Vocational Training Council

Electronics and Telecommunications Training Board

Report on 2015/16 Delegation Visit to Barcelona

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Background

1.　　In accordance with its 2015/16 programme of activities, the Electronics and Telecommunications Training Board (ECTB) undertook a 5-member on a 7-day delegation visit to Barcelona.　The objectives and areas of interest of the visit were as follows:

Objectives of the Delegation

  (i)　　To keep abreast of the latest technological development related to the electronics industry, especially in the areas of telecommunication and ICT (Information Communication Technology) and the related software development;

  (ii)　　To exchange experience and views on manpower planning, life-long training and measures to meet the changing manpower training needs of the electronics industry;

  (iii)　　To study the business model of the successful telecommunication companies participating in the exhibition;

  (iv)　　To study company and government initiatives for meeting the latest developments with training needs; and

  (v)　　To explore the future development of electronics industry.

Areas of Interest of the Visit:

  (i)　　Trends and new development of ICT (Information Communication Technology), Telecommunication, wireless devices, Smart Phone/Tablet PC and Apps;

  (ii)　　Energy saving and recycling technology;

  (iii)　　Health care & medical electronics and e-Health;

(iv)　　Smart city;

(v)　　Wireless broad band network and long term evolution (LTE) & 5G

(vi)　　Other advanced technologies; and

(vii)　　The training needs required to meet the latest development of the electronics industry and telecommunications industry.

2.　　　　The visit took place during the period from 21 to 26 February 2016. ----　The itinerary of the delegation visit is in Appendix 1.

The Delegation Team

3.　　　　The delegation comprised the following five members:

(i)　　Mr YEUNG Chi-hung, Johnny, Chairman of the ECTB and Leader of the Delegation;

(ii)　　Mr TSE Hung-keung Christopher, Vice-Chairman of the ECTB;

(iii)　　Mr HUI Kin-sang, Sam, Member of the ECTB;

(vi)　　Dr HUNG Kim-fung, Measure, Member of the ECTB; and

(v)　　Mr LEUNG Wing-kwan, Freddy, Secretary of the ECTB.

Organisations and Companies visited

4.   The delegation visited 5 organizations and 14 exhibitors at 2016 Mobile World Congress in Barcelona as listed in Appendix 2.

5.   With its attractive themes and trends of shown technologies, the delegation mainly visited 2016 Mobile World Congress (MWC), the world's largest gathering of the mobile industry in Barcelona, Spain.   Before the visit, with assistance of Hong Kong Science Parks Corporation Ltd and Agency of Business Competitiveness (ACCIÒ) of the Government of Catalonia, Spain, the Secretary prepared a list of selected companies at various sectors of the industry for the delegation to visit at the exhibition.

6.   MWC included hundreds of conference sessions, thousands of exhibitions, gathering of the mobile industry in Barcelona, dozens of programmes led by top organizations from around the world.   The other aim of the delegation visit was to study the government initiatives for meeting the latest development with training needs.   Hence, with the assistance of ACCIÒ, the delegation visited, Eurecat, Technology Center of Catatonia; CTTC, a research institute on telecommunications; the Physics Department of the University of Barcelona and the Salesians SARRIÀ, a vocational training organization in Barcelona.   The delegation had a fruitful discussion with the above organizations on manpower training and planning.

7.   During the visits to selected companies at the exhibition, the delegation exchanged views with them on the latest development and training needs of the electronics industry.

2016 Mobile World Congress

(A) Organisations visited

(i)   Barcelona Smart City Tour

8.   As introduced by the official of Barcelona City Council, the Council wanted to improve public services, boost business competitiveness and create employment.   In order to achieve the objectives, the Council was carrying out projects in areas such as transport, renewable energies, public lighting, environmental monitoring, etc., to make Barcelona a more open, efficient and sustainable city.   He supplemented that the initiatives turned it into an urban laboratory, with the following real projects producing tangible benefits in the everyday lives of its residents and tourists:

(a)   **Smart Bus Shelter**

The Smart Bus Shelter had a touchscreen with municipal public service and applications, dynamic digital advertising, a WiFi connection and contactless technology, based on NFC and QR technology, for downloading municipal applications.

(b)   **SmartParking**

A smart parking system designed to find solutions to the city's typical traffic problems, such as finding a free parking place.   Its sensor-based technology would give people real-time information on free places in the city, reducing the time they spend looking for somewhere to park and improving the traffic flow.

(c) **WiFi**

This access point was one of more than 700 in Barcelona, located in outdoor public areas as well as inside municipal facilities, to allow people to browse on the internet and had access to city information.

(d) **Pneumatic Waste Collection**

The waste collection system included underground storage and a suction system.   It was ideal for narrow streets and this type of system enabled better waste collection management and provided a better environment for the residents.

(e) **Multisensors**

The lampposts included the following devices:

(i) Thermal imaging camera.
Proof of concept for studying the location and flow of moving pedestrians, all done anonymously by installing thermal imaging cameras.   These data could be used for lots of different purposes such as studying the flows of people in tourist and shopping areas.

(ii) Sound sensors.
Noise sensors measure noise pollution in real time and send information on the level of continuous noise (dB) every minute.   These sensors allowed working conditions to be measured and controlled.

(iii) Environmental sensors.
Air quality sensors that measured NO2, CO, O3, SO2 and suspended particle air pollution in real time.   The four main variables were measured by chemical sensors, while the last one was measured with an optical sensor. Air quality was measured by the size of PM10 particles, one of the most dangerous particles for human health.

(iv)   Lighting Sensor

The City was installed with LED lighting with an IP address (identification number) to improve the energy efficiency and management of public lighting.   The system consisted of LED lampposts equipped with light sensors to control some of the variable requirements: the intensity of the light and connection with the municipal telecommunications network.

(f)   **Bicing**

Bicing is a form of public transport based on shared bike use. Providing a simple, practical, sustainable service for anyone wishing to get round Barcelona without making any noise or producing exhaust fumes.

(h)   **Waste Container Sensorisation**

Containers with sensors transmit waste levels via the municipal telecommunications network in real time.   These sensors were connected to the Sentilo (information system) platform.   The purpose of this project was to optimise the waste collection route and make waste management in the city more efficient.

Official representative: Mr Marc Sans
City Promotion Advisor, Barcelona City Council

**(ii)   Eurecat
(www.eurecat.org)**

9. Eurecat is the major Technology Centre of Catalonia and the result of the integration of the most important Catalan technology centers: Ascamm, Barcelona Media, BDigital and Cetemmsa.   It provides the industrial and business sector with differential technology and advanced expertise, and offers solutions to their innovation needs and boosts their competitiveness in a fast-paced environment.

10. The range of services offer by the centre were primarily focused on:

- Applied R&D;
- Technological Services;
- Information Technology Consulting;
- Highly Specialized Training;
- Product and Service Development; and
- Promotion and Distribution of Technological Innovation.

11. Eurecat offers its services at all business sectors but especially at seven key strategic areas identified by the regional Research and Innovation Strategies for Smart Specialisation:

- Food;
- Energy and Resources;
- Industrial Systems;
- Design-based Industries;
- Industries related to sustainable mobility;
- Health Industries and Cultural; and
- Experience-based Industries.

12. Eurecat combined the experience of over 450 professionals, generating an annual income of €38M.   It served over a thousand businesses, participated in over 100 national and international R&D and high level strategic projects, and had 36 international patents and 9 technology-based companies.

 Official representative: Mr Joan Albaigès
                                        Digital Technologies Area Manager of Eurecat

**(iii)   Centre Techològic de Telecommunicacions de Catalunya (CTTC)
(www.cttc.es)**

13.   The CTTC is a non-profit research institution based in Barcelona, resulting from a public initiative of the Regional Government of Catalonia. Research activities, both fundamental and applied were organized onto four research divisions:

- Communication Networks;
- Communication Systems;
- Communication Technologies; and
- Geomatics.

14.	CTTC is a Research Institute oriented towards innovative and high quality R&D project execution with intellectual property generation.	A portfolio of Products & Solutions (P&S) in the fields of communication networks, technologies, systems, position, navigation, and remote sensing, in different technology readiness levels, is available through the company CTTC-HK Ltd.

15.	CTTC had participated in more than 150 projects funded by European, Spanish or Catalan administrations or by direct contracts with industry, in the fields of:

- 4/5G Broadband Communication Systems;
- Embedded Systems;
- Next-generation All-optical Transport Networks;
- Software Defined Networking;
- Satellite Communications;
- Positioning Systems Machine-to-machine Communications; and
- Smart Grids.

16.	Professor Miguel Àngel Lagunas, Director of CTTC, gave a short speech of CTTC and introduced the collaboration between Hong Kong and CTTC to form a partner company CTTC-HK located in Hong Kong.	A Signing Ceremony of the MoU between ASTRI and CTTC was conducted.	It was followed by CTTC researchers to present their state-of-the-art research topics related to 5G and research test beds involved.	The delegation also visited their advanced network laboratoriess for cloud, cable signalling and IoT.

Official representative:	Professor Miguel Àngel Lagunas
Director of CTTC

(iv) Faculty of Physics of the University of Barcelona (www.el.ub.edu)

17.   The Head of the Faculty of Physics, Dr Santiago Marco introduced the Faculty of Physics that consisted of Departments of Quantum Physics and Astrophysics, Condensed Matters Physics, Applied Physics and Engineering Electronics.   Under the Department of Electronics, there was an Engineering Centre titled the Engineering Centre for Instrumentation and Control Microsystems (CEMIC), which was a research and technology centre that worked in the fields of electronic engineering and information technology.

18.   The CEMIC focused its efforts on the development of European and national projects.   It was proactive in promoting and retaining the loyalty of its industrial partners on R&D projects, and actively pursued policies for the protection of intellectual property.

19.   CEMIC had 6 Catalan Leading Research Group:

(i)   Bioelectronics and Nanobioengineering

(ii)   Intelligent Signal Processing

(iii)   Group of Radio Frequency

(iv)   Electronic Materials and Energy

(v)   Micro-and nanotechnology for electronics and photonics and

(vi)   Instrumentation System and Communications

20.   Research projects were on demand from the industry, and national and international R&D projects were related to the fields of electronic engineering and ICT.   Its team conducted research prior to industrialization at its 12 laboratories and prototyping facility.   They offered the following services:

⬧   Technology Monitoring;
⬧   Assessment of Know-how and Technologies; and
⬧   Scientific, Technological and Innovation Consultancy.

21.   The research was based on the demand from the industry and the product resulted from the projects were deployed to the industry.   The Centre assisted in the protection of intellectual property resulted from the research projects and helped the researchers to commercialize the services/products to the companies.   In response to the enquiry from the delegation about the motivation for start-ups, Dr Marco said that their lecturers would identify those potential researchers to go for start-ups otherwise they would advise them to provide consultancy service to the relevant companies.   Last of all, Dr Marco asked some of researchers to present the in-progress projects and share with the delegation the mechanism of transforming technology into commercial products.

  Official representative: Dr Santiago Marco
                              Head of the Faculty of Physics
                              University of Barcelona

(v)   Salesians Sarrià
(www. salesianssarria.com)
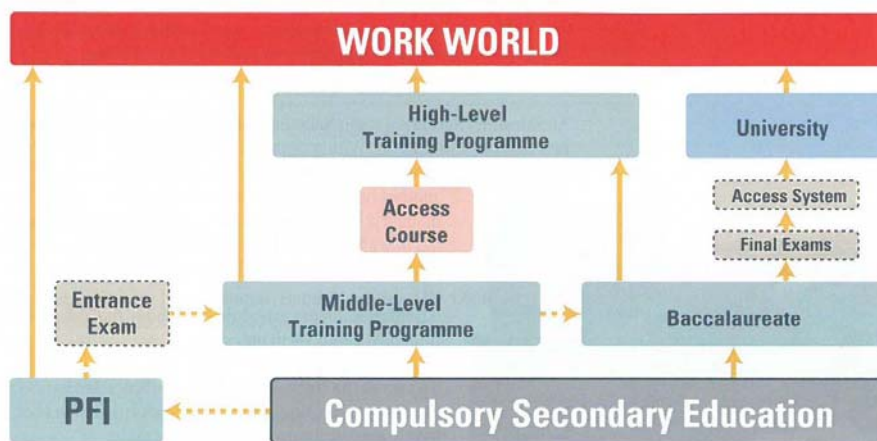
The Catalan Education System

22.   The Catalan education system is divided into four stages: early childhood education, primary education, secondary education and post-compulsory education.   Salesians SARRIÀ offers its experience to post-compulsory education, with a wide range of Baccalaureate and Vocational Education and Training (VET) programmes.

23.   Vocational Training is part of the courses students could take after achieving the Compulsory Secondary Education (ESO) diploma from the age of 16.   It is organized in Middle-Level and Higher-Level VET cycles.   This educational modality seeks to qualify students for the tasks associated with a profession and provides a first theoretical part at the educational center and a second phase consisting of practical training in the workplace.

24.   There is also the Dual VET (Apprenticeships) system that allowed students to combine their education at college with professional activity, working for a company which is related to the studies of the students.   Thus, the student will achieve part of learning in a practical way and through its work in the chosen company.

25.   Once the ESO diploma is obtained, the other academic output that students could choose is the Baccalaureate.   It takes two years and is usually studied between the ages of 16 and 18.   It is organized in different paths, so that students could choose one according to their interests: Science and Technology and Humanities and Social Sciences.

(i)   DUAL VET

The College has adapted their curricula in order that the students could alternate training time at college with time for training and productive activities in companies.   This training program provides training skilled workers that are adapted to market needs and ensure the cooperation between college and businesses.

Students will acquire the necessary technique or skills to help them in their integration into the labour market, which advancing in their studies.   Being able to apply their knowledge into practice helps them throughout the learning process and represents an added value for the student. Another key point is that this education model is financially funded training, which helps to ensure that students have an additional motivation.

Dual VET system (Apprenticeships) is divided into two phases: an initial unpaid one for a duration of between 80 and 100 hours of work, during which training takes place in the workplace and the student has a school insurance.   Once this stage is finished, there is a second phase where companies had two options, offering students an employment contract for training and learning, or a scholarship.

(ii)   Innovation and Entrepreneurship

The entrepreneurship spirit was essential in a globalized society which values qualities such as innovation capacity, initiative and creativity.   In this scenario, they are aware of the importance of strengthening these qualities and skills from education and bring to business the talent of students that are trained in these values.

The College is committed to providing practical training in the field of entrepreneurship, with programs targeting the creation of new businesses aimed at future entrepreneurs.

Their target is to foster the entrepreneurial spirit so that students acquire in a dynamic and creative way the knowledge and tools that enable them to create innovative projects.   One area where they could acquire practical experience through training in subject such as Business and Entrepreneurship; and participation in conference, events and contests.

Salesians SARRIÀ also participates in the InnovaFP programme promoted by the Department of Education, which promotes collaboration between companies and educational institutions, allowing the development of innovative projects and knowledge transfer.

Official representative: Mr Laura Ramírez Domínguez
International Relationship Officer

(B) *Companies visited at MWC 2016*

(i) Ericsson Pavilion
(www.ericsson.com)

26. Ericsson is a world leader in communications technology and services. Founded in 1876, Ericsson has its headquarters in Stockholm, Sweden with net sales of USD 29.4 billion in 2015. With approximately 115,000 professionals and customers in 180 countries, they combined global scale with technology and services leadership and they supported networks that connect more than 2.5 billion subscribers. Forty percent of the world's mobile traffic was carried over Ericsson networks.

27. With the assistance of the Ericsson specialists, the delegation had visited the following demonstration booths:

5G

(a) **5G radio prototypes:** Phase 2 of Ericsson's award-winning 5G Radio Test Bed, which included 5G radio prototypes set for operator field trials in 2016, had been running live and delivering industry-leading performance with advanced features such as Massive Multi-input Mulit-output (MIMO) and beam tracking.

(b) **Telehaptic control:** visitors could try out a prototype system for semi-autonomous, remote flying of radio-controlled helicopters. By adding haptic feedback to video and audio, users can feel the helicopter moving and interacting with its environment enabled by 5G networks.

Internet of Things (IoT)

(a)   **Cellular IoT:** Ericsson's leading low power wide area (LPWA) cellular IoT solutions, including Narrowband IoT (NB-IoT), Long Term Evolution LTE-M (Cat M) and (Extended Coverage) for Massive IoT applications had been demonstrated.

(b)   **IoT solutions:** IoT networks that connected directly to a 5G system with devices connected via short-range radio through capillary gateways had been demonstrated.

Cloud

(a)   **Evolution to Hyperscale IT infrastructure:** A new generation of datacenter system using disaggregated hardware architecture for better resource utilization – had been demonstrated, together with the latest Ericsson cloud offerings.

(b)   **Cloud Radio Access Network (RAN):** Ericsson's new Elastic RAN architecture, which enabled virtually limitless baseband interconnections had been demonstrated.

(c)   **Network Functions Virtualization (NFV):** Ericsson had showcased its end-to-end role in the NFV technology, including software-defined networking (SDN) and evolution to the 5G-ready core.

Networks

(a)   **Enriched VoLTE and Wi-Fi calling for multi-device:** Ericsson and Sony had demonstrated the latest consumer and enterprise communication services based on VoLTE. Extension of voice services to tablets, computers and other personal devices in collaboration with its device partners had been demonstrated.

(b)   **Gigabit LTE:** Network and device performance of up to 1Gbps had been demonstrated, using a combination of 3 Component Carrier Aggregation, 4X4 MIMO and 256 QAM, and including interoperability with the latest devices.

(d) **Indoor small cells:** Ericsson had demonstrated a new indoor radio planning tool designed to help operators dramatically reduce time-to-service for indoor solutions including the Ericsson Radio Dot System and Pico Radio Broadcasting System.

Industries

(a) **Mobile financial services:** Ericsson's Interconnect solutions, which ensured interoperability between mobile wallet providers and established payment networks, had been demonstrated.

(b) **Smart and sustainable cities:** Industry solutions for addressing key urban agendas of safety, efficiency, resilience, growth and holistic planning had been demonstrated.

(c) **Ericsson Emergency Response** – modern operations center capabilities to support emergency response agencies with efficient incident handling and inter-agency collaboration, across all mission-critical networks had been demonstrated.

(d) **Solar car:** Ericsson demonstrated how an application based on the Connected Traffic Cloud helped Solar Team Eindhoven's Stella Lux to win the Cruiser Class of the 2015 World Solar Challenge – a 3,000-kilometer race across the Australian outback.

(e) **Autonomous driving:** Ericsson was supporting Volvo autonomous vehicles, as well as its industry-leading infotainment and connected services had been displayed.

Official representative: Mr Sriram Ramakrishnan
Director of Operation & Business Support systems

Mr Ammar Sabbagh, Principal Consultant of
Global Smart Sustainable Cities

(ii)   Huawei Pavilion
     (www.huawei.com)

28.   Huawei is a leading global information and communications technology (ICT) solutions provider.   Their aim is to build a better connected world, acting as an innovative enabler for the information society, and collaborative contributor to the industry.   With 170 000 employees worldwide, the company is committed to providing maximum value for telecom operators, enterprises and consumers.   Their innovative ICT solutions, products and services are used in more than 170 countries and regions, serving over one-third of the world's population.

29.   Huawei currently has over 9 900 staff based in Europe, of whom 1 200 were working in R&D.   They have 18 R&D sites located in eight European countries (Belgium, Finland, France, Germany, Ireland, Italy, Sweden and the UK) and operated numerous joint innovation centres in partnership with telecom and ICT partners.

30.   Huawei's Executive introduced the Safe City Solution Experience Center at Mobile World Congress 2016 to the delegation.   Under the theme "Leading New ICT, Making Cities Safer", the experience center showcased leading new Information and Communications Technologies (ICT), including the Internet of Things (IoT), Mobile Broadband, Video and Big Data, which were reshaping traditional urban safety management.   The center also included Safe City Solutions that enable cities to build multidimensional and intelligent security systems featuring awareness, visualization, and collaboration, helping governments improve crisis prevention and emergency handling capabilities while reducing crime rates.
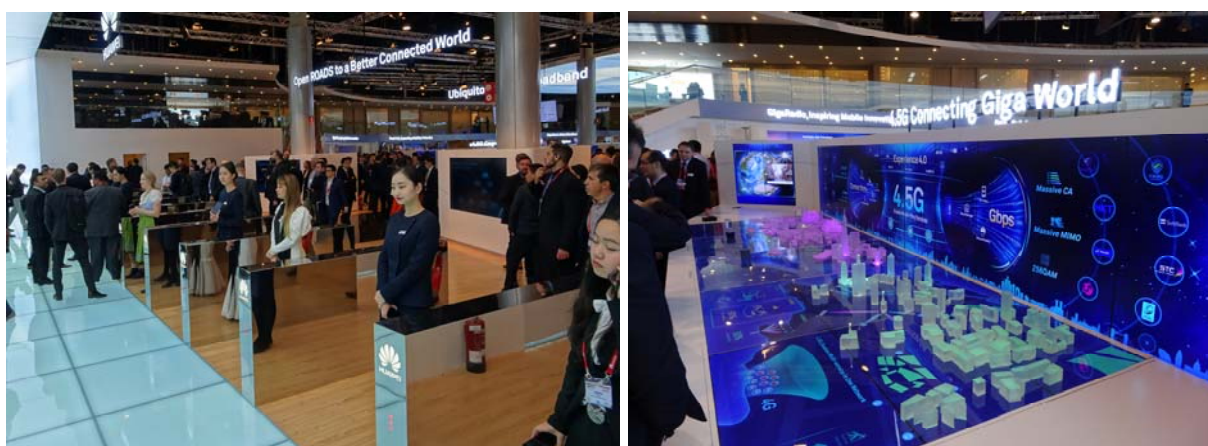
31.   With the increased frequency of serious public safety incidents, building a safe city had become a priority for city administrators.   Safe city development has shifted from an incubation period focused on video surveillance deployment to a rapid growth stage embracing comprehensive public safety management.   To help cities become safer, Huawei launched an agile and innovative Safe City Solution leveraging new ICT to enable "visualization" and "collaboration", two elements that Huawei considered to be critical to building safe cities.

32.   At MWC 2016, Huawei partnered with its industry partner, Hexagon to demonstrate the industry's first Visualized Converged Command Solution. Huawei's command solution supported the visualization of accident scenes and emergency handling resources (e.g. police force and emergency supplies) to allow unified commands based on a geographical information system (GIS) map.

33.   At the Mobile World Congress (MWC) 2016, the company showcased some of the latest 5G research achievements accomplished together with its industry partners:

> (i)   5G New Radio Access Technologies in a large-scale field trial conducted with NTT DOCOMO;

> (ii)   5G Full Duplex Radio Technology developed with China Mobile;

> (iii)   5G mobile architecture for Ultra-Reliable Low Latency Communication (URLLC) applications designed together with Vodafone;

> (iv)   Superfast 5G mmWave technology reaching transmission speeds of 70Gbps and end-to-end network slicing technologies, both achieved with Deutsche Telekom.

34.   As a global ICT industry leader, Huawei was working to expand the global 5G innovation footprint by leveraging technological innovations and partnerships at these early stages of 5G development to contribute to a global standard, which included:

(i)   a new air-interface capable of meeting all requirements for 5G applications;

(ii)   programmable, application-driven network architecture built on a cloud-native platform; and a holistic set of new capabilities to enable vertical applications for emerging 5G services and solutions as well as participating in the recently announced series of 5G technology field trials in China for its commercial launch in 2020.

Official representative: Mr Allan Lee
                            Specialist Executive

(iii)   Catalonia Pavilion

35.   The delegation visited the Catalonia Pavilion on 23 February, Tuesday afternoon.   Catalonia Trade & Investment aimed to help overseas investors to set up business in Barcelona and Catalonia and provide advice on government support and procedures for setting up offices.
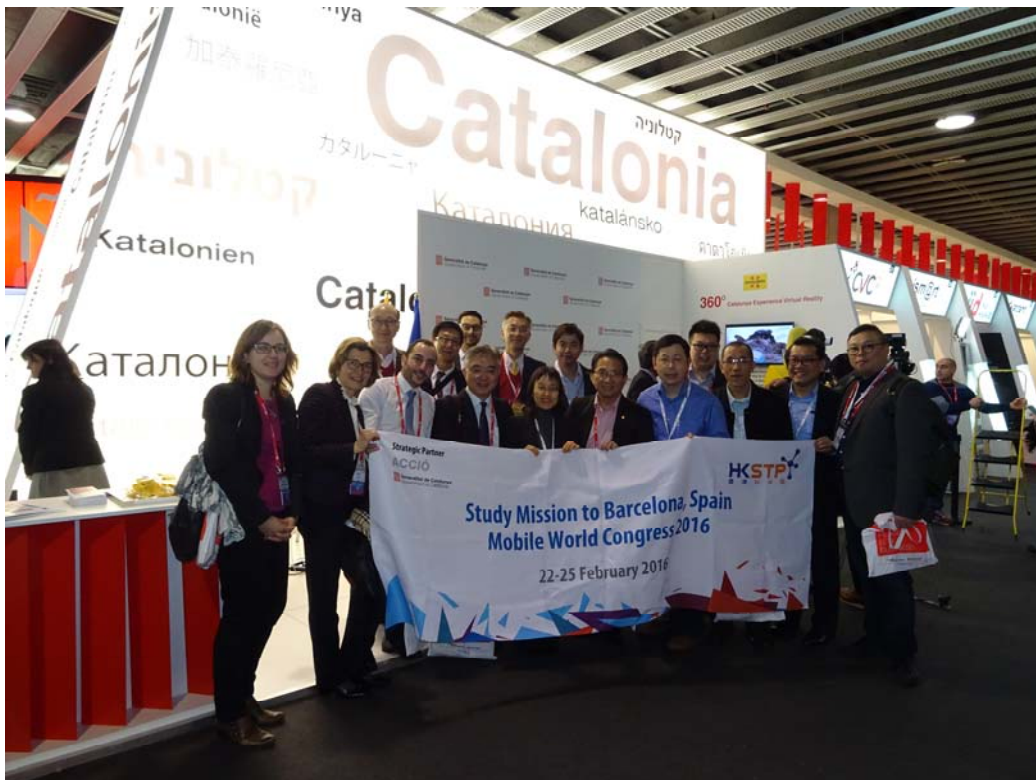
36.   During the visit to Catalonia Pavilion, the representatives led the delegates to visit and exchange views with the following companies:

(a)   **Starlab (www.starlab.es)**

Starlab is a high-tech company based in Barcelona with expertise in space and neuroscience technologies. As introduced by the Space Business Unit Director of the company, Dr. Antonio Mollfulleda, they provided state-of-the-art neuroscience data analysis services in three main areas: Neuromarkers, Human Experience and Human Performance, working closely with their sister company Neuroelectrics to provide customers with end-to-end integrated systems.

On the other hand, their expertise in the processing of satellite data allowed them to extract relevant information to be included in their products and services. For the creation of space applications, they had carried out some of the following activities:

(i)   New algorithms and models for Earth Observation: Development and tailoring of algorithms and signal processing techniques for ocean and land remote sensing.

(ii)   Implementation of new models to enhance the capabilities of estimation of geophysical parameters and to enable the monitoring of new variables of interest.

(b)   **Accent Systems** (www.accent-systems.com)

The delegation were well received by the CEO of the company, Mr Jordi Casamada.   He explained to the delegates that the company focused on implementation of different kinds of Bluetooth-based low energy beacons that enabled the clients to provide super-contextualized

information to users for the purpose of marketing or promoting their products/services.   Through the Bluetooth Low Energy (BLE) beacons that send a message to a mobile app, which would use it like a trigger for some pre-configured action. The BLE beacons were one of the most popular beacons on the market and officially the first compatible with iBeacon™ and Eddystone™ at the same time.

The main applications were:

- To help business bring targeted offered for their customers.
- To provide augmented information when user was in some interesting point (like museums).
- To collect sensor data (weather stations, motion detectors, buttons, etc).
- To create indoor heatmaps to better understand the customer behavior.

(c)   **I2cat** (www.i2cat.net)

I2CAT was a non-profit research and innovation centre which promoted R&D activities in Information and Communication Technologies and Future Internet.   The centre standed up for a new open innovation framework, fostering the collaboration among companies, public administration, the academic environment and end-users.   I2CAT had a wide experience in multiple national and European R&D projects, leading research lines in new fixed & mobile network architectures, wireless sensor networks, and content-based multimedia technologies, with the aim to develop new products, services and applications in the fields of eHealth, SmartCities & Smart Regions, Advanced Manufacturing and Culture & Creativity.

The demonstrator showed the delegates with the IoT technology using the LED lighting to track the position of the clients in order to promote the products on the shelves of the shop by providing more information about the product features/associated discounts.

(d)　**eCooltra Motorsharing**
(www. ecooltra.com)

As introduced by the Marketing Director of the company, Ms Tomàs Megía, ECooltra Motorsharing was a company from Cooltra Motors group, the leader in scooters rental market in Spain and southern European cities with ten years of experience in its sector.   The company offered a new concept of mobility as a service.   It complemented the public transport and replaced the private transport efficiently, relieving the environment and promoting sustainable traffic. With a completely innovative systems which combined together technology and sustainability, it offered a new alternative for sharing mobility in the city of Barcelona.

eCooltra provided a free float system that the client could pick up and leave the scooter wherever they want. The user became the owner of one of the electric scooters, for minutes, from the reservation until the parking moment, when finalizing the trip.

Official representative:　Mr Raül Guerra
General Manager of Investment Promotion of Catalonia Trade & Investment

Dr Daniel Rajmil Bonet
Project Manager of ACCIÒ

(iv)   Four Years From Now (4YFN) Tour

37.   **4YFN (Four Years From Now)** is an international meeting created for mobile sector entrepreneurs, organized by the GSMA and the Barcelona Mobile World Capital within the framework of the Mobile World Congress 2016. With three days of inspirational content, workshops and sessions to connect opportunities and needs (founders & investors), it was a great platform for start-ups to present themselves to the world.   It was aimed at providing a exchange platform for international companies, made up of start-ups, investors and executives from large companies attending the MWC.

38.   The Government of Catalonia, had participated in the 4YFN with 26 Catalan companies.   With this activity, Catalonia positioned itself as one of Europe's most recognized, dynamic and promising start-up ecosystems.   4YFN had become southern Europe's leading technological and digital start-up event.

39.   The delegates had visited the following companies in the 4FYN Hall in the afternoon of 24 February.

(a)   **Videotherapy** (www.videotherapy.co)

VideoTherapy's platform allowed physical therapists to build adaptive, supervised, and personalized video training programs and monitor patient progression from a distance. Patients used it as an advanced training web & mobile app that was available anytime, anywhere. The app offered a user-friendly interface, ongoing performance, real-time motion tracking and communication tools. The cross device application enabled the therapist to build step by step adaptive training for a wide variety of cases and for patients to gain maximum training efficiency

As demonstrated by the CEO & Co-Founder of the company, Mr Roy Shteren, VideoTherapy made it easy for the therapist to track the patients' training program wherever they were, and enabled the patients to use a simple webcam or a kinect console for real time motion analysis & scoring. The captioned technology generated data analysis by tracking on-going training sessions, providing the most effective treatment protocol for every individual, as recommended by the therapist.

(b)   **Trewgrip** (www.tregrip.com)

As introduced by Mr Mar Parker, President of the company that today's mobile devices were inefficient when it came to typing.   Hunt-and-peck and two-thumb techniques are barely adequate for entering just a few sentences.   Although voice dictation, handwriting recognition and gesture-based input continued to show promise, when it came to getting real work done, mobile workers set aside their mobile technology and sit-down at a laptop computer.

Trewgrip was a new form factor, or hardware platform, for enterprise mobility that enabled mobile workers to be both mobile and productive.   By simply rotating the hands 90°, and placing the keys on the backside in a familiar Qwerty keyboard configuration, mobile workers could hold Trewgrip and type productively at the same time.   It was indeed a grippable computer for mobile workers, with the productivity benefits of a laptop and the mobility benefits of a tablet.

(c)   **Warld Limited** (http://clip.cc)

Clip was a free Augmented Reality (AR) app that activated videos on printed media. It allowed the clients to access exclusive promotion content, messages, games, events, shows, promotions and many others.

As supplemented by Mr Hideya Nimi, CEO of the company, the client could use their API (application programming interface) to access the Clip API endpoints, which could create, purchase, and download a QR Code that could be read by the Clip App.   The product cost was different depending on the amount of videos the client would like to set, and QR codes that the client would like to produce.   Clients can create business cards, greeting cards, calendar, stickers and photos albums with augmented reality videos and each type of messages would be charged by the company.   The delegation learnt that their office was resided in Central in Hong Kong.

(d)   **Mintlabs** (www.mint-labs.com)

As introduced by the Head of Engineering of the company, Mr Takayuki Sato that MintLabs' platform allowed their clients to get more detailed insight in ever-growing neuroimaging data sets. It provided medical access to imaging data in a seamless, easy-to-use, secure and fast way.

They provided a remote, advanced medical image analysis and visualization platform.   The client could simply upload their images to the cloud server, and they would be automatically processed with the appropriate image analysis algorithms.   The client focused on the interpretation of the results and the system enabled them to collaborate on data analysis, share tools and results without the need of local complex computational infrastructure. For analytic purpose, the specialist could easily and automatically apply processing apps to their data by integrating clinical scores, psychometric data, genetic analysis with the imaging data as well as to derive measures from the MRI data on a single and group level.   In addition, the client could create high quality presentations by integrating 3D annotations and measurements from the data.

(e)   **PetPace** (www.petpace.com)

As introduced by the President & CEO of the company, Mr Avi Menkes, that PetPace was founded in 2012, specializing in remote pet health monitoring, leveraging advanced wearable technology along with innovative analytical and alerting models.

Mr Menkes said that PetPace's low-power, patent-pending wireless collar was fitted with an array of sensors that report vital signs as well as numerous physiological and behavioral parameters with a sophisticated cloud-based analytical engine that evaluated the data in real time.   When abnormal indicators or behaviors were detected, immediate alerts regarding the suspected condition were generated.   These alerts disseminated to pet owners or caregivers via any web-connected device, allowing them to take preemptive action to protect the pet's health.

(v)   Graphene Pavilion

40.   Graphene is one of the most interesting and versatile materials that are useful to the mobile industry.   As the world's first 2D material it contains a single layer of carbon atoms arranged in a hexagonal lattice and has a series of unique and outstanding properties. As well as being the thinnest, strongest and lightest known material it is flexible, impermeable to any known molecule and is extremely electrically and thermally conductive.

41.   As the mobile industry strives to maintain its pace of innovation, graphene has much to offer - helping to solve many problems including flexibility, smart batteries and sensors. Graphene can help to facilitate the next generation of mobile technology from chips and interconnects for data communication to screens and casings. For example, the strong and flexible nature of graphene makes flexible displays and bendable batteries possible and its excellent sensing ability can be used in the next generation of wearable electronics and will help to provide the building blocks for the internet of things.

42.   The Graphene Pavilion, jointly organised and run by the Graphene Flagship, Institute of Photonic Sciences (ICFO) and Groupe Speciale Mobile Association (GSMA) included live demos and prototypes of many different properties and applications such as a wearable fitness sensor that will collect heart beats from visitors of MWC (presented by the ICFO), printable touch sensors (presented by the University of Cambridge and Novalia), a working graphene supercapacitor (presented by Manchester University), flexible displays (presented by FlexEnable), a supercapacitor charger for smartphones (presented by Zap&Go) and a number of different flexible NFC antennas, sensors and ultra-fast photo receivers.   The delegates were impressed by the latest achievements in graphene research and development for the mobile industry.

(vi) Sierra Wireless
       (www.sierrawireless.com)

43.   The representative of the company introduced that Sierra Wireless was working on the Internet of Things with intelligent wireless solutions that empowered organisations to innovate in the connected world.   They offered the industry's most comprehensive portfolio of 2G, 3G and 4G embedded modules and gateways seamlessly integrated with their secure cloud and connectivity services.   OEMs and enterprises worldwide trusted their innovative solutions to get their connected products and services to market faster.

44.   The delegates were impressed by their demonstration on cloud services, LTE Network Infrastructure, Telemetry Systems, Mobile Enterprise Solutions and Services.

Official representative: Mr Oliver Beaujard
                           Vice President of Marketing Development

(vii) Rohde & Schwarz
        (www.rohde-schwarz.com)

45.   As introduced by the representative of the company, Rohde & Schwarz standed for quality, precision and innovation in all fields of wireless communications and was a global leader in test and measurement covering the full ecosystem from chipsets and devices to infrastructure and network performance.

46.   At the Mobile Network Testing booth, he demonstrated to the delegates a comprehensive range of solutions for the latest developments in cellular technology including Voice over WiFi (VoWiFi).

47.   In addition, a wide variety of cutting-edge innovations that covered all testing requirements on the path from 3G/4G to 5G had also been presented at the Device and Infrastructure Equipment Testing booth.   The delegates were impressed by the testing capability of their equipment in the range of up to 40 GHz

Official representative: Mr Heino Gregorek
                           Managing Director of Rohde & Schwarz

Observations

48.   Throughout the visits, the delegation had the following observations:

(a)   MWC is a good gathering opportunity for the IT and telecom specialists and developers to exchange and share their developments and applications using the latest technologies. Most of the participants will be inspired with the latest development of the technologies and enlightened to deploy those technologies in their own applications.

(b)   Huawei had successfully deployed their customer focused strategies flexibly to attract clients to use their solutions in the latest technologies to meet their needs whilst Ecrisson is strong to partner with their industry partners to provide their off-the-shelves solutions to the potential clients.

(c)   Future trend of technology solutions will be in the form of an integration of various technologies using IoT, cloud technologies, wireless technologies and 5G, etc. to be applied to different areas of applications.

(d)   4YFN (Four Years From Now) is a good opportunity for the young entrepreneurs to exchange and is a platform for the start-ups to present themselves to the potential investors. Throughout the activities of the Country Pavilions in both the MWC and 4YFN, Catalonia government and other countries have demonstrated their support to their start-ups in providing opportunities for exchange and meeting their investors.

(e)   The encouragement and support of the organizations and government for start-ups is a mechanism to enhance employment opportunities as well as to provide a vibrant and sustainable workforce to attract investors to establish their businesses in the country.

(f)　The Dual VET system of the Salesians Serrià College provides a good illustration of combining education with professional activity by enabling the students to work in the companies related to their studies. This system enables the students to gain experience and knowledge in a real work situation and they are motivated by receiving remuneration from work.

(g)　The entrepreneurship spirit fostered by the College enables the students to acquire the knowledge and skills to create innovative projects and prepare themselves to be the future entrepreneurs when opportunities come up.

(h)　The constant review of the curriculum of course modules and the arrangement of the students to develop real projects from industries to meet the company needs enhance the students' capability for employment.

Conclusions and Recommendations

49.　From the observations of the delegation visit and with reference to present situation of the electronics industry in Hong Kong, the delegation has proposed the following recommendations to the relevant units of the VTC for consideration:

(a)　Department of Engineering

(1)　By reviewing the vocational training in Barcelona, it is proposed to incorporate the entrepreneurial spirit, innovation and knowledge of creation of new business in the relevant modules so as to encourage the potential students to prepare and equip themselves for entrepreneurship;

(2)　It is recommended to co-ordinate with the industry to assign real projects for the students to develop products/services to meet company's need and this will enhance the employability of the students once the projects have proved to be successful;

(3) To liaise with the start-up companies in Hong Kong Science and Technology Parks Corporation and Hong Kong Cyberport to provide placement/industrial attachment opportunities for the students to enrich their knowledge of the business model and operation of the companies; and

(4) Throughout the visit, the industry trend/focus are identified to be in the areas of 5G, IoT, wearable technologies and Mobile apps, etc, it is proposed to incorporate the necessary skills and knowledge of the above technologies in their modules to prepare the students to meet the industry need.

(b) Vocational Training Council

It is also recommended that the Council to encourage the potential students who are interested to go start-up to seek further advice and consultation from TecONE, a start-up resource center in Hong Kong Science and Technology Parks.

50. The delegation considers that the visit has been worthwhile and fruitful, and the visit enables Members of the Training Board to keep abreast of the latest developments in the electronics and telecommunications industries.

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Vocational Training Council

Electronics and Telecommunications Training Board
Proposed Itinerary for the
2015/16 Delegation Visit to Barcelona
(21 to 27 February 2016, Sunday to Saturday)

Date	Event
21 February 2016 (Sunday)	Depart for Barcelona, Spain from Hong Kong
21 February 2016 (Sunday)	Arrive Barcelona, Spain
22 February 2016 (Monday)	Visit at MWC 2016 • Ericsson Pavilion (AM) Barcelona Smart City Tour (PM) Eurecat –The Technology Center of Catatonia (PM)
23 February 2016 (Tuesday)	Visit at MWC 2016 • Huawei Pavilion • Catalonia Pavilion (PM) Centre Techològic de Telecommunications de Catalunya (CTTC) (PM)
24 February 2016 (Wednesday)	Visit at MWC 2016 • Ericsson Pavilion (AM) • 4YFN Tour at Fira Motjuïc (PM) • Networking cocktail by HKSTP and ACCIÒ (PM)
25 February 2016 (Thursday)	Visit at MWC 2016 • Huawei Pavilion (AM) • Sierra Wireless (PM) • Rohde & Schwarz (PM) University of Barcelona (PM) Salesians Sarrià (PM)
26 February 2016 (Friday)	Depart for Hong Kong from Barcelona, Spain
27 February 2016 (Saturday)	Arrive Hong Kong

Organisations/Companies visited in Barcelona

Organisations visited in Barcelona

(i)   Barcelona Smart City Tour (by Barcelona City Council)

(ii)   Eurecat – The Technology Centre of Catalonia

(iii)   CTTC (Centre Technològic de Telecommunicacions de Catalunya)

(iv)   University of Barcelona

(v)   Salesians Sarrià

Companies/Pavilions visited at 2016 Mobile World Congress

(i)   Ericsson Pavilion

(ii)   Huawei Pavilion

(iii)   Catalonia Pavilion

        - Starlab

        - Accent Systems

        - I2cat

        - eCooltra Motorsharing

(iv)   Four Years From Now (4YFN) Tour in Fira Motjuïc

        - Videotherapy

        - Trewgrip

        - Warld Limited

        - Mintlabs

        - PetPace

(v)   Graphene Pavilion

(vi)   Sierra Wireless

(vii)   Rohde & Schwarz