

# What is PharmoWeb?

## Multiple Levels of Inquiry in a Knowledge System

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**Abstract.** This paper presents an empirical exploration of intranet technology in use in the departments and development projects of a multinational pharmaceutical company. The term knowledge system has been selected in order to grasp intranet technology as part of a practice rather than an application predefined in technical terms. Technologies, activities and people together constitute a sociotechnical knowledge system and have as such been investigated through interviews, document analysis, and observations. The purpose of the paper is to present the empirical material along with an analytical exploration of „what PharmoWeb is“. The paper discusses four levels of inquiry, identified as; (1) appearance, (2) descriptions and visions of what PharmoWeb can do, (3) configuration and material set-up, and (4) use in practice. In conclusion we argue that these levels together constitute „what PharmoWeb is“ and must be taken into consideration to adequately appreciate PharmoWeb's multiplicity and flexibility.

## 1 An Empirical Exploration of a Knowledge System

Within the departments and development projects of Pharmo, a multinational pharmaceutical company, a technology called PharmoWeb is utilized as a part of the corporate intranet (all names have been changed). We have studied these

departments and projects, and their use of PharmoWeb, guided by the term knowledge system in order to grasp this technology as part of practice, rather than an application predefined in technical terms. This implies that technical aspects of PharmoWeb are seen as an integral part of a larger whole, such as the work practices of Pharmo departments and projects and related infrastructure (Bowker & Star, 1999:35). Knowledge systems are thus sociotechnical systems in which technologies, actions and people are formed through the relations they engage in. The knowledge system PharmoWeb is thus constituted by an integration of heterogeneous elements, where technology is just one part among other social and conceptual aspects.

Knowledge is likewise understood as part of practice and as an integrated aspect of what makes people or groups of people able to undertake their jobs and carry out the work of developing, producing and marketing new pharmaceutical products. The firm Pharmo, its various departments, or a specific project is approached as a distributed knowledge system where “knowledge” is emergent and deeply integrated in the local practices and technologies. Knowledge is recreated constantly in practice when normative expectations, dispositions and local contexts are confronted (Tsoukas 1996). No one person can know everything nor foresee what knowledge will be needed in advance, rendering the knowledge system by definition decentralized and lacking a central locus of control (Tsoukas, 1996:22). We thus assume that the knowledge of the knowledge system is distributed throughout not only “people’s heads” but also in existing routines, infrastructures and of course PharmoWebs.

## 1.1 Ordering findings through four levels of inquiry

The main aim of the empirical study has been to explore this complex array of elements that constitute knowledge systems and thus form part of „what PharmoWeb is“. Different levels of inquiry have emerged as a result of the empirical study and are discussed as an analytical ordering of the striking differences in use and the multiplicity of descriptions and definitions of PharmoWeb we met in Pharmo. In order to probe this flexibility and multiplicity we have thus found it useful to distinguish between four overall levels of inquiry. These have been identified as; (1) appearance, (2) descriptions and visions of what PharmoWeb can do, (3) configuration and material set-up, and (4) use in practice. The levels of inquiry answer the four questions: What does PharmoWeb look like? What can PharmoWeb do? How does PharmoWeb do what it does? And lastly, how is PharmoWeb used in practice? Following a brief section on methodology, the paper presents answers to these four questions and thereafter concludes with a discussion of the relations between such levels of inquiry. The paper argues that these levels together constitute „what PharmoWeb is“ and must be taken into consideration to adequately appreciate PharmoWeb’s multiplicity and flexibility.

## 1.2 Methodology

The study is based on interviews and observations of various Pharmo employees such as project assistants, project members, and the IT developers of the application in question. Furthermore, we have analyzed a user manual, presentation slides about the application, statistics on use and have ourselves examined the application. In the interviews and observations we focused on descriptions and every day uses of the application in the organization, what type of work tasks and interactions the application was relevant to, what effects it had on the collaboration of the overall project group. In the analysis of our material we have described different forms of use and tried to categorize them as well as providing descriptions of the elements that constitute this particular use practice. The levels discussed thus emerged from our joint data analysis. Our initial investigations was, however, inspired by the three concepts: 'coordination mechanisms' (Schmidt & Simone 1996), 'intranet islands of practice' (Lamb & Davidson, 2000) and 'technologies-in-use' (Orlikowski 2000). In addition, the ideas on multiplicity draw on the technology study on Bush Pumps in Zimbabwe (de Laet and Mol 2000). We have found their depiction of an adaptable and flexible technology extremely valuable for thinking about the PharmoWeb application. Similar to the water pump, PharmoWeb as an application cannot be ascribed a stable identity and is perhaps more adequately approached as a multiple object that in time embodies and incorporates parts of its surroundings (de Laet and Mol 2000:252).

## 2 What does PharmoWeb look like?

At the first level of inquiry we examine what PharmoWeb looks like. Surfing around the application it resembles the interface of an ordinary Web page shown through a browser (see fig. 1 below). At the top of the page is a colored bar, with the title and logo of the project on the left. Underneath is a banner divided in a number of categories with each heading indicating the various layers, pages and features available. The example below show 12 banner categories; *Home*, *Status*, *Procedures*, *Practicalities*, *Organization*, *People*, *Task Forces*, *Fun!*, *Documents*, *Tools*, *Admin.*, and *Help*. When clicked upon the first category *Home* brings forth recent news and events published by project members. Likewise, *Status* refers to ongoing projects, *Procedures* to guidelines and manuals for project work, and so on. *Documents* is the most frequently used category since this is where meeting minutes, new project proposals, presentation templates, and ongoing work documents may be uploaded, shared and archived. Under this section layers of index categories can be found and dug into. On an upload documents page, found under the *Documents* section, there is a small window for restricting the access to a document as well as indexing it. *Tools* provides a section with yellow pages with phone numbers and locations of all project members and an option for

receiving personalized email notification of changes that have been made. The index *Admin* allows a “system administrator” to give or restrict access to new members, add index categories i. e. under the *Documents* section. Here you can also alter the appearance of the Web pages by selecting various color combinations or adding graphics to the top banner as seen in fig. 1.



Fig. 1. Screenshot of the PharmoWeb of the IT department.

When inquiring about the invisible parts, what is behind these pages, the main developer of the PharmoWeb, Gareth, explains that the underlying application of the first two versions were build in ASP. The building blocks for the pages of PharmoWeb were stored in a central database and put together by the server, when requests from the users client application, a web browser, came through. For version three of PharmoWeb the entire application was, however, rewritten in another programming language. An object oriented programming approach was selected in order to have more users be able to access the application at once, which was problematic in the first versions. Furthermore, Gareth adds that developers may continually change single features and add new parts to the application without having to rewrite the entire application.

The code and structure behind the application were thus entirely changed from version 2 to 3 although only the changes to interface and functionalities can be viewed as more incremental. According to Gareth this was a deliberate attempt to make the application “the same” for the project members and assistants that do not see or deal with the underlying code. So what does PharmoWeb look like? To us, and most of its users it looks like a set of flexible web pages and somewhat self-explanatory functionalities.

### 3 What can PharmoWeb do?

At the second level of inquiry we look at descriptions and visions of what PharmoWeb can do. As a set of Web pages and underlying functionalities,

PharmoWeb is an application that is easy to access and use regardless of geographical location. In a discussion of what PharmoWeb can do, three central visions were found among our interviewees. These are discussed as visions of shared space, group identity, and knowledge re-use.

### 3.1 Space and identity for distributed projects

During our study PharmoWeb was described as a „meeting point” or place joining a dispersed group, that transcends the long time span of a development project and its geographical distribution. As a shared space PharmoWeb provides a common life story of a project through the different documents that are saved and can be retrieved. The main developer of the application, Gareth explains this as the overall idea behind PharmoWeb:

“It was not different in the beginning, it was a meeting point for a project. Not just geographically, but also so that everyone could follow – when a project starts over in the research lab and they have they research results, in they go. (...) Those where the kind of thoughts we had about it then, and those are the things we could hear that they needed.”

He adds that this image has remained the same even though new versions of the application have been produced. The features that allow users with administration rights, to change the colors and categories of the set up plays an important part in “personalizing” the pages for the individual project or department. This ensures that people at once know that they are “inside” Pharmo. It allows them to shift between projects and departments without having to adjust to an entirely new way of organizing and presenting information, yet as project members shift they can distinguish and remain aware of the specific project „space” they are in. An employee of the IT department, Phil, emphasizes this:

”It is really useful if you are involved in a project, have to move projects or to close a project in order to start up a new project then you all ready know how this part of the intranet functions. It is some of the same things around you. Maybe there are different colors, or even a new logo but otherwise it is the same you see.”

In this way the application invokes images of an easy-to-enter space for distributed project work, a space that is delimited from that of other project spaces.

### 3.2 Group identity and cohesion

Apart from being Web pages through which documents and information may be stored and retrieved, PharmoWeb thus also contributes to creating a sense of cohesion in the project, which from other points of view might appear fragmented. By carving out the PharmoWeb with an omnipresent project name

and furnishing it with recognizable elements, such as the logo and particular colors belonging to the project, it also creates what a project assistant Janet calls a 'shared project identity'. It denotes the sense of belonging the project members feel, when using PharmoWeb. Phil speaks of the department web in terms of "community" and Eric, who is a member of a development project in the core-group, speaks of "our place" and "project spirit":

"... It [PharmoWeb] provides some or other form of corporate culture that you are able to say it is our place, it is in common, nobody else has access. We can go in there, and know what is the name, go in and change and put new stuff up. It is very much the project spirit, that this thing provides."

According to Janet, Phil and Eric, PharmoWeb enacts something more than Web pages with information. Images of identity, community and spirit are thus also brought forth to explain what PharmoWeb can do.

### 3.3 Knowledge re-use

Lastly, the benefits of PharmoWeb seem to extend beyond the individual project groups. Development projects often progress in "generations", where similar projects follow one another, another area where PharmoWeb can provide a crucial infrastructure for sharing and re-using knowledge across projects. Eric, for example, explains PharmoWeb as "a base" for future projects and emphasizes the transition enabling properties of PharmoWeb and the significant gains in being able to re-use knowledge between projects:

"We certainly do not consider such a PharmoWeb as something that emerges during a project and then afterwards it is closed down again. Not at all. It is in fact this whole PharmoWeb that is going to be made a copy of in our next generation of 'device'. It is really the whole base for the next development project."

PharmoWeb thus also reaches beyond the individual projects that they are a part of. They constitute a broader knowledge base or repository and seem to invoke images of "a knowledge base" or "organizational memory" that encompasses individual project members or the projects as such.

According to the descriptions and visions of our interviewees, PharmoWeb thus provides a shared space for storing and sharing information, group identity for geographically and professionally dispersed project members, and lastly an infrastructure for knowledge re-use across projects and departments.

## 4 How does PharmoWeb do what it does?

The third level of analysis is exemplified in the following as two different instantiations of PharmoWeb. The structure of a PharmoWeb in use is made up

in part by the project assistants, such as Janet and Paula using the facilities mentioned in section 2. They decide the colors and graphics to be displayed on every PharmoWeb screen (see fig. 1.), and they also construct the index categories and a hierarchy of project folders starting from the built-in default structure. They hereby create and constrain the different categories of articles, news items and documents. Furthermore, the project assistants have a pivotal role in delegating access and uploading rights to the users of a given PharmoWeb. The way the project assistants go about these tasks are different and crucial for how the knowledge system is shaped. We have chosen to call the effects of these ongoing processes configurations, since they affect the material set-up and subsequent use patterns of the intranet technology.

#### 4.1 The ultimate project communication tool

The first configuration we met, was that of PharmoWeb as a medium for communication. This configuration is exemplified in the project assistant Janet's work and use of PharmoWeb. Janet speaks of her project's PharmoWeb as her own, and she describes herself as "webmaster for my users". Part of her job description is to keep everybody informed about, what is going on in the project, and for this task she uses PharmoWeb a lot. She describes PharmoWeb as the "ultimate project communication tool" because it enables her to keep everybody up to date and have all the relevant documents available online in their most recently updated versions:

"The whole idea is to have a 24 hour service, in order to make them [the members of the project] independent of my presence or the project manager. All imaginable documents must be available..."

Revising timetables and development plans is crucial to the work of project assistants and before PharmoWeb, it was a troublesome task to continuously send out changes and revision. Now all these are co-located in PharmoWeb, where the most recent versions can quickly be found by project members alleviating the requests for information that previously were directed towards Janet. She also emphasizes the advantages of using PharmoWeb for presenting news about the progress of the project as well as keeping a current directory of members by integrating contact information from the companywide phonebook in PharmoWeb.

The material set-up of PharmoWeb in Janet's project is thus a configuration of PharmoWeb as a 'project communication tool'. The typical use pattern resembles publishing of information from center to periphery. Janet's task of keeping project members informed and motivated, is made easier in this configuration, and specific requests for documents and information from peripheral members to Janet are reduced remarkably. However, since she and the project manager are the only persons with uploading rights, all the documents in PharmoWeb are entered by her after she receives them via e-mail. Janet then uploads the documents in the structure in the correct place and

notifies the relevant project members. From her perspective PharmoWeb thus becomes a very useful project communication tool for carrying out specific tasks related to the project as it substitutes other communication media such as photocopying and internal mail as well as telephone calls and e-mails with attachments.

## 4.2 A set of private and safe workspaces

The other configuration of PharmoWeb we describe here belongs to another project. Paula is the project assistant of a project developing a new device in a joint-venture, where PharmoWeb serves as an extranet for the different companies involved. The major difference between this configuration and the previous of the project communication tool is the way in which access rights are delegated by the project assistant. By distributing uploading rights to all project members, Paula configures the knowledge system in this project as a set of private and safe workspaces. She explains that this setup corresponds to the espoused needs from the working groups collaborating with partner firms in California and Scotland.

These external partners for example have different quality and regulatory systems that must be supported in PharmoWeb. In addition to this they need different folders that represent their diverse divisions of work and documentation needs. Some of these folders are closed off by the “restricted areas” functionality. “Restricted areas” thus give sub-groups the possibility of exchanging documents and information that either are specific to those groups or that perhaps are not yet ready to be published for the entire project groups because of tentative conclusions or have unfinished draft status. In other projects such drafts are mostly circulated within sub-groups as email attachments. However, in this particular development project PharmoWeb is viewed as easier to use and more secure, as Paula states it:

“We needed a place where we could have the documents despite the distance. I mentioned security before - when we send an email there are all sorts of possibilities for opening it...”

Security issues when cooperating across the Atlantic Ocean is thus perceived as an explanation for an increased use of PharmoWeb for document exchange within sub-groups of the project. When a project member uploads a document he or she can select which sub-groups or specific persons within a sub-group are able to see the specific document as part of their PharmoWeb. Often an email is sent in parallel via PharmoWeb to notify the relevant people that the document is uploaded and available.

So PharmoWeb is able to do what it does by incorporating parts of its surroundings in its very configuration and material setup. The two different configurations described here are largely overlapping, since the specific details of the handling of access rights may not be relevant for all members of a project. Some users might never notice any difference between the two



configurations, but for other users, who want to exchange drafts and collaborate via PharmoWeb, the differences between the two configurations have profound implications for, what PharmoWeb can do. Furthermore, the way in which these configurations are mutually exclusive will be dealt with more explicitly later in the discussion section.

## 5 How is PharmoWeb used in practice?

The fourth level of inquiry concerns how people are using PharmoWeb as part of their work practices. Focus in the following is concrete examples of use situations. Also, we will look at PharmoWeb as one alternative among a wide range of technologies that support the practice of the development projects.

PharmoWeb is often found to be used to inform others on project details and progress. When used for information seeking, David from Marketing explains, that he only enters when he knows exactly what and where to look for the piece of information needed. Betty and Edwin who both are core members with a certain expert status crossing the different phases, use the agendas and minutes of other working groups to keep updated and i. e. to decide whether they should attend a meeting or give input on decisions already taken. Eric, Edwin and Betty thus had similar uses and experiences and when their fellow project members complained about not being properly informed, they all pointed to the PharmoWeb of the projects and the project members own responsibility to stay up to date. Additionally, PharmoWeb is used to coordinate the different phases and tasks to be done. Most projects have an overall project plan with milestones and more detailed parts, where different groups and people can see what and when they have to deliver. These plans are updated and followed up continuously or on a weekly basis.

The yellow pages in PharmoWeb, especially when extended with data on occupation and department, are used quite extensively and for many different purposes. Project members and others use it to get an overview on the projects and an impression of the process as well as contact and occupational data on each project members. Eric, for example, uses PharmoWeb to get updated contact information on the project members. He downloads information from PharmoWeb to his Palm Pilot and creates his own shortcuts on his computer to the information. This means that PharmoWeb is an important source of information, but not his preferred tool or format to access the information in the daily work situations.

In some projects a folder entitled “drafts for comments” is used for co-authoring. This way of using PharmoWeb is very close to the use of the shared LANs (local area networks) that some still use. The LANs are normally local, geographically and/or departmentally, which means that some departments and partners are not connected. In one project PharmoWeb is used for more static documents and documentation purposes, whereas the LAN is used for all

dynamic documents. Later, when these documents are more “finished”, they are moved to PharmoWeb.

Another example of a situation where PharmoWeb is *not* used, is the calendar functionality. This lack of use cannot be attributed to other technologies, but technical problems and hassles prevent a desired use, as Eric expresses it:

“Here we can add to the calendar and see what meetings are scheduled. It is not yet fully functioning, because we are unable to add on our own. You can actually write something here, but you can’t save it, so you have to take a copy of this and send it to Paula, who will add it.”

Here he describes that when he wants to enter a new event or meeting into the PharmoWeb calendar, he must involve the project assistant and ask her to enter the event so it becomes visible for the rest of the project group. Furthermore, he describes that the calendar in PharmoWeb is not integrated with his other calendars, which are located on a shared departmental LAN network which is synchronized to his Palm Pilot. He explains that these problems of tool integration and having to make new entries through the project assistant makes him abstain from using the calendar in PharmoWeb.

As the examples above show, PharmoWeb is often used as well as not used to carry out a number of different work tasks. It is used in combination with other technologies such as LANs, e-mail, telephone and tele- and videoconferences or Palm Pilots. In some ways the technologies can be seen as competing, for example both a LAN-drive and PharmoWeb can be used for document sharing in internal projects or groups within projects. In other situations they are complementary fulfilling different roles, as evident in the combination of email and PharmoWeb, where email fulfils the role of notifying and PharmoWeb secures access and common archiving of project communications and documents.

## 6 Multiplicity and Flexibility Within and Between Levels of Inquiry

Above we have described PharmoWeb at four different levels of inquiry. These are not exhaustive or fixed, implying that the patchwork they form could be larger and more detailed. The description does, however, serve to show that PharmoWeb as part of a knowledge system is more than one thing. The specificities of intranet technology depends on the way it is designed, envisioned, configured and used in different contexts. The empirical material illustrates how a knowledge system emerges and develops as a conglomerate of different technologies, visions, people, and practices. A knowledge system as such can thus be viewed as the effect or outcome of all the elements and levels depicted above.

Along the lines of the study of the Zimbabwean Bush Pump, we argue that these differences and the multiplicity we met in Pharmo are not merely matters

of interpretation, but are built into the technology itself (Laet and Mol 2000). PharmoWeb is descriptively and practically framed in a number of ways and each instantiation incorporates parts of its surroundings such as visions of its users and aspects of their very work and coordination practices. We suggest that the development of such instantiations may be explored at four levels of inquiry to fully appreciate that PharmoWeb is *more than* a technical application and *more than* hype and visions. That what it is must be understood in relation to specific practices such as that of the pivotal project assistants that set-up access rights, or, the project members whose choices between email and PharmoWeb are consequential. By differentiating four levels of inquiry we have attempted to highlight the complexity of factors that are a part of “what PharmoWeb is”. In the discussion of these four levels, a conflict within the third level of configurations, and a discrepancy between the second and fourth level of visions and actual use, will be treated.

## 6.1 Conflicting configurations

Our study does not point towards different implementations of “the same” technology, but instead uncovers incommensurable configurations and conflicting use practices that are embedded in the very material of the application. As discussed below, the configuration of “a ultimate communication tool” has a hard time coexisting with the configuration of “a set of private and safe workspaces” and vice versa. In these two configurations the fundamental approach to openness and information access is quite different. This is visible in the incorporation of different approaches to the delegation of access and uploading rights in PharmoWeb.

Differences in configurations influence the work practice of a project. A comparison of the projects of Janet and Paula and their use of PharmoWeb for coordinating shows differences in use practices that are clearly visible in the configuration of PharmoWeb. The assistant Janet promotes PharmoWeb as communication tool and explicitly states that: “you can not coordinate a transatlantic project through PharmoWeb”. She coordinates the activities abroad by stationing a member of the project management in North America in order to manage the relation with the project partners there that count among others some research-labs associated with PharmCo. In the other project developing a new device the assistant Paula configures PharmoWeb as a set of private and safe workspaces. PharmoWeb is configured for external use on an extranet as a solution to ease the coordination with the foreign partners, which was found problematic because of the geographical and time differences constraining the work time overlap to only a few hours. According to Paula PharmoWeb is used “in common for exchange of documentation and a lot of other things”.

The difference between the two project assistants is not only a question of two different projects, but also a difference between configurations of the knowledge system that is shaped by their work practice. Janet sees PharmoWeb

as her primary tool for coordinating the whole project through communication. Paula in contrast sees PharmoWeb as a common forum, where working groups have their own space for collaboration. For the “private and safe workspaces” PharmoWeb is shaped as a workspace for smaller delimited groups – where it becomes vital for all group members to have uploading rights and to restrict access to these areas from people outside the group. A central concern is to avoid the use of “unfinished knowledge” out of context. In contrast the shaping of the configuration of “the ultimate communication tool” grants access to everybody with any interest in the product and information about the project. In this case, PharmoWeb becomes a coordination mechanism for project management and it is found necessary to control the content of PharmoWeb by centralizing the rights to upload. This way of handling rights constrains the possibility to use PharmoWeb as “a set of private and safe workspaces” which is another kind of coordination mechanism for collaborative work on documents. The two configurations of „ultimate communication tool“ and „a set of private and safe workspaces“ contradict one another on certain points and would thus conflict within the same project.

## 6.2 Discrepancy between visions and practices

In order to discuss more detailed the relation between level two, descriptions and visions, and level four, actual practices, we employ a concept of „non-use“. Besides multiplicity, we continually met concrete use situations that did not correspond to the descriptions simultaneously conveyed. The concept of non-use has therefore been applied to make different uses and the discrepancies between a description and actual use more visible. In the following we provide some examples of non-use along with an explicating discussion.

A new functionality labelled „document commenting“ was presented to us by several interviewees as something extremely useful and practical for making visible what type of information an uploaded document contains. One interviewee described hypothetically, how it could be used, but when we subsequently asked how this functionality affects his work and search for documents, the same user explained that actually he did not use it. Nor did he encourage others to use it as it would ruin the overview of documents:

“We do not use it [document commenting], because ... I actually think it has not been agreed upon, but it will possibly be used in the future. It is probably this tendency to keep everything as simple as possible ... in order not to have to look at.”

Another peculiar aspect we found is that often when we were told how the system contributed to the work these were very general descriptions that did not really apply to the actual use of the interviewee. Eric for example gave an example of links to partner firms that are collected on a PharmoWeb page. This was useful to be able to check details, orient oneself, or find a person in the

particular firm. At the same time, he used another way to access this information:

“I have to admit, that I do not use this access to them. I have my own shortcuts via the web browser. But it is extremely important to new employees in the project and for our partners be able to quickly enter the project, that it is an official web site ...”

So, as mentioned above, descriptions do not always refer to actual use. In the two examples above the description of PharmoWeb is about potential uses, future uses, and the workpractices of others. Thus rendering a comparison of the various levels of inquiry as a second step in understanding “what PharmoWeb is”.

Such discrepancies may be partially attributed to “IT hype” that seems to revolve around PharmoWeb and more generally to new technology in organizations and the potential benefits these may offer. Instances of non-use may be hype about features, which look and sound good, seem to be nice to have, but subsequently are not used when implemented. Lastly, internal marketing stories of the outstanding abilities of PharmoWeb perhaps play a part along circulating tales of how other users are putting PharmoWeb facilities to use.

We have thus found a comparison within and between levels important because it points to situations, where the participants have diverging images of what the situation is about. These situations do not necessarily occur because of conflicting interests, lack of resources or skills, but are perhaps more often effects of diverging or drifting expectations and practices. Above we have pointed to divergence between two configurations and between imagined benefits in contrast to actual practical uses.

## 7 Concluding remarks

We have identified co-existing descriptions, configurations, uses and non-uses of PharmoWeb that can be attributed the empirical multiplicity and flexibility of this intranet technology. However, it remains an open question whether these differences and discrepancies will continue to coexist, whether a central configuration will be more explicitly and irreversibly built into the system in future versions, perhaps also followed up by recommendations and rules regarding how the system should be configured and used. Should divergent, perhaps conflicting, visions, configurations and use practices be centrally managed or should they be allowed to evolve decentralized? Is multiplicity and flexibility a universal good to be cherished or rather problems of a premature technology to be eliminated?

These and other questions beckon further investigations of, how the specificities of intranet technology depend on the way it is designed, envisioned, configured and used in different contexts. They remain however

beyond the scope of this paper. For now, we have pointed towards appearance, descriptions and visions, configurations, and actual use as four analytical levels that may enhance our understanding of knowledge systems and their complexity. Following these levels, PharmoWeb has been described as a set of flexible web pages and functionalities, as a common space for distributed projects, as a provider of group identity, as an infrastructure for knowledge re-use, as distinct configurations, as diverse use and non-use practices. Therefore PharmoWeb seems to be a lot of things at once. We suggest that by paying attention to the occurrences and details of the four levels presented and the relation between these levels, the efforts to improve knowledge systems might be directed to areas where changes may prove beneficial.

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