



# Challenges and opportunities in Bridging the Grand Challenges : The Malaysian Experience

**Prof Dato' Dr Asma Ismail, FASc**

**Vice-President Academy of Science Malaysia**

Vice-Chancellor, Universiti Sains Islam Malaysia

And

Professor, Institute for Research in Molecular Medicine  
Universiti Sains Malaysia





# Political will



- There is a need for political will to bridge the Grand challenge
  - Political will provides the funding in order for researchers to find the solutions, develop the solutions, evaluate the solution and when feasible, implement the solutions, study the impact and outcomes of the solutions
  - Ensures the necessary policies are in place
  - Identifies the government agencies responsible to implement the solution and determine the success of the deliverables

- In Malaysia, overcoming poverty and ensuring sustainability is the national agenda
- The government introduced the New Economic Model (NEM) to transform Malaysia into an advanced high income nation.
- The NEM is people-focused and addresses sustainability and inclusiveness (reducing the inequity divide)
- Providing solutions to the Grand challenges are an important component of the NEM since it is integral to national success.



# Grants to bridge the Grand challenges



**R**

## Phase 1: Consolidating Research

Research discoveries, acquisition of technologies

**PHASE 1**  
Making scientific discoveries

**D**

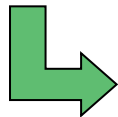


## Phase 2: Consolidating Development

Design, engineering and technology integration

**PHASE 2**  
Develop and evaluate the solutions

**C**

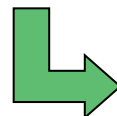


## Phase 3: Consolidating Commercialization

Patent, Marketing, Entrepreneurship and licensing

**PHASE 3**  
Pre-Commercialize

**E**



## Phase 4: Consolidating Knowledge-based enterprise (Research Park)

•Spin off companies/ JV companies

**PHASE 4**  
K-enterprise

Conducive innovation ecosystem to ensure a smooth and continuous flow of R-D-C-E



# Being realistic



- Despite the political will and the grants provided, its not easy to bridge the grand challenge successfully.
- There is a need to provide solutions that can create a sustainable change in society.
- The solution must also be commercially viable so that it can be accessible to the world market to touch base with the people who need it most
- To be commercially viable would require researchers to be innovative, creative with entrepreneurial and pioneering mindset
- Bottom line, there is a need to get the buy-in from the scientists and researchers and the stakeholders (NGO, industry, other ministries/agencies,community) to work in a multidisciplinary manner to move the agenda.

# Getting the buy-in from researchers



## R&I challenge: Stop playing catching up and turn around the way we do research

- Address the needs of the 5 billion people on the planet living below poverty line including those below poverty line in Malaysia
- Concentrate on research outcomes and technology development that will reduce sustainability that

**Nurture action-oriented research leaders who are able to provide sustainable solutions for humanity to use.**

**Blue Ocean Strategy**  
Providing Local Solutions to Answer Global Problems

**Balance Impact with Impact factor**

**Bottom Billions**  
5 billion

Knowledge Transfer  
Grants to evaluate feasibility

- Brains to business to humanity



# Showcase: Bridging the grand challenge with diagnostics for low resource settings



## Unavailability of diagnostics



- Despite decades of epidemics that we have experienced, we still do not have adequate diagnostics
- Annually 48 million die of cholera, 2.9 million from enteric infections, 5 million die of AIDS and tuberculosis
- WHY?
- Simply because diagnostics are **UNAVAILABLE** or **INACCESSIBLE** to those who need it most from the underdeveloped or developing countries.



Millions more will die due to infectious diseases especially among the poor and the vulnerable

Polar ice caps are melting faster than ever... More and more land is being devastated by drought... Rising waters are drowning low-lying communities... By any measure, Earth is at ...

*the TIPPING POINT*



Time, April 3, 2006

## Criteria for design and development

- Specific
- Sensitive
- Easy to perform
- Built-in-controls
- Cost effective
- No refrigeration
- No culture facilities
- Minimal lab infrastructure
- Lack of electricity
- Lack trained personnel
- Transported without cold chain



## Rapid Diagnostic Tests

**TESTS AVAILABLE FOR:**

- Cancer detection
- Filariasis (elephantiasis)
- Paratyphoid
- Shigellosis
- Campylobacteriosis
- Hepatitis B & C
- Tuberculosis

**SPECIAL FEATURES OF THESE TESTS:**

- ▲ Rapid
- ▲ Simple to perform
- ▲ Cost-effective
- ▲ High sensitivity
- ▲ High specificity

- Companies are Not interested to develop diagnostics for a market that could not afford to pay
- There is a need to reduce the inequity divide.
- **Bridging the Grand challenge with molecular Diagnostics to be made available and accessible to those who need it most**
  - Creation of thermostable low cost PCR based tests
  - Creation of low cost point-of-care dipsticks for both protein and DNA based tests
  - Future: creating non-PCR DNA based tests that can be used directly in the field.

# What kind of diagnostics should we create?

## Advise from a Nobel Laureate

“If we work on research topics that the West is not interested in, we will always be 20 years ahead. If we work on topics that the West is interested in, we will always be 20 years behind”.

..... Ahmad Zewail



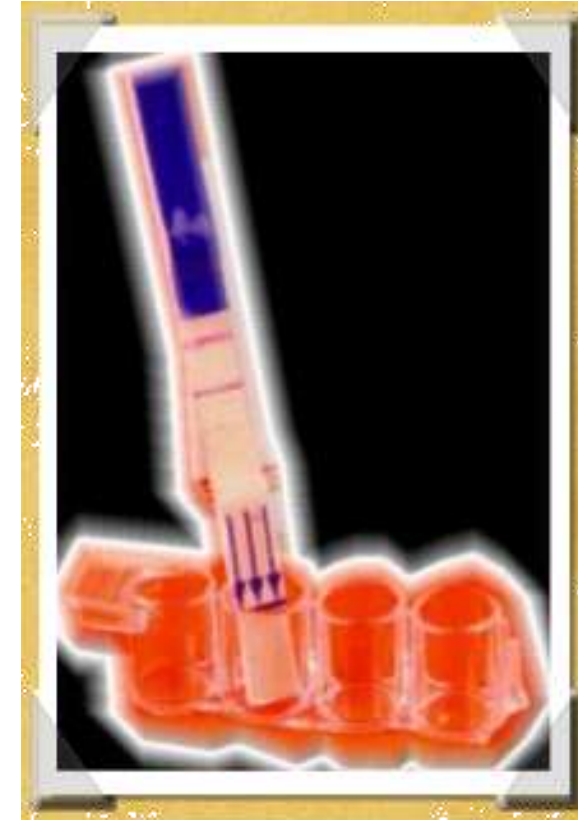
**1999 Nobel  
Prize  
in Chemistry**

**Blue ocean strategy**

# Focusing on diseases relevant to S.E Asia

## Rapid protein or DNA - based diagnostics for the following diseases

- Typhoid
- Cholera
- Campylobacteriosis
- Filariasis
- Tuberculosis
- Dysentery
- Paratyphoid
- Nosocomial infections
- Drug response to TB





# Commercialization Track record: Antibody-Based Biotech kits

6 kits commercialised

ORIGINAL  
DISCOVERIES

1994  
TyphiDot



1996  
TyphiDot M



2002  
TYPHirapid



1994  
BrugiaRapid



- Rapid immunochromatography test.
- Suitable for blood sample collected at any time.
- Detects specific IgG4 against Brugia filarial parasite.



2005  
Bancroftian  
Filariasis



- Rapid immunochromatography test.
- Suitable for blood sample collected at any time.
- Detects specific IgG4 against Brugia filarial parasite.



2006  
Pan Filariasis



- Rapid immunochromatography test.
- Suitable for blood sample collected at any time.
- Detects specific IgG4 against Brugia filarial parasite.



# From idea to market: Affordable diagnostics



● Rapid immunochromatography test. ● 50 tests / kit  
● Suitable for blood sample collected at any time.  
● Detects specific IgG4 against Brugia filarial parasite.



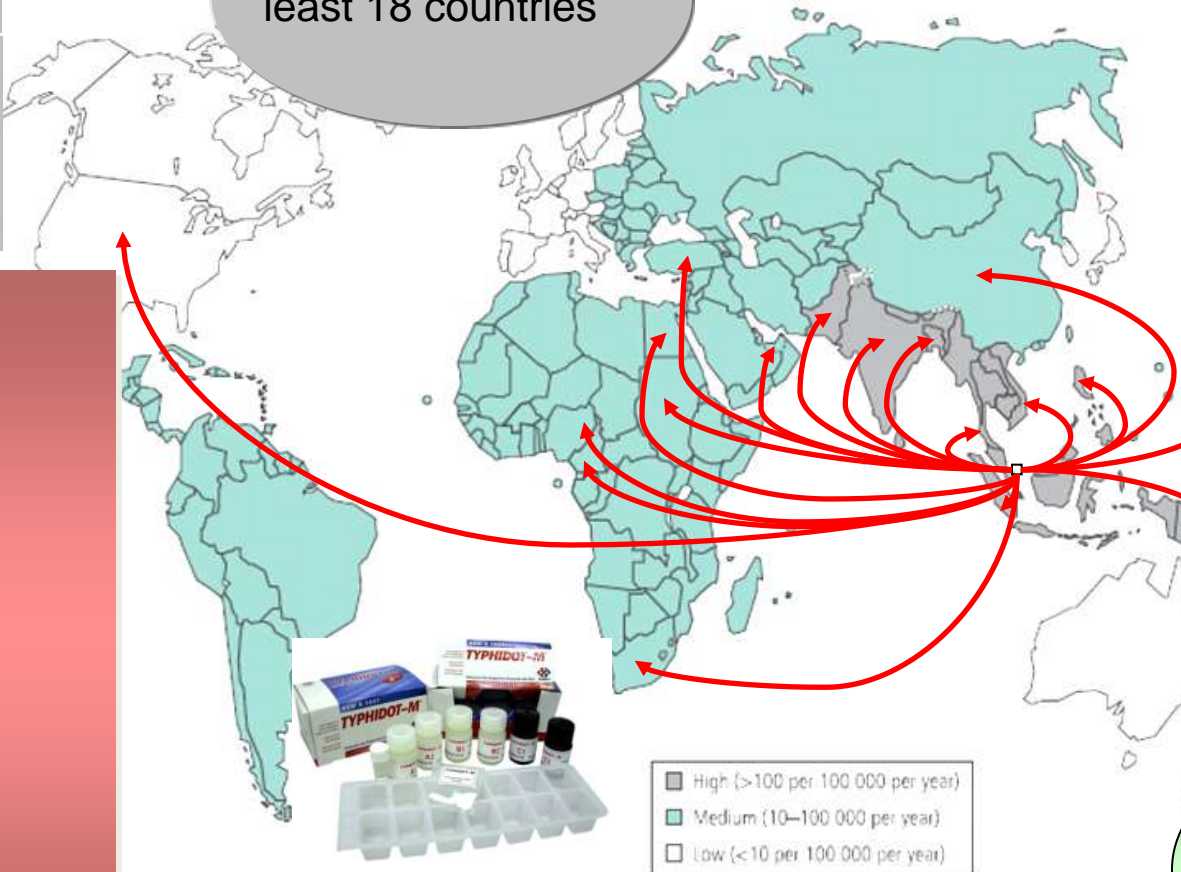
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Commercialised to at least 18 countries



- Pakistan
- India
- Philippines
- South Africa
- Guam
- Papua New Guinea
- Thailand
- Vietnam
- Egypt
- Turkey
- United Arab Republic
- Indonesia
- Bangladesh
- China
- Sudan
- Cameroon
- Nigeria
- USA

- Outputs**
- >20 Publications/kit
  - 12 Patents attained
  - 38 patents pending
  - Created spin-off biotech company
  - Creation of 500 jobs
  - Supported local industries
  - Generated income to country, university,
- Inventors**
- Won >100 awards
  - USD4,750,000 million grants obtained

R&D is necessary to make the product technologically competitive

Global Distribution of the Kits

# A DISEASE

2011

# NEGLECTED NO MORE

TWAS HAS JOINED FORCES WITH THE MALAYSIA-BASED INTERNATIONAL SCIENCE, TECHNOLOGY AND INNOVATION CENTRE FOR SOUTH-SOUTH COOPERATION (ISTIC) IN AN EFFORT TO IDENTIFY RESEARCH FINDINGS IN THE DEVELOPING WORLD THAT HAVE BEEN SUCCESSFULLY CONVERTED INTO NEW PRODUCTS,

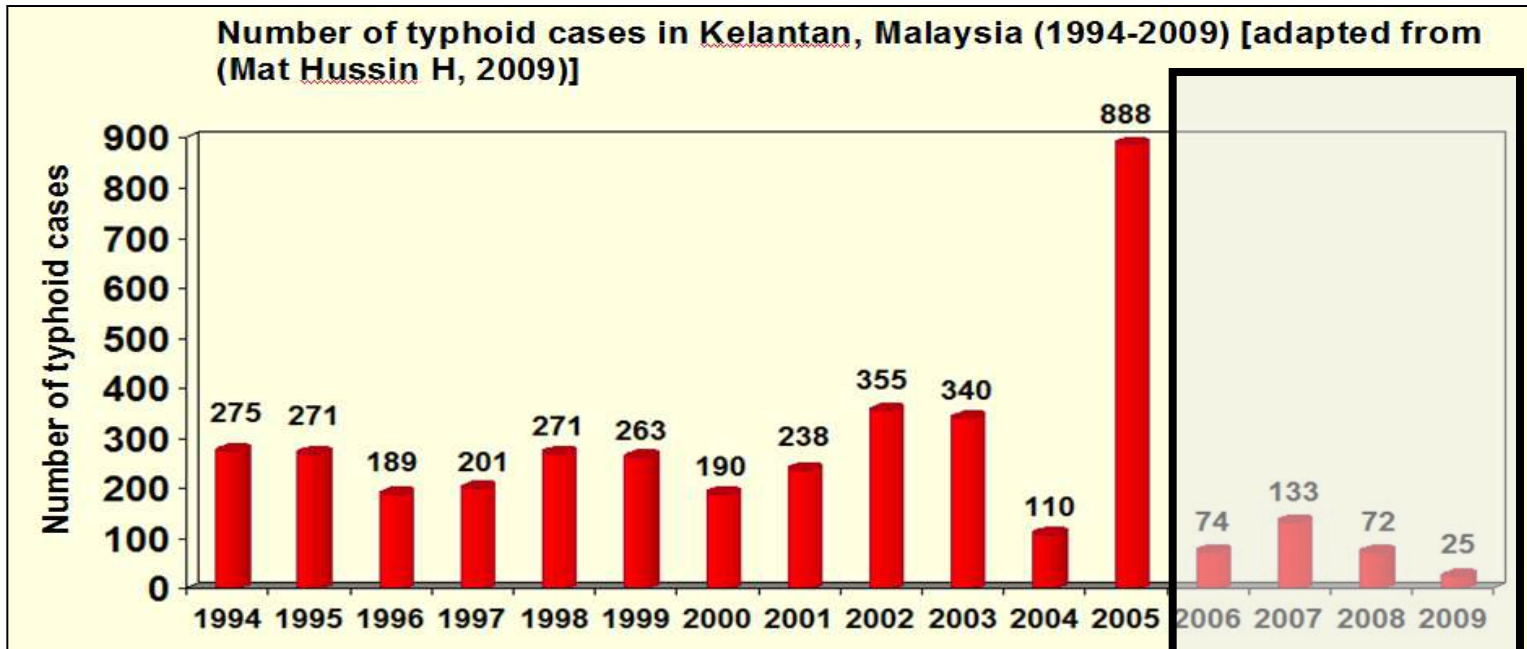
PROCESSES AND SERVICES. THE WINNER OF THE FIRST 'ISTIC-TWAS AWARD FOR ENTREPRENEURSHIP' WAS RAHMAH NOORDIN OF THE INSTITUTE FOR RESEARCH IN MOLECULAR MEDICINE (INFORMM), UNIVERSITI SAINS MALAYSIA.

NOORDIN WAS HONOURED FOR HER WORK ON DIAGNOSTIC KITS FOR LYMPHATIC FILARIASIS, A NEGLECTED DISEASE OF POVERTY.



# Success Story – impact of Typhoid carrier diagnostics to the Kelantan community, Malaysia

- Based on investigative study results of suspected typhoid carriers via Typhidot C , improved culture method and EZ Typhi PCR, Kelantan State Health Department took several actions as follows:
  - Provided treatment to those individuals who have shown stool culture and PCR positives
  - Provided treatment to those individuals whom their sera have shown IgA and IgG positives; only IgA positives and only IgG positives.
- As a result of the actions taken by the Kelantan State Health Department led by Dr. Lila P. Mohd Meeran and Dr. Hani Mat Hussin, the number of typhoid cases are decreasing tremendously from 2006- July 2009.



Creation of Point of care tests

- Protein based
- DNA based

Creation of molecular diagnostics at room temperature

Creation of solar powered devices

Development of our own membranes and nanoparticles as gold conjugates





# Partnerships

ASM organised sharing of experiences with OIC etc



## FIJI ISLAND

- The University of The South Pacific, Fiji Island

## CAMBODIA

- Royal University of Law and Economics, Cambodia

## PHILIPPINES

- Ateneo De manila University, Philippines
- San Pedro College, Philippines

## THAILAND

- Thammasat University, Thailand
- Suratthani Rajabhat University, Thailand
- Walailak University, Thailand
- Mae Fah Luang University, Thailand
- Chiang Mai University, Thailand
- Mahidol University, Thailand

## INDIA

- St. Ann's College of Education(Autonomous), Mangalore South India
- Salesian College Sonada/Siliguri, Bengal India

## MALAYSIA

- Universiti Sains Malaysia
- Universiti Putra Malaysia
- Universiti Malaysia Pahang
- Universiti Sultan Zainal Abidin
- Universiti Malaysia Kelantan
- Universiti Pendidikan Sultan Idris
- Universiti Malaysia Terengganu
- Universiti Teknologi Malaysia
- Universiti Malaysia Perlis
- Universiti Utara Malaysia
- Universiti Sains Islam Malaysia
- Universiti Tun Hussein Onn Malaysia
- Universiti Malaysia Sabah
- Universiti Malaysia Sarawak
- Universiti Teknologi MARA
- Universiti Teknikal Malaysia Melaka
- Universiti Tenaga Nasional
- Universiti Pertahanan Nasional Malaysia

## AUSTRALIA

- Australian College of Applied Psychology, Australia
- The University of Queensland, Australia

## CHINA

- HongKong Institute of Education, China

## PAKISTAN

- Abdus Salam School of Mathematical Sciences, Lahore- Pakistan
- University of The Punjab, Pakistan

## INDONESIA

- Universitas Brawijaya, Indonesia
- Universitas Pendidikan Indonesia
- State University of Malang, Indonesia
- Lambung Mangkurat University, Indonesia
- Universitas Negeri Medan, Indonesia
- Universitas Negeri Surabaya, Indonesia (UNESA)
- Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia
- Universitas Islam Negeri Riau, Indonesia

*APUCEN  
was launched on  
13<sup>th</sup> July, 2011.*

# Bridging the Grand challenge



**The future is not about where we are going  
but what we are creating**

Thank you  
[asma.ismail@usim.edu.my](mailto:asma.ismail@usim.edu.my)