

# The IT Support for Acquired Brain Injury Patients – the Design and Evaluation of a New Software Package

Micaela Serra and Jon Muzio

*Department of Computer Science  
University of Victoria, Victoria, B.C. Canada  
mserra @csr.uvic.ca jmuzio @csr.uvic.ca*

## Abstract

*The problems of producing a software system to assist in the rehabilitation of people who have suffered serious traumatic brain injuries are described. In addition to this primary use, therapists need the system to evaluate, monitor, and for measurement purposes. The challenges of ensuring a high level of usability by incorporating the best of graphic and HCI design into a well established software engineering methodology are discussed, as well as the details of the specific approach we designed. The software needs to be repeatedly used and enjoyed both by the patients and by the therapists. The challenges to writing software to be used by such disparate groups are significant, and there is currently very little software that has been written specifically for this user group. As we discovered, many of the standard software design paradigms are inappropriate for users suffering from brain traumatic injuries. The resulting suite of programs is now in use at a rehabilitation hospital in Victoria, and we report on their successful adoption.*

## 1. Introduction

The facilities at the Neurological Treatment Outpatient ward at the Gorge Road Hospital in Victoria (B.C., Canada) are used very intensively. The unit for Acquired Brain Injuries, which includes all types of brain injuries, acquired either as the result of disease processes (ranging from MS, strokes, aneurysms) or following traumatic brain injuries (e.g. motor vehicle accidents).

Original software was developed many years ago by the father of one of the patients, on an old Apple IIe with, obviously, no graphical interface. The software contained the basic functionality for a set of ten activities, to be used either as part of the rehabilitation process or for assessment, and while helpful, it did not meet the real needs of the patients. Further, it is completely unusable on newer

platforms of hardware and operating systems. According to Dr. Adele Hern, Director of Psychology at the Gorge Road Hospital, other North-American hospitals might be facing the same dilemma because the software was initially distributed widely, but never upgraded.

This computer-based approach was then, and it remains now, a fairly new concept for rehabilitation. In fact, at the clinical psychology level, no in-depth studies have been made of the scientific and statistical effectiveness of computer-based activities of this kind. Yet both the therapists and the doctors believe it to be very effective and have been observing its invaluable impact for many years. Therapists need such a system for a dual purpose: (a) for measurements, taken at sporadic intervals, to assess certain skills (e.g. ability to attempt a driving test); (b) for rehabilitation, evaluation, monitoring and improvement of certain skills, done over a daily basis. So any software system has to be effective for retraining certain cognitive functions, but also has to track the progress of the patients during the rehabilitation program. The software needs to be repeatedly used and give satisfaction to both the patients and the therapists.

This collaborative project aims at truly benefiting persons with brain injuries, with the three primary objectives:

1. To fulfill the needs of the therapists and the patients by writing an enhanced software package exploiting the newest multimedia interface platforms;
2. To yield a software product that can be used by other rehabilitation institutions as well as patients suffering from brain injuries working on their own.
3. To provide a genuinely satisfying experience for users.

In this context, *experience* is the emotional, intellectual, and/or physical reactions the user has while using the software. Producing a “satisfying experience” might seem a futile and esoteric goal for a software system but it is, in fact, critically important as the patients who use the system are engaged in a cognitive rehabilitation program not by