For discussion
on 17 April 2012

Legislative Council
Panel on Commerce and Industry

Funding Proposals for Research and Development (R&D) Centres

PURPOSE

This paper seeks Members' views on funding proposals for extending the operation of R&D Centres set up under the Innovation and Technology Fund (ITF).

BACKGROUND

2. The ITF was established in 1999 to fund projects that contribute to innovation and technology upgrading in manufacturing and service industries. As at end-March 2012, ITF has supported over 2 700 projects, including some 1 700 R&D projects, at an approved funding of about $6.4 billion. The uncommitted ITF balance was $2.1 billion.

Current Funding Commitment for R&D Centres

3. In June 2005, Finance Committee (FC) 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 5-year operation up to 31 March 2011. In April 2006, the Government set up the following R&D Centres as focal points to drive and coordinate applied R&D and to promote commercialization –

(a) Nano and Advanced Materials Institute (NAMI);

(b) Automotive Parts and Accessory Systems R&D Centre (APAS);

(c) Hong Kong Research Institute of Textiles and Apparel (HKRITA);

(d) R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM); and

(e) R& D Centre for Information and Communications Technologies under the Hong Kong Applied Science and Technology Research Institute (ASTRI).

Regarding (e), the operating cost of ASTRI is met separately from Government's annual recurrent subvention block grant due to historical reasons. Hence, there is no need to seek additional funding for it under the current exercise.

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

5. In June 2009, FC further 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. Hence, in total, FC has approved a total funding commitment of $642.9 million for the operation of the R&D Centres for a period of 8 years up to 31 March 2014. A summary of the Centres' respective approved funding commitments, cumulative operating expenditure up to 31 March 2012 (i.e. a period of 6 years) and the latest staffing situation is as below –

	Total Approved Commitment up to 31 March 2014 ($M)	Operating Expenditure up to 31 March 2012[#] ($M) [*% of Approved Commitment*]	No. of Staff as at March 2012 [*Establishment*]
NAMI	189.8	119.8 [*63%*]	47 [*69*]
APAS	167.6	89.8 [*54%*]	29 [*33*]
HKRITA	153.6	63.0 [*41%*]	22 [*27*]
LSCM	131.9	83.4 [*63%*]	44 [*55*]
Total:	642.9	356.0 [*55%*]	-

 # After netting-off R&D project administrative overheads and subject to 2011-12 final audited accounts.

Comprehensive Review of R&D Centres After Five Years of Operation

7. At the Panel meeting on 20 December 2011, we briefed Members on the outcome of the comprehensive review of R&D Centres' performance in their first five-year period vide Paper No. CB(1)624/11-12(05) (copy at ***Annex A***). Having regard to the review findings, we then proposed the following arrangements (paragraph 29 of the Paper) –

(a) for R&D Centres which meet the industry contribution target of 15% in their first five-year period i.e. NAMI and APAS, we will consider extending their operation beyond 31 March 2014 (viz. when their current approved funding expires) to allow them to plan their work on a longer horizon, noting that APAS will be merged with the Hong Kong Productivity Council (HKPC) in due course. Further reviews of their performance will be conducted in good time;

(b) for the other two Centres i.e. HKRITA and LSCM which have not yet achieved an industry contribution of 15% in the first five years, we will set key performance indicators (e.g. increase in industry contribution) and observe their performance for another two years and make recommendations on their future before the expiry of the current approved funding on 31 March 2014. Possible options include maintaining the status quo, disbandment, merger with an appropriate organization, etc.; and

(c) ASTRI has demonstrated an improving performance and its operation will continue to be funded under Government's annual recurrent subvention.

8. After consulting the Panel, we have in the past three months gathered further information including the performance of the four R&D Centres in 2011-12 (including trial use of their R&D results in the public sector) as well as their future business plans and funding requirements for analysis and consideration of the way forward for the Centres upon expiry of their current funding period on 31 March 2014. Our analysis and proposals are set out in the ensuing sections -

(A) Additional Funding for Extending the Operation of R&D Centres;

(B) Level of Industry Contribution;

(C) Commercialization; and

(D) Future of the ITF.

PROPOSALS

(A) Additional Funding for Extending the Operation of R&D Centres

General Principles

9. Having regard to the latest performance and progress of individual Centres, their future business plans and the interest and response of the industry, we consider that there is a case to extend the operation of the R&D Centres beyond 31 March 2014.

10. To enable the Centres to continue with their work and recruit/retain necessary staff to support their operation, we intend to seek FC's funding approval for extending their operation roughly two years before the current approved funding commitment lapses on 31 March 2014. In considering the amount of additional funding to be provided to each R&D Centre, we have taken into account the following –

(a) the Centre's past performance, especially the level of industry contribution achieved as this is a most important indicator showing the degree of confidence/support a Centre can secure from its industry;

(b) the Centre's past expenditure pattern, including the funding commitments approved in the past, expenditure trend, any deviations from the estimates and if yes, whether there are reasonable justifications for such deviations;

(c) the Centre's operational needs including its mode of operation, staffing, pool of R&D projects, work on the commercialization front, etc. In this regard, ITC has scrutinized closely the budgets submitted by the various R&D Centres;

(d) the Centre's projected level of activities (or "business") in the coming years. This includes –

- on the macro/industry front, assessing the prospects of the sector(s) and trade(s) which the Centre serves; the prospects of the application of the various technologies concerned; whether the industry is expanding or shrinking, etc.; and

- on the micro/Centre front, assessing the projects on hand and from these deduce the expected level of activities/business in the coming years; and

(e) the Centre's management capacity e.g. whether the management has the ability to cope with the proposed level of expenditure and deliver the deliverables as pledged; span of control of senior management, etc.

Extension and Funding Proposals for Individual Centres

For the two R&D Centres which have met the interim industry contribution target of 15% in their first five-year period, i.e. NAMI and APAS

11. NAMI and APAS have been putting up satisfactory performance since their establishment and are able to meet the interim industry contribution target of 15%. In 2011-12, they continued to initiate new collaborative projects and put effort to promote trial use of their R&D results in the public sector. While noting the positive progress and contribution made by NAMI and APAS so far, we consider it prudent to extend their operation with the ITF funding for another three years from April 2014 to March 2017. This will allow time for the two Centres to further build up their capacity and map out their long-term goals and directions.

NAMI

12. In the light of the good performance of NAMI in the first five years, we propose to –

(a) extend NAMI's operation beyond 31 March 2014 (viz. when its current approved funding commitment expires) for three years up to 31 March 2017, hence allowing it to plan its work on a longer horizon; and

(b) provide NAMI with an additional funding of $195.4 million.

13. A summary showing the funding commitment already approved for NAMI as well as the proposed additional funding is as follows –

Funding Already Approved –

	(in $million)
Funding commitment approved by FC in June 2005 for NAMI's first 5-year period (1 April 2006 – 31 March 2011)	61.4
[Note: Actual expenditure of NAMI for the first 5-year period (1 April 2006 – 31 March 2011)	*84.5 (or 38% above the original approved commitment of $61.4M)]*
Additional funding approved by FC in June 2009 for extending NAMI's operation for 3 years (up to 31 March 2014)	128.4
i.e. Total approved funding commitment for NAMI for an 8-year period (1 April 2006 – 31 March 2014)	**189.8**
[Note: Actual expenditure of NAMI for the first 6-year period (1 April 2006 – 31 March 2012)	*119.8 (or 63% of the total approved commitment of $189.8M with two more years to go; average annual expenditure: $20M)]*

Additional Funding Proposed –

	(in $million)
Proposed additional funding for extending NAMI's operation for 3 further years (up to 31 March 2017)	195.4
i.e. Proposed total funding commitment for NAMI for a 11-year period (1 April 2006 – 31 March 2017)	***385.2***

14. One may comment that the proposed additional funding to NAMI is aggressive, especially if we take the average annual expenditure of $20 million in the past as reference. We to a certain extent agree to this. We however still consider such a level of increase justified due to the following reasons –

(a) the expenditure level in the early years upon the setting up of the Centre was comparatively low as the Centre took time to procure accommodation and equipment, employ staff, etc. It needs time to scale up; and

(b) having put forward an impressive performance in the first five years (achieving 41.1% of industry contribution in 2010-11), we should encourage the Centre to strive further to support the industry.

Furthermore, the additional funding proposed is only a commitment serving as the funding cap. All Centres are required to submit annual plans and budgets for approval by their respective Boards of Directors and the Innovation and Technology Commission every year to justify their funding requirements in detail. In addition, we will continue to submit the Centres' annual progress reports to this Panel. For details on NAMI's business plan, please refer to ***Annex B***.

APAS

15. In the light of the past performance of APAS (industry contribution meeting target, kicking off some good public sector trials, etc.), we propose to –

(a) extend APAS's operation beyond 31 March 2014 (viz. when its current approved funding commitment expires) for three years up to 31 March 2017; and

(b) provide APAS with an additional funding of $60.6 million.

The proposed additional funding includes provisions for procuring specialized equipment to support the industry e.g. testing of spare parts and prototypes, Electric Vehicle (EV)-related research facilities, etc. In addition, it is expected that APAS will undertake market research on automotive-technologies to facilitate further collaboration with the industry in tapping opportunities in the Mainland's automotive market.

16. In addition, as explained in the last Panel Paper No. CB(1)624/11-12(05) (copy at Annex A), we propose to merge APAS with HKPC which can facilitate closer collaboration and to pool APAS's resources to focus on R&D projects and technology matters, thus bringing greater benefit to the industry. Since our submission to the Panel in December 2011, we have been working closely with the management of APAS and HKPC to work out details of the merger which is expected to take place in late 2012.

17. A summary showing the funding commitment already approved for APAS as well as the proposed additional funding is as follows –

Funding Already Approved –

	(in $million)
Funding commitment approved by FC in June 2005 for APAS's first 5-year period (1 April 2006 – 31 March 2011)	100.0
[Note: Actual expenditure of APAS for the first 5-year period (1 April 2006 – 31 March 2011)	*70.4 (or 70% of the original approved commitment of $100.0M)]*
Additional funding approved by FC in June 2009 for extending APAS's operation for 3 years (up to 31 March 2014)	67.6
i.e. Total approved funding commitment for APAS for an 8-year period (1 April 2006 – 31 March 2014)	**167.6**
[Note: Actual expenditure of APAS for the first 6-year period (1 April 2006 – 31 March 2012)	*89.8 (or 54% of the total approved commitment of $167.6M with two more years to go ; average annual expenditure: $15M)]*

Additional Funding Proposed –

	(in $million)
Proposed additional funding for extending APAS's operation for 3 further years (up to 31 March 2017)	60.6
i.e. Proposed total funding commitment for APAS for a 11-year period (1 April 2006 – 31 March 2017)	***228.2***

----- For details on APAS's business plan, please refer to ***Annex C***.

*For the two R&D Centres which have **NOT** met the interim industry contribution target of 15% in their first five-year period, i.e. HKRITA and LSCM*

HKRITA

18. As explained in the last Panel Paper No. CB(1)624/11-12(05) (Annex A), HKRITA's industry contribution for the first 5-year period was only 12.4% which was below the interim target of 15%. However, we appreciate the industry's aspiration for the continued existence of a R&D Centre to support the industry. We also note that after closing of the last five-year review period, HKRITA's level of industry contribution has been on the rise recently (23% in 2011-12). It has also made a good start in commercialization (e.g. the Nu Torque™ Single Ring Yarn technology has received licence fees of about $5 million so far). There also appears to be other high-potential project deliverables ready for commercialization e.g. novel quick testing sensors of formaldehyde in textiles fabrics and clothing products. As such we propose to –

(a) extend HKRITA's operation beyond 31 March 2014 (viz. when its current approved funding commitment expires) for one year up to 31 March 2015. This is to allow more time for the Centre to "catch up" on its performance and prove its worth; and

(b) continue to closely monitor/review the performance of HKRITA after 31 March 2013 (i.e. two years after the last round of review). If by then it manages to meet the industry contribution target of 18% (see section (B) on "Level of Industry Contribution" below) and can satisfy the Controlling Officer in terms of overall performance, we will consider how to support and sustain its further operation for an appropriate period (see Section (D) on "Future of the ITF" below). However, if by then its performance is still below target and expectations (we hope this will not be the case), we will have to consider alternatives such as disbandment or merging with an appropriate organization. HKRITA has estimated that its total expenditure will only reach $140.2 million by 31 March 2015, which can be adequately covered by its current approved commitment of $153.6 million i.e. no additional funding will be required for the proposed extension of its operation for one further year.

19. A summary showing the funding commitment already approved for HKRITA is as follows –

Funding Already Approved –

	(in $million)
Funding commitment approved by FC in June 2005 for HKRITA's first 5-year period (1 April 2006 – 31 March 2011)	60.3
[Note: Actual expenditure of HKRITA for the first 5-year period (1 April 2006 – 31 March 2011)	*47.0 (or 78% of the original approved commitment of $60.3M)]*
Additional funding approved by FC in June 2009 for extending HKRITA's operation for 3 years (up to 31 March 2014)	93.3
i.e. Total approved funding commitment for HKRITA for an 8-year period (1 April 2006 – 31 March 2014)	**153.6**
[Note: Actual expenditure of HKRITA for the first 6-year period (1 April 2006 – 31 March 2012)	*63.0 (or 41% of the total approved commitment of $153.6M with two more years to go ; average annual expenditure: $11M)]*

No Additional Funding Required

----- For details on HKRITA's business plan, please refer to ***Annex D***.

LSCM

20. The case of LSCM is pretty similar to that of HKRITA. Its industry contribution for the first 5-year period was only 12.3%, which was below the target of 15%. However, we appreciate the industry's aspiration for the continued existence of a R&D Centre to support the industry. We also note that with the Centre taking an approach of working more closely with the trade and the relevant public sector partners,

its performance is improving. Taking full account of the vibrancy of the logistics trade and supply chain sector, we hence propose to –

(a) extend LSCM's operation beyond 31 March 2014 (viz. when its current approved funding commitment expires) for one year up to 31 March 2015. This is to allow more time for the Centre to "catch up" on its performance and prove its worth;

(b) continue to closely monitor/review the performance of LSCM after 31 March 2013 (i.e. two years after the last round of review). If by then it manages to meet the industry contribution target of 18% and can satisfy the Controlling Officer in terms of overall performance, we will consider how to support and sustain its further operation for an appropriate period. However, if by then its performance is still below target and expectations (we hope this will not be the case), we will have to consider alternatives such as disbandment or merging with an appropriate organization; and

(c) provide an additional funding of $19.3 million to enable LSCM to meet the operating cost of the additional one year up to 31 March 2015.

21. A summary showing the funding commitment already approved for LSCM as well as the proposed additional funding is as follows –

Funding Already Approved –

	(in $million)
Funding commitment approved by FC in June 2005 for LSCM's first 5-year period (1 April 2006 – 31 March 2011)	52.2
[Note: Actual expenditure of LSCM for the first 5-year period (1 April 2006 – 31 March 2011)	*64.3 (or 23% above the original approved commitment of $52.2M)]*
Additional funding approved by FC in June 2009 for extending LSCM's operation for 3 years (up to 31 March 2014)	79.7
i.e. Total approved funding commitment for LSCM for an 8-year period (1 April 2006 – 31 March 2014)	**131.9**
[Note: Actual expenditure of LSCM for the first 6-year period (1 April 2006 – 31 March 2012)	*83.4 (or 63% of the total approved commitment of $131.9M with two more years to go; average annual expenditure: $14M)]*

Additional Funding Proposed –

	(in $million)
Proposed additional funding for extending LSCM's operation for one further year (up to 31 March 2015)	19.3
i.e. Proposed total funding commitment for LSCM for a 9-year period (1 April 2006 – 31 March 2015)	***151.2***

----- For details on LSCM's business plan, please refer to ***Annex E***.

(B) Level of Industry Contribution

22. As mentioned above, since R&D Centres are the platforms for coordinating applied research in designated technology areas and facilitating technology transfer to the industry, the level of industry contribution is both an important and useful indicator to show the degree of support from the industry to the respective Centres. In this regard, Members may wish to note that having regard to the performance of the Centres in their first five-year period, we have set higher targets for them in the second five-year period.

23. In the case of HKRITA and LSCM which have yet to achieve the baseline industry contribution target of 15% in the first five-year period, we have requested the two Centres to achieve an industry contribution target of around 18% in the two-year period ending 31 March 2013. Both the Boards and the Management of the two Centres have been informed of this new and progressive target. We will assess their performance after the observation period and consider the way forward. If changes in the institutional set-up of the Centres are required, the proposed one-year extension for the Centres up to 31 March 2015 will provide the buffer in terms of time and resources to implement the necessary changes and follow-up actions.

24. As for NAMI and APAS which have achieved more than 15% industry contribution in their first five-year operation, we will expect them in general to achieve an average industry contribution level of at least 20%. This is applicable for the second five-year period and the results from the first five-year period will not be counted. We believe this has struck a balance for R&D Centres in conducting a balanced portfolio of platform and collaborative projects as well as serving the needs of companies of different sizes and needs (as well as for the public sector in the interest of the community). This new target will also be applicable to HKRITA and LSCM should they pass the observation period.

(C) Commercialization

25. As the R&D Centres have become more established with more R&D projects completed, we would expect them to be more proactive in commercialization and technology transfers. Areas of assessment may include industry income from licensing fees, royalty payments and contract research, number of companies granted with technology licence, etc. Since the work of commercialization is still at a relatively early stage, we have not set common and specific targets for the R&D Centres at this point in time. [Note: Apart from commercialization, we also encourage the Centres to make use of their R&D results to serve the community at large – via application in the public sector which includes Government departments, quangos and trade associations.]

26. Since the R&D Centres have varying performances and circumstances, we are working with their Boards to set unique and more aggressive performance targets for them as appropriate. Hence, the 20% industry contribution level should not be taken as the sole performance target for R&D Centres in the coming years. Besides, the uplift of cash rebate level from 10% to 30% under the R&D Cash Rebate Scheme starting from 1 February 2012 should further assist R&D Centres in attracting contribution from their industry partners to kick start applied R&D projects. We will monitor the impact of the new initiative closely.

(D) Future of the ITF

27. At present, the support and the financing of R&D Centres constitute an important part of the ITF. It enables resources to be focused in a number of areas which Hong Kong has good potentials in (after extensive consultations). In approving the funding for the establishment and first five-year operation of the R&D Centres under ITF in 2005, FC noted that –

> "If an R&D Centre is to continue operation beyond the five-year period, it is expected to do so on a self-financing basis, counting on its ability to obtain adequate industry contribution and generate income to meet its operating cost."

However, such "self-financing" target has proved to be ambitious. Hence, when seeking FC's approval in 2009 for extending the operation of the R&D Centres for another three years up to 31 March 2014, we indicated in the FC paper that –

> "Whilst self-financing should remain our ultimate goal, this could only be achieved over a longer-term horizon as it is internationally accepted that R&D projects may not produce immediate or short-term financial results."

28. If our current extension proposal is approved by FC, the four R&D Centres will be in operation with ITF funding for a total of either 9 or 11 years (up to 31 March 2015 and 31 March 2017 respectively). Furthermore, with more ITF funding committed to the running of these four R&D Centres (as proposed in this paper) as well as the need to meet R&D expenditure of non-R&D Centre projects (e.g. projects undertaken by local universities, those undertaken by private companies under the Small Entrepreneur Research Assistance Programme, etc.), the uncommitted ITF balance of $2.1 billion as at end-March 2012 may be fully committed in around 2013 to 2014 (depending on rate of approving ITF funding for new projects, whether further initiatives to promote innovation and technology are introduced, etc.). The Government will take a critical look at the long-term funding arrangements for R&D projects/activities and the R&D Centres funded by ITF and consult the Panel in due course.

FINANCIAL IMPLICATIONS

29. It is estimated that an additional grant of $275.3 million, over and above the $642.9 million already approved by the FC, is required from the ITF to support our proposals of –

(a) extending NAMI's operation up to 31 March 2017 with $195.4 million of additional funding required;

(b) extending APAS's operation up to 31 March 2017 with $60.6 million of additional funding required; and

(c) extending LSCM's operation up to 31 March 2015 with $19.3 million of additional funding required.

No additional funding is required for extending HKRITA's operation up to 31 March 2015.

30. The estimated funding requirements of the R&D Centres can be met by the uncommitted balance of the ITF which stood at $2.1 billion as at end-March 2012.

ADVICE SOUGHT

31. Members are invited to advise on the above extension and funding proposals. Subject to Members' views, we will submit the funding proposals to FC for approval in May/June 2012.

Innovation and Technology Commission
April 2012

LC Paper No. CB(1)624/11-12(05)

For discussion
on 20 December 2011

Legislative Council
Panel on Commerce and Industry

Comprehensive Review of R&D Centres Set Up Under the Innovation and Technology Fund

PURPOSE

This paper seeks Members' views on the findings and recommendations of the Comprehensive Review of the R&D Centres set up under the Innovation and Technology Fund (ITF).

BACKGROUND

2. In April 2006, the Government set up R&D Centres in five selected focus areas to serve as focal points for conducting applied R&D and promoting commercialization of R&D results -

(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);

(c) Hong Kong Research Institute of Textiles and Apparel (HKRITA);

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

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

Except for ASTRI, each of them is set up as a separate legal entity with a hosting organization which possesses the necessary R&D infrastructure, hence enabling the Centres to commence operation as soon as possible. The hosting organizations and the latest staffing situation of the Centres are as follows -

	Hosting organization(s)	Staff Strength as at end-November 2011 *[Establishment]*
APAS	Hong Kong Productivity Council (HKPC)	29 [*33*]
ASTRI	N.A.	594 [*670*]
HKRITA	Hong Kong Polytechnic University (PolyU)	23 [*25*]
LSCM	University of Hong Kong (HKU), Chinese University of Hong Kong (CUHK) and Hong Kong University of Science and Technology (HKUST)	39 [*56*]
NAMI	HKUST	102 [*113*]

3. The total funding commitment approved by the Finance Committee (FC) for the R&D Centres (except ASTRI)[1] to meet their operating expenditure up to 31 March 2014 (i.e. for a period of 8 years) is $642.9 million. As at 31 March 2011, the cumulative operating expenditure of the R&D Centres was $274.5 million (or 43% of the approved commitments). R&D projects undertaken by the R&D Centres are funded separately by the ITF on a project basis.

4. In 2009, we conducted the Mid-Term Review of the R&D Centres. In seeking FC's approval for extending the Centres' operation, we undertook to –

(a) conduct a review in 2010 to look into the *modus operandi* of the R&D Centres to see if there is any room for achieving greater savings and higher cost-effectiveness; and

(b) conduct a comprehensive review in 2011 on the R&D Centres' operation and overall performance for the first five-year period, taking full account of their experience in technology transfer and commercialization.

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[1] *The operating cost of ASTRI is met from Government's annual recurrent subvention block grant.*

In respect of the level of industry contribution for the first five-year period, we also adjusted the original target of 40% to an interim target of 15% pending further review.

5. We reviewed the *modus operandi* for R&D Centres and submitted a report to this Panel in November 2010. In brief, the review concluded that the operating expenditure of R&D Centres supported a wide range of activities, including direct research, project vetting and monitoring, commercialization and administrative support. The findings and recommendations of the Comprehensive Review are set out in the following paragraphs.

LATEST SITUATION

6. We have reviewed the key areas of operation and performance of R&D Centres in their first five-year period (viz. April 2006 to March 2011). Having regard to the Centres' latest development, the level of industry contributions they secure should be one of the major performance indicators in reflecting interest and confidence from the industry in their R&D projects and results. Their operating and R&D expenditure, number of R&D projects undertaken and the level of industry contribution achieved during this period are summarized as follows –

Operating and R&D Expenditure of R&D Centres
from April 2006 to March 2011(*in $million*)

	(A) Operating Expenditure	(B) R&D Project Expenditure	(C) = (A) + (B) Total Expenditure
APAS	71.2 (*8.9%*)	89.9 (*5.9%*)	161.1
ASTRI	526.3 (*65.7%*)	1,114.0 (*72.8%*)	1,640.3
HKRITA	47.0 (*5.9%*)	98.0 (*6.4%*)	145.0
LSCM	71.0 (*8.9%*)	139.4 (*9.1%*)	210.4
NAMI	85.3 (*10.6%*)	89.5 (*5.8%*)	174.8
Total:	800.8 (*100%*)	1,530.8 (*100%*)	2,331.6

Number of R&D Projects[2] Commenced

	2006-07	2007-08	2008-09	2009-10	2010-11	5-year Cumulative
APAS	-	10 (1)[3]	10 (0)	17 (0)	10 (5)	47 (6)
ASTRI	21 (0)	37 (0)	46 (6)	48 (2)	44 (4)	196 (12)
HKRITA	-	16 (0)	12 (1)	13 (0)	10 (0)	51 (1)
LSCM	-	8 (0)	9 (0)	9 (2)	3 (0)	29 (2)
NAMI	-	7 (5)	7 (2)	17 (4)	14(6)	45 (17)
Total	21 (0)	78 (6)	84 (9)	104 (8)	81 (15)	368 (38)

Level of Industry Contribution Achieved
(based on approved project commitment)

	2010-11	5-year Cumulative (*April 2006 to March 2011*)
APAS	28.1%	16.5%
ASTRI[4]	20.3%	14.9%
HKRITA	12.3%	12.4%
LSCM	12.1%	12.3%
NAMI	41.1%	31.2%

[2] *Under ITF, there are broadly two types of R&D projects –*

(a) platform projects require industry contribution of at least 10% of the project cost from two or more companies. The industry sponsors will not be entitled to own the project IP; and

(b) collaborative projects require industry contribution of at least 30% (for R&D Centres' projects) or 50% (for non-R&D Centres' projects) of the project cost. The industry partner will be entitled to exclusive right to utilize the project IP for a defined period or own the project IP.

Seed Projects are capped at $2 million per project and aim to provide foundation work for future platform/collaborative projects. No industry contribution is required.

[3] *Figures in brackets denote number of collaborative projects.*

[4] *Due to historical reason, ASTRI has adopted a slightly different method of calculating industry contribution.*

ANALYSIS

(A) <u>APAS</u>

7. The performance of APAS showed marked improvements in 2010-11 when there was an increase in the number of collaborative projects and hence achieving a higher level of industry contribution of 28.1% that year. The overall industry contribution level was 16.5% for the first five-year period, hence meeting the interim target of 15%.

8. Among the completed projects, 6 are under commercialization. The Centre has established collaboration with BYD Company earlier this year on R&D of electric vehicles in Hong Kong. It has also installed its traffic information device prototype on 18 green minibuses for trial since July 2011. In the light of the improving performance, we propose to continue to invest in R&D of automotive parts and accessory systems industry.

9. We also see a case to improve the performance of APAS and achieve higher cost-effectiveness by merging APAS with HKPC for the following reasons -

(a) Both APAS and HKPC (its Automotive and Electronics Division (AED)) undertake applied R&D projects funded by ITF in automotive-related fields. Of the 47 projects funded under APAS in the first five-year period, 43% of these were undertaken by HKPC while 32% was by APAS staff and the rest by universities;

(b) HKPC's AED also conducts R&D projects in automotive technologies. To the industry, this may sometimes create confusion over the role of HKPC and APAS and their division of labour;

(c) Being an independent legal entity, APAS has devoted considerable amount of resources and efforts to deal with administrative and governance matters. Part of APAS's administrative and accounting work has already been outsourced to HKPC; and

(d) On staffing, APAS has experienced difficulties in recruiting and retaining R&D personnel over the years, possibly due to its small establishment and the more specialized research expertise involved.

10. Having considered all relevant factors, Government proposes that in promoting applied R&D in automotive parts and accessory systems in future, we should adopt a more cost-effective arrangement i.e. merging APAS with HKPC.

11. The proposal to merge APAS and with HKPC was discussed separately by both the APAS Board of Directors as well as HKPC Council. Both agreed to the proposed merger as they considered that the following benefits could be achieved:-

(a) A merger can facilitate closer collaboration between APAS and HKPC in R&D projects while making greater use of HKPC's resources and experience in promoting commercialization (e.g. publicity and industry networking). After the merger, HKPC can provide a one-stop shop service to the industry. HKPC's comprehensive staffing complement and extensive network in the Mainland can help to better market APAS's products and to tap the opportunities under the National 12th Five-Year Plan. Besides, the merger can provide a healthier career path for APAS staff as well as enhance the organization's capability in recruiting quality staff; and

(b) APAS can pool its resources to focus on R&D projects and technology matters, thus enhancing its R&D capacity.

(B) <u>NAMI</u>

12. The performance of NAMI is the best among all Centres with its level of industry contribution exceeding 40% in 2010-11 and a cumulative result of 31.2% for the first five-year period. During this period, 17 collaborative projects were undertaken by NAMI which was also the highest among all R&D Centres. This shows that NAMI has won the confidence of the industry. On Centre operation, NAMI has also grown

steadily and built up its in-house research capability, e.g. in renewable energies, to meet industry demand.

13. NAMI has been able to build up a cluster of research interest and efforts in photovoltaic (PV) technology and related areas, e.g. in addition to its mega project on thin-film PV technology, the Centre has recently commenced another large-scale project on CIGS solar cells. Progress has also been made in other market sectors including display and solid state lighting, environmental technologies, and building materials.

14. Among the completed projects, 7 are under commercialization with technology licences granted to several companies. Given its pool of collaborative projects already built up, NAMI's industry income should increase in the coming years.

15. NAMI has also been working actively in trial of its R&D results in the public sector. A solar cell demonstration system has been installed at the Tseung Kwan O Hospital as turn-key installation. Moreover, it has also been working with the Water Supplies Department for trial of nano-galvanized steel coating at sites susceptible to corrosion.

(C) <u>HKRITA</u>

16. The level of industry contribution achieved by HKRITA in 2010-11 was 12.3%, and the cumulative result for the first five-year period was 12.4%. This is below the interim target of 15%. Also, during this five-year period, only one collaborative project was undertaken by HKRITA which was the lowest among all R&D Centres. We note that the textiles and clothing is a mature industry and it is hence relatively difficult to break new grounds like nanotechnology or ICT. The situation however has improved starting from this year with two new collaborative projects commencing and hence resulting in an industry contribution of 28% for the seven-month period from April to October 2011.

17. On Centre's operation, HKRITA is unique in the sense that it does not have in-house research personnel. It draws on the expertise of the Institute of Textiles and Clothing of PolyU which is the only university

in Hong Kong with a dedicated textiles department. For the first five-year period, PolyU's Institute of Textiles and Clothing undertook 40 (or 78%) of the 51 R&D projects funded under HKRITA. HKRITA's role focuses on project solicitation and vetting as well as commercialization.

18. Among the completed projects, 12 are under commercialization with 12 technology licences granted to industry, including Nu-Torque™ Singles Ring Yarns, wet processing system, high performance sportswear, etc., at a total licensing income of $5.3 million. This makes RITA rank the second (after ASTRI) among the five R&D Centres in terms of licensing income. There is also industry interest in other R&D results like sportswear design software. On public sector trial projects, HKRITA is carrying out several projects involving use of new fabrics with special performance in uniforms for government departments and gearing up special fabrics for use and application by elderly homes, etc. There are also further companies, including one from overseas, expressing interest in licensing the Nu-Torque™ yarn technology. We also note that several projects in the pipeline, such as the manufacturing of formaldehyde hand-held sensor and imaging color measurement system, may have good potential for commercialization.

19. The Innovation and Technology Commission (ITC) has requested HKRITA to reinforce its performance, especially in facilitating commercialization, since it does not conduct direct research. These recommendations include:

(a) HKRITA to widen its pool of local collaborating partners apart from PolyU. For example, ITC has discussed with HKPC earlier on closer collaboration with HKRITA and other R&D Centres, by making use of HKPC's resources and experience in promoting commercialization (e.g. publicity and industry networking) and its 'more comprehensive' staffing complement and extensive network in the Mainland which can help to better market R&D Centres' results and to tap the opportunities under the National 12th Five-Year Plan;

(b) HKRITA to search for appropriate overseas and Mainland partners, both in terms of R&D collaboration and in evaluating market situation;

(c) HKRITA to step up its work in commercialization of projects; and

(d) HKRITA to strengthen networking with government departments/public bodies, companies/industry or trade associations, local universities and other research institutes for closer collaboration and to raise the profile of the Centre.

(D) LSCM

20. Despite a very vibrant logistics trade, the number of projects commenced by LSCM in the five-year period was the lowest among the five R&D Centres with only 29 projects, including two collaborative projects. Further, only three platform projects commenced in 2010-11. In terms of industry contribution, the cumulative result for the first five-year period was 12.3%. This is below the interim target of 15% and is the lowest among the Centres.

21. On commercialization, the progress has been slow. So far, LSCM has only managed to license two major R&D deliverables to the industry. LSCM is recently negotiating with interested parties for licensing a few projects and hopes to finalize the licensing agreements in the coming months.

22. To demonstrate the potential of its RFID applications, LSCM has been working with various government departments and public bodies in the past year to explore opportunities of collaboration. For instance, LSCM has been working on the development of an E-lock system for the Customs and Excise Department. LSCM has also started to work on the use of RFID in the Correctional Services Department's key handling and management system and Radio Television Hong Kong's AV equipment inventory.

23. On collaboration with the industry, we received feedback from the trade that LSCM had not been proactive enough in providing R&D support to the industry.

24. ITC as well as the LSCM Board of Directors have repeatedly asked the LSCM management to make improvements. For the first half of 2011-12, we witnessed slight improvements in the performance of LSCM. One platform project and two public sector trial projects have been approved in the period. Besides, one platform project has already been supported by the Centre's Technology Committee, and three public sector trial projects, two platform projects and one collaborative project are now being processed.

25. On staffing, LSCM has recently recruited a new CEO who has a strong industry and business background. Since the arrival of the new CEO, ITC has been working closely with him to improve the operation of LSCM, including boosting the level of industry contribution, delivering more projects with greater impact to the industry, facilitating a culture change in LSCM which would work on market-oriented projects more effectively. Major stakeholders, including industry players, will be consulted.

(E) <u>ASTRI</u>

26. ASTRI is different from the other four R&D Centres in that it has a longer history and hence has a much larger pool of R&D projects and successful cases of commercialization.

27. ASTRI's industry contribution has increased from 16.9% in 2009-10 to 20.3% in 2010-11 (with a cumulative result of 14.9% for 5 years, which is just marginally below the target of 15%). On commercialization, it has made some good progress in licensing its technologies to industry –

(a) During 2010-11, ASTRI attracted 3 new start-ups to establish their R&D and marketing centres in Hong Kong. These new companies are funded by US investors and are actively recruiting young R&D engineers in Hong Kong;

(b) ASTRI has licensed its compact anti-shaking technologies for camera phones to a company which offered a minimum licence fee-cum-royalty income of US$2 million. It is envisaged that

new products using ASTRI's technologies will be launched in the global consumer market in late 2012; and

(c) ASTRI has signed a research agreement with a Mainland company to jointly develop high speed data processing integrated circuits modules which are planned to be deployed in the communication system of China's High Speed Train.

28. ASTRI has also made good use of ITC's new programme "Promoting Innovation and Technology in the Public Sector" and collaborated with a number of government departments and public bodies to conduct test and trial of ASTRI's R&D results. Two examples are –

(a) Sample LED street-lamps have been installed at a Highways Department depot, Housing Department's estates in Tsz Wan Shan and Ma On Shan, and the Hong Kong Science Park. Evaluation of the trial results is under way; and

(b) In collaboration with Education Bureau, MyID, the first generation e-book developed by ASTRI, was put into trial use in more than 30 local schools and was well received by students and teachers. ASTRI's next generation e-book prototypes, together with e-learning management software, have been provided to schools participating in the Bureau's e-Learning pilot schemes.

RECOMMENDATIONS AND WAY FORWARD

29. Having regard to the above, we **recommend** that –

(a) for R&D Centres which meet the industry contribution target of 15% in their first five-year period i.e. NAMI and APAS, we will consider extending their operation beyond 31 March 2014 (viz. when their current approved funding expires) to allow them to plan their work on a longer horizon, noting that APAS will be merged with HKPC in due course. Further reviews of their performance will be conducted in good time;

(b) for the other two Centres i.e. HKRITA and LSCM which have not yet achieved an industry contribution of 15% in the first five years, we will set key performance indicators (e.g. increase in

industry contribution) and observe their performance for another two years and make recommendations on their future before the expiry of the current approved funding on 31 March 2014. Possible options include maintaining the status quo, disbandment, merger with an appropriate organization, etc.; and

(c) ASTRI has demonstrated an improving performance and its operation will continue to be funded under Government's annual recurrent subvention.

ADVICE SOUGHT

30. Subject to Members' advice, we will proceed to work out the detailed funding requirements and business plans for the Centres in the coming years. We shall consult Members again before putting up the funding proposal to FC for approval.

Innovation and Technology Commission
December 2011

Annex B

Nano and Advanced Materials Institute (NAMI)

Summary Report and Business Plan up to 2016-17

1. Mission and vision

The mission of NAMI is to serve as the platform for the technology development of Hong Kong in the areas of nanotechnology and advanced materials. In particular, NAMI will -

(a) identify and perform innovative, market-driven R&D projects in partnership with local industry and research community in a concerted manner; and

(b) drive the commercialisation of R&D project outputs.

2. Institutional Setup

The Centre was established in 2006 as a non-profit-making company wholly owned by The Hong Kong University of Science and Technology (HKUST).

The Board of Directors of NAMI 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;

(b) a Finance and Administration Committee which is responsible for advising on and overseeing all administrative matters; and

(c) an Audit Committee which is responsible for overseeing the governance of NAMI, including Internal Audit.

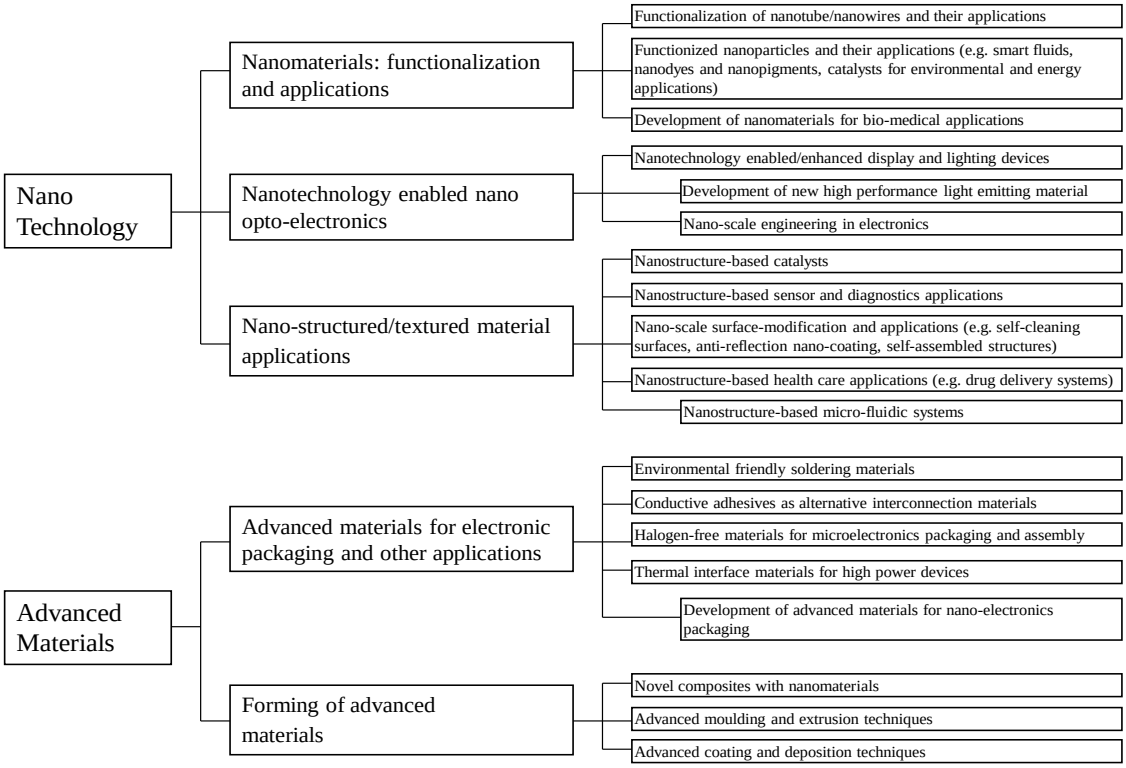
NAMI is required to prepare annual plans and quarterly/annual reports on its operation and submit them to the Commissioner for Innovation and Technology (CIT) for approval.

3. Organisation

As at 1 April 2012, the staff strength of NAMI is 47, against an establishment of 69 posts including the Chief Executive Officer. In addition, it employs about 50 R&D project staff. An organisation chart is at Appendix 1.

4. Technology roadmap and R&D programme

NAMI has been pursuing five core areas of nanotechnology and advanced materials as its technology roadmap in the past few years –



Working with the local industry, it is clear that a combination of technologies can be applied to different market sectors, including sustainable energy, display and solid state lighting, environmental technology, building and construction materials, and bio and healthcare products.

In the coming years, NAMI will continue to focus on the following technology areas –

(a) nanomaterials and nanotechnology enabled products - nanomaterials, nanoparticles and nanostructures with desired properties will be developed in a safe, environment-friendly manner and at a low cost for a series of nanotechnology enabled products such as sensors, healthcare products, energy storage devices and a variety of consumer appliances;

(b) nanoelectronics: display and lighting - it aims to apply nanotechnology to highly demanded nanoelectronics, display and lighting applications by enhancing their performance and lowering their materials and manufacturing cost;

(c) advanced materials: electronic packaging and other applications - new and advanced electronic packaging materials and manufacturing technologies will be developed to enable the technology advancement of the microelectronic packaging industry. Other advanced materials will also be developed such as those for buildings and construction, and biomaterials for consumer and industry; and

(d) advanced manufacturing: technologies for advanced forming, surface treatment and environmental sustainability - this will lead to upgrading of the production technologies for nanomaterials and advanced materials in form of coatings, composites, catalysts, etc. and devices derived from these materials. It emphasises the improvement in process flexibility, productivity, product performance, environmental sustainability and reduction in manufacturing cost.

To ensure its long-term sustainability, NAMI has been offering attractive features to potential sponsors. These include promising preliminary results on a product or technology, the availability of equipment as well as technical knowhow to perform the identified R&D, and the capability to commercialize the R&D deliverables in collaboration with a potential licensee / manufacturer.

Between April 2006 and March 2011, NAMI has undertaken a total of 45 projects, including 17 collaborative projects, at a total cost estimate of $205.8 million. The overall industry contribution for the five-year period is 31.2%.

	2006-07	2007-08	2008-09	2009-10	2010-11
No. of new projects commenced					
- Platform	-	1	4	8	5
- Collaborative	-	5	2	4	6
- Seed	-	1	1	5	3
Total:	-	7	7	17	14

In 2011-12, NAMI undertook 15 new projects, including 5 collaborative projects, bringing the total project cost estimate to $269.2 million. The level of industry contribution in 2011-12 is 35.9%. Over 250 research and related positions are provided under NAMI projects in the past six years. (A list of NAMI projects is at Appendix 2).

In addition, NAMI has accepted 9 contract research projects at a total cost of about $3 million, funded solely by the industry.

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

Commercialization of NAMI products and production technologies is in progress; income is derived from technology licensing fee and volume-based royalty. Up to now, 25 patents are in different stages of filing and examination; these serve as the basis for technology licensing. A low-cost humidity sensor has been licensed to two local companies. A sol-gel technology for the production of non-stick silicon coating on cookware was licensed to a local company as well. Currently, over 10 products generated from existing R&D projects are available for licensing. NAMI has a substantial number of collaborative projects which upon completion bodes well in terms of royalty income in the coming years.

To accelerate commercialization of the NAMI products and technologies, a systematic approach has been adopted. High-priority commercialization projects have been identified from the available licensable project deliverables. For such a commercialization project, a project team consisting of members from the Business Team and the Technical Team of NAMI is formed to drive the commercialization effort according to a task-based execution plan. Our experience indicates that additional R&D work is often required during marketing after completing an R&D project. A case in point is the sol-gel coating that needs to be improved in its adhesion and anti-scratch functions to be competitive in the marketplace. Additional resources will be provided to the

commercialization project team as needed for product improvement, testing and development of new and improved products.

Serving as the focal point for the development of nanotechnology and advanced materials in Hong Kong, NAMI has extensive collaboration with the Government, academia and industry.

NAMI has engaged local research institutes to work with industry. Some of the R&D projects have engaged research institutions based in the Mainland such as the South China University of Technology.

In addition, NAMI has formed a network of overseas research institutions such as Nanyang Technological University as technology providers. This is crucial if expertise is not available locally and in the Mainland. Also, NAMI has aligned itself with various local trade associations.

NAMI has been promoting the development of nanotechnology and advanced materials in Hong Kong through different channels – NAMI's corporate website, seminars, international conferences and workshops. These aim to promote the development and commercialization of products and manufacturing processes for various market sectors. The average number of attendees per event in NAMI organized meetings is over 100.

NAMI has recruited NAMI Consortium members as a way to maintain and enhance communication with individuals interested in nanotechnology and advanced materials.

NAMI has worked closely with different Government bureaux and departments to promote trial use of its R&D deliverables. For example, a 10kW thin-film silicon solar cell unit has been installed on the rooftop of the Tseung Kwan O Hospital as a supplementary source of power. Galvanized steel hangers with enhanced service life have been installed at Water Supplies Department sites. Demonstration units of nano coatings for the decomposition of volatile organic compounds have been installed at Elderly Resources Centre, among others.

6. Budget and cashflow

The current approved commitment for the operation of NAMI up to 31 March 2014 is $189.8 million and the cumulative operating expenditure of the Centre is estimated to be $240.0 million by then. To support its continued operation up to 31 March 2017, an additional funding of $195.4 million will be required for NAMI, i.e. increasing the total funding commitment for 11 years of operation to $385.2 million.

Operating Expenditure ($ million)

	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Total
Staff [(1)]	55.5	26.0	32.8	36.6	30.4	28.3	29.1	238.7
Accommodation[(2)]	8.1	2.4	3.2	4.7	3.7	4.5	4.6	31.2
Equipment and other capital costs [(3)]	9.8	0.5	14.9	7.0	3.0	3.0	3.0	41.2
Commercialization (including publicity, marketing, etc.)	0.8	1.6	3.0	3.2	3.0	3.0	3.0	17.6
Others [(4)]	11.1	8.3	9.0	13.3	16.2	17.4	18.0	93.3
Total expenditure:	85.3	38.8	62.9	64.8	56.3	56.2	57.7	422.0
Less: Administrative overheads [(5)]	0.8	3.5	2.6	4.9	7.6	8.6	8.8	36.8
Total operating cost from ITF:	84.5	35.3	60.3	59.9	48.7	47.6	48.9	385.2

Explanatory Notes –

(1) Staff cost covers basic salary, Mandatory Provident Fund contributions, medical and dental insurances. Inflationary adjustment of 3.5% per annum is assumed. We need to build up a technical team in the coming two years in order to develop our core competency to initiate projects. Once the core team is stabilized, we will gradually reduce the size of this core team and charge the manpower costs of R&D staff to ITF projects.

(2) A reduction in accommodation cost in 2014-15 arises from scheduled rent free allowance offered by the landlord for existing office and laboratory leases.

(3) A sum of $10 million is included for a one-off equipment purchase in 2012-13 to build up the research infrastructure for NAMI's focus market sectors. A provision of $3 million is also included for the renovation of new laboratory facilities at Hong Kong Science Park.

In 2013-14, another sum of $3.4 million is budgeted for equipment purchase and replenishment and a sum of $3.6 million for the renovation of additional office and laboratory facilities at Hong

Kong Science Park to meet the increase in research activities and staff growth in the following years.

(4) "Other" costs include property management fees and utilities, various administrative expenses (including IP filing, duty visit, legal/professional fees, office expenses etc.) and additional overheads required to support in-house R&D work.

(5) The administrative overheads provided under in-house R&D projects conducted by NAMI staff will offset the operating cost involved in supporting these projects.

R&D Projects and Indicative Expenditure ($ million)

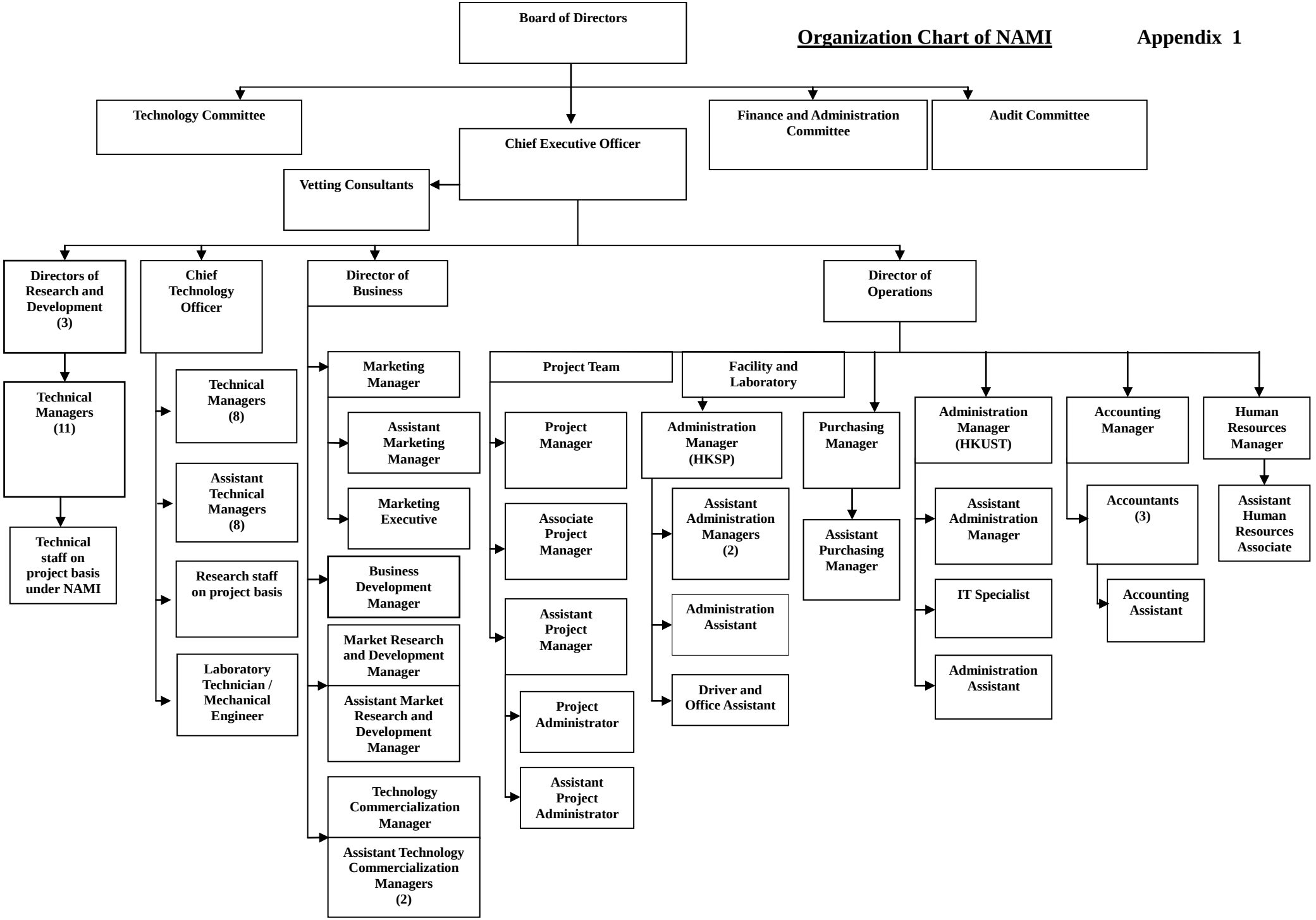
	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Total
No. of new projects commenced(1)	45	15	35	35	36	38	38	242
No. of projects under commercialization	12	17	18	19	24	29	35	N/A
R&D expenditure (Indicative)	**89.5**	**50.1**	**99.9**	**155.8**	**175.1**	**180.2**	**203.1**	**953.7**

Explanatory Notes –

(1) It is estimated that about 180 new projects will be launched for the period from 2012-13 to 2016-17.

Organization Chart of NAMI

Appendix 1

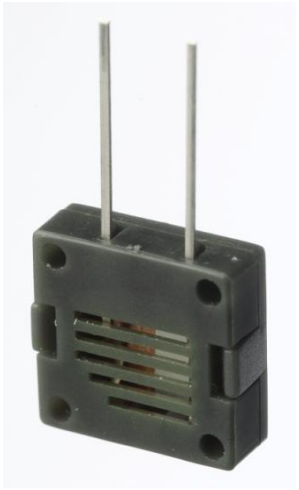


Appendix 2

Summary of R&D Projects Undertaken by NAMI
(April 2006 to March 2012)

	Project Title	Project Cost ($ million)
1.	LED Arrays on Silicon Substrates by Flip-chip Technology	4.0
		
2.	Development and Production of Novel Negative Air Ion Materials and Products	1.0
3.	Development of the Layered Nanostructured Metallic Sheet/Plate for Structural Applications	5.3
4.	Precision Polishing Method for Complex-curved-profile Parts and Polishing Slurry Used for the Method	2.3
5.	Development of Advanced Composite Pellets and a Novel Supercritical Fluid Extraction Process for Micro-powder Injection Moulding Technology	3.2
6.	Nanotechnology-enabled Organic Light Emitting Devices for Decorative and Special-effect Lighting Purposes	3.5
7.	Next Generation Display Technology	8.5
8.	Research & Development of New Materials for Printable Electronics	12.5
9.	Industrialization of Liquid TiO_2 Hydrosol Production and Extensive Applications for Indoor Air Purification* [#]	2.0

	Project Title	Project Cost ($ million)
10.	Demonstration Line for the Production of Low-cost Humidity Sensor*	0.6



11.	Industrial Scale Sonochemical Fabrication of Mesoporous Photocatalysts*	1.0
12.	Nano-enhanced Hot-dip Galvanizing Process*	2.5
13.	High Performance Polymer Nanocomposite Fibers for Electronic Applications*	5.4

14.	Development of Blue OLED Materials and Device*	0.6
15.	To Enhance the Attachment of Cells, Proteins and Peptides on Microplates by Surface Treatment for Enzyme-linked Immunosorbent Assay Applications*	2.4

	Project Title	Project Cost ($ million)
16.	Production of Carbon Nanotube and CNT Application as Catalyst Support and Advanced Material for Energy Storage	5.6
17.	Developing and Manufacturing Nano-structured Oral Dosage Forms of Isoflavone and Insulin with Improved Bioavailability	4.2
18.	Development of a "Green" and Low-cost Process for Synthesizing Nanoparticles for Advanced Ceramic Applications	1.2
19.	Process Development for Batch Production of Fine-structured Magnesium Alloy Sheets Using Thermo-mechanical Macro-deformation Processing System*	1.7
20.	Flexible Liquid Crystal Displays Based on Nanotechnology*	0.5
21.	Development of Functional Nanomaterials with Aggregation-Induced Emission (AIE) Characteristics for Biotechnological Applications	2.0
22.	High-speed III-V Transistors on a Silicon Platform	14.9
23.	Synthesis of Polyhydroxyalkanoate (PHA) Nanocapsules as Protein Drug Carriers	0.5
24.	Research on High Efficiency Amorphous Si Solar Cells by Introducing New Functional Materials*	31.9

	Project Title	Project Cost ($ million)
25.	White Anodized Aluminum Oxide Products	1.2

26.	Development and Production of Novel Polymer Based Functional Materials and Products	1.2

27.	High Coupling Efficiency PV Cells with Optical Elements and Photonic Crystal Integration	1.6
28.	Development of Advanced Multi-functional Coating Technologies for Environmental and Health Industries	1.0

	Project Title	Project Cost ($ million)
29.	Research on Nanostructured, Graded-index Antireflective Coating for Optoelectronic Application	1.2
30.	Development of Photonic-band Gap-based Microwave Multilayer Chip Antennas	4.0
31.	Development of Reactive Hybridization SOL-GEL Technology on Extra Hard and Non-stick Silicon Coating as an Alternative to Teflon Coating for Cookware*	1.5

32.	Enhanced Ductility and Service Life of Galvanized Structural Steel Members	5.0

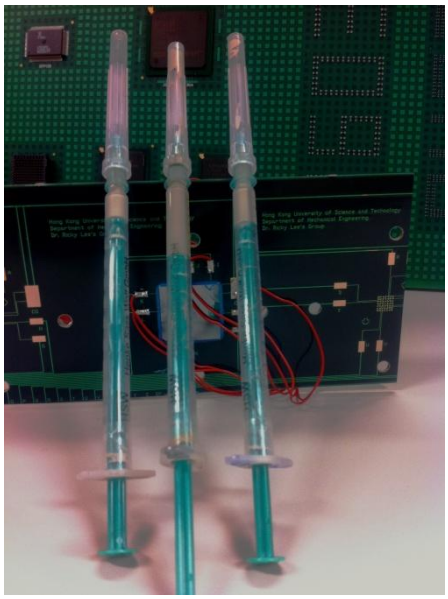
	Project Title	Project Cost ($ million)
33.	Advanced Thermal Insulation Coating Material	3.0

34.	Development of Low-cost Self-cleaning and Anti-bacterial Coatings for Building Materials*	1.0

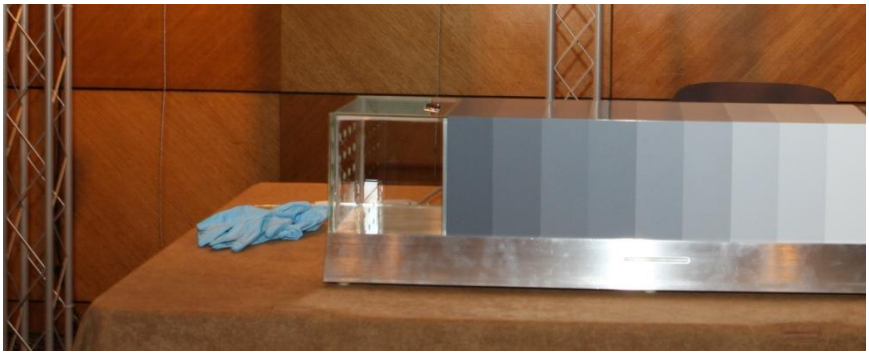
35.	Smart and Biofriendly Functional Chitosan Nanostructures for Biolabeling, Drug Delivery and Tissue Engineering	1.3
36.	Synthesis of Nanoparticles by Novel Mechanochemical Reactions and Their Dispersions in Aqueous and Organic Media	1.2

	Project Title	Project Cost ($ million)
37.	Novel Products Developed with Nano Particles and Electron Beam Technology	2.3

38.	A Nano Preparation for the Topical Treatment of Limb Injuries	4.0
39.	Developing guar-gum polymer as drug delivery vehicle for topical medication to manage muscle ache & joint pain and enhancing rehabilitation*	6.0
40.	Creating a novel product to protect the teeth against dental plaque and to prevent odontitis using nanotechnology and herbal medicine* #	1.3
41.	Development of Advanced Die Attach Adhesives with Nano-fillers/Microcapsules for High Brightness LED (HB-LED)	1.5

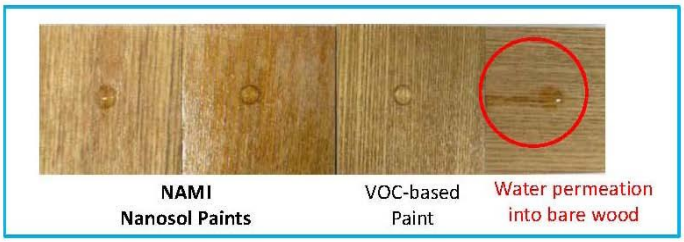


	Project Title	Project Cost ($ million)
42.	Research and development of highly efficient anti-bacteria porous filters for the use in air purifier*	1.2

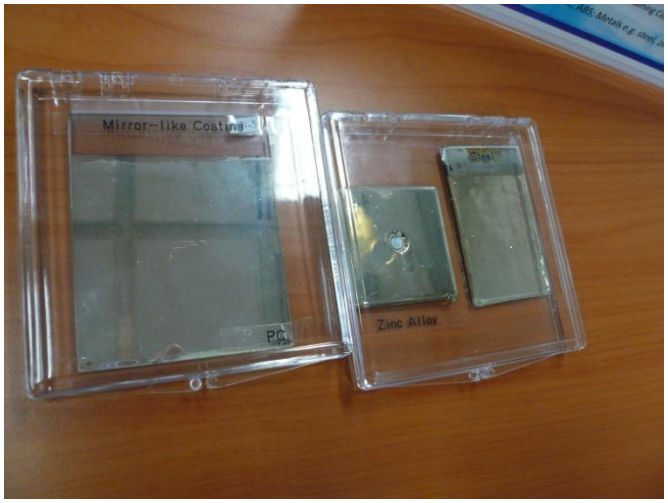


43.	Development of Key Technologies for CIGS Solar Cells: H2Se-free Selenization and Precise Chemical Bath Deposition*	42.8

	Project Title	Project Cost ($ million)
44.	Self-cleaning coating for LED street light* #	0.7
45.	Development of Photocatalytic Condensate-recovery Air-conditioning System for High Energy Efficiency and Good Indoor Air Quality* #	0.9
46.	Multifunctional Environmental Paint for Wooden Furniture Based on Organosilica Nanosol and Nanomaterial Additives	1.5



47.	Development of functional mirror-like nano-coating on target metals and the technology transfer study from laboratory to production*	1.4



48.	Development of high-performance printable transparent conductive film based on nanomaterials	1.6
49.	Development of high efficiency and low cost organic photovoltaic cell through novel materials synthesis and advanced device structure designs	2.0

	Project Title	Project Cost ($ million)
50.	Light trapping techniques for conversion efficiency enhancement of polymer solar cell	1.9
51.	Development of roll-to-roll manufacturing process for organic solar cell*	36.1
52.	Self-assembly nanoparticles for RFID tag	4.0
53.	Development of nano-coatings with thermal insulation and self-cleaning functions for architectural materials* #	1.4
54.	High performance cementitious materials for the construction of external wall with enhanced thermal insulation	1.6

55.	A flexible conducting composite and its application on electronic and biosystem devices	1.9
56.	Development of Advanced Structural Steel with High Density Nano/Submicron Twin for Lightweight Products	5.7
57.	Novel process for rare earth metals recovery by multi-component multi-stage extractive reaction and crystallization process	1.4
58.	Development of Circumferential Bracing Technology using Functional Foam for Emergency Treatment and Maximizing the Healing Efficacy of Humeral Shaft Fracture*	3.8

	Project Title	Project Cost ($ million)
59.	A germicide-free and durable anti-bacterial coating for hospital facilities	2.0

60.	LEDoS for Display and Personal Projector Applications	2.0

Note: * - *Collaborative project*
- *Terminated project*

Annex C

Automotive Parts and Accessory Systems R&D Centre (APAS)

Summary Report and Business Plan up to 2016-17

1. Mission and vision

Vision

To become a world-class automotive parts and accessory systems R&D centre and assist Hong Kong's foundation industries to enter into or expand in the automotive market.

Mission

(a) Develop R&D competencies in selected core technical areas;
(b) Establish related networks in the Mainland and overseas;
(c) Collaborate with the Mainland and overseas R&D partners; and
(d) Promote R&D services and expand user base.

2. Institutional set up

APAS was established in 2006 as a subsidiary company of the hosting organization, the Hong Kong Productivity Council (HKPC).

The Board of Directors of APAS 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.

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

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

It is envisaged that APAS will be merged with HKPC in late 2012.

3. Organization

As at 1 April 2012, the staff strength of APAS is 29, against an establishment of 33 posts including the Chief Executive Officer. An organisation chart is at Appendix 1.

4. Technology roadmap and R&D programme

The biggest challenge for China's automotive industry is the design and verification of complex electronics control systems in the vehicles. This challenge, however, represents opportunities in innovation and technology development for Hong Kong local industry.

To capture this opportunity, fundamental technical capabilities and core competency should be built up in the areas of development platform for electronics control systems, utilization of advanced toolsets and process and procedures for verification and knowledge accumulation. It is also very important to build a strong and stable R&D team dedicating its focus and attention to those areas for long enough through conducting R&D projects, and to establish its strength and capability in the process.

To fulfill its vision and mission, APAS will focus on following:

(a) Develop key components and technologies for electric vehicles;
(b) Market Research and Dissemination;
(c) Environment Related Testing Services; and
(d) Commercialization of R&D results/Technology Transfer.

In the light of the opportunities in China's automotive industry, APAS will focus on three key components and technologies relating to electric vehicles (EV):

(a) EV fast charging technologies (in handling the energy transfer from power grid to the vehicles);

(b) Battery management system (BMS) technologies (for managing the energy storage task for EV – this is the most complicated and important electronics control system for EV); and

(c) Vehicle system control (VSC) technologies (for controlling energy utilization in EV to enhance the vehicles' overall performance).

The technologies developed from the above will provide the launching pad for product development, testing and verification on EV fast charging station, BMS and VSC.

Between April 2006 and March 2011, APAS has undertaken a total of 47 projects, including 6 collaborative projects, at a total cost estimate of $153.5 million. The overall industry contribution for the five-year period is 16.5%.

	2006-07	2007-08	2008-09	2009-10	2010-11
No. of new projects commenced					
- Platform	-	6	7	13	5
- Collaborative	-	1	-	-	5
- Seed	-	3	3	4	-
Total:	-	10	10	17	10

In 2011-12, APAS undertook 6 new projects, including 2 collaborative projects and 2 public sector trials, increasing the total project cost estimate to $161.4 million. The level of industry contribution in 2011-12 is 13.9%. About 370 research and related positions are provided under APAS projects in the past six years. (A list of APAS projects is at Appenidx 2).

5. Progress in Commercialization and Collaboration with the Government Academia and Industry

As at end-March 2012, 32 APAS projects had been completed, and 19 project are still ongoing. APAS has filed 28 patent applications, of which 9 of them have been registered successfully.

APAS has established wide business network and maintained close contact with the industry through networking with industry partners and overseas experts, such as Hong Kong Auto Parts Industry Association. In the past three years, APAS organised and took part in over 140 public events comprising workshops, exhibitions and seminars.

APAS and HKPC have devoted considerable efforts to promote the Centre's R&D results and technology knowhow in the past two years. For example, APAS and HKPC executed technology licence agreements with two local companies in 2011 to adopt APAS's LED headlamp and long vehicle wireless backup monitor systems. APAS will continue to work closely with HKPC to leverage their business network to open more new customer potentials in market.

Apart from licensing, APAS has undertaken 8 collaborative projects in the past six years to support local companies' development in moving up the value chain. APAS will continue to explore potential collaborative projects with the industry in new product and technology niche.

As a growing R&D organization, APAS will continue to build up a track record to strengthen the industry's confidence in its R&D capability. The number of collaborative projects has increased since 2011. Recently, the Centre has signed a few licensing agreements and started receiving royalty income from the licensed companies.

In 2011, APAS signed a Memorandum of Understanding with Shenzhen's BYD Company Ltd on R&D collaboration of EV. Apart from setting up an R&D centre at Hong Kong Science Park, BYD Company will carry out five R&D projects in partnership with APAS and other research institutes in Hong Kong with a view to jointly developing EV-related technologies.

APAS has worked closely with various government departments to launch public sector trial projects, which have not only helped to publicize the Centre's R&D results, but also practically increased the technology edges of R&D projects.

6. Budget and cashflow

The current approved commitment for the operation of APAS up to 31 March 2014 is $167.6 million, and the cumulative operating expenditure is estimated to be $136.1 million by then. To support its continued operation up to 31 March 2017, an additional funding of $60.6 million will be required for APAS, increasing the total funding commitment for 11 years of operation to $228.2 million.

Operating Expenditure ($ million)

	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Total
Staff [1]	30.5	13.0	11.6	20.3	21.5	22.8	24.1	143.8
Accommodation	7.6	1.5	1.4	1.4	1.5	1.5	1.5	16.4
Equipment and other capital cost[2]	18.6	2.5	0.8	3.0	3.0	3.0	3.0	33.9
Commercialization (including publicity, marketing, etc.) [3]	2.7	1.0	2.0	2.2	2.4	2.6	2.8	15.7
Others[4]	11.8	2.2	3.6	1.6	1.7	1.8	1.8	24.5
Total expenditure:	71.2	20.2	19.4	28.5	30.1	31.7	33.2	234.3
Less: Admin. overheads[5]	0.8	0.8	0.8	0.8	0.9	1.0	1.0	6.1
Total operating cost from ITF:	**70.4**	**19.4**	**18.6**	**27.7**	**29.2**	**30.7**	**32.2**	**228.2**

Explanatory Notes –

(1) Staff cost covers basic salary, Mandatory Provident Fund contributions, contract-end gratuity and medical insurance, assuming inflationary adjustment of 3.5% per annum. It is planned that the vacancies will be filled and seven additional posts will be created in the coming few years to strengthen the Centre's R&D capability, commercialization effort, testing services and technology market research.

(2) APAS will continue to procure equipment for providing testing and other support services for the industry outside R&D projects e.g. in EV- related technology development.

(3) There will be a gradual increase in commercialization expenditure starting from 2012-13 as more R&D projects are completed and enter into the commercialisation phase.

(4) The 2012-13 budget has included a sum of $1.6 million to meet the costs arising from the merging of APAS with HKPC. Other miscellaneous cost items include legal/professional fees, staff development, repair and maintenance, service fee to HKPC, etc.

(5) The administrative overheads provided under in-house R&D projects conducted by APAS staff will offset the operating cost involved in supporting these projects.

Indicative R&D Projects and Expenditure ($ million)

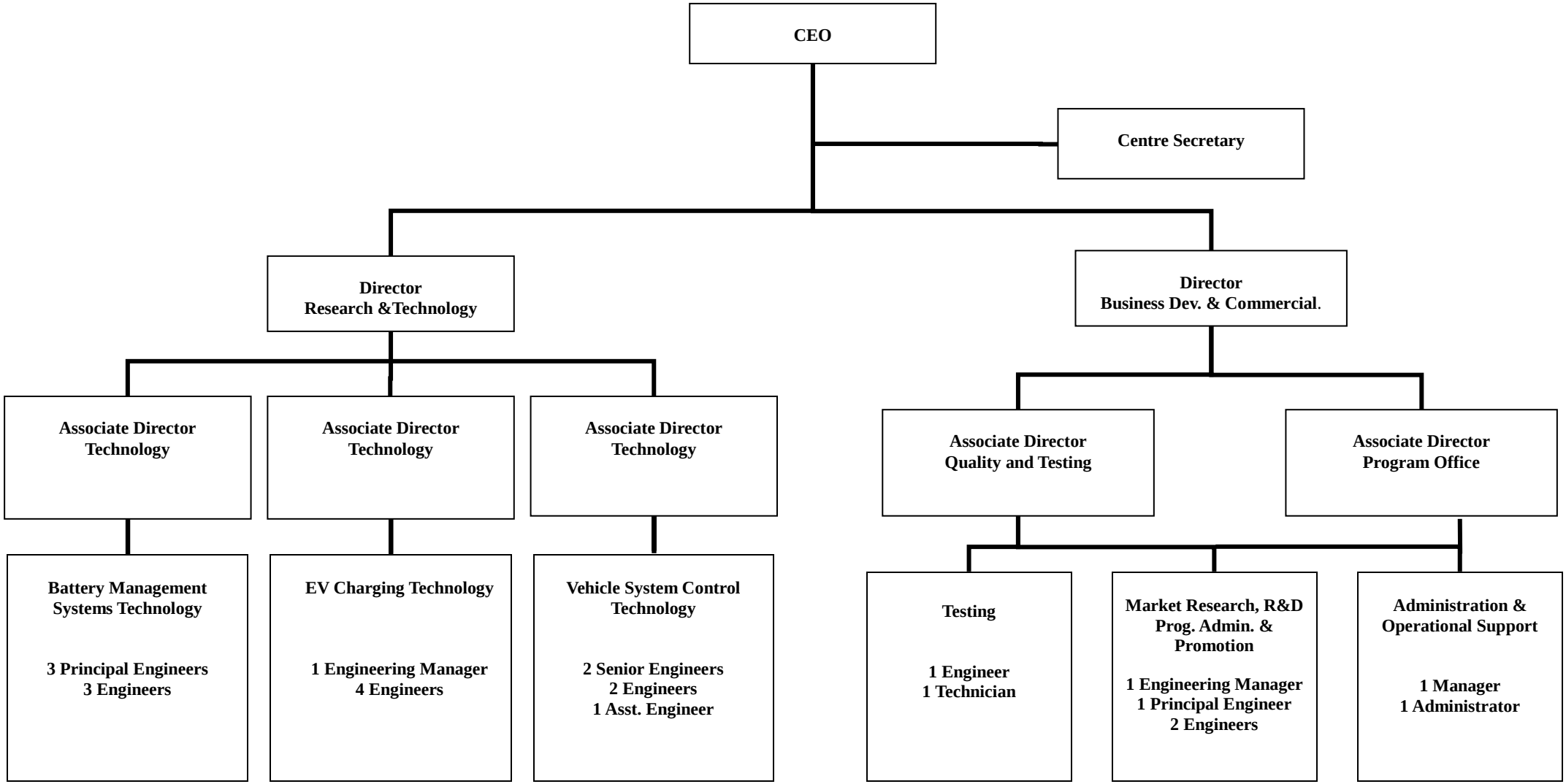
	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Total
No. of new projects commenced[(1)]	47	6	15	16	18	19	21	142
No. of projects under commercialization	8	13	10	12	20	22	24	n/a
R&D expenditure (Indicative)	**89.9**	**17.7**	**28.9**	**31.5**	**37.5**	**43.1**	**50.1**	**298.7**

Explanatory Notes –

(1) It is estimated that about 89 new projects will be launched for the period from 2012-13 to 2016-17.

Appendix 1

Organisation Chart of APAS



Appendix 2

Summary of R&D Projects undertaken by APAS

(April 2006 to March 2012)

	Project Title	Project Cost ($ million)
1.	Powder Metal Forming Technology for High Temperature Light Weight Aluminium-Titanium Alloys	3.3
2.	Development of Microcellular Foam Injection Moulding Technology Incorporated with Co-injection Technology for Producing High Quality and Value-added Plastic Automotive Parts	3.7
3.	Low Cost Direct Drive for Electric Vehicles	4.6
4.	Battery-less Tire Pressure Monitoring System	1.8
5.	Battery Management Control Strategy	1.0

6.	Development of Automobile Advanced Frontlight System*	7.1

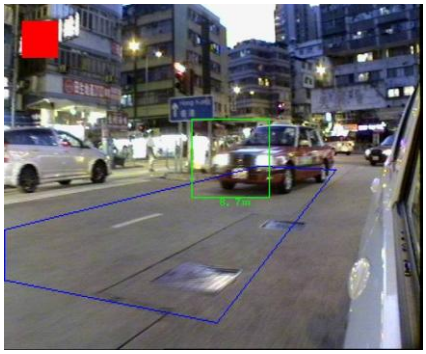
7.	Development of Advanced Tube Hydroforming Technology for Making Complicate-Shaped Metallic Tubular Automotive Parts	3.7
8.	Development of I.C. Engine Control Strategies	1.0

	Project Title	Project Cost ($ million)
9.	Integrated Battery Charger and Motor Drive Systems	4.4
10.	Long Vehicle Wireless Backup Monitor System	1.0
11.	Automotive Electronic Sub-system Design Guideline	1.0
12.	Development of AMT Controls and Systems	1.0
13.	Development of an Automobile Hybrid Air Conditioning System Technology	2.8
14.	Development of Automotive Headlamp System for LED Light Source	4.2

15.	Development of Software and Hardware Platform and Methodology for Integrated Configurable Dashboard Design	8.0
16.	A New Generation of Electric Vehicle Power Pack Platform	4.5
17.	Development of Immobilizer System	1.0
18.	Development of the 14V Idling Stop/Start System	3.4
19.	To Develop a Versatile Hydraulic Control Unit (HCU) for an Integrated Chassis Electronic Stability Control (ESC) System	4.0
20.	Development of ECU for Power Management Platform of EV	1.0
21.	An Advanced Safety System for Passenger/Goods Vehicles	3.5
22.	Infotainment System for Mass Transportation Vehicles	6.0
23.	Electrical Power Assisted Steering for EV and HEV Phase II	2.2
24.	Development of Novel Thermal Debinding Mechanism for Oxidation-Sensitive Powder Alloy	0.7

	Project Title	Project Cost ($ million)
25.	Development of Smart Charging Station for EV and PHEV	0.9

26.	Development of Electronic Control Unit (ECU) for Vehicle Anti-lock Braking System (ABS) and Electronic Stability Control (ESC) System	2.8
27.	Vehicle Safety Enhancement System Based on Wireless Communication	2.2
28.	Scalable AUTOSAR Integrated Automotive Body Electronics Controller	3.9
29.	Development of Integrated Lane Assist System	3.6



30.	Pedestrian Warning and Protection System	4.4
31.	Development of Advanced Collision Avoidance System	3.7
32.	Core Technology Platform of Image Processing and Recognition for Driver Assistance Systems	2.7
33.	Intelligent Transportation System - Mobile Vehicle Technology Applications	3.4
34.	Direct-drive Linear Switched Reluctance Actuator for Automobile Active Suspension Systems	6.0
35.	Development of Port HEV and Its Key Technology	0.4
36.	3G Automobile Infotainment System with Voice Interface	3.8

	Project Title	Project Cost ($ million)
37.	Development of advanced vehicle management and drive system for Plug-in Hybrid Electric Vehicle	10.8
38.	A Technological Platform for Traffic Information Collection and Integration	3.3
39.	Electrical Power Assisted Steering for EV and HEV	1.0
40.	Integrated Smart Electric Vehicle Charging Station with Professional E-payment System*	1.3

41.	Development of a Vacuum Assisted Low Injection Speed High Pressure Casting Technology for Magnesium Vehicle Wheels*	4.3
42.	Application of Quasi-Direct-Current Plasma Immersion Technique to Enhancement of Surface Properties of Automobile Components	2.5
43.	Development of Filter for Engine Air-Intake and Cabin Air-Circulation with Nanofiber Technology * #	1.0
44.	Intelligent Transportation Systems: Vehicle-to-Vehicle-based Mobile-Vehicle integration technology and applications	4.1
45.	Intelligent Transportation Systems: Public Transportation Vehicle Safety & Information Services System*	1.8
46.	A 50kW Stand-Alone Fast EV Charger Using Resonant Topology	5.0

	Project Title	Project Cost ($ million)
47.	Development of Fuel Injection Electronic Control Unit (ECU) for High Pressure Common Rail Diesel Engine* #	5.7
48.	Development of Electric Vehicle Power-train Platform with Vehicle System Controller (VSC)	1.9
49.	Integrated Battery Pack System for EV	1.9
50.	A Prototype of Vehicle Safety and Passenger Information Services: a Road Trial Run Program	0.6

51.	A Prototype of Long Vehicle Wireless Backup Monitor System for Road Trials	0.3

52.	Smart Battery Pack for Electric Scooter*	0.3
53.	Dual Channel 2-50 kW Fast Charging Station for Electric Vehicle*	2.9

Note: * - *Collaborative project*
- *Terminated project*

Annex D

Hong Kong Research Institute of Textiles and Apparel (HKRITA)

Summary Report and Business Plan up to 2014-15

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 a Hong Kong-wide 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.

2. Institutional set up

HKRITA was established in 2006 as non-profit-making 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 (CIT) for approval.

3. Organization

As at 1 April 2012, the staff strength of HKRITA is 22, against an establishment of 27 posts including the Chief Executive Officer. An organisation chart is at Appendix 1.

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For R&D work, HKRITA will continue to rely on the research capability of PolyU and other research insititutes. This reflects the most cost-effective use of resources.

4. Technology roadmap and R&D programme

The textiles industry in Hong Kong dates back to the early 1950s and has contributed significantly to Hong Kong's economic development over the decades. Over the years our textiles industry has grown from strength to strength from mass production of inexpensive garments to quality, high fashion apparel wear.

Feedback from industry partners as well as from PolyU and other research institutes which have been involved in HKRITA projects 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 Pearl River Delta and Yangtze River Delta. HKRITA will therefore continue to identify and invite project applications in these fields.

In the coming years, HKRITA therefore plans to continue to focus on the following technology areas:

(a)	New Materials, Textiles and Apparel Products
	- comfortable and functional fabrics and garments - smart and intelligent materials for protective, healthcare and technical textile applications - High-tech fibers - green and sustainable materials

(b)	Advanced Textiles and Production Technologies
	- Advanced clothing functional design CAD technologies - eco-friendly coloration and finishing technologies - new production technologies for textiles and clothing

(c)	Innovation Design and Evaluation Technologies
	- intelligent quality evaluation systems - novel quick testing system for toxic and harmful materials in textiles and clothing products - product specification and standardization

(d)	Enhanced Industrial Systems and Infrastructure
	- knowledge management portal - intelligent coaching system for textiles and clothing quality and production management - environmental management

The following are examples of promising projects under these focus areas which have attracted considerable industry interest -

(a) New Materials and Textiles and Apparel Products

- Biofunctional Materials and Application - Nano biofunctional protein materials extracted from wool and silk fibres can turn common textiles and clothing to higher value added products, i.e. functional apparel with anti-bacteria, infra-red, moisture management function, etc.

- Development of disposable and degradable synthetic fibres for textile industry by chelating dual/ multiple metal ions masterbatch technology.

- Development of Intelligent Impact Protectors Based on 3D Auxetic Fabrics- intelligent impact protectors used for protecting human body from impact stroke, blows or falls.

- Small Sized Fiber Sensors – development of electrically conductive fibers and fiber assemblies and polymeric optical fiber for applications in medical devices, industry, robotics and wearable electronics, etc.

(b) Advanced Textiles and Clothing Production Technologies

- Finer Nu-Torque Cotton Yarn Production - A novel spinning technology for the production of torque free single ring yarn which enhances the hand feel and other qualities of cotton fabrics.

- Advanced Clothing Functional Design CAD Technologies - integration of design applications, computer simulating technologies, and computer simulation software for functional clothing design.

- Development of a Novel Electrolytic Ozone Spray Process to Achieve Aged-look Effect for Denim Wear - develop an electrolytic ozone spraying system for bleaching denim garment to achieve aged-look or fading effect at specific part of garment without the use of traditional bleaching chemicals.

- Development of a Lab-dip System for CO2 Waterless Dyeing - a new dyeing method without the utilization of water to achieve the required colour for bulk production of CO2 textile dyeing.

(c) Innovative Design and Evaluation Technologies

- Imaging Colour Measurement System for Textiles and Garment Industry - An imaging colour measurement system is able to measure the accurate spectral colour of textiles samples with single- and multi-colour patterns, yarn dyed fabric, printings, etc.

- Fabric Sensors for Three Dimensional Surface Pressure Mapping - Innovative fabric pressure sensors that can measure pressure on three dimensional surface, which is promising for applications in functional wear and building maintenance.

- In-situ Multi-parameter Evaluation System for Protective Textiles under High-speed Impact - a built-in and in-situ multi-parameter evaluation system integrated with protective apparel to conduct real-time monitoring and analysis of spatial and temporal distributions of strain and pressure inside protective apparel during high-speed impact loading. The system provides a platform technology of developing smart protective apparel which can reduce possible injuries of wearer.

- Novel Quick Testing Sensors of Formaldehyde in Textile Fabrics and Clothing Products - a hand-held testing equipment comprising of intelligent sensor system which can provide quick testing of formaldehyde from textiles and clothing products.

- Fast Fabric Hand Measurement Technology - a professional prototype instrument to measure fabric hand properties of a fabric sample in turns of fabric stiffness/softness, fabric roughness/ smoothness, fabric fullness and warmness/coolness, etc. within a few minutes and to provide subjective assessment quickly.

(d) Enhanced Industrial Systems and Infrastructure

- Development of a Fashion Sales Forecasting Decision Support System using Artificial Intelligence Techniques - a scientific sales forecasting decision support system that can provide a state-of-art and user-friendly platform for conducting scientific forecasting for both aggregate yearly fashion demands and seasonal sales pattern of various fashion product categories.

- Activity-Based Carbon Footprint Modeling of manufacturing process of Intimate Apparel Products - an activity-based carbon footprint model about the carbon emission status-quo of the manufacturing processes of intimate apparel products in order to identify carbon reduction opportunities for the development of low carbon competitive advantages.

Between April 2006 and March 2011, HKRITA has undertaken a total of 51 projects, including 1 collaborative project, at a total cost of $179.8 million. The overall industry contribution for the five-year period is 12.4%.

	2006-07	2007-08	2008-09	2009-10	2010-11
No. of new projects commenced					
- Platform	-	16	11	13	10
- Collaborative	-	-	1	-	-
Total:	-	16	12	13	10

In 2011-12, HKRITA undertook 14 new projects, including 2 collaborative projects and 6 public sector trials, bringing the total project cost estimate to $207.8 million. The level of industry contribution in 2011-12 is 23%. About 540 research and related positions are provided under HKRITA projects in the past six years. (A list of HKRITA projects is at Appendix 2).

As at end-March 2012, 41 HKRITA projects had been completed. The remaining 24 are scheduled to be completed in 2012-13 and 2013-14.

Extension Services

HKRITA shall explore how it can leverage on the capabilities of PolyU as well as other universities and research institutes on R&D projects. In addition, its Extension Services programme will continue to reach out to industry partners to identify problems areas and where appropriate initiate projects for research.

Publicity and Marketing

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 2012, HKRITA has organised 174 seminars and workshops to benefit industry partners as well as take part in roadshows and exhibitions.

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

Collaboration parties

As our host university, PolyU continues to be HKRITA's main research partner. The Hong Kong Productivity Council and the Clothing Industry Training Authority have also undertaken research projects. There have also been 141 industry partners sponsoring the 65 projects.

Membership Scheme

HKRITA has a membership scheme with 443 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).

The major communication channels are -

(a) HKRITA website (www.hkrita.com) in English and Chinese. To-date there have been over 200 000 hits;

(b) E-Newsletter issued on a quarterly basis which, inter alia, 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.

Exhibitions and Roadshows

HKRITA has participated in 75 exhibitions in Hong Kong, the Mainland and overseas over the past three years. This included involvement in government-initiated events (e.g. the Innovation Expo), international conventions (e.g. Fashion Week), and HKRITA's own activities (e.g. the Technology Symposium and the roadshows at four local universities).

Commercialisation

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

(a) promotion of project' results including the production of prototypes/ samples for use in the public sector (e.g. Hospital Authority);

(b) conversion of lab-scale prototype to 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. We have promoted research deliverables at 14 events/ seminars as well as approached 200 companies individually to introduce technology and project deliverables. "Commercialisation panels" have also been set up under the Board to study business plans, assess market interest, advise on practical approaches to capture market interest, and determine license fees.

A highlight of the progress of commercialisation under several major HKRITA projects is as follow -

(a) Finer Nu-Torque Cotton Yarn Production

- Non-exclusive licenses have been issued to 3 companies for use of the Nu Torque™ Singles Ring Yarns Technology at a total licensing fee exceeding $5 million. Discussions are on-going with several other interested companies.

(b) High-Performance Sportswear and Devices

- Two non-exclusive licenses 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

- HKRITA has issued a non-exclusive license to Guangdong Textile Polytechnic in November 2011. Another non-exclusive license has been signed with a large fashion retailer in Canada. Discussion with other interested companies is in progress.

(d) Novel Quick Testing Sensors of Formaldehyde in Textile Fabrics and Clothing Products

- Manufacturing of sensor guns for industrial trial has just been completed. These guns are now under testing in fabric and garment factories.

(e) 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. Research in progress – completion date: August 2012. There is tremendous interest from the industry.

(f) Development of a Novel Electrolytic Ozone Spray Process to Achieve Aged-look Effect for Denim Wear

- The project has developed an electrolytic ozone spraying system for denim wear to achieve aged-look effect. The traditional treatment process generated large amount of waste water and chemicals while the excess ozone in the new system can be decomposed into oxygen naturally. HKRITA is now looking for textile machine manufacturers in producing the system for the industry.

Performance Indicators

Apart from industry contribution, HKRITA's performance can be measured and illustrated alongside that of the other R&D Centres (ASTRI is not included since its background is quite different). For example:

(a) HKRITA has undertaken 65 projects which is the highest number. Moreover, in terms of staff we have the smallest establishment;

(b) HKRITA has issued 14 licenses for project deliverables. Our income to-date from commercialisation stands at $5.3 million which is of the highest among the four R&D Centres so far;

(c) HKRITA projects has won seven international awards; and

(d) HKRITA has signed 18 MOUs with universities and other organizations, 13 of which are in the Mainland.

6. Budget and cashflow

The current approved commitment for the operation of HKRITA up to 31 March 2014 is $153.6 million and the cumulative operating expenditure of the Centre is estimated to be $140.2 million by 31 March 2015.

Operating Expenditure (in $ million)

	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	Total
Staff [(1)]	36.3	11.8	16.1	17.6	18.9	100.7
Accommodation[(2)]	1.8	1.3	1.9	1.9	1.9	8.8
Equipment and other capital cost	2.5	-	0.8	0.2	0.2	3.7
Commercialization[(3)] (including publicity, marketing, etc.)	2.5	1.7	3.1	3.2	3.3	13.8
Others[(4)]	3.9	1.2	2.5	2.7	2.9	13.2
Total expenditure:	47.0	16.0	24.4	25.6	27.2	140.2
Less: Admin. overheads	-	-	-	-	-	-
Total operating cost from ITF :	**47.0**	**16.0**	**24.4**	**25.6**	**27.2**	**140.2**

Explanatory Notes –

(1) Staff cost covers basic salary, Mandatory Provident Fund contributions, contract-end gratuity and medical insurance and assuming inflationary adjustment of 3.5% per annum. The staff establishment of HKRITA is forecast to reach 31 posts by 2014-15.

(2) The accommodation budget will increase starting from 2012-13 due mainly to the acquisition of additional office space for showroom facilities to display deliverables and for technical demonstrations so as to promote commercialisation.

(3) HKRITA plans to steps up its commercialisation efforts and increase expenditure in this aspect starting from 2012-13 to meet the costs for promoting research deliverables of both on-going commercialised projects and newly completed projects to the textiles and clothing industry. The expenditure mainly covers exhibitions, production of prototype as well as publicity and advertisements.

(4) Other miscellaneous cost items include human resource management related items, IT programming and maintenance, legal and audit fees, office expenses, utilities, etc.

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

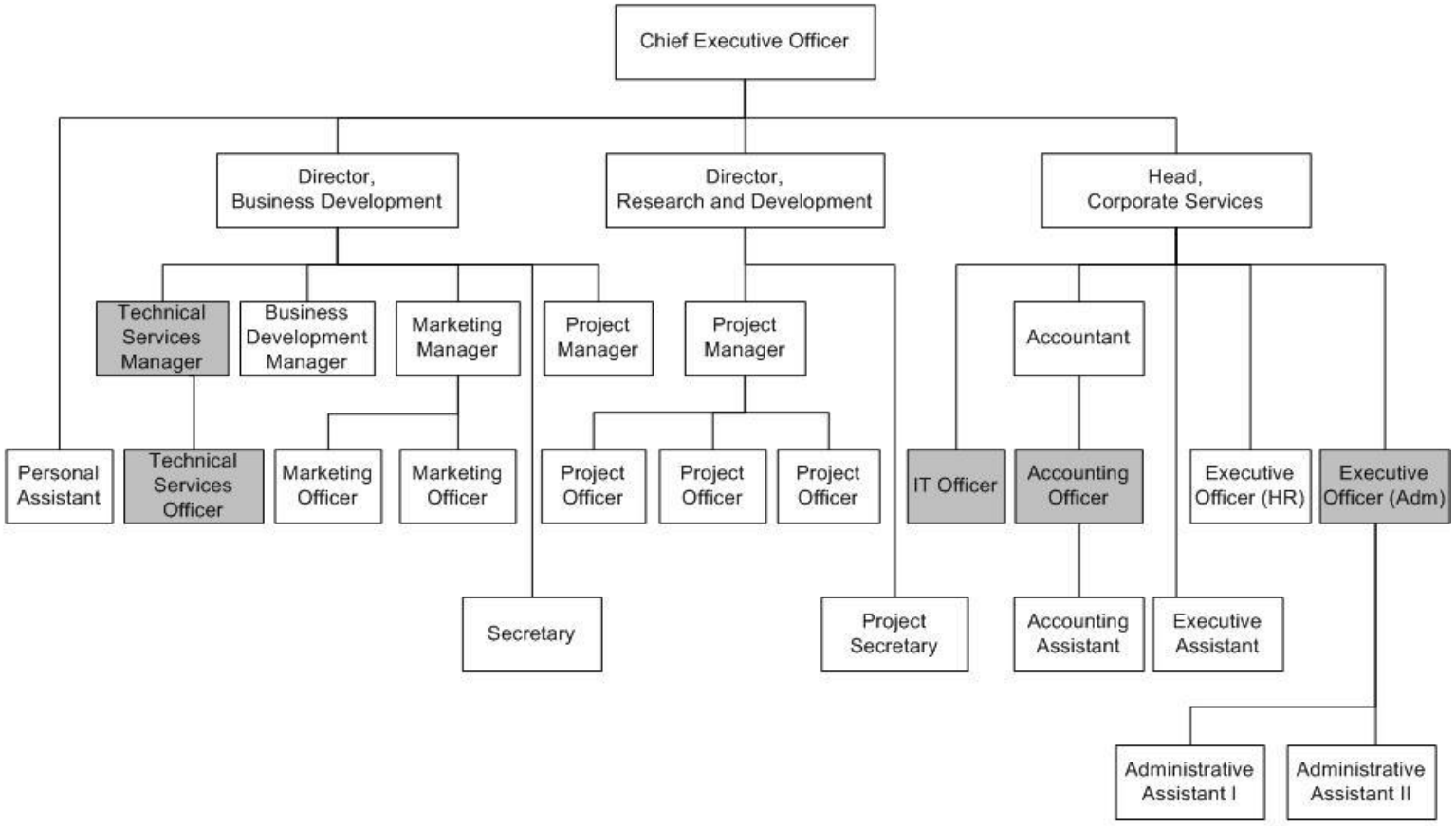
	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	Total
No. of new projects commenced[(1)]	51	14	14	16	16	111
No. of projects under commercialization	7	13	20	28	37	n/a
R&D expenditure (Indicative)	**98.0**	**37.5**	**57.5**	**50.6**	**63.4**	**307.0**

Explanatory Notes –

(1) It is estimated that about 46 projects will be undertaken for the period 2012-13 to 2014-15.

Appendix 1

Organization Chart of HKRITA



Existing Establishment: 27 posts

Number of Staff as at 1 April 2012: 22

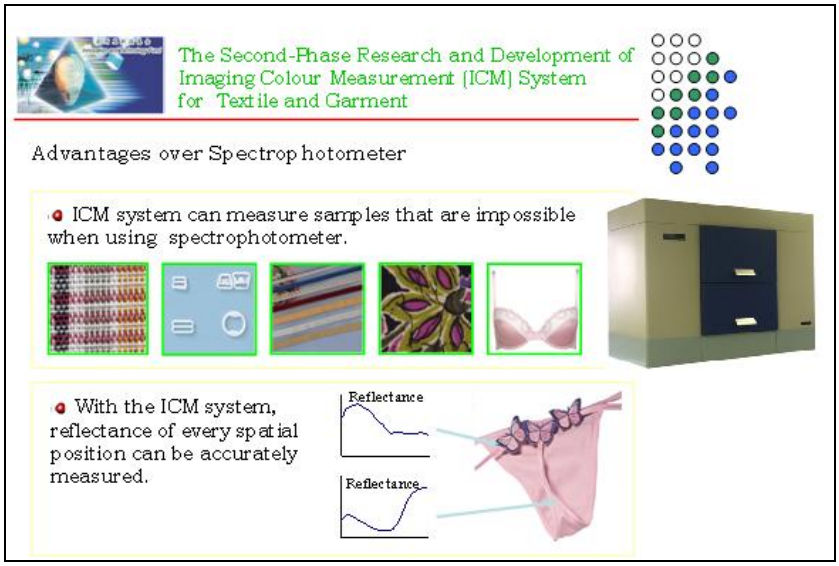
Appendix 2

Summary of R&D Projects undertaken by HKRITA
(April 2006 to March 2012)

	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 Mercerization 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

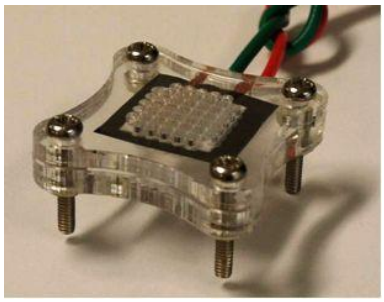
	Project Title	Project Cost ($ million)
9.	Imaging Colour Measurement System for Textile and Garment Industry	4.4



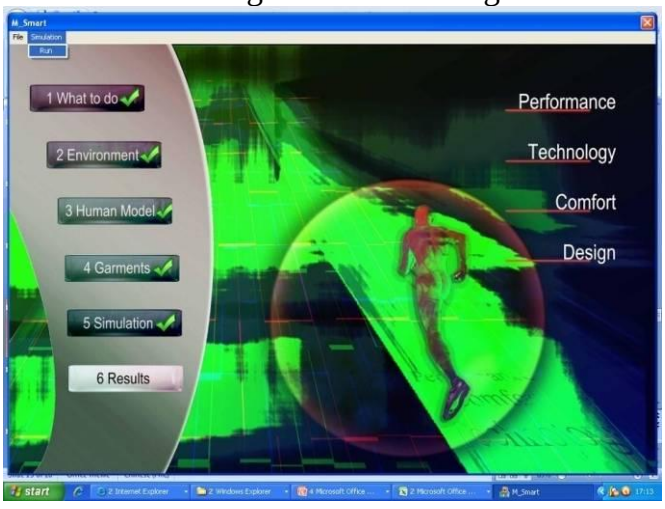
10.	Development of Shape Memory Knitted Fabrics/Garments	11.0
11.	Development of a Problem Solving Model for the Hong Kong Textiles and Clothing Industries	3.0
12.	Development of an Integrated Solution for Minimizing Pilling Problem of Cashmere Knitwear	2.8
13.	Fabric Sensors for Three Dimensional Surface Pressure Mapping	8.0
14.	Development of Smart Interactive Functional Clothing	3.1
15.	High-Performance Sportswear and Devices	5.4

16.	Development of a Fashion Sales Forecasting Decision Support System Using Artificial Intelligence Techniques	2.8

	Project Title	Project Cost ($ million)
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
23.	Advanced Clothing Functional Design CAD Technologies (II)	6.8



24.	Remote Assessment System for Physical Prototypes under an e-clustering Environment (EPAS – e-clustered Prototype Assessment System)	1.6

	Project Title	Project Cost ($ million)
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
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

	Project Title	Project Cost ($ million)
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
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	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 minimize 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 Computerized 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
60.	Monitoring Patients with Diabetic Foot Syndrome by Intelligent Footwear System	2.0
61.	Functional design optimization of Hong Kong Fire Service Uniform	1.8
62.	Adult Bibs for Elderly Care Home (Prototype)	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

*Note: * - Collaborative project*

Annex E

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

Summary Report and Business Plan up to 2014-15

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 the hosting organisations: 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 (CIT) for approval.

3. Organisation

As at 1 April 2012, the staff strength of LSCM is 44, against an establishment of 55 posts including the Chief Executive Officer. An organization chart is at Appendix 1.

4. Technology roadmap and R&D programme

LSCM R&D programme is driven in a demand-led direction. The technology roadmap facilitates the sharing of technological challenges among industry and academia. As for 2012-13 and onwards, the Centre's R&D technology roadmap will remain unchanged which is to innovate logistics and supply chain related technologies in the following areas:

(a) RFID hardware and systems;

(b) Networking and infrastructure technologies; and

(c) Applications and decision support technologies.

In addition, new emphasis is put on "sell-through" of technologies in the supply chain of various industries. This will be realized by (i) more collaborative projects with industrial partners; and (ii) showcasing research results in the public sectors to raise general industrial awareness.

Between April 2006 and March 2011, LSCM has undertaken a total of 29 projects, including 2 collaborative projects, at a total cost of $221.1 million. The overall industry contribution for the five-year period is 12.3%.

	2006-07	2007-08	2008-09	2009-10	2010-11
No. of new projects commenced					
- Platform	-	7	9	7	3
- Collaborative	-	-	-	2	-
- Seed	-	1	-	-	-
Total:	-	8	9	9	3

In 2011-12, LSCM undertook 5 new projects, including 1 collaborative project and 2 public sector trials, bringing the total project cost estimate to $241.5 million. The level of industry contribution in 2011-12 is 15.4%. About 380 research and related positions are provided under LSCM projects in the past six years. (A list of LSCM projects is at Appendix 2).

Technology Transfer

LSCM anticipates that commercialisation activities will gradually increase as effort will be put into transferring technologies to industries. In order to achieve such goal, the Centre will first identify the "gap" between research and actual industrial realization. Again, collaborative projects, prototype/trial scheme projects, and industry-funded contract research projects will then be conducted to bridge these gaps to drive commercialisation.

To align with the Centre's strategic initiatives of attracting industry contribution and commercialization of its R&D projects, the PR & Communication Team will kick start a series of publicity and promotion programmes in 2012-13. The goal of these programmes is to (i) raise profile of the Centre to the general public and RFID/Internet of Things industry practitioners; and (ii) drive collaboration between LSCM and industry/public sectors. In addition, organising industry activities, such as Summit in Logistics, Industry & Technology Forums, Membership e-news, will be major initiatives to promote technology transfer and commercialization activities.

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

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 ITC, the Centre has linked up with various Government departments and public bodies to explore "demand" from these organizations and stimulate project collaborations on innovation and technology development.

The Centre's research capabilities and strength in RFID applications have been demonstrated by several key public sector trial projects. For instance, the Centre has facilitated the implementation of Customs & Excise Department's (C&ED) Intermodal Transshipment Facilitation Scheme (ITFS) which aims to simplify Customs inspection procedures for air-land and sea-land intermodal transshipment cargoes. The Centre has developed an E-lock-enabled tracking platform for C&ED to ensure cargo security and monitor the movement of the vehicles. Under the ITFS project, the Centre has fulfilled C&ED's 4 technological requirements (namely monitoring, convenience, security, and open system) by developing 8 technologies (namely E-lock, data encryption and integrity, system interoperability, Global Positioning System (GPS) interface, GPS data interchange, system automation, user-friendly graphical interface, and system security).

Whereas a typical cargo shipment may need to go through one inspection (at the entry point) or even two inspections (both at the entry point and the

Airport/seaport exit) in a normal routine, with ITFS the Customs inspection can be reduced to only 1 time away from the entry point. The Custom Clearance process is thus streamlined as the inspection time for transshipment cargoes going through Hong Kong could be significantly reduced from 2-3 hours to a few minutes. Trial runs have been conducted between controls points of C&ED including Man Kam To, Lok Ma Chau, Sha Tau Kok, Shenzhen Bay Port, HK International Airport (HKIA). As at February 2012, over 100 shippers and forwarders have joined ITFS.

In addition, the Centre has been working with the Prince of Wales Hospital and United Christian Hospital on the application of RFID technology in a number of facilities and services. Special Location-Based Service (LBS) technologies have been developed which can be utilized in numerous industrial applications. Discussion is underway with Hong Kong Post, Heritage Museum and the private sector to apply LBS for work-in-progress and inventory tracking. The Centre has also worked on the use of RFID in the Correctional Services Department's key handling system and Radio Television Hong Kong's AV equipment inventory system. Further discussion is underway with Film Archive and Buildings Department for collaboration.

The Centre has maintained a strong momentum to build up public sector project pipelines in 2012. By showcasing the R&D results through this kind of public sector trial projects, the Centre aims to promote the adoption of the R&D results and eventually to the private industry sectors.

On the other hand, the Centre has reached out and made utmost efforts to listen to feedbacks and voices 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, the Hong Kong Association of Freight Forwarding and Logistics, Hong Kong Trade Development Council, and Airport Authority Hong Kong to introduce the Centre's funding program and to explore collaboration opportunities.

Since the establishment of the Centre, we have participated in over 250 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 December 2011, the Centre has recruited over 550 individual members, 200 Company/Institutes members, and 120 Technology/Solution Provider members, making the total number of members to be 878. Apart from business matching and project collaboration activities, members also actively participated in the Centre's events like industry and technology forum, exhibitions, conferences, delegations as well as networking opportunities.

6. Budget and cashflow

The current approved commitment for the operation of LSCM up to 31 March 2014 is $131.9 million and the cumulative operating expenditure of the Centre is estimated to be $127.8 million by then. To support its continued operation up to 31 March 2015, an additional funding of $19.3 million is required for LSCM, bringing the total funding commitment for 9 years of operation to $151.2 million.

Operating Expenditure ($ million)

	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	Total
Staff [(1)]	41.4	11.4	13.8	14.3	14.8	95.7
Accommodation	8.7	3.8	3.8	3.9	4.2	24.4
Equipment and other capital cost	3.7	0.3	0.6	0.7	0.7	6.0
Commercialization[(2)] (including publicity, marketing, etc.)	3.4	2.3	3.7	3.8	3.9	17.1
Others[(3)]	13.8	2.7	3.0	2.8	2.9	25.2
Total expenditure:	71.0	20.5	24.9	25.5	26.5	168.4
Less: Admin. overheads[(4)]	6.7	1.4	2.6	3.4	3.1	17.2
Total operating cost from ITF :	**64.3**	**19.1**	**22.3**	**22.1**	**23.4**	**151.2**

Explanatory Notes –

(1) Staff cost covers basic salary, Mandatory Provident Fund contributions, contract-end gratuity and medical insurance and assuming inflationary adjustment of 3.5% per annum. LSCM's staffing is expected to be built up to full strength by 2012-13.

(2) There will be a gradual increase in commercialization expenditure starting from 2012-13 as more R&D projects are completed and enter into the commercialization phase.

(3) Other miscellaneous cost items include utilities, legal & professional service fees, staff training, repair and maintenance fees, etc.

(4) The administrative overheads provided under in-house R&D projects conducted by LSCM will offset the operating cost involved in supporting these projects.

R&D Projects and Indicative Expenditure ($ million)

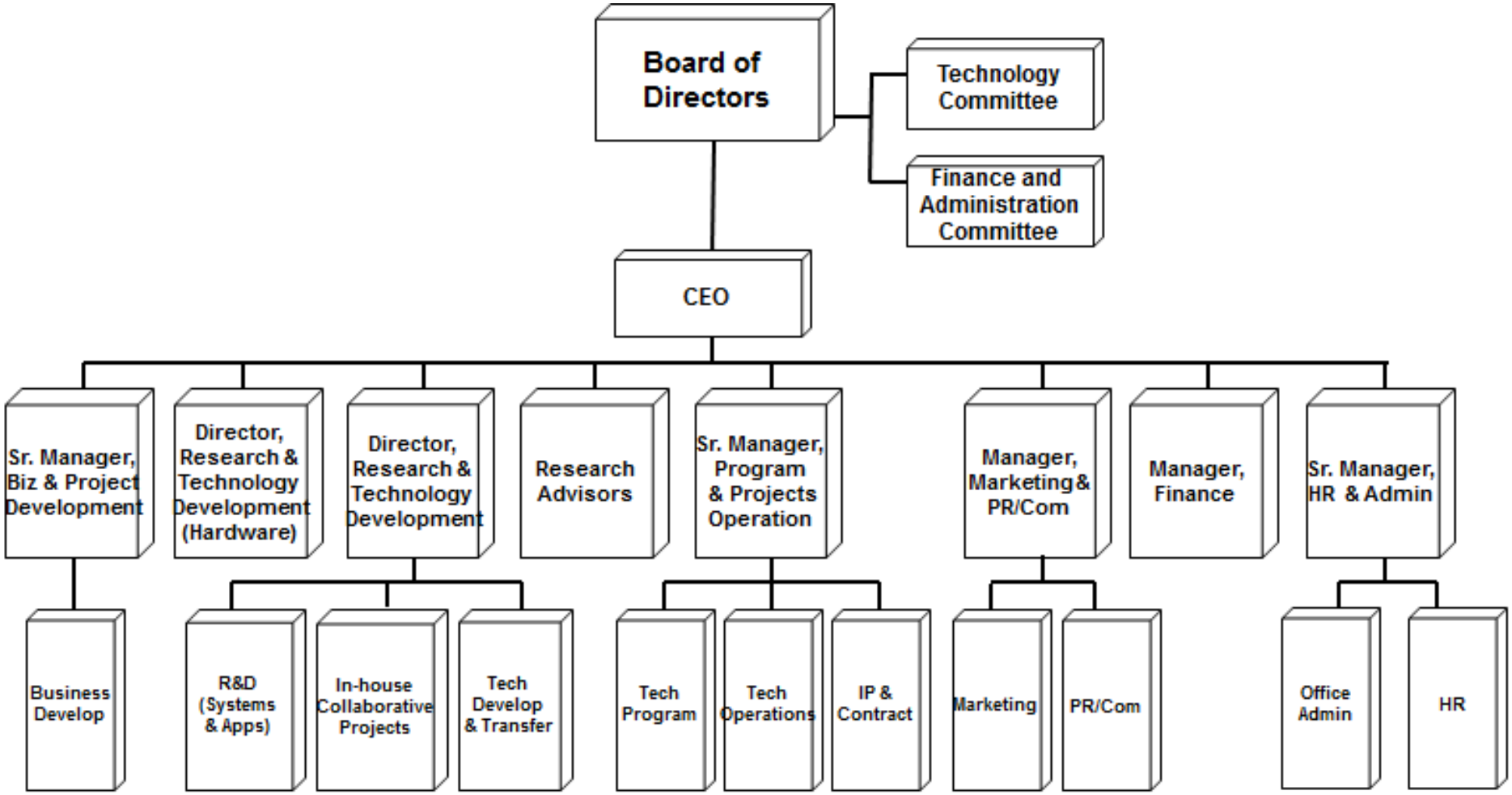
	5-year Cumulative 2006-07 to 2010-11	2011-12	2012-13	2013-14	2014-15	Total
No. of new projects commenced(1)	29	5	22	19	22	97
No. of projects under commercialization	8	17	24	31	35	n/a
R&D expenditure (Indicative)	**139.4**	**48.0**	**50.4**	**62.6**	**81.5**	**381.9**

Explanatory Notes –

(1) It is estimated that about 63 projects will be undertaken for the period from 2012-13 to 2014-15.

Appendix 1

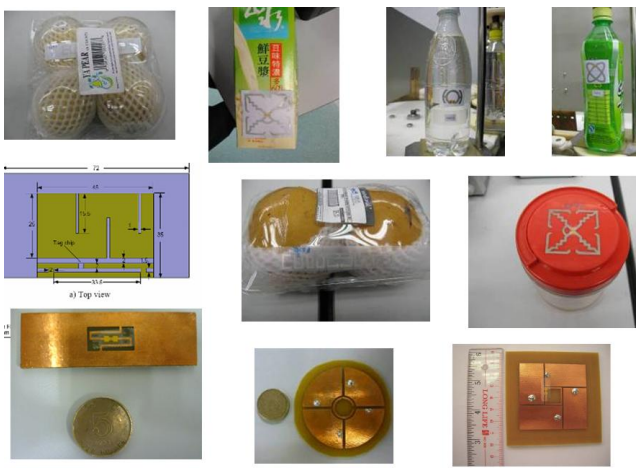
Organisation Chart of LSCM



Appendix 2

Summary of R&D Projects undertaken by LSCM
(April 2006 to March 2012)

	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
11.	Package-specific RFID Tagging and Embedding Technology	14.4



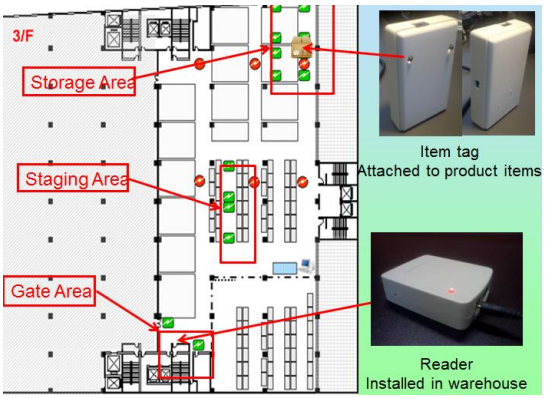
Tag designs for various consumer products

	Project Title	Project Cost ($million)
12.	Interoperability Technology and Applications for Container RFID and e-seal	9.6
13.	RFID-Enabled Real-Time Manufacturing Shop-floor Information Infrastructure for PRD Processing Trade Enterprises	7.5
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 Reader Chip – for mobile RFID applications

18.	RFID Application Service Technology in Guangdong-Hongkong Import/Export Supervision and Management	4.6
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

Project Title	Project Cost ($million)
23. Low-cost versatile tracking device and technology for logistics applications	5.5



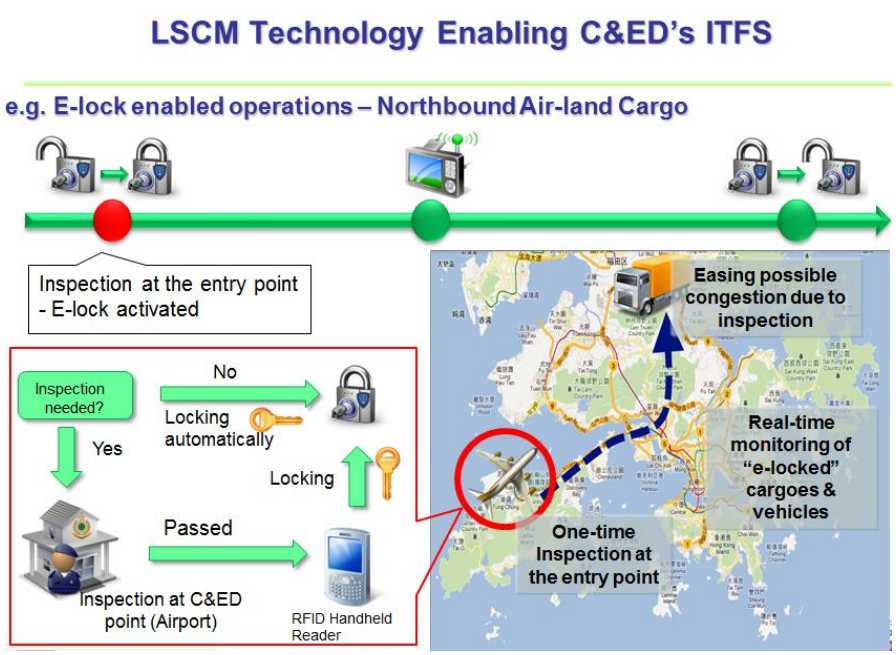
Tracking devices for warehouse management

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

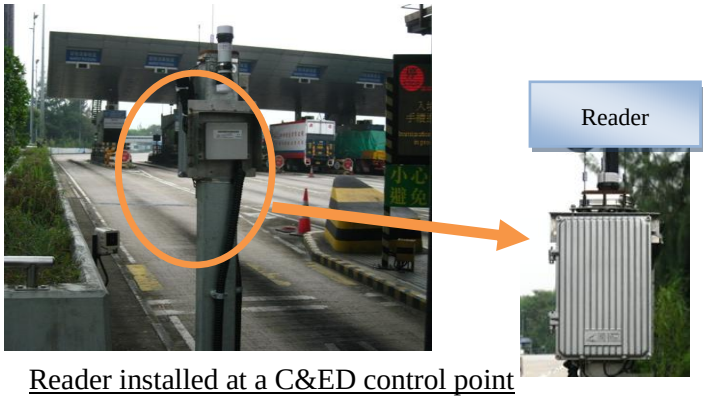
Mobile RFID Reader

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



Pilot testing with C&ED



Reader installed at a C&ED control point

	Project Title	Project Cost ($million)
29.	RFID and Sensor-based Productivity Enhancement System for Human-operated Workplace (Government and Industry)	12.9

Smart key chain for Correctional Service Department

RTHK inventory tagging

30.	Enabling Technologies for Baby Tracking in Hospital Environment (Tamper resistant & reusable baby tag)	12.6
31.	Optimal Design of Novel Reconfigurable UHF Antenna Systems for the Smart Shelf RFID Technology	1.0
32.	Service-Oriented System for Real-time Optimization and Execution of RFID-Enabled Smart Container Loading*	1.2
33.	Public Sector Trials (HK Food Council and HK Food Hygiene Administrators Association) - Food safety system w/ Enterprise application suite	2.3

Project Title	Project Cost ($million)
34. Public Sector Trials (Prince of Wales Hospital) - RFID Traceability for Risk Management in Hospital	3.3


Medical device tagging and locating in a PWH medical ward

*Note: * - Collaborative project*