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# Overview of the SBS 2015 Interactive Track

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**Abstract.** Users looking for books online are confronted with both professional meta-data and user-generated content. The goal of the Interactive Social Book Search Track was to investigate how users used these two sources of information, when looking for books in a leisure context. To this end participants recruited by four teams performed two different tasks using one of two book-search interfaces. Additionally one of the two interfaces also investigated whether user performance can be improved by providing a user-interface that supports multiple search stages.

## 1 Introduction

The goal of the Interactive Social Book Search (ISBS) task is to investigate how book searchers use professional metadata and user-generated content at different stages of the search process. The purpose of this task is to gauge user interaction and user experience in social book search by observing user activity with a large collection of rich book descriptions under controlled and simulated conditions, aiming for as much "real-life" experiences intruding into the experimentation. The output will be a rich data set that includes both user profiles, selected individual differences (such as a motivation to explore), a log of user interactivity, and a structured set of questions about the experience.

The Interactive Social Book Search (ISBS) Task started in 2014 as a merge of the INEX Social Book Search (SBS, [7–9]) track and the Interactive task of CHiC [12, 15]. The SBS Track started in 2011 and has focused on system-oriented evaluation of book search systems that use both professional metadata and user-generated content. Out of three years of SBS evaluation arose a need to understand how users interact with these different types of book descriptions and how systems could support user to express and adapt their information needs during the search process. The CHiC Interactive task focused on interaction of

users browsing and searching in the Europeana collection. One of the questions is what types of metadata searchers use to determine relevance and interest. The collection, use case and task were deemed not interesting and useful enough to users. The SBS contributes a new document collection, use case and search tasks. The first year of the ISBS will therefore focus on switching to the SBS collection and use case, with as few other changes as possible.

The goal of the interactive book search task is to investigate how searchers interact with book search systems that offer different types of book metadata. The addition of opinionated descriptions and user-supplied tags allows users to search and select books with new criteria. User reviews may reveal information about plot, themes, characters, writing style, text density, comprehensiveness and other aspects that are not described by professional metadata. In particular, the focus is on complex goal-oriented tasks as well as non-goal oriented tasks. For traditional tasks such as known-item search, there are effective search systems based on access points via formal metadata (i.e. book title, author name, publisher, year, etc). But even here user reviews and tags may prove to have an important role. The long-term goal of the task is investigate user behaviour through a range of user tasks and interfaces and to identify the role of different types of metadata for different stages in the book search process.

For the Interactive task, the main research question is:

**RQ** How do searchers use professional metadata and user-generated content in book search?

This can be broken down into a few more specific questions:

**RQ1** How should the UI combine professional and user-generated information?
**RQ2** Should the UI adapt itself as the user progresses through their search task, and if so, how?

In this paper, we report on the setup and the results of the ISBS track 2015. Section 2 lists the participating teams. The experimental setup of the task is discussed in detail in Section 3 and the results in Section 4. We close in Section 5 with a summary and plans for 2016.

## 2 Participating Teams

In this section we provide information on the participating teams. In Table 1 we show which institutes participated in this Track and the number of users that took part in their experiments. Three users in our experiment selected *Other* for the institute via which they were recruited, but did not fill in an institution name.

## 3 Experimental Setup

In this section we first describe the background of the Social Book search Lab and the role of the Interactive track, then describe the tasks, questionnaires, the

**Table 1.** Overview of the participating teams and number of users per team

| Institute | # users |
|---|---|
| Aalborg University | 36 |
| University of Amsterdam | 22 |
| Edge Hill University | 20 |
| Humboldt University | 67 |
| Manchester Metropolitan University | 23 |
| Oslo & Akershus University College | 20 |
| Stockholm University | 1 |
| Other | 3 |
| Total | 192 |

system and user interfaces, participants and the procedure for recruiting and informing participants.

### 3.1 Social Book Search

The goal of the interactive Social Book Search (ISBS) track is to investigate how searchers make use of and appreciate professional metadata and user-generated content for book search on the Web and to develop interfaces that support searchers through the various stages of their search task. The user has a specific information need against a background of personal tastes, interests and previously seen books. Through social media, book descriptions are extended far beyond what is traditionally stored in professional catalogues. Not only are books described in the users' own vocabulary, but they are also reviewed and discussed online, and added to online personal catalogues of individual readers. This additional information is subjective and personal, and opens up opportunities to aid users in searching for books in different ways that go beyond the traditional editorial metadata based search scenarios, such as known-item and subject search. For example, readers use many more aspects of books to help them decide which book to read next [13], such as how engaging, fun, educational or well-written a book is. In addition, readers leave a trail of rich information about themselves in the form online profiles which contain personal catalogues of the books they have read or want to read, personally assigned tags and ratings for those books and social network connections to other readers. This results in a search task that may require a different model than pure search [6] or pure recommendation.

The ISBS track investigates book requests and suggestions from the LibraryThing (LT) discussion forums as a way to model book search in a social environment. The discussions in these forums show that readers frequently turn to others to get recommendations and tap into the collective knowledge of a group of readers interested in the same topic.

The track builds on the INEX Amazon/LibraryThing (A/LT) collection [1], which contains 1.5 million book descriptions from Amazon, enriched with content from LT. This collection contains both professional metadata and user-generated content.[6]

The records contain title information as well as a Dewey Decimal Classification (DDC) code (for 61% of the books) and category and subject information supplied by Amazon. We note that for a sample of Amazon records the subject descriptors are noisy, with a number of inappropriately assigned descriptors that seem unrelated to the books. Each book is identified by an ISBN. Since different editions of the same work have different ISBNs, there can be multiple records for a single intellectual work. Each book record is an XML file with fields like *isbn*, *title*, *author*, *publisher*, *dimensions*, *numberofpages* and *publicationdate*. Curated metadata comes in the form of a Dewey Decimal Classification in the *dewey* field, Amazon subject headings in the *subject* field, and Amazon category labels in the *browseNode* fields. The social metadata from Amazon and LT is stored in the *tag*, *rating*, and *review* fields.

### 3.2 User Tasks

This year in addition to the two main user tasks, a training task was developed to ensure that participants are familiar with all the functions offered by the two interfaces. The queries and topics used in the training task were chosen so as not to overlap with the *goal-oriented* task. However, a potential influence on the *non-goal* task cannot be ruled out.

Similar to last year, two tasks were created to investigate the impact of different task types on the participants interactions with the interfaces and also the professional and user-generated book meta-data. For both tasks, participants were asked to describe their motivation for particular book selections in the book-bag.

**The *goal-oriented* task** contains five sub-tasks ensuring that participants spend enough time on finding relevant books. While the first sub-tasks defines a clear goal, the other sub-tasks are more open giving the user enough room to interact with and the available content and met-data options. The following instruction text was provided to participants:

> Imagine you participate in an experiment at a desert-island for one month. There will be no people, no TV, radio or other distraction. The only things you are allowed to take with you are 5 books. Please search for and add 5 books to your book-bag that you would want to read during your stay at the desert-island:
> – Select one book about surviving on a desert island
> – Select one book that will teach you something new

[6] This collection is a subset of a larger collection of 2.8 million description. The subset contains all book descriptions which have a cover image.

- Select one book about one of your personal hobbies or interests
- Select one book that is highly recommended by other users (based on user ratings and reviews)
- Select one book for fun

Please add a note (in the book-bag) explaining why you selected each of the five books.

**The *non-goal* task** was developed based on the open-ended task used in the iCHiC task at CLEF 2013 [14] and the ISBS task at CLEF 2014 [3]. The aim of this task is to investigate how users interact with the system when they have no pre-defined goal in a more exploratory search context. It also allows the participants to bring their own goals or sub-tasks to the experiment in line with the "simulated work task" idea [2]. The following instruction text was provided to participants:

> Imagine you are waiting to meet a friend in a coffee shop or pub or the airport or your office. While waiting, you come across this website and explore it looking for any book that you find interesting, or engaging or relevant. Explore anything you wish until you are completely and utterly bored. When you find something interesting, add it to the book-bag. Please add a note (in the book-bag) explaining why you selected each of the books.

### 3.3 Experiment Structure

The experiment was conducted using the SPIRE system[7] [4], using the flow shown in Figure 1. Each participant ran through the *Pre-Task*, *Task*, *Post-Task* steps once for each of the two tasks. When a new participant started the experiment, the SPIRE system automatically allocated them to one of the two tested interfaces and to a given task order. Interface allocation and task order were automatically balanced to minimise bias in the resulting data.

Participant responses were collected in the following five steps using a selection of questionnaires:

- *Consent* – all participants had to confirm that they understood the tasks they would be asked to undertake and the types of data collected in the experiment. Participants also specified which institute had recruited them;
- *Demographics* – the following factors were acquired in order to characterise the participants: gender, age, achieved education level, current education level, and employment status;
- *Culture* – to quantify language and cultural influences, the following factors were collected: country of birth, country of residence, mother tongue, primary language spoken at home, languages used to search the web;

[7] Based on the Experiment Support System – https://bitbucket.org/mhall/experiment-support-system

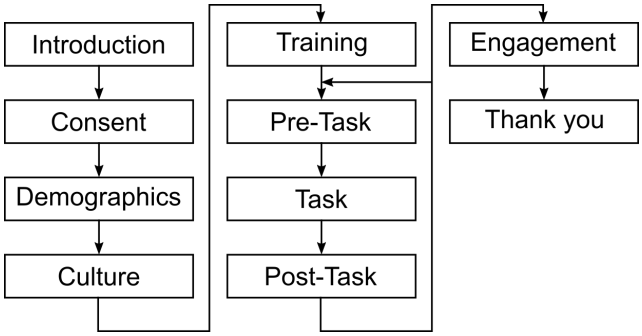


**Fig. 1.** The path participants took through the experiment. Each participant completed the *Pre-Task*, *Task*, *Post-Task* twice (once for each of the tasks). The SPIRE system automatically balanced the task order. No data was acquired in the *Introduction*, *Pre-Task*, and *Thank you* steps.

- *Post-Task* – in the post task questions, participants were asked to judge how useful each of the interface components and meta-data parts that they had used in the task were, using 5-point Likert-like scales;
- *Engagement* – after participants had completed both tasks, they were asked to complete O'Brien et al.'s [11] engagement scale.

### 3.4 System and Interfaces

The two tested interfaces (*baseline* and *multi-stage*) were both built using the PyIRE[8] workbench, which provides the required functionality for creating interactive IR interfaces and logging all interactions between the participants and the system. This includes any queries they enter, the books shown for the queries, pagination, facets selected, books viewed in detail, metadata facets viewed, books added to the book-bag, and books removed from the book-bag. All log-data is automatically timestamped and linked to the participant and task.

Both interfaces used a shared IR backend implemented using ElasticSearch[9], which provided free-text search, faceted search, and access to the individual books complete metadata. The 1.5 million book descriptions are indexed with all professional metadata and user-generated content. For indexing and retrieval the default parameters are used, which means stopwords are removed, but no stemming is performed. The Dewey Decimal Classification numbers are replaced by their natural language description. For instance, the DDC number 573 is replaced by the descriptor *Physical anthropology*. User tags from LibraryThing are indexed both as text strings, such that complex terms are broken down into

[8] Python interactive Information Retrieval Evaluation workbench – https://bitbucket.org/mhall/pyire
[9] ElasticSearch – http://www.elasticsearch.org/

individual terms (e.g. *physical anthropology* is indexed as *physical* and *anthropology*) and as non-analyzed terms, which leaves complex terms intact and is used for faceted search.

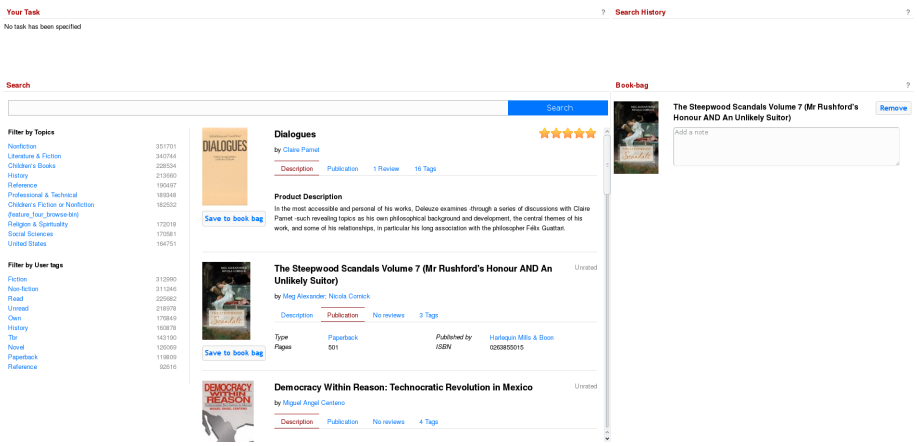


**Fig. 2.** *Baseline* interface – results view.

**The *baseline* interface** shown in figure 2 represents a standard faceted web-search interface, the only additions being the task information (top-left) and the list of past searches (top-right). The main interface consists of a search box at the top, two facets on the left, and the search results list (center). On the right-hand side is the book-bag, which shows the participants which books they have collected for their task and also provides the notes field, which the participants were instructed to use to explain why they had chosen that book.

The two facets provided on the left use the Amazon subject classification and the user tags to generate the two lists together with numeric indicators for how many books each facet contained. Selecting a facet restricted the search results to books with that facet. Participants could select multiple facets from both lists.

In the search results list each book consisted of a thumbnail image, title, authors, aggregate user rating, a description, publication information (type, publisher, pages, year, ISBN ...), user reviews, and user tags (where available). The aggregate user rating was displayed using 1 to 5 stars in half-star steps, calculated by aggregating the 1-5 star ratings for each user review. If the book had no user reviews, then no stars were shown. Additionally each book had a "Add to Bookbag" button that participants used to add that book into their bookbag.

**The *multi-stage* interface** aims to support users by taking the different stages of the search process into account. The idea behind the *multi-stage* interface design is supported by two theoretical components.

Firstly, several information search process models look at stages in the search process. A well-known example is Kuhlthau [10], who discovered "common patterns in users' experience" during task performance. She developed a model consisting of six stages, which describe users' evolving thoughts, feelings and actions in the context of complex tasks. Vakkari [16] later summarized Kuhlthau's stages into three categories (pre-focus, focus formulation, and post-focus), and points to the types of information searched for in the different stages.

The multi-stage search interface constructed for iSBS was inspired by [16]. It includes three distinct panels, potentially supporting different stages: *browse*, in which users can explore categories of books, *search*, supporting in-depth searching, and *book-bag*, in which users can review and refine their book-bag selections.

Secondly, when designing a new search interface for social book search it has also been relevant to look more specifically at the process of choosing a book to read. A model of decision stages in book selection [13] identifies the following decision stages: browse category, selecting, judging, sampling, and sustained reading. This work supports the need for a user interface that takes the different search and decision stages into account. However, the different stages in [13] closely relate to a specific full text digital library, and therefore the model was not applicable to the present collection.

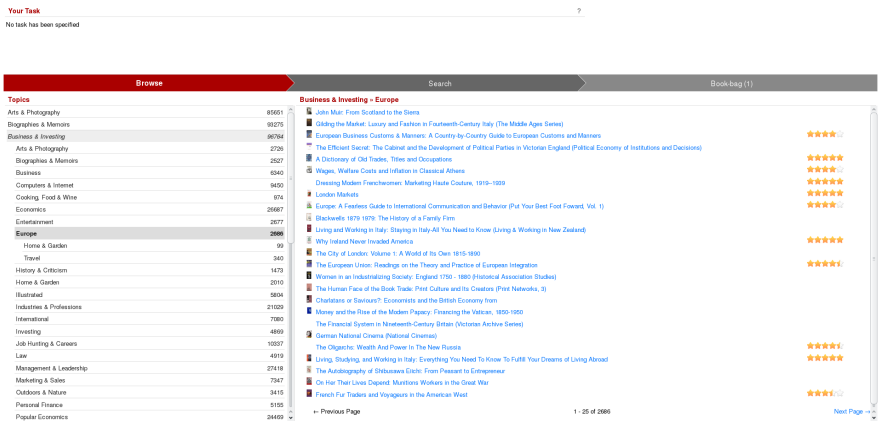


**Fig. 3.** *Multistage* interface – *Browse* view.

When the *multi-stage* interface first loads, participants are shown the *browse* stage (fig. 3), which is aimed at supporting the initial exploration of the dataset. The main feature to support the free exploration is the hierarchy browsing component on the left, which shows a hierarchical tree of Amazon subject classifications. This was generated using the algorithm described in [5], which uses

the relative frequencies of the subjects to arrange them into the tree-structure with the most-frequent subjects at the top of the tree. The search result list is designed to be more compact to allow the user to browse books quickly and shows only the book's title and aggregate ratings (if available). Clicking on the book title showed a popup window with the book's full meta-data using the same layout and content as used in the *baseline* interface's search result list.

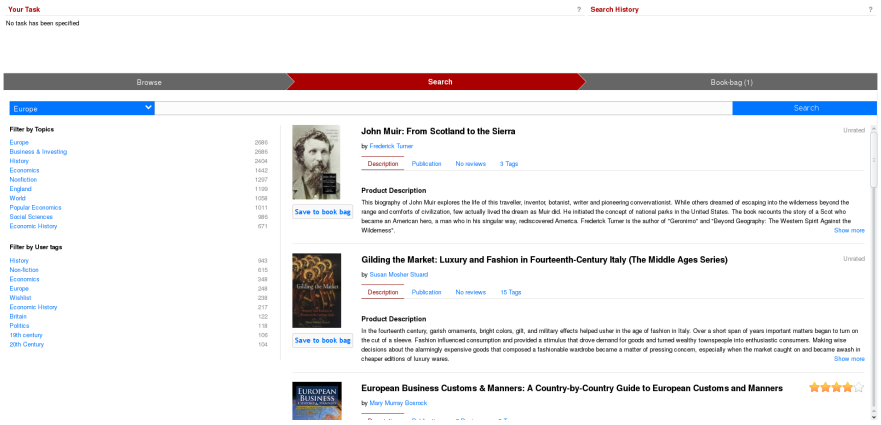


**Fig. 4.** *Multistage* interface – *Search* view.

Participants switched to the *search* stage by clicking on the "Search" section in the gray bar at the top. The *search* stage (fig. 4 uses the same interface as the *baseline* with only two differences. The first is that as the book-bag is a separate stage, it is not shown on the *search* stage interface itself. The second is that if the participants select a topic in the *browse* stage, this topic is pre-selected as a filter for any queries in the blow box to the left of the search box. Participants can click on that box to see a drop-down menu of the selected topic and its parent topics. Participants can select a higher-level topic to widen their search.

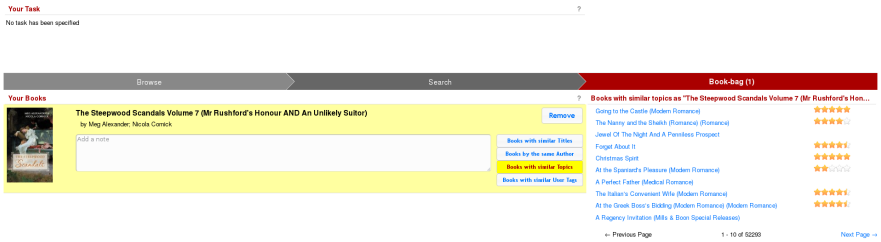


**Fig. 5.** *Multistage* interface – *Book-bag* view.

**Table 2.** Demographics of the participants

| **Gender** | **#** | **Location** | **#** |
|---|---|---|---|
| Female | 120 | Lab | 56 |
| Male | 72 | Remote | 136 |
| **Country of Birth** | **#** | **Age** | **#** |
| Germany | 63 | 18–25 | 72 |
| Uk | 33 | 26–35 | 80 |
| Denmark | 21 | 36–45 | 25 |
| Norway | 20 | 46–55 | 8 |
| Netherlands | 11 | 56–65 | 6 |
| Other | 44 | 66– | 1 |

The final stage is the *book-bag* shown in Figure 5, where participants review the books they have collected and can provide the notes for each book. For each book, four buttons were provided that allowed the user to search for similar books by title, author, topic, and user tags. The similar books are shown on the right using the same compact layout as in the *browse* stage. As in the *browse* stage, clicking on a book in that list shows a popup window with the book's details.

### 3.5 Participants

Demographic information on the 192 participants is given in Table 2. Of these participants, 120 were female and 72 male. In terms of age, 72 were between 18 and 25, 80 between 26 and 35, 25 between 36 and 45, 8 between 46 and 55, 6 between 56 and 65 and 1 over 65. 60 were in employment, 3 unemployed, 128 were students and 1 selected *other*. Participants came from 36 different countries (country of birth) including Germany (63 participants), UK (33), Denmark (21), Norway (20), the Netherlands (11), resident in 13 different countries, again mainly in Germany, UK, Denmark, Norway and the Netherlands. Participants mother tongues included German, Dutch, English, Danish, Romanian, Farsi or Portuguese and 23 others. The majority of participants executed the tasks remotely (136), only 56 users conducted the experiment at a lab. 95 participants used the novel *multi-stage* interface, while 97 used the *baseline* interface.

### 3.6 Procedure

Participants were invited by the individual teams, either using e-mail (Aalborg, Amsterdam, Edge Hill) or by recruiting students from a lecture or lab (Edge Hill, Humboldt). Where participants were invited by e-mail, the e-mail contained a link to the online experiment, which would open in the participant's browser. Where participants were recruited in a lecture or lab, the experiment

URL was distributed using e-learning platforms. The following browsers and operating systems had been tested: Windows, OS X, Linux using Internet Explorer, Chrome, Mozilla Firefox, and Safari. The only difference between browsers was that some of the graphical refinements such as shadows are not supported on Internet Explorer and fall back to a simpler line-based display.

After participants had completed the experiment as outlined above (3.3), they were provided with additional information on the tasks they had completed and with contact information, should they wish to learn more about the experiment. Where participants that completed the experiment in a lab, teams were able to conduct their own post-experiment process, which mostly focused on gathering additional feedback on the system from the participants.

## 4 Results

Based on the participant responses and log data we have aggregated summary statistics for a number of basic performance metrics.

**Session length** was measured automatically using JavaScript and stored with the participants' responses. Table 3 shows median and inter-quartile ranges for all interface and task combinations. Session lengths are significantly lower for the *baseline* interface (wilcoxon signed rank $p < 0.05$). Also all session lengths are significantly longer than in the iSBS 2014 experiment [3].

**Table 3.** Session lengths for the two interfaces and tasks. Times are in minutes:seconds and are reported median (inter-quartile range).

| Interface | Goal-oriented | Non-goal |
|---|---|---|
| *Baseline* | 10:30min (10:25min) | 5:33min (7:37min) |
| *Multi-Stage* | 12:52min (9:20min) | 7:18min (10:52min) |

**Number of queries** was extracted from the log-data. In both interfaces it was possible to issue queries by typing keywords into the search box or by clicking on a meta-data field to search for other books with that meta-data field value. Both types of query have been aggregated and Table 4 shows the number of queries for each interface and task. The number of queries per session is significantly higher for the *baseline* interface over the *multi-stage* interface for both tasks (wilcox $p < 0.05$) and also for the *goal-oriented* over the *non-goal* task in both interfaces (wilcox $p < 0.01$).

**Number of books collected** was extracted from the log-data. Participants collected those books that they felt were of use to them. The numbers reported

**Table 4.** Number of queries executed. Numbers are reported median (interquartile range).

| Interface | Goal-oriented | Non-goal |
|---|---|---|
| *Baseline* | 8 (5) | 2 (3) |
| *Multi-Stage* | 6 (6.5) | 1 (3) |

in Table 5 are based on the number of books participants had in their book-bag when they completed the session, not the total number of books collected over the course of their session, as participants could always remove books from their book-bag in the course of the session.

**Table 5.** Number of books collected. Numbers are reported median (interquartile range).

| Interface | Goal-oriented | Non-goal |
|---|---|---|
| *Baseline* | 5 (0) | 3 (3) |
| *Multi-Stage* | 5 (0) | 3 (3) |

Unlike the other metrics, there is no significant difference between the two interfaces. On the *goal-oriented* task this was expected as participants were asked to collect five books. On the *non-goal* task this indicates that the interface had no impact on what participants felt was enough to complete the task.

## 5 Conclusions and Plans

This was the second year of the Interactive Social Book Search Track. Our goal was to investigate how users deal with professional metadata and user-generated content when searching for books and how different types of interfaces support users in goal-oriented and non-goal-oriented tasks. The track makes use of a large collection of book descriptions from Amazon and LibraryThing with a mixture of professional metadata in the form of subject descriptors and classification codes and user-generated content in the form of user reviews, tags and ratings. Because search processes often consist of multiple stages, we developed two interfaces to identify and analyse these different stages. One interface resembles traditional search interfaces familiar from Amazon and LibraryThing, the other is a *multi-stage* interface where the first part provides a broad overview of the collection, the second part allows the user to look at search results in a more detailed view and the final part allows the user to directly compare selected books in great detail.

The first edition had a short data gathering period and served as a pilot to develop and test the interfaces, especially the multistage interface. This year the

track ran over the full annual cycle, with a data gathering period of almost five months, resulting in a shared data pool of 192 participants from many different backgrounds. The tasks have been re-designed to make users interact more and for longer periods of time during the experiments, with very satisfying results. This year, users spent significantly more time on both tasks, even though for the open task they could stop as soon as they wanted.

Users issued fewer queries with the multistage interface than with the baseline interface, probably because the multistage interface allows browsing as an extra mode of exploring the collection. The papers contributed by the participating teams contain more detailed analyses of the interactions and will focus on specific research questions and findings.

For the next year, we plan to have multiple, short experiments, more focused on specific research questions, with fewer users per experiment. Another option is to let individual teams plan their own experiments. Either way, the challenge will be to have enough commonality between the experiments so that the total data set provides a coherent insight into book search interactions in the different stages that users move through.

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