COMP 523 Client Application: Software Project Analytics
By Rodger C. Blair

This COMP 523 client application proposes to convert the existing, completed Software Project Analytics Prototype (SPAP) into an Apple iPad application called Software Project Analytics (SPA). SPAP is a powerful software prototype that provides understandable measures of project team productivity, software quality, project cost-effectiveness and software-process effectiveness to corporate-level executives and 70+ detailed development measures for software engineering management and practitioners. In essence, SPAP computes and outputs a health profile of (1) a software application under development and (2) the software project that builds this application.

SPAP is written in the Apple programming language Swift and runs in Apple’s Xcode Integrated Development Environment’s Playground facility (Xcode Version 11.4.1 or later). SPAP is based on years of applied software engineering research in the literature and under-the-hood data used in actual software practice in industry. Based on this research, there is no other software application on the market today like this one. The iPad application SPA will be unique.

As an example, SPAP accepts input parameters including (among others) Project Team Size, Software Product Size, Burdened Labor Rate, etc. From these and other inputs, SPAP provides its user with output measures that include Software Team Productivity, Software Product Quality and Project Cost Effectiveness to mention only a few.

There are three levels of users for the iPad app SPA: C-Level executives, software engineering managers and software practitioners.

For corporate-level executives (CEOs, CFOs, etc.), SPAP provides four easy to understand measures of overall software product and project health: project team productivity, software product quality, software project cost-effectiveness and software-development-process effectiveness. Each of these measures is based on a five-point scale with 5 indicating excellent software / business practice and 1 indicating very poor software / business practice.

For software engineering management, SPAP outputs the same four high-level measures as for corporate executives. Additionally, SPAP outputs, among others, the Total Software Project Cost, Project Duration and Estimated Project Success measures of the project that builds the software application.
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For software practitioners, SPAP outputs many software measures including Estimated Defect Density, Estimated Number of Pre-Release Defects and Estimated Number of Coding Defects to mention several.

The anticipated niche market for Software Project Analytics is industry and government software organizations that (1) build very large software systems and (2) use the Team Software Process\(^1\) and Personal Software Process\(^2\) developed by Watts S. Humphrey (deceased) at the Software Engineering Institute, Carnegie Mellon University, in Pittsburgh, Pennsylvania. This market includes industry, government and DoD contractor software organizations that build very large software-intensive applications. Examples of such large software systems include\(^3\):

1. Apollo 11 — 0.145M YaYuL SLOC
2. Space Shuttle — 0.400M HAL/S SLOC
3. Mars Curiosity — 2.500M C / C++ SLOC
4. Android OS — 12.000M Java SLOC
5. MS Windows — 45.000M C / C# SLOC
6. Mac OS — 86.000M Objective-C SLOC

The software measures that the Software Project Analytics iPad App can produce is appropriate for projects that build very large software systems such as these. The SPA iPad app can be used to analyze completed software projects, ongoing projects and/or what-if analysis of planned projects.

Finally, as a bonus for COMP 523 students working on this project, the Swift Code comprising the SPAP prototype is extremely well documented internally. The code comments document the source of the algorithms and data used in the prototype from the software engineering literature. Therefore, this COMP 523 project is a great opportunity for students to develop some expertise in non-agile methodology software metrics used in very large systems development. These metrics together with the

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experience of working on a real world software application will be very positive assets on a student’s resume!

Notes on the Proposed Project:

`SPAPrototype.swift` is the software prototype previously described and consists of 3,380 lines of Swift code that runs in the Playground Facility of the Apple Xcode IDE. All inputs for this software prototype consist of hard-wired variables in the Swift code. The initial value of these variables will constitute an Acceptance Test of proposed iPad application `Software Project Analytics` upon project completion.

`SPAPrototypeSupportPackage.swift` is a software support package that simulates the necessary user / project registration and input / output operation functionality needed for the proposed `Software Project Analytics` iPad application. This software support package consists of 2,515 lines of Swift code and runs as a macOS command mode application in the Apple Xcode IDE.

All software code associated with this project including the proposed iPad application is the intellectual property of SofTechMetrics, LLC (Rodger C. Blair) and may not be transferred to any other party and / or organization.