Visualizing Decision Making in Simulations: A Novel Tool for Objective Debriefing

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ABSTRACT

Simulations are typically followed by a debriefing session as a sort of conclusion or cap to an experience. Debriefs involve an assessor and a participant. The assessor need not be the facilitator of the exercise, but he or she should be able to communicate specific learning objectives and evaluate the participant based on these objectives.

Most simulations experts would agree that debriefing is an important educational component of simulation. However, much has been written about the challenges of debriefing:

• There is no systematic way to debrief a participant
• Quality of the debrief is frequently observer-dependent
• Analysis often relies on subjective interpretation
• Assessor recollection can be mistaken
• Assessors can be biased from their own past experiences
• Not all participants benefit from reflective learning
• Emotionally involved participants may not trust the assessor

These factors reduce the inter-rater reliability. Assessor subjectivity and variability can significantly degrade the overall educational impact of simulation-based learning.

This project will demonstrate a tool that reduces subjectivity in the debriefing process. It provides a novel, data-oriented visualization based on critical participant decisions so that assessor may more objectively analyze and communicate participant performance.

BACKGROUND ON WISER

The Peter M. Winter Institute for Simulation, Education & Research (WISER) is a world class multidisciplinary training and research facility. It features:

• 16 full size Laerdal® SimMan™ patient simulators
• Each simulator has a control room where a facilitator uses Laerdal® software to control and record simulations
• Following each simulation, the facilitator can upload SimMan™ logs to the WISER web application
• The WISER web application extracts out XML data and stores it into the WISER database
• Logs can be stored indefinitely and retrieved retrospectively

IMPLEMENTATION

72 Uncal Herniation Records

Visual C# Web Application

Web Browser View of Visualized Data

• Critical Decisions
• Pathways
• Pathway Prevalence
• Timestamps
• Average Durations
• Standard Deviations

RESULTS

• Each node represents an action
• Each arrow represents a decision from one action to the next
• The thickness of each arrow represents how many participants made a similar decision
• The height of the arrow represents the time in took to make the decision in standard deviations from the average
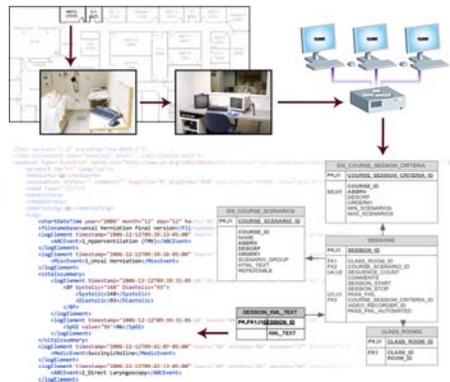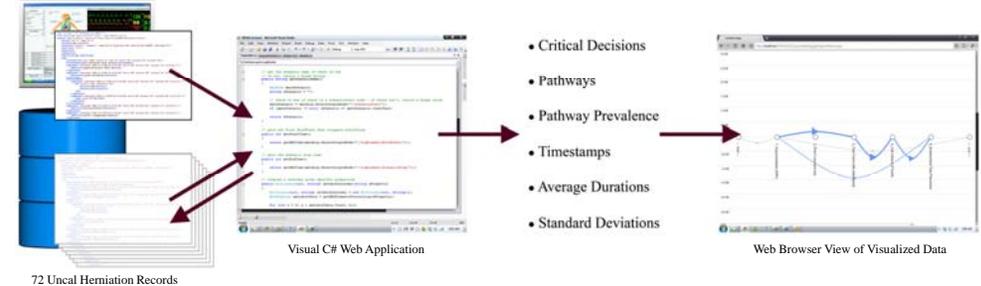

OBJECTIVES

Leveraging the resources at WISER, this project will design, implement, and demonstrate a software package that satisfies the following criteria:

❑ Retrieve objective, computable simulation data
❑ Mine educational information from recorded data
❑ Analyze performance in the context of peer performance
❑ Visualize significant decision-making in an intuitive way
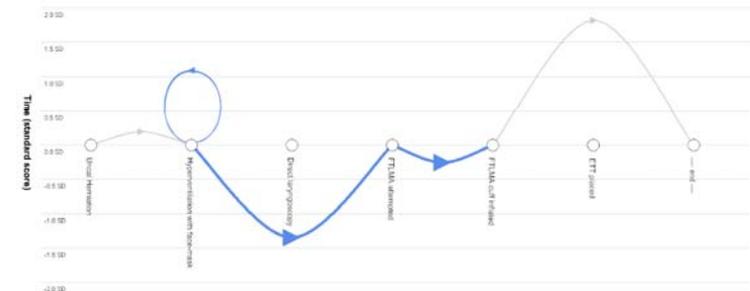❑ Scale the software to variable scenario types

METHODS

❑ Choose a simulation stored in the WISER database with discrete decision possibilities

❑ Examine Laerdal® SimMan™ XML schema for valuable, objective data fields

❑ Create a software interface to retrieve XML schema logs from the WISER database in real time

❑ Mine these XML schema logs for notable decisions and data

❑ Compare individual participant decision-making and temporal performance with simulation-wide performance

❑ Visualize performance in a novel and intuitive way

FUTURE DIRECTIONS

❑ Real-time implementation of tool during simulation debriefing

❑ Controlled, qualitative comparison of debrief with and without objective visualization tool

❑ Stratify performance comparisons to global, attendings, residents, medical students, and other participant populations

❑ Expand linear decision model to decision-tree visualization

❑ Determine most common decision-tree pathways

❑ Compare most common decision-tree pathways to evidenced-based, validated decision trees

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