Sharing Tales of the Dutch Revolt in a Virtual Research Environment

Isaac Newton famously postulated that scientific progress is made when researchers are able to "stand on the shoulder of giants."[1] For modern scientists, the possibilities to stand on the shoulders of others, and to benefit from what colleagues have accomplished, have been extended immensely in recent decades as a result of continuous technological advances. Olson et al. (2008) note that the increasingly collaborative nature of modern science can be demonstrated by tracing co-authorship patterns and by pointing at the steady rise in the number of multi-investigator grant proposals (p. 1). In the natural sciences, the impetus to collaborate largely emerged from the dramatic growth in the volume of digital data. Measuring devices and other instruments increasingly produce computer-readable data, and when scientists process and analyse these data, they mostly use digital research tools, thus producing additional datasets. Various initiatives have been developed to ensure that research data can be archived digitally so that they do not get lost and that they can be reused. At the moment, researchers who initiate new research projects have access to enormous quantities of existing academic resources, and, as a consequence, larger and more complex forms of enquiry become possible. Such ambitious research projects are often beyond the reach of individual scientists, and can only be carried out successfully if researchers join forces.

In the natural sciences, scientific collaboration traditionally took place in laboratories in which research instruments and other facilities were housed centrally and in which co-located researchers could meet and interact directly. Various authors have recognised that information and communication technologies have evolved to such an extent that they can effectively replicate the advantages of such physical settings in an on-line environment. Wulf (1993) asserted that the Internet enables scientists to work together in "centre[s] without walls, in which [they] can perform their research without regard to geographic location" (p. 854). Software systems which can offer support for web-based scientific collaboration are often referred to as "collaboratories" or as "virtual research environments" (VREs).[2] Importantly, a VRE provides facilities for a community of users who collectively focus on a set of related research questions. Through a VRE, such a community can obtain central access to the various resources and tools which are needed to answer these questions. A VRE comprises "a set of online tools and other

[1] The quotation appears in a letter to Robert Hooke, dated 5 February 1675.
[2] In this article, the terms "collaboratory" and "virtual research environment" will be treated as being synonymous.

network resources and technologies interoperating with each other to support or enhance the processes of a wide range of research practitioners within and across disciplinary and institutional boundaries."[3]

The VRE concept was largely developed in response to challenges that emerged from modern e-research projects, predominantly in fields such as the physical sciences, biological and health sciences, earth and environmental sciences and engineering studies. Disciplines such as these have often been documented to be highly interdisciplinary and data-intensive (Hey and Treffenden, 2003; Findholt, 2003; Borgman, 2007). Arguably, the needs to ensure distributed access to instrumentation and to organise vast quantities of research data are not as common in fields such as the humanities and the social sciences. When compared to the level of on-line support for research teams in the natural sciences, the number of VREs in the humanities lags behind dramatically.[4] The observation that academic collaboration appears to have a lesser urgency in the humanities may be explained in part by cultural differences. Humanistic research tends to focus on the development of ideas and on the interpretation of texts or other human artefacts, rather than on the discovery of facts. Consequently, scholars rarely use sophisticated digital instruments, and relatively simple applications, such as word processors or database programs, are usually sufficient. Borgman (2007) notes that, compared to other fields, the humanities "have the lowest rate of co-authorship and collaboration" (p. 219-220). Brockman (2001) found that "[c]irculation of drafts, presentation of papers at conferences, and sharing of citations and ideas" can add "a social and collegial dimension to the solitary activity of writing" (p. 11), but, as a result of the interpretative and relatively subjective nature of the research, results tend to remain centred around individual scholars. Davidson (1999) even contends that "the humanistic ethos of individuality helps to breed disputation and disrespect as the preferred model of intellectual interchange" (p. 1).

Nevertheless, the notion of on-line collaboration is clearly gaining prominence within humanistic research. In the United Kingdom, the *Building a VRE for the Humanities* project was carried out with the explicit aim to "investigate and identify the

[3] <http://www.jisc.ac.uk/publications/programmerelated/2006/pub_vreroadmap.aspx>

[4] The *Science of Collaboratories* , which was funded by the American *National Science Foundation*, aimed to "provide the vocabulary, associated principles, and design methods for propagating and sustaining collaboraties across a wide range circumstances" (Olson et al, 2008). The database that was created to record the various collaboratories that were studied includes more than 200 entries, but only seven of these appear to be created for research projects in the humanities.

potential benefits of a VRE for the Humanities research community in general."[5] Similarly, De Moor et al. (2008) observe that research in the field of global and world history is only possible on the basis of large databases that cover information on the entire globe. To arrive at such large hubs of data, "new methods of data sharing and scholarly communication need to be designed" (p. 68). Primary and secondary sources in the humanities mostly consist of physical objects produced by human beings or of academic writings which interpret these objects or which place these in a certain context. Relevant resources are often held by cultural heritage institutions such as libraries, archives and museums, and these institutions increasingly recognise that the large-scale digitisation of their collections is vital in order to stimulate the further development of e-scholarship. Due to on-line resources such as those created by *Europeana*,[6] *Project Gutenberg*[7] and the Dutch *Metamorfoze* programme,[8] the vision of data-rich science enabling researchers to perform larger and more comprehensive studies appears to be materialising more and more in the humanities disciplines as well.

This article presents the results of a project which was carried out in 2009 at Leiden University Library in the Netherlands, in close co-operation with the Dutch National Library in The Hague. The project was funded by SURF Foundation, an organisation which, through its SURFshare programme, supports new developments in the field of academic communication. The objective in this project was to set up a VRE for a group of historians, based at Leiden University, who collaborate in a research programme that is called *Tales of the Revolt: Memory, oblivion and identity in the Low Countries, 1566-1700*. The project explores how personal and public memories of the Dutch Revolt in the seventeenth century evolved and interacted to create new political and cultural identities for the societies that eventually were to become the kingdoms of the Netherlands and Belgium. The observation that certain research questions are too complex to be addressed by a single researcher is naturally as compelling in the humanities as it is in other fields, and the *Tales of the Revolt* project is a case in point. One of the central objectives in the study is to document the multimedia culture through which memories of the Dutch Revolt were communicated, deployed, and transmitted to new generations. For this purpose the team has to identify and describe a large number and variety of material and textual data. Memories were transmitted in printed books, in

[5] < http://www.jisc.ac.uk/whatwedo/programmes/vre1/bvreh.aspx>
[6] <http://www.europeana.eu/portal/>
[7] <http://www.gutenberg.org/wiki/Main_Page>
[8] < http://www.metamorfoze.nl/>

manuscripts and legal documents, and in materials such as prints, drawings and paintings, as well as gablestones and epitaphs. The relevant materials are scattered across libraries, museums and archival institutions throughout Europe. This complicated type of investigation could not possibly be carried out by a solitary researcher, and, for this reason, a research team was formed. Since it was anticipated that, in the course of the study, multiple researchers were collectively going to create a large database, and that many digital documents, originating at different locations, needed to be shared among all team members, online support was deemed necessary.

When compared with some of the other research project which are described in the scholarly literature on VREs, it can be seen that the *Tales of the Revolt* project has a number of characteristics which clearly set it apart. Most of the early VREs were created to attenuate the difficulties created by long-distance communication among large groups of geographically dispersed scholars (Olson and Olson, 2000). The *Tales of the Revolt* project, on the other hand, is carried out by a small group of five researchers who share offices in a single building. *Tales of the Revolt* is similar in some ways to the HubLab project, which is co-ordinated by the *International Institute for Social History*. In both projects, VREs are created to enable historians to collaborate during the creation of large databases. Nevertheless, the nature of the datasets that are produced differ widely. The researchers in the HubLab project mostly collect quantitative data on prices and wages in order to trace the economical developments of countries and continents (Kok, 2008). The database in *Tales of the Revolt* is used primarily to structure the team's research annotations. Records consist of brief bibliographical descriptions of the various primary and secondary resources, but, vitally, each record also contains free text fields in which researchers write brief summaries, copy important quotations, or record some of the ideas that emerged from studying the resources. These annotations are essentially qualitative and interpretative in nature, and are certainly not structured according to a predefined format. These dissimilarities also made the *Tales of the Revolt* project interesting, as it yielded an opportunity to investigate if the available recommendations for the development of VREs, which largely arose from other, more quantitative types of research, could also be confirmed by experiences with the *Tales of the Revolt* team.

One of the main initial challenges was to develop a clear insight into the needs of the researchers. Functional requirements were explored by means of interviews, a workshop, and many informal discussions. At the start of the project, an attempt was made to produce an abstracted description of the activities that would take place in the

course of the research. It was agreed that the various academic tasks can roughly be divided into four stages. A first stage was termed *data collection*. It consists of the identification, localisation and description of primary and secondary sources in cultural heritage institutes and on the internet. During a second stage, which was referred to as *analysis*, the various resources are consulted and synthesised. The work during this stage is largely governed by the research questions that had been formulated at the beginning of the study. During a third stage, the results of the analysis are laid down in a number of academic texts. The *authoring* phase is followed by the *publication* phase. Research results are to be disseminated via traditional channels, such as scholarly monographs or journal articles, and the results will also be presented during conferences. The research team also decided that a website needed to be built on which certain findings can be shared directly with other researchers. The process is evidently not static and strictly linear, since stages may take place in a different order or simultaneously.

A next step in the project was to find the technology that could best meet the demands of the research team. VREs can currently be implemented on the basis of a wide range of software products. Examples include Oracle Beehive,[9] Alfresco,[10] Drupal[11] and Microsoft SharePoint.[12] Some systems which were originally developed as virtual learning environments, such a Sakai[13] and Moodle,[14] also proved to be suitable as platforms for virtual research environments (Wusteman, 2008). A comparative technical analysis of Sakai, SharePoint and Alfresco, carried out as part of the HubLab project in 2008, demonstrated that these three systems largely provide very similar functionalities. A number of differences were found in the ease of installation and user-friendliness (Kok, 2008, pp. 14-16). In the *Tales of the Revolt* project, MS SharePoint was selected. In line with Voss and Proctor's (2009) advice to "provide interfaces that connect easily to what people are already using rather than forcing them to make changes in their existing work environment"(p. 185), the current SharePoint-based platform is largely integrated within the existing work environment of the researchers. When researchers log in at their office computers, they will also be authenticated automatically within the VRE. Users can also synchronise their personal calendars with the shared calendar in the VRE.

[9] <http://www.oracle.com/technology/products/beehive/index.html>
[10] <http://www.alfresco.com/>
[11] <http://drupal.org/>
[12] <http://office.microsoft.com/nl-nl/sharepointserver/default.aspx>
[13] <http://sakaiproject.org/>
[14] <http://moodle.org/>

In addition, a feature which appears to be unique to SharePoint is that the entire content of the VRE can be viewed in the Windows Explorer, alongside the files which are on the researcher's personal disks. On the basis of this functionality, users can upload and download documents relatively easily.

Platforms that facilitate collaborative work mostly offer a myriad of functionalities, ranging from data sharing tools and support for permission management to all sorts of social networking tools such as wikis, blogs and discussion forums. Finholt and Olson (1997) argue that VREs fundamentally offer three broad categories of applications. They consist of "technology to link people with people, technology to link people with information, and technology to link people with facilities". A very similar description of three core functionalities of VREs is found in Wulf (1993) who stresses that such platforms enable researchers to "interact[..] with colleagues, [to] access[…] instrumentation" and, thirdly, to share "data and computational resources" (p. 854). This threefold categorisation can also be used to describe the most important features of the *Tales of the Revolt* VRE. Firstly, the collaboratory connects the researchers to information. In a sense, the VRE functions as an on-line repository, in which collaborators can store and share the documents which are needed for their research. The ability to store documents online is highly important for the research team. Their study takes place on the basis of resources which can be found at museums, libraries and archives across Europe. When an institution is visited abroad, there is usually not enough time to fully study all the relevant objects at that particular location. Fortunately, cultural heritage institutions increasingly allow their visitors to photograph certain objects themselves, using a digital camera. When the images are uploaded to the VRE, researchers can then analyse these resources irrespective of their geographic location.

Secondly, collaboratories should also enable researchers to engage with these data. In other words, the possibility to store and to share resources should be augmented by a collaborative working environment in which researchers can collectively create knowledge about these resources. One of the most central components of the *Tales of the Revolt* VRE is a database in which team members can simultaneously describe and annotate their primary and secondary data. Whenever new sources with relevant memories are identified by one of the team members, this new source is added to the database, and a number of notes can be added which highlight its relevance or its relation to other sources. Other team member can view new additions and may comment on the new entry and add some notes of their own. In many cases, the annotations

consist of page-by-page descriptions of the work with numerous transcriptions of important text fragments. The shared database produces important advantages for the scholars. As research annotations can be organised in a single digital environment, this evidently saves them the trouble of having to manage individual administrations of research notes with the need to collate and integrate them periodically.

The *Tales of the Revolt VRE* also helps members of the research team to collaborate during the authoring stage. Firstly, all the documents that may be relevant during the writing process, such as bibliographies, or text files with brief notes and ideas, can be recorded in a separate document library. Users are also free to specify who is permitted to access this library, and can make sure that only those researchers who actually work on the article can open the documents in progress. Customising access rights includes the possibility to grant access to external researchers with a specific expertise on the publication's topic. A second way in which the VRE offers support for collaborative authoring is through its fairly advanced system for version management. Document libraries can be configured in such a way that when an author begins to edit a publication, the system automatically 'checks out' the document. This has the effect that the text can no longer be edited by other authors. When a new version of the publication is saved in the VRE, the data of the last update is recorded, together with the name of the user who had made the most recent modifications. The author is also prompted to comment on what has been changed. In addition, all versions of the publication can be saved and be given their own version number. Saving previous versions is vital, since some researchers had experienced that valuable ideas got lost when older versions were deleted.

Data sharing and data editing facilities would hardly be of value if researchers and scholars were not given the simultaneous opportunity to discuss these resources. Bos et al. (2007) emphasise that a VRE ideally "supports rich and recurring human interaction oriented to a common research area, and fosters contact between researchers who are both known and unknown to each other." Such "technologies to link people to people" are clearly essential. Users must be able to meet online, to exchange ideas, and to start discussions with colleagues. The *Tales of the Revolt* VRE provides discussion lists, web logs, instant messaging tools, and discussion forums. The VRE activity log indicates that the researchers all use these online communication tools on a very frequent basis. In addition, applications such as to-do lists and shared calendars can be used to ensure that all researchers know which tasks they are expected to carry out, and what other team

members are doing. Such project management tools help collaborators to relate their individual work to the overall goals of the team. To make sure that users do not miss important activities on the VRE, it can also be specified that e-mails are sent whenever changes take place in one of the sections of VRE.

During the interviews that were organised in an initial phase of the project, the research team had indicated that they did not only want to use the VRE to organise the internal communication of the team. They also intended to use the platform to share the project's results with colleagues at other institutions, and to experiment with new modes of electronic publication. The VRE is mostly a closed environment which only the members of the *Tales of the Revolt* team and a limited number of external researchers can access. Nevertheless, a specific section of the environment has been opened up entirely, and this unrestricted part currently functions as a public website. On these web pages, scholars can present themselves and their research activities. They can also make announcements or post preliminary results. An important advantage of implementing the research project's public website as part of the VRE is that the research group itself is fully responsible for the site's content. Evidently, there is a limit to what the research team is willing to share online. Researchers who focus on related questions will clearly be interested in consulting the sizable bibliographical database that is being compiled by the *Tales of the Revolt* team. Nevertheless, the database also contains research annotations which cannot be made available before the ideas that are expressed in them are consolidated in a formal publication. Managing the project's website also requires a very careful consideration of which information can be shared with whom, and under what circumstances.

The main objective of the *Tales of the Revolt* project was to implement a VRE that can support the scholarly workflow. An ancillary aim was to investigate the manner in which a VRE can facilitate the communication between researchers on the one hand, and academic libraries on the other. The Dutch National Library and Leiden University Library together own a substantial section of the research project's primary materials. For these libraries, the experiments with web-based collaboration platforms are interesting, since they provide an opportunity to explore an entirely new class of services towards researchers. The high-level description of the information lifecycle developed at an early stage of the project resulted in a model that distinguished four core activities: data collection, analysis, authoring and publication. The abstracted description of the workflow also enabled the participating libraries to probe the novel forms of support that

could be realised through a VRE. Traditionally, libraries have focused on the curation of physical and digital collections and the provision of access to their holdings. From the researcher's perspective, these tasks mostly have relevance during the data collection stage. In recent years, many academic libraries have broadened the range of their activities by setting up institutional repositories in order to archive scientific and scholarly publications. When libraries facilitate platforms for collaborative research, this enables them to extend the level of their support even further, and to claim a more active role in the full scholarly information cycle. Some of the ways in which libraries may directly facilitate the creation and dissemination of knowledge have already been mentioned. Through VREs, libraries can help researchers to organise their primary and secondary sources, they can offer advanced facilities for co-authoring texts, and they can support researchers to share some of their intermediate results with a wider audience. During a series of interviews and workshops, a number of additional library services were proposed. The bibliographic database which is compiled by the research team may be linked to the institution's digital library, which, in many cases, can provide full text access to the resources which have been identified. If subject librarians manage to characterise the nature of the research of the *Tales of the Revolt* team on the basis of a well-considered combination of subject terms, such a research profile could then be used to develop highly specialised information services. One example of such an advanced service could be a recommender engine which can generate a relevant selection of recently published monographs and journal articles.

De Moor et al. (2008) emphasise that environments which are created to support scholarly work almost inevitably have a temporary character (p. 6). This is also the case for the *Tales of the Revolt* VRE. The research project will run for a period of five years, and, most likely, when the research team is dismissed, the VRE will also be dismantled. At that stage, a decision must be taken about which components of the VRE must be preserved and why. The destination of the working papers, articles, dissertations and monographs should be clear. They can be published, or archived in Leiden University's institutional repository. Nevertheless, at the end of the research project, the VRE will also contain a vast array of other sources, such as research annotations, bibliographies, scholarly discussions, and older versions of publications. The researchers have indicated that their data collection should ideally be preserved after the conclusion of the research project, since it is very likely that the dataset can be re-used and that they can inspire new publications in future projects. A growing number of institutions have recognised

that there is a need for the stewardship of digital research data and have taken efforts to implement dedicated data archives.[15] Once the shared database of the *Tales of the Revolt* team has reached a certain definitive state, efforts will be taken to ensure that the dataset can be migrated to a trusted digital repository, so that the researchers can continue to use the data outside of the VRE in which they were originally created.

When research data have been archived digitally, this also creates the possibility to incorporate them into a so-called enhanced publication. This term is used by Woutersen et al. to refer to a "publication that is enhanced with research data as evidence of the research, extra materials to illustrate or to clarify or post-publication data like commentaries and ranking" (p. 79). By making use of enhanced publication technology, the final products of the scholarly process, such as articles of dissertations, can be published in conjunction with resources that have been produced at earlier stages, such as databases, images or metadata records. Such enhanced publications enable peers to replicate and, thus, to verify the claims that are made in scientific publications. Enhanced publications largely emerged from the need to visualise the lineage of the various products of the scholarly cycle, and to trace the historical development of e-research projects. Interesting examples of enhanced publications can be found in the *Journal of Archaeology in the Low Countries*,[16] which is published by Amsterdam University Press. The articles in this open access journal are often linked directly to the datasets, the images and the GIS data that have been used during the research. VREs are usually created to support the entire scholarly lifecycle, and, for this reason, they often contain all the resources which are needed to generate such enhanced publications. When the scholars in the *Tales of the Revolt* project co-author articles, they usually create separate document libraries in which all the resources that are relevant for the article are brought together. It would be interesting to investigate if such document libraries, in whole or in part, could be made available as enhanced publications. Instead of simply producing a single text, in which information from the various supporting materials has been synthesised, enhanced publication allow researchers to provide

[15] Examples of data repositories include eCrystals (<http://ecrystals.chem.soton.ac.uk/>), a digital archive created by the Southampton Chemical Crystallography Group and EPSRC UK National Crystallography Service, and EDNA (<http://www.edna.nl/>), an e-Depot for archaeological data hosted by Data Archiving and Networking Servioces (DANS) in the Netherlands. A notable initiative is also the Dataverse Network project. This environment, which is managed at Harvard University, offers "a complete open-source, digital library system for the management, dissemination, exchange, and citation of virtual collections of quantitative data" (<http://thedata.org/>).

[16] <http://www.jalc.nl/>

layered digital objects in which potentially the full breadth of the resources that have been consumed or produced can be made available.

Today's e-information landscape clearly poses a plethora of new challenges. Scholars often face unprecedented amounts of digital information, and, in addition, there is currently a wide range of novel ways in which researchers can share the final and provisional results with their peers. VREs have been developed to provide research projects with the technical underpinnings needed to shoulder such challenges. The VRE concept is still relatively new, and both scientists and librarians are exploring their potential and the factors that contribute to their successful implementation. In general, some considerable investments are required to implement an infrastructure for collaborative scientific work, but those investments can be justified if a VRE is appreciated and widely used by researchers, and, ultimately, if they can also help to enhance the frequency and the quality of academic discoveries. VREs had already proven to be valuable for large multi-disciplinary and data-rich e-research project in the natural sciences. Experiences with the *Tales of the Revolt* project have indicated that VRE technology can also yield clear advantages and new opportunities for smaller groups of collaborators engaged in qualitative historical research.

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