Outline

- E&E Sector Overview
- Key focus areas for growth
- Challenges and interventions
- Cluster development model
  - Academia-Industry Collaboration
- Conclusion
Eight Multinational, famously companies known as "Eight Samurai" started the electronic industry in Penang in 1972.
E&E Story | The Growth

- Over the 40 years, more multinational companies set up their operations in Penang.

- All these made possible by strong foundation in (i). manufacturing capabilities, (ii). knowledge-based talent pool and (iii). government incentives.
E&E Success Stories of MNCs in Malaysia

Intel success story
- Assembly and Test
  - Intel's 1st overseas site was in Penang (1972)
  - Today: sites in Penang, Kulim
- Intel Penang Design Center
  - Large-scale
  - Leading edge chips

Agilent Success Story
- 85% of Agilent Electronics Test & Measurement equipment produced in Penang
- World's Largest Integrated Campus with Full Global Business Charters and Accountabilities.

Motorola success story
- Substantial share of Motorola's of two-way subscriber radios produced in Malaysia
- First regional center in Asia-pacific with combined manufacturing, R&D, and distribution of the products

SOURCES: Company Websites; Lit Search, PEMANDU NKEA ETP Report 2010
... including successful local players

### SilTerra

- World technology and market leader (~20% global share) in small-panel LCD driver chips for mobile phones
- Global Tier-1 customer base
- International recognition:
  - Semiconductor International’s Top Fab Award
  - Frost & Sullivan’s SEA Industrial Technologies Award (Consumer Elect.)
  - 2x winner US Commerce Assc Best of San Jose Award for Semicon Devices
  - Running at full capacity past six quarters

### IRIS

Digital Identity Solution Provider
- 1st company in Asia to set up fully integrated manufacturing facilities for Contact & Contactless Smart Cards, electronic passport inlays & covers
Pioneered...
- World’s 1st electronic passport 1998
- Multi-application smart ID (MyKad)
- World’s 1st immigration autogate,
- World’s 1st automatic e-passport renewal kiosk

SOURCE: Company Websites; Lit Search
E&E 3.0 Moving Up the Value Chain

MOVING UP VALUE CHAIN

Value Add

Research

Product Devt

Eng. To Build

Build to Order

Build to Capacity

Order Mgt & Delivery

Service & Support

Order Generation

Market Path Finding

Source: Khazanah
NKEA - Driving Economic Growth

- E&E Sector is one of 12 key growth areas defined in the National Key Economic Areas (NKEA) in increasing the Gross National Income (GNI) by 2020.

- Four major clusters are identified to fuel the E&E sector growth through high value added R&D, logistic and operational headquarters activities to be distributed in key regions.

4 Major Clusters

- **Semicon**: Build out value chain capabilities with fabs, design and advanced packaging
- **Solar**: World’s #2 producer by 2020 (from #3 in 2011)
- **LEDs**: Light up the world with Solid State Lighting
- **Industrial Electronics**: Build on test & measurement and wireless communication clusters; expand and strengthen other Industrial Electronics sub-segments

4 Key Regions

- Build regional E&E clusters in Northern Corridor, Klang Valley, Johor and Sarawak, leveraging on each region’s unique value proposition
- Fix region specific enablers and cross-cutting enablers to create world-class operating environment
Opportunities in Major Clusters
2010 NKEA E&E LAB 1.0

Semiconductor & Embedded
- Intel
- Altera
- Infineon
- AMD
- SilTerra
- Renesas

Industrial Electronics
- Agilent Technologies
- Clarion
- National Instruments
- Avago Technologies
- IRIS

Opto-electronics / SSL
- Nichia
- OSRAM Opto Semiconductors
- Philips Lumileds
- LEDZ World
- ItraMAS

Solar
- SunPower
- MEMC
- Panasonic
- Q.Cells
- First Solar

2020 GNI impact: US$16.9B | Jobs 157,000
Public funding: US$3.7B | Private funding: US$20.6B
NKEA - Driving Economic Growth

- Key challenges identified to ensure growth
  - Industry-relevant Talent
  - R&D Collaboration
  - Shared facilities, infrastructure

- E&E Sectoral Working Group formalized to address the needs (Nov’10)
  - Key interventions on talent and research collaboration identified

**E&E TalentCorp Sectoral Working Group**

**IMMEDIATE INTERVENTION PLAN**

- **Post-graduation apprenticeship** to nurture "industry-ready" talent
- **Post-graduate programs** and incentives aligned to industry needs – MSc in ESDE (USM)
- **Extended internship** program for Year 3 and 4 students
- **Platform** for industry-academic collaboration
Introducing CREST.

CREST officially incorporated on 30 June 2011

Launched on 9 June 2012

- CREST has syndicated with key Federal Government Agencies
- Endorsed by the Economic Council

10 companies have signed up to become Founder Members of CREST
Mfg and R&D Contribution by Founding members

RM25 bil in total revenue
RM1.4bil in R&D expenditure
RM0.7bil in R&D contracts
5,030 total R&D employees
805 with Masters
85 with PhDs

Sources: PEMANDU; CREST Presentation to EC 2012.
E&E Talent Engagement Model

4 Major Clusters
- **Semicon**: Build out value chain capabilities with fabs, design and advanced packaging
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4 Key Regions
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CREST key clusters are validated and defined by key stakeholders (founding members) aligned to NKEA E&E major clusters

Program Management Office is structured to facilitate, support and drive cluster-focus activities through the programs under the R&D, Talent Development, Shared Services and other relevant department. It works closely with cluster teams, industry and academic partners.

Alignment to Talent Corp on E&E Talent agenda
Journey with the E&E Sector

November 12, 2010
Talent Corporation
EE Sector Meeting

Attracting Key Talents
Grow & Nurture
Talent Agenda

24 April, 2011
Formalize SWG
Launched Fastrack Programme

April 2012
UK Outreach
& Career Fairs

November 2011
US Outreach
& Career Fairs

April 24, 2012
Launching of
Talent Roadmap 2020

29-30 June, 2012
Graduan Aspire

July, 2012
CREST SI

November 2020
Launching of
Talent Roadmap 2020

9 June, 2012
Launching of
Graduan Aspire

2020 Talent Roadmap

January, 2011
Talent Corp established in January
2011 to catalyze enhanced talent
supply in the critical areas of the ETP

24 April, 2011
Formalize SWG
Launched Fastrack Programme

April 2012
UK Outreach
& Career Fairs

November 2011
US Outreach
& Career Fairs
Journey with the E&E Sector continues

**December 2012**
- RF i-COE (Agilent-UMP)
- USM Engineering, Science & Technology Career Fair

**October 2012**
- E&E Strategies & Plans
- Launching of Ready4Work Portal

**November 2012**
- CREST IC Analog Cluster Initiation
- MMU SFCF

**January 2013**
TXC Phase 1 PoC Completed & Endorsed by Agilent Technologies

**April 2013**
- Career Talk in UKM
- E&E NPO
- HITRSE Graduation
- UKEC London

**May 2013**
- Career Talk in UNIMAP

**June 2013**
- Graduan Aspire
- i-COE Wireless Comm. Mapping
- UiTM curriculum Mapping
- Innovate Malaysia Finale
- Career Talk in UNITEN, Taylor's Uni

**July 2013**
- RF i-COE COE (Agilent-UMP)
- USM Engineering, Science & Technology Career Fair

**August 2013**
- LSB (Osram & Altera)
- FasTrack 2 Graduation

**September 2013**
- Starting of FasTrack 201
- Korea Outreach

**October 2013**
- IBC

**November 2013**
- MMU SFCF
## Cluster Development - R&D Collaboration

### R&D Grant Summary 2012-2013

<table>
<thead>
<tr>
<th>Grant Cycle</th>
<th>Total Value (RM mil)</th>
<th>MNCs Cont. (RM mil)</th>
<th>SMEs Cont. (RM Mil)</th>
<th>Public Cont. (RM mil)</th>
<th>IPs</th>
<th>Publication</th>
<th>MSc</th>
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### SMEs

- SilTerra, QDOS, QT HighTech, Pentamaster, Scrap Computer Trading, TT Vision Technologies
- Wynstech, EXT Technologies, Penchem Technologies, Polytool Integration

(10 SMEs)

### MNCs

- Altera, Intel, Motorola, Infineon, National Instruments, OSRAM

(6 MNCs)

### Universities

- USM, UniMAP, Uniten, UTP, Taylor’s University, Wawasan Open University, MMU, Monash, UM, UTeM, UTM, UTM,
- University of Missouri,
- 12 local universities
- 1 foreign university

Promoting joint R&D collaboration between SMEs, MNCs, local and foreign universities in **Semiconductor** (IC Design, embedded, wafer technology, materials), **industrial electronics** and **opto-electronics**
HOW WE ACCELERATE INDUSTRY-ACADEMIA COLLABORATION?
Nurturing "Industry-Ready" Talent

Need for R&D engineers

E&E sector is moving up the value chain and in need of more competent R&D engineers

- Current graduates need time to be productive as competent R&D engineers
- Modularized competency based industrial training necessary to accelerate learning

Industry members are committed in nurturing local talent!

FasTrack program developed

FasTrack program designed by industry, developed with PSDC to address immediate needs providing

- Technical & Behavioral Modification curriculum with competency based assessment.
- Apprentices will be coached & mentored on real life projects at host companies

End in mind, FasTrack content adoption into university curriculum to ensure relevance of future graduates!
E&E TALENT DEVELOPMENT PROGRAM
FasTrack – Towards Market Driven HCD

- Modelled after MIMOS
- Developed into by PSDC
  - Psychometric Based Selection
  - Domain & Behavioral Competency Based Training
  - Competency & Performance Management
  - On-the-Job Training
- 1st Batch Graduated in June 2012
  5 MNCs, 101 apprentices
  100 hired by companies, 1 MSc
- 2nd Batch Intake June 2012
  7 MNCs, 131 graduated on 24-Aug’13
- 3rd Batch starting Jul’13 – 185 pax
What’s in 2013-2014 Session?

FasTrack

3.0 (R&D focus)
SFAM (Fab - MIMOS)
MSc (USM)

2013 Session – Open for Placement

Curriculum Embedment
Adjunct Lecture
Cluster Co-Op
Industry-Ready Graduate Program

Cluster-focused Internship, Apprenticeship, Research Program

(1) A consolidated program to introduce university students to the industry through Industry Visit, and expose to real industry working environment during Internship and solving industry problems in Final Year Projects and Apprenticeship.

(2) Advancing knowledge as Research Assistant in Contract Research projects.

(3) Lecturer Internship and Sabbatical opportunities

(4) Adjunct Program and Curriculum Enhancement at universities

(5) Seeding of Industry Experts, Golden Talent and Latent Talent as coaches to the interns, apprentices, research assistants and project teams.
E&E Talent Ecosystem
“Addressing Graduate Employability”

Malaysians in Malaysia → Industry Ready Graduates (IRG) → Curriculum Embedment & Finishing School

4 Years B.Sc. in Electrical Eng + 1 Year Up-skilling

- **Existing Talent**
  - **High $**
    - Limited talent
  - **New Talent**
    - **Low $**
      - Higher talent

Year 1-2 Industry Awareness
- Early Career Awareness
- Industry Boot Camp
- Innovation Challenges and Entrepreneurship

Year 3-4 + max. 6 months Finishing School
- Industry-Driven Curriculum, Blended Learning (MOOC)
- Extended Internship (6-18 months), Industrial MSc/PhD
- Industry-based assignments, projects & challenges
  - Adjunct Lecture & Lecturer Attachment
- Talent Database Mapped to Industry Requirements through TalentXChange

- **Embeded Systems**
- **IC Design & Architecture**
- **Wafer Fabrication**
- **Wireless Communication**
- **i-COE (MoHE, Agilent)**
- **Optoelectronics / SSL (NCIA)**
Finishing School System in Semiconductor Value Chain (including Embedded Systems)

Industry & Technology Track
1. Embedded & SW Development (Technology domain)
2. IC Design
3. Wafer Fabrication
4. Packaging
5. Test Development
6. Design Validation
7. FA & Product Qualification
8. NPI & Manufacturing

Pilot project starts Sep’13 with Embedded, IC Design and Wafer Fab tracks
Finishing School System in Semiconductor Value Chain (including Embedded Systems)

- Semiconductor components design and manufacturing value chain (inclusive of embedded solutions)
- Pilot program for cluster co-operative education program bringing career awareness, industry topics, projects, and subject matter experts into campus from Year 1 to Year 4 – preparing for Industry Ready Graduates, and pipeline for postgraduate research or entrepreneurship path (specialist vs. industrialist)
Industry Boot Camp (IBC) – *first step* towards Industry-Ready-Graduates (IRG) Funnel

The Industry-Ready-Graduates (IRG) Funnel

“Accelerating R&D Growth in the E&E Sector”

To serve as a platform for students to converge and gain industry exposure and career guidance from various industry players in the Electrical & Electronics (E&E) Sector that is aligned with industry needs.
**FasTrack Curriculum Embedment**

**Key modules**
- Wafer Fabrication
- Electronics Systems Design
- RF Communication Design
- SW Application Development
- **Embedded Software**

**Gap Assessment**
- Review competencies requirement & FasTrack courses
- Map against Courses Outcome
- Identify gap in curriculum
- Content delivery method
  - Embedded into existing courses
  - New courses
  - Technical talks and seminars
  - On-line learning plus tutorial on-campus
  - Structured Internship plus Industry-focused Final Year Projects
- Focus on E&E **Top Talent Providers** + UTAR, INTI, UMP, UTEM, UTP

**Talent Corp Commitment**
- Technical Talks and Seminars
- Adjunct Lecturers from industry
- Train the trainers (lecturers)
- Training of interns attached to FasTrack companies during the internship period
- Training of final year students working on projects from FasTrack companies.
- On-line content development (MOOC)

**University Commitment**
- Organize the Technical Talks and Seminars for students
- Incorporate content into existing courses or develop new courses
Finishing School System in Semiconductor Cluster
Embedded System & IC Design

**Embedded System**
- FasTrack Curriculum Embedment @ UNIMAP, USM, UiTM, MMU, UTM etc
- Adjunct Lecturer
- Train the Trainers (lecturers)
- Structured Internship
- Final year project (Innovate)
- FasTrack Master (USM)
- R&D Grant
- Industry Sponsors – Agilent (UiTM), Altera (UniMAP), Motorola (INTI), Western Digital (MMU), Kontron, Intel

**IC Design & Validation**
*Industry-Academia Collaborative Center*

<table>
<thead>
<tr>
<th>UPM (Design Library)</th>
<th>USM (Circuit Design)</th>
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<tr>
<td><strong>INTEL-CREST</strong></td>
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<tr>
<td>Architecture Research Center</td>
<td></td>
</tr>
<tr>
<td>UTAR (Design Automation &amp; Architecture)</td>
<td>UTM-Uniten (Structural Design)</td>
</tr>
</tbody>
</table>

**Talent Development**
- Cluster Focused Trainings, Adjunct, CE
- Leveraged Programs (FasTrack, FTM)

**R&D**
- CREST R&D Grant
- GRASPd

**Commercialization**
- IP Development
- Proof of Concept
Industry – Academia Networking
Connecting to local and foreign experts

R&D Grant Roadshow
2013-Cycle 2

18 June 2013
(Tuesday)
Universiti Teknologi Malaysia (UTM),
81310 Johor Bahru, Johor

19 June 2013
(Wednesday)
Universiti Teknikal Malaysia Melaka (UTeM),
Hang Tuah Jaya, 76100 Durian Tunggal, Melaka

24 June 2013
(Monday)
Universiti Malaysia Perlis (UniMAP)
Pauh Putra Campus, 02600 Arau, Perlis

25 June 2013
(Tuesday)
Universiti Sains Malaysia (USM),
11800 Penang

26 June 2013
(Wednesday)
 Multimedia University (MMU), Cyberjaya Campus,
Jalan Multimedia, 63100 Cyberjaya, Selangor

27 June 2013
(Thursday)
Universiti Teknologi PETRONAS (UTP)
Bandar Seri Iskandar, 31750 Tronoh, Perak

Global Malaysian Network (GMN)

Prof. Arokia Nathan
Center for Large Area Electronics, Cambridge University

IEEE Distinguished Lecture, IMEN-UKM, 18 July’13
Industry Tech Talk, sains@usm, 19 July’13
Continue seeking inputs from industry through workshops, symposiums and call for actions
Partnering for Talent

Thank You