

New interactive platform for new distributed work environments

Emanuil Rednic, Andrei Toma, and Anca Apostu

Abstract— Recent advances in information technology and latest changes in social and economic environment have determined important changes in individual workers or organizations behaviours. By aiming to present the way to gamify any e-business tools employed at either intranet level or internet level, this article presents the instruments description which should be used with this purpose. In the gamification process involved in the transformation of standard tools such as office tools, document management tools, security tools, it is mandatory to clarify the main concepts, such as game thinking, possible game elements, incentives and the psychology of motivation. As more and more individuals and organizations explore various types of distributed work arrangements, we intend to present these aspects in detail in the present paper in order to attain a preliminary definition of a gamification design framework in order to formalize the most important design choices.

Keywords— desktop application, gamification, distributed work environment, web application.

I. INTRODUCTION

THE organization of any corporate activity should be related to *gamification*, which refers to service design aiming to provide game-like experiences. While the fundamental concepts used in gamification come from the realm of interactive entertainment, the process itself seeks to apply these concepts and the related mechanisms to non-game applications and processes. Gamification's proponents argue that it works by making technology more engaging, by encouraging users to engage in desired behaviours, by showing a path to mastery and autonomy, by helping solve problems engaging users in the problem solving process, as well as taking advantage of humans' psychological predisposition to engage in gaming.

I. NEW DISTRIBUTED WORK ENVIRONMENTS

Taking into discussion the implications of work for organizational design and the employer-employee relationship, it is often concluded the „collaborative work”[12] in distributed environments has a decisive role in the process of virtual product design in different systems by successfully utilising web technologies and the programming environments, thus shortening the time needed for „bringing new products on the market and the improving the transfer of knowledge between business partners”[1].

In virtual informatic environments the purpose is to ensure the improvement of the cooperation and of the operative communication between the members of a team formed, for a limited time period, for the realising of a high complexity project.

Simulation nowadays plays an increasing role in situation analysis in research and the assessment of possible solutions in business[2]. The simulation models and tools of the sociotechnical systems are often incompatible, heterogeneous and territorially distributed and it is especially problematic if domain specialists lack the expertise and specific programming skills to use them effectively. To achieve this, several heterogeneous and territorially distributed models have to communicate and cooperate. The development of Future Internet creates new possibilities and challenges for simulation engineering by offering extended access.

This article discusses distributed work and communication environments as the possible solution aiming at deployment of the simulation services on the Future Internet. Easy communication environment usage is tested within distributed communication environments and infrastructure. The key aspects for a concept of architecture for distributed models that ensures interoperability and reuses among simulations, consists of:

- a) rules that determine federation;
- b) Object Model Template that defines the format for specifying the set of common objects used by a federation (federation object model);
- c) their attributes, and relationships among them;
- d) interface specification, which provides interface to the RunTime Infrastructure, that can be distributed and ties together federates during model execution [4].

However to create heterogeneous and distributed simulation models researchers mostly use one of abovementioned communication environments. One of the most influential drawbacks is the lack of ready-made solutions that would allow creating multi-model systems. Unfortunately each case has to be dealt separately, by designing new communication environment among models. Integration of communication environments is not trivial, it is complex and time-consuming, and therefore a software engineer is needed as well as additional funding for the research project. In fact, the accessibility of modelling tools is very limited for domain experts, and this very often leads to mistakes in decision process.

This article discusses the challenges of distributed environments within the context of different communication environments and the Future Internet development.

With the recent advances in communications technologies and decentralization of work practices, there has been an increase in distributed, remote, computerized work environments [3]. With the change from a physical to a virtual environment, opportunities for collaboration often go unnoticed. New dimensions of cooperative publishing can be exploited in the case of newspaper production. This paper investigates the integration of information technology in nowadays organizations. The study defines the level of integration that can be found and speculates on the opportunities that arise from the use of the information technology.

With recent advances in communications technologies and the widespread adoption of computers by organizations and individuals, new work practices have emerged. It has become more common to encounter individuals working at their computers and remotely collaborating with others. A tendency towards the decentralization of work has also gained strength, as teams come together temporarily to work on projects. As more organizations adopt cooperative work tools, individuals are led to the establishment of remote collaborations and working together in virtual environments [3].

Computer-based systems are frequently used to support the work of individuals. People use computers to help them with whatever task they are doing. Often this is an individual task—that people are doing on their own, e.g. using a word processor to produce a document. However, there is often a broader task and context for this work and in this context they may be collaborating with other people to complete a project or series of activities.

High speed wide area networks such as the Internet encourage the transfer of large volumes of data between potentially distant hosts. Novel collaborative technologies now allow geographically dispersed groups of co-workers to interactively conduct a range of work-related activities. The published newspaper is the net of the integrated accumulative work of a group of people. The traditional publishing systems used by the majority of the newspapers organizations limit the ability to enter the new era of conducting business. Successful organizations continually renew their basic architectures and platforms to take advantage of new technologies [4]-[5]. One important objective of the newspaper organization is to improve the publishing process using the technology as a key enabler.

As a consequence of the global nature of the phenomenon, actual views and perspectives at many, widely distributed locations[6], would have to be composed into an in-depth article as a group effort for which even the focus (or main thrust) would grow out of cooperative work. Instead of traditional correspondent reports groups of experts/correspondents at different locations would have to cooperate to create in-depth articles. Except for conferencing software capabilities so far unknown the different and distributed competence of the correspondents creates partial and overlapping responsibilities which have to be respected during the cooperative process of creating a competent article based on the partially competent contributions. Also some major newspapers are published in various geographical

locations around the world. In order to achieve that newspaper organizations employ high speed internet connections supported by extensive information infrastructure.

Distributed Virtual Environments simulate the behaviour and activities of a great number of users interacting in a virtual world over a wide area network[4]. The size of the virtual worlds and the tremendous number of users that these environments are called to support require additional bandwidth and computational resources.

For supporting large-scale Distributed Virtual Environments, extended infrastructure is needed in terms of both hardware and software. However, both researchers and application designers do not always have access to such an extended infrastructure and the assessment and evaluation of developed performance improvement techniques becomes extremely difficult.

Paper [7] presents an awareness-based learning model, developed for distributed environments, that allows nodes to accomplish an effective collaboration by means of a multi-agent architecture in which agents are aware of its surroundings by means of a parametrical and flexible use of this information. Their ANN-based strategy used to include learning abilities aiming to improve the effectiveness and efficiency of collaboration process by learning three different processes:

- (1) to collaborate based on levels of awareness;
- (2) to select a potential candidate to negotiate on saturated conditions; and
- (3) to decide whether or not a node must change the information that describes its current conditions related with collaboration.

Information technology (IT) is the facilitator for successful implementation of distributed-work[8]. However, research on the implication of different types of IT in distributed-work in an organization is limited. The aim of our research was to study the distributed-worker's media use empirically, and determine the influential factors that affect the media selection and its effect on distributed-work.

II. STANDARD TOOLS FOR CORPORATE DISTRIBUTED ENVIRONMENT

Complex tasks plus a global economy have impelled the creation of many distributed engineering and development groups supported by information and communication technologies. Distributed groups range in duration from weeks to years, they range in size from fewer than ten people to more than a thousand and they may have members located in two or more locations. Distributed engineering and development depends on careful planning, coordination and supervision[9].

“Contributors who are geographically distant from one another inevitably operate under some degree of autonomy.”[10] The management challenge is to ensure that members of geographically distributed engineering and development teams stay focused on shared goals, schedules and quality. This challenge grows as the number of employees and sites grows.

One possible approach in ensuring employee engagement is including game-like mechanisms in existing applications in

order to increase motivation by adding additional incentives to the existing ones.

Web 2.0 stands for a new trend in the online world – including new interactive web applications with user-generated content and collaborative techniques for updating web sites. The migration of desktop tools to the World Wide Web in the form of web services and web applications has been a significant recent development in many areas of science.

Web 2.0 software is online and accessible to anyone with an Internet connection and a browser, “we have new avenues for collaboration and communication” [10]. The tools are free and businesses, young people and some educators are already using them. Web 2.0 tools change the nature of the Web from “distributed to participatory”[11].

People control the tools of production and publication and use them to collaborate. They can add to and change others’ work online. A useful starting point in analysing the effectiveness of applications in facilitating collaboration is a comparison between the web and desktop applications, studying the major events in the web application development industry for the last five years and based on that try to determine if and how the web applications will compete with desktop applications in the next years. The current research starts by showing advantages and disadvantages of using web apps over desktop apps.

- *Advantages for users:* with web tools no installation and updating are needed, access from anywhere is possible via the Internet, data is stored remotely, cross-platform compatibility, better suitable for low-end computers and require little disk space, the client computer is better protected against viruses as the application is sandboxed inside a browser. Web tools are also suitable for users who have more than one computer, as all their data and preferred software is accessible on multiple devices. It also becomes more important that web applications are cross-platform and work on different OS.
- *Disadvantages for users:* desktop applications have better user experience, while not requiring internet access except for networked components; the remote server could be compromised leaking private information.
- *Advantages for developers:* easier to monitor every user’s actions, get full statistics and feedback, server-side code can be completely controlled, making it impossible to pirate, easier to add collaboration possibilities as data is stored on the server, easier to make a mobile version if you use HTML and JS, easier integration with web services.
- *Disadvantages for developers:* as it is not a native application it has a lot of restrictions and limitations, less tools and frameworks for development.

The most important problem with web applications right now is their poor user experience, because of the performance problems and browser limitations. But as computer processing power is getting exponentially faster, combining this with the browser performance improvements, one can predict that this problem will be solved very soon.

Another major limitation of the web apps is the requirement of the Internet connection. But this changes quickly, as mobile internet and mobile broadband becomes faster and cheaper.

On the other side, an important drawback of desktop applications is a problem of all digital data: after several years the techniques to read and write old media are no longer available. “The resulting challenge is maintainability of applications with an increasing complexity”[12]. “Distributed and heterogeneous systems need to interoperate in a flexible and scalable way”[13].

For some types of applications like mail clients and collaboration tools the advantages of web apps already outweigh the disadvantages, and number of good use cases for web apps will only increase.

Web applications are undoubtedly growing fast and this trend will continue in the next years. Tools that were not accessible a few years ago such as browser-based audio editing software are now good enough for non-professional use. Email, collaboration and project management web applications are starting to replace desktop applications.

Present trends relate generally to systems and methods for supporting a worker in a distributed work environment, systems and methods that identify and locate a worker in a distributed work environment when a data communication connection is established between the worker’s computing device and a network and that provide the worker with services and privileges based on the worker’s location and/or identity.

World Wide Web, and client-server architecture are complementary software technologies, which, when used together provide a powerful set of tools for developing and deploying multi-user distributed applications.

At the beginning of the computer age, communication between a user and the computer was based solely on the command line. Later came the first graphical desktop applications that are often still in use today. Both command line tools and desktop applications are executed locally on the computer of a user – in contrast to an application that is executed over a network and can be used in a web browser.

Web applications deliver interactive services through web servers distributed over the Internet (or intranet). A web site simply delivers content from static files. “A web application can present dynamically tailored content based on request parameters, tracked user behaviours, and security considerations.”[14]

The next logical step after the growing popularity of web applications was Web 2.0, featuring an increased focus on collaboration and other social features. While this approach appeals to the natural human instinct to socialize, it only partially addresses the problem of user engagement (socializing in a manner which is conducive of the purpose for which the application was designed).

III. GAMING APPROACH IN WEB 2.0

The term "Web 2.0" is commonly associated with web applications that facilitate interactive information sharing, interoperability, user-centred design and collaboration on the World Wide Web.

A Web 2.0 platform allows its users to interact with each other as contributors to the website's content, in contrast to websites where users are limited to the passive viewing of information that is provided to them. In order to discuss about WEB 2.0, is mandatory to cross over the main elements.

A. Social Networking projection

The social networking services will allow users to create a profile for themselves and have a self-description page. They will be able to make friends and groups as well as use the system of recommendations for acquaintance with whom they participate in various projects or participated in developing the content. This will help increase the group's cohesion and affiliation.

Among the benefits of a social networking component we can mention: the possibility to meet people, find like minds and socialize with peers - this socialization may include reading the profile pages of other members as well as the possibility to even contact them sharing content related to any project or any other professional content creating and encouraging diversity of ideas.

Because the Internet gives professionals from all around the world access to the social networking web platform users can be organized based on their geographic features and their attributes, through the process of gamification a recommendation system linked to trust can be integrated in the web platform to give more credibility to the professionals from this domain.

The social networks will include additional features, such as the ability to create groups that share common interests or affiliations, upload or stream videos, and hold discussions in forums. By the means of these new tools, the enterprise work environment can benefit of more professional opportunities.

A.1 Gamification for Social Networks

Gamification for Social Networks refers to service design aiming to provide game-like experiences inside the social collaborative platform. Gamification works by making technology more engaging, by encouraging users to engage in desired behaviors, by showing a path to mastery and autonomy, by helping to solve problems and being more engaging, and by taking advantage of humans' psychological predisposition to engage in gaming. Some of the most common reasons of why serious people involve in games are:

- Getting a higher and higher score;
- Risk, chance, and surprises;
- Connecting with other players;
- Competing with other players.

The above player characteristics are integrated using a predefined user category profile (*by Enspire Learning*) and several gamification profiles will be developed following the corresponding strategies, according with table 1:

User category profile	Gamification profile	Strategies

Achievers	Rewards, Point badges, Levels	Celebrate accomplishments Incrementally build mastery
Explorers	Virtual world, World building	Self-development Experimentation Freedom to fail
"Killers"	Competitions	Competing individually or in teams Feedback
Socializers	Collaboration	Working in groups Personalization

Table 1. integrated player characteristics using a predefined user category profile

This classification is based on Bartle's seminal article[15] identifying the types of players in massively multiplayer online games. While applying the above categories to users in a real system, the conclusion has generally been that most of the users enter into the socializer category; if user retention/involvement is what is desired from the system, socializer-friendly mechanisms should be employed which makes social networks one of the main avenues for implementing gameification.

During this task, the involved partners will develop services and components to create fun and engaging experiences, converting social networking users into players. General features of the platform that will be made available in the development of this task are:

- meeting people, find like minds and socialize with peers - this socialization may include reading the profile pages of other members as well as the possibility to even contact them;
- sharing content related to any idea project or any other professional content;
- creating and encouraging diversity of ideas - because the Internet gives professionals from all around the world access to the social networking web platform;
- users can be organized based on their geographic features and their attributes, through the process of gamification;
- a recommendation system linked to trust can be integrated in the web platform to give more credibility to the professionals from this domain.

The social networks will include additional features, such as the ability to create groups that share common interests or affiliations, upload or stream videos, and hold discussions in forums.

A.2 Recommendation engines for optimized system flow

While gamifying a system with a strong social component, such as a social network or a web portal, a designer will necessarily focus on optimizing the experience for socializers. While the mechanisms necessary to engage the other types of users exist, by necessity, the "default" experience will be that of a socializer.

While a possible approach is to offer all the gamification mechanism to all the users, in our opinion such an approach would like prove unproductive, creating numerous problems with the implementation of an user interface which is easy to use. As such, the system should include a software layer designed to ensure that it adapts to the needs of each particular user.

This can be achieved by identifying and integrating local and global influences to the user's behavior and selecting the mechanisms which would prove most effective. A trivial approach is to simply eliminate from the interface those elements that do not focus the attention of the user. Unfortunately, such a system would take significant time to adapt and such a long period in which the system is not functioning ideally for a particular user runs the risk of alienating at least part of the users which do not fall into the socializer prototype.

For this reason, it is preferable to employ more advanced mechanisms, especially since the required algorithms now form an integral part of most social web applications.

A further application of a recommendation engine is the fact that it is a useful tool to reflect the structure of the user base. This can serve to confirm the repartition of the classic four player types as well as investigate how the selected mechanisms fit over Bartle's extended taxonomy [15]. This extended taxonomy divides eight player types divides the players via the added coordinate of explicit or implicit behavior.

Possible gamification elements which may be favored for certain player types are reflected in the table below.

User category profile	Gamification profile
Opportunists	Reward based polls, Badges, Points
Planners	Levels, Points, Completionist badges
Scientists	World building
Hackers	Virtual world
Networkers	Badges, Points
Friends	Badges, Points
Griefers	Competitions - disruption
Politicians	Competitions with a social component

Table 2. Possible gamification elements for certain player types

The general strategy for the opportunists is based on unexpected/unplanned rewards. An opportunist will try to achieve within the system, but achievement is not an ongoing concern. As such, mechanisms which involve planning and

perseverance will not necessarily work. An opportunist will use the chance to gain a reward, but will not follow a well-defined plan to achieve it. As such, mechanisms based on perseverance such as levels will not have a large impact, but a daily poll awarding points will.

Planners set long term goals and achieve them, overcoming possible obstacles in their way. They are explorers which act according to a larger plan so they will most likely react positively to being awarded for their perseverance, such as in the case of badges awarded for being a completionist.

Scientists explore the system to understand it and as such they are useful in mentoring programs if they can be motivated to interact socially. They can be involved in the construction of the system through clear progression indicators of their involvement, such as levels.

Hackers have an innate understanding of the system and explore it in a non-methodical fashion. They will usually be motivated to answer questions if the system contains a forum in which these can be asked, but their approach is not methodical. As such, they can be rewarded through achievements since it is difficult to predict where their involvement will be. Challenges which do not require sustained effort also present a useful tool to increase their involvement.

Networkers use the system to know other users and are interested in making an effort to know them. Badges based on social involvement as well as rewards for social interactions can be used to increase their involvement in the system. Since networkers are highly sensible to social feedback, this feedback must be managed through carefully constructed feedback loops.

Friends are the networkers counterparts, interacting mainly with people they feel they know well. Because of this bond, they will be extremely stable users of the system, since their motivation is the presence of other people, some of which are socializers. They provide the input to the feed-back loop the socializers need. Griefers are extremely hard to involve in a system in a useful manner, since their aim is to derive satisfaction from exploiting other players. Their approach is, however, not done in a coordinated fashion, which may cause disruptive effects on the system. Since griefers are primarily motivated by competition, they must be taken into account when adding features containing a competitive dimension as they will try to disrupt it, causing loss of involvement in other users.

Politicians are motivated by manipulating other players. As opposed to griefers, they can prove a useful tool in community building, as long as effective avenues to apply their skills are given, such as competitions with a strong community component.

A.3 Semantic Technologies for Community Matching

Research on algorithms for matching members of different communities based on their shared interest in the same topics and problem areas (via need or via ideas for innovation).

Traditional content management systems (CMS) usually do not understand the meaning of the content that they manage. Enabling that understanding through semantic tools could

allow CMS developers and users, contributors and followers to work more efficiently.

Semantic Technologies for content management systems are focused on the CMS which are aware of the content managed on the platform and the ones which are not. In this new web platform for ideas management, the content will be heterogeneous, that's why semantic criteria will be made in two phases: one at the design-development and one during maintenance. For the maintenance phase, semantic issues will increase the content on the web platform much faster, due to gamification process.

Advances in ideas research have created significant opportunities for offering personalized projects. At the same time social networking has become a bottleneck in terms of complexity, effectiveness and, in their present form, fitness for purpose. In the realm of information technologies on the other hand advances in semantic technologies and grid computing have reached a stage where multi-dimensional applications requiring the combination of heterogeneous data and software resources can be realistically tackled.

It addresses to entire community, as well as software developers providing an open platform where novel and powerful services can be offered and put to use by practitioners in the field. The *types of services provided* are enumerated below:

- Business Analysis;
- Software Analysis;
- Graphical and Software Design;
- Software Research and Development;
- Content Research and Development;
- IT Training;
- Software Application Administration;
- Technical Support.

Bellow we are enumerating the *technologies* which are used:

- JSR 168 Portlets;
- Hibernate;
- PostgreSQL;
- HSQL;
- MySQL;
- Tomcat;
- Axis WS;
- JSP/Servlet;
- Spring;
- HTML/CSS;
- DHTML;
- Ajax;
- GlobusToolkit4.0;
- Gridsphere;
- Openssl.

Semantics Technology used in Gamification will play an important role in capturing the knowledge of users formally and unambiguously from their web-based activities and enable further machine-based reasoning on that knowledge to infer new knowledge and make use of it. This will provide new added value to Web 2.0 services and potentially give

Gamification a competitive edge over other existing systems in the future.

Semantics Technology used in Gamification will play an important role in capturing the knowledge of users formally and unambiguously from their web-based activities and enable further machine-based reasoning on that knowledge to infer new knowledge and make use of it. This will provide new added value to Web 2.0 services and potentially give Gamification a competitive edge over other existing systems in the future.

A.4 Interaction methods with Social Network Platforms

Gamification will contain the user interface and is responsible for the interaction between the end user and the application. Main features of the Gamification public interface are:

- Customizable to accommodate the content according to specific users;
- Secure storage and distribution of electronic content in different formats;
- Setting advanced warning and notification mechanisms for users using RSS's;
- Using Web 2.0 technologies to access information (Ajax, REST, etc.);
- Customizing the visualization of categories of data;
- Advanced search and indexing capabilities;
- Search heterogeneous data sources;
- Indexing documents and associated metadata
- Searchable documents using keywords, author, title, keyword, category and by specific elements;
- Index and search content in any format external application (i.e. websites, portals, network file collections, etc.);
- Location mapping;
- Integration with external search engines;
- Publishing and sharing information;
- Most used Web browsers compatibility;

A.5 Integration Artefacts

The task ensure technical integration of the main module and the platform modules.

Several communication tools will be available over both modules in a unified manner:

- Chat and instant messaging – the tool proves its usefulness by the number of users/visitors/participants in a conversation and the subtle nuances of expression that enrich face to face speech.
- Audio/video conferencing – audio/video conferencing systems will not only increase the outcomes of training but will reduce the need to travel as well as the subsequent costs involved in the traditional brainstorming-meeting process.
- Shared content, documents and workspaces.
- Blogs, audio blogging and podcasting.

From the user point of view, integration functionalities in the Gamification platform will allow users a better way of handling information. End users can retrieve important

information in a reduced time, can identify and access documents faster. Along with the search technology, that ensures the most relevant and up to date results, Portal also offers the tools to organize information.

Gamification becomes a collaboration environment that provides teams of users the tools and means to work on documents, tasks, contacts, events and projects. It also offers team managers a better activities control, content management, and collaboration tools (calendars, document libraries, open discussions using blogs, or collecting and storing information into online dictionaries – wiki).

The main functionalities are:

- *Personalization* – options to customize the content for each of the users and personal needs of these;
- *Content Management* – securely stores and offers access to electronic content in different formats;
- *Information Distribution* – advanced mechanisms to publish information, generate alerts and notifications when new information is published, all this using RSS feeds;
- *Latest Technologies* – makes use of all the WEB 2.0 approaches (Ajax, REST, jQuery);
- *Data Access* – customize the way data is displayed for each of the available categories;
- *Search* – advanced indexing and search capabilities:
 - Indexing and search within heterogeneous data sources: internet, intranet, databases;
 - Indexing documents and associated metadata;
 - Searching within document content using keywords, author, title, category and specific elements;
 - Search engine integration;
- *Forum* – the module facilitates collaboration and dissemination of information;
- *Compatibility* – support for all modern browsers and most previous versions of them;

The presentation services are the services that allow the users to interact with the Gamification by viewing basic data or reports and adding data using specific forms.

B. Interfaces

The current paper will enumerate and explain the most important aspects regarding user interfaces related to the gamification concept.

B.1 Chat and instant messaging

Instant messaging and group chat applications applied to geographically distributed workgroups can increase the outcomes of discussions, ideas, projects. A chat focused on specific tasks can convey many important pieces of information and fulfil the need for informal talk amongst the community of users.

Current online chat environments and instant messaging provide new opportunities for communication. The tool proves its usefulness by the number of users/visitors/participants in a conversation and the subtle nuances of expression that enrich face to face speech.

B.2 Audio/video conferencing

A conference system enables the users in their activities to communicate in real time with other users by utilizing various means of communication, including audio and video.

The new technologies incorporated in videoconferencing systems represent a new, innovative communication mode that stands between the telephone call and face-to-face meetings. Audio-video technology supports a dramatic increase in the amount of multimedia content available for the moderators who can examine large amounts of multimedia content quickly.

Audio/video conferencing systems will not only increase the outcomes of their activity but will reduce the need to travel as well as the subsequent costs involved in the traditional brainstorming-meeting process.

B.3 Shared content, documents and workspaces

A significant growth in recent years has been noticed amongst services that facilitate the storage and sharing of content. If users are more and more inclined to use these services in their leisure time, this trend should be applied for business and administrative use.

Nowadays millions of people participate in the sharing and exchange of various forms of content by producing their own documents, podcasts, videos, photos etc. These outcomes can be of real help as part of professional interactive platform and would also represent a way to motivate visitors to become more involved in the web platform.

This development has only been made possible through the widespread adoption of high quality, but relatively low cost digital media technology which is becoming available for the majority of users.

B.4 Blogs

The posting and commenting process will contribute to the exchange of views between the users and the moderators, who communicate to an unlimited number of readers. Each post will be “tagged” with a keyword or two, allowing the subject of the post to be categorized within the system so that when the post becomes old it can be filed into a standard, theme-based menu system. Clicking on a post’s description, or tag (which is displayed below the post), will take the user to a list of other posts by the same author on the blogging software system that uses the same tag.

The blog within the web platform will be easy to read and follow and will include clearly written instructions for posting comments. The questions posed will be pertinent to various polls and will follow their progress in a timely fashion. Professionals involved in developing the content of the web platform will be able to share information with the rest of the users and other people interested in the subject.

Blog software also facilitates syndication, in which information about the blog entries, for example, the headline, is made available to other software via RSS. This content is then aggregated into feeds, and a variety of blog aggregators and specialist blog reading tools can make use of these feeds.

B.5 Audio blogging and podcasting

Podcasting is the distribution of audio or video files, such as radio programs or music videos, over the Internet, using either RSS or Atom syndication for listening on mobile devices and personal computers.

Podcasts are audio recordings, usually in MP3 format, of talks, interviews and training, which can be played either on a desktop computer or on a wide range of handheld MP3 devices. A podcast is made by creating an MP3 format audio file (using a voice recorder or similar device), uploading the file to a host server, and then making the world aware of its existence through the use of RSS.

At its most basic level, podcasts will offer to the web platform a wide range of possibilities. Apart from listening, they will also have the possibility to use podcasts to extend the scope of the activity management within gamification by involving the rest of the web-community in the creation and publishing of their own content for a wider audience.

Publishing the audio outcomes is a way of encouraging the users to take greater care over their content contribution to the web platform. The attention to detail and interest is superior to when contributors are producing content which is only being seen by a specific audience; furthermore the way of producing the content is part of gamification process for the activity management.

B.6 Design tools

In order to make the environment more flexible and modern, each anonymous or registered user will be able to add web content for new work projects using its own content, furthermore if they are regular contributors, using proper content for the web platform, the moderator will give them the possibility to create and customize sub web platforms, personal sub web platforms. In order to categorize contributors and special visitors, new web tools will be developed, such as:

- *Points system [16]* – points systems are the core of a game system, with a variety of embodiments; points quantify the level of engagement of the user in the system, albeit in a simplified manner. Points can be awarded in the system either for preferred actions (tasks) or for social interactions, which, although not necessarily useful increase the engagement of other users in the system. Points systems can be awarded by the system itself, but also by the players, which could, for example, endorse each other for positive actions. Points can either be visible to the users or hidden, depending on the set of actions for which they are awarded.
- *Visiting progress bar* – special progress bar which will track the time a visitor is spending on the web platform (which is a specific instance of awarding hidden points), after a specific time, if it is a registered user will receive specific authorizations privileges in order to browse, read or write in the custom section. If the user is allocated to a specific project, the visiting progress bar will change the color

to its specific. The color code will be discussed in the analysis phase.

- *Customization options [16]* – depending of the web content uploaded to the platform, contributors will have special avatars, either standard, or custom. Furthermore users will be able to add all the gained artifacts to the avatar in order to customize it. The level of available customization options is not limited to avatars, as users can also be rewarded with the ability to customize the look and feel of the application to their preference.
- *Badges [16]* – badges can be awarded to users which perform specific actions on the platform, creating both a feeling of personal as well as social achievement.
- *Web prizes* – specific web tools, web icons, web emoticons, web multimedia effects for contributors, in order to customize their personal sub web platforms. The ways how a user will receive a prize can be set either by special contributors either prior at the design stage.
- *Ribbons & Stars* – on special occasions, such as: changing the marital status, birthdays, children birthdays, celebration of year(s) from the registration to the web platform, users will receive ribbons. The color of the ribbon for a user will be set accordingly by a pool, where the other users may decide it. For the ideas, projects, subjects who gathered a specific number of stars, contributors and followers, special ribbons will be given for it as well.
- *Polls* – used for users, to decide: the color of a ribbon, accept a nickname for a user or add an extra one, or either other custom subjects in the environment. Polls are designed to increase engagement by giving the users the option to customize the common experience.
- *Artifacts* – special prizes for special users: if they are staying online on the web platform, on a random timeframe, they will receive a task to make, a quiz to answer, or answer to a riddle, either customs, from the others users or standard, at the design stage. Artifacts can be added to idea projects as well in order to gain more visibility in the web platform, for example at search filter, projects enhanced with specific artifacts will appear on the top in result list.
- *Levels* – levels can be utilized to quantify the contribution of a particular user to the platform. While a possible use is to create a link between social and organizational prestige and the game elements, levels can also be used as a means of quantifying trust in that particular user's expertise and/or helpfulness
- *Mentoring* – mentoring can be employed in order to facilitate the integration of new users in the community built around the platform. New users can be assigned to senior users, which will be motivated via the points system or via badges/achievement.
- *Challenges [16]* – challenges can be employed in order to motivate the users to undertake a certain subset of

actions for a short period of time. Challenges must be coupled with a reward, either via the points system or the achievements/badges system.

- *Social engagement loops*[16] – social engagement loops are a core mechanism of the system, with the objective of motivating users to get involved through the interaction with their peers. For example, a user endorsing a forum post by another user creates the motivation to check the state of that particular forum topic.
- *Leaderboards*[16] – leaderboards are used as an extension of the leveling system, presenting a view of the users which have accumulated the largest number of positive actions in the system. While the primary application of leaderboards is ranking the users, they can also be employed in order to increase cohesion in subgroups of users of the system; if the leaderboards show a list of groups instead of a list of users, it is possible to create competition between the groups while increasing cooperation inside the groups.

IV. LIMITATIONS

While gamification is a very promising direction for the extension of existing social mechanisms which gained prominence with the advent of Web 2.0, there are some inherent limitations in adding game features to social platforms. One fundamental limitation is that while gamification can be employed to increase user engagement, transforming an existing application into a game is, for now, outside our reach[17].

The reason for this limitation is that, in order to create a full featured ludeme which reflects the mechanics of a real world set of interaction involves intimate knowledge of the interactions being modelled. While certainly possible for simple processes, this would prove prohibitively expensive for more complex ones, especially since a scientific approach to game design has yet to be formalized.

A second limitation to the effectiveness of a gamification mechanism as presented in the present paper is its lack of inclusiveness. The effectiveness of these mechanisms for persons with disabilities has to be examined in detail, followed by the necessary adjustments to the presented mechanisms.

V. THE PARADIGM: WEB USER VS. EMPLOYEE

There are two different but convergent goals in the employment of a gamified system.

On one hand, a target of the system is the involvement of new users, which are not involved in the underlying business[18]. The goal in what these users are concerned is to involve them further in the system to the point at which they become a contributor to the underlying business. Simply put, the system seeks to transform new users into employees, over a sufficiently large period of time.

A particular challenge in this direction is ensuring that new users interact with the platform for a period of time sufficient to create habituation.

On the other hand, the system concerns itself with ensuring that the experience of the users which are already employees of the business is as engaging and rewarding as possible, with the desired outcome of increasing overall productivity and employee satisfaction.

VI. RECOMMENDATION ENGINES FOR OPTIMIZED SYSTEM FLOW

In order to optimize the users' interaction with the system, a recommendation engine can be employed to facilitate navigation. This refers both to the content which can be more easily accessed by a particular user based on their action profile as well as to the interaction between users.

For example, when selecting a mentor for a new user, the choice can be directed by the data already collected for the new user. By employing this approach, the new user gains the benefit of being directed to the person most likely to provide them with useful information/aid [19].

VII. SEMANTIC TECHNOLOGIES FOR COMMUNITY MATCHING

Research on algorithms for matching members of different communities based on their shared interest in the same topics and problem areas.

Semantic Technologies for content management systems are focused on the CMS which are aware of the content managed on the platform and the ones which are not. In this new web platform for work environment, the content will be heterogeneous, that's why semantic criteria will be made in two phases: one at the design-development and one during maintenance. For the maintenance phase, semantic issues will increase the content on the web platform much faster, due to gamification process.

Advances in social management research have created significant opportunities for offering personalized projects. At the same time social networking has become a bottleneck in terms of complexity, effectiveness and, in their present form, fitness for purpose. In the realm of information technologies on the other hand advances in semantic technologies and grid computing have reached a stage where multi-dimensional applications requiring the combination of heterogeneous data and software resources can be realistically tackled.

VIII. CONCLUSION

The elements presented in this paper are the building block of game design, but are far from reflecting the complexity of this area. There are multiple possible elements which, while lacking this degree of generality, might prove effective in increasing user engagement.

The connections between specific ludemes, which are included in specific game types and specific business application should also be analysed in a future paper.

One objective is to allow the user to customize their working environment to the extent where it represents their personality, an approach which would allow the user for increased control over their experience.

REFERENCES

- [1] Cioca Marius, Cioca Lucian-Ionel, Buraga Sabin-Corneliu, „*Collaborative work in distributed environments using web technologies and programming languages for the improvement of design processes in virtual production systems*”, 4th WSEAS Int. Conf. on COMPUTATIONAL INTELLIGENCE, MAN-MACHINE SYSTEMS and CYBERNETICS Miami, Florida, USA, November 17-19, 2005 (pp105-108). Available: <http://www.wseas.us/e-library/conferences/2005miami/papers/501-228.pdf> [Accessed 19 March 2013]
- [2] Artis Aizstrauts, Egils Ginters, Dace Aiztrauta, Peter Sonntagbauer, „*Easy Communication Environment on the Cloud as Distributed Simulation Infrastructure*”, Proceedings of the 5th WSEAS World Congress on Applied Computing Conference (ACC '12), University of Algarve, Faro, Portugal, May 2-4, 2012 ISBN: 978-1-61804-089-3, (pp173-178). Available: <http://www.wseas.us/e-library/conferences/2012Algarve/BICA/BICA-29.pdf> [Accessed 19 March 2013]
- [3] Evaggelia Avraam, Andreas Pomportsis, Andreas Veglis, „*Computer Supported Cooperative Work in newspaper organizations*”, Proceedings of the WSEAS Multiconference: Circuits, Systems, Communications, Computers, Vouliagmeni, Athens, Greece, 2004, July 12-15. Available: <http://www.wseas.us/e-library/conferences/athens2004/papers/487-221.pdf> [Accessed 19 March 2013]
- [4] Christos Bouras, Eri Giannaka, Thrasylvoulos Tsiatsos, „*A simulation modelling tool for Distributed Virtual Environments*”, Simulation Modelling Practice and Theory, Volume 25, June 2012, pp. 1–16, available: <http://www.sciencedirect.com/science/article/pii/S1569190X12000287>
- [5] Cole, Stephen Michael, Schanhals, Jeffrey Alan, Vallillee, George William, „*System and method for supporting a worker in a distributed work environment*”, US Patent, 2002
- [6] Venkatesh, Alladi and Vitalari, Nicholas P., „*An Emerging Distributed Work Arrangement: An Investigation of Computer-Based Supplemental Work at Home*”, Available: <http://mansci.journal.informs.org/content/38/12/1687.short> [Accessed 19 March 2013]
- [7] Mauricio Palettaa, Pilar Herrero, „*Learning to collaborate in distributed environments by means of an awareness-based artificial neural network*”, Neurocomputing, Advances in Extreme Learning Machine: Theory and Applications, Volume 74, Issue 16, September 2011, pp. 2603–2613, available: <http://www.sciencedirect.com/science/article/pii/S0925231211002372>
- [8] Janaka Wijayanayakea, Kunihiko Higaa, „*Communication media choice by workers in distributed environment*”, Information & Management, Volume 36, Issue 6, December 1999, pp. 329–338, available: <http://www.sciencedirect.com/science/article/pii/S0378720699000312>
- [9] Emanuil Rednic, Andrei Toma, Anca Apostu, „*Organize Distributed work environments in a gamely fashion way*”, 12th WSEAS International Conference on Software Engineering, Parallel and Distributed Systems(SEPADS '13) - ISI Proceedings, 20-22 February, 2013, ISSN: 1790-5109, ISBN: 978-1-61804-162-3
- [10] Ramage, Magnus - „*Online Communication and Collaboration: A Reader*”, Routledge, 2010.
- [11] Baker, Scott M., Moon, Bongki - “Distributed cooperative Web servers”, Computer Networks, Volume 31, Issues 11–16, 17 May 1999, pages: 1215-1229
- [12] Henrich, Verena, Hinrichs, Erhard, Hinrichs, Marie, Zastrow, Thomas – “Service-Oriented Architectures: from Desktop Tools to Web Services and Web Applications” <http://www.sfs.uni-bingen.de/~eh/Publications/Multilinguality-Tufis-Chapter.pdf>
- [13] Josuttis, N.M., „*SOA in Practice – The Art of Distributed System Design*”, O'Reilly Media Inc., Sebastopol, CA, USA, 2007
- [14] Shklar, L., Rosen. R., „*Web Application Architecture: Principles, Protocols and Practices*”, 2nd ed., John Wiley & Sons Ltd, Chichester, England, 2009.
- [15] Richard Bartle, „*Virtual Worlds: Why People Play*”, Available: <http://www.mud.co.uk/richard/VWWPP.pdf>
- [16] Zichermann, Gabe, Cunningham Christopher – “*Gamification by design*”, O'Reilly Media, 2011
- [17] Schell, Jesse – “*The art of game design : A book of lenses*”, Morgan Kaufmann, 2008.
- [18] Solomon, Gwen, Schrum, Lynne - “*Web 2.0: New Tools, New Schools*”, International Society for Technology in Education, 2007.
- [19] Toma, Andrei, Constantinescu Radu, Nastase Floarea, “Recommendation system based on the clustering of frequent sets” - *WSEAS Transactions On Information Science And Applications*, Volume 6, 2009.