Legislative Council
Panel on Commerce and Industry

Mid-Term Review
of the Research and Development (R&D) Centres

PURPOSE

This paper briefs Members on the outcome of the Mid-Term Review of the operation of the R&D Centres (Centres) set up under the Innovation and Technology Fund (ITF).

BACKGROUND

2. The Government is committed to driving Hong Kong to become a world-class knowledge-based economy through innovation and technology development. Following public consultation in 2004 and approval of funding by the Finance Committee (FC) in June 2005, the Government established R&D Centres in five key technology areas. The Centres serve as focal points for driving and coordinating applied R&D, thereby facilitating technology transfer of the R&D results to the relevant industries. The Centres are required to observe five key objectives: focus, market relevance, industry participation, leverage on the Mainland, and better coordination among different elements of the innovation and technology programme. The five Centres established in April 2006 were -

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

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

(c) Hong Kong R&D Centre for Information and Communications Technologies (ICT) (This is subsumed under the Hong Kong Applied Science and Technology Research Institute (ASTRI) and its operating expenditure is met by Government's annual subvention to ASTRI);

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

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

3. We have previously briefed Members on the work of the Centres in November 2006, July 2007 and June 2008 respectively. Given the Centres only

started rolling out their R&D programme in 2007-08, we undertook to conduct a mid-term review of their operation up to end-2008.

MID-TERM REVIEW

4. The Innovation and Technology Commission (ITC) has conducted a review on the operation of the Centres. Each of the R&D Centres has submitted a report to ITC. Copies of these reports have been deposited with the LegCo Secretariat.

5. The key findings of the review are as follows -

(a) By the end of 2008, the Centres have undertaken a total of 316 projects with an estimated cost of $1,344.6 million. A summary of the R&D projects undertaken by each Centre and the project cost estimates are at **Annex A**.

Annex A

(b) The Centres have secured a total contribution of $140.9 million from industry in support of 208 projects funded under ITF, representing about 11% of the total project cost estimate. Among the 208 ITF-funded projects, 94 have been completed with the remaining due to be completed in 2009 and 2010.

(c) The total operating expenditure incurred by the Centres for this period (except for ICT) was $112.9 million. A breakdown of the expenditure incurred by the Centres for their operation and R&D work up to end-2008 is as follows -

April 2006 to December 2008
($ million)

	Operating expenditure	**R&D expenditure** *(no. of projects)*
APAS*	35.6	53.5 (*27*)
HKRITA	22.0	45.6 (*29*)
LSCM	29.5	74.0 (*23*)
NAMI	25.8	47.6 (*25*)
Total:	**112.9**	**220.7** *(104)*

* *This includes the expenditure of $6.2 million for procuring testing equipment for wider industry uses.*

(d) From these 208 approved projects, the Centres have filed a total of 178 patent applications. In addition, they are taking steps to

pursue technology transfer under 49 projects. A list of these projects is at **Annex B**.

Annex B

(e) The Centres conducted about 300 seminars and workshops on their technology focus areas and R&D programmes/results. They have established Club Membership or Technology Consortium arrangements with more than 1 500 members from the industry and higher education/research institutes.

A summary of the reports from APAS, HKRITA, LSCM and NAMI, including their revised business plans, are at **Annexes C to F**. (For ICT/ASTRI, please see paragraphs 8 to 13 below.)

Annexes C-F

6. A brief highlight of the focus areas and early successes of APAS, HKRITA, LSCM and NAMI is as follows –

(a) APAS: Its R&D work cuts across several technology areas including electronics, materials science, battery management control, etc. In one of its collaborative projects, APAS has successfully developed an adaptive front-light system (AFS) which allows the head-lamp to self-adjust its movement to adapt to different driving environment e.g. uphill/downhill or on a curved road. Whilst similar systems are available from individual overseas suppliers, the new invention allows the local industry to produce a comparable product at a much lower cost. The product has attracted considerable interest both locally and overseas.

(b) HKRITA: It has leveraged on the capability of PolyU and developed close partnership with the industry. One of the successful R&D projects under HKRITA is to improve the existing spinning technology for mass production of finer Nu-Torque cotton yarn for weaving and knitting. The technology provides much thinner and lighter fabrics produced by finer yarns, with unique cashmere-like softness for the resulting fabric. The local industry has shown keen interest in this technology breakthrough.

(c) LSCM: Two focus areas of LSCM are Radio Frequency Identification Devices (RFID) technology which has wide application in both industry (e.g. inventory management, track-and-trace) and everyday life (e.g. retail, food safety and security), and the logistics industry, especially those involving cross-boundary operations. Its RFID Application Enablement (RAE) middleware allows companies to integrate the new RFID systems with their existing systems at minimal cost and to connect to the global supply chain infrastructures in a speedy and

cost-effective manner. There has been encouraging response to this from the market. The potential of RFID in daily life applications is huge, for example, passive tags used in university libraries and airport baggage check-in, and active RIFD tags for automated tunnel toll payment. The Octopus is perhaps the best illustration of the wide range of applications that can be realized from RFID technologies.

(d) NAMI: Nanotechnology and new materials can help upgrade the wide range of products manufactured by the more traditional industries. One of the key successes of NAMI is the development of a nano-humidity technology platform that could either be used as a high performance device or in low cost applications. The platform is now being evaluated by local industry partners for incorporation into their new products. On thin film photovoltaic (PV) technology, NAMI will undertake several large-scale collaborative projects in the coming few years and position itself as a leading R&D centre in solar energy technologies in the region.

7. Having regard to the initial operating experience and the updated R&D programmes, the four Centres have revised their operating expenditure estimates for the initial five-year period and drawn up their funding requirements for extending their operation beyond 2010-11. The revised expenditure estimates for the initial five-year period are summarised as follows -

($ million)

2006-07 to 2010-11

	FC approved funding	Revised estimates
APAS	100.0	89.5
HKRITA	60.3	59.7
LSCM	52.2	52.2
NAMI	61.4	97.6
Total:	**273.9**	**299.0**

The higher operating expenditure requirement of NAMI in the initial five-year period is mainly due to its latest R&D plans on PV technology which will require a substantial increase in its R&D personnel by 2012.

ICT/ASTRI

8. Unlike the other four R&D Centres, ICT was subsumed under ASTRI. ASTRI started operation in 2001 with the mission of performing high quality R&D for technology transfer to industry, developing the much needed technical human resources and bringing together industry and university R&D assets to enhance Hong Kong's technological competitiveness.

9. Under ICT/ASTRI, there are four technology areas, namely, Communications Technologies, Enterprise and Consumer Electronics, IC Designs, and Material and Packaging Technologies. As of end-2008, ASTRI has 469 staff of which 401 are research personnel. The annual Government recurrent subvention to support the operation of ASTRI in the past three years was about $120 million.

10. ICT has been able to leverage on ASTRI's established infrastructure and as a result has been able to make more progress than the other R&D centres. Between April 2006 and end-2008, ICT undertook a total of 212 projects, including 100 contract research and seven collaborative R&D projects. Excluding contract research, the total project cost estimate of the 112 projects is $781.7 million, under which a total of $68.6 million in industry contributions was secured.

11. The number of patents filed by ASTRI has been growing fast since 2006. For the period 2006 to 2008, more than 170 patents (53 in 2006, 58 in 2007 and 63 in 2008) were filed. The number of technology transfers has also grown significantly during the period. While the figure was only six in 2004 rising to nine in 2005, a total of 144 technology transfers (32 in 2006, 42 in 2007 and 70 in 2008) were conducted between 2006 and 2008.

12. In the area of Communications Technologies, antenna designs developed by ASTRI were applied in advanced cell phone and WiFi systems. The technology is also used in the creation and rendering of high resolution images in locally designed MRI medical imaging machines. In the area of Enterprise and Consumer Electronics, the peer-to-peer technologies developed by ASTRI allowed local cable users to watch the 2008 Olympic Games from their laptops and mobile handheld devices. The set-top box digital television technologies have also been licensed to manufacturers, with their set-top boxes sold in Hong Kong and Mainland. In the area of IC Designs, an IC for the analog front end of a Charge-Coupled Device (CCD) camera module was designed to integrate the functions of three ICs, and has been licensed to local industry partners. In the area of Material and Packaging Technologies for LED,

enhanced thermal management designs were licensed to two manufacturers for high-power general lighting applications such as street lights. LED technology is also employed successfully in providing backlight for LCD televisions with savings in energy whilst providing better display contrast. The R&D results have so far been licensed to four companies. At **Annex G** is a list of other major R&D results under ASTRI's projects and the latest progress in technology transfer.

Annex G

13. ASTRI organized four Industry and University Consultation Forums in 2007 and 2008 (two in Hong Kong and the other two in Shenzhen) to bring industry and the academic worlds together on technology programmes and R&D endeavours. With the recent establishment of a new office in Shenzhen, ASTRI plans to further increase the number of forums to be held in Shenzhen as well as other strategic locations in the Pearl River Delta (PRD).

ASSESSMENT

14. The Centres were set up as a platform for driving applied R&D and facilitating the technology transfer to the industry. Our assessment on their initial performance is as follows -

(a) R&D programme: The Centres have launched over 300 applied R&D projects. More importantly, they are focusing on emerging technologies, collaborating with both industries and tertiary institutes. These R&D programmes are focused and market relevant.

(b) R&D expenditure: The Centres' project expenditures lag behind their original estimate drawn up in 2005. Except for ICT under ASTRI, it had taken longer than originally envisaged for the Centres to set up their offices, recruit key staff and put in place the project planning and management system. As a result, the Centres only started rolling out their R&D programme in the first half of 2007. They have put up a very robust R&D programme from 2009-10 onwards. The Centres have revised their R&D project expenditure estimates for the initial five years to $2,122 million, about 91% of the 2005 target.

(c) Industry feedback: We note that the Centres have been reaching out to the industry through project solicitation, seminars and various collaboration activities. We solicited feedback from the major industry support organizations as part of this review exercise, i.e. the Federation of Hong Kong Industries, the Chinese Manufacturers Association of Hong Kong, the Hong Kong General Chamber of

Commerce and the Chinese General Chamber of Commerce. They have indicated general support for the Centres, but they hope the R&D Centres can be more proactive in promoting their research deliverables to local companies and build up a closer partnership with the local industry, including their operations in the PRD.

(d) Industry contributions: The Centres have solicited $171 million from the industry, or 13% of their research budgets. This falls below the original target of achieving an industry contribution of 40% at the end of the first five-year period. Given the current financial climate, we consider that the Centres will have genuine difficulty to increase the proportion of industry contribution substantially in the near future. We therefore intend to review the Centres' target of soliciting industry contributions. Whilst self-financing should still 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.

(e) Collaboration with the Mainland: With the establishment of joint funding schemes with Guangdong and Shenzhen in 2004 and 2007 respectively, R&D Centres are now engaging more and more joint projects with their Mainland counterparts. We encourage this and expect such collaborations to continue to grow.

(f) Technology focus areas: We have reviewed the need to establish additional R&D centres for new technology areas and concluded that, for the time being, we should focus our resources on existing Centres so that they have time to consolidate their R&D efforts and make a major push for technology transfer and commercialization. Applied research in new technology areas could either be absorbed by the existing Centres or be funded under a separate scheme under the ITF.

(g) Pace of commercialization: Since the Centres are only about to complete the first batch of projects, it is pre-mature to judge their success in commercialization at this early stage. On the other hand, the experience of ASTRI outlined above suggests that there is certainly the opportunity for the Centres to do more in this area. We are optimistic that they will be able to deliver more R&D results for the benefit of local industry in the coming years. Indeed, we note that all Centres are putting in more resources and commitment to technology transfer in the years ahead.

(h) Institutional framework: The present institutional framework for the establishment and operation of the Centres appears to be working

satisfactory but it is not ideal. We are monitoring closely the ratio of operational expenditure to R&D expenditure, which we recognise will be on the high side during their early stage of operation. This is not unexpected as the Centres have only just rolled out their R&D programmes. There is definite scope for improvements to the overall cost-effectiveness and operating efficiency of the Centres. However, it would be counter-productive to introduce major changes at this stage as this may disrupt the R&D and technology transfer programmes being taken forward by the R&D Centres, so shortly after their establishment. Our intention therefore is to conduct an overall review in 2010 with a view to rationalizing the existing institutional framework before the end of the first five-year period. In the review, we will continue to look into the *modus operandi* of the Centres to see if there is any room for achieving greater savings and higher cost-effectiveness and consider the feasibility of merging all the R&D Centres under one umbrella or to move towards shared support facilities to cut costs. We will report our findings to Members for consultation.

(i) Benefits to the economy: In October 2006, we engaged a local university to conduct a consultancy study on ways to analyze the economic and social benefits generated from the work of the R&D Centres and possibly the R&D work funded by the ITF. Work on the consultancy study has been seriously affected by the difficult nature of the study itself as there are no internationally accepted methodologies to quantify the economic and social impact of R&D work. Following lengthy consideration, the Consultant will now focus on the few variables that would have a significant impact on the economy and will aim to complete the study by the end of the year.

15. Having regard to the above findings, we are of the view that the Centres have made a significant start and are now making an important contribution towards strengthening our R&D infrastructure and culture. They are also expected to play an increasingly important role in support of Hong Kong enterprises in the PRD as they upgrade their industrial processes. This will complement the future development of the PRD in various strategic technology areas such as automotive, new materials, environmental protection, renewable energy, integrated circuit design. Under the current financial climate, it is imperative to re-affirm our strong policy commitment to promote innovation and technology as a means to encourage high value added economic activities that open up new sectors for sustainable economic growth. According to latest findings of the OECD, many economies have increased public funding of R&D, despite persistent budget constraints, as a key driver to put the economies back on a path to sustainable growth.

16. We are examining the future funding requirements, including the level of industry contributions, drawn up by the R&D Centres. We will submit the funding proposal separately.

INTERIM IMPROVEMENT MEASURES

17. In the course of the Mid-Term Review, we have identified a number of restrictions under the present ITF funding guidelines which may have hindered the development of R&D work by either the Centres or the Universities or private companies. We therefore propose to relax the following restrictions with a view to promoting and encouraging more organizations to seek funding support for R&D work under the ITF:

(A) Intellectual property (IP)

18. Before the setting up of the R&D Centres, the intellectual property (IP) generated from platform R&D projects undertaken by local universities including technology transfer were owned and managed by the universities themselves. In considering the operation of the Centres in 2005, we envisaged that the Centres would play a more active role in technology transfer and commercialization and hence decided to rest the IP ownership with the Centres except for contract research and collaborative research projects (i.e. the companies paying at least 50% of the research cost). We have received feedback indicating that this arrangement may be an inhibitive factor for local universities to apply for funding support. It has also been argued that where the R&D work is undertaken by local universities, it may be more advantageous for the researchers themselves to take the lead in promoting technology transfer, possibly together with other IPs and R&D deliverables which are not funded by ITF.

19. Our primary concern is to ensure that the R&D results will be put into best use in a timely manner for industry and technology upgrading. We will map out an appropriate collaboration model between the Centres and the universities for pursuing technology transfer and optimising the potential benefits to the industry. The important principle is to ensure that the Centres retain the right to commercialise the results of R&D work regardless of who owns the IPs.

(B) R&D work conducted outside Hong Kong

20. In 2007, we formulated a proposal to relax the geographical restriction under the University-Industry Collaboration Programme (UICP). The purpose was to allow an overseas university to take part in an UICP project, thereby enabling our industry to capitalize on the R&D expertise and strengths not

available locally. Following further consultation with local universities, we have refined the proposal to allow, as a general rule, no more than 50% of the R&D work to be conducted by non-local universities or outside Hong Kong, provided that under the same UICP project, a local university -

(a) plays the role of Project Coordinator who is responsible for the overall co-ordination of the project and the management of the project account and the funds disbursed; and

(b) undertakes some R&D work of the project.

We consider this an appropriate balance between local participation on the one hand and the need to provide new impetus to promote university-industry collaboration on the other, whilst providing reasonable safeguards against abuse.

21. We have received feedback from time to time on the need and advantages for the research work under other ITF-funded projects to be conducted in the Mainland, be it in the form of collaboration partners or outsourcing part of the R&D work to research institutes in the Mainland. Given the close ties between Hong Kong and the PRD region, we consider it sensible to adopt similar rules by allowing up to 50% of the R&D work to be conducted in the Mainland under ITF-funded projects. In the case of overseas universities or research institutes outside the UICP, we will provide the same treatment under the aegis of international or regional technology collaboration agreements reached between the Hong Kong SAR Government and the overseas R&D institutes/centres or universities (e.g. memorandum of understanding on technology research cooperation).

(C) Increasing Private Sector Investment in R&D

22. Our total public and private R&D expenditure remained low at 0.81% of our GDP in 2006, when compared to our neighbouring economies (e.g. Taiwan: 2.6% of GDP in 2006 and Singapore: 2.4% of GDP in 2005). Whilst we would continue to provide funding support for R&D projects, our policy objective should also seek to encourage and stimulate private sector investment in R&D. Our recent experience on PV technology project indicates that there are substantial benefits to be gained by bringing in overseas investment and expertise. We therefore intend to explore new models to provide direct funding support for private sector companies with good research capabilities, say, in the form of matching grant, to undertake major R&D work in strategic and new technology areas that will bring long-term benefits to the economy as a whole. We will in conjunction with the Centres work out the detailed funding and collaborative arrangements.

ADVICE SOUGHT

23. Members are invited to note the outcome of the Mid-Term Review.

Innovation and Technology Commission
April 2009

Annex A

R&D projects
undertaken by the R&D Centres
(April 2006 to December 2008)

	Types of projects	No. of projects	Total Project Cost Estimate ($ million)	Industry Contributions ($ million) *(% of project cost)*
APAS	Platform	25	99.6	12.9 (*13%*)
	Collaborative	2	10.9	5.5 (*51%*)
	Contract	-	-	-
HKRITA	Platform	26	98.0	11.4 (*12%*)
	Collaborative	1	3.2	1.6 (*50%*)
	Contract	2	0.1	0.1 (*100%*)
ICT	Platform	105	749.0	50.0 (*7%*)
	Collaborative	7	32.7	18.6 (*57%*)
	Contract	100	26.9	26.9 (*100%*)
LSCM	Platform	23	184.2	22.4 (*12%*)
	Collaborative	-	-	-
	Contract	-	-	-
NAMI	Platform	12	122.6	12.9 (*11%*)
	Collaborative	7	14.5	5.7 (*39%*)
	Contract	6	3.0	3.0 (*100%*)
	Total:	**316**	**1,344.6**	**170.9 (*13%*)**

Notes:

(1) Under platform projects, R&D Centres are generally required to secure a contribution of at least 10% of the project cost from the industry, as an indicator of market relevance and needs.

(2) Under collaborative projects, the industry contribution should be at least 30% of the project cost. Where the industry contributes more than half of the project cost, the industry partner will own the IPs generated from the R&D work.

(3) Contract projects refer to contact research and contract services that are requested and wholly funded by the industry.

(4) The above figures have included 34 projects in the relevant technology areas in which the R&D Centres assisted in the project monitoring.

Annex B

List of projects undergoing/to undergo technology transfer and commercialization

	Project Title	Project Cost ($ million)
APAS		
1.	Development of Automobile Advanced Frontlight System*	7.1
2.	Powder Metal Forming Technology for High Temperature Light Weight Aluminum-Titanium Alloys	3.3
3.	Development of Microcellular Foam Injection Moulding Technology Incorporated with Co-injection Technology for Producing High Quality and Value-added Plastic Automotive Parts	3.7
4.	Low Cost Direct Drive for Electric Vehicles	4.6
HKRITA		
5.	Biofunctional Materials and Applications	4.5
6.	Advanced Clothing Functional Design CAD Technologies	4.1
7.	Development of an Innovative Finishing System for Wet Processing of Garments and Accessories	1.7
8.	Development of a Laboratory-scale Electrochemical Mercerization and Bleaching System for Technologies Evaluation	1.0
9.	Finer Nu-Torque Cotton Yarn Production	2.4
10.	Development of Fabric Structure Analysis and Appearance Evaluation System	2.9
ICT		
11.	Application Specific AMS IC Design Platform for Integrated CCD Image Sensor Processing	11.9
12.	DTMB SFN Technology Adaptors and Systems	4.0
13.	Advanced Wireless Super-Physical Layer for Wireless Personal Area Networking Core Technology Platform (Advanced WiSPHY for WPAN CTP)	14.6
14.	Dualmode CWPAN/ZigBee RFIC Transceiver	10.9
15.	Mobile WiMAX Basestation Technology Platform	16.6
16.	Next Generation Anode Material for Lithium Lon Batteries (NALI)	10.0

	Project Title	Project Cost ($ million)
17.	Next Generation Antenna Sub-Assemblies	8.5
18.	OFDM Core for Digital TV Applications	16.3
19.	Practical MIMO for WiMAX/LTE Device	17.0
20.	Thermal Energy Management with Advanced Materials and Structures	13.0
21.	WiMAX Access Service Network Gateway (ASN-GW) Platform	14.7
22.	iShare Media Sharing Platform	8.9
23.	Interactive TV Technologies Platform	9.2
24.	Mobile Peer Group Service Platform	6.7
25.	Social Networking Internet Tablet	6.9
26.	Flexible and Adaptive – Active Dynamic LED Backlight Control ASIC Development (FA-ADBC)	11.0
27.	Integrated Driver Solution for LED Solid State Lighting (SSL)	9.2
28.	Mixed Signal System-on-Chip (AMS SoC) Design Platform	9.2
29.	A Novel Method of Removing Sapphire for Solid-state Lighting Power GaN LEDs	14.5
30.	Advanced Compact Camera Module (ACCM) for Cellular Phone Applications	13.3
31.	LED Based Intelligent Outdoor Lighting System	10.6
32.	Low-Cost Solution for High-Performance and High-Density Packaging	12.0
33.	Reliability Engineering for 3D Packaging (REF3D)	15.3
34.	DTMB Instrumentation and Testing Platform	3.1
35.	MMP AVS/H.264 Si-Proven Test Chip Development (MMP-SiP)	13.1
36.	Development and Commercialization of Key IC Packaging Technologies for Tire Pressure Monitoring System*	9.3
37.	Advanced & Affordable MRI*	4.6
38.	Multi-Mode Mobile TV Baseband Demodulator	14.8
39.	Near-Field Antenna Sub-Assemblies	8.7

	Project Title	Project Cost ($ million)
40.	Optek Multimedia SoC Development (OMM-SoC)*	4.2
41.	Recordable Electrical Memory (REME)*	7.5
42.	High Definition Single/4 Channels Streaming Player*	2.3
43.	Next Generation Anode Material for Lithium lon Batteries	10.0
44.	Thermal Therapy Apparatus & Devices (TTAD) for Surgical Applications*	1.7
LSCM		
45.	RFID Enablement Middleware for Enterprise Applications	11.8
46.	Establishing an EPC Network Infrastructure to Enable End-to-End Supply Chain Visibility	17.2
47.	Development of RFID Reader	5.1
NAMI		
48.	Demonstration Line for the Production of Low-cost Humidity Sensor*	0.6
49.	Development and Production of Novel Passive Negative Air Ion Materials and Products	1.0

*Note: * - Collaborative project*

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

Summary Review Report and Revised Business Plan

1. Mission and vision

Vision

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

Mission

- Develop R&D competencies in selected core technical areas
- Establish related networks in the Mainland and overseas
- Collaborate with the Mainland and overseas R&D partners
- Promote R&D services and expand user base

2. Institutional set-up

APAS was incorporated on 31 March 2006 as a subsidiary of the hosting institution, the Hong Kong Productivity Council (HKPC). APAS leverages on HKPC to provide finance, human resources, administration, secretariat and publicity support. The operation of APAS is overseen by a Board of Directors and two standing committees: the Technology Committee (TC) and Finance and Administration Committee (FAC). TC is responsible for reviewing the R&D proposals submitted to APAS and making recommendations. FAC monitors the financial performance of APAS and provides advisory support on administration matters.

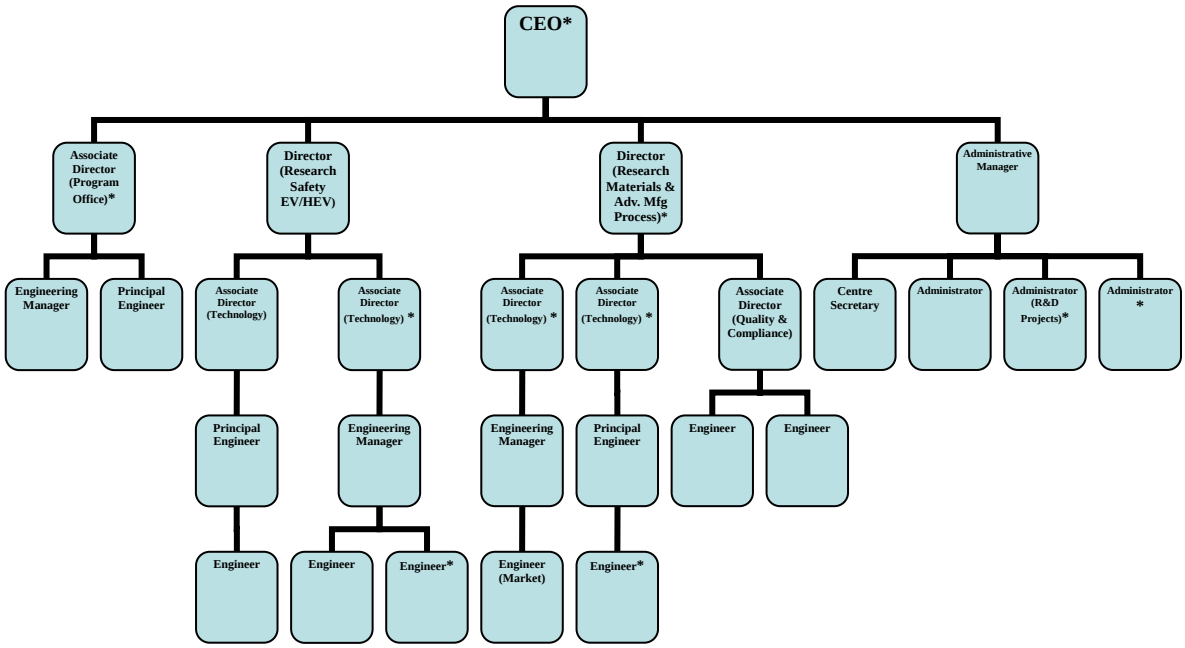
For each financial year, APAS will prepare and submit an annual plan for submission to ITC for approval. The plan sets out the R&D programme, operational issues and financial estimates for the financial year.

APAS prepares and submits on a quarterly basis an operational report to ITC. The report comprises a quarterly financial statement of income and expenditure for APAS' operations, as well as cashflow requirement for the next 6 months.

3. Organisation chart

The staff establishment of APAS comprises 27 posts including the Chief Executive Officer. As at 1 April 2009, 17 posts were filled and recruitment for 9 posts was in progress. Except for one Administrator post which will be

filled on a need basis, the Centre's establishment is expected to be built up to full strength by 2010-11. The organization chart is shown below.



* under recruitment

4. Technology roadmap and R&D programme

Manufacturers in the Mainland and Hong Kong lag behind foreign suppliers in advanced technologies. They are less competitive in the higher-end segments of automotive parts and accessories. Automakers mostly source imported parts and accessories from foreign suppliers. Now that the Mainland government calls for autonomous innovation in the industry and increase in market share of local brands, opportunities arise for Hong Kong manufacturers to collaborate with the local automakers and develop their own products.

In the coming years, APAS plans to continue to focus their programme on the following technology areas -

(a) <u>Electronics and software</u>

Electronics and software are essential parts of virtually every vehicle system. From sensing, information processing, to actuation, they are the brain of many components and systems. The value of electronics and software in modern vehicles is projected to increase to over 30% of the cost of each car in the near future.

(b) Safety

The applications of safety and security related components are not only limited to protective and preventive systems for driver and passengers. Those dealing with restrain systems are highly regulated requiring high level of reliability and assurance. There are a number of systems that are less critical and yet provide comfort and convenience that allow the driver to operate the vehicle more safely, such as illumination and prognostic systems for preventive maintenance, and many of the interior systems which support the driver and passengers. These components represent good starting point for manufacturers with less experience to enter the industry.

(c) Hybrid electric drive and environment

Technologies which provide fuel economy and emission control are in high demand. On the other hand, crude oil price had gone up to US$140 per barrel in 2008, and more stringent emission regulations and environmental concerns are driving and adding more pressure on the development of innovative technologies. Hybrid drives and eventually electric drives are part of the answer. Equally challenging is the need to make the internal combustion engine more efficient and less polluting. The key to the success in Electric/Hybrid Electric vehicle applications is: low weight structural components, higher energy density and long life battery packs, more efficient internal combustion engines, and more efficient power control.

Up to end-2008, APAS has undertaken six Electric Vehicles (EV)-related projects in cooperation with R&D teams in Hong Kong and the Mainland. These six projects cover key component technologies such as Battery Management Control strategy, functional EV power pack demonstration and Charging Station for EV technology.

Moreover, six new proposals related to EV are in the pipeline. They cover key technologies on Regenerative Braking Control Systems and EV power management.

(d) New materials and processes

For the auto parts industry, the two focus areas in material are composites and light weight alloys. The performance needs are light weight and strength at acceptable cost. Any gram reduction leads to better fuel economy and value for the consumer. Composites can potentially replace heavier metal parts for many structural and some functional parts. For body parts, steel has many desirable qualities in manufacturing, design flexibility and reparability. However, low cost replacements are needed to reduce the weight of parts.

Improvements in steel applications such as galvanization and high strength steel have led to weight reduction, but further reduction is needed. For light weight alloys in engine, transmission, gears, seats, and intake manifolds, aluminium alloys have been used quite extensively.

Limitations of materials and capabilities of processes are what engineers and manufacturing people deal with on a daily basis. Better materials and processes are fundamental enablers for developing new and improved products which deliver fuel economy, safety, emission and process cost benefits. This focus area is certainly an important part of the R&D programme.

Against the original target of a total of 110 projects in five years, APAS has so far undertaken 27 projects in four major technology areas by the end of 2008 (full list at **Appendix**). The lower number of approved projects and industry sponsorship mainly due to the longer time required to do the setup arrangement, recruit suitable project staff and difficulties in finding industry partners. As a new R&D organization, APAS is still in the process of building up a track record to strengthen the industry's confidence in APAS's R&D capability. Industry investment in R&D has also been hard hit by the global economic downturn.

Appendix

Between April 2006 and December 2008, APAS conducted seven rounds of project proposal solicitation, and received a total of 42 applications (from outside of the Centre). Of these applications, 12 projects were approved. APAS also initiated nine R&D projects and assisted in monitoring six platform projects in automotives and related areas. The total estimated project funding from ITF for these 27 projects is $92.1 million. About $18.4 million of industry sponsorship were secured for the projects, repersenting about 17% of the contribution from the industry towards the project expenditure.

APAS has engaged external experts to render advice on all project proposals received by the Centre in accordance with the expertise of individual experts.

Up to end-2008, nine of these 27 approved projects have been completed, with another 15 projects to be completed in 2009. The Centre has set up a R&D project commercialization support group led by its Commercialization and Development Director to establish a network with industry end users with a view to encouraging them to use the R&D results, participate in product commercialization and assist in production pilot run. The group is also responsible for handling intellectual property licensing and royalty activities between the Centre and the industry.

5. Collaboration parties

The R&D Centre would implement projects in collaboration with seven major local research institutes (HKUST, PolyU, CityU, CUHK, Hong Kong Institute of Vocational Education, ASTRI and HKU), six HK industry Associations (Auto Parts, Foundry, Metal Finishing, Plastic Machinery, Optoelectronics & Screw and Fastener) and seven Mainland technology partners.

6. Industy feedback and liason

APAS has established a wide business network and maintained a close contact with the industry through networking with industry partners and overseas experts.

In the last three years, APAS has organized and taken part in 143 public events comprising workshops, exhibitions and seminars.

APAS has set up a members club to promote the latest events and facilitate club member's access to industry information, reports, standards and engineering specifications of major global auto makers. Up to December 2008, the club has more than 600 members.

7. Budget and cashflow

Operating Costs

	2006-07	2007-08	2008-09	2009-10	2010-11	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Staff	1,900	7,400	8,260	12,340	13,540	43,400
Equipment and other capital cost	300	4,700	3,850	5,000	5,500	19,350
Other direct costs	7,300	4,000	5,230	5,500	5,800	27,830
- *Publicity/promotion*	142	693	800	950	1,000	3,585
- *marketing/ commercialisation*	0	0	300	350	400	1,050
- *Administrative support and others*	7,158	3,307	4,130	4,200	4,500	23,195
Total expenditure:	9,500	16,100	17,340	22,840	24,840	90,620
Less: Income	0	0	600	240	240	1,080
ITF funding:	**9,500**	**16,100**	**16,740**	**22,600**	**24,600**	**89,540**

Explanatory Note -

(1) The revised cost estimate for procuring testing equipment for wider industry uses is $18 million.

R&D Expenditure (revised estimate)

	2006-07 to 2010-11 $'000
R&D expenditure	291,100
Less	
Industry contributions and other income	40,400
Total project funding from ITF (indicative)	**250,700**

Summary of
R&D Projects undertaken by APAS
(April 2006 to December 2008)

	Project Title	Project Cost ($ million)
1.	Intelligent Omni-directional Hybrid Electric Vehicle	14.3
2.	To Develop a Mg Semi-solid Slurry Maker for Rheo-diecasting in Production of High Strength Low Weight Mg Automotive Part	3.1
3.	Optical CAE Technology for Automotive Lighting and Illumination Parts Development	2.1
4.	A Total Solution for Manufacturing of High Strength Mg Automotive Parts – Mg Thixoforming, Scraps Recycling and Billet (Feedstock) Production	9.1
5.	To Establish Automotive Components Quality Management Support Services for Enhancing the Capabilities and Reputation of Auto Parts Suppliers	2.4
6.	Design and Fabrication of HID and LED Lighting System for Automotive Illumination	8.8
7.	Development of Software and Hardware Platform and Methodology for Integrated Configurable Dashboard Design	8.0
8.	Development of the 14V Idling Stop/Start System	3.4
9.	To Develop a Versatile Hydraulic Control Unit (HCU) for an Integrated Chassis Electronic Stability Control (ESC) System	4.0
10.	Development of Electronic Control Unit (ECU) for Vehicle Anti-lock Braking System (ABS) and Electronic Stability Control (ESC) System	5.6
11.	Development of Automotive Headlamp System for LED Light Source	4.2
12.	Battery-less Tire Pressure Monitoring System	1.8
13.	Low Cost Direct Drive for Electric Vehicles	4.6
14.	Integrated Battery Charger and Motor Drive Systems	4.4
15.	A New Generation of Electric Vehicle Power Pack Platform	4.5
16.	Development of an Automotive Hybrid Air Conditioning System Technology	2.8

	Project Title	**Project Cost** ($ million)
17.	Powder Metal Forming Technology for High Temperature Light Weight Aluminum-Titanium Alloys	3.3
18.	Development of Advanced Tube Hydroforming Technology for Making Complicate-Shaped Metallic Tubular Automotive Parts	3.7
19.	Development of Microcellular Foam Injection Moulding Technology Incorporated with Co-injection Technology for Producing High Quality and Value-added Plastic Automotive Parts	3.7
20.	Development of Immobilizer System	0.9
21.	Development of AMT Controls and Systems	1.0
22.	Battery Management Control Strategy	1.0
23.	Development of I.C. Engine Control Strategies	1.0
24.	Automotive Electronic Sub-system Design Guideline	1.0
25.	Long Vehicle Wireless Backup Monitor System	1.0
26.	Development of an Integrated Map Matching Based Automotive Navigation System*	3.8
27.	Development of Automobile Advanced Frontlight System*	7.1

*Note: * - Collaborative project*

Hong Kong Research Institute of Textiles and Apparel (HKRITA)

Summary Review Report and Revised Business Plan

1. Background

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. To-day Hong Kong remains a leading player in this field. The significance of the textiles industry to Hong Kong's economic development is underlined by the fact that for the period ending December 2007 the gross value of domestic export for the Hong Kong Textiles and Clothing Industry stood at $42.5 billion which equated to 39% of total domestic export.

2. Mission and vision

HKRITA was established in April 2006. Its mission is to be a leading centre of excellence in research, development and technology transfer in fashion and 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 fashion and textiles industry and, thereby, continue to contribute to Hong Kong's economic development.

3. Institutional set-up

HKRITA is a government-funded organization and is a non-profit making company wholly-owned by the Hong Kong Polytechnic University (PolyU).

PolyU was selected to host HKRITA because -

(a) the Institute of Textiles and Clothing, PolyU, is recognised to be amongst the world's top three world class research institutions in the textiles field; and

(b) it was anticipated that many of research projects would be carried out by professors at PolyU given their expertise in the various fields of technology pertaining to textiles.

HKRITA's Board of Directors consists of representatives from academic institutions, the industry and related organisations and the Government.

The Board determines policy and spearheads the direction of HKRITA. It is underpinned by -

(a) an Executive Committee which is responsible for advising on and overseeing all administrative matters; and

(b) a Technology Committee which is responsible for advising on project applications and related issues.

HKRITA is required to seek formal approval for funding of individual projects from the Commissioner for Innovation and Technology (CIT) and also submit quarterly reports and annual plans on its operating budget.

4. Organisation chart

The Centre is headed by the Chief Executive Officer who reports directly to the Board of Directors. He is responsible for policy formulation and overall management of the Centre.

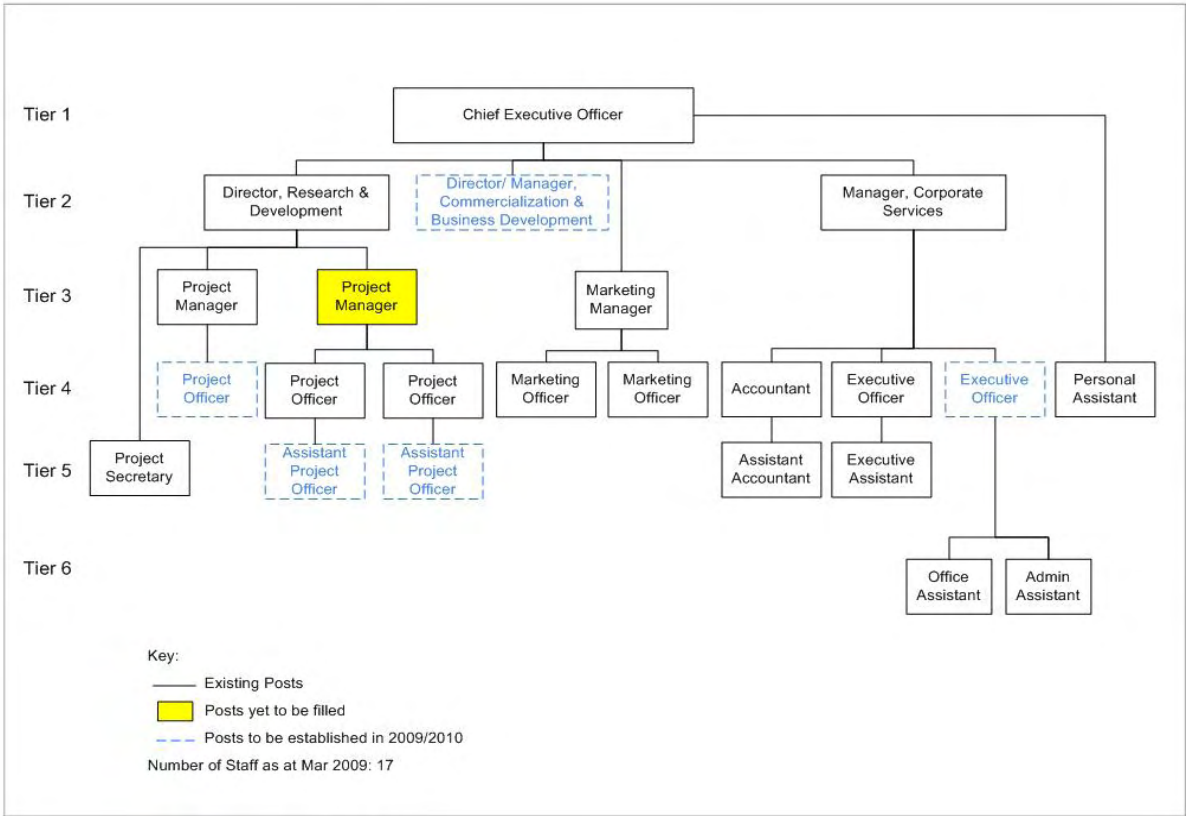
At present, he is supported by three key officers -

(a) The Director, Research and Development who is in charge of the vetting application for project funding and monitoring on-going projects;

(b) The Manager, Corporate Services who is responsible for human resources, finance and accounts, general administration, procurement and committee work; and

(c) The Marketing Manager who is responsible for promoting HKRITA and providing publicity-cum-marketing support for R&D projects.

The organisation chart is depicted below:



To-date HKRITA has an established of 17 staff which is expected to grow to 23 by 2010-11. The additional staff will mainly be in the R&D team given increased project workload and also include a senior officer to handle "commercialisation" for completed projects.

For actual project 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.

5. Technology roadmap and R&D programme

Feedback from industry partners as well as from PolyU and other research institutes which have been involved in HKRITA projects over the past three years 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 their programme on the following technology areas:

(a)	New Materials, Textiles and Apparel Products
	- thermal and moisture management fabrics and garments - nano materials - shape memory polymers, fabrics and garments - smart garments for healthcare applications - functional fibers

(b)	Advanced Textiles and Production Technologies
	- multiple functional treatments for fabrics and garment - new coloration technolgies - new finishing technolgies - new spinning technolgies - 3D pattern CAD

(c)	Innovation Design and Evaluation Technologies
	- new mannequin for product development and evaluation - quality evaluation systems - product specification - garment fit

(d)	Enhanced Industrial Systems and Infrastructure
	- knowledge portal - yarn and fabric database - fashion design database - industrial consortium - training and consultancy

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

(1) <u>New Materials and Textiles and Apparel Products</u>

- 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 an Innovative Finishing System for Wet Processing of Garments and Accessories - An innovative rotary type wet finishing machine that meets industry expectation for washing cashmere.

- Advanced Functional Surface Treatment Technology for Textile Materials - Advanced functional treatments, i.e. nanotechnology based multi-functional treatment, advanced self-cleaning treatment, and nanoparticle-based flame retardant treatment that provide added value to the textiles and clothing products.

(2) 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 Textiles and Garment Manufacturing Process Technology - An RFID-based system that can support the automation in the textile and garment manufacturing process and facilitate the capturing of data through different production points so as to reduce bottlenecks.

(3) Innovative Design and Evaluation Technologies

- Development of Fabric Structure Analysis and Appearance Evaluation System - A fabric structure analysis and appearance evaluation system for weave structure identification. This will facilitate the quick prototyping of woven fabric and knit fabric evaluation.

- Imaging Colour Measurement (ICM) 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.

(4) 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.

Applications for projects can either be in response to call circulars or submitted at any time. Between April 2006 and December 2008, HKRITA has had six rounds of submissions to its Technology Committee. A total of 55 applications have been received. Of these applications, 27 projects have been approved at a total estimated project funding of $88.2 million from ITF. About $13 million of industry sponsorship was

secured from these projects, repersenting about 13% of the contribution from the industry towards the project expenditure.

Applications for projects are first vetted by the HKRITA R&D team. In-put is then obtained from a panel of experts (both local and overseas) as well as from Innovation and Technology Commission. Submissions are then put to the Technology Committee for endorsement.

Appendix

A full list of the approved projects (excluding contract research) is at **Appendix**. Up to end 2008, four projects have been completed and the remaining 23 are scheduled to be completed by 2010.

HKRITA will also adopt the following initiatives in its roadmap -

Extension Services

HKRITA shall explore how it can leverage on the capabilities of universities and research institutions on research projects.

Its Extension Services programme will continue to reach out to industry partners to identify problems areas and where appropriate initiate projects for research.

Commercialisation

With projects coming to fruition, a new and important priority will be to push for the commercialisation of research deliverables. HKRITA shall, inter alia, adopt the following approaches -

(a) promotion of projects' results;

(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.

With this in mind, a "Standing Committee on Commercialisation" will be set up to study business plans, assess market interest, and advise on practical approaches to capture market interest.

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.

HKRITA will also continue to organise seminars and workshops to benefit industry partners as well as take part in roadshows and exhibitions.

Operational

In consultation with CIT, HKRITA shall streamline procedures with a view to speeding up project related work. The Administrative team will also constantly review staffing, procurement and other arrangements to ensure value for money.

6. Collaboration parties

Many organisations express interest to participate in the Centre's operation. PolyU, HKPC and CITA are HKRITA's main research partners. There are also over 120 industry partners, 15 industrial supporting organisations and trade associations and 7 overseas organisations.

7. Industy feedback and liason

Broad Strategy

HKRITA's fundamental marketing strategies have been to promote HKRITA as a professional R&D Centre; focus on its research programme; instil a research culture in the industry and publicise technologies and knowledge to its partners.

Membership Scheme

HKRITA has a membership scheme and have 252 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 (eDM) which enables a fast and efficient way to reach industry partners.

Exhibitions and Roadshows

HKRITA has participated in 23 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).

8. Budget and cashflow

Operating Costs

	2006-07	2007-08	2008-09	2009-10	2010-11	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Staff [(1)]	4,500	6,050	7,720	11,400	13,400	43,070
Equipment and other capital cost [(2)]	710	1,470	220	80	180	2,660
Other direct costs	490	1,920	2,270	3,900	5,680	14,260
- *Publicity/promotion* [(3)]	170	540	740	800	2,140	4,390
- *Commercialisation* [(4)]	0	0	0	1,000	1,000	2,000
- *Administrative support and others* [(5)]	320	1,380	1,530	2,100	2,540	7,870
Total expenditure:	5,700	9,440	10,210	15,380	19,260	59,990
Less: Income	40	120	80	40	40	320
ITF funding:	**5,660**	**9,320**	**10,130**	**15,340**	**19,220**	**59,670**

Explanatory Notes -

(1) This covers basic salary, MPF contribution, contract-end gratuity, medical insurance for staff.

(2) Equipment and other capital cost includes expenditure on (a) office renovation and (b) IT infrastructure including IT servers.

(3) This covers website, publicity, publication and promotion expenses.

(4) Expenses related to "commercialisation" of completed R&D projects. (No expense in the first three years since R&D projects were still in their early stages)

(5) This covers operational expenses on human resources related expenses, insurance, information technology, legal and audit fees, office expenses, utilities, etc.

R&D Expenditure (revised estimate)

	2006-07 to 2010-11 [(1)]
	$'000
R&D expenditure	244,300
Less	
Industry contributions and other income	34,900
Total project funding from ITF (indicative)	**209,400**

Explanatory Notes

(1) The total number of R&D projects carried out in the first five years of operation is estimated to be 78 (platform research: 67; collaborative research: 5; and contract research: 6). (The original target drawn up in 2005 was 105.)

Summary of
R&D Projects undertaken by HKRITA
(April 2006 to December 2008)

	Project Title	**Project Cost** ($ million)
1.	Biofunctional Materials and Applications	4.5
2.	Advanced Clothing Functional 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
9.	Imaging Colour Measurement (ICM) 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
17.	Functional and Decorative Textile Products through Sputtering Technology	0.8

	Project Title	**Project Cost** ($ million)
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
25.	An Intelligent Fabric Sample Resources Management System (FRMS) 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

*Note: * - Collaborative project*

Annex E

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

Summary Review Report and Revised Business Plan

1. Mission and vision

The goal of LSCM is to foster the development of core competencies in applied R&D in logistics and supply chain related technologies, with focus on 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 is set up as a non-profit-making limited company jointly owned by the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong University of Science and Technology.

The operation of the Centre is overseen by the Board of Directors which is supported by the Finance and Administration Committee and the Technology Committee.

The Board of Directors oversees the operation of the R&D Centre's activities, including submission of annual plans and quarterly operational reports to ITC.

The Finance and Administration Committee oversees all matters relating to the finance and administration of the Centre, including capital expenditure, financial management, budgeting, project control, treatment of intellectual property rights, staffing, human resource development and management, procurement, and commercialization framework.

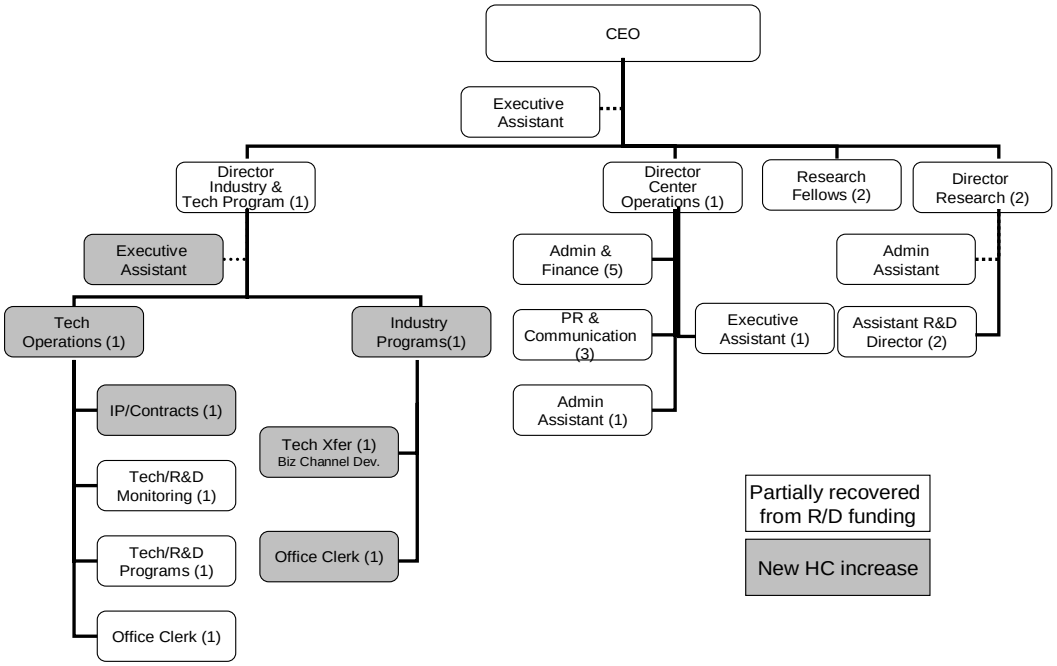
The Technology Committee evaluates and assesses project proposals and monitors and reviews the progress of all R&D programmes and projects of the Centre.

3. Organisation chart

At present, there are 31 Centre staff including the Chief Executive Officer. As LSCM enters the next five-year period, the Centre anticipates an increase in business and technology transfer activities, and

a moderate increase in the overall research activities by working closely with university and R&D partners. The Centre is expected to be built up to full-strength by 2012 and the headcount is expected to increase to 47. The Centre's organizational structure and mode of operation will remain largely unchanged.

Proposed Structure for LSCM Operations



Under this structure, the Centre will maintain its current level of administrative staff while relying on host university support for finance, IT support and HR functions. Additional staff will be hired in the following areas -

(a) IP and contract management
(b) Technology Transfer and commercialization
(c) Business and industry development
(d) Project monitoring/University relations

The Centre will continue to maintain two R&D Directors. The Directors will be responsible for (a) developing R&D strategies for their respective areas, (b) liaising with industries on technical issues, and (c) monitoring research activities for their respective areas.

The Centre may also appoint selected Principal Investigator or outside experts as Centre Research Fellow(s) to represent the Centre in external activities as well as to advise the Centre on technology and research

issues. The Research Fellows will be partially or fully funded under the R&D budget.

4. Technology roadmap and R&D programme

In 2008, LSCM conducted a market intelligence study with an objective to empower logistics and supply chain community with industry needs and technology capabilities to enhance production and adoption of relevant technologies in the industry. Its extensive industry analyses and researches (including in-depth study of market trends and interviews with industry experts and leaders) have highlighted a number of gaps between present technology and industry's requirements.

Having regard to the study, LSCM plans to continue focus the R&D programme on the following technology areas in the coming years:

(a) RFID hardware and systems – to develop core design capabilities, system implementation and manufacturing processes of RFID tags and readers that are related to targeted logistics management applications. Key research areas include RFID Testing and Qualification, Low-cost RFID Tag Manufacturing Techniques, RFID Hardware Systems Development for Manufacturing and Packaging Industries, RFID Beyond Gen2.

(b) Networking and infrastructure technologies – to develop advanced computer networking and information infrastructure technologies for industrial adoption of information technologies in their business processes and for enabling efficient and effective business integration among enterprises, in order to nurture the technology enabled environment for competitive advantage of the local industry. Key research areas include Enterprise e-Logistics Internetworking, On-demand technologies for Logistics Application Software Service Platforms.

(c) Applications and decision support technologies – to reinforce Hong Kong's position as a world-class logistics hub with advanced technologies and to assist manufacturers and suppliers in this region to fulfill RFID adoption requirements set by their global buyers. Key research areas include RFID-enabled warehouse management system, food safety, cross border, retailing, manufacturing and decision technologies.

Between April 2006 and December 2008, LSCM conducted six rounds of project proposal solicitation and received a total of 43 applications. LSCM also initiated R&D projects of relevance to the industry.

Appendix

Against the original target of a total of 80 projects in five years, LSCM has so far undertaken 23 projects by the end of 2008 at a total estimated project funding of $161.8 million from ITF (full list at **Appendix**). About $22.4 million of industry sponsorship was secured with these projects, representing about 12% of the estimated total project costs.

Project Vetting

Project proposals are also vetted by the Expert Review Panel (ERP), which consists of members from the logistics and supply chain management enabling technologies-related industries, trade and industry associations, research and academic institutions, public bodies, Government etc., and of the legal, accounting, financial and management professions.

Technology Transfer

The Centre has started to build up R&D project pipeline since mid-2007. With an average project duration of about 18 to 24 months, some of our early funded projects are either completed or reaching their final development stages.

In late 2008, the Centre completed its first R&D project, "RFID Enabling technologies for Retail & Logistics Industry", with the IP licensing arrangements finalized in January 2009. Currently, both the Hong Kong International Airport and a local major pharmacy chain store have expressed interest in adopting the new technologies and are potential clients of the project.

The Centre anticipates that commercialization activities will gradually increase. Organizing industry activities, such as LSCM Annual Conference, Industry & Technology Forums, Membership e-news, will be one of our key commercialization strategies.

In order to provide an effective platform for the exchange of IP and technology with the industry, the Centre will form a new cross-functional team which consists of researchers, technical staff, marketing staff and business staff to capture the increasing technology transfer opportunities.

5. Collaboration parties

LSCM aims to act as the focal point of the coherent force that combines Government resources, industry support and university researchers to create the greatest value for the supply chain management and logistics industry. To empower the Centre with market feedback and intelligence, the Centre has engaged the following industry partners and research

institutions, from local, mainland China and overseas for various forms of collaboration -

Organizations	**Details of Collaboration**
Hong Kong Productivity Council; Hong Kong Science & Technology Parks Corporation; Hong Kong Trade Development Council; Federation of Hong Kong Industries; Guangdong and Hong Kong Feeder Association; Hong Kong Association of Freight Forwarding And Logistics; Hong Kong CFS and Logistics Association; Hong Kong Logistics Association; Hong Kong Shippers' Council; The Chamber of Hong Kong Logistics Industry	➢ Co-organize and promote industry events, e.g. seminar, training, exhibition, study tour ➢ Solicit industry problems and requirements ➢ Disseminate project results
GS1 Hong Kong; Guangdong RFID Technology Service Center; Shanghai Base of National RFID Industrialisation; RFID China Alliance; EPCglobal, Inc.	➢ Promote RFID adoption and applications ➢ Closely monitor technology and stand development
The University of Hong Kong; The Chinese University of Hong Kong; The Hong Kong University of Science and Technology; The Hong Kong Polytechnic University; Sun Yat-sen University; Shanghai Research Center for IC Design; Shanghai Jiao Tong University; Beijing University of Posts and Telecommunications; Fudan University; Shenzhen Institute of Advanced Technology; RFID Research Center, Institute of Automation, Chinese Academy of Sciences; National ICT Australia (NICTA); University College London (UCL); Center for Information Technology Research in the Interest of Society/University of California, Berkeley (CITRIS/UCB); University of California, Los Angeles (UCLA)	➢ Undertake research/ consulting project ➢ Establish research partnership

6. Industry feedback and liaison

Since the establishment of the Centre, we have participated in over 150 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.

In addition, we have organized more than 50 forums/conferences/ seminars in the last few years, expanding our reach into the logistics and supply chain industry. These activities also enable the research community in Hong Kong to interact directly with the industry players while searching for innovative solutions. The Centre also actively participates in networking activities. For instance, the Business Development Team has participated in 52 events in 2007 and 2008.

Thirty delegations from different countries have visited our Centre in the last two and a half years. Nine overseas groups are now collaborating with us on several R&D initiatives.

Membership Scheme

As of 24 February 2009, the Centre has recruited over 350 individual members, 110 company/institutes members, and 70 technology/solution provider members, making a total of 540 members.

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.

7. Budget and cashflow

Operating Costs

	2006-07	2007-08	2008-09	2009-10	2010-11	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Staff	5,139	9,602	6,709	8,000	8,000	37,450
Equipment and other capital cost	766	208	306	155	155	1,590
Other direct costs	2,214	3,063	7,185	7,341	7,341	27,144
- *Publicity/promotion*	159	298	300	824	824	2,405
- *marketing/ commercialisation*	159	298	300	824	824	2,405
- *Administrative support and others*	1,896	2,467	6,585	5,693	5,693	22,334
Total expenditure:	8,119	12,873	14,200	15,496	15,496	66,184
Less: Income	81	2,974	2,717	3,500	4,740	14,012
ITF funding	**8,037**	**9,899**	**11,483**	**11,996**	**10,756**	**52,170**

Explanatory Note –

(1) The revised estimates on staff costs are higher than the 2005 estimates due to more Centre-initiated research projects.

R&D Expenditure (revised estimate)

	2006-07 to 2010-11 $'000
R&D expenditure	334,350
Less	
Industry contributions and other income	38,500
Total project funding from ITF (indicative)	**295,850**

Explanatory Notes –

(1) The estimates of R&D project expenditure $334.4 million is to support LSCM to carry out about 45 projects between 2006 and 2011. The percentage of industry contribution is estimated to be around 11.5%

Summary of
R&D Projects undertaken by LSCM
(April 2006 to December 2008)

	Project Title	Project Cost ($million)
1.	RFID Tag and Reader Technologies at UHF Band for Logistics Management	5.9
2.	Development of RFID Reader	5.1
3.	RFID Enablement Middleware for Enterprise Applications	11.8
4.	Establishing an EPC Network Infrastructure to Enable End-to-End Supply Chain Visibility	17.2
5.	Enabling Technologies for Single-Chip Passive UHF RFID Tags and Readers	7.1
6.	The Development of RFID-based Business Solutions for Counterfeit Prevention, Physical Asset Management (PAM) and Commercial Applications	5.4
7.	Study the Design Challenges of 90nm Technology UHF RFID Tag IC	2.2
8.	An eLogistics Appliance with Data Exchange and Conversion Technologies for Infrastructure Connectivity	6.6
9.	Integrated Passive UHF RFID Tags and Readers	7.7
10.	RFID-based Interoperable Gateway for Logistics Service Platforms (RIG)	11.3
11.	RFID Benchmarking: Methodology and Practice	2.2
12.	RFID Enabling Technologies for Retail & Logistics Industry	7.3
13.	Package-specific RFID Tagging and Embedding Technology	14.3
14.	RFID-Enabled Real-Time Manufacturing Shop-floor Information Infrastructure for PRD Processing Trade Enterprises	7.7
15.	Trustworthy RFID Technologies: Methodology and Practice	4.4
16.	RF-based Technologies for Asset/Personnel Tracking	6.5
17.	RFID Benchmarking Methodology, Report and Tool Support	10.7

	Project Title	**Project Cost** ($million)
18.	Enhancing the Competitiveness of the Hong Kong Air Freight Forwarding Industry Using RFID and Software Agent Technologies	4.5
19.	Lightweight RFID Reader Chip for NFC and Mobile Applications	14.6
20.	Interoperability Technology and applications for Container RFID and e-seal	9.6
21.	RFID-enabling Platform Technology for the Integrated Shenzhen-Hong Kong Food Safety and Supply Chain Management Public Information Platform	10.0
22.	Privacy Protection and Communication Security in RFID Systems	2.0
23.	A Market Intelligence Study on Enabling Technologies for Industries related to Logistics & Supply Chain Management	10.0

Nano and Advanced Materials Institute (NAMI)

Summary Review Report and Revised Business Plan

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 communities in a concerted manner; and

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

Six market segments with significant growth potential will be emphasized for the next phase of development. These include: Sustainable Energy; Solid State Lighting; Environmental Technology; Metals and Metal Finishing; Lifestyle and Healthcare Products; and Advanced Materials for Consumer and Industrial Applications.

2. Institutional Set-up

The Centre is established as a non-profit-making limited company wholly owned by the Hong Kong University of Science and Technology (HKUST). As the host institute, HKUST provides NAMI with support in various areas such as human resources, procurement, finance, technology transfer, etc.

The Board of Directors oversees the operation of NAMI activities, including submission of annual plan, and quarterly and annual operational reports to ITC.

Under the Board, a Technology Committee consisting of members with technology background and government representatives is in charge of the evaluation and monitoring of R&D project proposals. Project monitoring is viewed from both the business and technical perspectives in order to ensure that technical development is carried out according to the research plan, and that commercial opportunities can be realized as soon as possible.

A Finance and Administration Committee is set up under the Board to oversee the administration procedures and policies as well as all aspects of NAMI's financial matters.

An Audit Committee will be formed to monitor all aspects of NAMI operations. An International Advisory Committee will be formed to provide advice in terms of scientific and technology directions to the Centre.

3. Organisation chart

The existing headcount of NAMI is 19, including two part-time staff. The senior management comprises the Chief Executive Officer, two Chief Technology Officers serving on consulting basis, and the Senior Business Development Officer. The staff size is expected to increase to 47 due to a series of large-scale R&D projects on photovoltaic (PV) technologies starting from 2009.

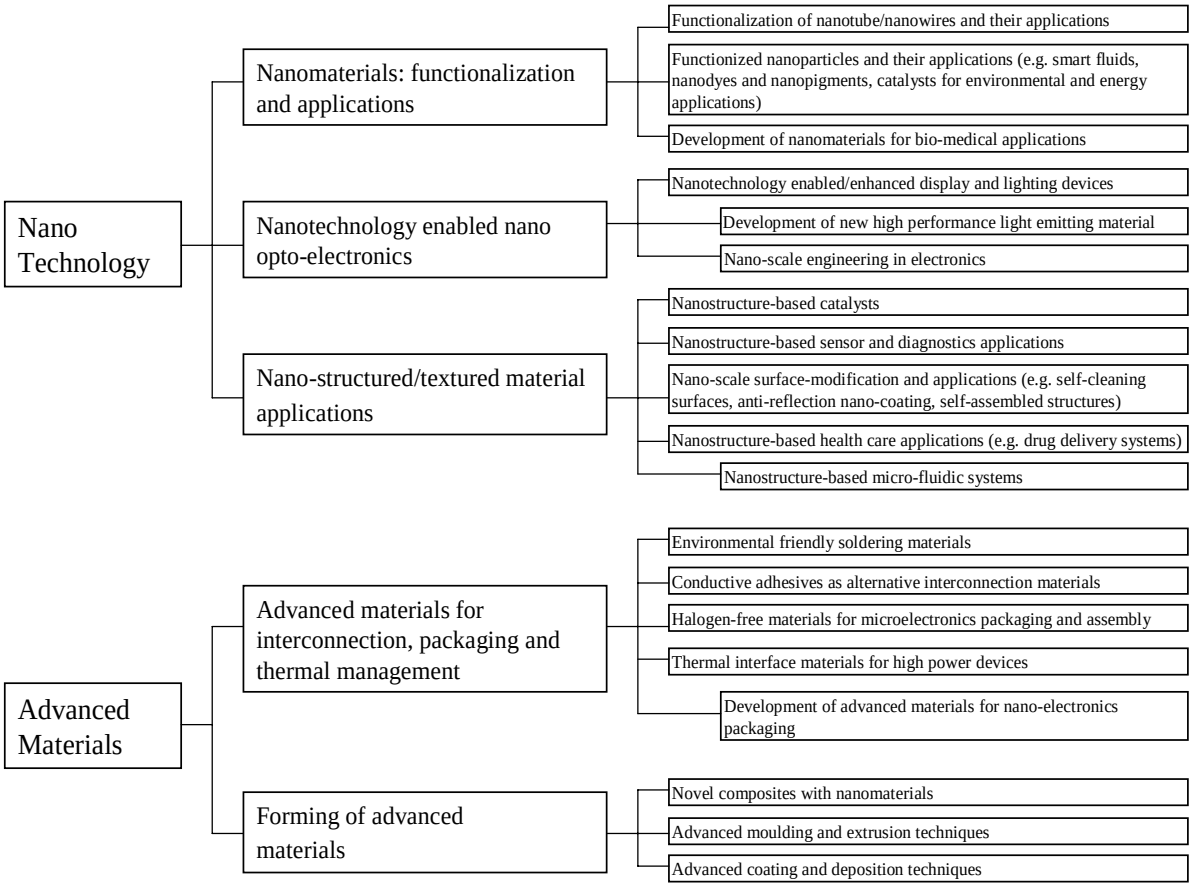
The operations of NAMI are executed by six teams: Technical Team; Project Administration Team; Business Team; Administration and Human Resources Team; Accounting Team; and Project Support Team.

Appendix 1 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 three years -

(a) Nanomaterials: functionalization and applications;
(b) Nanotechnology enabled nano opto-electronics;
(c) Nano-structured/textured material applications;
(d) Advanced materials for interconnection, packaging and thermal management; and
(e) Forming of advanced materials.



Following working with the local industries, it has become clear that a combination of technologies can be applied to different market segments. These include sustainable energy, solid state lighting, environmental technology, metals and metal finishing, lifestyle and healthcare products, advanced materials for consumer and industry, among others. A market segment perspective shows the application of multiple technologies in an individual market segment. It also makes it easier to communicate the values of a research project in terms of market requirements. Thus, the technology roadmap can be viewed from core technology and market segment perspectives as follows -

Market segment / **Technology area**	Advanced materials for consumer and industrial applications	Environmental technology	Lifestyle and healthcare	Metals and metal finishing	Solid state lighting	Sustainable energy
Nanomaterials: functionalization and applications	S	P	P	S	S	P
Nanotechnology enabled nano opto-electronics	S				P	S
Nano-structured/ textured material applications		S	S	S		
Advanced materials for interconnection, packaging and thermal management	S	S			S	S
Forming of advanced materials	P	S		P		S

Note: P - Primary area; S - Secondary area

In the coming years, NAMI plans to continue to focus its programme on the following technology areas –

(a) nanomaterials and nanotechnology enabled products - nanomaterials, nanoparticles and nanostructures with desired properties will be developed in a safe, environmental-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, displays and lighting applications by enhancing their performance and lowering their material and manufacturing cost;

(c) advanced materials: electronic packaging and assembly - new and advanced electronic packaging materials and manufacturing technologies will be developed to enable the technology advancement of microelectronic packaging industry to meet the demanding package schemes and environmental requirements; and

(d) advanced manufacturing: technologies for advanced forming, surface treatment and environmental sustainability - this will lead to upgrading of the production technologies for advanced materials, coatings, composities and catalysts related processes in the manufacturing sector. It emphasizes the improvement in process flexibility, productivity, product performance and reduction of manufacturing cost.

From the market segment perspective, NAMI plans to carry out a number of large-scale R&D projects in collaboration with industry. These include –

(a) sustainable energy and related products - solar energy is clean and inexhaustible. Nanotechnology and advanced materials can help improve the conversion efficiency, lower the cost, prolong solar cell life and create innovative solar energy-based products. An example is thin-film photovoltaic (PV) technologies;

(b) solid state lighting - it aims to apply nanotechnology to invent new materials for use in solid state lighting, enhance product performance and lower the manufacturing cost -

(i) Miniaturized LEDs in order to improve its resolution;

(ii) Improved manufacturing process to minimize the difference in lamp color of LED devices from the same production batch; and

(iii) OLED materials for better photo-electric conversion efficiency;

(c) environmental technology - nanotechnology and advanced materials can play a major role in the monitoring, remediating and improving the quality of air, water and land, and contribute to the invention of environmental-friendly products and manufacturing processes;

(d) metals and metal finishing - NAMI has worked with industrial sponsors on various projects to improve the mechanical strength, the anti-corrosion properties, etc. of steel materials. Another initiative is to work on metal composite materials;

(e) lifestyle and healthcare products - There are a number of NAMI projects in this area, which include healthcare products such as nano forms of dietary supplements, consumer electronic products, personal-care products such as nano creams, etc. NAMI will redouble its effort in creating innovative products for this market segment; and

(f) advanced materials for consumer and industrial applications - NAMI is currently working on a number of research ideas on developing new composite materials for both indoor and outdoor applications. They either are low cost replacements to existing products or offer performance and physical properties that exceed current capabilities.

Against the original target of a total of 75 projects in five years, NAMI undertook 25 R&D projects in the various major technology areas by the end of 2008.

Between April 2006 and December 2008, NAMI conducted five rounds of project proposal solicitation, and received a total of 62 project proposals. Of these applications, 15 projects (including three undertaken in-house by NAMI) were approved. NAMI also assisted in monitoring four platform projects on advanced materials and nanotechnology. The total estimated project funding from ITF for these 19 projects (full list at **Appendix 2**) is $118.5 million. About $18.6 million of industry sponsorship was secured for these projects, repersenting about 14% of the total project costs.

Appendix 2

In addition, NAMI has accepted six contract research projects with a total project cost of over $3 million funded solely by industry.

Commercialization of NAMI products and production technologies is in progress. A nano-catalyst was licensed and used in a commercial air purifier manufactured by a local company. A low temperature polycrystalline silicon and active matrix organic light emitting diode manufacturing technology, a color vertically aligned LCD, a photoalignment technology, and a manufacturing process for separating fullerenes C60 and C70 have been licensed to industry.

In addition, NAMI technical staff has developed a nanomaterial-based humidity sensor, a coating of high light reflectivity, and a material which can generate a substantial amount of negative ions without power supply. Up to now, six patents are in different stages of filing and examination. Also, between now and March 2010, over 10 products are expected to be available for commercialization based on the expected completion dates of existing R&D projects.

5. Collaboration parties

NAMI has engaged the following local research institutions to work with industry -

- City University of Hong Kong
- Hong Kong Baptist University

- Hong Kong Productivity Council
- The Chinese University of Hong Kong
- The Hong Kong Polytechnic University
- The Hong Kong University of Science and Technology
- The University of Hong Kong

Some of the R&D projects have engaged research institutions based in Mainland China such as the South China University of Technology.

In addition, NAMI has formed a network of overseas research institutions as technology providers. This is crucial if expertise is not available locally and in Mainland China. NAMI is part of the Asia Nano Forum which comprises 13 Asian economies. Also, NAMI has been aligned itself with various local trade associations such as The Chinese Manufacturers' Association and the Federation of Hong Kong Industries.

6. Industry feedback and liaison

NAMI has been promoting the development of nanotechnology and advanced materials in Hong Kong through different channels - NAMI corporate website, seminars, symposia, international conferences and workshops. A total of seven workshops have been held between 2007 and 2008, five of which were co-organized with the Hong Kong Trade Development Council, to promote the development and commercialization of products and manufacturing processes for various market segments. The average number of attendees per event in NAMI organized meetings has been over 100.

NAMI has recruited NAMI Consortium members as a way to maintain and enhance communication with individuals interested in nanotechnology and advanced materials. To further strengthen the NAMI business and technical network, two major initiatives will be carried out.

Firstly, a network of leading researchers will be invited to become "affiliates" of NAMI. The NAMI affiliates can be strong in either fundamental or applied research in the market segments that NAMI has targeted. NAMI might involve our affiliates in R&D projects, workshops, brainstorming sessions, reviews, consultancy, etc. The aim is to organize people to serve as technology providers for the target market segments.

Secondly, marketing focus groups made up of business and technical people will be organized. The main purpose of these meetings is to provide a platform for -

- updating on market situations and requirements;

- presenting new ideas, research results, case studies of technology applications;

- widening the network and deepening the collaboration between local industry and research institutions; and

- identifying new opportunities for R&D projects and technology commercialization and applications.

Based on our consultation and interactions with industry from the past operations of NAMI, the following recommendations can be made to ensure the best use of the public funding entrusted to NAMI. The main objective behind these recommendations is to ensure a research programme would meet real market needs in the window of opportunity afforded by the market.

- NAMI should focus on a number of market segments to benefit from synergism and scale.

- The project approval process should be streamlined in order to speed up the time to market.

- In addition to industrial sponsorship, more effort should be made to get end-user commitment to try out the technology and to include these trials as part of the research programme.

- Project monitoring should be done from both the business and technical perspectives in order to ensure that technical development is carried out according to the research plan, and that commercial opportunities can be identified as soon as possible and where necessary to re-align the technical development if there is any change in market requirements.

7. Budget and cashflow

Operating Costs

	2006-07	2007-08	2008-09	2009-10	2010-11	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Staff	6,930	7,265	9,480	21,324	22,391	67,390
Equipment and other capital cost	311	99	410	5,122	700	6,642
Other direct costs	3,196	3,234	3,472	7,119	7,715	24,736
- *Publicity/promotion*	32	41	190	374	393	894
- *marketing/ commercialisation*	0	0	60	252	265	577
- *Administrative support and others*	3,164	3,193	3,222	6,493	7,057	23,265
Total expenditure:	10,437	10,598	13,362	33,565	30,806	98,768
Less: Income (1)	70	45	443	300	300	1,158
ITF funding:	**10,367**	**10,553**	**12,919**	**33,265**	**30,506**	**97,610** (2)

Explanatory Notes –

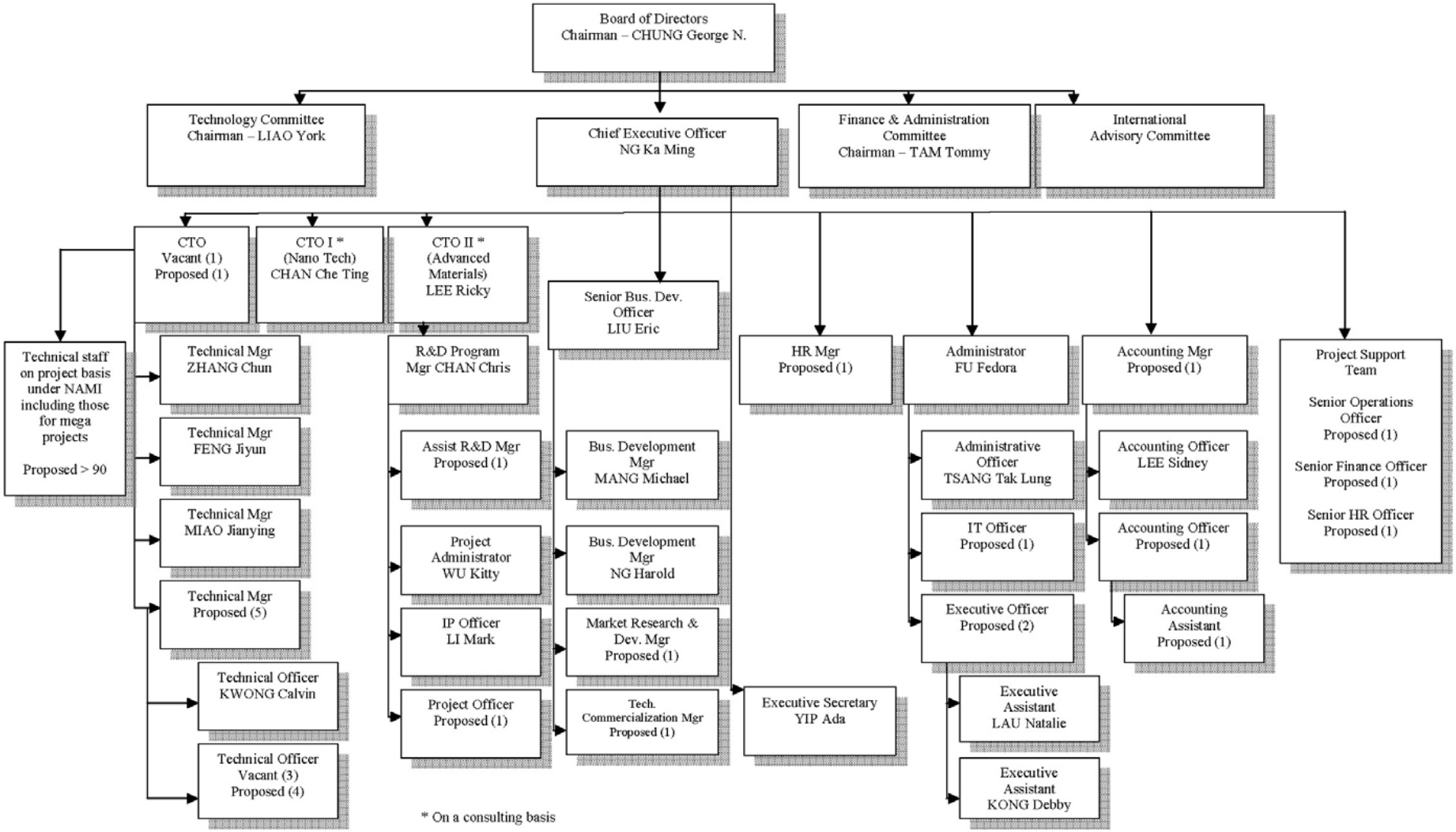
(1) The income includes fees collected from testing services and charges collected for overheads of NAMI projects. From 2009 and thereafter, an annual income of $300,000 is expected from contract research work.

(2) The increase in funding request as compared to that approved by the FC in 2005 was mainly attributed to the large-scale collaborative projects on PV technology. This increase includes $11 million per year for new staff, one-off $4 million for capital expenditures for lab and office facilities at the Hong Kong Science and Technology Parks (HKSTP), $3 million per year for rent and utilities at HKSTP, $1 million per year of contingency funds and $0.6 million per year for PR and commercialization expenses. For 2009-10 and 2010-11, $2 million per year is required for the project support team.

R&D Expenditure (revised estimate)

	2006-07 to 2010-11
	$'000
R&D expenditure	452,200
Less	
Industry contributions and other income	141,500
Total project funding from ITF (indicative)	**310,700**

Appendix 1 to Annex F



Summary of
R&D Projects undertaken by NAMI
(April 2006 to December 2008)

	Project Title	Project Cost ($ million)
1.	Advance Materials, Devices and Processing Technologies for Organic Light-Emitting Devices (OLED)	8.5
2.	Robust OLED Materials and Their Purification Technology	4.3
3.	New OLED Materials Technologies for Displays, Illumination and Backlighting	6.1
4.	Institute of NanoMaterials and NanoTechnology (INMT): Development of Functional Nanomaterials and Technologies	63.3
5.	LED Arrays on Silicon Substrates by Flip-chip Technology	4.0
6.	Development and Production of Novel Negative Air Ion Materials and Products	1.0
7.	Development of the Layered Nanostructured Metallic Sheet/Plate for Structural Applications	5.3
8.	Precision Polishing Method for Complex-curved-profile Parts and Polishing Slurry Used for the Method	2.3
9.	Development of Advanced Composite Pellets and a Novel Supercritical Fluid Extraction Process for Micro-powder Injection Moulding Technology	3.2
10.	Nanotechnology-enabled Organic Light Emitting Devices for Decorative and Special-effect Lighting Purposes	3.5
11.	Next Generation Display Technology	8.5
12.	Research & Development of New Materials for Printable Electronics	12.5
13.	Industrialization of Liquid TiO_2 Hydrosol Production and Extensive Applications for Indoor Air Purification*	2.0
14.	Demonstration Line for the Production of Low-cost Humidity Sensor*	0.6
15.	Industrial Scale Sonochemical Fabrication of Mesoporous Photocatalysts*	1.0
16.	Nano-enhanced Hot-dip Galvanizing Process*	2.5
17.	High Performance Polymer Nanocomposite Fibers for Electronic Applications*	5.4

	Project Title	**Project Cost** ($ million)
18.	Development of Blue OLED Materials and Device*	0.6
19.	To Enhance the Attachment of Cells, Proteins and Peptides on Microplates by Surface Treatment for Enzyme-linked Immunosorbent Assay (ELISA) Applications*	2.4

*Note: * - collaborative project*

Annex G

List of major R&D results and progress of technology transfer under ASTRI projects

Project Title	R&D results	Progress in technology transfer
(A) Communication Technologies		
EMS for Wireless Networks	• Element Management System for WiFi and WiMAX network base stations • Rapidly and cost-effectively customizable.	• Licensed to local WiFi operator and telecom company
Multimode Mobile TV Handset	• Baseband IC for DVB-T/H (Europe), T-DMB (Korea) and CMMB (China) • RF IC for multi-band tuner. • Single chip solution reduces power consumption and cost.	• Designs ready for licensing in 2009 for China and international market.
Practical MIMO for WiMAX/LTE Device	• Reference designs and core IP modules for an MIMO-OFDM platform (WiMAX/LTE) • Digital hardware platform for a TD-LTE emulator	• Ready for technology transfer in 2010
Advanced Indoor MIMO Platform	• Enhanced 802.11g/n platform with ASTRI's Innovations in antenna selection and rate/mode selection • Wireless Home AV distribution system	• Licensed to world leading 802.11 chip vendor

Project Title	**R&D results**	**Progress in technology transfer**
(B) Enterprise & Consumer Electronics		
Video Encoder and Decoder	• HD H.264 decoder FPGA and IC • Chinese AVS Compression Standards	• Licensed to Chinese TV manufacturer. • IP accepted into AVS pool in China standards.
Client-based Wireless Hotspot Access	• Handheld WiFi devices with access to multiple hotspots • Voice over IP with roaming	• ASTRI had signed marketing agreement with main provider of hotspots worldwide. • Turnkey WiFi VoIP phone reference design available to be licensed.
Portable Dual Mode Wireless and Broadcast Multimedia Platform	• A mobile digital TV platform leveraging the convergence of wireless networks (cellular and Wi-Fi) and broadcast networks (DVB-H and T-DMB). • 3 hours viewing time with 1200mAh battery, quick service discovery and channel switch, and DSP multimedia engine	• Reference design licensed to local and overseas partners
Triple Player IP Set Top Box (STB) Platform	• “Triple Play”: video, data and voice services provided by a single operator delivered via the broadband network. • Personal Video Recording (PVR) with streaming application. • Robust IP TV streaming modules with ASTRI proprietary error resilient algorithms	• Reference design licensed to local and overseas partners

Project Title	**R&D results**	**Progress in technology transfer**
(C) IC Designs		
Power Management IC	• Low Drop Out (LDO) voltage regulator • DC/DC Converter for mobile phones	• LDO IC in mass production since 2007 • IP transferred to local partners
Nanometer IC Design	• 90nm and 65 nm design methodology • Library of popular components • Upgrade local IC design capability	• Low cost nanometer IP library components available in 2010 for HK IC designers to provide advanced products
ASIC for Integrated CCD Image Sensor Processing	• Integration of analog mixed signal IP with digital circuitry • High speed-low power data converters (ADC, DAC), • Precision oscillators and high voltage CCD clock drivers in BiCMOS and CMOS processes.	• Licensed to local partners for volume production
(D) Materials & Packaging Technologies		
Advanced Technologies System-in-Package (SiP)	• Integration for wireless front-end module • Applications in automobile electronics	• Award winning design in Consumer Electronics Show • Specific product IPs retained by the industry partner (collaborative research project).
Opto-electronics Modules	• Small size personal micro-projector: 20mm/30mm/13mm • Optical HDMI cable transceivers	• 3.4Gb/s per channel for 100m long cable design licensed to two industry partners.

Project Title	**R&D results**	**Progress in technology transfer**
LED for General Lighting - Area Light Source	• Chip electrode design for LEDs • High brightness and low energy consumption LED driving module • High failure tolerant circuit design for LED light source • Remote and feedback control technology	• High power LED based MR16 lamp design licensed to local partner who is receiving orders for volume production
Large-Sized (>32”) Back-Light Unit using LED	• A backlight unit using Red, Green, and Blue Light Emitting Diodes (RGB-LEDs) • Special package design for heat dissipation • Pulse LED system design for energy saving	• Licensed to Chinese TV manufacturers