1. Introduction

The Software Engineering (SWE) industry has constantly been characterized by a search for the best approach to SWE. Early attempts at applying engineering-inspired, defined processes in plan-driven, Waterfall approaches had limited success. Modern adoption of iterative, Agile approaches has also been accompanied by numerous failed attempts.

This course presents an opportunity to investigate the concept and practices of Situational Software Engineering that require the SWE approach to be situationally appropriate to prevailing conditions.

This involves:
- Reviewing Myburgh's Complex-Adaptive Situational Model (CASM) that defines both the situational domains of SWE and the band of feasibility.
- Understanding how SEMAT Essence sets the scene for fundamental Crafted Quality and Situational SWE.
- Investigating how the introduction of SWE practices gives substance to the journey across the band of feasibility from Crafted (CrQ) to Controlled Quality (CoQ).
- Discovering synergies between CASM, Essence and Boehm’s Incremental Commitment Spiral Model (ICSM).

2. Learning Outcomes

The purpose of this course is to investigate the concept and practices of Situational Software Engineering that apply to the CASM band of feasibility from CrQ to CoQ.

3. Course Content

The formal part of the course consists of 6 seminars from 28 August 2017 to 9 October 2017 (inclusive) covering:
- Introduction
- A brief review of Myburgh’s Complex-Adaptive Situational Model (CASM).
- SEMAT Essence and practices that apply to fundamental Crafted Quality.
- Consideration of some other recognised approaches in the context of CASM.
  - Boehm’s Incremental Commitment Spiral Model (ICSM)
• Identification and assessment of practices that apply across the zone of feasibility.
• Conclusion

4. Organisational issues

The course coordinator is Mr. Barry Myburgh.

He can be contacted via email at: barrym@jcse.org.za.

5. Assessment

Group work

The group assignment involves preparing a mini research report on the findings of the investigation into synergies between CASM, SEMAT Essence and Boehm’s Incremental Commitment Spiral Model (ICSM) (Fully referenced in section 7.1 below). In particular, the group must report on the following:

A) The extent to which the practices required to satisfy SEMAT Essence checklist items are sufficient to progress from one ICSM commitment point to the next.
B) Additional practices that may or may not be required to progress from ICSM commitment point 1 to 6.
C) Where to position the ICSM approach in the band of feasibility: fully Crafted Quality (Agile) or closer to Controlled Quality?
D) The possibility that various instantiations of ICSM will be positioned at various points along the band of feasibility. For example, when risk-based decisions are made in the face of negligible risk, we may be closer to Crafted Quality and when facing acceptable risk, a more thorough ICSM might lie closer to Controlled Quality.

Assignment guideline and assumptions:

• The ICSM approach can be placed somewhere along the CASM band of feasibility.
• Performing the iterations of ICSM will to some extent lead to advancement of all seven SEMAT Essence Alphas.
• SWE practices are executed to:
  o Generate results that lead to fulfillment of Essence checklist items.
  o Progress the cyclical iterations of ICSM
• Practices are executed in response to an appropriate level of Management Governance and/or Production Governance.

(A practice can be expressed by: (1) Identifying the areas in which it advances the endeavor, (2) Describing the activities used to achieve this advancement and the work products produced (where relevant), (3) Describing the specific competencies needed to carry out these activities.)
**Individual Assignment**

The individual assignment involves preparing a critical review of the article “Scrum Powered by Essence” by Park, McMahon and Myburgh and in particular, responding to the following:

1. Motivate why you believe that SEMAT Essence either does or does not add value to the SCRUM approach?
2. To what extent might the suggested way of working constrain and limit the freedom of an Agile Developer?
3. Explain why it either is or is not helpful to add additional checklist items - e.g. as per the Requirements Alpha in the Coherent State?
4. Does "Scrum Powered by Essence" place the emphasis on Management or Production Governance (or both?)
5. Assuming that the approach described as "Scrum Powered by Essence” lies somewhere in the Band of Feasibility, where would you place it and why?

(Material related to Scrum is freely available at [http://www.scrumguides.org/](http://www.scrumguides.org/))

**Written reports:**

The assignments are to be presented in documents that shall comply with the following:

- Reports must conform to essential aspects of the School of Electrical and Information Engineering’s standards, as set out in "Reports & Presentations – A Communications Manual for the Engineer". This communications manual is available at a small fee from the reception of the School of Electrical and Information Engineering, 2nd floor, Chamber of Mines Building, West Campus.
- Reports must be word processed and printed. Hand written documents will not be accepted.
- Reports must be in hard-copy format. Submissions on electronic media will not be accepted.
- For group assignments, each group must submit a single report, i.e. one document per group.
- For group assignments, each report must have a cover page giving the project title, course name and code, student numbers and names of all group members and a statement confirming that all members of the group participated in execution of the assignment.
- Effective, yet concise communication is encouraged. The reports are expected to not exceed 25 printed, A4 pages. It is acceptable for reports to be shorter than 25 pages.

**Deadline:**

**Group assignment reports** are to be submitted by 15h30 on Monday, 16 October 2017.

**Individual assignment reports** are to be submitted by 15h30 on Monday, 23 October 2017.
Assignments must be posted into the red tender box at the School of Electrical and Information Engineering’s reception area, second floor, Chamber of Mines Building, west campus.

The following policy will be enforced with regards to late submission of the course reports:

- On submission of a report up to an hour after the deadline, the student (or group of students) will receive a penalty of 5 marks (out of 100) off the final report mark.
- After that, and if submitted before 08h30 of the following day, the student (or group of students) will receive a penalty of 15 marks (out of 100) off the final report mark.
- Documents received after 15h30, but no later than 72 hours after the deadline, will only be assessed on a pass/fail basis, checking that key outcomes have been achieved. The final report mark in such a case will either be 50% or 0%.
- In the case that a document is submitted more than 72 hours after the deadline, the final report mark will be 0%.

Assessment:
The mark for this course has two components: one for group work (50%) and one for the individual assignment (50%).

In order to pass the course, students must achieve an overall percentage of at least 50% while at the same time scoring at least 50% for both the individual and group assignments.
The reports will be marked according to the following marking grid:

<table>
<thead>
<tr>
<th></th>
<th>Unacceptable</th>
<th>Poor</th>
<th>Acceptable</th>
<th>Good</th>
<th>Excellent</th>
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</thead>
<tbody>
<tr>
<td><strong>Report Understanding and Background (15%)</strong></td>
<td>Extremely flawed problem analysis, analysis does not match implementation</td>
<td>Poor analysis</td>
<td>Adequate analysis, minimal consideration of broader problem domain</td>
<td>Good analysis, consideration of broader problem domain</td>
<td>Astute analysis and excellent understanding of the problem domain</td>
</tr>
<tr>
<td><strong>Critical Analysis and Evaluation (40%)</strong></td>
<td>No critical analysis</td>
<td>Poor attempt at critical analysis</td>
<td>Adequate attempt at critical analysis</td>
<td>Good critical analysis and evaluation</td>
<td>Extremely good critical analysis and evaluation</td>
</tr>
<tr>
<td><strong>Appropriate use of examples (35%)</strong></td>
<td>No examples</td>
<td>Poor attempt at providing examples or examples inappropriate</td>
<td>Adequate attempt at providing appropriate examples</td>
<td>Good, appropriate examples</td>
<td>Extremely good and appropriate examples</td>
</tr>
<tr>
<td><strong>Technical Communication (10%)</strong></td>
<td>Written report deviate significantly from the School's standards, reference lacking</td>
<td>Written report does not conform to the school's standards, use of language and style, report structure is poor</td>
<td>Written report generally conforms to the school's standards in use of language and style, report structure acceptable</td>
<td>Written report generally conforms to the school's standards in use of language and style is good, report well-structured</td>
<td>Written report fully conform to the school's standards in use of language and style is excellent, report very well-structured</td>
</tr>
</tbody>
</table>

7 Information to Support the Course

7.1 Recommended Text/Reading

4. Jacobson, I, Spence, I, and Ng, P. “Agile and SEMAT – Perfect Partners”
5. Jacobson, I, Ng, P, Spence, I, and McMahon, P. “Major-league SEMAT — Why Should an Executive Care?”
7. McMahon, P. "15 Fundamentals for Higher Performance in Software Development"
8. McMahon, P. “It’s All Upside Down – what I’ve learned about software development and why it seems opposite to everything I was taught”, published by Leanpub, 2016.


11. Park, J, McMahon, P and Myburgh, B. "Scrum Powered by Essence"

7.2 Notes and other material

If required, notes and other material will be handed out during the course.