

# Powerhouse Museum Lexicon Project

## THE PROJECT

### ACTIVITY 1:

Chromium is a mineral which has a role in carbohydrate metabolism. Chromium can be found in meat, cheese and legumes.

Like Chromium, selenium is a mineral. Selenium is a component of an antioxidant enzyme, it can be found in seafood, meat and cereals

### ACTIVITY 2:

The screenshot shows a web browser window with the following elements:

- Browser tabs: "Chromium - Wikipedia, the free enc...", "Ph|M Power Project", "W|Ajax (programming) - Wikipedia, the..."
- Navigation bar: "Bank", "Live Mail", "Facebook", "MHS Moodle", "Exetel Login"
- Page title: "The Powerhouse Museum Power Project"
- Menu: Home, Search, Browse, User Login, FAQ, Contact Us
- Search section: "Search for an item:" with a dropdown menu showing "Selenium", an "OR" option, and a search input field containing "Chromium". A "Submit" button is below the input field.
- Image: A photograph of a piece of metallic chromium.
- Text: "Chromium (pronounced /'kroumiəm/, *KROH-mee-əm*) is a chemical element which has the symbol Cr and atomic number 24, first element in Group 6. It is a steely-gray, lustrous, hard metal that takes a high polish and has a high melting point. It is also odourless, tasteless, and malleable. The name of the element is derived from the Greek word "chrōma" (χρῶμα), meaning color, because many of its compounds are intensely colored. It was discovered by Louis Nicolas Vauquelin in the mineral crocoite (*lead chromate*) in 1797. Crocoite was used as a pigment, and after the discovery that the mineral chromite also contains chromium this latter mineral was used to produce pigments as well. Chromium was regarded with great interest because of its high corrosion resistance and hardness. A major development was the discovery that steel could be made highly resistant to corrosion and discoloration by adding chromium and nickel to form stainless steel. This application, along with chrome plating (electroplating with chromium) are currently the highest-volume uses of the metal. Chromium and ferrochromium are produced from the single commercially viable ore, chromite, by silicothermic or aluminothermic reaction or by roasting and leaching processes. Although trivalent chromium (Cr(III)) is required in trace amounts for sugar and lipid metabolism in humans and its deficiency may cause a disease called chromium deficiency, hexavalent chromium (Cr(VI)) is toxic and carcinogenic, so that abandoned chromium production sites need environmental cleanup.
- Copyright: "(c) 2009"
- Taskbar: "Ph|M Power Proje...", "Powerhouse Mus...", "Adobe Dreamwea..."

## COLLABORATION

### ACTIVITY 1:

- **Systems Analyst:** Person who oversees the whole project, the “big picture”. Manages the project and be the person who communicates with both the development team and the management. Person has control of the whole development project
- **Web Designer:** Because the project is designed to be online, a web designer needs to be involved to create the user interface that those who would use the system need to interact with. Web designer would also need skills in graphic design and some knowledge of coding.
- **Programmer:** The person who develops the algorithms and implements them into the language of choice. This person needs to be able to create code that will fulfil the requirements as demanded by the project.
- **Linguist:** As one of the requirements was for the website to work in many languages, there need to be linguists on the team to provide services such as translations, grammar and spelling checks.

### ACTIVITY 2:

Robert Dale would have used many management skills during this project. Such skills include:

- **Time management skills:** This project may have needed to have been completed on a schedule and so as the person who is in control of the project as a whole, he would have had to have been able to coordinate everything so that the project was completed on time. This involves excellent time management and coordination skills
- **People Skills (communication):** Because he is the project leader, he is the first level of communication between the development team and management. As well, because he coordinates the project as a whole, all the various parts of the project report to him. He must then be able to communicate effectively with all the people involved (passing on messages, resolving disputes)
- **Management skills:** Actual management skills such as being able to coordinate deadlines with project goals would be vital as the project manager, he oversees everything that is happening

The PEBA system provided encyclopaedic descriptions of animals and was able to compare the animals as well as describe them. It could then generate a page that took into account the user’s level of knowledge and what other pages the user had previously looked at.

## CHALLENGES AND PROJECT GOALS

### ACTIVITY 1:

The hardware requirements would depend on what the specific requirements of the project would be however general hardware requirements might be:

- A server that would contain all the information in the database as well as dynamically generate the webpages. This server would process the code involved in the natural language generation process.

- Hardware for the user to access this site and use it. This includes a PC and related peripherals such as modems etc. There is no point having a website if users do not have the hardware required to access it.

One of the main issues between hardware and software is compatibility. Is the software compatible with the hardware? Software is just code that is translated into 0's and 1's so that a machine can interpret, process and use it. If the software is not compatible with the hardware, then a machine will be able to do nothing with it. For example, if the software that runs the web server is not compatible with the hardware then the machine will not be able to serve out the webpages to the user.

Software in turn, has minimum requirements for hardware. These requirements ensure that the software works as designed such as needing a certain amount of RAM or hard drive space to install on. A machine that does not meet the minimum requirements may be unable to run the software, for example, there needs to be sufficient storage space to install the database program and to hold the data in the database.

## ACTIVITY 2:

The goal of the power project is to be able to take static data that is stored in a database and to generate dynamic content that is customised for a specific user on the basis of what they already know, what they have already read and in generate this HTML page in different languages.

1. Hardware: the effect of hardware would not be too great. As long as the hardware is sufficient enough to be able to store all the data, handle requests, run the code, process all the data, serve the dynamic HTML page and handle the demand, there should not be such a great effect on the finished program.
2. Software: the software would be the key feature of this system that has the most effect on the finished program. Assuming that the software will run on the hardware, the next question is will the program written run on the operating system software (ie: if it is written in PHP, will the operating system used support PHP?). If the OS does not support the language that the program will be written in then a new OS may need to be looked at. The next consideration is the actual program. When finished, it would be considered as software and steps must be taken to ensure that it is compatible with the rest of the system such as hardware, OS software.
3. Development process: The development process will definitely impact on the finished program. The final program may look and feel different depending on the approach taken to developing the software. For example, using RAD would not allow for the exact requirements that this project demands compared to Structured. Using prototyping may allow for better interface development than RAD or structured.
4. Cost: in this project should not be too much of a concern as there is a team of researchers there being funded by the University and the CSIRO. If this project was not funded, then cost may play some part as a too expensive project may lead the developers to rethink their requirements and objectives, however in this case, it is not a factor.
5. Time: as this is a research project, time would not be that much of a consideration unless there was a deadline when funding ran out. However, if this was not a research project and there was a deadline imposed by a company that had tendered this software, then time would be a major factor in the finished program. For example, if there were some more

advanced features outside the initial requirements that the programmers wanted to build in but there was not enough time, then these features would not make it.

### ACTIVITY 3:

1. Defining and understanding the solution: The project had specific requirements such as needing to be able to remember what a visitor had previously read and to integrate that into the description that the natural language generator creates. It should also be able to give the user information based on what level of expertise they have told the software that they already have. The developers would have needed to specifically define each of these requirements and understand them so that there were able to create code to solve the problem
2. Planning and designing the software solution: this would have involved sitting down with the team members and coming up with a plan on how they would approach the development of the software. They would have to build a natural language generator that would be able to pull data from a database and present that as an HTML file. They would also have to consult the Powerhouse museum to gain access to their database.
3. Implementing the software solution: this is where the development team simply build the software solution to meet their requirements. They would already have had a fair idea of how they would do it in the planning and designing stage. In this stage, the actual ideas and algorithms get converted into actual code that can be run on a machine.
4. Testing and evaluating the software solution: this would have involved other people, or testers as well as the developers to use the software as they would in normal life to see if they can find any faults in the code. If there were any faults, then the solution would be modified and testing repeated. Things that would need to be checked include: correct grammatical translations, correct data given depending on user knowledge and previously read data and the general functionality of the software.
5. Maintaining the software solution: this would occur if there were changes to the programming language or database. For example, if the Powerhouse museum upgraded their database software to a new version, the power project may need to be looked at again to ensure full compatibility with the new database software. If there are significant user flaws that were not pointed out during the testing stage, then these changes can be reflected in the maintaining stage. As well, the GUI could be updated depending on what the latest web trend might be. Other things, such as updating the HTML code to the new XHTML standards.

## SOFTWARE DEVELOPMENT CYCLE

### ACTIVITY 1:

The type of programming language that would be used would be functional

### ACTIVITY 2:

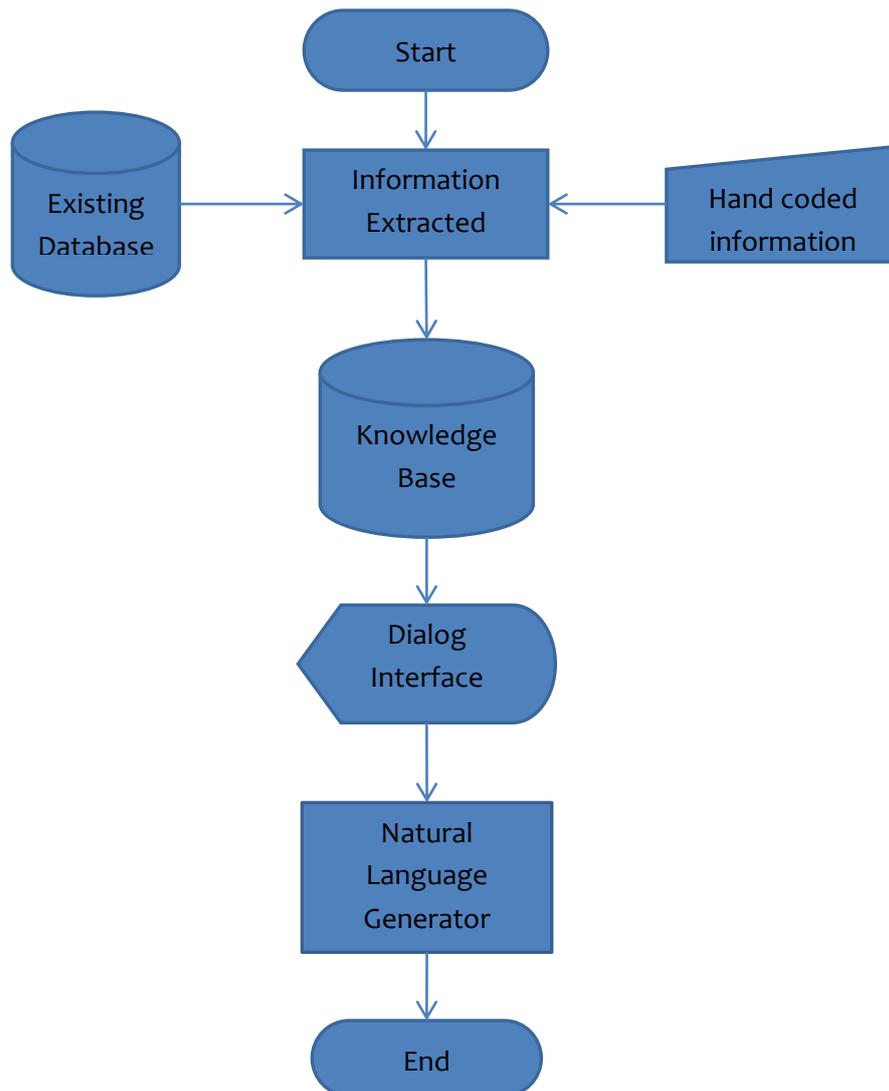
An advantage of functional programming is that the programs can be easy to understand and the functions can be reused (modular). Because functions have no side effects, it can be easy to test functions and the resulting systems.

The disadvantage is that it is difficult to perform input-output as this is non-functional and it is difficult to perform IO with functions without having side effects.

### ACTIVITY 3:

- Steven Green: take the underlying data from the museum database and find a way of extracting the information so it could be in a usable form for the program to process.
- Maria: Organising the text produced so that it was coherent and followed grammatical standards
- Karen: made sure all the Dutch text was there and correct.
- Cécile: made sure all the French text was there and correct.
- Stephen: made sure all the Chinese text was there and correct.

### ACTIVITY 4:



### ACTIVITY 5:

Advantages to prototyping:

- Reduced time and costs: if what the user wants is determined earlier in the project then it is much cheaper to rectify any problems than if these problems are picked up much further into the program
- Increased user involvement: the user is more involved in the development of the program allowing them to interact with the prototype and give feedback and suggestions as the

development progresses. This means that the end result will be more suited to the user than if it was just the developers working on the solution.

Disadvantages to prototyping:

- Excessive development time spent on the prototype: if developers spent too long on the prototype, they may try to develop one that is too complex. As the prototype is designed to be thrown away (expect in the case of evolutionary prototyping), this can waste time and money if a developer designs a complex prototype.
- Expense in implementing prototyping: prototyping costs time and money that could otherwise be spent on developing the final product. Prototyping, if not done quickly can end up costing large amounts of time and money which may not significantly help the final solution.

### ACTIVITY 6:

Knowledge base: “A database designed to meet the complex storage and retrieval requirements of computerized knowledge management, especially in support of artificial intelligence or expert systems.”  
–Wiktionary ([http://en.wiktionary.org/wiki/knowledge\\_base](http://en.wiktionary.org/wiki/knowledge_base))

### ACTIVITY 7:

One of the bad aspects of this software design development was the lack of user feedback and input into the program. When testing and evaluating the software, more user feedback would have been beneficial to the program as well as user feedback during the prototyping stage. One of the good aspects to this was the attempt at garnering user feedback with the system placed on the web as a trial version so that people could discover the website and give feedback. As well as getting the curators of the museum involved during the early stages of the development. However, it would have been much better to get the curators involved during the whole development process as well as much greater user feedback.

### ACTIVITY 8:

The problem of losing staff could be resolved by easing the pressures that they had elsewhere as well as at work and to make work an enjoyable place. For example, spread the workload out multiple programmers instead of just on the one people. As well, creating a positive working environment for the workers such as that of Google where they can take time out to relax, have fun and socialise would help to make work a more enjoyable place and less stressful. This way, staff would be less likely to leave.

As well, it should be ensured that the programmers make extensive documentation so that if they do need to leave, other programmers can read their documentation and pick up from where they have left off.

### ACTIVITY 9:

A balance between the research agenda and the end result needs to be achieved by possibly changing the outcomes desired to meet the end result but at the same time meeting some of the research agendas. Certain parts of the project could be allocated to research and the rest to developing the final project achieving a good balance between the two. These objectives would need to be set out early on in the development process in the defining the solution stage. Such time management tools such as Gantt Charts could also be used to effectively manage the schedule.

## SOCIAL AND ETHICAL ISSUES

### ACTIVITY 1:

*What are the ethics of research like this being tied to corporations like Microsoft? What happened with this research? Did Microsoft Australia have a stake in the outcome?*

- Funding was not an issue to begin with in the first place and the funding was not tied other than to report annually etc.
- Microsoft Australia did not have a research arm so there was no channel to report research through. The only reporting done was to local Microsoft management.
- There was free reign over what the researchers did and was not tied to the interest of Microsoft.

*Corporate funding of research isn't always that hands-off. If this research had been funded by Microsoft in the US things would've been different and this would've had advantages and disadvantages.*

- If this had been funded in the US then the project would have been tied to the Microsoft US research agenda and Microsoft would have had a larger influence on what was done.
- Perhaps it would have been better to report via the US as there is more funding that way for good ideas.

### ACTIVITY 2:

There are many ethical implications involved in this sort of project. One of the questions that needs to be asked is whether or not the software will take over the role of the curator because it is the curators job to create descriptions and labels however the software has been designed to create the descriptions automatically. Some may see this as invading into the territory of the curator. This could lead to structural unemployment of the curators as there is new technology that can do their job for a fraction of the cost.

However, the designers of the program would have taken this into account when designing the program to ensure that the tasks performed by the software did not encroach into the territory of the curators. The developers decided from an early stage not to take over the curator's role. For example, the software has been designed to perform different tasks compared to the curators such as displaying the text in many different languages as well as generating dynamic content based on the previous knowledge of the user and what they have already read. So it does not perform the same task as the curator as well as performing a task that a curator would not do to begin with.

Social and ethical implications were seriously considered when developing this software to ensure that the tasks performed by the software did not in any way affect negatively any members of the museum staff.