

# Five Design-Sheet (FdS) Methodology Overview and Examples

From “Sketching Designs using the Five  
Design-Sheet Methodology”  
Roberts, Headleand, Ritsos  
InfoVis 2015

# Sheet 1 – Brain Storm

- Generate Ideas
  - short concepts that could be part of whole
- Filter
  - remove duplicate or impossible ideas
- Categorize
  - order the ideas
- Combine & Refine
  - organize ideas into bigger solutions, multiple views?
- Question
  - does this provide a solution to the task?

## Rules of Brainstorming

1. Don't criticize
2. Don't evaluate
3. Generate-generate-generate
4. Use the whole design space

# **Sheets 2, 3, 4 – Initial Designs**

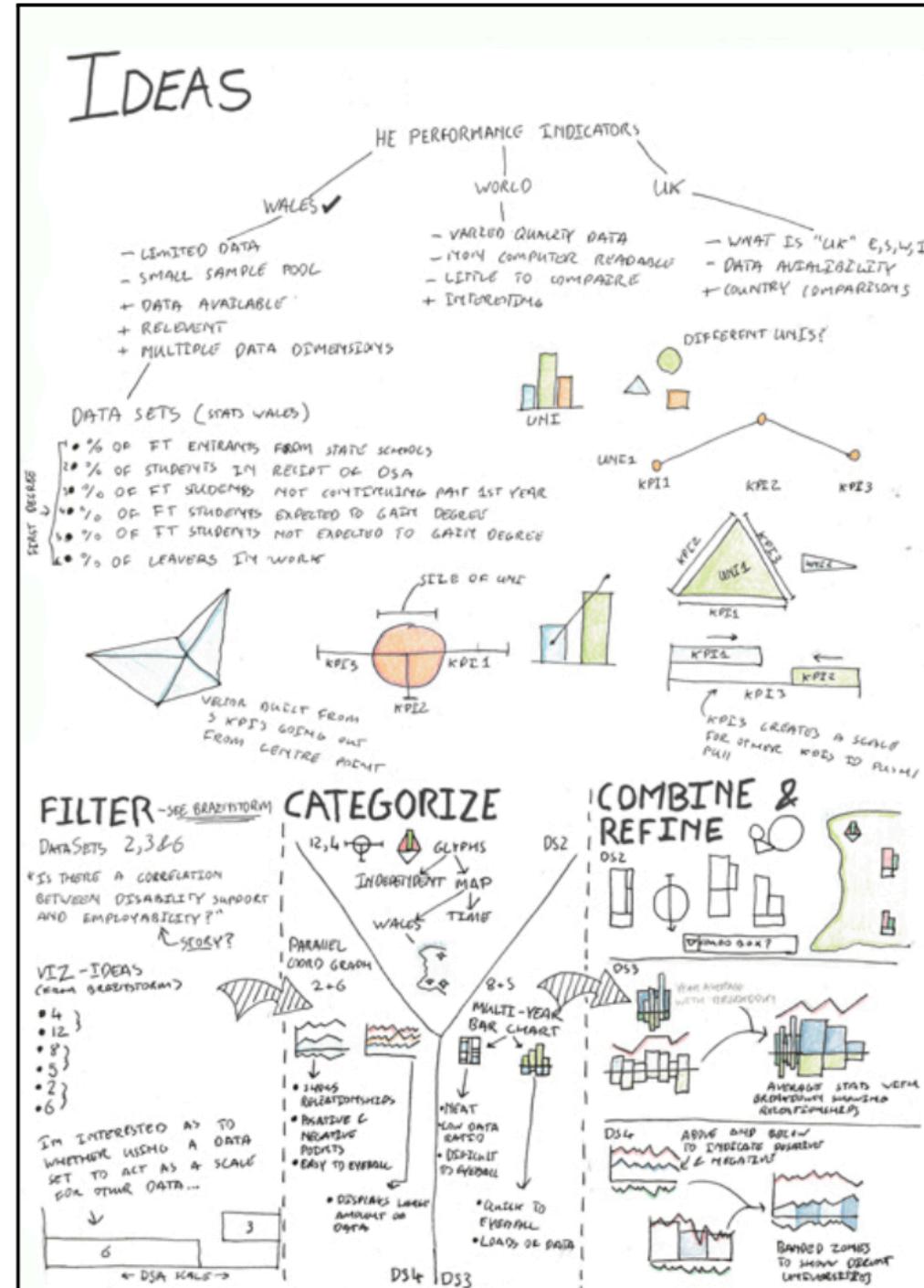
- Layout
  - vision of what the final vis would look like, sketch screenshot
- Focus
  - central idea of the vis, could be particular component or novel interaction method
- Operations
  - how the user operates the vis, controls needed for the interface
- Discussion
  - advantages and disadvantages of the technique

# Sheet 5 - Realization

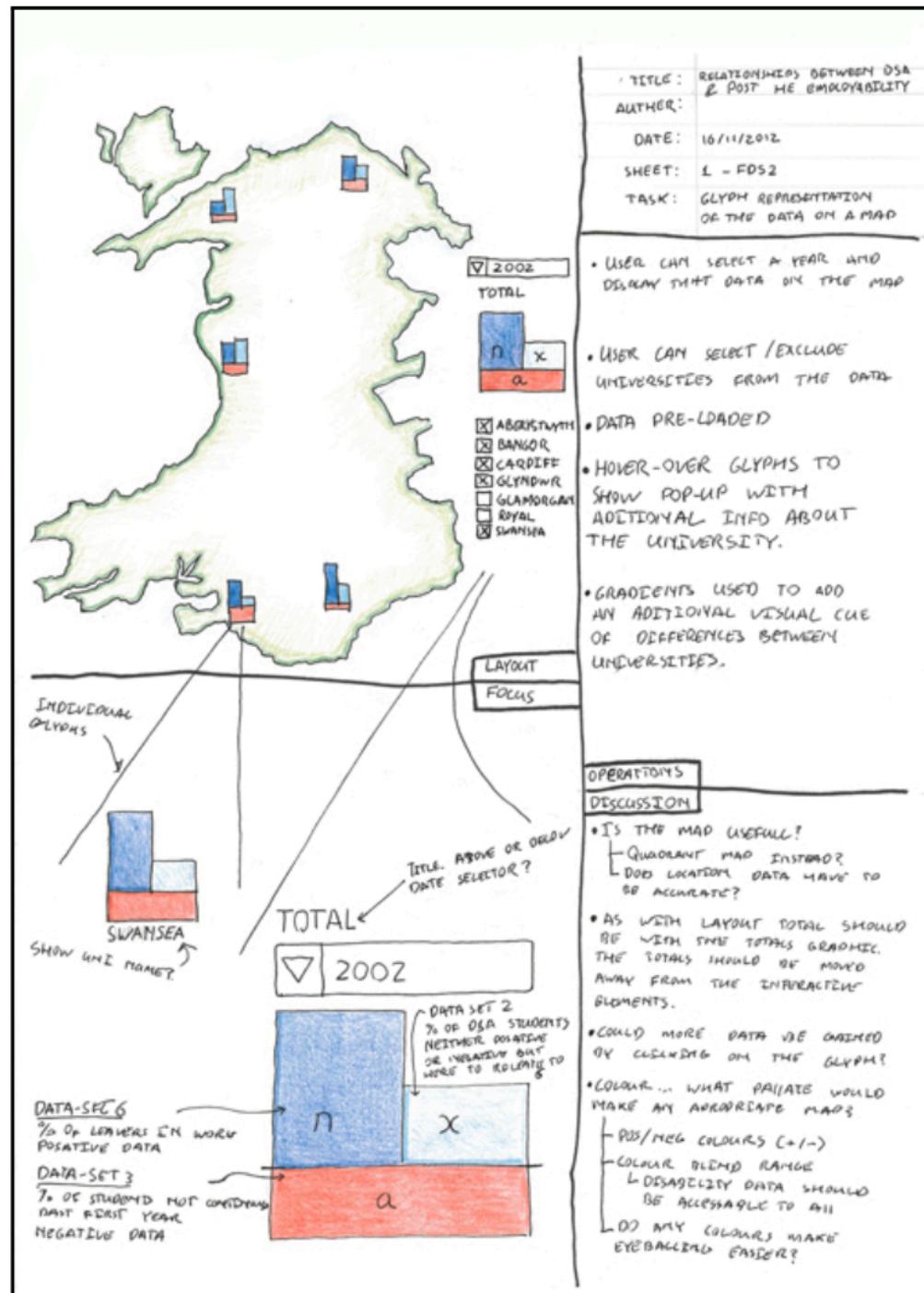
- Complete layout, focus, and operation sections for the chosen vis
  - may be different from the original 3, or a combination
- Exchange discussion for detail
  - algorithms
  - design details (color, shapes, etc.)
  - dependencies – software libraries
  - estimated time to build
  - other hardware/software requirements

# Sheet 1 - Brainstorm

Data regarding University access for disabled students.



## Sheet 2 – Initial Design 1



# Sheet 3 – Initial Design 2

**TITLE : RELATIONSHIPS BETWEEN OSA & POST-HB EMPLOYABILITY**  
**AUTHOR:**  
**DATE : 16/11/2012**  
**SHEET : 2 - F053**  
**TASK : BAR-CHART REPRESENTATION OF THE OSA, EMPLOYABILITY & LEAVERS DATA**

UNI-1   ◊ UNI-2   ◊ UNI-3   ◊ UNI-4   ◊

LAYOUT  
FOCUS

FOCUS ON THE UNI THE USER HOVERS OVER. THIS DISPLAYS A YEAR BY YEAR BREAKDOWN.

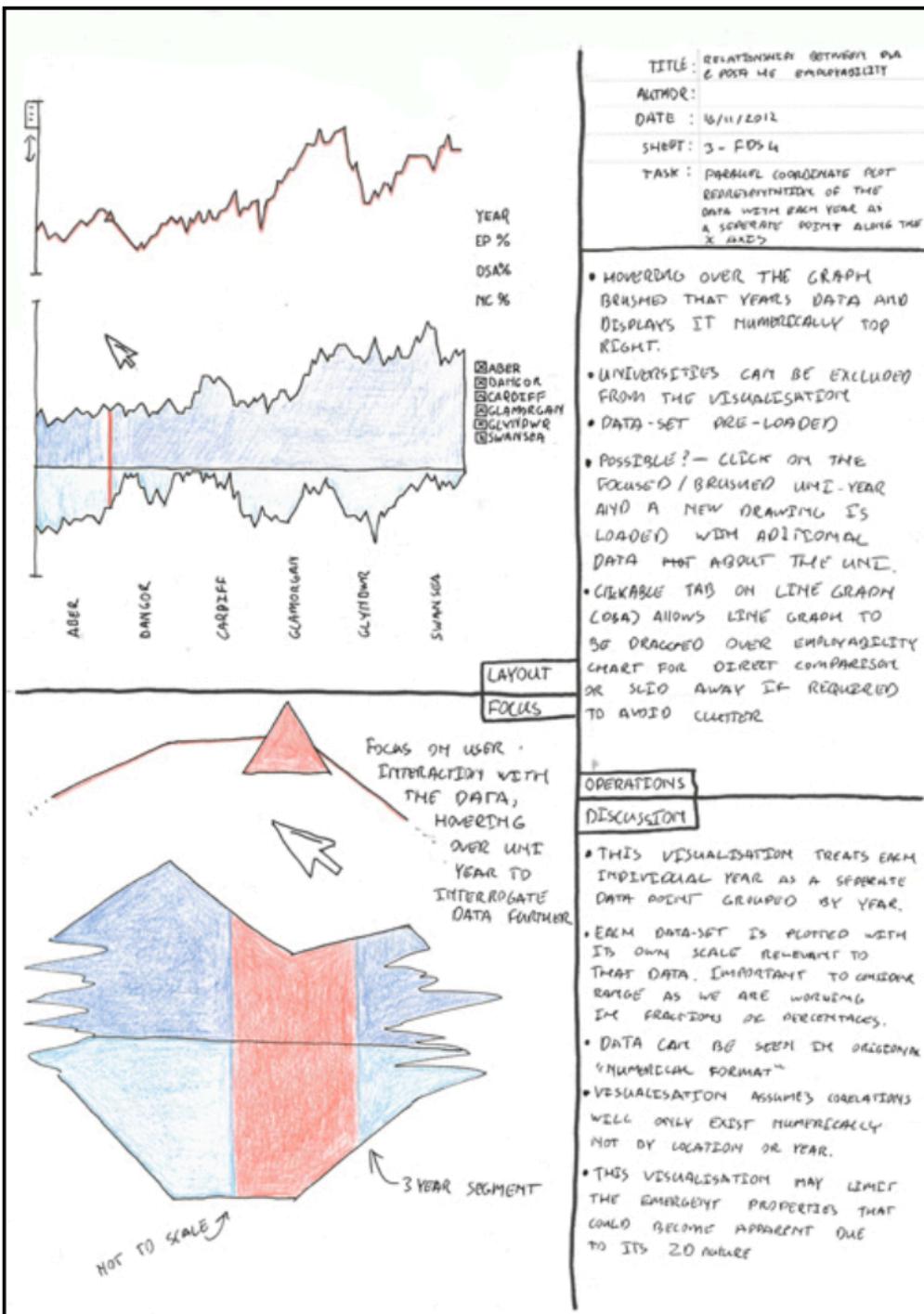
NOT TO SCALE

- HOVERING OVER EACH AVERAGED UNIVERSITY BAR DRAWS THE YEAR BY YEAR BREAKDOWN.
- CLICKING ON AN INDIVIDUAL YEAR WOULD SET ALL BACKGROUND "MAZ" BARS TO THE FIGURES OF THAT YEAR ALONE FOR COMPARISON.
- CLICKING ON THE MINUS SYMBOL WOULD MINIMISE THAT UNI WITH THE REMAINING UNIS EXPANDING TO FILL THE SPACE.
- DATA PRE-LOADED?
- ABILITY TO CHANGE DISPLAY COLOR COLOURS FOR DIFFERENT USERS PREFERENCES?

**OPERATIONS DISCUSSION**

- DOES 'MINIMISING' UNI'S ADD ANY USEFULL INTERACTION?
- DURING THE HOVER-OVER BREAKDOWN OF DATA SHOULD THE YEAR BE DISPLAYED IN TEXT FOR EASE OF INTERPRETATION
- SHOW ALL BUTTONS COULD BE USEFUL BUT IT MAY CLUTTER THE DATA.
- VISUALISATION ASSUMES THE ONLY CORRELATIONS WILL BE NUMERICAL.
- COULD OTHER DATA BE DISPLAYED ON THE BARS? PERCENTAGES OR DEGREE CLASSIFICATION BY TYPE?

# Sheet 4 – Initial Design 3



# Sheet 5 – Realization

**STATE 1**

CHANGE VIEW  
2004

ABERYSTWYTH  
BANGOR  
CARDIFF  
GLAMORGAN  
GLYNNDWR  
SWANSEA  
ROYAL

LOCATION & MAP DA  
STATE & FOR VISUAL  
REFERENCE &  
LINE LOCATION

**STATE 2**

NE/NW  
SW/SE

CHANGE VIEW  
2004

ABERYSTWYTH  
BANGOR  
CARDIFF  
GLAMORGAN  
GLYNNDWR  
SWANSEA  
ROYAL

SPECIFIED LOCATION  
MAP FOR EACH  
INTERACTED  
OR DATA BY  
LOCATION

**STATE 3**

RETURN

Bar - chart representation  
of all the data from  
a single unit with  
with each bar  
representing a  
single year

**OPERATIONS**

**DETAIL**

- TIME TO BUILD ESTIMATED AT 16 HOURS
- DATA-SETS ACQUIRED FROM STATS WALES
- SCALE FOR EACH ITEM SET TO THE RANGE AS THE DIFFERENCE IS FRACTIONS OF %'s.
- COLOUR CHOICE BASED ON SURVEY DATA, HOWEVER WOULD NOT BE SUITABLE FOR COLOUR BLINDS. MAY CHOOSE YELLOW, PURPLE & BLUE TO SUIT DEUTERANOMALY & PROTANOPHY COLOUR BLINDNESS.  
#0080AA - BLUE,  
#E6E6FA - YELLOW,  
#333352 - PURPLE.
- DATA-SET WILL NEED SAME CLEANING AS NOT ALL UNITS HAVE ALL YEARS DATA.
- MAY NOT DISPLAY STATE THREE L STATE THREE BASED ON FDS3.

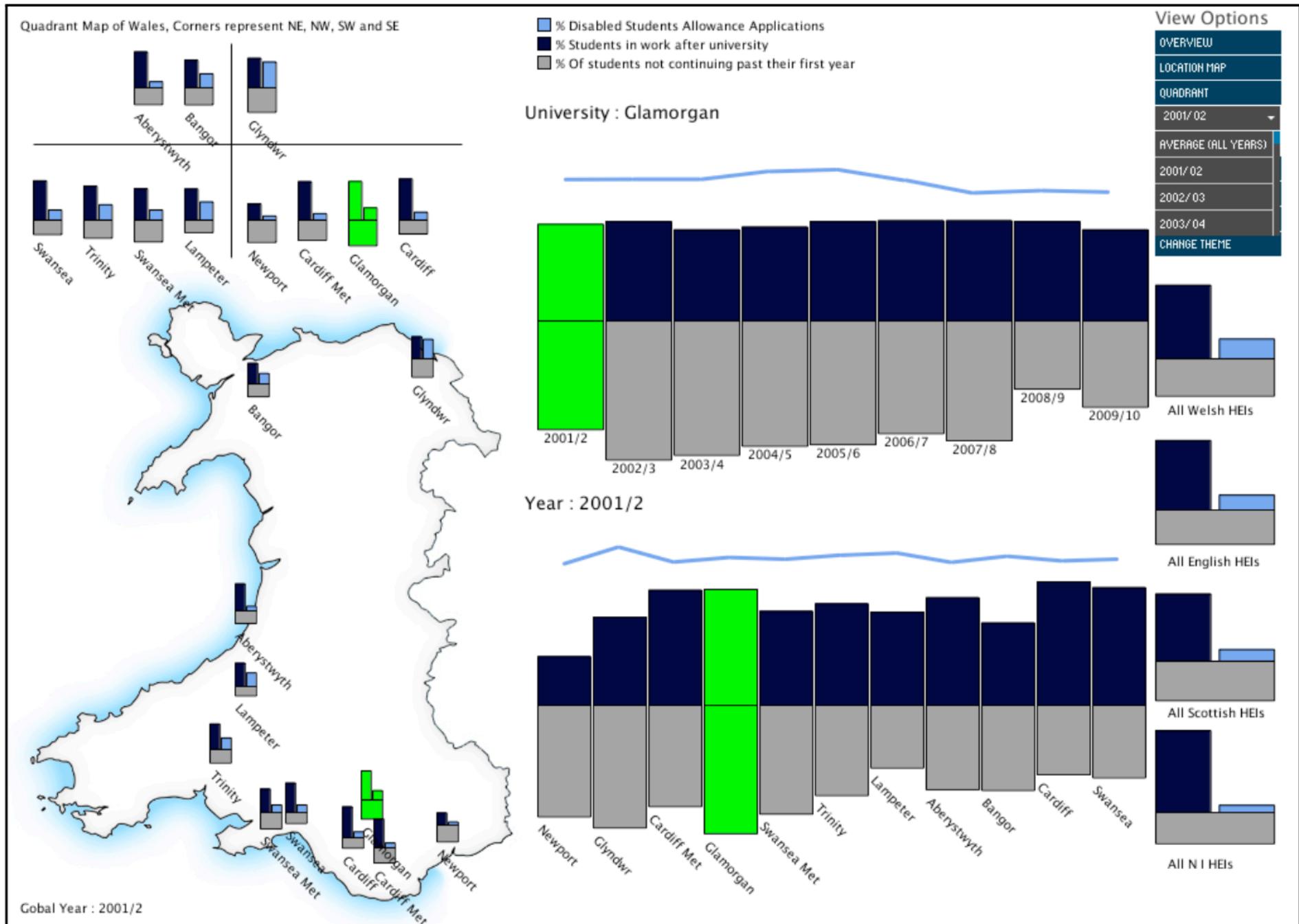
**LAYOUT**

**FOCUS**

EMPLOYABILITY  
% OF UNEMPLOYMENT AFTER 1ST YEAR

FOCUS WILL CHANGE DEPENDING  
ON CURRENT VISUAL STATE. MAIN  
FOCUS WILL BE ON THE BI-POLAR  
GLYPH (RIGHT) WITH POSITIVE  
DATA ABOVE THE DASH AND  
NEGATIVE BELOW THE DASH.  
THE SCALE WILL BE DIFFERENT  
(NUMERICALLY) FOR EACH DATA-ITEM  
HOWEVER, WILL MAKE THE SAME UPPE  
AND LOWER LIMITS VISUALLY..

**TITLE:** RELATIONSHIPS BETWEEN DATA & POST ME EMPLOYABILITY  
**AUTHOR:**  
**DATE:** 17/11/2012  
**SHOOT:** 4 - FDS3  
**TASK:** FINAL DESIGN CONCEPT USING  
3 STATES, MAP, QUADRANT MAP  
& BAR GRAPHS  
**DEVELOPMENT:** DEVELOPED FROM FDS2, FDS3  
& CLIENT COMMUNICATION

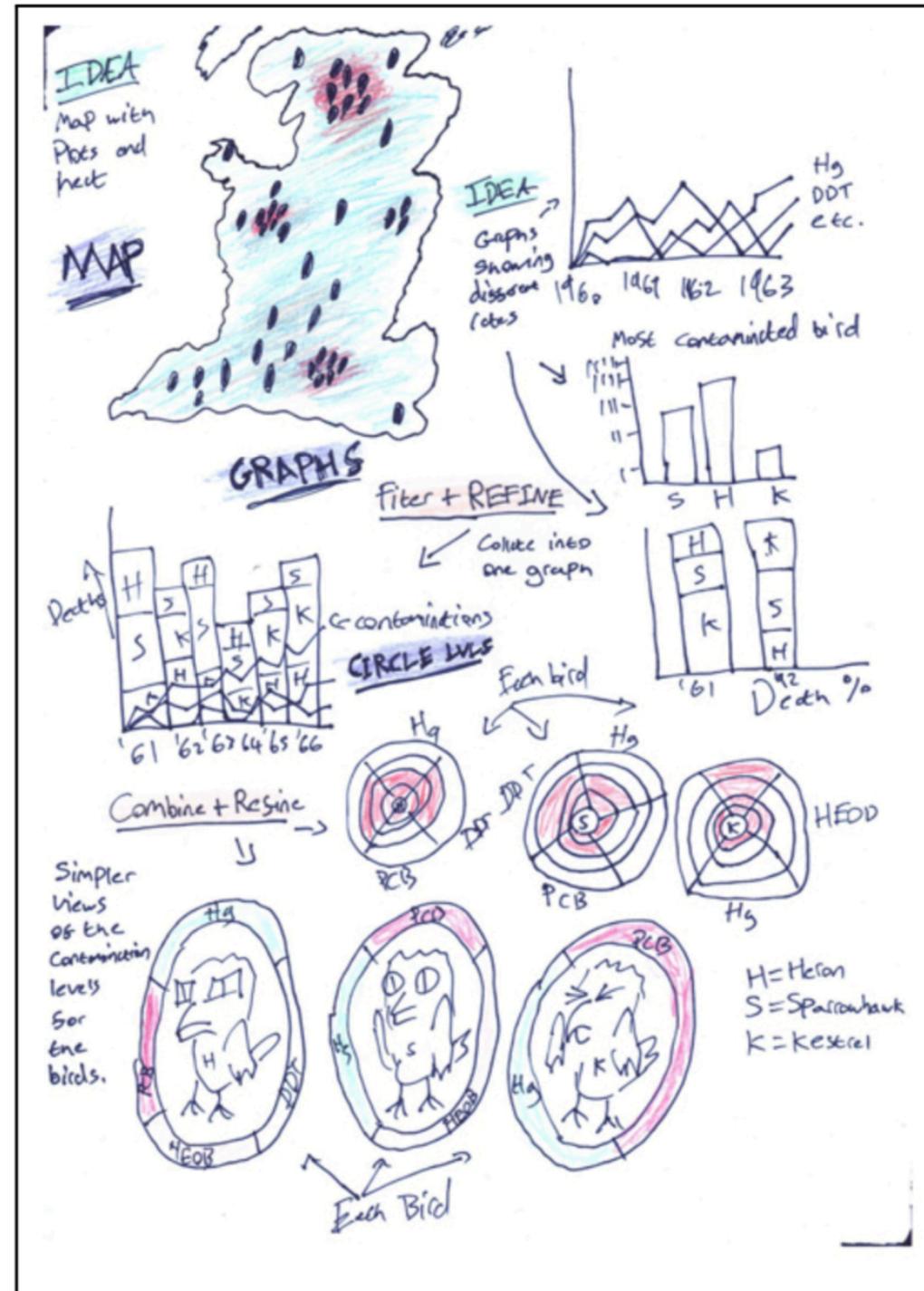


# Sheet 1 - Brainstorm

Data of predatory birds in the UK.

Contains information about breeding pairs, deaths of birds, and population growth.

Worked through ideas for temporal, circular, and map-based visualizations



## Sheet 2 – Initial Design 1

Title: Interactive Map  
Author:  
Date: 16/11/12 Sheet: 2  
Task: Visualize predatory bird  
Contamination in UK

The diagram shows a wireframe of a computer screen displaying a map of the United Kingdom. A heatmap overlay on the map shows red and orange areas, indicating contamination levels. In the top right corner, there is a vertical stack of checkboxes labeled 'Hg' and 'DDT'. To the left of the map, a legend box contains 'options', 'Deaths etc.', 'Species etc.', and 'etc.'. Below the map, another legend box contains '1960', '61', '62', '63', 'etc.', and 'etc.'. Handwritten annotations provide details about the interface:

- Bird data plotted. Heat signatures showing contamination levels.
- Criteria options (what to display on map)
- Click → Brings up details
- Checklists to change visual results on map
- The checklists will have a lot more options than shown, e.g. Deaths list up to 12 types of ways the bird died.
- Same with dates
- Same with heat map

• User has initial view of the average results (whole timeline) and can click checklists to either alter the heatmap results (only show chemical X etc.) or alter data sources (#-on-map) to see only certain items based on criteria.

• Hover over data sources and click to see further details.

+ Extensive options to show map details.  
+ simple visual analysis with heatmaps.

- Does not really make use of total window space, the checkboxes should be altered or moved.

## Sheet 3 – Initial Design 2

Title: Graphical slices and graphs

Authors:

Date: 16/11/12 | Sheet: 3

Task: Visualize Predatory bird Contamination in UK

Overall averages are represented, hover over certain areas to find detailed values for the item.

Circles represent contamination level of each species, each slice is its own contaminant.

Ring Slices are overall accumulation of chemicals amongst that species.

PCB DDT Hg Hover over area to get statistic 10.98mg

1960 1961 - 2010

Death %

+ Comprehensive visual representation of averages amongst the data.

+ All data is shown from initial view.

# Species such as how the bird died is ignored.

# Circular rings/slices do not show specific yearly statistics.

## Sheet 4 – Initial Design 3

Title: Visual Eggs and Graph

Author:

Date: 16/11/12 | Sheet: 4

Task: Visualize predatory bird contamination in the CLK

• Hover over section of Bird egg shell to see Chemical %.

• Click date timeline to alter egg shell chemical ratio based on selected date.

Each bird inside an egg, shell represents % of contamination of chemicals the bird has.  
Timeline chart below.

+ Simple design

+ Birds in egg provide easy visual representation

- Does not provide details or dates

- Egg shells somewhat like pie chart.

# Sheet 5 – Realization

Title: Interactive Map (Realization)

Author:

Date: 17/11/12 Sheet: 5

Task: Visualize predatory bird contamination in the UK.

- Hover over Plotted bird icon for different detailed info.
- Checkbox Criteria to filter the plotted data to how the user wants.
- Map library = unfolding
- jcoards used to translate X/y plots in dataset to northing/longitude.
- Translucent circles for heatmap plotting, must avoid inaccuracy such as heatmap spreading to the ocean.

m = Bird icon  
One for each species.  
Heatmap is still colour coded.

Criteria for plotting data on the map:  
Chemicals, Deaths, etc.

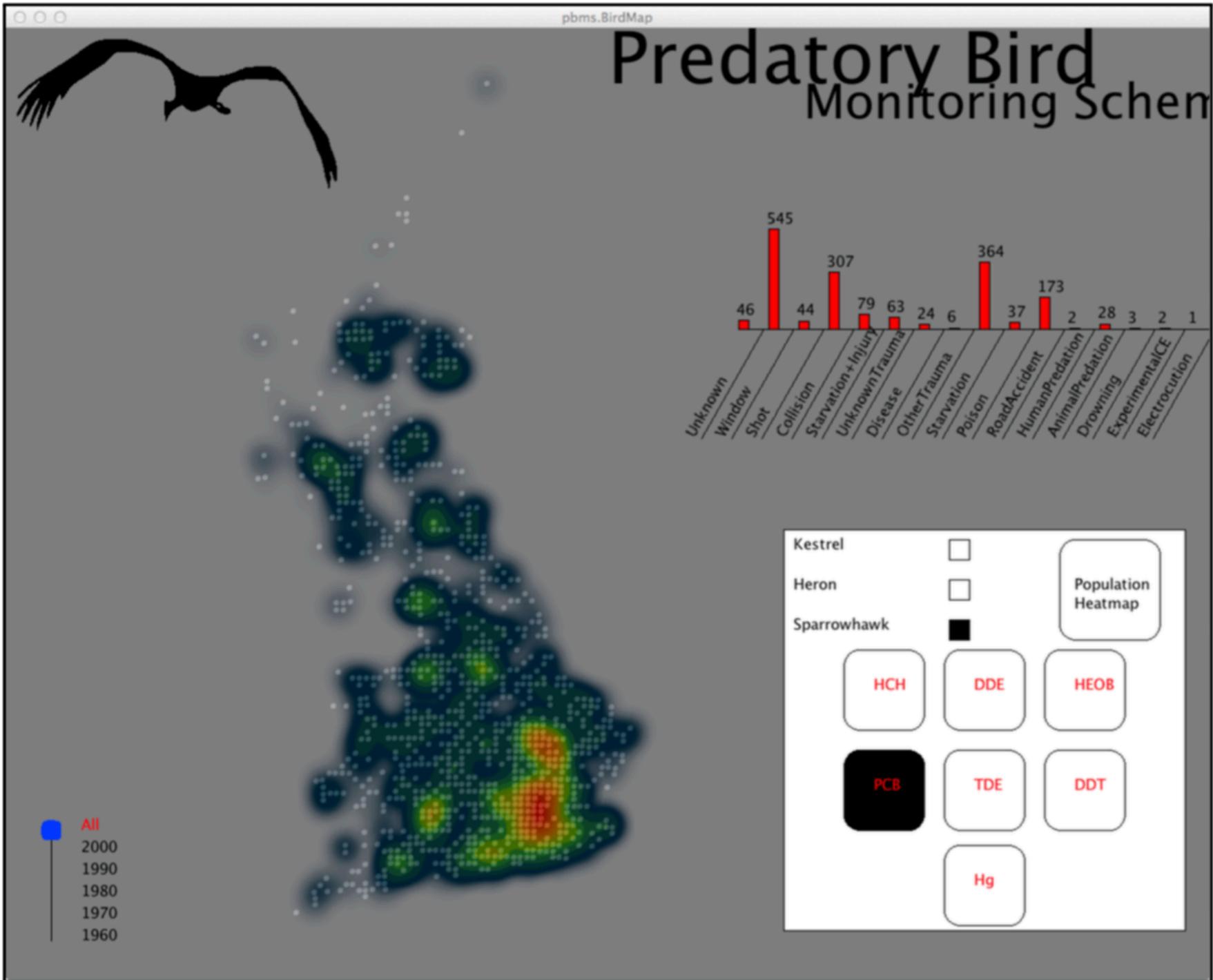
Hover → Bring up details

m = Bird

Select Year →  
of data to display with click

Home Hg Cl DDT DDE

checkbox ← ignore criterion (button) and display AVG.

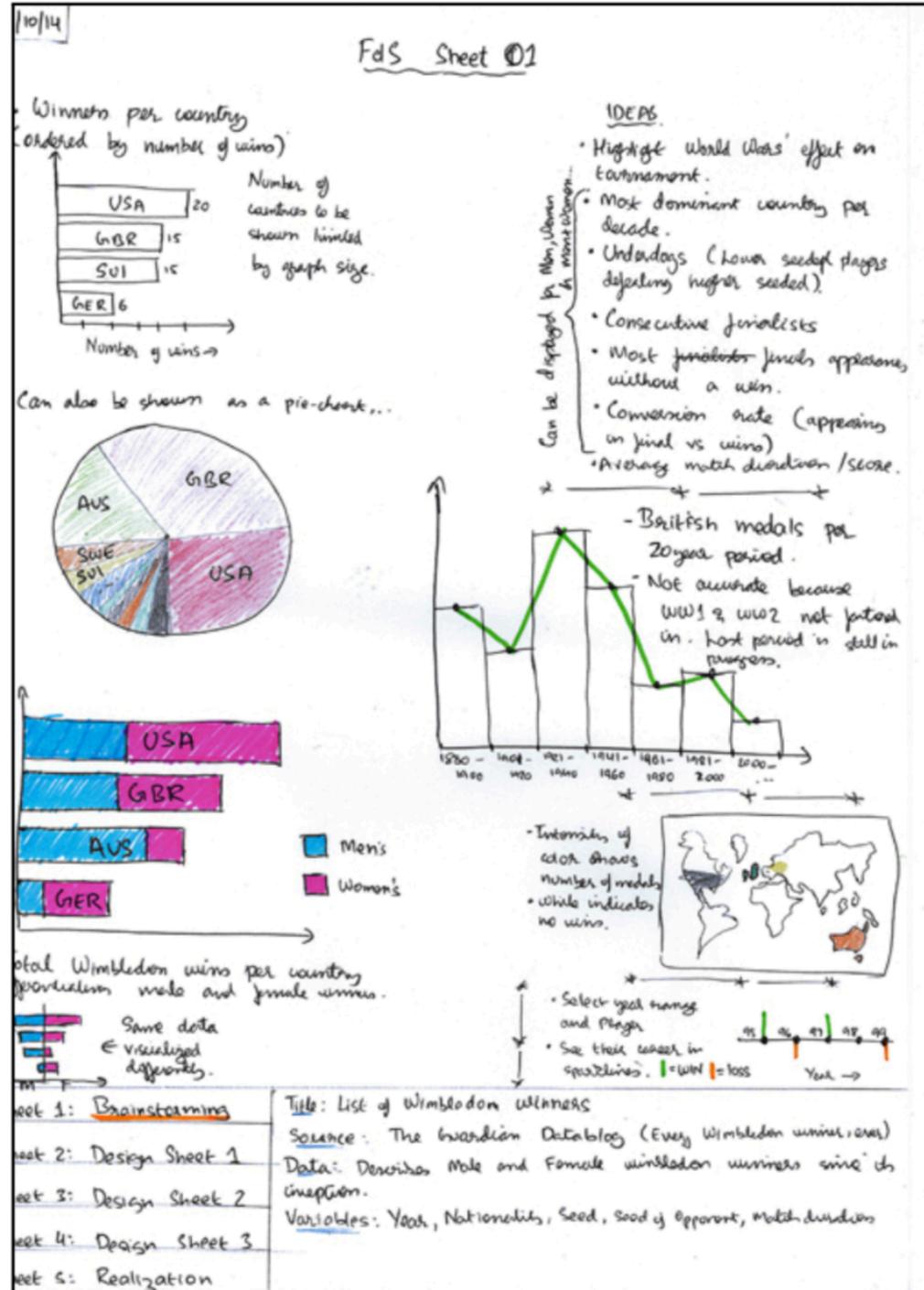


# Sheet 1 - Brainstorm

Data of Olympic medal wins

Considered pie charts, stacked bar charts, and map views

Discovered the “missing” Olympic games during WWII



## Sheet 2 – Initial Design 1

LAYOUT

OPERATION

Title: ASSIGNMENT 1 : F&S  
Author:  
Date: 24/10/2014

Sheet : 2

• User selects type of games : 'MEN'S' or 'WOMEN'S'.  
• The pie chart changes based on the category.  
• Legend and colours also reflect the pie-chart and dynamically change.  
• Hovering over segments brings up a tool-tip that shows full country name and number of male/female winners.

Positives

- Dominating countries can be clearly seen.
- A slice can be used to get a rough estimate of the percentage.
- Can show information at a glance.
- Easy to implement

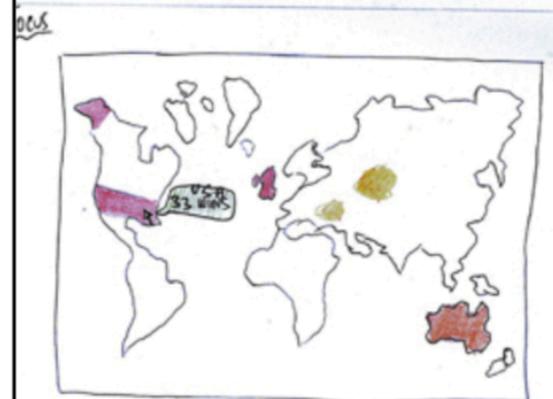
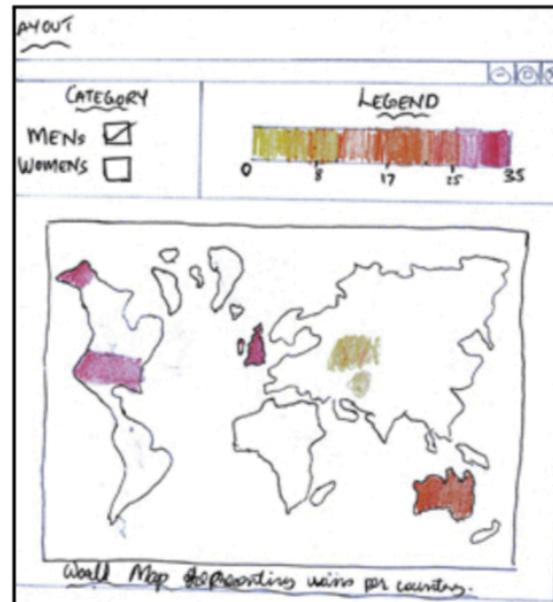
Negatives

- Cannot compare different categories simultaneously.
- Very simple, does not reveal any underlying patterns or relationships.

# Sheet 3 – Initial Design 2

<p><u>LAYOUT</u></p>	<p>Title : Assignment 1 Fds Author: Date : 24/10/2014 Sheet : 03</p> <p><u>OPERATION</u></p> <ul style="list-style-type: none"> <li>Can choose to display data from MENS, WOMENS or both categories.</li> <li>According to data that fits categories chosen, the legend and graph changes.</li> <li>The Data Range Slider at the bottom is initialised to the entire range but can be changed to any range.</li> <li>The axes and legend change accordingly as the slider MIN and slider MAX year range is adjusted.</li> </ul> <p><u>FOCUS</u></p>	<p><u>Discussion</u></p> <p><u>Advantages</u></p> <ul style="list-style-type: none"> <li>Highly interactive visualisation</li> <li>Trends in Wimbledon history can be gauged easily.</li> </ul> <p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>Hard to implement</li> <li>Depending on number of countries to display, graph can get congested.</li> </ul>
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## Sheet 4 – Initial Design 3



R. mouse points that bring up additional information about each country.

Title : Assignment 1 F&S

Author:

Date : 24/10/2014

Sheet : 04

### OPERATION

- User selects Mens/Womens/Both checkboxes on Top left.
- Scale on Legend and Heat map changes based on selection.
- Hovering over countries with mouse shows tooltip of wine for that country.

### DISCUSSION

#### POSITIVES:

- Highly interactive.
- Entire data can be previewed in one view.
- Trends like geographical regions and their influence can be observed. For e.g. lack of wine for countries in 10/40 versions.

#### NEGATIVES:

- Difficult to implement
- Small countries will not appear as visually prominent despite number of tourists.

# Sheet 5 – Realization

Project

The top section shows a wireframe of a user interface. On the left is a legend with 'Category' (checkboxes for 'MENS' and 'WOMENS'), a scale from 0 to 25, and a 'Legend' section. Below is a map of the world with several colored pins. A callout labeled 'HOME PAGE' points to a timeline graph below. The graph has 'CATEGORY: MENS' and a 'LEGEND' on the right. The x-axis shows years from 1900 to 2000. The y-axis is unlabeled. Data series include a blue line with '+' markers and a red line with 'x' markers. A callout from the timeline graph points to a detailed view.

Title: Assignment 1: FdS  
Author:  
Date: 24/10/2014  
Sheet: 05  
Operations

- User selects types of tournaments to show and map is updated.
- Countries that have won Wimbledon at least once get a marker pin to differentiate them.
- Clicking on pin reveals a tooltip which shows country name, flag and link to wimbledon comparative history.
- Comparative history compares chosen countries to 5 top winning countries using a timeline - line graph.

Detail

- Dependencies
  - Google Maps API
  - Javascript + Visualization API
  - HTML + CSS
- Time to build
  - 3 weeks.
- Requirements
  - Browser that supports CSS3 & JS
  - Internet connection
  - Device with at least 480x320 resolution

WS

A wireframe of a tooltip for a map pin. It contains a flag icon, a 'COUNTRY:' label, a 'WINS:' label, and a 'Link to History' button. A callout from the main map points to this tooltip. Below it is a note: 'Countries with who have markers.'

