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QLectives introduction

QLectives is a project bringing together top social modelers, peer-to-peer engineers and physicists to design and deploy next generation self-organising socially intelligent information systems. The project aims to combine three recent trends within information systems:

- **Social networks** - in which people link to others over the Internet to gain value and facilitate collaboration

- **Peer production** - in which people collectively produce informational products and experiences without traditional hierarchies or market incentives

- **Peer-to-Peer systems** - in which software clients running on user machines distribute media and other information without a central server or administrative control

QLectives aims to bring these together to form Quality Collectives, i.e. functional decentralised communities that self-organise and self-maintain for the benefit of the people who comprise them. We aim to generate theory at the social level, design algorithms and deploy prototypes targeted towards two application domains:

- **QMedia** - an interactive peer-to-peer media distribution system (including live streaming), providing fully distributed social filtering and recommendation for quality

- **QScience** - a distributed platform for scientists allowing them to locate or form new communities and quality reviewing mechanisms, which are transparent and promote

The approach of the QLectives project is unique in that it brings together a highly inter-disciplinary team applied to specific real world problems. The project applies a scientific approach to research by formulating theories, applying them to real systems and then performing detailed measurements of system and user behaviour to validate or modify our theories if necessary. The two applications will be based on two existing user communities comprising several thousand people - so-called "Living labs", media sharing community tribler.org; and the scientific collaboration forum EconoPhysics.

Executive summary

In this deliverable, we describe our progress toward QScience during the previous year. This year we have made the crucial decision to use a content management system (CMS) as the platform for development of the EconoPhysics Forum as well as for QScience v2, v3, and v4. The evaluation process that brought us to this conclusion focused on the following questions:

1. Do we need to refactor the EconoPhysics Forum code?

2. Shall we use an existing CMS?

3. Which CMS fits best our needs?

Reckoning with the gap between the functionalities that we would like to offer in QScience, the current stage of the EconoPhysics Forum code base, and in particular given that:

1. our developing man-power is limited,

2. the project is ambitious,

3. users don't care about the underlying implementation,

4. CMS have big communities behind them,

5. the security aspect is, in general, carefully checked,

we decided that a CMS could actually help our development. From the existing popular CMSs we have chosen Drupal which is an open source content management

platform powering hundreds of thousands of websites and applications. It is developed, used, and supported by an active and diverse community of people around the world.[1] In the second half of 2010 we have successfully implemented most functions of the current EconoPhysics Forum in a new Drupal version.

The second important decision concerns the concept of QScience. This concept, which had been rather uncertain before, has crystallized and now relies on creating suitable conditions for the evolution of individual instances of QScience. Similarly to biological populations, this "evolution" would be facilitated by three main processes:

1. *Replication*, which in our case would be represented by creating new instances of QScience where it should be possible to copy settings of an existing instance, thereby allowing for replication of instances.

2. *Variation*, which in our case would be represented by the possibility to modify the settings.

3. *Evaluation*, which in our case would be represented by a central QScience site providing an overview of existing instances and their performance characteristics.

To enhance the evolutionary process, all three processes need to be carefully prepared to make it easy for the users to access and use them (for example, by offering the possibility to host new instances on our servers or by preparing a set of predefined instances that would cover typical user needs). Practical realization of the described concept of evolution of instances will be the main task for the rest of the QLectives project.

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[1]See `http://drupal.org` for more information.

Contents

Chapter 1

Introduction

In this deliverable, we describe our progress toward QScience during the previous year. First we deal with specific components of this progress which are represented by technical reports and development plans of the EconoPhysics Forum.[1] Perhaps even more important is Chapter 5 where we motivate and describe the goal and future shape of QScience. While this part of work is still in its initial stage, it is of great importance because it will soon delimit our future work on the QScience platform.

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[1]EconoPhysics Forum is a web-based publication which serves as a community ideas exchange platform for the community of interdisciplinary physics—see `http://www.unifr.ch/econophysics`.

Chapter 2

Why use CMS Drupal

We have decided to use Drupal (an open-source Content Management System) as the platform for development of the EconoPhysics Forum as well as for QScience v2, v3, and v4. The evaluation process that brought us to this conclusion consisted in answering the following questions:

1. Do we need to refactor the EconoPhysics Forum code?

2. Shall we use an existing CMS?

3. Which CMS fits best our needs?

Do we need to refactor the EconoPhysics Forum code?

After inspection of the code, we agreed that the current EconoPhysics Forum code base was not designed in a modular way and major modifications would need to be introduced in order to meet the goals of QScience.

Shall we use an existing CMS?

To answer this question, we used the following table to guide our judgement in this delicate part of the decision process which would affect all future project development.

Using an existing CMS

Pros	Cons
• Architecture already defined	• Learning a new CMS
• Most security issues covered	• Adapting the current code into the CMS
• Many social functionalities are already implemented	• Future limitations are not foreseeable now (for sure there are some—they will arise during implementation of more advanced features)
• Nice templates already available	
• Community available (to get help from, to involve)	• Quality of the code is not always guaranteed (specially with user-created modules)

Refactoring the current EF codebase

Pros	Cons
• The code is already there and running	• Major architectural revision required to introduce modularity
• Great freedom for developing further extensions	• No extra community to involve (for now)
• Not vulnerable to known CMS security bugs	• We need to create many little side functionalities already available in a CMS
	• Lack of tools for code checking and debugging

Furthermore, we considered how a specific choice would impact the particular goals that we want to achieve with the EconoPhysics Forum (EF)/QScience. Here follows a list of the key features that we want to implement:

- **Replicable Component:** The EF would be the standard instance of a QScience community.

    – Such instance would be replicable for any other scientific community.

    – Easy personalization of the instance is crucial.

- **External Platform:** The EF would connect to a scientific platform from which it would get data about:

    – Users

    – Papers

    – Rankings/Reputation

    – Other shared data (news, events, jobs opening,...)

- **Plugins:** The EF functionalities could be expanded through plugins.

  - These plugins would be downloaded from the scientific platform or other repositories in the future.

  - Plugins' scope would be broad enough to cover social and scientific utilities.

- **Open API:** EF and the the web scientific platform would talk to each other through an open API (a REST or SOAP web service – or both).

- **Distributed Login:** If you would login in the EF, you would be logged-in automatically in all other communities connected to the platform.

Reckoning with the gap between the functionalities that we would like to offer in QScience and what is the current stage of the EconoPhysics Forum code base, and in particular given that:

1. our developing man-power is limited,

2. the project is ambitious,

3. users don't care about the underlying implementation,

4. CMS have big communities behind them,

5. the security aspect of CMSs is, in general, carefully checked,

we decided that a CMS could actually help our development. The only thing we did not know (and we still cannot know) is what will exactly be the future limitations. We will face them for more advanced operations but we are aware of this issue while taking this decision.

Which CMS fits best our needs?

With the goal of re-using (with minor adaptations) and integrating portions of the old code base in an existing CMS, we decided to look among PHP CMS's for the ones that could fit best our needs.

We used as a starting-point review articles about present best PHP-based CMS[1] and decided to test for two weeks three top ranked CMSs (EzPublish, Joomla and Drupal) to understand how well they could fit our needs. We filled out a questionnaire (see appendix) which was created to investigate the strong and weak points of each CMS software relatively to our goal.

Results

EzPublish was discarded rather quickly because it appeared to be a problematic piece of software with some performance problems. Moreover, its community is probably the smallest one among the three CMS candidates.

Between Joomla and Drupal, we eventually opted for Drupal for the following reasons:

1. We already have on board a skilled user/programmer (Kornél Csernai, University of Szeged).

2. Drupal's community is bigger than that of Joomla.

3. Drupal is using jQuery as the Javascript framework, which is likely to be a long-term adequate choice and which we already had some experience with.

4. Drupal architecture is based on the concept of modules.

5. It seemed that Joomla suffers from frequently appearing security issues.

In particular, the community factor was very important in making up our mind in the final decision. A large community can really make a difference. Moreover, we hope to convince some independent Drupal developers to join our efforts, even if only occasionally.

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[1]In particular, http://cms-software-review.toptenreviews.com and http://designerfoo.com/php-frameworks-first-glimpse-for-beginners.html.

Chapter 3

The Drupal Content Management System

We have chosen the Drupal CMS to be the new base of the EconoPhysics Forum. While this means that we had to make an effort migrating our already existing system, we believe that in the long run, this choice is going to be beneficial. In this chapter, we describe some of the technical details of this new system.

3.1 The Drupal community

Drupal was started as a simple project in 2001. Since then, it has grown tremendously. One of the biggest advantages of using Drupal is that it has a *large community*. As of now, 3 000+ people are actively developing, and drupal.org has 800 000+ registered users users with 7 000+ projects.

The Drupal community provides us with many already existing functionalities, most of which are user-friendly, efficient, secure, well-tested, generic, and extendible. We can focus on the actual implementation of the major contributions of QScience instead of having to worry about the smallest technical details. Also, having many people use Drupal as their production website, it means that it has been tested very

thoroughly.

There is a wide variety of support available, including online documentation, forums, guides, IRC, and discussion groups. The project is well maintained and documented. There is an online issue tracker and a patch revision system. They use CVS as a versioning system.

3.2   Modularity

The problem we have with our current EconoPhysics Forum implementation is that the system is not modular at all. It is not straightforward to extend it or use a subset of its features. Let alone replicating parts of the site with ease. On the other hand, the main advantage of Drupal is that it is very modular.

In Drupal, every major content (such as a news item, blog post, etc.) is called a *node*. This generic type can later be customized by the site administrator. We use this heavily in our implementation.

The Drupal architecture has three major components: the *Core*, the *module*s, and the *theme*s. The Core handles the modules, themes, users, nodes, permissions, taxonomy, menu, and such. The modules extend the basic features. There are two types of modules: core modules and user contributed modules. The Core and the core modules are maintained by the main Drupal developers, while anybody can contribute a module extending what is already available. Drupal is mainly written in *PHP*, which is a very popular open source web programming language. Each module can override a predefined set of hook functions, for example implementing menus, node types, permissions, etc. It is not strictly object-oriented, but something similar. The themes define the layout or design of a web page: they contain *CSS, HTML, JavaScript*, and *some PHP* code.

There is a huge number of modules and themes available at the main Drupal project repository, `http://drupal.org/project/modules`. Right now, there are over

7000 modules and over 700 themes. These user contributed modules implement many functionalities that can be used as a building block for a website:

- user handling (roles and privileges),

- administration, menus, site-wide settings,

- user interface enhancements: AJAX, WYSIWYG editor, uploading media,

- content handling: wiki, blog, forum, user-definable content types,

- user activities: voting, messaging, social network, recommendation, polls,

- integration with other services, distributed database, multi-instance support,

- search, aggregation,

- internationalization.

3.3   Major versions

At the moment, Drupal has three active major versions: 5, 6, and 7. Version 5 was released in 2007—Drupal became highly popular after this release. In 2008, they released version 6 in which they refactored several things and made the user interface cleaner. The next major release, version 7, has not yet been finished but the release date is very close: there is a release candidate out already. It will introduce some new features and a more user-friendly interface.

Most basic modules are available for version 5, but not the newer ones. The newer modules are typically always available for version 6, but some older modules have not yet been ported from version 5. Drupal 7 offers quite a limited variety of modules but many contributors have pledged to port their module once version 7 becomes stable. Because of this, we chose to use Drupal 6 for the time being. Porting modules is not very hard.

3.4 Installation and system requirements

The vanilla Drupal release has a web-based installation interface, which helps a lot when setting up a completely new site. Also, there can be custom installations made. However, we plan to make this even simpler by providing a practically one-click installation/cloning solution (see Chapter 5 for details), possibly hosting them initially on a central server maintained by the QLectives project.

Web server

A Drupal installation runs best on an *Apache* webserver with *mod_rewrite* and *.htaccess* support enabled. It is also possible to run it on an *IIS* (5, 6, 7) server, but that might involve a few extra steps of configuration.

Database

The database server requirements depend on the Drupal version, namely

- Drupal 5: MySQL 3.23.17 or higher, PostgreSQL 7.4 or higher;

- Drupal 6: MySQL 4.1 or higher, PostgreSQL 7.4 or higher;

- Drupal 7: MySQL 5.0.15 or higher (PDO extension needed for PHP), PostgreSQL 8.3 or higher, SQLite 3.x – some modules might not work properly due to the lack of abstraction.

SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, INDEX, ALTER, CREATE TEMPORARY TABLES privileges are needed. Currently other databases, such as Microsoft SQL Server, Oracle, and MongoDB are not supported in Drupal core, but various efforts are underway to supply support.

PHP scripting support

- PHP 5.3 is not yet supported by Drupal 5.x, but is supported by Drupal 6.14 core and higher. PHP 5.2 or higher will be a requirement for Drupal 7.

- The PHP extension for connecting to your chosen database must be installed and enabled. Drupal's currently supported database connectors are: mysql (the original MySQL extension), mysqli (an improved connector for newer MySQL installations), and pgsql (for PostgreSQL).

- XML extension.

- GD library.

- Php Data Objects (PDO) for Drupal 7.

Memory, Disk Space

Depends mostly on the modules used. PHP memory requirements can vary significantly depending on your use of modules. While 16 MB may be sufficient for a default Drupal 6 installation and 30 MB may be sufficient for a default Drupal 7 installation, a production site with a number of commonly used modules enabled (CCK, Views etc.) could require 64 MB or more. Also, space is needed for database tables (inside the database server).

Chapter 4

Screenshots of the development version of the EconoPhysics Forum

Here we present screenshots documenting progress of our work on the EconoPhysics Forum (which is available at `http://www.unifr.ch/econophysics`). Our main task was to implement its current functionality in a new version based on the open-source CMS Drupal. Only a few new functions have been added in the process. As argued above, the new EconoPhysics Forum (EPF) based on Drupal is easily extensible, modular and portable, hence it is able to serve as the basis for our future development of QScience.

While the development version already has most of the current EconoPhysics Forum, its design has not yet been optimized and performance/stability tests are also yet to come.

Figure 4.1: Front page of EPF for a logged-in user. The search block and the current user's account information are in the left sidebar. A list of similar users, recommended content, active users and recent events are shown in the right sidebar. Recent content for each section is shown in the middle column.

News and announcements

Debate: Who is to say something interesting about economics?
posted by matus (Tue, 2010-08-24 09:23)

Letter: Let a physicist take charge of economics
posted by matus (Tue, 2010-08-24 08:58)

Job Opening: Postdoc in theoretical physics at the University of Manchester
posted by matus (Fri, 2010-08-13 10:06)

more

Current & future events

Econophysics Colloquium 2010
From Thu, 2010-11-04 00:00 to Sat, 2010-11-06 23:59 at Taipei

CompleNet 2010 - 2nd International Workshop on Complex Networks
From Wed, 2010-10-13 21:14 to Fri, 2010-10-15 21:14 at Rio de Janeiro

more

Book reviews

Complexity explained
Authors: Péter Érdi , Reviewer: Matúš Medo

Data Analysis: A Bayesian Tutorial
Authors: Devinderjit Sivia and John Skilling , Reviewer: Matúš Medo

more

Papers

Asset pricing puzzles explained by incomplete Brownian equilibria
Authors: Peter Ove Christensen, Kasper Larsen

The endogenous dynamics of markets: price impact and feedback loops
Authors: Jean-Philippe Bouchaud

A contribution to the systematics of stochastic volatility models
Authors: Frantisek Slanina

Figure 4.2: The list of sections (and part of their content) on the front page.
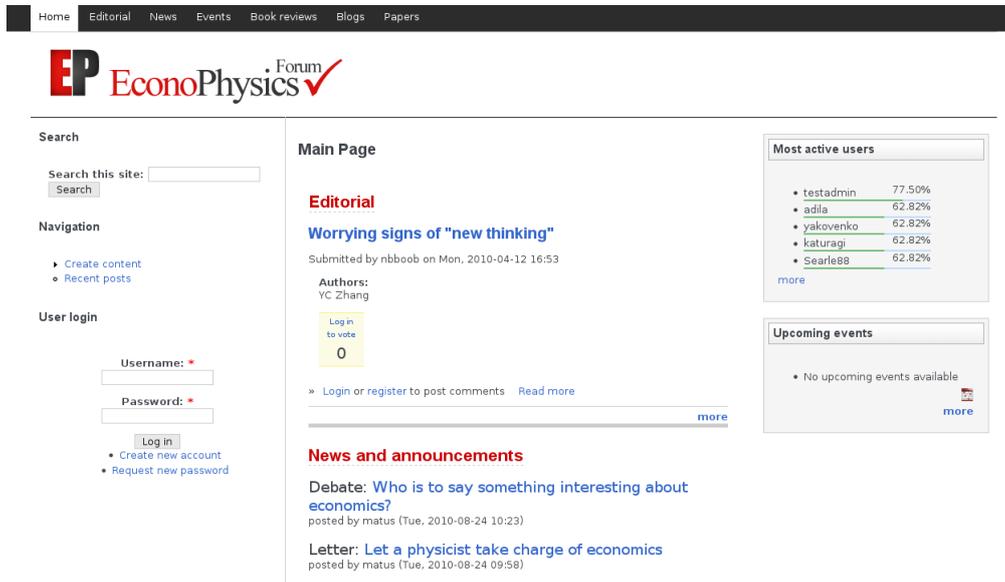
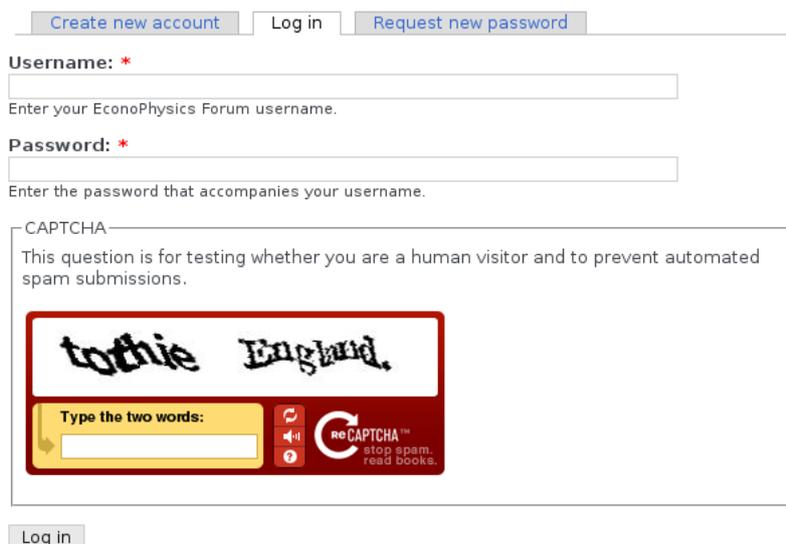Figure 4.3: For an anonymous user, a block for quick login is shown in the left sidebar of the front page.

Figure 4.4: The login page.

Figure 4.5: The registration page.

Figure 4.6: After registering, the user can modify their personal profile through the "my account" page.

Figure 4.7: Both registered and anonymous users can submit new content. For an anonymous user, a block for quick login is shown. If this quick login is ignored, the content can still be submitted anonymously but it has to go through review by the site administrator.

Home

Asset pricing puzzles explained by incomplete Brownian equilibria

Submitted by matus on Mon, 2010-09-20 11:15

Authors:
Peter Ove Christensen, Kasper Larsen
Abstract:

We examine a class of Brownian based models which produce tractableincomplete equilibria. The models are based on finitely many investors withheterogeneous exponential utilities over intermediate consumption who receivepartially unspanned income. The investors can trade continuously on a finitetime interval in a money market account as well as a risky security. Besidesestablishing the existence of an equilibrium, our main result shows that theresulting equilibrium can display a lower risk-free rate and a higher riskpremium relative to the usual Pareto efficient equilibrium in complete markets.Consequently, our model can simultaneously help explaining the risk-free rateand equity premium puzzles.

Average:
⭐⭐⭐⭐⭐
Your rating: None Average: 5 (2 votes)

Log in
to vote

0

» Login or register to post comments

first comment

Submitted by bobo on Mon, 2010-12-06 17:43.

⭐⭐⭐⭐⭐

first comment

»
Login or register to post comments

comment title

Submitted by bobo on Mon, 2010-12-06 17:44.

⭐⭐⭐⭐⭐

second comment

»
Login or register to post comments

Figure 4.8: This is a paper content page with a five star rating widget. The comments are shown below the main content. Anonymous users need to login to post comments. The comments are hierarchical, which means that it is possible to comment on a comment.

first comment

Submitted by bobo on Mon, 2010-12-06 16:43.
⭐⭐⭐⭐⭐

first comment

»
edit   reply

comment title

Submitted by bobo on Mon, 2010-12-06 16:44.
⭐⭐⭐⭐⭐

second comment

»
edit   reply

Post new comment

Your name:
bobo

Subject:

Rating:
⛔⭐⭐⭐⭐⭐

Comment: *
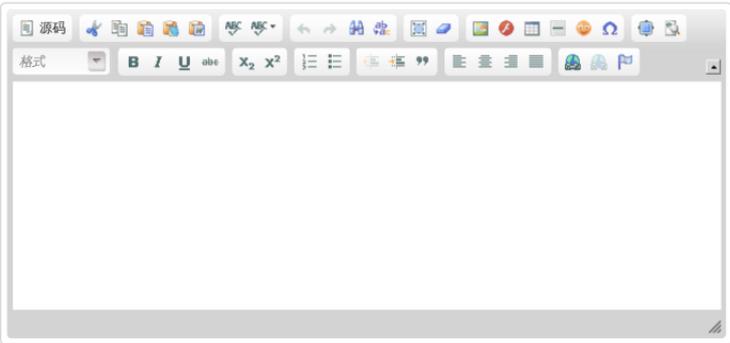
Switch to plain text editor
- Web page addresses and e-mail addresses turn into links automatically.
- Allowed HTML tags: <a> <em> <strong> <cite> <code>   <dl> <dt> <dd>
- Lines and paragraphs break automatically.

More information about formatting options

Save   Preview

Figure 4.9: A logged-in user can see the comment form at the bottom of the content page.

Chapter 5

The general framework of QScience

The goal of our development of the EconoPhysics Forum has always been not only to improve the site itself but, mainly, to create a software package that would allow anyone to easily install, configure, and personalise a similar site (which we refer to as a new instance in the following text). Discussions held over the past year have taken us one step farther and yielded a more general concept which represents the future basis of QScience.

Our new concept relies on creating suitable conditions for the evolution of individual instances of QScience. Similarly to biological populations, this "evolution" would be facilitated by three main processes:

1. *Replication*, which in our case would be represented by creating new instances of QScience where it should be possible to copy settings of an existing instance, thereby allowing for the replication of instances.

2. *Variation*, which in our case would be represented by the possibility to modify the settings.

3. *Evaluation*, which in our case would be represented by a central QScience site providing an overview of existing instances and their performance characteristics.

To enhance the possibility of beneficial evolution, all three processes need to be carefully prepared to make it easy for users to access and use them. This can be achieved by:

1. preparing a set of predefined instances which would cover the basic needs of all users (simple forums with different degrees of openness, journals with various submission policies, etc.),

2. offering the possibility to host new instances on our servers, so that the creation of a new instance would become a matter of one click,

3. allowing for replication of instances at the central QScience site where one could sort the instances according to their performance on various criteria (some may want to replicate a forum with high user participation, another may prefer a forum with a good reputation system, etc.),

4. creating a simple graphical interface for changing the settings of a given instance (if the modification of settings is too complicated, mutation will not take place and the best we can hope for are copies of the predefined instances),

5. allowing third parties to contribute new modules or algorithms.

It is important to note that what differentiates QScience from other discussion fora or journal management software is that:

1. It will target scientists.

2. It will dramatically speed up the evolution of mechanisms to support the emergence of quality by an extremely easy setup (replication), configuration (variation), and evaluation (to facilitate selection) of communities.

3. It will connect different communities in several ways, mainly through algorithms for recommendation, performance evaluations, etc., that will be run based on several QScience instances.

4. There will be no need to impose rules (*e.g.*, if/how contributions and authors should be evaluated or what the entrance barriers should be) from the top. Instead, every community will be able to choose the settings that best serve its spirit. Settings producing successful communities will have the possibility to be copied and to serve another community.

During a working meeting in Szeged (November 29—December 1 2010) we discussed various parts of QScience, in particular its core functionality, data structures, access levels, supported algorithms, and implementation issues.

Practical realization of the described concept of evolution of instances will be the main task for the rest of the QLectives project. To be more specific, here is a list of priorities for the third year of the QLectives project:

1. To generalize the code of the EconoPhysics Forum so that the resulting code will be able to serve as a forum or a journal.[1]

2. To prepare the central site where it will be possible to obtain the code of QScience (which can be used to create a new instance on an independent server), to review the existing instances, and to create a new instance simply by copying the settings of an existing one and benefiting from the possibility of having this instance hosted on our server.

3. As a proof of the concept, we would like to have multiple instances running by the end of 2011.

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[1]Since these two modes of function—forum and journal—are quite distinct, when they will be implemented, many other possible ways of usage may arise naturally. However, at least in the initial development phase we want to focus our attention solely on these two functions which, we believe, are also the ones that could most contribute to the QLectives project.

Chapter 6

Summary and outlook

This deliverable describes progress of our work on the QScience platform. To summarize, over the past year we:

1. evaluated possible platforms (CMSs) for future development of QScience and selected one them (Drupal),

2. reproduced most functionalities of the current EconoPhysics Forum in its new Drupal version,

3. formulated the basis for our future work on QScience which now becomes a platform for fostering the evolution of scientific discussion.

In the next year, our activity will focus on:

1. adding new functions to the Drupal version of the EconoPhysics Forum,

2. designing and implementing the evolutionary part of QScience (separating all settings, creating a central site, making it possible to host new instances on our servers,...).

The Testing Questionnaire

To choose a CMS to work with, we used the following questionnaire.

1. Architecture/Core/Plugins

   (a) Does it follow the MVC (Model-View-Controller) pattern?

   (b) What does the core architecture include and what is left to plugins?

   (c) How easy is to write a plugin/module/extension?

   (d) How many plugins are available?

   (e) How many scientific plugins are available?

2. Interoperability/Portability

   (a) How many databases are supported?

   (b) Is there a database abstraction layer?

   (c) Is there native support for Web Services?

   (d) Does it use SOAP/REST?

3. JavaScript

   (a) Which Javascript framework is used?

4. Community

   (a) How big is the community using it?

   (b) Do we know any influential member in it?

5. GUI/Template Engines

   (a) How difficult is to modify the GUI?

   (b) Is there any template engine used?

6. Users Management

   (a) Is a distributed login possible?

   (b) If so describe the procedure.

7. Requirements

   (a) Easy to install?

   (b) Custom Installation available?

   (c) What are the installation requirements?

   (d) Memory, Disk Space, No-Database, Web Server,…

8. Personal Experience

   (a) Do you have personal experience with it?

   (b) Do we have access to any skilled person willing to join the project?

9. EconoPhysics Forum (optional—please be as technical and specific as possible)

   (a) How do you imagine the EconoPhysics Forum to be integrated in the frameworks

   (b) Conversely, how do you imagine the EconoPhysics forum to integrate the features of the CMS?