



# Kecemerlangan Pengurusan Penyelidikan dan Inovasi

## Excellence in Research and Innovation Management

Profesor Dr. Ghazali binti Omar  
Advanced Manufacturing Centre (AMC)  
10.45am – 12.45 pm



Appointed as Professor at UTeM on Jun 2015

To exercise a special responsibility in providing leadership and in fostering excellence in research, teaching, professional activities and policy development in the academic discipline

### Skill base

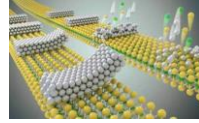
1. A doctoral qualification with **significant experience** in the relevant discipline area
2. Demonstrable scholarly and **professional achievement** in the relevant discipline
3. Demonstrate academic excellence through an **outstanding contribution to teaching & research**
4. Be recognised as a **leading authority** in the relevant discipline area

### Research

1. The conduct of research including, where appropriate, **leadership of a large research team**
2. **Fostering the research of other groups** and individuals both within the discipline
3. Supervision of the program of study of postgraduate students **engaged in major research projects**
4. Development of research policy
5. An ability to **attract research resources**



## My 25 years Industry Experience



National Semiconductor



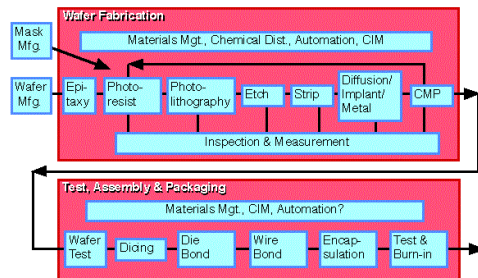
Motorola/ ON Semiconductor



Infineon Kulim

All has to do with interconnect material

### The Chip Making Process



## All Has to Do With Interconnect Material



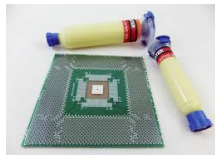
Wire Bonding



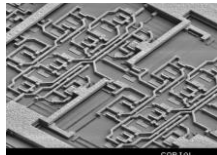
Soldering



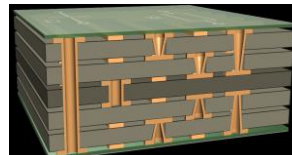
Chip level Component Attach



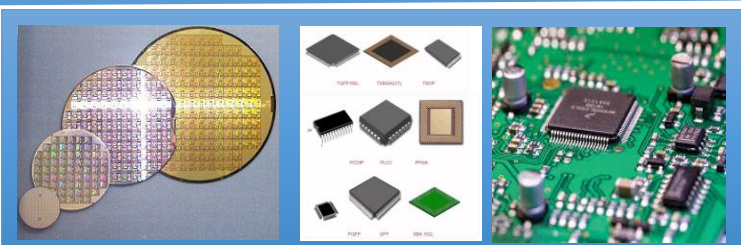
Polymer Composite Attach



Submicron Interconnect



PCB Interconnect





## Formation of the Members of AMCHAL

### About Us

Designing the Comprehensive Demand-Driven Laboratory for Industry

- **Professional and Demand-Driven Laboratory** under Universiti Teknikal Malaysia Melaka (UTeM) since 2018. (established 2015).
- Main **objective** is to bridge the gap among academia-industry relationship focusing on advanced materials technology.
- AMCHAL **members** hail from mechanical engineering majoring in materials, vibration, thermal, design, automotive, control and etc. All these fields had the full spectrum to support the advanced materials technology nowadays and future.
- Open to **jointly research and collaboration** across all scientific fields.



5

## Formation of the Members of AMCHAL



**Prof Dr. Ghazali bin Omar**  
Research Interest:  
Industry Based Advanced Material



**Prof. Ts. Dr. Noreffendy Tamaldin**  
Research Interest:  
Automotive, Emission & System Design



**Dr. Siti Hajar binti Sheikh Md Fadzuliah**  
Research Interest:  
Conductive Polymer Composites



**Dr. Nor Azmmi bin Masripan**  
Research Interest:  
Tribology & Thin Hard Nanocoating



**Ts. Dr. Muhd Ridzuan bin Mansor**  
Research Interest:  
Concurrent Eng. & Composites



**Ts. Dr. Mohd Azli bin Salim**  
Research Interest:  
Modeling and Simulation & Vibration



**Dr. Mizah binti Ramli**  
Research Interest:  
Adhesive Bonding & Adv. Materials



**Dr. Mohd Nur Azmi bin Nordin**  
Research Interest:  
Composites & Reliability Study



**Dr. Nadlene binti Razali**  
Research Interest:  
Material Characterization & Polymer



**Mrs. Anita Akmar binti Kamarolzaman**  
Research Interest:  
Adv. Materials Characterization



**Dr. Nurfaizey bin Abdul Hamid**  
Research Interest:  
Electrospinning & Nanofibre



**Dr. Mohd Zaid bin Akop**  
Research Interest:  
Diesel Spray, Thermal & Solar



**Adzni Md. Saad**  
Research Interest:  
Instrumentation and Hybrid Technology

### List of Expertise

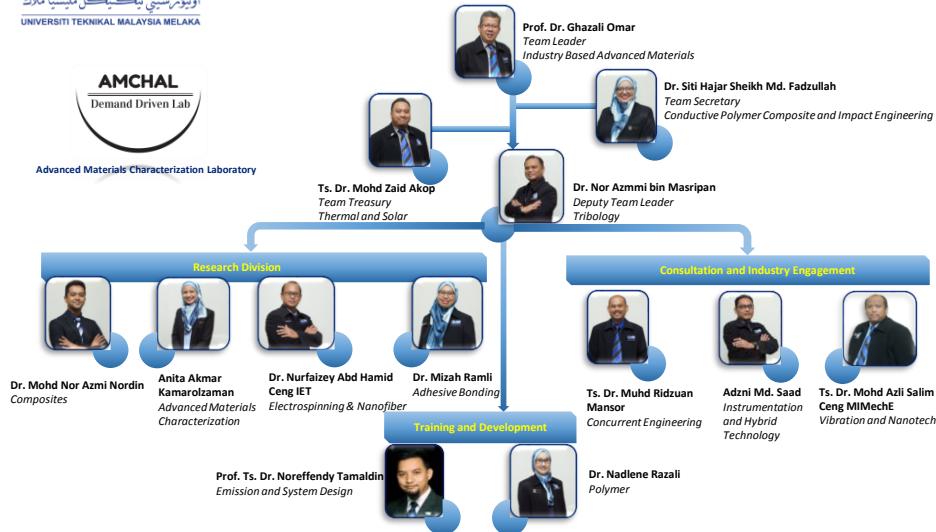


CENTRE FOR ADVANCED RESEARCH ON ENERGY  
Universiti Teknikal Malaysia Melaka

Updated: April 4, 2018



## Managing Lab for Sustainability



## SOLUTION PROVIDERS FOR INDUSTRIAL & SOCIETAL ADVANCEMENT

01

### Enhancing Industry-demand driven based projects in manufacturing and computing industry

- Embed industrial-demand products and services in research grants applications.

02

### Holistic and highly competent technology scholars

- Promoting academic staff to be involved in enhancing inventions and innovations.

03

### Securing high impact projects

- Securing high impact projects through collaborative efforts between industry-university such as matching grants, contract projects, consultations and innovative solutions.

04

### Strengthening strategic linkages between UTeM-Industry-Community

- Strengthening the linkages between university-industry-community by having a one stop centre, establishing smart partnership, providing platform for industry in university and increasing number of certified labs and number of R&D&I products.

Majlis  
PERUTUSAN  
NAIB CANSELOR  
2020

*Menjuarai Teknologi,  
Merealisasikan Aspirasi*



VCUTeM



## GLOBALLY VISIBLE & PROMINENT

01

### Strategizing for QS Asia Ranking

- Number of papers in SCOPUS indexed journals
- Number of paper with globally recognized and international / industries affiliations
- Number of citations in SCOPUS database

02

### Strategizing for QS Asia Ranking Subjects in E&T

03

### Industry preferred solution provider focusing on advanced manufacturing & computing technology.

- CEO Round Table / Luncheon Talk
- MoU/MoA with globally recognized institutions/industries

04

### Strengthening strategic linkages between university and reputable entities (society & industry).

05

### Enhance Strategic and dynamic technology scholars through affiliation with renowned global researchers from universities and industries.



LIST OF GRANTS (last 5 years)

| YEAR AWARDED | TITLE OF PROJECT   | TYPE OF GRANT                           |
|--------------|--|---|
| 2020         |  | GERAN INDUSTRI (INDUSTRY)               |
| 2020         | DESIGN AND DEVELOPMENT OF LOW COST SOLUTION AND TELEMETRY IOT FOR DOCKING SYSTEM   | GERAN INDUSTRI (INDUSTRY)               |
| 2019         | THE EFFECT OF CHEMICAL TREATMENT AND FIBRE SIZE TOWARDS THE MECHANICAL, THERMAL AND RHEOLOGICAL PROPERTIES OF KENAF FIBRE REINFORCED PLA VIA FUSED DEPOSITION MODELLING (FDM)  | GERAN RACER (NATIONAL)                  |
| 2019         | RELIABILITY TEST AND PRE-COMMERCIALISATION OF THE CONELAYING   | MTUN PENGKOMERSILAN (COMMERCIALIZATION) |
| 2019         | MATERIAL COMPATIBILITY ASSESSMENT ON PALM BIODIESEL (B30), ENGINE PERFORMANCE AND EMISSION EVALUATION, FUEL DELIVERY SYSTEM, TRIBOLOGY STUDY AND INJECTOR PERFORMANCE  | GERAN KERAJAAN/PRIVATE/NGO (INDUSTRY)   |
| 2019         | ENHANCING INTERFACIAL SURFACE INTERACTION OF EUTECTIC AU-SI FILLER IN CONDUCTING POLYMER COMPOSITES UTILIZING THERMOSONIC ENERGY FOR HIGH ELECTRICAL PROPERTIES PERFORMANCE  | GERAN FRGS (NATIONAL)                   |
| 2019         | IMPACT OF HIGHER BLENDED BIODIESEL FUEL ON THE FUEL INJECTOR SURFACE WEAR AND DEPOSITS   | SHORT TERM (UTEM)                       |
| 2019         | INTERFACE DISSOCIATION MECHANISM IN MULTIWALLED CARBON NANOTUBE-FILLED ELECTRICALLY CONDUCTIVE ADHESIVE BY HYGROTHERMAL EFFECT   | GERAN FRGS (NATIONAL)                   |
| 2019         | ERASMUS+ CAPACITY BUILDING IN HIGHER EDUCATION (CBHE) ON AUTOMOTIVE ENGINEERING  | GERAN ANTARABANGSA (INTERNATIONAL)      |
| 2019         | COMPREHENSIVE ASSESSMENT ON ADVANCED DRIVER-ASSISTANCE SYSTEMS (ADAS) VEHICLE SAFETY ASSIST TECHNOLOGY BASED ON SOUTH-EAST ASIA ENVIRONMENT AND ROAD CONDITIONS: LANE DEPARTURE WARNING (LDW) AND LANE KEEP ASSIST (LKA) | GERAN ANTARABANGSA (INTERNATIONAL)      |
| 2019         | DEVELOPMENT OF A SEMI-AUTOMATIC CONE LAYING AND PICKING MACHINE FOR MAINTENANCE AND EMERGENCY USE  | GERAN INDUSTRI (INDUSTRY)               |
| 2018         | DESIGN AND DEVELOPMENT OF CONE LAYING SYSTEM FOR ROAD MAINTENANCE USAGE  | GERAN INDUSTRI (INDUSTRY)               |
| 2018         | DESIGN AND DEVELOPMENT FOR GEOSPATIAL IMAGES STRATEGY USING ADDITIVE MANUFACTURING APPROACH  | SHORT TERM (UTEM)                       |
| 2016         | AN INVESTIGATION OF SUPER HYDROPHOBIC WATERPROOFING FOR ELECTRONIC ASSEMBLY  | GERAN INDUSTRI (INDUSTRY)               |
| 2016         | AN INTEGRATED APPROACH IN ESTABLISHING DURABLE STRETCHABLE CONDUCTIVE INK (SCI) FOR HIGH PERFORMANCE APPLICATION   | GERAN INDUSTRI (INDUSTRY)               |
| 2016         | AN INVESTIGATION OF OLED LIGHTING LIFESPAN SUBJECTED TO VARYING TEMPERATURE AND HUMIDITY CONDITIONS  | GERAN INDUSTRI (INDUSTRY)               |
| 2016         | BONDING MATERIAL ENHANCEMENT FOR SURFACE MOUNT COMPONENT ON PLASTIC ASSEMBLY   | GERAN INDUSTRI (INDUSTRY)               |
| 2016         | INVESTIGATION ON SUPERHYDROPHOBIC CARBON NANOTUBE COATING FOR HIGH PROTECTIVE RESISTANCE ON ELECTRONICS COMPONENTS   | HIGH IMPACT (UTEM)                      |
| 2016         | SYNTHESIS OF GRAPHENE NANOPATELETS USING CATALYTIC CHEMICAL VAPOR DEPOSITION AND WASTE OIL AS CARBON FEEDSTOCK   | HIGH IMPACT (UTEM)                      |
| 2016         | FUNDAMENTAL SOLUTION ON WPCS PROPERTIES  | GERAN PPRN (NATIONAL)                   |

### Definitions of research

"Systematic investigation towards increasing the sum of knowledge"

(Chambers 20th Century Dictionary)

"an endeavour to discover new or collate old facts etc. by the scientific study of a subject or by a course of critical investigation."

(The Concise Oxford Dictionary)



- What do we mean by research?
- Why should we do research?
- What are the barriers to research?
- Overcoming the barriers

### What do we mean by 'research'?

#### 'Academic' research

- Problem solving or curiosity driven - purpose is to create new knowledge (or confirm existing knowledge)
- Grounded in disciplinary context (literature, theory, methodology, interpretation)
- Produce outputs of publishable quality
- Audience: other scholars, policy makers, practitioners
- Make an 'impact' (REF)

#### 'Practitioner' research

- Focused on current problem or need
- Pragmatic approach to theory and methodology - often investigative or evaluative
- Results inform practice - support decision-making for immediate benefit
- Audience: often managers or professional colleagues but...
- ...dissemination frequently a secondary consideration

### Definition of Research

- "Search for facts – answer to questions and solutions to problems. It is a purposive and organized inquiry".



#### CREATIVITY

The act of turning new and imaginative ideas into reality.



#### INVENTION

Creation of a new idea or concept



#### INNOVATION

Turning a new concept into commercial success or widespread use

#### What is innovation?

So what does innovation really mean? And how does it differ from invention and creativity in a business? Let's start from a definition of innovation, invention and creativity:

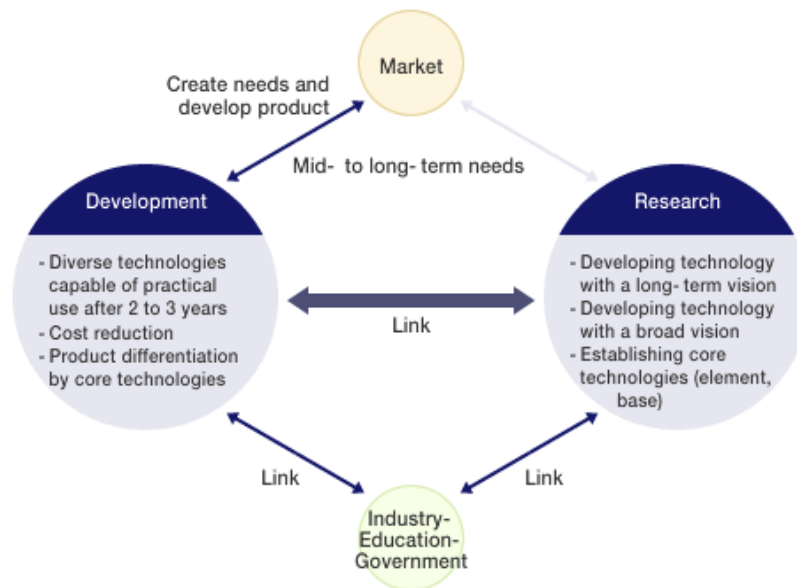
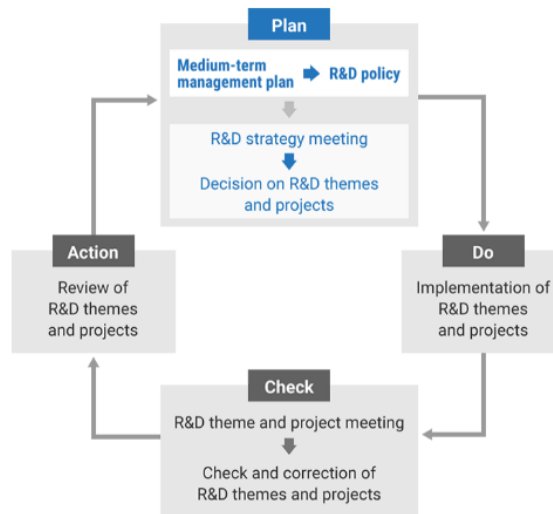
- **Innovation** is the process of turning a new concept into commercial success or widespread use.
- **Invention** is the creation of a new idea or concept.
- **Creativity** is the act of turning new and imaginative ideas into reality.

Creativity, invention, and innovation are all interrelated and necessary for growth to occur. We can follow any successful company and see an investment of time and effort into these three concepts. Based on our experience and research conducted, we have discovered these insights:

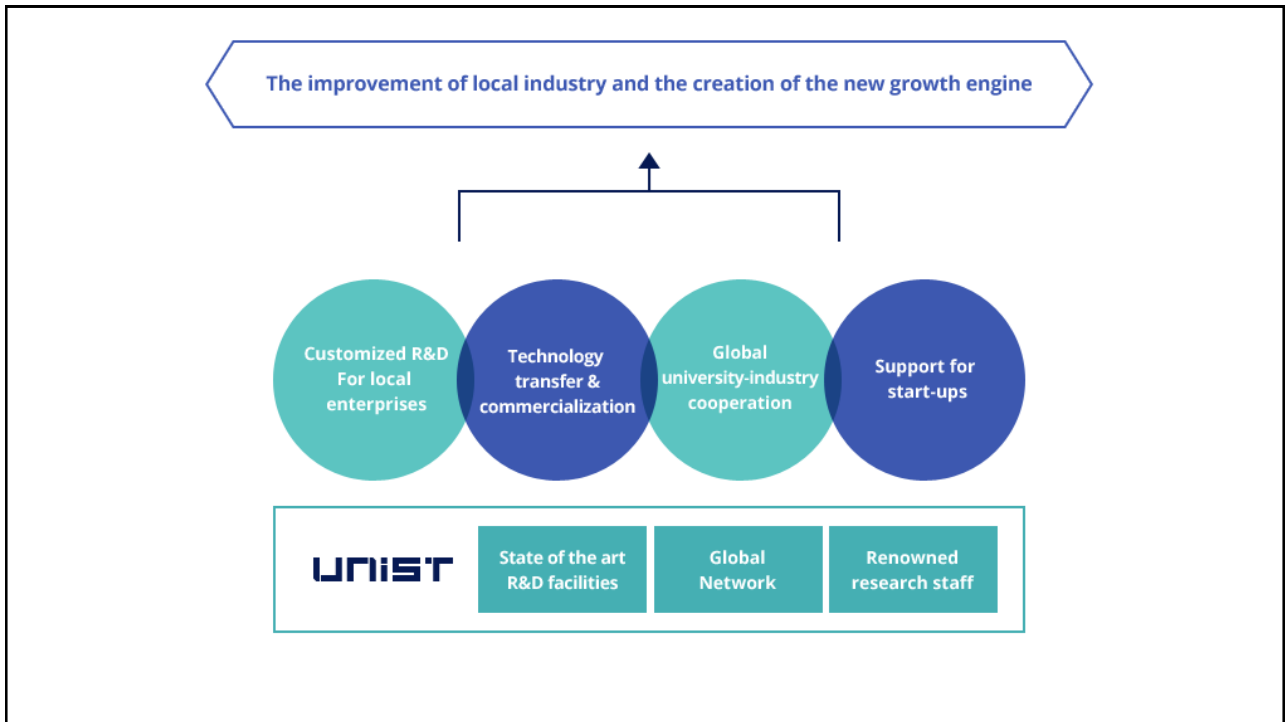
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graph TD
    Market[Market] -- Needs --> Planning[Planning & Development]
    Planning -- Differentiated products --> Market
    Planning -- "Concrete research objectives and problems" --> RnD[Research & Development]
    RnD -- "Solutions and feedback" --> Planning
    Resources[(Resources, raw materials, and technologies)] --> RnD
    subgraph RnD_Circle [R&D]
        Value["- Creation of added value -"]
        Reinforce["- Reinforcement of competitive businesses"]
        Create["- Creation of new core businesses"]
    end
  
```

To increase the efficiency of Group-wide research and development activities, we annually implement the R&D promotion system as shown below. Our R&D strategies are project-oriented: we introduced a project manager system to realize early implementation of business.



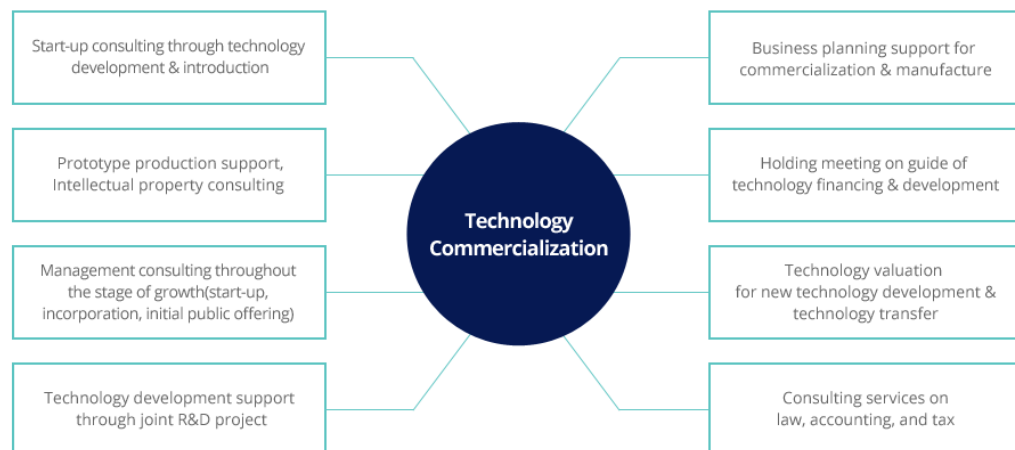




#### ♦ Technology commercialization

Technology commercialization is the process of developing technologies, augmenting them with complementary knowledge, developing and manufacturing saleable goods and marketing the goods.

#### ♦ Technology Commercialization Framework



Excellence in research and innovation, which has impact both within the Institute and beyond, is the cornerstone of our research and innovation strategy.

#### Objectives

- Maintain our internal research prioritisation processes
- Strengthen the TRAs, remaining cognizant of the need to support the mature TRAs in ICT, Photonics and Lifesciences and Wellbeing
- Ensure research and innovation activities result in tangible outputs that have measureable impact
- Strengthen the connection between research and undergraduate teaching and learning

#### Plan

- Prioritise TRAs focus on applications to strategic funding programmes and ensure that research and innovation priorities are reflected in resource allocation
- Implement a formal process for the establishment of designated research entities as Centres or Research Groups
- Formalise the reporting structure within designated Research and Innovation Centres and Groups
- Establish formal performance review mechanisms for all designated research and innovation entities
- Support the development of at least one designated research and innovation group in each of the TRAs of Exercise and Health, Entrepreneurship, Competitiveness and Innovation, and Creative and Performing Arts
- Ensure that the outputs from research are linked to tangible benefits including the career development of research students, the strengthening of the research and innovation entity, the teaching and learning within the undergraduate cohort in the Institute, the support to industry and external collaborators, the generation and commercialisation of IP, the potential for spin-outs and, more generally, the reputation of the Institute
- Assess and publish research and innovation outputs and impacts annually
- Increase the involvement of research entities in undergraduate projects, taking advantage of the significantly increased research and innovation infrastructure in CIT (notably the NIMBUS and CREATE buildings); inherent in this approach will be the need to involve academic staff who are not currently research active and academic staff who have an interest in becoming research active
- Create an environment in which research and innovation entities work with departments to develop/supplement undergraduate modules that contain specific material based on ongoing research activity
- Create researchers of the future from within the CIT undergraduate cohort through a three-stage process of raising awareness in year 1 and 2 integrating research skills in projects in year 3 and where possible, completing some or all of their projects in year 4 in a designated research or related entity



# THANK YOU

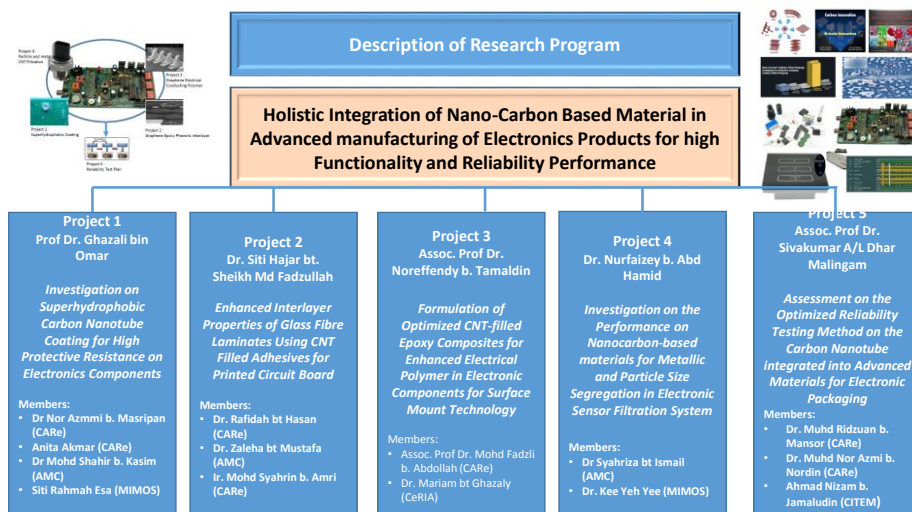


# Penjanaaan Kewangan

## Income Generation

Profesor Dr. Ghazali binti Omar  
Advanced Manufacturing Centre (AMC)

2.30 pm – 4.30 pm



## Challenges

- A key challenge for strong networking is the difficulty of contextual understanding the industry languages from different organizations leads to communication breakdown.
- Despite close collaboration, full insight into a company is difficult, although desirable, for university partners to achieve and vice versa.

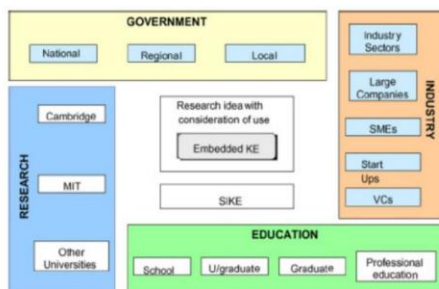
## Strategies

- Work with industry bodies to identify research gaps.
- Explain the research process, Produce results in a form that can be used by industry.
- Obtain funding from a variety of sources including government funding schemes.
- Outputs are in two forms – journals and book chapters for academic consumption and reports, barometers and media releases for industry consumption.

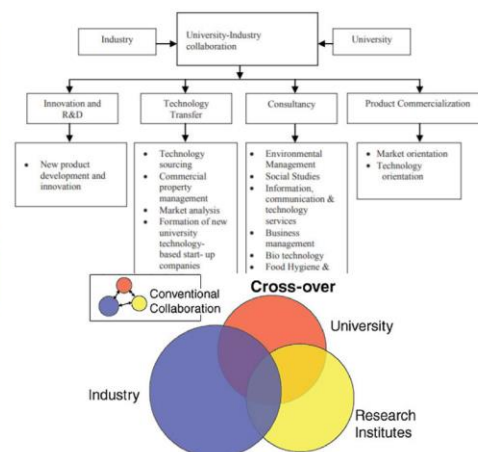


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## Different Models of Collaboration



The six-component model of a Knowledge Integration Community (Industry, Government, Research and Education) through two binding mechanisms: knowledge exchange (KE) and the study of innovations in knowledge exchange



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## With Defined Strategies and Model

It will only work if.....

Build trust with your partner



Walk the talk

I DON'T  
TRUST WORDS,  
I TRUST  
ACTIONS.

Simple Reminders



Ensure no communication breakdown



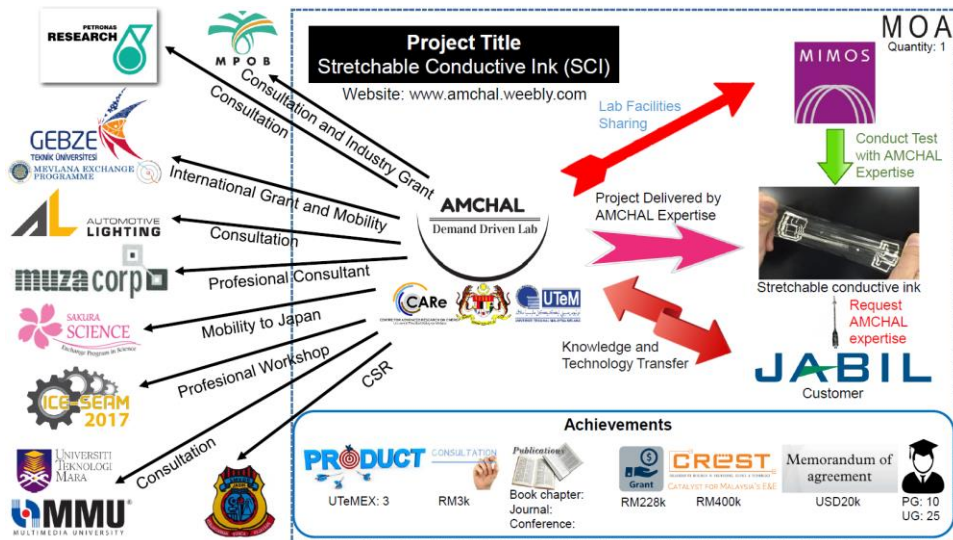
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## There is No Model that Fits All



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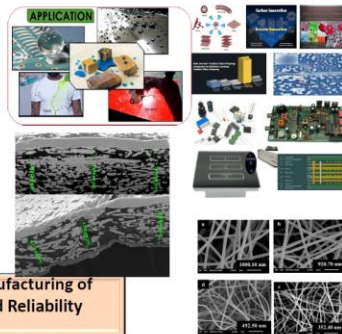


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Serving the capital equipment, computing and storage, defense and aerospace, healthcare, industrial and energy, and networking and telecommunications industries.

Jabil Penang offers end-to-end solutions in manufacturing, testing, and distribution including printed circuit board assembly (PCBA), new product introduction (NPI), surface mount technology (SMT)



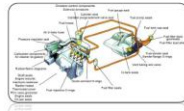
#### Nano-Carbon Based Material in Advanced manufacturing of Electronics Products for high Functionality and Reliability Performance



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#### Elastomer & Metallic Integrity test



#### Engine Performance & Emission



#### Fuel deposit study

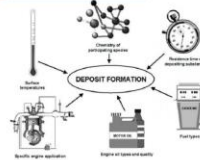


Figure 1 Key factors influencing deposit formation

#### Injector Reliability



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## Design and Development of Cone Laying System for Road Maintenance Usage

Customer: Projek Lebuhraya Usaha Sama Berhad (PLUS)

Problem Statement: Safety issue facing by PLUS

Industrial matching grant concept (total value: RM 80,000)

Duration: 12 Months (Start Date: June 2018, End Date: May 2019)

#### Job scope:

- Product design and optimization
- Automation design and development
- Functionality testing

#### Job scope:

- Design and prototyping
- Field testing and inspection
- Quality assurance



Phase 1: Product Design



Phase 3: Prototyping and Installation

Month 0      Phase 2: Analysis and Optimization      Phase 4: Testing and Quality Check      Month 12



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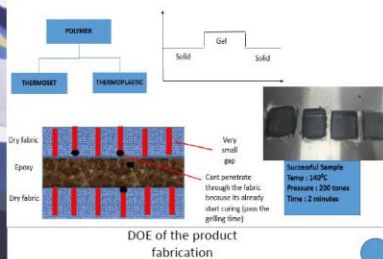
### PROJECT COLLABORATION AMIC-CTRM-AMCHAL : FABRICATION AND CHARACTERIZATION OF COMPOSITES SEAT PAN USING HOT PRESS METHOD



- Consultancy offer from CTRM AEROCOMPOSITES SDN BHD which is a Malaysian based manufacturing and research company involving aerospace composite products.
- Consultation work: Fabrication of passenger seat fabrication products using hot press machine and characterization of fabricated products .
- Characterization method : Flexural test, Nano indentation, SEM and EDS.



#### THEORY OF THERMOSET BEHAVIOR

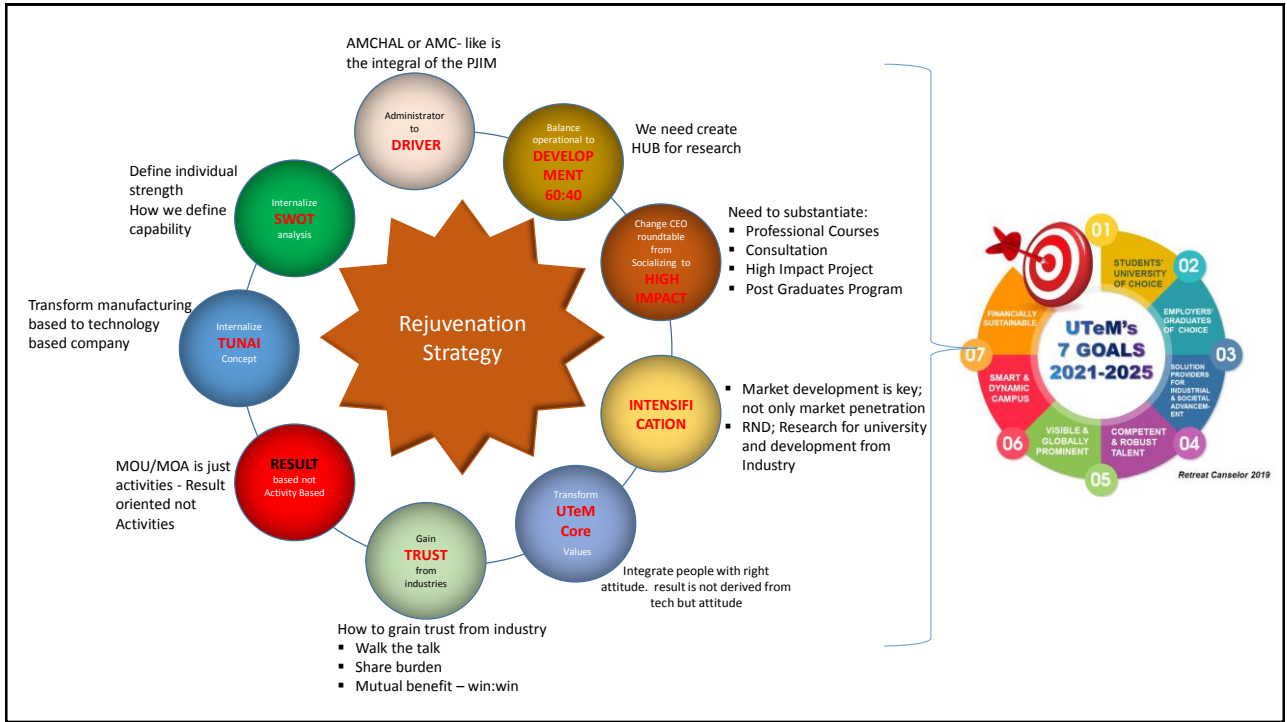


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## Industry Related Research Grant

|  |  |                       |   |
|--|--|-----------------------|---|
| CREST Electronics Consortium                   | Electronics – Applied reserach based on stretchable Conductive Ink | Industry Grant RM1.2M | ● |
| Jabil Circuit Sdn Bhd                          | Electronics – NanoCarbon based research on CNT                     | Industry Grant RM450K | ● |
| Malaysia Palm Oil Board                        | Automotive – Material charac on B20 blended biodiesel              | Industry Grant RM318K | ● |
| PLUS Hiway Sdn Bhd                             | Automation on Road safety system                                   | Industry Grant RM80K  | ● |
| Composites Technology Research Malaysia (CTRM) | Design and develop geospatial additive manufacturing               | Industry Grant RM30K  | ● |

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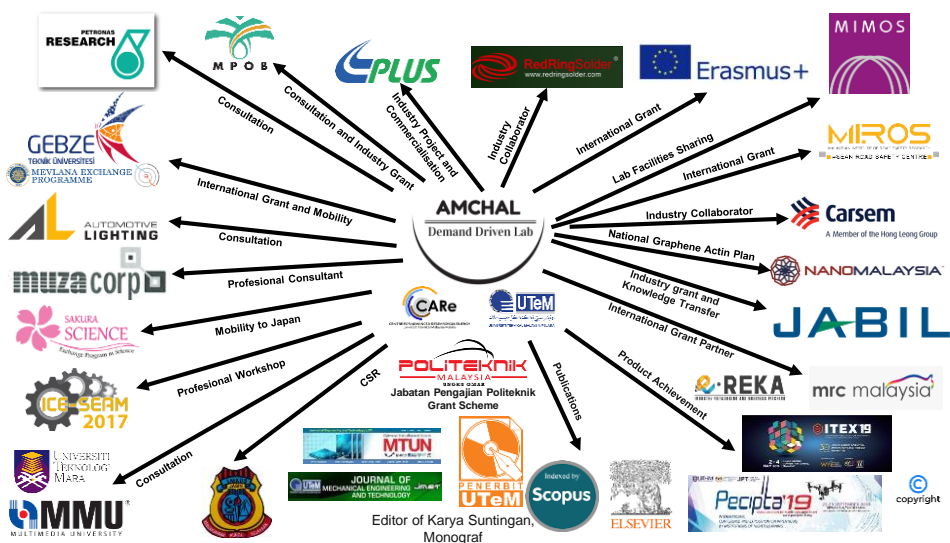
| Goal Synopsis  | Deliverables   | Owner                         | Strategic Initiatives   | Key Strategic Initiatives (KSSI)                      | Action Plan  | KPI Statement   |
|--|--|-------------------------------|---|---|--|---|
| UTeM to exploit technical talents, utilise research facilities and enhance infrastructure in order to meet the needs and solve technical problems of industry and society. | 1. Number of academic staff engaged with industries and communities technical projects | TNCPI<br>PNCJIM<br>(co-owner) | 1. Enforce each faculty research group to engage with SME and MNC on technical services and consultation                  | 1. Number of industry driven research group formation | To identify potential industry and provide schedule visit based on area of expertise | Number of Industry engaged (cumulative)   |
|  | 2. Number of research facilities being utilised by the industries and communities      |                               |   |   | Management to provide seed fund on any successful industry collaboration             | Number of Industry-based Project implemented (cumulative)                       |
|  | 3. Number of successful industry solutions projects being completed                    |                               |   |   |  | Total amount of fund receive from industry collaboration                        |
|  |  |                               | 2. Enhance the skillset of the academic staff through systematic mentor mentee program                                    | 2. Level of industrial skillset program implemented   | Staff short Industry Attachment (1 to 3 month)                                       | Number of staff attached to industries with project successfully implemented    |
|  |  |                               | 3. Promote the utilisation and commercialisation of the lab facilities to the industries through strategic marketing plan | 3. Number of lab facilities commercialised            | Develop lab capability to meet industrial commercial standard                        | Number of developed capabilities ( NOT capacities) for industry based on demand |
|  |  |                               |   |   | Centralized administrator on UTeM equipment/facilities capability as one stop centre | Number of project engagement derived from centralized administrator             |
|  |  |                               |   |   | To use teaching factory concept as one stop centre aka solution provider             | Number of project engaged with industry   |
|  |  |                               | 4. Develop the special task group (COE) to meet the demand on the   | 4. Number of developed the special task group (COE)   | Formation members among multi talent to provide solution to industry                 | Number of Industry engaged (cumulative)   |
|  |  |                               |   |   |  | Number of Industry-based Project implemented (cumulative)                       |
|  |  |                               |   |   |  | Total amount of fund receive from industry collaboration                        |



| Goal Synopsis   | Deliverables   | Owner | Strategic Initiatives   | Key Strategic Initiatives (KSSI)                                | Action Plan   | KPI Statement                    |
|---|--|-------|---|---|---|----------------------------------|
| UTeM to be the leader and referred technical institution in providing industrial and societal technology advancement through impactful commercialised projects, industries demand driven research, product developments and innovations | 1. Number of innovative Product commercialised by the industries<br>2. Number of value creation for IPRI and Commercialisation through<br>a. Technology Licensing<br>b. Outright Sale<br>c. Spin off Company<br>3. Number of grant received on the impactful Projects through<br>a. National Grant<br>b. International Grant<br>c. Industry Grant<br>4. Number of Vibrant Industry-Community Preferred Partner |       | 1. Implement the industry within University program through incubation program  | 1. Number of industry-university incubation program implemented | To provide the facilities and infrastructure on the university and industry project   | Number of product commercialised |
|   |  |       |   | 2. Number of industry demand product implemented                | To ensure every product to be develop MUST have the industry partner  | IPRI generation                  |
|   |  |       | 2. Ensure the product to be developed are based on industry demand driven and have industry taker to use and/or commercialise it. |   | Periodic engagement with industries and communities by holding workshops for solving specific problem on products or services to gain their trust | Number of product commercialised |
|   |  |       |   |   |   | Number of Filed Patents          |
|   |  |       | 3. Proactively create the data bank on the grant proposal to ensure readiness for submission with high quality proposal           | 3a. Number and amount of grant secured                          | Focusing internal grants for developing products and services based on programs with smart industrial/community partnership (Matching grant)      | Number of Granted Patents        |
|   |  |       |   | 3b. Number of technology based project established              | Identifying potential research programs and propose it for larger grants at national (e.g. MTUN Matching Grant etc.) or international level       | Number of IPRI's                 |
|   |  |       | 4. Create dynamic research profile as a strong promotion for global visibility for international grant                            | 4. Number and amount of international grant secured             | Create database for potential international grant quarterly or yearly   | Income generation                |
|   |  |       |   |   |   | Number of grant secured          |
|   |  |       |   |   |   | Amount of grant secured          |



## Our Projects and Collaborators







# THANK YOU

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