Case Study 1: Open Access Button enabled Discovery and Delivery at Imperial College London

Produced as part of Work Package 2 for the “Exploring the opportunities for an Open Access Button enabled discovery/inter-library loan service” project. Prepared for Jisc by the Open Access Button.

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Summary
In this case study we investigated the technical feasibility and desirability of an OAB-enabled set of applications in the discovery to delivery workflow outside traditional library systems. We conclude that this in fact feasible, with many routes to delivery.

While Imperial College London doesn't currently employ tools outside library search, link resolvers and interlibrary loan tools. We predict that adding stand alone tools, could reduce the steps required for the library to provide access by 10x across all platforms. Such tools, combining subscriptions with Open Access and the ILL system would provide an easily installed, user-friendly one-stop-shop for users to access materials wherever they discover them.

We'd like to thank the current and former staff at Imperial College London (especially Karine Larose, Andrew Preater, and Simon Barron) for their time, expertise, openness, and leadership during this process.

Background
This case study forms part of a broader lisc project with the Open Access Button to assess the feasibility of a service in the discovery/interlibrary loan (ILL) workflow utilising Open Access Button functionality to aid the discovery, creation and promotion of Open Access content. The case studies have run in parallel with work package one, which gathered evidence from a range of institutions as to how the creation of a service could deliver the most benefit to the most institutions, by developing use-cases to articulate where the service could sit within the discovery/ILL workflow. Within the case studies, we aim to understand the feasibility and desirability of each of the use-cases in greater depth at institutions. These two bodies of work will then inform the development of an assessment in work package three of whether there is value in developing any potential service further.
The Open Access Button’s interest in ILL and library services broadly crystallized during a meeting with Imperial College London, and a close collaboration formed from that point. Using our existing technology we built a “quick and dirty” proof of concept tool with Imperial aiming to demonstrate feasibility in at least one instance. The tool was designed to be installed in a patron’s environment (e.g. browser), or on college PCs. In work package one, it was demonstrated that this initial project was tapping into a broader desire in universities.

Imperial College London uses Ex Libris’s Primo and Alma to provide its library search, link resolver and ILL, respectively. It is an institution that prides itself on a user experience focus, innovation and Open Access.

This use-case is important: researchers’ workflows have transitioned towards starting their research on journal websites and Google Scholar. This presents an issue for the library in delivering its services. Library services are often unknown, unused or seen as unfriendly. As libraries, and legal systems, have struggled to keep pace, we’ve seen the rise of systems like Sci-Hub. While these tools are more user-friendly (although by no means perfect) they sacrifice legality to achieve this. To libraries’ credit, many have realised the urgent need for tools that bring library services into researchers’ workflows (rather than vice-versa).

In this case study we wanted to analyse the potential impact of stand-alone apps for delivering library services. This is one of three case studies exploring opportunities based on previously identified use-cases. Case study 2 at the University of York aimed to
explore how to provide existing Open Access content into library search, link resolvers, while providing seamless access to the ILL system and Open Access Button requests. Case study 3 at the University of Huddersfield aimed to simplify and enhance ILL forms, while streamlining ILL staff workflows.

Current workflows and challenges

Imperial do not currently have any systems for delivering material outside of traditional library systems (link resolvers, library search & ILL). Challenges in existing systems are covered in Case study 2 & 3, and as such we'll simply use figures and issues highlighted in those documents.

However, the college recognises the need to reach users not well-served by traditional library systems, and to integrate Open Access into these systems. There were some notable activities here:

- Imperial had installed a “bookmarklet” on college PCs for accessing reading list materials. This informed later decisions about technologies to use in our proof of concept.
- Imperial were doing intense user experience investigations around the ILL system and library search. We sat in on several days of user testing. Complete outputs from these investigations can be found here (which were used in other case studies) and early insights drove developments in this approach.
- Imperial focused a rapid improvement event on its library document delivery and ILL service. Follow-up actions were not fully resolved due to limitations of Alma and Primo (a consistent theme in much of their user experience work).

Outside library services, several legal and illegal options exist for accessing content, whether Open Access or paywalled, and for legally requesting inaccessible content. Since a library-owned option provided here will compete (or complement) with these options, it's important to review them. It should be noted, no free external options exist for ILLs. The closest alternative is the Open Access Button request system.

To establish a metric for the effectiveness of a workflow, we analysed the number of steps required from a user to achieve an objective. Here, a step may be clicking a link or button, or filling in a field. For this purpose, we've assumed a user's objective is landing on an article splash page (as clicks required to access full text may vary by journal).

<table>
<thead>
<tr>
<th>Workflow</th>
<th>Using Sci-Hub</th>
<th>Using Unpaywall</th>
<th>Using the Open Access Button (for requests)</th>
</tr>
</thead>
</table>
| Accessing from a journal site | Installation: Sci-hub can't be installed.  
  • Navigate to Sci-Hub, or include prefix in URL | Installation: one-step process from their website.  
  • Click plugin when green | Installation: one-step process from their website.  
  • Click plugin  
  • Choose “Request article” (if OA was |
| • Enter URL | Steps: 1 | already available, this is where the workflow would end) |
| • Hit enter | Success rate: ~50% of articles with DOIs, or ~5% of paywalled content from legal sources. |
| Success rate: ~97% Note, Sci-Hub is becoming more difficult to access in the UK. | Steps: 4 | Success rate: ~5% |

Table 1. A comparison of various existing workflows relevant to the case study for accessing articles.

Exploring OAB-enabled Workflows

We co-developed the initial approach (with bookmarklets) for designing stand-alone apps with Imperial, with heavy inspiration from the Open Access Button plugin. We successfully interfaced with the college's Primo and Alma system to obtain subscribed content and submit ILLs.

In expanding our approach to plugins and mobile apps, we involved our developers and designers - but also took significant external inspiration and advice around mobile workflows (where we're weaker internally).

Please note that the following designs are to be used primarily for exploring possible implementations of a service. Their copy, styles and even user flow do not necessarily reflect a finished product. They are provided to make the ideas we're outlining more tangible, and enable better feedback and discussion - rather than account for every scenario or circumstance.

Across the web: Browser Bookmarklets

Bookmarklets provide an attractive option for a stand-alone app. They technically work cross-browser and on mobile by default (to varying degrees of success), and are relatively easy to deploy and develop. This was our choice of technology for prototyping with Imperial for these reasons, and Imperial had already rolled out a bookmarklet to their college PCs. However, they require a user to click for any checks to be made and are increasingly harder for users to install.

A bookmarklet could be pre-installed on college PCs. Here, it can always be visible in the bookmarks bar, with a self-explanatory name such as “Get PDF”. The bookmarklet can also be installed from any web page onto a patron-managed device. A dedicated page could be hosted externally, or on the library site. The install process involves dragging the tool to your bookmarks bar, which is simple but unfamiliar.
If a version of the paper was accessible to the user from a
library subscription the
bookmarklet would simply
send them there when clicked.
This can be done through an
integration with Imperial's
catalog (via Primo).

Off-campus, this could display
a message to the user
instructing them to login as
they already have access.

<table>
<thead>
<tr>
<th>Description / Discussion</th>
<th>Mock-ups</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a version of the paper was accessible to the user from a library subscription the bookmarklet would simply send them there when clicked. This can be done through an integration with Imperial's catalog (via Primo). Off-campus, this could display a message to the user instructing them to login as they already have access.</td>
<td><img src="image1" alt="Paywalled Paper" /> <img src="image2" alt="Loading Window" /> <img src="image3" alt="Full Text" /></td>
</tr>
</tbody>
</table>

**Paywalled Paper**

**Loading Window**

**Full Text**

A soft robot that navigates its envir through growth

Elliot W. Hawkes, Laura N. Blumenstein, Joseph D. Graves

Across kingdoms and length scales, certain cells and organisms navigate motion but through growth. This pattern of movement is found in fungi, where it is characterized by extension from the tip of the body. Inactive control of growth direction. This results in the ability to move and form useful three-dimensional structures from the body. We now capable of a basic form of this behavior, growing substantially in ten directions using robust sensing of environmental stimuli. Further, the scale of animal and robot locomotion. This is enabled by two principal vessel allows rapid and substantial lengthening of the tip of the robot. In growing the tip allows directional control. Further, we demonstrate the environments by exploiting passive deformation and form three-di body of the robot along a path. Our study helps lay the foundation for the environment.

INTRODUCTION

Growth as a method for navigating the environment is found in fu gal hyphae with diameters as small as a few micrometers (22) as well as in trees with trunks thicker as a meter (22). These organisms env
If a self-archived article was found, a button to go to the article can be provided. This is achieved using the Open Access Button's API.

Where a user would still like a published version through and ILL, this can be easily accessed from the plugin. ILL staff will be informed the user didn't want the Open Access version and that the article isn't in the catalog.

Where an article isn't available, the patron can begin the process of requesting an ILL and making a request to the author simultaneously. ILLs can be submitted into Alma with all the metadata required, and confirmation that checks of the catalog & Open Access sources have been completed.

There is potential to remove stories from here; however, in this case they're included.

<table>
<thead>
<tr>
<th>Found Article (via oa)</th>
<th>Requesting article via ILL</th>
<th>Request Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 3</td>
<td>G. 1</td>
<td></td>
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<td></td>
<td>G. 2</td>
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<td>G. 3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>E. 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article not available</th>
<th>Entered sufficient text</th>
<th>Request Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 1</td>
<td>C. 1</td>
<td></td>
</tr>
<tr>
<td>A. 2</td>
<td>C. 2</td>
<td></td>
</tr>
<tr>
<td>A. 3</td>
<td>C. 3</td>
<td></td>
</tr>
<tr>
<td>A. 4</td>
<td>C. 4</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Key points in a potential workflow, with justifications and descriptions, for bookmarklets as part of a discovery to delivery pathway. For all the designs shown, including high-res images see our Github repository.
It is certainly feasible to develop a stand-alone app in this fashion. However, bookmarklets leave much to be desired from a user experience perspective, hence a general shift to products using dedicated plugins and mobile apps. The familiar install processes, as well as abilities for apps to act on behalf of a user, particularly make this shift important - however, this may raise significant challenges for institutions in rolling them out onto managed PCs.

**Across the web: Browser Plug-ins**

Plugins, especially on a patron’s own computer, provide the ideal option for stand-alone apps from a user experience standpoint. They can provide value to users, without the need for them to fully understand an app. For example, a patron landing on an article could be automatically shown a link to an available copy.

Further, their install processes are familiar and straightforward, often requiring only one click. Staff could encourage usage by pre-installing them on library-managed computers or advertising them prominently within existing library discovery systems.

Developing plugins is usually seen as prohibitive as most platforms require different versions of the app. However, especially for simple apps, platforms are progressively harmonising their requirements and start-ups are enabling single code bases to cover all platforms. However, for legacy systems, compatibility may still be an issue best solved by offering a bookmarklet.
<table>
<thead>
<tr>
<th>Description / Discussion</th>
<th>Mock-ups</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an Open Access copy is available to the user, this can be shown here. Once clicked, that could open in the same tab or a new tab.</td>
<td><img src="image1.png" alt="Mock-up 1" /> <img src="image2.png" alt="Mock-up 2" /></td>
</tr>
<tr>
<td>If they'd still like request a published version, this can be just as easily requested. A library could choose if to advertise the ILL system in this context.</td>
<td><img src="image3.png" alt="Mock-up 3" /> <img src="image4.png" alt="Mock-up 4" /></td>
</tr>
<tr>
<td>The iconography is designed to give immediate visual feedback to a user when on an article page, but if a user hovers over is expanded to show clearer instructions.</td>
<td><img src="image5.png" alt="Mock-up 5" /> <img src="image6.png" alt="Mock-up 6" /></td>
</tr>
<tr>
<td>If a copy is available through ILL, an icon can make clear to a user that while they have access, it isn't instant access.</td>
<td><img src="image7.png" alt="Mock-up 7" /> <img src="image8.png" alt="Mock-up 8" /></td>
</tr>
<tr>
<td>There is no requirement to collect a story from the user. However, in this mockup it is included.</td>
<td><img src="image9.png" alt="Mock-up 9" /> <img src="image10.png" alt="Mock-up 10" /></td>
</tr>
<tr>
<td>If a user is signed in (e.g. this plugin is on their personal machine) they wouldn't need to re-enter their email address. That would make this action much simpler.</td>
<td><img src="image11.png" alt="Mock-up 11" /> <img src="image12.png" alt="Mock-up 12" /></td>
</tr>
</tbody>
</table>
If a copy is available through a subscription, the icon can be displayed to allow one-click access.

At institutions reading lists, and external search systems are common places to discover content. A plugin could ease the process of accessing these papers by allowing a user to simply highlight a desired reference and click the button to take them there. This is a UI element deployed by the “Google Scholar Button”, and seems well received.

Table 3. Key points in a potential workflow, with justifications and descriptions, for plugins as part of a discovery to delivery pathway. For all the designs shown, including high-res images see our Github repository.
Mobile apps
With many libraries seeing significant numbers of users accessing content on mobile devices, we considered how the library could help them here. While we didn’t mock-up full workflows, it did become clear that harnessing “share to” functionalities, seen on all modern smartphones, would provide the best user experience. While using the “share to” menu was considered primarily for browsers, theoretically it should work for most apps. The work needed to integrate mobile apps with library systems would be more than described above.

Figure X. An example of the key point in the user journey for mobile apps

A user can download the app from normal app stores and complete a simple sign-in process. They’d then be able to continue browsing papers in any of their preferred apps, and when desired (i.e. they don’t have access) use the “share to” menus found in most apps to identify where best to obtain legal access.

While developing mobile apps is usually considered prohibitive, harnessing this method could keep the app as simple as possible - while still providing the desired functionality in people’s workflows.

Potential Impact
To estimate the effectiveness of our interventions, we obtained historical article ILL data from the campus and used the Open Access Button API to measure how much of it we could find in Open Access form. Other figures, such as estimates of cost, were requested to make calculations from this data. User experience improvements were judged informally through staff response, and quantified based on steps required to work through our product mock-ups (where applicable) and decreases in delivery times. The data and analysis used to generate these insights are available here.

We ran 7700 records and found 6% could be obtained through self-archived Open Access sources, while 13% were accessible from the catalog.

For Imperial, an important part of the business case for these interventions is the positive impact they’ve had on strategic Open Access advocacy efforts, as well as direct service improvements. We’ve found this mentality mirrored elsewhere.

User Experience
Staff responded positively to all our interventions, and they expected users would too.
<table>
<thead>
<tr>
<th>starting point</th>
<th>Using current systems if content is available via subscriptions</th>
<th>Using current systems or existing apps if content is unavailable via subscriptions</th>
<th>Using proposed stand-alone apps when content is available through subscriptions</th>
<th>using proposed stand-alone apps when content is unavailable through subscriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialist Databases (Case study 2)</td>
<td>2 via link resolver</td>
<td>15 via ILL 2 through Open Access 4 through Sci-Hub</td>
<td>1</td>
<td>2 through ILL. 1 through Open Access.</td>
</tr>
<tr>
<td>Google Scholar (Case study 2)</td>
<td>2 (via link resolver)</td>
<td>15 via ILL 2 through Open Access 4 through Sci-Hub</td>
<td>1</td>
<td>2 through ILL. 1 through Open Access.</td>
</tr>
<tr>
<td>A journal article</td>
<td>1</td>
<td>15 via ILL 1 through Open Access 3 through Sci-Hub</td>
<td>1</td>
<td>2 through ILL. 1 through Open Access.</td>
</tr>
<tr>
<td>A mobile reading app</td>
<td>?</td>
<td>15</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>A reading list</td>
<td>2</td>
<td>15 via ILL 2 through Open Access 4 through Sci-Hub</td>
<td>2</td>
<td>3 through ILL. 2 through Open Access.</td>
</tr>
</tbody>
</table>

Table X. A comparison of the steps required for a user to access content with existing technology and the proposed solutions.

By delivering self-archived Open Access content instantly, Imperial could reduce their delivery times by 6%. By delivering paid-for content instantly, this could be reduced by 13%. Employing both these mechanism would reduce times by 16%.

In running the ILL data, it was clear our “false positive” rate was far too high. It could be as high as 6% of entries run. Our system is optimized to run on URLs, or DOIs, which aren't available in traditional ILL systems. The root issue here is poor repository metadata, which isn't possible for us to fix. However, we are making significant improvements through checking results for full text before they're presented and training our system against similar datasets.
Cost savings
The key assumptions behind cost-savings figures are that Open Access copies could be delivered to patrons instantly, and that an insignificant number would continue to desire an ILL. We also didn't calculate the value of staff time saved through automatic catalog checks, self-archived Open Access checks, or increases in OA by making requests to authors.

Our analysis suggests that Imperial could save over 6% on ILLs by utilizing the Open Access Button. These cost savings are calculated only by considering the direct costs saved by delivering an self-archived Open Access copy instantly, which is a relatively limited analysis. In this case, we were unable to calculate the cost savings from delivering paid-for content instantly without staff intervention. However, it can be expected this figure would rise significantly.