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Development of a Wiki to Promote Financial Research Collaboration at the Financial University under the Government of the Russian Federation

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Development of a Wiki to Promote Financial Research Collaboration at the Financial University under the Government of the Russian Federation

Interactive Qualifying Project Report completed in partial fulfillment of the Bachelor of Science Degree at
Worcester Polytechnic Institute, Worcester, MA

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Abstract

The International Financial Laboratory of Financial University, Moscow sought to improve long distance research collaboration among its many branches throughout Russia. Our team planned to implement online software suitable to the Financial Laboratory's needs. We researched the benefits of working online, alongside collaborative technologies. Based on our research, we used MediaWiki to develop finlabwiki.org, an environment for the creation and storage of research projects. Finlabwiki.org connects students with similar interests and aids them in the achievement of research goals.

Acknowledgements

Our team would like to thank several people for their tremendous effort in making this project a success.

Executive Summary

The Financial University under the Government of the Russian Federation is one of Russia's leading academic institutions. The university has over fifty branches spread across Russia's many regions. The university's programs are focused on training students in the fields of business, economics, law, and politics. Recently, the university has been looking for a way to improve its research. Firstly, the university desires a system that would make collaboration among the schools many branches simpler. Additionally, the International Financial Laboratory has identified a problem with research preservation. The International Financial Laboratory at the university is a part of the University's financial department. The Laboratory desired an online system that could be used for research collaboration and the preservation of results. The website would provide a center of connectivity for professors, students, and other universities. We planned to meet the following objectives:

1. Research online collaboration software
2. Select the best software to use as a basis for our tool
3. Design a collaborative tool based on specifications given by the project sponsor
4. Host the tool online so that it can be accessed by students and faculty
5. Gather feedback on the effectiveness of our tool

Research

Many studies have attempted to compare the effectiveness of online teams against teams that meet mostly in person. The dynamics of virtual teams and the study of online collaboration has led to interesting research (Malhora & Majchrzak, 2014). Researchers have had difficulties coming to a consensus. Some studies praise the benefits of online collaboration while others view many aspects of online collaboration negatively (Kreijns, Kirschner, & Jochems, 2003).

During our preliminary research, we studied a wide variety of collaborative tools. Many educational tools have been developed over the past decade for use within a classroom. The Internet provides an excellent framework for communicating online. For years these online tools have been used to extend learning outside of the classroom (Kim, 2002). Currently, tools such as Blackboard, WebCT, and FirstClass provide students and teachers with a means of submitting assignments, providing feedback, grading, and facilitating group discussion.

Based on our analysis of existing technologies, our team settled on using MediaWiki as a framework for our tool. MediaWiki is a tool designed to create a shared learning environment. It is an open source wiki package for the construction of wiki software. Websites such as Wikipedia and OpenWetWare were built using MediaWiki. Because the tool is open source, it can be used for free to create wiki software. Students at the Financial University would be able to use the wiki we created to share and organize data collected in their research projects.

Development

The development of our wiki began on our local computers. We wanted to familiarize ourselves with the installation and calibration of MediaWiki before moving development to the Financial University's server. We desired to learn what customization options would be available for constructing the wiki. It was also important to learn how easy customizing the wiki would be after its initial installation. Because we were familiar with MediaWiki's installation, it was easy to communicate our needs to the university's IT department, and install our wiki on the school's network. With the system in place and accessible from within the university, our team began implementing features. The design of the website, was inspired by several questions our team asked about the websites functionality. Some of these questions include:

- How would users be identified so that work could be attributed to them?
- How do we ensure that the wiki can be used by people with only a basic understanding of computers?
- How do we categorize pages?
- What's the best way to display information to the users?

MediaWiki is a framework for website creation. It is written in the coding language PHP which none of our team members had experience using. Thankfully, there are many software extensions for MediaWiki that make development with the tool much simpler. As we designed our website, we were able to find many extensions that helped us implement the functionality we desired.

The first problem we approached was the creation of user accounts. In order to keep track of the edits to the wiki, each user needed a unique account. Additionally, we could not allow anybody with internet access to create an account. The wiki needed to be contained to Financial University students. Using an extension called ConfirmAccounts we made it necessary for user accounts to be confirmed by an administrator before that user could begin using the wiki.

Another problem we solved using extensions was the issue of complexity. The content of sites created using MediaWiki is entirely controlled by the site's users. In order to create a page associated with their projects, users would need to have an understanding of the code necessary to format such a page. Since we knew that some users would not have coding experience, we found an easier way to create pages. An extension called Semantic MediaWiki, gave us the ability to design page templates. Pages within a certain category (such as projects) could then be created using a template that could easily be edited. The software extensions we implemented into our wiki allowed us to create a functional product that could be used by the students and faculty of Financial University and its branches.

Results

Once the majority of the website's functionality was in place, we hosted the website online. The website we designed is currently hosted at **finlabwiki.org**. We introduced students to our wiki through a webinar. The webinar was a video demonstration of our website that was broadcast to branches of the Financial University in Omsk and St. Petersburg, Russia. During the webinar, we monitored account creation and gauged student reactions to the website. The website provides users with a centralized location to store information. Because our website was built using MediaWiki, it provided users with an excellent system to create and organize webpages.

It was easy for students to create accounts and begin using the wiki. After their accounts were confirmed, they could begin creating tickets. On our wiki, a ticket is the fundamental statement of a problem. Each ticket contains a description of the problem as well as links to related tickets and associated research. Students that wish to work on the ticket can apply and begin working on a project designed to answer the questions posed by a ticket.

Another useful feature of our wiki is its ability to connect students with similar interests. When a user creates an account, a user page is automatically created for him or her. Users can add their interests to their user pages as keywords. A user can then search the wiki by keyword to find other users with the same interests. The search results will also turn up projects that are associated with the keyword, allowing users to find projects of interest to them.

With students finally using our wiki, we hoped to gather some feedback about how useful students felt the system would be. Unfortunately, because the development of our wiki was the most significant chunk of our project, we did not have time to develop interview questions or monitor the use of our wiki for more than a few weeks. By talking with students and faculty of the International Financial Laboratory, we were able to get some very general feedback.

The desire for a system like ours was clear. Students at the university were looking for a centralized location for all their research ideas and progress to be deposited. Using the system we create, Russian students were able to share research data, graphical analysis, and informative articles. Through our system, students would be leaving a legacy of their work after they graduated. Projects completed on the wiki will eventually serve as example for other students. After allowing users to provide their feedback, we were able to incorporate some important changes to the wiki and created a list of possible recommendations for website.

Conclusion

The wiki gave students the ability to create tickets for projects associated with their interests. Existing tickets served to inspire future tickets. As new users join, they will be able to find other students that share research interests. New users can also learn a lot by browsing through completed tickets. The website is an excellent tool for the International Financial

Laboratory. It serves both an educational and a functional purpose, since the users are doing real-world analysis and addressing present-day economic and financial problems.

In order for the new technology to become more popular, gain usage, and flourish, it has to start out strong and robust. Students will find the technology useful if they can benefit from it immediately. Our team knows that we have provided a strong foundation for finlabwiki.org. As time goes on the wiki should grow and additional features will surely be added. Our website is still in early development but the potential for growth is strong.

It is our understanding the Financial Laboratory is pleased with the ability of the wiki we have installed for them in meeting their specifications. Despite minor differences from what we set out to do in the initial project, this project has been a success. Our hope is that the wiki will remain in use by the lab for many years. Additionally, we offer many recommendations for future updates to the project.

Recommendations

Before listing our recommendations for the website, we would like to address some of the limitations of our project. Firstly, due to a lack of time, our team was unable to conduct interviews or create surveys addressing the use of the wiki. Hopefully, once the wiki grows and many users have contributed, official feedback can be gathered. User response is critical to keeping the system up to date and functional. Additionally, because the wiki is new and rather small, our team was unable to conduct an analysis of its capacity. We do not know whether the site will slow down or crash under the strain of a large number of users.

Our website is still in early development. Though we were able to create something functional for the purposes of International Financial Laboratory, it is still not complete. With this is mind we have several recommendations for the improvement of the website as time goes on.

- **Notification System.** A notification system would be useful for alerting students when projects are created that might interest them. Students could also be notified when edits are made to their projects.
- **Suggested keywords and projects**. Users could have keywords and projects suggested to them based on their interests. Suggesting keywords to users based on their interests is a great way for users to gain knowledge of a wide variety of topics.
- **Automatic page creation**. At the moment, links are automatically created for keyword pages but it would be convenient for these pages to be automatically created.
  - **Translations**. The wiki is currently used by both Russian and English speakers. An easy way to translate content would be very useful, especially if the wiki grows to further international use.
  - **Policing content.** As the wiki grows it may be important to police content to ensure that the wiki's content is appropriate. Future implementations of the wiki

could feature systems that administrators could use to appropriately manage the wiki.

Authorship

        This paper was written through the collaboration of Philipp Baumann, William Farrar, and Keenan Gray. Research for this report was done collaboratively but in order for the paper to take shape, it was necessary to divide the paper into several sections. Each team member worked on a specific section that was later reviewed and edited by the others.

        The introduction chapter was drafted by Philipp. All team members made changes and contributions to this section before it was finalized by Keenan.

        The background chapter was drafted by Keenan. Philipp and William contributed summaries of research to this section. Keenan organized these summaries into the background section of this report.

        The writing of the methodology section was led by Philipp. Philipp wrote the original draft of the methodology and passed it on to William and Keenan for review. After the section was reviewed major changes were made to the section by Philipp.

        The findings sections of this report was originally drafted by Keenan. William finalized the chapter after the project was completed.

        The conclusions chapter was drafted by William. Additional recommendations and conclusions were added by Philipp and Keenan before William finalized the section.

        The executive summary was originally written by William. Keenan and Philipp added to the executive summary based on their sections of the report. The final version of the executive summary was edited by Keenan.

        All team members reviewed the final report in order to identify any errors made when combining sections. Each team member also proofread the entire report to check for grammatical errors and missing content.

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1. Introduction

The Financial University under the Government of the Russian Federation is one of Russia's top academic institutions (Appendix A). The university's programs are focused on training students in the fields of business, economics, law, and politics. The university is one of Russia's leading research centers. Research at the university has a focus on finance, credit management, insurance, taxes, accounting, and other economic and political fields ("Financial University under the Government of the Russian Federation," 1999-2013). Research projects are an essential part of the university's training program.

The Financial University is interested in connecting geographically dispersed Russian researchers with foreign partners. Researchers at the Russian university are managing their research very well, but sometimes feel as though certain standards are lacking, when compared to other countries. Firstly, there is little centralization among researchers. Many times research will be completed and published but beyond that, the focus is lost. Professor Didenko wants students and researchers to look towards completed research when beginning new projects. It is important that young students learn lessons by example.

By uniting young researchers online, and connecting them with partners abroad, the university wants to strengthen its financial research presence by publishing its work online and sharing results with other universities. A social environment for the collaboration of researchers will provide researchers with a way of sharing and storing knowledge and of teaching students the skills required for managing international group-based research.

Russia's vast size often makes face-to-face collaboration very difficult. For many investigations conducted by the Financial University, it is necessary to gather information and data from many different regions. An online tool would make performing a multi-regional study easier to conduct. Researchers from a specific region would be able to provide insight into a project, based on their experience of living in that region.

Over the last several years, the International Financial Laboratory at the university has been investigating the elements of technology that would allow for the collaboration of master's and bachelor degree students with senior researchers. The Supervisor of the International Financial Laboratory, Professor Didenko, outlined the functional expectations of this system, which include that the system would allow for long distance work and data storage. We then identified tools that provided the functionality desired by the research lab at the university. Using information gathered in our background literature review, we selected MediaWiki as the framework we would use to create a website to be tested by students at the university.

Using MediaWiki, our team created a website that allowed users to come together to create and discuss project ideas. Ideas worthy of further investigation could be turned into entire projects that could be completed by collaborating students. Users of the site had personal accounts that described their research interests, and listed projects they had worked on. We have hope that the site will be used for many projects done by students at the Financial University and, with some luck, future projects might be inspired by work we completed during this project.

In the following chapters of this report, our team will further explain the goals of our project, what information we used to complete the project, how we developed our website, and what we learned during the process. The Background chapter provides numerous examples of online educational and collaboration tools. The background also provides information on effective online collaboration. Finally, the next chapter has information from several case studies that provide descriptions of procedures we used in developing and testing a new collaboration software instrument. The studies demonstrate methods of analyzing wiki based software as well as student feedback on difficulties they encountered with the collaboration projects.

2. Background and Literature Review

2.1 Project Background

Establishing an effective system for collaboration among students and researchers across the span of Russia is an important issue facing the Financial University under the Government of the Russian Federation. As the use of technology grows worldwide, it becomes more important that students and professors have efficient systems for communicating online. The Financial University has an established network of colleges, with over fifty branches spread across the country. ("Financial University under the Government of the Russian Federation," 1999-2013). The enormous distances between these colleges created a demand for online collaboration tools. The International Financial Laboratory is also interested in using online collaboration tools for international research projects.

The university is aware of several problems that could be resolved by the use of online collaboration technology. In addition to the geographic problem, the Russian university faces issues with the training of university students. According to our advisor at the Financial University, Professor Didenko, students are taught very formal research practices during their early years of education. Most Russian students are very knowledgeable when it comes to their area of study. However, their education does not always provide the problem solving skills or real-world experience that is necessary in a research environment. An online tool will help Russian professors become advisers for research projects. Using the tool, the advisers would be able to provide students with comments and corrections. Through this communication, Russian students can stay up to date on research practices and apply what they have learned to the real world.

2.2 Online Collaboration

Many studies have attempted to compare the effectiveness of online teams against teams that meet mostly in person. The dynamics of virtual teams and the study of online collaboration has led to interesting research findings (Malhora & Majchrzak, 2014). Researchers have had difficulties coming to a consensus. Some studies praise the benefits of online collaboration while others view many aspects of online collaboration negatively (Kreijns, Kirschner, & Jochems, 2003). For example, Kreijns analysis of virtual collaboration claims that the lack of social interaction when collaborating online prevents students from retaining information and building technical skills. Majchrzak gives examples of the positive effects of online collaboration including, quick feedback, faster team formation, and more creative solutions. Some articles recognize online collaboration as a necessity and describe steps to effective collaboration online (Nunamaker, Reinig, & Briggs, 2009).

Online collaboration often occurs asynchronously. Team members are not meeting in person, therefore they may miss out on important opportunities for deep learning and information

retention (Kreijns et al., 2003). Translating work from in-person collaboration to a virtual space can be challenging. The authors of *Principles of Effective Virtual Teamwork*, outline several principles designed to help teams collaborate online. By exploring these principles, the necessities for functional online collaboration can be identified.

2.3 Creating Motivation

The first principle listed by Nunamaker, Reinig, & Briggs is the realignment of reward structures for a team working mostly online. Finding motivation when collaborating online can be difficult. When working online, the lack of in person social interaction means less appreciation is felt by collaborators when work gets done. For successful online collaboration, team members need to be individually rewarded and feel that their participation in the project is important (Nunamaker, Reinig, & Briggs, 2009). In addition to individual contribution to a project, team members should have shared goals associated with completing the project (Berry, 2011). Providing contributors with feedback about their online work will build confidence towards the project and likely increase productivity. Keeping track of the team's progress and clearly marking when goals are completed will also motivate an online team.

Students can sometimes feel that utilizing online technology involves additional work outside of their daily work. Students must be able to integrate online collaborative work into their daily routines or else a small fraction of the team members will end up doing a disproportionately large share of the work, defeating the purpose of working collaboratively (Wheeler, Yeomans, & Wheeler, 2008). Systems that support online collaboration should be compatible with the normal practices used by team members (Nunamaker et al., 2009). Collaboration techniques that are new to a group can slowly be practiced and included in daily activities, until working online begins to feel natural. In this way, virtual work feels related to, not separate from, everyday work.

2.4 Focusing Attention

A lack of face to face communication can lead to problems with focusing attention on a project. Finding new ways to focus attention is important for an online team. There are several attention problems faced when working online. The first and most obvious issue is that there are many distractions online. These distractions take students' attention away from the tasks at hand (Nunamaker et al., 2009). Focus can also be lost when a discussion lacks a center. Face to face interaction usually involves focal points such as whiteboards that can be used to call attention back to the subject at hand if a discussion gets off topic (Nunamaker et al., 2009).

When collaborators are geographically distributed, maintaining situational awareness can be difficult. A webcam may not be able to convey the same sense of urgency or fluidity of movement as seen when meeting in person (Sonnenwald, Maglaughlin, & Whitton, 2004). Situational awareness is related to how aware each team member is of what the other team

members are doing. The problems created by a lack of situational awareness are easily seen in the use of wiki technologies.

In a study involving undergraduate students using free wiki software, problems often occurred when team members were unaware of the work being done by the rest of the team. The students became frustrated when their work was deleted because multiple members attempted to simultaneously edit the same page (Wheeler et al., 2008). Using the proper software tool should prevent data from being deleted, but, as with all software, problems can occur without warning. It is advisable that team members coordinate on the distribution of work in order to avoid similar situations.

When conducting team meetings online, tools for application and screen sharing can help to ensure all team members are focusing on the same task. It is also important for team leaders to implement a response system to be used during online discussions and presentations in order to make sure everyone is being attentive and no one has had any technical difficulties (Nunamaker et al., 2009). Taking a roll call or pausing to answer questions helps to support situational awareness during video conferencing.

Screen sharing tools that allow users to communicate through pointing can also aid in keeping attention focused and allow for stronger communication. The process of teaching students to use this tool will likely be done using screensharing software. By sharing a screen with the students we will be able to demonstrate the software's functionality in action, instead of with still images.

2.5 Establishing Standards

Virtual teams are often interdisciplinary groups. A virtual team can be made up of people in different fields, from different organizations, or with different training. The standards and terminology used by online collaborators has to be agreed upon before efficient work can be done (Nunamaker, Reinig, & Briggs, 2009). Problems will almost certainly arise if each member of a team follows his or her organization's standard operating procedure. Some standards that must be agreed upon by a team include, rules associated with the technology that will be used, a clear definition of when tasks are considered complete, and how progress will be documented and reported to the rest of the team (Berry, 2011). The design of our software will have to incorporate established standards. Our wiki will use a unified template for projects in order to ensure that best practices are followed. Not only will a clear method of beginning projects be important for the students at the Financial University, but it will also be useful if the software is ever extended internationally.

2.6 Fostering Communication

Communication is one of the major factors of online collaboration. Troubles associated with communication can occur for a variety of reasons which include language barriers,

misunderstood directions, and unclear goals explanation. Communication tools can be extremely useful, but can sometimes be impeding. (Brandt, England, & Ward, 2011). Most of the time, virtual teams use computer-mediated asynchronous communication (CMAC) (Berry, 2011).

Asynchronous communication lets students communicate their ideas immediately, without fear of interruption from others. CMAC puts users in a situation where they can contribute on their own time. On our wiki, users will be contributing information all the time. Everyone's voice can be heard before final edits are made. This system works so long as a team is in sync, otherwise users may upload duplicate information, or modify edits made by other users without permission.

A performance study of graduate students collaborating online showed that a lack of quality communication was a major complaint associated with the collaboration (Brown, Eastham, & Ku, 2006). The same study concluded that teams had issues adhering to communication standards agreed upon at the start of the collaboration. Students may lack enthusiasm towards a project, and so, put in minimal effort. Irregularities between when and how often team members check and respond to e-mails or other chat services often leads to communication problems in online collaboration projects (Chan & Chan, 2011).

Email and video conferencing tools are useful tools for online collaboration, but may not provide the level of skill development desired by educators (Brandt, England, & Ward, 2011). An online team can benefit more from the use of shared workspaces, such as a wiki or google doc. Sharing software provides a more social experience for a team. The social interaction of a virtual team has been proven a critical part of learning through collaboration (Kreijns, Kirschner, & Jochems, 2003). Seeing that MediaWiki has been used as part of college courses has inspired us to use MediaWiki for our project.

There are other risks associated with online collaboration. Technology should be easy to set up and convenient. Because tools are not always simple to use, an inaugural meeting can be important simply to guarantee all the technology is working effectively (Nunamaker et al., 2009). For the most part, technical problems can be overcome. Social problems on the other hand, can have greatly affect the performance of online collaborators (Kreijns et al., 2003). In person, social interaction comes naturally. When online, a team must focus its effort on being socially conscious. The process of developing our wiki at the Financial University required us to work methodically and explain our process throughout. We wanted people to continue developing the wiki even after our project was completed and we left Russia.

2.7 Tools Analysis

There are many available tools for use in online collaboration and selecting the right kind of software for the job can be difficult. One important issue is the tool's delivery method. Some tools are client based and others use an Application Service Provider (Kim, 2002). A client based application requires the creation of a local server administered by an internal tech support team. Application Services Providers (ASPs) on the other hand are subscription-based

information technology services. ASPs provide an easy solution to companies lacking the time or resources to host, manage, and run online software applications (Sushil & Jatinder, 2002). Adoption of ASPs is growing as many companies desire up to date software but cannot always afford to hire full-time IT professionals (Smith & Kumar, 2004).

Many educational tools have been developed over the past decade for use in education. The internet provides an excellent framework for communicating online. For years these online tools have been used to extend learning outside of the classroom (Kim, 2002). Currently, tools such as Blackboard, WebCT, and FirstClass provide students and teachers with a means of submitting assignments, providing feedback, grading, and facilitating group discussion.

At Worcester Polytechnic Institute, professors and students use an online system called myWPI. MyWPI is powered by the Blackboard Learning System ("Academic Technology Center - WPI," 2013). MyWPI is mostly used for sharing course materials online and communication between students and professors. As we learned more about our project, we realized that our system would not be similar to myWPI. The website we will develop will be more suited to the International Financial Laboratory's specific needs, where blackboard is more suited to a classroom environment.

Another tool, OpenWetWare, is an online wiki for collaboration in the research community. On OpenWetWare researchers can upload information about their experiments and results. OpenWetWare timestamps uploaded data and provides users with a history of changes made to reports (Patil & Siegel, 2009). Similar social bookmarking systems exist. These systems allow for the sharing of published research easily. ReadCube and de.licio.us, offer a way to manage links and articles so that students with similar interests can share research that they find interesting (Patil & Siegel, 2009). On de.licio.us students can "tag" interesting or useful resources. Through the use of tags, students can share a sources' location and rate the sources usefulness (Wheeler et al., 2008).

Social media software like the tools listed above as well as user-generated content wikis present students with new opportunities to share content and receive feedback from other users (Wheeler et al., 2008). The ease of use of social media software allows many different educational disciplines to benefit from its use. The use of these kinds of tools benefits the collective knowledge of the communities involved in the research. These tools are used to train contributors in collaboration skills (Dwyer, 2011). Contributing serves as a confidence booster for users receiving approval and feedback from peers and advisors.

A wiki is a website used to easily manage and create multiple interlinked webpages. Wiki's are easily used to publish content to the web. New and old content in a wiki can be edited making it easy to update and correct information. Importantly, wikis can be "rolled back" to previous versions if information is deleted or maliciously modified (Wheeler et al., 2008). Because wikis allow for students and professors to edit content from different locations, wikis are a useful tool for online collaboration. Wikis can help refocus higher education efforts back on student learning. Wiki use can also contribute to developing high-level thinking skills and practical management knowledge (Wheeler et al., 2008).

MediaWiki is an open source wiki package for the construction of wiki software that provides a basic foundation upon which unique websites can be built. Appendix C shows a variety of websites built using MediaWiki as a framework. Because the tool is open source, it can be used freely to create wiki software. Students at the Financial University would be able to use a wiki created using MediaWiki to share and organize data collected in their research projects.

MediaWiki is an open source platform, meaning that the only associated cost with using it will be the hosting cost of a server that connects the wiki to the internet. MediaWiki requires only an apache server with PHP installed in order to run. Because MediaWiki can be installed on almost any computer, the Financial University will be able to host MediaWiki on a local network if they choose not to pay for hosting. The wiki can also be easily transferred from one webhost to another if a more suitable hosting option becomes available. The scalability of MediaWiki makes it an apt choice for use at the International Financial Laboratory.

An assessment of the usefulness of wikis in online collaboration was conducted at the University of Cádiz (UCA) and the University of Seville (US) (Palomo-Duarte et al., 2014). The aim of the study was to determine if the use of wikis improved the students' collaboration and problem solving skills. Specifically, the advisors wanted to see if students were capable of updating the wiki with additional information relevant to the class. It was entirely up to the students what information to add. The students had to identify what material was lacking information or unclear and expand on it. The students were also responsible for identifying and fixing mistakes.

One of the benefits of wiki software is its ability to be monitored and analyzed with regard to use. With a wiki, it easy to keep track of how often edits are made. The flow of data to a wiki can be studied using software such as StatMediaWIki and HistoryFlow (Palomo-Duarte et al., 2014). These programs can generate charts and graphs, which can provide an excellent idea of whether the wiki is an appropriate tool for online collaboration.

Several important lessons came from the case studies at UCA and US. The first study involved wikiSSOO, a wiki composed of supplementary material in a computer science course. Contributing to wikiSSOO was voluntary, the students received extra credit for their contributions. Analysis of online communities has shown that voluntary participation sometimes results in a smaller population of users. This is not necessarily a bad thing, since voluntary participation can contribute to a more focused effort through the assumption of collaborative roles (Faraj, Jarvenpaa, & Majchrzak, 2011). That is, a person may be more comfortable taking on a role as a contributor while online, than in person.

The wikiSSOO analysis concluded that the wiki was moderately successful, despite lack of interest in contributing. The biggest obstacle students had in contributing to wkiSSOO was a "feeling of uncertainty" (Palomo-Duarte et al., 2014). Contributing to a wiki is a fairly creative process and without strict guidelines to adhere to, it may sometimes be unclear whether information is worth contributing. Having a plan for what kinds of information should be

included on a wiki page and how it should be represented is an important step for implementing wiki software.

Another study was conducted within an operating systems course. A project in the course involved students using a wiki in order to record the movement of a company's computer infrastructure. The teams of three contributed to the project through editing the wiki based on certain guidelines. AssessMediaWiki was used by students to peer review the largest contributions to the wiki (Palomo-Duarte et al., 2014). By reviewing the work of other students, the students were able to exercise skills such as technical assessment of research. AssessMediaWiki became a useful tool when measuring the contribution of a large number of users. For a smaller number of wiki users, the measurement of each individual's contribution is more easily managed through the use of a shared spreadsheet within a Google doc.

Based on our analysis of existing technologies, our team planned to develop a tool that could be made easily available to students at the Financial University. We will be using the MediaWiki tool to create a shared learning environment. Using the system we create, Russian students will be able to share research data, graphical analysis, and informative articles. As soon as the system is developed, our team will begin training the Russian students and faculty in its use.

Our methodology chapter outlines our approach to the creation of this system, what reasoning guided our design, and how we made the system available to the Russian students. The methodology explains how we trained Russian students in the use of our system. Finally, the methodology details the methods by which we analyzed the effectiveness of the collaborative tool.

3. Methodology

The goal of our project was to develop a software used for collaborative research among students at the International Financial Laboratory of Financial University under the Government of the Russian Federation. The initial project description was a list detailing the functions the software should have. In order to satisfy our sponsor and meet project objectives at the International Financial Laboratory, we set several goals for ourselves:

1. Selection of backend technology
2. Familiarization with and installation of MediaWiki
3. Designing the wiki based on specifications given by the project sponsor
4. Hosting the website

This chapter describes the process of creating finlabwiki.org (our collaborative website), selecting the necessary features of our wiki, and making it available to students.

3.1 Selection of Backend Technology

Over the course of our research our team came across many tools used to facilitate online collaboration. Long distance collaboration was our primary target. The initial phase of our project had us researching online collaboration. Our goal was to learn how to be most effective when collaborating online, and how to avoid the problems that are often encountered when collaborating over the internet. The information we found gave us the background necessary to create the tool that would best serve the needs of International Financial Laboratory at Financial University. The original project description, written by Alexander Didenko, the Deputy Dean and Head of the International Financial Laboratory at the Financial University, was instrumental in deciding the base software we would use to create our wiki. This description can be found in Appendix B.

Despite the long list of features given in the description, our team felt confident that MediaWiki, the open source software behind Wikipedia, would be flexible enough to implement them all. We selected MediaWiki with the hope that the framework would provide everything we needed to create a collaborative website.

Though MediaWiki will build a connective bridge between student and professor, it will not come without a price. In order for MediaWiki to be utilized by the Financial University it will need a small team that is always able to operate and provide maintenance on the system. However, maintaining such a system over the long term is no easy task and will require that there always be someone available to work on fixing the software should something go wrong.

3.2 Familiarization with and Installation of MediaWiki

It was important that all of our team members had a thorough understanding of MediaWiki in order to successfully complete our project. We needed to research how to install different extensions to MediaWiki in order to fulfill each of the requirements that were given to us. It was also important to discover how well the software would run as more extensions were added.

Since we did not have access to a server at the university, we had to locally install MediaWiki on our own machines in order to begin testing. The software we created on our personal computers could not be seen from any external source, but having the local prototypes was useful in some ways. With these local copies, we were able to learn how to use MediaWiki in ways that would be applicable for our project. These local copies also served the purpose of being an example of our software to show to our sponsor at Financial University when trying to explain our product. We were also able to make changes to the software through our computers in order to see how the software would react to help us assess the resiliency of the system. This knowledge helped us to keep the software stable when we were building the software on the university's network.

The next step in setting up our software involved meeting with the technical department of the university in order to acquire the permissions necessary to get MediaWiki established on their network. Initially getting our Russian partners to understand what we needed was a lot more difficult than we expected. Not only did we face a verbal language barrier, but the Russian computers required to host our website displayed most text in Cyrillic. Fortunately, the people at Financial Laboratory were very friendly and eager to help, so we were ultimately able to explain our requirements and continue our project.

3.3 Designing the Wiki Based on Specifications Given by the Project Sponsor

The functionality of the wiki was outlined in the project description and clarified in person by Professor Didenko. Wiki users would be creating project tickets that would then be approved by project supervisors and eventually converted into official projects. Every ticket had to have several descriptive characteristics such as status, keywords, ticket-parent (preceding project), ticket-heir (succeeding project), links to other research, and additional information that could easily edited and managed by users. These tickets served as project proposals and it was important that tickets could be merged or separated, based on the requirements for a project. Users also needed to have the ability to search the wiki for tickets, projects, and users that were associated with certain keywords.

Once the server and database infrastructure necessary to our wiki had been established on a network connected server, we began work on implementing the key features for the final version of our website. Without paying for hosting, the wiki was accessible from the campus's network only. Each member of the team created administrator accounts on the wiki in order to

manage system operations. Over the course of developing our wiki, we took into account several questions. These questions helped us decide how to implement the desired features effectively. Some of the important questions we had to answer in order to design the website include:

- How would users be identified so that work could be attributed to them?
- How do we ensure that the wiki can be used by people with only a basic understanding of computers?
- How will users create tickets?
- What is an easy way for users to edit tickets?
- How do we categorize pages?
- What's the best way to display information to the users?

The first function we addressed was user account creation. A student interested in using the wiki can request an account. The account is approved by an administrator and then the user receives a password to login to the wiki. Account creation serves a double purpose. First, it allows for administrators to restrict access to the wiki to confirmed users, thus keeping the information on the wiki safe. Additionally, when a user account is created, a user page for that user is also created. Every user's page holds the user's research interests and any projects that the user is associated with. Through the user pages, students can make connections with people that do similar research and review each other's work.

Making the wiki easy to use was another great concern. Most students have fundamental computer skills, but we knew we could not rely on students having significant programming backgrounds. MediaWiki's built in text markup claims to be designed for all levels of users. In our use of the markup language, however, we found it too difficult to memorize. We also realized that pages with more complex layouts were very confusing when viewed through MediaWiki's text editor. Without a clearer method of creating and editing pages, our wiki could not be used as an effective collaboration tool.

We installed a MediaWiki extension called Semantic Forms which simplified page creation significantly. Implementing Semantic Forms allows for the creation of wiki pages using predefined forms. Much like a paper form, a semantic form is a list of fields where users can input information. A page is then automatically created based on the form input. By using a form, users can create project tickets with the required information (title, supervisor, description, etc). Users could also edit pages using forms, eliminating the need for average users to ever view a page's source code.

Not only did we make the wiki pages easy to edit using forms, we also automated several wiki processes. As mentioned before, when a user creates an account, a user page is set up for them automatically. The page will automatically display any of the user's projects. The user can add his or her research interests as keywords on this page (again using a form to edit), giving wiki users an easy way to find others with similar interests while also providing them with easy links to all projects that the user may be interested in.

We found a way for users to categorize pages they create based on keywords. Pages in the wiki can be viewed and sorted by these keywords. To add a keyword to a page, a user simply edits the page and inserts keywords or methods. This not only categorizes the page, but also creates a link to the keyword definition page. For example, if a page had the "Stock Market" keyword a link would be created to the "Stock Market Category" page. Each keyword's page lists every page that is tagged as a member of that category. Users that include a keyword in their list of interests will also appear in the results of a category search. If a user links to a keyword that does not exist, he or she can easily create that keyword page. Making keyword tags easy to create and use helps keep the wiki organized.

It was Professor Didenko who answered our question on how best to display the wiki's information to users. Professor Didenko's plan was to use a tagcloud to display the wiki's categories. A tagcloud is a way of displaying text in a visually useful way. In our case, the tagcloud works like list of categories on our wiki. Next to the text in the cloud a number displays the number of pages on the wiki associated with that category. Categories with the most articles display in large text and categories with few articles are displayed with smaller text.

There are still some design challenges to overcome on our wiki. Not every feature we wanted to include had a perfect solution. Editing category pages to add descriptive text or further links requires utilizing the wiki editor. We attempted to make the instructions for adding information to category pages clear, however, the process might be confusing for people unfamiliar with wiki editing. This same problem extends to the creation of pages that do not have associated forms, such as discussion pages.

3.4 Hosting the Website

The purpose of relocating the website from the campus' network to the internet was to allow for distant branches of the university to have access to the site. Making the wiki accessible through the internet provided the opportunity for the long-distance collaboration that our sponsor hopes to encourage. Though it was necessary for the International Financial Laboratory to purchase web hosting rights, hopefully the value of the collaboration potential with the software is worth far more than the cost for hosting.

Since millions of people could potentially have access to the website, we had to ensure that any information supplied by users was protected. We needed to make sure that only registered users could view our website. We restricted the permissions on our website to users with accounts only. By preventing anonymous access to the site, we ensured that any information that was not intended to be released to the public would be hidden from all but those who are qualified to view it.

To introduce students to the wiki, our team hosted a webinar tutorial: a demonstration of the software to potential user. Appendix D holds the script our team used when performing the webinar. Students gathered in several of Financial University's branches and watched as we demonstrated the wiki's features live on a projected screen. We were able to introduce the

students to all the different page types on the wiki and how to compose and edit their tickets. We conducted the webinar in English while Professor Didenko stood by and translated.

Hosting our website also required training administrators to take over our team's duties. Once our project came to an end, we would be unable to work as administrators for the website. Professor Didenko became the first true administrator of our wiki. We personally instructed him in the system operations of the wiki, including a) confirming accounts, b) monitoring uploads, and c) policing the wiki. We also instructed him on making changes to the forms and templates that control ticket creation, in case he desires to add additional fields to ticket forms. In addition, we wrote up an administrator's guide for the wiki that explains all of the expectations for administrators.

4. Project Results and Analysis of Findings

The result of our project was the development of the Financial Laboratory's website for collaboration. The website we created is currently located at finlabwiki.org. The measure of our success is drawn from finlabwiki.org's ability to fulfill the goals and problems that were proposed to us, as well as the student/professor response to working with the wiki. We were very interested in learning more about the significance of this project and the pros and cons of using MediaWiki. Included in our findings sections is an analysis of our product and the responses from wiki users.

Professor Didenko was very interested in the completion of our project. He has high hopes for the growth and expansion of this project through the years. Not only is our website of high interest to students that wish to learn about real-world problem solving, but it is also exciting to think about the project as a tool for many schools and companies to use in order to solve problems of concern to the wide world. Though the website serves its purpose well, it also has areas where it can be improved, clearing the way for future projects.

4.1 Product Description

Our methodology chapter discusses the steps we took to build our final project. In this section we will again outline the functions of our website as it relates to our findings about user response to the wiki. The website provides users with a centralized location to store information. Because our website was built using MediaWiki, it provided users with an excellent system to create and organize webpages. A wiki page is a webpage that can be categorized and formatted to display information. The website we created is designed such that users can create pages associated with themselves, their projects, and their interests.

It was easy for users to create accounts and begin contributing to the wiki. We were able to confirm the accessibility of the wiki after our introductory webinar. The students helped us to make improvements to the wiki that we had not originally thought about. We added the ability to sort projects by language since projects could be in either Russian or English. Students that created accounts during the webinar were excited to beginning working on projects and making connections.

Students were given the tools they needed to create projects and find collaborators immediately after their accounts were created. The process of connecting students with similar interests was dictated by page categories (sometimes called "tags"). Users simply added the tags that interested them to their user page. A user's tags were displayed in two forms, once as a "cloud" of keywords, and also as a list. The list of tags displayed how many pages on the wiki included the tag. We found that it was important to include the number of pages that had a specific tag so that users could easily identify when new pages of interest were created. Feedback from users suggested that they wanted to know when new tickets were created with a

specific tag so that they could identify projects of interest. **Figure 1** shows an example user page with the tags on display.

Figure 1: Example User page.

It was easy for users to find others with similar interests. Additionally, since a user's page displayed a list of projects they had worked on, anyone viewing the page could view that user's projects. By viewing each other's projects, users decided whether they wished to work together. Interests brought users together, and viewing previous projects gave users a sense of what quality of work to expect from others.

The process of ticket and tag creation allowed for the wiki to grow organically. The ticket model was an important part of Professor Didenko's vision. Tickets were designed to give users information about a project in an organized and recognizable way. Every ticket in the wiki follows the same template so that information is uniform. An example ticket is displayed in **Figure 2**. We wanted a ticket to have a flow. The information in the table in the top right is meant to serve as a quick reference that lets people know if they would be interested in the ticket. Inside the table, the supervisor, author, and members are listed along with information about related projects, and the projects keywords. Information outside the table is more detailed information about the ticket, like the description, the methods, and the database used.

Anyone viewing a ticket has connections to many other places around the wiki. For example, a user can visit the user pages of the members of the ticket by clicking on their names in the information table. Clicking a keyword gives users access to a list of pages associated with that keyword, and the predecessor and successor are linked on each ticket.
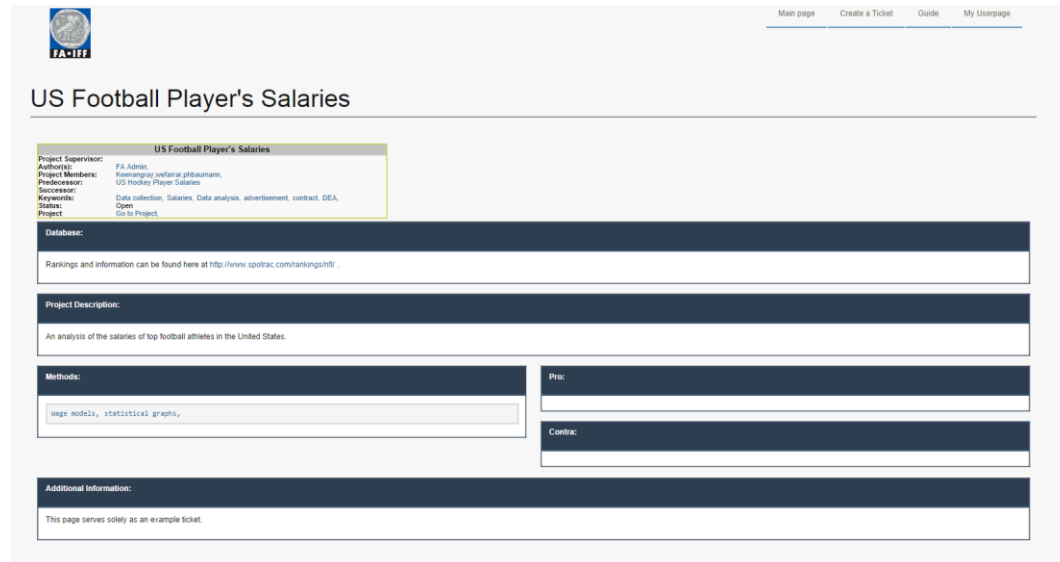
Figure 2: Example ticket page.

Users did not have to create category pages before including those categories in tickets since the category page could be created from the ticket page. Likewise, if a user was part of a project then that project is automatically displayed on the user's page. The ease of access made our wiki very popular among the students.

Another benefit of using the wiki was the opportunity for students and professors to interact outside of the classroom. The "User Talk" namespace allows students to talk with each other as well as professors. These conversations are available to all users of the wiki so they can check there for answers when they might have similar questions. A talk page is available for all pages created on the wiki, meaning students can discuss tickets, categories, and projects alike.

Teaching others to use the wiki was not as challenging as originally thought. Because we had designed the wiki to be user friendly, it was easy to show users how to create and edit pages. The Semantic Form extension provided us with an easier way for users to add information to the wiki. **Figure 3** shows part of a form used to create a ticket on the wiki. **Figure 4** shows some of the wiki code required to generate that page. Without the use of forms, users would have to insert their descriptions directly into the wiki code, which would be far too confusing for the average user.

Figure 3: Form for editing page.

Figure 4: Wiki markup for editing page.

We had a desire to create pages that had a distinct look, allowing the website's usability to be clear and simple. Ticket pages contain tables at the top which display relevant information such as the project supervisor, project members, the author, and associated keywords. Separate from this table is the project description, list of databases, and methods sections. The text on each page was organized so that every ticket would have the same appearance. If users were responsible for creating their own styles, then every page would lack uniformity. The recognizable structure of each page of the wiki is significant to its purpose, because users will design their future tickets based on other tickets within the wiki.

The Bootstrap skin extension of MediaWiki allowed us to add style and uniqueness to the website. This extension helped us to deliver a polished product without compromising functionality. Rather than the website's appearance being unappealing and hard to maneuver, we were able to use the Bootstrap skin extension to create a visually attractive website providing more apparent, easy-to-use features.

4.2 Student Response

The development of our wiki was the most significant chunk of our project. We did not have time to develop interview questions or monitor the use of our wiki for more than a few weeks. In our webinar the wiki was introduced to one of Professor Didenko's classes, faculty from other Financial University branches, and over 80 students in Omsk, Russia. Despite the number of students we presented to, only a small number of accounts were created. At the time, the students were working in teams and only one team member created an account. We expect the user count of the wiki to grow considerably but unfortunately the time constraint on our project restricts us from a full analysis.

Student response to the wiki was incredibly positive, as students did not hesitate to ask questions and request features that would aid them. The desire for a system like ours was clear. Students at the university were looking for a centralized location for all their research ideas and progress to be deposited. We were unable to distribute surveys and gather conclusive data about how the students felt about our wiki but we feel that the website gives students the ability to collaborate with others that share similar interests. If further analysis could be performed in the future, we encourage research teams to conduct quantitative as well as qualitative analysis of whether students developed better practices from use of the wiki. Also including which features proved most useful and which were the most problematic.

4.3 Engineering in a Social Context

Professor Didenko's hope for this project was to improve student research practices by connecting them socially online to discover, share, and complete research. The goal of effective online collaboration has been discussed frequently within this report. We have analyzed tools, read case studies, and developed a tool of our own. Even when not being used to communicate over vast distances, the internet serves a purpose of improving social connectivity.

Tickets and their associated projects were stored separately. This was done with the intent that students would be able to read the short ticket description, before diving in to read or work on a project. An important feature of our contemporary global society is the ability to look at precedents and examples before taking on a challenge. Humanity is becoming more and more connected and it is important that we can learn from others. Our project embraces the hope that technology can be used to further human knowledge.

It came as no shock to us that our webinar tutorial was broadcast to students thousands of miles away in the city of Omsk, Russia. The internet allows people to connect to one another in incredible ways and we hoped from the beginning it would not just be students in Moscow using our wiki. In the future, we hope our project will continue to be expanded and built upon by other IQP project groups to the point where, one day, it might reach an international level.

4.4 Limitations

Despite our best efforts, there are features we were unable to implement in the current version of our website. MediaWiki is written in the PHP coding language, which none of us had prior experience using. We were able to use MediaWiki extensions to implement the functions that we needed but several things would have required writing our own code, which we lacked the time and skill to accomplish. Some major functionality missing from our website include:

- A fluid notification system that updates users when pages are created that might interest them.
- The ability to suggest keywords and projects to students based on interests.
- An improved system for confirming accounts.
- A system to police content to ensure all pages are wiki-appropriate.

Another limitation of our project concerns the analysis of the wiki itself. While we were able to speak with users of the wiki and observe its use over a limited time, we do not have an understanding of how the wiki will grow over the next year. The early adopters of the wiki provided us with useful feedback, but we will not be around to watch the wiki as it grows. Also, because the user base was small during our analysis, we were unable to test the wiki under the strain of a massive amount of users. If many people were to access it at once, the server might not be able to handle the load. Even if the webpage could handle the requests, it might suffer large speed reductions.

5. Conclusion

Our project's goal was to design a system through which students and researchers at the Financial University could share research ideas and collaborate on research projects. The system was outlined by our sponsor, Professor Alexander Didenko of the Financial University. Professor Didenko had been nursing the idea of an online environment that could be used for the sharing and promotion of research done by students at the university.

Our team sought information on software we could use to develop this system. We decided to create a website using MediaWiki, the framework powering Wikipedia. Our decision was based on the desired functionality of the website we were to develop. The website needed several things:

- Tickets serving as the basic building blocks of projects
- User pages with lists of interests
- Keywords allowing for an intelligent project searching system
- Areas to upload necessary files of a variety of types.

Creating the website was a major focus of our time and effort. When it was completed, we introduced students to the website and they became our first official users. Unfortunately, time constraints limited our ability to analyze the wiki's use beyond the first few weeks of its launch. The wiki gave students the ability to create tickets for projects associated with their interests. Existing tickets served to inspire future tickets. As new users join, they will be able to find other students that share research interests. New users can also learn a lot by browsing through completed tickets. The website is an excellent tool for the International Financial Laboratory. It serves both an educational and a functional purpose, since the users are doing real-world analysis and addressing present-day economic and financial problems.

We view this project as a successful implementation of a collaborative wiki. Having little experience with wiki's in the past, our group emphasizes that wiki's have an appropriate place in the world of academia. MediaWiki makes installing a wiki easier than one might think. While some advanced computer literacy is necessary to get a wiki online and install extensions, it shouldn't be very difficult for an IT department of a company or school to get a wiki running.

Additionally, MediaWiki is incredibly flexible. Looking at examples in Appendix C it is immediately clear that a wiki can be applied to many different tasks.

It is our understanding the Financial Laboratory is pleased with the ability of the wiki we have installed for them in meeting their specifications. Despite minor differences from what we set out to do in the initial project, this project has been a success. Our hope is that the wiki will remain in use by the lab for many years. Additionally, we offer many recommendations for future updates to the project.

Recommendations

Data:

- During our time, we did not have enough time to collect data on the user satisfaction with our website. Aside from having our emails available for feedback and concerns, it would be more beneficial to perform individual surveys, for example. We definitely recommend this as a priority in order to have data trends on the satisfaction or dissatisfaction with the use of the website. Having this information allows for specific parts of the website to be tested or fixed in order to appeal more to the users.

- An analysis should be conducted on the capacity of the website. This should test how many people can access the website at once before the server experiences difficulties holding this amount of users. Performing these tests will give insight into the future of the website and possible upgrades that could be made for the server.

Technical:

- Looking forward it would be ideal to have a more elaborate notification system. This would be a convenience for attracting more users. It would include notifications for invitations to work on projects and tickets as well as keyword notifications when projects are created that may interest that user.

- As of now, we have a system that will create project pages from ticket pages and user pages upon create creation. While our systems are good and only require the user to save the page to create it, we recommend making this a smoother system in the future. We hope that the middle "saving" step could be taken out of the process completely and the pages could eventually be automatically generated.

- At the moment users are capable of manually inputting their interests using keywords. A recommended feature is the implementation of a system that would suggest keywords for users based on their interests and already existing keywords. The suggestion system could also recommend tickets to users so they could conduct research within their interests more easily.

- There is a good deal more automation that could be added to the wiki. Firstly, the confirmation of accounts is currently done by an administrator after a user requests an account. However, the administrators of the wiki can't constantly be online to

review applications. The account requesting process could be improved if administrators were notified by email when an account is created or if users could view the wiki with limited permissions after requesting an account.

- Another issue that may arise in the future is ensuring that all content on the wiki is appropriate and that there is no duplicate information. MediaWiki gives administrators the ability to patrol pages but at the moment there are only a few administrators for the wiki. In order to respond to project growth, the financial laboratory will need to promote more administrators on the wiki.

It is clear that this project holds a lot of importance to the Financial Laboratory at the Financial University. The project has accounted for the majority of functions requested by our sponsor in the Project Description. The website we have created is currently in use by students at the university. Throughout the course of this project, much has been learned about online collaboration. By developing our own system we were able to make our own decisions and create something incredibly functional. We look forward to hearing about future projects associated with our collaborative website that demonstrate and expand upon its functionality.

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Appendix A: About the Financial University under the Government of the Russian Federation

Dear Colleagues,

Financial University is one of the leading Russian institutions of higher learning with more than ninety years' history. During these years, we have been accumulating and passing on to the new generations our pedagogical, scientific, and organizational experience. Intensity of the educational process, involvement in progressive developments, readiness to embrace large-scale transformations, quick response to changing life challenges and ability to meet them have always distinguished this higher education institution.

Having preserved achievements and the best traditions of the Russian and Soviet higher school, we have enriched the educational process by constantly introducing efficient up-to-date educational technologies, thus providing high quality professional training and research work.

The Financial University has always been open for cooperation with foreign partners. Today it is a truly international university both in terms of the student body and the nature of its activities, a university which is becoming actively integrated into the European and global educational and research community.

Year by year the University has been developing its powerful academic, intellectual and creative potential, which we can now, by right, take pride in, and has been shaping its humanitarian traditions, which we are cherishing and keeping up, acquiring valuable experience in training top-class specialists. It has always been distinguished by its unique academic and teaching staff. The scholars of the University have made an outstanding contribution to the development of Russian economic science. Renowned economists, heads of scientific research schools, authors of textbooks and monographs used by many generations of Russian and foreign financiers and economists have worked and still work here. While holding advanced positions in Russian economic education today, we face the future with confidence and work for the benefit of the future by contributing to the development of our country's economy and wellbeing and prosperity of its citizens.

Mikhail A. Eskindarov

Rector of Financial University

under the Government of the Russian Federation

Doctor of Science (Economics), Professor,

Honored Scholar of the Russian Federation

Appendix B: Initial Project Description
INTERNATIONAL MEDIA LAB DEVELOPMENT
Project Title: Online knowledge base and research management environment for connecting young researchers, promoting reproducible research and social science collaboration
Local Sponsor/Partner: *International Financial Laboratory*, Financial University
Project Liaison:
Alexander Didenko, INTERNATIONAL FINANCE FACULTY/DEPARTMENT Deputy Dean
alexander.didenko@gmail.com; Tel: 8 903 5490032; website: iff.fa.ru

Project Description & Goals:
Motivation for this project is the need in modern Russian universities to find cost-efficient ways to integrate young (masters and PhD students) researchers, spread across all regions of Russia), with potential partners abroad, by building cross-cultural, cross-disciplinary, multimedia social environment for sharing and storing knowledge and managing group research activities.
The situation with scientific research and preparation of researchers in Russia is currently marked by misbalance. On the one hand, there is a good research base persevered from the Soviet times in natural and technical sciences. On the other hand, research in the field of economics, management, business, and social sciences is lagging behind standards established for these disciplines abroad. Likewise, representation of the Russian research in scientific journals – both natural and social ones – is far from what it should be given the scale and the potential of our country. The majority of young people in Russia who could become interested in research work have good computer skills, could read and write in English and have the experience of using social networks and of multi-media. However, they are out of the loop of the international research process (this is especially true of the provinces) because they have a very vague notion of how a scientific investigation should be conducted today. The research they perform as part of their formative training is very formal in character and does not promote finding solutions to real-life problems. At the same time, Russia faces a multitude of burning issues in its everyday life in the area of sustainable development, specifically in the realm of climate change, urbanizations, materials use, globalization, demographics, water and food security, energy security, public health, energy efficiency, security of its ecosystems, forest security, renewable energy, smart systems, sustainable way of life, etc.

Addressing such issues is in the hands of young people whose lives are directly shaped by conditions they will find themselves in. Successful collaboration could be multi-disciplinary and multi-regional – to include experts who have access to different experience as part of their professional activity or as part of being residents in a certain region of the country. Research into finding solutions to these problems could become subject of publications and serve as a contribution on the part of Russia's young people to the international research process.

For three years now, our Laboratory is trying to work out the elements of the proposed technology. Initially, we were in need of organizational and IT-technology, which could allow for collaboration of master's and bachelor students with "senior" researchers as part of diploma and dissertation research efforts. The system has to support cutting-edge research as well as ensure continuity of research efforts, reproducibility of the results, options for long-distance work and preservation, archiving and exchange of accumulated data. With time, the following vision of the optimal system emerged.

Software has to be a combination of blogs servicing, Wikipedia and project management software. Software is the central element of organization of the process of generating scientific knowledge. MediaWiki allows for preservation of documents of varying formats (text and graphics, audio, video, presentations, databases, codes and models of programs, etc.), while being effective at controlling and keeping track of versions of documents, determining access rights, commentary, collective document work and a number of additional functions. The database keeps presentation and videoconferencing materials (audio files, presentation files), literature reviews, quantitative models and databases (as direct products of the Laboratory efforts as well as student work performed as part of compiling in-depth literature reviews), articles encyclopedic in nature, dissertations and other materials accompanying the research work or being the result of it.

Projects that are still under development are tagged by the system as research tickets – short descriptions of research goals in 1-2 pages specifying goals, tasks, research sources and the expected results. Ticket could be granted a certain status, assigned rubrics, merged or separated, assigned to teams and executors. Ticket could have its ticket-parent and ticket-heir. After the project is completed, the team or executor have to introduce several new tickets into the system based on the previous one. As soon as the new goal or problem that forces the research in a new direction is identified, it is introduced as a new ticket. Principal investigator (PhD) or a group of investigators on the project serves as a ticket supervisor. If the project acquires executors, they fall under the management of the supervisor.

To become an executor, a student or student team has to put together a proposal (4-5 pages long), specifying the vision of the problems and ways of solving it, a short review of existing literature on the subject as well as proposes the timeline indicating hash marks and milestones of the project's progress. Proposal is stored in the database, reviewed by the supervisor, who could, if necessary, make corrections in dates and in facts, which the student could either accept or not. All versions of the proposal, all commentary and online discussion are stored in the database. After meeting with the Principal Investigator or after the management meeting, the executor writes a short half-page note stating his or her understanding of what was the instruction and what was the assigned task. Note and comments of the supervisor are stored in the database.

In the course of work, students analyze peer-reviewed papers from international journals following a special plan. Article descriptions are entered into the database, which facilitates entry for subsequent students and student teams. All models in R-project, Matlab/Octave, etc. along with entry data are stored in links to students' original research and documentation on the models' use.

Groups coordinate their activities and exchange experiences at meetings moderated by their instructors.

Student meetings («seminars») could take place online or offline (audio and screencasts are stored in the database). The system also performs the selection of students for a meeting based on their interests. Let's say a given group of students is researching energy efficiency of the Public Housing Sector using DEA. Another student engaged in evaluating hospital productivity levels has parsed and replicated in a new DEA method, with an article written on it just recently. His review is automatically recommended by the system for the student group about to have a meeting to discuss DEA topics, and this student could be invited to exchange knowledge and experience. Another time, the same group could invite to the meeting another group studying energy efficiency of agriculture. Since all the materials are tagged and assigned rubrics by the user, the system recommends the relevant materials all by itself. And since all the research results are stored in the system along with all the documentation, models, discussion history and the code, the group could master these methods and process this information independently. Thus, know-how and information does not leave the university community with the students' graduation, but continues to inform new students that move this field forward.

Such a system will allow extending collaboration among students in different regions in the country and in different countries and becoming a medium where joint projects could be performed by, among other parties, the WPI and the Financial University students. Our University currently has over 30 in different regions of the Russian Federation. We could use this structure as a base platform for developing core models of collaboration and software adjustment.

Tasks
1. To systematize the required user experience and to structure tasks that the system is facing.
2. To analyze existing technologies: Wiki technologies, long-distance collaboration technologies, database technologies, reproducible experiment technologies.
3. To decide which products could be productively integrated
4. To perform programmatic integration, unroll the system, perform user training.

Appendix C: MediaWiki Website Samples

Mono Project

Krass.com

This is krass.com (A Techno Wiki).

Here you can find information about Techno in Barcelona, Germany and London.

The website is using a wiki software like wikipedia, this makes it possible for anyone to change pages and to update information. You can edit most pages right away, or you could create an account at the User Login page to start adding and changing information.

There is also a small archive of photos, flyers and links. And a directory for clubs and DJs.

Christof
damian@krass.com

What's Up?
Sónar 2006
List of Festivals
Poller Wiesen
Calendar

Barcelona | Germany | London

directory : photos | flyers | clubs | djs | labels | links , Search

Article Discussion **Edit** History unprotect Delete Move Watch
Christof Damian My talk Preferences My watchlist My contributions Log out
Main Page Community portal Current events Recent changes Random page Help Donations
What links here Related changes Upload file Special pages Printable version Permanent link
About krass Disclaimers

Wikimini.org

Wikimini, l'encyclopédie des enfants

Bienvenue sur Wikimini !

Wikimini est une **encyclopédie** en ligne **écrite par des** *enfants* **et des** *adolescents*, aidés des plus grands. Elle est gratuite et compte actuellement 14 294 articles et 22 791 Wikiminautes!

En classe ou depuis chez soi, **chacun peut participer** à cette belle aventure collective.

Rechercher

L'image du jour

Appendix D: Webinar Script

Introduction:

Hello students of Financial University, I am Will Farrar and these are my colleagues Keenan Gray and Philipp Baumann. We are students from Worcester Polytechnic Institute in the United States. Over the past few weeks we have been developing a website designed to facilitate collaboration among students with an interest in financial research. The website is under a wiki format meaning, the more people that join and contribute content to the website, the more powerful of a resource the website will become. Today we would like to show you some of the features of this website so that you can begin working towards your research goals.

Let's get started, the website can be accessed through the domain finlabwiki.org. When you first access the page you will be prompted to login. Clicking the "login" link takes you to a page where you can login, if you have a previously existing account, or request an account. We will show you how to request an account by clicking the "request account" link. Anyone without an account will not be able to view the site freely, so, if everyone with access to a computer could take a minute right now to fill in the required information and request an account that would be ideal. Once you are approved you will receive an email, on the email address you entered, with your password and you will be able to login to the wiki. Anyone unable to do this will have to follow along with my screen. Throughout the webinar, we will do our best to approve all the accounts so you may explore the website.

[[**Sign In]]**

Now we'll sign in to my account in order to show you around the wiki. The first thing you will see after logging in is the main page. There are three things to take note of on this page. Projects you are currently involved in, your keywords cloud, and a list of recently created tickets. This information is different based on the user who logged in to the wiki. For example, these are the projects that I am involved in and the keywords that I chose. If Keenan were to log in right now, his projects and keywords would be his own, that he personally chose. This same information is displayed and viewable by others on your user page. You can access this by clicking on "My Userpage" in the top right, which we will do now, or by typing it into the search bar. [[**Click User page]]**

Now let's talk about these three categories in more depth. The My Projects table will automatically display all the projects with your username listed as Supervisor, Author, or a member, this makes it easy for others to see the projects you've created or are associated with. The My Keywords heading will display your keywords cloud, which consists of keywords you have specifically chosen as your interests. To add keywords to your page, click on "User page→Edit" and type keywords into the keywords box. . Clicking on a keyword will bring you to the category page where you can view all users, projects, and pages that have that keyword. Additionally on your userpage, you will also be able to track how often these keywords are used via the links below your cloud. These links have an updating number next to them that will show you on how many pages they appear on the wiki. Clicking one of these links will show you exactly what pages they are on. (Show DEA) For example, DEA is a part of these two projects as well as on my userpage, it is a part of 3 pages, denoting the number 3. (Go back) Now,

if a Keyword category doesn't exist, for example entrepreneurship, you can create the category page for that project, just click the word, add a description and press save.

The third item on this page is the New Ticket table, which displays all new and open tickets, meaning you can request to join these tickets. A Ticket, you might be asking, is a proposal for a new project that you would like to work on. A ticket must be proposed in order for it to be approved by a supervisor or professor so that one or a group of students can begin collecting data and research on that project. Now let's create a Ticket: To create a ticket, use the "Create a Ticket" link. As the page explains, you can enter a title for your ticket and press "Create or Edit". If you create a new page, for example **[[Enter Example Title]]** you will be brought to a form page with blank fields that will be used to create the ticket. Let's go back now and look at a ticket that we have already created. Enter **[[Webinar Ticket Name]]**. Since we have already created this ticket, we are brought to an edit page that has the forms filled in already. We will scroll down and hit "Save" to view this ticket. You can also visit this page by clicking a link you find on the wiki or searching for the page title. Much like the user page, to edit a ticket page, just click "Page→Edit" and you will be brought to the form for editing the page.

Let's talk about some of the fields in the ticket form:

In the Project Supervisor, Members, and Author fields, you should enter the usernames of people working on the project. It is important that user names be entered instead of real names for the best results. For example, under members we have entered Wefarrar instead of my real name which is Will Farrar. This allows these items to be linked back to your account and userpage.

Next, The Project Predecessor and Project Successor fields hold links to other projects within the wiki. If your project draws inspiration or key material from another project, put it under predecessor. Also be sure to edit the predecessor's ticket with the new project as a successor in order to link the projects together, as demonstrated with the project "US Football Player Salaries" and "US Hockey Player Salaries".

Next are the Methods and Keywords fields. Values entered into these fields can be used to create wiki categories. Creating methods and keywords works the same as creating keywords on the user page. You simply type them into the field and if they exist it will show other pages that include those keywords or methods. If they don't exist it is just like the userpage, click the link, edit the description, and click save.

The final important field in the ticket form is the Status field. New tickets are given the "Newly Created" status to mark them as new projects that have yet to be opened by a supervisor, this also links them to the front page under the "New Tickets" table. Once a supervisor "Opens" a ticket, this also creates the "go to project" link on the ticket. Clicking this link and saving the page will create the "Wiki Project" page identical to the ticket associated with the project. The major difference here is that the page is in the "Wiki Project" namespace, indicating that it is a project and not a ticket meaning it is ready for data collection and research.

That sums up our presentation on the use of our wiki. Please take note that this wiki is still a work in progress and will be subject to change. Whenever you find the time, feel free to create an account for the wiki and it will be approved in a timely manner. We will now take any questions or comments.