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COLLEGE OF ARTS AND SCIENCE

PROJECT REPORT

IPTCOMKIT:  
COMMERCIALIZATION OF IHL RESEARCH  
TOOLKIT

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IPTCOMKIT:  
COMMERCIALIZATION OF INSTITUTE OF HIGHER LEARNING  
RESEARCH TOOLKITS

A thesis submitted to Dean of Postgraduate Studies and Research Office in partial  
fulfillment of the requirement for the degree  
Master of Science (Information Technology)  
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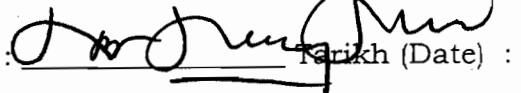
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## ABSTRAK

Walaupun banyak kajian dilakukan oleh penyelidik Institut Pengajian Tinggi (IPT) menerima banyak penghargaan dan anugerah di pertandingan tempatan ataupun antarabangsa, peratusan penyelidikan yang berjaya dikomersilkan masih rendah. Kekurangan maklumat tentang bagaimana untuk mengkomersilkan hasil dan produk kajian adalah salah satu faktor yang menyumbang kepada perkara ini (Richard & Thursby, 2001). Tujuan projek ini adalah untuk membina Alat Bantu Pengkomersilan IPT (IPTComKit), sebuah sistem alat bantu yang membekalkan maklumat untuk penyelidik IPT mengkomersilkan hasil kajian mereka. IPTComKit ini menyediakan panduan lengkap berasaskan model proses pengkomersilan yang diperkenalkan oleh Saville dan Norsaadah (2010a). IPTComKit dapat memberikan maklumat tentang langkah-langkah yang diperlukan untuk mengkomersilkan hasil kajian dengan lengkap.

## **ABSTRACT**

Even though many of research made by Institute of Higher Learning (IHL) researchers have received many awards from local events or international events, the rate of the commercialized products by IHL researchers is still low. Lack of information on how to commercialize research product is one of the causes for this to happen (Richard & Thursby, 2001). The purpose of this project is to build the IPT Commercialization Toolkit (IPTComKit), a toolkit which to guide IHL researchers to commercialize their research findings or results. IPTComKit provides a complete guide to commercialize based on a commercialization process model introduced by Saville and Norsaadah (2010a). The IPTComKit can provide information for steps to commercialize, the purpose of the steps, tasks needed to be followed, provide templates, and the outcome of every step.

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## LIST OF ABBREVIATIONS

7MP	7th Malaysia Plan
8MP	8th Malaysia Plan
9MP	9th Malaysia Plan
CRDF	Commercialization of Research and Development Fund
ICT	Information and Communication Technology
IHL	Institute of Higher Learning
IRPA	Research in Priority Areas
IP	Intellectual Property
IPT	Institut Pengajian Tinggi
MOHE	Ministry of Higher Education
MOSTI	Ministry of Science, Technology and Innovation
MTDC	Malaysian Technology Development Corporation
PSPTN	National Higher Education Strategic Plan
R&D	Research and Development
RU	Research University
TAF	Technology Acquisition Fund

## **CHAPTER ONE**

### **INTRODUCTION**

This chapter provides an overview of the study. It presents the background of the study, problem statement, research questions and research objectives. The significance of the study and the scope of the study are also presented at the end of the chapter.

#### **1.1 Background**

Malaysian Government has made substantial investments in research and development (R&D) activities in an effort to strengthen the capacity and capability of the nation. For example, in the 8th Malaysia Plan (8MP), RM100 million has been channelled through the Ministry of Higher Education (MOHE) Development Division and a total of RM79.12 million was paid to 17 public universities from 2001 to 2005. Meanwhile, in the 9th Malaysia Plan (9MP), the government has given priority to R&D based on market-oriented and to increase the rate of commercialization. Commercialization refers to the process by which the results of research are transformed into products that can be marketed and released commercially. A total of RM200 million has been allocated by MOHE and RM2.9 billion by the Ministry of Science, Technology and Innovation (MOSTI) in the 9th Malaysia Plan for the purpose

The contents of  
the thesis is for  
internal user  
only

## REFERENCES

- Alexandrou, M. (2010). *Rapid Application Development (RAD) Methodology*. Retrieved September 6, 2010, from <http://www.mariosalexandrou.com/methodologies/rapid-application-development.asp>
- Anderson, D. M. (2010a). *Commercialization*. Retrieved August 25, 2010, from <http://www.halfcostproducts.com/commercialization.htm>
- Anderson, D. M. (2010b). *Half Cost Products*. Retrieved August 26, 2010, from <http://www.halfcostproducts.com/>
- Appelo, J. (2008, July 18). *The Definitive List of Software Development Methodologies*. Retrieved September 6, 2010, from <http://www.noop.nl/2008/07/the-definitive-list-of-software-development-methodologies.html>
- Beetham, H. (2002). Developing Learning Technology Networks Through Shared Representations of Practice. *Proceedings of the 9th International Improving Student Learning Symposium* (pp. 421-434). Oxford: Oxford Centre for Staff and Learning Development.
- Bell, D. (2004, February 16). *UML basics: The sequence diagram*. Retrieved October 20, 2010, from <http://www.ibm.com/developerworks/rational/library/3101.html>
- Berita Harian. (2007, Mac 29). Modal teroka cara terbaik komersial R&D. *Berita Harian*.
- Chapman, J. R. (1997). *Software Development Methodology*. Retrieved September 3, 2010, from [http://www.hyperthot.com/pm\\_sdm.htm](http://www.hyperthot.com/pm_sdm.htm)
- Conole, G., & Fill, K. (2005). A learning design toolkit to create pedagogically effective learning activities. *Journal of Interactive Media in Education*, 2005 , 8, 1-16.
- Conole, G., & Oliver, M. (2002). Embedding Theory into Learning Technology Practice with Toolkits. *Journal of Interactive Media in Education*, 2002 , 8, 1-28.



- Conole, G., Oliver, M., McBean, J., & Harvey, J. (2002). Using a Toolkit to Support the Evaluation of Learning. *Journal of Computer Assisted Learning* , 18 (2), 199-208.
- Cosares, S., Deustch, D. N., Sane, I., & Wasem, O. J. (1995). SONET Toolkit: A Decision Support System for Designing Robust and Cost-Effective Fiber-Optic Networks. *Interfaces*, 25 (1), 20-40.
- Ericsson, M. (2004, April 22). *Activity Diagrams: What They Are and How to Use Them*. Retrieved October 20, 2010, from <http://www.ibm.com/developerworks/rational/library/2802.html>
- Farlex Inc. (2010). *The Free Dictionary*. Retrieved September 23, 2010, from <http://www.thefreedictionary.com/intellectual+property>
- Feldman, M., Feller, I., Bercovitz, J., & Burton, R. (2002). Equity and the Technology Transfer Strategies of American Research Universities. *Management Science INFORMS* , 48 (1), 105-121.
- GatherSpace.Com. (2008). *Use Case Diagram*. Retrieved October 20, 2010, from [http://www.gatherspace.com/static/use\\_case\\_diagram.html](http://www.gatherspace.com/static/use_case_diagram.html)
- Hamilton, A., Mitchell, G., & Yli-Karjanmaa, S. (2002). The BEQUEST Toolkit: A decision Support System for Urban Sustainability. *Building Research & Information* , 30 (2), 109-115.
- Kennedy, W. (2006). *So what? who cares? why you?: The Inventor's Commercialization Toolkit*. Ontario, Canada: Wendykennedy.com Inc.
- Matveev, A. G. (2002, January). *Faculty as Entrepreneurs*. Retrieved July 22, 2010, from <http://www.encyclopedia.com/doc/1G2-3403200224.html>
- Ministry Of Higher Education. (2007). *Pelan Strategik Pengajian Tinggi Negara : Peletakan Asas Melangkaui Tahun 2020*. Retrieved July 22, 2010, from [http://www.mohe.gov.my/transformasi/images/1\\_bm.pdf](http://www.mohe.gov.my/transformasi/images/1_bm.pdf)
- Mohd. Asron, M. (2010, October 17). Komersialkan Hasil R&D - Khaled Nordin. *Mingguan Malaysia* , p. 2.

- Oliver, M., & Conole, G. (1998). Evaluating Communication and Information Technologies: a toolkit for practitioners. *Active Learning* , 8, 3-8.
- Oliver, M., & Conole, G. (2002). Supporting Structured Change: Toolkits for Design and Evaluation. In R. Macdonald, & J. Wisdom, *Academic and Educational Development: Research, Evaluation and Changing Practice in Higher Education* (pp. 62-75). UK: Routledge.
- Phillips, R. G. (2002). Technology Business Incubators: How Effective as Technology Transfer Mechanisms? *Technology in Society* , 24 (3), 299-316.
- Richard, J., & Thursby, M. (2001). Proofs And Prototypes For Sale: The Licensing Of University Inventions. *American Economic Review* , 91 (1), 240-259.
- RMK-9. (2005). *Rancangan Malaysia Ke 9*. Retrieved July 22, 2010, from <http://www.utusan.com.my/utusan/SpecialCoverage/RMK9/html/bahasa.htm>
- Rogers, D. S., Lambert, D. M., & Knemeyer, A. M. (2004). The Product Development and Commercialization Process. *The International Journal of Logistics Management* , 15 (1), 43-56.
- Saville, C., & Norsaadah, I. (2010b, September 1). An Inventory Of Commercialisation Competencies. *Commercialization Programme* . Cyberjaya, Malaysia: Kementerian Pengajian Tinggi Malaysia.
- Saville, C., & Norsaadah, I. (2010a, September 1). The Commercialization of Intellectual Property Assets - A Competency Development Module. *Commercialization Programme* . Cyberjaya, Malaysia: Kementerian Pengajian Tinggi Malaysia.
- Servo, J. C. (2003, Mac 19). Commercialization Strategies that Work. *The Texas Technology 2003 Showcase* . Texas: Texas Industries of the Future.
- Slater, S. F., & Mohr, J. J. (2006). Successful Development and Commercialization of Technological Innovation: Insights Based on Strategy Type. *The Journal of Product Innovation Management* , 26-33.

Vaishnavi, V., & Kuechler, W. (2004). *Design Research in Information Systems*  
Retrieved October 31, 2010, from [http://ais.affiniscape.com/  
displaycommon.cfm?an=1&subarticlenbr=279](http://ais.affiniscape.com/displaycommon.cfm?an=1&subarticlenbr=279)

W3Schools.com. (2010). *Browser Statistics*. Retrieved November 8, 2010 from  
[http://www.w3schools.com/browsers/browsers\\_stats.asp](http://www.w3schools.com/browsers/browsers_stats.asp)

World Intellectual Property Organization. (2010). *What is Intellectual Property?*  
Retrieved September 28, 2010, from <http://www.wipo.int/about-ip/en/>

World Intellectual Property Organization. (2004). *WIPO Intellectual Property Handbook: Policy, Law and Use* (2nd Edition ed.). Geneva: WIPO Publication.