

FundFind

Exploring scholarly funding opportunities

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Declaration of originality

In signing below, I confirm that:

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In signing below, I hereby agree to this dissertation being made available to other students and academic staff of the Aberystwyth Computer Science Department.

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Thanks to the Open Knowledge Foundation for striking out and encouraging prototype projects, providing ample inspiration for FundFind.

I would like to thank Research Councils UK, a partnership of the seven UK Research Councils, for all the effort they have put into the Gateway to Research API, consolidating data from seven separate institutions and making it available under an Open license.

Abstract

FundFind is a web application which enables scholars, research development officers and post-graduates to share information about funding opportunities. Data about funding opportunities and funding organisations can be submitted, browsed and searched via a mobile-friendly web UI as well as a JSON API. FundFind stores data using an asynchronous approach, which enables the development of small independent modules for automatic funding data harvesting.

The project is a learning exercise, aiming to explore the field of scholarly funding, identifying potential problems with the open sharing of such data. Prototype technical solutions concretise the technical problems. Other types of problems are noted and discussed.

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Chapter 1

Background & Objectives

A note on “scholarship” - the word and its derivatives are used throughout this text to mean all types of academic work, due to “science” being sometimes perceived as exclusionary to the Arts and Humanities fields.

1.1 Scholarship and funding

Scholars need money to conduct research. To be precise, research projects need *additional* money (on top of the investigators’ salaries) in order to cover material expenses, travel costs, hiring Research Assistants or providing studentships to PhD candidates and other expenses.

In other words, established scholars need to look for funding for aims which may be hard to define, for amounts of money ranging from thousands to millions.

Postgraduate-level scholars (candidates, postgraduates, post-doctoral researchers) are also usually looking for a way to fund the next stage of their scholarly career. (Note: undergraduate-level funding was not considered in this project.)

The quintessential problem is that the information about available funding is published in many different places. Usually each funding organisation publishes its own calls for proposals and announces its own studentships on its own website(s) and mailing list(s).

Keeping up with these sources of information becomes quite difficult - so much so, that it takes a significant portion of research development officers’ time. Worse still, this is a significant barrier for those looking into a career in academia - the fragmented information can make it difficult to build a mental picture of what the funding in one’s chosen field “looks like”. This leads to a feeling of opaqueness instead of transparency and being overwhelmed - instead of having a clear idea of what it takes to succeed in a chosen field. Sometimes it even leads to accusations of cronyism in distributing funding (private conversation as well as ??).

These problems seem to stem from the fact that the distribution of scholarly funding seems to have evolved over time from a series of changes to more general money distribution in society. This is actually a well-known problem that the software development field has had to deal with - if multiple stakeholders with distinctive interests try to influence the development of a software system, changing its requirements over time, the results can be disastrous.

There is no easy way to track money - where it gets allocated to, what fields (or even topics) within scholarship get funded more than others. Up until November 2012, there was no publicly accessible *centralised* detailed account of historic funding information in the United Kingdom. The Gateway to Research project being implemented by Research Councils UK finally gives a partial (RCUK-specific) overview of historical data.

However, there is still no mechanism of getting *present, current* data about scholarly funding.

Something which allows searching the (vastly) different, *currently available* streams of funding within academia was thus identified as potentially useful by various people interested in the subject:

1.2 Audience and high-level requirements

The potential audience of this project was discovered to be quite varied. It seems multiple stakeholders stand to benefit from more transparent scholarly funding dissemination.

The requirements or potential uses that these users might want to put FundFind to are closely tied to the benefits that come with opening up funding data.

1.2.1 Professionals looking for funding

1.2.1.1 Accomplished scholars

- **Who:** Academics - lecturers, professors
- **Aims:** Wish to fund future projects
- **Benefits from opening up funding data:** Easier access and search across funding institutions through tools which aggregate funding data; Transparency and accountability of their funding bodies.
- **Possible requirements from FundFind:** Aforementioned cross-funder search; Sharing opportunities with colleagues.

1.2.1.2 Junior academics

- **Who:** Postgraduate candidates, postgraduate students, academics in post-doctoral posts (e.g. Research Associates)
- **Aims:** Wish to find suitable positions to move on with their academic career, e.g. a post-graduate with a PhD will be looking for a post-doctoral position
- **Benefits from opening up funding data:** (More) easily find and compare funding sources
- **Possible requirements from FundFind:** Find funding. To quote a postgraduate candidate: “I want to do a taught MSc in Astrophysics but I can’t afford to self fund. Where can I go and who will pay me?”

Share funding information with peers (e.g. if a candidate for a Computer Vision PhD finds a good PhD studentship call for applications in Bioinformatics, they may well want to forward it to a colleague).

1.2.1.3 Research development officers

- **Who:** Professionals who find more funding opportunities for scholars
- **Aims:** Wish to record the opportunities they find somewhere and share them with scholars. Also may want to access a list of all opportunities *they* have found over time, so that they can report to their line managers more easily.

- **Benefits from opening up funding data:** Not as many as scholars, unless they are happy to share the opportunities they have found with research officers from other institutions (which they do not always want). However, a system which allows sharing of recorded opportunities with a select subset of users (such as all within the officer's institution) would be welcome as this can allow them to record a funding opportunity once, share it with "their" scholars and include it in reports.
- **Possible requirements from FundFind:** Find funding. Share funding with subset of users. See information submitted per user (themselves).

1.2.2 Those looking to advertise funding opportunities.

Funding Stream and Programme managers at various institutions such as:

1.2.2.1 Focusing on certain audience groups

Satisfying the major requirements of all these users is not a suitable scope for this project (it may be for a follow-up project).

Therefore, this project will focus on the first group of users. The main reasons are time constraints and ease of access to such users. Searching for opportunities can be significantly harder than submitting them. In a way, providing data to academic users will pave the way for providing data to a more general public (third group) for re-use and analysis.

The project will nonetheless provide basic information submission ("digestion") capabilities and basic general raw data access via an open machine-ready interface ("API") to satisfy some of the requirements of the second and third groups. The author belongs to the third group. The Open Knowledge Foundation Open Knowledge Foundation (n.d.d) and Cottage Labs LLP Cottage Labs LLP (n.d.) will be briefly consulted on the completed project. Cottage Labs has stated that the project will be valuable to Open Knowledge if executed well and is happy to provide feedback.

1.3 Scholarly funding opportunities

This project deals with an important bit of the infrastructure of scholarship - namely, the money it relies upon. "Scholarship" in this case (and throughout this document) refers to the human endeavours in the fields of the Humanities(e.g. arts), Social Sciences (e.g. law) and Science (e.g. biology, computer science).

1.3.1 Funders

There is no easy way for people who wish to fund scholarly endeavours to advertise their funding to a lot of scholars at once, getting a higher chance of the "perfect" researcher/problem fit.

Certain ad-hoc channels have evolved around this problem - for example, scholars interested in a funder's sphere can subscribe to their e-mail list. There are problems with this - the most obvious one is scholars having to subscribe to all the funders they might be interested in. While this sort of works for national funding bodies like the UK Research Councils, there are many more private funders - various non-profit and/or Non-Governmental Organisations and even private companies. A cross-disciplinary funding opportunity would have to be advertised across multiple channels, which would take time/effort on the part of funders therefore making such opportunities costlier to set up.

Table 1.1: Notes on case representation. Based on Table 1 from ?

Potential users	Their aims	Benefits of opening up funding data
Research Councils in the UK	Wish to attract the best scholars in their own field, but also look to establish new cross-disciplinary projects	Already committed to opening up historical funding data, would like to advertise current funding data more widely.
JISC JISC (n.d.) (digital infrastructure in education/research)	Wish to attract talent to work on scholarly infrastructure in the UK, i.e. give their aims and projects more exposure. Scholars rarely choose scholarship infrastructure as their main field.	Have always wanted wider reach, as well as vigorously supported Open Data. Have a lot of funding opportunities from minor to large, would like to advertise them better.
Various charitable Foundations, Institutes, Endowments and so on which fund scholarly activities (e.g. the Wellcome Trust Wellcome Trust (n.d.), Shuttleworth Foundation Shuttleworth Foundation (n.d.), Knight Foundation Knight Foundation (n.d.))	Want the best scholars competing for their money.	Need to reach more scholars to build up an ever-improving pool of applicants (in terms of quality). Also, as private institutions, would like to demonstrate greater transparency with their funding dissemination and allocation.
Commercial organisations which perform R&D activities	Simply need quality applicants when using talent outside the organisation	Might make it significantly easier to reach a lot of good scholars. Such organisations may only need external help with R&D intermittently and thus may not have an audience of scholars following their every move.
There is a group which has markedly different needs from the first two groups - people interested in analysing how scholarly money is allocated and/or spent		
Software developers, journalists and others interested in Open Knowledge and visualising data for the purposes of transparency or advancing the digital economy Open Knowledge Foundation (n.d.d) The author is included	Want transparency and accountability. May want to visualise how scholarship money is being spent or otherwise help society engage with scholarly spending.	Open Data essential for re-use for their aims. Usually do not have first hand information about what happens behind closed doors when funding is distributed and used by universities. Think that this is strange, since often both funder and fundee are public

It also fails fantastically when it comes to the globalisation of scholarship. There are only two ways to get to know about funds coming from the other side of the world:

1. directly: be subscribed to that particular funder's news (the number of funders has not been estimated globally to the best of the author's knowledge, not to mention the huge variety of forms which news feeds take - from RSS through e-mail to just publishing on a website somewhere).
2. indirectly: hear about the opportunity from others. "Others" could mean colleagues - research development officers, other scholars - but these people have to be directly or indirectly related to the funding source. The funder will only reach a very small subset of the world's scholars directly, however, and this is crucial for a network model.

The other currently possible meaning of "Others" is commercial companies who collect scholarly funding information, package it into databases with a front-end and sell it to research institutions. While the author is not against making a profit out of information, there has been overwhelming evidence in the past two decades that commercially exploiting information *by virtue of hoarding it and then restricting access to it* is not a good strategy for anybody but the hoarder.

1.3.2 The value of Openness in scholarship and elsewhere

The Free Software, Open Source and more recently, Open Knowledge (which Open Access is a part of) movements have all demonstrated that the value of information can be greatly multiplied simply by having more people access it, reuse it and even be creative with it (e.g. visualise or summarise). The Open Knowledge Foundation argues this Open Knowledge Foundation (n.d.d). Seminal works like "The Cathedral and the Bazaar" Eric S. Raymond (2000) have also argued this.

Governments seem to have grasped the benefits as well. The UK Government has mandated that all research funded with public money (which is a lot in the UK - almost everything through the seven Research Councils) should be published as Open Access by 2014 Ian Sample (2012). It has also funded initiatives such as Open UK governmental data in the form of data.gov.uk UK Government - Unknown individual name (2012) and the recent Finch report Alok Jha (2012) Various (a UK Government Working Group), chaired by Dame Janet Finch (2012).

Private organisations are not far behind and may in fact be leading the way - one of the largest funders of science in the UK and around the world, the Wellcome Trust, has had a progressive and strict Open Access policy since 2006 Craig Brierley (2012).

1.3.3 Scholars

Openness is recognised as beneficial - and many scholars are supposed to be able to benefit from having access to all this scholarship for free instead of having the libraries pay extortionate amounts to academic publishers. The very essence of scholarship is building on what has been discovered before.

However, while previous knowledge is a core requirement of science, sustenance is a very core human requirement, and in the modern world, this often translates to salaries *and* (sometimes "or") grant money, at least for scholars. Why should *this* information be commercially exploited for the benefit of a few corporations when it could be used to better (globally) connect the minds to the money, to put it bluntly?

There is another point - information about funding opportunities may be available but may be too generic or hidden beyond layers and layers of website navigation, reflecting the mental model

of the funding organisation instead of the mental model of the researcher (RCUK are a case in point Research Councils UK (n.d.)). Thus, the goal of this project from the perspective of scholars can be summarised as “bringing it together”.

1.4 The project

This project is about making an open-source web application named “FundFind” which lets stakeholders (just the scholars at first) share information about funding opportunities under open terms (the Open Definition defines “open” well Open Knowledge Foundation (n.d.a)).

Follow-up work may increase this scope to include funding organisations or governments - they will already be able to submit funding information directly to a centrally hosted instance of the software produced by this project, but they will probably have special requirements related to this.

The project does include functionality to allow scholars to access the information, and allow developers / journalists / analysts and other stakeholders to analyse and mash up the information.

1.5 Existing works

There is no single piece or combination of pieces of software which enables involved stakeholders to do what this project would allow them to do upon completion, to the best of the author’s knowledge.

However, this project fits well within a current framework of Open Knowledge-related projects, a nice selection of which are hosted and developed by the Open Knowledge Foundation Open Knowledge Foundation (n.d.c) Open Knowledge Foundation (n.d.b).

This project will also require data to be useful. While one of its core aims is to enable crowd-sourcing of scholarly funding information, it should also try to make use and “digest” existing information. This could mean looking at current funding opportunities RCUK (n.d.) AHRC (n.d.) BBSRC (n.d.) EPSRC (n.d.) or at loading information about past opportunities, such as what the Australian National Health and Medical Research Council has funded over the past 23 years NHMRC / Australian Government (n.d.). Of course, part of the point of this project is that it is not easy to get such information in a nice universally readable (e.g. machine-readable) format. Research about useful data would be an optional objective subject to good feedback on the core software output and enough budget (of time).

Chapter 2

Development Process

You need to describe briefly the life cycle model that you used. Do not force your project into the waterfall model if it is better described by prototyping or some other evolutionary model. You do not need to write about all of the different process models that you are aware of. Focus on the process model that you have used. It is possible that you needed to adapt an existing process model to suit your project; clearly identify what you used and how you adapted it for your needs.

In most cases, the agreed objectives or requirements will be the result of a compromise between what would ideally have been produced and what was felt to be possible in the time available. A discussion of the process of arriving at the final list is usually appropriate.

You should briefly describe the design method you used and any support tools that you used. You should discuss your choice of implementation tools - programming language, compilers, database management system, program development environment, etc.

2.1 Introduction

Introduce the specific model that you chose to use.

2.2 Modifications

Did you have to modify the model to suit a one-person project. If so, what did you change and why?

Chapter 3

Design

You should concentrate on the more important aspects of the design. It is essential that an overview is presented before going into detail. As well as describing the design adopted it must also explain what other designs were considered and why they were rejected.

The design should describe what you expected to do, and might also explain areas that you had to revise after some investigation.

Typically, for an object-oriented design, the discussion will focus on the choice of objects and classes and the allocation of methods to classes. The use made of reusable components should be described and their source referenced. Particularly important decisions concerning data structures usually affect the architecture of a system and so should be described here.

How much material you include on detailed design and implementation will depend very much on the nature of the project. It should not be padded out. Think about the significant aspects of your system. For example, describe the design of the user interface if it is a critical aspect of your system, or provide detail about methods and data structures that are not trivial. Do not spend time on long lists of trivial items and repetitive descriptions. If in doubt about what is appropriate, speak to your supervisor.

3.1 Overall Architecture

3.2 Some detailed design

3.2.1 Even more detail

3.3 User Interface

3.4 Other relevant sections

Chapter 4

Implementation

The implementation should look at any issues you encountered as you tried to implement your design. During the work, you might have found that elements of your design were unnecessary or overly complex, perhaps third party libraries were available that simplified some of the functions that you intended to implement. If things were easier in some areas, then how did you adapt your project to take account of your findings?

It is more likely that things were more complex than you first thought. In particular, were there any problems or difficulties that you found during implementation that you had to address? Did such problems simply delay you or were they more significant? Your implementation might well be described in the same chapter as Problems (see below).

Chapter 5

Testing

Detailed descriptions of every test case are definitely not what is required here. What is important is to show that you adopted a sensible strategy that was, in principle, capable of testing the system adequately even if you did not have the time to test the system fully.

Have you tested your system on 'real users'? For example, if your system is supposed to solve a problem for a business, then it would be appropriate to present your approach to involve the users in the testing process and to record the results that you obtained. Depending on the level of detail, it is likely that you would put any detailed results in an appendix.

5.1 Overall Approach to Testing

5.2 Automated Testing

5.2.1 Unit Tests

5.2.2 User Interface Testing

5.2.3 Stress Testing

5.2.4 Other types of testing

5.3 Integration Testing

5.4 User Testing

Chapter 6

Evaluation

6.1 Approaching the field of scholarly funding

6.2 Whose requirements?

6.3 Collecting information from disparate sources - technological suitability

6.4 User needs

6.5 Exploring scholarly funding

6.6 In retrospect

Appendices

Appendix A

Third-Party Code and Libraries

If you have made use of any third party code or software libraries, i.e. any code that you have not designed and written yourself, then you must include this appendix.

As has been said in lectures, it is acceptable and likely that you will make use of third-party code and software libraries. The key requirement is that we understand what is your original work and what work is based on that of other people.

Therefore, you need to clearly state what you have used and where the original material can be found. Also, if you have made any changes to the original versions, you must explain what you have changed.

Appendix B

Code samples

2.1 Random Number Generator

The Bays Durham Shuffle ensures that the psuedo random numbers used in the simulation are further shuffled, ensuring minimal correlation between subsequent random outputs ?.

```
#define IM1 2147483563
#define IM2 2147483399
#define AM (1.0/IM1)
#define IMM1 (IM1-1)
#define IA1 40014
#define IA2 40692
#define IQ1 53668
#define IQ2 52774
#define IR1 12211
#define IR2 3791
#define NTAB 32
#define NDIV (1+IMM1/NTAB)
#define EPS 1.2e-7
#define RNMX (1.0 - EPS)

double ran2(long *idum)
{
    /*-----*/
    /* Minimum Standard Random Number Generator */
    /* Taken from Numerical recipies in C */
    /* Based on Park and Miller with Bays Durham Shuffle */
    /* Coupled Schrage methods for extra periodicity */
    /* Always call with negative number to initialise */
    /*-----*/

    int j;
    long k;
    static long idum2=123456789;
    static long iy=0;
    static long iv[NTAB];
```

```
double temp;

if (*idum <=0)
{
    if (-(*idum) < 1)
    {
        *idum = 1;
    }else
    {
        *idum = -(*idum);
    }
    idum2=(*idum);
    for (j=NTAB+7; j>=0; j--)
    {
        k = (*idum)/IQ1;
        *idum = IA1 *(*idum-k*IQ1) - IR1*k;
        if (*idum < 0)
        {
            *idum += IM1;
        }
        if (j < NTAB)
        {
            iv[j] = *idum;
        }
    }
    iy = iv[0];
}
k = (*idum)/IQ1;
*idum = IA1*(*idum-k*IQ1) - IR1*k;
if (*idum < 0)
{
    *idum += IM1;
}
k = (idum2)/IQ2;
idum2 = IA2*(idum2-k*IQ2) - IR2*k;
if (idum2 < 0)
{
    idum2 += IM2;
}
j = iy/NDIV;
iy=iv[j] - idum2;
iv[j] = *idum;
if (iy < 1)
{
    iy += IMM1;
}
if ((temp=AM*iy) > RNMX)
{
```

```
        return RNMX;  
    }else  
    {  
        return temp;  
    }  
}
```


Annotated Bibliography

AHRC. *AHRC Funding Opportunities*. <http://www.ahrc.ac.uk/Funding-Opportunities/Pages/Funding-Opportunities.aspx>. Accessed November 2012.

The root funding page of AHRC, the Arts and Humanities Research Council.

Alok Jha. 2012 (June). *Open access is the future of academic publishing, says Finch report*. <http://www.guardian.co.uk/science/2012/jun/19/open-access-academic-publishing-finch-report>. Accessed November 2012.

A Guardian article describing the Finch report which looked into Open Access and its benefits for academic publishing and society at large.

Balci, Osman, Gilley, William S., Adams, Robin J., Tunar, Emre, & Barnette, N. Dwight. *The Spiral Model*. <http://courses.cs.vt.edu/csonline/SE/Lessons/Spiral/index.html>. Accessed November 2012.

A textbook section-length explanation of the Spiral software development model with a graphic visualisation and a table enumerating the various artefacts of the model. Although this an online educational resource from an academic institution, there is no publication date available for the project itself or the section on the Spiral model.

BBSRC. *BBSRC Research Funding*. <http://www.bbsrc.ac.uk/funding/funding-index.aspx>. Accessed November 2012.

The root funding page of BBSRC, the Biotechnology and Biological Sciences Research Council.

Beck, Kent, Beedle, Mike, van Bennekum, Arie, Cockburn, Alistair, Cunningham, Ward, Fowler, Martin, Grenning, James, Highsmith, Jim, Hunt, Andrew, Jeffries, Ron, Kern, Jon, Marick, Brian, Martin, Robert C., Mellor, Steve, Schwaber, Ken, Sutherland, Jeff, & Thomas, Dave. *Manifesto for Agile Software Development*. <http://agilemanifesto.org/>. Accessed November 2012.

A succinct set of statements enumerating the core values behind the Agile software development collection of approaches to software development.

Browshot. *Browshot - Powerful web screenshots*. <https://browshot.com/>. Accessed November 2012.

Homepage of the Browshot service. This allows a developer to make screenshots of web pages in any screen size, as any device including Personal Computers and mobile devices, in a variety of resolutions.

Cottage Labs LLP. *cottage labs - we don't sell products, we trade our skills*. <http://cottagelabs.com/>. Accessed November 2012.

The homepage of a partnership of freelance software developers working together to produce open source software for the benefit of Higher Education and commercial companies around the world. Dedicated to Open Knowledge and Open Scholarship.

Cottage Labs LLP and Open Knowledge Foundation. *FacetView - Pure Javascript Frontend for SOLR and ElasticSearch*. <http://okfnlabs.org/facetview/>. Accessed November 2012.

Homepage of the Facetview project, a faceted Javascript browser (front-end) to indexing servers such as elasticsearch.

Craig Brierley. 2012 (June). *Wellcome Trust strengthens its open access policy*. <http://www.wellcome.ac.uk/News/Media-office/Press-releases/2012/WTVM055745.htm>. Accessed November 2012.

A press release by the Wellcome Trust stating it is strengthening its Open Access policy and related punishment for breaking the terms of the policy, as well as linking to a full version of the policy.

Don Wells. *Extreme Programming Project*. <http://www.extremeprogramming.org/map/project.html>. Accessed November 2012.

A diagram showcasing the Extreme Programming (Agile software development practice) project lifecycle. Different sections of the diagram provide links to more detailed explanations of the various parts of the project lifecycle.

Emanuil Tolev and Cottage Labs LLP. *IDFind - Got an ID? Not sure what it is? What you can do with it? Well, use this!* <https://github.com/CottageLabs/idfind/>. Accessed November 2012.

The current homepage and version control repository page of the IDFind project. It tries to guess what kind of identifier an unknown string is.

EPSRC. *EPSRC Research Funding*. <http://www.epsrc.ac.uk/funding/Pages/default.aspx>. Accessed November 2012.

The root funding page of EPSRC, the Engineering and Physical Sciences Research Council.

Eric S. Raymond. 2000 (Sept.). *The Cathedral and the Bazaar*. <http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/>. Accessed November 2012.

A discussion on why / how JSON maps better to intuitive human understanding of the world than XML does and why this is important for a data representation format.

FAST. *Organisation Details - IBM UK Research Laboratories*. <http://www.fastuk.org/atcommunity/orgview.php?id=3073>. Accessed April 2013.

"The Foundation for Assistive Technology was founded in 1998 to tackle the inadequate design of assistive technology products and services." This listing of IBM as a "source of funding" in their R&D section seemed as an appropriate reference to IBM Research UK as a commercial R&D vendor in the context of the project.

Gerrard Consulting. *The W-Model*. <http://www.gerrardconsulting.com/?q=node/531>. Accessed November 2012.

Explains the W software development lifecycle model and how it follows on from (or has evolved from) the V-model. This model could also be referred to as the double-V model.

GitHub Inc. *GitHub - Homepage*. <https://github.com/>. Accessed November 2012.

Currently popular decentralised version control system, usually used for software source code (but suitable for any artefacts although less suitable for binary formats or large files).

Google Inc. *Google Maps*. <https://maps.google.co.uk/>. Accessed November 2012.

A geographical mapping service by a commercial company.

Google Inc. and various authors - an open-source project. *Google Refine, a power tool for working with messy data (formerly Freebase Gridworks)*. <http://code.google.com/p/google-refine/>. Accessed November 2012.

A piece of open-source software for handling large semistructured datasets, making en-masse changes to them and cleaning them up. Google has now relinquished control and ownership of the project to the community, it is now the OpenRefine project.

Ian Sample. 2012 (July). *Free access to British scientific research within two years*. <http://www.guardian.co.uk/science/2012/jul/15/free-access-british-scientific-research>. Accessed November 2012.

An article in the electronic edition in the Guardian newspaper detailing the UK Government's policy on Open Access publications in 2014.

JISC. *JISC - We are the UK's expert on information and digital technologies for education and research*. <http://www.jisc.ac.uk/>. Accessed November 2012.

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