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E-commerce and Web 3D for involving the customer in the design process

The case of a gates 3D configurator

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Abstract — **This paper aims to show to what extent the Web3D is an advantage for Living Lab paradigm. From this viewpoint, we present various applications of online e-commerce or using the Web3D. A state of the art on these existing solutions enabled us to select the most suitable functionalities and properties for designing a gates 3D configurator. This tool has been evaluated by 27 participants. The results of this evaluation show that the particular 3-dimensional visualization of the object is an advantage for the sale, because a single image does not usually allow user to imagine the product in its environment. The use of Web3D for e-commerce gives the consumer a strong capacity to get involved in the design process. This point is a first answer to a research question on the role and definition of Living Labs.**

Internet, e-commerce, Web3D, Living Lab

I. INTRODUCTION

A. Motivations and scientific interest

Living Lab[1] is an emerging paradigm for fifteen years and supported by the European Commission. Their objective is, in fact, to engage communities of users as soon as possible in the cycle of R&D to co-create, explore, experiment and evaluate services, products or new uses before the realization phase. Their particularity is to have a strong participatory dimension because the end user, for whom the new product (or service) is built, is implied in the early stages of the design process, and needs are taken into account throughout the project.

Analysis of explanatory sheets of Living Lab[2] shows that the main means used to facilitate this participatory dimension are online social networks, permanent high speed Internet access, model cities and Virtual Reality. Therefore, we assume the E-commerce using the Web 3D facilitates the engagement of customers in all phases of the life cycle of a product from the design to the pricing, through the promotion and the distribution.

After the arrival of "Web 2.0", we talk nowadays of "semantic web", described by some authors as "Web 3.0". The latter is characterized by a definition and a structuring of information and services, making possible to answer to any request from users and machines [1]. The web behaves as a large and global database [2]. This new dimension pairs with new technologies or more specifically new informational contents. Thus the third dimension, which is already very common in our daily applications, is actively supported by the Web3D Consortium[3]. The web is transformed gradually into a set of interconnected 3D spaces [3]. In accordance with [4], it is possible to consider the Web3D as real time 3D (also known as Virtual Reality[4]) broadcasted on non-immersive systems (personal computers) via the Internet medium. The term "immersion" is defined here as the objective and quantifiable description of the degree (e.g., completeness) wherewith the system interface controls sensory input for each modality of perception and action [5, 6]. Even without the immersive aspect, users may still have a feeling of presence in the virtual environment [4]. This sensation of presence is of primary importance and it becomes possible to make it feel by the great majority with the technologies associated with Web3D. The major advantage of the Web3D is the same functioning as the "classical" web that is a complete independence from the platform: it requires only a standard computer and a simple plug-in for the web browser [7].

Thus, if the Web3D has been standardized for several years, the size of files to be exchanged was not compatible with the low speed Internet connections. The VRML (Virtual Reality Modeling Language) has become de facto a standard. Today, thanks to the prevalence of broadband or even FTTH (fibber to the home) connections, web appropriates 3D content. To unify the innovations in the field of Web3D, the Web3D Consortium was established with the aim of achieving the specifications of information formats on Web3D and especially the evolution of the X3D format, which is recognized by ISO (Extensible 3D,

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[1] For more information on Living Labs, see www.openlivinglabs.eu/

[2] These sheets are downloadable on: www.openlivinglabs.eu/livinglabs

[3] http://www.web3d.org/

[4] Virtual reality is the generation of 3D entities that interact in real time and change according to user behavior [15]

the successor of VRML language for describing 3D virtual world) [8].

Web3D allows a wide access to benefits and interest of the third dimension. The application areas are in fact very large: learning [9], e-commerce, simulation [10], education, with for example virtual tours of museums or cities and virtual exhibits [11] or the birth of virtual communities (e.g., Second Life) [12] present a comprehensive and illustrated taxonomy of these applications. The collaborative and participatory dimension, for example in design activities, can also be greatly facilitated [13]. There are now many software solutions that allow distribution of 3D content through the web. For example, 3D application layers are available for the Flash format (e.g., away3D - www.away3d.com). These software solutions also simplify the export of 3D models and environments to Web environments [14]. The transition from a 2D environment to a 3D environment is not trivial, especially in the case of web solutions where users have no device other than the traditional keyboard / mouse. The interaction must necessarily be adapted to the new content type, as shown in [12] in their comparison of Web 2.0 and Web3D.

The potential of Web3D is important in the field of e-commerce. The third dimension allows users to manipulate, view, or even configure / customize the products that interest them, as they would do in the real world [16]. The interest in terms of economic repercussions is important: in 2006 it was estimated that over 19% of purchases were made online through e-commerce sites [17]. In [18], authors believe that a platform of e-commerce "*brings advantages to both suppliers and buyers, regarding [...] the use of automated supply procedures, economies of scale, wide access on both local and international markets, dynamic real-time price mechanisms/modules*". However, these benefits could be obtained only through careful design of the website, with content and functionalities adapted to the product.

The issue of design and scientific evaluation of a platform for e-commerce has already been widely discussed in the literature in the case of common products for the general-public [4, 18]. Yet, few efforts have been focused on the contribution of the third dimension in response to the needs of manufacturers for specific products in the field of e-commerce.

B. Action-Research in the context of an industrial project

The work reported here fall within the scope of this question and was done in the context of an Action-Research[5] conducted in the framework of an industrial project initiated by the firm "Groupe Maine", specialized in the extrusion of plastics and PVC profiles. To optimize the management of orders and respond quickly to customer needs, the company made (under AutoDesk Inventor) a parametric model of portal for each range, namely 5 parametric models. This company wants to overhaul its orders management system to provide optimum service to the customer. The company wishes to allow the end customer, the buyer of the portal, to make his order directly online (currently the customer must speak to a rep). Using parametric models, the user should be able to achieve its own configuration and get the 3D model of the portal suitable for his project. He will then be able to view the chosen portal in situ, in its future environment using a picture of his house or his building for example.

The actions realized in this project have contributed to the design of a 3D gates configurator that served as support for the empirical study described in this paper. From these actions and data from the field, we also aimed to produce scientific knowledge about the use of Web3D technologies in the industrial field. To sustain this issue and in comparison with the study of what already exists, we propose to evaluate a solution that meets the needs of online sales. After the evaluation, we will be able to define the advantages of the designed Web3D business solution. And thus provide recommendations for the design of platforms for e-commerce offering advanced features and a high support of the third dimension.

C. Objective and paper organization

The aim of this paper is therefore to illustrate the interest of Web3D technologies for a Living Lab paradigm, through a concrete design case of an e-commerce 3D platform allowing gates setup and customization. Through a technological and competitive benchmarck (i.e. the comparative presentation of competing or similar solutions) and the needs of the backers, we selected all the features we have implemented in the functional demonstrator. This one serves as support to the experimentation that we conducted with 27 participants, to attest to the interest of 3D modelling in an online commerce site concerning the implication of customers in the sale process. This experiment does not consist to compare our demonstrator with existing solutions, and it does not intend to evaluate the usability in depth.

The article is structured as follows. In the next section, we describe and compare, according to different criteria, the existing solutions using Web3D technologies in the field of e-commerce and more generally the solutions for viewing and / or exchange of 3D models. The results of this comparison are used to design our application of e-commerce of gates. Features and properties of 3D configurator are presented in Part 3. Section 4 describes the issue we want to answer and the experimentation that we conducted for this purpose. The results, presented in Section 4, are discussed in Section 5. We conclude this section by a summary of results and the perspectives they offer, especially in the field of co-design and more specifically in the field of Living Labs.

II. Description and Comparison of Existing Solutions

A. Description of existing solutions

Several solutions for the general public of e-commerce exist and have relative advantages. We propose a comparison of several solutions in order to present the advantages and disadvantages of each, according to three

[5] For a discussion on Action-Research, see [19]

criteria: the functionalities (e.g., printing, 3D manipulation), non-functional properties (e.g., ease of use) and technical solutions (e.g., Away3D + Flash). From these three criteria we will be able to assess the commercial interest of each one. Among these applications, some have a common a view that augments the real environment of the user by adding a product 3D model.

1) "Cadiou" solution

Cadiou[6] allows customers to configure and view their portal in situ using a Web3D application. The client can thus obtain a 2D visualization of the gate in a chosen environment (Fig. 1) or 3D artificial representation (Fig. 2) exported to a *PDF* document (PDF 3D).

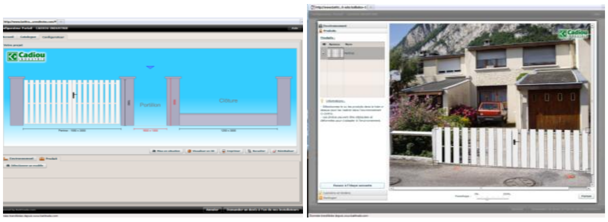

Figure 1. "Cadiou" configurator with 2D results

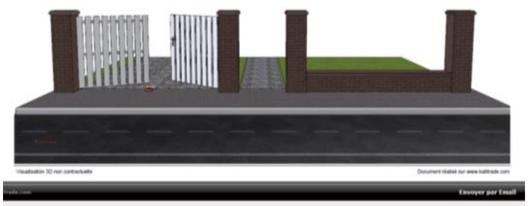

Figure 2. "Cadiou" configurator with 2D results

This solution provides concrete 2D and 3D views of the gate selected and sized by the user. This application uses the solution from *Batitrade* which combines *Flash* environment and a 3D engine. It is directly usable by the client to obtain a quote related to the configuration created. Nevertheless, the 2D models obtained are only a distorted picture of a generic portal. The environment can be modified by importing a photo of the customer's home. The 3D PDF document corresponds to a standard scenario: the user does not visualize its portal but a 3D object taken from the catalogue in a virtual environment. The emphasis is placed on the fidelity of the 3D model, but it is impossible for the client to view its portal on its future site of installation.

2) "Lapeyre" solution

Lapeyre[7] solution offers a preview of 2D objects superimposed on a 2D environment. Figure 3 shows the user interface. This application uses the *Away3D* engine associated with the *Flash* environment.

The main advantages are the efficiency of the application, the simplicity of the interface and the realistic visualization. Moreover, it is possible to dynamically change the color and size of available gates and doors. Nevertheless, the application can be improved because of its slowness and its low reactivity, whereas it is only a 2D visualization. This application allows the user to visually assess the rendering of its portal and its installation in front of his house.

Figure 3. Lapeyre configurator with 2D superimposition

3) "But" solution

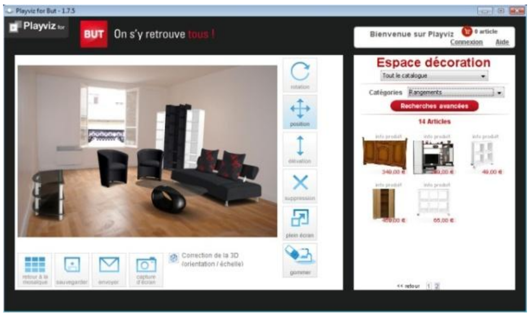

Figure 4. But configurator in augmented reality

But[8] solution offers a preview of 3D objects in a 2D environment. The screenshot (see Fig. 4) shows the user interface. The technical solution associates Java runtime environment with OpenGL for 3D.

The advantage of this solution is the depth offered by the display that lets you add 3D models (i.e. furniture) superimposed on a 2D environment (i.e. the client environment). However, this application has a heavy execution, particularly during installation of the plug-in. Furthermore, this application does not correspond to an e-commerce platform because it displays only 3D models of the real furniture offered by the store. Thus, the application does not provide tools to proportion the 3D objects, as it is necessary in our study.

4) "Homestyler" solution

We can identify solutions that allow to fully configure a home online (i.e. Autodesk Homestyler[9]). From a plan of an empty environment, users can add walls, doors, windows, appliance and furniture (Fig. 5). Once the house or apartment is fully configured, it is possible to visualize it smoothly. Finally, users can share their modelling with friends and family (by email, *Facebook* or *Twitter)*. The configuration can first be made in 2D on a plane (top view), and then viewed in 3D. This application uses the *Away3D* engine associated with the *Flash* environment.

[6] Cadiou gates configurator: www.batitrade.com/appsBT/site.php?hash=511917bd9d842d18509cd5c06f2fc3d6&referer=http://www.cloturesdiroise.com/

[7] Lapeyre gates configurator: http://ns0.bolero.fr/lapeyre/prod/amenagementExterieur.html

[8] But configurator: www.but.fr/animations/realite-augmentee.html

[9] Homestyler configurator: www.homestyler.com/designer

5) *Tracepart and Content Central websites*

Non-commercial solutions or less oriented to direct sales solutions exist. These ones are related to CAD (Computer Aided Design) field, where it is possible to view parts models in 2D and 3D then to download them later (for free or not). These sites are *Tracepart*[10] and *Content Central*[11] of Dassault Systems. The application Tracepart is developed with the Java environment; Content Central is developed with Viewpoint media player.

Figure 5. HomeStyler: 3D configurator of interior fitting-out

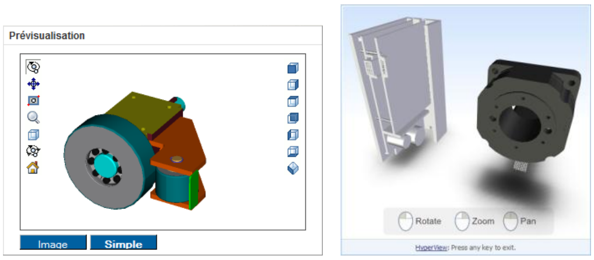

Figure 6. Tracepart and Content Central websites

6) *"SketchUp" solution*

Other sites and solutions exist and concern the sharing of 3D models. For example, Google offers a library of 3D models for its SketchUp[12] solution. Like the previous examples, this large database offers 3D visualization before the download of the model (Fig. 7).

7) *Zoomlion website*

There are other applications which allow the visualization of 3D objects online, but which are on the sidelines of our scope. These visualizations can involve multiple areas such as Zoomlion[13] website (i.e. the field of structural work). On this site it is possible to visualize construction equipment (excavator, bulldozer ...) online (Fig. 8). This site is characterized by its high framerate.

[10] Sharing site of CAD elements: www.traceparts.com/fr

[11] Sharing site of CAD elements: www.3dcontentcentral.fr

[12] Sharing site of graphic design parts : sketchup.google.com/3dwarehouse/?hl=fr

[13] Sharing site graphic design pieces: web.icm.cn/zoomlion/case.htm

Figure 7. Sketchup object

Figure 8. Zoomlion website

B. *Comparative evaluation of existing solutions*

TABLE I. COMPARISONS OF WEB3D SOLUTIONS FOR COMMERCIAL PURPOSES

Solution	2D or 3D	Properties	Engine	Mark
Cadiou	3D and allows disposition of the gate (3D PDF or 2D superimposition)	Explicit visualization Concrete interest	Batitrade (Flash)	★★★★★
Lapeyre	Only 2D	Explicit visualization Concrete interest	Away3D (Flash)	★★★★
But	Concrete 3D perception	Weight use Limited interest	Java3D	★★★★★
Homestyler	Excellent 3D visualization	Long loading time Limited interest	Away3D (Flash)	★★★★

Table 1 provides a summary of the more interesting applications relatively with regard to the objective of the project: In this table, ★ represents very bad, ★★ represent bad, ★★★ represent medium, ★★★★ represent good and ★★★★★ represent very good.

For a more detailed taxonomy of 3D formats and API dedicated to the web, the reader may refer to [20] and [21].

3D provides a very interesting gain but requires more resources and increases load time. Via the internet, 3D visualizations may have a lack of fluidity offer a small gain when the features and potentialities of the third dimension are not in line with marketed products.

Moreover, adding a new dimension to representations must be made with special care. In fact, according to [22], cognitive abilities (among them the spatial skills) are a major factor causing differences between individuals. The design of a new representation must be done with the goal of not penalizing users with low cognitive abilities, especially as we make an e-commerce application that targets the largest audience: we clearly situate in a compensatory strategy [23], in the sense that we want to weaken the impact of inter individual differences.

It is necessary to develop an application using the advantages of the solutions listed above without their drawbacks. Firstly, our application has to offer the same framerate and the same quality as a locally installed application on a computer. This implies a light and optimized application. The choice of a model and its design must be a step prior to visualization of the product in its intended environment. Finally, the application must provide a cost estimation of the final model taking into account the configuration chosen and the command potential. As demonstrated before, no solution brings together all of these features. Moreover, to our knowledge, no research work was focused on demonstrating the value of this kind of platform of e-commerce. In addition to our research question, the synthesis of the existing solutions allowed us to define all the properties and functions of the gates 3D configurator for *Groupe Maine* Company.

III. FUNCTIONNALITIES AND PROPERTIES OF THE GATES 3D CONFIGURATOR

The configurator developed for online sales of Group Maine's gates is compatible with the most common browsers (Internet Explorer, Firefox, Chrome, and Opera). It was realized with the *Unity3D* software which allows to create web applications in 3D dimensions. The gate (Fig. 9) is a 3D model of the product that the user has selected, sized and positioned in front of a customizable image that corresponds to the environment where it will be placed in the real world.

The user can access to the interface via its personal identifiers. He can see the product for which he requested a quote. This customized product can be moved in space by drag and drop then finely positioned (rotation and depth) through the scroll bars. The user can also change the colour of the gate. Finally, the environment into which the gate is placed can be changed: users can choose an environment among those predefined or import a personal image via the importation form at the bottom of the page.

For our configurator, we choose the solution of a 3D model registering on a picture rather than real situations. Even if the second category allows to obtain a good size, a correct position, and a proper measure, it has two major drawbacks. Firstly it is more difficult to personalise the environment of the gate (house, trees ...) with a 3D model which is generic by nature (the case where the user has a 3D model of his house is quite rare). Secondly, having a photorealistic 3D model of a house and its environment could result on problem with real time rendering, especially with online applications.

In the following section, we present methodology and results of the empirical study based on the assessment of the gates 3D configurator.

IV. EMPIRICAL EVALUATION OF GATES 3D CONFIGURATOR

A. *Objective*

The objective of the empirical study based on the configurator developed is to show that the 3-dimensional visualization of the object is an advantage for the implication of customers in the sale process.

We assume that the use of a Web3D application with a high fidelity model (similarly to the real object) allows a better visualization than the current 2D solutions for the customer (VD1) and encourages the purchase (VD2). The two operational assumptions are:

- The visualization of a product (VD 1) on the Internet is improved by using a Web3D application;
- The purchase of a product (VD 2) on internet is favoured by using a Web3D application.

Figure 9. 3D Configurator of gates of Groupe Maine in a predefined environment

Figure 10. 3D Configurator of gates of Groupe Maine: an environment imported by user

To assess these two operational hypotheses, we ask participants to use and evaluate a gate 3D configurator during a "normal" session as if they want to configure their "own" gate. The session aims to explore all the functionalities of the 3D configurator we developed (for Groupe Maine): moving the product, changing its colour, customizing the background image and uploading a personal photo.

B. *Methodology*

1) *Participants*

This study involved 27 participants aged between 15 and 50 years (average = 24.6 years; S.D. = 9.75 years). They were mainly men (56%). The profiles of participants have been defined according to their skills in computer science: all people use computers every day but were not systematically initiated to interactions with 3D objects. Participants are representative of target users. Table 2 summarizes participants' profiles.

2) *Equipment*

The equipment used was a computer, a monitor, a mouse, a keyboard and a web connection (8 Mbit/s). We provide the participants with a web browser compatible with the needed plug-in (i.e. Web Player). The equipment needed for the data collection was the identification questionnaire of participants, the instructions for users and the evaluation questionnaire of the configurator evaluation.

3) Data collection

Participants were completely autonomous. They had the time they wanted, but the recommended minimum time was 2 minutes. The experiment took place in a unique, isolated and quiet room at Ingénierium - Arts & Métiers ParisTech in Laval. Participants were able to connect to the website via a computer at their disposal. In addition, participants could take breaks and stop the activity as they wish.

At the beginning of the experiment, participants were provided with two documents: a questionnaire for identifying their profile, and a document which presents the experimentation and some general guidelines related to the task to achieve. The experimental time was not directly taken into account in data analysis. However, to get an estimation of necessary time, it was asked each participant for identifying the start time and the end time of achievement task.

TABLE II. PROFILES OF PARTICIPANTS (1 = NEVER; 2 = ONCE A QUARTER; 3 = ONCE A MONTH; 4 = ONCE A WEEK; 5 = ALMOST EVERYDAY)

Questions	1	2	3	4	5
Do you use a computer?					100%
Do you play with 3D games?	11%			44%	45%
Do you use CAD or computer graphics software?	34%	11%	22%	22%	11%
Do you use tools to create 3D interactive scenes?	44%	11%		33%	12%
Do you buy products online?	11%	34%	22%	33%	
				Yes	**No**
Have you already seen or manipulated 3D objects on internet?				22%	78%
Have you already seen your purchases in 3D on e-commerce web site?				78%	22%

We invited users to explore the various functionalities offered by the application: moving the product, changing its colour, customizing the background image and uploading a personal photography. To simulate a real situation of use, we said to each participant that the product was already custom-built and quoted. Thus, participants must access to the product and the command through an identification phase.

At the end of the experiment, each participant must complete a questionnaire for collecting his comments and subjective preferences on the application. These answers were the basis for our qualitative analysis concerning the contribution of Web3D for online purchase.

4) Collected data

Collected data were 27 completed participants' identification questionnaires and the 27 completed evaluation questionnaires. The data were composed of responses to closed questions, execution time and participants' commentaries.

5) Quantitative and qualitative analysis of data

The quantitative analysis of data was performed using standard descriptive statistics (e.g., mean, percentages). Qualitative data will be used only insofar as they illustrate, support and explain the statistical results.

C. Results

1) Participants habits

Table 2 summarizes the habits of participants. We observe that online shopping sites are widely used because more than half of the participants have a regular practice. These results are consistent with those of [17]. In the evaluation questionnaire, participants indicated that shopping on the web is quick, accessible, often less expensive and allows them to find products not available in traditional stores. However, the lack of security of certain web sites and the inability to touch or try the products explains that this way of buying is not predominant today.

Regarding to use of 3D applications, we observe that the majority of participants have already used them and that 3 out of 4 participants have already viewed a 3D object on Internet. The Web3D is already a reality; however few participants have reported its use in the field of e-commerce.

2) Ease of manipulation of 3D objects

We observed that, during the discovery of the application, participants found easily the different functionalities: identification and access, positioning, choice of colour, depth moving and customization of the environment. It was quite natural for them to manipulate 3D objects and interact with the environment around the product. The literature also shows that the third dimension, today more and more common, allow a better spatial representation and makes navigation operations easier. In addition, studies have shown that a 3D representation can improve significantly spatial memory [24]. That may be interesting, for example, in the case of virtual shops in 3D, compared to classical websites.

Fig. 11 shows the distribution of time required for positioning the 3D gate in front of the environment composed of a house photography previously downloaded by the user. To achieve it, without assistance from the experimenter, the participant had to perform the insertion of the image file of the house, adjust the gate and move it in depth. The distribution of the time is very large because of the disparity of participants' profiles (see Table 2) according to their experiences with 3D games, CAD, software to create 3D scenes, e-commerce websites based on 3D objects.

The participants needed an average of 3 minutes 34 seconds to correctly position the product in the environment of their choice. All participants found the Web3D application intuitive and easy to use (100% of the participants). The Web3D technology seems to be easy to apprehend for the user.

3) Advantages of Web3D on E-commerce

We wanted to know if the Web3D presents an advantage or not for e-commerce. Table 3 summarizes the participants' answers to questions about the association Web3D and e-commerce.

3D visualization provides a distinct advantage to the buyer according to participants, because 89% of them position themselves favourably. The answers to the questions presented in Table 3 also suggest that a simple static visualization is not enough: 89% of the participants judged that the possibility of interaction with the 3D object is important. Moreover, if the manipulation tasks can be enough for standard products (clothing, Hi-Fi product, etc...), more complex tasks are necessary when the users have to insert objects into their intended environment. It is this kind of interaction which gives a certain interest to the designed prototype. The online sale is less used than the traditional sale because the object cannot be physically manipulated. Having a quasi-real view of the object is an advantage for sale. Several participants suggested visualization similar to reality.

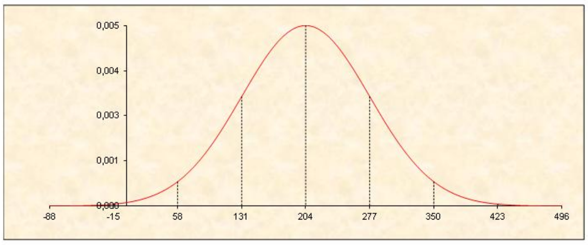

Figure 11. Distribution of time needed to explore completely the application (seconds)

TABLE III. QUESTIONNAIRES ON THE CONTRIBUTION OF WEB3D

Questions	Yes	No
Is the possibility of 3D interaction is important for the buyer?	89%	11%
Does a 3D visualization of the product (and not an image) is a plus for the buyer?	89%	11%
Does 3D visualization for sale online is necessary?	67%	33%
Does the Web3D improve the view of the product?	89%	11%

Nevertheless, the Web3D does not seem to be absolutely necessary for Internet users. Indeed, only 2 out of 3 participants think that 3D visualizations for online sales are required. Users think that 3D visualization is advantageous especially for the objects which are placed in a chosen environment (a kitchen, a gate or clothing). For basic products such as food or simple and common objects, an image is enough and 3D would do nothing more.

V. DISCUSSION, CONCLUSIONS AND PERSPECTIVES

We set out, through this empirical study, some of the advantages of the Web3D for e-commerce. We confirm the hypothesis that the use of a Web3D application with accurate 3D models allows better visualization than present Web3D solutions and encourages the purchase. These results are in line with observations of [4]: in the case of e-commerce, the third dimension "*allows people to visually assess product performance and aesthetics prior to purchase*". This first "augmented" contact with the product tends to reduce the perceived risk before buying [25]. We hear more and more configurator is the kind of useful application for the online sale of such products. Nowadays, it remains important to configure / customize the products using online sale web sites. The configuration of its own product is also seen as a major component of success in terms of financial performance and productivity [4]. These configurators are in full expansion as can be seen in Section 2. We can strongly envisage that the sale of products we have to visualize in our personal environment will soon be exclusively proposed in 3 dimensions. In [7], authors have mentioned virtual environments dedicated to learning make users more curious, more interested and more joyful. Our study suggests that these benefits can be transferred to the field of e-commerce, with an ability to attract new customers [20]. Howerver, it would have been relevant to conduct a comparative study with other existing web sites to better position the contribution of our 3D web configurator.

Thus, the use of Web3D on E-Commerce will assign the consumer a strong capacity to get involved in the design process. This feature is compatible with Living Labs. In this paper, we showed indeed that the Web3D for e-commerce is a perspective that remains to be explored to better integrate the users in a participatory way, that is to say to involve them in the decisions making process about the transformation of the artefact [26] and the definition of its usefulness [27]. Research works like those of [13] are a first step in this direction by illustrating how to go to a simple configurator to a user-centered design tool.

Another perspective of the study concerns the addition of avatars to guide the user through the configuration of the portal. Indeed, a drawback of e-commerce sites is the absence of the feeling of presence, especially in the case of products which are generally sold exclusively through sales consultants. Indeed, the avatars have the advantage of introducing a social dimension [7].

Finally, the area of augmented reality opens new and promising perspectives. Emerging technologies such as smartphones and digital tablets like "iPad" are increasingly used to surf on the internet and are featured with at least one camera. They are ready for augmented reality. Currently, we find lot of applications coupled with GPS, as for example helps in finding shops or restaurants in the street by adding contextual information to the real environment. Moreover these devices could extend the uses of such web configurator to an in situ gates' configuration. The current development problem is to develop robust and simple to use markerless solutions compatible on one hand with internet constraints (bandwidth) and with low computation capabilities of mobile platforms on the other hand.

ACKNOWLEDGMENTS

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