

Graspeo: a Social Media Platform for Knowledge Management in NGOs

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ABSTRACT

Timely access to critical information is crucial for any organization operating in situations of emergency. Deploying an adequate information system tailored to specific organizational needs and matched to the organizational structure is essential. To understand the knowledge management needs of Médecins Sans Frontières, one of the leading NGOs in the humanitarian and medical fields, we conducted in total 145 hours of in-depth interviews. This paper presents three identified key requirements for an effective knowledge management system specifically designed for large distributed NGOs, like MSF. Additionally, we introduce a novel social media called Graspeo designed and built from ground up to fulfill these requirements.

Categories and Subject Descriptors

H.4 [Information Systems Applications]: Miscellaneous;
D.2.1 [Software Engineering]: Requirements/Specifications

General Terms

Design, Human factors, Management

Keywords

NGO, MSF, Information System, Knowledge Management, User management, Requirements, Social Media, Graspeo

1. INTRODUCTION

Knowledge is often regarded as one of the most important resources available in non-governmental organizations (NGOs) [6]. Hence, NGOs need to be able to timely and reliably access critical knowledge and build and share knowl-

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edge efficiently between different, often geographically dispersed, teams. Médecins Sans Frontières (MSF)¹ or Doctors Without Borders was created in 1971 and is one of the leading NGOs in the humanitarian and medical field delivering emergency medical aid quickly, effectively and impartially. MSF employs over 33'000 staff worldwide and has an organizational governance structure with 24 headquarters and an operationally driven structure with 70 missions coordinating over 325 projects. The complex structure of MSF brings to the surface challenges related to distributed large scale knowledge management (KM).

Improving KM was identified as one of the strategic objectives of MSF for 2012-2015. To achieve this objective, MSF aims to connect experts inside and outside of the organization with knowledge relevant to the situations that MSF deals with. Such knowledge sharing is often found in NGOs to involve outside stakeholders, for example through blogs and video sharing platforms [5]. Hence, public social media use by NGO employees is growing, while deployment of social media inside of organizations is still in its early stage [9]. Matschke et al. [6] argue that an adequate KM system for NGOs should rely on social media, since NGOs and social media have similar characteristics, such as voluntariness, participation, personal relevance and non-formalization.

Recognizing the importance of social media, MSF had an open call to find a suitable social media for their KM needs. To better understand specific KM requirements, we conducted an in-depth study consisting of a total of 145 hours of interviews in Geneva (20 hours), Niger (100 hours) and Swaziland (25 hours) between June and August 2013.

This paper is structured as follows. Based on the study mentioned above and participatory design, Section 2 identifies the key requirements for an effective KM system specifically designed for large distributed NGOs, like Médecins Sans Frontières. Considering these requirements, Section 3 reviews existing related knowledge management systems. Afterwards, Section 4 describes in details a novel social media called Graspeo, which was designed and built from ground up to satisfy the identified requirements. Finally, Section 5 wraps up with conclusions and future work.

¹MSF, <http://www.msf.org>

2. REQUIREMENTS

MSF relies on a total of 35 different web repositories and content management systems. This infrastructure fragmentation makes it hard to find relevant documents when needed. An internal audit estimated that an equivalent of two hours a day per person is wasted searching for information. Additionally, the permissions management is done in a centralized way, which introduces considerable waiting times for hierarchy decisions. Since most communication is still done through email, all this results in a chronic emails overload. Based on the extensive interviews with MSF employees, the ideal KM platform should address the described issues by fulfilling the following three key requirements.

Req 1 – Source-Agnostic Knowledge Aggregation: The system should support integration and management of knowledge coming from heterogeneous sources in multiple formats, including uploaded files, web content, as well as from existing KM systems. Additionally, it should support social interaction (e.g. discussions), which are often used as means of knowledge sharing. Implementing this requirement allows to have all relevant knowledge in one place preventing fragmentation.

Req 2 – Flat Knowledge Organization: MSF, as many NGOs, has a flat organizational structure, which should be reflected in the KM system itself [6]. In particular, the content and permissions management should be decentralized (delegated locally to users). Being able to share knowledge with the right audience is key in providing adequate motivation and balance between right for privacy and prestige of exposure [6]. Implementing this requirement addresses the issue of centralized hierarchy bottlenecks.

Req 3 – Online and Offline Knowledge Access: When Internet connection is available, knowledge should be accessible online without installation effort. It has to be retrieved easily through a coherent structure and powerful search. Given the limited Internet connection in many areas where MSF operates, the knowledge should be accessible in the offline mode. This requirement addresses the findability issue and enables the knowledge access both online and offline.

3. RELATED WORK

Several mainstream cloud services exist that blend social media and content management features, which could potentially fit the listed requirements. Due to the limited space, here we review some of the popular platforms often found in organizations, namely *DropBox*², *Google Drive*³, *Yammer*⁴ and *Confluence*⁵. The research literature has also addressed the issue of knowledge sharing inside and between remote local communities. One of the potential candidates for NGO KM systems is Kwaabana. *Kwaabana* [4] targets local communities, and provides a full content management system based on *OwnCloud*⁶ with some social media features. This list is by no means complete but allows to give an overview of the landscape. Below we briefly discuss how each of the mentioned systems matches the identified requirements.

Req 1 – Source-Agnostic Knowledge Aggregation: Most solutions (Dropbox, Google Drive and Kwaabana) allow up-

²<https://www.dropbox.com>

³<https://drive.google.com>

⁴<https://www.yammer.com>

⁵<https://www.atlassian.com/software/confluence>

⁶<https://owncloud.org>

loading various file formats, but they do not provide dedicated facilities for web links and adding apps. Only Yammer and Confluence allow file upload as well as sharing of links.

Req 2 – Flat Knowledge Organization: This requirement is rarely met in existing platforms. For instance, in Drive, Dropbox, Yammer and Kwaabana, there can be only one owner per file or folder. Confluence provides centralized user management for administrators who can configure user rights in detail. The administrators can also grant right to Confluence users to create and manage spaces on their own and thus support decentralized management to some level.

Req 3 – Online and Offline Knowledge Access: Dropbox and Drive allow to view files online and to sync them to a local device to have them accessible offline. Confluence and Yammer do not support offline access out-of-the-box. Most of the services are hosted in the cloud hence are not accessible when the Internet connection is not available. Kwaabana allows working with a locally deployed server when the Internet is cut off, but standalone usage is not supported.

Our analysis shows that the considered platforms meet some of the requirements, but none of them covers all. From this analysis we decided to design and develop the Graspeo platform implementing all three key requirements.

4. GRASPEO

*Graspeo*⁷ is a social media web platform that was designed and developed from the ground up based on the previously elicited requirements, the user interface is presented in Figure 1. Its main concepts were inspired by Graasp, a platform used to support collaboration in online learning communities [1] [3]. Learning communities and NGOs share many KM needs, for instance it is typical to collect information in groups from different sources and disseminate it to others [2].

4.1 Req 1 – Source-Agnostic Knowledge Aggregation

Adding content to Graspeo can be done simply by dragging and dropping files and folders from the desktop into Graspeo running in the browser. Graspeo supports all major types of files including PDF and Microsoft Office documents, video and audio files. In addition, Graspeo facilitates aggregation of web resources (e.g. text, pictures or videos) by simply providing a web link. If the web page content can be recognized (e.g. a YouTube video or a SlideShare presentation), Graspeo will create a resource with the embedded content. If the content of the page cannot be extracted, Graspeo will just create a screenshot of the page. Graspeo supports contextual discussions over each uploaded file or each added web content. This all contributes to having all relevant knowledge in a single platform.

4.2 Req 2 – Flat Knowledge Organization

Graspeo supports decentralized content and permission management by using hierarchical spaces with flat membership.

Spaces. A space is the central concept in Graspeo that encapsulates the context of a knowledge sharing. A space in Graspeo can be loosely compared to a folder with associated permissions. Formally, let s denote a space. Graspeo consists of a set of spaces $\{s_1, \dots, s_n\}$ organized in trees, where every space can have a set of sub-spaces. We say $s' < s$ if s'

⁷<https://graspeo.org/>

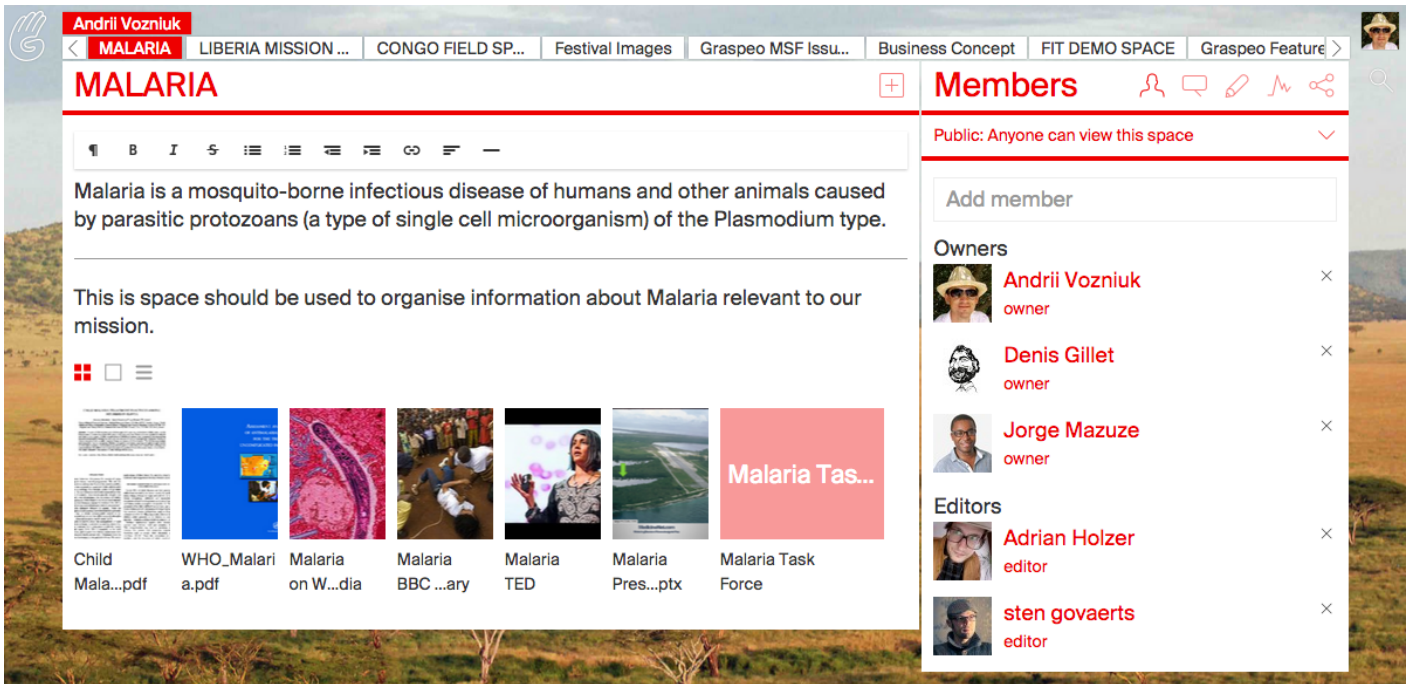


Figure 1: Screenshot of the Malaria space in Graspeo

is part of the sub tree where s is the root. We use the family tree metaphor and say that s' is a descendant space of s and that s is an ancestor space of s' . If there is no space s'' such that $s' < s'' < s$ then s' is called the child of s and s is the parent of s' . The space content includes a *description*, and a set of *items*. The space information includes a set of *members* with *permissions*, associated *discussion* threads and a list of *settings* (e.g. the background image) and *activities*. Each space can be shared with others, either by making it *public* and accessible to anyone on the Web, or by keeping the space *private* accessible to only the space members.

Each space s acts as a container for *items*. Let i denote an item. All items $\{i_1, \dots, i_n\}$ that are children of s are said to be located in s . Items can be of four main types: (1) spaces, (2) resources (coming from the local disk and the cloud), (3) applications (e.g. OpenSocial gadgets) and (4) alias items providing dynamic links to other items. This is illustrated in Figure 1, which shows an example of the usage of Graspeo. It shows a public space called MALARIA that was created by Jorge Mazuze, a knowledge manager in MSF, to share knowledge about malaria. The MALARIA space is populated with two PDF files, three videos and a PowerPoint presentation, all presenting malaria research, and the private 'Malaria Task Force' sub-space created by Jorge for his malaria expert task force.

Members. Each space has a set of members. Let m denote a member. Let $M(s)$ denote the function to get all members $\{m_1, \dots, m_n\}$ of s . Each member of a space has a defined permission in this space. Let p denote a permission from the set of permissions $\{\text{owner}, \text{editor}, \text{viewer}\}$, where owners have more rights than editors, which have more rights than viewers (i.e., $\text{owner} > \text{editor} > \text{viewer}$). In Figure 1, the MALARIA space contains five individual members: three co-owners and two editors.

Graspeo allows flat space ownership so that a space can be

co-owned by several members permitting decentralized permission management. However, in order to provide owners with complete control of their subspaces we force an owner of a space to also be an owner of all its descendants. This rule implies that an owner of a top-level space will be an owner of every descendant space and can thus remove unwarranted members or items on any level.

4.3 Req 3 – Online and Offline Knowledge Access

Graspeo architecture, illustrated in Figure 2, was built to provide an easy access to knowledge both online and offline. The architecture consists of three main parts: (1) the Online System, (2) the Offline System and (3) the Peer-to-Peer (p2p) Synchronization Middleware.

Online System. The Graspeo online system is a single page web application using JavaScript end-to-end [7]. As such, it is composed of the front-end part, running in a browser and the back-end part installed on a server. The front-end is developed with the AngularJS⁸ framework that allows to minimize the data sent to the clients since only templates are exchanged instead of complete HTML pages. This saves bandwidth and decreases latency leading to a more responsive web page in places with low bandwidth. On the back-end, a Node.js⁹ server is handling the business logic and the data is persisted in a MongoDB¹⁰ database.

Offline System. The online content of Graspeo can be synchronized on a user's file system using a peer-to-peer middleware presented below. Typically each space will be mapped and synchronized to a folder on the user's device. When the Internet is unavailable, Graspeo users have two options: (1)

⁸<https://angularjs.org/>

⁹<http://nodejs.org/>

¹⁰<http://www.mongodb.org/>

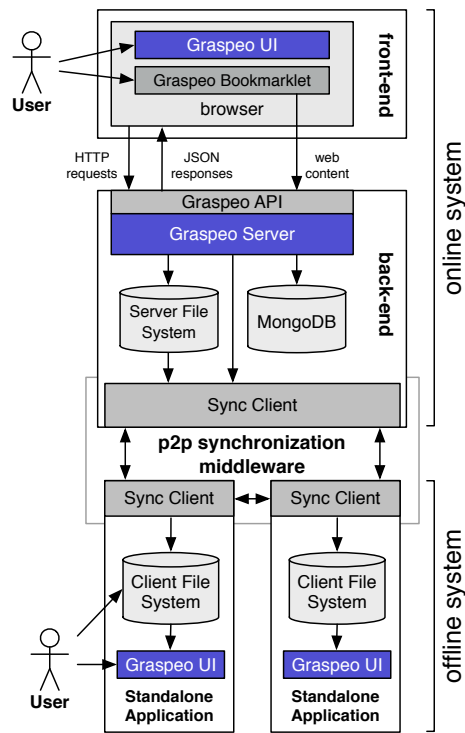


Figure 2: The Graspco Architecture

they can still access their content on their local hard drive or (2) they can interact with the platform in an offline mode using the standalone Graspco application (currently under development). The standalone application allows users to access their data offline through a UI, which mimics the look and feel and part of the functionality of the online Graspco, including the ability to view spaces, resources, discussions and ratings.

Peer-to-Peer Synchronization. In order to synchronize offline and online content, we rely on BitTorrent Sync¹¹ (also known as Sync), a peer-to-peer data synchronization framework developed by BitTorrent. For this purpose each space has an associated secret Sync key. Thanks to the local peer discovery protocol, Sync is able to find local peers and synchronize directly with them potentially benefiting from a faster local network. The data does not need to go through a central remote server, like it is done in most of the platforms presented in Section 3. This allows to still perform local data exchange in cases when the central server is not reachable and eventually synchronize with it when it becomes available again. In the future, Sync may also potentially be replaced by an open-source alternative such as Hive2Hive¹² or Syncthing¹³.

5. CONCLUSION

Designing adequate KM systems for a large distributed NGO like MSF is a challenging endeavor. From participatory design exercises, we have derived the following three key

¹¹<http://www.bittorrent.com/sync>

¹²<http://hive2hive.com/>

¹³<http://syncthing.net/>

requirements for KM systems for NGOs: (1) source-agnostic knowledge aggregation from wherever the knowledge resides, (2) flat knowledge organization eliminating decision bottlenecks and (3) easy online and offline knowledge access. With these requirements in mind, we have presented Graspco, a social media platform for NGOs. Currently, MSF is running a pilot with 150 employees using the first Graspco implementation.

In theory providing an adequate KM system can reduce the email overload and positively affect the organization's operational performance. But in practice it is still not clear if using social media within organizations offers actual measurable benefits. We want to investigate this question in future research implementing activity analytics dashboards [8] based on the Graspco activity logs we record. From the logs we also want to get a clearer picture of the importance of each requirement and potentially refine them.

Working closely with MSF allowed us to deeply understand specific KM processes and issues with existing KM systems. However, a limitation is that these requirements are based on the needs of a single organization. Nevertheless, since MSF is a large and distributed NGO that has many similar characteristics of other NGOs, Graspco can be deployed and is useful for more NGOs. We want to validate our requirements with other NGOs and expand the Graspco usage to such organizations. One option, we consider, is to open source the platform to foster broader adoption and trust.

6. REFERENCES

- [1] E. Bogdanov et al. Graaasp: a web 2.0 research platform for contextual recommendation with aggregated data. New York, USA, 2010. ACM Press.
- [2] D. Gillet and E. Bogdanov. Cloud-savvy contextual spaces as agile personal learning environments or informal knowledge management solutions. In *ITHEE'13*, pages 1–6. IEEE, 2013.
- [3] D. Gillet et al. Personal Learning Environments in a Global Higher Engineering Education Web 2.0 realm. In *proceedings of the 1st IEEE Education Engineering Conference*, pages 897 – 906. IEEE, 2010.
- [4] D. Johnson et al. Kwaabana: File sharing for rural networks. In *ACM DEV'13*, page 4, 2013.
- [5] N. Kruger, L. Dang-Xuan, A. Schneider, and S. Stieglitz. Usage of social media for external stakeholder relationship management—a study of german companies and international non-government organizations. In *WAINA'13*, pages 1479–1482, 2013.
- [6] C. Matschke, J. Moskaliuk, and U. Cress. Knowledge exchange using web 2.0 technologies in NGOs. *Journal of Knowledge Management*, 16(1):159–176, 2012.
- [7] M. Mikowski and J. Powell. *Single Page Web Applications: JavaScript end-to-end*. Manning Publications, 2013.
- [8] A. Vozniuk, S. Govaerts, and D. Gillet. Towards portable learning analytics dashboards. In *International Conference on Advanced Learning Technologies*, 2013.
- [9] H. Zhang, M. De Choudhury, and J. Grudin. Creepy but inevitable?: the evolution of social networking. In *ACM CSCW'14*, pages 368–378, 2014.