The impact of the virtual companies using the distributed systems in current society

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Abstract: The concepts, as a result of the human thinking, evolve permanently: data $\rightarrow$ information $\rightarrow$ knowledge $\rightarrow$ wisdom [2]. The society evolution is in a close connection to the evolution of these concepts and the economics follows, of course, the model of the society where it is put into practice. The informational society allows the access of using its benefits within all the domains of the human activities: a new way of working, a new way of knowledge.

Key-Words: informational society, virtual company, distributed systems, web services, social impact, trust

1 Introduction
The further evolution of the concepts and methods used in the field of the virtual companies is a long process, with consequences very difficult to be foreseen at present. Among the necessary changes, the scientific literature enumerates the following [3]:
- law changes, due to the legal implications in creating, functioning and disappearing of the virtual companies;
- the defining of the new evaluation methods of the companies' assets, relies not only on the physical properties or on the number of employees, but also on their capacity of attracting the clients, of fulfilling the tasks, of adding a real value of the products and services offered to the market place;
- the change of the relations between syndicates and the patronage;
- an intense flux of activities among different states;
- the radical change of the competition nature among companies.
The main reasons which make these methods and techniques be extremely useful for changing the company' organizations are the following:
1) resolve problems too big for a system having only one agent; 
2) allow the interconnection and interoperation of some already existing systems, very different one another; 
3) offer solutions for problems distributed on large geographical areas; 
4) can integrate pieces of information brought by the distributed informational sources; 
5) improve the speed, the safe, the extensibility and the capacity of operating with information or knowledge; 
6) offer conceptual clarity and simplicity in projecting; 
7) after implementation they can be easily extended or reduced, for a better usage of the available resources or for the transparency increase when operating.
During the next period of time, we will be the witnesses of the amplification of these changes above mentioned. The most important directions to be undertaken can be considered the following:
a) the development of a platform of virtual companies, accessible to the small and medium Romanian companies; 
b) the specification of the operational requirements and the projection of the distributed architecture of this platform; 
c) the development of new leadership, coordinating, cooperation and negotiation methods among the virtual companies; 
d) the resolving of the social and legal aspects raised by the apparition and development of such companies in the Romanian economy.
Such an approach will lead to the development of the concepts and methods connected to the dynamics of virtual companies. The new digital technologies reduce considerably the cost for information access, stocking and transmission. Within the XX th century, the greatest technological and social event was the apparition of the Internet. Web became a means of publishing the information. Thus, the web sites promote companies, products and also information, due to the fact they facilitate the communication. Once with the web development, the big sites have emerged and they raised the problem of the management of their content. Thus, systems of the content management have appeared (Content Management System - CMS). The input of the information to be published appears in the system CMS and the output is represented by the HTML pages offered to the visitors. The passing towards an informational society implies the increasing of the information volume and the communication acceleration. All this suppose the combination of the following elements: the distributed systems, the numerical calculation and the mathematical models, the social impact of this type of companies.

2 The informatics distributed systems
In order to have a global impact when constructing a virtual company, we need follow the principles and rules imposed by the distributed systems. How can we get a web service within a distributed system? The most important challenges connected to the resource administration of the big distributed systems were presented by Dong & Aki in 2006. These are:

✓ The heterogeneity of the resources through varied software platforms
✓ The resources autonomy – they are not administrated in a single control point, but they have different politics for accessing and priority settings
✓ The dynamism – the resources loading frequently varies; they are hard to be foreseen, because there is not only one user
✓ The separation of the computational resources from the stocking resources

Among the most known platforms for planning, there are: Condor (Thain, 2005), PBS (pbs-www, 2008) and SGE (sge-www, 2008), for meta planning Condor-G (Frey, 2002), Diogenes (2006) and GridWay (2007).

These pieces of information are used for taking the planning decisions, for choosing the resources which fulfill the users’ requirements.

2.1 The web-sites elaboration
The sites development consists of the problem formulation and projection. Each iteration produces a partial version. The iterative model is ideal for the web applications, because of the limited time. The client validates it when satisfied. The elaboration of a web site follows the steps [1] presented below:

![Figure 1. The iterative process of web-sites development](image1.png)

The web sites are classified into navigation pages and content pages. For a virtual company we need both types of pages. The navigation pages are realized in order to extract the information. They have filtrations facilities and also facilities for seeking the content pages. The former one is the final point. The figure below presents the abstract model of the content page. [1]

![Figure 2. The abstract model of the content page](image2.png)

2.2 The benefits of the web services
By separating the data of different applications found on different hardware platforms and operating systems, the web services have several benefits, such as:
- facilitate the connection with the partners;
- offer a more personal and integrated experience to the users, due to the new intelligent approaches, including the PC-s;
- save time and money, by reducing the time for applications development;
- greater income;
- the free technological coupling;
- are free from transport;
- temporized constructions;
- dynamic inspection;
- the use of the standard protocols, instead of the particular technologies.

The web services do not impose the changing of the present applications or the adopting of the same technologies by all the participants. [7]

2.3 The architecture of the distributed systems

Up till now, the implemented distributed systems show a large architectural variety. They have still in common a series of characteristics of their development. These characteristics and the projection aspects of the distributed systems can be described as descriptive models. Each and every model will represent an abstract, simplified but consistent description of the relevant aspects of the distributed systems.

For these, the hardware component is important, but the software has a determinant role. The most known structure is the hierarchical structure on modules. The following figure shows the general structure [1] of a distributed system.

![General structure of a distributed system](image)

As we can see above, there are three levels: the platform, middleware and the distributed applications. Each level offers services to the upper level. The communication between hardware and software is realized by the help of the platform. Among the most known platforms, there are: Intel x86/Windows, Sun SPARC/SunOS, PowerPC/MacOS, Intel x86/Linux [8]. The middleware level masks the platform heterogeneity and supports the communication through some abstractions, the invoking of the methods, the events notifications, the replication of the separated data and their transmission in the real time. The most common services offered by the middleware solutions are: the access transparency, the names’ usage, the persistency, the security. [5]

The knowledge and the usage of the numeric calculation are practice, efficient and elegant, the realization of an own architecture of web services will significantly contribute to this process. [5] In order to exemplify this, we present the Rnk1min function. Thus, we can determine the minimum of the respective function. The function service is created on the Eclipse platform and it is realized in Java language.

![Rnk1min WSDL](image)

![The launching of the web service for Rnk1min function](image)

![The response time for Rnk1min function](image)

We present below a code sequence for the numeric calculation corresponding to the Rnk1min function.
By respecting and adapting the way of projecting these types of function and mathematical calculation, any virtual company can adapt each and every calculation formula, using both the distributed system and the web services.

3 The social impact of the distributed systems
The psychological attitude we mention with this subject is the trust. Its importance is usually mentioned [4]. This concept raised interest both in practice and in the scientific literature. The idea of the virtual companies in which the actors – people and companies – contribute to the company’s success can not be realized without a minimum trust. The measures for forming the trust represent a potential issue for research [6].

3.1. A case study – measuring the degree of trust in the virtual companies
In order to see the present situation, we applied a number of 60 questionnaires containing questions connected to the implications of buying on line. All the respondents are Romanian citizens, living and working in Romania, not abroad. The respondents’ age mean was of 23, 53 years old. The educational mean level was: 40% high school, 60% faculty. Another introductory item was the respondents’ level of incomes per family. The results were the following table. (table no. 1)

<table>
<thead>
<tr>
<th>Lei Incomes/family</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000</td>
<td>33%</td>
</tr>
<tr>
<td>&gt;1000 – &lt;2000</td>
<td>40%</td>
</tr>
<tr>
<td>&gt;2000 – &lt;3000</td>
<td>7%</td>
</tr>
<tr>
<td>&gt;3000</td>
<td>20%</td>
</tr>
</tbody>
</table>

As we can see in the figure no.4, the level of poverty is fairly raised; only 27% of respondents have exceeded 2000 lei/family.

![Figure 7. The incomes level/family](image)

The first item of the questionnaire was if they bought from a virtual shop (table no.2)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>60%</td>
<td>40%</td>
</tr>
</tbody>
</table>

We can see that more than a half of the answers say “yes”, although the percent of 40% is still high as compared with other European countries. The second question was if they bought from the Romanian online shops (table no.3)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>53%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Here we meet a surprising situation. Although we mentioned that the respondents are all Romanians, we see they do not trust much the Romanian virtual companies: nearly half of them (47%) have not bought from the inner market.

The third item was: If you had not bought from Romania, where had you bought from? The choices and the answer can be seen in the table no.4.

<table>
<thead>
<tr>
<th>UE online shops</th>
<th>Outside UE online shops</th>
<th>Have not bought</th>
</tr>
</thead>
<tbody>
<tr>
<td>36,3%</td>
<td>9,7%</td>
<td>55%</td>
</tr>
</tbody>
</table>
As we can notice in the figure no.5, the greater percent – 36,3 – of those who bought goods, corresponds to “UE online shops”. There are a few respondents (9,75) who bought from the Asian market.

![Figure 8 - The graphic representation of the UE and outside UE online shops](image)

The fourth item was: Which were the motifs you have not bought from the Romanian online shops? The variants of response and the answers are to be found in the table no.5

<table>
<thead>
<tr>
<th>Table 5. The motifs of buying abroad</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe in the seriousness of the abroad online shops</td>
</tr>
<tr>
<td>I have not found the wanted products</td>
</tr>
<tr>
<td>The products were cheaper abroad</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>Don’t know/Don’t answer</td>
</tr>
</tbody>
</table>

We see there are sufficient motifs for the Romanian customers not to choose the Romanian online market. Thus, the online Romanian shops lack seriousness for 10% respondents, the desired products for a great number of customers 47%; or the prices are more expensive than abroad as 13% consider. We remark that there are also other motifs, not mentioned, for 13% of respondents.

The fifth question was: Did you know you have the right to return the product you bought in 10 working days, if discontented? The results can be seen in the table no.6

<table>
<thead>
<tr>
<th>Table 6. The right of returning a product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>66,7%</td>
</tr>
</tbody>
</table>

We see there are people, and not few, (33,3%) who did not know they have the right to return the product if they are discontented.

The next question is in a tight connection with the previous one: If you had known of this right, would you have bought online? The table no.7 illustrates the answers.

<table>
<thead>
<tr>
<th>Table 7. Attitude of trust in the virtual shops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>73,3%</td>
</tr>
</tbody>
</table>

We make notes on the 20 percent of respondents which even they had known about the previous mentioned right of returning the products, they wouldn’t have bought using the virtual technologies. We add the 6,75 of those with an undecided position and obtain a quarter of respondents who do not have trust to go virtual shopping.

The seventh item was: On a scale from 1 to 5, where 5 is the maximum degree, how much trust do you have in the shops where you bought from? The responses can be seen in the table no.8

<table>
<thead>
<tr>
<th>Table 8 – Scale of trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>6,7</td>
</tr>
</tbody>
</table>

Here we have results for all the categories of items. The value varies from the smallest one, 6,7%, up to greatest one, 40%. Generally the clients manifest a medium degree of trust.

![Figure 9 - The level of the customers’ trust in the online shops](image)

In order to see which issues would increase the customers’ trust in the virtual shop, the eighth item was: Would you have much more trust if the virtual shops were evaluated and certified by an established entity? The table no. 8 presents the answers.

<table>
<thead>
<tr>
<th>Table 9. The importance of an established entity for certifying and evaluation of the virtual shops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>66,7</td>
</tr>
</tbody>
</table>

We notice that the degree of trust would significantly increase if an established entity evaluated and certified the virtual commerce. There
are also, 20% which would not be more trustful, even knowing about the existence of the above mentioned controlling entity.

The last item we make reference with the present paper was: Would you be more trustful in the virtual shops if there were an independent entity which mediated the conflicts? The responses are presented in the table no. 10

Table 10. The role of an independent entity in mediating the conflicts

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>13.3</td>
<td>46.7</td>
</tr>
</tbody>
</table>

We remark the percent of 40 whose trust would increase if there were an independent entity which would mediate the conflicts. Thus, the clients would feel more protected. But, there is a great percent - of 46.7 – which represents undecided clients and which cannot express a clear position.

4 Conclusions

The virtual companies and the virtual shopping represent an area with a great potential for both development and scientific studies. They imply a lot of aspects and roles. The subject interests large categories of scientific preoccupations.

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