Half-day Tutorial on Sketching Visualization designs, and using the Five Design-Sheet (FdS) Methodology in Teaching

Jonathan C. Roberts* Bangor University
Panagiotis D. Ritsos† Bangor University
Christopher Headleand‡ University of Lincoln

ABSTRACT

This tutorial leads attendees through sketching designs following the Five Design-Sheet methodology (FdS) and discusses how it can be used in teaching. The first part (before the break) will introduce the FdS, place it in context with other methods, discuss creative thinking and different problem types, explain the benefit of sketching designs, and provide a worked example of the FdS. The second part (after the break) focuses on using the FdS in teaching in Higher Education. We give examples of students' work, and discuss issues and challenges of using sketching for designing and prototyping in teaching, followed by a question and answer session.

Keywords: Sketching visualization designs, Five Design-Sheet, Information Visualization, Teaching visualization, Learning Support

Index Terms: H.5.2 [Interfaces and Presentation]: User Interfaces—Graphical User interfaces (GUI). K.3.2 [Computing Milieux]: Computers & Education—Computer Science Education

1 THE LEVEL OF THE TUTORIAL (BEGINNING)

The first part of the tutorial will be especially useful for anyone who wishes to create visualization interfaces, and needs to think through different potential ways to display their data. At the end of this part participants will understand techniques that help them be more structured in their ideation. They will be able to sketch interface designs using the Five Design Sheet methodology and think through alternative solutions.

The second part will be particularly useful for teachers wishing to apply the technique in their own teaching. It will also be useful for researchers or students because it will present and discuss many examples of how different students have interpreted the technique. Examples of good practice will be included. At the end, researchers and academics will know how they can use the FdS in their situation. Educators, especially, will learn how to apply it to their courses.

2 BACKGROUND & HISTORY

When developing computer interfaces, software engineers need to consider different alternative solutions before they start to program. This is especially true of visualizations, but also useful in other situations where designers need to work through different permutations, to decide which to implement. It is often difficult to know how to explore the idea space, which design is best, and how to proceed towards a final proposal. The Five Design-Sheet method enables developers/students to consider different ideas make plans (in sketch form) that capture the interface layout, operations and underpinning algorithms.

*e-mail:j.c.roberts@bangor.ac.uk
†e-mail: p.ritsos@bangor.ac.uk
‡e-mail: cheadleand@lincoln.ac.uk

The FdS was originally published in 2011 in the Eurographics education workshop [1], with several years of use before this date. Since 2011 a full journal publication was presented at IEEE VIS 2015, titled "Sketching Designs Using the Five Design-Sheet Methodology" [2] and recently a book on the methodology and related concepts was published by Springer [3]. This tutorial builds upon previous tutorials, including those delivered: (i) over 3 years at the UK-VAC summer school (over 50 participants per year), and (ii) at IEEE VIS 2016 where we focused on sketching skills and people implemented their own FdS. The tutorial for 2017 will focus more on the application of the FdS, based on insight gained by its use by over 500 students at Bangor and at Lincoln Universities, as well as information obtained from its use across the world, at different Universities.

We acknowledge that using sketching in teaching can be both rewarding and challenging. Some students excel and revel in the freedom of expressing their ideas in sketch form; whereas other students struggle to comprehend the importance of alternative ideas, and the necessity of using sketching. Hence for 2017, half of the tutorial will be given over to issues in its application and use.

We refer readers to chapters in our book "Five Design-Sheets: Creative Design and Sketching for Computing and Visualization" [3], such that attendees can read about the ideas in more detail.

3 OUTLINE SCHEDULE PART 1

3.1 Introduction & Overview of the Five Design-Sheets method (40 min)

The Five Design-Sheet methodology facilitates the exploration of different ideas, to think through many potential design solutions and sketch them on paper. This section presents sketching as a tool for design planning, explains the sketching method and what resources you'll need and explores techniques to improve your skills of sketching for design. This part briefly introduces each sheet. Sheet 1 of the five sheets provides a space where creativity can flow. You can imagine, and so draw, lots and lots of different ideas. Sheets 2, 3 and 4 then develops those ideas further, while the final sheet (Sheet 5) provides a more refined solution of one of the major ideas. It is through sketching that a user will understand more about the issues, opportunities and challenges of the design task. In this section we introduce the main concepts explored in the tutorial, and the different skills that we wish attendees to learn.

- Introduction
- Background of the FdS
- The FdS in detail, covering each of the 5 sheets
- Who has used the FdS
- Where can it be applied?
- Benefits of sketching
- Other methods / Related work.

Further details about the FdS can be read in Chapter 2, with more details in Chapters 8,9 and 10, [3].

3.2 Types of problems, creative thinking and idea generation, (30 min)

This section explores thinking and provides a list of techniques to help users get started with coming up with new designs. There are many different types of problems; those that converge to a single answer and others that diverge to many potential possibilities.

- Being a convergent critical thinker
- Types of problems; structured problems vs. ill-structured
- Idea generation; where do ideas come from?

Further detail about problems can be read in Chapter 3, [3].

3.3 Examples and a worked scenario (30 min)

This section looks at the whole process, especially structuring and generating the main visualization interface in sketch form (the content of Sheets 2,3,4 and 5). We will go through the structure of these sheets and provide examples of the Layout/big picture, Operations/components, the Parti (main underpinning algorithm of the visualization) and the Disadvantages/Advantages panels. We then work through a scenario where we provide a live-demonstration of the process.

- Presentation of the five parts to sheets 2,3,4, including: Information, The Big Picture, Operations and Components of the system, The Parti (the main focus), Discussing the pros and cons.
- Scenario and live demonstration
- Discussion of common issues (and solutions) to sketching the sheets

Several examples are explained in full detail in Chapter 11, [3].

BREAK

OUTLINE SCHEDULE PART 2

3.4 Planning to use the FdS, lectures and practical activities (30 min)

In this section we discuss how to start to use the FdS. We discuss practical requirements and exercises to help students develop their creative skills. If time permits, participants may try some of these exercises themselves!

- Getting a kit together
- Pens, not pencils
- Bold and faint lines
- Using labels and words with sketched diagrams.

More information about sketching techniques is found in Chapter 5, [3], and also in the Explanatory Visualization Framework (EVF) paper [4] that uses the FdS as part of a module design. Issues of graphical marks and its use on the FdS can be found in Chapter 6, [3].

3.5 Attitudes, issues etc. (20min)

Students are sometimes heard to say "but I cannot draw". We discuss attitudes of the students and how to encourage them to sketch, and to believe that there is value in looking at alternatives. But it is not only the student that needs to have the right attitude; teachers too need to be positive about the use of sketching and the FdS.

- "But I cannot draw!"
- Attitudes and issues in teaching creativity for Computing Students
- Teacher attitudes

More information about discussion on attitudes can be found in Chapter 5 [3], and in the Explanatory Visualization Framework (EVF) paper [4].

3.6 Student examples and good practices (30 min)

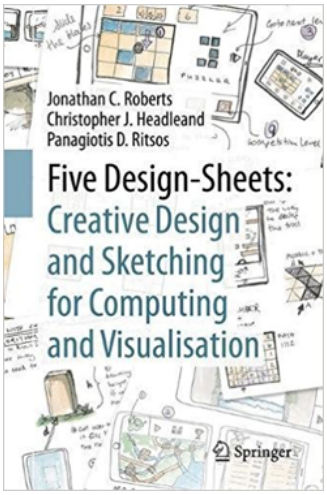
We show many examples of students work, and discuss good and bad practices. We discuss methods to help students achieve better grades, and how ongoing feedback is useful.

- Examples of students work
- Discussion over good practices
- How to grade work, and what to look for.

More information about grading for the FdS is explained in the Explanatory Visualization Framework (EVF) paper [4].

3.7 Question/Answers & Conclude (20 min)

The final part will be more interactive. We will prompt participants to ask questions and share their own experiences.



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