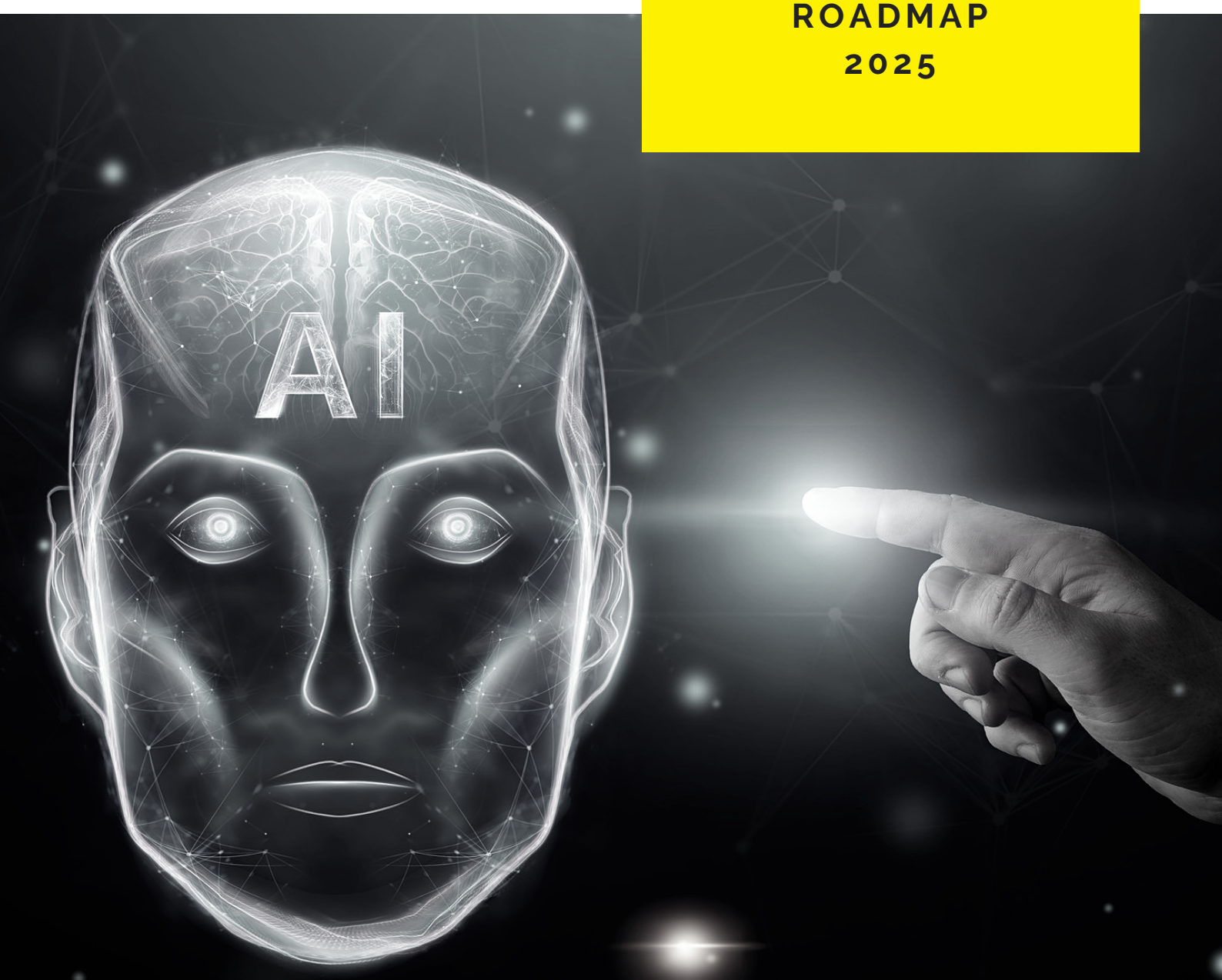
MCAST ARTIFICIAL INTELLIGENCE STRATEGY©

A Draft Overview for Consultation

AI

ROADMAP 2025

August 2019



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MCAST
Malta College of Arts, Science & Technology

MIST

AI at our core

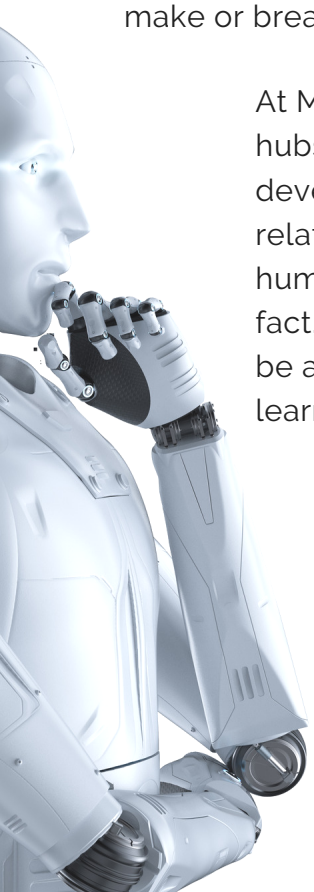
A College which provides learning at practically all levels of our National Qualifications Framework, is a challenging human endeavour. I am banking on artificial intelligence (AI) as a talented player, as a game changer.

The strategy that you are about to read can spearhead MCAST as the innovative hub for vocational and professional education and training. Endorsing 21st century technologies in education is like James Pillans' discovery of the use of the blackboard in 1801 at the Old High School in Edinburgh, Scotland. It then took almost a 160 years (1960) to commercialise whiteboards and for these to be widely used 30 years later!
Education is not a sector known for its innovation ethos. But MCAST aspires to break this traditional mind-set. The AI strategy designed by colleagues in MCAST's Applied Research and Innovation Centre is proof to this determination.

The College has three overarching challenges that it needs to address. These are retention, progression and automation. The first two will determine whether Malta's workforce will actually meet the challenges of a fast growing economy or whether the importation of human capital will continue to put unsustainable pressures on our small scale infrastructure.The third addresses the use of human capital in a more cost-effective manner.

The AI Roadmap 2025 addresses all these at the same time. The fear that technology will replace human beings will soon be dissipated by the added value of artificial intelligence in attracting learners to lifelong learning, assisting academics in keeping abreast with new knowledge and skills and simplifying administrative work. AI will bring the world of work inside Colleges and will make programmes far more relevant to employability.

As a working document, MCAST welcomes your comments and insights to this strategy. Artificial intelligence is a product of human acumen. But like all other inventions, it can make or break our future; it has its pros and its cons.



At MCAST we will spare no effort to transform our learning environments into hubs of attraction, innovation and learning keeping the individual's human development at the heart the College experience. All levels of intelligence can relate to artificial intelligence much more than they can communicate with human intelligence. No emotional barriers will henceforth obstruct learning. In fact, AI provides bespoke interactions that can be rewarding as much as they can be addictive. I look forward to seeing AI being the new partner that includes all learners and keeps them as lifelong learners and value workers.

PROF. JOACHIM JAMES CALLEJA

PRINCIPAL & CEO

DEFINING ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is a disruptive technology with the potential to impact numerous aspects of everyday life as we know it. AI can be defined as:

A technology or system that can emulate human performance typically by learning, coming to conclusions, appearing to understand complex content, engaging in natural dialogues with people, enhancing human cognitive performance or replacing people on the execution of non-routine tasks. [Gartner 2019]

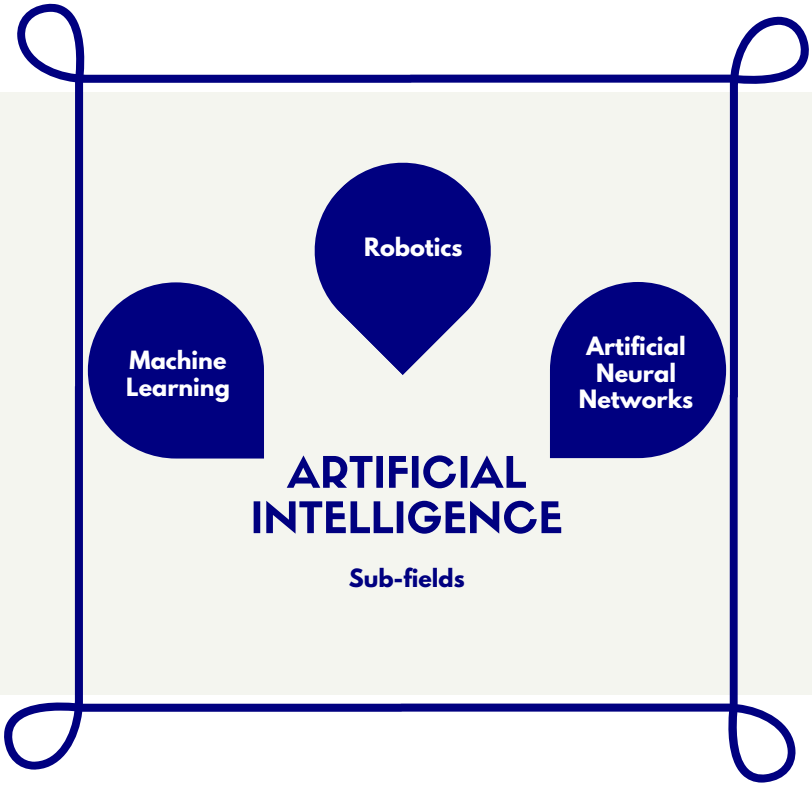
AI is demonstrated by a machines' ability to understand, think and act on a problem in the same way a human would in the same situation. [Wandering Alpha].

When defining the underlying and/or constituent technology/ies, AI is used as an umbrella term to combine the use of disparate technologies that work in conjunction toward achieving the defined AI objectives.

Intelligence means more than just a mastery of a set of skills or a system of knowledge. As humans, we grow and adapt, we dream and create, we delight each other and surprise ourselves. We cannot quantify the entirety of our own intelligence, and indeed we are only in the infancy of our study of the brain and the gut. But we can quantify the intelligence of the machines that we build. We know how to do this because we have painstakingly constructed each model, framework, and algorithm.
[S. Rosa Feb 2019]

HOW AI WORKS

AI is composed of a constellation of technologies that combine big data with intelligent algorithms to allow the software to automatically learn how to respond to certain actions from patterns identified within the data. The effectiveness of the AI system is proportional to the of the volume of training data analysed. AI contribute significantly towards improving the accuracy of complex tasks such as visual perception, speech recognition and sentiment analysis.



AI IN EDUCATION

The state of the classroom has seen little change since its inception during the first education revolution as defined by Anthony Seldon [2018]. AI has the potential to change this by addressing challenges within the current education model such as the inhibition of personalized learning and educational processes overwhelmed by admin work.

AI is of particular relevance in addressing the individual needs of students with learning difficulties, adressing the relevancy of qualifications to the needs of the labour market and bridging the gap between education and the world of work.

AI Education is in its infancy and most of the available technologies are working within the peripheral of the teaching and learning processes such as tackling admin practices [Luckin 2019].

The available AI solutions can be categorized by stakeholder. Typically, these are a) the learner, b) the lecturer, c) the system.

Tangible examples of AI applied in the education model:

- Data-bots to support personalized and distance learning.
- AI powered platforms to identify the student's knowledge gaps.
- AI to simplify administration processes.
- AI in curriculum development.
- Expression analysis to assess student's understanding and engagement.
- Systems that record the learning process and collates it to a digital twin. Data extracted and analysed on demand using AI.

THE IMPERATIVE TO CHANGE

It is envisaged that in the coming years the AI revolution will bring about a series of disruptions in both the job market and the educational ecosystem. Educational institutions, will in turn, be working through unchartered territory. In order to remain relevant, educational institutions must react to these changes and embrace AI systems.

AI AT THE CORE OF MCAST

Anthony Seldon [2018] identified AI as the technology that will bring about the fourth Education Revolution. In his view, this technology will bring opportunities for a more radical restructuring of the education provision. This strategy explores ways of how the AI constellation can be exploited and integrated into MCAST's core functions and principle internal organs to enhance the quality of the education provided.

The basis of this strategy encompasses the breakdown of the constituent elements of the various operational and educational processes of MCAST's ecosystem. An assessment on how and to what extent AI can be adopted toward the identified processes shows how MCAST can become an 'AI Ready' college.

This AI strategy seeks to align with:

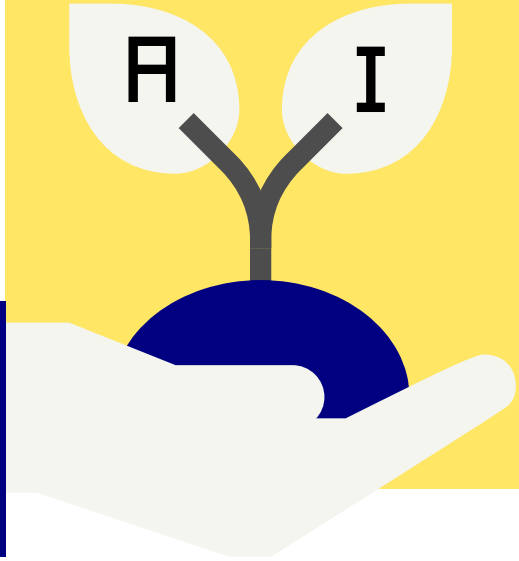
a) MCAST's strategic plan 2019 – 2021, in particular, in the following components:

- Upgrade IT infrastructure to enhance teaching and learning.
- Provide students with a richer experience that enables all our students to reach their full potential.
- Work with industry partners for quality placements.
- Develop internal structures for data management, provision and dissemination
- Stimulate and develop applied research at college level leading to business development, transfer of knowledge and prototypes.

b) MCAST's revised line budget for post-2018 , allowing it to move away from being that of a resource-stressed institution.

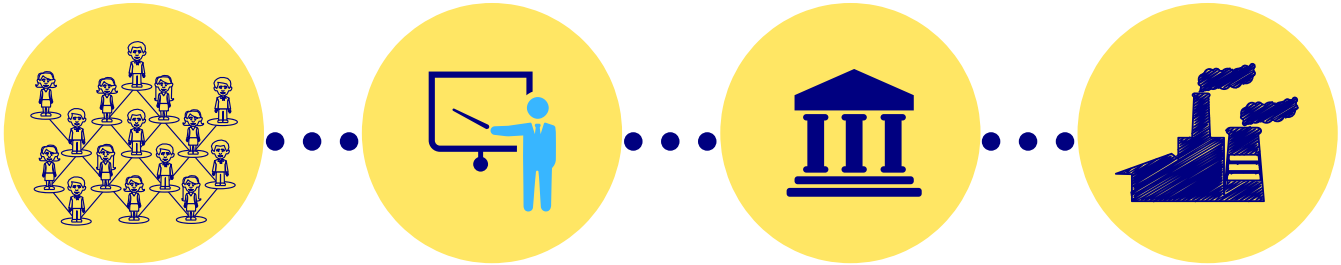
c) MCAST's Research Framework https://www.mcast.edu.mt/applied-research/

THE STRATEGY



This strategy sees AI to become an integral part of what we do, well embedded within our daily practices. It considers various initiatives that will ensure a smooth AI adoption within MCAST. It also focuses on the skilling for the AI age which is of particular importance to a VET provider. Additionally, it looks into how research within the area of AI and related subsets can create solutions to sustain MCAST, Industry and Society. Such research will help in MCAST's key focus towards the 17 UN Sustainable Development Goals..

The 4 main beneficiaries targeted by this strategy:



STUDENTS **ACADEMICS** **INSTITUTION** **INDUSTRY**

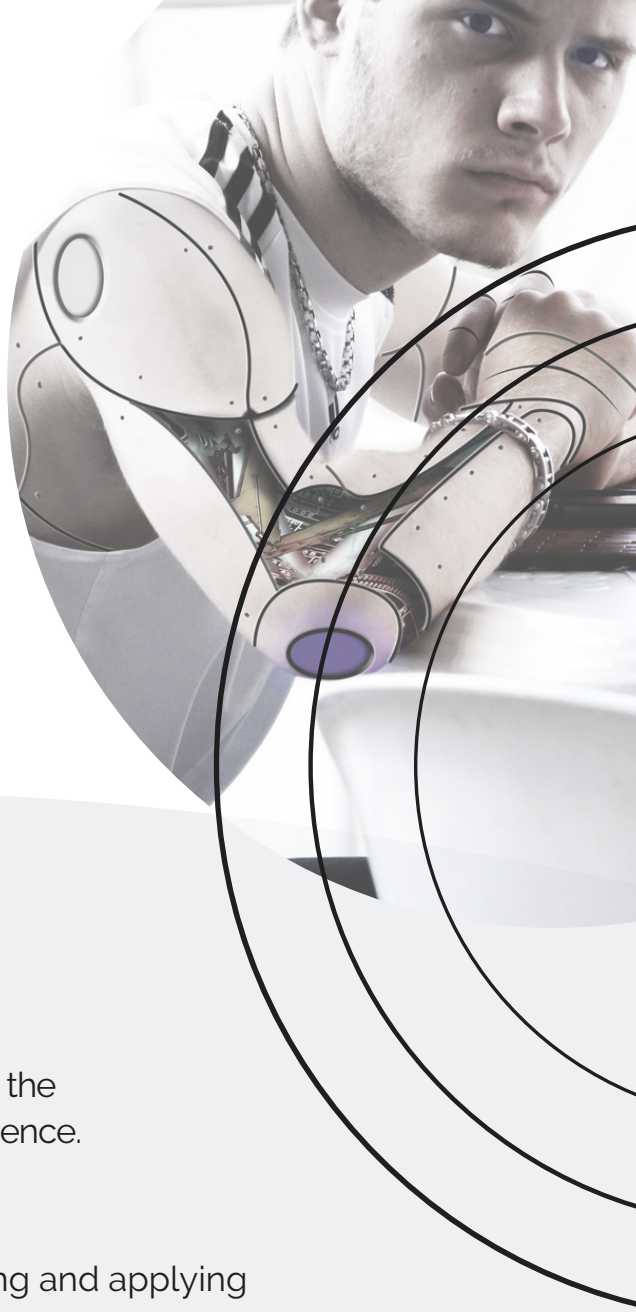
ADDRESSING POSSIBLE CONCERNS

Students (both IVET & CVET), academics and the institution are placed at the centre of the strategy. This will ensure that the much-needed human contact within an educational setting are retained. The AI technology constellation will act as a support tool.

The main concerns that are mostly associated with AI in education are:

- the ethical concerns related to the gathering, storage and analysis of personal data. – This will be addressed through robust user data protection policies in conjunction with technological solutions such as federated learning.

- the fear that academics will be replaced by the technology. – AI shall be used as a tool that will support the academics in their work.



FOCUS OF THE STRATEGY

The strategy is both inward- and outward- looking. The key focus of the strategy is a) to integrate AI into MCAST's operations as a support component and b) to provide AI solutions to MCAST, industry and society.

GOALS

01 MCAST students better prepared for an industry that includes AI.

02 MCAST students assisted and managed, with the support of AI, throughout their learning experience.

03 Lecturers more competent in understanding and applying AI in teaching, research and industry solutions.

ACHIEVING THE GOALS

To achieve the goals, AI shall be intrinsically embedded into MCAST's daily operations as a support decision making tool. Industry will play a key role in transforming MCAST's core business into an AI culture across all sectors of education and training.

These three main goals shall be achieved through a series of nine diverse initiatives that impact different aspects of the services provided by MCAST. The proposed AI initiatives will be a game changer for MCAST and its key stakeholders.

Each initiative has a number of deliverables associated with it to ensure that the key objective of the initiative will be brought to fruition. The deliverables are staggered over an implementation period of five years thus facilitating the success of these ambitious goals of this strategy. To complement these, additional deliverables are recommend for post 2025.

Initiative 1

Enhanced e-Learning Environments

Students further assisted and supported through intelligent personal virtual co-bots that monitor the individual student's activities and actions. This will help to motivate students in their learning trajectory. Additionally it will support the student towards achieving better performance by proposing an individualized study plan study time for different times of the day and established optimized assessment priorities.

Initiative 2

Personalized Learning through Smart Content

Development of an AI based suite that caters for the individual student's needs and provides a self paced learning environment with tutoring and support that can be provided outside of the classroom. The system provides optimized smart content that attunes to the students learning style and level. Furthermore, AI will work to allocate student time to other more valuable topics not yet in student's skill set. This system will also include AI-based career coaching tools.

Initiative 3

CPD in AI for Academics

Preparing academics for AI in their teaching and delivery methods through the development of innovative CPD programmes that train staff to endorse and utilize the latest and emerging AI technologies in their teaching and delivery settings.

Initiative 4

Intelligent Tutoring Systems

The application of AI based solutions to enhance in the creation of the most suitable lesson plans in accordance to the different learning abilities of the class. The robust system will be optimized according to the student attendance on the day in conjunction with their strengths and weaknesses. The system will propose suitable delivery methods for different topics.

Initiative 5

Simplification in Administration

Integration of AI within MCAST's core administrative functions to enhance its operation. AI based decisions will enable a more efficient use of resources while alleviating pressures on decision makers and administrative staff. Harmonized solutions can be integrated in various aspects of student management including timetabling, resources managment and data analytics.

Initiative 6

SMART Campus Buildings

An intelligent campus that uses machine learning to deliver a smarter and safer experience for students and staff. This will be achieved through Artificial Intelligent based smart building automation controllers that will be capable of adapting to user preferences, focused on improved user comfort, safety and enhanced energy performance.

Initiative 7

Alignment of LO's to Job Profiles

Enhancing the relevance of MCAST's programmes to industry by collaborating with external stakeholders to combine big data, data mining, data analytics and deep learning. To identify current and future trends in the job market and propose appropriate knowledge, skills and competences to programme managers and programme content developers.. Additionally, AI to be used to identify automation resistant skills to ensure future-proof graduates.

Initiative 8

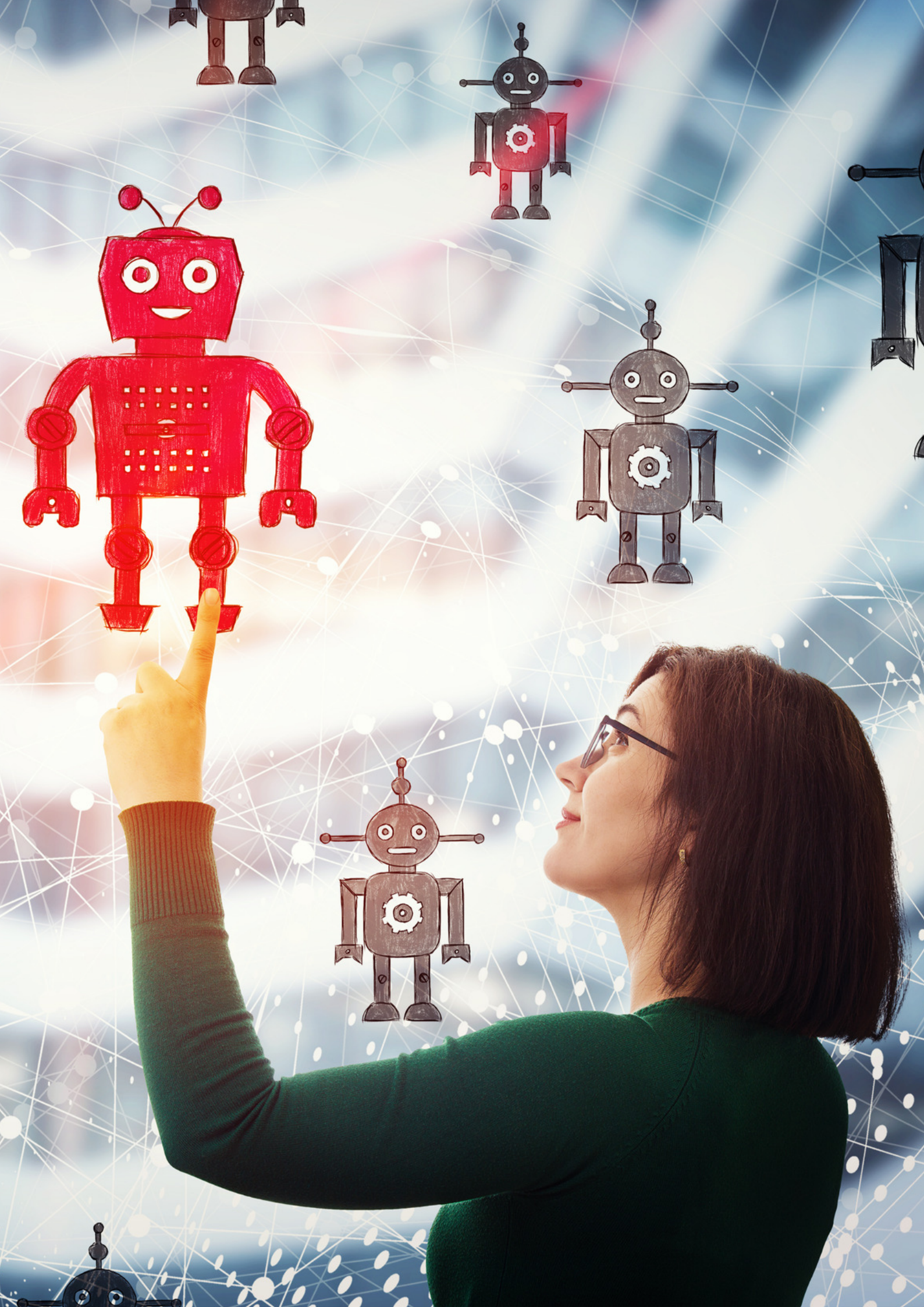
Curriculum & AI Specific Programmes & Projects

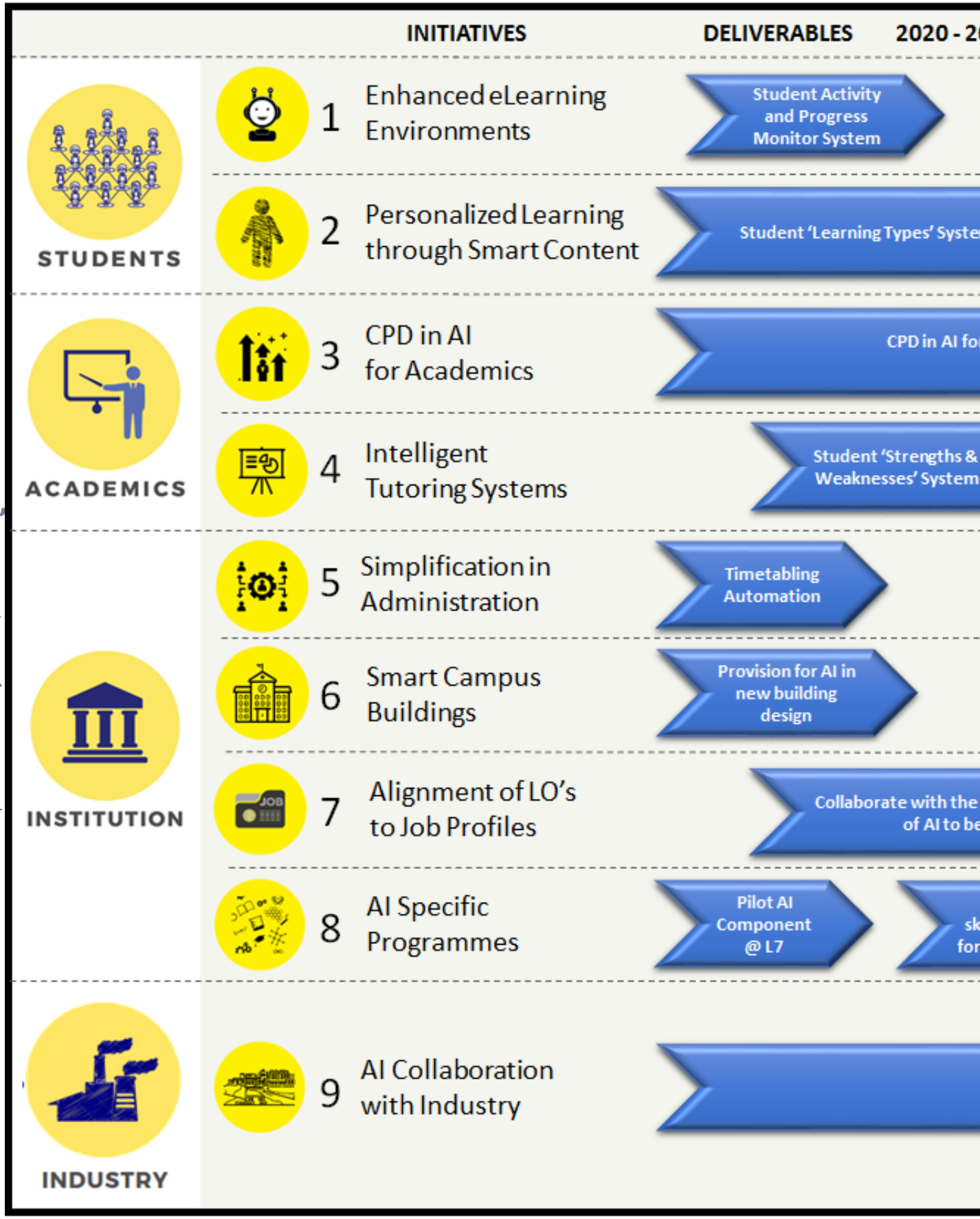
Preparing today's students for tomorrow's AI-augmented world. A learning component of AI to be introduced as a integral part of curricula across all levels to help the students appreciate how AI would impact their lives and provide them with an understanding of the ethical implications. Technical programmes with a strong focus on AI offered at higher level to motivate students and academics to research and develop AI further.

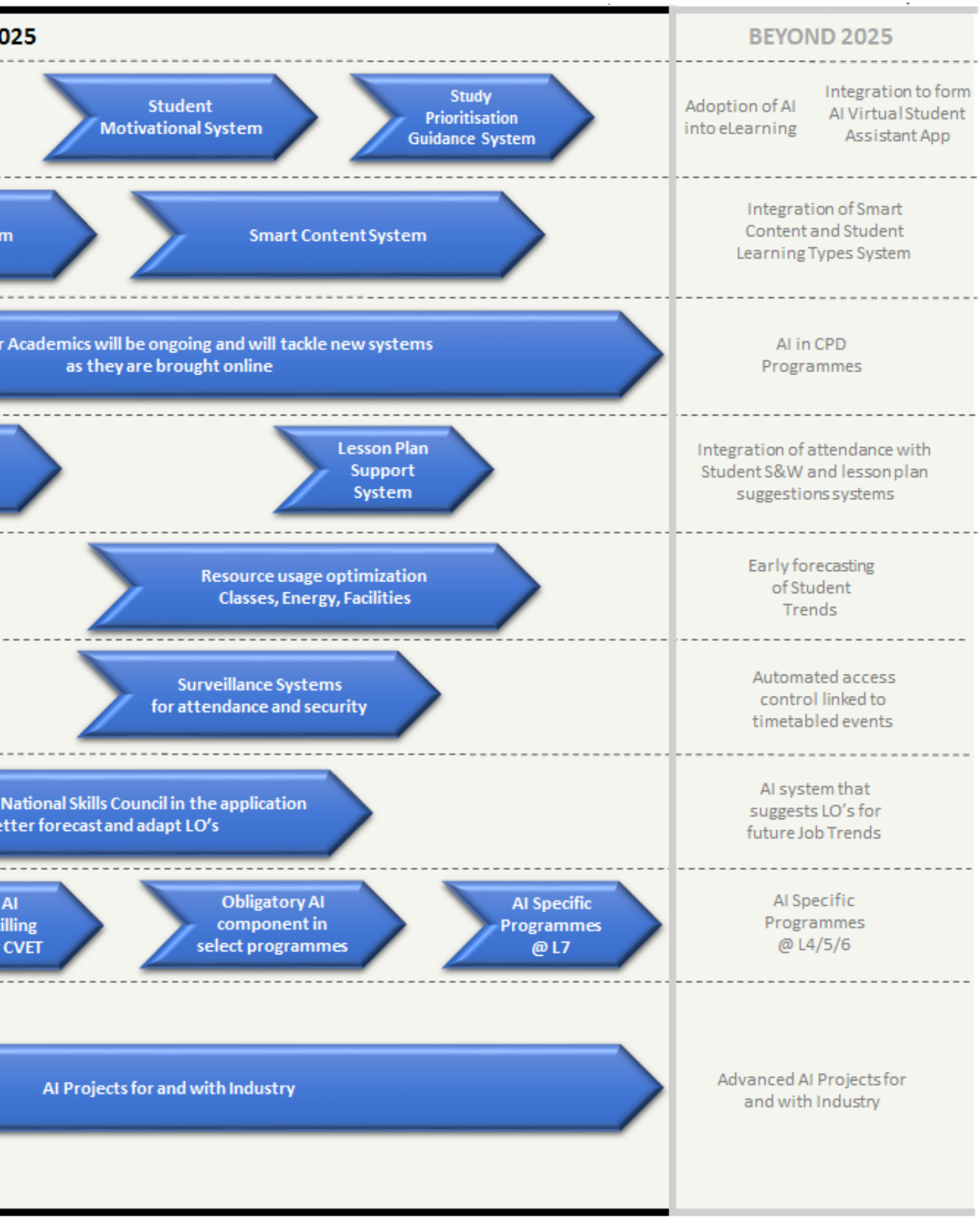
Initiative 9

AI Collaboration with Industry

On the brink of the next industrial revolution the local industry requires contextualized AI solutions to cope within the Industry 4.0 ecosystem. Through applied research and innovation in the field of AI, MCAST has the potential to provide a range of services and solutions to industry and society. Niche markets such as AI solutions for SMEs will be explored.




INITIATIVES
DELIVERABLES
2020 - 2
STUDENTS
1
Enhanced eLearning Environments
Student Activity and Progress Monitor System
2
Personalized Learning through Smart Content
Student 'Learning Types' Syste
ACADEMICS
3
CPD in AI for Academics
CPD in AI fo
4
Intelligent Tutoring Systems
Student 'Strengths & Weaknesses' System
INSTITUTION
5
Simplification in Administration
Timetabling Automation
6
Smart Campus Buildings
Provision for AI in new building design
7
Alignment of LO's to Job Profiles
Collaborate with the of AI to be
8
AI Specific Programmes
Pilot AI Component @ L7
INDUSTRY
9
AI Collaboration with Industry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BEYOND 2025
Student Motivational System
Study Prioritisation Guidance System
Adoption of AI into eLearning
Integration to form AI Virtual Student Assistant App
m
Smart Content System
Integration of Smart Content and Student Learning Types System
r Academics will be ongoing and will tackle new systems as they are brought online
AI in CPD Programmes
Lesson Plan Support System
Integration of attendance with Student S&W and lesson plan suggestions systems
Resource usage optimization Classes, Energy, Facilities
Early forecasting of Student Trends
Surveillance Systems for attendance and security
Automated access control linked to timetabled events
National Skills Council in the application
etter forecast and adapt LO's
AI system that suggests LO's for future Job Trends
AI
illing
CVET
Obligatory AI component in select programmes
AI Specific Programmes @ L7
AI Specific Programmes @ L4/5/6
AI Projects for and with Industry
Advanced AI Projects for and with Industry

AI @ MCAST

AI@IET

The Insitute of Engineering & Transport's Optimisation & Machine Learning Research Group (OPtiMaL) works with industry on research projects that involves big data analytics. The team create AI solutions with a focus on cost saving and revenue opportunities in the manufacturing industry and faster lifesaving diagnoses and clinical research in the life sciences industries.

During the process of drawing up the policy several internal key stakeholders were consulted. This was done to identify the current work that is being done at MCAST in relation to AI and to discuss their vision of AI at MCAST.

There are several initiatives related to AI which are localized and not connected. Students form IICT experience AI through a a number of specialized modules and projects. One such project, by an ICT Level 6 student, is the generation of an AI algorithm that summarizes texts. Lecturers at IET are working directly on AI projects through the Optimisation & Machine Learning Research Group (OptiMaL). The OptiMaL work with industry to provide solutions to real-world problems. Members of the team have worked to launch the Masters by Research in Optimisation and Machine Learning.

These initiatives augur well on the technical abilities of MCAST academic staff and help to ensure a solid foundation to building an MCAST future in AI.

AI@IICT

The institute of ICT has been working on projects involving AI for a number of years. Such projects, largely based on students dissertations, have involved using AI to perform automatic text summarization utilizing natural language processing techniques, use of machine learning techniques to predict card fraud, maximise betting profits and anomaly detection techniques. Computer Vision has been used in traffic sign recognition, traffic management, feature detection in images and automating car park management to name a few.

MCAST FAST FACTS

100,000m²

Total Area of Campuses

5

Campuses across Malta & Gozo

Full-time Students

Part-time Students

189

The number of Full-time Programmes offered within the six institutes.

76

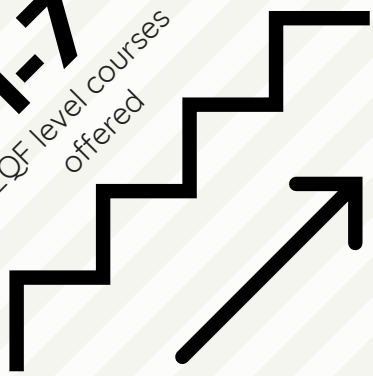
The number of different Student Nationalities

11,723

The number of Enrolled Students

1-7

EQF level courses offered



326

The Part-time courses offered.

768

The number of Lecturers at MCAST

255 Part-time Lecturers

513 Full-time Lecturers

[2018/2019 data]

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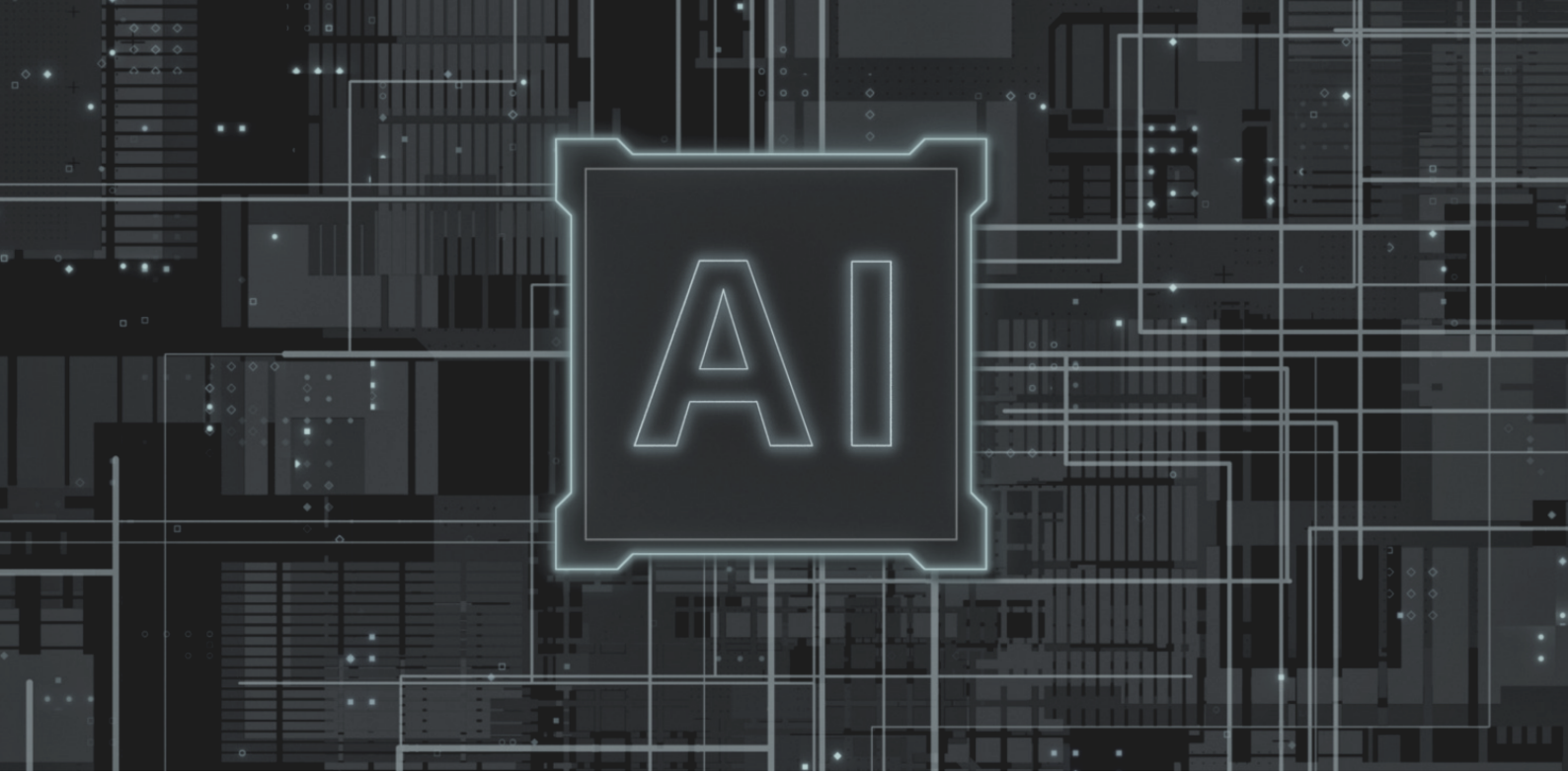

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