

## CHAPTER 10

### 10. CONCLUSIONS AND RECOMMENDATION

The objective of this research was to analyse some of the current problems experienced by the local software industry and exploring the feasibility of a software engineering centre that facilitate small and medium software enterprises and individuals to use the state of the art technology tools and platforms to design and develop high quality, reliable software products and conceptualise a service delivery model.

A questionnaire was prepared and a survey was conducted based on the literature review and the observations made by the researcher. The survey results were used as evidence to validate the identified problems in the local software industry and estimate the demand for a proposed software engineering centre. The survey results concluded that there is a demand for such services offered by the centre if its provided at reasonable price and should guarantee the piracy and confidentiality of the source code developed and tested at the centre.



A case study examines to understand the financial model of an average sized software development project. A conceptual model was derived from the case study analysis and the service delivery model of the proposed software engineering centre was explained. The conceptual model further extended to carry out a comparative analysis of the financial benefit and business benefit derived from using the services offered by the centre opposed to purchasing software tools and hardware platforms.

Based the above analysis a sustainable business model was proposed. The business model attempts to address the pricing, financial model and resource requirements.

Based on the research findings researcher concluded that the government should take immediate measures to reform policies and promote software industry in Sri Lanka. The policies should be formulated to protect the local software industry and give them an opportunity to learn and experience the local e-government projects under the

supervision of expert groups. Further opportunities for innovative software projects such as e-Societal applications and transaction-based applications should initiate to provide more opportunities for small and medium software firms to provide those solutions. The government should provide subsidies, incentives for investment and government guarantees to assist a software firm to obtain financial facilities.

## 10.1 SUMMARY OF RESEARCH FINDINGS AND RECOMMENDATIONS

Findings	Recommendations / Conclusion
Survey findings : Lack of support form the government	<p>Researchers Recommend the following as the government role to develop the local software industry:</p> <p>Set-up communication infrastructure (Island wide broadband network )</p> <p>Set-up soft infrastructure such as internet-based data centres, electronic trading hubs, and payment gateways</p> <p>Formulate special task force to promote software industry to international market</p> <p>Provide incentives for investment, financial support or government guarantees to obtain loans to expand the software business.</p> <p>Formulate policies to safeguard the local software industry and give priority for local software firms for e-government project</p>



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**Survey questionnaire and**

**Case study finding:** Most of the software firms do not use state of the art software tools and technology for design, development and testing of software solutions given to their clients

**Conclusion :** It is not financially viable for a small and medium software firm or individual to purchase state of the art technology tools and hardware platforms on project basis. Due to this reason the quality of the products are very poor comparing to the software applications developed by large firms who utilise these tools and technologies.

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**Conceptual Model:**

**Conclusion :** The conceptual model defines the service delivery model of the proposed software engineering centre. It further attempts to compare the cost benefit of using the services offered by the centre opposed to purchase of software tools and hardware platforms. The financial benefits and business benefits using the services offered by the centre were explained.



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**Business Model :****Recommendation for a Sustainable****Business Model:**

Researcher proposed a sustainable business model for the software engineering center. It was pointed out that the centre needs an initial capital investment drawn from government support or donor agency support. The recurrent cost has to be born by the revenue generated by the centre. Subsidy should be provided to finance the deficit on recurrent cost as a promotional activity of the government. A detailed risk assessment needs to be done to identify the financial risk and business risk of the centre.

The pricing structure of the services offered by the centre has to be carefully analysed and revised based on the industry demand.

Information security measures need to be taken at the centre to prevent unauthorised access to the resources of the centre and safeguard the privacy.



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TABLE 19: SUMMARY OF RESEARCH FINDINGS AND RECOMMENDATIONS.



## **NOTES, REFERENCES AND BIBLIOGRAPHY**

BARR, A. AND TESSLER, S., 2002. Developing Sri Lanka's Software Industry, Report submitted to the World Bank.

Centre for Development of Advanced Computing in Mumbai (online), available from: <http://www.ncst.ernet.in/> [Accessed 12 September 2004]

KARUNANANDA, A.S., 2004. Missing Dimensions in the Sri Lankan Software Industry, submitted for Proceedings of the 23rd National IT Conference, Colombo, Sri Lanka,

KOTTER, P., 2003, Marketing Management, Prentice- Hall of India

Lanka Software Foundation (online), available from : <http://www.lankaopensource.lk> [Accessed 12 August 2004]

Lanka Education And Research Network (online), available from : <http://www.cse.mrt.ac.lk/research/NRG/index.html> [12 August 2004]



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R&D Centre at IIT Bombay (online), available from: <http://www.cfdvs.iitb.ac.in/> [Accessed 5 September 2004]

RANASINGHE, S. AND FONSEKA, M., 1998, Research Method in Management ,Postgraduate Institute of Management, Sri Lanka.

Software Engineering Research Center (online), available from : <http://www.serc.net/web/index.asp> [ Accessed 12 September 2004]

Survey Monkey , Survey tool, (online), available from <http://www.surveymonkey.com/> [ Accessed 20 September 2004]

The Software Engineering Research Laboratory (online), available from: <http://www-serl.cs.colorado.edu/index.php> [Accessed 15 September 2004]

The Laboratory for Advanced Software Engineering Research (online), available from: <http://laser.cs.umass.edu/> [Accessed 10 August 2004]

The Advanced Digital Media Technology Centre (online), available from: <http://www.admtc.lk/inauguration.html> [Accessed 15 August 2004]



## ANNEXES

ANNEX A: Survey Questionnaire Results

ANNEX B: Case Study – Project Plan

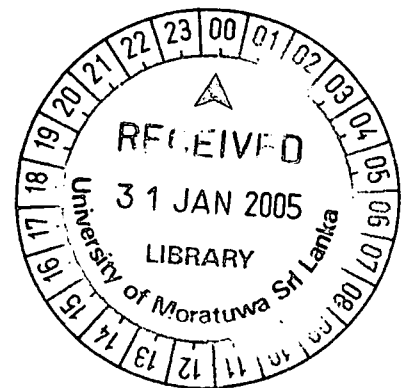
ANNEX C: Conceptual Model

ANNEX D: Conceptual Model - Software Centre Utilisation

ANNEX E: Business Plan – Software Engineering Centre Detailed Budget

ANNEX F: Business Plan - Infrastructure Requirement of the Software Centre

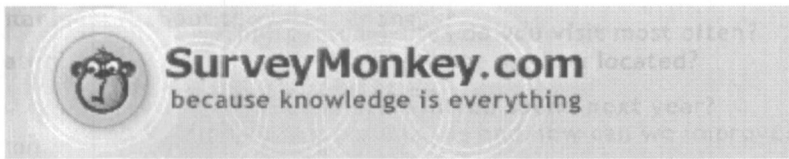
ANNEX G: Economic and Social Analysis - Adjusted Financial Projection



**ANNEX A:**  
**Survey Questionnaire Results**



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### 1. Introduction

1. What is your company name and the main line of business?

[View](#) **Total Respondents** 36  
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2. What describe your job profile?

	Response Percent	Response Total
(a) Software Engineer	25%	10
(b) Systems/Network Administrator	10%	4
(c) IT Manger/IT Project Manager	17.5%	7
(d) IT Consultant	15%	6
<a href="#">View</a> Other (please specify)	32.5%	13
<b>Total Respondents</b>		<b>40</b>
(skipped this question)		0

### 2. Survey Questionnaire

3. What do you think as problems in software industry in Sri Lanka

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Response Total
(a). Lack of investment support from the government (Tax exceptions , incentives)	27% (9)	61% (20)	9% (3)	3% (1)	0% (0)	33
(b). Difficult in obtaining financial support from banks and financial institutions	3% (1)	52% (16)	42% (13)	3% (1)	0% (0)	31
(c). Lack of Infrastructure facilities	36% (12)	42% (14)	18% (6)	3% (1)	0% (0)	33

(d). Lack of knowledge in the global software market demands	9% (3)	<b>44% (14)</b>	16% (5)	28% (9)	3% (1)	<b>32</b>
(e). Inadequate knowledge of state of the art software development tools and methodologies	12% (4)	24% (8)	18% (6)	<b>33% (11)</b>	12% (4)	<b>33</b>
(f). Failure to construct high quality software products to compete in the global market	6% (2)	21% (7)	18% (6)	<b>45% (15)</b>	9% (3)	<b>33</b>
(g). Lack of opportunities to gain experience in the country's e-government projects	12% (4)	<b>38% (13)</b>	35% (12)	12% (4)	3% (1)	<b>34</b>
						<b>Total Respondents</b>
						<b>35</b>
						<b>(skipped this question)</b>
						<b>5</b>

4. What should be the government role in Software Industry development

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Response Total</b>
(a). Provide required Infrastructure facilities	<b>45% (15)</b>	39% (13)	9% (3)	6% (2)	0% (0)	<b>33</b>
(b). Formulate policies for software industry	<b>45% (15)</b>	30% (10)	9% (3)	12% (4)	3% (1)	<b>33</b>
(c). IPR law enactment to the software industry	6% (2)	<b>39% (12)</b>	32% (10)	3% (1)	19% (6)	<b>31</b>
(d). Sponsor research and development activities	<b>47% (16)</b>	41% (14)	9% (3)	3% (1)	0% (0)	<b>34</b>
(e). Promote Sri Lanka Software Industry	<b>65% (22)</b>	29% (10)	3% (1)	3% (1)	0% (0)	<b>34</b>
						<b>Total Respondents</b>
						<b>34</b>
						<b>(skipped this question)</b>
						<b>6</b>

3. Usage of Software

5. If customer request you to develop a system using specific development platform or database how do you handle such project

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Response Total</b>
(a). Company do not accept those projects	4% (1)	4% (1)	28% (7)	<b>48% (12)</b>	16% (4)	<b>25</b>
(b). Company request client to purchase those software components	7% (2)	26% (7)	<b>41% (11)</b>	22% (6)	4% (1)	<b>27</b>
(c). Comapany purchase those software tools from the project budget	12% (3)	<b>42% (10)</b>	33% (8)	8% (2)	4% (1)	<b>24</b>
(d). Company uses the pirated or evaluation version of those software for the development purpose.	8% (2)	24% (6)	24% (6)	<b>28% (7)</b>	16% (4)	<b>25</b>
						<b>Total Respondents</b>
						<b>27</b>
						<b>(skipped this question)</b>
						<b>13</b>

6. How do you conduct load testing of your system before it's fully deployed

	<b>Strongly</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly</b>	<b>Response</b>
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	Agree				Disagree	Total
(a). Conduct testing using in house developed tools at the customer site test environment	30% (9)	<b>47% (14)</b>	10% (3)	13% (4)	0% (0)	<b>30</b>
(b). Conduct testing using purchased software tools	7% (2)	<b>45% (13)</b>	28% (8)	17% (5)	3% (1)	<b>29</b>
(c). Do not conduct load testing unless it's requested by the client	4% (1)	4% (1)	7% (2)	<b>54% (15)</b>	32% (9)	<b>28</b>
				<b>Total Respondents</b>		<b>31</b>
				<b>(skipped this question)</b>		<b>9</b>

7. If those software tools and development platform available in a software engineering centre

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Response Total
(a). Will it be used by your company at a reasonable price	14% (4)	<b>64% (18)</b>	14% (4)	7% (2)	0% (0)	<b>28</b>
(b). Will you make an arrangement with clients to utilise the services offered by the centre to conduct testing.	8% (2)	<b>69% (18)</b>	19% (5)	4% (1)	0% (0)	<b>26</b>
(c). Will you continuously use the centre to conduct testing before new version is release to your clients.	12% (3)	<b>54% (14)</b>	31% (8)	4% (1)	0% (0)	<b>26</b>
				<b>Total Respondents</b>		<b>28</b>
				<b>(skipped this question)</b>		<b>12</b>



8. What product and services recommended for a Software Engineering Centre (NR – Not Recommended , U –Undecided , R- Recommended, WU – Willing to Use (If this service is available at a rational rate.)

	Not Recommended	Undecided	Recommended	Willing to Use	Response Total
(a) Hire a Project Room for Entire Software Development Cycle	17% (5)	28% (8)	<b>31% (9)</b>	24% (7)	<b>29</b>
(b) Use of State of the art software tools for commercial projects	7% (2)	19% (5)	<b>56% (15)</b>	19% (5)	<b>27</b>
(c) Use of High end hardware and OS platforms to conduct load testing	10% (3)	23% (7)	<b>37% (11)</b>	30% (9)	<b>30</b>
(d) Use of expert advisory services on software development process improvement	0% (0)	28% (8)	<b>52% (15)</b>	21% (6)	<b>29</b>
(e) Consulting on certification services to obtain CMM or ISO certification at an affordable price	0% (0)	28% (8)	<b>48% (14)</b>	24% (7)	<b>29</b>
(f) Outsourcing of Research and Development work	30% (9)	17% (5)	<b>40% (12)</b>	13% (4)	<b>30</b>
(g) Use the centre to train your staff on latest technology	0% (0)	7% (2)	<b>68% (19)</b>	25% (7)	<b>28</b>
			<b>Total Respondents</b>		<b>30</b>
			<b>(skipped this question)</b>		<b>10</b>

4. Hardware platforms and Software tools

## 9. What hardware platforms and software tools that are recommended for the software centre.

	Willing to Use	Recommended	Undecided	Not Recommended	Response Total
Object oriented design tools	35% (11)	<b>58% (18)</b>	3% (1)	3% (1)	<b>31</b>
Artificial Intelligent tools	34% (10)	<b>41% (12)</b>	21% (6)	3% (1)	<b>29</b>
SW Testing Tools	35% (11)	<b>61% (19)</b>	3% (1)	0% (0)	<b>31</b>
Source Test Tools	31% (9)	<b>55% (16)</b>	14% (4)	0% (0)	<b>29</b>
Embedded Test Tools	32% (9)	<b>39% (11)</b>	29% (8)	0% (0)	<b>28</b>
Data Base Test Tools	23% (7)	<b>68% (21)</b>	6% (2)	3% (1)	<b>31</b>
Load testing tools	38% (11)	<b>52% (15)</b>	10% (3)	0% (0)	<b>29</b>
Integrated Testing tools	40% (12)	<b>50% (15)</b>	10% (3)	0% (0)	<b>30</b>
Performance monitoring tools	38% (11)	<b>55% (16)</b>	7% (2)	0% (0)	<b>29</b>
J2EE, JBOSS, Tomcat	30% (9)	<b>57% (17)</b>	10% (3)	3% (1)	<b>30</b>
.NET, ASP	34% (10)	<b>52% (15)</b>	10% (3)	3% (1)	<b>29</b>
Web Development Tools	34% (10)	<b>59% (17)</b>	3% (1)	3% (1)	<b>29</b>
Web Services Software	28% (8)	<b>59% (17)</b>	10% (3)	3% (1)	<b>29</b>
Graphic designing tools	32% (9)	<b>50% (14)</b>	11% (3)	7% (2)	<b>28</b>
Video image processing tools	31% (9)	<b>41% (12)</b>	24% (7)	3% (1)	<b>29</b>
Content Management Tools	25% (7)	<b>43% (12)</b>	25% (7)	7% (2)	<b>28</b>
Hit rate monitoring Tools	29% (8)	<b>39% (11)</b>	29% (8)	4% (1)	<b>28</b>
Online Survey Tools	<b>36% (10)</b>	<b>36% (10)</b>	21% (6)	7% (2)	<b>28</b>
Video Streaming	34% (10)	<b>38% (11)</b>	24% (7)	3% (1)	<b>29</b>
Data mining tools	29% (8)	<b>57% (16)</b>	11% (3)	4% (1)	<b>28</b>
Data warehousing tools	31% (9)	<b>55% (16)</b>	10% (3)	3% (1)	<b>29</b>
Oracle	35% (11)	<b>58% (18)</b>	6% (2)	0% (0)	<b>31</b>
DB2	32% (9)	<b>54% (15)</b>	11% (3)	4% (1)	<b>28</b>
Ms-SQL	39% (11)	<b>50% (14)</b>	4% (1)	7% (2)	<b>28</b>
Windows Enterprise Server (2000/03 or XP)	35% (9)	<b>46% (12)</b>	12% (3)	8% (2)	<b>26</b>
IBM AIX	<b>32% (9)</b>	<b>32% (9)</b>	<b>32% (9)</b>	4% (1)	<b>28</b>
Sun Solaris	34% (10)	<b>45% (13)</b>	21% (6)	0% (0)	<b>29</b>
				<b>Total Respondents</b>	<b>31</b>
				(skipped this question)	<b>9</b>

## 10. What is your opinion in setting up software centre in Sri Lanka? (Will their be a demand and what benefit it would bring to the industry)

**Total Respondents** **25**  
(skipped this question) **15**

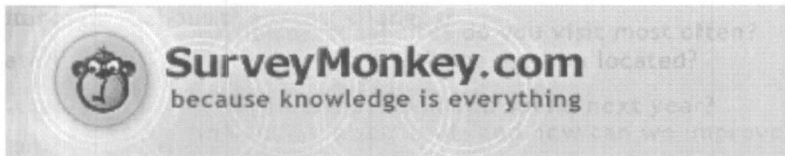


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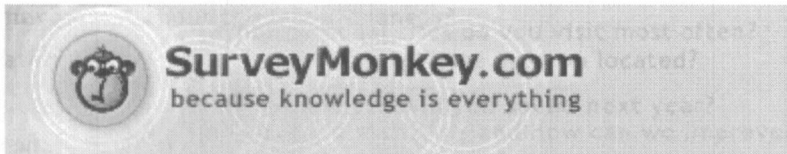
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What is your opinion in setting up software centre in Sri Lanka? (Will their be a demand and what benefit it would bring to the industry)

1. It has to be a part of the Software Development policy of the Government. In the Government Master plan, the contribution of Software development has to be decided and in order to cater to that the Software centre has to be planned. It should not be implemented just for the sake of having a software centre. Bearing the implementation cost should not be bourne by the government, where as they should get investment from the International players. The best option is to present a case to most of the Software development companies in the world to persuade them to identify the true potential of the Sri Lankan talent. Furthermore, this should not be a catalyst to implement Intellectual Property laws barring the use of pirate software in Sri Lanka. Such laws should not be implemented in Sri Lanka unless such practise is required by the clients. As far as the demand is concerned, the true demand will come only after it is implemented and when the output is properly utilised by the companies and universities.
2. The software center should be research based, rather than just developing commercial software for some company in USA. There are plenty of graduates from state universities who can contribute to such an initiative.
3. Yes, Good demand... Go ahead..!
4. .
5. You need to evaluate the current sitation of major software companies opearatiog here before setting up a software center in Sri Lanka. Most of major software companies uses in-house R&D tools and various testing tools before a software is released to the client. For a software center to be financially viable , you need to have good customer base who regularly use the resources to be offered by the center. Specially if you can catch software giants , definity you have the edge of making the software center feasible. So my recomendation is to identify the requirements of major software companies that currently they don't have and develop the plans of software cente accordingly.
6. Setting up in a working level wo n't be esay but after some time it willl get a wide acceptance. There should be proper methodology putting out for Non Disclosive Agreements
7. yes. I agree with the idea and it will surely benifited to the country as well as to the industry.
8. Obviously this would be beneficial for small sw companies who can't offered to buy expensive SW/HW. High quality training facilities offered would be beneficial to the whole SW industry.
9. That is a very good idea. It will be very use full for Sri Lanka software industry.
10. Excellent Idea, will be productive only if political keep hands clean.

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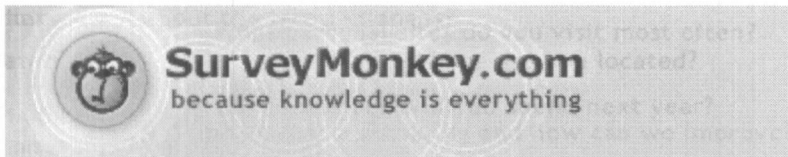
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What is your opinion in setting up software centre in Sri Lanka? (Will their be a demand and what benefit it would bring to the industry)

11. yeah, defintly there will be a good demand if we can expose our talents, countries like india srilnka can also be recognized if there is proper reference! [Moratuwa, Sri Lanka](#)
12. It would be great for people & industries in the IT environment, but only as long as it is free from political influences. In can be a place where all the IT professionals will get together & share their views on critical issues, from which the whole country would benifit. Quite importantly, it can represent the voice of the local software industry & aquire a greater attention from the government from which, the industry needs a lot of support.
13. It is good to set up a center as it would bring awareness among people and sectors. Government will invest for R&D. Foreign investments will increase and there will be a exposure
14. Since the Software industry in Sri-Lanka is in developing stage i would say YES there would be a demand & it will benefit in many ways, But when providing software tools to companies from the centre they should be provided for a resonable price. It will benefit in the quality of the software solutions when software development firms use certified hardware,software tools & platforms.
15. well there will be a demand cause most of the companies are planning to develop software for there company and there will be lot of foreign companies will come to develop there software due to the fact that Sri Lanka's cost of labor is less.because of this fact tere will be a demand.
16. I think setting up a software centre in Sri Lanka will be of great advantage to companies as well as to individuals. There needs to be a place where people will have access to all technologies available in order to be competitive the demand driven world. One of the main pitfalls in this economy is the lack of experiancd IT resources when compared to the rest of the asisan countires. This concept will help companies as well as individuals to contantly keep abreast with IT. However a key factor to the sucess of the centre will be the price. It is vital that this service be accessible and affordable to the general market and not specifically aimed at high end IT companies.
17. It is certainly a good idea, if implemented properly and maintained right throughout.
18. Its good to have a software centre. It'll help for the rapid development of the IT industry in Sri- Lanka
19. The software industry in SL has a lot of potential and room for growth. Setting up a S/W centre in SL will really be a milestone IT future of the country.
20. 1. Most companies are willing to use pirated copies, therefore, there may not be a high demand. 2. Software center has to gain the trust of the customers, otherwise there will be a doubt about safety of the intellectual properties. 3. Center will be usefull for resarch and development work, but in Sri Lanka, there is not much of a budget for thatkind of work.





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What is your opinion in setting up software centre in Sri Lanka? (Will their be a demand and what benefit it would bring to the industry)

21. It must be subsidised so that it can be afforded by many (small) firms. Pricing should be in par with obtaining similar facilities in and around colombo with different levels of service given at different prices (making it accessible for many small companies as well.
22. In My opinion, setting up a software testing center will involve a considerable financial outlay and take a while to provide return on investment. Before reaching ROI, further investment will be required to upgrade tools, services and infrastructure. Hence the project may be viable only if it is sponsored by institutions that have a genuine interest to develop the industry with long-term objectives in mind. Secondly, the Software Center must be recognised. For this, the Center must provide some tangible value such as a certification that will be recognised by the industry. This will create the demand for the services of the center, enabling it to charge a fee for such services. This provides a sustainable income for the Center.
23. The pricing model needs to be clear
24. It is a good idea. Developers does not like the idea of having there codes on a public place unless open source based development. This issue need to the clarified probably through some agreement. This will help small companies with less capital to come into the industry.
25. There will be a deman if and only if the infrastructure costs are reasonable. Specilly cost of energy and tele-communication are of major concern.

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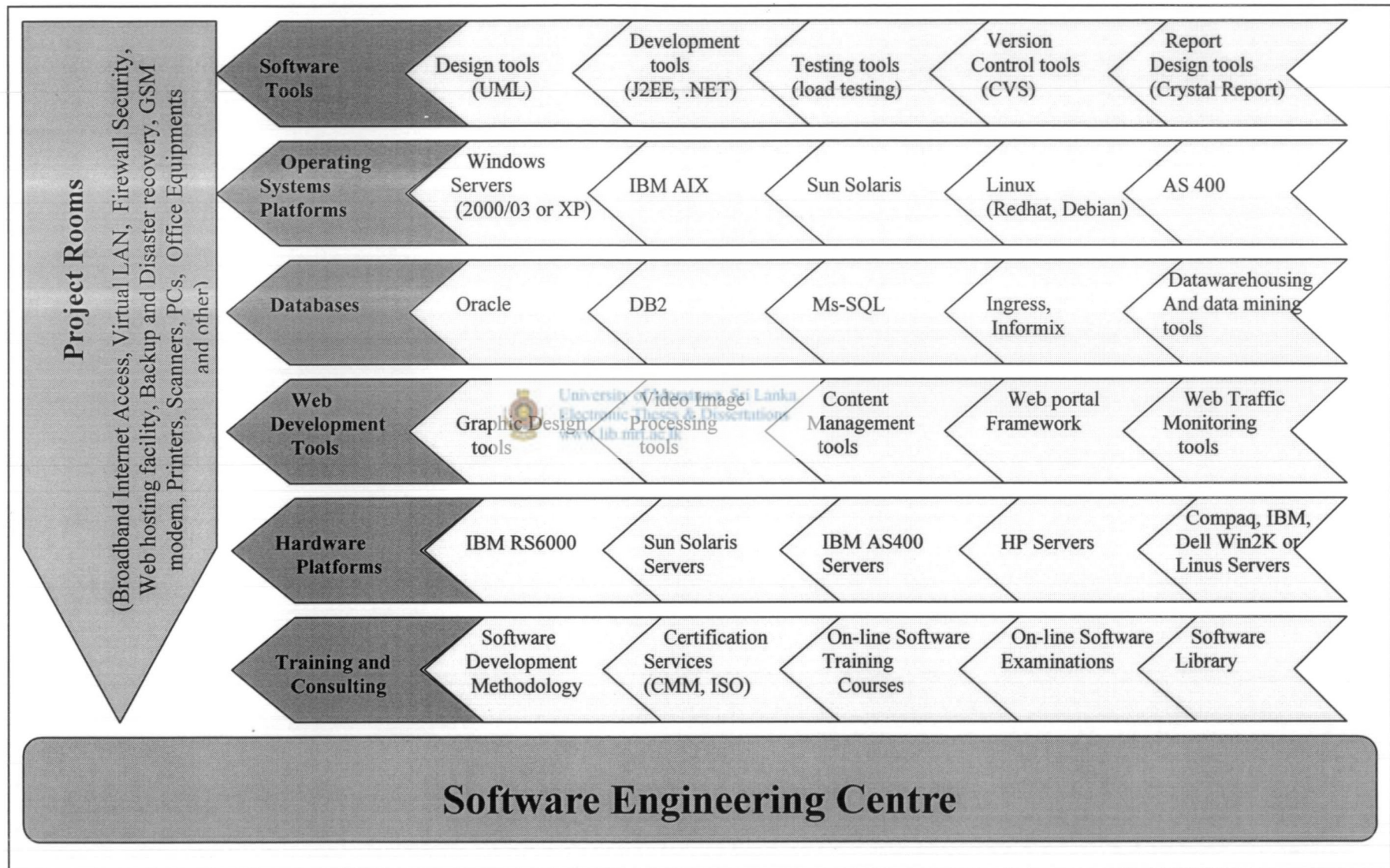
## ANNEX B: Case Study – Project Plan

ID	Task Name	Duration	Start	Finish	January			February			March			April			May			June			July			August		
					B	M	E	B	M	E	B	M	E	B	M	E	B	M	E	B	M	E	B	M	E	B	M	E
1	<b>Business Proposal Stage</b>	<b>11 days</b>	<b>Mon 03/01/05</b>	<b>Mon 17/01/05</b>																								
2	Feasibility Study	2 days	Mon 03/01/05	Tue 04/01/05																								
3	Technology Analysis	4 days	Wed 05/01/05	Mon 10/01/05																								
4	Prepare Business Proposal	4 days	Tue 11/01/05	Fri 14/01/05																								
5	<i>Business Proposal</i>	1 day	Mon 17/01/05	Mon 17/01/05																								
6	<b>Analysis</b>	<b>36 days</b>	<b>Tue 18/01/05</b>	<b>Tue 08/03/05</b>																								
7	Create Project Structure	2 days	Tue 18/01/05	Wed 19/01/05																								
8	Analyse the current System	18 days	Thu 20/01/05	Mon 14/02/05																								
9	Process & Technology Analysis	8 days	Fri 04/02/05	Tue 15/02/05																								
10	Functional Design	12 days	Wed 16/02/05	Thu 03/03/05																								
11	<i>Functional Spec Sign Off</i>	3 days	Fri 04/03/05	Tue 08/03/05																								
12	<b>Design</b>	<b>35 days</b>	<b>Fri 04/03/05</b>	<b>Thu 21/04/05</b>																								
13	<b>Prototype</b>	<b>31 days</b>	<b>Fri 04/03/05</b>	<b>Fri 15/04/05</b>																								
14	Interface Design	8 days	Fri 04/03/05	Tue 15/03/05																								
15	Report Design	6 days	Wed 16/03/05	Wed 23/03/05																								
16	Develop Prototype	20 days	Wed 16/03/05	Tue 12/04/05																								
17	<i>Sign Off Prototype</i>	3 days	Wed 13/04/05	Fri 15/04/05																								
18	<b>Technical Design</b>	<b>20 days</b>	<b>Fri 25/03/05</b>	<b>Thu 21/04/05</b>																								
19	Technical Design	20 days	Fri 25/03/05	Thu 21/04/05																								
20	<b>Development</b>	<b>57 days</b>	<b>Wed 13/04/05</b>	<b>Thu 30/06/05</b>																								
21	Set-up Dev Environment	5 days	Wed 13/04/05	Tue 19/04/05																								
22	Develop Business logic	50 days	Fri 22/04/05	Thu 30/06/05																								
23	<b>Testing</b>	<b>11 days</b>	<b>Fri 01/07/05</b>	<b>Fri 15/07/05</b>																								
24	Integrate Testing	8 days	Fri 01/07/05	Tue 12/07/05																								
25	Load and Performance Testing	10 days	Mon 04/07/05	Fri 15/07/05																								
26	<b>User Training and UAT</b>	<b>16 days</b>	<b>Mon 18/07/05</b>	<b>Mon 08/08/05</b>																								
27	Conduct User Training	3 days	Mon 18/07/05	Wed 20/07/05																								
28	User Acceptance Testing	10 days	Thu 21/07/05	Wed 03/08/05																								
29	UAT Sign Off	3 days	Thu 04/08/05	Mon 08/08/05																								





## ANNEX C: Conceptual Model



## ANNEX D: Conceptual Model - Software Centre Utilisation

	<i>Activity Description</i>	<i>Man days at the centre</i>	<i>Total Man Days</i>	<i>System Analyst</i>	<i>Software Archt.</i>	<i>System Eng.</i>	<i>Software Dev.</i>	<i>Project Mng.</i>	<i>Business Dev Mng</i>
<b>Business Proposal Stage</b>									
Feasibility Study	<i>Collect the bid document and conduct feasibility study.</i>		2						2
Technology Analysis	Visit the software-engineering centre and conduct a feasibility analysis of the proposed technology to obtain familiarity of the platforms.	4	6		2	2		2	
Prepare Business Proposal	<i>Prepare business proposal and deliver to the client.</i>		4						4
<i>Business Proposal</i>									1
<b>Analysis</b>									
Create Project Structure	Use the project management software tools and prepare project structure.	2	2					2	
Analyse the current System	<i>Analyse current systems and requirement gathering</i>		20	18				2	
Process & Technology Analysis	Draw process flow diagrams, use case diagrams and decide technology platforms and R&D requirements. (Use of Flow Chart, Rational Rose, Visio and other design tools)	7	8	5	2			1	
Functional Design	<i>Functional design of the system.</i>		12	10				2	
<i>Functional Spec Sign Off</i>			3					3	
<b>Design</b>									

<b>Prototype</b>							
Interface Design	Use the Integrated development tools to design and develop interface	7	8	7			1
Report Design	Use report design tools (Crystal report and others)	5	6	5			1
Develop Prototype	Develop the prototype to demonstrate features of the system (Java, Visual studio or Web development tools)	39	39	4	1	32	2
<i>Sign Off Prototype</i>	Demonstrate the prototype to the client and sigh off	3	3				3
<b>Technical Design</b>							
Technical Design	Develop program spec using design tools. (Rational rose and others, document management system)	21	21		20		1
<b>Development</b>							
Set-up Development Environment	set-up required development environment by configuring server environment and client environment with required operating system, database system and development tools ( <i>Linux, Win2K, Sun Solaris, HP Unix, Oracle, Ms-SQL, DB2, Jboss, Tomcat, Websphere, Jbuilder, Visual Studio, Crystal Report and others</i> )	11	11			5	5
Develop business logic and data layer	Use the development environment and develop the modules.	210	210			200	10
<b>Testing</b>							
Integrate Testing	Use integrate tools and conduct testing	11	11			5	5



Load and Performance Testing	Conduct load and performance testing using specific software tools; generate reports on the performance criteria of the application for specific hardware and network configurations.	11	11	5	5	1			
<b>User Training and UAT</b>									
Conduct User Training	Use the training centre with all the training facilities and give system training to users ( <i>overhead projectors, desktop PCs, white board, training materials</i> )	3	3			3			
User Acceptance Testing	Conduct UAT with the target user group and allow them to test the load and performance of the system.	10	10			10			
<i>UAT Sign Off</i>		3	3			3			
<b>Maintenance</b>									
Application Modifications	Modification of the application based on user requirements.	30	33		30	3			
Version Upgrade	Keep a storage space to deploy the application and databases and relevant documentation. All version upgrades can be simulated at the centre before it's deployed to the client.	2	2	2					
Load and Performance Testing	Conduct load and performance testing before any release of version upgrades.	3	3	2		1			
User Acceptance Testing	Users will conduct UAT at the centre for any new release or version upgrades.	4	4			4			
<i>Version Upgrade Sign Off</i>		2	2			2			
<i>Man days</i>		388	438	37	37	21	277	59	7
<i>Cost</i>		372		297,850	297,850	120,750	1,592,750	542,800	64,400
<b>Total project cost</b>				<b>2,916,400</b>					

**ANNEX E:**  
**Business Plan – Software Engineering Centre Detailed Budget**

<b>Software Centre Capital Cost</b>			
<b>Hardware</b>			
<b>Server Farm</b>	<b>Unit Price</b>	<b>Quantity</b>	<b>Total</b>
IBM RS6000 Server	1,000,000	1	1000000
Sun Solaris Server	1,000,000	1	1000000
AS400 Server	1,000,000	1	1000000
Linux Server (IBM, Compaq, Dell)	1,000,000	1	1000000
Microsoft Windows Enterprise Server (IBM, Compaq, Dell)	1,000,000	1	1000000
<b>Client Farm</b>			
Client PCs (50 Nos.)	75,000	50	3750000
Laptops (5 Nos.)	150,000	5	750000
PDA (3 Nos.)	50,000	3	150000
Hand held devices (2 Nos.)	25,000	2	50000
Printers (IBM Line printer and e-Studio printer)	300,000	2	600000
Scanners (5 Nos.)	10,000	5	50000
Camcode (5 Nos.)	5,000	5	25000
<b>Backup Servers (Low configuration servers)</b>			
IBM RS6000 Server	500,000	1	500000
Sun Solaris Server	500,000	1	500000
AS400 Server	500,000	1	500000
Linux Server (IBM, Compaq, Dell)	500,000	1	500000
Microsoft Windows Enterprise Server (IBM, Compaq, Dell)	500,000	1	500000
<b>Software</b>			
<b>Application Software</b>			
<b>Database Systems</b>			
Oracle Enterprise Server	1,200,000	1	1200000
DB2 Enterprise Server	1,200,000	1	1200000
Ms-SQL	1,200,000	1	1200000
<b>Software Design tools</b>			
Rational rose,	1,000,000	1	1000000
Flow chart design tools, Visio	750,000	1	750000
<b>Software Development Tools</b>			
Software Development Tools			0
Java Development tools: Jbuilder	1,000,000	1	1000000
.NET development tools : Ms-Development Studio	1,200,000	1	1200000
<b>Web application server</b>			
Webspehre	1,200,000	1	1200000

<b>Other Open source platforms (No cost)</b>			
<b>Software Testing Tools</b>			
Performance testing tools	750,000	1	750000
Load testing tools	750,000	1	750000
Traffic generating tools	750,000	1	750000
<b>Network Infrastructure</b>			
Routers (Internet Router)	300,000	1	300000
Switches	50,000	5	250000
Firewall	300,000	1	300000
Leased line connection (2 MB leased line)	500,000	1	500000
Dial in Modem pool	200,000	1	200000
GSM Modem	40,000	1	40000
<b>Power Supply</b>			
Power backup system (Generator power)	1,000,000	1	1000000
UPS System	500,000	2	1000000
AC System	1,000,000	1	1000000
<b>Access control system</b>	500,000	1	500000
<b>Training Room</b>			
Multimedia projectors	300,000	2	600000
Desktop PCs	75,000	20	1500000
<b>Library with Books and Magazines</b>	1,000,000	1	1000000
<b>Furniture, cupboards and stationary</b>	2,000,000	1	2000000
<i>Total Capital Cost (Funding Required)</i>			<b>34,065,000</b>



<b>Recurrent Cost Per Annum</b>			
<b>Office Space</b>			
Space for Server farm, 5 project rooms, two training room, two conference room, Library room with other utility facilities such as including canteen (Rs.150,000x12 months)	150,000	12	1,800,000
<b>Broadband Internet Connectivity</b> (Internet connection, Web hosting facility) - (Rs.100,000x12 months)	100,000	12	1,200,000
<b>Administration:</b>			
Administration staff (CEO, Marketing Manager, Secretary, and Accountant, project co-ordinator, clerical staff –2 Nos.)			3,600,000
Technical staff (Server administrators, Network Administrator, help desk staff – 3 Nos.)			2,040,000
<b>Total Recurrent Cost</b>			<b>8,640,000</b>
<i>Total Revenue</i>			
<b>Income from project room</b> (5 Project rooms , 10 projects for 6 months period (Rs.500,000 per project))	500,000	10	5,000,000
<b>Training Income</b>	200,000	5	1,000,000
<b>Total Revenue</b>			<b>6,000,000</b>
<b>Deficit (Subsidies required per annum)</b>			<b>2,640,000</b>

<b>Staff Cost</b>			
<b>Administration Staff</b>	<b>Monthly Salary</b>	<b>No</b>	<b>Annual Salary</b>
CEO	100,000	1	1,200,000
Marketing Manager	80,000	1	960,000
Secretary	30,000	1	360,000
Accountant	30,000	1	360,000
Project Co-ordinator	30,000	1	360,000
Clerical staff	15,000	2	360,000
<b>Technical Staff</b>			
Server Administrator	40,000	1	480,000
Network Administrator	40,000	1	480,000
Help Desk staff	30,000	3	1,080,000
<b>Total Staff Cost</b>			<b>5,640,000</b>

## **ANNEX F:**

### **Business Plan - Infrastructure Requirement of the Software Centre**

#### **Hardware Requirements:**

- Server Farm
  - IBM RS6000 Server
  - Sun Solaris Server
  - AS400 Server
  - Linux Server (IBM, Compaq, Dell)
  - Microsoft Windows Enterprise Server (IBM, Compaq, Dell)
- Client Farm
  - Client PCs (50 Nos.)
  - Laptops (5 Nos.)
  - PDA (3 Nos.)
  - Hand held devices (2 Nos.)
- Printers (IBM Line printer and e-Studio printer)
- Scanners (5 Nos.)
- Camcode (5 Nos.)
- Backup Servers (High End Server)

#### **Software Requirements:**

- Application Software
- Database Systems
  - Oracle , DB2, Ms-SQL
- Software Design tools
  - Rational rose, Flow chart design tools, Visio
- Software Development Tools
  - Java Development tools: Jbuilder
  - .NET development tools: Ms-Development Studio
  - Web application server software (Jboss, tomcat, websphere)
- Software Testing Tools
  - Performance testing tools
  - Load testing tools
  - Traffic monitoring tools

#### **Network Requirements:**

- Router (One Internet Router)
- Switches (5 Nos.)
- Firewall
- Leased line connection (2 MB leased line)
- Dial in Modem
- GSM Modem
- Broadband Internet Connectivity (Internet connection, Web hosting facility)

#### **Other Requirements**

- Access control system
- UPS (2 Large Units)
- Power backup system (Generator power)

**Expert Group:**

- Group of experts consists of academic and research institutes (universities) and independent consultants. (These experts service is offered on request basis)

**Administration:**

- Administration staff (CEO, Marketing Manager, Secretary, Accountant, Project Coordinators- 2 Nos., Clerical Staff -2 Nos.)
- Technical staff (Server Administrators – 3 Nos., Network Administrator, Help Desk staff – 2 Nos.)

**Other Infrastructure**

- Space for Server farm and project rooms (5 project rooms and one large access room)
- 24x7 365 days power supply and A/C
- Lecture rooms and meeting rooms
- Furniture, cupboards and stationary for staff an project rooms



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**ANNEX G:**  
**Economic and Social Analysis – Adjusted Financial Projection**

Software Centre Fixed Assets Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Hardware and Operating Systems</b>						
Server Farm	5,000,000				6,000,000	
Client Farm	5,375,000				6,450,000	
Backup Servers	2,500,000				3,000,000	
<b>Software</b>						
Database Systems	3,600,000		720,000	4,320,000	864,000	5,184,000
Software Design tools	1,750,000		350,000	2,100,000	420,000	2,520,000
Software Development Tools	2,200,000		440,000	2,640,000	528,000	3,168,000
Web application server	1,200,000		240,000	1,440,000	288,000	1,728,000
Software Testing Tools	2,250,000		450,000	2,700,000	540,000	3,240,000
<b>Network Infrastructure</b>	1,590,000				1,908,000	
<b>Power Supply</b>	3,000,000				3,600,000	
<b>Access control system</b>	500,000				600,000	
<b>Training Room</b>	2,100,000	420,000	420,000	420,000	420,000	420,000
<b>Library facilities</b>	1,000,000	200,000	200,000	200,000	200,000	200,000
<b>Furniture, cupboards and stationary</b>	2,000,000					2,000,000
<b>Total Capital Cost</b>	<b>34,065,000</b>	<b>620,000</b>	<b>2,820,000</b>	<b>13,820,000</b>	<b>24,818,000</b>	<b>18,460,000</b>
<b>Other Expenses</b>						
Office Space		1,800,000	2,160,000	2,592,000	3,110,400	3,732,480
Broadband Internet Connectivity		1,200,000	1,260,000	1,323,000	1,389,150	1,458,608
<b>Staff Cost</b>						
<i>Administration Staff</i>		3,600,000	4,320,000	5,184,000	6,220,800	7,464,960
<i>Technical Staff</i>		2,040,000	2,448,000	2,937,600	3,525,120	4,230,144
Telephone, Electricity and Other overhead cost		2,400,000	2,640,000	2,904,000	3,194,400	3,513,840
<b>Total Recurrent Cost</b>		<b>11,040,000</b>	<b>12,828,000</b>	<b>14,940,600</b>	<b>17,439,870</b>	<b>20,400,032</b>
<b>Total Cost</b>	<b>34,065,000</b>	<b>11,660,000</b>	<b>15,648,000</b>	<b>28,760,600</b>	<b>42,257,870</b>	<b>38,860,032</b>

Revenue	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Software Engineering Centre Services</b>						
Income from project room		5,000,000	7,500,000	10,000,000	12,500,000	15,000,000
Individual usage, Training and conference room facilities		1,000,000	1,200,000	1,440,000	1,728,000	2,073,600
Consulting services (Technical advices and Certification consulting)			1,000,000	1,100,000	1,210,000	1,331,000
Research and Development			1,000,000	1,200,000	1,440,000	1,728,000
Marketing and promotion			2,600,000	3,120,000	3,744,000	4,492,800
Service Revenue		6,000,000	13,300,000	16,860,000	20,622,000	24,625,400
<b>Economic Adjustments</b>						
Increase in Software Exports			10,000,000	30,000,000	60,000,000	90,000,000
Foreign Direct Investment			20,000,000	20,000,000	20,000,000	20,000,000
Foreign Outflow Savings			10,000,000	20,000,000	20,000,000	20,000,000
Economic Benefit			40,000,000	70,000,000	100,000,000	130,000,000
<b>Total Revenue</b>		6,000,000	53,300,000	86,860,000	120,622,000	154,625,400
<b>Cash Flow</b>	(34,065,000)	(5,660,000)	37,652,000	58,099,400	78,364,130	115,765,369
<b>Cumulative Cash Flow</b>	(34,065,000)	(39,725,000)	(2,073,000)	56,026,400	134,390,530	250,155,899
<i>Factor (10%)</i>	<i>1</i>	<i>0.909</i>	<i>0.826</i>	<i>0.751</i>	<i>0.683</i>	<i>0.621</i>
<b>NPV (10%)</b>	(34,065,000)	(5,144,940)	31,100,552	43,632,649	53,522,701	71,890,294
<b>Cumulative NPV</b>	(34,065,000)	(39,209,940)	(8,109,388)	35,523,261	89,045,962	160,936,256