LiSCAMBIO: literacy and city-center revitalization

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I. Introduction

The last annual report about the production and reading of books in Italy [1], presented by the National Statistical Office (ISTAT), highlights that in 2017 only 41.0% of people from 6 years and over have read a book for non-professional reasons. Moreover, the availability of services (e.g., bookshops and libraries) and related initiatives have an influence on the propensity to read, causing inequalities on the territory.

In the post-disaster context of the city of L'Aquila, where a reconstruction process is in progress, the city life is more difficult w.r.t. other cities in the country. For instance, although several business activities are coming back to the historical center of the city, local traders suffer for the lack of citizens living in or visiting the historical city center.

In this context, research innovation (recommendation systems, gamification, etc) and smart cities technologies can help in realizing smart services and solutions addressing the challenges.

The aim of our proposal is twofold: (i) engage people in sharing and reading books, and (ii) attract people to the city center, through the involvement of existing local activities. The overall idea consists in a revision and contextualization of the so-called Book Crossing.[1]

Considering the findings of the annual ISTAT report about the territorial disparities [1, p. 13], we find interesting to investigate the possible impact of LiSCAMBIO when introduced in two different realities, such as the cities of L'Aquila and Bolzano. Bolzano is a dynamic city, with a bustling city center, many commercial activities, and several libraries. Hence, the impact of a project such as LiSCAMBIO is expected to be more limited. Nonetheless, there is space for some improvement that are worth measuring. Evidence of this is the fact that the cultural services of Bolzano are always exploring new initiatives to engage with the citizens, even towards the increase of the general literacy.[2]

Our proposal can be further extended and applied in different contexts, such as schools [2], public and private institutions.

[1]https://www.bookcrossing.com

[2]http://www.provincia.bz.it/arte-cultura/biblioteche-lettura/pianeta-lettura.asp (accessed 30/05/2019)

II. Existing book sharing implementations and limitations

Lending and borrowing books is as old as books themselves. *The traditional way of exchange is limited to the actual social network of the readers*; books pass from acquaintance to acquaintance. Overcoming these limitations, book swapping has existed in the form of a shelf or a box provided in some places, where books can be left or picked up. To borrow a book, readers must visit a place of their knowledge and see the books available. *There is no way to discover new places, or know where to find a specific book.* With the advent of the Internet, a more technological approach overcame these limitations. The BookCrossing.com website envisages different ways for the release of previously registered books, such as in public spaces (e.g., on a bench), direct swaps among users or inside a set of users that expressed the desire of reading the same book. As of today, there are almost 2 millions book crossers and over 12 millions books travelling in 132 countries.

On BookCrossing.com, the book identification happens through the registration of the book in the website providing a unique BCID (Book Crossing ID) that has to be printed *by the user* on a paper-tag and attached to the book. The BCID permits the books to be followed around the world.

Printing a BCID paper-tag is asking time and additional material contribution from the user. We find that this is an interesting challenge that could be tackled in two ways: (i) finding novel technologically-driven identification methods of individual copies of a book; (ii) designing an advanced book sharing platform with all the advantages of BookCrossing.com but doing so *without* identifying individual copies.

III. Value-added services, exploiting existing technologies, and research adoption

Figure 1 shows an overview of the architecture supporting LiSCAMBIO application. LiSCAMBIO is essentially based on the release of books in places registered at local activities, where citizens can go and borrow books. Unlike BookCrossing.com, which is mainly based on wild release, LiSCAMBIO exchange locations are strategically linked to local activities in the city center, to attract people there. In addition, we want to be able to exploit the existing technologies,[3] and also to inte-

[3]E.g., https://www.programmableweb.com/category/books/api (accessed 30/05/2019) is a repository of over 100 book APIs.

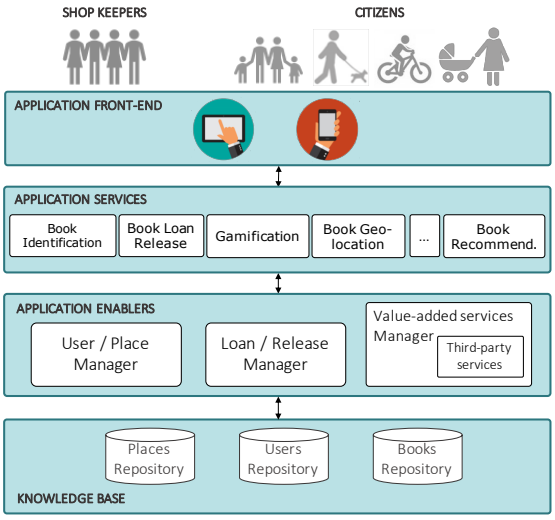

Fig. 1. Overview of the architecture.

grate innovative research, in order to realize and provide value-added services. One example of such value-added services is book recommendation, for which dedicated book APIs already exist, and there research is ongoing. In order to offer reading recommendation that are best-suited for a given user, we aim at leveraging the potential of recommender systems [3], that is, their ability to predict what a user may prefer or be looking for among a set of available books. Another example is the incentivization of reading, book sharing, and visiting places through techniques of gamification [4].

We must acknowledge that the future use of a technology, and LiScambio itself, cannot be completely anticipated at design time [5]. Adding promising value-added services and removing 'bloat' services should be made rather simple in the development cycle. To facilitate the evolution of LiScambio, state of the art model-driven system design need to be adopted.

IV. Elementary data model

Some of the deciding characteristics of LiScambio appear also in a possible high-level conceptual modelling of the data which is presented in Figure 2. The data model of LiScambio would be naturally built on top of a socle of literary works (Work) and of their more tangible manifestations: editions and variants (Book), and individual copies (BookCopy). Playing a crucial role at the top, are the places (Place) in the city where the individual copies of the books will be exchanged. It holds the information about the existing local activities being the actual enablers of LiScambio. Exchanges can take the form of two basic operations: releasing a book copy (Release), and borrowing a book copy (Loan). At the center of it all are the citizens (User).

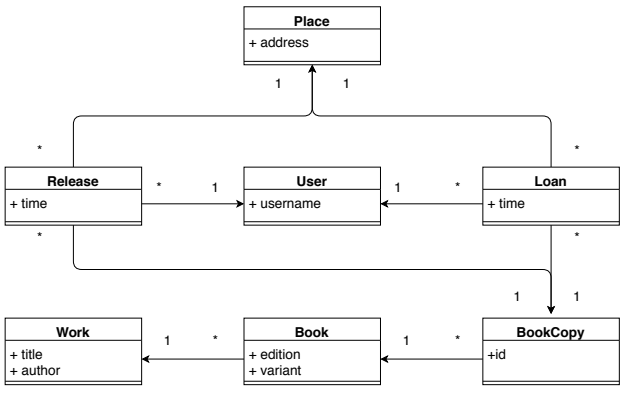

Fig. 2. Overview of the data model.

V. Challenges

An interesting innovation challenge is emerging from the issue of identifying individual copies of a book. ISBN or bar-codes are not sufficient identifiers: (i) an ISBN only identifies an edition and variant of a literary work; (ii) some books do not have an ISBN at all (e.g., old, or unpublished books). Libraries deal with the issues by using in-house labeling systems. In our case, the books are not centrally managed. Hence, it may be difficult to implement. Other book sharing services rely on the user for the univocal labelling. For simplicity and to not hinder citizen engagement, we are of the opinion that offering a new book, and taking a book on loan, should be a simple task that does not require more than a smart-device, and possibly a pen. Several solutions could be evaluated:

- Seemingly simple solutions are to keep tags at the disposition of the users at the exchange places. These tags could be pre-printed sticky labels, or RFID labels (e.g., [6]). Both are relatively cheap solutions but not sustainable without continuous funding (RFID labels can be acquired for as little as 10 cents). These solutions also force us to ensure an administrative presence to make sure that the places have enough labels at all times. (RFID readers and writers should also be installed in the places, as smart devices are not all equipped with the suitable technology.)
- The mobile application could also use image recognition from the camera of the devices. Using context reasoning (Where is the place? Which books are currently at this place? Who is the user?) it would be possible to identify a book uniquely, and deduce which operation is being performed (loan, release).
- Promising solutions would also involve a two-way adaptation of the Grab-and-Go model for retail proposed by Amazon Go.[4] Transactions are recognized automatically using sensors and computer vision. Our domain of application might be simple enough to be implemented by setting at each exchange place only a cheap single-board computer and a low-definition camera.

One could even pose the question as to whether identifying individual copies of a book is a necessity. Not being able to identify individual copies, we cannot unambiguously track a book copy. We may then want to transform a technical difficulty into a social opportunity through flexible and adequate incentivization frameworks, and make LiScambio a trust-centered advanced book sharing platform.

[4]https://amazon.com/go

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