

***Response to the
Public Consultation Paper on***

***New Strategy of Innovation and Technology
Development***

A submission by the:

The Hong Kong Computer Society

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重點科技範疇 Technology focus areas

1. 對 13 個建議重點科技範疇的定義和範圍的意見 Comments on definition and scope of the 13 proposed focus areas
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The 13 proposed “focus areas” are considered too many, too diversified and lacking of clear and true focus.

The inter-relationship of these “focus areas” deserves more thorough analysis to create synergistic groupings to support better planning and management. Disjointed R&D¹ activities scattered into small and uncoordinated pockets are not the encouraged models for going forward. Critical mass must be shepherded together to allow our chosen R&D directions to reach sustainable momentum in the shortest possible timeframe.

Bearing in mind that the funding has an industrial application and commercialization purpose instead of purely knowledge discovery, R&D directions must therefore be demand driven and the themes of which carefully chosen, led and calibrated from time to time to reflect true industry needs of Hong Kong and the greater PRD region that Hong Kong is economically integrating into. They must support holistic programmes consisting of related activities of symbiotic natures. Uncoordinated “R&D projects” on trendy or fashionable topics will not automatically translate into success fulfilling the needs of the industry.

We agree with the new emphasizes placed on *market relevance and industry participation*. To do so, we need to take one step backward to carefully examine the *problems* that we intend to solve for the various sectors of the industry before embracing the perceived “solutions” or the potential elements contributing to such solutions.

The following diagram is an attempt to map these 13 “focus areas” into a more manageable model so that related R&D activities can be harnessed together to create effective solutions to the practical and broader industry problems².

¹ The term R&D is used within the context of the Innovation and Technology Funding scheme and the activity scope covered within this Consultation Paper. It is not referring to the Basic or Pure Research work undertaken by the universities and the specific Product Development work of the industries.

² The 13 “focus areas” are denoted in italics in this diagram for easy identification.

Problems to be solved	Slow and sub-optimal adoption of Information Technology in key Industry Sectors of Hong Kong.	Improvement is needed in the Product Development Capabilities of the Electronic Industry.	Injection of New Technologies into the traditional Manufacturing Industry.	Fostering of New and High Potential Industry Sectors for Strategic Growth.
Business Opportunities	Progressive Adoption of IT in the following sectors: <ul style="list-style-type: none"> • Logistics Industry • Hospitality and Tourism Industry • Retail Industry • Manufacturing Industry • Medical and Healthcare Industry 	Enhance the collective product development capabilities in the following areas: <ul style="list-style-type: none"> • <i>Consumer Electronics</i> • <i>Medical Diagnostics and Devices</i> • <i>Automotive Accessory Systems</i> 	Enhance the collective manufacturing capability and efficiency in the following areas: <ul style="list-style-type: none"> • <i>Textile and Clothing</i> • <i>Automotive Parts</i> • <i>Electronics Assembly</i> • <i>Toys and Hobby</i> 	Chosen new industry areas to nourish for fast growth: <ul style="list-style-type: none"> • <i>Digital Entertainment</i> • <i>Chinese Medicine</i> • <i>Integrated Circuit Design</i> • <i>Opto-electronics</i>
R&D Activities	<ul style="list-style-type: none"> • <i>Communication Technologies</i> • <i>Logistics/Supply Chain Management Enabling Technologies</i> • <i>Software and Information Services</i> 	<ul style="list-style-type: none"> • <i>Display Technology</i> • <i>Integrated Circuit Design</i> • <i>Opto-electronics</i> • <i>Embedded Software Development</i> 	<ul style="list-style-type: none"> • <i>Advanced Manufacturing Technologies</i> • <i>Nano-technology and Advanced Material</i> 	

This diagram only gives an illustration of a possible model. Needless to say, there is more than one way to perform such mapping or grouping of R&D activities. One of the key elements of this model is the problem statement for which solutions are sought. Different problem statements may produce very different mappings of these R&D “focuses”. We are not suggesting that this above mapping is the only way for the grouping of the proposed 13 R&D “focus areas”.

We are merely suggesting that this type of top-down approach should be adopted for the planning and management of our R&D activities. We must resist the temptation to rush into the “solutions” assuming that we all know the problems so well that their precise definitions are not required.

An agreement on the problem statement by the stakeholders with emphasis on market relevance can improve the opportunity in obtaining consensus on the methods to tackle them for solutions. Valuable time can be wasted debating on fragments of the perceived solutions while understanding of the problems remain divergent.

2. 重點範疇增減的建議 Suggestions on addition or deletion of focus areas

Addition or deletion to the “focus areas” is less important than the articulation of clear statements for appropriately-scoped industry or structural problems that are needed to be solved. When such statements are unambiguously defined, the organizations given the responsibilities to do whatever is needed to solving them can determine such additions and deletions of R&D areas with advice provided by the various stakeholders.

But an industry focused R&D Center with limited financial resources needs to be demand-led. Its focus cannot be maintained by what the researchers consider as relevant as would often be the case in academic research.

One of the important direction missing from the 13 “focus areas” is the progressive application of IT on some of Hong Kong’s key industry sectors in order to maintain their competitiveness. While IT application in our large enterprises are very mature and have attained world-leadership levels, our SME are suffering from a “digital-divide” syndrome of an immense magnitude. If this problem remains unsolved, the competitiveness of these SME businesses will rapidly deteriorate. It will in turn cause irreversible damages to the economic diversity and well being of Hong Kong.

The over-correction in many industries reacting to the faded IT hypes fueled by unrealistic expectations and over investment at the end of the last century has falsely created an impression that “IT Does Not Matter”. The innovative use of IT in many key industry sectors of Hong Kong has fallen off the radar screen of the executives. The government has the responsibility in assuming a leadership role to correct such unfortunate misconception. We believe an undeterred commitment to solve the problem reflected in the “slow and sub-optimal adoption of IT among key industry sectors” must be clearly proclaimed and concrete actions must then follow to effectively find the necessary solutions.

Poor performance of past attempts to solve this problem does not mean this problem is not real or insolvable. Such failure may only indicate that ineffective approach has been used on solving a problem that has not been comprehensively defined to command coordinated effort for its solutions.

We strongly recommended that the problem related to “slow and sub-optimal adoption of IT among key industry sectors” be dealt with under the scope of this New Strategy of Innovation and Technology Development.

New strategy does not mean we can only focus on new problems. We need to apply new thinking and new strategy to existing problems as long as they are real and important.

On the need to venture into some “green-field” industries, such selection is always non-trivial. The disciplines required for selecting, jump-starting and nourishing such

type of initiatives are different from what are commonly used in the cultivation of more matured and better-understood industries for secondary growth. Risk tolerance, risk management and when public funding is involved, education of the public to understand the true and strategic values of such investments will become important issues that ITC must be prepared to take up.

Investments into these “green-field” opportunities must be carefully balanced with our investments in the re-ignition and boosting of more matured industries for new growth. Green-field opportunity that works for some countries may not automatically work for the others. We have NO strong opinion at the present concerning the five “R&D focus areas” that we have classified as green-field ones for Hong Kong¹. They are:

1. Nano-technology
2. Integrated Circuit Design
3. Opto-electronics
4. Chinese Medicine
5. Digital Entertainment

The temptation to bet our chips on all green-field opportunities is sometimes difficult to resist because of their high-growth potentials. However, we must not let our imagination overtake our pragmatism in order to strike the needed balance. Some cold and hard figures will have to be established as the maximum investment that we can afford to direct to these “green-fields”. A lower but meaningful private sector funding level must also be set to ensure sufficient industry support and commitment are there to cultivate and later to harvest from these “green-fields”.

As the investments into these green-fields must also have certain critical size to allow them to reach self-sustainable states, we therefore can only FOCUS our ITF funding on a few areas that have better chances to succeed. Such selection is not easy and can be unsettling when preference and vested interest play their parts in such decisions. The “matching fund” scheme that we will explain in point number 5 can be used as an objective criterion and the pre-requisite of such selection.

3. 對每個建議重點範疇下的主要研發題目的建議 Suggestions on key R&D topics under each of the proposed focus areas

A rigid prescription of solutions to imprecisely defined problems too early in the cycle under the disguise of “focus areas” is not necessarily the best way to solve the real problems. The 13 “focus areas” should only be used as a good starting point for the assembly of a laundry list in the examination of solution elements to some of our industry problems waiting for more precise definitions and consensus.

1 The criteria used for classification of these Hong Kong green-fields are: insufficient critical mass in the local industry; lacking of a sustainable eco-system; limited man-power involved; isolated pockets of skills, yet some are world-class; a few visionaries are championing for it; opportunities and potential growth are huge.

研發中心 R&D Centres

4. 成立研發中心能否符合本港經濟、科技及產業發展的需要 Whether the establishment of R&D Centres could meet the needs of economic, technology and industry development in Hong Kong
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We totally agree with the five guiding principles used by ITF in the formulation of the new strategy of Innovation and Technology development in Hong Kong. With limited resources and narrowing windows of opportunities, we must *focus*, foster and rely on strong *industry participation* to increase *market relevance*, *leverage on the Mainland*, particularly the pan-PRD region to establish our foothold on new grounds in the shortest possible time. This can only be done through *better coordination* of the participants for enhanced synergy and resources utilization.

We support the establishment of “R&D Centers”. However, other names more descriptively reflect their mission and role shall be considered. One of the suggestions is to use the term: “Technology Development and Transfer Center” to highlight its role to perform “transfer of technology” while reducing the risk in the incorrect interpretation of the “R” as basic or pure research work.

Other suggestions such as “R&D Support Center”, “Applied Research and Technology Transfer Center”, “Industry Collaborative Product Development Center”. “Industry Solution Center” are equally appropriate depending on the scope and nature of the problems that they are chartered to solve.

5. 研發中心的職能、運作模式、組織架構和集資模式 Functions, mode of operation, organization and funding model of R&D Centres

Before the examination of possible operational and management models for these “R&D Centers”, it is worthwhile to lay down some of the principles that we believe are important considerations in the design of any workable framework.

Some of the key ones are highlighted below:

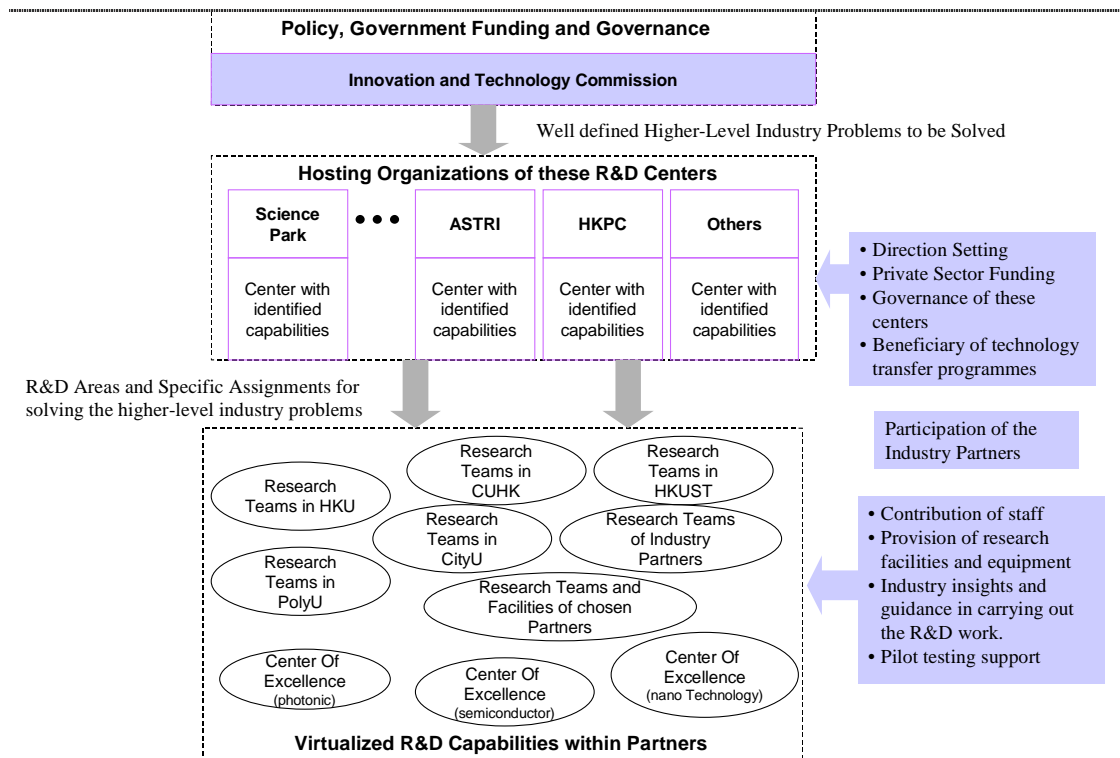
- Instead of creating more “brick-and-mortar” as well as duplicative management structures to support the operations of these proposed “R&D Centers”, we should give priority consideration in re-shaping and re-aligning existing organizations to take up the roles defined under this new strategy for Innovation and Technology Development. These existing organizations may include: HKPC, ASTRI, Science Park, universities and other research capabilities that can be marshaled to support this course.
- Substantial participation by relevant industry sectors is key to the success of this new strategy. The participants must be treated as intimate partners with deep involvement in these “R&D Centers”. Their involvement is not limited to fund sponsorship. They should also be invited to contribute staff time, ideas, market information, industry leads, expert views in carrying out the work of the centers. Some of these industry partners can be nominated into the executive decision-making and governance bodies of these centers to ensure the partnership is solid and enduring.
- The term “industry” used in the above bullet point has a broad definition. It refers to the beneficiaries and the sectors that this initiative is intended to serve. Government in its role as one of the biggest user of technologies in the Hong Kong market must also be included as a key industry partner supporting this new strategy. Its participation as an end-user, as a supporter must be clearly seen and to become a role model of the private sector.
- The transformation of certain parts of the existing organizations proposed above to take up the defined roles of these “R&D Centers” must be expediently done. It is conceivable to structure them as separate business units within these established hosting organizations. The industry participants as partners of the centers are privileged to information concerning the center without the need to know the details of the entire hosting organizations. The “business unit” structure allows the creation of the needed transparency and accountability satisfying the needs of these industry partners.
- With the R&D culture still at its infancy in Hong Kong, the bulk of our local R&D capacities and capabilities are residing in our universities. Such capacities and capabilities must be effectively leveraged to support this new strategy. While the research work supported by this ITF initiative must not be used as alternate funding sources to support academic or pure research work; it must at the same time, not compromise the academic excellence of these institutions and cause

severe disruption to the careers of their academic staff.

- Given this current constraint, “R&D Center” can be virtualized in terms of research capabilities. It means these research capabilities need not totally belong to the “Center” or physically housed under the roof of the “Center”. These research capabilities can be scattered as appropriate and necessary into multiple locations operated by universities and other chosen research partners anywhere in the world.
- These “R&D Centers” must acquire the necessary skills in managing such virtualized and physically scattered R&D capabilities. Appointments of the R&D partners and funding of the R&D activities must be done efficiently while maintaining the required accountability.
- The other core skills required for the successful management of these “R&D Centers” are:
 1. Identification of the relevant technologies and solution elements for the high-level problems that they are chartered to solve.
 2. Breakdown of the high-level problems into solvable parts and the re-integration of these parts to become complete solutions.
 3. Assembling sufficient level of industry support for the operations of these “R&D Centers” and create market relevant solutions that can be readily transferred to the industry.
 4. Recognition and acceptance of the roles and charters of the peer “R&D Centers”, leveraging the strength of these peer centers for fast and effective solutions to avoid duplicative work and investments.
 5. Ability to conduct or commission market research on areas relevant to the problems that they are chartered to solve.
 6. IP protection and management, Patent application and management.
 7. Development and execution of appropriate go-to-market models to carry out the Technology Transfer mission.
 8. Operation of an effective sales/marketing arm for revenue generation.
 9. Running of these “R&D Centers” as sustainable businesses with viable business plans and realistic funding commitments of the government.

The Organizational Framework

The following is a proposed framework for the structuring and management of the Innovation and Technology Development initiative spearheaded under this new strategy.



This framework consists of three tiers of authority and responsibility:

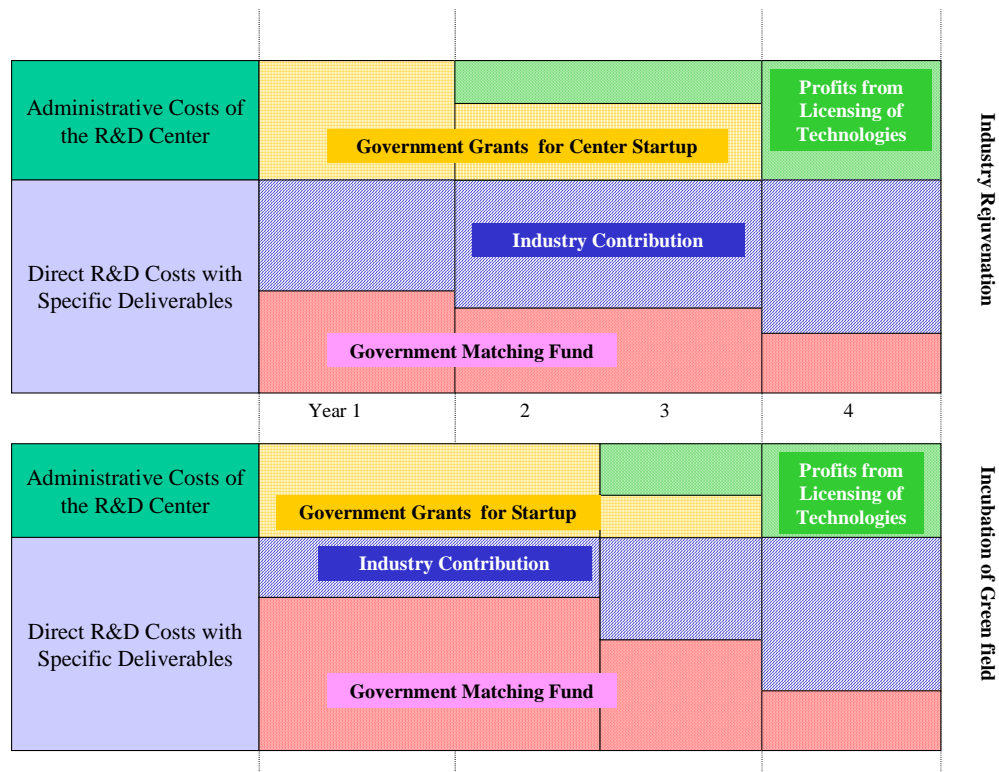
1. At the top of this pyramid is the policy, funding and governance body of the programme. It is the Innovation Technology Commission representing the government as the overseer.
2. At the middle tier, there are the hosting organizations of these “R&D Centers” created to undertake the solving of higher-level, broadly scoped industry problems agreed by the stakeholders. Their core skills are given above as a reference and their capability for undertaking the role is their ability to stay in touch on a day-to-day basis with industry and their ability to operate as a bridge and arbitrator between researchers and industrialists.
3. At the lower tier, these are the virtualized R&D capabilities required to solve the higher-level industry problems given to the “R&D Centers”. They can be research teams assembled in our local universities, laboratory facilities of these institutions, research teams of the industry partners. They are research project driven and are required to work closely with the middle-tier “R&D Centers” for the development of long lasting partner relationship. Their focus is to carry out research work under the direction of the virtualized “R&D Centers”. The burden of productization, technology transfer, IP licensing and other commercialization activities is removed from participants at this tier.

This structure provides a clear separation of functions, responsibilities and authorities. It allows larger number of participants in the lower tier while maintaining a reasonable level of control at the middle tier for better coordination and planning.

The set of core skills identified for the middle tier “R&D Centers” can be developed fully and consistently to support commercialization activities which are the crucial factors for success of this new strategy. It is totally impractical to expect the large number of research teams in the universities to acquire and excel in all these skills. It is equally undesirable to give such commercialization responsibilities to the “Technology Transfer Centers” of the various universities where individual institutional interest inevitably takes precedence over the interest of the larger community.

The Funding Schemes

It is difficult to develop very precise formula for the funding schemes at the planning stage of the new strategy. However, some basic principles can be explored. The following diagram can be used as a conceptual framework in the development of a funding model.



On the expenses side, there are the two main categories of costs:

1. Costs associated with the setup and administration of the R&D Center – At the initial stage, government grants can be allocated to such purposes. However, these R&D Centers must be prepared to gradually absorb such expenses through the revenue generated from the licensing of the technologies developed from the centers. The ratio and timeline for achieving this target can vary depending on the nature of the center. For example, industry rejuvenation programmes can have a more aggressive schedule than the incubation of green fields.

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2. Direct R&D costs for specific deliverables agreed by the stakeholders – This must be a combination of industry contributions and matching fund provided from the ITF funding. Again, such ratio can vary based on nature of the problems for which solutions are to be developed through this R&D work.

Checkpoints with clear criteria for further disbursement of money to cover these two types of costs must be established by the ITC for the continuation of the government funding.

On the income side, the R&D center must be given a clear mandate to generate sufficient revenue through technology licensing to cover its administrative expenses when the agreed deadline is reached. Formula for the disposition of the excessive profits generated from technology licensing must be transparently and clearly defined. These profits can be distributed to the following parties based on pre-agreed percentages:

- Industry sponsors
- R&D Center as reserve
- Participating R&D partners (universities, research institutes..)
- Return to the ITF fund

Industry sponsorship and government matching fund can only be used to support direct R&D activities. The administrative expenses of the R&D Center shall not be allocated to or paid by this type of funding contributed by the sponsor and the government.

R&D Centers will undoubtedly engage in multiple “projects” in parallel. These projects may have different sets of sponsors and matching funds. Therefore, direct R&D cost for each project must be accounted for individually.

These centers can involve in contracted R&D work given to them by the private sectors. Such work must be secured and managed using fair business practices. Charging formula for this type of work must be determined equitably to avoid the unfair use of public funding to support the work benefiting a limited number of clients. Equally important is that these centers must condition themselves to compete for this type of work equitably with other commercial organizations capable of offering the same service. The use (or shared use, as some may claim) of publicly funded facilities, equipment, support staff and other infrastructure for this purpose can potentially create such conflicts.

To avoid doubts, ambiguities and potential embarrassments, engagement rules and safeguard measures for taking on contracted R&D work of this nature from qualified clients must be developed by ITC and administered consistently among all the participating R&D Centers.