Teaching Agile Project Management by Combining Group Interaction and Simulation

Eduardo Miranda
Institute for Software Research
Carnegie Mellon University
Pittsburgh, USA
mirandae @ andrew.cmu.edu

***Abstract*—This half-day workshop will demonstrate the use of a lottery-based simulation to teach students how to run an agile project by practicing the routine of daily meetings, coordination by mutual adjustment and tracking and reporting of progress. The objective of the simulation is twofold: to teach students the process' mechanics and provide them with insights about the implications on performance and cost of expediting, multitasking, and using overtime to speed things-up**.

Keywords-Agile project management; simulation; teaching; group activities; SCRUM

I. INTRODUCTION

Simulation has been shown to be an effective, technique in the training of aircraft pilots[1], manager [2], school administrators[3], service personnel and medical students[4] just to mention a few. In the area of software project management, simulation, as a mean to develop expertise that cannot be achieved by conventional lecturing has been proposed by Bollin et al[5] and also by Deininger and Schneider[6].

This half-day workshop will demonstrate the use of a lottery based simulation to teach students how to run an agile project by practicing the routine of daily meetings, coordination by mutual adjustment and tracking and reporting of progress. The objective of the simulation is twofold: to teach students the process' mechanics and provide them with insights about the implications on performance and cost of expediting, multitasking, and using overtime to speed things-up.

The simulation was successfully applied by the instructor in a course on agile software development at the Master of Software Engineering program at Carnegie Mellon University. The advantages of the approach proposed is that, unlike many computerized simulations in which a single student tries to steer a project to successful completion, the proposed simulation applies to a group of interacting students much as would be in a real development environment. As the lottery makes no assumptions about the simulated project nor the underlying behavior of the students, its outputs can be used to drive multiple groups of students, each with their own project in the context of a single class, creating an engaging atmosphere of fun competition among the many teams.

The results of the simulation are later used by the groups in team's retrospective meetings to close the circle of reflective practice.

II. WORKSHOP FORMAT AND ACTIVITIES

The simulation workshop consists of three parts: introduction, a mock class in which participants play the role of students and a closing discussion. The workshop will be framed in the context of a project using Scrum to make it concrete, but it can be applied to other development contexts with minor terminology adjustments.

During the introduction section of the workshop, the simulation, the course in which the simulation is used and the project used as running assignment, will be explained.

For the mock class part of the workshop, participants will be organized in teams of four or five. Each team will work in a section of the room using self-adhesive easel pads and sticky notes. The mock class will run for approximately 2 hours and consist of the following activities: Sprint Planning, Sprint Execution and Retrospective.

In the Sprint Planning section, the teams will decompose provided user stories into the tasks necessary to realize them, estimate their effort and lay them on a task board for their execution.

Through the Sprint Execution the teams will: 1) conduct daily Scrum meetings, deciding which tasks to execute, and who will execute them and whether they will use overtime or not; 2) report their progress on the task board in response to the commands from the simulation; 3) update the Sprint and Release burndown(up) charts and 4) capture events and measurements for use in the Retrospective session.

During the Retrospective session, the teams will calculate a number of performance metrics included the team velocity, will also discuss their performance and the use of the task board and charts, and seek ways in which they could have done better. After the individual team meetings, all teams will share their project experience with the others.

The workshop will conclude with a discussion session in which participants will be able to share their experience using the simulation and discuss its implementation as well as its adaptability to other contexts with the instructor.

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III. The Simulation

The simulation is based on the two lotteries. The Team Level lottery, used to simulate events that affect the team as a whole, for example an update of the server used to build the software, an offsite meeting all the team members have to attend, or the aggregation or deletion of a user story. The Members Level lottery affects individual team members' performance, for example: how much work was accomplished in a given day or whether the team member gets sick or temporarily reassigned to fight a fire.

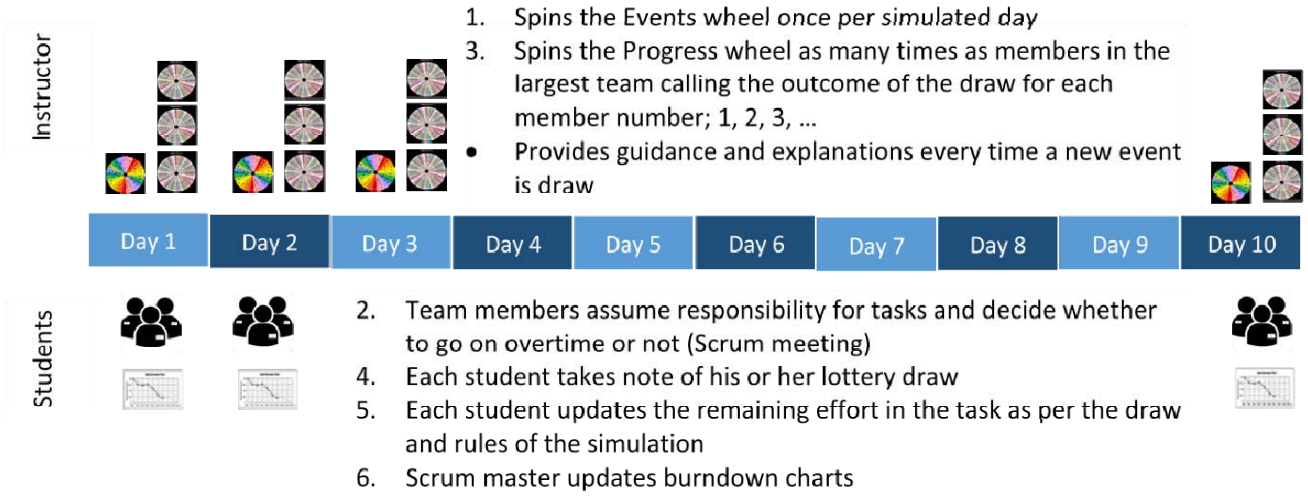

Figure 1 Simulation workflow

Each simulation cycle corresponds to one day in a project iteration or Sprint. For each simulation cycle, the team events lottery is spun once and the member events lottery as many times as team members. See Figure 2.

IV. Presenter

Dr. Miranda is an Associate Teaching Professor at Carnegie Mellon University. He teaches courses in the Master of Software Engineering Program, the Heinz College and at the Tepper Business School.

Before joining Carnegie Mellon Dr. Miranda worked for Ericsson where he was instrumental in implementing Project Management Offices (PMO) and improving project management and estimation practices. His work is reflected in the book "Running the Successful Hi-Tech Project Office" published by Artech House in March 2003.

Dr. Miranda holds a PhD. in Software Engineering from the École de Technologie Supérieure, Montreal and Master degrees in Project Management and Engineering from the University of Linköping, Sweden, and Ottawa, Canada respectively and a Bachelor of Science from the University of Buenos Aires, Argentina. He has published over fifteen publications in software development methodologies, estimation and project management.

Dr. Miranda is a certified Project Management Professional and a member of the PMI and the IEEE.

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