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Assessment of Systems Engineering Technical Processes in the
Development of a Serious Game

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SUMMARY OF MASTER’S DISSERTATION

Student Identification Number	81334546	Name	Cuesta Aguiar Victor Alonso
Title: Assessment of Systems Engineering Technical Processes in the Development of a Serious Game			
<p>Abstract:</p> <p>Several frameworks for the development of serious games exist (DPE, MDA, P-III et al). Systems Engineering (SE) is not commonly used for the development of serious games. This thesis intends to evaluate how systems engineering technical processes compare to other development frameworks. To make a comparison, a serious game was developed as to identify the problems a developer could face when using SE technical processes (SE TP). For the development of the game, no specialized SE software was used. Problems found during the development included: No specialized product life cycle for serious games, traceability (a trademark of SE) is significantly time consuming without specialized software, unnecessary complexity and SE requires a person to with enough experience to successfully apply the framework.</p> <p>As part of assessing SE TP a game was developed, the ORIGAMI game, a completely original 4 player game, was developed to teach undergraduate engineering students taking engineering economy the following concepts: marginal cost curve, market demand curve and market surplus (market flooding) The origami game was developed from the ground and makes use of origami as its main material. Background research showed that origami is not a main material used in board games and that serious games are not usually used in teaching engineering economics. There is the opportunity to develop games using origami and promote its use in serious games. The ORIGAMI game is played by 4 players, each player is the owner of a company whose purpose is to have a high market share and highest profit in the origami market. To achieve this, the players can manufacture any of the following origami: red heart, green Mt. Fuji, blue flower and yellow cat. The game is properly verified and validated showing a total teaching efficiency of 75.76 (score includes the game section, posttest evaluation and discussion).</p> <p>Most serious games design frameworks do not use all Systems Engineering Technical Processes, some of the methods only used certain technical processes, those being stakeholder analysis and verification and validation with an iterative design approach. A comparison table with other frameworks is provided. A hypothetical PLC and a framework that only considers the most necessary technical processes in SE for the development of serious games is also provided. Based on the problems faced by the developer when creating a serious game that is not completely software (computer assisted board game), it is difficult to recommend the use of SE for serious game development. The main barriers to using SE are having sufficient knowledge, experience and the right tools (software) to use the framework.</p> <p>Future work related to the assessment of Systems Engineering includes the development of an all software serious game and documenting the problems and challenges found to later assess if Systems Engineering Technical Processes are suitable for 100% software based serious games. An additional research opportunity, includes using specialized Systems Engineering Software and then assessing how systems engineering performs when specialized tools are used for the development of a serious game.</p>			
<p>Keywords: Serious Games, Development Frameworks, Systems Engineering Technical Processes, Origami, Education</p>			