

For discussion
on 19 November 2013

**Legislative Council
Panel on Commerce and Industry**

**Extension of the Operation of
Research and Development (R&D) Centres**

PURPOSE

This paper seeks Members' views on a funding proposal to extend the operation of two research and development (R&D) Centres set up under the Innovation and Technology Fund (ITF), namely the Hong Kong Research Institute of Textiles and Apparel (HKRITA) and the Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM).

BACKGROUND

2. The ITF was established in 1999 to fund projects that contribute to innovation and technology upgrading in the manufacturing and service industries. As at end-September 2013, the ITF has supported over 3 500 projects, including over 2 100 R&D projects, at an approved funding of about \$7.8 billion. The uncommitted ITF balance was around \$0.9 billion.

Current Funding Commitment for R&D Centres

3. In June 2005, the Finance Committee (FC) of the Legislative Council approved vide FCR(2005-06)21 a total commitment of \$273.9 million under the ITF for the establishment of four R&D Centres and their first five years of operation up to 31 March 2011. In April 2006, the Government set up the following R&D Centres as focal points to drive and co-ordinate applied R&D and to promote commercialisation –

- (a) Automotive Parts and Accessory Systems R&D Centre (APAS);
- (b) R&D Centre for Information and Communications Technologies under the Hong Kong Applied Science and

Technology Research Institute (ASTRI)¹;

(c) HKRITA;

(d) LSCM; and

(e) Nano and Advanced Materials Institute (NAMI).

4. R&D projects undertaken by the R&D Centres are funded separately by the ITF on a project basis.

5. In June 2009, FC approved vide FCR(2009-10)27 an increase in the funding commitment by \$369 million to extend the operation of the four R&D Centres for three years up to 31 March 2014.

6. In 2011, we conducted a comprehensive review on the operation and overall performance of the five R&D Centres in their initial five years of operation up to 31 March 2011. With the support of Panel Members, FC approved vide FCR(2012-13)21 in May 2012 an additional commitment of \$275.3 million to extend the operation of the R&D Centres as follows –

(a) for NAMI and APAS which had met the interim industry contribution target of 15% in their first five-year period, their operation period was extended until 31 March 2017; and

(b) for HKRITA and LSCM which had not achieved an industry contribution of 15% in the first five years, their operation period was only extended to 31 March 2015. We undertook to closely monitor/review their performance during a two-year observation period ending March 2013 (i.e. two years after the last review). If by then they managed to meet the industry contribution target of 18% and could satisfy us in terms of overall performance, we would consider whether and how to support and sustain their further operation for an appropriate period.

In other words, since 2005, FC has approved a total funding commitment of \$918.2 million for the operation of the four R&D Centres.

¹ The operating expenditure of ASTRI is met separately from Government's annual recurrent subvention granted to ASTRI due to historical reasons.

7. When we briefed Members of the annual performance of the R&D Centres at the Panel meeting on 18 June 2013, we reported to Members that both HKRITA and LSCM had achieved an overall level of industry contribution for the two-year observation period (from 2011 to 2013) of 25.6% and 18.1% respectively, hence both exceeding the target level of 18%. We then undertook to consult the Panel again with a recommendation on the way forward of their further operation having regard to their performance.

PERFORMANCE OF HKRITA AND LSCM FROM APRIL 2011 TO MARCH 2013

(A) Overall performance

8. Following our reports to the Panel in June 2012 (Paper No. CB(1)2153/11-12(03)) and June 2013 (Paper No. CB(1)1282/12-13(05)) regarding the annual performance of HKRITA and LSCM in their two-year observation period from April 2011 to March 2013, a summary of their performance as compared to their first five-year position since the last comprehensive review conducted in 2011 is set out below.

9. During the two-year period, the two Centres incurred a total of \$75.1 million in operating expenditure –

Table 1: Operating Expenditure[#] (in \$million)

	Current Approved Commitment up to 31 March 2015 (\$ million)	First Five Years of Operation (2006-11)	2011-12	2012-13	Cumulative Operating Expenditure up to 30 September 2013 [#] (\$ million)	No. of Staff as at September 2013 [Establishment]
HKRITA	153.6	47.0	16.0	19.1	92.2	28 [29]
LSCM	151.2	64.3	19.1	20.9	115.2	52 [67]

[#] After netting off administrative overhead for in-house R&D projects. The expenditure of 2013-2014 (six months up to September 2013) is based on estimates provided by the Centres.

10. In the same period, the two Centres have undertaken a total of 51 R&D projects. The level of industry contribution and the number of

new R&D projects commenced were –

Table 2: Level of Industry Contribution
(based on approved funding commitment)²

	First Five Years of Operation (2006-11)	2011-12	2012-13	Overall Two-year Period (2011-13)	
				Actual	Target
HKRITA	12.4%	23.0%	26.8%	25.6%	18%
LSCM	12.3%	15.4%	18.7%	18.1%	18%

Table 3: Number of New Projects Commenced (Notes 1&2)

	First Five Years of Operation (2006-11)	2011-12	2012-13	Two-year Period (2011-13)	7-year Cumulative (2006-13)
HKRITA	51(1)	14(2)	19(4)	33(6)	84(7)
LSCM	29(2)	5(1)	13(2)	18(3)	47(5)

Note 1: Under the ITF, there are broadly two types of R&D projects:

- (i) *platform projects* which require industry contribution of at least 10% of the project cost. The industry sponsors (minimum of two) will not own the project intellectual property (IP); and
- (ii) *collaborative projects* which require industry contribution of at least 30% (for R&D Centre projects only) or 50% (for non-R&D Centre projects) of the project cost. The industry sponsor(s) will be entitled to utilise the project IP exclusively for a defined period or own the project IP, depending on the level of contribution and agreement among the parties concerned.

The ITF also supports seed projects for the R&D Centres which are capped at \$2.8 million per project. These are more forward-looking and exploratory projects and aim to provide foundation work for future platform/collaborative projects. No industry contribution is required for seed projects.

Note 2: Figures in brackets denote the number of collaborative projects.

² The level of industry contribution is calculated as follows –

$$\frac{\text{Industry Contribution Pledged}}{\text{Approved Project Expenditure}} \times 100\%$$

Table 4: Project Costs of New Projects Commenced
(in \$million)

	First Five Years of Operation (2006-11)	2011-12	2012-13	Two-year Period (2011-13)	7-year Cumulative (2006-2013)
HKRITA	179.7	28.1	52.7	80.8	260.5
LSCM	221.1	20.4	67.9	88.3	309.4

11. As regard R&D expenditure (which is funded separately by the ITF), the situation is as follows –

Table 5: Actual R&D Expenditure
(in \$million)

	First Five Years of Operation (2006-11)	2011-12	2012-13	Two-year Period (2011-13)	7-year Cumulative (2006-2013)
HKRITA	98.0	37.5	28.0	65.5	163.5
LSCM	139.4	48.0	35.4	83.4	222.8

Despite the commencement of many new projects in 2012-13, the actual R&D expenditure of both Centres in 2012-13 was lower than that in 2011-12 due to cash flow reason, which we expect will catch up in the coming years.

(B) Detailed Analysis

12. HKRITA and LSCM have both met their target level of industry contribution in the two-year observation period from 2011-2013. We have also evaluated their performance in other areas and found them generally satisfactory. These areas include their progress in conducting R&D projects, commercialisation and trial of R&D results in the public sector, etc. Performance of the two R&D Centres, including the latest developments in the recent months since our last progress report to the Panel in June 2013, is elaborated below.

HKRITA

13. The performance of HKRITA in 2011-2013 has shown marked improvements, as compared with its first five years of operation. During the two-year period, it has achieved an overall industry contribution level of 25.6% (as against 12.4% in the first five-year period). The total number of projects commenced by HKRITA was 14 in 2011-12 and increased to 19 in 2012-13, which compared favourably to the 51 projects in the first five years. The number of collaborative projects also grew from 2 in 2011-12 to 4 in 2012-13, compared to just one project in the first-five year period. HKRITA has also broadened its research areas and placed a stronger focus on delivering solutions to promote sustainable development and reduction of labour and materials costs.

14. In the first six months of 2013-14 up to September 2013, HKRITA has commenced 5 collaborative projects at a total cost of around \$30 million, which already exceeded the total number of such projects in 2012-13, and a few more are in the pipeline. These included a collaborative project on “Waterless Multi-functional Supercritical Fluid System for Textile Treatment” commenced in April 2013 in partnership with a local garment company which provided a more environment-friendly dyeing method for the textile industry to reduce the use of water and electricity. In September 2013, HKRITA successfully organised a technical symposium at the Hong Kong Convention and Exhibition Centre which attracted over 300 local and overseas participants. At the symposium, HKRITA signed a Memorandum of Understanding (MOU) with Shinshu University of Japan to collaborate on high-performance fibre research. Two of HKRITA’s projects also won the Gold medal in the 41st International Exhibition of Inventions of Geneva in April 2013: one was an ‘Image Colour Measurement system for Textile and Garment Industry’, and another one was a ‘Fabric Touch Tester’. These outcomes demonstrated that HKRITA has successfully enhanced its collaboration with and gained more recognition of the industry both locally and overseas.

15. In terms of commercialisation, HKRITA has set up a dedicated business development team to promote its R&D deliverables through seminars, workshops and liaison with individual companies. Since its establishment, HKRITA has granted 22 licences for its R&D results. The more successful examples included licences granted to five companies for the use of the Nu-Torque Cotton Yarn Technology valuing at more than \$8 million in total. Discussions are on-going with several

other potential licensees. Three licences were also issued on the 'Advanced Clothing Function Design Computer Aided Design (CAD) Technology' which was developed by HKRITA in collaboration with the Hong Kong Polytechnic University (PolyU), including the latest one with the Shinshu University in Japan in September 2013. In 2011-13, HKRITA was granted 21 patents whereas none was granted in the first five years.

16. HKRITA has also been taking an active role in promoting the use of R&D results in the public sector which will benefit the community. As at end-September 2013, it has undertaken 12 projects under the Public Sector Trial Scheme (PSTS) (the Scheme was launched in March 2011). For example, HKRITA has collaborated with ASTRI and LSCM and completed a trial in two elderly care centres under the Tung Wah Group of Hospitals on an outerwear made of Nu-Torque fabric and embedded with RFID tags to track the movement of Alzheimer patients to better monitor their locations. Discussion is underway to conduct a larger scale trial of the technology. HKRITA also applied an advanced functional design technology in producing a prototype uniform for the Fire Services Department which would help reduce firemen's thermal stresses/strains and increase comfort and safety during training and work.

LSCM

17. LSCM's performance has also shown considerable improvements during the 2011-13 period. It has commenced 13 projects in 2012-13, up from five projects in 2011-12. Its overall level of industry contribution in 2011-13 was 18.1% against 12.3% in the first five-year period. It has also commenced three collaborative projects in 2011-13, compared to two in the first-five year period. Discussion on a number of new collaborative projects is already underway, including a partnership with PolyU and an engineering company on construction site supply chain management.

18. In 2011-13, LSCM has proactively reached out and forged closer working relationship with various industry sectors in addition to the logistics and supply-chain sector, including the retail sector, construction industry, private hospital sector, etc., leveraging on its technology capabilities in radio-frequency identification (RFID), Internet-Of-Things (IoT) and location-based service technology. LSCM also played an important role as a platform among the Government, industry, academia and research institutions to create collaboration

opportunities. For instance, in the last six months, it has partnered with PolyU and the Lands Department (LandsD) to kick-start a platform project on positioning infrastructure by integrating the global positioning system (GPS) and the Beidou Navigation Satellite system, which will improve the positioning efficiency and reliability. This will enable LandsD to achieve more precise outdoor positioning in various location-based applications available to the public.

19. In terms of commercialisation of R&D results, LSCM's performance is also improving. In the two-year period from 2011-2013, it has concluded 14 licensing agreements, compared to just one agreement in its first five years of operation. It has placed more focus on transferring its technologies to small and medium enterprises (SMEs) in Hong Kong. For example, it has granted two licensing agreements to enable companies in Hong Kong and the Mainland to adopt its RFID antenna design, and is discussing with a number of local enterprises on further adoption of its RFID technology. LSCM will continue to promote and expand its commitment to transfer more technologies to the private sector.

20. LSCM has played a pivotal role in promoting the trial of R&D outcomes in the public sector. Since March 2011 up to end September 2013, it commenced a total of 8 PSTS projects. Some of the successful examples include the 'E-Lock-Based Enabling Technology for Container Cargo Trans-shipment Process' which has been successfully adopted by the Customs and Excise Department. This cargo tracking platform has helped reduce the number of repeated customs inspection for cargos at the entry control points, enhance couriers' efficiency and reliability, and facilitate logistics flow between Hong Kong and the Mainland. In addition, with the support of the Airport Authority Hong Kong and Carrier Liaison Group (a trade organisation representing the air cargo, mail, courier and express cargo industries in Hong Kong), LSCM is currently working on an 'Advance Truck Arrival Notice System' where various cargo terminals will be notified when trucks heading for the Hong Kong International Airport are passing through the Tsing Ma Bridge. The system will help improve terminal docking space scheduling and loading/unloading efficiency and raise air-freight service quality and reliability. It is expected to be completed by September 2014.

PROPOSALS FOR EXTENSION OF OPERATION OF HKRITA AND LSCM

21. Having considered the satisfactory performance of HKRITA and LSCM in the last two years as outlined above, we have also analysed their future business plans and funding requirements for their operation beyond 31 March 2015. As the R&D Centres have shown sustained improvements in their overall performance and their continued operation would be conducive to promoting innovation and technology upgrading in their respective industrial sectors, we propose to seek FC's funding approval for extending their operation for two more years until 31 March 2017 to align with the operation period of APAS and NAMI. This will allow the Centres to continue with their work, recruit/retain the necessary staff to support their operation and enter into longer term collaborative agreements with its partners and other R&D Centres. Our proposals are set out in the ensuing paragraphs.

(A) Additional funding

22. The business plans of HKRITA and LSCM are at **Annex A** and **Annex B** respectively for Members' reference. As suggested by Members at the June 2013 Panel meeting, the two Centres have also provided an analysis of their Strengths, Weaknesses, Opportunities and Threats (SWOT analysis) in their plans.

23. A summary showing the funding commitment already approved for the two Centres as well as the proposed additional funding is as follows –

HKRITA

Funding Already Approved –

	<u>(in \$million)</u>
Funding commitment approved by FC in June 2005 and June 2009 for HKRITA's operation from 1 April 2006 to 31 March 2015 ³	153.6
<i>Note: Actual expenditure of HKRITA for the first 7.5 years (1 April 2006 – 30 September 2013)</i>	92.2

Additional Funding Proposed –

	<u>(in \$million)</u>
Proposed additional funding for extending HKRITA's operation for two further years (up to 31 March 2017)	44.1
<i>i.e. Proposed total funding commitment for HKRITA for a 11-year period (1 April 2006 – 31 March 2017)</i>	197.7

24. Below are the highlights of HKRITA's funding proposal and business plan (details at **Annex A**) in the coming few years –

- (a) Operating expenditure: an estimated \$44.1 million on top of the \$153.6 million approved by FC is proposed to cover the operating expenditure for the two additional years of operation up to 31 March 2017. The annual operating expenditure is estimated to increase from \$24.8 million in 2013-14 to \$33.1 million in 2016-17, an average increase of 10.1% per year;
- (b) R&D programme: HKRITA will engage in a wider range of research areas and research partners, including overseas institutions. It has recently entered into an MOU with the Shinshu University of Japan to collaborate on research in high

³ No additional funding was sought from FC when it approved in May 2012 the extension of HKRITA's operation for one year to 31 March 2015, as the approved commitment then was sufficient to cover the estimated expenditure up to the end of the extended operation period.

performance fibre and new printing technologies. HKRITA currently has no in-house R&D staff and mainly relies on the research capabilities of the PolyU and other local research institutions. It will consider establishing an in-house R&D team to conduct centre-owned projects on hitherto underdeveloped technology areas with good potentials, such as lean manufacturing and technical footwear research. HKRITA estimates that the number of new R&D projects to be commenced will increase from 24 in 2013-14 to 33 in 2016-17; and

- (c) Commercialisation and technology transfer: with more R&D projects coming to fruition, HKRITA will put more effort on commercialisation and maximise its contribution to realising the R&D outcomes in the local community through public sector trial projects. It is expected that in 2016-17, there will be a total of 57 projects under commercialisation.

LSCM

Funding Already Approved –

Funding commitment approved by FC in June 2005, June 2009 and May 2012 for LSCM's operation from 1 April 2006 to 31 March 2015

(in \$million)

151.2

Note: Actual expenditure of LSCM for the first 7.5 years (1 April 2006 – 30 September 2013)

115.2

Additional Funding Proposed –

Proposed additional funding for extending LSCM's operation for two further years (up to 31 March 2017)

(in \$million)

56.7

i.e. Proposed total funding commitment for LSCM for a 11-year period (1 April 2006 – 31 March 2017)

207.9

25. Below are the highlights of LSCM's funding proposal and business plan (at **Annex B**) in the coming few years –

- (a) Operating expenditure: an estimated \$56.7 million on top of the \$151.2 million approved by FC is proposed to cover the operating expenditure for the two additional years of operation up to 31 March 2017. The annual operating expenditure is estimated to increase from \$22.2 million in 2013-14 to \$29.4 million in 2016-17, an average increase of 9.8% per year;
- (b) R&D programme: LSCM has, in consultation with its Board, drawn up a technology roadmap that is demand-driven, with an emphasis on providing innovative solutions to enable its clients, in particular SMEs, to move up the value chain. LSCM estimates that the number of new R&D projects to be commenced will increase from 16 in 2013-14 to 22 in 2016-17; and
- (c) Commercialisation and technology transfer: LSCM will build upon its network of SMEs and strengthen its commercialisation programme to identify technology solutions to supply chain of various sectors and expand its potential clientele to the Mainland. We expect that in 2016-17, there will be a total of 47 projects under commercialisation by LSCM. It will proactively explore more collaborative opportunities with the public sector for the benefit of the community and encourages SMEs to adopt technologies to enhance productivity. It is anticipated that there will be more positive impact brought to the community and the various industries such as by enhancing safety in construction sites, enhancing efficiency of the logistics and retail industries, etc.

(B) Performance monitoring

Level of industry contribution

26. As HKRITA and LSCM have already achieved the industry contribution target of 18% in the two-year observation period and are gradually building up stronger client base and industry reputation, we are optimistic that their performance in industry collaboration will continue to improve. Consequently, we have stipulated an increase from 18% to 20% in the overall target level of industry contribution for the two R&D

Centres for the second five-year period (from 2011-12 to 2016-17), to align with the target set for the other R&D Centres. This target will be reviewed regularly having regard to the Centres' development and performance.

Commercialisation

27. As outlined in paragraphs 15 and 19 above, both HKRITA and LSCM will step up their efforts in driving commercialisation of R&D results, following the completion of an increasing number R&D projects.

28. We note that the number of licensing deals and commercialisation income received by the two Centres have started to increase gradually. These included income generated from licensing/royalty and contract services. For details of the commercialisation income of the two Centres, please refer to **Annex A** and **Annex B**. We however are mindful that such income still only constituted a small proportion of their total industry income and could fluctuate greatly due to a number of factors including the market situation/reaction and technological development.

29. We will continue to work closely with the respective Boards of Directors/management of the Centres to review their existing set of performance indicators and targets to better review their performance. Indeed, the Board of Directors of the two R&D Centres have put in place additional qualitative and quantitative indicators on the performance of the Centres in their annual plans, including the number of public sector trial projects, number of patents filed/granted, number of awards won, total number of research personnel participated in R&D projects, and publicity and networking efforts of the Centres. For example, according to the 2013-14 Annual Plan of HKRITA, it is anticipated that HKRITA will file 28 patents and conclude 9 licensing deals. Similarly, LSCM estimates in its 2013-14 Annual Plan that it will file 4 patents and conclude 18 licensing agreements in the same period.

Cost effectiveness

30. The Innovation and Technology Commission (ITC) recognises that the total operating expenditure of the two R&D Centres still constitute a sizeable proportion of their annual R&D expenditure. We consider that the operating expenditure were generally reasonable as the Centres have been supporting a wide range of activities including

conducting basic research to build up their technological capability and determine their future R&D focuses, identifying potential industry clients and research partners for future collaboration, commercialisation and marketing efforts at the corporate level, etc.

31. For HKRITA and LSCM, while their operating expenditure is expected to increase gradually in the coming few years to support more R&D projects and commercialisation efforts, we anticipate that their cost-effectiveness will improve particularly as more licensing deals arising from completed R&D projects could be closed.

32. As indicated by Panel Members at earlier meetings, we agree that the level of industry contribution should not be the sole indicators for the performance of the R&D Centres. Indeed, HKRITA and LSCM have been performing satisfactorily in serving as a focal point to facilitate collaboration among the Government, industry, academia and research sectors in R&D and application of technology in their respective focus areas, and we expect that they will be able to perform this role better in the coming years and bring wider benefits to the community. Not only will they encourage greater industry participation in conducting applied R&D in Hong Kong, the Centres will also provide more training and employment opportunities for universities graduates and technical personnel. For example, in 2012-13, HKRITA and LSCM have engaged 165 and 180 researchers respectively in their R&D projects. For further details on the development plan of the two Centres and the expected benefits brought to the industry and community, please refer to **Annex A** and **Annex B**.

Recent improvements made by the ITC

33. We would also like to report that as part of a comprehensive review of the ITF which commenced in mid June 2013, we have introduced the following measures to facilitate the commercialisation and monitoring of performance of the R&D Centres –

- (a) the ITC has promulgated in August 2013 a new guide on intellectual property arrangements for projects funded by the Innovation and Technology Support Programme, and sets out the latest policy and arrangements pertaining to intellectual property and related matters, such as ownership, licensing and benefit-sharing, etc. The new guide aims to provide a clear, transparent, fair and consistent framework for intellectual

property arrangements, and allow greater/reasonable flexibility for the R&D Centres and other local research institutions to determine the best terms of commercialisation and benefit-sharing arrangements having regard to their individual circumstances; and

- (b) the ITC has in consultation with the R&D Centres developed a more comprehensive/systematic post-project evaluation framework to better measure the performance of the R&D Centres in a more comprehensive manner. We have recently completed a trial run of the new framework which will be put in place shortly.

Review and control mechanism

34. We will continue to monitor closely the operation and performance of the two R&D Centres. As a standard practice, they are required to prepare and submit the following for approval by their respective Boards of Directors and the ITC every year –

- (a) an annual plan on the Centre's R&D programme, including the annual expenditure budget and performance indicators;
- (b) quarterly reports on their operation, covering the staffing position, major activities and expenditure position; and
- (c) annual audited accounts of the Centre's operation and its R&D projects.

In addition, we will continue to submit the Centres' progress report to this Panel annually.

35. Subject to the support of the Panel to extend the operation of HKRITA and LSCM to 2016-17, the operation of all four Centres funded by the ITF will be extended up to 2016-17. As we reported to this Panel at its meeting on 18 June 2013, we are conducting a comprehensive review on the ITF and exploring areas of improvements. As part of the review, we will also take a critical look at the long-term funding arrangements for R&D projects/activities and the R&D Centres funded by the ITF. Subject to the outcome of the review, we will evaluate the operation of all the R&D Centres in around 2015 and put forward our recommendation with regard to their future operation at an appropriate juncture taking into account –

- (a) whether their performance has shown sustained development, and if yes, if such development will continue in the future. In arriving at this conclusion, we will take into account factors such as their level of industry contribution, income from commercialisation, ability to realise their R&D outcomes in the public sector setting, etc;
- (b) state of the market by then; and
- (c) prevailing Government policies.

FINANCIAL IMPLICATIONS

Operating Expenditure

36. It is estimated that an additional grant of \$100.8 million, over and above the \$918.2 million already approved by the FC, is required from the ITF to support our proposals of –

- (a) extending HKRITA's operation up to 31 March 2017 with \$44.1 million of additional funding required; and
- (b) extending LSCM's operation up to 31 March 2017 with \$56.7 million of additional funding required.

R&D Project Expenditure

37. The R&D expenditure of the R&D Centres will be funded separately out of the ITF. The latest estimates of the R&D expenditure of HKRITA and LSCM (detailed breakdowns at **Annex A** and **Annex B**) are summarised below –

Table 6: Indicative R&D Expenditure up to 2016-17
(in \$million)

	Actual		Estimates
	First Five Years of Operation (2006-11)	Two-year Period (2011-13)	2013-17
HKRITA	98.0	65.5	260.5
LSCM	139.4	83.4	233.7

38. The total estimated additional funding requirements for the operating expenditure of the R&D Centres from 2015-17 and the estimated R&D expenditure will be met by the uncommitted balance of the ITF which stood at \$0.9 billion as at end-September 2013.

ADVICE SOUGHT

39. Members are invited to offer views on the above extension and funding proposals. Subject to Members' support, we will submit the funding proposals to FC for approval in early 2014.

Innovation and Technology Commission
November 2013

香港紡織及成衣研發中心簡要報告及至 2016-17 年度業務計劃
The Hong Kong Research Institute of Textiles and Apparel
Summary Report and Business Plan up to 2016-17



香港紡織及成衣研發中心(HKRITA)兩項測量儀於4月在日內瓦舉行的第四十一屆國際發明展中獲得金獎，其中一個奪得評審團特別嘉許金獎。

This April HKRITA projects won 2 Gold medals at the 41st International Exhibition of Inventions of Geneva. One of them won the Gold medal with the congratulations of jury.



今年夏天 HKRITA/ LSCM/ ASTRI 共同合作開發一套優質的社區護老服務系統。

This summer HKRITA/ LSCM/ ASTRI collaborated to develop an apparel based RFID system for better elderly care.

Hyperlinks to HKRITA project videos 香港紡織及成衣研發中心項目的短片連結 -

Project Title 項目	Link 連結
Better Quality Community Care of the Elderly 優質的社區護老服務系統	http://www.youtube.com/watch?v=uStggEDDka4
Fabric Touch Tester 織物觸感測試儀	http://www.youtube.com/watch?v=EqjvNUmHOuc
Imaging Colour Measurement System (ICM) based on Multi-spectral Technique 多光譜成像顏色測量系統	http://www.youtube.com/watch?v=oVuKYiO43jg
Intelligent Footwear System Embedded with Fabric Pressure Sensor 智能鞋監測系統	http://www.youtube.com/watch?v=SOouyo21Tdk
Energy-saving Production Technologies for Brassiere Cup 低耗節能胸杯生產技術及系統	http://www.youtube.com/watch?v=QnKvGwYzxyo
Electrolytic Ozone Spray Finishing System for Denim Wear 用於牛仔服裝的電解臭氧噴霧整理系統	http://www.youtube.com/watch?v=qVV EAjTvvp0
Development of Dyeing Fabric in Supercritical Carbon Dioxide 超臨界染色在紡織品中的發展	http://www.youtube.com/watch?v=yT-REhsfeLA&feature=youtu.be
Nu Torque™ Cotton Yarn Production Technology 扭妥™ 低扭矩環錠紡紗技術	http://www.youtube.com/watch?v=Hqen1gHh2I&feature=youtu.be
Novel Design, Production and Evaluation Technologies of High-Performance Running Wear and Cycling Wear 高性能跑步服及單車服的創新設計、製造及評估技術	http://www.youtube.com/watch?v=WiHamXF-5A&feature=youtu.be
Commercialisation of Smart Pressure Monitored Suits (SPMS) for Managing Hypertrophic Scar 智能壓力衣於增生性疤痕之應用及生產	http://www.youtube.com/watch?v=p0fA0wB1pt0&feature=youtu.be

Hong Kong Research Institute of Textiles and Apparel (HKRITA)

Summary Report and Business Plan up to 2016-17

1. Mission and vision

The mission of HKRITA is to be a leading centre of excellence in research, development and technology transfer in textiles technologies. It is an R&D Centre with the remit to support the continual development of technologies to enhance the competitiveness of the textiles, apparel and fashion industry and, thereby, continue to contribute to Hong Kong's economic development.

Apart from working with the industry, HKRITA also strives to be a useful contributor to the Hong Kong society by providing project outcomes that generally benefit the local community.

2. Institutional set up

HKRITA was established in 2006 as non-profit company wholly-owned by the hosting organisation, Hong Kong Polytechnic University (PolyU).

The Board of Directors of HKRITA oversees the operation and development of the R&D Centre. It is underpinned by -

- (a) a Technology Committee which is responsible for advising on project proposals and related issues; and
- (b) an Executive Committee which is responsible for advising on and overseeing all administrative matters.

HKRITA has also put in place internal audit (IA) mechanism. IA reports are submitted to the Executive Committee.

HKRITA is required to prepare annual plans and quarterly/annual reports on its operation and submit them to the Commissioner for Innovation and Technology for approval.

3. Organisation

As at 1 September 2013, the staff strength of HKRITA is 28, against an establishment of 29 posts including the Chief Executive Officer. An organisation chart is at [Appendix 1](#).

4. Technology roadmap and R&D programme

The textile and apparel industry of Hong Kong contributes significantly to Hong Kong's economic development. It has done so for over half a century. Over the years this industry has grown from mass production of inexpensive garments to quality, high fashion apparel wear. Hong Kong's textile and apparel industry have also moved upstream and downstream to become Original Design Manufacturer (ODM), supply chain orchestrators, inventory managers, retailers and brand owners.

Feedback from industry partners as well as from HKRITA's partner research institutes has confirmed that the focus areas for research which HKRITA have adopted so far remain valid. This has also been borne out in HKRITA's field trip and observations as well as through discussion with its contacts in the Mainland. As resulted from an industry engagement exercise in 2012, HKRITA has gained new insights on the state of development of the textile industry as well as the opportunities and challenges that it is facing. It has also evaluated the impact of the industry from a series of important events/economic happenings such as the abolition of the quota system (2005), the global financial crisis (2008), the appreciation of the renminbi (RMB), and the move of manufacturing away from the Pearl River Delta. HKRITA has therefore refined its research domains with more specific focus and themes.

HKRITA has also identified some gaps in its R&D focus. These include areas like supply chain operations (demand forecasting, lean manufacturing in high variable environments, integrated end-to-end multi-platform retail solutions, high quality low volume manufacturing solutions), technical footwear research (high performance solutions for niche sports activities, last research for the Greater China market, high performance materials for new types of upper manufacturing, and sustainable small lot manufacturing), enterprise solutions for fashion industries.

These gaps have induced HKRITA to explore centre owned research and technical partnership with overseas research institutions. In September 2013 HKRITA signed a research Memorandum of Understanding (MOU) with Japan's Shinshu University. The intention is to collaborate on high performance fibre research and new types of printing technology. HKRITA is also in discussions with several other international institutions to strengthen HKRITA's research capabilities and fill in its gaps.

At the end of September 2013, HKRITA launched a Project Management and Information System (PMIS). PMIS is an integrated scalable in-house system that has given HKRITA the capability to significantly

manage more projects and activities with greater transparency, agility, and with the ability to capture learning and data. It should improve the resource and headcount efficiencies of HKRITA in managing an increasing number of R&D projects.

In the coming years, HKRITA plans to continue to focus in the following technology and thematic areas:

	New Materials	New Production Technologies	New Evaluation Technologies	Enterprise Knowledge/ Systems
Sustainability	recyclable/ renewable/ clean/ traceability			
Reduce Cost of Labor/ Material	efficient/ defect reduction/ transparency			
HK Industry Advantage	high value added/ high performance/ fast turn/ low volumes			
HK Society Advantage	job creation/ pollution reduction/ supply chain advantages			

Between April 2006 and March 2013, HKRITA had undertaken a total of 84 projects, including 7 collaborative research projects, at a total cost of \$260.5 million.

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
No. of new projects commenced							
- Platform	-	16	11	13	10	6	9
- Collaborative	-	-	1	-	-	2	4
- Seed	-	-	-	-	-	-	-
- Public Sector Trial Scheme Projects	-	-	-	-	-	6	6
Total:	-	16	12	13	10	14	19
Industry contribution in percentage	-	11.6%	14.9%	11.6%	12.3%	23.0%	26.8%

In 2012-13, HKRITA undertook 19 new projects, including 4 collaborative research projects and 6 projects under the Public Sector Trial Scheme, bringing the total project cost to around \$52.7 million. The level of industry contribution in 2012-13 was 26.8%. About 757 research and related positions were generated from HKRITA's projects in the past seven years. (A list of HKRITA projects is at [Appendix 2](#)).

As at end-March 2013, 49 HKRITA projects had been completed. The remaining 35 are scheduled to be completed between 2013-14 to 2015-16.

Collaboration parties

As HKRITA's host university, PolyU continues to be HKRITA's main research partner. Apart from that, HKRITA has also engaged the Hong Kong Productivity Council (HKPC), the Clothing Industry Training Authority (CITA) and City University of Hong Kong (CityU) to undertake research projects.

Going forward, as the needs arise, HKRITA will organise and execute research projects in-house. This is for areas where identified industry needs are either underdeveloped or solutions that require multi-disciplined coordinated efforts such as footwear.

5. Progress in Commercialisation and Collaboration with the Government, Academia and Industry

Commercialisation

With more projects coming to fruition, the top priority will be to push for the commercialisation of R&D deliverables. HKRITA shall adopt the following approaches -

- (a) promotion of project results including the production of prototypes/samples for use in the public sector;
- (b) conversion of laboratory-scale prototype into scalable, commercial product;
- (c) intellectual property management including the filing of patents; and
- (d) licensing arrangement and technology transfer to interested industry users.

HKRITA's Business Development team was established in September 2010. The team has promoted research deliverables through 108 seminars/workshops as well as approached to over 230 companies individually to introduce technology and project deliverables. It has also disseminated commercialisation technologies to over 1,500 companies through general marketing channels such as emails, exploratory meetings and business networking events, etc. "Commercialisation panels" have also been set up under the HKRITA Board to study business plans, assess market interest, advise on practical approaches to capture market interest, and determine licence fees.

Highlights of the progress of commercialisation under several major HKRITA projects are as follows -

- (a) Finer Nu-Torque Cotton Yarn Production
- Non-exclusive licences have been issued to 5 companies for use of the Nu Torque™ Singles Ring Yarns Technology at a total licensing fee exceeding \$8 million. Discussions are on-going with several other interested companies.
- (b) High-Performance Sportswear and Devices
- Two non-exclusive licences have been issued. The deliverables of the project won design awards at the 5th China Sportswear Contest and China's Successful Design Award in November 2011 in Shanghai.
 - A prototype project for sample sportswear with special features to reduce muscle fatigue, enhance recovery and improve training and competition performance is being developed for the Hong Kong cycling and triathlon teams at the 2012 London Olympic Games.
- (c) Advanced Clothing Functional Design CAD Technologies
- Three non-exclusive licences have been issued. One was non-exclusively licensed to Guangdong Textile Polytechnic in November 2011; one non-exclusive licence has been signed with a large fashion retailer in Canada in the same year; and another non-exclusive licence has been signed with Shinshu University in 2013. Discussion with other interested companies is in progress.
- (d) Imaging Colour Measurement (ICM) System for Textile and Garment Industry
- The project provides for an innovative and technological breakthrough to measure different colours of printed fabric or three-dimensional lace structure in one-shot imaging capturing process. The project has obtained strong interest from the industry.

Public Sector Trial Projects

As at September 2013, HKRITA has conducted 12 projects under the Public Sector Trial Scheme. It has collaborated with several Government Departments, non-profit organisations, and community groups. HKRITA's aim is to maximise the benefits of its research outputs for our local community.

Publicity and Marketing

Since the establishment in 2006, HKRITA has over 200 positive publicity exposures via various publications or media reports to promote the Centre and its projects. HKRITA's marketing priority will be to complement the R&D efforts to generate industry interest in the deliverables from completed projects. Up to March 2013, HKRITA has organised and supported 205 seminars and workshops to benefit industry partners as well as take part in roadshows and exhibitions.

HKRITA has participated in 84 exhibitions in Hong Kong, the Mainland and overseas over the past seven years. This included involvement in government-initiated events (e.g. the InnoCarnival), international conventions (e.g. Fashion Week), and HKRITA's own activities (e.g. the Innovation and Technology Symposium and the roadshows at four local universities).

Membership Scheme

HKRITA has a membership scheme with over 500 registered members. Companies which have not joined as members may still have access to HKRITA through their affiliation with trade organisations (such as the Textile Council).

In 2012-2013 HKRITA has modified its membership scheme to encourage more industry participation. It has also launched dedicated sites on social networks such as Facebook and LinkedIn to promote public's recognition of HKRITA's activities and news.

Other major communication channels currently adopted by HKRITA include –

- (a) HKRITA website (www.hkrita.com) in English and Chinese. To-date there have been 200,000 visits to HKRITA's website;
- (b) E-Newsletter issued on a quarterly basis which provides articles on projects as well news on current industry matters; and
- (c) Electronic direct mailing which enables a fast and efficient way to reach industry partners.

6. SWOT Analysis

A Strength-Weakness-Opportunity-Threat (SWOT) Analysis of the development of HKRITA is set out below –

Strengths	Weaknesses
<ul style="list-style-type: none"> - Strong industry support - Build on established HK strengths (as a sourcing hub) - Close industry collaboration - Strong industrial demand for innovation - Supply of young local talent 	<ul style="list-style-type: none"> - Lack of top-in-class cross-functional world class talent - Broad strategic research focus - Weak self-funding business model in the short term - Lack of applied research motivation from local institutions
Opportunities	Threats
<ul style="list-style-type: none"> - Transformation of industry to high value add activities - Sustainability and long term regional development - Specialised market opportunities (medical, industrial and functional) - Revival of high end local manufacturing 	<ul style="list-style-type: none"> - Strong regional research and development competition - Succession planning and uncertain future for local industry - Lack of applied research support from local institutions

7. Budget and cashflow

The current approved commitment for the operation of HKRITA up to 31 March 2015 is \$153.6 million. To support its continued operation up to 31 March 2017, an additional funding of \$44.1 million is required for HKRITA, bringing the total funding commitment for 11 years of operation to \$197.7 million.

Operating Expenditure (in \$ million)

	5-year Cumulative							Total
	2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	
	(Actual)	(Actual)	(Actual)	(Estimate)	(Estimate)	(Estimate)	(Estimate)	
Staff ⁽¹⁾	36.3	11.8	12.9	16.6	17.9	20.9	23.9	140.3
Accommodation ⁽²⁾	1.8	1.3	1.9	2.1	2.4	2.4	2.4	14.3
Equipment and other capital cost ⁽³⁾	2.5	-	1.2	0.3	2.0	0.5	0.5	7.0
Commercialisation ⁽⁴⁾ (including publicity, marketing, etc.)	2.5	1.7	1.5	3.0	2.6	2.9	3.1	17.3
Others ⁽⁵⁾	3.9	1.2	1.6	2.8	3.0	3.1	3.2	18.8
Total expenditure:	47.0	16.0	19.1	24.8	27.9	29.8	33.1	197.7
Less:								
Admin. overheads	-	-	-	-	-	-	-	-
Total operating cost from ITF :	47.0	16.0	19.1	24.8	27.9	29.8	33.1	197.7

Explanatory Notes –

- (1) Staff cost covers basic salary, Mandatory Provident Fund contributions, contract-end gratuity, medical insurance and assuming inflationary and salary adjustment of 10% per annum. The staff establishment of HKRITA is forecast to reach 39 posts by 2016-17.
- (2) The accommodation budget will increase starting from 2014-15 mainly due to the acquisition of additional office space for the expansion of the size of HKRITA.
- (3) A provision of \$1.8M is made in 2014/15 for renovation of the office space to accommodate the additional staff recruited over the past few years.
- (4) HKRITA plans to steps up its commercialisation efforts and increase expenditure in this aspect starting from 2013-14 for promoting research deliverables of both commercialised projects and projects to be commercialised. The budget mainly covers expenditure for exhibitions, production of prototype as well as publicity and advertisements.
- (5) Other miscellaneous cost items include human resource management related expenses, IT programming and maintenance fees, professional fees, utilities expenses etc.

R&D Projects and Expenditure (in \$ million)

	5-year Cumulative 2006-07 to 2010-11 (Actual)	2011-12 (Actual)	2012-13 (Actual)	2013-14 (Estimate)	2014-15 (Estimate)	2015-16 (Estimate)	2016-17 (Estimate)	Total
No. of new projects commenced	51	14	19	24	26	29	33	196
No. of projects under commercialisation ⁽¹⁾	7	13	29	36	43	50	57	n/a
R&D expenditure (\$ million)	98.0	37.5	28.0	31.4	56.4	79.0	93.7	424.0

Explanatory Notes –

- (1) Completed or on-going projects with technologies ready for commercialisation such as licensing and filing of patents.

Commercialisation Income (2006-13) (in \$ million)

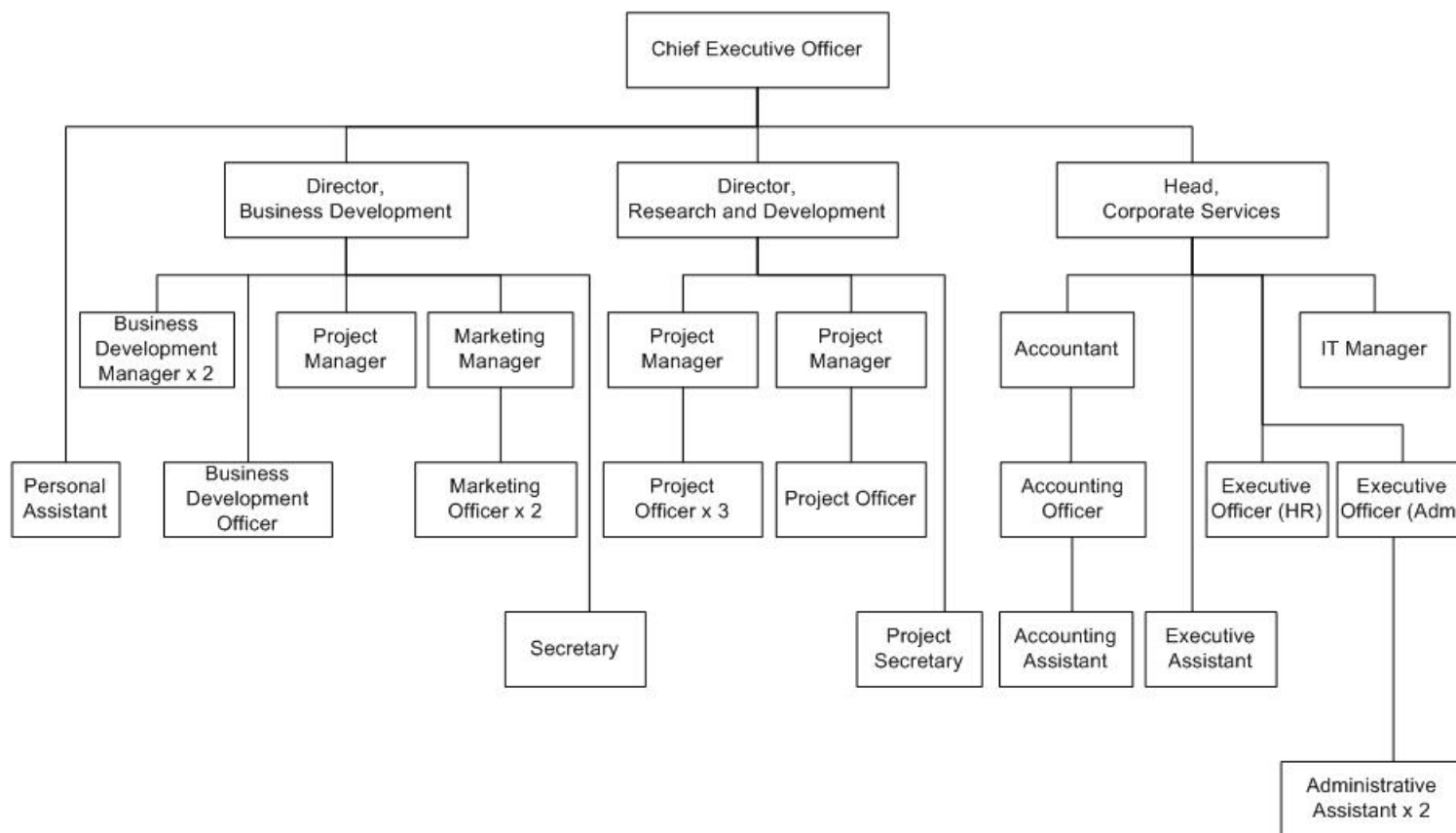
	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Licence fee and royalty income	0	0	0	0.07	5.19	0.57	1.02	6.85
Contract Services	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0
Total	0	0	0	0.07	5.19	0.57	1.02	6.85

Staff Strength (2006-13)

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Non-R&D Staff	11	14	17	17	19	22	25
R&D Staff	-	-	-	-	-	-	-
Total	11	14	17	17	19	22	25


HKRITA
November 2013

Organisation Chart of HKRITA



Total no. of Posts in 2013/14: 29

**Summary of Projects undertaken by HKRITA
(April 2006 to March 2013)**

Project Title	Project Cost (\$ million)
1. Biofunctional Materials and Applications	4.5
2. Advanced Clothing Functional Design Computer-aided Design (CAD) Technologies	4.1
3. Development of an Innovative Finishing System for Wet Processing of Garments and Accessories	1.7
4. Advanced Textile and Garment Manufacturing Process Technology	3.9
5. Development of a Laboratory-scale Electrochemical Mercerisation and Bleaching System for Technological Evaluation	1.0
6. Finer Nu-Torque Cotton Yarn Production	2.4
	
7. Development of Fabric Structure Analysis and Appearance Evaluation System	2.9
8. Advanced Functional Surface Treatment Technology for Textile Materials	4.8

Project Title

**Project Cost
(\$ million)**

9. Imaging Colour Measurement System for Textile and Garment Industry

4.4

The Second-Phase Research and Development of Imaging Colour Measurement (ICM) System for Textile and Garment

Advantages over Spectrophotometer

- ICM system can measure samples that are impossible when using spectrophotometer.
- With the ICM system, reflectance of every spatial position can be accurately measured.

10. Development of Shape Memory Knitted Fabrics/Garments

11.0



11. Development of a Problem Solving Model for the Hong Kong Textiles and Clothing Industries

3.0

12. Development of an Integrated Solution for Minimising Pilling Problem of Cashmere Knitwear


2.8

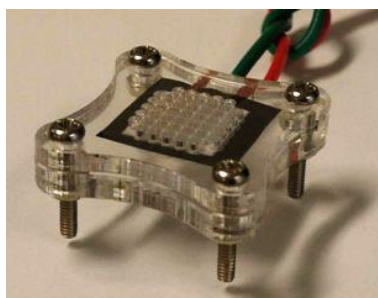
13. Fabric Sensors for Three Dimensional Surface Pressure Mapping

8.0

14. Development of Smart Interactive Functional Clothing

3.1

Project Title	Project Cost (\$ million)
15. High-Performance Sportswear and Devices	5.4
	
16. Development of a Fashion Sales Forecasting Decision Support System Using Artificial Intelligence Techniques	2.8
17. Functional and Decorative Textile Products through Sputtering Technology	0.8
18. Novel Finishing Treatment for Knitwear Using Low Temperature Rapid Evaporation	2.9
19. Small Sized Fiber Sensors	6.0
20. Development of an Innovative Manufacturing Solution for Energy-saving and Environmental-friendly Production of Brassiere Cup	2.7
21. Novel Quick Testing Sensors of Formaldehyde in Textile Fabrics and Clothing Products	4.3




22. Biofunctional Materials and Applications (II)	5.2
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Project Title	Project Cost (\$ million)
23. Advanced Clothing Functional Design CAD Technologies (II)	6.8



24. Remote Assessment System for Physical Prototypes under an e-clustering Environment	1.6
25. An Intelligent Fabric Sample Resources Management System for Fashion Product Development	1.0
26. Application of Foam Dyeing Technology for Developing Colour Wash-out Effect on Cotton Knitted Fabric	1.0
27. Development of 100% Cotton Super Comfort & Easy Care Fabrics and Garments*	3.2
28. Textiles Needs of Paraplegic and Quadriplegic Patients in Paediatric Hospitals	0.8
29. An Empirical Study of Laser-based Finishing for Textile Materials	0.5
30. Feasibility Study on Low Pressure Plasma Assisted Dyeing Process with Both Inorganic and Organic Dyestuff for Textile Products	1.0
31. Conversion to an Industrial Scalable Technology – “Advanced Textile and Garment Manufacturing Process Technology”	1.0

Project Title	Project Cost (\$ million)
32. Development of a Novel Electrolytic Ozone Spray Process to Achieve Aged-look Effect for Denim Wear	2.0
	
33. Development of a Lab-Dip System for CO2 Waterless Dyeing	2.3
34. Development of Custom Shoe-Last from Foot Scan Data	1.1
35. Development of Durable Adult Bibs for Healthcare	0.5
36. Using the lateral stretch length to enhance the design capacity, production quality and marketing competitiveness of knitwear industry	0.9
37. Body Weight/Shape Reinforcing Health Garment for Overweight Young Females	1.1
38. Conversion of Lab-scale to industrial scale production technology of (4in1) finishing agents and its application system	1.0
39. Development of Intelligent Impact Protectors Based on 3D Auxetic Fabrics	4.9

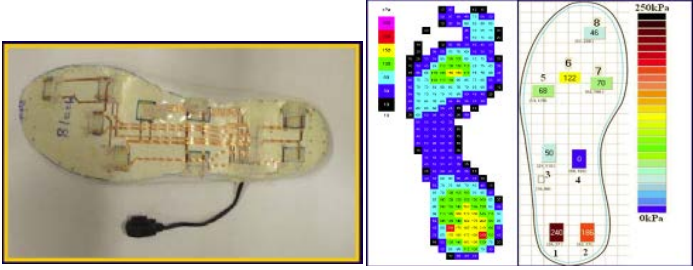
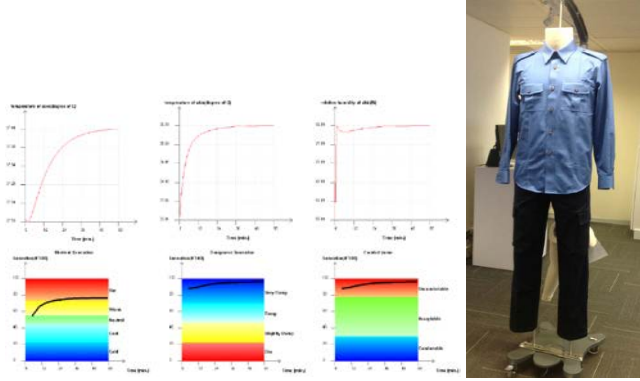
Project Title	Project Cost (\$ million)
40. Innovative Energy and Utility Management System in Textile Processing	4.9
	
41. The Second-Phase Research and Development of Imaging Colour Measurement (ICM) System for Textile and Garment Industry	8.8
42. Development of a Smart Process Flow Management Expert System for Agile Manufacturing of Apparel Supply Chain	4.0
43. Development of Shape Memory Fiber by Melt Spinning Method	10.0
44. iTextile - An Intelligent Searching System for Woven Fabric Database	2.7
45. Development of Sprain-free Sport Shoe: Prototype Version	1.5
46. Conversion to an Industrial Scale Project- An Intelligent Fabric Resource Management System (FRMS) for Fashion Product Development	1.3
47. Development of Plant Structured Knitted Fabrics and Garments*	3.4
48. Fabrication of Durable Surface-Cooling Fabrics by Binder-Free Finishing Technology*	1.9
49. Development of Industry-scale Plasma Treatment System for Wool/Cashmere Knitwear to Minimise Pilling	3.5
50. Artificial Muscle and Skin for Rehabilitation	3.2
51. In-situ Multi-parameter Evaluation System for Smart Protective Apparel under High-speed Impact	9.7
52. Develop a patentable Smart Multi-adhesive-carrying-rollers Lamination System to upgrade the local Intimate Apparel Industry	3.7


Project Title	Project Cost (\$ million)
53. Designing and Engineering Lightweight Knitwear Fabrics with Ultraviolet Protection Function	1.8
54. SimFactory – A Computerised Coaching System for Sewing Line Management	3.0
55. Fast Fabric Hand Measurement Technology	8.2



56. Developing a Pilot Scale Continuous Atmospheric Pressure Plasma Treatment System for Textile Preparation and Finishing	1.9
57. Development of Roll to Roll Magnetron Sputtering System for Large-size Fabric	4.1
58. Multi-function Odour-Control Uniform for Food and Environmental Hygiene Department of HKSAR Government	0.5
59. Performance Sportswear Support for Hong Kong Sports Institute Elite Athletes in Olympic 2012	1.3



Project Title	Project Cost (\$ million)
60. Monitoring Patients with Diabetic Foot Syndrome by Intelligent Footwear System	2.0
	
61. Functional design optimisation of Hong Kong Fire Service Uniform	1.8
	
62. Adult Bibs for Elderly Care Home	0.1
63. Medical Textiles for Eczema Patients	1.2
64. Innovative Wrinkle-free Finishing for Cotton Woven Fabrics	0.9
65. An Intelligent Condition-based Key Machinery Assets Maintenance Management Platform for the Textile Industry	4.0
66. Development of Innovation Apparel Products and Evaluation Technology for CSD Uniform Apparels	1.4
67. Development of Disposable and Degradable Synthetic Fibres for Textile Industry by Chelating Dual/Multiple Metal Ions Masterbatch Technology	3.0
68. Commercialisation of Smart Pressure Monitored Suits (SPMS) for Managing Hypertrophic Scar	0.3
69. Activity-based Carbon Footprint Modelling of the Manufacturing Processes of Intimate Apparel Products	3.2
70. Development of sprain-free sport shoe: prototype version	0.3
71. Development of Smart Orthopedic Devices Using Shape Memory Textile Composites	6.3

Project Title	Project Cost (\$ million)
72. O-blanket - Phototherapy device for neonatal jaundice	1.2
73. Innovative Nano-catalysed Ozonation Technology for Dyehouse Wastewater Treatment & Reuse	3.0
74. Development of Dyeing Natural Textiles in Supercritical Carbon Dioxide	6.4
75. Fabrication of Metallic Textiles*	1.8
76. High Performance Sportswear and Devices (Phase II)	5.1
77. A Novel Approach in Thermal Functional Textile with Conductive Materials*	1.6
78. To Develop an Innovative, Cost Effective and Multi-functions Textile and Apparel Decoration Machine for Flexible Manufacturing*	2.2
79. Technological Aspects for Designing Warp Knitted Fabrics	1.7
80. Develop a Knowledge Based 3D Shoe Design, Patterning & Mass Customisation System to strengthen the new product development capability of Hong Kong Footwear Industry	4.1
81. Intelligent Monitoring System for Physiological and Mechanical Signals in Sports of Weightlifting	1.0
82. Quick Response Quality Management (QRQM) Platform for Apparel Supply Chain	1.1
83. Finer Nu-Torque Cotton Yarn Production	0.6
	
84. Development of Total Environmental Solution for Leather Production Industry*	8.5

*Note: * - Collaborative project*

香港物流及供應鏈管理應用技術研發中心
 簡要報告及至 2016-17 年度業務計劃
**Hong Kong R&D Centre for Logistics and
 Supply Chain Management Enabling Technologies (LSCM)
 Summary Report and Business Plan up to 2016-17**



LSCM Logistics Roadshow (Feb 2013)
 LSCM 物流展覽 (二零一三年二月)

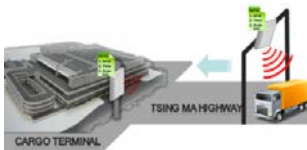
LSCM Logistics Summit (Sep 2013)
 LSCM 物流高峰會 (二零一三年九月)



E-lock for C&ED's ITFS
 配合香港海關多模式聯運轉運貨物便利計劃的電子關鎖監控系統



Location-based Technology at outdoor environment
 戶外場地追蹤管理技術



Trucks' Arrival Notice at Airport Island
 配合機場貨運業的車輛實時通知系統



LSCM Authen✓Tick™
 LSCM 「認」真「析」貨™

Hyperlinks to LSCM's videos / LSCM 研發中心的短片連結 -

Project Title 項目	Link 連結
E-Lock-Based Technology for Container Cargo Transshipment Process 針對集裝箱貨物轉運流程的電子關鎖應用技術	http://youtu.be/xFhw3ZVBmjI
BIM Technologies for Pro-active Construction Management 基於定位技術之資產追蹤及風險管理	http://youtu.be/xqwmW23SfLE
Product Authentication at Retail Points –Infrastructure and Systems 應用於零售店的产品驗證技術 - 網絡基建與應用系統 (零售核證系統)	http://youtu.be/pSsPvJTbo6M
Wearable Tags for Elderly Care at Tung Wah Group of Hospitals 東華三院社區護老服務的可穿戴式 RFID 標籤	http://youtu.be/udDIW9cVE2k
Live Pig RFID Passageway for Sheung Shui Slaughterhouse 上水屠房無線射頻識別活豬通道	http://youtu.be/lkKXwCKYtpc
Baby Tracking Technologies in Hospital Environment (Baby Tag) 在醫院環境的嬰兒追蹤應用技術 (嬰兒標籤)	http://youtu.be/_GiFj5xXu20
ATV 亞洲電視 <<今日 iCity>> - 22/9/2013	http://youtu.be/ITTdHRzPKvk
Advance Notice for Trucks to Airport by TVB 無線 <<財經透視>> - 13/10/2013	http://youtu.be/5_AMKEHh5yU

**Hong Kong R&D Centre for Logistics and
Supply Chain Management Enabling Technologies (LSCM)**

Summary Report and Business Plan up to 2016-17

1. Mission and vision

The mission of LSCM is to foster the development of core competencies in applied R&D in logistics and supply chain related technologies, such as radio frequency identification (RFID), and to facilitate adoption of these technologies by industries in Hong Kong and the Mainland to enhance their competitiveness.

2. Institutional set up

LSCM was set up in 2006 as a non-profit-making company jointly owned by its hosting organisations, namely the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong University of Science and Technology.

The Board of Directors of LSCM oversees the operation and development of the R&D Centre. It is underpinned by –

- (a) a Technology Committee which is responsible for advising on project proposals and related issues; and
- (b) a Finance and Administration Committee which is responsible for advising on and overseeing all administrative matters.

LSCM has also put in place Internal Audit (IA) mechanism. IA reports are submitted to the Finance and Administration Committee.

LSCM is required to prepare annual plans and quarterly/annual reports on its operation and submit them to the Commissioner for Innovation and Technology for approval.

3. Organisation

As at 30 September 2013, the staff headcount of LSCM is 52, against the budgeted establishment of 67, including the Chief Executive Officer. The organisation chart is at [Appendix 1](#).

4. Technology roadmap and R&D programme

To develop core technology competencies and enhance efficiency in the logistics and supply chain industries, LSCM has undertaken industry-oriented research projects involving businesses and universities. R&D projects funded by the Centre range from the use of RFID in applications for manufacturing shop-floors, retail and distribution use, and freight tracking and locating (indoor and outdoor) to monitor personnel in hospitals, as well as electronic lock (E-lock) technology to secure transshipment of cargo containers.

Between April 2006 and March 2013, LSCM has undertaken a total of 47 projects, including 5 collaborative projects, at a total cost of \$309.4 million.

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
No. of new projects commenced							
- Platform	-	7	9	7	3	2	6
- Collaborative	-	-	-	2	-	1	2
- Seed	-	1	-	-	-	-	-
- Public Sector Trial Scheme Projects	-	-	-	-	-	2	5
Total:	-	8	9	9	3	5	13
Industry contribution in percentage	-	11.7%	11.8%	13.4%	12.1%	15.4%	18.7%

In 2012-13, LSCM undertook 13 new projects and have achieved the level of industry contribution of 18.7%. This, together with the performance in 2011-12 (15.4%), would bring the overall industry contribution for LSCM for the two-year period from 2011-13 to 18.1%. (A list of LSCM projects is at [Appendix 2](#)).

Technology Roadmap

LSCM's technology roadmap is demand-driven with an emphasis on enabling industries to innovate and move up the value chain. This roadmap focuses on five major areas –

- (a) Infrastructure Information Technology System;
- (b) Internet-Of-Things (IoT) and RFID Technology;
- (c) Location Based Service (LBS) Technology;
- (d) Logistics and Supply Chain Analytics/Applications; and
- (e) Supply Chain Security.

Looking forward, with the continuous efforts of LSCM in realising its public mission, LSCM envisions that it will bring positive impact to various industries and the community in the following manner –

- Help to provide a safer working environment – the Proactive Construction-site Management System will reduce accidents in construction and other workplaces;
- Facilitate smoother and quicker cross - boundary customs checks to enhance the efficiency of the logistics industry;
- Enable tracking-and-tracing of construction parts - as big as pre-fabricated kitchens or toilets via IoT technologies;
- Provide immediate notice of vehicle departure from the airport island to allow efficient forward logistics planning at the destination anywhere in the Hong Kong;
- Enable SMEs to benefit from the logistics information platforms commonly used by big corporations through developing “Software Plug” and other supporting tools;
- Provide the technology to allow locating and monitoring important objects around the city, such as trees, for enhancing safety and utilisation;
- Provide the most accurate outdoor and indoor locationing technology for logistics, tourism, retail and consumer industries; and
- Help stamping out counterfeited goods using the LSCM’s Authen ✓ Tick System which provides easy identification of authentic products.

5. Progress in Commercialisation and Collaboration with the Government, Academia and Industry

LSCM's Effort in Commercialisation of Technology

The Centre has played an active role in the commercialisation of its R&D deliverables. In particular, the Centre's successful introduction of its core readerchip technology to the private sector was a result of a year-long effort in engaging small and medium enterprises (SMEs). During this engagement process, the Centre fostered close ties with no less than 15 different local enterprises, which each expressed an interest in adopting the Centre's readerchip technology. Amongst these companies, one of them has partnered with LSCM's research team to develop a collaborative R&D project which aims to customise the readerchip for commercial use.

On the other hand, the Centre has reached out and made lots of efforts to listen to feedbacks and comments from industries and research target groups. In order to develop demand-led and industry-driven R&D projects, the Centre has been proactively seeking inputs from industry-support bodies, trade associations and enterprises. In particular, the Centre has connected with the Hong Kong Logistics Development Council (LOGSCOUNCIL), the Hongkong Association of Freight Forwarding and Logistics, Hong Kong Trade Development Council, and Airport Authority Hong Kong to explore collaboration opportunities.

In the coming years, the Centre will continue to build on its relationship with SMEs in order to identify practical technology solutions based on its R&D results for commercialisation.

LSCM's key strategies in promoting commercialisation include the following –

- Strengthen the “sell-through” programme with system integration (SI) partners - Keep developing more SI partners in a value chain model such that engagement among partners can be synergised with selling-through business potential. Co-organise workshops or seminars with the licensees periodically to promote the solutions developed by the licensees based on LSCM's technologies;
- Engage industry partners for projects as a technology transfer strategy - Assist companies to develop commercial products based on Centre's R&D results by providing collaborative project funding and contract research services. Identify industry sectors with high potential of commercialisation such as tag design, RFID equipment, and logistics tracking and provide contract research and technical

design as technology transfer to the market; and

- Extend to Mainland market - As some technologies can also be adopted by the relevant industries in the Mainland, LSCM will extend its coverage to the Mainland market.

LSCM's Effort in Realisation of Technology

LSCM aims to act as the focal point that combines Government, industry, academia and research sectors to create the greatest value and positive impact for the supply chain management and logistics industry. With the support of the Innovation and Technology Commission, the Centre has linked up with various Government departments and public bodies to explore collaboration opportunities from these organisations.

In 2012-13, LSCM spearheaded new technology initiatives to realise/commercialise its R&D results in collaborative with the logistics sector (e.g. 'E-Lock-Based Enabling Technology for Container Cargo Trans-shipment Process'), retail sector (e.g. 'Product Authentication at Retail Points'), cultural services sector (e.g. 'Sensing Technologies for Real-time Environmental Monitoring'), airport (e.g. 'Indoor Navigation Location Based Services'), the construction sector (e.g., 'Building Information Management and Real Time Locating Service to Improve Construction Site Logistics and Safety'), the private hospital sector (e.g. 'RFID Positioning for Patient Monitoring and Baby Tag') and others.

The Centre has maintained a strong momentum to build up public sector project pipelines in 2013. By showcasing its R&D results through public sector trial projects, the Centre aims to promote the adoption of the R&D results and eventually to the private industry sectors.

LSCM's Effort in Promoting Technology

Since its establishment, LSCM has participated in over 320 promotional events all over the world. These activities serve to promote the Centre's strong research capabilities and help foster the adoption of enabling technologies by the logistics and supply chain industries. As of July 2013, the Centre has recruited 606 individual members, 220 Company/Institutes members, and 135 Technology/Solution Provider members, making the total number of members to be 961. Apart from business matching and project collaboration activities, members also actively participated in the Centre's events like industry and technology forums, exhibitions, conferences, delegations as well as networking opportunities.

To increase the awareness of its identity, LSCM has organised a series of events including the LSCM Logistics Summit (September 2012 and

September 2013), LSCM Logistics Workshop (February 2013) and LSCM Logistics Roadshow (February 2013). As one of the highlighted programmes, the kick-off ceremony of the Logistics Roadshow attracted more than 300 attendees from the Government, logistics and supply chain industries, IoT companies and industry-support bodies for engagement and intellectual interaction. In addition, the Roadshow has aroused media's interest and generated great coverage as well as feature stories on the Centre's technologies.

By leveraging its unique position as a liaison platform among the Government, industry, academia and research institutions, the Centre has been able to create opportunities for collaboration by bringing together many interested parties at these marketing events. With the positive momentum gained, the Centre is well positioned to support the logistics and supply chain industry going forward.

Technology Transfer

Since 2011, LSCM has increased its commitment to facilitate effective transfer of Centre's technologies to the private sector. It had successfully ramped up the number of technology transfer cases from 1 during the five-year period (2006-11) to 3 in 2011-12 and 11 in 2012-13.

In 2012-13, LSCM has signed 11 licensing agreements (up from a total of 4 cases from 2006-07 to 2011-12). LSCM's technologies are licensed to a variety of business sectors such as logistics companies, IT solution providers, printing companies, etc., including a labeling company which has licensed LSCM's RFID tag design for making labels for a branded wine.

6. SWOT Analysis

A Strength-Weakness-Opportunity-Threat (SWOT) Analysis for the future development of LSCM is set out below –

Strengths	Weaknesses
<ul style="list-style-type: none"> - Wide and deep partner/customer base - Close relationship with industrial community - Broad and strong technology focus - Good standing in technology field: <ul style="list-style-type: none"> ➤ The most experienced research institute designing RFID tag antenna and the only institution that has designed and manufactured a RFID Reader IC chip in China ➤ One of the leading IoT research institutes in Hong Kong ➤ The biggest technology institute closely related with logistics industry in Hong Kong ➤ The central hub of LBS researches 	<ul style="list-style-type: none"> - Insufficient technologists in logistics and supply chain areas (both in-house and from universities) - Lack of manufacturing partners in Hong Kong to provide support - Gap exists between research results and commercialisation - need further trial and developmental engineering program - Immature cooperation model among LSCM, academia, government and industry - Effort needed to command trust and faith of industries - albeit rapidly improving
Opportunities	Threats
<ul style="list-style-type: none"> - LSCM's IoT researches would bear significant impact to future industrial development - Logistics, Construction, Retail, Hospital, Hotel, etc. - Offering of enabling technologies can help Hong Kong logistics industry transform from a geography-based to intelligence-based model - LSCM's LBS Technology will put Hong Kong in leading position in GNSS (Global Navigation Satellite System) accuracy - Help propel Hong Kong's advancement in becoming a truly Smart City 	<ul style="list-style-type: none"> - Insufficient resources to attain critical mass - Insufficient participation and support of universities - Monopolisation of key technologies by foreign companies - Limited supply of technology human capital in Hong Kong - No critical mass of technology start ups and SMEs

7. Budget and cashflow

The current approved commitment for the operation of LSCM up to 31 March 2015 is \$151.2 million. To support its continued operation up to 31 March 2017, an additional funding of \$56.7 million is required for LSCM, bringing the total funding commitment for 11 years of operation to \$207.9 million.

Operating Expenditure (in \$ million)

	5-year Cumulative							Total
	2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	
	(Actual)	(Actual)	(Actual)	(Estimate)	(Estimate)	(Estimate)	(Estimate)	
Staff ⁽¹⁾	41.4	11.4	11.6	13.9	16.8	16.3	18.6	130.0
Accommodation ⁽²⁾	8.7	3.8	3.7	4.0	4.5	4.5	4.5	33.7
Equipment and other capital cost	3.7	0.3	0.7	0.7	0.7	1.0	1.0	8.1
Commercialisation ⁽³⁾ (including publicity, marketing, etc.)	3.4	2.3	3.5	4.3	3.9	4.1	4.3	25.8
Others ⁽⁴⁾	13.8	2.7	2.0	3.3	3.3	3.4	3.5	32.0
Total expenditure:	71.0	20.5	21.5	26.2	29.2	29.3	31.9	229.6
Less: Admin. overheads ⁽⁵⁾	6.7	1.4	0.6	4.0	4.5	2.0	2.5	21.7
Total operating cost from ITF :	64.3	19.1	20.9	22.2	24.7	27.3	29.4	207.9

Explanatory Notes –

- (1) Staff cost covers basic salary, Mandatory Provident Fund contributions, contract-end gratuity and medical insurance, with an assumption of inflationary salary adjustment at 4% per annum. The variations in staff cost during the period reflect the scheduled completion of employment contracts resulting in the payment of contract-end gratuity as well as the anticipated change in payroll management from 2014-15 onwards. Depending on the number of individual projects, the staff establishment of LSCM is forecast to reach 80 posts by 2016-17. As the change in staff establishment is attributed to the requirement for individual R&D projects, its implication to the administrative headcounts and recurrent cost of the operating expenditure of the Centre as set out above is minimal. Subject to CIT's approval, staff cost for individual R&D projects as part of project expenditure will be funded by the Innovation and Technology Fund.
- (2) The tenancy agreement for the existing premises of LSCM in Cyberport will expire on 31 December 2013. The new tenancy starting from 1 January 2014 will be subject to a higher rate.
- (3) As more and more R&D projects are completed and entered into the commercialisation phase, the commercialisation expenditure increased from 2012-13 onwards.
- (4) Other operating cost items include utilities, legal & professional service fees, staff training, repair and maintenance fees, etc. In order to improve its performance, LSCM

will take a more proactive role than past years in carrying out R&D projects, soliciting sponsorship from industry, disseminating the R&D results and promoting commercialisation. With the steady growth of the Centre, its activities level and the other operating costs will increase from 2013-14 onwards.

- (5) The administrative overheads provided under in-house R&D projects conducted by LSCM will offset the operating cost involved in supporting these projects. A reduction in administrative overhead income in 2015-16 and 2016-17 is anticipated as the Centre will undertake more public sector trial projects resulting from the platform and collaborative projects conducted in the preceding years.

R&D Projects and Expenditure (in \$ million)

	5-year Cumulative							Total
	2006-07 to 2010-11 (Actual)	2011-12 (Actual)	2012-13 (Actual)	2013-14 (Estimate)	2014-15 (Estimate)	2015-16 (Estimate)	2016-17 (Estimate)	
No. of new projects commenced	29	5	13	16	18	20	22	123
No. of projects under commercialisation ⁽¹⁾	8	17	24	31	35	40	47	n/a
R&D expenditure (\$ million)	139.4	48.0	35.4	48.8	54.9	61.0	69.0	456.5

Explanatory Notes –

- (1) Completed or on-going projects with technologies ready for commercialisation such as licensing and filing of patents.

Commercialisation Income (2006-13) (in \$ million)

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Licence fee and royalty income	0	0	0	0	0	0.07	0.16	0.23
Contract Services	0.03	0.04	0	0.01	0	0	0.15	0.23
Others	0	0	0	17.63 ⁽¹⁾	0.13	0	0	17.76
Total	0.03	0.04	0	17.64	0.13	0.07	0.31	18.22

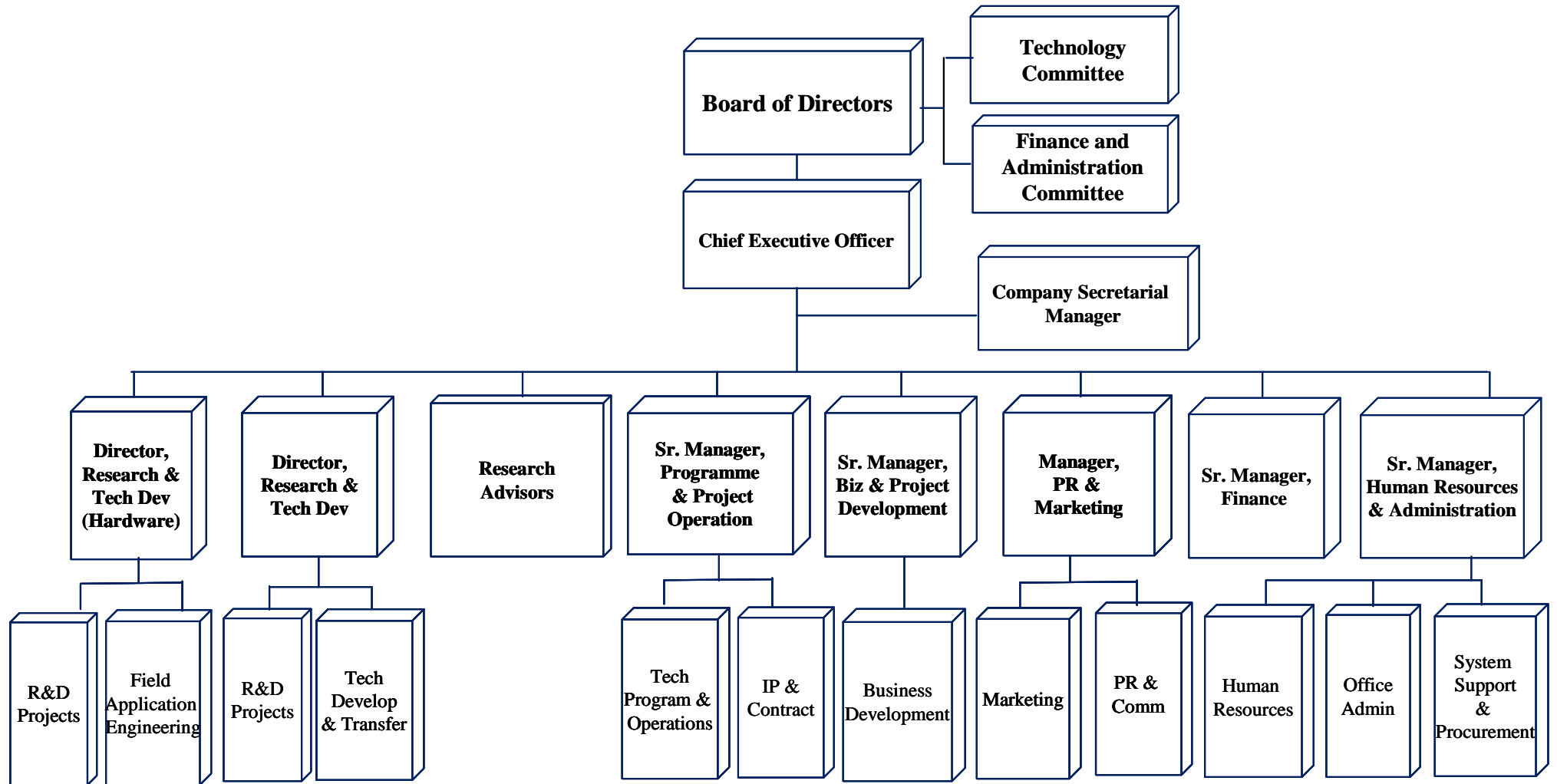
Explanatory Notes –

- (1) The figure shown denotes the income from a batch of six early projects which commenced before April 2006 and commercialised by the university concerned.

Staff Strength (2006–13)

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Non-R&D Staff	6	13	15	18	15	21	16
R&D Staff	7	8	16	22	22	23	37
Total	13	21	31	40	37	44	53

Organisation Chart of LSCM



Total no. of posts in 2013-14: 67

Appendix 2

Summary of Projects undertaken by LSCM (April 2006 to March 2013)

	Project Title	Project Cost (\$million)
1.	RFID Benchmarking: Methodology and Practice	2.2
2.	RFID Enabling Technologies for Retail & Logistics Industry	7.4
3.	RFID-based Interoperable Gateway for Logistics Service Platforms (RIG)	11.3
4.	An eLogistics Appliance with Data Exchange and Conversion Technologies for Infrastructure Connectivity	6.6
5.	Study the Design Challenges of 90nm Technology UHF RFID Tag IC	2.2
6.	Integrated Passive UHF RFID Tags and Readers	7.7
7.	Privacy Protection and Communication Security in RFID Systems	2.0
8.	A Market Intelligence Study on Enabling Technologies for Industries related to Logistics & Supply Chain Management	10.0
9.	Trustworthy RFID Technologies: Methodology and Practice	4.5
10.	RFID-enabled Platform Technology for the Integrated Shenzhen-Hong Kong Food Safety and Supply Chain Management Public Information Platform	10.0

Project Title

**Project Cost
(\$million)**

- 11. Package-specific RFID Tagging and Embedding Technology

14.4



LSCM's antenna design for wine bottles

- 12. Interoperability Technology and Applications for Container RFID and e-seal

9.6



RFID-enabled Container Yard Management System

- 13. RFID-Enabled Real-Time Manufacturing Shop-floor Information Infrastructure for PRD Processing Trade Enterprises

7.5

	Project Title	Project Cost (\$million)
14.	Enhancing the Competitiveness of the Hong Kong Air Freight Forwarding Industry Using RFID and Software Agent Technologies	4.5
15.	RF-based Technologies for Asset/Personnel Tracking	6.5
16.	RFID Benchmarking Methodology, Report and Tool Support	10.7
17.	Lightweight RFID Reader Chip for NFC and Mobile Applications	14.6



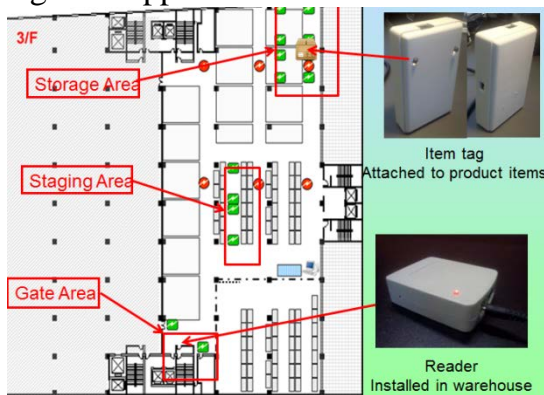
LSCM's UHF Gen2 Reader Chip for mobile RFID applications - first reader-chip ever designed in Greater China region

18.	RFID Application Service Technology in Guangdong-Hongkong Import/Export Supervision and Management	4.6
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RFID-enabled Passageway Monitoring Application at Shengshui Slaughter House

	Project Title	Project Cost (\$million)
19.	RFID Traceability for Risk Management in Hospital	11.0
20.	RFID-based Enabling Technology for On-Target Visibility in Garment Supply Chains*	3.1
21.	Service Platform for PRD Waterway Logistics Operators	7.8
22.	RFID Tagging and Packaging Technology for Food Products	10.9
23.	Low-cost versatile tracking device and technology for logistics applications	5.5



Tracking devices for warehouse management

24.	Use-IT-Easy: A Low Cost, High Performance Mobile RFID Platform	6.4
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Mobile RFID Reader

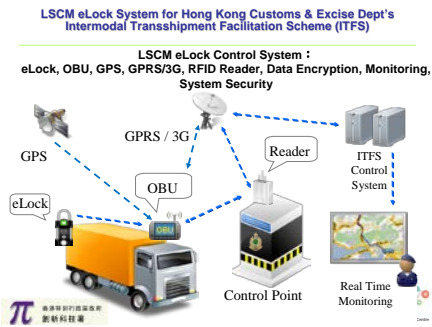
25.	Real Time Food Quality Management Service System	11.1
26.	Development of a printable RFID antenna on packages with polymer and paper substrate*	0.9
27.	Trust Solution for RFID Enabled Interoperable E-logistics	5.2

Project Title

**Project Cost
(\$million)**

28. E-Lock-Based Enabling Technology for Container Cargo Transshipment Process

10.0



An E-locked Enabled ITFS



ITFS enabled control point by Hong Kong Customs and Excise Department using LSCM designed E-Lock Monitoring System

29. RFID and Sensor-based Productivity Enhancement System for Human-operated Workplace

12.9



Smart key chain for Correctional Service Department



RTHK inventory tagging

	Project Title	Project Cost (\$million)
30.	Enabling Technologies for Baby Tracking in Hospital Environment (Tamper resistant & reusable baby tag)	12.6



The Babytag design



An illustration of alert system for baby monitoring

31.	Optimal Design of Novel Reconfigurable UHF Antenna Systems for the Smart Shelf RFID Technology	1.0
32.	Service-Oriented System for Real-time Optimisation and Execution of RFID-Enabled Smart Container Loading*	1.2
33.	Food safety system w/ Enterprise application suite	2.3
34.	RFID Traceability for Risk Management in Hospital	3.3
35.	Low-Cost and “Green” UHF RFID Tags	10.5
36.	Trusted Network-based RFID Infrastructure	4.4

Project Title

**Project Cost
(\$million)**

37. Product Authentication at Retail Points - Infrastructure and Systems

7.3

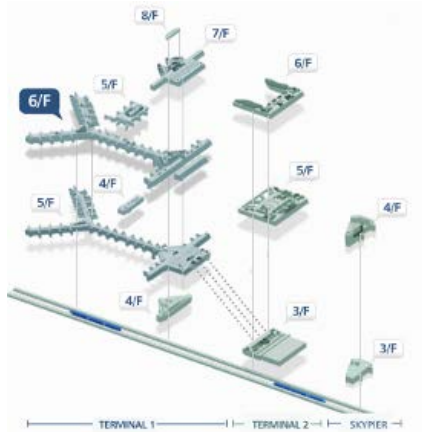


Product Authentication mechanism

Product authentication system at retail point

38. Indoor Localisation, Tracking and Navigation

10.8



Indoor Navigation Assistance for travelers in Hong Kong International Airport

39. RFID-Enabled Sensing Technologies for Real-time Environmental Monitoring and Risk Management

10.5



Active tag for archive items



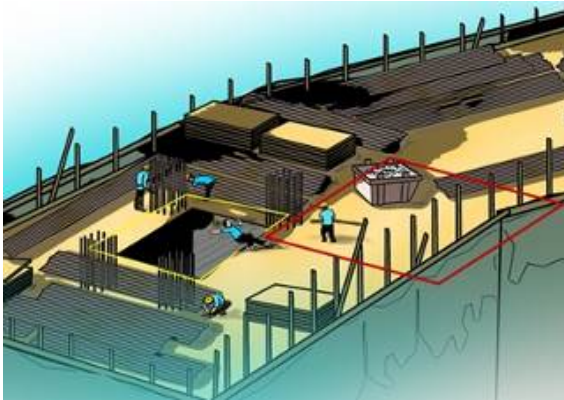
Sensor-integrated RFID tag prototype

Project Title

**Project Cost
(\$million)**

- 40. Location-based Technologies for Asset Tracking and Risk Management

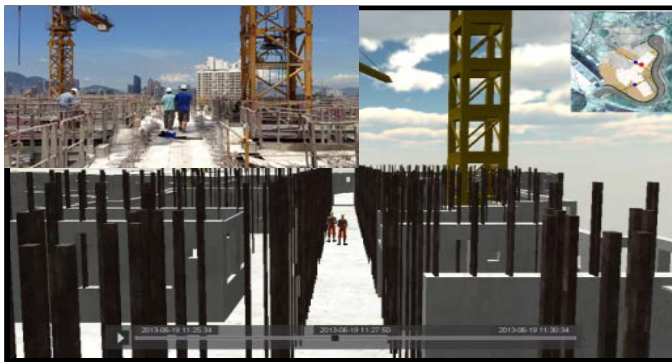
11.2



Dangerous situations of outdoor works



Housing Authority construction site pilot

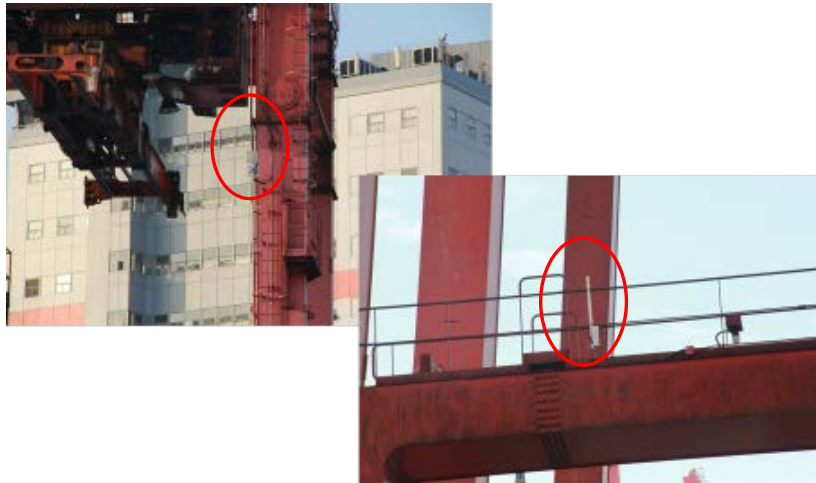


Dangerous situations of outdoor works

- 41. Innovating an Efficient Outdoor Mobile Wireless Mesh Network*

2.4

	Project Title	Project Cost (\$million)
42.	Designing an advanced outdoor wireless router*	0.7



Mesh Routers installed at a container terminal

43.	Use-IT-Easy: Item Level Tagging Platform in Supply Chain Industry Using Mobile RFID Reader	1.6
44.	Package-specific RFID Tagging and Embedding	3.5



Using RFID for film archive



Implementation site at Hong Kong Film Archive - Archival item storage using RFID technologies

- | | Project Title | Project Cost (\$million) |
|-----|--|---------------------------------|
| 45. | E-Lock-Based Enabling Technology for Container Cargo Transshipment Process | 2.3 |
| 46. | RFID Tagging and Application Technology for Food Products | 2.0 |



RFID Tags for Signboard Management of Building Department

- | | | |
|-----|---|-----|
| 47. | RFID Tagging and Packaging Technology for Food Products | 0.5 |
|-----|---|-----|



RFID Reader Installed at Checkpoints



Wearable RFID Tags embedded in a vest

Note: * - Collaborative project