# Prologue

# Learning Habits versus Habits for Knowledge

Kim H. Veltman

Virtual Maastricht McLuhan Institute, Netherlands
veltman@hotmail.com

**Abstract.** The internet has made enormous strides towards visions of universal access to knowledge. This work reviews progress and explores three subtle obstacles posed by emerging technologies, namely, social networks, adaptive interfaces and brain interfaces.

## 1. Introduction

Encyclopaedic visions have existed since the earliest cultures. In Antiquity, the library at Alexandria strived to achieve this is in one building. The French philosophers of the 18th century attempted an abridged, portable version in the form of the Encyclopédie. In the 19th century, Pannini's vision for the British Museum/Library inspired a new type of universal library. The early 20th century turned to a new vision that all knowledge might one day be online to create a global brain (Gehirn der Welt) [1]. It acquired various names: world brain, collective intelligence, collective memory, enduring knowledge, digital libraries.

When the Internet began in 1968 the rhetoric was universal communication: the practice was largely academic e-mail and military networks. During the 1980s when connections often began with a 200 baud modem, speed was an obstacle. Even so the Internet grew from 2 persons to 1 million users in 30 years. The advent of the WWW reopened the dreams of universal access. From 1990-2000 it expanded from 1 million to 200 million users. The vision of global access to knowledge returned but during this period lack of content was an obstacle and e-content became a mantra of the day. In the new millenium, major corporations and governments announced plans scan the full texts of up to 20 million books in a single project. Together the projects promised more than 60 million books [2]. As always there were delays and redundancies in scanning the same book more than once. Yet, miraculously the great texts of the world are gradually coming on line, many free of direct cost to the user.

From 2000-2010 the WWW expanded from 200 million to 2,000 million. By the end of 2011, the WWW grew to 2,267,233,742 users [3]. While pessimists continued to emphasize the digital divide, optimists pointed to unexpected developments. Within the same decade that 2 billion persons achieved internet access, over 5 billion acquired mobile access. Enthusiasts noted that within 5 years these mobile phones could be internet-enabled and then 70% of the world's population would be connected.

Some great enthusiasts announced that the digital divide was coming to an end and that one day soon everyone would be online. Technologically it is possible. Financially, it is feasible, with some new computers as low as $25, and predictions that this will go down to $10. Parallel with this remarkable growth of the Internet have been other developments. Although the idea of short messages goes back to the time of morse code and the telegraph, electronic versions of messages began seriously after a protocol in 1984, which was improved in 1990. In the first year, there were over a million SMS messages.

By 2010, this had increased to 8 trillion. By 2015, it is predicted to increase to 15 trillion. Social networks have also grown like Topsy, with over 800 million users of Facebook alone and over 300 million users of Twitter, generating over 300 million tweets and handling over 1.6 billion search queries per day [4].

This work explores three recent developments which pose dangers for our definitions of humanity and for the long-standing vision of universal access to knowledge. Under the guise of augmented humanity, social networks pose dangers in undermining basic human distinctions between dreaming, seeing, feeling, thinking and doing. Further dangers are posed by adaptive interfaces and brain interfaces. The questions raised entail philosophy and ethics.

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

## 3. Social Networks and Adaptive Interfaces

The official rhetoric is wonderfully attractive. Social networks allow us to share ideas with friends and increase contact through personal networks. It is easier to keep in touch with friends, more efficient to share news and comments with them and it is useful for being up to date on last minute developments. These personal networks can even give a voice to everyday persons in political events, we are told. Twitter has a phenomenal growth when seen in terms of numerical statistics (figure 1). The reality of Twitter use is record numbers of tweets for an anime film, Castle in the Sky, for the Superbowl with the Giants vs. Patriots game and Madonna's half-time performance [44]. While obviously fun and entertaining, these statistics are not matched by being records of depth or profundity. Traditionally they belong to the outer boundaries of categories such as sport and entertainment and could be classed as trivia.

***#tweets***
3 years, 2 months and 1 day. The time it took from the first Tweet to the billionth Tweet.
1 week. The time it now takes for users to send a billion Tweets.
50 million. The average number of Tweets people sent per day, one year ago.
140 million. The average number of Tweets people sent per day, in the last month.
177 million. Tweets sent on March 11, 2011.
456. Tweets per second (TPS) when Michael Jackson died on June 25, 2009 (a record at that time).
6,939. Current TPS record, set 4 seconds after midnight in Japan on New Year's Day.

***#accounts***
572,000. Number of new accounts created on March 12, 2011.
460,000. Average number of new accounts per day over the last month.

**Fig. 1.** Number of Twitter tweets and accounts [45].

Facebook is officially free. At present (February 2012), Facebook's business [46] generates revenue of $3.7 billion by giving the advertising industry access to this personal information. The social networks help advertiser's "target" the trends, tastes, fashions, needs, desires, wishes, expectations, hopes, and aspirations of users. Browsers such as Firefox are free because Google prefers to pay them rather than another company with a browser. The hidden price is that all information about any search made on Firefox is sent to Google. An official, public version of these trends is explicit in Google's new privacy policy (which begins 1 March, 2012), in a section headed, Tailored for you:

> *If you're signed into Google, we can do things like suggest search queries – or tailor your search results – based on the interests you've expressed in Google+, Gmail, and YouTube. We'll better understand which version of Pink or Jaguar you're searching for and get you those results faster* [47].

Eric Schmidt, who is also chairman of the board of the New America Foundation, paints a bigger picture in terms of what he calls augmented humanity:

> *"Ultimately, search is not just the web but literally all of your information – your email, the things you care about, with your permission – this is personal search, for you and only for you".*
> *"We can suggest what you should do next, what you care about. Imagine: We know where you are, we know what you like".*
> *"A near-term future in which you don't forget anything, because the computer remembers. You're never lost"* [48].

At one level this is a technological version of earlier ideas such as The Experience Economy [49] in the United States and the Dream Society [50] in Europe. Leaving aside questions of privacy [51], which technologists continually claim has died even when it has not, there are more subtle dangers and challenges. A first, as noted earlier, is that there is a great divide between what is being described publicly and what is happening very quietly, supposedly to protect our interests. A second is that there is a fundamental conflict between learning habits and habits for knowledge. Habits are mainly about the home turf, the familiar. Knowledge is about the turf beyond, the unfamiliar, the unknown.

## 4. Learning Habits

Computer networks, especially social networks, can track what sites we search and even trace what we do. Habits are about giving order and a pattern to our lives: coffee or tea, two lumps, none, late lunch, light dinner, etc. They are about habitual things that are daily, weekly or monthly rituals; going to a bar,

www.blueherons.net


editions

## 5. Familiar and Unfamiliar

Habits and everyday life, the social of social networks are about familiar surroundings, persons, topics and things. We "know what to expect" and what is expected from us, or think we do and hence assume we "know how to behave". We are comfortable and take comfort because we do not have to waste time learning new customs, new rules, new names, new expectations. Here it is sometimes very useful to be reminded of a name or something that we have temporarily forgotten or slipped our mind. Scholarship is about finding new names, places, events, things. Here, we need to be guided towards finding terms we have never met and often do not expect.

Two concrete examples from personal experience arising from study of the history of the alphabet illustrate the problem. The usual story of alphabets in Russia is that Saints Cyril and Methodius introduced Cyrillic in the 9th century A.D. Some research brings to light that there was an earlier version called Glagolitic. Research on Russian sites reveals that there were six old Slavic alphabets including a priestly language called: Х'Арийская Каруна. If this is submitted to Yahoo Babelfish, the translation is "[Kh]' Arian [Karuna." If this is submitted to Google, there are many hits but none immediately relative. The same Russian term submitted to Google translate, leads to "H'Ariyskaya Karuna" which, if entered into Google, produces 30 hits, but no images. Submitting the original Russian into Google produces 17,700 results under search; 3,690 results under images and 98 videos. In short, a person unfamiliar with the term in Russian cannot find important historical information that exists online.

The second example entails an Alphabet des Indiens de la Biblitheque Grimanienne (i.e., the Grimani Library in Venice) published by Duret in 1613. It exists online as part of the Internet Archive at Open Archive.org [53] and if we have the title we find it on Google. This alphabet is of interest because it has unfamiliar names for the letters: i.e., a is alephu, b is bethu, g is gamelie, d is danletztim. A search for these names on Google is not helpful. Danletzim gives no results. Gamelie takes us to Amelie. Alephu, asks if we mean Aleph, the familiar, which the search for the unfamilar does not want. A search for Alphabet des Indiens results in some Indian alphabets and some North American alphabets but not the specific Alphabet des Indiens published by Duret.

Understandably, Abyssinian alphabets from India from before Christ are not likely to be at the top of Google's page-ranking algorithms and even less obvious as necessary candidates for advertising sponsors. But for a scholar with evidence that this could be a source of the names of some letters of the Hebrew alphabet this source has considerable significance. In its present state Google is excellent for persons wanting Amelie and not useful for scholars searching for Gamelie.

Adaptive technologies in the advertising sense (and leaving aside their important role for persons who are "challenged" in the use of limbs or senses), are constantly aiming to please, which is wonderful in getting the right colour of flowers or the favourite kind of chocolates. They are ideal for the algorithms to learn what might be pleasing and relaxing, which in most cases have nothing to do with the learning of human beings. It is about when we turn off the new horizons to feel safe, cozy, lazy and at some point doze off.

Real knowledge seeking is a quiet sifting over evidence in books, using dictionaries, encylopedias, gazetteers, book catalogues to arrive at new terms, places, titles that will help the journey. There is nothing cozy about this quest as mediaeval monks learned long ago. Unless search engines develop such functions, then Eric Schmidt's company may discover the brand of coffee and type of biscuit a scholar eats and possibly even likes, but will not be providing what scholars really want: access to new, old and enduring knowledge.

Google Scholar claims to address these needs. However, typing Socrates produces no results for the Greek philosopher on the first page. His student, Plato, appears in two of the first 10 results where we learn that the Republic has been cited 277 times and Gorgias 148 times. Plato's student Aristotle manages four of the first 10 hits. Even a non-specialist in the Classics may rightly wonder if this is in accurate picture of 3 of the greatest philosophers of the Hellenic world. Classics scholars will certainly want a rather different list. They will know and want to see the name once and a mention of all the writings not just a random title, as major library catalogues have done for centuries. In Google Scholar, Leonardo da Vinci results in two references to Freud, two references to a psychological article but no mention of his complete works in the first page of results. The hearts's desire of a scholar wants and needs more.

### 5.1 Censorship

The field of censorship has always been a difficult domain and cannot be solved in a paragraph [54]. Even so it is instructive to look at the lists of so-called swear words, which include basic anatomical parts in medical vocabulary [55], the world's oldest profession (whore), homo (the Latin word for man); God, who generally has a good reputation and damn, which means that a "grande dame" is censored and many

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

# Chapter 1

# Multifold Random Projection for Cancellable Face Biometric

Padma Polash Paul, Marina Gavrilova

Department of Computer Science
University of Calgary, Canada
pppaul@ucalgary.ca, marina@cpsc.ucalgary.ca

**Abstract.** Biometric authentication system automatically identifies or verifies a person using physical, biological, and behavioral characteristics such as face, iris, fingerprints, hand geometry or voice. Compared to the traditional identification and verification methods (ID, card, password), biometrics is more convenient for users, can reduce fraud, and is more secure. In the past decade, biometric became an important standard of security, intelligence, and law enforcement. In a traditional system, if password is compromised user can easily change it. However, biometric for the users is limited and unique, and if user biometric is compromised, it is impossible or highly difficult to change it for a particular system. Cancellable biometric has recently emerged as solution of the problem, which allows replacing the compromised biometric template. The concept of *cancelable biometric* or *cancelability* is to transform a biometric data or feature into a new one so that users can change their single biometric template in same or another system. In this chapter, we present a biometric system where both signal and feature level transformations are used to achieve cancelability. The proposed cancelable system is established based on three steps. In the first step the two-fold random selections of the signals are made. Each fold is then randomly projected using random projection technique. In the second step, the Principal Components Analysis (PCA) is used to reduce the feature dimension of the randomly projected folds. After the PCA, a dimension reduction feature-based fusion using k-mean clustering is applied to create single template for face biometrics. In the third step, to enhance the discriminability, the Linear Discriminant Analysis is applied to the features. These features are then used in a classifier to get the final authentication performance.

**Keywords:** Biometric Authentication, System Security, Identification, Cancelability, Linear Discriminant Analysis

## 1. Introduction

The different types of credentials can be used to protect the information access on computer, network and smart device. Passwords and tokens are traditionally used credentials to authenticate the users for information access. Generally, the security of the password protected system is proportional to complexity of the password. There are many reasons for which a password-based system may be efficient, secure or reliable. It is difficult for the user to remember the password. Password protected systems are easy to crack by different types of hacker attack.

On the other hand, password can easily be stolen using different spyware by hackers. Unlike passwords or ID cards, biometric characteristics of a person cannot be borrowed, stolen, or forgotten, and forging them while possible still presents both logistic and implementation challenges. Thus, the use of biometric technologies in physical and logical access control system is one of the most broadly commercialized sectors of biometrics. Another broad category of biometric technology usage is forensic or criminal investigation system.

## 1.1 Biometrics

It is widely known that term "biometric" originates from Greek words bios (life) and metrikos (measures) Some of the earlier applications of biometric recognition can be traced back to middle ages where merchants marked the pottery with prints of their thumbs, and later authenticated documents by signing their initials on parchment. Recognizing humans based on their body features became more and more interesting and reliable in emerging technology applications. A biometric system is essentially a pattern-recognition system that recognizes a person based on a feature vector derived from a specific physiological or behavioral characteristic that the person possesses [1]. Commonly used biometric traits include fingerprint, face, signatures, iris, palm-print, fingerprint, hand geometry, ear and voice. Figure 1 shows example of biometrics used worldwide.

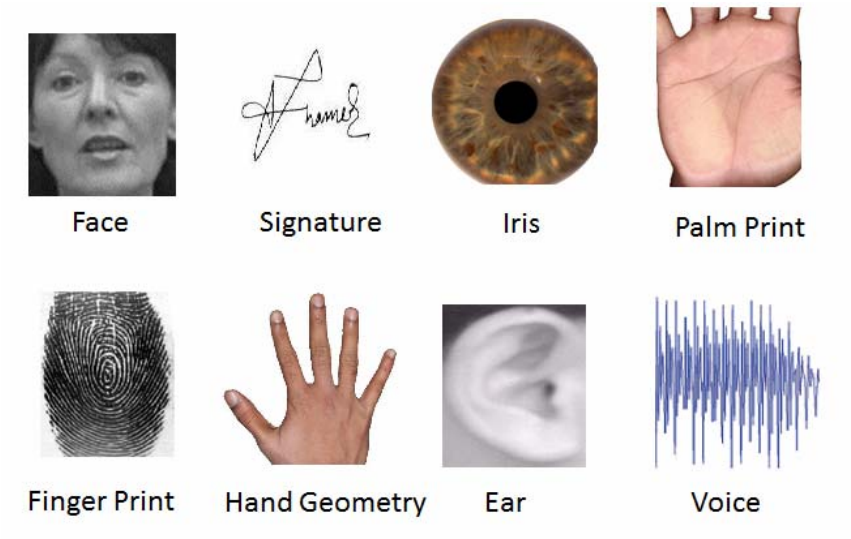



**Fig. 1.** Different types of biometrics used in system security [1].

A typical biometric system usually consists of four basic components, a) acquisition of biometric data, b) Feature extraction, c) Matching , and d) Decision-making (user identity is established or a claimed identity is accepted or rejected). Figure 2 shows the simple biometric system of authentication.

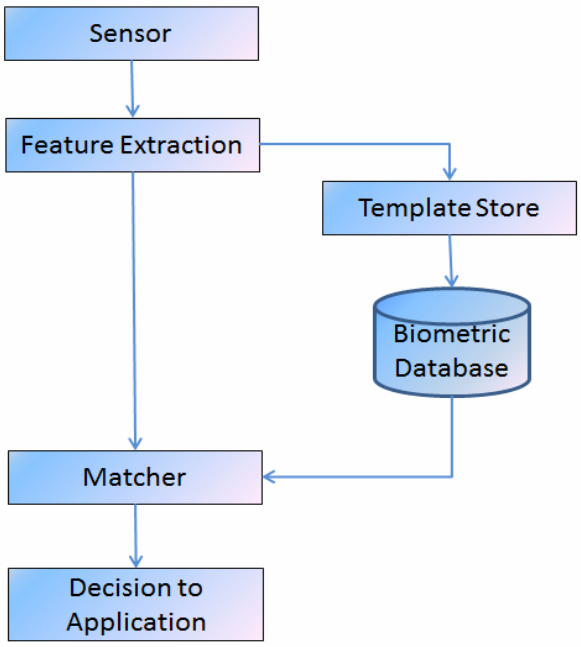



**Fig. 2.** General block diagram of traditional biometric system.

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net

eigenvectors of the data covariance matrix. Let us denote the data covariance matrix by Ru = E {uuT} where the superscript T denotes the transpose of vector or matrix. Then the SVD of Ru has the form:

$$R_u = U_u D_u U_u^T \quad (1)$$

Where $U_u$ is the eigenvector matrix and Du is the diagonal matrix whose diagonal elements correspond to the eigenvalues of $R_u$. Then the linear transformation W for PCA is given by:

$$W = U_u^T \quad (2)$$

Figure 7 shows the impact of projection using different number of principal component for experimental data.

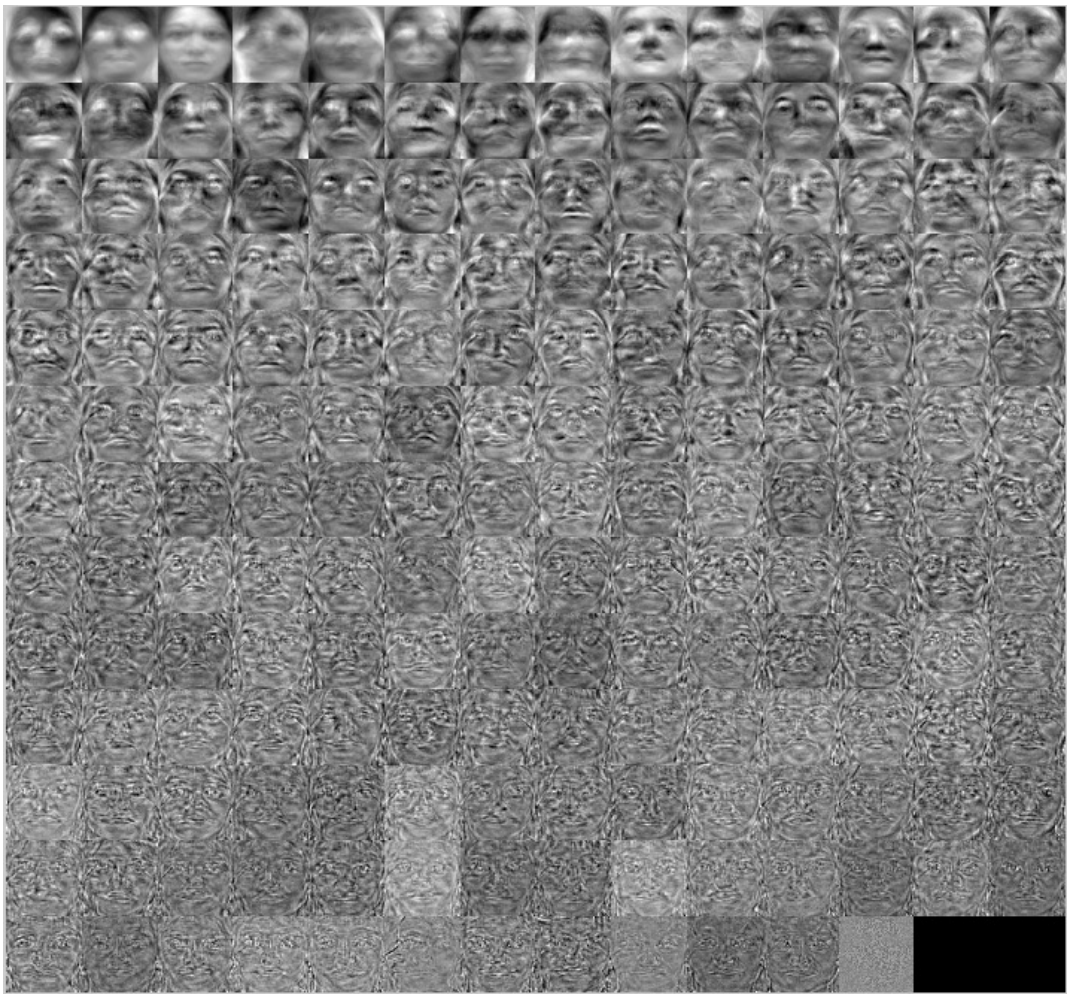


**Fig. 7.** Example of projected image using Eigen vectors of corresponding eigenvalues (from highest to lowest).

For dimensionality reduction, one can choose p dominant column vectors in Uu which are the eigenvectors associated with the p largest eigenvalues in order to construct a linear transform W. The strength of the Eigen values is shown in figure 8.

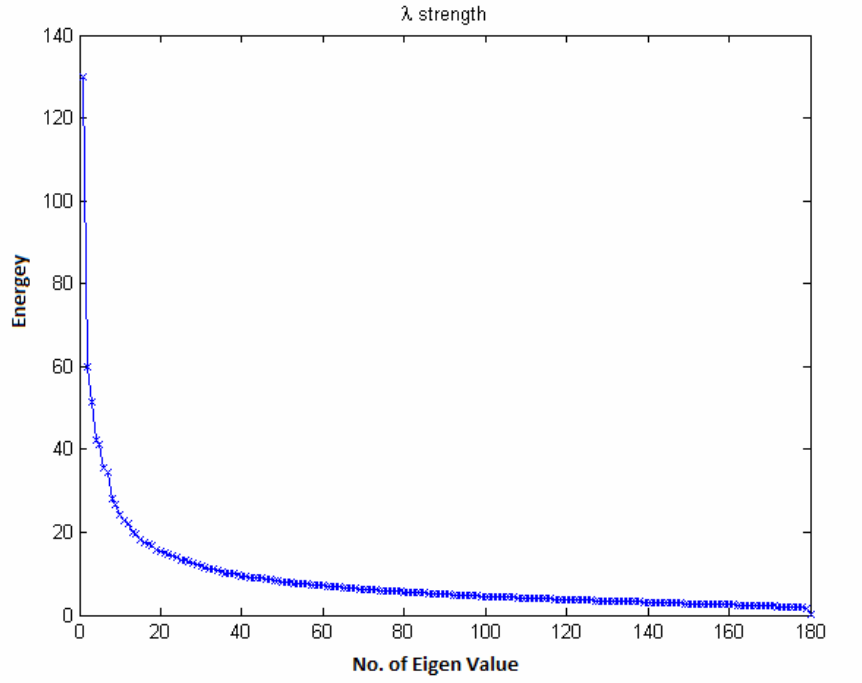



**Fig. 8.** Strength (Energy) of Eigenvalues for the experimental database.

## 3. 2 K-means Clustering

Features of reduced dimension are then clustered by combining both fold of the random selection. *k*-mean clustering is used to find clusters of the features. Final features are the distances between the combined clusters and individual clusters. Figure 9 shows the clustered cancelable biometric face template.

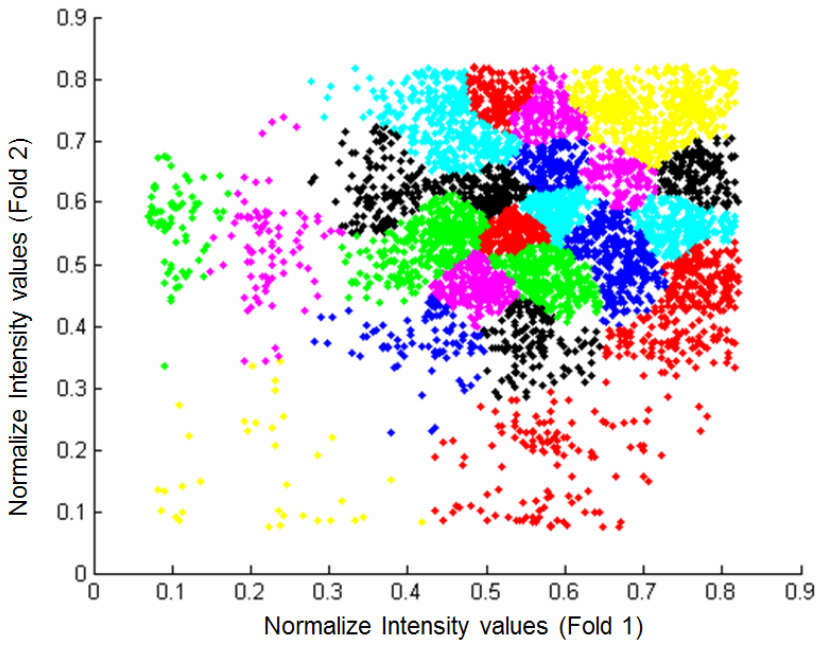



**Fig. 9.** Clustered cancelable template for using k-means clustering.

Some examples of cancelable feature in figure 10:

www.blueherons.net

# 4. Experiments

## 4.1 Databases

The main goal of the experiment is to test the cancelability of the face template. AT&T database of Faces, [22] contains a set of face images taken between April 1992 and April 1994. The database was used in the context of a face recognition project carried out in collaboration with the Speech, Vision and Robotics Group of the Cambridge University Engineering Department.

There are ten different images of each of 40 subjects. The images were taken at different times, varying the lighting, facial expressions (open / closed eyes, smiling / not smiling) and facial details (glasses / no glasses). All the images were taken against the same dark background with the subjects in an upright, frontal position. The size of each image is 92x112 pixels, with 256 grey levels per pixel. A preview of the images is shown in figure 12.

**Fig. 12.** Example faces of AT&T database.

## 4.2 Results

### 4.2.1 Experimental Setup

We have applied tenfold cross validation to establish the classification model. From AT&T database, we have used 400 faces of 40 individuals. Each dataset was then divided into ten equal parts. For training, we have chosen potion of that dataset, with another part used for testing.

### 4.2.2 Recognition using Known Random Selection

To generate the cancelable biometric database we have used pseudo random number to split the raw biometric template in to two parts. We have implemented biometric cryptosystem to store the random numbers. We have used stored numbers to generate the cancelable template during test phase. We found that our proposed system enhances the classification accuracy and provide the template security. Following figure shows the results of classification.

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

# Chapter 2

## Animation for Supporting Parent-and-Child Communication

Kaoru Sumi[1], Mizue Nagata[2]

[1] Future University Hakodate
041-8655 Hakodate, Japan
kaoru.sumi@acm.org
[2] Jumonji University, Department of Child Education
352-8610 Saitama, Japan

**Abstract.** In this chapter, we evaluate the effect of animation on parent-and-child communication and its possibilities. We developed a type of media for helping children understand content presenting an animation and dialogue by transforming text automatically. We evaluate the effect of presenting animation and dialogue via interaction between a nursery staff and a child on children's understanding and quality of their interaction. Through our experiment, we have shown that the effects of presenting animation with dialogue and its possibilities.

**Keywords:** Animation, Children, Information Media, Understanding

## 1. Introduction

The environment surrounding children has rapidly changed under the influence of fast and furious technology growth and development. Information media surrounding children go beyond the categories of television, videos, personal computers, TV games, portable games, mobile phones, and smart phones, as can be seen from the release of so many products equipped with new kinds of software and hardware. Research on the evaluation of influence on humans of products such as television, video, and games covers a wide range of academic areas, such as cognitive psychology, information science, educational technology, pedagogy, developmental psychology, sociology, social psychology, neurosurgical study, medical study.

In Japan, in a negative comment on providing children with television, videos, and games, the Japan Pediatric Association proposed "Don't make children under two years old watch television and videos" in Proposal on the problem of children and media in 2004. There was an incident of "Pokemon Shock" in which many children were taken to hospital by ambulance suffering from photosensitive epilepsy caused by the visual effects of the TV program "Pokemon". It was identified that heavy use of certain visual techniques in TV programs causes harm to children. In the developmental psychology area, there is an explanation that children find it difficult to differentiate television from the real world, and they can recognize them clearly after infancy [1, 2, 3]. Understanding of children during infancy and childhood on visual techniques such as zoom and pan has difference in age [4]. The adverse effects of digital games on children's brains [5, 6] has been a controversial issue among neurosurgical scientists

On the other hand, there is a movement to use digital games in our own lives in a positive way, exploiting their advantages. There are serious games [7, 8] that can be used for solving social problems [9, 10, 11]. The concept of "Serious games" involves using digital games as tools for human development or education in a proactive manner, taking advantage of their attractiveness.

For utilizing information media, detailed study is needed to investigate what aspects of information media affect what kind of user's perceptions or behavior.

The Interactive e-hon was developed with the aim of utilizing information media for children through animation [12], and "e-hon" means a picture book. The users of Interactive e-hon are assumed to be a pair of a parent and a child. The Interactive e-hon system displays animation with voice automatically when the user inputs text. Text is automatically translated into dialogue and played, synchronized with the action of

the character. The system aims at supporting children's understanding by presenting animation and dialogue instead of text, which is difficult for children to read.

An image is said to improve understanding and memory, promote learning, and present additional information when it is presented with text [13]. An image has the capability of directing the user's attention and has more attention-grabbing ability than text [14, 15]. The present result suggested that animation is effective for improving the user's motivation [16]. Paivio's dual coding theory [17] postulates that visual and verbal information are processed differently and along distinct channels, with the human mind creating separate representations for information processed in each channel.

We mainly discuss evaluation of the animation effect on children and its possibilities in this chapter. In the following section, we give a brief introduction of the Interactive e-hon, an evaluation of how it supports communication between a child and an adult by presenting animations and dialogues.

## 2. Interactive e-Hon

The Interactive e-hon is an automatic word translation medium that provides expression through the use of 3D animation and dialog explanation to help users understand Web content or any other electronic resources, such as news, novels, and essays. For given content, animation and a dialog explanation spoken by a voice synthesizer are synchronized. Figure 1 is a snapshot of Interactive e-hon. The system generates documents with semantic tags (.tag files), morphological and dependency structure information (.morph files), and animation files (.ehon files), based on the .x file format of DirectX. We use Japanese for text. Figures 2, 3, and 4 show examples of a .tag file, a .morph file, and an .ehon file, respectively.

The Interactive e-hon transforms content into animation by using semantic tags, morphological and dependency structure information, and an animation database.


**The original text information can be seen in the text box above the animation. The following is a dialogue explanation for this example:**

*Parent Agent: President Roosevelt went bear hunting. Then, he met a small, dying bear.*
*Child Agent: The President met a small bear who was likely to die.*
*Parent Agent: But, what do you think happens after that?*
*Child Agent: I can't guess. Tell me the story.*
*Parent Agent: The President refused to shoot and kill the bear. And, he helped it instead.*
*Child Agent: The President assisted the small bear.*
*Parent Agent: The occurrence was carried by the Washington Post as a heartwarming story, with a caricature by Clifford Berryman.*
*Child Agent: The episode was carried by the newspaper as a good story.*

**Fig. 1.** Sample view from Interactive e-Hon.

First, the system attempts to reduce a long, complicated sentence into simple sentences, each of which includes a verb. An animation and its dialogue generated from a simple sentence plays at the same time. After the play, it plays next simple sentence.

www.blueherons.net


editions

www.blueherons.net

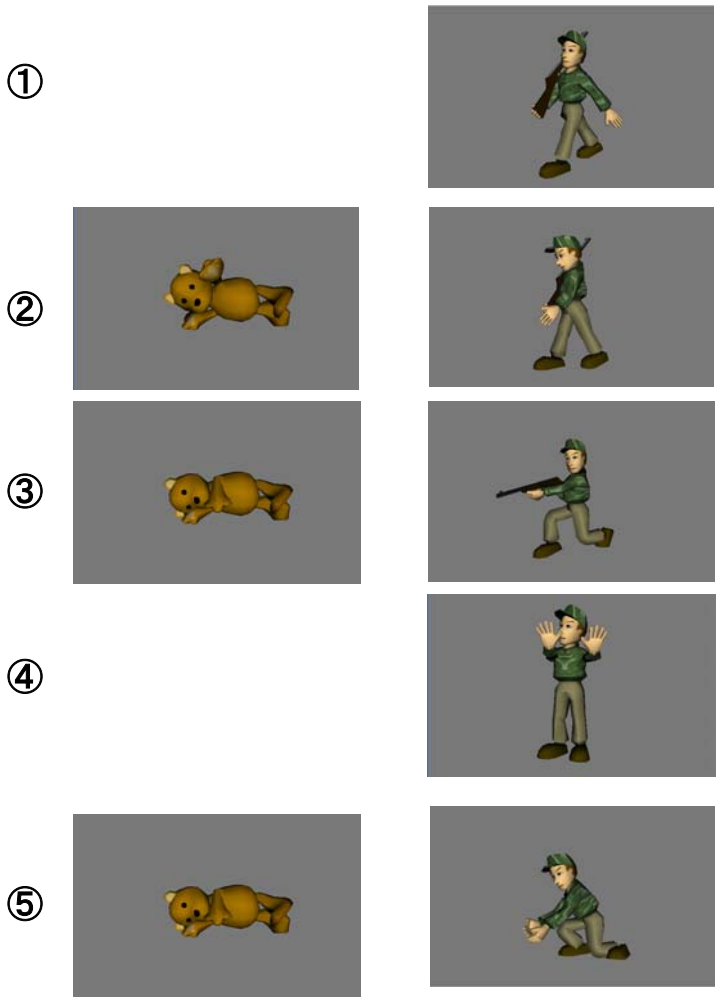



**Fig. 6.** Example of the parts of the animation.

## 3. Supporting Communication

We explored the effect of presenting animation and dialogue via interaction between a nursery staff member and a child instead of a parent and a child, and evaluated how it affected children's understanding and the quality of their interaction.

**Fig. 7.** Experiment using a subject pair consisting of a teacher and a child.

www.blueherons.net

www.blueherons.net

www.blueherons.net

# Chapter 3

## A Virtual World to Educate Software Engineering Students

Guillermo Rodríguez[1,2], Alvaro Soria[1], Marcelo Campo[1,2]

[1] ISISTAN, Research Institute – UNICEN, Argentina
[2] Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)
{grodri, asoria, mcampo}@exa.unicen.edu.ar

**Abstract.** One of the main goals of teaching Software Engineering is that students face problems that happen in the real world of software development. To do so, agile approaches emerge as a feasible alternative for student to apply theoretical concepts to practice situations. Particularly, learning an agile approach such as Scrum requires students to perform its process activities in a working environment as real as possible. With this goal in mind, we propose the use of virtual worlds to represent a development environment through virtual elements such as blackboards, browser, document viewers, charts, calendar, and so on. In this chapter, we present Virtual Scrum, an educational virtual world focused on learning/teaching strategies to educate Software Engineering students in using Scrum. We used a questionnaire to evaluate the usability and effectiveness of the tool with undergrad students. The results have shown that Virtual Scrum is suitable for teaching student how to implement the different elements in a Scrum team room and to perform the activities throughout the Scrum process.

**Keywords:** Software Engineering, Scrum, Virtual World, Learning/Teaching Strategies

## 1. Introduction

As the implementation of Agile Methods (AM) is becoming main-stream in the software industry, its inclusion in a Software Engineering course is just natural [19]. AM empathizes the importance of team effort and social and human activities in the software development. These concepts are crucial in the professional formation of future computer and information science engineers.

Out of the various agile approaches, Scrum has gained wide acceptance because it concentrates on managing software projects and includes monitoring and feedback activities [2, 3]. These features allow students to acquire skills beyond technical and scientific scenarios, such as teamwork-related abilities. Thus, these aspects are welcome for SE teachers because they enable students to get acquainted with agile methods and, at the same time, provide mechanisms for evaluating individual agile concepts.

Several works [5, 6, 7] have aimed to teach a few practices of software engineering like programming, testing, estimating and planning techniques by following agile approaches. However, they have not elaborated about the actual implementation of a teaching environment. Other approaches have stated Scrum covers a big number of good software engineering practices [8, 9]. For this reason, Scrum seems to be the most suitable alternative of AM to obtain a high level of coverage of software engineering practices. So far, there is not much evidence about teaching Scrum. Mahnic (2010) taught Scrum through a capstone project and described the course details, student perceptions and teacher observations after the course [2]. However, there is a lack of approaches to teach Scrum involving students in real team rooms of software developments.

To effectively learn how to work with Scrum, students have to setup a Scrum-based Team Room. This way, students are introduced to the use of tools and techniques for supporting different Scrum roles within a capstone project. However, setting up a Team Room for each group of students in a Software Engineering course is not always possible due to the cost of the required didactic material and, more important yet, the availability of the university facilities.

In this context, we find virtual worlds highly suitable for helping students to feel familiar with development contexts by viewing software artifacts, which are naturally intangible. These 3D environments provide a physical topology of the structure of information in a software project, which would allow accessing the project information [4]. For instance, one objective is to have the information

readily available, visualize the traceability of requirements, and be aware of the team progress. In this context, the artifacts are always shared in an integrated development environment. Thus, virtual worlds have to be as close to real life as possible by exploiting the 3D metaphor.

In this work, we present *Virtual Scrum*, a virtual world that provides students with a platform in which they can experience several aspects of the Scrum framework to prepare them for their future jobs in the software development jobs and consequent exposures to the software process.

To evaluate how much *Virtual Scrum* helps students in different aspects of the Scrum framework, we conducted a case study with students of the Software Engineering course at UNICEN (National University of Central Buenos Aires Province, Tandil – Argentina). To record the perception of students of this study, we designed a questionnaire to collect students' opinions with respect to *Virtual Scrum* performance and usability.

The results showed that there are some positive and some negative effects by introducing *Virtual Scrum*. The most notably positive effect is that students are clearly motivated to use the tool. However, there are some issues to improve which affect the tool performance, such as avatar movement controls, little friendly graphic user interface and the tool deployment. Those issues were considered by students in the questionnaire because they affected the tool usability.

The remainder of the chapter is organized as follows. Section 2 describes the Scrum framework in a teaching context. Section 3 gives an overview of *Virtual Scrum*. Section 4 shows experimental results. Section 5 reports background on collaborative work in software development. Finally, Section 6 concludes this research and identifies directions for future work.

## 2. Teaching the Scrum Framework

The emergence of the Manifesto for Agile Software Development brought changes in the software development community, generating contradictory opinions and discussions in several segments of manufacturing, civil and aerospace constructions as well as in project management [24]. The Manifesto essentially defines a new focus on the software development based on agility, flexibility, communication abilities and the capacity for offering new products and services with high value to the marketplace in short periods of time [20]. A new approach that is currently taking place in software engineering education is the shift from traditional lectures based on teaching software engineering practices to agile development based on a simulated project. This kind of project is developed in the classroom and supervised by professors. This strategy aims to increase student's participation in the learning process and address not only common problems found in the development of software systems but also several values proposed by the Agile Manifesto [25, 26].

In this context, Scrum has attracted significant attention amongst software practitioners during the last five years. Scrum is a methodology that organizes projects into small, self-organized and cross functional teams, called Scrum Teams, who are in charge of fulfilling the work and running the process. Scrum aims at identifying and planning corrective actions to possible issues and impediments to the development process by performing daily and quick meetings with everyone of the project team. Figure 1 shows the relationship between Scrum roles.

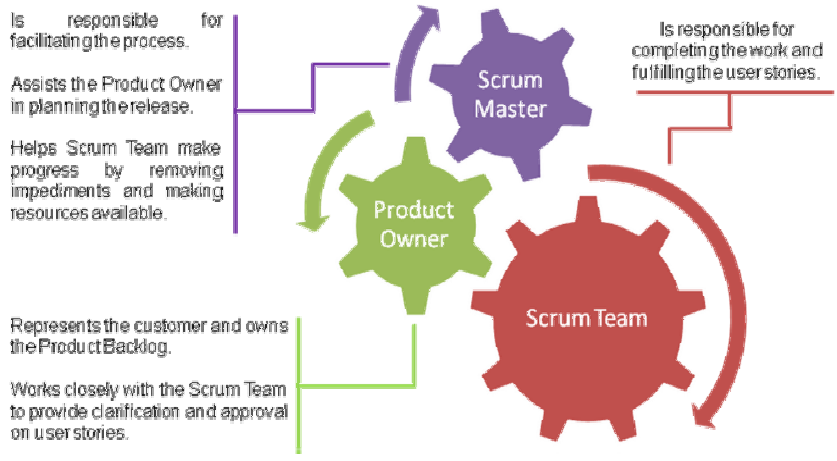



**Fig. 1.** Relationships between Scrum roles.

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net

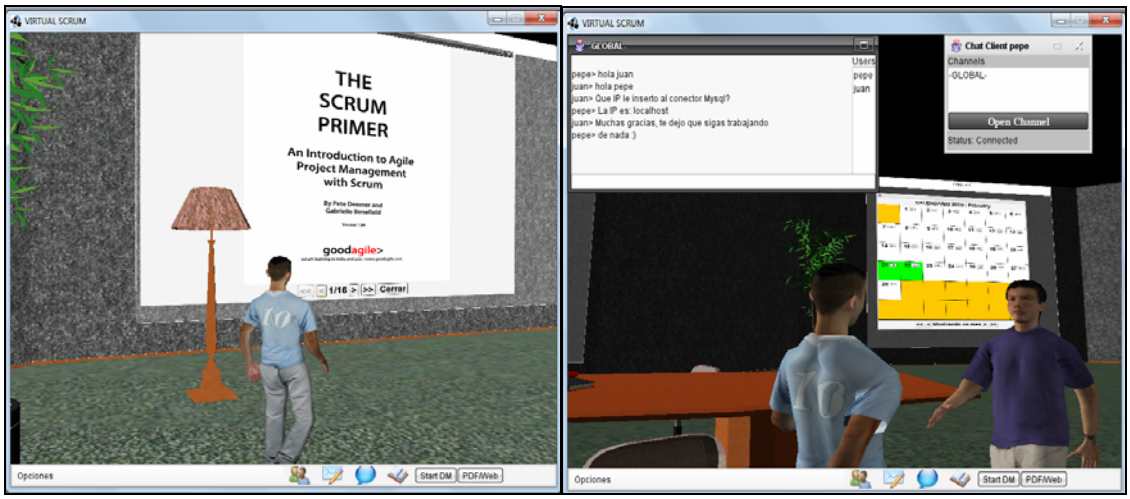



**Fig. 6.** **(a)** Virtual PDF Viewer **(b)** Virtual Chat.

## 4. Experimental Results

The experiment focused on evaluating how much *Virtual Scrum* helps students in different aspects of the Scrum framework. Thus, we carried out a case study with 8 students of the last year of System Engineering at UNICEN University of Argentina.

Students were of both sexes and were between 21 and 25 years old. They were given some lectures of Scrum in the context of Software Engineering course of the System Engineering BSc program at the Faculty of Exact Sciences (Department of Computer Sciences – UNICEN). Each student had a personal computer in order to simulate a geographical distribution.

Before the experiments, we held a training course for the participants so as to provide them with the skills to interact with each artifact of the virtual world and its relationship with the Scrum framework. The experiment consisted in building a web-based system to manage purchase and sale of products. Professors, who played the role of Product Owner, gave students a list of 9 user stories. The participants had to perform all the Scrum activities such as building the Product Backlog, estimating and planning the user stories, holding Daily Meetings and observing the progress of the tasks.

To evaluate the perception of the tool, we used a questionnaire based on Likert's approach [17] so as to collect student opinions about *VS* artifacts. The questionnaire items were statements based on a 3-point scale in which the students could either totally agree, agree, or disagree.

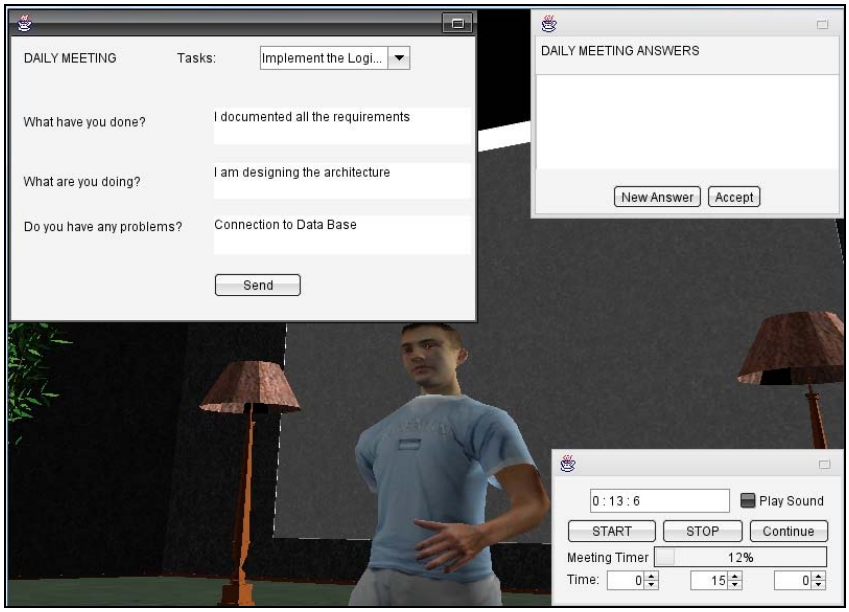



**Fig. 7.** Daily Meeting in Scrum.

www.blueherons.net

www.blueherons.net

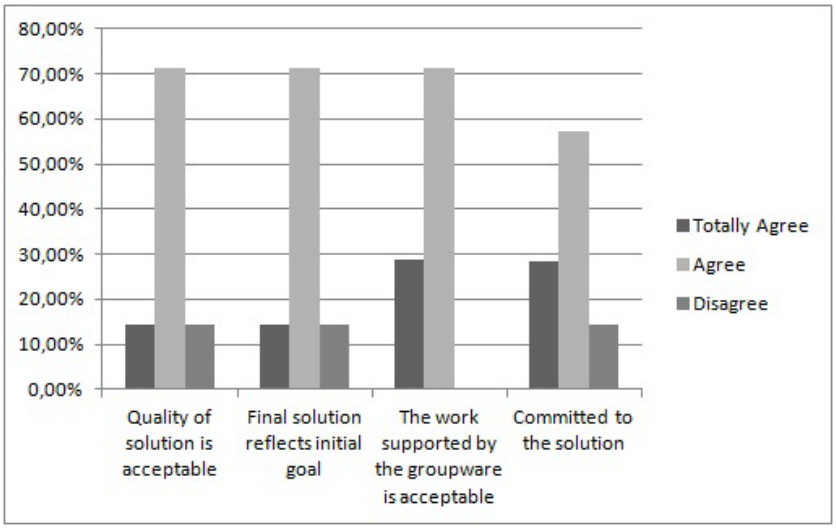



**Fig. 10.** Opinion about quality of tool features to support the process.

Overall, we were interesting in knowing whether the students would use the tool again to perform any Scrum practice like a Daily Meeting. Figure 11 depicts the results of our question. Remarkably, 86% of students would use the tools again as long as it is not viable a face-to-face team room. As well, 14% of them would use the tool again some time.

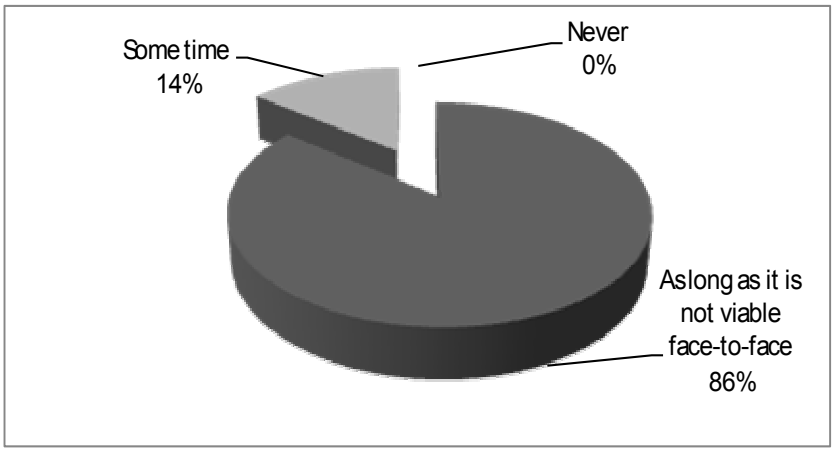



**Fig. 11.** Use the tool again.

## 5. Related Work

There are some 2D tools for collaborative development in agile methods like CollabNet TeamForge[1] and ScrumWall[2] which allow developers to visualize and develop software artifacts in a distributed environment. However, the main drawback of these tools is that they do not support meetings among developers, which are essential for agile approaches.

The advent of better Internet connections and more powerful computers have encouraged the creation of Virtual Worlds in which people get together and interact. Thus, these platforms are a good opportunity to build a software environment that supports meetings and the interaction of people during the development of a product saving people time and traveling money. Massive multiplayer online games (MMOG), like Second Life[3] and Wonderland[4] illustrate this trend.

[1] http://www.collab.net
[2] http://www.scrumwall.com
[3] http://www.secondlife.com
[4] http://java.net/projects/wonderland

www.blueherons.net

www.blueherons.net

# Chapter 4

## Describing Grid Services with FOSD

Natalia Trejo, Karim Hallar, Sandra Casas

Unidad Académica Río Gallegos, Universidad Nacional de la Patagonia Austral
Río Gallegos, Argentina
nbtrejo@gmail.com, karimhallar@gmail.com, lis@uarg.unpa.edu.ar

**Abstract.** Grid computing and Feature-oriented Development Software are emerging technologies, which can be combined to analyze, model, and specify Grid services. In a Grid environment, there are a large number of similar resources provided by different parties that may provide the same functionality, but different Quality of Service (QoS) measures. A feature-based approach is presented to optimize the development of Grid services and Grid service composition. WSDL specification is extended to contain useful description of both functional and non-functional characteristics by mean Design by Contract technique. In this way, Grid users can specify their QoS expectations and select suitable resources and use them for their Grid workflow at design time before its execution on the Grid.

**Keywords:** Grid Service, Feature-Oriented Software Development, Design by Contract, QoS Attributes, Grid Service Composition

## 1. Introduction

This work presents a unique blend of ideas from different technical areas: distributed computing, feature-oriented software development as new software engineering paradigm, service-oriented architecture, and software design methods. Grid technology [1] provides a distributed computing environment based on the aggregation and the sharing of comprehensive, safe and coordinated heterogeneous resources from different organizations dynamically pooled into Virtual Organizations (VOs).

Grid applications for service-based systems are usually not based on a single service, but are rather composed of several services working together in an application-specific manner to achieve an overall goal. An application developer has to decide which services offered by the Grid should be used in the application, and he/she has to specify the data and control flow between them. We refer to workflow as the automation of both – control and data flow – in Grid applications.

QoS is a "combination of several qualities or properties of a service" [2]. In the context of Service-oriented Architecture (SOA), it is a set of non-functional attributes that may influence the quality of the service provided by a Web service [3]. Usually, several Web/Grid services are able to execute a given task although with different levels of quality. In addition, different users or applications may have different expectations and requirements. However, workflows developers would have to offer multiple criteria related to non-functional or QoS characteristics. Thus, during design time of Grid workflows, it is important to consider non-functional attributes of the Grid application in order to satisfy the needs of each service requester/consumer before Grid workflow execution.

Feature-oriented software development (FOSD) [4] is a paradigm for designing and implementing applications based on features. A feature is an end-user visible characteristic or requirement in a software system. Software is modularized into feature modules that represent features [5]. To create an application, feature modules are composed. Thus, features can be composed in different combinations, i.e., omitting certain features or implementing alternative features. In this way, FOSD can be used to develop software product lines. The concept of Design by Contract (DbC) was first introduced by Meyer [6] to facilitate component reuse. Grid services are components in computing paradigm based on Grid technology, and DbC can be used at the level of components specifying component contracts as part of the components interfaces including functional requirements and QoS restrictions of Grid applications based on Grid services.

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net


editions

9. Almond, J., Snelling, D.: UNICORE: uniform access to supercomputing as an element of electronic commerce. Future Generation Computer Systems, Vol. 15, pp. 539–548 (1999)
10. EGEE Project, gLite. http://glite.web.cern.ch/glite (2002)
11. OASIS, Web Services Resource Framework (WSRF) 1.2. http://docs.oasis-open.org/wsrf/wsrf-ws_resource-1.2-spec-os.pdf (2006)
12. Jia, Y., Rajkumar, B.: A Taxonomy of Workflow Management Systems for Grid Computing. Grid Computing, Vol. 3 (3), pp. 171–200 (2005)
13. Zeng, L., Benatallah, B., Dumas, M., Kalagnanam, J., Sheng, Q.: Quality driven web services composition. In Proc. of the 12th International Conference on World Wide Web (WWW'03), New York, pp. 411–421 (2003)
14. D'Ambrogio, A.: A Model-driven WSDL Extension for Describing the QoS of Web Services. In Proc. of the IEEE International Conference on Web Services, Washington, pp. 789–796 (2006)
15. Rajendran, T., Balasubramanie, P.: Analysis on the Study of QoS-Aware Web Services Discovery. Journal of Computing, Vol. 1 (1), pp. 119–130 (2009)
16. Ranaldo, N., Zimeo, E.: A Framework for QoS-based Resource Brokering in Grid Computing. In Emerging Web Services Technology, Vol. 2, pp. 159–170 (2008)
17. Acher, M., Collet, P., Lahire, P., Montagnat, J.: Imaging Services on the Grid as a Product Line: Requirements and Architecture. In SPLC (2): Software Product Lines, 12th International Conference, pp. 137–142 (2008)
18. Acher, M., Collet, P., Lahire, P., France, R.: Managing Variability in Workflow with Feature Model Composition Operators. In 9th International Conference on Software Composition, Malaga (2010)
19. Musunoori, S., Eliassen, F., Eide, V.: QoS-driven service configuration in computational grids. Grid Computing, 2005. The 6th IEEE/ACM International Workshop (2005)
20. Manset, D., McClatchey, R., Oquendo, F., Verjus, H.: A Model-driven Approach for Grid Services Engineering. CoRR, Vol. 509066 (2005)
21. Brandic, I., Pllana, S., Benkner, S.: High-level composition of QoS-aware Grid workflows: An approach that considers location affinity. Workflows in Support of Large-Scale Science, 2006. WORKS '06. Workshop on, pp. 1–10 (2006)
22. Li, W., Liang, X., Song, H., Zhou, X.: QoS-Driven Service Composition Modeling with Extended Hierarchical CPN. Theoretical Aspects of Software Engineering, 2007. TASE '07. First Joint IEEE/IFIP Symposium on, pp. 483–492 (2007)
23. Guo, L., et al.: Enabling QoS for Service-Oriented Workflow on GRID. In Computer and Information Technology, 2007. CIT 2007. 7th IEEE International Conference on, pp. 1077–1082 (2007)
24. Wahib, M., Munawar, M. Munetomo, M., Kiyoshi, A.: SOAG: Service Oriented Architectured Grids and adoption of application specific QoS attributes," in Grid Computing, 2008 9th IEEE/ACM International Conference on, pp. 346–351 (2008)
25. Chiu, D., Deshpande, S., Agrawal, G., Li, R.: Cost and accuracy sensitive dynamic workflow composition over grid environments. In Grid Computing, 2008 9th IEEE/ACM International Conference on, pp. 9–16 (2008)
26. Brandic, I., Music, D., Dustdar, S., Venugopal, S., Buyya, R.: Advanced QoS methods for Grid workflows based on meta-negotiations and SLA-mappings. Workflows in Support of Large-Scale Science, WORKS 2008. Third Workshop on, pp. 1–10 (2008)
27. Kyriazis, D. et al.: QoS-Based Decision Services in Grids. In Informatics, 2008. PCI '08. Panhellenic Conference on, pp. 78–82 (2008)
28. Allenotor, D., Thulasiram, R.: Grid resources pricing: A novel financial option based quality of service-profit quasi-static equilibrium model. In Grid Computing, 2008 9th IEEE/ACM International Conference on, pp. 75–84 (2008)
29. Apel, S., Kaestner, C.: An Overview of Feature-Oriented Software Development. Journal of Object Technology, Vol. 8 (4), pp. 1–3 (2009)
30. Weiss, D., Lai, C.: Software Product-Line Engineering: A Family-Based Software Development Process. New York: Addison-Wesley, p. 448 (1999)
31. Apel, S., Kaestner, C., Lengauer, C.: Research challenges in the tension between features and services. In SDSOA '08: Proc. of the 2nd international workshop on Systems development in SOA environments, New York, pp. 53–58 (2008)
32. Robak, S., Franczyk, B.: Modeling Web Services Variability with Feature Diagrams. In Revised Papers from the NODe 2002 Web and Database-Related Workshops on Web, Web-Services, and Database Systems, London, pp. 120–128 (2003)
33. Meyer, B.: Object-Oriented Software Construction. New Jersey: Prentice Hall, p. 1254 (1997)
34. Binder, R.: Testing Object-Oriented Systems:Models, Patterns, and Tools. New York: Addison Wesley, p. 1296 (1999)
35. Heckel, R., Lohmann, M.: Towards Contract-based Testing of Web Services. Electronic Notes in Theoretical Computer Science (ENTCS), Vol. 116, pp. 145–156 (2005)
36. Milanovic, N.: Contract-based Web Service Composition. Berlin: Humboldt University Berlin (2006)
37. Andrade, L. Fiadeiro, J.: Feature Modeling and Composition with Coordination Contracts. In Proc. of the ECOOP 2001 Workshop on Feature Interaction in Composed Systems (FICS 2001), Budapest, pp. 49–54 (2001)
38. Kang, K., Cohen, S., Hess, J., Novak, W., Peterson, S.: Feature-Oriented Domain Analysis (FODA). Feasibility Study (90). Software Engineering Institute, Carnegie Mellon University (1990)
39. Calder, M., Kolberg, M., Magill, E., Reiff-Marganiec, S.: Feature interaction: a critical review and considered forecast. Computer Networks: The International Journal of Computer and Telecommunications Networking, Vol. 41 (1), pp. 115–141 (2003)

# Chapter 5

## Recognition of Software Design Patterns from the Interaction of a User with a CASE Tool

Juan F. Silva Logroño, Luis Berdún, Marcelo Armentano[1], Analia Amandi[1]

ISISTAN Research Institute, Facultad de Ciencias Exactas – UNCPBA
Campus Universitario, Paraje Arroyo Seco, Tandil, 7000, Argentina
[1] also CONICET, Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina
{juanf.silval}@gmail.com,
{lberdun, marmenta, amandi}@exa.unicen.edu.ar

**Abstract.** In software engineering, a design pattern is a general repeatable solution to a commonly occurring problem in software design. A design pattern is a description or template for how to solve a problem that can be used in many different situations. In this chapter we propose to create a model from the sequences of actions that an expert designer is expected to perform to model a design pattern in a CASE tool. This model is then used to detect possible design patterns a novice user might be trying to create in the CASE tool in order to provide him/her assistance in this task.

**Keywords:** Design Patterns, Discrete Sequence Analysis, Personal Assistants

## 1. Introduction

Design patterns can speed up the development process by providing tested and proven software designs for different functionalities in a give software system. Many benefits are derived from the user of software design patterns. Reusing design patterns helps to prevent subtle issues that can cause major problems and improves code readability for coders and architects familiar with the patterns. Design patterns provide general solutions, documented in a format that doesn't require specifics tied to a particular problem. In addition, patterns allow developers to communicate using well-known, well understood names for software interactions.

In order to learn how to properly use these reusable portions of software designs, novice designers need to read and understand long catalogs of patterns to acquire this knowledge, missing the learning that is only obtained from practice [2]. Novice designers, who are exposed to patterns for the first time, should engage in real problems where patterns can help to understand that a given solution can exist and be applied [17]. In [8] the authors remark from their experience with a beta course that people cannot learn patterns without trying them out. Also, people need to identify them in their own domain".

Personal Assistants [10] are computer programs that enhance the functionality provided by a software application by implementing a mixed-initiative interaction with the user in which both, the assistant and the user, can execute tasks and initiate the interaction with each other. This kind of software is also known as Interface Agents in the Artificial Intelligence community and arises in order to provide users with proactive and reactive support in a personalized way in the use of a software application.

To provide assistance, interface agents own a user model that is built according to the interests, preferences, priorities and needs demonstrated by the user through their interaction with the agent. However, the task of an interface agent is not only to learn the preferences and habits demonstrated by the user during use of the application, but it also must consider the user's goal previous to start interacting with him/her. In order to provide a recommendation service two main factors must be considered in the design of an interface agent: first, the focus of attention with regard to the activities being undertaken by the user and second, the uncertainty regarding the user's current goal. With these premises in mind, the need to create an agent capable of performing an early detection of the user's current goal arises, so that the assistance provided by the agent is adapted to the context of the tasks performed by the user.

For the reason expressed above, and because of the difficulty of predicting the user's goal when designing a software system is that the use of interface agents in CASE tools (Computer Aided Software Engineering) has been an almost unexplored field. In several applications approaching this task [4, 7, 9, 15,

www.blueherons.net


editions

www.blueherons.net


editions

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

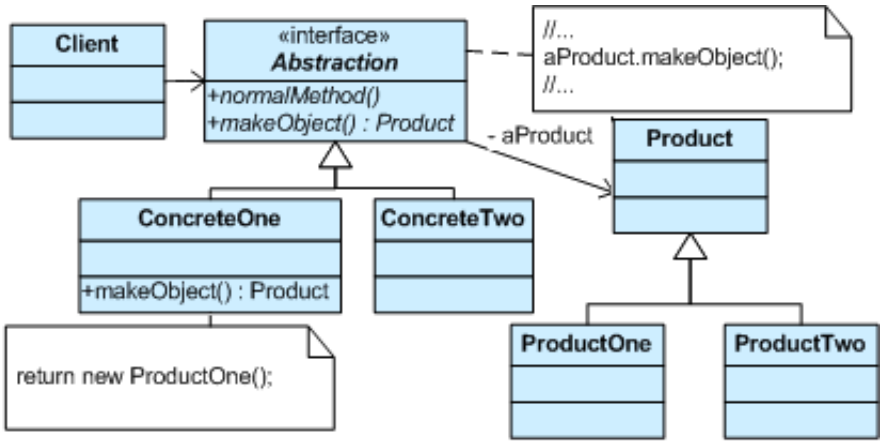



**Fig. 3.** Class diagram for the Factory Method design pattern.

Each artifact in the class diagram in figure 3 is created after the user performs one of the actions described in table 2. These actions must be performed in a specific order according to the syntax of the class diagram. For example, it is impossible to create a relation between two classes if these classes are not created beforehand. With these restrictions in mind the following three alternative sequences of actions might be performed to achieve the class diagram shown in figure 3:

1. AddAbstractClass, AddClass, AddClass, DefGeneralization, AddAbstractClass, AddClass, AddClass, DefGeneralization, DefGeneralization, DefGeneralization, DefAssociation, AddClass, DefAssociation

2. AddAbstractClass, AddClass, AddClass, AddAbstractClass, AddClass, DefAssociation, DefAssociation, DefGeneralization, AddClass, AddClass, DefGeneralization, DefGeneralization, DefGeneralization

3. AddAbstractClass, AddClass, DefGeneralization, AddClass, AddAbstractClass, AddClass, AddClass, DefGeneralization, AddClass, DefGeneralization, DefAssociation, DefGeneralization, DefAssociation

The first sequence, for example, indicates that the user first adds an abstract class to the diagram, and then he/she adds two concrete classes and connects them with a generalization relationship. After this, the user repeats the process with a new abstract class and two concrete classes with the corresponding generalization relationships. Finally, the user connects the two abstract classes with an association relationship and creates a new concrete class connected to the diagram with another association relationship.

### 6.3 Building the Plan Corpus

The term Plan Corpus is used to name the consistent training data from a goal list and the actions performed by the user to reach them. In our particular case, each goal will refer to the construction of a model of a particular design pattern, and the actions considered are those listed in table 2. The quality of the Variable-Order Markov model developed to represent the patterns depends on the correctness and completeness of this plan corpus.

For our experiments, we used an AI planning algorithm, called Ag-Ucpop [3], to automatically generate the plan corpus. We selected the Ag-Ucpop algorithm due to the simplicity to obtain all the plans to achieve a particular goal.

The planner's input are (1) the definition of the final state desired, that is the design pattern being modeled, and (2) the set of actions that can be performed in the CASE tool. The planner's output is a set of feasible plans that allow the user to achieve the given final state, and consequently to model the corresponding design pattern. Each of these plans is a partial order plan. This fact allows us to obtain several total order plans from a single plan found by the algorithm. A total order plan defines a feasible sequence of actions that when executed in any world satisfying the initial state description will let the user achieve the goal [18].

www.blueherons.net

www.blueherons.net

We performed a Leave-One-Out cross validation with the training sequences for each pattern. To determine the most adequate EMA value to be used during these tests, we made a full evaluation of the domain using values for λ ranging from 0.1 to 1.0, using intervals of 0.1. The results we obtained for online accuracy are presented in figure 7.

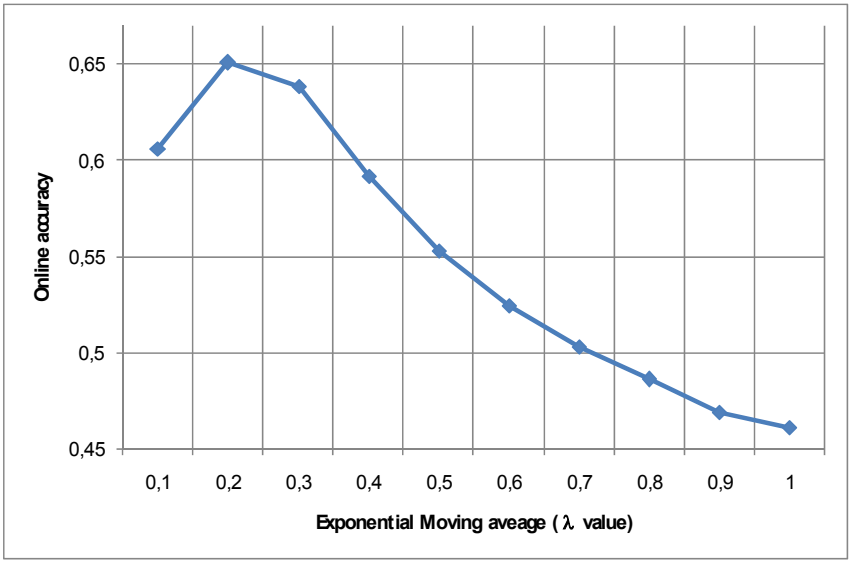



**Fig. 7.** Online accuracy for different values of λ.

As figure 7 shows the value of λ that maximized the online accuracy was λ=0.2. This value maximized the media of the online accuracy for all the models analyzed in our experiments.

Table 3 shows the results of the experiment. The table shows that the online accuracy values for each model is around 65%, with some special cases in which the value is close to 30%. These particular cases result from the way the pattern is implemented. The Class diagrams used to represent these patterns use basic structures used in Object Oriented Programming; therefore, this simple structure was present in several of the patterns used in the experiments.

The average error obtained was 7.8%. We have to bear in mind that this metric is independent of the number of models considered to make the prediction. It is calculated using the distance between the probability value of the actual user's goal and the top value of the plan recognizer. The average convergence was of 53%, with some values lower than 34%, similar to the results obtained for the online accuracy.

With these results, we conclude that combining a planning algorithm with VOM models to formulate plans and make predictions in the domain of software patterns give us high levels of certainty about the user's goals at the moment of designing a software pattern.

**Table 3.** Experimental Results.

| *Category* | *Pattern* | *Online Accuracy* | *Error* | *Convergence* | *Sequences length (average)* |
|---|---|---|---|---|---|
| Creational | Abstract factory | 0,78509964 | 0,02891106 | 69,1803 | 23 |
| | Factory Method | 0,95139217 | 0,00324753 | 78,8108 | 13 |
| | Prototype | 0,33333333 | 0,18535306 | 16,4683 | 7 |
| Structural | Adapter | 0,47037441 | 0,15656416 | 34,1058 | 6 |
| | Bridge | 0,80208333 | 0,06706767 | 70,3125 | 12 |
| | Composite | 0,26956107 | 0,15291051 | 20,9924 | 8 |
| | Decorator | 0,60063437 | 0,04938729 | 42,3299 | 12 |
| Behavioral | Command | 0,71853189 | 0,04900221 | 60,4813 | 15 |
| | Iterator | 0,83858521 | 0,02541061 | 73,1404 | 15 |
| | Mediator | 0,67768595 | 0,09292792 | 67,7686 | 11 |
| | Observer | 0,71040243 | 0,05159191 | 54,9127 | 15 |
| Average values | | 0,65069853 | 0,07839763 | 53,5003 | 12,45 |

www.blueherons.net

www.blueherons.net

# Chapter 6

## Italian Electronic Health Record: A Proposal of a Federated Authentication and Authorization Infrastructure

M. Claudia Buzzi[1], Francesco Donini[1], Abraham Gebrehiwot[1], Alessio Lunardelli[1], Cristian Lucchesi[1], Paolo Mori[1]

[1] CNR-IIT – Pisa, Italy
{Claudia.Buzzi, Francesco.Donini, Abraham.Gebrehiwot, Alessio.Lunardelli, Cristian.Lucchesi, Paolo.Mori}@iit.cnr.it

**Abstract.** The Electronic Health Record (EHR) is a systematic collection of electronic health information about patients that can improve health care and personal safety through more accurate evidence-based decision support. EHRs comprise medical history, medication and allergies, immunization status, laboratory test results, radiology images, vital signs, personal stats such as age and weight, demographics and billing information. EHR is in digital format so can be shared across different healthcare settings/organizations. Healthcare organizations, primarily in different regions/local governments, can have different architectural solutions, procedures and access control policies, thus making it necessary to adopt a single Federated infrastructure model. Furthermore, data stored in the EHR Infrastructure concerns the health status of patients so are critical, and their confidentiality and integrity must be protected by proper security support. In this chapter we present some ideas on how to manage federation and security issues for the management of the Electronic Health Record in Italy.

**Keywords:** e-Health, Electronic Health Record, SOA, Infrastructure, Federation, Security

## 1. Introduction

The Electronic Health Record (EHR) is a systematic collection of electronic health information about patients that can improve health care and personal safety through more accurate evidence-based decision support. EHRs can include medical history, medication and allergies, immunization status, laboratory test results, radiology images, vital signs, personal stats such as age and weight, demographics, billing information and other information that can be distributed to different Health Care Organizations (HCOs). EHR is in digital format so can be shared across different health care settings/organizations. Some healthcare agencies also provide a patient summary containing all relevant information such as blood group, allergies, vital medicines and others; the patient summary is very useful in emergencies or to describe the general health conditions of a patient.

The development and use of electronic health record systems (EHR) will improve coordination of healthcare services. Different health care organizations follow different procedures, and thus may have various access control policies [1], so there is the need to define and implement common rules supported by infrastructure solutions for the effective administration and direction of EHRs. In order to facilitate the creation of the Electronic Health Record by reassembling data maintained in different health care organizations, the Italian Ministry for the Public Administration and Innovation is supporting the process of building an interoperability framework for EHR management; this framework will allow all citizens and authorized health professionals to access the EHR wherever they are located.

The health information will be available for primary uses such as emergency assistance or evidence-based decision support, but also for epidemiological studies, administrative purposes and government. A basic requirement for the technological infrastructure of the interoperability framework is that it should be compliant with the architectural solutions previously developed by the different regions/local governments. This requirement can be satisfied using a single federated infrastructure model that allows each entity to follow the overall model implementing its own technology choices and business rules.

An additional requirement concerns the technological infrastructure that needs to be consistent with Italian law regarding the Public Connectivity System (SPC), which specifically regulates the rules for the

www.blueherons.net


editions

www.blueherons.net

- the data structure used for the interactions between the domains, also ensuring all security principles.
- Service works on the basis of an agreement between at least two subjects (supplier and client); such agreements have a technical basis and an institutional/jurisdictional basis. These agreements should be formalized in order to support the development and the life-cycle of services in a (semi) automatic way. The agreement specification is called Service Agreement and is based on the XML language.

In order to support these principles, SPCoop includes the following components:

- *Agreements Repository* is the software component used to register and maintain the Service Agreements. It can be considered the "database" that allows cooperation. This component offers functionalities for the registration, access, update and search of the agreements.
- *Schemas/Ontologies Repository* is the software component that offers functionalities to deal with the service and information semantics, in order to discover services that are most suitable for providing the required functionalities. This component acts as a structure to store ontologies and conceptual schemas, offering functionalities of registration, access, update and reasoning on them.
- *Federated Identity Management* is used to authorize and control access to application services over SPCoop; the federation is needed to reuse the already in-place identity management systems of regional/national authorities. Integration is done through specific interfaces supporting SAML v2.0.
- *Monitoring Service* for the monitoring of the Service Level Agreements (SLAs).

A service agreement is a well-specified XML document that regulates the relationships of an application service between a supplier and a client regarding the following aspects:

1. Service interface
2. Conversations admitted by the service
3. Access points
4. Service Level Agreements (SLAs)
5. Security characteristics
6. Descriptions of the semantics of the service

The public nature of the service agreement makes it easier to establish domain ontologies that allow aggregating services with similar semantics. In the context of a set of public administrations (i.e., a Cooperation Domain), services can be composed and orchestrated, thus generating other services described in turn by service agreements. A Service Agreement describes a 2-party collaboration/cooperation, with a subject offering a SPCoop application service and another subject using such a service. Many administrative processes do not concern only a single administration, but involve different subjects. The Cooperation Domain is the formalization of the desire of different subjects to join together to cooperate for the automation of administrative processes.

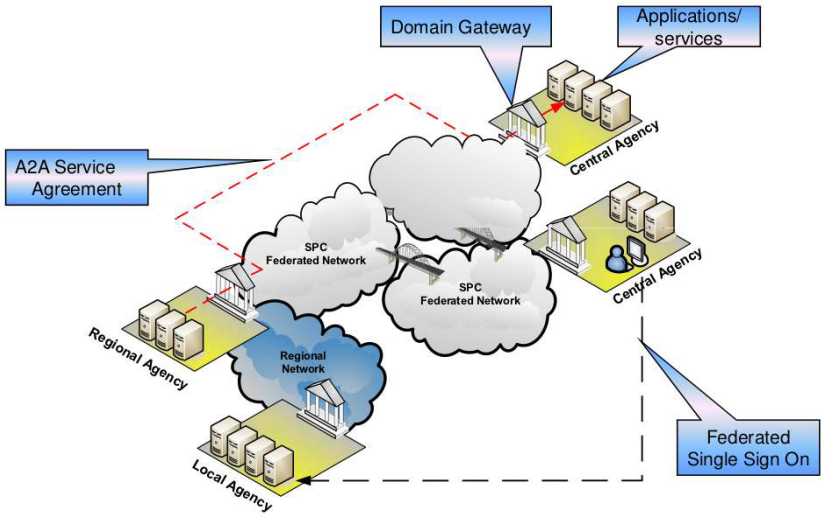



**Fig. 1.** SPC high-level architecture (© CNIPA[2]).

[2] http://archivio.cnipa.gov.it/HTML/docs/SPCoop-Introduzione%20ai%20Servizi%20SICA%20V_1.0.pdf

www.blueherons.net

www.blueherons.net

www.blueherons.net

1. The identity of an individual is managed by the Italian Region where a citizen/patient resides.

2. Individuals are identified by an Identity Provider (IDP) using an authentication mechanism that is decided by the Region.

3. An authenticated user is identified by various attributes such as: first name, surname, date of birth, citizenship, sex, municipality of residence, stature, eye color, etc.

4. A Role Based Authorization system is adopted (see Section 6) and the role of the authenticated user is identified by various Attribute Authorities (AA) using attributes such as: general practitioner, emergency room doctor, patient, nurse, professional organization membership, administrative employee of a hospital, pharmacist, etc.

5. The electronic identity of an individual is composed of the aggregate values of the identity and the role of the subject. The aggregation is managed by an additional authority called the Profile Authority (PA).

The services offered by the Federation are distributed among the various Italian Regional health care organizations using components called Service Providers (SP). Access to services is managed through federated authentication and authorization mechanisms. For federated identity access, the internal SPs within a particular region appoint the Local Proxy (LP) to authenticate and retrieve the appropriate profile of a user belonging to the Federation. The local proxy implements a Discovery Service (DS) to locate the origin of the user Profile Authority. The interaction between the common infrastructure components SP, IDP, AA, PA, LP and DS uses the SAML2 standard protocol.

## 5.2 Interaction of OpenInFSE Components for the Web SSO Profile

This part presents an example of interaction for the Web SSO profile. A Web browser of a user coming from Region B attempts to access a protected resource (an item of the HCR) by a Service Provider (SP) in Region A using his federated identity (see figure 4). In this example we will describe OpenInFSE Web SSO component interaction assuming that the user browser does not have a valid SSO session. In case of a Web browser with a valid Web SSO session, the interactions are much more simple than the one described here and many steps are carried out without needing to involve the end user.

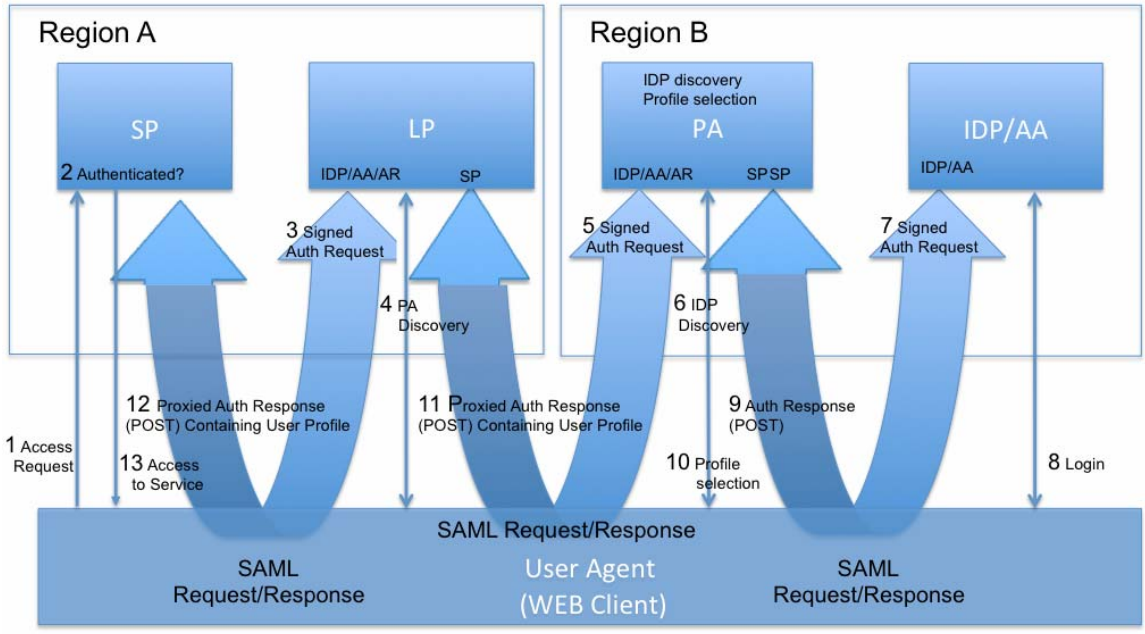



**Fig. 4.** Interaction of OpenInFSE components for Web SSO profile.

www.blueherons.net

www.blueherons.net

A = end user, B = web service client, C = STS, D = web service
A ! = B: (This is the sender-vouches case)

B contacts C to get a **SAML** assertion on behalf of A to access D. The method used to retrieve the SAML assertion can be similar to the one described in the Web SSO section which involves the end user. C creates a **SAML** assertion with A's identity in the assertion, and C also signs the assertion. B sends the assertion to D and uses B's certificate to secure the message.

The federated identity management architecture for Web Services is shown in figure 6:

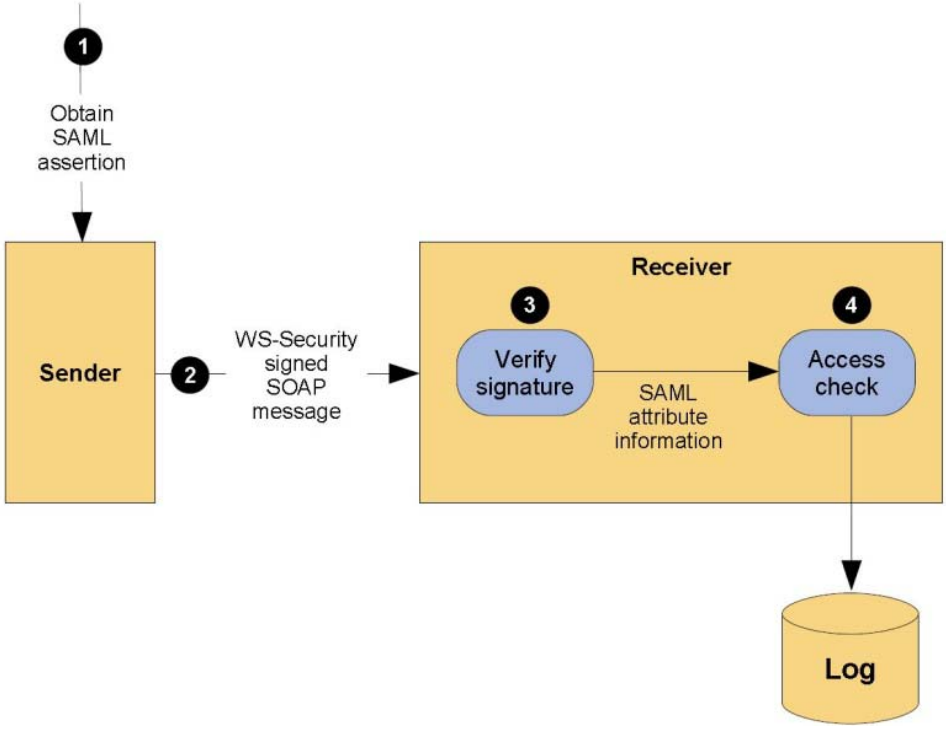



**Fig. 6.** Typical Use of WS-Security with SAML Token [12].

Recovery of the SAML assertions containing the user profile is previously obtained through Web SSO, as indicated in figure 5. The public key of the "sender" is included as a SAML attribute in the assertion. Subsequently, the interaction between the Front End and the Back End to protect the SOAP message is described in the following steps:

1. The "sender" constructs the SOAP message, including a SOAP header with a WS-Security header. A SAML assertion is placed within a WS-Security token and included in the security header. The key referred to by the SAML assertion is used to construct a digital signature over data in the SOAP message body. Signature information is also included in the security header.

2. The message receiver verifies the digital signature.

3. The information in the SAML assertion is used for purposes such as Access Control and Audit logging.

## 6. Authorization

Data protection is fundamental in EHR management infrastructure, since stored data includes sensitive information that is highly confidential. Obviously, health data are critical and must be properly protected. Metadata (i.e., pointers to health data/records) could also be considered critical, since they could reveal that certain treatments or tests have been carried out on a patient, providing indirect but clear information about his/her health status. Moreover, the need for an advanced and flexible security support that provides an effective protection of the patients' data is also stated in the Italian guidelines for the EHR management [2] issued by the Italian data protection authority.

www.blueherons.net


editions

www.blueherons.net


editions

www.blueherons.net


editions

## 7. Conclusions

This chapter describes the infrastructure defined by the OpenInFSE project to support the creation of an interoperability framework between the various organizations operating in the Italian healthcare scenario for the management and recomposition of Electronic Health Records. The scenario is complex and there are many crucial requirements, including compliance with previously developed local architectural solutions and with the Italian laws, distributed architecture, and sensitivity and confidentiality of managed data. Specifically, in this chapter we have focused on the adoption of a federated identity management system and proper security support for preserving the confidentiality and integrity of data stored in the Electronic Health Records. Furthermore, the chapter proposed a possible solution for implementing federated authentication and authorization in the OpenInFSE infrastructure, based on the ICAR INF3 project and the OASIS XACML standard for the RBAC model.

**Acknowledgments.** This work was supported by the joint project CNR-Presidenza del Consiglio dei Ministri: Infrastruttura Operativa a Supporto dell'Interoperabilità delle Soluzioni Territoriali di FSE nel Contesto SPC.

## References

1. Eyers, D., Bacon, J., Moody, K.: OASIS Role-based Access Control For Electronic Health Records. In IEEE Proc. on Software, Vol. 153 (1), pp. 16–23 (2006)
2. The Italian Data Protection Authority, Linee guida in tema di Fascicolo Sanitario Elettronico (FSE) e di dossier sanitario – 16 luglio 2009 (G.U. n. 178 – 3 agosto 2009) *In Italian*
3. OASIS, eXtensible Access Control Markup Language (XACML) v.3.0. (16th Apr 2009)
4. Bergmann, J., Bott, O., Pretschner, D., Haux, R.: An e-consent-based shared EHR system architecture for integrated healthcare networks, International Journal of Medical Informatics, Vol. 76 (2–3), pp. 130–136 (2006)
5. Tsiknakis, M., Katehakis, D., Orphanoudakis, S.: An open, component-based information infrastructure for integrated health information networks, Int. Journal of Medical Informatics, Vol. 68 (1–3), pp. 3–26: http://www.sciencedirect.com/science/article/pii/S1386505602000606 (2004)
6. Anderson, R.: A Security Policy Model for Clinical Information Systems, IEEE Symposium on Security and Privacy, pp. 30–42 (1996)
7. Anderson, R.: Security in Clinical Information Systems. Computer Laboratory University of Cambridge (1996)
8. Win, K.: A review of security of electronic health records. Health Information Management, Vol. 34 (1), pp. 13–18 (2005)
9. Acharya, D.: Security in Pervasive Health Care Networks: Current R&D and Future Challenges, Mobile Data Management, pp. 305–306 (2010)
10. Hewitt, B.: Exploring how security features affect the use of electronic health records, Healthcare Technology and Management, Vol. 11 (1–2), pp. 31–49 (2010)
11. Sohr, K., Drouineaud, M., Ahn, G.: Formal specification of role-based security policies for clinical information systems. SAC: Security Track, ACM, pp. 332–339 (2005)
12. Security Assertion Markup Language (SAML) V2.0 Technical Overview Committee Draft 02 (25th March 2008)
13. Sandhu, R., Coyne, E., Feinstein, H., Youman, C.: Role-Based Access Control Models. IEEE Computer, Vol. 29 (2), pp. 38–47 (1996)
14. OASIS, ebXML Registry Services and Protocols Version 3.0, OASIS (2nd May 2005)
15. OASIS, SAML 2.0 profile of XACML v2.0, OASIS Standard (1st February 2005)
16. OASIS: Web Service Security: SOAP Message Security 1.1 (WS-Security 2004) OASIS Standard incorporating Approved Errata (1st November 2006)
17. OASIS, XACML Profile for Role Based Access Control –RBAC (13th February 2004)

# Chapter 7

## Fostering Team-role Balance in Computer Supported Collaborative Learning

Rosanna Costaguta[1], Silvia Schiaffino[2, 3], Rubén Fares[1, 2]

[1] Departamento de Informática, Facultad de Ciencias Exactas y Tecnologías – FCEyT
Universidad Nacional de Santiago del Estero – UNSE, Avda. Belgrano (S) 1912 – 4200 Santiago del Estero, Argentina
[2] CONICET, Comisión Nacional de Investigaciones Científicas y Técnicas, Argentina
[3] ISISTAN, Facultad de Ciencias Exactas, Universidad Nacional del Centro de la Provincia de Buenos Aires,
Campus Universitario (Paraje Arroyo Seco) Tandil – 7000 Buenos Aires, Argentina

rosanna@unse.edu.ar, sschia@exa.unicen.edu.ar, estebanfares@hotmail.com

**Abstract**. The concept of team in Computer Supported Collaborative Learning is very important, however, organizing students in groups or teams does not guarantee their learning. The behaviors that students show while solving a collaborative task, that is, the roles they play, are vital to reach teaching and learning goals successfully. On the other hand, although the behaviors or roles of an individual in a team can be infinite, the range of useful behaviors that make a real contribution to the team is finite, and only when an adequate balance of roles is achieved within a group, this group will carry out tasks in a coordinate fashion. In this chapter, we present a multi-agent model that monitors students' participation in a group, recognizes their team roles as they work collaboratively, diagnoses the state of the collaboration considering balance of team roles as an ideal situation, and then proposes corrective actions when the group behavior is far from this ideal. Currently, the proposed model is under development in an e-learning environment, and will be soon validated with real user experiences.

**Keywords**: Computer Supported Collaborative Learning, Team Roles, Team Role Balance, Intelligent Agents, Collaboration Profiles

## 1. Introduction

Collaborative learning (CL) describes a situation in which certain types of interactions among people that promote their learning are expected, although not guaranteed [20]. The use of computational tools in the collaborative learning area originated new teaching and learning scenarios and research opportunities in Computer-Supported Collaborative Learning (CSCL), with the goal of facilitating collaboration and communication with new technologies. CSCL was soon adopted by the e-learning community because students become independent of the time and space variables. Thus, in a CSCL system, students can work collaboratively while situated in distant locations and even contributing in different times.

In CSCL the concept of group is fundamental. A group is a dynamic set of students that work together, discussing some topic, to eventually achieve some predefined goal [12], where each student is responsible for his/her actions, but they work together on the same problem or exercise accepting the abilities and contributions of the other members. On the other hand, forming groups and encouraging their members to work collaboratively is not enough to guarantee neither collaborative learning nor carrying out the tasks in a coordinate and efficient manner.

In a learning group it is essential that members perform different functions or roles that allow for a coordinated and collaborative learning and, thus, achieve success. While the behaviors or roles of an individual in a team can be infinite, the range of useful behaviors that make a real contribution to the team is finite [6]. Belbin argues [6] that only when an adequate balance of roles is achieved within a group, this group will carry out tasks in a coordinate fashion. This balance appears when we can find most of the roles present in a group, and these roles are not repeated among team members. Thus, it emerges a need to identify the roles that each of the members of a group shows, and diagnosing the current state of collaboration in order to intervene at the right time, promoting a balance of roles and successful collaborative learning.

www.blueherons.net

www.blueherons.net

www.blueherons.net

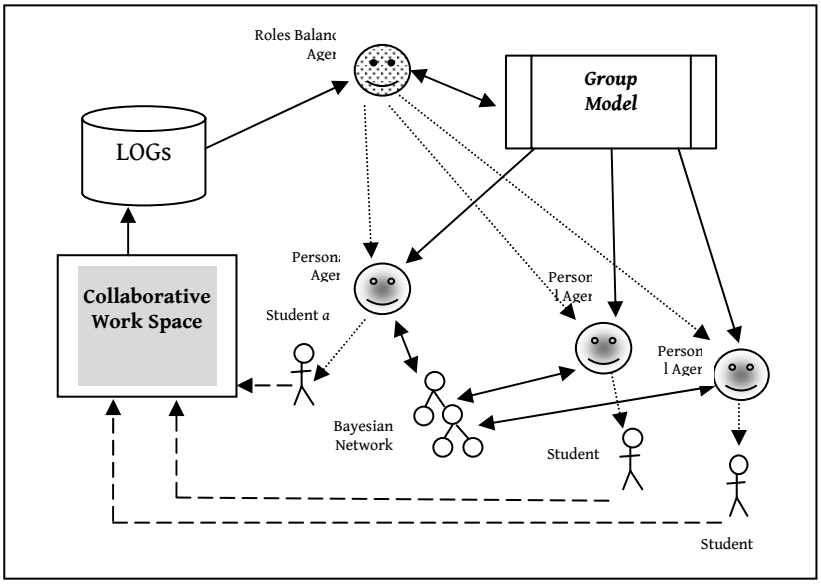



**Fig. 1.** Proposed Multi-agent Approach.

The structure chosen to model the dialogue between the students in each discussion group is discussion trees, where the original exercise or task proposed by the teacher will be the root node of the tree, from which new branches are incorporated as students propose new ideas or discuss different alternatives or solutions. The participation of students is carried out using opening sentences, i.e. they select from the interface the phrase with which they want to start their contribution to the dialogue and then continue writing free text [34]. With the help of a Psychologist we are identifying communication patterns most frequently used by students to determine each of the roles proposed by Belbin [5]. This will define the set of opening sentences to implement at the interface.

During experimentation all the student interactions originated during their group work will be stored. A group agent, the *Roles Balance Agent*, will review these interactions to update the group model. This agent will diagnose the state of collaboration and determine whether any intervention is needed to balance the roles expressed by group members. When this occurs, the *Roles Balance Agent* will notify the *Personal Agent* of each student in the group. These *Personal agents*, considering the information contained in the group model and in a Bayesian network designed specifically, will recognize the corrective actions to be implemented to promote team role balance in the group.

Currently, with the advice of psychologists, we are designing Bayesian networks able to define which the roles that are not properly shown in the group are, making the dynamic balance of the group be away from the expected.

The proposed multi-agent model corresponding to the highest category presented in [16], is this, the CSCL systems that perform recommendations.

## 5. Bayesian Networks

Bayesian networks, also known as causal networks, are one of the techniques from Artificial Intelligence commonly used to model uncertain domains. A Bayesian network consists of a set of nodes that represent variables of interest, and directed arcs connecting these nodes represent the causal relationships between variables [15]. Each node in a Bayesian network can take different states, depending on the values the variable representing that node can take. The arcs in a BN are directed. They go from the cause (parent node) to the effect (child node). Nodes without parents are known as independent nodes. In our work, the direction of arcs indicates that, for example, a given student behavior with the learning system determines a certain value in role. In other words, they indicate that the role depends on, or is determined by, the actions the student carried out.

On the other hand, quantitative information in a BN is expressed through the strength of the relationships between nodes, which are given by probability tables. For each node, a probability table specifies the probability of each possible state of the node given each possible combination of states of its parents. These tables are known as conditional probability tables (CPT). There are different ways to obtain the values for these probabilities: they can be specified by an expert in the domain considered, they can be obtained from statistical information, or they can be calculated from a dataset using a machine learning

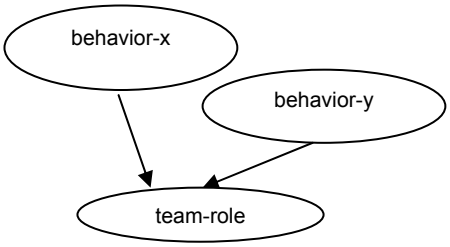
algorithm. Also, each independent node has an associated probability, called evidence or marginal likelihood, which corresponds to a simple or unconditional probability.

Inference mechanisms in Bayesian networks are based on Bayes' Theorem, which allows us to infer the state of a given variable depending on the status of any combination of other variables in the network [15]. In this chapter, a Bayesian network created specifically to detect unbalanced groups, will define what intervention strategy to implement in order for the group to reach the desired balance of roles.

For example, in the simple BN shown in figure 2, "behavior-x" and "behavior-y" are independent nodes representing actions in an e-learning system and "team-role" depends on the values that "behavior-x" and "behavior-y" take. The direction of the arcs indicates this dependence. The figure also shows the probability tables that define the quantitative information of the BN, supposing that "behavior-x" and "behavior-y" can take the values "observed" and "not observed" and "team-role" can take the values "role-one" and "role-two". In this example, the probability values indicate that "behavior-x" was observed 70% of the times the student used the system and "behavior-y" was observed 60% of the times. In the "team-role" CPT we specify the probability of the node having the values "role-one" and "role-two" given each possible combination of the values of "behavior-x" and "behavior-y". The CPT indicates, for example, that if "behavior-x" is observed and "behavior-y" is not observed in a set of a student's actions, then the probability of the student having "role_two" is 70%.

| behavior-x= observed | behavior_x= not_observed |
|---|---|
| 0.7 | 0.3 |

| behavior-y= observed | behavior-y=not observed |
|---|---|
| 0.6 | 0.4 |




| P(team-ole/ behavior_x, behavior_y) | behavior-x= observed behavior-y= observed | behavior-x= observed behavior-y= not_observed | behavior-x= not_observed behavior-y= observed | behavior-x= not_observed behavior-y= not_observed |
|---|---|---|---|---|
| team-role= role-one | 0.5 | 0.3 | 0.8 | 0.5 |
| team-role = role-two | 0.5 | 0.7 | 0.2 | 0.5 |

**Fig. 2.** A simple BN.

In addition to BN's simplicity to model different domains in terms of variables and the relationships between them, the mathematical model underlying BN makes them a sound technique and enables us to make inferences about the value of a certain node given the observation of values in other nodes in the network. The mathematical model underlying BN is Bayes' theorem, which is shown in Equation 1. Bayes' theorem yields the conditional probability distribution of a variable A, assuming we know: information about another variable B in terms of the conditional probability distribution of B given A, and the probability distribution of A alone. Equation 1 reads: the probability of A given B equals the probability of B given A times the probability of A, divided by the probability of B.

$$P(A/B) = \frac{P(B/A)\,P(A)}{P(B)} \qquad (1)$$

Bayes' theorem is the key of Bayesian inference mechanisms. Through these mechanisms we can infer the value of any node in the network given evidence of the values taken by other nodes. In the simple example of figure 2, B in Equation 1 could represent a given student behavior ("behavior-x" for example) and A can stand for a role. Then, considering information about a set of students' actions, P(A) is the probability of a student having a certain value in a team-role (this probability can be obtained by counting the number of students having role over the total number of students observed). P(B) is the probability of a student showing a particular behaviour (it can be obtained by counting number of occurrences of actions in the log file). P(B/A) is the probability of a student showing a particular behaviour given that the student has a certain role (this probability can be also obtained from the information in the log file). Then, we could

www.blueherons.net


editions

www.blueherons.net


www.blueherons.net
blue
herons
editions

# Chapter 8

## Realistic Nature Simulation as a Popular Entertainment Topic

Andreas Kratky

University of Southern California
Interactive Media Division
School of Cinematic Arts
900 West 34th Street, SCA 213
Los Angeles, CA 90089-2211, USA
akratky@cinema.usc.edu

**Abstract.** Several recent studies indicate a disconnect between the individual and the natural environment and show that instead more time is spent with interactive entertainment experiences. Another recent observation reveals an increase in more realistic simulations of nature as a core part of interactive entertainment titles. Interpreting this development as a need for nature experience, this chapter traces a short historic overview of the development of technologically mediated experiences of nature and tries to locate reasons for the diagnosed disconnect. From this analysis several conclusions for possible developments in interactive entertainment are formulated.

**Keywords:** Virtual Environments, Simulation, Pervasive Computing, Interactive Entertainment, Virtual Nature

## 1. Introduction

Our environment is permeated by electronic devices and electronically mediated information. The prevalence of digital media in our every day life has shifted the balance between mediated and unmediated experience. In the past media devices were limited to certain places and occupations. They had to be wired for power and data access and thus the extent in which they could interfere into the everyday life of people were limited. It was necessary to spend time in a dedicated place, such as at the computer workstation in workplace, the entertainment media center in the living room, and the wired telephone. Today, after in the 1990s mobile computers and mobile phones became miniaturized and untethered devices, they are omnipresent in our everyday lives and the communication flows and business transactions are requiring the relative ubiquity of these devices in order to participate in the normal way of doing business. In this sense we are not only at work surrounded by technological devices for production, communication, and entertainment, but equally at home. We spend a large amount of our time with these technologies and – at the same time – the time we spend without them and with experiences, that are not mediated through technological channels, is shrinking. Mobile technologies such as smart phones and navigation devices superimpose a layer of mediated information to the formerly unmediated experience. When we use maps and augmented reality navigation tools to guide us through the city or through nature we perceive our immediate environment at least partially through this media-overlay.

As a concurrent line of development we have seen a continuous improvement of the visual quality in the rendition of digital imagery. The rendering quality of computer graphics applications and in particular the real-time rendering of virtual environments has gotten significantly more realistic. With the current degree of visual quality as well as sound quality experience mediated through digital technologies have reached a level of quality that makes them, up to a certain extent and in certain respects, indiscernible from the unmediated experience of reality. High definition screens and high quality photorealistic rendering technologies deliver compelling, visceral, and immersive entertainment experiences into the home and make it almost obsolete to leave the home to seek 'reality' –experiences such as a hike through nature or a trip to a distant place. Pet-robots and AI-simulations deliver potential replacements for the experience of interacting with a real pet. As the quality of rendition has improved we also see an increase in detailed and realistic simulations of natural phenomena going beyond the simple depiction of scenes as part of popular entertainment titles.

www.blueherons.net

www.blueherons.net


editions

**Fig. 1.** Painting of the St. Elizabeth Flood. Master of the St. Elizabeth Panels (ca. 1490 – 1495).

The aspect of a simulation of another place is more explicitly the goal of many of the collections of natural objects that also started to become popular in the sixteenth century. In these cabinets of curiosities rich collectors were assembling intricate displays of stuffed animals, shells, bizarre stones etc. that were brought to Europe from the budding trade and exploration journeys at that time [25]. While it is difficult to speak of these cabinets really as an experience of nature, even though the idea behind their composition was to resemble the "book of nature" [26], the very elaborate taxidermies of exotic animals and preparations of plants can be seen as a particular form of simulation of the characteristics of nature. The form of nature mediation created by the cabinets of curiosities as a whole was an abstract representation of the ordering principles and divine affinities between the creatures and objects.

After its first adoption in the Netherlands, landscape painting over time got also adopted in the other European countries. Painting remains the mainstay of nature representation until the nineteenth century. During the period of romanticism, from the late eighteenth to the mid nineteenth century, landscape painting embodied the meditative immersion of an introverted longing that we can see in the paintings of Caspar David Friedrich and other painters of the period. The longing for the 'lost paradise' that finds its expression in the moody and foggy landscapes with ruins [27]. The imagination of the lost paradise along with the idea of the arcadian landscape did not only deliver the mindset for landscape paintings, it equally inspired to more visceral experience oriented, themed – as we would nowadays say – parks and landscape installations with artificial grottos, fountains, lakes, etc, creating real landscapes that recreated the visions

www.blueherons.net

construction, and the notion of photorealism is still in most cases their ideal [37]. With the development of computer graphics techniques in the context of virtual images the notion of the camera has become a virtual one, that in an inversion of the optical camera that captured incoming light rays, becomes the source of rays that are sent from the virtual camera into a virtual scene, consisting of a mathematical description of geometric objects in a space, in order to calculate a view of the objects hit by these rays. This form of ray-tracing has become one of the standard ways of generating visible images from the virtual descriptions of geometric objects in the computer [38]. Beginning with simple shaded renderings the algorithms as well as the hardware have developed over time and made it possible to create not only more and more realistic images, but also to calculate and render irregular objects, fluids, and natural phenomena [39, 40]. The improving techniques of image creation from computer-generated scenes made it possible to create and calculate the formal aspects of natural scenes and thus apply computation to the mathematical study of the morphogenesis of biological forms that has been undertaken since the Renaissance.

**Fig. 2.** Images of virtual plants and ecosystems (Deussen, O., Lintermann, B., xfrog.com).

The combination of the advances in rendering of complex scenes with techniques of the modeling of organic forms, in particular branching structures, seed arrangements, growth patterns etc. paved the way for high quality computer graphics images of photorealistic natural scenes as well as the dynamic simulation of their development over time [41, 42]. These computer graphics techniques are the basis for the real-time rendering engines behind the interactive entertainment titles described in the beginning of this chapter.

## 4. Interacting with Nature

After the computational creation of highly realistic looking plants was achieved and complex constellations of plants were calculable, the next step was the creation of entire virtual ecosystems. At the beginning these ecosystems only recreated plant distributions and densities that are like those observed in nature, without modeling the actual interdependencies and forces that create the particular constellations of plants [43]. At a later stage virtual ecosystems did not only formulate methods of managing the very computation-intense geometries of landscapes, but in a second step also modeled the complex relationships between plants within an ecosystem and other influences on the growth and development of a natural scene. The ability of todays computers to deliver highly detailed dynamic simulations of natural scenes and phenomena that the viewers can interact with in real time is a significant shift in how mediated forms of nature can be perceived and interacted with.

While all of the prior forms of nature representation were involving up to a certain extent the imagination of the viewer filling in for aspects that are not part of the representation, such as the lack of movement and dynamic changes in the represented system, the lack of detail and realism, or the lack of agency of the viewer within the represented system, the recent computer-based interactive representations deliver an unprecedented degree of immediacy and realism. Despite the simulation of the long-term effects of growth and resource management within an ecosystem, the physics of a tree moving in the wind is art of another dynamic simulation complex that requires significant computation power and research. But also in this field impressive progress has been made [44].

Obviously there are still important components of the real experience of nature excluded, for example there are generally no smells existent in virtual environments to name just one aspect. Nevertheless, the level of fidelity coupled with significant levels of agency of the viewer distinguishes these recent incarnations of nature representations from their precursors. Even though the dynamism of simulated landscapes has been of great concern for the researchers, one of the aspects directly inherent to the real experience of nature, the physical movement of the person who explores a landscape on a hike or through other forms of physical engagement, was so far not incorporated into virtual nature simulations. But we also see this changing slowly. While originally computers and game consoles were identified with sedentary activities, several developments have broken up the stationary character of human-computer interaction. Mobile devices per se have contributed their part to making computing more physical through the use of sensors such as accelerometers and gyro-sensors, but on top of that they enabled activities such a geocaching which combine computing with an active outdoor experience situated either in a natural or urban environment. Outdoor big-game activities such as "Can you see me now" [45] by Blast Theory have realized comparable forms of hybrid computer and outdoor entertainment experiences. The focus of this example was not on the experience of nature but on the integration of a real with a virtual environment. Other sporadic projects have experimented with more experiences that more expressly link nature and computing. The project "Interactive Plant Growing" [46] is one of the early implementations in the media art context. It developed by the artists and researchers Christa Sommerer and Laurent Mignonneau and uses real plants as the interface to control a virtual plant growth simulation. Through touching the real plants users could stimulate or inhibit the growth of a virtual nature scene.

More recent developments in the entertainment industry have developed game controllers that allow for more physical interactions between the players and the game system. The most outstanding examples are the Nintendo Wii and the Microsoft Kinect controllers. Numerous games are available that operate with those platforms and stimulate active physical engagement in the gameplay. In a recent research endeavor by Diane Tucker the usage of the Microsoft Kinect controller as an interface device for a virtual nature experience called "Mother Earth" has been explored [47].


**Fig. 3.** Image showing "*Mother Earth*" (Tucker, D.) and a player gesturally interacting with the virtual nature simulation.

Through a set of gestures players can make a garden grow, produce rain, foster animals etc. The gestures to control the experience are based on metaphorical interactions with nature. Different from a direct illustrative mapping the attempt was made to realize a balanced set of genuine and intuitively understandable gestures that in themselves provide pleasure in carrying them out.

We perceive in this research an attempt to not only use nature as a theme for an entertainment experience, but to stimulate a deep and imaginative engagement of players with the experience of nature, making them feel immersed and contained in the experience. The results of this research direction could

www.blueherons.net


editions

www.blueherons.net

# Chapter 9

## Cloud Computing for Parameter Sweep Experiments

Elina Pacini[1], Melisa Ribero[1,2], Cristian Mateos[3], Anibal Mirasso[2], Carlos García Garino[1,2]

[1] Instituto para las Tecnologías de la Información y las Comunicaciones (ITIC), UNCuyo
Mendoza, Argentina
{epacini, cgarcia}@itu.uncu.edu.ar
[2] Facultad de Ingeniería, UNCuyo – Mendoza, Argentina
melisaribero@yahoo.com.ar, aemirasso@uncu.edu.ar
[3] ISISTAN – CONICET, Tandil – Buenos Aires, Argentina
cmateos@conicet.gov.ar

**Abstract.** Nowadays, scientists and engineers are more and more faced to the need of computational power to satisfy the ever-increasing resource intensive nature of their experiments. Traditionally, to cope with this, users have relied on conventional computing infrastructures such as clusters and Grids. A recent computing paradigm that is gaining momentum is Cloud Computing, which offers a simpler administration mechanism compared to those conventional infrastructures. However, there is a lack of studies in the literature about the viability of using Cloud Computing to execute scientific and engineering applications from a performance standpoint. We present an empirical study on the employment of Cloud infrastructures to run parameter sweep experiments (PSEs), particularly studies of viscoplastic solids together with simulations by using the CloudSim toolkit. In general, we obtained very good speedups, which suggest that disciplinary users could benefit from Cloud Computing for executing resource intensive PSEs.

**Keywords:** Parameter Sweep, Viscoplastic Solids, Cloud Computing

## 1. Introduction

Parameter Sweep Experiments, or PSEs for short, is a very popular way of conducting simulation-based experiments among scientists and engineers through which the same application code is run several times with different input parameters resulting in different outputs [1]. Representative examples of such kind of experiments are sensitivity studies of results in terms of defined parameter changes like is the case of imperfections in the simulation of simple tension test, or the study of buckling of imperfect columns.

From a purely software perspective, most PSEs are cluster friendly since individual inputs of an experiment can be handled by independent jobs. Therefore, using a software platform such as Condor [2], which is able to exploit the distributed nature of a computer cluster, allows these jobs to be run in parallel. In this way, not only PSEs execute faster, but also more computing intensive experiments can be computed, and hence more complex simulations can be performed. The same idea has been systematically applied to execute PSEs on Grid Computing [3], which are basically infrastructures that connect clusters via wide-area connections to increase computational power. To this end, software platforms designed to exploit Grids provide the illusion of the existence of a large supercomputer, which in turn virtualizes and combines the hardware capabilities of many much less powerful, geographically-dispersed machines to run resource intensive applications [4].

On the downside, for users not proficient in distributed technologies, manually configuring PSEs is tedious, time-consuming and error-prone. As a consequence, users typically waste precious time that could be instead invested into analyzing results. The availability of elaborated GUIs –specially for Grids– that help in automating an experimentation process has in part mitigated this problem. However, the highly complex nature of today's experiments and thus their associated computational cost greatly surpasses the time savings that can be delivered by this automation. Consequently, performance and particularly job scheduling becomes crucial. Broadly, job scheduling involves the recurrent problem of efficiently mapping a number of parallel jobs to available computing nodes in a distributed environment.

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

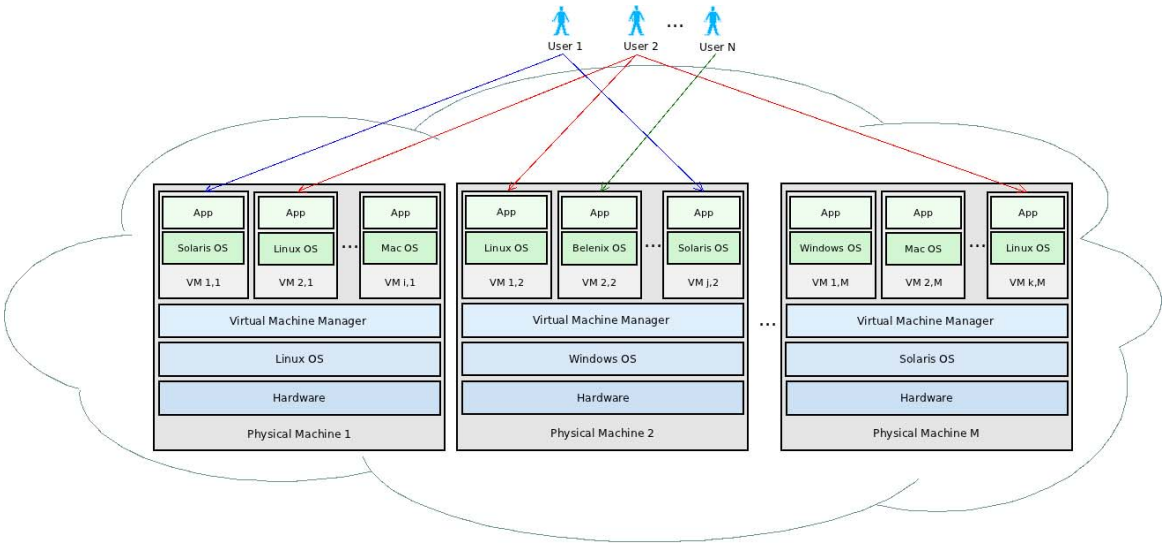



**Fig. 1.** Cloud Computing: High-level view.

In summary, a Cloud gives users the illusion of a single, powerful computer in which complex applications can be run. Besides, the software stack of the infrastructure can be fully adapted and configured according to user's needs. This provides excellent opportunities for scientists and engineers to run applications that demand by nature a huge amount of computational resources –i.e., CPU cycles, memory and storage– and rely on specific software libraries.

With everything mentioned so far, we can say that from the perspective of domain scientists, the complexity of traditional distributed and parallel computing environments such as clusters and Grids should be hidden so that domain scientists can focus on their main concern, which is performing their experiments. As a result, the use of Cloud Computing infrastructures is a good choice for running scientific applications. Precisely, for parametric studies such as the one presented in this work, or scientific applications in general, the value of Cloud Computing as a tool to execute complex applications has been already recognized within the scientific community [22, 23].

## 2.2 The CloudSim Toolkit: Simulation of Cloud Computing Environments

CloudSim [9] is an extensible simulation toolkit that enables modeling, simulation and experimentation of Cloud Computing infrastructures and application provisioning environments. CloudSim supports both system and behavior modeling of Cloud system components such as data centers, virtual machines (VMs) and resource provisioning policies. A virtual machine (VM) is a software implementation of a machine (i.e., a computer) that executes programs like a physical machine. By using CloudSim, researchers and developers can focus on specific system design issues that they want to investigate, without getting concerned about the low level details related to Cloud-based infrastructures and services. This is desirable as intuitively putting a real Cloud to work demands much administration effort.

CloudSim offers support for modeling and simulation of large scale Cloud Computing infrastructures, including data centers on a single physical computing node. Besides, CloudSim provides a self-contained platform for modeling data centers, service brokers, scheduling, and allocations policies. In addition, CloudSim lets users to easily switch between space-shared and time-shared allocation of both processing elements (PEs) and jobs to virtualized services.

The core hardware infrastructure services related to Clouds are modeled by a Datacenter component for handling service requests. A Datacenter is composed by a set of hosts that are responsible for managing VMs during their life cycle. Host is a component that represents a physical computing node in a Cloud, and as such is assigned a pre-configured processing capability, memory, storage, and scheduling policy for allocating processing elements (PEs) to VMs.

CloudSim supports scheduling policies at the host level and at the VM level. At the host level it is possible to specify how much of the overall processing power of each PE in a host will be assigned to each VM. At the VM level, the VMs assign a specific amount of the available processing power to individual jobs units –called cloudlet by CloudSim– that are hosted within its execution engine. At each level, CloudSim implements the *time-shared* and *space-shared* allocation policies.

When employing the *space-shared* policy only one VM can be running at a given instance of time, this policy takes into account how many processing cores will be delegated to each VM, and how much of the processing core's capacity will effectively be attributed for a given VM. So, it is possible to assign specific

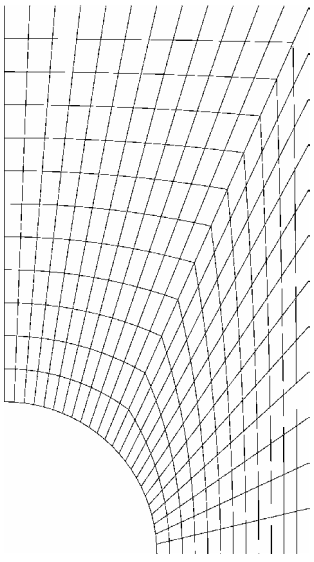
CPU cores to specific VMs. The same happens for provisioning cloudlets within a VM, since each cloudlet demands only one PE. If there are other cloudlets ready to run at the same time, they have to wait in the run queue. The estimated start time depends on the position of the cloudlet in the execution queue, because the processing unit is used exclusively by one cloudlet. With the space-shared policy CloudSim processes jobs in first come first serve basis. This is the sequence in which cloudlets are sent to the VMs by the *broker*. The broker models a high-level software component that controls which cloudlet should be sent to which VM and in what sequence. Last but not least, with the *time-shared* policy, the processing power of hosts is concurrently shared by the VMs. Therefore, multiple cloudlets can simultaneously multi-task within the same VM. With this policy, there are no queuing delays associated with cloudlets.

## 3. Case Study: A PSE for Nonlinear Solids Problems

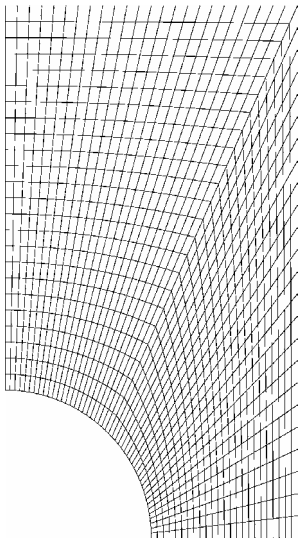
In order to assess the effectiveness of Cloud Computing environments for executing PSEs, we have processed a real experiment by using different Cloud infrastructures simulated via CloudSim toolkit. The case study chosen is the problem proposed in [24], in which a plane strain plate with a central circular hole is studied. The dimensions of the plate are 18 x 10 m, R = 5 m. Material constants considered are E = 2.1 $10^5$ Mpa; $\nu$ = 0:3; $\sigma_y$ = 240 Mpa; H = 0. A Perzyna viscoplastic model with m = 1 and n = $\infty$ is considered. The large strain elasto/viscoplastic Finite Element code SOGDE is used in this study. References to SOGDE can be seen in the works of [25, 26] and application problems simulated with the code can be found in [27]. A detailed presentation of viscoplastic theory, numerical implementation and examples can be found in the works [7, 28].

We have previously studied parametric problems where a geometry parameter of imperfection was chosen [8]. In this case a constitutive material coefficient is selected as a parameter. In order to do that different viscosity values of $\eta$ parameter are considered: $1.10^4$, $2.10^4$, $3.10^4$, $4.10^4$, $5.10^4$, $7.10^4$, $1.10^5$, $2.10^5$, $3.10^5$, $4.10^5$, $5.10^5$, $7.10^5$, $1.10^6$, $2.10^6$, $3.10^6$, $4.10^6$, $5.10^6$, $7.10^6$, $1.10^7$, $2.10^7$, $3.10^7$, $4.10^7$, $5.10^7$, $7.10^7$and $1.10^8$ Mpas.

The two finite element meshes displayed in figure 2 were tested. The first one has 288 elements and the second mesh has 1,152 elements. In both cases Q1/P0 elements are chosen. Imposed displacements (at y=18m) are applied until a final displacement of 2000 mm is reached in 400 equals time steps of 0.05 mm each one. For all the time steps $\Delta t$ = 1 has been set. Large strain effects are considered in all experiments simulated.



1. 288 elements



2. 1,152 elements

**Fig. 2.** Finite element meshes using during our study.

## 4. Experimental Results

This section presents the results obtained from our experimental study. The experiments aim to demonstrate and evaluate the viability of using Cloud Computing to perform parameter sweep experiments PEs, which consumes time.

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

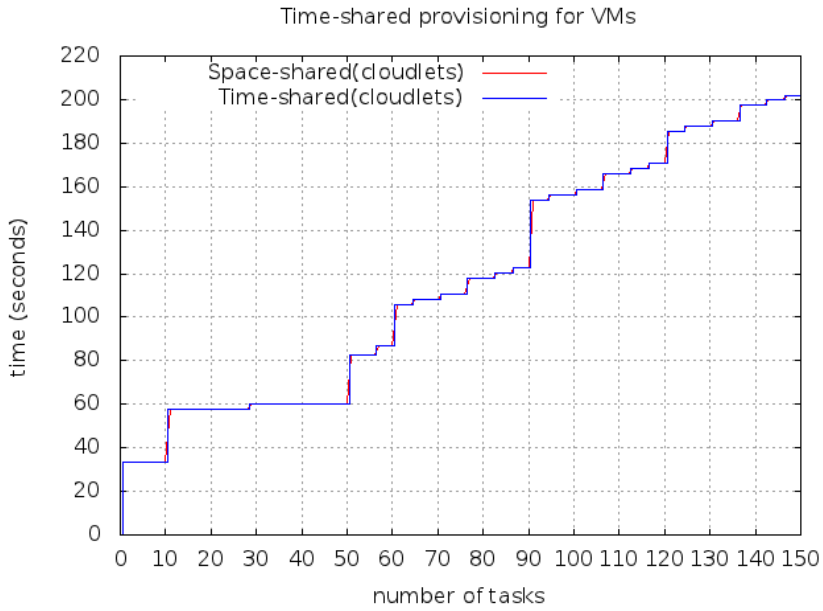



**Fig. 7.** Time-shared provisioning for VMs, space-shared and time-shared provisioning for jobs (mesh of 288 elements): Results.

### 4.1.4 Time-shared Provisioning for VMs and Jobs

In this scenario a time-shared allocation is applied for both VMs and job units. Figure 8 shows the makespan from this scenario as the number of cloudlets increases from 25 to 250. When the time-shared policy is used, the processing power within a host is concurrently shared by its associated VMs and the PEs of each VM are simultaneously divided among its cloudlets. As a consequence, in this scenario, there are no queuing delays associated with job units. CloudSim assumes that all the computing power of PEs is available for VMs and cloudlets, and it is divided equally among them. In this scenario, the makespan for the mesh of 288 elements was 62.51, 91.42, 108.22, 139.53, 199.64, 202.05, 247.76, 247.75, 307.89 and 339.17 seconds when the number of cloudlets was increased from 25 to 250 by groups of 25 cloudlets (see figure 8, curve in red). On the other hand, the makespan for the mesh of 1,152 elements (curve in blue) was 280.94, 384.3, 449.11, 557.2, 780.55, 821.43, 922.3, 946.3, 1,198.52 and 1,328.13 seconds.

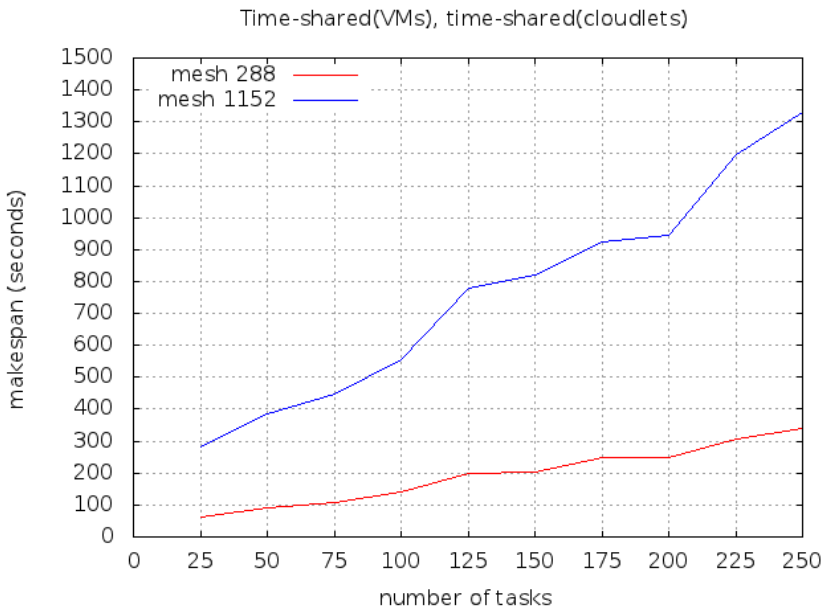



**Fig. 8.** Time-shared provisioning for VMs and jobs: Results.

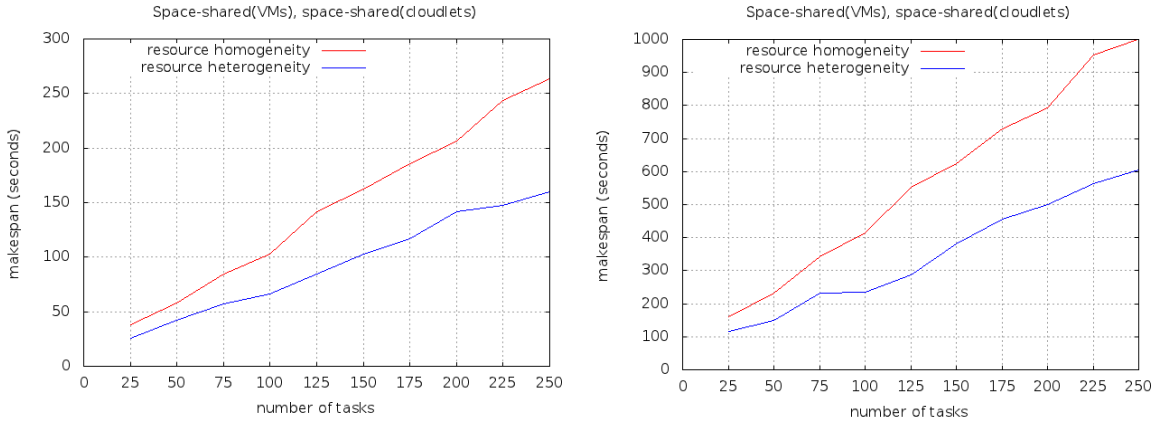
The progress (curve in blue) of execution times when we sent to execute a group of 150 cloudlets is illustrated in figure 7. As the reader can see, the execution times are consistent with that of the scenario of the previous subsection. Since there is a greater number of VMs actually running at any time, it was not necessary to interchange the jobs between the VMs. Whenever a cloudlet is ready to be executed, there is a machine available to use.

## 4.2 Heterogeneous Resources Experiments

In this subsection we analyze how each scheduling policy responds when using a Cloud with heterogeneous hosts. To analyze the performance of the scheduling algorithms, one characteristic that is of importance in real world scenarios is how the algorithms perform in the presence of resource heterogeneity. In this analysis, we have considered hosts with a random number of PEs between 1 and 6, while the other specifications are the same shown in tables 2 and 3. Until now, each VM had only one PE. Next, we discuss the same scenarios of the previous section, and perform a comparison of job assignment with respect to homogeneous and heterogeneous infrastructures.

### 4.2.1 Space-shared Provisioning for VMs and Jobs

The provisioning scenario where the space-shared policy is applied for both VMs and cloudlets can be seen in figure 9. After the creation of VMs with a random number of PEs, cloudlets were incrementally sent to VMs in groups of 25 to measure the makespan as the workload on the VMs increased. The number of cloudlets to be performed ranges from 25 to 250 as in the previous subsection. The allocations of cloudlets to heterogeneous resources are illustrated in figure 9a and figure 9b by the curve in blue. The red curve shows the same scenario that was discussed in subsection 4.1.1 for the case of homogeneous resources.




(a) Mesh of 288 elements (b) Mesh of 1,152 elements

**Fig. 9.** Space-shared provisioning for VMs and jobs using resource heterogeneity: Results.

Due to the fact that in this scenario the entire Cloud had more number of PEs available to run the experiments (between 1 and 6 per resource), runtimes were reduced significantly with respect to the homogeneous scenario. The makespan of the first group of 25 cloudlets –corresponding to the mesh of 288 elements– was very close to the makespan of the homogeneous scenario (see figure 9a). This makespan was 38.21 seconds for the homogeneous scenario and 26.1 seconds when using heterogeneous resources. Here, makespan is close because in the worst case (homogeneous scenario) the number of PEs available to execute the cloudlets is nearby to the number of executed cloudlets (20 VMs to execute 25 cloudlets). Then, each cloudlet is executed in one PEs until the former finishes. For the following groups of cloudlets –between 50 and 250– the makespan was always lower when using heterogeneous resources. When we sent 250 cloudlets the makespan was 159.89 seconds.

The same heterogeneous scenario when we using the mesh of 1,152 elements is illustrated in figure 9b (curve in blue). Here the makespan was 117.12, 150.24, 231.38, 235.43, 288.54, 380.74, 454.94, 499, 563.07, and 604.22 seconds when the number of cloudlets was increased from 25 to 250 by groups of 25 cloudlets.

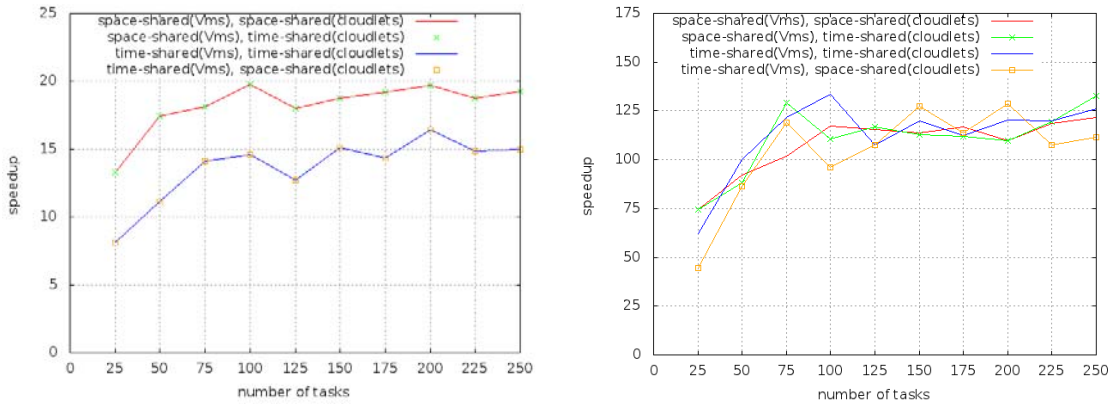
www.blueherons.net

www.blueherons.net

www.blueherons.net

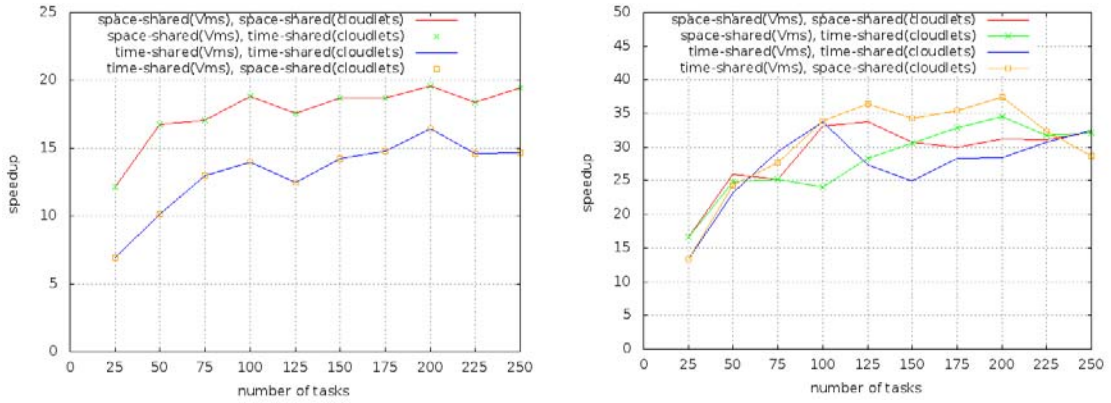
### 4.2.2 Space-shared Provisioning for VMs and Time-shared Provisioning for Jobs

- This subsection presents an heterogeneous scenario where the space-shared policy is applied for allocating VMs to hosts and the time-shared policy is used for allocating jobs to processing elements within a VM.
- $T_1$ is the completion time of the sequential execution in a single machine, and
- $T_p$ is the completion time of the parallel execution with p processing elements.




(a) Without resource heterogeneity (b) With resource heterogeneity

**Fig. 14.** Speedup achieved by space-shared and time-shared policies (mesh of 288 elements): Results.




(a) Without resource heterogeneity (b) With resource heterogeneity

**Fig. 15.** Speedup respect to space-shared and time-shared policies (mesh of 1,152 elements): Results.

We conclude that a scenario in which the space-sharing policy is used for the VMs allocation to hosts enables a better speedup than the time-sharing policy in both scenarios (homogeneous and heterogeneous). While for the experiments we have conducted in this work a space-share policy for the allocation of VMs to hosts yields better results, due to the fact that the employed cloudlets are sequential –i.e., they have no inner parallelism to exploit–, a time-share policy to assign the VMs to hosts would be more appropriate for other types of applications (not batch or sequential) and also could be good to improve not only the makespan but also the perceptible response time to the user, since incoming jobs could be periodically scheduled and then executed in small groups, thus giving sign of progress.

## 5. Conclusions

Cloud Computing is a new paradigm that provides the means for building the next generation distributed and parallel computing infrastructures. Although the use of Clouds finds its roots in IT environments, the idea is gradually entering scientific and academic ones. Even when the positive effects of Cloud Computing regarding simplified administration is a well-known fact, little research has been done with respect to evaluating the benefits of the paradigm for scheduling and executing resource intensive scientific applications. In this sense, through a real case study and simulations, we have reported on the speedups

www.blueherons.net


editions

www.blueherons.net


editions

# Chapter 10

## Agents to Manage Student and Group Models in CSCL Systems

Rosanna Costaguta, Elena Durán

Departamento de Informática, Facultad de Ciencias Exactas y Tecnologías – FCEyT
Universidad Nacional de Santiago del Estero – UNSE
Avda. Belgrano (S) 1912 – 4200 Santiago del Estero, Argentina
rosanna@unse.edu.ar, eduran@unse.edu.ar

**Abstract**. Computer Supported Collaborative Learning (CSCL) systems have recognized advantages. However, using these systems does not guarantee an effective collaborative learning. Success or failure of the learning experience depends on the collaborative skills the students show in the group. In this chapter, a briefly theoretical framework with an introduction to personalization and user modeling in education, and an introduction to collaborative learning are presented first. Then a multiagent model applied to CSCL environment is introduced. It aims both at recognizing conflicts occurring in group dynamics and also at providing personalized training of collaborative skills demonstrated by group members. Conflicts are recognized with the aid of information stored in a group model and by applying the Interaction Process Analysis method. Personalization is achieved through Bayesian networks that consider students' collaborative characteristics, stored in a collaborative student model, to elucidate the most suitable training strategy.

**Keywords**: Collaborative Learning, Personalization, Multiagent Model, Student Model, Group Model, Collaborative Skills

## 1. Introduction

Students learn effectively in group when they ask questions, explain and justify their opinions, articulate their reasoning, and produce and ponder their own knowledge. Nevertheless, the benefits of collaborative learning are fully reaped only by means of well articulated learning groups. At present, the effect of Collaborative Learning (CL) depends on the quality of interactions that take place among group members. These interactions depend on the different collaborative skills students have, which are often conditioned by the collaborative context in which the students are participating.

Personalized assistance to students in collaborative learning environments has been recognized in recent years [35, 42]. Consequently, it is important that this kind of assistance is made effective for the users to accept it. To meet this goal, it is crucial to record data about students' personal characteristics, knowledge and collaborative skills for the construction of a student model.

Numerous student models for CSCL environment have been provided [12, 31, 33, 35, 42]. All these models are composed of only two kinds of profiles: student profile with personal characteristics and group profile with group characteristics. The collaborative skills that a given student possesses have not been recorded in student profiles. In a previous work [17] we proposed a collaborative student model with three different profiles: Personal, Collaborative and Group Profiles.

On the other hand, there is less research studies related to the training of collaborative skills. According to Prichard et al. [37], this fact could be attributed to an extended belief that every student already has developed these collaborative skills, or because it is generally accepted that the student acquired them by the mere practice of doing collaborative work. Recent research on this CL area proves that the group achievement and the process of learning of each individual in the group are enhanced with the aid of training [37]. Since there is a close relation between CL and CSCL, it is reasonable to suppose that these findings in the area of the CL can be successfully transferred to the CSCL environment.

Research can also be found about this subject, in which, taking into account the analysis of registered interactions, such recommendations to the users were generated [21, 25, 27, 29, 42].

www.blueherons.net


editions

In this chapter we propose a multiagent system with a group model to recognize conflicts occurring in group dynamics and also a collaborative student model to provide personalized training of collaborative skills demonstrated by group members. This article is organized as follows. Group and student models are presented in Section 2. Our proposed multiagent system is described in Section 3. Finally, section 4 shows our conclusions and future work.

## 2. Theoretical Framework

### 2.1 Personalization

The first grand challenge in education is to personalize education. In the past, teachers had the exclusive authority to hold and dispense scarce instructional resources. Now, technology makes it possible to move to a new model of learning that breaks free from that constraint. Learning meant "the acquisition of knowledge relevant to issues encountered in the world" [24]. In the information age, individual learners are asked to shape their own knowledge out of their own sense of the world. Information is material selected by individuals to be transformed by them into knowledge to solve a problem in their life-world [8].

Education is currently based on a one-size-fits-all, undifferentiated approach to teaching. This simply does not work for our diverse population. Equity issues demand new approaches for people who are underrepresented in some disciplines, and for others who may learn differently [43]. Numerous studies document that no optimal pedagogy or instructional medium is effective across every learner or subject [2, 13, 26, 39]. Personalization of education is a challenge given that productivity has historically been achieved through normalization of production rather than customization. The nature of the content and skills to be learned by students shapes the type of instruction to use, just as the developmental level of the student influences what teaching methods will work well [13].

The technology challenge in personalizing education is to develop technology that reasons about a student as might a human tutor, observes each student's activities, evaluates her learning and finds opportunities to offer help. Technology can monitor student activities step-by-step, understand what opportunities exist for improvement, and plan and execute ways to support learners to take advantage of those learning opportunities [43].

Motivated by this concern, Adaptive Learning Systems were created, which, according to [4], are knowledge based systems which automatically alter functionality aspects and interations in order to accommodate the education to the different preferences and requirements of the diverse users. This adapting capacity makes the adaptive systems able to contribute to the new learning approaches, since because of the fact that they are based on student centered models, they drive a significant and active learning process. For this reason they are widely and successfully known in the field of computer based learning. Every adaptive system introduces a basic architecture, encompassing three models, like the ones shown in Figure 1 (Domain model, interactive model, user model).

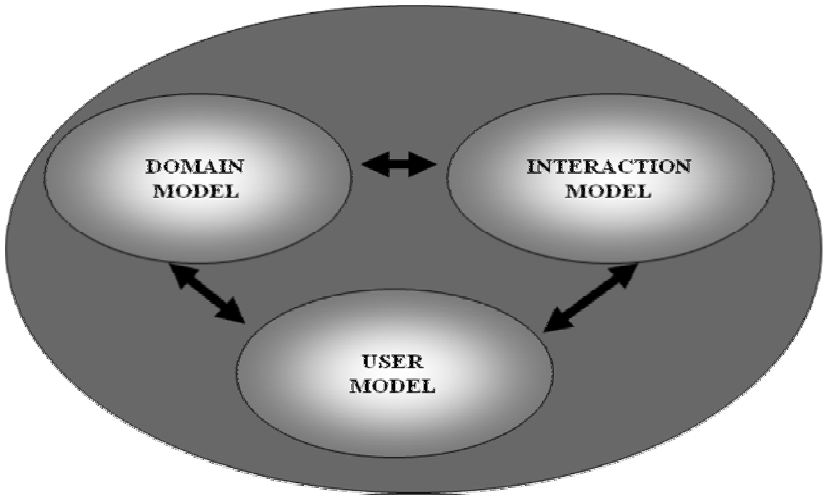



**Fig. 1.** Adaptive System Achitecture.

The User Model makes it possible to determine a particular user type. The Interaction Model defines actions that are possible to be executed in the interface, and the Domain Model describes data in relation to which such actions will be executed. Besides, the adapting process consists in three fundamental stages as

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

more adequate training for the student, the created Bayesian networks take the particular situation of each student in relation to the different collaboration skills, according to the content of the student collaborative model. Six Bayesian networks were designed, tailored to focus on one of the six conflicts identifiable by means of the IPA method in the group collaboration dynamics. Each one of the networks was conceived considering that independent nodes represent every collaboration sub-skill that any student can manifest according to the detected IPA conflict, and also considering that the value assigned to the dependent node indicates the sub-skill required for the training. In every case, the conditional probabilities were defined with the help of experts. Since the marginal probabilities of the independent nodes are calculated in relation to the information provided by the student model collaborative profile, the values of the variables are particularized to each student. Applying Bayesian reasoning and using the conditioned probabilities specially designed for each network, it is possible to learn a training strategy tailored to each student. Since students are able to adequately manifest their collaboration skills within the group where the problem has appeared, the networks are also able to determine when training is not necessary.

### 3.4 Interaction between Agents

The designed multiagent model is created to monitor, evaluate and improve the process that students perform during a collaborative task. There is in the model a space for shared work where the students deposit their contributions, which are stored in a logs base, for further analysis. For each group of students working in the CSCL environment, there are three classes of artificial agents: a Conflict Recognizer Agent, responsible for maintaining the Group Model and detecting group problems; a Student Model Agent, responsible for maintaining the two profiles Student Model (individual and collaborative); and several Personal Agents, one for each student comprising the group, responsible for training the student in those collaborative skills that are needed to avoid group conflict generation.

The Student Model Agent and the Conflict Recognizer Agent periodically process the logs base. The aim of the first one is to update the Collaborative Profile, and to this purpose a method based on Web Usage Mining is applied, which, using Association Rules, allows the model to recognize the student collaborative skills. This method is explained in [16].

The second agent calculates the indicators to evaluate the group behavior and to recognize the disturbances in the work dynamics. It applies for this purpose the Interaction Process Analysis (IPA) method [1], which allows the group behaviors to be sorted into twelve specific categories. IPA, by means of these categories, sorting them in pairs and considering certain limit values for each one of them, is able to recognize six types of conflicts (communication, evaluation, control, decision, stress reduction and integration conflicts) through which a group can flow during their dynamics cycle. In order to pave the way for applying the IPA method, a mapping was designed [9] between the collaboration attributes (table 1) and the various group behaviors which are associated to the conflicts. As soon as a conflict is detected, the Conflict Recognizer Agent communicates the situation to the Personal Agents in order to have the corrective actions performed.

When receiving the attention call of the Conflict Recognizer Agent, each Personal Agent determines in which skills the student should be trained in order to have the group stepping forward in the collaboration process, using for this purpose the specially created Bayesian nets. A correction action involves a box that pops up where the Personal Agent suggest the student to perform the interaction that the net has learned, which is necessarily connected to the student training needs. The design of the six Bayesian nets, tailored for each one of the six types of IPA conflicts, is documented in [10].

For the model validation, in a first stage a validation of the generation and maintenance of the Collaborative Student Model was separately made, and the result was documented in [15]; besides, the validation of the Conflicts Recognizer Agent and Personal Agents have also been validated and documented [11]. In a second stage it is planned to perform the complete validation of the multiagent model as a whole. For this purpose a development of the multiagent model will be made and implemented in distance education with MOODLE platform. Then the model will be tested with distance education courses implemented in this platform.

www.blueherons.net


editions

www.blueherons.net


editions

41. Soller, A.: Supporting Social Interaction in an Intelligent Collaborative Learning System. International Journal of Artificial Intelligence in Education, Vol. 12, pp. 40–62 (2001)
42. Vizcaíno, A.: A Simulated Student Can Improve Collaborative Learning. International Journal of Artificial Intelligence in Education, Vol. 15, pp. 3–40 (2005)
43. Woolf, B., et al..: A Roadmap for Education Technology. Final Report, Workshop Future of Educational Technology, Global Resources for Online Education –GROE (2009)

# Chapter 11

## Unified National Registry

Mario A. Fidelibus, Eduardo R. Caturegli, Eduardo C. Ferroni

Universidad Tecnológica Nacional – Facultad Regional Córdoba, Argentina
Consejo Profesional de Ciencias Informáticas de la Provincia de Córdoba, Argentina
mariofidelibus@fibertel.com.ar, ercaturegli@gmail.com, eduardoferroni@gmail.com

**Abstract.** All the actions regarding Persons, Entities, Properties and Activities have a register in State organisms receiving the general name of "Registry", being a lot of them widely distributed and using a numerous variety of bureaucratic methods, thus making difficult for the citizens to complete a register without wasting time and money. This environment also contributes to tax evasion, shifting more weight of taxes on those who comply conscientiously with their payment. This chapter presents a proposal of solution by means of informatics technology, which would result on having a clear, efficient and safe registry methodology, integrated with other areas of Public Administration. The central idea is the creation of a Unified National Registry, from which is to be motorized a change towards having a State whose actions are transparent and citizen oriented.

**Keywords:** Registry, Unique Database, Identity Document, State, Citizen, Attributes

## 1. Introduction

The function of a "REGISTRY" is to manage all the actions that ensure the "note" (register) of Persons, Entities, Properties and Activities, ensuring the integrity, transparency, dissemination, confidentiality and sufficient legal safeguard, constituting such "notes" the base and the source of information which support the interrelations between different actors and elements of the Society.

Different departments and branches of State are in charge, as specified in the respective Laws, of the administration of the Records of the main elements mentioned.

Such organisms' dispersion, plus the wide and complex variety of methods, is hard to escape from the criterion and the observation skills of the citizens. It is also added the: lack of facilities for carrying out procedures, its slowness, the tedious monitoring process, the costs involved in transfers and negotiators and, finally, which will be fair for all, to eliminate the contribution that this environment gives to tax evasion, shifting more weight of taxes on those who comply conscientiously with the payment of their obligations.

For all of these reasons, we present a proposal aiming to obtain, through the study and the streamlining of administrative procedures and legal frameworks underpinned by the incorporation of informatics technology, a registry methodology being clear, efficient, safe and unique, moreover which, is to be tightly integrated with the other thematic areas of Public Administration.

Having a database of updated procedures and efficient access will impact significantly on the simplification of a great quantity of community activities of persons, entities and areas of the State.

One of the central ideas of the proposal, along with some points mentioned in the preceding paragraphs, is the creation of a Unified National Registry, from which all the actions will be motorized.

Also, some non-traditional ideas of solution are incorporated, which constitute important factors to promote the such needed and claimed change which is to have a country into which the State actions are characterized by its transparency and are predominantly oriented to the citizen, raising his/her confidence level, making him/her to envision a better future and improving his quality of life.

## 2. Our Proposal

We believe essential to set a horizon and a way of transition from the current situation to which we envision as appropriate. Our vision is that the Registries will be the unique starting point of any individual or collective action, for people with activities and objects, as well as its primary source of information.

The mission that we propose is to improve the State-Citizen-Institutions relationship, providing through the application of unique standards at all levels of State, the basic information that they need to regulate activities in the public and private sectors. On the horizon that we set, it is seen the compliance with the following objectives:

- Ensure a unique registry database, with support and legal certainty.
- Speed and simplify the administrative functioning of the State, making it more efficient.
- Evident to citizens all legal fact registration.
- Facilitate administrative facts in the State-Citizen-Institutions relationship.
- Tend to all civil act produced by a citizen or an entity contributes to equity in the payment of taxes to the State.

To follow the path wisely, as it is to predict the existence of numerous obstacles, we propose to do it having in mind a set of strategies and solutions to be seen here later.

## 2.1 The Formal Origin of the Whole Community and its "Attributes"

We decided to take as "mothers" the registration of "Physical Persons" and the registration of Juridical Persons (Entities), because if they did not exist, none community or appropriation activity makes sense, giving the role of "attributes" to the purposes of the remaining registries, basically into two big groups:

- Personal attributes, which make the lives of physical persons.
- Attributes of objects and activities, which make the essence of legal persons.

We believe as important to note that we have written in lower-case the word "registry" when referring to physical and legal persons, as it should be clear that it refers to the activities and not to the institutions that now make them. It is important as a reader to think in the possibility that a person, who has not been registered at birth, do personal activities and partnerships within the community.

To give just a notion of the "attributes" of Physical and/or Legal Persons, according to the conceptual idea, imagine the usefulness of having, in only one place, data such as:

- Automobiles
- Real estate
- Health insurance
- Weapons
- Working activities
- Health history
- Police record and previous offences
- Driving record
- Copyrights
- Establishment as a legal person
- Registered medicine
- Agricultural products
- Activities:
    - Constructors of public works
    - Cults
    - Leisure activities
    - Health providers
    - Education
    - Issuers of certificates and degrees
    - Generators and operators of hazardous waste
    - Breeding Places

## 2.2 The Unified National Registry

The new entity that we propose, that we have called Unified National Registry must be integrated from a reformulation of all the existing Registries (this time in upper-case), taking advantage of their buildings, geographic distribution and qualified personnel.

www.blueherons.net

www.blueherons.net

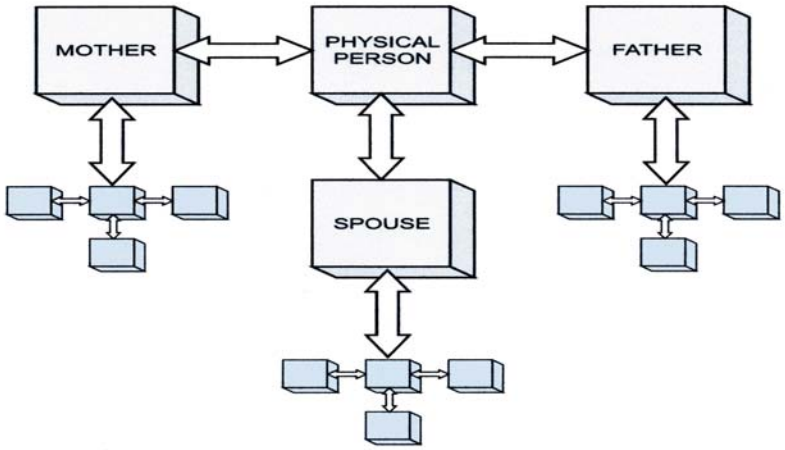



**Fig. 1.** Family Cube.

It had been taken the primary elements that correspond to the registration of a person at birth and when forming a legal couple. This means, at birth, the registration of who their parents are and, when marrying, who the spouse is. In the current headquarters of the Civil Registries, these data are reflected in birth and marriage certificates. What is inserted into a death certificate will only make, according to our vision, the cube being active or inactive.

It will be surely easier to understand through some examples:

- The relationship of a person with his/her father and in turn of this one with his/her own, will let us know who the grandparents of the person are. Continuing in a further "step", we will also know who the paternal great grandparents are.

- All persons that, in the opposite direction, point to the same parent must be identified as brothers.

- The relationships with the parents of the spouse, going through the primary relationship with them, will identify the parent's in-law.

- All persons who point to the same father, but taking that identified in the previous case as father in law, will then be his children and therefore the siblings in law of the physical person that we used in the beginning.

- All the physical persons who are identified as deceased will result in a "null" relationship from the standpoint of the generation of events that affect them.

## 2.6 The Electronic ID Card

An effective "digitalization" of the Citizen-State relations founds a first response in initiating a project to develop an Electronic Identity Card (DIE in Spanish) [1]. Determinants as the basis of this view we can identify:

1. Must be a means of identification "at sight" under the request of law enforcement or other public or private entities, as well as "on the net" for the purposes of access to services.

2. Must be a reliable instrument, either by its physical characteristics as for the information technologies used.

3. Must ensure a single mode of management for the distribution of services by all public administrations, whether central or local.

4. The issuance of the DIE must be made by the Unified National Registry, with functions that today correspond to the Renaper (National Registry of Persons) in similar method as the one used for the current ID, but the procedure must be performed directly in the offices of the Unified National Registry located in the Municipalities.

www.blueherons.net

www.blueherons.net

population (only at two or three months before), the current year's budget and its efficiency ratio by a tax ranking of municipalities in the present year.

- Offer of services to free the citizen from discomfort on travel and waiting, such as obtaining Digital Certificate (Electronic Signature), carrying out procedures that require or not the Digital Certificate, self-assessment tax and downloading forms.

In connection with extremely sensitive issues, as the significant and widespread decline in incomes of the population and a State that spends more than it collects, it will be possible to determine the involvement of private equity entities, with appropriate limitations by means of informatics -as already mentioned-, are so simple to perform, so that, either within their own management or in contribution to the State, improve the quality of life of citizens and absorb part of the costs, eliminating unnecessary expenses that indirectly affect personal income and contribute to the economic inefficiency of public administration.

## 3. Diagrams

### 3.1 Unified National Registry

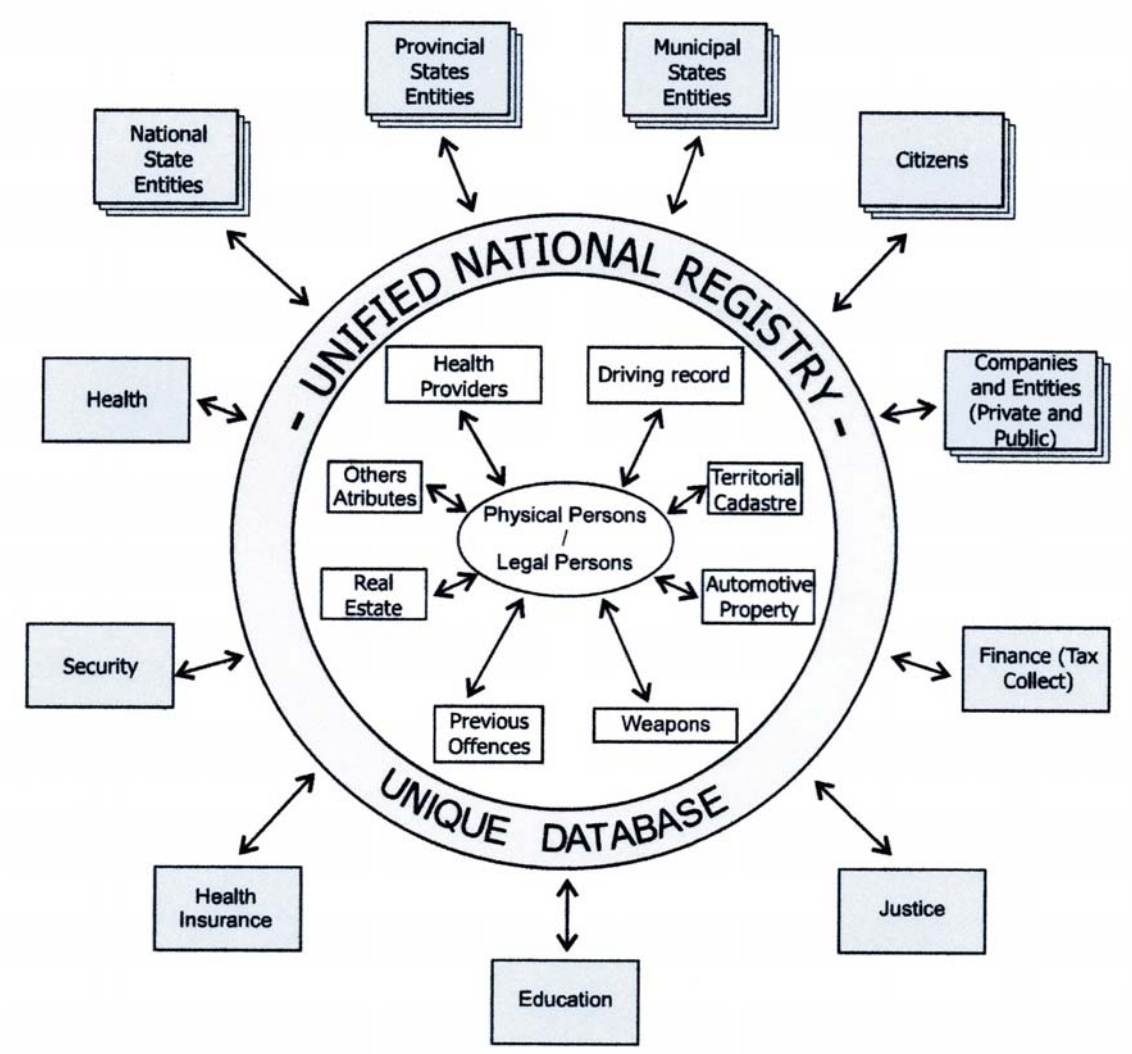



**Fig. 2.** Unified National Registry –Unique Database.

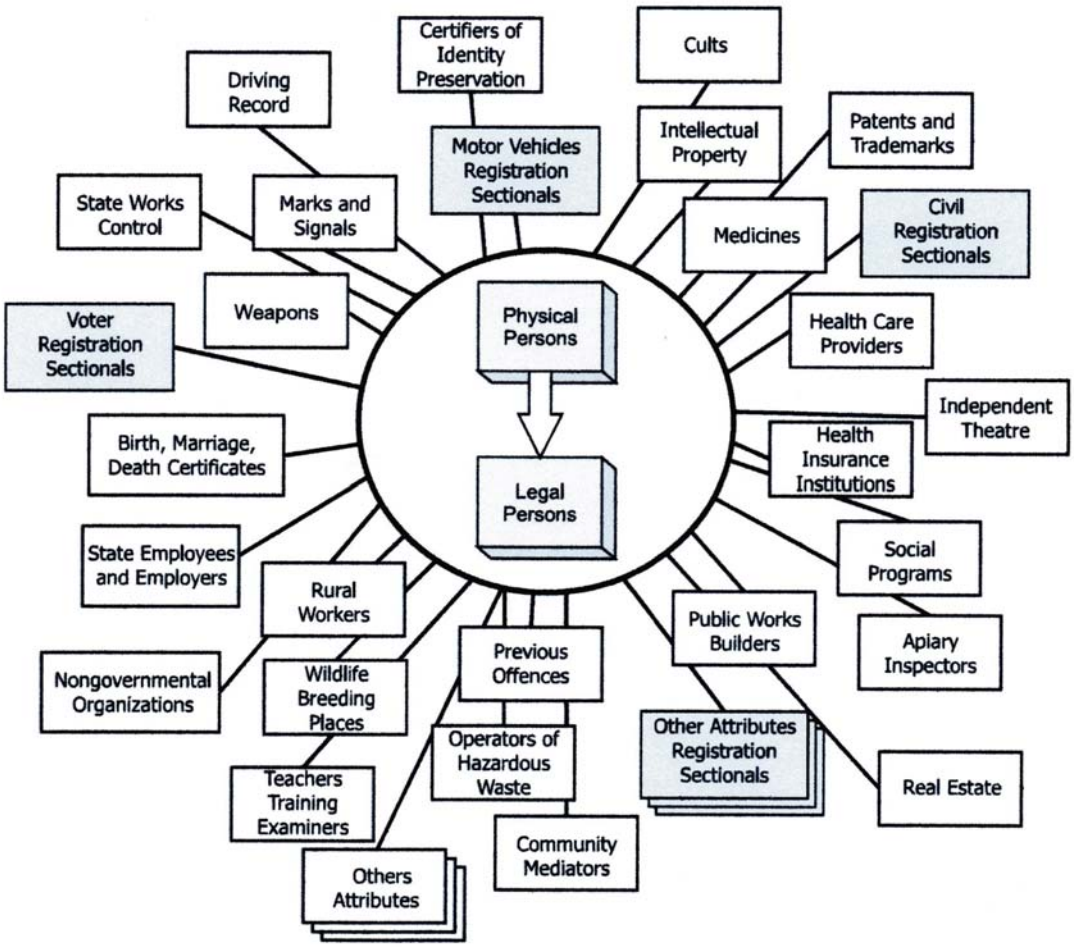



**Fig. 3.** Unified National Registry –Unique Database.

This schema reflects the "attributes" of persons, and allows to show the citizen and institutions in a single and normalized plane of the recordable acts, with complete information, which is registered on their behalf.

For the State –Nation, Province, City Council, it will be a screening tool and a source of very valuable and convenient information for decision making.

## 4. Main Components of the Current Registry Activity

### 4.1 Functions of Registries

Listed in order of priority:

- **Manage**, because they are basis and source of information and without them it is not possible to manage.
- **Serve**, because the Registries are needed for decision-making and streamline, transparent and give legal value to the State-Citizen relations (physical and legal persons).
- **Produce**, because they ensure the veracity of recordable legal facts.
- **Finance**, because they collaborate with the tax collection, nurture with work to professional associations and, under a principle of good performance, reduce the administrative cost to the citizen and the State.

www.blueherons.net

www.blueherons.net

www.blueherons.net


editions

As examples that will enable to better visualize the magnitude of the subject, we next give some values rescued from a survey conducted a few years ago in some Registries of the Province of Cordoba:

- **Civil Registry and Persons Capacity**: there are some 190,000 volumes, containing Birth protocols, Marriage or Death, from the year 1897 to date. This corresponds to approximately 8,000,000 digital images.

- **Registry of Real Property**: since the year 1897 to date, considering only domain "protocols" and other registry acts related directly with them, into the files it was accumulated approximately 19,000 volumes with chronological entries, more than 750,000 Real Folios, which correspond in total to 1,800,000 real estate properties, 5,500,000 folios and 3,800,000 notes. This would be equivalent to about 10,000,000 of digital images (without counting other documentation called static file).

## 5. Highlighted "Use Cases": The Simplicity as a Premise

We must recognize that the informatics people sometimes have the habit, poor indeed, to use specific terms to our profession when speaking with other people. That is why we intend to involve the reader in our informatics ideas (meaning that includes or not the computers), without diving into specific technical details, so that is why we remove them from this article, even having to a large quantity at our disposal.

While the words of the title "Use Cases" are typical of modern methodology of systems development, we prefer to use them in a general way when describing the "use" that citizens and institutions make of every Registry and, surely and more simply, will be able to do at the Unified National Registry.

Basically, without going into some particular things that the State bureaucracy has incorporated with more or less degree of necessity, the tasks of Registries consist in doing what the informatics people call an ABM (in Spanish) and report the results. In common terms, we can translate an ABM like incorporate, suppress and modify data.

However, in particular for the Registries, this is even simpler. There will always be to incorporate data and also modify them, but never delete them for everything that was once registered will have to remain forever as a source of valid information. An example of previously mentioned is the case of what today a Civil Registry does when a person dies: issues a Death Certificate but never destroys the ones of Birth and/or Marriage of the deceased.

Under the scope of the Unified National Registry will be of different types the data to be registered, but will not lose their character of attributes, as we have called them and how to proceed will also be the same, this is to incorporate, modify, and report.

## 6. Critical Success Factors: Opportunities and Difficulties

To ensure the success of the project it would be required the concurrence of different elements or factors that are critical and necessary for achieving the objectives, considering the systemic and cross-cutting vision of the proposal. The main ones are detailed below:

- That the actions of the present proposal have the public consensus.
- That they have legal basis, according to the respective national, provincial and/or municipal norms and be consistent with international law when appropriate.
- To ensure the citizens of free access to information.
- To have the support of the highest level of State.
- To concrete the incorporation of the technological vector to all areas of State, in an integrated manner and accompanied by the necessary administrative rationalization.
- That the registral information contained in the unique database be one-one and necessarily used by other areas of the State in everything that so corresponds, through the effective integration of existing databases and systems thereof.
- To ensure the security of data from disasters of all kinds, as well as to ensure the confidentiality of the information according to applicable laws.
- To be done the reviews, unifications and necessary adjustments in the Laws, Agreements and Procedures of National, Provincial and Municipal levels, depending on the proposed objectives, ensuring harmony, share of responsibilities and actions between each of the participating organisms.

It is our belief that this proposal is reinforced because:

www.blueherons.net

www.blueherons.net

www.blueherons.net

# Chapter 12

# New Technologies and South European University Education: The Dangerousness of the Human and Social Factors

Francisco V. Cipolla-Ficarra

HCI Lab. – F&F Multimedia Communic@tions,
ALAIPO: Asociación Latina Interacción Persona-Ordenador –Latin Association of HCI, and
AINCI: Asociación Internacional de la Comunicación Interactiva –International Association of Interactive Communication
c/ Angel Baixeras, 5 – AP 1638 – 08080 (Barcelona) Spain, and
Via Tabajani 1, Suc. 15 (7) – 24121 (Bergamo) Italy
info@alaipo.com

**Abstract.** The current work analyses through heuristic techniques the situation of the new technologies in the academic environment in the two countries of Southern Europe – Spain and Italy – in order to determine the factors of the potential users of interactive systems known as NEETs (not in education, employment or training). The study focuses on the university academic field from the 90s to the current time to see the roots of the phenomenon and its magnitude. A phenomenon which entails using and adapting techniques of the social and formal sciences to quantify it, the social networks to detect it and the knowledge and experiences of the communicability expert. The scope of the academic university distortions is studied from a working-economic perspective starting from on-line information, such as doctoral theses and study projects, to determine whether they are included or in the international framework. Also some kind of compass rose has been developed called in initials CRUE (Compass Rose for University Education) with the educational quality criteria whether they are positive or negative from a systemics or structural point of view which is the result of two decades of analysis in the public and private university context of Southern Europe. Through the description of the components of that compass rose we try to establish a bridge with the potential NEETs users and the new technologies students or workers. Besides, we will use a special language based on techniques of social research such as the compilation of documentation and the analysis of content. That is, we will resort to a narrative language for the presentation of the facts through real examples, which can't be shown in a explicit way out of respect to the privacy rules. However, all the cases which are presented are real, verifiable and objective in their exposition.

**Keywords:** New Technologies, Computer Science, Multimedia, Human Factors, Social Psychology, Education, Communicability, Heuristic Analysis

## 1. Introduction

The origins of the so-called Neets from Southern Europe lie in the university educational structure which has been set up in a fast, disorganized and anti-European way. Socially analyzing the Catalan university reality, we see that the rapidity is linked to the policies of the educational system responding in an implicit or explicit way to the growth of the pseudo-nationalist factors since 1990. Through the linguistic spread of Catalan there was the aim of quickly encompassing all the cultural sectors of that society setting Catalan before Spanish. The university classrooms, the publishers, the traditional mass media (press, television, radio, etc.) the new supports of multimedia contents, etc. [1, 2, 3] were cast into these demands of the existing political system at the time. It was in this way that the colleges that were opened through financial subsidies from the European Union (EU) never filled their classrooms. These classrooms were only not filled because there were conflicts in the human relationships between professors and students because of the linguistic factor (Catalan vs. Spanish and vice versa) but besides the birth rate of the population

decreased over the years (due to a lack working stability for all those who were excluded from the system and the structure of autonomic power), and moreover there were no students for the amount of universities opened in that decade: Pompeu Fabra University (1991), University of Lleida (1992), University of Girona (1992), Rovira i Virgili University (1992), Open University Catalonia (1995), Universitat Ramon Llull (1991), University of Vic (1991), University International of Catalonia (1997), Abat Oliba CEU University (2003). Besides, University of Barcelona, Autonomous University of Barcelona and Polytechnic University of Catalonia. The total are 12 universities and the Catalonia region covers an area of 31,895 square kilometres.

The speed is also linked to the zeal to get financial resources and implement anti-universal cultural systems in contradiction with the very word "university" which has led to turn of local professors into staff [4]. Some of those professors take the highest academic positions because they preach and exercise the philosophy of being the crux of the universe or navel of the world as Salvador Dalí would say [5]. The corroboration of that statement is the listing of the names and surnames, date of entry, etc. in the pages of the university websites, of all those who are professors, lecturers, associates, etc. Now this modality in the access to the university context has made up perennial structures even in the face of the international financial crisis. These structures are strengthened through the system implemented through the new legislation of the Spanish state, regional government and European guidelines in the second decade of the new millennium which lead the university professors to occupy their professorships even after the 70 years of age. The Neet (Not in Education, Employment or Training) generation encounters in that reality a monolithic structure which is impossible to modify in the short term. In other words, a first source of frustration for the future of the new generations, in some places of Southern Europe that lead to an increasing statistical number of the neets and joblessness. A reality which does not exist in such a radical way in other geographical areas of our planet, especially when we are in the context of the new technologies.


**Fig. 1.** Unemployment in Spain, digital newspaper: El Pais –04.27.2012 (www.elpais.es).

www.blueherons.net


editions

computer science and maths (without having any scientific publication indexed in the computer and/or maths database) would end up working as cellar and bars decorator in his/her spare time while the university authorities in that department would create for him/her an "ad hoc" educational space in illustrations to justify the barbarism and educational anti-model of the Spanish university system.


**Fig. 4.** The presentation of the drawing university course is changing its name along the minutes in YouTube, it is even being considered as a kind of lecture in a ICT (Spanish –TIC) congress or conference. In other words, a same content online is indexed with several simultaneous names.


**Fig. 5.** Presentation of a course on freehand writing, in a Majorca public university, whose contents are not for the students, since said students are regarded as clients by the professor.

This disorganization in the chart of a university is exported and boosted to the umpteenth grade when that doctor makes up his/her social networks in the academic context. So we can meet him/her as member of panels in the examination of future doctoral candidates of the audio-visual sector, usability engineering, multimedia and virtual reality, etc. That is, the disorganization doesn't only affect the structure where it is generated but it is also transferred to other areas. The direct and indirect consequences about the Spanish university disorganizational charts we can see in the figures 1 and 2, for instance.

## 2.1 University Organizational Chart: Model or Antithesis of the Model?

The conformation of the university organizational charts of the European Mediterranean basin in the 90s constitutes an antimodel or antithesis of the model [3] with endless interrelations, that is, not only in the academic environment but in the nefarious consequences for the future generations of professionals and potential users of the new technologies aimed at the online and offline interactive systems and/or researchers, for instane [6, 7, 8]. The appearance of a myriad universities in a same autonomic region as they are called in Spain led to quickly transferring the professors from high schools, schools, academies, etc. which had associated the word "technical" to the universities. Simultaneously were raised the local linguistic barriers to put a brake to the university globalization phenomenon in cities such as Barcelona or Palma of Majorca among others located in Southern Europe. That is, the public civil servants (including the university professors in this category) in Madrid could not work in Barcelona because they didn't speak Catalan perfectly in the university classrooms, whereas in the inverse sense that was possible. In other

words, that a Catalan-speaking professor could work without any problems in Madrid, Valladolid or Seville. This is an anti-European factor.

The anti-European factor is common in the current rules in linguistic matters such as favoring a national language or a regional language to carry out teaching. Consequently, the local teachers had a priority although they didn't have the teaching experience or training as it can be read in their curricula online. It was a Machiavellian method to exclude other teachers stemming from other states of the EU who spoke the language of the state but did not master 100% the regional language. Not even the university diplomas of those linguistic courses had any validity since the oral expression of the professors was measured. Obviously there are infinite examples where the students made fun of the professor who was forced to answer to them in the same language in which the questions were asked to him/her. Mostly the European professors had temporary working contracts and were not integrated in the staff (i.e., Catalan universities opened between in 1991 and 1999). To such a degree that the students of that trans-European professor body got a steady post for life in less than a decade. The training and/or experience wasn't enough to get that place, only an excellent pronunciation in the regional language. To such extent that in some elitist, religious and private centres of the northern area of the city of Barcelona such as those located in Diagonal, Bonanova, Sarrià, etc., the highest rulers applauded those measures because the role of the foreign professors was "they have to teach us how things are done but then they should go".

In other words, the "garbage" contracts (Spanish name of the contracts which didn't guarantee working stability in 1990) of the foreign professor body were in fact training contracts of future local professors. Here is one of the great educational contradictions in the heart of the EU which would foster with the passing of time an anti-European model born and grown in the public and private college cloisters. That which Saussure maintained that "language is a natural process in the learning of itself" was modified and imposed dictatorially [4] by decrees of the educational policy in the autonomous governments (Catalonia) with the go-ahead of the central government, that is, Madrid.

## 2.2 Meteoric System in University Degrees

Once the civil servant posts were covered for the engineering degrees and the B.A., the problem arose of covering the professor posts for the masters and PhDs. For the former in the private institutions it was not necessary to have any title to teach seminars or mini-courses inside them. An example regarding this were the masters related with multimedia engineering in Ramon Llull University (late 90s and early 21st century) where the owners of small computer animation firms or the members of the technical offices of the autonomic government (Generalitat de Catalunya –autonomous government of Catalonia) competed in the same themes, with the professors and collaborators of the alleged elitist universities and the educational excellence, which worked under garbage contracts. Obviously, the direction of those masters was in charge of the local professors inexperienced but endorsed by a strong campaign of commercial marketing in private education and in continuous training, especially in the avant-garde sector of the new technologies. With regard to the PhDs, in principle, it may be more complex, but it wasn't at all for certain departments of the audio-visual, software engineering, computer engineering, and systems or maths, etc. in those educational centres generating educational antimodels or models anomalous. The solution consisted in breeding PhDs in a record time, two or three years, and leaving them as life-long civil servants in the same university department. Currently in cities such as Palma of Majorca, Lleida, Girona, Bellaterra, Barcelona, etc. it suffices with comparing the time used between the attainment of the college degree and/or engineering degree and the PhD to detect this academic anomaly. Many of them got their PhDs without any international scientific publication or indexed in the databases of world prestige. Oddly enough, some patent in the USA of products and/or services which the potential users or experts of the ICT sector would never use because they served to widen the digital gap. Remarkably, those were times (decade of the 90s) where the research heads got record figures in 100% subsidized European projects [4].

That is, that these PhDs had plenty economic funds to present works in the scientific congresses, workshops, etc. Exceptionally, if they did, we find articles with works of two or three pages, with over 10 authors. All of them in the same sector of scientific knowledge of which they wanted the lifelong working post, once their doctoral thesis was presented. The exception to this reality was made up by the foreign students who not only had to pay the registration fees of the courses, but also the photocopies of the scientific articles from the library, the corrections of the translations of the articles or chapters, the inscription to the scientific congresses, the trip and the stay at the moment of submitting the scientific works, etc. Of course, then those works merged in the production of the department generating of European antimodels to get new European subsidies and foster the training of professionals or meteorite Catalan doctors such as can be seen in the following figure [9]:


**Fig. 6.** The Catalan educational antimodel. The comets students have in a decade two degrees, two masters and a PhD, simultaneously occupying high offices in firms of the education sector, commercial, etc. These comets are only for Catalan students.

## 2.3 Scientific Stalking

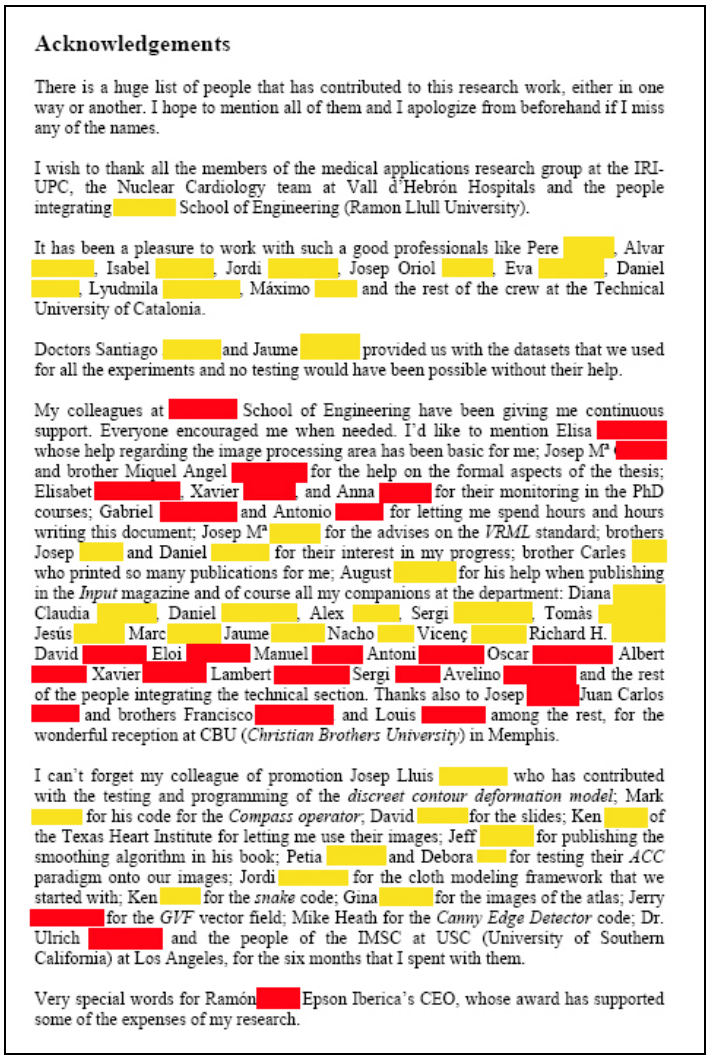
Now those professors who have wandered through those lands of university educational antimodels unwittingly become a source of constant plagiarism of their scientific works, since the legislation [10] now in force in these places is non-existent. A plagiarism that with the passing of over time becomes a kind of persecution or "scientific stalking" of everything those people do in the context of teaching and/or research. It is the phenomenon which we call PP (plagiarism and persecution –neutral initials from the point of view of meaning in the Spanish context). For instance, if the victims of university stalking organize international congresses, their attackers (PP) will start to invite the members of their scientific committee in other similar congresses organized by themselves. Even the international keynote speakers are taken to their labs and study centres to give their opinions for free, which are recorded and broadcast in YouTube. That is, the former present them as a component of exclusivity in the event while the latter (PP promoters) debase them to something cheap and common, which can even be seen on the internet, without need to pay any inscription fees.

Besides, the participants in the PP congresses will be able to get important amounts of money or computer material of the latest generation as awards to the works submitted. Oddly enough, the information on the associations which devote themselves to the attack is very reduced online (as a rule, they are religious institutions or of some other kind, which have a star or a compass drawn in the logo which represents them, as is the case in some engineering departments in Polytechnic University of Catalonia). The cities from which the PP act also generate stars if the following cities are considered Barcelona, Lleida, Palma of Majorca, Valencia and Saragossa, as vertexes of those stars with a pentagram shape. Sometimes those foreign professionals of interactive design who dared to comment in front of the authorities of the Catalan private educational institutions that it was necessary to remove the straight angles from their logos due to the vertical or dictatorial connotation were automatically sidelined and fired from their jobs.

## 2.4 Communicability Expert: Toward the Solution

Now in view of the described reality (a small sample truthful and verifiable which for reasons of space in the current work and privacy of the agents generators of antimodels we can not enlarge) emerges a big question which includes several questions: How can these deviations be detected and quantified to avoid them and find solutions in regard to the future generations aimed at the new technologies? The answer is simple: resort to a communicability expert [3], who using techniques and methods from the formal and factual sciences can draw exactly and quickly a map of the sites which do not meet the educational excellence they preach through the traditional mass media or from the last technological generation. In the 90s it was the usability engineers who used the resources of the social sciences under the caption of

heuristic techniques but did not detect the deviations that were generated from the new environments of the disciplines related to the technological avant-garde, usability engineering included. They spoke of the union of the methods and techniques but in reality it was intersections of knowledge and experiences, resorting to real professionals who count on a 360 degrees training such as is the case of the communicability experts.



**Acknowledgements**

There is a huge list of people that has contributed to this research work, either in one way or another. I hope to mention all of them and I apologize from beforehand if I miss any of the names.

I wish to thank all the members of the medical applications research group at the IRI-UPC, the Nuclear Cardiology team at Vall d'Hebrón Hospitals and the people integrating School of Engineering (Ramon Llull University).

It has been a pleasure to work with such a good professionals like Pere , Alvar , Isabel , Jordi , Josep Oriol , Eva , Daniel , Lyudmila , Máximo and the rest of the crew at the Technical University of Catalonia.

Doctors Santiago and Jaume provided us with the datasets that we used for all the experiments and no testing would have been possible without their help.

My colleagues at School of Engineering have been giving me continuous support. Everyone encouraged me when needed. I'd like to mention Elisa whose help regarding the image processing area has been basic for me; Josep Mª and brother Miquel Angel for the help on the formal aspects of the thesis; Elisabet , Xavier , and Anna for their monitoring in the PhD courses; Gabriel and Antonio for letting me spend hours and hours writing this document; Josep Mª for the advises on the *VRML* standard; brothers Josep and Daniel for their interest in my progress; brother Carles who printed so many publications for me; August for his help when publishing in the *Input* magazine and of course all my companions at the department: Diana Claudia , Daniel , Alex , Sergi , Tomàs Jesús , Marc , Jaume , Nacho , Vicenç , Richard H. David , Eloi , Manuel , Antoni , Oscar , Albert , Xavier , Lambert , Sergi , Avelino and the rest of the people integrating the technical section. Thanks also to Josep Juan Carlos and brothers Francisco and Louis among the rest, for the wonderful reception at CBU (*Christian Brothers University*) in Memphis.

I can't forget my colleague of promotion Josep Lluis who has contributed with the testing and programming of the *discreet contour deformation model*; Mark for his code for the *Compass operator*; David for the slides; Ken of the Texas Heart Institute for letting me use their images; Jeff for publishing the smoothing algorithm in his book; Petia and Debora for testing their *ACC* paradigm onto our images; Jordi for the cloth modeling framework that we started with; Ken for the *snake* code; Gina for the images of the atlas; Jerry for the *GVF* vector field; Mike Heath for the *Canny Edge Detector* code; Dr. Ulrich and the people of the IMSC at USC (University of Southern California) at Los Angeles, for the six months that I spent with them.

Very special words for Ramón Epson Iberica's CEO, whose award has supported some of the expenses of my research.

**Fig. 7.** Doctoral thesis in Barcelona, Catalonia (Spain).

Although historically the stars belong to the field of study of astronomy in the cosmos of knowledge, we can find a great chaos on planet Earth from the point of view of private university education, for instance. Part of this chaos is due to the "come phenomenon" in the university education in Southern Europe, that is, people who in a single decade get degrees, masters, PhDs, etc. [9]. All of them in areas of knowledge which are not related to each other, that is, meaning that the set of elements stemming from the intersection of the formal and factual sciences is very small. Of course that is a normal reality for the local students in certain geographical areas, since it takes ten years for foreigners to submit a doctor thesis, previously changing three times their university to submit the thesis in the context of the new technologies. Now how we can detect that phenomenon simply through the discourse analysis of a page which goes with the acknowledgment section of the doctoral theses or final career projects, in the case of the degrees, engineering, etc. In the randomly chosen example (figure 7 –we have hidden part of the text to keep the anonymity of the real person) of a universe of study of 30 cases (each one of them with its matching number and chosen through the use of a lottery draw) whose main data have been left out through privacy reasons. In our case of analysis we have a work submitted in an elitist private institution. Obviously this last term doesn't mean that directly or indirectly we are talking about educational excellence, although the educational commercial marketing tends to sell that meaning as if it was were a luxury product. However, following the components of the analysis of the speech made by Veron [11], we find in few words with the implicit and explicit profile of the future collaborator in the Catalan educational chaos, for instance. First of all, the infinite list of people in the acknowledgment section (in figure 7, we present only one page but

www.blueherons.net

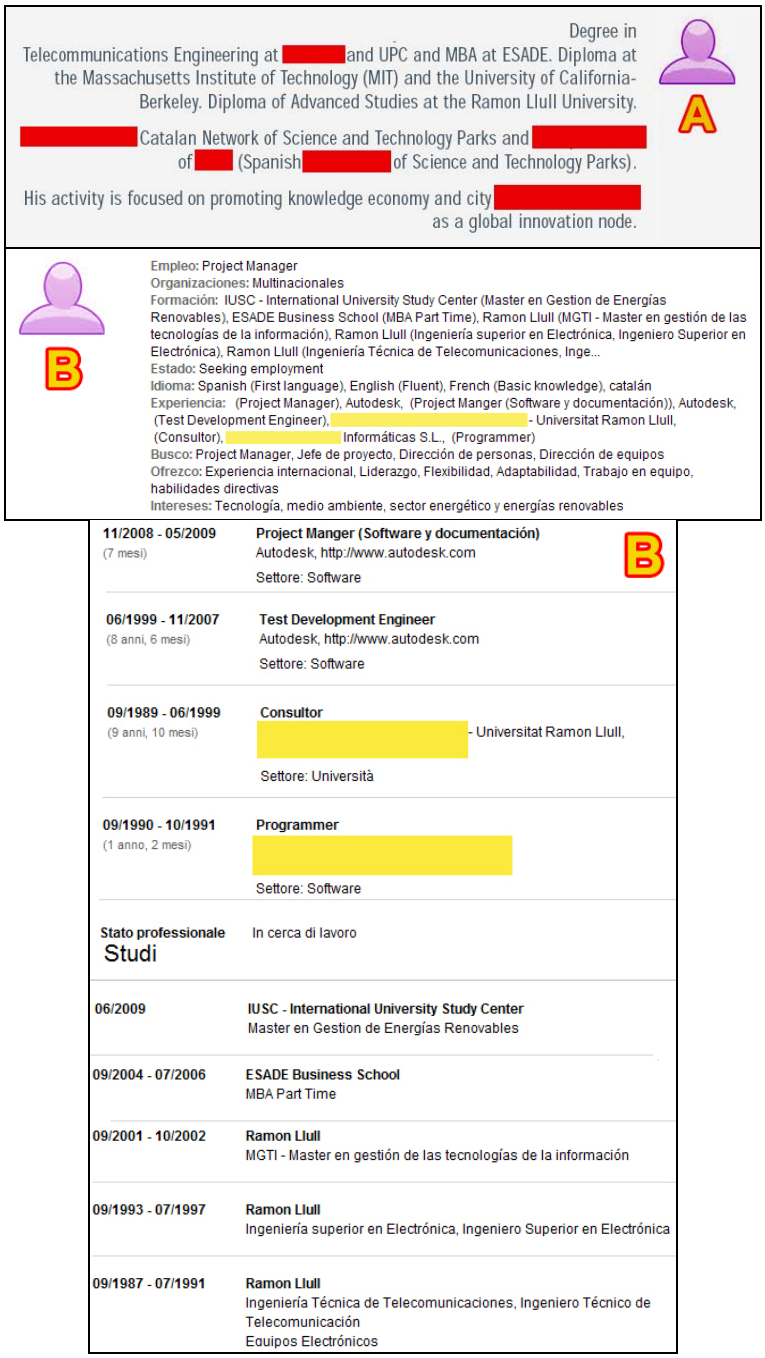



**Fig. 9.** Analysis of the contents online. Catalan students from the same educational centre, for instance, ESADE – business and law schools in Barcelona, Catalonia (Spain).

In the sections A and B, we have two former students (today, managers) from the same Catalan educational centre. In both cases we can see they have taken higher studies and several masters in private or religious institutions. However, one of them (manager B) is unemployed for having left that private institution and the other is general manager (A) of an autonomic political-religious institution. Whereas the former has taken masters compatible with the available spare time, the latter shows a real meteorite-speed career on both sides of the Atlantic. For instance, manager (A) has a master at the MIT (Massachusetts Institute of Technology) and simultaneously holding high managerial offices, alien to the studies that he shows in the social sciences. Obviously the value of the veracity of this online information is equal to zero, especially manager (A). However, we can include in that set of nullity the former case, because manager B introduces himself/herself as an external consultant (internal contradictions between section formation and section jobs), when in reality he/she was a hired student or teacher.

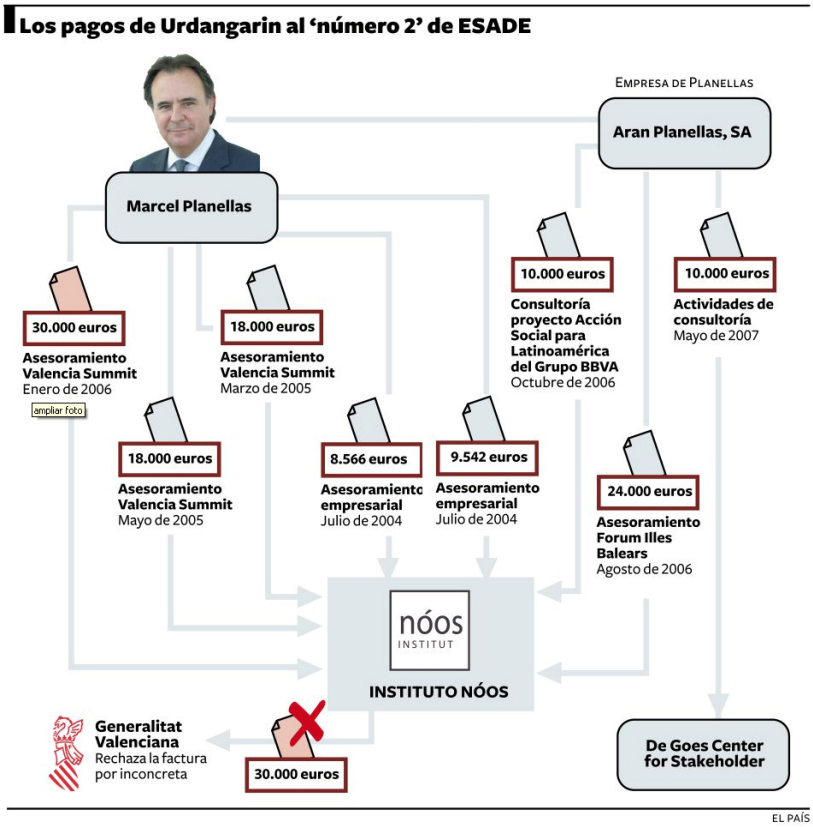



**Fig. 10.** Digital and analogical information/data (photography, texts, numbers, flow diagram, etc.) for a not ethical behaviour (financial corruption) into ESADE, business and law school in Barcelona, Catalonia (Spain). Digital newspaper: El País (www.elpais.es –02.28.2012).

Once again a rule fullfils itself in our universe of studies which has been taking shape along two decades in the south of Europe, the deviations and educational antimodels stemming from those students who in some moment of their lives have converged with the creeds and the dogmas of certain educational institutions, private or hybrid, belonging to other millennial institutions. Of course we also have a few exceptions in this sense. The problem at the current time lies in removing the masks to certain deceitful publicity campaigns to appeal to the students to-be to join the ranks of the unemployed. For instance, in the first decade of the new millennium, while the textile firms closed in the Lombardy Alps, in the mobile publicity of the buses of the city of Bergamo it could be read how the hybrid university promoted the great future the textile engineering career had [13]. That is, the parents on the dole, but their children were supposed to study trades whose future is now to be found in India, China or Turkey.

The wild mercantilism of education does not only lead to a situation of financial corruption such as those seen in figure 10, but it also destroys the myth that in the avant-garde environment of architecture/audio-visual/industrial engineering, for instance, with the latest technology, inside the private institutions of European education, there is educational excellence. However, a community has the greater educational excellence the smaller the Neet generation is.

The big problem of this reality is that the marketing factor beats by far the truthful information which goes around the traditional media channels (television, radio and press) which are distributed globally. The truthful information in the Internet are also eclipsed since the economic interests of the millennial institutions are being damaged which have seen in the new technologies an important source of revenues. In few words, in the centre and the south of the American continent, there are many who yearn for the private education model following the mirage of the Northern hemisphere.

Finally, the intelligent buildings or of recent inauguration were and usually are in some places (i.e., north of the city of Barcelona or near to the Mediterranean sea) a commercial feature to appeal to the potential engineering, degree, masters, PhD, post-doctorate, etc. belonging to the set of the new technologies. Another example in the European continent may be the volume of concrete used to build a great surface aimed at becoming a great usability lab but with a null serious scientific production since its opening. Although the Catalan educational marketing signals it as the greatest usability lab in Southern Europe and the alleged excellence of the R+D works, the reality lies in the opinion of the 99% of those students who end their studies there, leaving the faculty totally demotivated to keep on working in the context of usability or multimedia or telecommunications engineering, once they have spent months in that

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

with the techniques used at the time, only the superficial aspect was approached, without bearing in mind what from linguistics or semiotics was considered the contextuality.

A contextuality valid in our days to understand the hidden contents or not manifest of the language in the categories of design of an interactive system, for instance. From the theoretical point of view, a "theory speech" was missing. In this regard were generated important movements in the disciplines related to literature, journalism, publicity, etc. in Latin America. Some of the pioneers in that area for the interested readers are Eliseo Veron [11], Maria Dalmasso [29], Tomas Maldonado [30]. Mario Bunge [31], etc. Many of their conclusions have not been considered with the momentum of the Internet because of their origin or place of birth of many of them: Argentina, Brazil, Costa Rica, Cuba, Ecuador, etc. However, it has been accepted in North America and exponentially expanded to Europe under the umbrella of the human-computer interaction, expressions or pseudo disciplines such as "semiotics engineering" [32] Once again it can be seen how educational mercantilism breeds not only educational antimodels but also scientists.

### 4.2 Analysis of Content: Compass Rose for University Education (CRUE)

The same as in the hypermedia systems the quality attribute called orientation [23, 24] is paramount to the users. Starting from this quality attribute, the structure of nodes and links allows to know where we are, how we have reached that node, and wither to go is essential. Actions which are important not only for the usability of an interactive system but mechanisms to avoid widening the statistic data of the figures 1, 2 and 3. The set of questions, rhetorical or not, which will be listed next allow to understand how it has been possible to reach that situation of the Neet generation in Southern Europe, preventing it from a repeat in the immediate future or in the long term. With these main goals, the intersection of the formal and factual sciences, with its methods and techniques plays an essential role, for instance, in computer science, education and journalism [33–37]. It is in the area of this intersection where the analysis of content [17], the study and development of the university websites [38], the generation of the communicability expert [3], the examination of the university social websites [39], the credibility of online information on the Catalan and Lombardian portals [3, 19], the veracity of the information [3, 39] from the professors, students and researchers, etc., allow us to present this first set of orienting instruments so that the potential users, programmers, analysts of systems, bachelors or computing engineers and/or systems, telecommunications engineers, etc., have a compass not to get lost in the continuous advance of the new technologies and university training [40–43].

The table below is the result of the direct observation carried out during decades in American and European universities. In our case we will focus on the main aspects related to the systems and educational structures of Southern Europe. In some specific cases, parallels will be drawn to the systems and structures of other continents. The table is made up by an attribute and an example. These attributes stand for quality. They have a positive sign if they are constructors, and a negative if they are destructors. In the cases where there are both signs, it means that they depend on the human factor rather than on the technological factor. Besides, a communicability expert may turn these attributes into quality metrics and attain heuristically quantifiable results of the systems and educational structures where the study is made. Next the listing of the components, following the alphabetic order:

- Adaptability of the university contents to the social evolution (+). It is important that there is a constant interrelation among the formal and the factual sciences in the context where these develop. That is, that the requirements of society towards the future professionals that will join it once they finish their studies are taken into account. For instance, if in the 90s a many similar universities from the structural point of view were opened, from Girona (Spain) to Cadiz (Spain), in the face of the global crisis, the merger among them or their temporary closure would be in order.
- Clearness of the systems and the structure (+). The main variables and functions that constitute the educational structures and systems are not presented through the new technologies and sometimes use simple plagiarisms or rehashes from other universities. For instance, the complete programmes, with their matching bibliographies and professors, related to the masters, specialization courses, continuous training, etc., are not published integrally in the portals of the Southern Europe colleges. This opacity in the education system is a common practice in the following universities: UAB (*Universitat Autònoma of Barcelona*), UdL (*Universitat of Lleida*), UdG (*Universitat of Girona*), UIB (*Universitat de les Illes Balears*), UPF (*Pompeu Fabra University*), etc. In contrast, the transparency in Australia or New Zealand universities is a common denominator in this kind of educational offer.
- Continuity in the research lines (+). The constitution of research teams and the allocation of financial resources entails a logical direction of the research in the short, mid and long term. Often, once the financial resources to finance projects in local, provincial, regional funds are attained, those projects

www.blueherons.net

blue herons

editions

find colleges where millions of euros in equipments have been invested, but only has access to its use the elite students in relation to the fees they pay monthly to the university where they are studying a multimedia or software engineering. Therefore, if the universe of study has been fractioned and there are several experts working simultaneously at the end of their studies and conclusions, they may serve as controllers of the results obtained by their colleagues. It is a way to cut down costs in labs and equipments, for instance. Fourth, give the greatest possible publicity to the obtained results, thus avoiding the commercial channels. Logically we are talking of the scientific channels, but regrettably the financial resources and pressure groups in the mass media, including the current social networks, that the said centres of alleged educational excellence have at their disposal are so big that they can afford to buy not only the scientific channels, but also the human team they have. For instance, in the participation in congresses, workshops, symposiums, etc., the inclusion of awards with heavy sums of cash for all those who present research works is a clear sign that this event is not scientific, but rather commercial and serves to conceal the low quality prevailing in the alleged centres of educational excellence As a rule, such awards are assigned beforehand. This is another of the strategies used by the educational commercial marketing in Southern Europe. Fifth, in the last example we have already seen the importance of the context where these centres for educational excellence are located. The human and social factor which is developed in certain environments and temporal spaces have an influence on the concentration or dispersion of the educational quality in a country. The same as with the analysis of the content of a text, what is intended is to know the latent motivations, not in a speech, but in a society so that its educational centres have excellence or not. Considering these five points, we proceed to a set of rhetoric questions to build our first table of heuristic assessment and of a binary type (two feasible answers to every question; yes or no).

- Does the percentage of foreign teachers and/or researchers surpass the 50% of the staff?
- Have the curricula, the departments, the labs, etc. been developed by local or foreign staff?
- Is the use of other languages which are not the local freely allowed or is it imposed implicitly or contractually to the whole staff of the excellence centre?
- Do the local and the foreign staff have the same working conditions in the hiring of their services?
- Are those "illustrious visitors" who take part in the master classes, specialization seminars, etc. exclusive of the centre or do they participate in other places inside the national territory, that is, do they respond to a sort of war in disguise among centres of educational excellence in order to split up the war loot?
- Is the technology and knowledge transfer free inside the market or is it manipulated by the authorities of the centre of excellence?
- Are the equipments of the labs from different brands or do they belong to a few software or hardware brands?
- Do the providers of computer goods and services participate directly or indirectly in the extracurricular activities, for instance, science fairs, "open days", tenders, congresses, etc.?
- Is there freedom to choose the subjects of projects, theses, etc?
- Are the subjects of research which do not respond to the mercantilist or scientific expectations of the centre of excellence excluded together with those students who propose them?
- Do the authorities who are neutral to the academic sector determine the excellence of the education centre?
- Is there an excessive use of the phrase "centre of educational excellence"?
- Is the access to the centre unimpeded and free of charge for all?

Although the questions may seem trivial, they aren't, because through the analysis of the content of the university portals and also the reformulation of these questions in questionnaires which have been distributed over two decades among professors and students in Spain and Italy.

## 5. Lessons Learned

The use of narrative language has been one of the solutions to present disparate elements inside the set of the human factors, social factors and the new technologies. The reason why this has been resorted to is due to the description of examples stemming from private academic sectors (religious mainly), public or hybrid, guided by the provocative motto "***no one can harm us***". That is, they have the control of the academic stalking, for many decades in Southern Europe, and as it is easily provable, they enjoy perennial legal immunity. Besides, they regard themselves as the true holders of the ethical or moral values of the national and international community. In this sense, and from a perspective of social psychology or sociology, before making such statements, the readers in Spanish may see their alleged values in [44], with true stories of the 20$^{th}$ century. The Anglo-saxon public can read the book [45], because little or nothing

has changed in those places and from that time to our days. Besides, it suffices to see how they have got the listing university titles in a decade. In other words, the human factors in the educational institutions are very hard to detect, especially in the private or religious universities. However, they together with the social factors may put a brake to the advance of the ICTs and the digital culture [46] in a country or a European continental region. The analysis of content, with its techniques and methods adapted to the new technologies and led by a communicability expert may generate positive results in the short term, and with limited costs. The notions stemming from the social sciences, jointly with its methods and techniques may be valid in engineering, as it has been for usability in the 90s. Obviously academic titles obtained in a logical and gradual way in time and not like the comet professionals in Catalonia and Lombardy thanks to the virtual campuses or the networks of friendships, inside and outside the academic unit to which they belong. A way of wiping out these anomalies in the Spanish educational system is that in the private university centers its professors should be liable to rules in force in the rest of the state. That is, follow the patterns of the ANECA *–Agencia Nacional de Evaluación de la Calidad y Acreditación* (Spanish agency which habilitates for university teaching), for instance. That is, theoretically make transparent the contests to the posts of professors and university researchers. A reality which in Southern Europe is still being eclipsed in the new millennium but the consequences have been very negative not only for the future generations but for all those who currently make up the Neet generation. In that sense, we think that the university professor in new technologies should go ahead of the donkeys and in keeping with the winds of technological evolution of the interactive systems, for instance.

**Fig. 11:** A traditional weathervane in the hills of Córdoba, Argentina (the person walks ahead of the donkey –and not vice versa).

## 6. Conclusions

Several are the problems that present themselves in this kind of research work where converge education, the ICT sector, sociology and/or social psychology, for instance. On the one hand, the volatility of online information by those who wish to keep hidden the university failure and the conformation of the Neet generation. That is, the online information which appears in these moments in the Internet, in few minutes may change or be eliminated for marketing or institutional image reasons.

University disorganization, regardless of the kind of statute that brings it about, has negative consequences not only for the members of that structure, but also to the rest of the community where it is located, since education and health are two cornerstones for the quality of life of human beings. Educational mercantilism, joined to pseudo nationalism in some regions of Southern Europe, has allowed in both healthcare and education in the last two decades the generation of a reality that is summarized in the state of art of the current work. Recovering the credibility of these institutions is not an easy task, because it is not just a change of system, but rather of structure. A structure which has nothing to do with the building but with the people who make it up. People who in certain geographical contexts, slow down or contradict the essential rules of international university education and human dignity contained in them. Educational quality, now called excellence, is not always to be found in the private centers of education. In Southern Europe, in the inverse sense, that is, there is an indirect relationship because sometimes the greater are the monthly costs that a student pays in a university, the lesser is the quality of the education she/he gets.

www.blueherons.net

www.blueherons.net

# Final Remarks

We have opened these pages with the masterful contribution by professor Kim Henry Veltman. We are grateful for that point of view since as usual it helps us to locate the beacon on the coast, in the current moments in which the waters of the ocean of knowledge generated with the Internet and the transfer of technologies among human beings are very troubled. Now with the content of the current contributions a varied and dynamic reality has shored up. Each one of the sectors represented in computer science as a whole and multimedia in particular are related to the intersection of the formal and factual sciences. The whole of the works is a small and functional compass in the hardware and software environment in the current era of the expansion of communicability that bears in mind the human factors.

Although the social networks have generated a new way of working online, there are many issues to be solved in the short and the long term, particularly with the open software and the multimedia systems. These interactive online and offline systems have increased the quality of their performance, thanks to many unseen and original solutions which come from all those who participate in great magnitude products for the fostering of the commonwealth of human kind. As a rule, these are non-profit projects and in it are included practically all the works which have been presented in this compendium. In this field, the scientific research has found an interesting way to present and spread their breakthroughs from the basis of the population pyramid towards the summit and vice versa. Evidently, a process that requires prudence in the face of the negative human factors, since they can spoil the normal flux of access and the continuous democratization process of digital information.

The phenomenon of horizontal democratization of the contents in the Internet which originated in the mid 90s should be kept and boosted with the social networks since they have accomplished a very important role in the context of the open software. An open software which has considerably reduced the costs involved into computing aiding numerous public institutions, such as colleges, hospitals, libraries, city halls, etc. Today we can come across situations where the servers and computers do not need a yearly renovation of commercial software licences for the operating system, the writing of texts, the making of interactive presentations, among other daily activities. Without any doubt, it is necessary to keep on betting for creative solutions. The combination of the dynamic and static media boost this search through the use of open software and eradicating the negative effects for the human users. We end with the following thoughts: “Light shining on water droplets spaced out along a bamboo stalk turns the whole structure into a flute” (Malcom de Chazal), “We are what we think” (Buddha), and “Insist on yourself; never imitate” (Ralph Waldo Emerson).

# Author Index

# Keywords Index

www.blueherons.net

blue herons

editions

www.blueherons.net

blue herons editions

Cipolla-Ficarra, F. et al.: Computational Informatics, Social Factors and New Information Technologies: Hypermedia Perspectives and Avant-Garde Experiences in the Era of Communicability Expansion. Bergamo: Blue Herons (2011)
Cipolla-Ficarra, F. Vivas, E., Romo, Q.: Credibility Online: Quality Metrics for Evaluation. HCI International 2009, On Line Communities and Social Computing. Heidelberg: Springer, pp. 171–181 (2009)
Cipolla-Ficarra, F., Ficarra, M.: Software Manament Applications, Textile CAD and Human Factors: A Dreadful Industrial Example for Information and Communication Technology. In Proc. First International Conference on Advances in New Technologies, Interactive Interfaces and Communicability, ADNTIIC 2010. Heidelberg: Springer, pp. 121–131 (2011)
Cipolla-Ficarra, F., Ficarra, V.: Anti-Models for Universitary Education: Analysis of the Catalans Cases in Information and Communication Technologies. In Proc. First International on Software and Emerging Technologies for Education, Culture, Entertaiment, and Commerce: New Directions in Multimedia Mobile Computing, Social Networks, Human-Computer Interaction and Communicability (SETECEC 2012). Heidelberg: Springer. *In Printer*
Cipolla-Ficarra, F., Nicol, E., Cipolla-Ficarra, M.: Research and Development: Business into Transfer Information and Communication Technology. First International Conference on Advances in New Technologies, Interactive Interfaces and Communicability, ADNTIIC 2010. Heidelberg: Springer, pp. 44–61 (2011)
Cipolla-Ficarra, F., Nicol, E., Cipolla-Ficarra, M.: Vademecum for Innovation through Knowledge Transfer: Continuous Training in Universities, Enterprises and Industries. Innovation through Knowledge, Transfer 2010. Berlin: Springer, pp. 139–149 (2011)
Cipolla-Ficarra, F., Villarreal, M.: Strategies for a Creative Future with Computer Science, Quality Design and Communicability. In Proc. Human-Computer Interaction, Tourism and Cultural Heritage. Heidelberg: Springer, pp. 51–62 (2011)
Cipolla-Ficarra, F.: Communication Evaluation in Multimedia –Metrics and Methodology. Vol. 3, Mahwah: LEA, pp. 567–571 (2001)
Cipolla-Ficarra, F.: Evaluation and Communication Techniques in Multimedia Product Design for On the Net University Education. Multimedia on the Net. Berlin: Springer-Verlag (1996)
Cipolla-Ficarra, F.: MEHEM: A Methodology for Heuristic Evaluation in Multimedia. In Proc. 6th International Conference on Distributed Multimedia System –DMS'99. Aizu: KSI, pp. 89–96 (1999)
Cipolla-Ficarra, F.: Persuasion On-Line and Communicability: The Destruction of Credibility in the Virtual Community and Cognitive Models. New York: Nova Publishers (2010)
Cipolla-Ficarra, F.: Software and Emerging Technologies for Education, Culture, Entertaiment, and Commerce. In Proc. First International Conference on Software and Emerging Technologies for Education, Culture, Entertaiment, and Commerce, SETECEC 2012. Heidelberg: Springer. *In Printer*
Cipolla-Ficarra, F.: Usability Engineering Versus Social Sciences: An Analysis of the Main Mistakes. Advances in Dynamic and Static Media for Interactive Systems: Communicability, Computer Science and Design. Bergamo: Blue Herons Editions, pp. 165–189 (2011)
Cohen, S., Hamilton, J., Turner, F.: Computational Journalism. Communications of the ACM. Vol. 54 (10), pp. 66–71 (2011)
Cohn, M.: Agile Estimating and Planning. New Jersey: Prentice-Hall (2006)
Constantino-González, M., Suthers, D., Escamilla de los Santos, J.: Coaching Web-based Collaborative Learning based on Problem Solution Differences and Participation. International Journal of Artificial Intelligence in Education, Vol. 13 (2003)
Constantino-González, M., Suthers, D.: Automated Coaching of Collaboration based Workspace Analysis: Evaluation and Implications for Future Learning Environments. In Proc. 36th IEEE Hawaii International Conference on System Sciences (2003)
Costaguta, R., Amandi, A.: Training Collaboration Skills to Improve Group Dynamics. In: ACM Euro American Conference on Telematics and Information Systems (2008)
Costaguta, R., García, P., Amandi, A.: Using Agents for Training Students Collaborative Skills. IEEE Latin America Transactions, Vol. 9 (7), pp. 1118–1124 (2011)
Costaguta, R.: Habilidades de Colaboración Manifestadas por los Estudiantes de Ciencias de la Computación. Revista Nuevas Propuestas, Vol. 43-44, pp. 55–69. Santiago del Estero: Ediciones UCSE (2008) *In Spanish*
Coveney, P., Chin, J., Harvey, M., Jha, S.: Scientific grid computing: The first generation. Computing in Science and Engineering, Vol. 7, pp. 24–32 (2005)
Cuff, D., Hansen, M., Kang, J.: Urban sensing: out of the woods. Communications of the ACM, Vol. 51 (3), pp. 24–33 (2008)
Dalmasso, M.: La imagen y el sentido. Las paradojas de lo verosímil. Teoría y Crítica de la Manipulación, Vol. 2. Córdoba: Universidad Nacional de Córdoba (1992) *In Spanish*
D'Ambrogio, A.: A Model-driven WSDL Extension for Describing the QoS of Web Services. In Proc. of the IEEE International Conference on Web Services, Washington, pp. 789–796 (2006)
Daston, L., Galison, P.: Objectivity. New York: Zone Books, p. 17 (2007)
Daugman, J.: Recognizing persons by their iris patterns. In Biometrics: Personal Identification in Networked Society, A. K.Jain, R. Bolle, and S. Pankanti, Eds., pp. 103–122, London: Kluwer Academic Publishers (1999)
Davies, M.: Fake, fact, and fantasy: Children's interpretations of television reality. Mahwah: Lawrence Erlbaum Associates (1997)
De Andrade, A, Jaques, P., Vicari, R., Bordini, R., Jung, J.: A Computational Model of Distance Learning Based on Vygotsky's Socio-Cultural Approach. In Proc. MABLE Workshop, X International Conference on Artificial Intelligence on Education, San Antonio (2001)
De Lucia, A. et. al.: SLMeeting: Supporting collaborative work in Second Life. In Proc. of the working conference on Advanced Visual Interfaces, Napoli, pp. 301–304 (2008)

Debray, R.: Vie et mort de l'image: une histoire du regard en Occident. Paris: Gallimard (1995) *In French*

Dede, C.: Learning Context: Gaming, Simulations and Science Learning in the Classroom. National Research Council Committee for Learning Science: Computer Games, Simulations and Education (2009)

Delgado, A., Olguín, C., Ricarte, I.: Monitoring Learners Activities in a Collaborative Environment. In Proc. 7th IEEE International Workshop on Groupware (2001)

Deussen, O., Hanrahan, P., Lintermann, B., Měch, R., Pharr, M., Prusinkiewicz, P.: Realistic modeling and rendering of plant ecosystems. In Proc. SIGGRAPH '98 –25th Annual Conference on Computer Graphics and Interactive Techniques, pp. 275–286 (1998)

Deussen, O., Lintermann, B.: Digital Design of Nature: Computer Generated Plants and Organics. Heidelberg: Springer (2010)

Diamantaras, K., Kung, S.: Principal Component Neural Networks: Theory and Applications. New York: JohnWesley & Sons (1996)

Diaz, J., Garbajosa, J., Calvo-Manzano, J.: Mapping CMMI Level 2 to Scrum Practices: An experience report. Software Process Improvements, Vol. 42. Heidelberg: Springer, pp. 93–104 (2009)

Dikaiakos, M., Katsaros, D., Mehra, P., Palli,s G., Vakali, A.: Cloud Computing: Distributed Internet Computing for IT and Scientific Research. IEEE Internet Computing, Vol. 13 (5), pp.10–13 (2009)

Dillenbourg P.: What do you mean by collaborative Learning? Collaborative-learning: Cognitive and Computational Approaches. Amsterdam: Elsevier, pp. 1–19 (1999)

Dukes, C., Koch, K.: Crafting a Delightful Experience: Teaching Interaction Design to Teens. Interactions, Vol. 19 (22), pp. 46–50 (2012)

Durán, E., Amandi, A.: Collaborative Student Profile to Support Assistance in CSCL Environment. In Proc. ACM Euro American Conference on Telematics and Information Systems (2008)

Durán, E., Amandi, A.: Personalised collaborative skills for student models. Interactive Learning Environment. New York: Routledge, Vol. 19 (2), pp. 143–162 (2011)

Durán, E., Amandi, A.: WUM approach to detect student's collaborative skills. Journal of Web Engineering, Vol. 8 (2), pp. 93–112 (2009)

Eagles, P., McLean, D., Stabler, M.: Estimating the tourism volume and value in parks and protected areas in Canada and the USA. The George Wright FORUM 17 (3), pp. 62–82 (2000)

Edvardsen, F., Kulle, H.: Educational Games: Design, Learning and Applications. New York: Nova Publishers (2010)

Erickson, J., Siau, K.: Web Service, Service-Oriented Computing, and Service-Oriented Architecture: Separating hype from reality. Journal of Database Management, Vol. 19, pp. 42–54 (2008)

Eriksson. A., Wretling, P.: How flexible is the human voice? A case study of mimicry. In Proc. of the European Conference on Speech Technology (Eurospeech '97), pp. 1043–1046, Rhodes (1997)

Etherington-Smith, M.: The Persistence of Memory: A Biography of Dali. New York: Random House (1993)

Eyers, D., Bacon, J., Moody, K.: OASIS Role-based Access Control For Electronic Health Records. In IEEE In Proc. on Software, Vol. 153 (1), pp. 16–23 (2006)

Felder, R., Silverman, L.: Learning and Teaching Styles in Engineering Education Application. Engr. Education, Vol. 78 (7), pp. 674–681 (1988)

Feng, Y., Yuen, P., Jain, A.: A hybrid approach for face template protection. In Proc. Int. Society for Optical Engineering (SPIE), Vol. 6944, pp. 1–11 (2008)

Feng, Y., Yuen, P., Jain, A.: A Hybrid Approach for Generating Secure and Discriminating Face Template. IEEE Transactions on Information Forensics and Security, Vol. 5 (1), (2010)

Findlen, P.: Possessing Nature. Berkeley: University of California Press (1996)

Florijn, G., Meijers, M., van Winsen, P.: Tool support for object-oriented patterns. Vol. 1241, pp. 472–495 (1997)

Foster, I., Kesselman, C., Tuecke, S.: The Anatomy of the Grid: Enabling Scalable Virtual Organizations. International Journal of High Performance Computing Applications, Vol. 15 (3), pp. 200–222 (2001)

Foster, I., Kesselman, C.: The Grid: Blueprint for a New Computing Infrastructure. San Francisco: Morgan Kaufmann (2003)

Foster, I., Zhao, Y., Raicu I., Lu S.: Cloud Computing and Grid Computing 360-degree compared. In Grid Computing Environments Workshop (GCE '08). IEEE Computer, pp. 1–10 (2008)

Foucault, M.: The Order of Things. New York: Random House, p. 35 (1994)

Franklin, S., Graesser, A.: Is it an Agent? or just a Program. In Proc. 3rd International Workshop on Agent Theories; Architectures and Languages (1996)

Frezza, S., Tang, M., Brinkman, B.: Creating an Accreditable Software Engineering Bachelor's Program. IEEE Software, Vol. 23 (6), pp. 27–35 (2006)

Furtado, A., Santos, A., Ramalho, G.: Improving Digital Game Develpoment with Software Product Lines. IEEE Software, Vol. 28 (5), pp. 30–37 (2011)

Gagliardi, F., Begin, M.: Egee –Providing a production quality grid for e-science. In Proc. of the 2005 IEEE International Symposium on Mass Storage Systems and Technology, IEEE Computer Society, pp. 88–92 (2005)

Gamma, E., Helm, R.. Johnson, R., Vlissides, J.: Design patterns, elements of reusable object-oriented software, New York: Addison-Wesley (1994)

García-Garino C., Oliver J.: Un modelo constitutivo para el análisis de sólidos elastoplásticos sometidos a grandes deformaciones: Parte II Implementación numérica y ejemplos de aplicación. Revista internacional de métodos numéricos para cálculo y diseño en ingeniería, Vol.12, pp. 147–169 (1996) *In Spanish*

García-Garino, C., Gabaldón, F., Goicolea, J.: Finite element simulation of the simple tension test in metals. Finite Elements in Analysis and Design, Vol. 42 (13), pp. 1187–1197 (2006)

www.blueherons.net

blue herons

editions

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

www.blueherons.net


editions

www.blueherons.net

# Editorial Advisory Board and List of Reviewers

- Abdulmotaleb El Sadik. University of Ottawa (Canada)
- Alberto Cáceres Díaz. Universidad de Puerto Rico (Puerto Rico)
- Alicia Mon. Universidad Nacional de La Matanza (Argentina)
- Annie Lau. University of New South Wales (Australia)
- Andreas Fleck. University of Berlin (Germany)
- Andreas Kratky. University of Southern California (USA)
- Artemisa Trigueros. Universidad de La Matanza (Argentina)
- Arturo Colorado. Universidad Complutense (Spain)
- Beatriz Sainz de Abajo. Universidad de Valladolid (Spain)
- Claudia Marcos. Universidad Nacional del Centro de la Provincia de Buenos Aires (Argentina)
- Daniel Pargman. Royal Institute of Technology (Sweden)
- Emma Nicol. University of Strathclyde (UK)
- Elio Ramos Colón. Universidad de Puerto Rico (Puerto Rico)
- Fabio Crestani. University of Lugano (Switzerland)
- Fabio Gallo. Universidad Nacional de Santiago del Estero (Argentina)
- Farshad Fotouhi. Wayne State University (USA)
- Florian Kammüller: Middlesex University London (UK)
- Francis C. M. Lau. Hong Kong University (China)
- Gavriel Salvendy. Tsinghua University (China)
- Georgios Styliaras. University of Ioannina (Greece)
- Giulio Mori. IIT – National Research Council (Italy)
- Graciela Cruzado. Universidad Nacional de La Matanza (Argentina)
- Graciela Hadad. Universidad Nacional de La Matanza (Argentina)
- Graciela Vidal. Universidad Nacional de la Patagonia Austral (Argentina)
- Huang Chih-Fang. Yuan Ze University (Taiwan)
- Igor Chikalov. King Abdullah University of Science and Technology (Kingdom of Saudi Arabia)
- Inmaculada Vilches López. Universidad de Granada (Spain)
- Isidro Moreno Sánchez. Universidad Complutense (Spain)
- Jen Wen-Yuan. National United University (Taiwan)
- Juan Enríquez. Universidad Nacional de la Patagonia Austral (Argentina)
- Juan Silva Salmerón. University of Ottawa (Canada)
- Jurek Kirakowski. University College Cork (Ireland)
- Juri Hwang. Alaipo & Ainci (South Korea)
- Kaisa Väänänen Vainio Mattila. Tampereen Teknillinen Yliopisto (Finland)
- Kaoru Sumi. Future University Hakodate (Japan)
- Kim Veltman. Virtual Maastricht McLuhan Institute (The Netherlands)
- Klementina Možina. University of Ljubljana (Slovenia)
- Kürşat Çağıltay. Middle East Technical University (Turkey)
- Lastenia Bonilla. Universidad de Costa Rica (Costa Rica)
- Leda Digión. Universidad Nacional de Santiago del Estero (Argentina)
- Ljubica Marjanoviè Umek. University of Ljubljana (Slovenia)
- Luigi Barazzetti. Politecnico di Milano (Italy)
- Maarten Weyn. Artesis University College Antwerp (Belgium)
- Mabel Sosa. Universidad Nacional de Santiago del Estero (Argentina)
- Manuel Garrido Lora. Universidad de Sevilla (Spain)
- Manuel Imaz. Napier University (UK)
- Marco Anisetti. University of Milan (Italy)
- Maria Claudia Buzzi. IIT – National Research Council (Italy)
- María del Mar Ramirez Alvarado. Universidad de Sevilla (Spain)
- Maria Ierardi. IMATI - National Research Council (Italy)
- María Teresa Dalmasso. Universidad Nacional de Córdoba (Argentina)
- Marilú Lebrón Vázquez. Universidad de Puerto Rico (Puerto Rico)
- Marina Buzzi. IIT – National Research Council (Italy)
- Mario Fidelibus. Universidad Tecnológica Nacional (Argentina)
- Mark Saragona. University of Malta (Malta)
- Mitja Gradišnik. University of Maribor (Slovenia)
- Miguel Cipolla Ficarra. Alaipo & Ainci (Italy & Spain)
- Monica Landoni. University of Lugano (Switzerland)
- Norin Curran. University College Cork (Ireland)
- Onur Demirors. Middle East Technical University (Turkey)
- Özkan Kiliç. Middle East Technical University (Turkey)
- Pablo Flores. Universidad de la República (Uruguay)
- Pablo Negrón Marrero. Universidad de Puerto Rico (Puerto Rico)
- Paloma Díaz Pérez. Universidad Carlos III (Spain)
- Peter Stanchev. Kettering University (USA)
- Philip Bonanno. University of Malta (Malta)
- Pivovarova Liudmila. Moscow State University (Russia)
- Rodrigo Bonacin. DSSD – CTI, Ministério da Ciência e Tecnologia (Brazil)
- Ruly Darmawan. Institute of Technology Bandung (Indonesia)
- Sandra Casas. Universidad Nacional de la Patagonia Austral (Argentina)
- Stafford Griffith. University of the West Indies (Jamaica)
- Stefano Levialdi Ghiron. Università degli Studi di Roma la Sapienza (Italy)
- Steve Anderson. University of Southern California (USA)
- Susana Herrera. Universidad Nacional de Santiago del Estero (Argentina)
- Tetsuo Tamai. University of Tokio (Japan)
- Timothy Read. Universidad Nacional de Educación a Distancia (Spain)
- Urška Fekonja Peklaj. University of Ljubljana (Slovenia)
- Valerio Bellandi. University of Milan (Italy)
- Veysi Isler. Middle East Technical University (Turkey)
- Vigneswara Ilavarasan. Indian Institute of Technology Delhi (India)
- Vili Podgorelec. University of Maribor (Slovenia)
- Virginia Guarinos Galán. Universidad de Sevilla (Spain)
- Wen-Yuan Jen. National United University (Taiwan)
- William Grosky. University of Michigan-Dearborn (USA)
- Yeonseung Ryu. Myongji University (South Korea)
- Zeynab Barzegar. Sharif University of Technology (Iran)

# Main Editor Bio

Francisco Vicente Cipolla Ficarra is a professor, researcher and writer. PhD. Area: Multimedia (1999). B.A. in Social Communication (1988). B.A. in Computer Programming and Systems Analysis (1983). Manager and coordinator of the first Human-Computer Interaction Lab. in Barcelona, Spain (1997 – 1999). Professor in American and European universities, technical and professional colleges (1981 – present), subjects: computer science, computer graphics and animation, human-computer interaction, design and multimedia. Scientific journalist and writer (1989 – present). Director: Blue Herons Editions. Coordinator of AInCI (International Association of Interactive Communication –www.ainci.net) and ALAIPO (Latin Association International of Human-Computer Interaction –www.alaipo.net). Main research interests: HCI, communicability, software quality, auditory and evaluation of interactive systems, computer graphics and animation, social communication, semiotics, e-learning, video games, ecological and cultural heritage. ACM and IEEE member.