysis includes –

1. Archived online project sites and emails – Examine the content of the web pages and files and establish -
   (i) the various places the information was stored - draw a visual picture;

(ii) the Formal and Informal information content: according to the information types identified by the study instances of information content will be quantified; the unit of analysis will be the online site, a file or an email at the macro level and a phrase, sentence or paragraph at the micro level;
(iii) the different forms of information carrier used;
(iv) the amount of information stored;
(v) when information was stored and present as a timeline;
(vi) the value students gave to information.

Emails to be examined for Formal and Informal content also.

2. Questionnaire – Questionnaires will be completed by local sides of teams, i.e. 2 questionnaires returned per global team.

From (1) the Archived online project sites and emails and (2) the Questionnaire, build up a 'picture' of how the teams stored their distributed information and present to each UK-side of a participating team. All the analysis is to be presented as bar charts, diagrams or timelines, for ease of understanding.

3. Examination of Secondary Data/Documentation – information from any reflective sessions and report writing can be added to the findings.

Electronic and paper copies are to be kept, as a record of the findings from each of the analyses of the archived documents; the questionnaire and the reflection.
From the raw data of the findings a **Case Study Record** will be compiled for each of the Cases classifying the data under the headings of *what, where, when, ho, why and value.*

***Data Validation***

Semi-structured Interviews – UK sides of participating teams will be shown the findings and asked to confirm and validate. Further questions will be asked to gain greater detail and will add further to the data collected for the Case Studies. Consent to record interviews to be sought from participating students prior to interview. Digitally recorded interviews to be transcribed and categorised. Quotes to be used in Reports and Case Study reporting.

***Case Study Reporting***

For each of the Studies, an overall Report will be compiled of the Findings from the Archived Data; from the Questionnaires; from the Reflection and from the Semi-structured Interviews. This material will then form the basis of a set of Case Studies highlighting the findings and issues each distributed team experienced in undertaking the Global Design Project. The findings will be clustered and visualised under headings-

- where? - information storing systems;
- what? - information storing;
- when? - information patterns; and,
- how? and why? - information strategy.

***Case Study Results***

From the issues identified by the Case Studies, it is intended to develop a series of Recommendations and Guidance to support distributed-design information storing practices.

(June 2005)

| Study 1: Case 1 & 2 | | Study 2: Case 3 & 4 | | Study 3: Case 5 & 6 | | Study 4: Case 7 | |
|---|---|---|---|---|---|---|---|
| Stanford……...USA | | Swinburne…… Sw | | Malta…….. ……M | | Swinburne…….Sw | |
| Strathclyde……..UK | | Strathclyde……..St | | Strathclyde……..St | | Strathclyde……St | |
| Team 5 UK | T5 | Team 2 UK | T2 | Team 2 UK | M T2 | Team B UK | TB |
| Student 1 | 5.1 | Student 1 | 2.1 | Student 1 | M2.1 | Student 1 | B.1 |
| Student 2 | 5.2 | Student 2 | 2.2 | Student 2 | M2.2 | Student 2 | B.2 |
| Student 3 | 5.3 | Team 2 Swinburne | T2Sw | Team 2 Malta | MT2M | Team B Swinburne | TBSw |
| Team 5 USA | T5USA | | | | | | |
| Team 6 UK | T6 | Team 3 UK | T3 | Team 3 UK | MT3 | | |
| Student 1 | 6.1 | Student 1 | 3.1 | Student 1 | M3.1 | | |
| Student 2 | 6.2 | Student 2 | 3.2 | Student 2 | M3.2 | | |
| Student 3 | 6.3 | Team 3 Swinburne | T3Sw | Team 3 Malta | MT3M | | |
| Team 6 USA | T6USA | | | | | | |
| File galleries | fg | Information on wikis | w | Information on wikis | w | Info on wikis | w |
| Info on wikis | w | Info in emails | em | Info in emails | em | Info in emails | em |
| Info in emails | em | Reflection (UK only) | r | Reflection (UK only) | r | Questionnaire (UK) | q |
| UK-side Questionnaire | q(q1-q6) | Reflective reports (UK only) | rr | Reflective reports (UK only) | rr | Swinburne-side questionnaire | Swq |
| Interview (USA) | i | Written questions at interview (UK only) | q | Written questions at interview (UK only) | q | Valid. Interviews (UK only) | v |
| Reflection (UK only) | r | Swinburne-side questionnaire | Swq | Maltese-side questionnaire | Mq | | |
| Reflective reports (UK only) | rr | Valid. Interviews (UK only) | v | Valid. Interviews (UK only) | v | | |
| Valid. Interviews (UK only) | v | | | | | | |

| **Data Source Coding** | **Statement/Finding** | **Analysis Coding** |
|---|---|---|
| T5,rr | Students recognised they needed to organise and structure information in order to work smoothly. (5.1) | How |
| T5,rr | By recording information issues can be avoided, e.g. Team 5 - dimensions (5.2). | How |
| T5,rr | Emails were used to transfer some information amongst teams. (5.1). | How |
| T5,v | UK students created the team file galleries. On reflection they reported they should have made joint rules for storing information at the beginning, to allow for greater ownership across both sides of the team. A strategy should have been put in place. | How |
| T5USA,i | A scheduled way of storing would help minimise problems with information storing. | How |
| T5USA,i | Information storing evolved; no plans were made. However since global team was made up from members from *"totally different worlds which had used different tools then perhaps it would have been better to talk about it upfront."* | How |
| T5,q | In terms of progressing the project towards its goals, students noted they highly valued Formal information on *brief; market research; user observations; materials; manufacturing info,; concepts & detail design/prototypes; detail design/prototypes testing* and the *final solution* the most. (q5) | Value |
| T5,q | The type of Informal information the UK students on team 5 reported they valued highly was - *actions & decisions* and *problems/issues/questions.* They also valued prior knowledge; previous project knowledge; *design rationale*; and communications & *contextual information.* (q5) | Value |
| T5,q | *Social* information; *procedural information* and organisational information on task or team were not valued. (q5) | Value |
| T5,v | USA students valued Informal information more. | Value |
| T5USA,i | In terms of Formal Information, the USA team valued market research; product requirements; concepts; concept development and the final solution the most in terms of Formal information. | Value |
| T5USA,i | The USA students valued the Informal information more than Formal information and more then the UK students. *Actions & decisions* and the *problems/issues/questions* were recorded the most. | Value |
| T5,em | Team 5 retained 39 emails from the project. These contained 170 instances of information and knowledge. 98% of this information was Informal. | What |
| T5,em | The highest instances of Informal information were *actions & decisions* (19%) and *problems/issues/questions* (18%). *Contextual info.* (13%), *social info.* (12%) and *organisational info. on team* (10.5%) were the next highest categories of information. *Design rationale* (3%) and *discussions* (1%) were low in instances in the emails saved. All types of Informal information content were found in emails. | What |
| T5,em | Only 2 instances of Formal information were recorded in the examined emails, one on *materials* and the other on the *final solution*. | What |
| T5,fg | All of the information in team 5 file galleries was stored as image files (98.5%) e.g. .jpg and .bmp, except for one text document (1.5%) which showed a graphic of folding for the idea for a coffee cup holder. | What |
| T5,fg | 69 files were stored in Team 5's file galleries. The team stored all their project work files in their Team 5 file gallery and 5 other image files (uploaded as USA training prior to class start) were uploaded to the Global Design Class file gallery. | What |
| T5,fg | All files were examined for information content. 161 instances of information and knowledge were found (see types). A greater amount of Formal information and knowledge (80%, 129 instances) was stored in the | What |

| | | |
|---|---|---|
| | file galleries than Informal (20%, 32 instances). | |
| T5,fg | The most common information & knowledge type found was information on *materials* (17%) and on *detail design/prototypes* (15%) of the prototype. There were also high incidences of information on the *function* (14%) and their *testing* (10%). These are all Formal information types. | What |
| T5,fg | The instances of Informal information that appeared most were *social information* (7%), *contextual information* (6%); and *design rationale* (3%). | What |
| T5,fg | There were no *user surveys/observation* or *manufacturing info*; no *calculations* or *testing* and *evaluation* at concept stage. No *actions & decisions*; *discussions, communications info.* or *procedural information* were stored. | What |
| T5,fg | Image files obviously contained the most instances of information due to the high percentage of image files stored compared to other formats of files (98.5%). Greatest instances of recorded Formal information in the image files were on *materials* and on the *function* of the prototype. There were also high incidences of information on *detail design/prototypes* and their *testing*. The instances of Informal information that appeared most were *contextual information*; *social information* and *design rationale*. | What |
| T5,fg | There was only one text file which contained a graphic and this gave *component & assembly information* and information on *detail design/prototypes*. | What |
| T5,fg<br>T5,q<br>T5,em | Students noted in their questionnaire that they stored a greater % of Formal information throughout the project but examination showed this was not the case when adding the information content in the file galleries, wikis and university emails. There was slightly more instances of Informal information (293) than Formal (271). It could be argued that emails might not be regarded a 'store' in which case there was more Formal information (269 instances) across the file galleries and the wikis than Informal (157 instances). | What |
| T5,q | Meeting minutes recorded key points of both Formal information (market research, concepts, testing and prototypes) and Informal information (*design rationale*, actions & decisions, problems/issues/questions and discussion). These minutes were stored on LauLima wiki pages. (q3) (q4) | What |
| T5,q | Market research, concept generation and development was predominantly stored on paper in the form of hand drawn sketches/notes. These were then scanned or photographed. At concept generation stage physical models were photographed and video was used to record developed concept testing and the final concept. (q3) | What |
| T5,q | Photographs were uploaded to LauLima file galleries and displayed on LauLima wiki pages. (T5,q1) Videos were stored on You-Tube but accessed directly from LauLima. These were good evidence to show to others and also gave a snapshot of what happened. (q4) | What<br>How |
| T5,q | *Design rationale*, decisions, actions and communication info were contained in the wiki pages (q2) to keep everyone aware of what was happening. (q4) | What<br>Why |
| T5,q | Students made an estimate at the amount of information and knowledge stored and recorded by the team.<br>Students reported a much greater percentage of Formal information was stored than Informal information. (q1) | What |
| T5,q | The most Formal information (76-100%) students said they stored was – *project requirements; concepts* and *final solutions* (between 76-100%). (q1)<br>Students noted no information was recorded on *function* and *materials* and *calculations*, although this is not the case as the file galleries, wikis and emails recorded *functional and materials info*. | What<br>How |
| T5,q | Students felt everything had to be recorded."…even tiny bits which may appear irrelevant as they may become important later." (q4) | What<br>Why |
| T5,q | Informal information - The team noted they recorded a much smaller amount of Informal information. They noted they recorded – | What |

| | | |
|---|---|---|
| | *design rationale* ; *actions and decisions; problems/issues/questions* and *communications information* but only up to 50%. (q1) These were recorded throughout the project. (q6) | |
| T5,q | Students noted they recorded a lot of informal information in meeting minutes e.g. *design rationale* , for sharing with team; looking back for assessment and moving project from stage to stage; *actions and decisions* for accountability; and some *problems/issues/questions* but they usually discussed these rather than storing them. On such a short project they stressed there wasn't enough time to record too much. (q4) | What Why |
| T5,q | Information type such as *contextual, social, procedural* and *organisational info on tasks & team* were discussed but not always recorded. This would take too long. (q4) | What Why |
| T5,rr | Concept generation work stored on LauLima supported asynchronous work. (5.2) | What Why |
| T5,v | PolyCom sessions were not recorded. Students didn't know how to do this. Minutes were not taken of VC sessions but actions were noted at the end of a VC. | What Why How |
| T5,v | Didn't store everything on the project. We stored what we felt was useful. Storing information takes time and it takes over from 'doing' the project. On longer projects good to store when you might not be able to remember. | What Why |
| T5,v | Informal information was exchanged by email and other communication technologies. Emails contained more Informal information. They contained communication information but were seldom referred back to. | What |
| T5,v | Students reported, in terms of the deliverables, that Formal information was more important but without the Informal information you wouldn't have achieved the outcome. All outcomes were documented but not all decisions, only those that impacted on the outcome. | What Why |
| T5,v | Concept sketches, product requirements, significant events, meeting minutes, pictures and final solution must be stored. | What |
| T5,v | Images were richest in content. Students noted "…yes, we did a lot of models and sketches…and model making rather than talking." "Americans worked best this way as well." Easiest to explain with a model on VC. | What How |
| T5,v | Not enough actions and decisions had been stored. "…we stored more about the actual product and concepts than the actual path to get there." | What |
| T5,w | Team 5 stored 233 instances of information and knowledge in 31 wiki pages of their Team Project Sites at 4 levels (i.e. homepage plus 3 further sub levels). Amount of information increased at each level. They had 56 links to other wiki pages; files and websites. | What Where |
| T5,w | Wikis were used to store information and knowledge in most categories across both Formal and Informal information. More Formal information was stored across all wikis – 60%, 140 instances. Informal information stored was 40%, 93 instances. | What |
| T5,w | Information on *materials* (12%), *concepts* (10%), *detail design/prototypes* (8%) and their *testing* (7%) were the greatest instances of Formal information. *Design rationale* (9.5%), *contextual* (7%), *communications* (5%) and *social information* (4%) were the greatest instances of Informal information. | What |
| T5,w | Information on the homepage was Informal only. At level 2 there was more than twice as much Formal information (70% of level 2) than Informal information (30%). Level 3 contained predominantly Informal information (86%) on *design rationale, actions & decisions, communications info, social info* and *organisational info on the team*. Level 4 stored highest quantities of information and knowledge (72% of whole site), buried deeper inside the Team Project Site. At Level 4, 72% of this information was Formal and 28% was Informal. | What |
| T5,w | Team 5 stored information in video format on You-Tube accessed from LauLima wiki pages via a link to You-Tube. UK videos contained | What |

| | | |
|---|---|---|
| | information on *testing of detaildesign/prototypes, concepts, materials* and *functional information.* USA videos contained *contextual* and *social information.* | |
| T5USA,i | Recording everything would be 'overkill'; so only things to remember were noted. | What |
| T5USA,i | Lot of formal documents were stored in LauLima but little informal information or knowledge. | What |
| T5USA,i | Lot of pictures of drawings and sketches were stored. | What |
| T5USA,i | Lot of informal information doesn't get written down. | What |
| T5USA,i | Informal information is often stored in case it is required to meet the deliverables. | What |
| T5USA,i | VCs were recorded via note taking. | What |
| T5USA,i | Things to record for use on during the project – pictures of drawings and sketches (lots of information contained in these and often outcome of meetings); meeting minutes (most things came out of meetings); project goals and requirements; user requirements; concepts and final solution. | What |
| T5USA,i | Pictures of sketches and models, prototypes (*"a great way of storing information ….all of the information that is hard to put into other forms…."*) were the most useful media types for storing. | What |
| T5USA,i | Market research (as this was gathered by everyone and had to be stored to be shared); requirements (important to understand what was expected); *design rationale* and concepts and development were highly valued information types. | What |
| T5USA,i | Concept sketches, requirements, insights and significant events that changed direction were regarded as critical elements to store. | What |
| T5USA,i | Not enough actions and decisions were stored nor enough video. Video takes too long to take and upload. It is also hard to find information in video at a later date. | What |
| T5,em | Email timeline - Team 5 used email regularly amongst all members of the team at the beginning of the project (nearly every day) for noting *organisational info. on team* and *tasks; social* and *contextual info; communications info* and *actions & decisions.*<br>It was also used heavily at the end of the project for *organisational info on team* and *tasks; actions & decisions; problems/questions/issues, communications info* and *procedural info.* In between it was used and information was recorded and exchanged every 3 to 4 days. | When |
| T5,fg | File galleries timeline - Examination of the file galleries over time showed a peaking pattern at and just following a weekly deliverable. Team 5 were uploading files at this key time. On the 2 days prior to the final presentations activity in the file gallery was high with 31 images uploaded (see file gallery timeline). File galleries were also physically modelled on a timeline (see below). Peaks of activity in file galleries can again be identified at deliverable times. | When |
| T5,fg | USA students took time to submit items to file galleries. Early studies have shown that the LauLima system has a steep learning curve. By week 3 they were uploading significant numbers of items immediately following the UK students (reflecting the time difference of -8 hours) | When |
| T5,fg | Prior to the project start and into week 1 files uploaded to the file galleries contained 100% Informal information and knowledge – *social* and *contextual info.* By the end of week 1 the team has stored 40% Formal information and knowledge – market research, materials and functional info. and 60 % Informal information and knowledge - contextual info. and organisational info on team.<br>During weeks 2 and 3 more Formal information was stored and less supporting Informal information. Week 2 - 86% Formal/14% Informal and Week 3 – 87% Formal/13% Informal. | When<br>What |
| T5,v | Sides of team stored information at different times. UK–side stored | When |

| | | |
|---|---|---|
| | information as they went along. They felt this was best. USA-side stored information later meaning some decisions were taken without all the available information. | Why |
| T5,w | Wiki Timeline - Activity (changes made) on the wiki pages showed a tendency to happen at the beginning of a new stage of the project. Information was being added or edited and stored on the wiki pages at these points. Activity was high and intense on the final week of the project leading up to the presentation. Team 5 used the wikis for their final presentation. | When How |
| T5,w | Changes made to the wikis over time were modelled physically using 'post-its' and also graphically displayed using Excel charts. USA were new to the system and spent more time prior to the project to familiarise themselves with LauLima's wikis. (They were familiar with the Laulima system and its wikis and creation of Project Team Sites.) UK activity was high at the start of Week 1 as UK set up the wiki site and populated with market research early on. USA contributed more to wikis as time went on but, UK stored most information and knowledge on the wikis. | When |
| T5,w | Prior to the project start the information contained in the wikis was 100% Informal – *social info, prior knowledge* and *organisational info. on team*.<br>In week 1 Informal information and knowledge was still high – 72%. Information types included – *social info, contextual info, prior knowledge and experience, procedural info, organisational info on team* and *tasks, design rationale*, and *problems/questions/issues*. 28% of Information stored in wikis was Formal. This included *market research, product/user requirements* and *materials info*.<br>In week 2, much more Formal information was recorded (79%) than Informal (21%). Students recorded *actions & decisions, communications info, procedural info* and *contextual info* to support the Formal information on the development of the concepts – *product/user requirements, concepts, materials* and *functional info*.<br>Week 3 saw a rise in recorded Informal information and knowledge (37%). Students recorded high levels of *decision rationale* and *actions and decisions* within the wikis at the end of the project to support their concept development, evaluation and prototyping. | When Why |
| T5,q | Information and knowledge was recorded in a number of places which did not allow a shared record of the information nor a 'permanent' record. Not all concepts were stored but all were sent via email. All final solutions and deliverables were stored in the file galleries. (q1) | Where What |
| T5,q | Student noted the quickest way to record most design information was on paper. This was the core information that could be looked at later by each side of the team. Paper records could not be made available to all of the teams so this was made digital and also acted as a copy. (q4) | Where |
| T5,q | Information about the final solution was kept on LauLima to keep everyone aware. Information at this stage was bouncing back and forward via email and by putting up solutions we could see what we had. (q4) | Where How |
| T5,q | Much of the Informal information was being exchanged via communication technologies like –<br>University Email, Skype and PolyCom - used to exchange project requirements, concepts, final solutions, actions and decisions, problems/issues/questions and discussions between USA and UK team members. (q2) Information contained in Email was stored but not accessible to all from a common point and information and knowledge from VC meetings were not recorded using the technologies (PolyCom & Skype) themselves. (q4)<br>Texting took place amongst the UK side. (q2) | Where How |
| T5,q | Information on market research, requirements and concept information was also stored on personal computers. | Where |
| T5,r | Students found using information storing system with a communication | Where |

| | | |
|---|---|---|
| | system worked well (e.g. LauLima with Skype). | |
| T5,rr | USA team members were not familiar with the information storing system used (LauLima). They found it hard to use in the given time without training. Extremely complex for first time user. Different skill levels across team. (5.1) | Where Why |
| T5,rr | Students noted they had not given enough attention to deciding on what tools should be used to store project information. (5.1) | Where |
| T5,rr | Beneficial to have a place everyone can access at all times, (5.1) e.g. wiki page presentations allowed both sides of team to access same information at presentations. (5.2) | Where How |
| T5,v | System to be used should be simple. LauLima wiki syntax was complicated and navigation was difficult. | Where |
| T5,v | Would rather choose the information storing system. | Where |
| T5,v | There were differing skill levels in terms of being able to use the system. UK-side was far more familiar with system than USA-side. | Where |
| T5,v | Information was duplicated and stored in different places – in the file galleries and also on wikis, set up by UK students. | Where |
| T5USA,i | Keep system simple. | Where How |
| T5USA,i | Email was used to send information, but files, etc. were stored on desktops which was hard to find later | Where |
| T5USA,i | LauLima was more useful for storing information than email but it was still difficult to remember where things were kept later on and it took time to upload information to LauLima. | Where |
| T5USA,i | Informal information - communications, actions and decisions were stored in emails. | Where |
| T5,q | Information was stored on LauLima in wiki pages and file galleries so that everyone could refer back to in order to make both prototypes the same; for presentations; so everyone had access to all information. (q4) | Why |
| T5,rr | Students noted that information recorded would refresh their memories if necessary e.g. progress in meetings minutes stored on LauLima. (5.1) | Why |
| T5,v | When you go back to write a report you want to have groups of information available. | Why |
| T5,v | Since "…project develops so much….only interested in the most recent information…but you might want to go back…", for report writing, decision making. | Why |
| T5,v | Video was useful for sharing of concepts testing and for demonstrations; but it was time consuming to find specific information in video. | Why How |

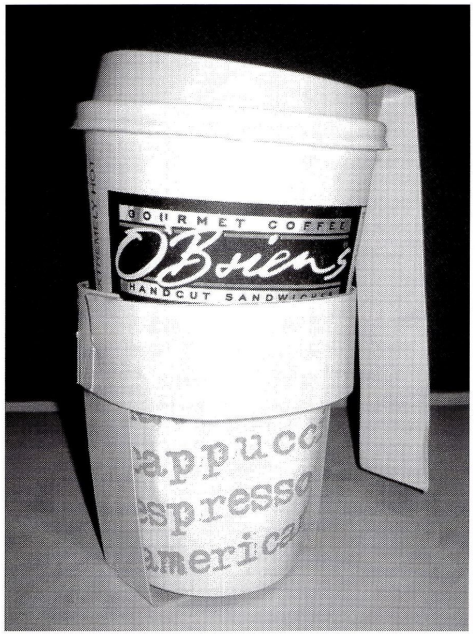
| | |
|---|---|
| **Information:** | Information can be 'existing' (found or known by the team) and 'generated' (created by the team in the process of undertaking the project). Something that can be explicitly told or recorded containing data. Information can be both formal and informal. |
| **Information Content:** | The information contained in different information carriers, e.g. information on user requirements, function, materials, testing, rationale, context, procedures, etc. |
| **Instance of Information:** | An occurrence of stored information. In text, it can occur as a phrase or sentence or as a word. Instances of information can also be identified in an image, sketch or video. |
| **Formal Information:** | Formal information and knowledge (often referred to as 'hard') is the primary work product of the worker and is easily and routinely captured. It is factual and informative. Identified as more *product-related*, it is more factual and declarative and is about the outputs and results. |
| **Market Research:** | Information on available products and trends in the current market. |
| **Product/User requirements:** | Information on the performance requirements of the product and on the needs of the users of the resulting product. |
| **Concepts:** | Information on the ideas for product development. |
| **Concepts Testing/Evaluation:** | Information on the testing of the concept performance and on the selection of concepts. |
| **Calculations:** | Information on early/final calculations in connection with the performance of products/concepts, e.g. costs, forces, sizes, etc. |
| **Detail Design/Prototypes:** | Information on developed concepts and prototypes. |
| **Detail Design/Prototypes Testing/ Evaluation** | Information on the testing of the developed concepts and prototypes. |
| **Functional Information:** | Information on how a product, part, component, etc. performs (e.g. mechanisms). |
| **Materials Information:** | Information about the materials used to make models/prototypes. |
| **Components & Assembly: Information** | Information on parts of the product and how they are combined together. |
| **Manufacturing Information:** | Information on how the product is to be manufactured. |
| **Final results/solution:** | Information on the final solution. |
| **Informal Information:** | Informal information and knowledge (often referred to as 'soft') is created in the process of producing the formal results. It is more practice-oriented and gives context to the formal information. Information identified as more *practice-related*, produced as a result of generating the outputs and results. |
| **Prior experience/knowledge:** | Anything previously known or experienced from any source that can be brought to a new design problem. |

| | |
|---|---|
| **Design rationale** | An explanation of the reasoning, tacit assumptions, design parameters, operating conditions, dependencies or constraints applied in the creation of an artefact or some part of it. |
| **Actions & decisions** | Information on activities and resulting decisions undertaken in course of project work. |
| **Problems/issues/questions** | Information on issues arising during project work. |
| **Discussions** | Conversations conducted during project work. Often not recorded; often summarised if important. |
| **Communications Information** | Information relating to arrangements to communicate, e.g. planning times for video conferences, meetings, etc. |
| **Social Information** | Personal information about individuals in a team; or, motivational information; or informal 'chit-chat'. |
| **Contextual Information** | Background information; information on aspects relating to the context around the task/work to be carried out, e.g. times available to work, including holidays, etc. |
| **Procedural Information** | Information on 'how to do things'; procedures for engagement of work. |
| **Organisational information on tasks** | Project management relating to the team, e.g. log of events; stages of work, processes and progress. |
| **Organisational information on team** | Project management relating to the task, e.g. allocation of roles; assigning of leadership, etc. |
| **Locational Information** | Information which indicates where design information is stored. |

Example: Case 3, Team 2 (Swinburne and Strathclyde); instances of information content in images and text on wikis.








CONCEPTS
MATERIALS INFO.
ASSEMBLY INFO.

file #603

**Here's the instructions:**

**Materials required:**

- 1x A3 (420mm x 297mm) Card sheet MATERIALS INFO.
- 1x Scissors MATERIALS INFO.
- 1x Sellotape MATERIALS INFO.

**Construction is as simple as the following five steps**: PROCEDURAL INFO.

Step 1:

- Cut 1 strip off A3 card lengthways (approx 420mm x 30mm) PROCEDURAL INFO. / SIZES
- Cut 1 strip off A3 card lengthways (approx 300mm x 30mm) PROCEDURAL INFO. / SIZES / CALCS.

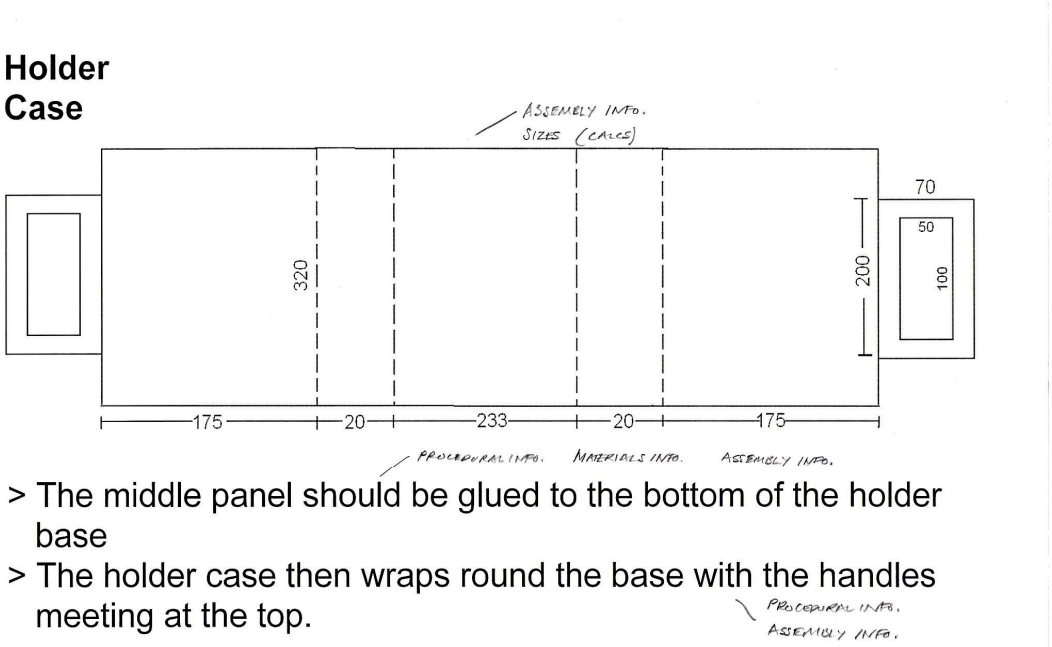
MATERIALS INFO.
CONCEPT
ASSEMBLY INFO.

file #613

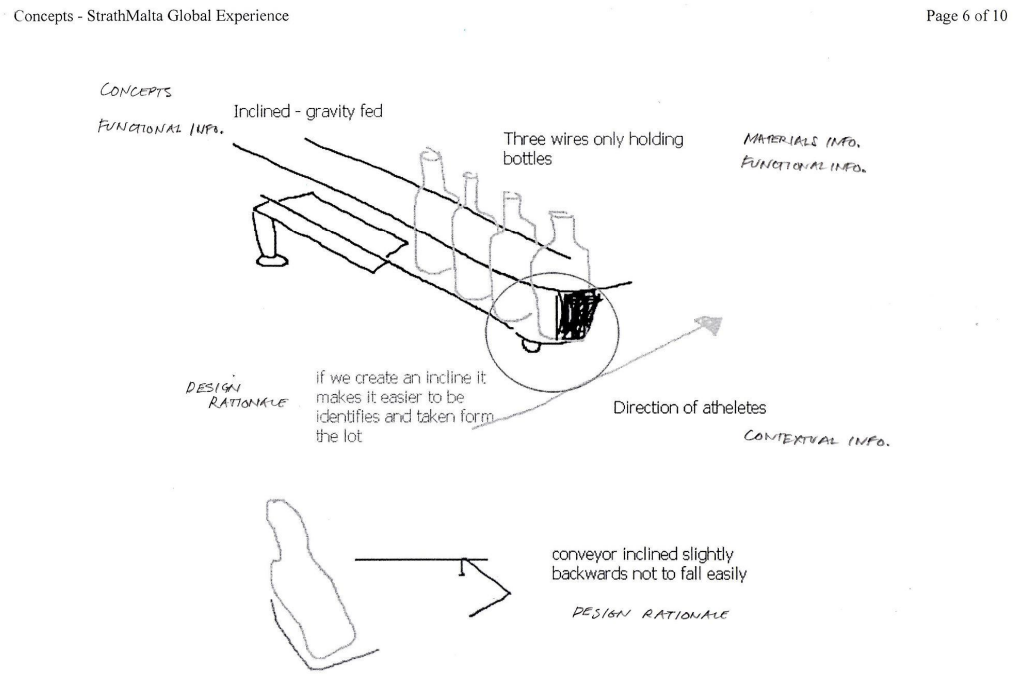
CONCEPT
FUNCTIONAL INFO.
MATERIALS INFO.
CONTEXTUAL
ASSEMBLY INFO.

file #614

Example: Case 4, Team 3, (Swinburne and Strathclyde); instances of information content in a page from a PPT.




Example: Case 5, Malta Team 2, (Strathclyde and Malta); instances of information content in sketches on a wiki.



Example: Case 5, Malta Team 2 (Strathclyde and Malta); instances of information content in emails.

(7)

From: David Fraser
Sent: 24 November 2007 11:28
To: Michael Sim; andre.spiteri@gmail.com; ilandalli@yahoo.com; ms_astrid@hotmail.com
Subject: RE: Global Design

Hello all

Sorry for not considering work (and outings) for Friday night. (^-^)

I've set up a 'doodle' time chart which you can participate in. All you have to do is type your name, clck when you are free and press 'participate'.

Here's the URL: http://www.doodle.ch/participation.html?pollId=ntskqg5mc6fc2z4m

It's for Sunday - so if u can do it today that would be great.

Thanks

Davie

SOCIAL INFO.
ORG. INFO. ON TEAM
ACTION
LOCATIONAL INFO.
ACTION

(11)

From: Michael Sim
Sent: 03 December 2007 08:58
To: ilan dalli; David Fraser; andre.spiteri@gmail.com; ms_astrid@hotmail.com
Subject: Global Design

Hey guys,

not sure if David emailed you earlier but we have been told to let you know that ther is a reflection exercise for Global Design scheduled for today at 2-2:50 GMT (3-3:50 Malta time). If this is a problem then let either myself or David know!

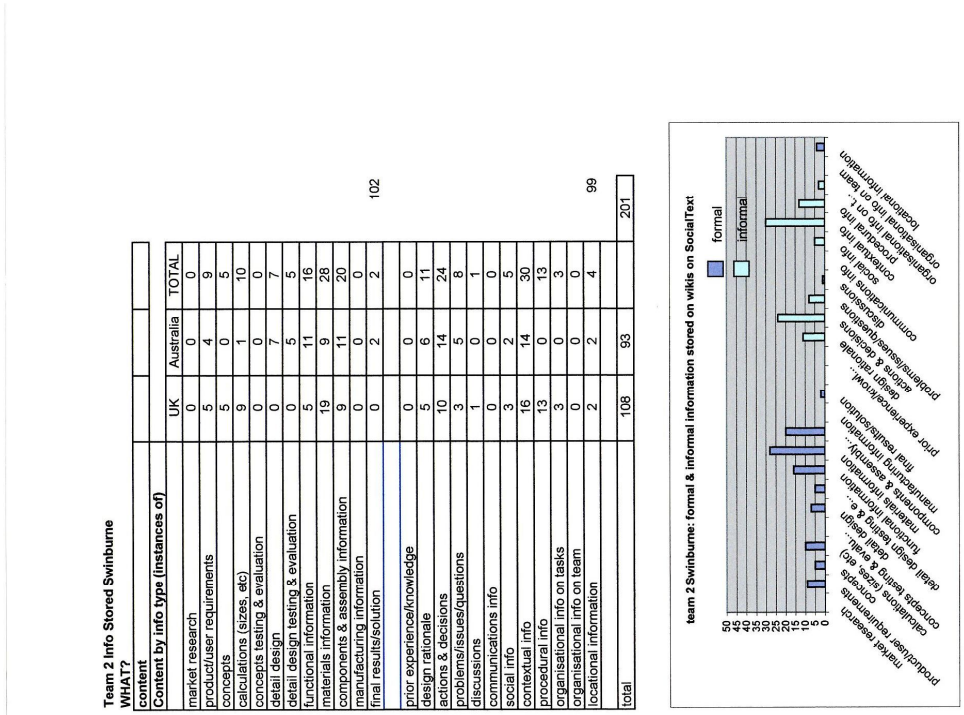
Hope all is well and will hopefully speak to you later.

Best Regards,

Michael Sim

ORG. INFO. ON TEAM
ACTION
SOCIAL INFO.

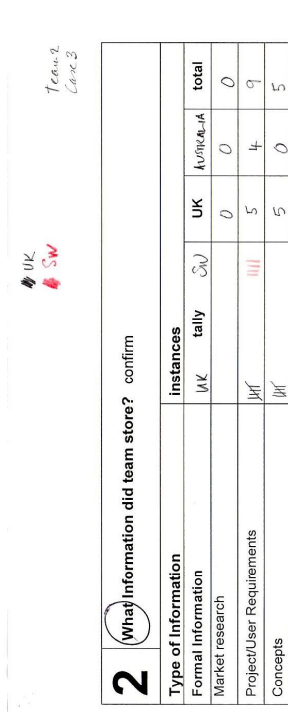
Example: Case 3, Team 2 (Strath./Swinburne); Q2. What information was stored.



**Team 2 Info Stored Swinburne**
**WHAT?**
**content**

| Content by info type (instances of) | | | |
|---|---|---|---|
| | UK | Australia | TOTAL |
| market research | 0 | 0 | 0 |
| product/user requirements | 5 | 4 | 9 |
| concepts | 5 | 0 | 5 |
| calculations (sizes, etc) | 9 | 1 | 10 |
| concepts testing & evaluation | 0 | 0 | 0 |
| detail design | 0 | 7 | 7 |
| detail design testing & evaluation | 0 | 5 | 5 |
| functional information | 5 | 11 | 16 |
| materials information | 19 | 9 | 28 |
| components & assembly information | 9 | 11 | 20 |
| manufacturing information | 0 | 0 | 0 |
| final results/solution | 0 | 2 | 2 |
| | | | 102 |
| prior experience/knowledge | 0 | 0 | 0 |
| design rationale | 5 | 6 | 11 |
| actions & decisions | 10 | 14 | 24 |
| problems/issues/questions | 3 | 5 | 8 |
| discussions | 1 | 0 | 1 |
| communications info | 0 | 0 | 0 |
| social info | 3 | 2 | 5 |
| contextual info | 16 | 14 | 30 |
| procedural info | 13 | 0 | 13 |
| organisational info on tasks | 3 | 0 | 3 |
| organisational info on team | 0 | 0 | 0 |
| locational information | 2 | 2 | 4 |
| | | | 99 |
| total | 108 | 93 | 201 |



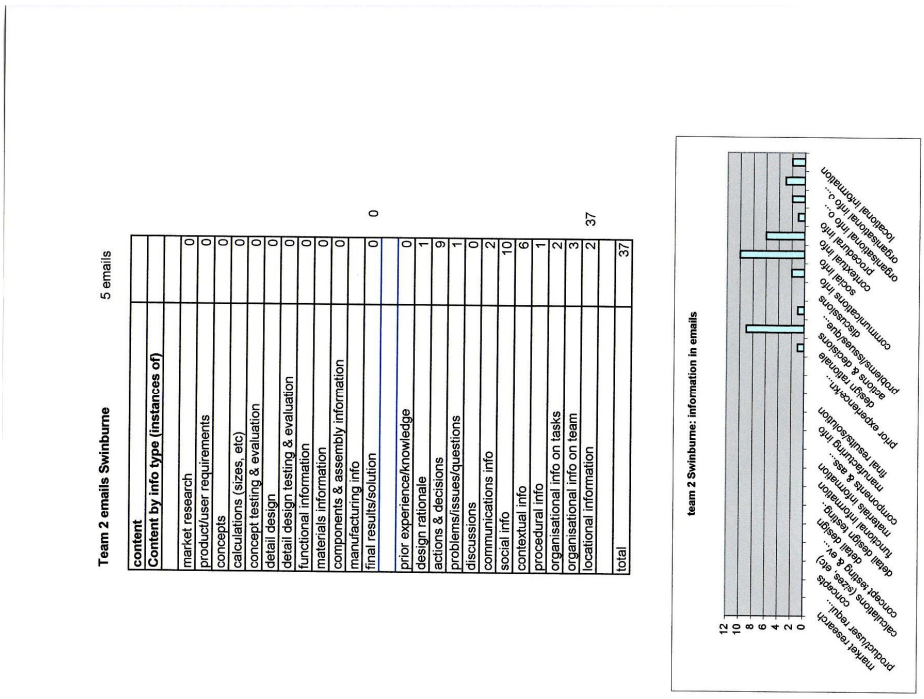



Example: Case 3, Team 2 (Strath./Swinburne); Q3. How was information stored.

**Team 2 Info Stored Swinburne**
**HOW?**
**media types/formats**
**instances of info types in media types**

| | text (web page, text doc annotation) | photos of physical models/objects, people | total | |
|---|---|---|---|---|
| market research | 9 | | 9 | |
| product/user requirements | | | 0 | |
| concepts | | 5 | 5 | |
| calculations (sizes, etc) | 6 | 4 | 10 | |
| concept testing & evaluation | | | 0 | |
| detail design | 4 | 3 | 7 | |
| detail design testing & evaluation | | 5 | 5 | |
| functional information | 8 | 8 | 16 | |
| materials information | 6 | 22 | 28 | 39 |
| components & assembly information | 5 | 15 | 20 | 63 |
| manufacturing info | 0 | 0 | 0 | |
| final results/solution | 1 | 1 | 2 | |
| | | | 0 | 102 formal |
| prior experience/knowledge | | | 0 | |
| design rationale | 11 | | 11 | |
| actions & decisions | 24 | | 24 | |
| problems/issues/questions | 8 | | 8 | |
| discussions | 1 | | 1 | |
| communications info | | | 0 | |
| social info | 5 | | 5 | |
| contextual info | 18 | 12 | 30 | |
| procedural info | 12 | 1 | 13 | |
| organisational info on tasks | 3 | | 3 | |
| organisational info on team | | | 0 | 99 informal |
| locational information | 4 | | 4 | |
| | 39 | 63 | 201 | |
| totals | 86 | 13 | | |
| | 125 | 76 | | |

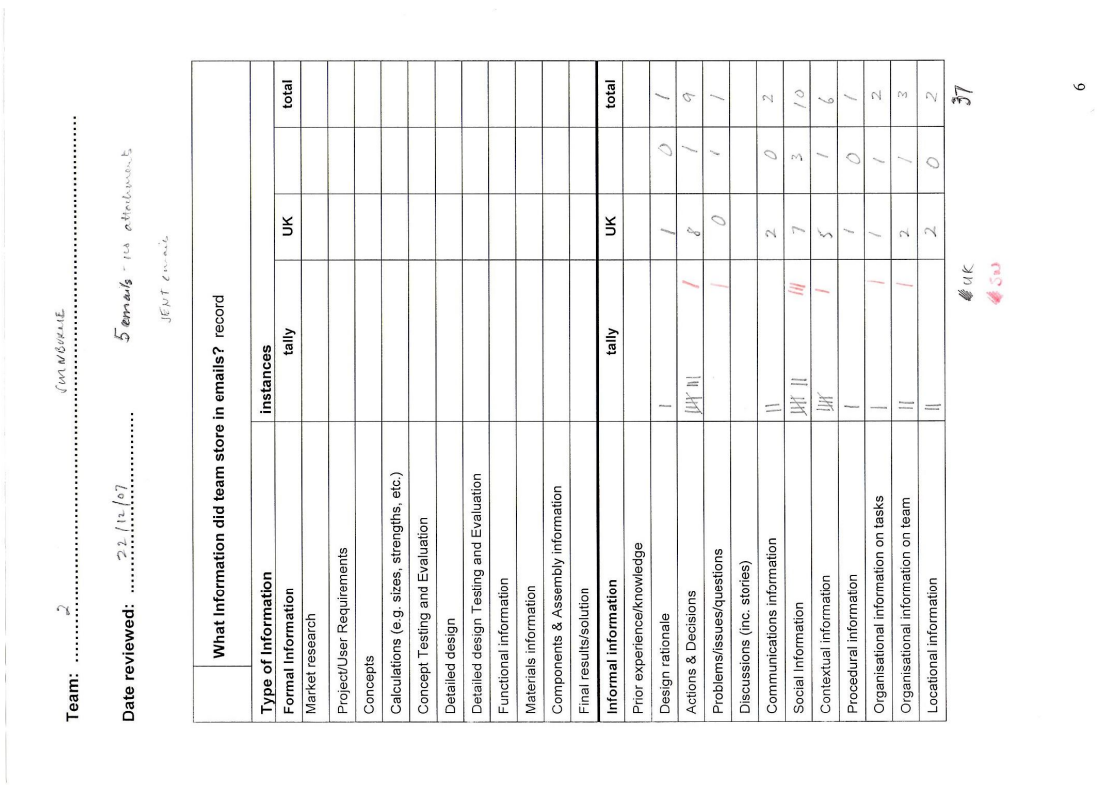
Example: Case 3, Team 2 (Strath./Swinburne); Quantifying of email info content.



**Team 2 emails Swinburne** 5 emails

| content | |
|---|---|
| **Content by info type (instances of)** | |
| market research | 0 |
| product/user requirements | 0 |
| concepts | 0 |
| calculations (sizes, etc) | 0 |
| concept testing & evaluation | 0 |
| detail design | 0 |
| detail design testing & evaluation | 0 |
| functional information | 0 |
| materials information | 0 |
| components & assembly information | 0 |
| manufacturing info | 0 |
| final results/solution | 0 |
| | 0 |
| prior experience/knowledge | 0 |
| design rationale | 1 |
| actions & decisions | 9 |
| problems/issues/questions | 1 |
| discussions | 0 |
| communications info | 2 |
| social info | 10 |
| contextual info | 6 |
| procedural info | 1 |
| organisational info on tasks | 2 |
| organisational info on team | 3 |
| locational information | 2 |
| total | 37 |





**Team:** 2 SWINBURNE

**Date reviewed:** 22/12/07 5 emails - no attachments

SENT email

**What Information did team store in emails?** record

| Type of Information | instances | | | |
|---|---|---|---|---|
| **Formal Information** | **tally** | **UK** | | **total** |
| Market research | | | | |
| Project/User Requirements | | | | |
| Concepts | | | | |
| Calculations (e.g. sizes, strengths, etc.) | | | | |
| Concept Testing and Evaluation | | | | |
| Detailed design | | | | |
| Detailed design Testing and Evaluation | | | | |
| Functional information | | | | |
| Materials information | | | | |
| Components & Assembly information | | | | |
| Final results/solution | | | | |
| **Informal information** | **tally** | **UK** | | **total** |
| Prior experience/knowledge | | | | |
| Design rationale | I | 1 | 0 | 1 |
| Actions & Decisions | 卌 III | 1 | 8 | 9 |
| Problems/issues/questions | | 1 | 0 | 1 |
| Discussions (inc. stories) | | | | |
| Communications information | II | 2 | 0 | 2 |
| Social Information | 卌 II | 7 | 3 | 10 |
| Contextual information | 卌 | 5 | 1 | 6 |
| Procedural information | I | 1 | 0 | 1 |
| Organisational information on tasks | I | 1 | 1 | 2 |
| Organisational information on team | II | 2 | 1 | 3 |
| Locational information | II | 2 | 0 | 2 |

UK 37
SW

6

Example: Case 2, USA Team 6 Questionnaire



**Information & Knowledge in the Distributed/Global (Product) Design Process**
**Where is Information & Knowledge recorded in distributed team projects?**

**Purpose of the Study**
This study will examine where information & Knowledge is stored in Distributed/Global student design team projects. What is being recorded? How much? Can an accurate picture of the design story be generated from the information that is stored? What are the gaps? The context for the study is the Global Design Project involving global student teams (from USA and UK) solving a Coffee Transportation problem.

**Instructions for interview/questionnaire**
Please complete the following questions about Information & Knowledge recorded/stored whilst working as a team on the Global Design Project, as a team rather than individually. Please give responses from the perspective of the global team (i.e. both USA and UK sides).
Each question is described and an example given. Please read carefully as some questions may have multiple responses. The questionnaire should take approximately 30 minutes to complete.

**Team -** 6

**Names** (optional) -

Tori, Tom, Marc.

**Glossary (Some definitions for purposes of this study):**

**Information:** information also includes data and knowledge. It can be both, 'existing' (found or known by team) and 'generated' (created by the team in the process of undertaking the project), at all stages of the design process.
**Type of Information:** is based on its content i.e. concepts/ideas, decisions, functional information, rather than media type, sketch, report.
**Prior Experience/Knowledge:** anything previously known or experienced from any source that can be brought to the new design problem.
**Stories:** past recollections told to illustrate points or describe events
**Communications Information:** information relating to arrangements to communicate, e.g. planning times for video conferences, meetings, etc.
**Social Information:** personal information about individuals in a team; or, motivational information; or informal 'chit-chat'.
**Contextual Information:** background information; information on aspects relating to the context around the task/work to be carried out, e.g. times available to work, including holidays
**Procedural Information:** information on 'how to do things'; procedures for engagement of work
**Organisational Information on tasks:** project management relating to the task, e.g. allocation of roles; assigning of leadership, etc.
**Organisational Information on team:** project management relating to the team, e.g. log of events; stages of work, processes and progress
**Functional Information:** any information on how a product, part, component, etc. performs (e.g. mechanisms).
**Rough calculations:** information on early/initial calculations in connection with the performance of product/concepts, (e.g. costs, forces, etc.).

Hilary Grierson, DMEM, Strathclyde University, Glasgow, h.j.grierson@strath.ac.uk, (0141-548-4573)





**1** **What amount of Information and Knowledge was stored?**
For each of the information types state whether the team stored this information during the Global Design Project – *yes*, **Y**, or *no*, **N**. If *yes* then what percentage of this type of information was stored?
***E.g. If half of the Market Research was stored by the team, please indicate Y, 26-50%.***

| Type of Information | Y | N | 1-25% | 26-50% | 51-75% | 76-100% |
|---|---|---|---|---|---|---|
| Project scope (brief) | ☑ | ☐ | ☐ | ☐ | ☐ | ☑ |
| Market research (competition, trends, patents, user surveys) | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| User surveys/observations (generated) | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Project/User Requirements (generated) | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ |
| Functional information (e.g. mechanisms, etc.) | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Materials information | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Components & Assembly information | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Manufacturing processes information | ☑ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Concepts (including brainstorming) | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Rough calculations (e.g. costs, strengths, etc.) | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Testing (at Concept Stage) | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ |
| Concept Evaluation | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Developed concepts | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Testing of Developed concepts | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Final results/solution | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ |
| Prior experience/knowledge | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Previous academic projects | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Design rationale (process) | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Actions & Decisions | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Problems/issues/questions | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Discussions (inc. stories) | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Communications information | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Social Information | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Contextual information | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Procedural information | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| Organisational information on tasks | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |
| Organisational information on team | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ |

**2** **Where is information and knowledge stored? (location/technology)**
Where did the team store each information type during the Global Design Project? Give all locations/ technologies used for each information type as there may well have been several places and technologies used. Be as specific as possible. ***E.g. For Developed concepts, select - Paper, LauLima groupware, Other…and write 'Google documents' or 'Socialtxt'.***

| Type of Information | Paper (notebook, sketchbook) | Computer/laptop | LauLima - wikis | LauLima - file gallery | LauLima – email | Web page | MSN Messenger | Bookmarks | Uni. email | Hotmail | Mobile/cell | MP3/MP4 | Other (note below) | Other (note below) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project scope (brief) | ☐ | ☑ | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Market Research | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| User surveys/observations | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Project/User Requirements | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Functional info. (mechanisms) | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Materials information | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Components & Assembly info. | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Manufacturing processes info. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Concepts (inc. brainstorming) | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Rough calculations | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Testing (at Concept Stage) | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Concept Evaluation | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Developed concepts | ☐ | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Testing of Developed concepts | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ |
| Final results/solution | ☐ | ☑ | ☑ | ☑ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Prior experience/knowledge | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Previous academic projects | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Design rationale (process) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Actions & Decisions | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Problems/issues/questions | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Discussions (inc. stories) | ☐ | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Communications information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Social Information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Contextual information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Procedural information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Organisational info. on tasks | ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Organisational info. on team | ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

Other..... (name for last columns)

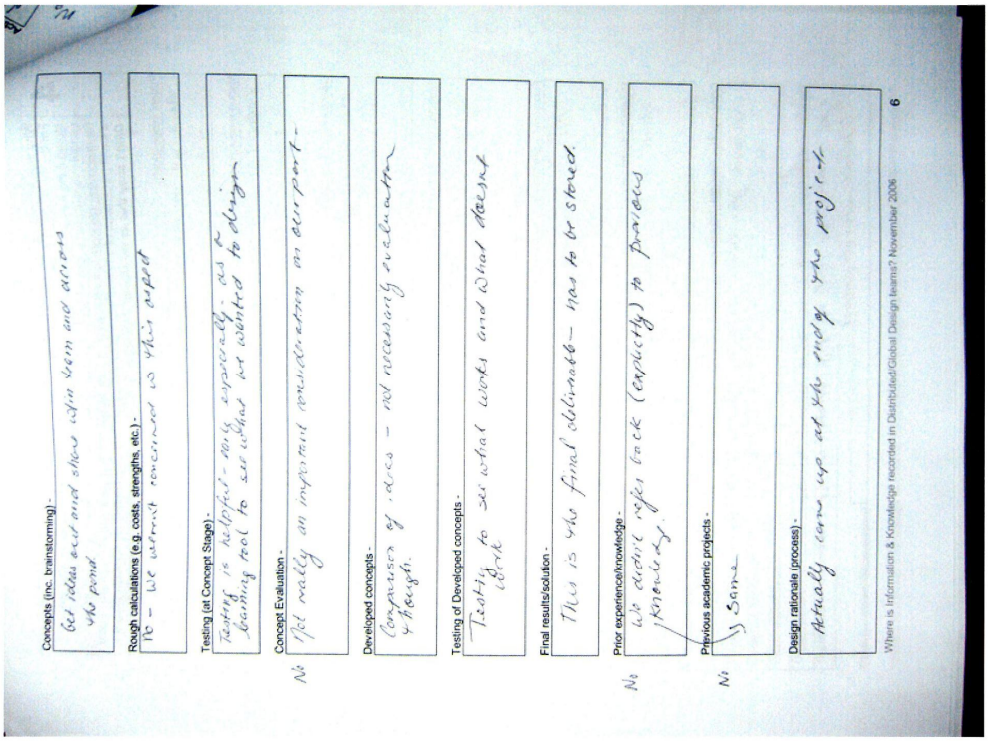




**3** **How was information stored? (media type)**
**In what format was each information type recorded? Give all formats as there may have been more than one type. *E.g. For User surveys/observations, select - scanned notes/sketches, photographs, videos, sound recording, report.***
**If 'Other……', please note below.**

| Type of Information | hand drawn notes/sketches | scanned notes/sketches | physical models/prototypes | photographs | video | sound recording | CAD - 2D & 3D | Online log | VC files | meeting minutes | spreadsheets | report | presentation | Other (note below) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project scope (brief) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ |
| Market Research | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| User surveys/observations | ☑ | ☐ | ☐ | ☑ | ☑ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |
| Project/User Requirements | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ |
| Functional info. (mechanisms) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Materials information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Components & Assembly info. | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |
| Manufacturing processes info. | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☑ | ☐ | ☐ | ☑ | ☐ |
| Concepts (inc. brainstorming) | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ |
| Rough calculations | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Testing (at Concept Stage) | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Concept Evaluation | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Developed concepts | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Testing of Developed concepts | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Final results/solution | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ |
| Prior experience/knowledge | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Previous academic projects | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Design rationale (process) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Actions & Decisions | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Problems/issues/questions | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Discussions (inc. stories) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Communications information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Social Information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Contextual information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Procedural information | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Organisational info. on tasks | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Organisational info. on team | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Other..... (name for last column)



**4** **Why was information stored or not stored? (Rationale)**
For the information the team stored (refer to Question 1 above, **Y/N**) - State why your team stored it this way (think about amount, location/technology and media type). If you didn't store certain information (i.e. you answered **N** above for any of the information types), why did the team chose not to store this information. It is as important to find out why no information or only a small percentage of a type of information was stored. ***E.g. For Testing (at Concept stage) – Didn't store this as we shared it during a VC f2f and didn't record the VC meeting.***

Project scope (brief) -
Stored but not referred to.

Market research (competition, trends, patents, user surveys) -
Concept generation stage brainstorming

User surveys/observations -
Brainstorming and concept generation; concept refinement

Project/User Requirements (generated) -
Generated b/c asked to; not necessarily b/c we intended to refer to them

Functional information (e.g. mechanisms, etc.) -
Not generated b/c not needed for project

Materials information -
Stored in the concepts - existing carriers

Components & Assembly information -
Reference for how existing carriers constructed

Manufacturing processes information -
Not - because not a big consideration in concept development.

Where is Information & Knowledge recorded in Distributed/Global Design teams? November 2006 5



Concepts (inc. brainstorming) -
Get ideas out and share w/in team and across the pond

Rough calculations (e.g. costs, strengths, etc.) -
No - We weren't concerned w this aspect

Testing (at Concept Stage) -
Testing is helpful - only especially - as a learning tool to see what we wanted to design

Concept Evaluation -
No Not really an important consideration on our part -

Developed concepts -
Comparison of ideas - not necessarily evaluation though.

Testing of Developed concepts -
Testing to see what works and what doesn't work

Final results/solution -
This is the final deliverable - has to be stored.

Prior experience/knowledge -
No We didn't refer back (explicitly) to previous knowledge.

Previous academic projects -
No Same

Design rationale (process) -
Actually came up at the end of the project

Where is Information & Knowledge recorded in Distributed/Global Design teams? November 2006 6

Actions & Decisions -
Not officially declared.

Problems/issues/questions -
Not to be officially declared
Not aware will they explored.

Discussions (including stories) -
Not captured on the go.

Communications information -
- On meeting wiki → copied
- to remind everybody

Social Information -
Copy previous wiki

Contextual information -
Not easy to find/use

Procedural information -
(1)

Organisational information on tasks -
(1)

Organisational information on team -
To remind ppl.





**5** **Perceived value of information types?**
For each of the information types what value was placed in terms of it progressing the project and achieving a common goal in the context of Distributed/Global Design?
*E.g. For 'Decisions', select – 'Great Value*

| Type of Information | No value | Some value | Great value |
|---|---|---|---|
| Project scope (brief) | ☐ | ☑ | ☐ |
| Market research (competition, trends, patents, user surveys) | ☐ | ☑ | ☐ |
| User surveys/observations (generated) | ☐ | ☐ | ☑ |
| Project/User Requirements (generated) | ☐ | ☑ | ☐ |
| Functional information (e.g. mechanisms, etc.) | ☐ | ☑ | ☐ |
| Materials information | ☐ | ☐ | ☑ |
| Components & Assembly information | ☐ | ☐ | ☑ |
| Manufacturing processes information | ☐ | ☐ | ☑ |
| Concepts (including brainstorming) | ☐ | ☐ | ☑ |
| Rough calculations (e.g. costs, strengths, etc.) | ☐ | ☑ | ☐ |
| Testing (at Concep' Stage) | ☐ | ☐ | ☑ |
| Concept Evaluation | ☐ | ☑ | ☐ |
| Developed concepts | ☐ | ☐ | ☑ |
| Testing of Developed concepts | ☐ | ☐ | ☑ |
| Final results/solution | ☐ | ☐ | ☑ |
| Prior experience/knowledge | ☐ | ☑ | ☐ |
| Previous academic projects | ☐ | ☑ | ☐ |
| Design rationale (process) | ☐ | ☐ | ☑ |
| Actions & Decisions | ☐ | ☐ | ☑ |
| Problems/issues/questions | ☐ | ☐ | ☑ |
| Discussions (inc. stories) | ☐ | ☐ | ☑ |
| Communications information | ☐ | ☑ | ☐ |
| Social Information | ☐ | ☐ | ☑ |
| Contextual information | ☐ | ☐ | ☑ |
| Procedural information | ☐ | ☐ | ☑ |
| Organisational information on tasks | ☐ | ☐ | ☑ |
| Organisational information on team | ☐ | ☐ | ☑ |

**6** **When was the Information and Knowledge stored?**
For each of the information types select when it was stored throughout the design process.
Each type of information may have been recorded at one stage, a few stages or throughout the project. ***E.g. For Materials information, select Stage 2, Stage 3.***

| Type of Information | Stage 1 – Needs Finding & Research | Stage 2 – Concept Generation/ Evaluation | Stage 3 – Detailed Design/ Prototypes | All stages of the design project |
|---|---|---|---|---|
| Project scope (brief) | ☑ | ☐ | ☐ | ☐ |
| Market research (competition, trends, patents, user surveys) | ☑ | ☑ | ☐ | ☐ |
| User surveys/observations (generated) | ☑ | ☑ | ☑ | ☑ |
| Project/User Requirements (generated) | ☑ | ☑ | ☐ | ☐ |
| Existing creative ideas | ☑ | ☑ | ☑ | ☑ |
| Functional information (e.g. mechanisms, etc.) | ☐ | ☐ | ☐ | ☐ |
| Materials information | ☐ | ☐ | ☐ | ☐ |
| Components & Assembly information | ☐ | ☐ | ☐ | ☐ |
| Manufacturing processes information | ☐ | ☐ | ☐ | ☐ |
| Concepts (inclucing brainstorming) | ☐ | ☐ | ☐ | ☐ |
| Rough calculations (e.g. costs, strengths, etc.) | N/A | ☐ | ☐ | ☐ |
| Testing (at Concept Stage) | ☐ | ☑ | ☑ | ☐ |
| Concept Evaluation | N/A | ☐ | ☐ | ☐ |
| Developed concepts | ☐ | ☑ | ☑ | ☐ |
| Testing of developed concepts | ☐ | ☑ | ☑ | ☐ |
| Final results/solution | ☐ | ☑ | ☑ | ☐ |
| Prior experience/knowledge | N/A | ☐ | ☐ | ☐ |
| Previous academic projects | N/A | ☐ | ☐ | ☐ |
| Design rationale (process) | ☐ | ☐ | ☑ | ☐ |
| Actions and Decisions | ☐ | ☑ | ☑ | ☐ |
| Problems/issues/questions | ☐ | ☐ | ☐ | ☒ |
| Discussions (inc. stories) | ☐ | ☐ | ☐ | ☑ |
| Communications information | ☐ | ☐ | ☐ | ☑ |
| Social Information | ☐ | ☐ | ☐ | ☑ |
| Contextual information | ☐ | ☐ | ☐ | ☑ |
| Procedural information | ☐ | ☐ | ☐ | ☑ |
| Organisational information on tasks | ☐ | ☐ | ☐ | ☑ |
| Organisational information on team | ☐ | ☐ | ☐ | ☑ |

Where is Information & Knowledge recorded in Distributed/Global Design teams? November 2006 9

| | Partners | Strathclyde 56521 Global Design Class with…. | Global Design Project | Project Duration and Tasks | Tools used to store information | Case/ Team | Students |
|---|---|---|---|---|---|---|---|
| **Study 1** | Stanford University, Stanford, U.S.A. | ME397 Design Theory and Methodology - Distributed Design with Digital Libraries Class | Design and prototype of a **Coffee Cup Holder** to hold six cups using only cardboard | 3 weeks<br><br>Week 1 – needs finding<br>Week 2 – concept generation and selection<br>Week 3 - prototyping | *LauLima Learning Environment* for storing information<br><br>*PolyCom* VC for presentation<br><br>Email | Case 1 Team 5 | 3 UK 5th year Product Design Engineering (PDE) students<br>2 USA students Mechanical Engineering Design Methodology research students |
| | | | | | | Case 2 Team 6 | 3 UK 5th year PDE students<br>3 USA Mechanical Engineering Design Methodology research students |
| **Study 2** | Swinburne University of Technology, Melbourne, Australia | HDPD524 'Professional Attributes' Class | | 2 Weeks<br>Task-based<br><br>Week 1 – Background research<br>Week 2 – Strathclyde create concepts; Swinburne students then made and tested the prototype | *Socialtext* for storing information<br>No VC<br>Email | Case 3 Team 2 | 2 Strathclyde 5th year PDE students<br>3 Swinburne 4th year PDE students<br>(all final years) |
| | | | | | *Google Docs* for storing information<br>No VC<br>Email | Case 4 Team 3 | 2 Strathclyde 5th year PDE students<br>3 Swinburne 4th year PDE students<br>(all final years) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Study 3** | University of Malta, Msida, Malta | Voluntary basis | Design of a **Marathon Water Station**, market research to concept design only | 2 Weeks<br>Task-based<br><br>Week 1 – Preparation; research and initial concepts<br>VC meeting to discuss concepts and select one<br>Week 2 – Concept development and presentation | *Wetpaint* for storing information<br>*PolyCom* for VC<br><br>Email | Case 5 Malta Team 2 | 2 Strathclyde 5th year PDE students (same students as Study 2 Case 3)<br>3 Maltese 3rd year Mechanical Engineering students |
| | | | | | *Google Groups* for storing information<br>*FlashMeeting* for VC<br>Email | Case 6 Malta Team 3 | 2 Strathclyde 5th year PDE students (same students as Study 2 Case 4)<br>3 Maltese 3rd year Mechanical Engineering students |
| **Study 4 Validating Study** | Swinburne University of Technology, Melbourne, Australia | HDPD524 'Professional Attributes' Class | Design and prototype of a **Coffee Cup Holder** to hold six cups using only cardboard | 3 Weeks<br><br>Week 1 – research, concepts generation & evaluation (global)<br>Week 2 – detail design (Swinburne)<br>Week 3 – prototyping (Strathclyde) | *Wetpaint* for storing information<br><br>Email | Case 7 Team B | 3 Strath. Students – 1, 5th year PDE students; 2, GIM PG students<br>3 Swinburne 4th year PDE students<br>(all final years) |

Note Study 4, Case 7 is the Validating Study

| | | **Where information was stored** | |
|---|---|---|---|
| **Study 1 (Asynchronous)** | **Case 1** | *LauLima* file galleries – files | 69 files across 2 file galleries (68 image files & 1 text file) |
| | | *LauLima* wikis | 31 wikis - 4 levels; 56 links to other wikis or files |
| | | University email system | 39 emails – 5 attachments (also in Laulima) |
| | **Case 2** | *LauLima* file galleries – files | 41 files across 2 file galleries (27 image files, 8 text files, 5 wikis, 1 PPT) |
| | | *LauLima* wikis | 10 wikis - 2 levels; 9 links to other wikis or files |
| | | University email system | 41 emails – 31 attachments (also in Laulima) |
| **Study 2 (Asynchronous)** | **Case 3** | *Socialtext* – *wiki pages* | 5 wikis - homepage + 4<br>33 files (all image files embedded in wiki pages) |
| | | University email system | 5 emails - no attachments |
| | **Case 4** | *Google Docs* – *web pages* | 5 web pages - homepage + 4<br>2 files (pdfs of PPTs also on Google Docs web pages) |
| | | University email system | 8 emails – 1 attachment (uploaded to *Google Docs*) |
| **Study 3 (Synchronous)** | **Case 5** | *Wetpaint* – *wikis* | 9 wikis – 3 levels (14 links to wikis and to 1 pdf )<br>1 file (pdf linked to wiki) |
| | | University email system | 11 emails |
| | **Case 6** | *Google Groups* – *web pages* | 1 web page – storing files; no other information<br>5 files – 2 image files (several images, 3 Word docs with text and images |
| | | University email system | 5 emails |
| **Study 4 (Asynchronous)** | **Case 7 Validating case** | *Wetpaint* – *wikis* | 21 wikis<br>37 image files in photo gallery<br>1 PPT presentation<br>18 posts |
| | | University email system | 5 emails – 3 *SolidWorks* attachments |

Appendix 4.3 What information was stored across the Case Studies: Formal & Informal Information

| | | **What:** files, wikis, emails | **What:** instances of information content | **What:** Formal and Informal instances of information content | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Formal** | | **Informal** | |
| **Study 1** | **Case 1** | files | 161 | 129 | 80% | 32 | 20% |
| | | *LauLima* wikis | 233 | 140 | 60% | 93 | 40% |
| | | emails | 170 | 2 | 1% | 168 | 99% |
| | | **overall** | **564** | **271** | **48%** | **293** | **52%** |
| | **Case 2** | files | 378 | 258 | 68% | 120 | 32% |
| | | *LauLima* wikis | 39 | 0 | 0% | 39 | 100% |
| | | emails | 131 | 20 | 15% | 111 | 85% |
| | | **overall** | **548** | **278** | **51%** | **270** | **49%** |
| **Study 2** | **Case 3** | *Socialtext* wikis | 201 | 102 | 51% | 99 | 49% |
| | | emails | 37 | 0 | 0% | 37 | 100% |
| | | **overall** | **238** | **102** | **43%** | **136** | **57%** |
| | **Case 4** | *Google Docs* web pages | 112 | 59 | 53% | 53 | 47% |
| | | emails | 44 | 3 | 7% | 41 | 93% |
| | | **overall** | **156** | **62** | **40%** | **94** | **60%** |
| **Study 3** | **Case 5** | Wetpaint wikis | 219 | 98 | 45% | 121 | 55% |
| | | emails | 42 | 0 | 0% | 42 | 100% |
| | | **overall** | **261** | **98** | **38%** | **163** | **62%** |
| | **Case 6** | files | 213 | 137 | 64% | 76 | 36% |
| | | *Google Groups* webpage | 0 | 0 | 0% | 0 | 0% |
| | | emails | 24 | 0 | 0% | 24 | 100% |
| | | **overall** | **237** | **137** | **68%** | **100** | **42%** |
| **Study 4** | **Case 7 Validating case** | Wetpaint wikis | 402 | 212 | 53% | 190 | 47% |
| | | emails | 17 | 0 | 0% | 17 | 100% |
| | | **overall** | **419** | **212** | **50.5%** | **207** | **49.5%** |

| | | **What:** Top 5 instances of information content in files | % | **What:** Top 5 instances of information content in wikis/ web pages | % | **What:** Top 5 instances of information content in emails | % | **What:** no instances of information content |
|---|---|---|---|---|---|---|---|---|
| **Study 1** | **Case 1** | Materials information | 17 | Materials information | 12 | Actions & decisions | 19 | Rough calculations |
| | | Detail design/prototype | 15 | Concepts | 10 | Problems/issues/questions | 18 | Concept testing |
| | | Functional information | 14 | Design rationale | 9.5 | Contextual information | 13 | |
| | | Detail design/prototype testing | 10 | Detail design/prototype | 8 | Social information | 12 | |
| | | Concepts | 9 | Contextual information | 7 | Organisational information on team | 10.5 | |
| | | | | | | | | |
| | **Case 2** | Product/user requirements | 17 | Contextual information | 36 | Actions & decisions | 25 | Manufacturing information |
| | | Materials information | 11 | Organisational information on task | 18 | Communications information | 17.5 | Rough calculations |
| | | Functional information | 8 | Organisational information on team | 18 | Problems/issues/questions | 10 | |
| | | Contextual information | 7 | Social information | 15 | Organisational information on team | 8 | |
| | | Organisational information on tasks | 7 | Prior knowledge/experience | 5 | Procedural information | 7 | |
| | | | | | | | | |

| | | **What:** Top 5 instances of information content in files | % | **What:** Top 5 instances of information content in wikis/ web pages | % | **What:** Top 5 instances of information content in emails | % | **What:** no instances of information content |
|---|---|---|---|---|---|---|---|---|
| **Study 2** | **Case 3** | All files were images. Embedded in wikis pages. Examined as wiki content | | Contextual information | 15 | Social information | 27 | Market research |
| | | | | Materials information | 14 | Actions & decisions | 24 | Concept testing and evaluation |
| | | | | Actions & decisions | 12 | Contextual information | 16 | Prior experience/knowledge |
| | | | | Components & assembly | 10 | Organisational information on team | 8 | |
| | | | | Functional information | 8 | Organisational information on tasks | 5 | |
| | | | | | | | | |
| | **Case 4** | All files (pdfs of ppts) also as Google Doc web pages. Examined as wiki content. | | Components & assembly | 18 | Actions & decisions | 25 | Product/user requirements |
| | | | | Materials information | 15 | Social information | 18 | Concept testing and evaluation |
| | | | | Actions & decisions | 14 | Contextual information | 16 | Prior experience/knowledge |
| | | | | Contextual information | 7 | Locational information | 9 | Discussions |
| | | | | Design rationale | 7 | Design rationale | 7 | |
| | | | | | | | | |

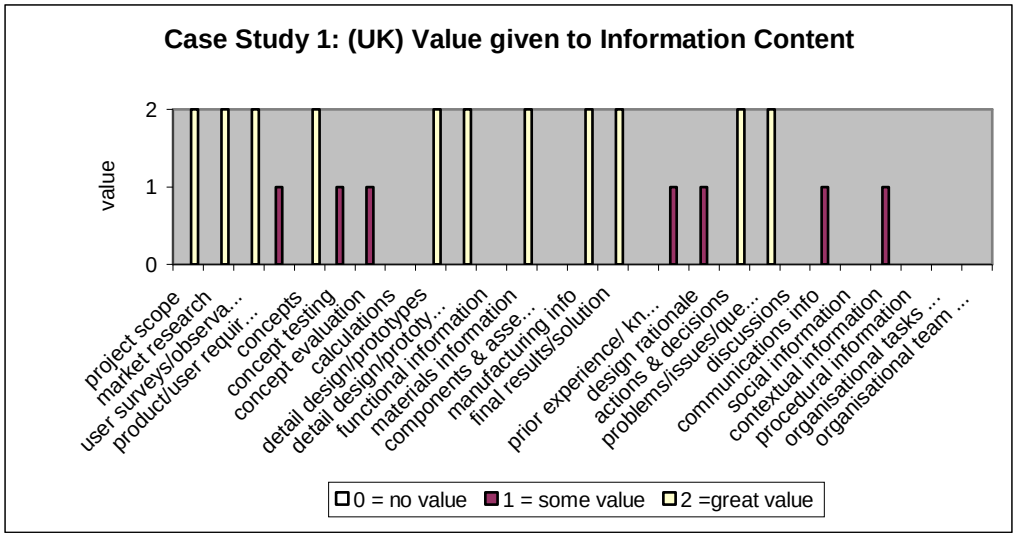
| | | **What:** Top 5 instances of information content in files | % | **What:** Top 5 instances of information content in wikis/ web pages | % | **What:** Top 5 instances of information content in emails | % | **What:** no instances of information content |
|---|---|---|---|---|---|---|---|---|
| **Study 3** | **Case 5** | 1 file linked to Wetpaint wikis. Examined as wiki content. | | Functional information | 12 | Actions & decisions | 24 | Concept testing/evaluation |
| | | | | Contextual information | 12 | Organisational information on team | 17 | Detail design/prototype testing |
| | | | | Product/user requirements | 11 | Problems/issues/questions | 14 | Discussions |
| | | | | Social information | 9.5 | Communication information | 2 | |
| | | | | Actions & decisions | 8 | Social information | 2 | |
| | | | | | | | | |
| | **Case 6** | Functional information | 23 | All information stored in 5 files, located on 1 webpage in Google Docs Examined as file content | | Actions & decisions | 42 | Concept testing/evaluation |
| | | Product/user requirements | 18 | | | Organisational information on team | 12.5 | Detail design/prototype testing |
| | | Contextual information | 13 | | | Social information | 12.5 | Prior knowledge |
| | | Concepts | 10 | | | Locational information | 8 | Discussions |
| | | Design rationale | 7.5 | | | Organisational information on tasks | 8 | Communications information |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Study 4** | **Case 7 Validating case** | All files embedded in wikis, therefore examined as wiki content. | | Problems/issues/questions | 12 | Social information | 29 | Prior experience |
| | | | | Functional information | 10 | Organisational information on team | 18 | Discussions |
| | | | | Concepts | 9 | Actions & decisions | 12 | |
| | | | | Product/user requirements | 8 | Problems/issues/questions | 12 | |
| | | | | Contextual information | 8 | Locational information | 12 | |

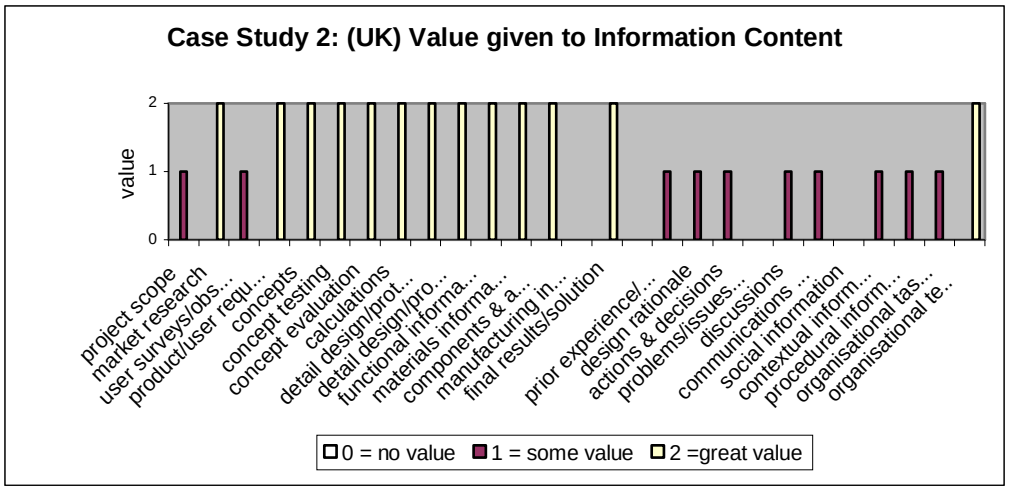
| | | | **What: Amount of information content students thought they stored from all information generated on distributed projects (source questionnaire (q1))** | | | | |
|---|---|---|---|---|---|---|---|
| | | | none | Up to 25% | 26-50% | 51-75% | 76-100% |
| **Study 1** | **Case 1** (UK response only; USA did a VC interview instead) | | *project scope, functional information, materials information, rough calculations, prior experience/knowledge, discussions, social information, contextual information, procedural information, or organisational information on tasks and team* | *user surveys/ observations, manufacturing information, concept testing, design rationale, problems/issues/action,* | *detail design/prototype, actions & decisions and communications information;* | *market research, components & assembly information, concept testing/evaluation and detailed design/prototype testing* | *project/user requirements, concepts and final results/solution;* |
| | **Case 2** (UK and USA responses) | **UK** | *functional information, materials information, components & assembly information, manufacturing information, rough calculations; detail design/prototypes, prior experience/knowledge, actions & decisions, problems/issues/questions, discussions, social information, contextual information, procedural information,* or *organisational information on tasks* and *team* | *concepts testing detailed design testing* | *concept evaluation* | *final results/solution, design rationale* and *communications information*; | *market research, user surveys/observations, project/user requirements* and *concepts* |
| | | **USA** | *functional information, manufacturing information, rough calculations, prior experience/knowledge, actions & decisions, problems/issues/questions, social information, contextual information* or *procedural information* | *materials information, concepts, concept evaluation, detail design/prototypes, design rationale, discussions and organisational information on tasks* and *team* | *market research, user surveys/ observations, components & assembly* and *detailed design/prototype testing* | *product/user requirements, concepts testing, final results/solution* and *communications information* | *project scope* |

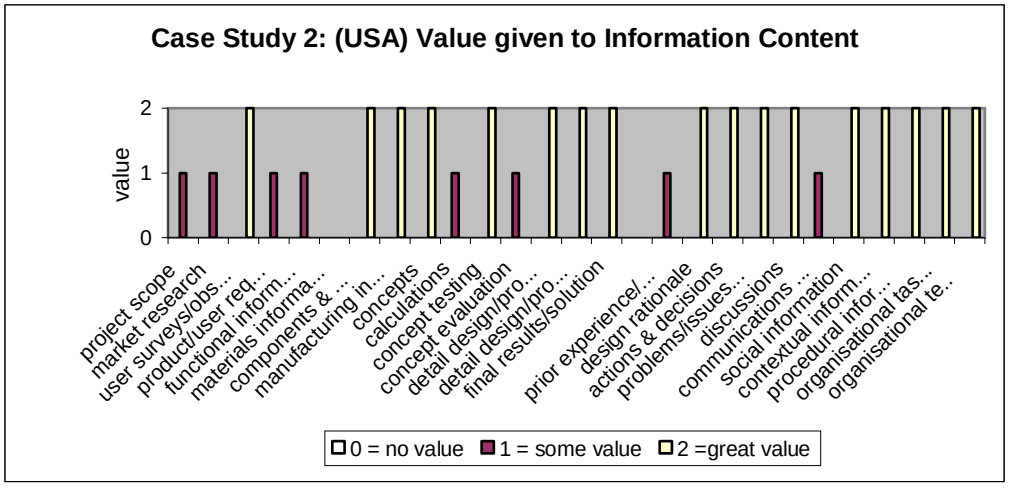
| | | |
|---|---|---|
| | | *Following Study 1 it was found that asking students what they thought they had stored did not give an accurate record of what had been stored. The analysis of the stored data/documents on wiki sites, in files and emails gave the accurate picture. Therefore in Studies 2 & 3 students were asked to only give an estimate of how much of <u>all the information</u> they had collected and generated during the project did they store.* |
| **Study 2** | **Case 3** | Overall - 60-70% |
| | **Case 4** | Overall - 60% |
| **Study 3** | **Case 5** | Overall - 50% stored.<br>No PolyCom conversations stored. |
| | **Case 6** | Overall - 45% (if VCs had been stored then 80%) |
| **Study 4** | **Case 7** (validating case) | About 80% |

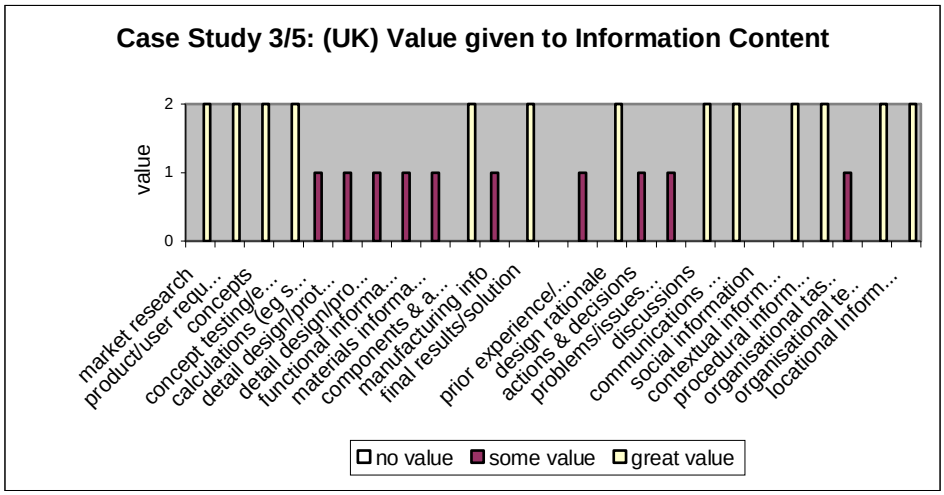
| | | **What:** information carriers |
|---|---|---|
| **Study 1** | **Case 1** | Photographs or scans - hand drawn sketches or notes<br>Photographs - physical models/ objects /people<br>Text – reports, meeting minutes (documents or wiki pages)<br>Spreadsheets/Gantt charts<br>Video (You-Tube; links not live; removed) |
| | **Case 2** | Text – reporting, meeting minutes (documents or wiki pages)<br>Photographs or scans - hand drawn sketches or notes<br>Photographs - physical models/people<br>Presentations (on wiki pages)<br>Images from internet<br>Video |
| **Study 2** | **Case 3** | Text – meeting minutes, feedback, annotation<br>Photographs - physical models/people/objects |
| | **Case 4** | Text – meeting minutes (documents or wiki pages)<br>Photographs - physical models/people/objects<br>Photographs or scans - hand drawn sketches or notes<br>CAD drawings |
| **Study 3** | **Case 5** | Text – meeting minutes (documents or wiki pages), reporting, notes on web pages, annotation<br>2D CAD drawings<br>Photographs - physical models/ objects /people<br>Spreadsheets/Gantt charts |
| | **Case 6** | Text – meeting minutes (documents or wiki pages)<br>Photographs or scans - hand drawn sketches or notes<br>Images from internet of background research |
| **Study 4** | **Case 7** | Text – meeting minutes (documents or wiki pages), annotation, reporting<br>Photographs or scans - hand drawn sketches or notes<br>Photographs or scans – engineering drawings<br>Photographs - physical models/ objects /people<br>Spreadsheets/Gantt charts<br>CAD drawings |



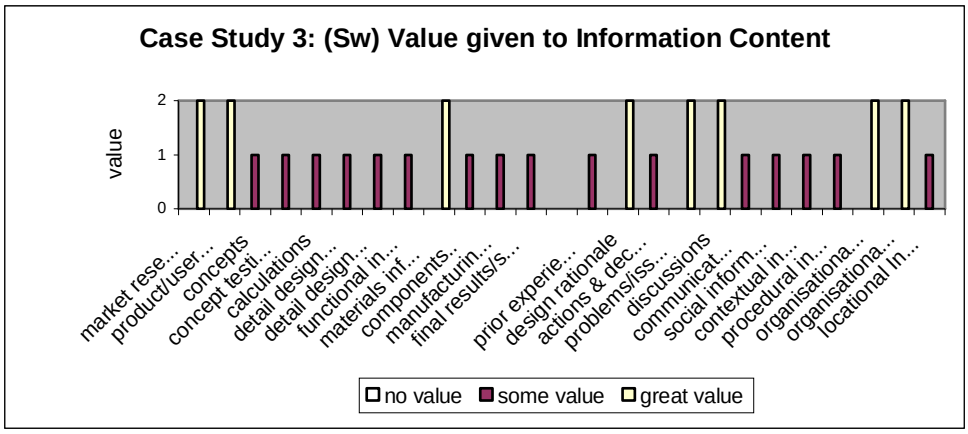

Note: Team 5 (USA) did not complete a questionnaire. At interview, USA-side were found to value - Formal information content: *market research, product requirements, concepts, detailed design/prototype* and the *final results/solution* the most; and, Informal information content: *actions & decisions* and *problems/issues/questions* were valued the most. (T5USA,i)

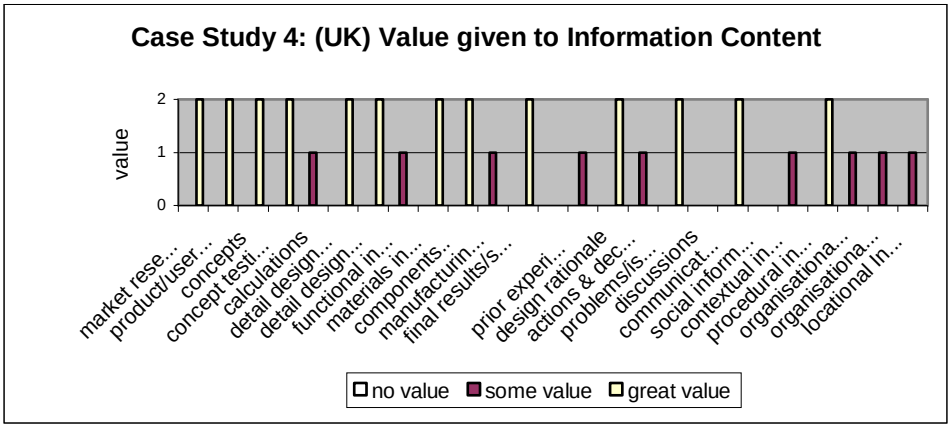


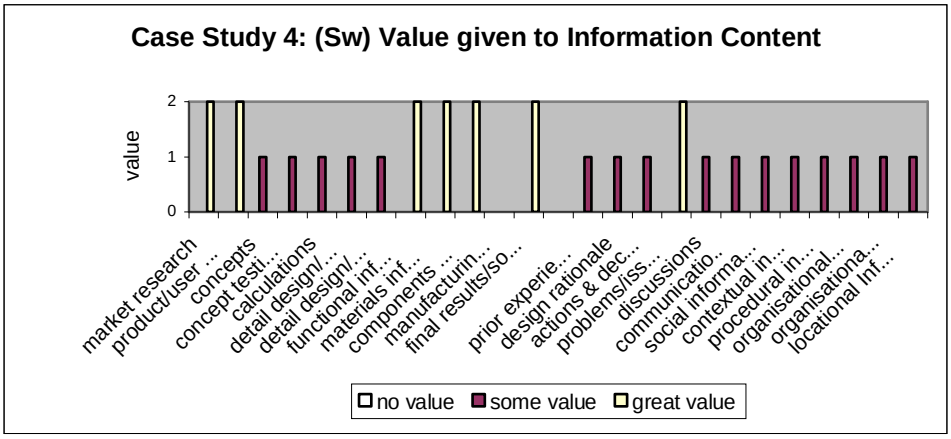



Note: same UK students for Case Study 3 and Case Study 5. 'Value' responses given at semi-structured interview.

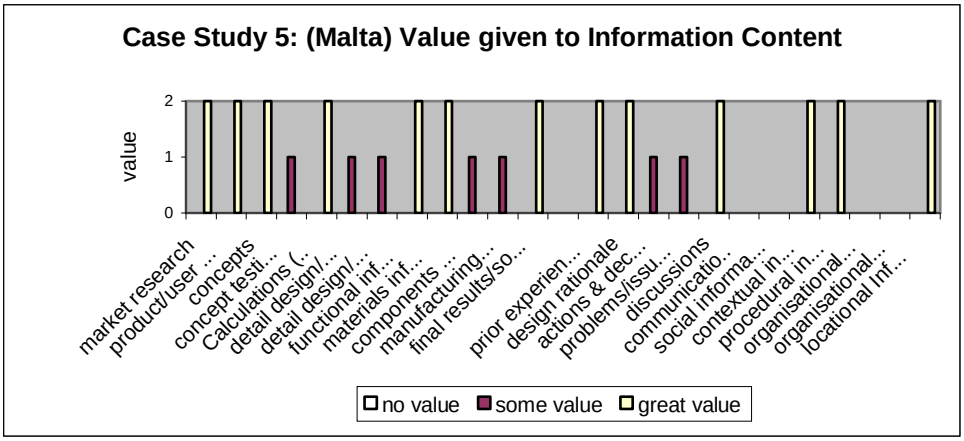




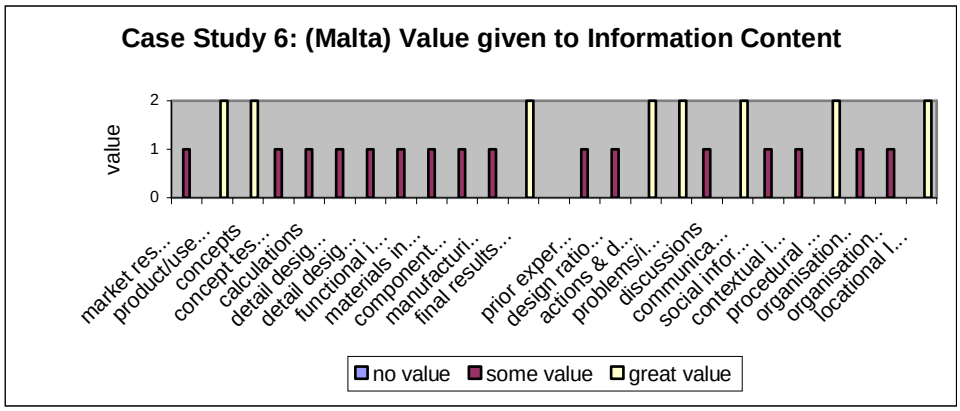

Note: same UK students for Case Study 4 and Case Study 6. 'Value' responses given at semi-structured interview.

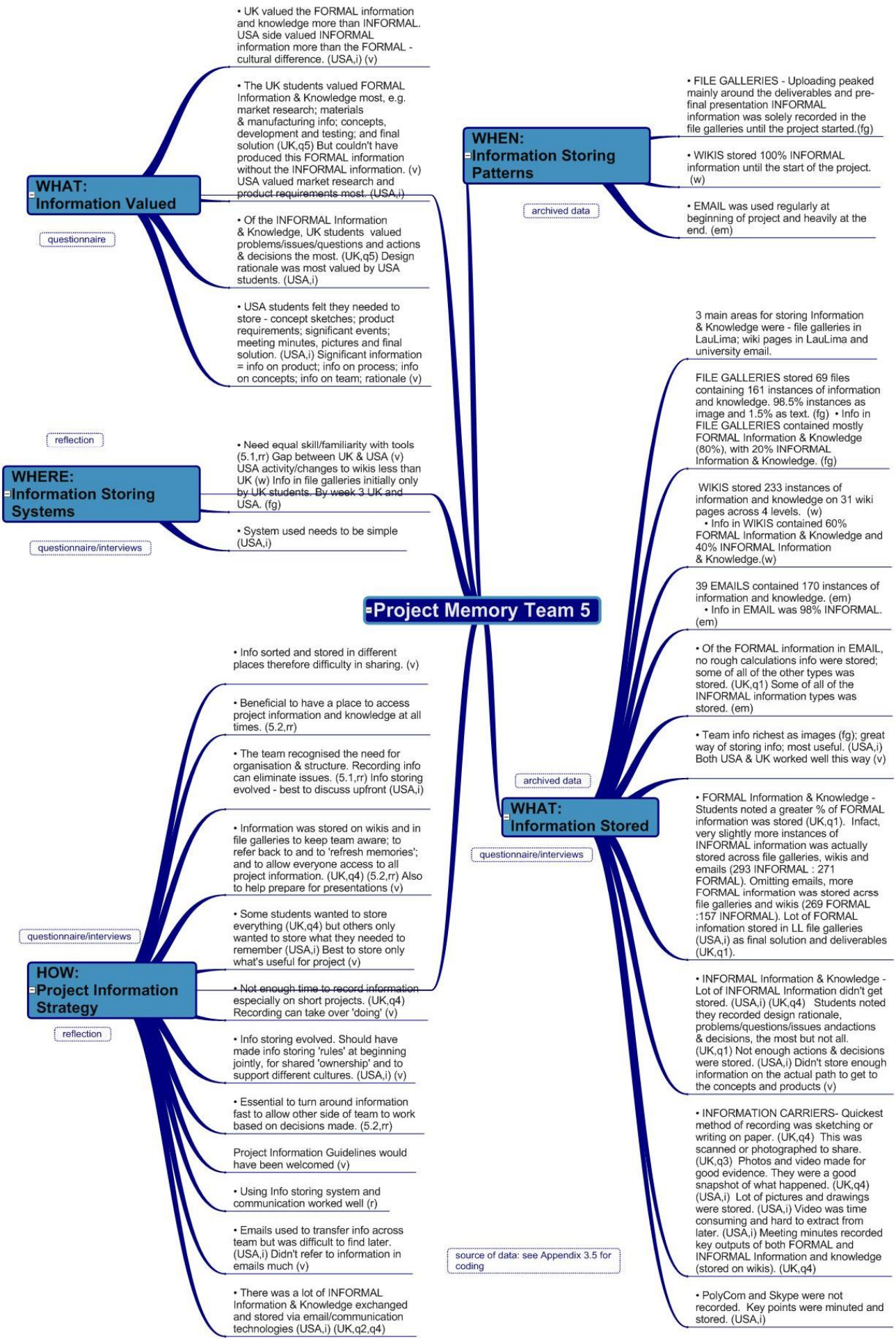


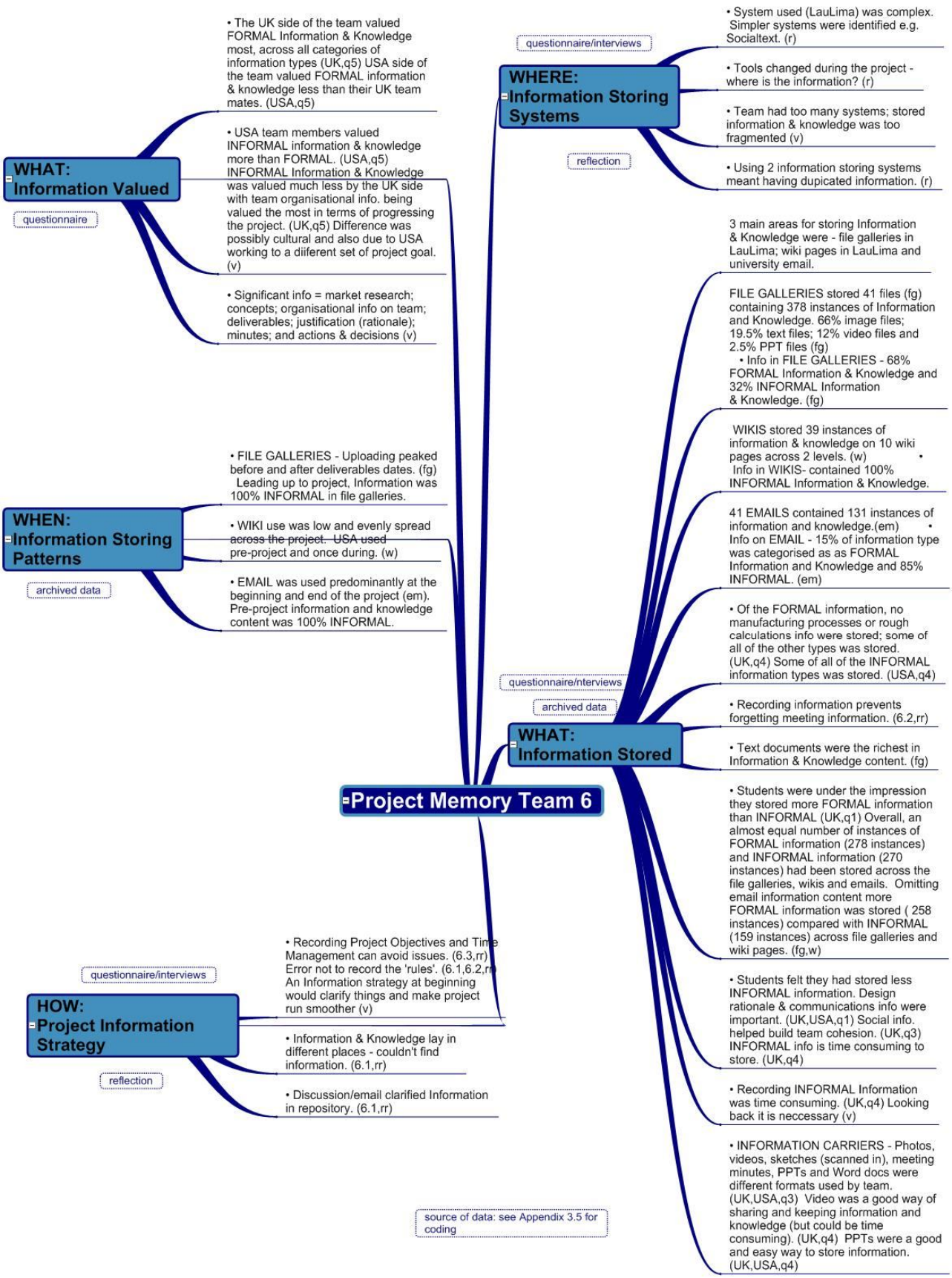
Note: same UK students for Case Study 5 as for Case Study 3; see above. 'Value' responses given at semi-structured interview.

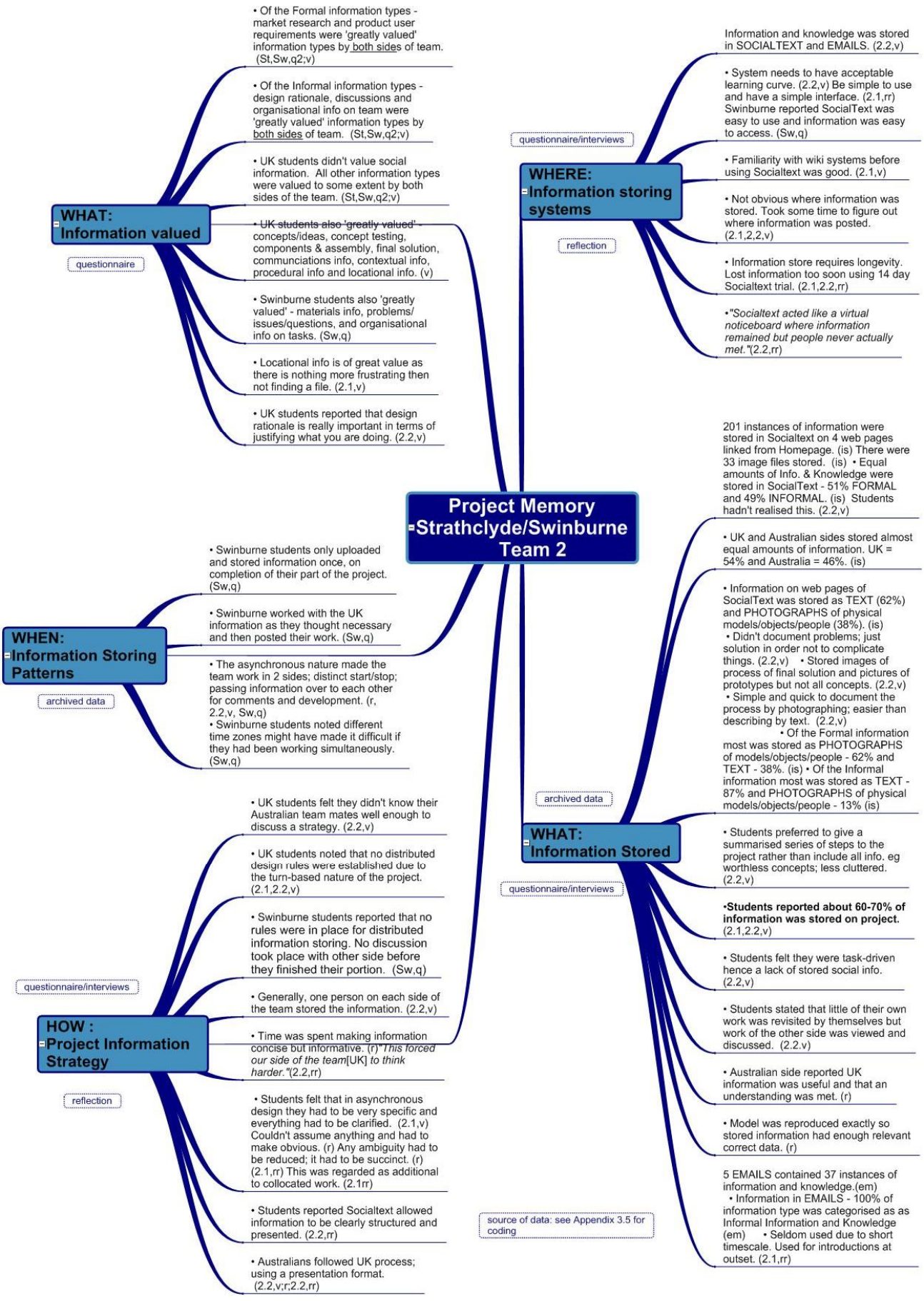


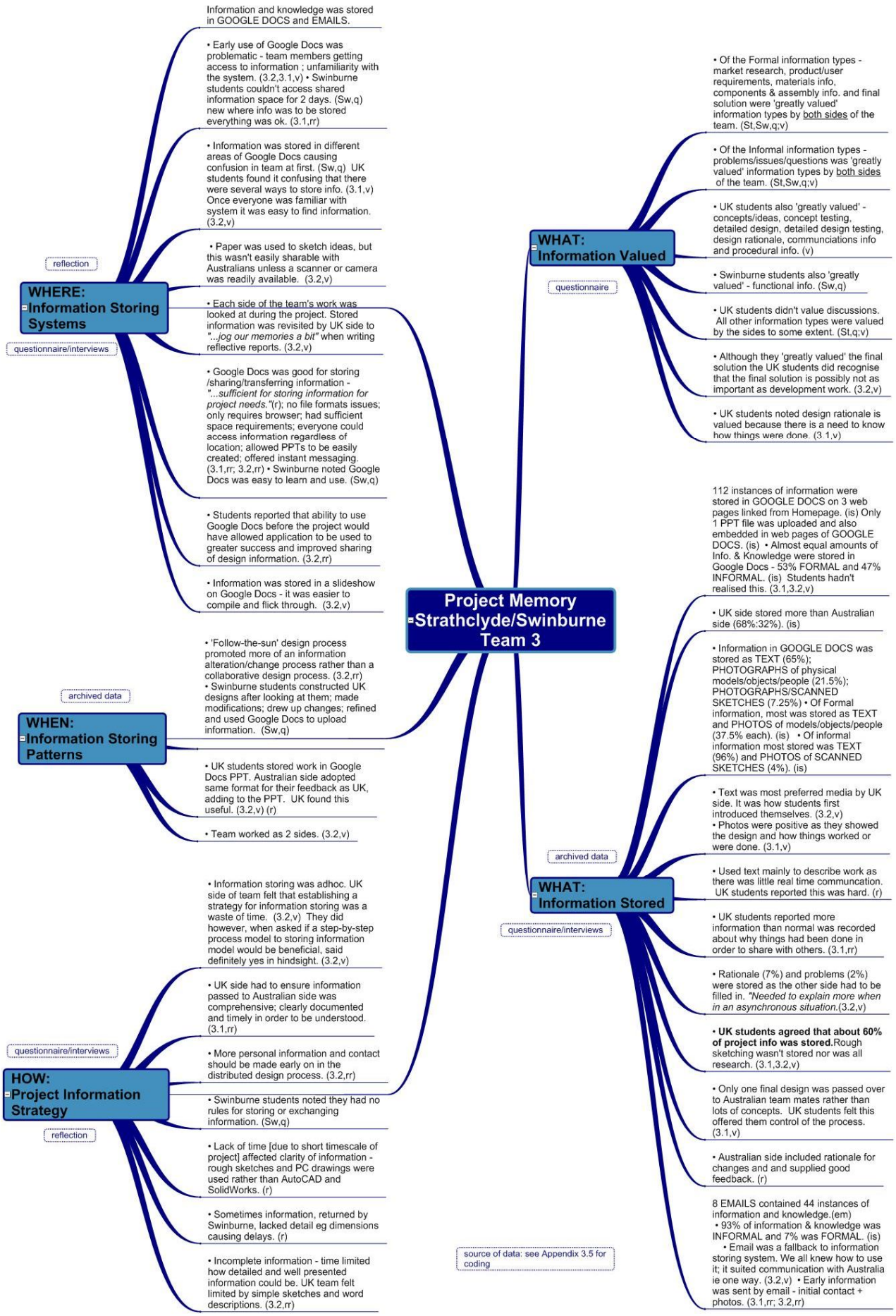

Note: same UK students for Case Study 6 as for Case Study 4; see above. 'Value' responses given at semi-structured interview.

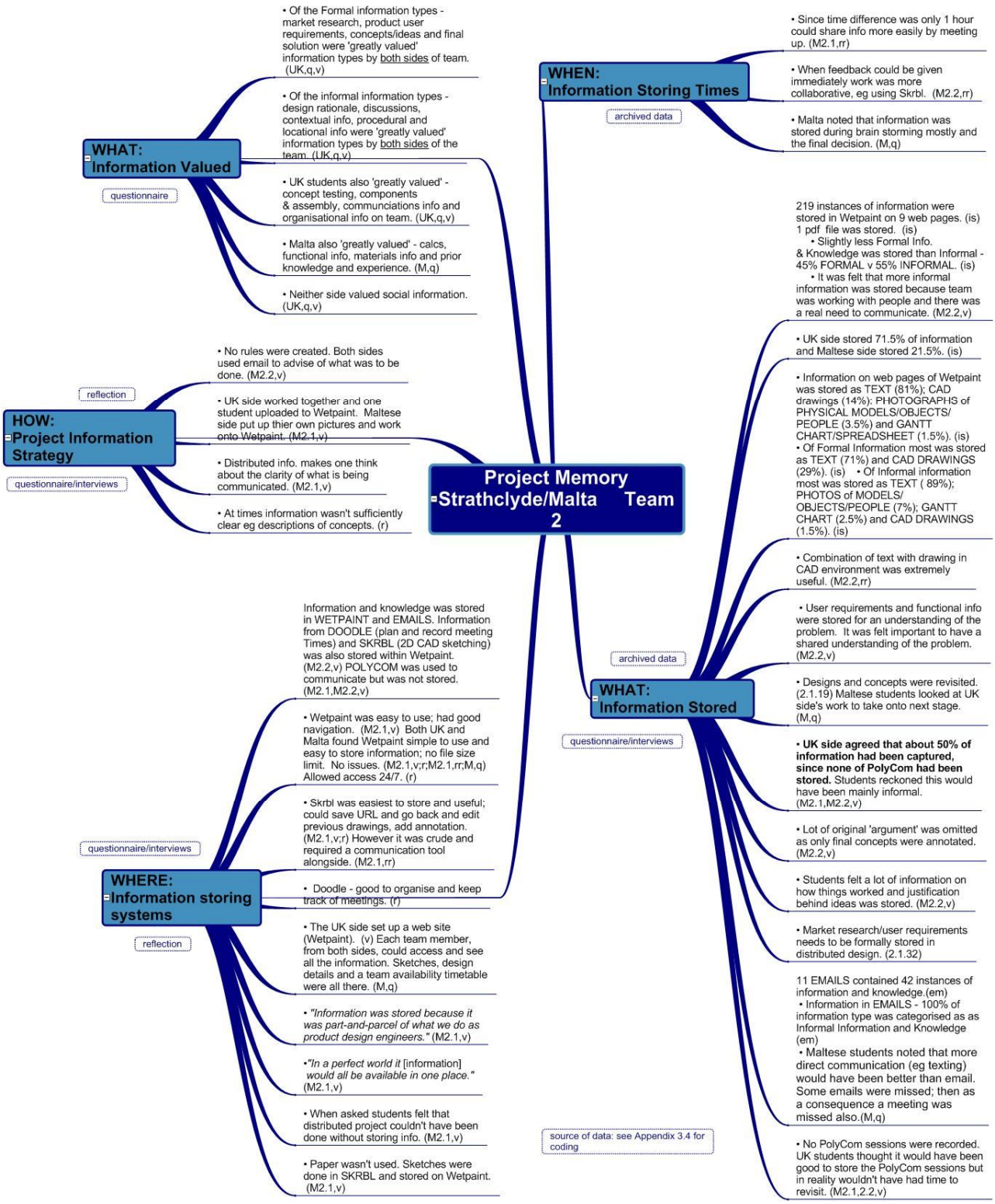


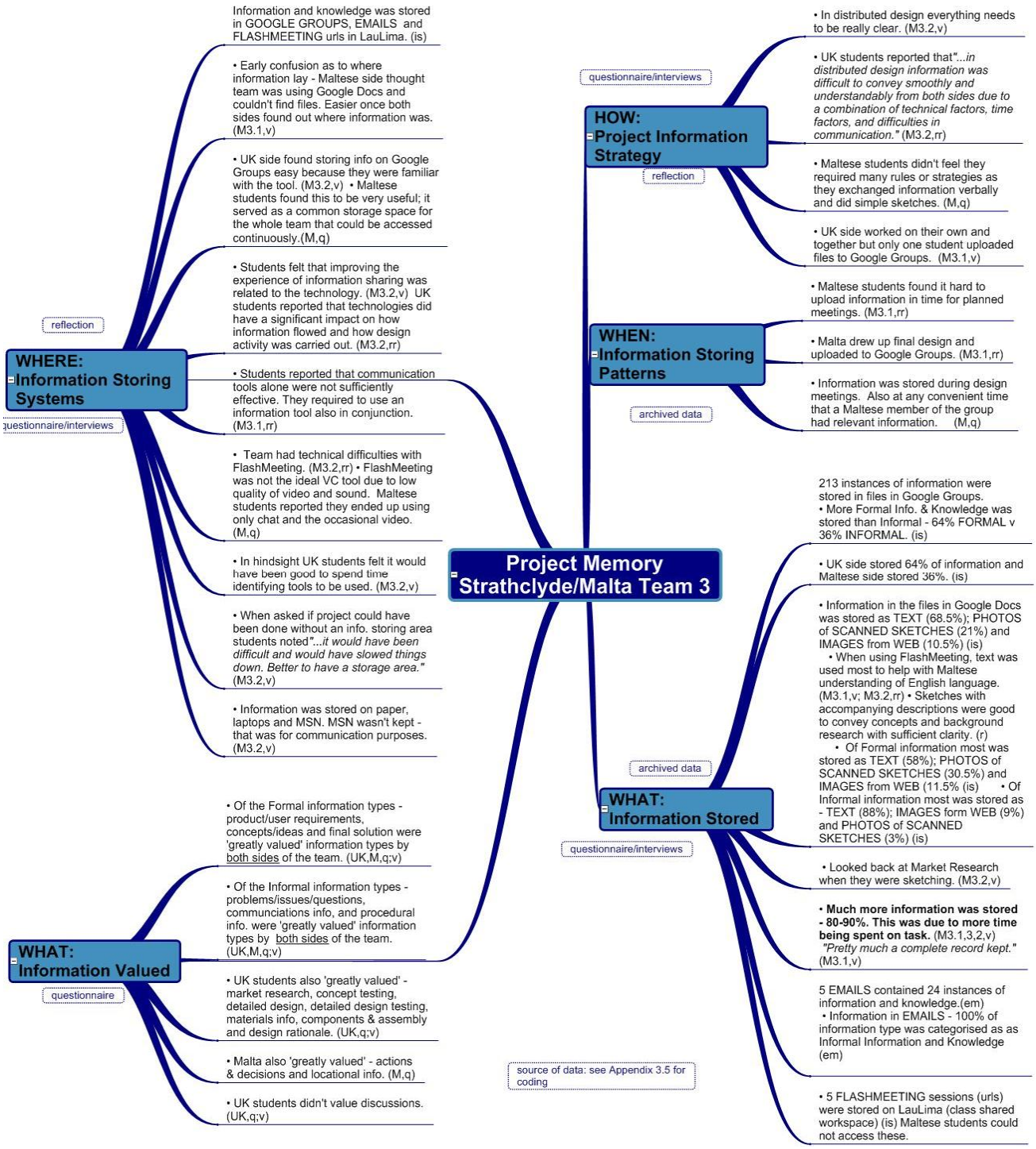

Project Memory Team 5
WHAT: Information Valued
questionnaire
• UK valued the FORMAL information and knowledge more than INFORMAL. USA side valued INFORMAL information more than the FORMAL - cultural difference. (USA,i) (v)
• The UK students valued FORMAL Information & Knowledge most, e.g. market research; materials & manufacturing info; concepts, development and testing; and final solution (UK,q5) But couldn't have produced this FORMAL information without the INFORMAL information. (v) USA valued market research and product requirements most. (USA,i)
• Of the INFORMAL Information & Knowledge, UK students valued problems/issues/questions and actions & decisions the most. (UK,q5) Design rationale was most valued by USA students. (USA,i)
• USA students felt they needed to store - concept sketches; product requirements; significant events; meeting minutes, pictures and final solution. (USA,i) Significant information = info on product; info on process; info on concepts; info on team; rationale (v)
WHEN: Information Storing Patterns
archived data
• FILE GALLERIES - Uploading peaked mainly around the deliverables and pre-final presentation INFORMAL information was solely recorded in the file galleries until the project started.(fg)
• WIKIS stored 100% INFORMAL information until the start of the project. (w)
• EMAIL was used regularly at beginning of project and heavily at the end. (em)
reflection
WHERE: Information Storing Systems
questionnaire/interviews
• Need equal skill/familiarity with tools (5.1,rr) Gap between UK & USA (v) USA activity/changes to wikis less than UK (w) Info in file galleries initially only by UK students. By week 3 UK and USA. (fg)
• System used needs to be simple (USA,i)
WHAT: Information Stored
archived data
questionnaire/interviews
3 main areas for storing Information & Knowledge were - file galleries in LauLima; wiki pages in LauLima and university email.
FILE GALLERIES stored 69 files containing 161 instances of information and knowledge. 98.5% instances as image and 1.5% as text. (fg) • Info in FILE GALLERIES contained mostly FORMAL Information & Knowledge (80%), with 20% INFORMAL Information & Knowledge. (fg)
WIKIS stored 233 instances of information and knowledge on 31 wiki pages across 4 levels. (w)
• Info in WIKIS contained 60% FORMAL Information & Knowledge and 40% INFORMAL Information & Knowledge.(w)
39 EMAILS contained 170 instances of information and knowledge. (em)
• Info in EMAIL was 98% INFORMAL. (em)
• Of the FORMAL information in EMAIL, no rough calculations info were stored; some of all of the other types was stored. (UK,q1) Some of all of the INFORMAL information types was stored. (em)
• Team info richest as images (fg); great way of storing info; most useful. (USA,i) Both USA & UK worked well this way (v)
• FORMAL Information & Knowledge - Students noted a greater % of FORMAL information was stored (UK,q1). Infact, very slightly more instances of INFORMAL information was actually stored across file galleries, wikis and emails (293 INFORMAL : 271 FORMAL). Omitting emails, more FORMAL information was stored acrss file galleries and wikis (269 FORMAL :157 INFORMAL). Lot of FORMAL infomation stored in LL file galleries (USA,i) as final solution and deliverables (UK,q1).
• INFORMAL Information & Knowledge - Lot of INFORMAL Information didn't get stored. (USA,i) (UK,q4) Students noted they recorded design rationale, problems/questions/issues andactions & decisions, the most but not all. (UK,q1) Not enough actions & decisions were stored. (USA,i) Didn't store enough information on the actual path to get to the concepts and products (v)
• INFORMATION CARRIERS- Quickest method of recording was sketching or writing on paper. (UK,q4) This was scanned or photographed to share. (UK,q3) Photos and video made for good evidence. They were a good snapshot of what happened. (UK,q4) (USA,i) Lot of pictures and drawings were stored. (USA,i) Video was time consuming and hard to extract from later. (USA,i) Meeting minutes recorded key outputs of both FORMAL and INFORMAL Information and knowledge (stored on wikis). (UK,q4)
• PolyCom and Skype were not recorded. Key points were minuted and stored. (USA,i)
source of data: see Appendix 3.5 for coding
questionnaire/interviews
HOW: Project Information Strategy
reflection
• Info sorted and stored in different places therefore difficulty in sharing. (v)
• Beneficial to have a place to access project information and knowledge at all times. (5.2,rr)
• The team recognised the need for organisation & structure. Recording info can eliminate issues. (5.1,rr) Info storing evolved - best to discuss upfront (USA,i)
• Information was stored on wikis and in file galleries to keep team aware; to refer back to and to 'refresh memories'; and to allow everyone access to all project information. (UK,q4) (5.2,rr) Also to help prepare for presentations (v)
• Some students wanted to store everything (UK,q4) but others only wanted to store what they needed to remember (USA,i) Best to store only what's useful for project (v)
• Not enough time to record information especially on short projects. (UK,q4) Recording can take over 'doing' (v)
• Info storing evolved. Should have made info storing 'rules' at beginning jointly, for shared 'ownership' and to support different cultures. (USA,i) (v)
• Essential to turn around information fast to allow other side of team to work based on decisions made. (5.2,rr)
Project Information Guidelines would have been welcomed (v)
• Using Info storing system and communication worked well (r)
• Emails used to transfer info across team but was difficult to find later. (USA,i) Didn't refer to information in emails much (v)
• There was a lot of INFORMAL Information & Knowledge exchanged and stored via email/communication technologies (USA,i) (UK,q2,q4)


Project Memory Team 6
WHAT: Information Valued
questionnaire
• The UK side of the team valued FORMAL Information & Knowledge most, across all categories of information types (UK,q5) USA side of the team valued FORMAL information & knowledge less than their UK team mates. (USA,q5)
• USA team members valued INFORMAL information & knowledge more than FORMAL. (USA,q5) INFORMAL Information & Knowledge was valued much less by the UK side with team organisational info. being valued the most in terms of progressing the project. (UK,q5) Difference was possibly cultural and also due to USA working to a diiferent set of project goal. (v)
• Significant info = market research; concepts; organisational info on team; deliverables; justification (rationale); minutes; and actions & decisions (v)
WHEN: Information Storing Patterns
archived data
• FILE GALLERIES - Uploading peaked before and after deliverables dates. (fg) Leading up to project, Information was 100% INFORMAL in file galleries.
• WIKI use was low and evenly spread across the project. USA used pre-project and once during. (w)
• EMAIL was used predominantly at the beginning and end of the project (em). Pre-project information and knowledge content was 100% INFORMAL.
HOW: Project Information Strategy
questionnaire/interviews
reflection
• Recording Project Objectives and Time Management can avoid issues. (6.3,rr) Error not to record the 'rules'. (6.1,6.2,rr) An Information strategy at beginning would clarify things and make project run smoother (v)
• Information & Knowledge lay in different places - couldn't find information. (6.1,rr)
• Discussion/email clarified Information in repository. (6.1,rr)
WHERE: Information Storing Systems
questionnaire/interviews
reflection
• System used (LauLima) was complex. Simpler systems were identified e.g. Socialtext. (r)
• Tools changed during the project - where is the information? (r)
• Team had too many systems; stored information & knowledge was too fragmented (v)
• Using 2 information storing systems meant having dupicated information. (r)
WHAT: Information Stored
questionnaire/nterviews
archived data
3 main areas for storing Information & Knowledge were - file galleries in LauLima; wiki pages in LauLima and university email.
FILE GALLERIES stored 41 files (fg) containing 378 instances of Information and Knowledge. 66% image files; 19.5% text files; 12% video files and 2.5% PPT files (fg)
• Info in FILE GALLERIES - 68% FORMAL Information & Knowledge and 32% INFORMAL Information & Knowledge. (fg)
WIKIS stored 39 instances of information & knowledge on 10 wiki pages across 2 levels. (w)
• Info in WIKIS- contained 100% INFORMAL Information & Knowledge.
41 EMAILS contained 131 instances of information and knowledge.(em)
• Info on EMAIL - 15% of information type was categorised as as FORMAL Information and Knowledge and 85% INFORMAL. (em)
• Of the FORMAL information, no manufacturing processes or rough calculations info were stored; some of all of the other types was stored. (UK,q4) Some of all of the INFORMAL information types was stored. (USA,q4)
• Recording information prevents forgetting meeting information. (6.2,rr)
• Text documents were the richest in Information & Knowledge content. (fg)
• Students were under the impression they stored more FORMAL information than INFORMAL (UK,q1) Overall, an almost equal number of instances of FORMAL information (278 instances) and INFORMAL information (270 instances) had been stored across the file galleries, wikis and emails. Omitting email information content more FORMAL information was stored ( 258 instances) compared with INFORMAL (159 instances) across file galleries and wiki pages. (fg,w)
• Students felt they had stored less INFORMAL information. Design rationale & communications info were important. (UK,USA,q1) Social info. helped build team cohesion. (UK,q3) INFORMAL info is time consuming to store. (UK,q4)
• Recording INFORMAL Information was time consuming. (UK,q4) Looking back it is neccessary (v)
• INFORMATION CARRIERS - Photos, videos, sketches (scanned in), meeting minutes, PPTs and Word docs were different formats used by team. (UK,USA,q3) Video was a good way of sharing and keeping information and knowledge (but could be time consuming). (UK,q4) PPTs were a good and easy way to store information. (UK,USA,q4)
source of data: see Appendix 3.5 for coding


Project Memory Strathclyde/Swinburne Team 2
WHAT: Information valued
questionnaire
• Of the Formal information types - market research and product user requirements were 'greatly valued' information types by both sides of team. (St,Sw,q2;v)
• Of the Informal information types - design rationale, discussions and organisational info on team were 'greatly valued' information types by both sides of team. (St,Sw,q2;v)
• UK students didn't value social information. All other information types were valued to some extent by both sides of the team. (St,Sw,q2;v)
• UK students also 'greatly valued' - concepts/ideas, concept testing, components & assembly, final solution, communciations info, contextual info, procedural info and locational info. (v)
• Swinburne students also 'greatly valued' - materials info, problems/ issues/questions, and organisational info on tasks. (Sw,q)
• Locational info is of great value as there is nothing more frustrating then not finding a file. (2.1,v)
• UK students reported that design rationale is really important in terms of justifying what you are doing. (2.2,v)
WHERE: Information storing systems
questionnaire/interviews
reflection
Information and knowledge was stored in SOCIALTEXT and EMAILS. (2.2,v)
• System needs to have acceptable learning curve. (2.2,v) Be simple to use and have a simple interface. (2.1,rr) Swinburne reported SocialText was easy to use and information was easy to access. (Sw,q)
• Familiarity with wiki systems before using Socialtext was good. (2.1,v)
• Not obvious where information was stored. Took some time to figure out where information was posted. (2.1,2,2,v)
• Information store requires longevity. Lost information too soon using 14 day Socialtext trial. (2.1,2.2,rr)
•"Socialtext acted like a virtual noticeboard where information remained but people never actually met."(2.2,rr)
WHEN: Information Storing Patterns
archived data
• Swinburne students only uploaded and stored information once, on completion of their part of the project. (Sw,q)
• Swinburne worked with the UK information as they thought necessary and then posted their work. (Sw,q)
• The asynchronous nature made the team work in 2 sides; distinct start/stop; passing information over to each other for comments and development. (r, 2.2,v, Sw,q)
• Swinburne students noted different time zones might have made it difficult if they had been working simultaneously. (Sw,q)
WHAT: Information Stored
questionnaire/interviews
archived data
201 instances of information were stored in Socialtext on 4 web pages linked from Homepage. (is) There were 33 image files stored. (is) • Equal amounts of Info. & Knowledge were stored in SocialText - 51% FORMAL and 49% INFORMAL. (is) Students hadn't realised this. (2.2,v)
• UK and Australian sides stored almost equal amounts of information. UK = 54% and Australia = 46%. (is)
• Information on web pages of SocialText was stored as TEXT (62%) and PHOTOGRAPHS of physical models/objects/people (38%). (is) • Didn't document problems; just solution in order not to complicate things. (2.2,v) • Stored images of process of final solution and pictures of prototypes but not all concepts. (2.2,v) • Simple and quick to document the process by photographing; easier than describing by text. (2.2,v) • Of the Formal information most was stored as PHOTOGRAPHS of models/objects/people - 62% and TEXT - 38%. (is) • Of the Informal information most was stored as TEXT - 87% and PHOTOGRAPHS of physical models/objects/people - 13% (is)
• Students preferred to give a summarised series of steps to the project rather than include all info. eg worthless concepts; less cluttered. (2.2,v)
•Students reported about 60-70% of information was stored on project. (2.1,2.2,v)
• Students felt they were task-driven hence a lack of stored social info. (2.2,v)
• Students stated that little of their own work was revisited by themselves but work of the other side was viewed and discussed. (2.2.v)
• Australian side reported UK information was useful and that an understanding was met. (r)
• Model was reproduced exactly so stored information had enough relevant correct data. (r)
5 EMAILS contained 37 instances of information and knowledge.(em) • Information in EMAILS - 100% of information type was categorised as as Informal Information and Knowledge (em) • Seldom used due to short timescale. Used for introductions at outset. (2.1,rr)
source of data: see Appendix 3.5 for coding
HOW : Project Information Strategy
questionnaire/interviews
reflection
• UK students felt they didn't know their Australian team mates well enough to discuss a strategy. (2.2,v)
• UK students noted that no distributed design rules were established due to the turn-based nature of the project. (2.1,2.2,v)
• Swinburne students reported that no rules were in place for distributed information storing. No discussion took place with other side before they finished their portion. (Sw,q)
• Generally, one person on each side of the team stored the information. (2.2,v)
• Time was spent making information concise but informative. (r)"This forced our side of the team[UK] to think harder."(2.2,rr)
• Students felt that in asynchronous design they had to be very specific and everything had to be clarified. (2.1,v) Couldn't assume anything and had to make obvious. (r) Any ambiguity had to be reduced; it had to be succinct. (r) (2.1,rr) This was regarded as additional to collocated work. (2.1rr)
• Students reported Socialtext allowed information to be clearly structured and presented. (2.2,rr)
• Australians followed UK process; using a presentation format. (2.2,v;r;2.2,rr)


Project Memory Strathclyde/Swinburne Team 3
WHERE: Information Storing Systems
reflection
questionnaire/interviews
Information and knowledge was stored in GOOGLE DOCS and EMAILS.
• Early use of Google Docs was problematic - team members getting access to information ; unfamiliarity with the system. (3.2,3.1,v) • Swinburne students couldn't access shared information space for 2 days. (Sw,q) new where info was to be stored everything was ok. (3.1,rr)
• Information was stored in different areas of Google Docs causing confusion in team at first. (Sw,q) UK students found it confusing that there were several ways to store info. (3.1,v) Once everyone was familiar with system it was easy to find information. (3.2,v)
• Paper was used to sketch ideas, but this wasn't easily sharable with Australians unless a scanner or camera was readily available. (3.2,v)
• Each side of the team's work was looked at during the project. Stored information was revisited by UK side to "...jog our memories a bit" when writing reflective reports. (3.2,v)
• Google Docs was good for storing /sharing/transferring information - "...sufficient for storing information for project needs."(r); no file formats issues; only requires browser; had sufficient space requirements; everyone could access information regardless of location; allowed PPTs to be easily created; offered instant messaging. (3.1,rr; 3.2,rr) • Swinburne noted Google Docs was easy to learn and use. (Sw,q)
• Students reported that ability to use Google Docs before the project would have allowed application to be used to greater success and improved sharing of design information. (3.2,rr)
• Information was stored in a slideshow on Google Docs - it was easier to compile and flick through. (3.2,v)
WHEN: Information Storing Patterns
archived data
• 'Follow-the-sun' design process promoted more of an information alteration/change process rather than a collaborative design process. (3.2,rr) • Swinburne students constructed UK designs after looking at them; made modifications; drew up changes; refined and used Google Docs to upload information. (Sw,q)
• UK students stored work in Google Docs PPT. Australian side adopted same format for their feedback as UK, adding to the PPT. UK found this useful. (3.2,v) (r)
• Team worked as 2 sides. (3.2,v)
HOW: Project Information Strategy
questionnaire/interviews
reflection
• Information storing was adhoc. UK side of team felt that establishing a strategy for information storing was a waste of time. (3.2,v) They did however, when asked if a step-by-step process model to storing information model would be beneficial, said definitely yes in hindsight. (3.2,v)
• UK side had to ensure information passed to Australian side was comprehensive; clearly documented and timely in order to be understood. (3.1,rr)
• More personal information and contact should be made early on in the distributed design process. (3.2,rr)
• Swinburne students noted they had no rules for storing or exchanging information. (Sw,q)
• Lack of time [due to short timescale of project] affected clarity of information - rough sketches and PC drawings were used rather than AutoCAD and SolidWorks. (r)
• Sometimes information, returned by Swinburne, lacked detail eg dimensions causing delays. (r)
• Incomplete information - time limited how detailed and well presented information could be. UK team felt limited by simple sketches and word descriptions. (3.2,rr)
WHAT: Information Valued
questionnaire
• Of the Formal information types - market research, product/user requirements, materials info, components & assembly info. and final solution were 'greatly valued' information types by both sides of the team. (St,Sw,q;v)
• Of the Informal information types - problems/issues/questions was 'greatly valued' information types by both sides of the team. (St,Sw,q;v)
• UK students also 'greatly valued' - concepts/ideas, concept testing, detailed design, detailed design testing, design rationale, communciations info and procedural info. (v)
• Swinburne students also 'greatly valued' - functional info. (Sw,q)
• UK students didn't value discussions. All other information types were valued by the sides to some extent. (St,q;v)
• Although they 'greatly valued' the final solution the UK students did recognise that the final solution is possibly not as important as development work. (3.2,v)
• UK students noted design rationale is valued because there is a need to know how things were done. (3.1,v)
WHAT: Information Stored
archived data
questionnaire/interviews
112 instances of information were stored in GOOGLE DOCS on 3 web pages linked from Homepage. (is) Only 1 PPT file was uploaded and also embedded in web pages of GOOGLE DOCS. (is) • Almost equal amounts of Info. & Knowledge were stored in Google Docs - 53% FORMAL and 47% INFORMAL. (is) Students hadn't realised this. (3.1,3.2,v)
• UK side stored more than Australian side (68%:32%). (is)
• Information in GOOGLE DOCS was stored as TEXT (65%); PHOTOGRAPHS of physical models/objects/people (21.5%); PHOTOGRAPHS/SCANNED SKETCHES (7.25%) • Of Formal information, most was stored as TEXT and PHOTOS of models/objects/people (37.5% each). (is) • Of informal information most stored was TEXT (96%) and PHOTOS of SCANNED SKETCHES (4%). (is)
• Text was most preferred media by UK side. It was how students first introduced themselves. (3.2,v) • Photos were positive as they showed the design and how things worked or were done. (3.1,v)
• Used text mainly to describe work as there was little real time communcation. UK students reported this was hard. (r)
• UK students reported more information than normal was recorded about why things had been done in order to share with others. (3.1,rr)
• Rationale (7%) and problems (2%) were stored as the other side had to be filled in. "Needed to explain more when in an asynchronous situation.(3.2,v)
• UK students agreed that about 60% of project info was stored.Rough sketching wasn't stored nor was all research. (3.1,3.2,v)
• Only one final design was passed over to Australian team mates rather than lots of concepts. UK students felt this offered them control of the process. (3.1,v)
• Australian side included rationale for changes and and supplied good feedback. (r)
8 EMAILS contained 44 instances of information and knowledge.(em) • 93% of information & knowledge was INFORMAL and 7% was FORMAL. (is) • Email was a fallback to information storing system. We all knew how to use it; it suited communication with Australia ie one way. (3.2,v) • Early information was sent by email - initial contact + photos. (3.1,rr; 3.2,rr)
source of data: see Appendix 3.5 for coding


Project Memory Strathclyde/Malta Team 2
WHEN: Information Storing Times
archived data
• Since time difference was only 1 hour could share info more easily by meeting up. (M2.1,rr)
• When feedback could be given immediately work was more collaborative, eg using Skrbl. (M2.2,rr)
• Malta noted that information was stored during brain storming mostly and the final decision. (M,q)
WHAT: Information Valued
questionnaire
• Of the Formal information types - market research, product user requirements, concepts/ideas and final solution were 'greatly valued' information types by both sides of team. (UK,q,v)
• Of the informal information types - design rationale, discussions, contextual info, procedural and locational info were 'greatly valued' information types by both sides of the team. (UK,q,v)
• UK students also 'greatly valued' - concept testing, components & assembly, communciations info and organisational info on team. (UK,q,v)
• Malta also 'greatly valued' - calcs, functional info, materials info and prior knowledge and experience. (M,q)
• Neither side valued social information. (UK,q,v)
HOW: Project Information Strategy
reflection
questionnaire/interviews
• No rules were created. Both sides used email to advise of what was to be done. (M2.2,v)
• UK side worked together and one student uploaded to Wetpaint. Maltese side put up thier own pictures and work onto Wetpaint. (M2.1,v)
• Distributed info. makes one think about the clarity of what is being communicated. (M2.1,v)
• At times information wasn't sufficiently clear eg descriptions of concepts. (r)
WHERE: Information storing systems
questionnaire/interviews
reflection
Information and knowledge was stored in WETPAINT and EMAILS. Information from DOODLE (plan and record meeting Times) and SKRBL (2D CAD sketching) was also stored within Wetpaint. (M2.2,v) POLYCOM was used to communicate but was not stored. (M2.1,M2.2,v)
• Wetpaint was easy to use; had good navigation. (M2.1,v) Both UK and Malta found Wetpaint simple to use and easy to store information; no file size limit. No issues. (M2.1,v;r;M2.1,rr;M,q) Allowed access 24/7. (r)
• Skrbl was easiest to store and useful; could save URL and go back and edit previous drawings, add annotation. (M2.1,v;r) However it was crude and required a communication tool alongside. (M2.1,rr)
• Doodle - good to organise and keep track of meetings. (r)
• The UK side set up a web site (Wetpaint). (v) Each team member, from both sides, could access and see all the information. Sketches, design details and a team availability timetable were all there. (M,q)
• "Information was stored because it was part-and-parcel of what we do as product design engineers." (M2.1,v)
• "In a perfect world it [information] would all be available in one place." (M2.1,v)
• When asked students felt that distributed project couldn't have been done without storing info. (M2.1,v)
• Paper wasn't used. Sketches were done in SKRBL and stored on Wetpaint. (M2.1,v)
WHAT: Information Stored
archived data
questionnaire/interviews
source of data: see Appendix 3.4 for coding
219 instances of information were stored in Wetpaint on 9 web pages. (is) 1 pdf file was stored. (is)
• Slightly less Formal Info. & Knowledge was stored than Informal - 45% FORMAL v 55% INFORMAL. (is)
• It was felt that more informal information was stored because team was working with people and there was a real need to communicate. (M2.2,v)
• UK side stored 71.5% of information and Maltese side stored 21.5%. (is)
• Information on web pages of Wetpaint was stored as TEXT (81%); CAD drawings (14%); PHOTOGRAPHS of PHYSICAL MODELS/OBJECTS/ PEOPLE (3.5%) and GANTT CHART/SPREADSHEET (1.5%). (is)
• Of Formal Information most was stored as TEXT (71%) and CAD DRAWINGS (29%). (is) • Of Informal information most was stored as TEXT ( 89%); PHOTOS of MODELS/ OBJECTS/PEOPLE (7%); GANTT CHART (2.5%) and CAD DRAWINGS (1.5%). (is)
• Combination of text with drawing in CAD environment was extremely useful. (M2.2,rr)
• User requirements and functional info were stored for an understanding of the problem. It was felt important to have a shared understanding of the problem. (M2.2,v)
• Designs and concepts were revisited. (2.1.19) Maltese students looked at UK side's work to take onto next stage. (M,q)
• UK side agreed that about 50% of information had been captured, since none of PolyCom had been stored. Students reckoned this would have been mainly informal. (M2.1,M2.2,v)
• Lot of original 'argument' was omitted as only final concepts were annotated. (M2.2,v)
• Students felt a lot of information on how things worked and justification behind ideas was stored. (M2.2,v)
• Market research/user requirements needs to be formally stored in distributed design. (2.1.32)
11 EMAILS contained 42 instances of information and knowledge.(em)
• Information in EMAILS - 100% of information type was categorised as as Informal Information and Knowledge (em)
• Maltese students noted that more direct communication (eg texting) would have been better than email. Some emails were missed; then as a consequence a meeting was missed also.(M,q)
• No PolyCom sessions were recorded. UK students thought it would have been good to store the PolyCom sessions but in reality wouldn't have had time to revisit. (M2.1,2.2,v)


Project Memory Strathclyde/Malta Team 3
WHERE: Information Storing Systems
reflection
questionnaire/interviews
Information and knowledge was stored in GOOGLE GROUPS, EMAILS and FLASHMEETING urls in LauLima. (is)
• Early confusion as to where information lay - Maltese side thought team was using Google Docs and couldn't find files. Easier once both sides found out where information was. (M3.1,v)
• UK side found storing info on Google Groups easy because they were familiar with the tool. (M3.2,v) • Maltese students found this to be very useful; it served as a common storage space for the whole team that could be accessed continuously.(M,q)
• Students felt that improving the experience of information sharing was related to the technology. (M3.2,v) UK students reported that technologies did have a significant impact on how information flowed and how design activity was carried out. (M3.2,rr)
• Students reported that communication tools alone were not sufficiently effective. They required to use an information tool also in conjunction. (M3.1,rr)
• Team had technical difficulties with FlashMeeting. (M3.2,rr) • FlashMeeting was not the ideal VC tool due to low quality of video and sound. Maltese students reported they ended up using only chat and the occasional video. (M,q)
• In hindsight UK students felt it would have been good to spend time identifying tools to be used. (M3.2,v)
• When asked if project could have been done without an info. storing area students noted "...it would have been difficult and would have slowed things down. Better to have a storage area." (M3.2,v)
• Information was stored on paper, laptops and MSN. MSN wasn't kept - that was for communication purposes. (M3.2,v)
WHAT: Information Valued
questionnaire
• Of the Formal information types - product/user requirements, concepts/ideas and final solution were 'greatly valued' information types by both sides of the team. (UK,M,q;v)
• Of the Informal information types - problems/issues/questions, communciations info, and procedural info. were 'greatly valued' information types by both sides of the team. (UK,M,q;v)
• UK students also 'greatly valued' - market research, concept testing, detailed design, detailed design testing, materials info, components & assembly and design rationale. (UK,q;v)
• Malta also 'greatly valued' - actions & decisions and locational info. (M,q)
• UK students didn't value discussions. (UK,q;v)
HOW: Project Information Strategy
questionnaire/interviews
reflection
• In distributed design everything needs to be really clear. (M3.2,v)
• UK students reported that "...in distributed design information was difficult to convey smoothly and understandably from both sides due to a combination of technical factors, time factors, and difficulties in communication." (M3.2,rr)
• Maltese students didn't feel they required many rules or strategies as they exchanged information verbally and did simple sketches. (M,q)
• UK side worked on their own and together but only one student uploaded files to Google Groups. (M3.1,v)
WHEN: Information Storing Patterns
archived data
• Maltese students found it hard to upload information in time for planned meetings. (M3.1,rr)
• Malta drew up final design and uploaded to Google Groups. (M3.1,rr)
• Information was stored during design meetings. Also at any convenient time that a Maltese member of the group had relevant information. (M,q)
WHAT: Information Stored
archived data
questionnaire/interviews
213 instances of information were stored in files in Google Groups.
• More Formal Info. & Knowledge was stored than Informal - 64% FORMAL v 36% INFORMAL. (is)
• UK side stored 64% of information and Maltese side stored 36%. (is)
• Information in the files in Google Docs was stored as TEXT (68.5%); PHOTOS of SCANNED SKETCHES (21%) and IMAGES from WEB (10.5%) (is)
• When using FlashMeeting, text was used most to help with Maltese understanding of English language. (M3.1,v; M3.2,rr) • Sketches with accompanying descriptions were good to convey concepts and background research with sufficient clarity. (r)
• Of Formal information most was stored as TEXT (58%); PHOTOS of SCANNED SKETCHES (30.5%) and IMAGES from WEB (11.5% (is) • Of Informal information most was stored as - TEXT (88%); IMAGES form WEB (9%) and PHOTOS of SCANNED SKETCHES (3%) (is)
• Looked back at Market Research when they were sketching. (M3.2,v)
• Much more information was stored - 80-90%. This was due to more time being spent on task. (M3.1,3,2,v) "Pretty much a complete record kept." (M3.1,v)
5 EMAILS contained 24 instances of information and knowledge.(em)
• Information in EMAILS - 100% of information type was categorised as as Informal Information and Knowledge (em)
• 5 FLASHMEETING sessions (urls) were stored on LauLima (class shared workspace) (is) Maltese students could not access these.
source of data: see Appendix 3.5 for coding

# Principles and Framework for Distributed Design Information Storing - d-DIS

## Focus groups – Global Design students December 2008

*Format:*
*Focus group to consist of 9 students. Focus group to run 2 times. Duration = 1 hour. Sheets to record data at (2); flip charts to record data (3); voice recorder to record discussion at (4). Researcher to facilitate group.*
*Sheets to hand out –*
*(i) Consent & information sheets*
*(ii) Info pack – Principles; Framework*
*(iii) Sheet to complete for feedback*

**1. Present Principles and Framework to group 10 mins**
Introduce session, obtain consent and give an overview of the research to the group. Show pyramid of development. Hand out info sheets.

**2. Individual feedback on the Principles 20 mins**
Hand out feedback sheets. Students will be given the principles for good practice and asked whether they agree with each one or not; and asked to give an example from their global design experiences which illustrates each response. Sheets will be provided to record data. Students will carry this out individually. Retain sheets for analysis.

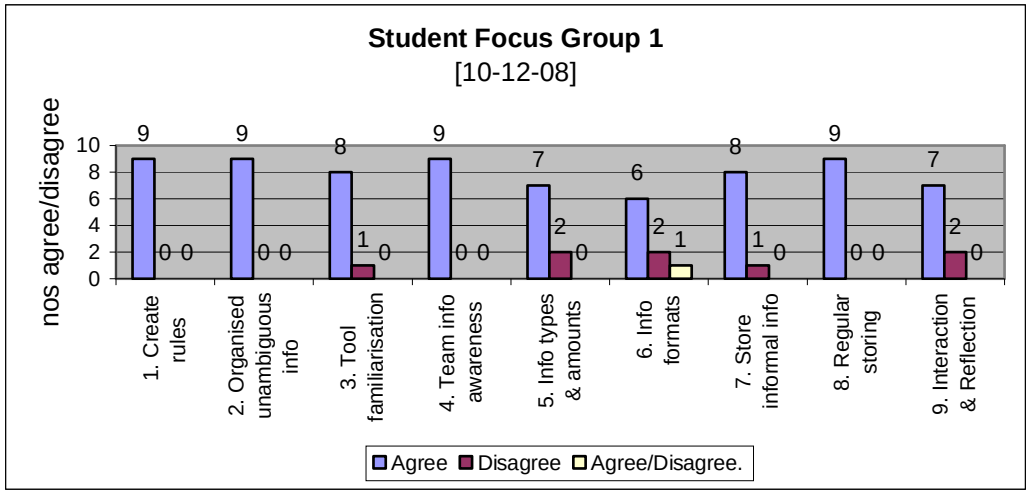
**3. Small group feedback on Principles and Framework 20 mins**

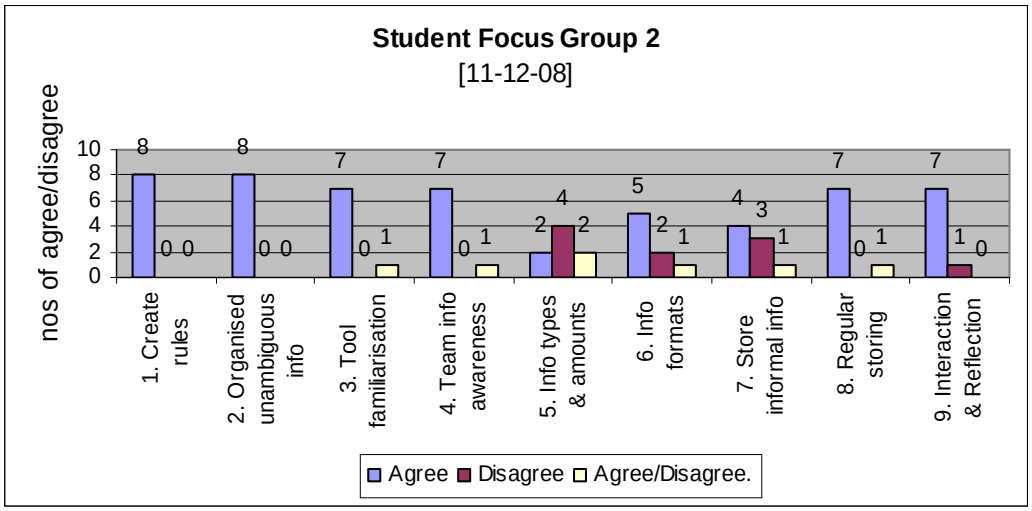
In groups of 3 the students will be asked to discuss and record on flip charts –
(i) Any principles they think might be missing, ie gaps. These are to be illustrated with examples from experience.
(ii) Their thoughts on Framework

**4. General discussion by everyone on Principles and Framework 15 mins**

Pin up flip charts from (**3**) and then to sum up facilitate a general discussion on principles and framework. Record on voice recorder.
Ask such questions as –
(i) How they see the principles and framework being implemented into project work, ie what format
(ii) When they would use these in class
(iii) What is important to them
(iv) What factors do they think prevents good distributed information management
(v) Are principles too general
(vi) What additional info is needed to implement to principles

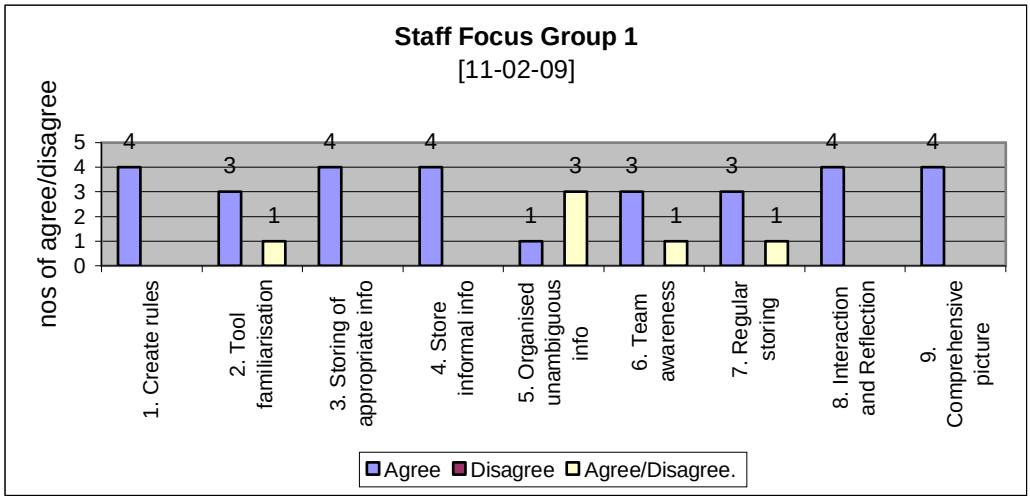
| | Code | Student/Staff (initials only) | Course/Expertise |
|---|---|---|---|
| **Students in Focus Group 1** | FG1.1 | CG | PG Global Innovation Management |
| | FG1.2 | EG | PG Global Innovation Management |
| | FG1.3 | IC | PG Global Innovation Management |
| | FG1.4 | MI | PG Global Innovation Management |
| | FG1.5 | OE | PG Global Innovation Management |
| | FG1.6 | PS | PG Global Innovation Management |
| | FG1.7 | SG | 5th Year Product Design Engineering |
| | FG1.8 | TF-A | PG Global Innovation Management |
| | FG1.9 | XG | PG Global Innovation Management |
| **Students in Focus Group 2** | FG2.1 | EC | 5th Year Product Design Engineering |
| | FG2.2 | JB | 5th Year Product Design Engineering |
| | FG2.3 | KM | 5th Year Product Design Engineering |
| | FG2.4 | MB | PG Global Innovation Management |
| | FG2.5 | MM | 5th Year Product Design Engineering |
| | FG2.6 | MO | PG Global Innovation Management |
| | FG2.7 | MS | PG Global Innovation Management |
| | FG2.8 | PSa | PG Global Innovation Management |
| | FG2.1 | EC | 5th Year Product Design Engineering |
| **Staff in Focus Group 1** | FG3.1 | SB | Lecturer in Centre for Academic Practice & Learning Enhancement; information specialist. |
| | FG3.2 | RMCL | Teaching Assistant; Global Innovation Management Co-ordinator |
| | FG3.3 | AT | Senior Lecturer at DMEM; information and knowledge specialist; experience and PhD supervision in distributed design |
| | FG3.4 | AW | Lecturer at DMEM; Global Design Class Registrar |
| **Staff in Focus Group 2** | FG4.1 | AC | Research Fellow; Knowledge & Information Management |
| | FG4.2 | SL | Senior Research Fellow; Knowledge & Information Management Expert |
| | FG4.3 | KM | PhD Researcher; Product Design |
| | FG4.4 | IW | Lecturer at DMEM; expertise in Knowledge & Information Management; VR; distributed design |
| **Students in Principles Validation Focus Group** | PFG1 | AC | 5th Year Product Design Engineering |
| | PFG2 | AN | PG Global Innovation Management |
| | PFG3 | JP | 5th Year Product Design Engineering |
| | PFG4 | PT | PG Global Innovation Management |
| | PFG5 | RK | PG Global Innovation Management |
| | PFG6 | TV | PG Global Innovation Management |

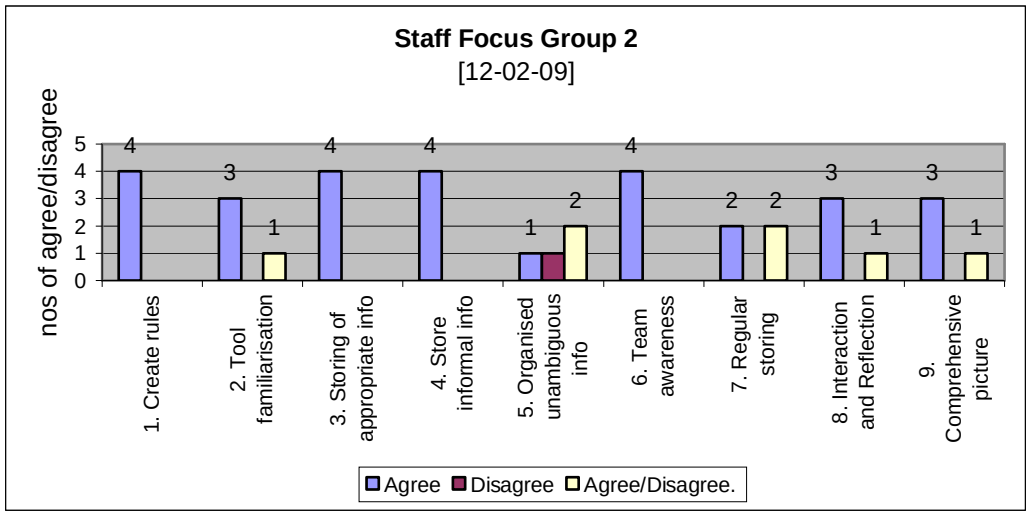

Student Focus Group 1
[10-12-08]
nos agree/disagree
1. Create rules
2. Organised unambiguous info
3. Tool familiarisation
4. Team info awareness
5. Info types & amounts
6. Info formats
7. Store informal info
8. Regular storing
9. Interaction & Reflection
Agree
Disagree
Agree/Disagree.


Student Focus Group 2
[11-12-08]
nos of agree/disagree
1. Create rules
2. Organised unambiguous info
3. Tool familiarisation
4. Team info awareness
5. Info types & amounts
6. Info formats
7. Store informal info
8. Regular storing
9. Interaction & Reflection
Agree
Disagree
Agree/Disagree.

Appendix 6.4 Results from each of the Staff Focus Groups on the Principles

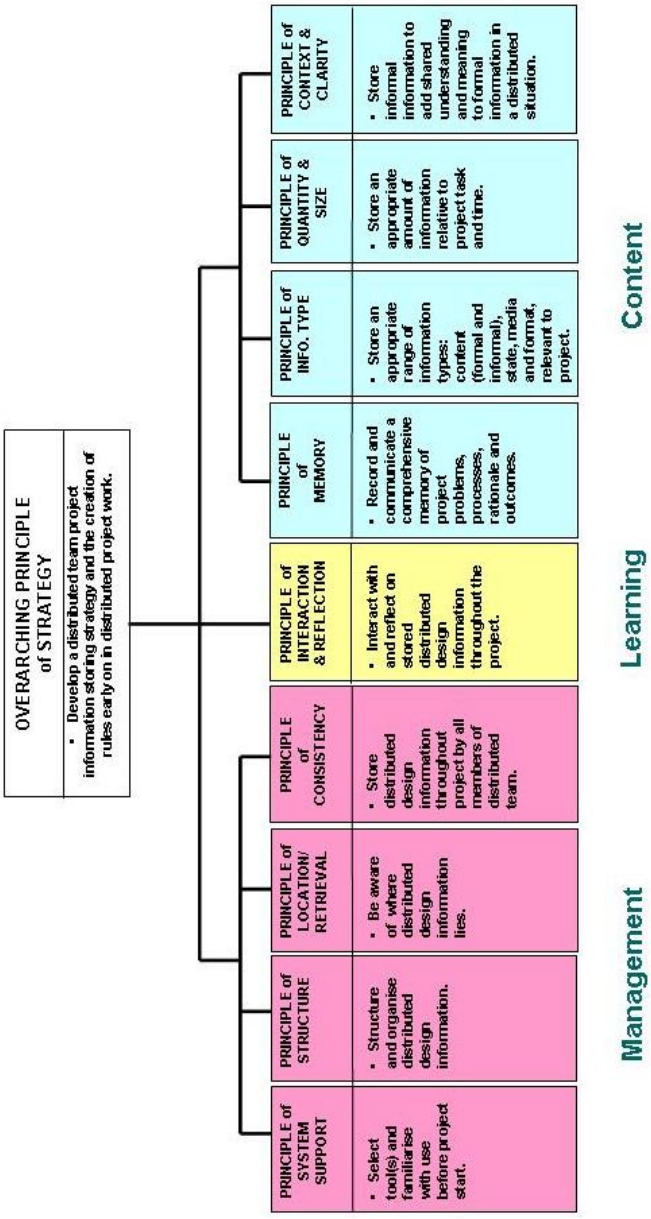
Note the ordering and numbering of the Principles changed during Refinement between Student Focus Groups and the Staff Focus Groups.



**Principles and Guidance Document**
**For**
**STUDENTS**
**for**
**distributed-Design Information Storing (d-DIS),**
**in student team-based project work**

**September 2009**




**Overview of Principles**

## Overarching Principle: PRINCIPLE of STRATEGY

### Emphasises the need for a distributed team project information storing strategy and the creation of rules early on in project work

**OVERARCHING PRINCIPLE**

**of STRATEGY**

- **Develop a distributed team project information storing strategy and the creation of rules early on in distributed project work.**

***Explanation:*** *Distributed design team work, by its very nature, requires a strategy to manage the storing of information to an even greater extent than traditional design. A strategy and rules are fundamental to co-ordinating the use of information and critical to the efficiency and effectiveness with which a team can share information. Without a clear strategy for storing and sharing information, information can be lost or duplicated, be inappropriate or untimely; and the quality of project information can be affected, resulting in a lack of project direction; time wasting; confusion and disagreement.*

*Guidance:* A strategy for storing project information should include procedures and processes on what to store (content, media types, formats); where to store it (tools); how to store it (organisation/who) and when to store it (team working patterns).

*Guidance:* The time spent establishing a strategy and rules will be recouped over throughout the length of the project.

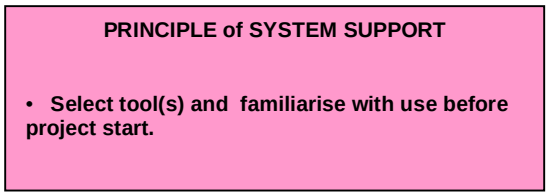
*Guidance:* Any strategy should be flexible and capable of being adapted to some extent, dependent on information storing requirements, as project develops.

*Guidance:* Any strategy should be agreed and established jointly by all team members.

*Guidance:* Socialising supports creation of a project information storing strategy through the early exchange of personal information and the developing of trust.

## PRINCIPLE of SYSTEM SUPPORT

**Requires the selection of tool(s) and familiarisation of use prior to project start.**




***Explanation:*** *Distributed design information storing is best supported by a centralised shared online store. Satisfaction with information storing and sharing in distributed project work is often directly related to the technologies used. Selecting the best tool(s) based on information needs, project length and team requirements and becoming familiar with at least basic functionality saves time and benefits project progress.*

Guidance: Tool(s) selection should satisfy the distributed team's information storing requirements. It is beneficial to spend time identifying tools. Consider the type of information to be stored; scope of work taking place and people in team; duration of work. Generally, tools should provide a central common storage space (to avoid confusion and duplication); allow access 24/7, regardless of location; and support appropriate file types.

Guidance: The selected tool(s) must have an acceptable learning curve; be simple to use; and have a simple interface. Tool(s) should not interfere with or hinder the design process, but be integral to it.

*Guidance:* All team members should contribute to the selection of the tool(s).

*Guidance:* A combination of linked tools rather than one tool often gives advantage.

*Guidance:* Use of a communications tool can greatly support information storing tool(s). These tools tend to contain informal project information which can add context to stored project documents.

*Guidance:* Unfamiliarity with the selected tool(s) causes confusion. All team members should know the general functionality and capabilities of the tool(s) in order to make the best use of them.

*Guidance*: Due to the indeterminate nature of design and the difficulty in establishing all requirements of tool(s) early on, allowance should be made for other tool(s) to be added to support information storing if required, as project progresses.

*Guidance:* To ensure the longevity of project information the selected tool must be capable of retaining project information for the duration of the project and beyond, e.g. for academic purposes: student reflection, staff re-use, external assessment.

## PRINCIPLE of INFORMATION TYPE

**Requires storing of an appropriate range of information types: content (formal and informal), state, media and format, relevant to project.**

**PRINCIPLE of INFO. TYPE**

- **Store an appropriate range of information types: content (formal and informal), state, media and format, relevant to project.**

*Explanation: Storing a range of information types with both formal and informal content; in a range of states (e.g. raw, developed or finalised) using a variety of media and formats, in a 'Project Memory' (an online store of information and knowledge gathered and generated during a project) helps give meaning and understanding to all project information and progresses project work.*

*Guidance:* Both Formal and Informal information need to be stored in distributed student project work.

> ***Formal information*** *and knowledge (often referred to as 'hard') is the primary work product of design work and is easily and routinely captured. It is factual and informative. Identified as more product-related, it is more factual and declarative and is about the outputs and results.*
>
> ***Informal information*** *and knowledge (often referred to as 'soft') is created in the process of producing the formal results. It is more practice-oriented and gives context to the formal information. It is identified as more practice-related, produced as a result of generating the outputs and results.*

*Guidance:* Informal information takes time to store; it can also be long and messy. However, it is vital to add meaning and understanding and has value for reflection.

*Guidance:* Storing a range of states or maturity levels of information, e.g. raw data, file versions, developed information and final forms of solutions is necessary to give a comprehensive picture of a project's development and to support valuable reflection.

*Guidance:* Reduce compatibility issues by establishing what information formats to use at the project outset. This reduces frustration and confusion.

*Guidance:* Sharing and storing informal information increases team cohesion; in particular social information shared at beginning of project.

*Guidance:* Different types of information will have greater or lesser value depending on project problem, task and team. Often, not all valued informal information is stored, whereas valued formal information is more likely to be stored. Value of information can also relate to the number of relationships it has to other information.

*Guidance:* Allow for flexibility during project work. Do not restrict the type of information stored. This can result in limitations, e.g. loss of ideas, loss of information which could develop and progress project in later stages.

*Guidance:* Store a range of media types, appropriate to the project task and time available, e.g. text, photographs of physical models/objects/people, videos of models/objects/people, CAD drawings, photographs or scanned sketches and images from the Internet.

Text was found to be the most frequently used media type for sharing and storing information. However it requires greater time for clarity. Text is extremely useful in combination with other media types, e.g. text and photographs, text and CAD drawings, text and sketches.

Images from the Web help create a shared understanding of a project problem. They provide clarity and context.

Photographs capture the design process simply and quickly. How things work and finalised solutions can be visualised easily. Less is left to misinterpretation. Photographs or scans of sketches with accompanying text descriptions are good to convey background research and concept work with sufficient clarity.

CAD drawings tend to contain more formal information, e.g. concepts, component and assembly information, calculations and functional information.

Video is useful to capture the informal aspects of the design process. Video is a good media to capture events at key points in time; to help recall; it offer great visual understanding (especially coupled with audio). There are however issues with the use of video to store information, e.g. high preparation and production times; video requires editing into small segments for sharing and re-use; drawn information doesn't communicate too well across video; and finding specific information in video can be difficult and time consuming.

Video conferencing sessions tend not to be stored as there is little time to revisit the full recordings during a project. Stored summaries of VC sessions are more valuable.

## PRINCIPLE of QUANTITY and SIZE

**Requires storing of an appropriate amount of information relative to project task and time.**

**PRINCIPLE of QUANTITY & SIZE**

- **Store an appropriate amount of information relative to project task and time.**

***Explanation:*** *Each project is different and unique. It is important to consider how much information to store depending on the length of the project, the scope of the task, and the number of team members - not too much and not too little.*

*Guidance:* Not all information needs to be stored. Students find it counterproductive to store all information as it takes a lot of time and effort. Often, not all rough concept work or sketches get stored.

*Guidance:* Avoid information overload as this can be unmanageable and can affect access to information. Managing information includes the disposal of information. Too much project information contributes to loss of focus; storing unnecessary information wastes time; and information is often not re-visited if it is lengthy.

*Guidance:* Stored information needs some value and purpose for it to be useful in the future.

*Guidance:* Avoid information underload, or the limiting information content, media types or formats as this might lead to information not being stored and an incomplete project 'picture'.

*Guidance:* Sufficient information should be stored to help support all key design decisions.

*Guidance:* There is a requirement to store at least half informal information when working in a distributed situation. This adds context and meaning. Store more *design rationale*, explanation, decision making, *actions and decisions.*

*Guidance:* Less information is usually stored when working in a synchronous distributed mode due to greater opportunity to discuss work via real time communication tools. Information is more easily shared by meeting up and therefore less is stored.

*Guidance:* Avoid storing duplicated information.

*Guidance:* Consider the size or granularity of the information. If it is too large (e.g. long report or document) information content will be hard to find; if it is too small it will probably lack context and become meaningless over time. Make use of summaries and keywords.

## PRINCIPLE of CONTEXT and CLARITY

**Encourages the storing of informal information to add shared meaning and understanding to formal information in a distributed situation.**

**PRINCIPLE of CONTEXT & CLARITY**

- **Store informal information to add shared understanding and meaning to formal information in a distributed situation.**

***Explanation:*** *In distributed design there is a need for context. Informal information can add meaning and context. A shared understanding and meaning of formal information can be promoted in a distributed situation through the storing of more informal information. There is also a greater need for making information clear in distributed design work due to the lack of opportunities for explanation and discussion. Teams are more efficient and productive when information is understandable.*

*Guidance:* In asynchronous design situations, information has to be comprehensive and clear; ambiguity in interpretation of information needs to be reduced. By its very nature, some design information can be ambiguous and messy, e.g. sketches, scribbles, notes, but the content needs to be clearly understandable. Incomplete drawings, lack of dimensions, etc. leads to confusion, frustration and delays. Information should be kept concise whilst at the same time informative. This takes time and requires greater thinking.

*Guidance:* In virtual space the positive effects of tacit knowledge transfer are severely reduced. Information with context becomes increasingly more desirable. More informal information needs to be stored as formal information alone is not sufficient for accurate recording of design project work. Informal information (i.e. more tacit aspects) is critical to understanding in distributed design work and should be regarded as an 'appropriate' information type to store.

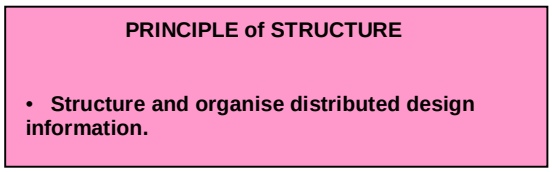
*Guidance:* Information should be richer and more detailed in an asynchronous situation; greater amounts of rationale and justification have to be stored. Increase the recoding of informal information by documenting design process, methods and failures; use logbooks; keep meeting minutes and notes of decisions made. Embed informal information in formal documents or make links between stored informal and formal information.

*Guidance:* Communication tools (e.g. email, forums, chat & VC technologies) contain valuable informal information, e.g. *actions, decisions, problems, issues, questions, social information, contextual information and organisational information.* This information can be useful to store but is often not re-visited due to lack of time and difficulty in pinpointing information. Summaries, or a record of outcomes of these sessions, prove more valuable to store.

*Guidance:* Time impacts on information clarity. The shorter the project the less time is available to ensure information clarity.

## PRINCIPLE of STRUCTURE

**Encourages the structuring and organising of distributed design information.**




***Explanation:*** *Consideration given to the structuring and organising of distributed design information early on in project work, will make information storing, sharing and retrieval easier and less time-consuming.*

*Guidance:* Unstructured or unorganised project information often causes frustration, confusion and misunderstanding amongst team members in a distributed team.

*Guidance:* Once having experienced distributed design team work, students are much more likely to structure their project information, making information retrieval easier and less time-consuming.

*Guidance:* In distributed design, several of the key context providers for information are missing, e.g. people, place, time. Information can be given greater meaning by linking it or clustering it to other information and creating relationships between information which will give greater meaning when viewed out of context or at a later date.

*Guidance:* Reflecting on the structuring and organisation of distributed design information during project work (at least mid-project) to assess its success (or otherwise), helps to improve project performance.

## PRINCIPLE of LOCATION/RETRIEVAL

**Encourages an awareness by each team member of where distributed design information is stored.**

**PRINCIPLE of LOCATION/ RETRIEVAL**

- **Be aware of where distributed design information lies.**

***Explanation:*** *Distributed design information needs to be found easily and quickly. It is important that each team member knows where distributed design information is stored at any given time. This means the team is more likely to use the same information; avoid confusion; reduce inconsistent decisions based on differing information; and, save time which could be best spent on other design activity.*

*Guidance:* The use of a simple information management system or the structuring of information supports knowledge of where information lies. This then facilitates good team working; reduces time wasted finding information; and even, prevents the use of 'inappropriate' closest match information.

*Guidance:* Notifying (by email or other asynchronous tool) when information has been posted helps to inform all team members of where distributed design information is stored which in turn helps avoid confusion and saves time.

## PRINCIPLE of CONSISTENCY

**Emphasises the consistent storing of distributed design information throughout project by all members of distributed team.**

**PRINCIPLE of CONSISTENCY**

- **Store distributed design information throughout project by all members of distributed team.**

***Explanation:*** *For information to be most effective during a distributed design project it needs to be shared and available to all team members at the time of information need. Information recorded sporadically can disadvantage a team and impact negatively on team cohesion.*

*Guidance:* Information in a distributed situation requires storing as it is generated in order to be of greatest benefit to others. It should be stored frequently throughout, as it occurs, rather than at the end of the each design phase.

*Guidance:* Existing behaviours may need to be modified in order to achieve more consistent storing of project information and enable improved storing and sharing of information.

*Guidance:* The regularity with which information is stored will be determined by factors such as project length and complexity. Avoid storing at predetermined intervals; as this could affect any naturally occurring work activity patterns or even encourage the storing of unnecessary irrelevant information.

*Guidance:* Generally in student distributed team projects, one person at each site stores the information. This can often lead to inequality across a distributed team. To avoid this, all team members should be encouraged to contribute equally to the storing of distributed design information.

## PRINCIPLE of INTERACTION & REFLECTION

**Provides opportunities for interaction with and reflection on stored distributed design information throughout the project.**

**PRINCIPLE of INTERACTION & REFLECTION**

- **Interact with and reflect on stored distributed design information throughout the project.**

***Explanation:*** *Interaction with information keeps team members updated during a project; helps them visualise what others in the team are doing and promotes a feeling of collaboration. Maintaining an online store of project information or a 'Project Memory' is critical for project reflection, for future learning, and informing what can be improved the next time.*

*Guidance:* To increase interaction and reflection on 'Project Memory' content make stored information easy and quick to access; well structured and organised; of small and concise size, with context.

*Guidance:* Often stored information is viewed only once and traditionally reflection takes place at the end of a project or at key stages. Work with, and refer back to stored information often, as greater interaction supports better decision making and improved idea generation.

*Guidance:* Reflection is essential for student learning.

## PRINCIPLE of MEMORY

**Encourages recording and communicating a comprehensive memory of project problems, processes, rationale and outcomes.**

**PRINCIPLE of MEMORY**

- **Record and communicate a comprehensive memory of project problems, processes, rationale and outcomes.**

***Explanation:*** *Project information storing creates an archive which can be used to recall the story of the project at a later date. The information can be re-used for the purposes of assessment; reflective reporting; examinations; class discussion; for exemplars, and even for learning from failures.*

*Guidance:* The extent of how well the information storing records a comprehensive picture depends a number of factors: the type of information content and media types (wide range); the level of information captured (detailed and meaningful); captured or linked context (relationship with other information); and structuring of information (easily retrievable).

*Guidance:* The contents of the project information store or the *Project Memory* need to be interpretable and meaningful post project for years to come. Each nugget of information should be linked to appropriate context to greater or lesser degrees in order to make it understandable.

*Guidance:* It would be ideal if the project information stored in the *Project Memory* during the project also formed an archive. However, by its very nature design work tends to messy and additional work is usually required post project to create a reusable project archive from the content of the *Project Memory*. This requires either stripping out redundant, irrelevant information or making stored information more explicit and meaningful. Adoption of Principles for distributed design information storing will reduce time spent on this activity.

## Principles for distributed-Design Information Storing

### PRINCIPLES for Educators

| | Good distributed information storing practice should: |
|---|---|
| Overarching Principle | **PRINCIPLE of STRATEGY: Develop a distributed team project information storing strategy and the creation of rules early on in project work**<br>*To what extent do class design or project activities allow for the development of an information strategy before project start?* |
| **1.** | **Encourage the selection of tool(s) and familiarisation of use before project start.**<br>*To what extent can student teams select tool(s) for storing project resources and is time allocated for familiarising themselves with the tools pre-project?* |
| **2.** | **Require the storing of an appropriate range of information types: content (formal and informal), state, media and format, relevant to project.**<br>*What formal opportunities are offered to student teams to determine and assess information content, state, media type or formats throughout project work? What guidance is given to students on what and how to store project information?* |
| **3.** | **Encourage storing an appropriate amount of information relative to project task and time.**<br>*What formal opportunities are offered to student teams to determine and assess how much information to store? What guidance is given to students on how much project information to store?* |
| **4.** | **Encourage the storing of informal information to add shared meaning and understanding to formal information in a distributed situation.**<br>*To what extent are student teams encouraged to record the more informal aspect of their work, e.g. project process and design rational?* |
| **5.** | **Encourage the structuring and organising of distributed design information.**<br>*To what extent do class or project activities encourage the structuring and organising of distributed design information?* |
| **6.** | **Encourage an awareness of where distributed design information lies.**<br>*To what extent do class design or project activities support student team communication of project resources and information?* |
| **7.** | **Emphasise the consistent storing of distributed design information throughout project by all members of distributed team.**<br>*To what extent do class or project activities encourage the consistent storing of project information by every student?* |
| **8.** | **Provide opportunities for interaction with and reflection on stored distributed design information throughout the project.**<br>*What formal opportunities are there in class design and project activities for interaction with stored project information? To what extent are there formal opportunities for students to reflect on project resources?* |
| **9.** | **Record and communicate a comprehensive memory of project problems, processes, rationale and outcomes.**<br>*To what extent do class design and project activities help to build a comprehensive story of project development and outcomes?* |





| | |
|---|---|
| **4.** | **Encourage the storing of informal information to add shared meaning and understanding to formal information in a distributed situation.**<br>*To what extent are student teams encouraged to record the more informal aspect of their work, e.g. project process and design rational?* |
| Change | Students were encouraged to share personal information and to keep communications levels high. |
| **5.** | **Encourage the structuring and organising of distributed design information.**<br>*To what extent do class or project activities encourage the structuring and organising of distributed design information?* |
| | No formal activities were planned in this regard.<br>Previous examples were shown to the students – both good and bad. |
| **6.** | **Encourage an awareness of where distributed design information lies.**<br>*To what extent do class design or project activities support student team communication of project resources and information?* |
| | No formal activities were planned in this regard.<br>Discussion took place on the impact of not being aware of where information lies. |
| **7.** | **Emphasise the consistent storing of distributed design information throughout project by all members of distributed team.**<br>*To what extent do class or project activities encourage the consistent storing of project information by every student?* |
| | No formal activities were planned in this regard but staff emphasised information storing. |
| **8.** | **Provide opportunities for interaction with and reflection on stored distributed design information throughout the project.**<br>*What formal opportunities are there in class design and project activities for interaction with stored project information? To what extent are there formal opportunities for students to reflect on project resources?* |
| Change | The reflective session at the end of the Strathclyde class was extended. A joint reflective session with the Maltese students were organised by VC. |
| **9.** | **Record and communicate a comprehensive memory of project problems, processes, rationale and outcomes.**<br>*To what extent do class design and project activities help to build a comprehensive story of project development and outcomes?* |
| Change | Greater emphasis was placed on creating a 'comprehensive' picture of project development through increased staff emphasis on the storing of project information in class, in order to support UK reflective report writing. |

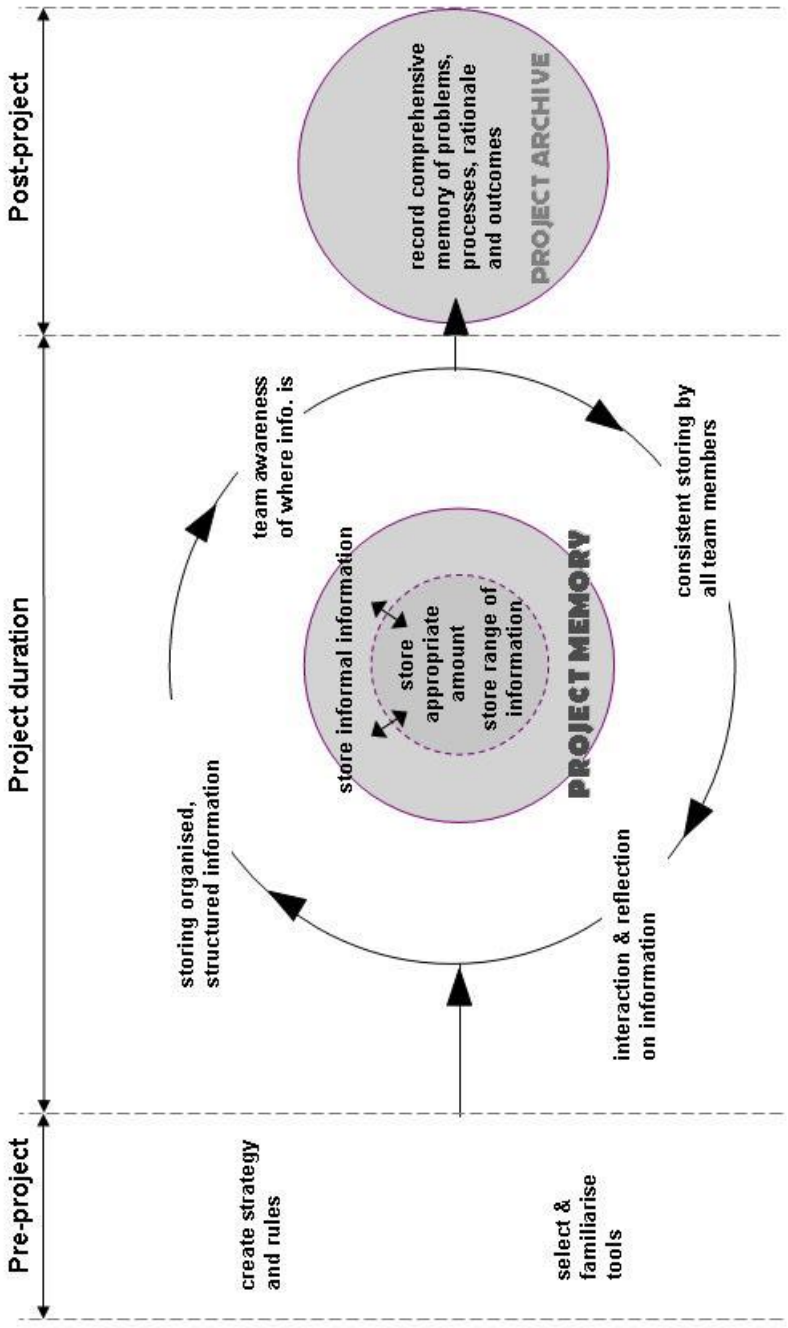
**Principles for good distributed-Design Information Storing practice**

**PRINCIPLES for STUDENTS**

When undertaking distributed team-based project work involving the storing & sharing of information & knowledge give consideration to as many of the following Principles as possible. Revisit this list throughout duration of project for greatest impact.

| Overarching Principle | **Develop a distributed team project information storing strategy early on in distributed project work.** |
|---|---|
| 1. | **Select tool(s) and familiarise with use before project start.** |
| 2. | **Store an appropriate range of information types: content** (formal and informal subject matter), **state** (raw developed or finalised), **media and format, relevant to project.** |
| 3. | **Store an appropriate amount of information relative to project task and time.** |
| 4. | **Store informal information to add shared meaning and understanding to formal information in a distributed situation.** |
| 5. | **Structure and organise distributed design information.** |
| 6. | **Be aware of where distributed design information lies.** |
| 7. | **Store distributed design information consistently throughout project by all members of distributed team.** |
| 8. | **Interact with and reflect on stored distributed design information throughout the project.** |
| 9. | **Record and communicate a comprehensive memory of project problems, processes, rationale and outcomes.** |

Principles for distributed-Design Information Storing (d-DIS), in student team-based project work




distributed-Design Information Storing (d-DIS) Framework

**Principles and Framework**
**for Distributed Design Information Storing - d-DIS**

**Evaluation Plan/ Measurement of Impact of Principles**
**November 2009**

## 1. Student Validation of the Principles - Questionnaires and Focus Group

(i) **Questionnaire** to all local sides of teams – UK and Swinburne
- How the Principles were used?
- When used?
- Effectiveness?
- Closed questions relating directly to Principles aims and to issues from earlier case studies.

UK Students – during **Reflective class session** each team to complete **feedback on Principles** through discussion Swinburne Students - Far-side of teams to also complete feedback on Principles – emailed questionnaire.

(ii) **Confirmation** of responses and follow up on 'doubtful' responses.
UK f2f and Swinburne via email.

(iii) **Focus Group** – f2f – 1 student from each team.
Show results of questionnaire; confirm and elaborate –
- When used?
- Effectiveness?
- How they helped teams?
- Use in future?

## 2. Case Study Comparison – Data/Document Analysis

(i) **Measure and analyse information content in one Case Study**. Measure as before –
- ***where?*** – tools and technologies used to store project information
- ***what?*** – the amount of information content stored; the amount of informal information; the different information carriers; a comprehensive memory?
- ***when?*** - consistent storing?; by all teams members?
- ***how?*** - structured?; organised?; clear?

(ii) **Semi-structured interview** with UK side of team to confirm findings from analysis of *Project Memory*.

28/07/09

| | | Method | Purpose | Participants |
|---|---|---|---|---|
| **Student Validation of the Principles** | Qualitative & Quantitative | **Questionnaires** | Student Validation of the Principles | **7 Global teams – A, B, C, D, E, G, I**<br>Questionnaire issued to all 11 global teams (22 sides) - all Strathclyde sides returned; 8 Swinburne sides returned (1 incomplete)<br>**14 questionnaires**<br>**39 students** (of 50 students total) |
| | Qualitative | **Focus Group** | Student Validation of the Principles | **6 Strathclyde students - A, B, C, E, G, I**<br>1 from each of the 7 Global teams above (1 student absent on day); selected by invitation on a first response basis |
| **Case study comparison** | Quantitative | **Data/Document Analysis of archived online project work** | Case study comparison – examination of information content in *Project Memory* | **1 *Project Memory* – Team B**<br>From 1 of the 6 above |
| | Qualitative | **Semi-structured Interview** | Student confirmation of the information content in *Project Memory* | **3 Strathclyde students – Team B**<br>Owners of above Project Memory<br>(1 student absent on day) |

Example: Case 7, Team B, UK-side.

UK

**Principles for distributed-Design Information Storing (d-DIS), in student team-based project work**
**Evaluation of the Principles in Global Design Project 2009-2010**

**Please discuss and complete one questionnaire per local side of each team.** **Please note your Team in box** B
**Return to your course tutor or supervisor.**

**Team signatures** .....[redacted]

**1.** Please note in the table below the considerations and discussion your team gave to each of the Principles during the Global Design Project. Note how you implemented the Principles into your team's information storing practices and when this took place. And, finally indicate how effective you felt each of the Principles were in terms of improving distributed-design information storing. You may refer to the original Principles Checklists and documentation issued.

| Principles | Consideration and Actions<br>Please note the considerations your team gave to each Principle; and how your team actually implemented each Principle to support your distributed-design information storing processes. If the Principle wasn't considered or acted upon before or during distributed project work then please state 'none'. | When<br>Please tick when each Principle was acted on. One or more can be ticked. | | Effectiveness<br>Please indicate on a 1-5 scale effectiveness of each Principle. | |
|---|---|---|---|---|---|
| **Overall Principle of Strategy**<br>Develop a distributed team project information storing strategy early on in distributed project work. | → DEVELOPING A TIME SCHEDULE<br>→ BREAKING DOWN THE PROCESS INTO STAGES<br>→ CREATED AN UPLOAD SCHEDULE | | never | (5) | most effective |
| | | ✓ | early on | 4 | |
| | | | mid project | 3 | to |
| | | | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of System Support**<br>Select tool(s) and familiarise with use before project start. | → SELECT WETPAINT & FAMILIARIZE WITH IT<br>→ ORGANIZE THE WEB PAGE<br>→ | | never | 5 | most effective |
| | | ✓ | early on | (4) | |
| | | | mid project | 3 | to |
| | | | all throughout | 2 | |
| | | | at end | 1 | least effective |



| | Considerations and Actions | When | | Effectiveness | |
|---|---|---|---|---|---|
| **Principle of Structure**<br>Structure and organise distributed design information. | → HOME PAGE - USED FOR UPDATES<br>→ INDIVIDUAL PAGE FOR EACH STAGE OF THE PROJECT<br>→ USED GMT AS STANDART TIME | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Location/Retrieval**<br>Be aware of where distributed design information lies. | → SHARED WORKSPACE<br>→ WEB PAGE ORGANIZED IN DIFFERENT SECTIONS<br>→ 1 PAGE FOR 1 STAGE | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Consistency**<br>Store distributed design information consistently throughout project by all members of distributed team. | → UPLOADED INFO THROGHOUT THE PROJECT REGULARLY | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Interaction and Reflection**<br>Interact with and reflect on stored distributed design information throughout the project. | - INTERACTION THROUGH DISCUSSION BOARD<br>- // // E-MAIL | | never | 5 | most effective |
| | | | early on | 4 | |
| | | | mid project | (3) | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |

| | Considerations and Actions | When | | Effectiveness | |
|---|---|---|---|---|---|
| **Principle of Clarity and Context**<br><br>Store informal information to add shared meaning and understanding to formal information in a distributed situation. | → PROFILE PAGES OF MEMBERS | | never | 5 | most effective |
| | | ✓ | early on | 4 | |
| | | | mid project | (3) | to |
| | | | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Information Type**<br><br>Store an appropriate range of information types: content (formal and informal), state, media and format, relevant to project. | → DIFFERENT FILE TYPES UPLOADED | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Quantity**<br><br>Store an appropriate amount of information relative to project task and time. | → STORE ONLY RELEVANT INFO | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |
| **Principle of Memory**<br><br>Record and communicate a comprehensive memory of the project problems, processes, rationale and outcomes. | → RECORDED EVALUATION TABLES, BRAINSTORMING MAP ETC. | | never | (5) | most effective |
| | | | early on | 4 | |
| | | | mid project | 3 | to |
| | | ✓ | all throughout | 2 | |
| | | | at end | 1 | least effective |



| 2. Please consider each of these statements and circle your response, 1-5, where 1 = strongly agree and 5 = strongly disagree. | | Strongly agree | Agree | Agree/ disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1. | The Principles for distributed-design information storing helped support information storing in this project. | 1 | 2 | (3) | 4 | 5 |
| 2. | Use of the Principles contributed to a satisfying distributed team-based project work experience. | 1 | (2) | 3 | 4 | 5 |
| 3. | Use of the Principles helped generate a good re-usable project archive which told a comprehensive story of our project. | 1 | (2) | 3 | 4 | 5 |
| 4. | Using and applying the Principles gave us a good understanding of storing information in distributed project work and improved our information storing skills. | 1 | (2) | 3 | 4 | 5 |
| 5. | Applying the Principles saved time which could be spent on other project activities. | 1 | 2 | (3) | 4 | 5 |
| 6. | Creation of a strategy and rules early on helps distributed team work. | (1) | 2 | 3 | 4 | 5 |
| 7. | Being familiar with the information storing technologies is not necessary. | 1 | 2 | 3 | (4) | 5 |
| 8. | To maximise the use of project resources stored online you need to structure and organise information. | (1) | 2 | 3 | 4 | 5 |
| 9. | We are still unsure about what information to store and how much. | 1 | 2 | (3) | 4 | 5 |
| 10. | Storing informal information benefits distributed project work. | (1) | 2 | 3 | 4 | 5 |
| 11. | It is not important to know where project information is located. | 1 | 2 | 3 | 4 | (5) |
| 12. | Information should only be stored and shared at milestones or the end. | 1 | 2 | 3 | (4) | 5 |
| 13. | Interacting with and referring back to stored information helps decision making and progresses project work. | (1) | 2 | 3 | 4 | 5 |
| 14. | Distributed-design project work can be carried out without an online store or 'Project memory' of project information. | (1) | 2 | 3 | 4 | (5) |
| 15. | Our team took full advantage of the Principles – their application, the checklist, examples, etc. | 1 | 2 | (3) | 4 | 5 |
| 16. | The information, guidance and materials given on the Principles were sufficient and helpful. | 1 | (2) | 3 | 4 | 5 |

By completing the above questionnaire you have agreed to offer up feedback on the use of the Principles for Distributed Design Information Storing from your experience in the Global Design Class, 2009-2010. Thank you for your participation. It is greatly appreciated. Hilary Grierson

**Principles and Framework**
**for Distributed Design Information Storing - d-DIS**

**Focus Group – Global Design Students**
**25 November 2009**

*Material to be supplied to students at session –*
*Information sheet*
*Consent form*
*Principles Checklist and Framework*
*Principles Guidance Document*
*Sheets to complete for Q1 and Q2.*

Hand out the **Information sheet and Consent Form**. Ask students to read and to complete.
Advise of recording. 5 mins

1. Hand out sheets for **written responses** (warm-up) – do in small groups.

   5 mins/10mins

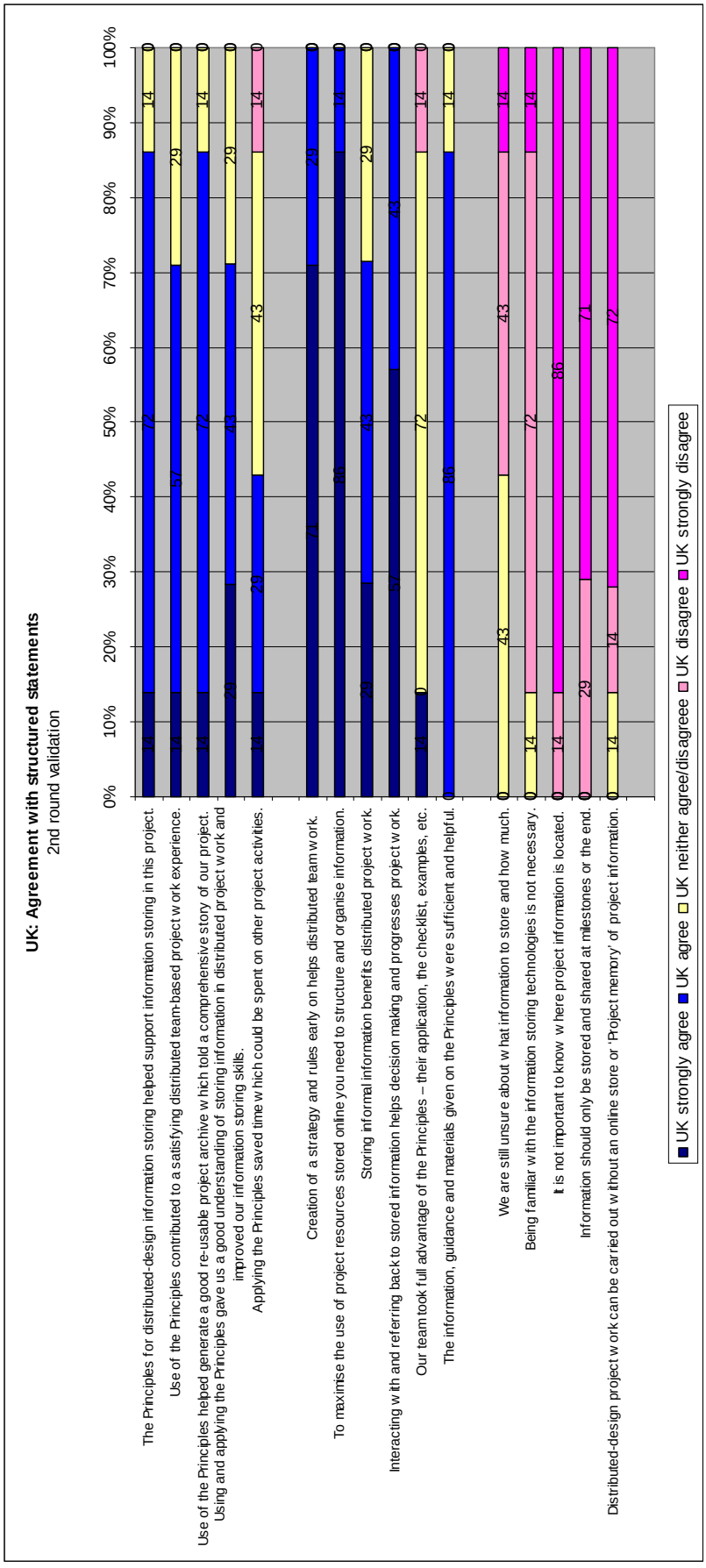
2. Then ask for **rationale** - **general discussion**. RECORD.

   (i) Show students the effectiveness of the Principles and ask them to give rationale. 15 mins
   (ii) Show students when Principles were used. Tie into Framework. Ask students to give rationale. 15 mins

3. The Principles and the Framework were introduced to the class in a presentation and a Principles Checklist and a copy of Guidance on the Principles was issued to each team. Can you suggest any **other methods** for presenting or integrating the Principles with the class and distributed project work? 15 mins

| Coding | Definition and explanation (derived from students responses) |
|---|---|
| C | Context – Some of the Principles helped students to realise the importance of, and the need to store some informal information to add context. If context is lost information can be misinterpreted or irrelevant. |
| CC | Clear and Concise – Students noted that information had to be "concise and effective enough to interpret [B] - "short and simple" [A]. Information should not be overwhelming. |
| DT | Document Throughout – Several Principles encouraged students to document and store information for all stages of project work and also to guard against losing or misplacing information. |
| FT | Familiar Tools – Principle of System Support helped students realise the need to know tools before project start. "Better use of the Principle makes for more structured approach to [use of ] tools." [G] |
| L | Locate Information - Several of the Principles made information more "readily available" [G] and easy to locate and retrieve for all team members. A central store (Project Memory) supports this. Finding information easily and quickly is especially vital for long projects. Also important that no 3rd party had access. |
| LL | Lessons Learnt – Important to identify and store project problems so as not to repeat them. |
| M | Memory -Some students found it easy to forget project work from week to week; storing regularly prevented this. Stored information supported identification and solving of problems and doubts; and, the need for more information. |
| OS | Organised and Structured - Principles helped students organise and structure their information within tools. Vital for long projects. Unstructured information can be problematic. |
| PO | Project Outcome - Some Principles helped maintain focus and drive towards project outcome; "allowing the task to be completed effectively within a global team". [E] |
| R | Reflection – Referring back to, or reflecting on stored information. If information was in several places then this was difficult to do |
| St | Strategy – Principles offered "an ideal framework" [B] and basic guidance to the team in approaching distributed project work – an opportunity to standardise approaches and methods across a team. |
| Tm | Teamwork - Team members were encouraged to contribute when they saw updates on team sites. Collaboration was increased through sharing of informal information and activities. This strengthened relationships within teams. |
| U | Understanding – Principles helped students understand what was expected of them in distributed project work. This in turn helped reduce anxiety at the start of the project. |
| UV | Usefulness and Value – Principles made some students think about the usefulness, value and importance of information. This helped them to determine what to store, how much and where. "Relevant" was a term used several times. [A,B,E] |

[A] Team A, [B] Team B, [E] Team E, [G] Team G


UK: Agreement with structured statements
2nd round validation
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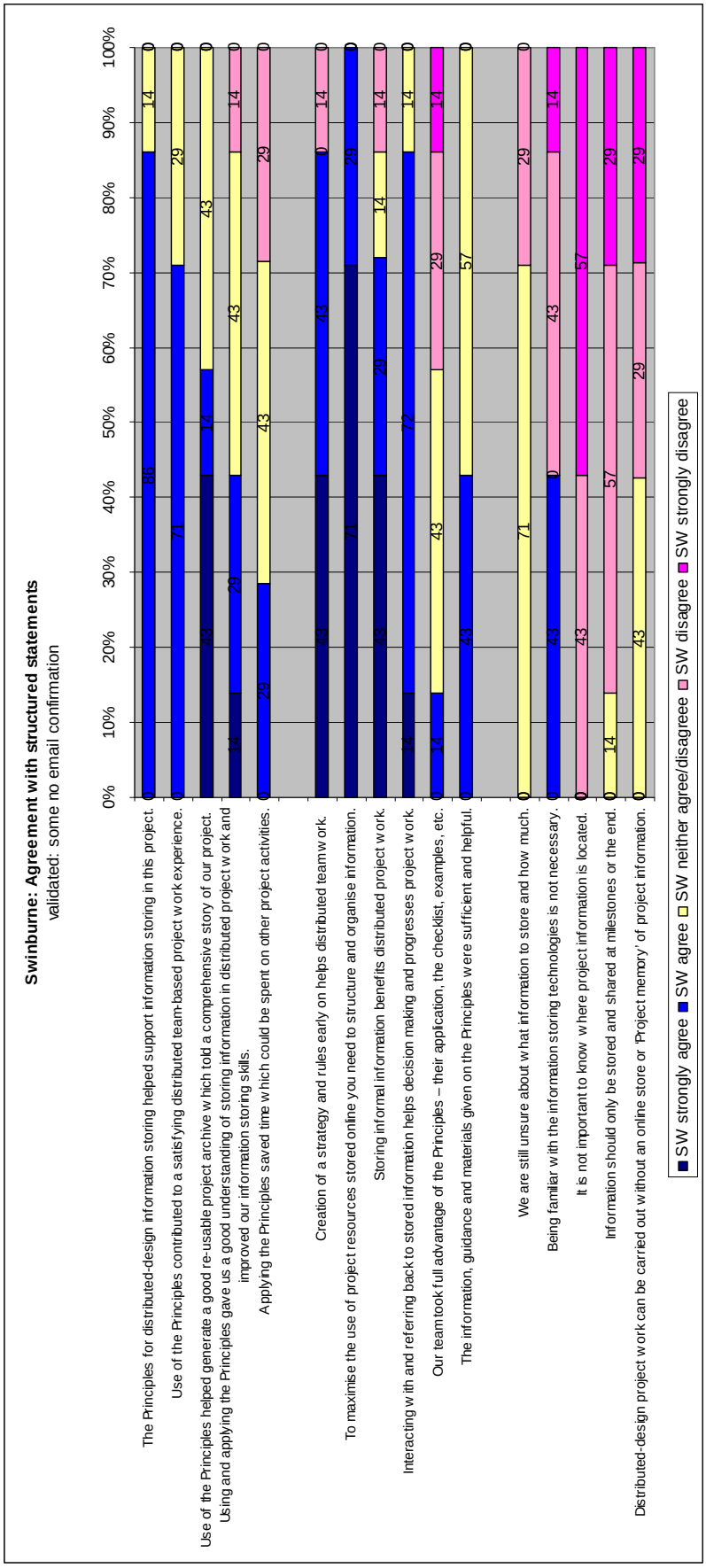
The Principles for distributed-design information storing helped support information storing in this project.
Use of the Principles contributed to a satisfying distributed team-based project work experience.
Use of the Principles helped generate a good re-usable project archive which told a comprehensive story of our project.
Using and applying the Principles gave us a good understanding of storing information in distributed project work and improved our information storing skills.
Applying the Principles saved time which could be spent on other project activities.
Creation of a strategy and rules early on helps distributed team work.
To maximise the use of project resources stored online you need to structure and organise information.
Storing informal information benefits distributed project work.
Interacting with and referring back to stored information helps decision making and progresses project work.
Our team took full advantage of the Principles – their application, the checklist, examples, etc.
The information, guidance and materials given on the Principles were sufficient and helpful.
We are still unsure about what information to store and how much.
Being familiar with the information storing technologies is not necessary.
It is not important to know where project information is located.
Information should only be stored and shared at milestones or the end.
Distributed-design project work can be carried out without an online store or 'Project memory' of project information.
UK strongly agree
UK agree
UK neither agree/disagree
UK disagree
UK strongly disagree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Our team took full advantage of the Principles – their application, the checklist, examples, etc.
The information, guidance and materials given on the Principles were sufficient and helpful.
We are still unsure about what information to store and how much.
Being familiar with the information storing technologies is not necessary.
It is not important to know where project information is located.
Information should only be stored and shared at milestones or the end.
Distributed-design project work can be carried out without an online store or 'Project memory' of project information.
SW strongly agree
SW agree
SW neither agree/disagree
SW disagree
SW strongly disagree

Questionnaire handed out as part of a reflective session at the end of 2009-2010 Global Design Class, to the UK sides of teams. Questionnaire emailed to Swinburne sides of all teams.
Note: A number of negative responses were included in closed statements.

| % agreeing and disagreeing to structured statements<br>Global teams – Strathclyde + Swinburne<br><br>**'Strongly agree' and 'agree' merged. 'Strongly disagree' and 'disagree' merged.** | **Students agree (%)** | **Students neither agree nor disagree (%)** | **Students Disagree (%)** |
|---|---|---|---|
| Creation of a strategy and rules early on helps distributed team work. | **93** | | **7** |
| The Principles for distributed-design information storing helped support information storing in this project. | **86** | 14 | |
| Use of the Principles helped generate a good re-usable project archive which told a comprehensive story of our project. | **71** | 29 | |
| Interacting with and referring back to stored information helps decision making and progresses project work. | **93** | 7 | |
| Storing informal information benefits distributed project work. | **72** | 21 | **7** |
| Using and applying the Principles gave us a good understanding of storing information in distributed project work and improved our information storing skills. | **57** | 36 | **7** |
| | | | |
| Being familiar with the information storing technologies is not necessary. | **42** | 14 | **42** |
| To maximise the use of project resources stored online you need to structure and organise information. | **100** | | |
| It is not important to know where project information is located. | | | **100** |
| Information should only be stored and shared at milestones or the end. | | 7 | **93** |
| Distributed-design project work can be carried out without an online store or *'Project Memory'* of project information. | | 29 | **71** |
| We are still unsure about what information to store and how much. | | 57 | **43** |
| | | | |
| Applying the Principles saved time which could be spent on other project activities. | **36** | 43 | **21** |
| Use of the Principles contributed to a satisfying distributed team-based project work experience. | **71** | 29 | |
| Our team took full advantage of the Principles – their application, the checklist, examples, etc. | **14** | 57 | **29** |
| The information, guidance and materials given on the Principles were sufficient and helpful. | **64** | 36 | |