

Conversion of Information into Process for Collaborative Virtual Reality Environments (CVRE)

Tulio Sulbaran, Ph.D¹, Mohsen Foroughi-sabzevar²

Abstract - Information is the knowledge that is acquired through experience or study [Dictionary by Farlex 2011]. Information is closely related to the notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception, representation, and especially entropy [Wikipedia 2011a]. In all projects a large quantity of information is generated and in most cases it is not converted into processes. The processes are important because they typically describe actions and routine procedures or steps that support decisions to accomplish actions and/or events. [Wikipedia 2011b].

This report focuses on a case study to convert information into processes for a Collaborative Virtual Reality Environment (CVRE) project done by a student participating in the research team. The student's responsibility was to convert information gathered from the research team members, into processes for the CVRE. In other words, the student documented the steps that other group members conducted in regard to creation of the CVRE.

The process developed by the student had to meet three parameters: 1-clear, 2-simple and 3-detailed. In addition to creation of the process this task was important for the student because the student had to communicate with all team members from different disciplines. This is not a common practice in most universities. Since, most students only communicate in projects with peers in their own disciplines This uncommon interaction with students from other disciplines allowed the student to improve the communication skills dramatically (as demonstrated during the weekly progress meetings) which will help him in future positions. Moreover, the student learned about application of different software in the several fields such as graphic, modeling, and programming. These software include Blender, Sketch-up, Google Chrome, SSH, FTP, Three JS among others.

The processes developed also have broad long term implications, as they will allow users of the CVRE that are not programmers to complete tasks to expand the CVRE capabilities. The users will be able to adjust the CVRE based on their own idea using the processes developed. This simplification will certainly allow users to accomplish tasks that could not be accomplished otherwise and increase their satisfaction regarding the CVRE.

Keywords: Information, Process, Virtual Reality, Users

INTRODUCTION

This report focuses on the conversion of information into processes for a Collaborative Virtual Reality Environment (CVRE) project done by a student participating in the research team. The student's responsibility was to convert information gathered from the research team members, into processes for the CVRE. In other words, the student documented the steps that other members of the multi-disciplinary team conducted in regard to creation of the CVRE.

Information and Process

Information is the knowledge that is acquired through experience or study [1]. Information is closely related to the notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception, representation, and especially entropy [2].

¹ Associate Professor – School of Construction at the University of Southern Mississippi, Box 5138, Hattiesburg, MS, 39406. E-mail: Tulio.Sulbaran@usm.edu.

² Graduate Assistant – School of Construction at the University of Southern Mississippi, Box 5138, Hattiesburg, MS, 39406. E-mail: Mohsen.Foroughisabzevar@usm.edu.

In other words, Information is anything, which exists in any form of records, documents, memos, e-mails, opinions, advices, press releases, circulars, orders, logbooks, contracts, reports, papers, samples, models, data material held in any electronic form and information relating to any private body which can be accessed by a public authority under any other law for the time being in force. In simple term, information is anything, which exists in any form with a public authority. Clearly file noting are opinions, legal or other opinions obtained by Public authorities, or various reports received by them are all covered [5].

Process is “A series of actions that have a particular result” [4]. In all projects a large quantity of information is generated and in most cases it is not converted into processes. The processes are important because they typically describe actions and routine procedures or steps that support decisions to accomplish actions and/or events [3]. The Figure 1 shows a Process Diagram. This diagram includes five steps which explains a process from establishing, developing a strategy, making and implementation of a recommendation to reviewing the goals.

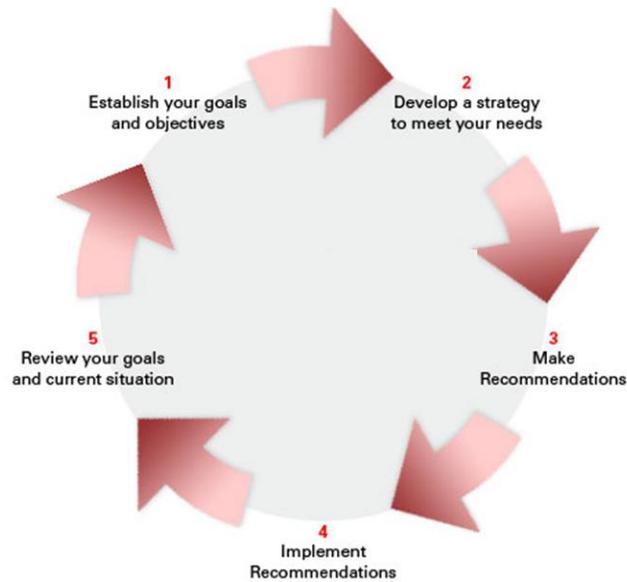


Figure 1. Process Diagram [8]

Virtual Reality vs. Collaborative Virtual Reality

Virtual reality (VR) is a technology that allows a user to interact with a computer-simulated environment which can be a real or imagined one [6]. Virtual reality (VR) is a term that applies to computer-simulated environments that can simulate physical presence in places in the real world, as well as in imaginary worlds. Figure 2 presents a Virtual Reality Visualization.

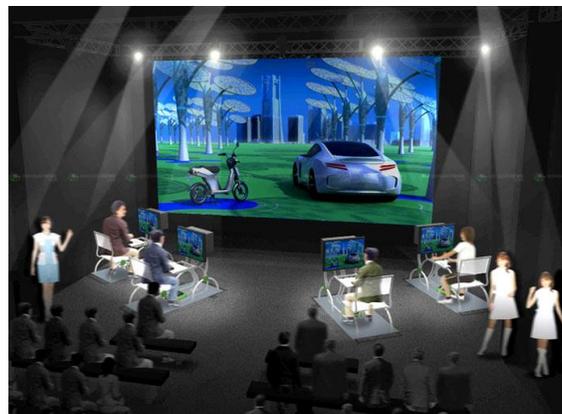


Figure 2. Virtual Environment Visualization

Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays, but some simulations include additional sensory information, such as sound through speakers or headphones. Some advanced, haptic systems now include tactile information, generally known as force feedback, in medical and gaming applications.

Furthermore, virtual reality covers remote communication environments which provide virtual presence of users with the concepts of telepresence and telexistence or a virtual artifact (VA) either through the use of standard input devices such as a keyboard and mouse, or through multimodal devices such as a wired glove, the Polhemus, and omnidirectional treadmills.

The simulated environment can be similar to the real world in order to create a lifelike experience. For example, in simulations for pilot or combat training it can differ significantly from reality, such as in VR games. In practice, it is currently very difficult to create a high-fidelity virtual reality experience, due largely to technical limitations on processing power, image resolution, and communication bandwidth; however, the technology's proponents hope that such limitations will be overcome as processor, imaging, and data communication technologies become more powerful and cost-effective over time.

Virtual reality is often used to describe a wide variety of applications commonly associated with immersive, highly visual, 3D environments. The development of CAD software, graphics hardware acceleration, and head mounted displays, database gloves, and miniaturization have helped popularize the notion.

In the book *The Metaphysics of Virtual Reality* by Michael R. Heim, seven different concepts of virtual reality are identified: simulation, interaction, artificiality, immersion, telepresence, full-body immersion, and network communication. People often identify VR with head mounted displays and data suits [7].

Collaborative Virtual Reality Environments (CVRE) extends the VR definition since CVREs are used for collaboration and interaction of possibly many participants that may be spread over large distances. The applications are usually based on the shared virtual environment. CVREs can be accessed through the Internet and allows a group of geographically separated users to interact in real time for a broad expanse of applications such as physics, archaeology, chemistry, astronomy, construction, engineering, etc. The CVREs offer meeting space, networking opportunities and simulations that students in any university can benefit without having to leave their geographical location [6]. Figure 3 shows sample architecture of a CVRE

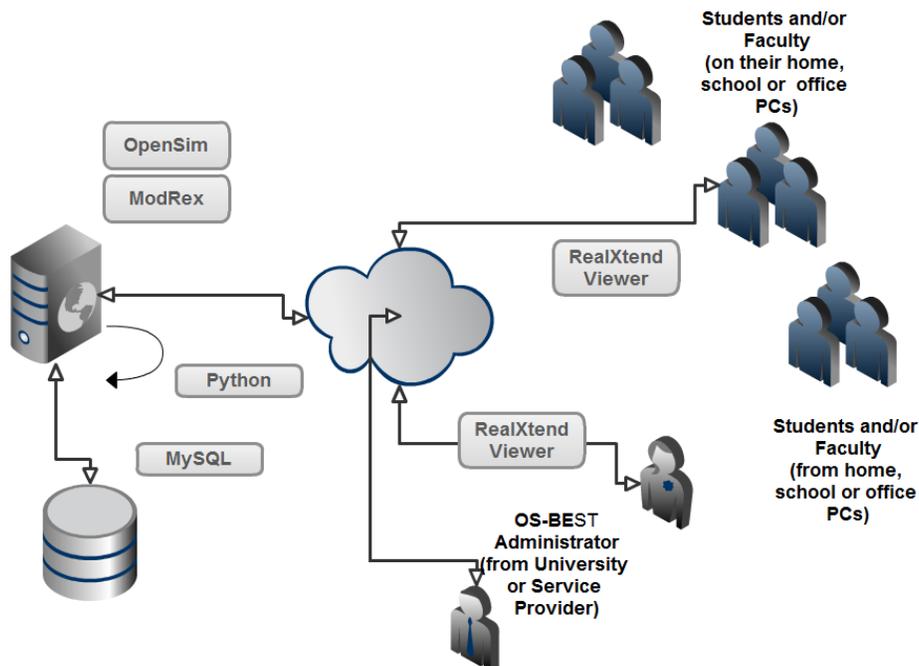


Figure 3. Sample Architecture of a CVRE [9]

PROJECT APPROACH

The research team conducted the work following a descriptive methodology organized in nine stages as shown in figure 4 and the reflect, learn and connect model is presented in the Figure 5.

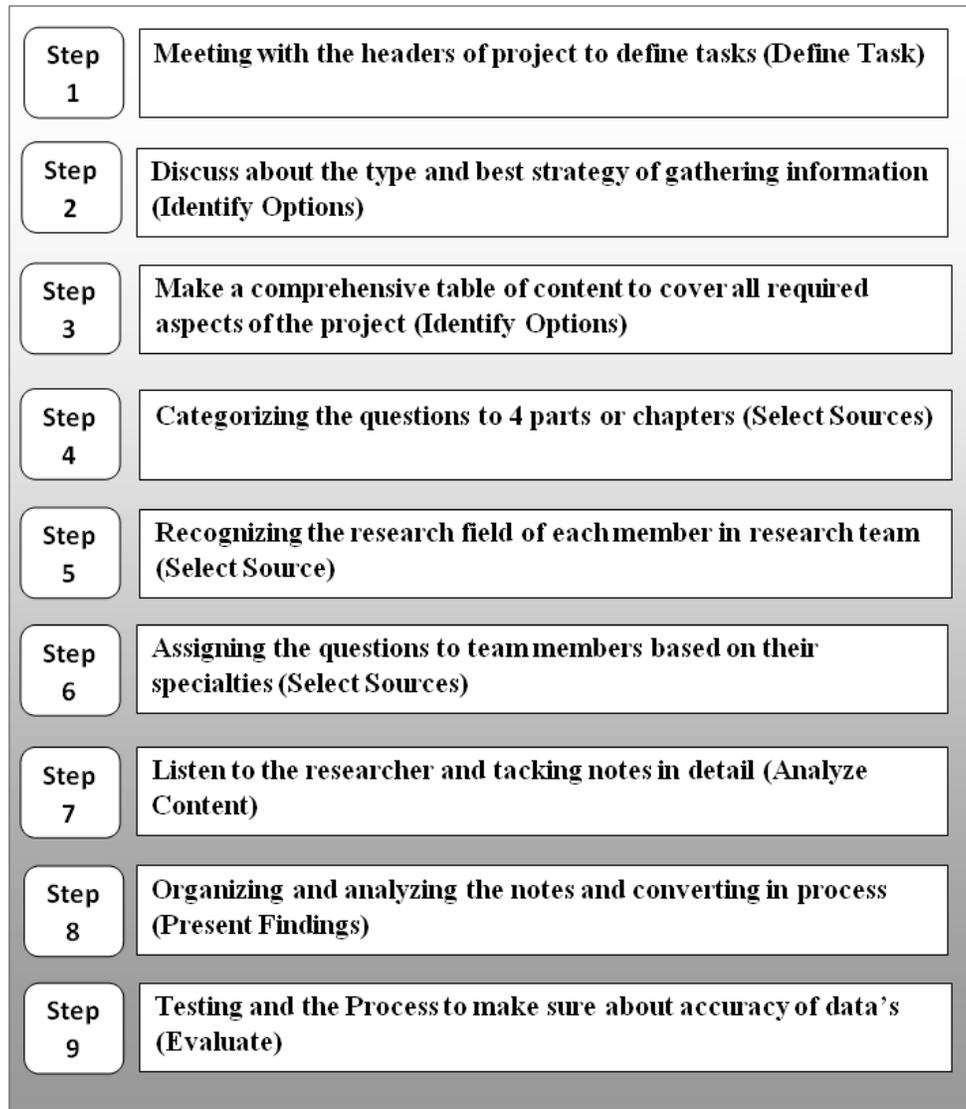


Figure 4. Research Methodology

As is indicated in the stage 4 of figure 4, the questions were categorized to 4 parts or chapters. The first part or chapter is User Guide (Level 1 Access to Server – Mainly FTP files to server Write). The second part or chapter 2 is Configuration Guide (Level 2 Access to Server – Turn on/off features). Third part or chapter 3 is Programmer Guide (Level 3 Access to Server – Add/Delete/Modify Program Code). Fourth part or chapter 4 is Deployment Guide Level 4 (Access to Client Server)

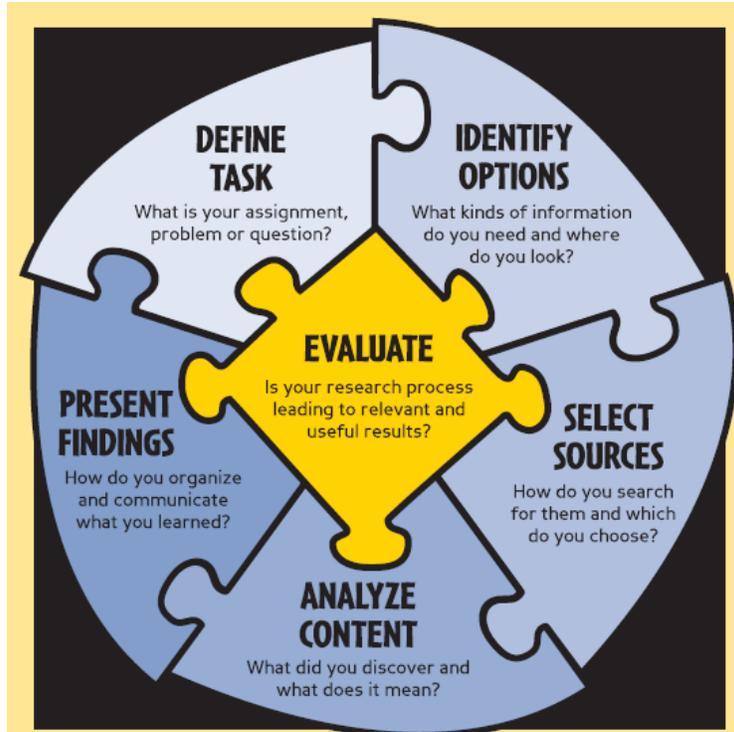


Figure 5. Reflect – Learn – Connect [10]

Figure 5 shows a general view about what has been illustrated in figure 4. As shown this framework involves 6 steps that cover all 9 steps in the previous flowchart.

RESULTS

The resulting product was a step by step procedure and reference manual that other group members can use to expedite the creation of the a Collaborative Virtual Reality Environment (CVRE).

Figure 6 illustrates a sample of information note that was collected by the student. This note indicates the information related to creating a new page for Avatar in Game environment.

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"SSH Secure Shell Client , "bigcat.cs.usm.edu" as Host Name, U.n: "YYYYY",
P.w:"XXXXX" .
Cd public_html/osbest004/jumpzones.
cp builder.js newZone.js
LS: whether the new page has been added or not"

```

Figure 6. The row information collected by student before processing

As you see the note just covers key points about creation of "New Page". Therefore, it needs to be explained simply, clearly and detailed to be understandable by reader. Definitely, the best way could be converting information into procedure. Figure 7 shows converted information into procedure.

1. Go to Start menu >All Programs> SSH Secure Shell Client.
2. Type: "bigcat.cs.usm.edu" in the "Host Name" box.
3. Type: "YYYYYY" in the "User Name" box.
4. Type: "XXXXX" in the "password" box.
5. Press "Log in"
6. Type: *cd public_html/osbest004/jumpzones*
7. Press "Enter".
8. Type: *cp builder.js newZone.js* (Note: **newZone** is an example. You can choose any name you like)
9. Press "Enter".
10. If you want to check whether the new page has been added or not, type **LS**.
11. Press "Enter"

Figure 7. Information after processing

LESSONS LEARNED

There were several lessons learned as listed below:

- The process developed by the student had to meet three parameters: 1-clear, 2-simple and 3-detailed. Thus, to implement these factors, he should improve his writing skills. This will help him not only in doing his current task but also other academic activities. This is novel because student should take responsibility about accuracy of his task since he knows that result of his work has a practical application and has a direct effect on the continuous of the project. Therefore he does not face with that such his regular assignments in class.
- In addition to creation of the process, this task was important for the student because the student had to communicate with all team members. This allowed the student to improve the communication skills dramatically which will help him in future positions. This is especially important for the students who have a dissociable characteristic or international students who have difficulty to adapt them self with the new environment. In this case the student was a foreigner and daily talking and meeting with local students could make him familiar with new atmosphere and new language. So common obstacles against the communication in a real work place such as lack of self confidence or new pronunciation was removed very fast.
- Moreover, the student learned about application of different software in the several fields such as graphic, modeling, and programming. The main software that were used included Blender, SketchUp, Google Chrome, SSH Secure Shell and Microsoft Office Word package.
- The processes that were developed also have broad long term implications, as they will allow users of the CVRE that are not programmers to complete tasks to expand the CVRE capabilities. The users will be able to adjust the CVRE based on their own idea using the processes developed. This simplification will certainly allow users to accomplish tasks that could not be accomplished otherwise and increase their satisfaction regarding the CVRE.

CONCLUSION

This report is based on the experience of the student about conversion of information into the processes for collaborative virtual reality environment. This report includes a literature review on the concepts of information, process, Virtual Reality (VR) and Collaborative virtual Reality environment (CVRE). Furthermore, it offers a flow chart to represent an approach for collecting information. Moreover, in this report, the student illustrates a sample information note and procedure to clarify what exactly has been done in regard to conversion of information to process. In addition, in this report, lessons that were learned were reflected.

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