

Project Overview

Project Title (in English): A Visual Platform for the Design, Implementation, and Analysis of Collaborative Business Simulation Games

Project Title (in Chinese):

視覺化商業協同模擬遊戲的設計、實施及分析平臺

Executive Summary

(Please provide, within this page, an executive summary of the project.)

The development business game simulation has been shaped by new technology (Fritzsche and Burns, 2001; Adobor and Daneshfar, 2006). Studies have shown that business simulation is effective in business and management education (Lin & Tu 2012; Pasin & Giroux, 2011; Salas, Wildman & Piccolo, 2009; Waller, Lei & Pratten, 2014). The conditions under which simulation-based training works best have been identified and appropriate implementations are highly important (Salas, Wildman & Piccolo, 2009). Pasin and Giroux (2011) have shown that only simple decision-making skills can be acquired with traditional teaching methods and that simulation games are more effective in training students' decision making abilities for managing complex and dynamic situations.

The Hong Kong Council for Accreditation of Academic and Vocational Qualifications' (HKCAAVQ) has clearly defined the Generic Descriptors for QF Level 5. These descriptors refer to the necessary abilities and skills that undergraduates should have possessed, after completing a Bachelor programme. Specifically, undergraduate programmes should provide students with trainings necessary to strengthen their abilities to analyse and evaluate a wide range of information to make judgements based on different sources (Education Bureau, 2008). We agree that these skills are indispensable in the pursuit of a successful career, which would certainly help graduates to become integral to corporation success. Business undergraduates, in particular, are often required to make decisions in various dynamic and changing setting and situation, so as to help improve the corporation performance. However, it is challenging for fresh graduates to fully comprehend the real world business problems, since most of them have not yet obtained any work experience. Practice in a simulated environment therefore comes to the fore, by enabling students to make decisions and receive feedback without suffering a cost. Our proposed development of a visual platform in this project is expected to facilitate and to enhance teaching and learning by allowing students to gain decision-making experience through business games that are designed in a way academics exactly need.

Business simulation games may facilitate teaching and learning only if they have high flexibility. More importantly, the characteristics of simulations needs to be aligned with the desire/needs of academics (Lynch and Tunstall, 2008). Faria and Wellington (2004) suggested that academics are concerned with how business simulations may be used and introduced to students. Although the off-the-shelf business simulations are readily available to scholars and students, what is missing is the ability to design games and simulations around learning outcomes appropriate to specific teaching areas. In light of the diversity of teaching styles and taught courses in universities, it is important for academics to be able to tailor their own set of course requirements, teaching style, or content when using business simulation games. To support this contention, Thomas (2006) has discussed the importance of flexibility, in terms of whether the parameters of business simulations may be altered.

Our proposed project – the development of a visual platform for collaborative business simulation games – aims to enhance teaching quality and learning experience. This can be accomplished with its high flexibility and cost effectiveness. It will be the first business simulation visual platform, which allows scholars to design, implement and share their business games with each other. It will overcome the barrier that existing business simulations do not meet academics' needs. With the collaboration among the three institutions – Hang Seng Management College, Chu Hai College of Higher Education and Shue Yan University –, we have confidence that our visual platform can benefit seven thousand students and scholars.

Problems Identified

(Please provide your assessments to the problems / needs identified.)

Background:

Business process management (BPM) has been widely accepted in business practice for improving business performance. It has been incorporated as part of the curriculum at the university level education, allowing students to gain a variety of skills in business processes modelling, re-design, management, strategic implementation, and real-time monitoring.

Simulation games may bridge the gap between theoretical framework and real-life problems. Many universities have begun to adopt the approach of *blended learning*, which incorporates simulated decision-making environments into teaching (Beckem & Watkins, 2012). Simulation games have been applied in different disciplines such as Accounting, Finance, Management, Marketing, Human Resource, and Supply Chain Management in both in-school education and in-campus training. They have been widely used at all levels to train leaders, managers, and employees. Incorporating simulations in education creates an *immersive learning environment* that enables students to do more than just memorising theoretical concepts. This allows students to apply and analyse information and thus, more difficult knowledge may be learnt (Beckem & Watkins, 2012). For example, it was found that students showed high levels of engagements in game-based learning (Peng, Lee & Heeter, 2010). Integrating real data into simulation games may be more effective than using traditional case studies in teaching (Kenworthy & Wong, 2005).

The industry of simulation game is a fast growing one, with an immense potential in business education and e-learning. According to TechNavio (2014), the global market is forecasted to grow at an annual of 68.4% over the period 2013-2018. Impact Instruction Group (2013) found that 86% of respondents intended to invest in e-learning. This result attests to a fast growing interest in simulation games as an alternative learning method. Gartner Research (2011) predicted that more than 50% of the conglomerates would adopt business game simulations for training by the end of 2015. All of these suggest that the number of simulation games will continue to grow, and more people will adopt simulation games in teaching and learning. We believe that a simulation design platform helps enhance the teaching and learning in business disciplines. Employers expect business graduates to make effective decisions in dynamic situations. However, it is difficult for undergraduates to fully comprehend the real world business problems, since many of them do not have much work experience. Practising in a simulated environment may therefore come to the fore, because students can learn how to make effective decisions with little cost.

To address all these needs, we propose a visual platform for simulation games, with the following nine major features:

1. Giving scholars or trainers the flexibility to design and build their own simulation games.
2. Enabling the development of collaborative business processes, so as to facilitate interdependent decision-making among students from various business disciplines as well as the decisions reacting to external business events.
3. Incorporating real enterprise data into the simulation environment, allowing business simulation that closely replicates the real world dynamics.
4. Allowing academics to create assessment elements in the form of business simulated games.
5. Supporting a visual platform that takes academics' experience into account in designing their own course requirements.
6. Adopting Web-based technology to create simulation games that are compatible with popular

Web browsers and mobile devices and to enable a live communication among participants.

7. Offering a library of standard business process models (e.g. sale process, purchasing process, or warehousing process).
8. Enhancing the participation of academics from diverse disciplines in Hong Kong or abroad, through our platform that enables academics to design simulation games of their own choices.
9. Facilitating collaborations among academics with similar expertise in a user-friendly environment, by sharing their simulation games that they design with the teaching materials and learning outcomes.

Contents

As mentioned, academics can define and create their own simulation games using our visual platform, which will better serve the learning outcomes of different business courses. This involves specifying the scenario, the number of entities, business processes, and business events that characterise some real-life situations. Some basic business scenarios that are commonly found have been specified as the templates in the visual platform. Academics are able to integrate them into their own simulation games. These simulated business scenarios require students' good understanding of knowledge in Strategic Management, Operation Management, Human Resources Management or Marketing. They were designed to help students to make better decisions.

An interactive learning and teaching kit included in the visual platform consists of:

1. A basic scenario and its building blocks
2. A set of learning objectives and outcomes
3. Teaching notes that detail the logics of business simulation games
4. Suggested modifications of simulated environment for academic use – this will give academics autonomy to align the simulation game with their own courses.

Simulation Game Example: Job Contract Negotiation

To illustrate how to create a simulation game using the visual platform, we present a business negotiation simulation. This scenario involves an employer and a potential employee in a job contract negotiation. The structure of the negotiation is a multi-issue negotiation. That is, it focuses on a negotiation situation in which an employer and employee have to resolve six issues, including salary, annual leave, performance bonus, starting date, medical coverage and company car. This negotiation consists of the possibility of a win-win (or integrative) agreement, which can be commonly found in a real-life business negotiation. Specifically, employer and candidate have different preferences across to-be-negotiated issues. That is, the consideration of the annual leave is more important than that of the performance bonus to the employer, but the consideration of performance bonus is more important than that of the annual leave to employee.

Figure 1 shows the Graphical User Interface (GUI) of the visual platform as below:

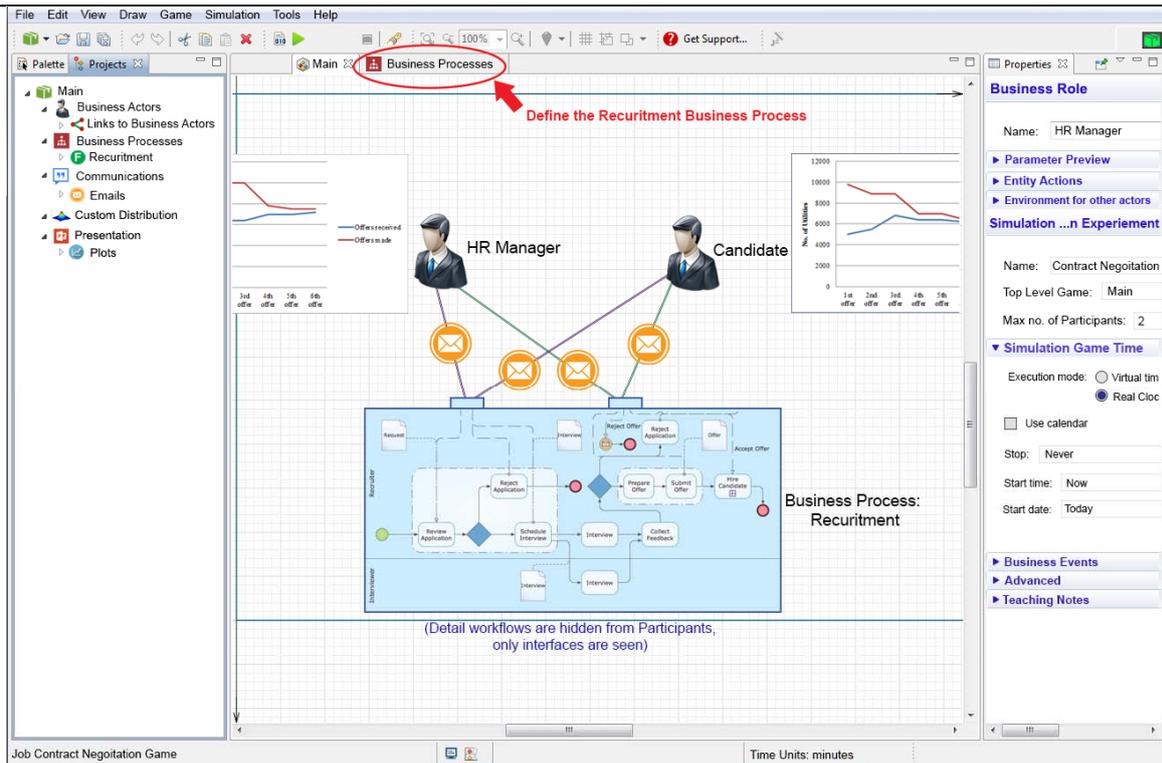


Figure 1: The Visual Platform - The Proposed Graphical User Interface for Game Designer

- The left column shows a folder-style list of *active elements* in the negotiation game, including all the building blocks, communication methods, and presentation methods for the results. The centre of figure illustrates the negotiation scenario. The right column specifies the parameters, behaviours and environment in the game.
- The active entities in this game are the business actors, who can be an individual (a HR manager or a candidate) or a group (e.g. an organization, a business unit or a firm). Their behaviours are defined by the *roles* (in the Properties tab) and the key business processes are highlighted in blue.
- For both the HR manager and candidate, the specific tasks that are part of the recruitment process are pre-designed. Participants may interact with each other via the *process interface*, which accommodates information-exchange (such as contracts, offers, and job applications) during the game.
- The visual platform allows academics to specify different modes of exchanges (or communication) in an simulated environment. It also allows customised business processes, as illustrated in Figure 1.
- During the simulation, participants will be prompted the number of utility points that their counterparts' offers generate. The utility function of each business actor is defined as parameters in the Business Role property tab (See Appendix A.1 for details of utility functions).

Once participants have reached an agreement with their assigned counterpart, their performance is shown graphically as illustrated in Figure 2 below:

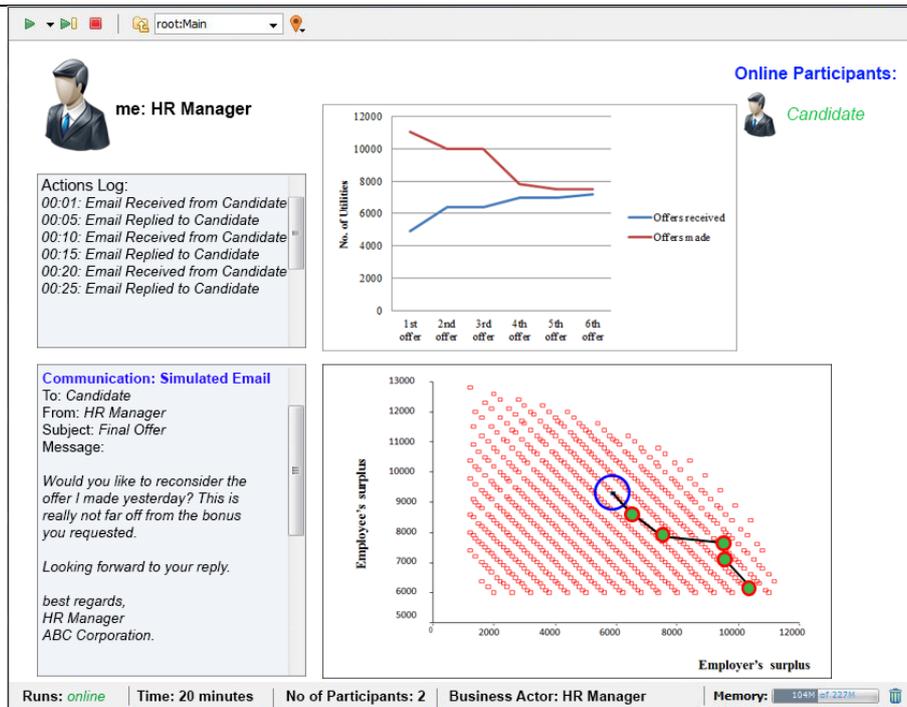


Figure 2: Simulation Games – Running online on a standard web browser (For illustration only)

The circled blue square shows a sample agreement reached by participants. Suggestions will be provided in the visual platform regarding how their negotiation performance can be improved and how more efficient agreements may be reached.

Designing Your Own Simulation Games for Your Learning Outcomes

In the development of the simulation game, it is important for students to consider the routes to solve a problem. Students can learn how to be proactive and think ahead how a problem may be solved in an efficient fashion. The context of the problem is defined by the academics. The platform will evaluate all the decisions made and action taken in the course of the simulation game. It generates a report summarising the results and the extent to which specific learning outcomes are achieved.

Implementation Phases and Future Works

This project consists of Phases I and II. Phase I will encompass the development of software and interfaces supporting the core simulation games. Phase II will be defined as additional improvements that build on the functions provided through Phase I. In particular, Phase II will include the functions that allow academics to modify visual platform's default settings, so as to enable the relevance of concepts taught in the intended learning outcomes. When our visual platform is available, we expect that this can be adopted in many business modules.

Three areas of future development have been identified, upon the completion of Phase II. Firstly, we plan to extend the visual platform to the areas of social sciences (e.g. public policy, sociology and psychology) and further broaden our beneficiaries to students in these disciplines. Secondly, our visual platform can be run entirely on the cloud as Software as a Service, which connect academics from different places together to create business simulation games. In addition, a library of simulation games can be shared and accessed easily on the cloud-based platform. Thirdly, when more participants use our visual platform, we expect that more data about students' behaviours can be collected and that students' weaknesses may be easily identified. Academics, with the consent of students, may use their performance to study the decision making process and predict the best strategy for a given scenario.

Roles and Contributions of Three Institutions

The representatives of three institutions will meet on a regularly basis. The representatives will participate in the Platform Development sub-committee or in the Teaching and Learning Quality (TLQ)

sub-committee. At least one representative from each institution will participate in the Project Management Committee (PMC). The PMC is responsible for identifying the key components of the platform, defining the key business processes, establishing the overall platform architecture, monitoring and updating the progress, and ensuring the quality of deliverables. Members of the PMC need to join either one of the sub-committees. The two sub-committees will have a co-meeting at least once every three months. The composition of project team can be found in appendix, figure A.2.

Chu Hai College

1. Responsible for 2D/3D graphics scene, and GUI for software applications in various devices (outsource as services)
2. Administer APIs implementation of peer-to-peer communications
3. Develop libraries of various business process applications
4. Manage the platform integration and front-end development
5. Test and improve the presentation of the platform
6. Collect the users' requirements

HSMC

1. Investigate, design and define various business processes for the visual platform
2. Design and establish the simulation engine
3. Establish server, database and ERP platform.
4. Administer the implementation of libraries (with various business processes)
5. Evaluate the quality of the platform
6. Organise pilot run and competition
7. Collect the users' requirements

Shue Yan University

1. Co-investigate and define various business processes
2. Co-ordinate meetings and write-up reports and user manuals
3. Promote the platform and offer training to colleagues and students
4. Collect the users' requirements

Project Objectives and Deliverables

Measurable Objectives	How it can be achieved
1. To assist students in applying business knowledge learnt from a classroom to simulated business scenarios	Releasing the visual platform and promoting simulation games in teaching and education and supporting the blended learning methodology.
2. To allow academics to fully control the business simulated environments that cannot be achieved by the existing business simulation games	Providing the functions that allow academics to delete/add entities, to design their corresponding attributes and parameters, to create custom business processes, to generate random events that change the dynamic of business environment and, to enable arbitrary forms of interaction among entities.
3. To integrate market and real data into the visual platform	Using ERP data of real companies (with their consent) and other market data (e.g. currency exchange rates, cost of commodities).
4. To strengthen students' creative and critical thinking skills	Closely monitoring students' progresses in simulations and their performance in simulations that require highly creative and critical skills.

5. To enhance students' learning experience and strengthen their knowledge	Establishing channels for interactions and providing advisors' comments on the pre-designed scenarios.
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Project Deliverables

(Please list out all the deliverables to be achieved and how they can be shared with, if possible, other institutions.)

Deliverables	Sharing mechanism
1. To provide easy and free access to our visual platform with the library of simulation games, entities and business processes.	The visual platform software will be made available and downloadable on the relevant EDB website. All come with a step-by-step guide.
2. To enable the functions so that users may build their preferred simulation games, business processes and entities; that is, they may change entities and parameters that control simulated environments	An instruction manuals will be made available online and uploaded to the relevant EDB website. To enable academics to build their own simulation games using our platform, they will be invited to a series of training workshops at HSMC and other institutions.
3. To take into account academics' teaching needs and how they may be accomplished using the visual platform	To collect feedback on the pilot version from academics. We will conduct a symposium discussing the direction from which the visual platform may be further improved.
4. To demonstrate how default simulation games facilitate teaching and how a desired simulation game may be created using the visual platform	To offer training workshops to academics of HSMC, other self-financing institutions and UGC Universities.
5. To enable the functions that academics may include assessment components "during" and/or "post-" simulation games	Users (academics) will be invited to share how they can integrate assessment components into their own courses.
6. To generate an array of relating business processes (e.g. recruitment, pricing, sales, etc.) in our visual platform's libraries	The project co-ordinator will disseminate the business processes available in our visual platform's library from which other users may access
7. To develop teaching kits and learning materials for defaulted simulation games	To make the teaching kits and learning materials available on the relevant EDB website; to provide academics with training in using our teaching kits
8. To continually increase the size of beneficiaries by allowing cross-platform (e.g. mobile device, tablet, etc.) access to the simulation games	To promote the effectiveness and advantages of using our visual platform, in teaching and learning activities
9. To develop a user-friendly channel for sharing of academics' own simulations and for collecting feedback on their use and further improvement.	To adopt a peer-review system on simulations designed by academics; to encourage academics to co-develop simulation game by allowing feedback from other academics. All of these will help achieve continuous improvements on teaching innovative, updated methods.

(Please indicate the information that can be uploaded onto relevant EDB websites during and after the project period.)

1. Instructions to download the visual platform software
2. Instruction manual
3. The evaluation reports on teaching and learning effectiveness by adopting the visual platform and simulation games.

Beneficiaries

Expected type and number of beneficiaries of	Number of users:
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the project	<p>Phases I & II: over 7000 business school students and academics from the three partner institutions</p> <p>Upon completion: All UGC-funded/Private Tertiary Institution Students and Academics</p>
<p><i>(Please provide justification to support the above estimation and explain how they can be benefited from the project.)</i></p>	
<p>The target beneficiaries are expected to be primarily academics, undergraduate and postgraduate students. As of 2014, there are 3,500 business students in HSMC, 1100 business students in Chu Hai College and 2,400 business students in Shue Yan University. The total number of students benefited from this platform will be over 7,000. In addition, the number of beneficiaries can be expanded to cover all UGC-funded universities in Hong Kong. For example, in the City University of Hong Kong, there are over 4,000 business undergraduate students. We estimate that the platform will benefit over 25,000 undergraduate students in Hong Kong. Taking into account that business students are required to take about 20 business courses on average during their four-year study, the benefits will be substantial even if only 50% of them are to make use of our platform. Sub-degree and master degree students will be the target beneficiaries in the future.</p> <p>Currently, there are about 150 full-time academics teaching business subjects in three partner institutions. About 400 academics in Hong Kong are expected to benefit from using the visual platform. After completing Phase II of this project, more academics and students from other disciplines can be benefited. Also, other templates can be created for secondary schools' teachers teaching business-related DSE subjects. The student population may thus be further expanded, and the number of beneficiaries will increase significantly.</p>	

<p>Implementation Schedule</p>		
<p><i>(Please list out the implementation schedule and key milestones to be achieved on a half-yearly basis.)</i></p>		
Estimated start date of the project (month/year)	1/12/2015	
Estimated end date of the project (month/year)	30/11/2018	
Project duration (months)	36	
Month	Key milestones	
	In terms of project activities and deliverables	In terms of monitoring and evaluation
1-6	<p>Activities</p> <ul style="list-style-type: none"> • Assess users' requirements and design the visual platform <p>Deliverables</p> <ul style="list-style-type: none"> • A draft framework of the visual platform • Business process model specifications 	<ul style="list-style-type: none"> • We will form a Project Management Committee (PMC) and define its Terms of Reference of PMC • Identify External Advisor and academics to join the PMC
7-12	<p>Activities</p> <ul style="list-style-type: none"> • Design and implement the main component – simulation engine <p>Deliverables</p> <ul style="list-style-type: none"> • Draft prototype of the visual platform and develop the relevant documentation 	<ul style="list-style-type: none"> • The PMC monitors the progress of the visual platform, and will review the project deliverables

13-18	<p>Activities</p> <ul style="list-style-type: none"> • Design and implement the graphical user interface of the visual platform • Develop business scenarios for the simulation games and write training materials • Prepare teaching kits <p>Deliverables</p> <ul style="list-style-type: none"> • Establishment of the visual platform with teaching kits and learning materials 	<ul style="list-style-type: none"> • The PMC will assess, report and give comments on the trial version of the visual platform and training materials
19-24	<p>Activities</p> <ul style="list-style-type: none"> • Integrate and test all core software components, accompanied with revised teaching kits and learning materials <p>Deliverables</p> <ul style="list-style-type: none"> • Develop the test version of the visual platform and a webpage for the visual platform information • Prepare the second progress report 	<ul style="list-style-type: none"> • The PMC will assess and approve the visual platform (test version)
25-30	<p>Activities</p> <ul style="list-style-type: none"> • Promote the visual platform (test version) to stakeholders in the three partner institutions • Review the feedback from the partner institutions and revise the functions of the visual platform <p>Deliverables</p> <ul style="list-style-type: none"> • Launch the visual platform (version one) 	<ul style="list-style-type: none"> • The PMC will assess and approve the visual platform (version one) and teaching kits • The PMC will advise on the launch of the visual platform to other institutions
31-36	<p>Activities</p> <ul style="list-style-type: none"> • Fully launch the visual platform • Offer training workshops and symposium • Collect feedback from students and academics <p>Deliverables</p> <ul style="list-style-type: none"> • Finalise the visual platform with teaching kits and materials • Prepare the final report of this project 	<ul style="list-style-type: none"> • The PMC members review the comments obtained from the workshops and symposium • The PMC evaluates the entire systems and teaching resources, and conclude the project • The PMC assesses the quality of final report

Publicity Plan

(Please describe all the publicity activities to be organised and materials to be produced to acknowledge the support of Quality Enhancement Support Scheme. Please suitably reflect the publicity activities as key milestones in the implementation schedule above.)

The project team will work closely with the Communication Public Affairs Office of HSMC and create posters about our workshop and symposium in the three institutions for other tertiary institutions.

Information about how the visual platform facilitates teaching and learning will be disseminated in the form of e-mails and will be made available on the webpages of three institutions. And introductory talks in institutions will be organised.

Promotion pamphlets will be sent to press and media, and interviews will be arranged.

Cash Flow and Budget

Project Expenditure				
	Amount in HK\$			
Period	Year 1	Year 2	Year 3	Total
Manpower	981,000	2,180,800	2,459,340	5,621,140
Equipment / Facilities	290,000	60,000	140,000	490,000
Services	0	200,000	50,000	250,000
General Expenses	8,000	12,000	14,000	34,000
Others (e.g. auditor's fee)	30,000	50,000	125,000	205,000
Total				6,600,140

Project Income (if any, e.g. fees received)				
	Amount in HK\$			
Period	Year 1	Year 2	Year 3	Total
Total				

(Please provide a detailed breakdown of the project budget by completing the following Excel file.)

Grant Sought under the Quality Enhancement Support Scheme	6,600,140
Funding from the Principal Applicant / Applicant(s)	0
Funding from Other Sources	0
Total Project Value	6,600,140

(Please specify the amount to be funded by each funding source (e.g. donations, contributions from applicant / its parent organisation) and whether the funding has been secured. If not, please provide the plan to obtain the funding.)

(Please provide the duty lists of manpower to be funded by this project.)

Post	Duties
Business Process and Database Architect	<ul style="list-style-type: none"> • To design and establish an executable business process specification • To implement the compositions of business process models • To define the business process workflows • To implement the standard business process modules for the visual platform • To implement the linkage between the process specification and the simulation engine • To develop simulation game databases • To establish and administer the database and ERP platform
Simulation Engineer	<ul style="list-style-type: none"> • To create high fidelity simulations and models for business game designs, performance assessment, and test support • To provide analysis and modelling of business entities and game components over a wide range of business scenarios • To develop and implement new tools and methodologies utilizing simulation techniques to assist in simulation game designs and analysis • To develop and implement the modelling solutions and the discrete event

	<p>simulation engine</p> <ul style="list-style-type: none"> • To implement the linkage between the simulation engine and the database • To develop interfaces to the visual platform • To integrate virtual simulation events to capture changes to tactics and operational procedures, for use in scenarios development • To provide development support throughout product lifecycle
Application Engineer 1	<ul style="list-style-type: none"> • To design business scenarios and establish libraries for various business process models • To develop business simulation games for the visual platform • To perform in-depth analyses and provide technical support for the visual platform software, including testing, operational integration, and user support • To provide support for the life-cycle maintenance of the visual platform software • To configure and deploy the software for different platforms • To provide test support for the development team • To implement complex network analysis tools for performance evaluation
Application Engineer 2	<i>Same as the above</i>
Front End and Website Developer	<ul style="list-style-type: none"> • To implement menus and develop user workflows • To define and implement game mechanics • To connect to the simulation engine • To develop data visualization tools • To display the performance assessment results • To integrate all components into the visual platform • To implement peer-to-peer communications • To integrate Web 2.0 applications for interactions and online communications • To create mobile cross-platform display library • To support connections to online market data • To develop website and videos for teaching the simulation platform
Coordinator & Trainer	<ul style="list-style-type: none"> • To co-ordinate meetings, draft reports and user manuals • To promote the platform, provide trainings to colleagues and students • To liaise closely with other institutions and seek supports for their uses of the visual platform • To co-ordinate with other institutions or stakeholders in the joint-development of simulation games • To in-charge the administration tasks for the simulation competition
Student Helpers	To test and provide suggestions to improve the user experience of the platform
<p>Project Sustainability <i>(Please estimate the amount of recurrent expenditure and describe how you will commit the resources to ensure sustainability of the project. Please put supplementary information (e.g. proof of financial support) at appendix.)</i></p>	

HSMC and the partner institutions emphasise on quality teaching and learning experience. The maintenance costs of the system will be shared among the three institutions, on a proportional basis. It will be based on the academics' usages. The estimated annual cost for maintenance is HK\$320,000. It includes the costs of half-a-headcount for IT and Administrative support, relevant licenses and hardware maintenance costs. Also, academics will be invited to conduct trainings and workshops at other institutions, and honorarium will be provided.

Academics and students from these three institutions can use this platform for free. Academics from other local institutions will pay an annual academic membership fee of \$800 (tentative). The income will be spent on maintenance and training costs. A bi-annual symposium on teaching with simulation will be conducted to exchange the latest ideas and feedbacks.