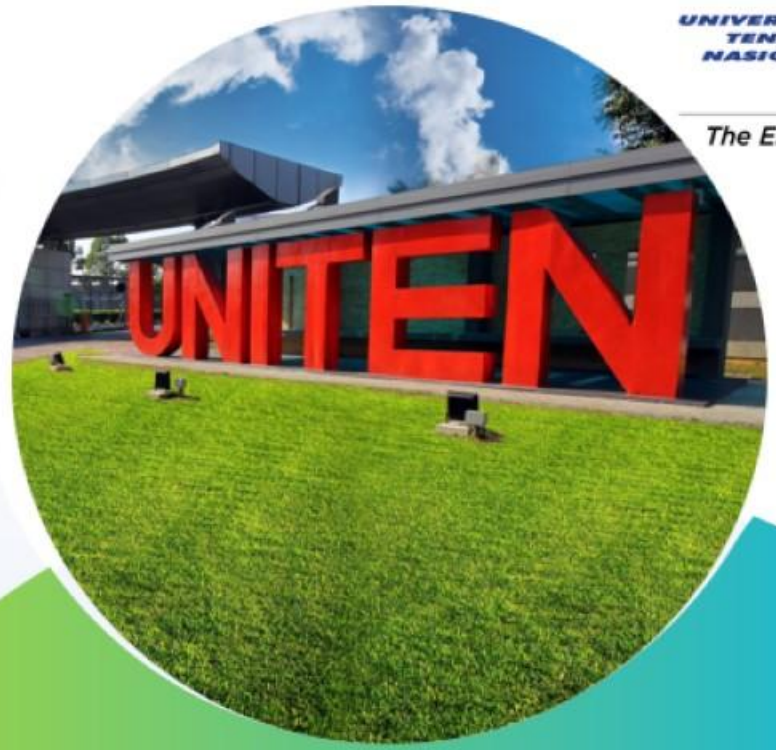
UNIVERSITI TENAGA NASIONAL

The Energy University



The Impact of Technology on Labour Market Transformations

From Job Disappearance to the Emergence of New Ones

Keynote by :

Prof. Ir. Dr. Khairul Salleh Mohamed Sahari, FASc
Vice-Chancellor
Universiti Tenaga Nasional (UNITEN)

What Do These Companies Have in Common?

Source: Business Insider, 2023

What Do These Companies Have in Common?

- Out of 800 respondents, **95% of respondents say their companies currently require bachelor's degrees for at least some roles. In 2024, 45% of these companies plan to eliminate the bachelor's degree requirements for some positions.**
- 80% of hiring managers favor experience over education in job applicants
- 3 in 4 employers say certificate programs are valuable training for potential employees

You no longer require degree to work here!

Source: Business Insider, 2023

INTRODUCTION: Post-Normal Times

- We are living in the **post normal times** – transformative forces are causing the world to be in the state of chaotic, full of uncertainties and the only constant is change.Has a great impact on higher education, livelihood and in our lives.
- Many of the problems we face today, such as climate change, global health crises, and socio-economic inequality, are inherently complex.
- These problems do not have straightforward solutions and require diverse perspectives to tackle effectively. **Linear thinking needs to make way to systems thinking** (looking at the big agenda).
- You need to show **interconnectivity** with the ecosystem and cause and effect within the ecosystem and no longer in smaller parts.
- **We need to shift from linear thinking to systems thinking**
- When faced with a complex unknown like COVID 19, we find that science alone may not provide clear-cut answers or solutions to complex problems.
- Answers can come from **many disciplines** including **indigenous knowledge**.
- Emphasis is placed on **transdisciplinary/multi-disciplinary collaboration, ethics, values, and public engagement** in addressing these issues.
- We need to perform responsible research and innovation, with **stakeholder engagement from the beginning and** Learn to work together to co-create solutions**.**
- For decision making we can no longer afford to make top-down decisions. We need to **engage** and obtain inputs from various stakeholders, including scientists, policymakers, experts, public and private sector and affected communities before deciding on policies.

Source: S.O. Funtowicz and J.R. Ravetz, 2017, Science for the Post-Normal Age, The Postnormal Times Reader. International Institute of Islamic Thought, compiled by ASM Analytics, 2023

Impact of Post Normal Times to H.E.

UNIVERSITI TENAGA NASIONAL

The Energy University

DIGITALIZATION AND OPEN ACCESS
Blended and on-line to make education flexible and accessible

MULTI/INTER/ TRANSDISCIPLINARY RESEARCH AND EDUCATION
- Complex global challenges require transdisciplinary solutions

FLEXIBLE LEARNING
- short courses, micro-credentials, and continuous learning opportunities to meet the evolving needs of learners throughout their lives.

GLOBALIZATION
- Cross-cultural competencies
- Global curriculum

GOVERNMENT POLICY AND FUNDING
- cross-cultural competencies
- Global curriculum

VALUES-DRIVEN EDUCATION AND DEEI
- Embodying the Malaysian National Education Philosophy – Developing potential of individuals in a holistic & integrated manner (intellectually, spiritually, emotionally & physically balanced and harmonious)

HEALTH AND WELL-BEING
- investing in wellness programs and support services to address the well-being of students and staff.

INNOVATION AND ENTREPRENEUR SHIP
- Encouraged to foster creativity and job creation

QA AND ACCREDITATION
- Evolving accreditations systems and learning assessment

POLICY AND FUNDING FOR R&I
- Encourage PPP and outcome-based funding

FLEXIBLE EDUCATION (HYBRID MODELS)
- Online and face to face

PERSONALISATION
- Advances in data analytics and AI are making it possible to customize

ALTERNATIVE CREDENTIALS
- digital badges, certificates, and industry-recognized certifications, are gaining recognition as valuable indicators of skills and knowledge.

PLANETARY HEALTH and SUSTAINABILITY FOCUSSED
- Emphasise on sustainability in education and research with impact

ETHICAL CONSIDERATIONS
- Technology usage
- Academic integrity
- Data privacy

Source: 1) Are Universities of the Past Still the Future? (EY, 2022); Greening Education Partnership (UNESCO, 2022); 2) Developing Sustainable Resilience in Higher Education, (AdvancedHE, 2020); 3) National Education Philosophy (MOE, 1988); 4) Research Futures: Drivers and Scenarios for the Next Decade. *Elsevier and Ipsos MORI, 2019.* 5) Akademi Sains Malaysia (NHSTI, 2023)

Impact of Post Normal Times to H.E.

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emotionally & physically balanced and harmonious)

The future of higher education institutions will need to be agile, adaptable, and innovative to navigate the changing landscape successfully. Digitalization and digital literacy will be a strong driving force in the future

POLICY AND FUNDING FOR R&I
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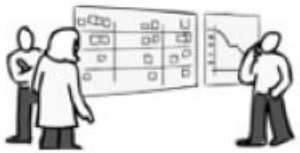
Talent For The Future

Talent for the Traditional Economy	Transformational Shift	Talent for the Knowledge Economy
Administrators	→	Innovators
Linear thinking	→	Systems Thinking
Closed innovation	→	Open innovation (Collaborative)
Emphasis on qualifications	→	Employment based on competencies
 Performance driven	→	Values-infused and impact driven
In-silo view	→	Ecosystem view

Talent will need to have SOFT Skills (ability to communicate with others), **SMART Skills (**(skills co-developed with other humans) **& SHARP Skills** (skills co-developed with digital technologies).

Source: © ASM Analytics, 2022.

Talent For The Future

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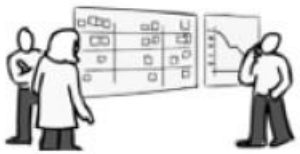

Balanced talent (knowledge and character) that are imaginative, agile, adaptive, flexible, future-ready, with attributes responsive to post-normal times

Talent will need to have SOFT Skills (ability to communicate with others), **SMART Skills ((**skills co-developed with other humans) **& SHARP Skills** (skills co-developed with digital technologies).

Source: © ASM Analytics, 2022.

Attributes and skills expected of students in post-normal times

Need to prepare students to **cope with unknowns** e.g. flexible, adaptable, agile when facing pandemic COVID 19 which is unprecedented.

- **Resilience**: Resilience is the ability to bounce back from adversity. It involves maintaining a positive attitude, adapting to change, and persevering in the face of setbacks.
- **Adaptability**: Being open to change and flexible in one's thinking and actions is crucial when facing the unknown. The ability to quickly adapt to new circumstances can make a significant difference.
- **Resourcefulness**: Resourcefulness involves finding creative and innovative solutions to problems, often with limited resources. This skill is particularly important during crises.
- **Critical Thinking**: Critical thinking skills help individuals analyze information, make informed decisions, and discern facts from misinformation. In times of uncertainty, critical thinking is invaluable.
- **Emotional Intelligence**: Being in tune with one's own emotions and empathetic toward others helps manage stress and build positive relationships during challenging times.
- **Communication Skills**: Effective communication is vital for disseminating information, providing support, and maintaining a sense of community. **Clear and transparent communication can reduce anxiety and confusion.**
- **Adaptation to Technology**: In a digital age, being comfortable with technology and its applications for remote work, education, and social interaction is increasingly important.
- **Self-Discipline**: Staying focused and maintaining self-discipline, especially when working or learning from home, is essential for productivity and achieving goals.
- **Patience**: Dealing with the unknown often involves waiting for answers, solutions, or improvements. Patience is crucial in times of uncertainty.
- **Community Engagement**: Being part of a supportive community or network can provide emotional and practical assistance. Engaging with others and offering support can foster a sense of belonging and resilience.
- **Proactive Approach**: Taking a proactive approach to problem-solving and preparedness can help mitigate the impact of unforeseen challenges. This includes disaster preparedness and emergency planning.
- **Mental Health Awareness**: Understanding the importance of mental health and seeking help when needed is crucial during times of stress and uncertainty.
- **Resource Management**: Effective management of resources, including financial resources, can help individuals and organizations weather economic challenges.
- **Global Awareness**: Being aware of global issues, pandemics, and interconnectedness can help individuals and communities respond more effectively to crises.
- **Lifelong Learning**: A commitment to continuous learning and self-improvement can help individuals stay informed and adaptable in the face of changing circumstances.
- **Crisis Management**: Understanding the basics of crisis management and decision-making is valuable when facing unknown challenges.
- **Intellectual humility**

Disclaimer: For MQA Internal circulation and consumption ONLY

Source: ASM Analytics, 2023

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Educators should also undergo professional development to be updated with the new attributes and skills that the students need to have in post normal times

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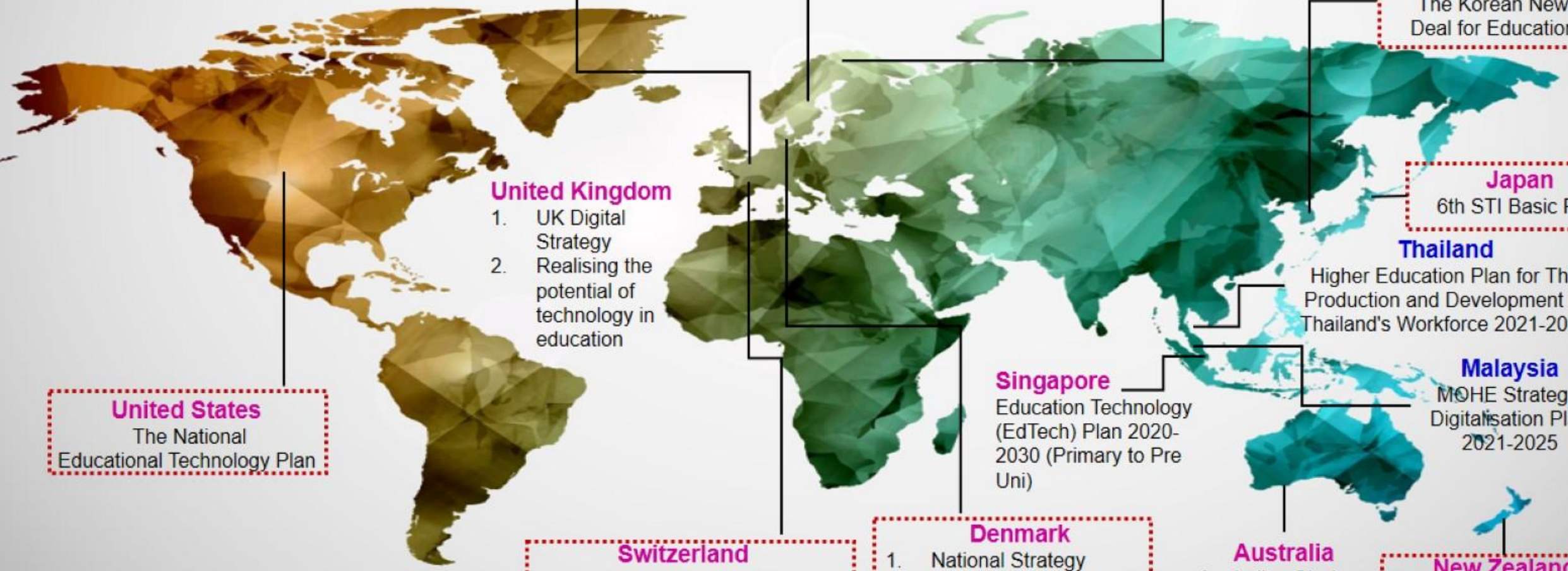
Source: ASM Analytics, 2023

GLOBAL BENCHMARKING AGAINST COUNTRIES WITH TECHNOLOGY ADOPTION STRATEGIES



Germany
1. Digital Strategy 2025
2. Digital Strategy of the Federal Ministry for Education and Research

Sweden
Swedish National Digitalisation Strategy for the School System 2017-2022

Finland
The Education Policy Report

South Korea
The Korean New Deal for Education

United Kingdom
1. UK Digital Strategy
2. Realising the potential of technology in education

Japan
6th STI Basic Plan

Thailand
Higher Education Plan for The Production and Development of Thailand's Workforce 2021-2027

United States
The National Educational Technology Plan

Singapore
Education Technology (EdTech) Plan 2020-2030 (Primary to Pre Uni)

Malaysia
MOHE Strategic Digitalisation Plan 2021-2025

Switzerland
Federal Education, Research, and Innovation Policy 2021-2024

Denmark
1. National Strategy for Digitalisation
2. Digital Growth Strategy

Australia
Australian Strategy for International Education 2021-2030

New Zealand
Connected Ako: Digital and Data for Learning

Note: Benchmarked countries are based on top ten ranking under Global Innovation Index (GII)'s "Human Capital and Research" pillar and neighboring countries in ASEAN.
Source: Compiled by ASM Analytics , 2023.

GLOBAL BENCHMARKING AGAINST COUNTRIES WITH TECHNOLOGY ADOPTION STRATEGIES

All benchmarked countries have a dedicated technology adoption strategy for higher education or incorporate digital transformation as part of their higher education policies.

Benchmarking analysis was carried out for **6 out of 13 countries** that emphasise the importance of experiential learning or values and ethics in the use of technologies and link to their commitments on sustainability (the US, South Korea, Switzerland, Denmark, New Zealand and Japan). This is important since we need to **institutionalize a culture of responsibility , values and ethics** in HEI STI ecosystem to build greater trust in science especially with the usage of AI and generative AI and improve resilience to future emerging disruptive technologies.

Our scoping showed that majority of countries are more **technology-centric** but not **humanity-centric** (**prioritizes the well-being, needs, and values of humanity**). Malaysia needs its own model that is humanity centric,nature based, values-driven and STI enabled.

Note: Benchmarked countries are based on top ten ranking under Global Innovation Index (GII)'s "Human Capital and Research" pillar and neighboring countries in ASEAN.
Source: Compiled by ASM Analytics , 2023.

Humanity-Centric Model (Don Norman, 2023)

- The term "humanity-centric model" in the context of science, technology, and innovation is a creative approach to problem solving.
- It's a process that starts with the community that you're are engaged with and ends with new solutions that are purpose-built to suit their needs.
- Humanity-centric model is user-centered by cultivating deep empathy with the community you're engaged with; generating ideas; building prototypes; sharing what you've made together; and eventually, putting your innovative new solution out in the world.
- This approach must be accountable to the **well-being, needs, and values of humanity**.
- It emphasizes the idea that scientific and technological advancements should ultimately serve the betterment of human society, taking into account **ethical considerations, social impact, inclusivity and accessibility, global collaboration, education and awareness and emphasizes the importance of sustainability and planetary health.**
- **The solution must take account of not only about people's understanding to use the innovation but also whether the solution offered is planet friendly.** When we design for humanity, we cannot stop just with people. We must consider the all living things and the environment. **What we do to the world will come back to affect us since** changes in one component can impact every component.

Progress in science, technology, and innovation must be accountable to the well-being of individuals and societies, with a keen awareness of the broader impact on the planet and future generations.

This concept should be a shared value among family, society and nurtured through schools and education system, be part of the HE curriculum, embedded in our governance & policies and in the innovations that we offer.

Source: Don Norman, *Design for a Better World: Meaningful, Sustainable, Humanity-Centred* (The MIT Press, March 2023), ASM Analytics, 2023

Humanit\y-Centric Teaching and Learning

The Energy University

What Do Students Look For When They Come To Universities?

Universities offer a learning ecosystem that allow students to :

1. Discover their potential
2. Nurture their potential
3. Unleash their potential
4. Be future-ready
5. Have clarity of purpose

- As we navigate through Post Normal Times, **reimagining** the role of science in higher education is not just a choice but a necessity.
- The Humanity-Centered Model proposed, offers a forward-looking approach that empowers students to become not just scientists but compassionate and ethical leaders, equipped to address the unique challenges of our times.
- By embracing interdisciplinary collaboration, ethical considerations, adaptability, global perspectives, and empathy, higher education institutions in Malaysia can pave the way for a new horizon in science, technology, and innovation to unleash their potential.

Humanity-Centric T&L Highlights

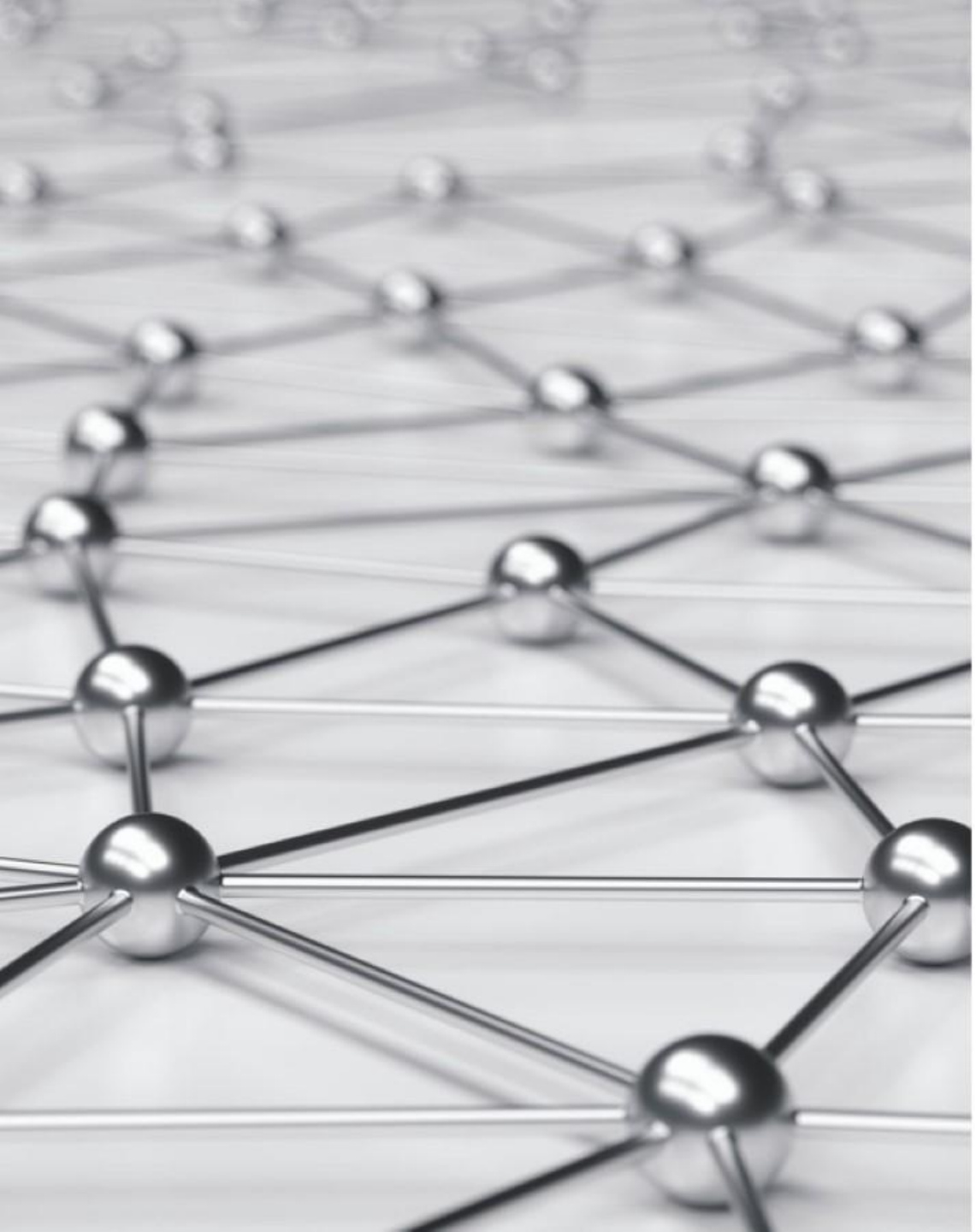
- Rapid technological advancements, global crises, and societal transformations require a paradigm shift in our educational models, particularly in the realm of science.
- The Humanity-centric teaching and learning encompasses:

Interdisciplinary Integration:

- Emphasizing the convergence of diverse disciplines, the model encourages collaborative learning experiences. By integrating humanities and social sciences with traditional scientific disciplines, students gain a comprehensive understanding of the ethical, cultural, and societal implications of scientific advancements.

Cultivating Empathy:

- In an era marked by rapid technological advancements, cultivating empathy becomes integral. The model integrates courses that explore the human side of science, encouraging students to consider the societal impact of their work. This empathetic approach ensures that innovations are not only technologically advanced but also socially responsible.



Humanity-centric teaching and learning: Highlights

Ethical Decision-Making:

- In Post Normal Times, ethical considerations are paramount. This model places a strong emphasis on nurturing ethical leaders in science. Courses on ethics and responsible research practices are embedded within the curriculum, fostering a sense of responsibility and accountability among future scientists.

Adaptive Learning Environments:

- Recognizing the dynamic nature of contemporary challenges, the model promotes adaptive learning environments. Virtual labs, simulations, and real-world problem-solving scenarios equip students with the skills needed to navigate complex and unpredictable situations, preparing them for the uncertainties of the future.

Global Perspectives

- Science knows no borders, and a Humanity-Centered Model ensures that students are exposed to global perspectives. Collaborative research projects, international partnerships, and exchange programs cultivate a sense of global citizenship, enabling students to address challenges that transcend geographical boundaries.

Source: ASM Analytics, 2023

Leading Malaysia's Energy Future

UNIVERSITI TENAGA NASIONAL
The Energy University

Collaborative Stakeholder Approach

The journey from campus innovation to national implementation requires a **symbiotic relationship** between key stakeholders.

Academia
Research & Talent Development

Industry
Commercialization & Investment

Government
Policy & Regulatory Framework

Research Excellence
- Developing foundational research
- Creating specialized programs

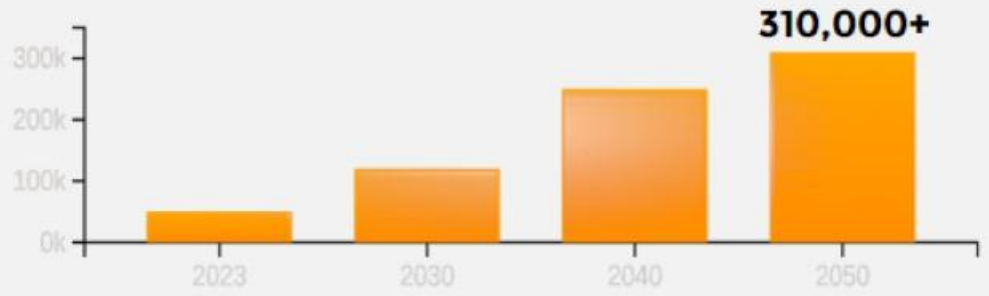
Commercialization
- Providing investment
- Scaling successful innovations

Policy Support
- Establishing supportive policies
- Creating regulatory frameworks

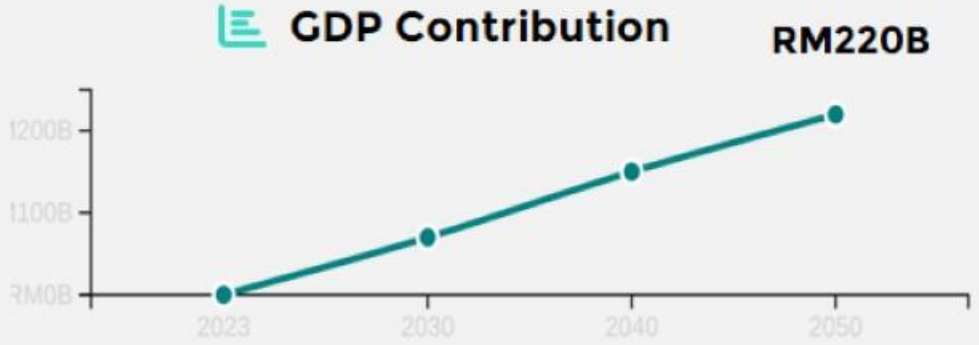
> **All stakeholders must unite and empower this vision to secure a prosperous and sustainable Malaysia.**

Social Benefits

Green Jobs Creation



GDP Contribution



UNITEN’s Strategic Role in Workforce Transformation

UNITEN’s Alignment with National Talent Needs

UNITEN is uniquely positioned to supply Malaysia's next-generation digital workforce through strategic alignment with national talent needs.

Programmes in AI, Data Science, Cybersecurity

Direct mapping to emerging job clusters in the digital economy, preparing students for high-demand roles.

Cross-College Technical Electives

Free modules equipped students from all faculties with foundational digital literacy skills for the modern workplace.

Micro-Credentials & Industry-Based Training

Supporting lifelong learning through flexible certification pathways that align with industry needs.

UNITEN is not just responding to the future — we are building it.

Campus as Innovation Engine

The Energy University

Pioneering Research

- Developing next-generation digital energy solutions
- Testing advanced grid controls and AI algorithms
- Creating cybersecurity protocols for energy infrastructure

Cultivating Talent

- Developing specialized curricula in energy data science
- Preparing workforce for digitized energy sector
- Fostering research and innovation in green technologies

Living Laboratories

- Testing microgrids with renewable sources
- Piloting vehicle-to-grid charging technologies
- Experimenting with peer-to-peer energy trading

"Innovation and talent are the indispensable sparks igniting Malaysia's energy digital transformation, with universities serving as the primary wellspring."

Research Ecosystem

To enhance research culture, collegiality, mentorship

Outcome

- Impactful Research to Nation
- Aligning Research Outcome into Academic Curriculum
- Attracting Post Graduate Student

Universiti Tenaga Nasional — The Energy University

Research & Innovation

College Research Centre

1. College of Engineering (COE)
2. College of Computing and Informatics (CCI)
3. UNITEN Business School (UBS)
4. College of Continuing Education (CCEd)

Office of Deputy Dean (Research & Innovation)

Research Institutes

- Institute of Sustainable Energy (ISE)
- Institute of Energy Infrastructure (IEI)
- IPE — Institute of Power Engineering (IPE)
- IEPRe — Institute of Energy Policy and Research (IEPRe)
- IICE — Institute of Informatics & Computing in Energy (IICE)
- Institute of Nuclear Energy (INE)

HiCOE by MOHE

AAIBE
Chair for Renewable Energy

DOSH Centre of Excellence for Electrical & Energy Safety

Energy Commission
Chair in Energy Economics

TNB TSLM
Chair in Energy Informatics

Research Excellence Centre

1. Research Grant
2. Publications
3. Exhibitions and Promotions
4. Research Competencies
5. RA & Post Doctoral
6. Knowledge Transfer

UR&D Sdn. Bhd

1. TNB Technology Fund
2. Industry Funded Research
3. Industry Partnership
4. IP & Commercialization
5. Technology Incubator
6. Research Technical Training

MIDA — Malaysian Investment Development Authority
R&D Status Company

National Energy Centre

1. Energy Research Leadership
2. Energy Research Consortium
3. Energy Transition Academy
4. International Energy Research Network

Input → Process Management → Output

Cultivating Future-Ready Talent

The Energy University

Human Capital Development

Universities serve as the primary wellspring for talent development, crucial for Malaysia's energy transition.

MQA SWAKREDITASI SELF-ACCREDITATION MQA/SA/0015 SINCE 2017

Future-Ready Workforce

Preparing graduates with skills for Malaysia's digitized energy sector.

Upskilling & Reskilling

Training existing professionals for the digital energy workforce.

Data Science for Energy

Specialized programs in energy data analytics and AI.

- BCS (Artificial Intelligence)
- Master in Artificial Intelligence
- Master in Data Science

Renewable Technologies

Programs in RE technologies.

- Diploma in Renewable Energy Technologies

Energy Systems & Management

Specialized programs in energy systems and management

- Master in Energy Management
- Master in Engineering Management

Energy Policy & Economics

Programs in energy policy and economics.

- Bachelor in Economics (Energy)

Digitalization transforms traditional energy systems into intelligent networks.

UNITEN features future-focused, industry-relevant academic programmes with Self-Accreditation status since 2017

The Energy University

Engineering

- Foundation in Engineering
- Diploma in Mechanical Engineering
- Diploma in Electrical Engineering
- **Diploma in Renewable Energy Technologies**
- Bachelor of Mechanical Engineering
- Bachelor of Electrical & Electronics Engineering
- Bachelor of Electrical Power Engineering
- Bachelor of Civil Engineering

Business & Accounting

- Foundation in Accounting
- Foundation in Business Administration
- Diploma in Accountancy
- Diploma in Business Studies
- Diploma in Financial Technology
- Diploma in Digital Business
- Bachelor in Accounting
- Bachelor in Finance
- Bachelor in International Business
- BBA (Marketing)
- BBA (Human Resource Management)
- BBA (Entrepreneurship and Venture Management)
- Note:
- BBA – Bachelor in Business Administration

Computer and Science

- Foundation in Computer Science
- Foundation in Information Technology
- Diploma in Computer Science
- BCS (Systems & Networking)
- Bachelor in Software Engineering
- BCS (Cyber Security)
- BIS (Business Analytics)
- BIT (Graphics & Multimedia)
- **BCS (Artificial Intelligence)**

Note:
BCS – Bachelor Computer Science
BIT – Bachelor Information Technology
BIS – Bachelor Information Systems

Energy Economy

- Foundation in Management
- Bachelor in Economics (Energy)
- Bachelor in-Business Economics

Tahfiz Program

- JAKIM-UNITEN Tahfiz al-Quran Certificate in
  - Engineering
  - Computer Science
  - Information Technology
  - Accounting
  - Business & Management
  - Energy
- Diploma in Corporate Management Tahfiz

Postgraduate Programmes

Master Programmes

Structure A (by Research)

- Master of Science in Electrical Engineering
- Master of Science in Mechanical Engineering
- Master of Science in Civil Engineering
- Master of Science in Information Technology
- Master of Science in Accounting
- Master of Science in Finance
- Master of Science in Management

Structure B (by Coursework & Research)

- Master in Electrical Engineering
- Master in Information Technology

Structure C (by Coursework & Project)

- Master of Business Administration
- Master of Business Administration - ODL
- Master in Engineering Management
- Master in Structural Engineering
- Master in Energy Management
- **Master in Artificial Intelligence**
- **Master in Data Science**

PhD Programmes

Structure A (by Research)

- Doctor of Philosophy (Engineering)
- Doctor of Philosophy in Information and Communication Technology
- Doctor of Philosophy (Business Management)

MQA
SWAAKREDITASI
SELF-ACCREDITATION
MQA/SA/0015
MULAI / SINCE 2017

Student Activities, Industry Collaborations

Living Laboratories on Campus

The Energy University

Microgrids

Localized energy grids with renewable sources.

→ Integration of solar and storage

Peer-to-Peer Energy Trading

Blockchain-enabled platforms for direct energy exchange.

→ Decentralized energy markets

Campus as Testbed

University campuses serve as ideal **"living laboratories"** for energy innovations.

- Controlled environment for testing before national implementation
- Provides real-world data for refining technologies
- Develops talent ready for national energy challenges

Vehicle-to-Grid Charging

Bidirectional charging where EVs supply energy back to the grid.

→ Testing V2G technology

Smart Building Management

Advanced systems for optimizing building energy consumption.

→ AI-driven building controls

SMART UNIVERCITY

Based on the UNITEN Smart UniverCity blueprint, 6 pillars have been identified to support the overall initiative

Objectives :

To create a sustainable and unique campus experience by enriching students, staff and visitors experience through the application of technology to improve lifestyle, to reduce carbon footprint and innovate solutions for industry.

Smart Facilities

UNITEN is equipped with more than 180 unit of smart LED street lights, complete with remote monitoring and management system.

Smart Education

UNITEN is transforming its classrooms with digital infrastructure towards enhanced teaching & learning experience

Smart Mobility

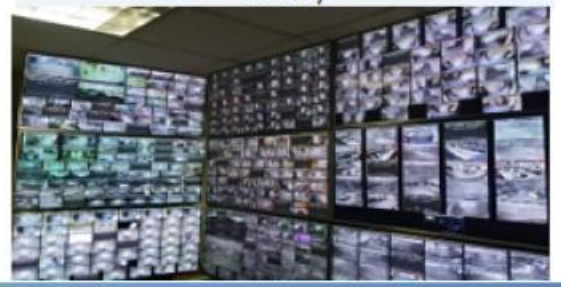
Electric scooters and electric buses complement UNITEN's fleet, which aim towards carbon footprint reduction.

Smart Energy & Infrastructure

UNITEN collaborated with the industries to equip its campus with rooftop solar panels, floating solar panels and energy storage systems, that are capable to sustain its buildings energy needs.

Smart Security

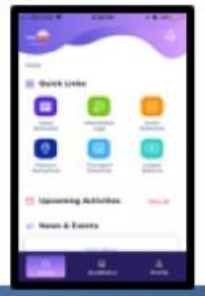
UNITEN in midst to install smart surveillance system and smart building security system for enhanced in-campus security.



Smart Lifestyle

Cashless payment accepted at all retails and services in UNITEN campus. Plus, UNITENLife App brings university information to students' fingertip.

UNITENLife Application



SMART UNIVERCITY

UNIVERSITI TENAGA NASIONAL
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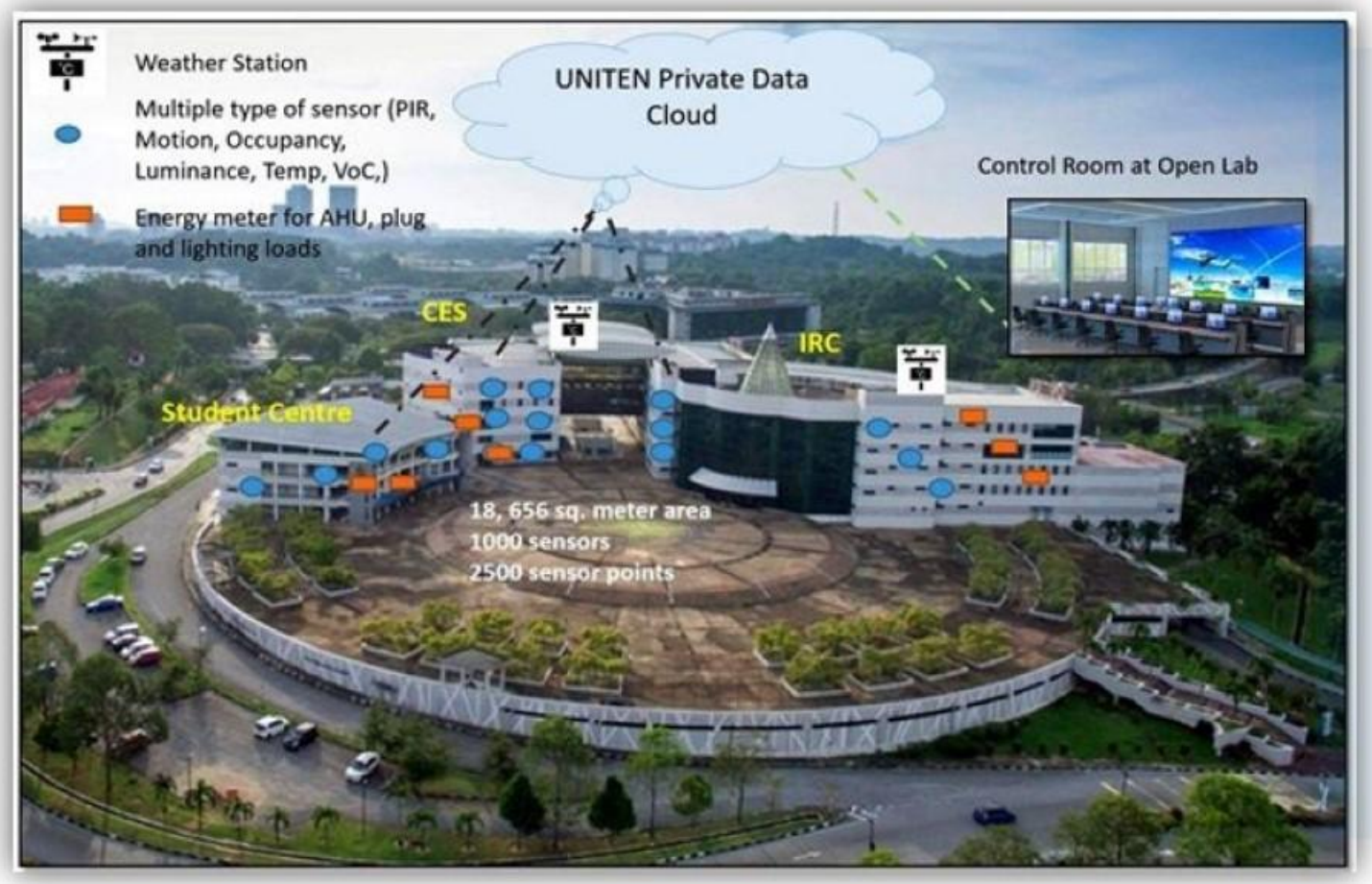
Key Projects:
Energy Efficient Building



UNITEN, in collaboration with Center of Energy Informatics, University of Southern Denmark, is transforming UNITEN Information & Resource Centre (IRC) into a smart building.

The building is being retrofitted with remote monitoring system, communication arrays, and energy sensors.

Strengthening Graduate Employability Through Digital Transformation

UNITEN's Strategic Initiatives

"UNITEN is not just responding to the future — we are building it."

Industry Collaboration
Partnerships with industry for real-world projects and internships to provide practical experience.

AI Integration in Teaching
Incorporating AI tools into teaching to enhance learning experiences for AI-driven workplaces.

Specialized Labs
Development of AI, Smart Energy, and Cybersecurity labs aligned with the TNB ecosystem.

Faculty Upskilling
Training faculty through AI-driven teaching to ensure they can effectively guide students.

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The Workforce of 2050 — What It Looks Like

Preparing for the Future of Work in a Digital World

The Workforce of 2050

- Highly tech-augmented roles across all sectors
- Seamless human–AI collaboration
- Majority hybrid jobs requiring digital + domain knowledge
- Continuous learning as a way of life
- Globally competitive talent moving across borders

Malaysia's Opportunity

"To succeed by 2050, Malaysia must:"

- Build a strong digital talent pipeline
- Integrate AI and digital skills in all higher education programmes
- Strengthen industry–university–government collaboration
- Invest in innovation, research, and entrepreneurship

"The future must be technologically advanced and ethically grounded."

We need the whole of nation approach to achieve the goals of NETR.
We can no longer afford to work in silos
No one can whistle a symphony.
It takes a whole orchestra to play it.
H.E. LUCCOCK
AKADEMI SAINS MALAYSIA

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Thank You

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