Science of the Project: Session 5

Documenting and communicating design research

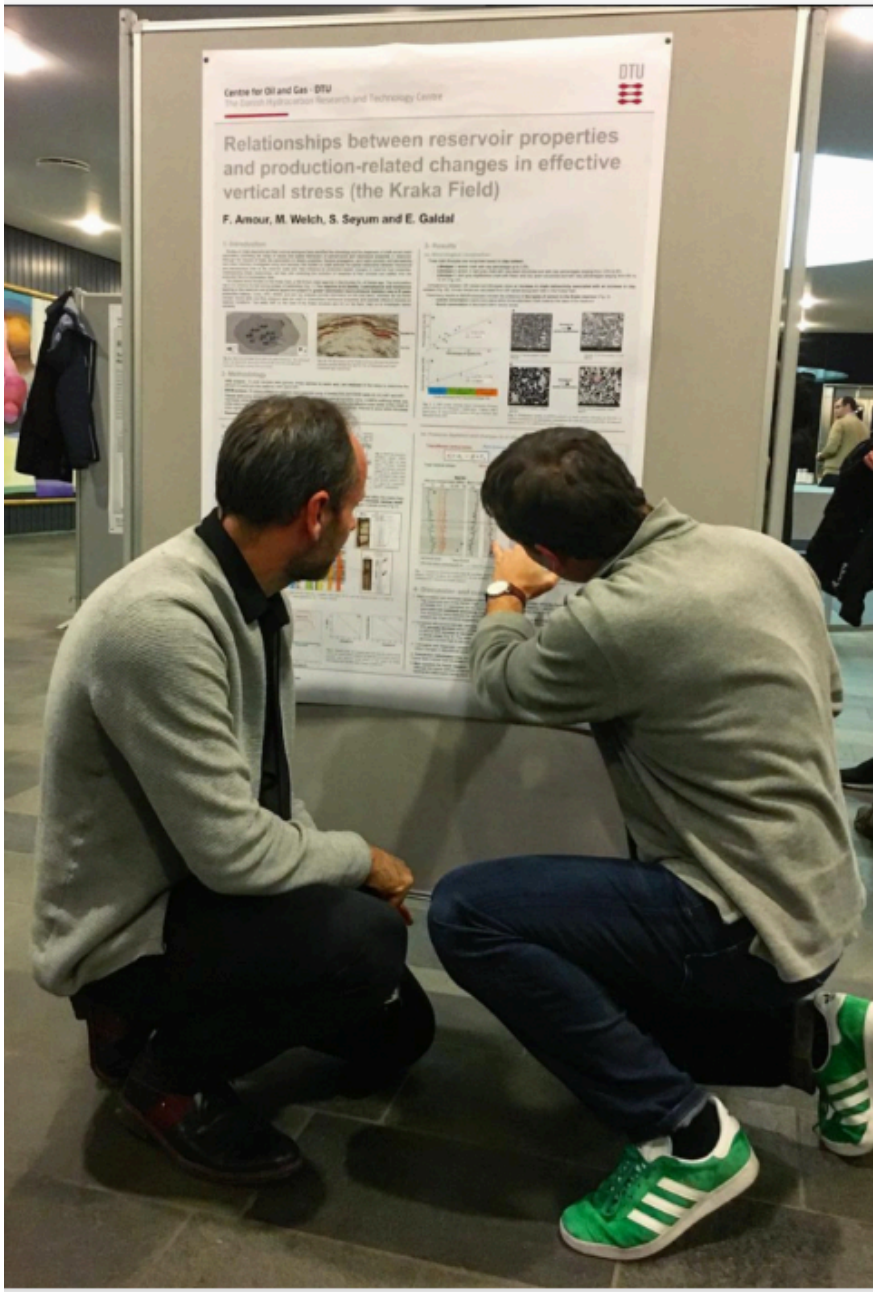
What are we doing when we document research?

- Peer Contribution
- Communication
- Validation
- *a matter of record*

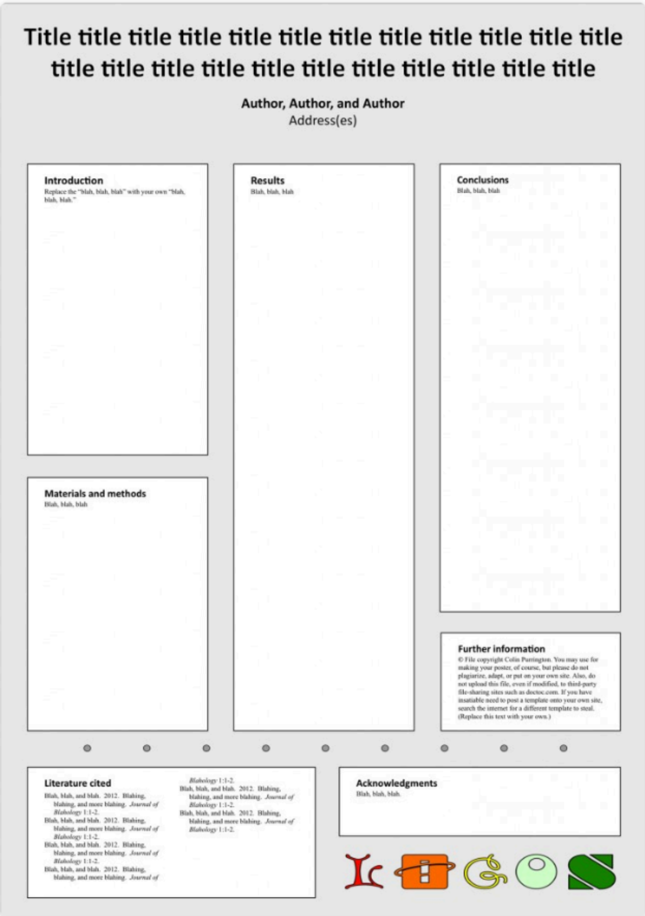
Papers

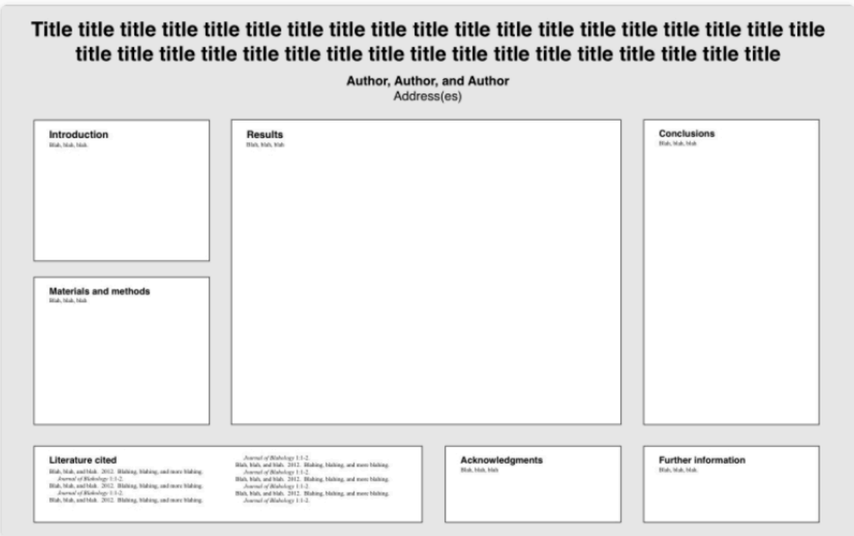
- Posters
- Short papers
- Position papers (for workshops or similar)
- Long papers
- Journal Papers
- Book chapters
- Videos
- Demonstrations
- Pictorials (new: DIS & SIGCHI & NORDICHI conferences)

Conference Posters



https://colinpurrington.com/tips/poster-design





DESIGNING FOR THE IMPOSSIBLE: Creating a mobile application for time dilation

AUTHOR KEYWORDS
DESIGN
TIME
TEMPORALITY
EVENTS
VISUALISATION
AESTHETICS
USER EXPERIENCE
USABILITY
MAKING

INTRODUCTION

In our paper we discuss the development of *Time-Travel*, a mobile application for tracking personal time dilation. Time dilation is the warping effect on time that movement in space produces. Predicted by Einstein's theory of relativity (1905)and verified by practical experiment, [5] time dilation affects all things in motion, anywhere in the universe [7]. Our project was to develop a simple application aimed at smart watches that could communicate the imperceptible effects of time dilation on a user's everyday activities in an easy to understand, meaningful way.

The Haffele Keating experiment of 1972, showing one of the caesium clocks used in the experiment being transported in a commerical jet airliner. This was the first practical experiment demonstrating evidence of time dilation. Highly accurate atomic clocks were flown around the globe and compared with a previously synchronised stationary clock.

THE INTERFACE AND UX design process contained challenges of communicating highly abstract concepts in an engagable, easy to understand way. We experienced technical challenges in tracking and calculating time scales in the trillionths of seconds or less (ten to the minus fifteen or smaller durations) and of programming for an uncertain execution stack. Building on our previous cross disciplinary work [1][2] in this arena we approached our project as both critical design [3] and design probe [4].
Our design is at pre-release stage and as an ongoing project will iterate further in the run-up to widescale release and in subsequent revisions.

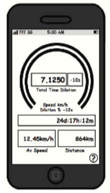
MAIN OBJECTIVES

STARTING FROM BASIC functional investigations and visualisations the project generated key requirements. Through iterations of the requirements and visualisations a first version minimum viable product (MVP) was arrived at, comprising;

- GeoLocative Tracking
- Calculation of instantaneous dilation effect
- Readout of total dilation
- Readout of average speed

Secondary functionality that was felt to be desirable included

- Tools to share total and/or weekly dilation in with other users
- A high score style table to create the ability to compare totals with friends.



Interface design lo-fi wireframe

ENGINEERING

$$t' = \frac{t}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Equation for the calculation of time dilation. The effect is non-linear in nature. At low speeds the effect is extremely small. However, as the velocity, v, approaches the speed of light c, (3 x 10^8 m/s), the dilation effect increases dramatically from t1/t=1 (v=0) toward t1/t=infinity at v=c, where in theory, time ceases to have relevance.

THE SOFTWARE PLATFORMS considered were Android and iOS, Android being chosen as the initial development platform for reasons of programming, testing and deployment convenience. The Android OS running on a watch styled device was targeted as an ideal candidate hardware platform. This was felt to be effective both from a form and interaction factor but also given the intimate link to ideas of time that a watch styled device evokes.

RESULTS

INITIAL DEPLOYMENT was of early prototypes and was immediately helpful in providing feedback and field testing to the iterative design process. Early iterations of the design displayed greater amounts of information relating to the geolocative tracking process, displaying latitude, longitude, elapsed time between geotracking updates etc. It quickly became apparent that much of this information, whilst interesting from a development and debugging perspective, was irrelevant and unnecessary to convert the key message of the project.

AN AWARENESS OF THE BENDING AND FLUIDITY OF TIME.

CONCLUSIONS

SO FAR THE PROJECT is at the end of its first stage and though we have viable working prototypes it is anticipated that there will be several more cycles of work. The goals are to have a wider dicussion and greater user numbers to allow statistically significant research to be undertaken on how the application affects the perceptions of users.

MAKING THE IMPERCEPTIBLE PERCEIVABLE

forthcoming research

OUR NEXT STAGE is to conduct an adoptive user study with a small number of users (n=<-10) with Android smartwatches devices. In the adoptive strategy we ask users to engage with the application for an extended period of time. We are primarly interested in studying what if any changes occur when we present seemingly impossible concepts such as the speed of light and the warping of time in visual form to users. Following this adoptive process we will engage in user interviews and evaluate the findings with a view to both futher design iterations and reporting of research findings.

At this point in our research we wish to engage in a wider discussion as to the best process to evaluate the next stage of our project. We are working in the arena of making the invisible immediate. The arena where we are augmenting our senses through technology - such as experiments in making wi-fi signals perceivable [8] or detecting magnetism [6] - changes the context of how we live and how we may comprehend our world.

We see our project as a bridge between the lived and theoretical worlds and present it as a practical investigation into what happens when we make the imperceptible perceivable.

Acknowledgements
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THE PATCHING ZONE

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Tracking the Imperceptible

Visualising Time Dilation on Wearable Devices

In this project we discuss the development of TimeTravel,

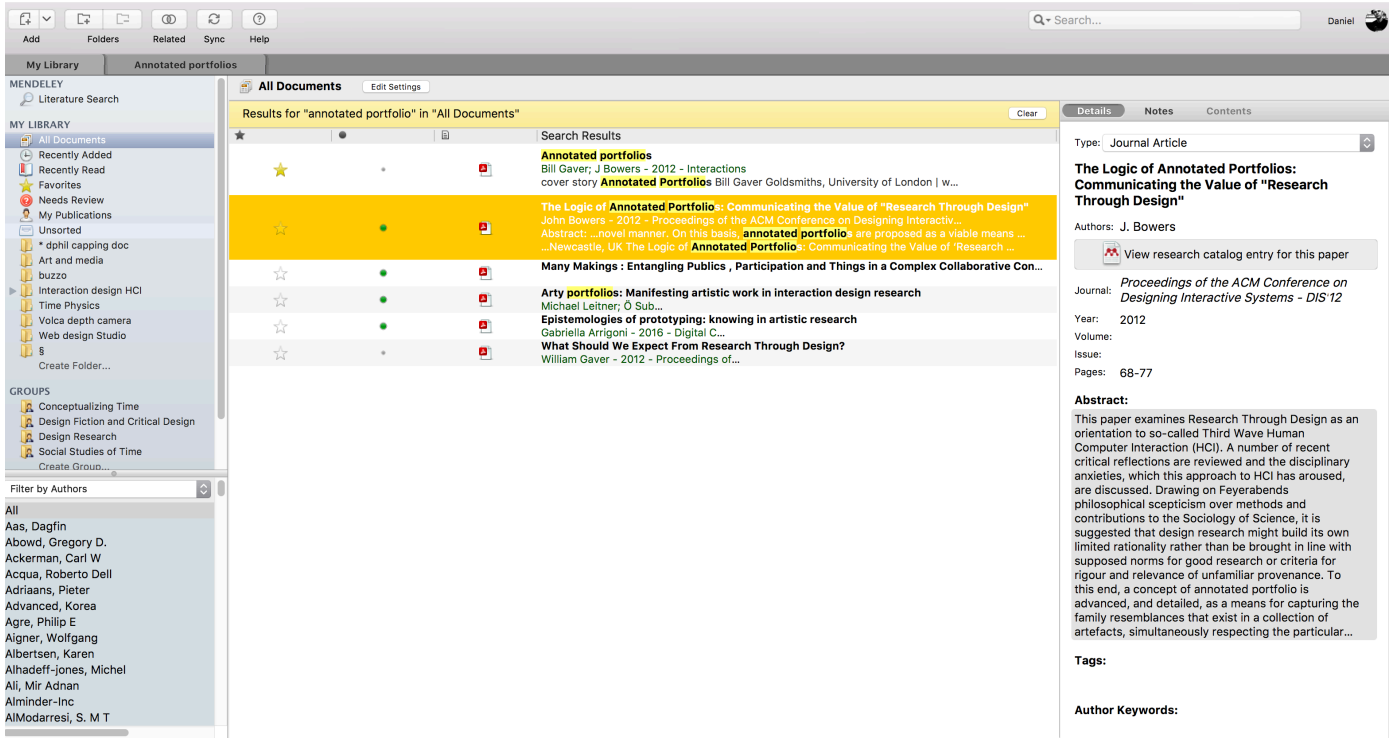
Annotated Portfolios

Templates for assignment

- ACM SIGCHI Extended Abstracts

Managing references, citations and reading

- Mendeley
- Refworks
- Zotero



getting started with mendeley

https://www.youtube.com/watch?v=Gv6_HuCYExM

writing

Note and draft taking

- evernote
- one note
- etc

Formatting and final work

- MS Word
- LaTeX

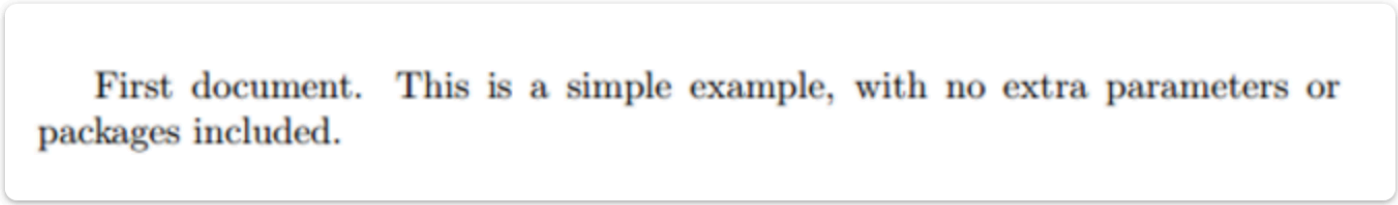
Backup and versioning

- you **MUST** have a clear strategy

using LaTeX

```
\documentclass{article}

\begin{document}
First document. This is a simple example, with no
extra parameters or packages included.
\end{document}
```



First document. This is a simple example, with no extra parameters or packages included.

- LaTeX (pronounced «Lah-tech» or «Lay-tech»)is a markup system for writing, editing and styling text documents.
- “It is based on the WYSIWYM (what you see is what you mean) idea, meaning you only have focus on the contents of your document and the computer will take care of the formatting. Instead of spacing out text on a page to control formatting, as with Microsoft Word or LibreOffice Writer, users can enter plain text and let LaTeX take care of the rest.”
- overleaf.com
- Mactex
- etc

versioning with Git

Basic Git workflow:

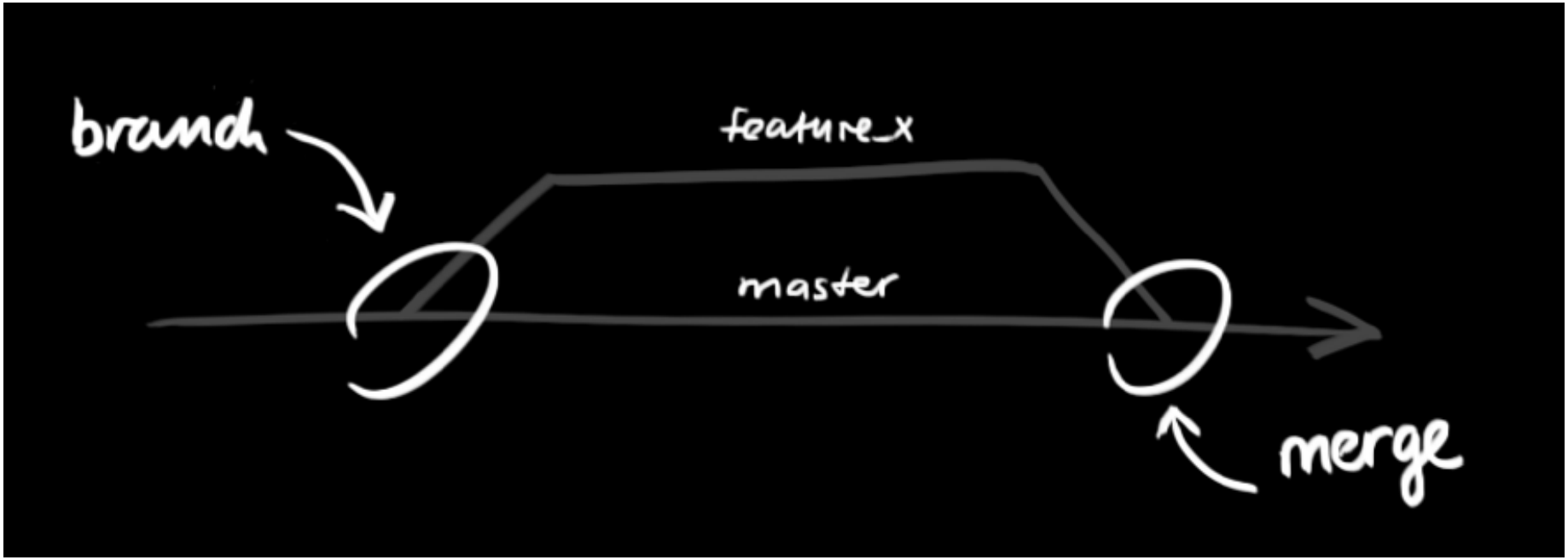
- start a project
- tell git that it is a repository of files (a ‘repo’)
- make changes to your project:
  - add new and/or modified files
  - remove files you don’t want
- commit changes (aka save)
- Each commit has a unique identifier and you can return one at any time.
- It’s like a “save point” & you can add a message reminding you what you did:

Dan Wilcox: Git Basics

versioning with Git

- Each step (commit) is recorded and anyone involved in the project can see the current state of the project. You can also make side versions ‘branches’ to investigate or work on elements - eg, and experimental change or a quick fix to a problem.

- If useful these branches can be pulled back into the main version with a ‘merge’.



Dan Wilcox: Git Basics

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- introduction to overleaf https://www.youtube.com/watch?v=g8Ejj0T0yG4
- https://www.youtube.com/playlist?list=PLqhXYFYmZ-VeNZSlqyzuDgtbpElkOqJA5