



Application-Driven Curriculum Design

Online Workshop - 5th October 2020

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Outline

- **Before we start.**
- **The changing face of education.**
- **Curricula design aims and objectives**
- **Curricula design & final year project [FYP]**
- **Final Year Project: Design example**
- **Robotics and Smart Technologies: MSc**
- **Modules' Details**
- **Conclusions.**



“Behind every smart city is a smart University”



Dr Simon Eassom – IBM



**“We must prepare students for a
future we can neither describe nor
predict”**



David Warlick

Before We Start

2020 1930's



Before We Start

Operation room 1950's



Operation room Now

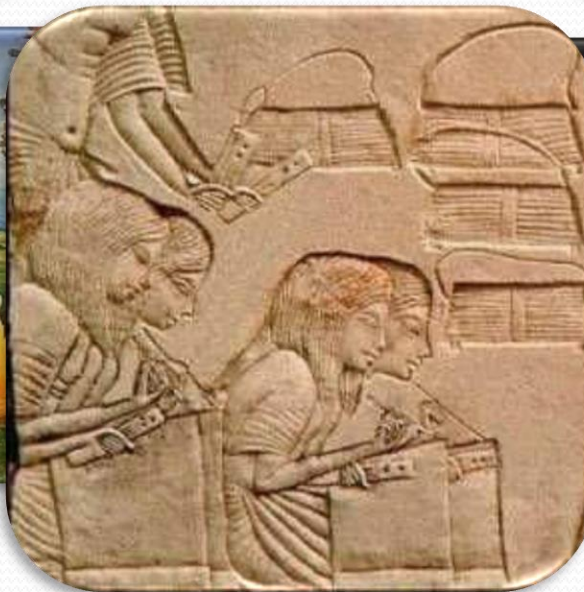
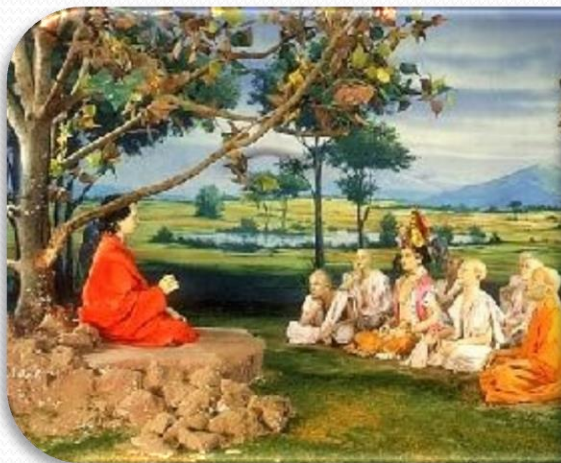


Before We Start



Any Change?

Still the same. In-
person, tied to
location, age,
proximity.



Before We Start



Industrial Revelations & its Effect on Education

Before We Start



Industrial Revelations & its Effect on Education

Before We Start



Industrial Revelations & its Effect on Education



Before We Start

The changing face of education

“The rapid acceleration of technological innovation is dramatically changing the nature of learning. The education system will change more in the next five years than it has in the last two hundred.”


Before We Start

The changing face of education



The industrial revolution begins. Mechanization of manufacturing with the introduction of steam and water power

1st
Revolution



Mass production assembly lines using electrical power

2nd
Revolution



Automated production using electronics, programmable logic controllers (PLC), IT systems and robotics

3rd
Revolution






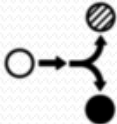








Autonomous decision making of cyber physical systems using machine learning through cloud technology

4th
Revolution

Before We Start

The changing face of education

	First Industrial Revolution	Fourth Industrial Revolution
Learning Objectives	Mastery of basic skills and knowledge (e.g., reading, math) 	Development of whole person across multiple intelligences (e.g., emotional, intellectual, social) 
Role of Educator	Expert 	Facilitator 
Learner Experience	'Factory model' - Passive, structured, directed, en masse 	'Custom model' - Active, self-directed, exploratory 
Target Age	K-12 	Lifelong learning 
Expertise	"Teacher knows best" 	"Anyone can teach" 
Access	Physical classroom 	Anytime, anywhere, any device 

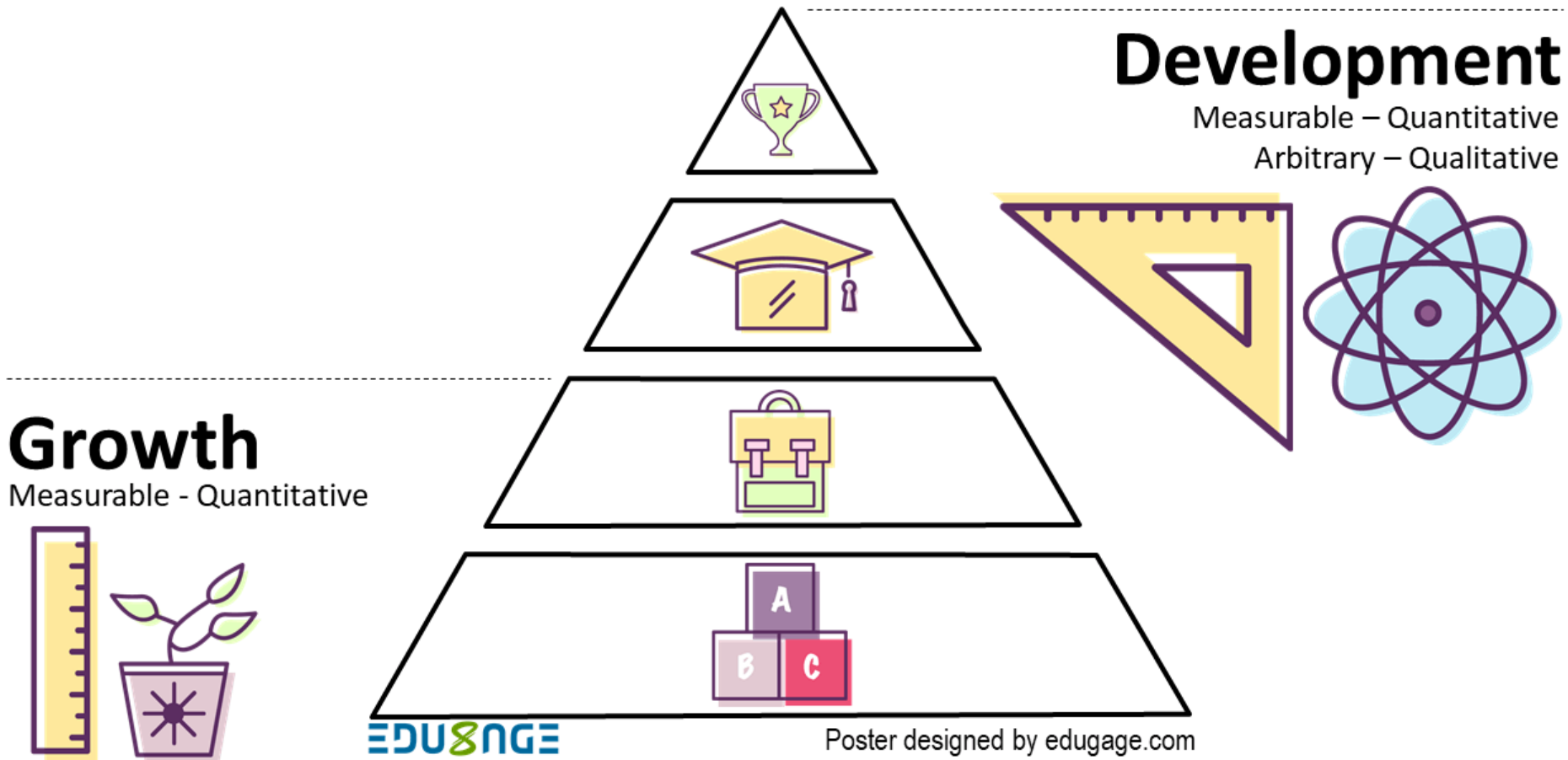
Before We Start

The changing face of education



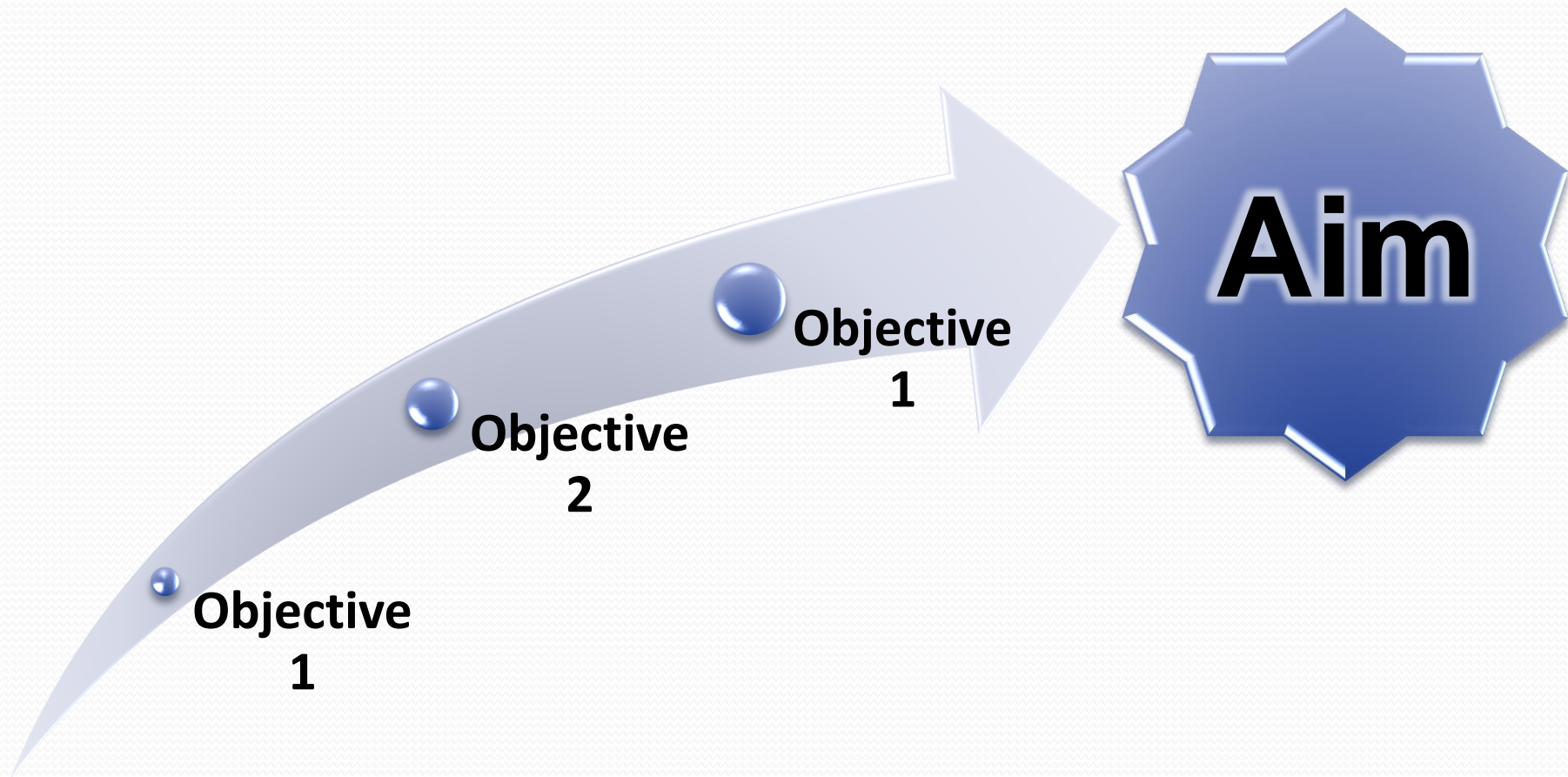
Jack Ma
Chinese business magnate

Curricula Design Aims and Objectives

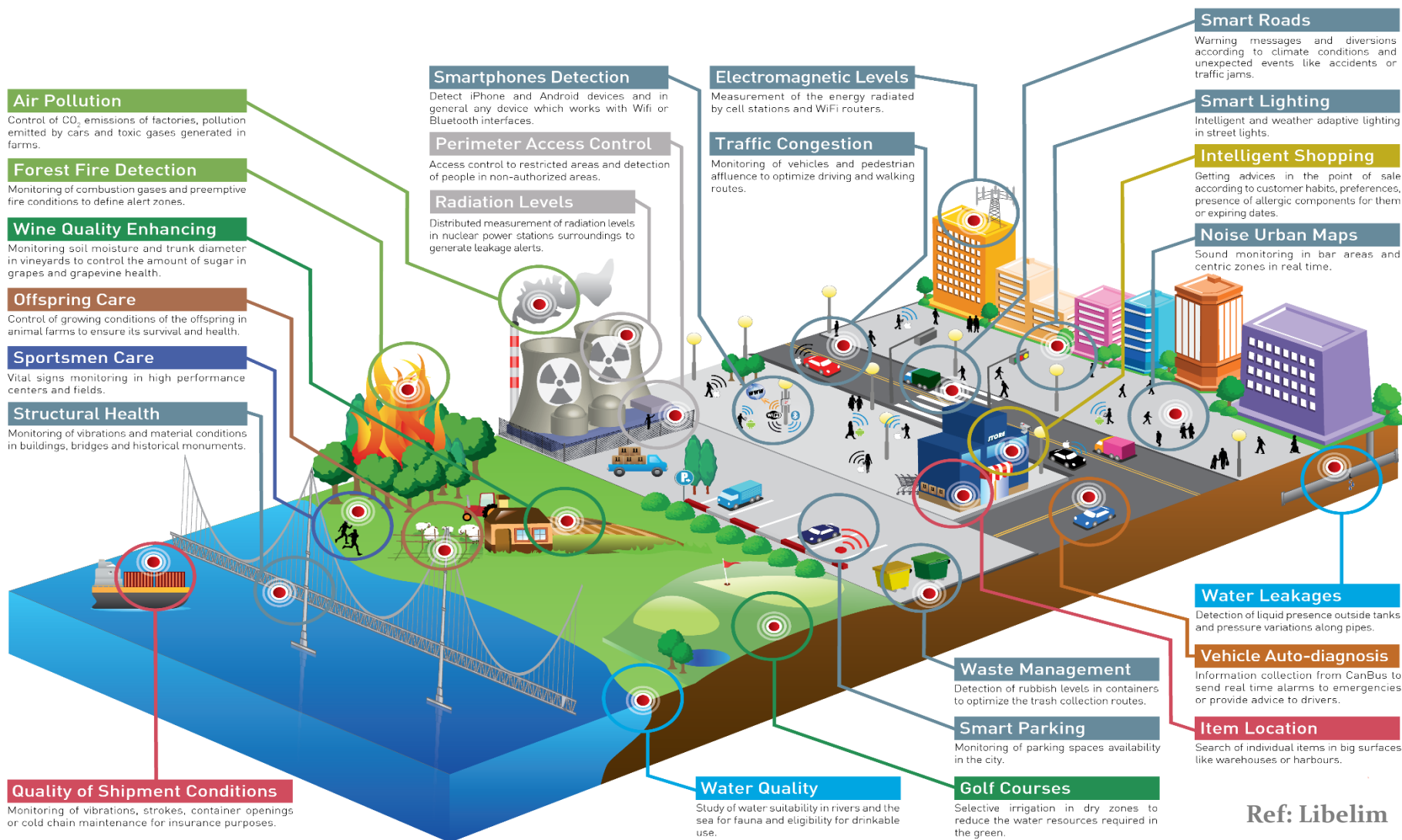




Curricula Design Aims and Objectives



Curricula Design & Final Year Project [FYP]



Curricula Design & Final Year Project [FYP]

Smart systems incorporate functions of:

- **Sensing & data acquisition,**
 - Acquiring data that describe the situation.
- **Data Processing & Analysis,**
 - In adaptive/predictive manner.
- **Decision Making & Control.**
 - Thus, performing smart actions.

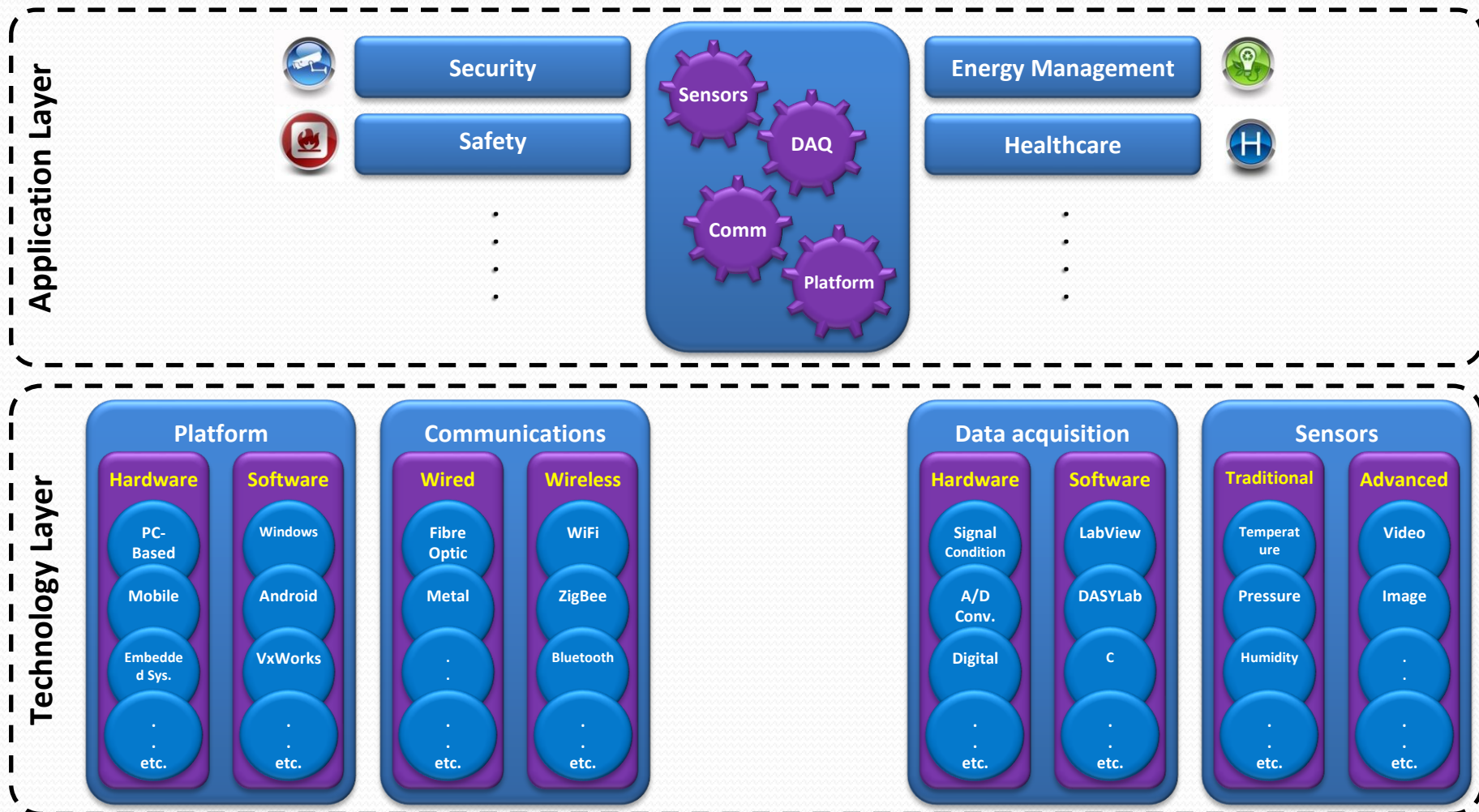


Communications

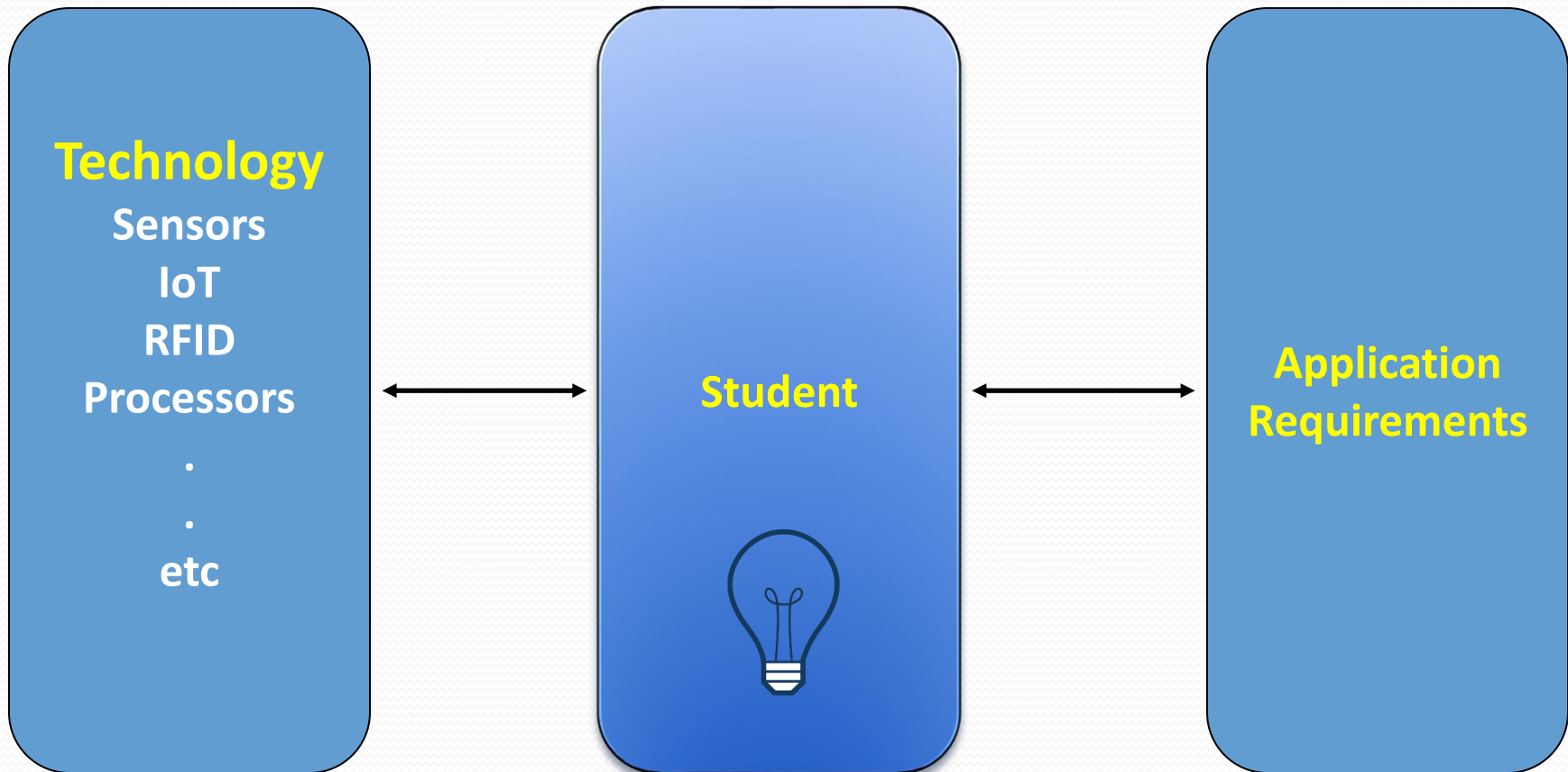


Power requirements

Final Year Project: Design example



Final Year Project: Design example



System Design: Note

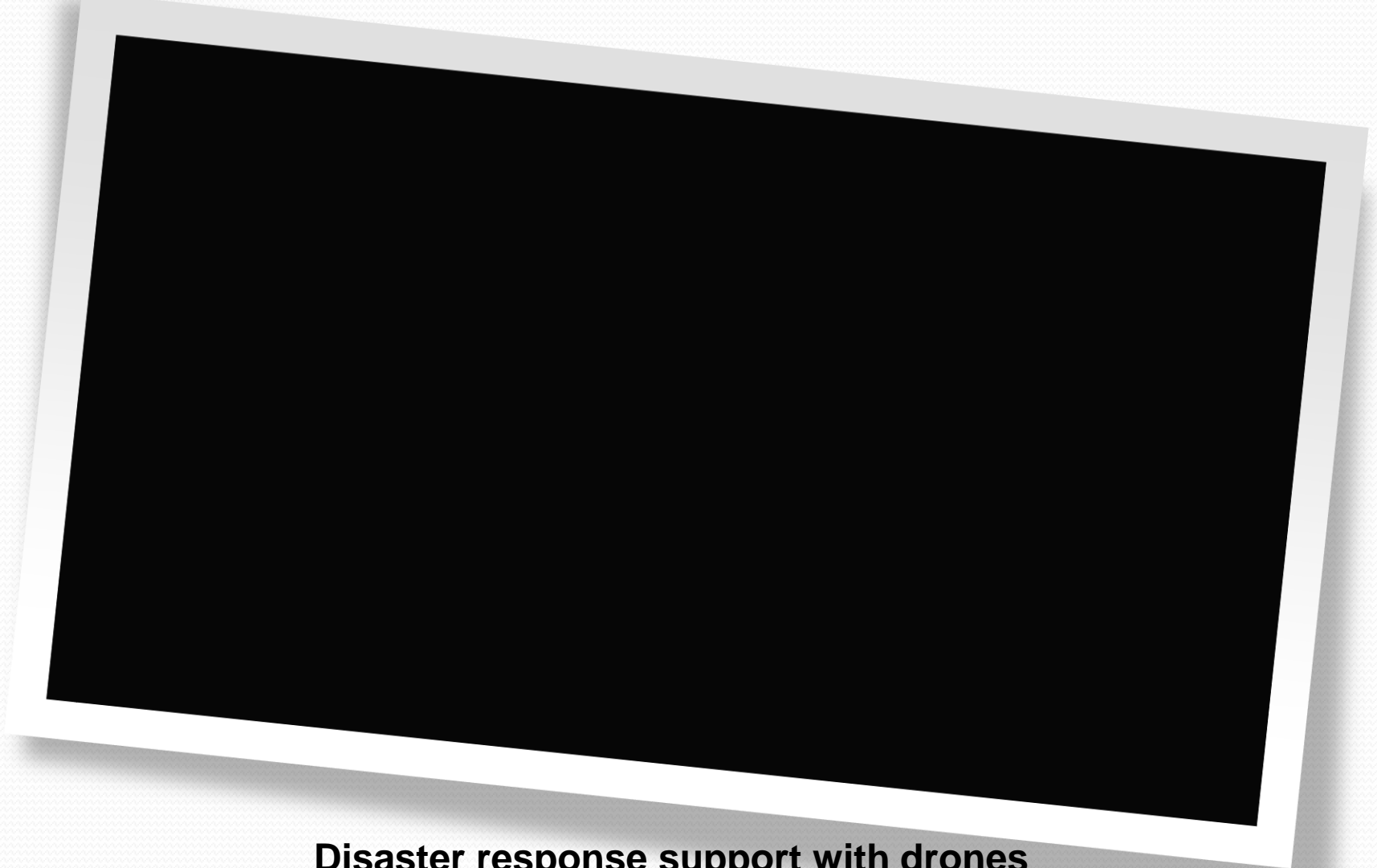


Which phone is smart?





Application: Practical example



Disaster response support with drones

Curricula Design: **Soft Skills**

The Top 5 Skills...

...British employers believe young people should have when entering the workforce are:

- 1 **Communication and literacy (59%)**
- 2 **Positive attitude (58%)**
- 3 **Self-management (48%)**
- 4 **People skills (45%)**
- 5 **Team working (41%)**

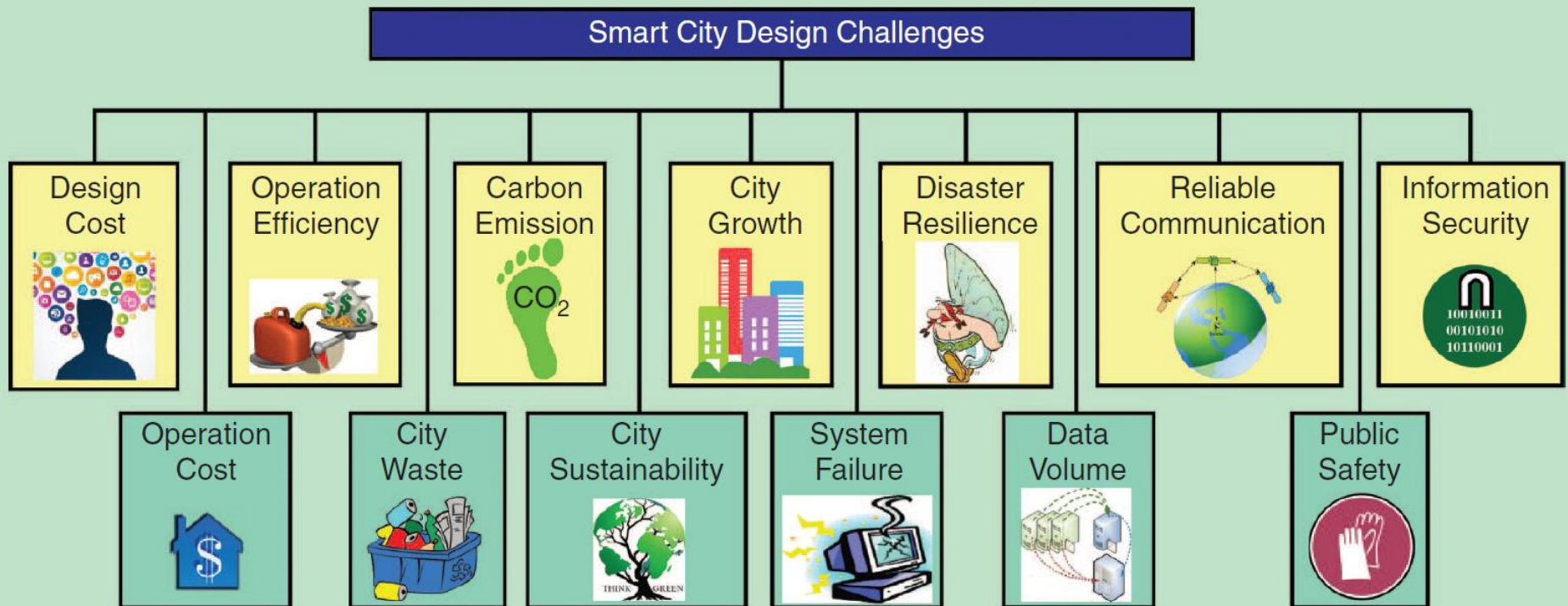
The Top 5 Skills...

...British employers believe young people lack the most when entering the workforce are:

- 1 **Self-management (50%)**
- 2 **Communication and literacy (44%)**
- 3 **People skills (35%)**
- 4 **Positive attitude (35%)**
- 5 **Confidence (35%)**

People skills are patterns of behaviour and interactions. Among people, it is an umbrella term for skills under three related set of abilities: personal effectiveness, interaction skills, and intercession skills

Curricula Design: Practical example



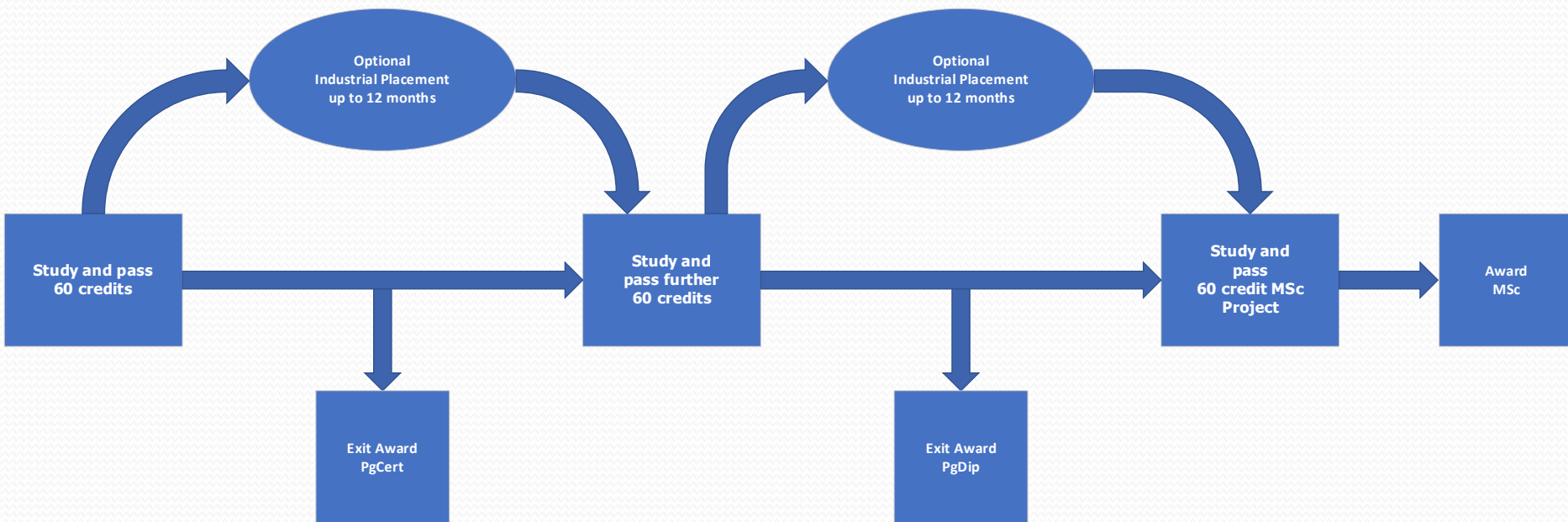
Some challenges in system design

Robotics and Smart Technologies: MSc

The specific aims of this Course are:

-
-
.

What is distinctive about this programme?



MSc Engineering Course Structure, incorporating points at which the optional industrial placement can be taken



Robotics and Smart Technologies: MSc

Course outcomes [1]

OUTCOME HEADINGS	PgC	PgD	MSc
Knowledge and Understanding	Demonstrate an understanding of knowledge which is at the forefront of Robotics and Smart Technologies.	Demonstrate an understanding of a significant body of knowledge which is at the forefront of Robotics and Smart Technologies.	Demonstrate an understanding of a significant body of knowledge which is at the forefront of Robotics and Smart Technologies.
Learning	Demonstrate the independent learning ability required to advance your knowledge and understanding within the engineering discipline.	Demonstrate the independent learning ability required to advance your knowledge and understanding within the engineering discipline and especially Robotics and Smart Technologies.	Demonstrate the independent learning ability required to advance your knowledge and understanding, and to develop new skills to a high level for continuing professional development.



Robotics and Smart Technologies: MSc

Course outcomes [2]

OUTCOME HEADINGS	PgC	PgD	MSc
Enquiry	Demonstrate a comprehensive understanding of methodologies and techniques, within engineering.	Demonstrate a comprehensive understanding and critical evaluation of methodologies and techniques, including Information Literacy, applicable to Robotics and Smart Technologies.	Demonstrate a comprehensive understanding and critical evaluation of methodologies and techniques, including Information Literacy, applicable to Robotics and Smart Technologies, where appropriate, propose new hypotheses.
Analysis	Demonstrate a critical awareness and evaluation of current research within engineering.	Demonstrate a critical awareness and evaluation of current research within engineering especially Robotics and Smart Technologies.	Demonstrate a critical awareness and evaluation of current research, advanced scholarship, contemporary problems and/or new insights, much of which is at, or informed by, the forefront of engineering.



Robotics and Smart Technologies: MSc

Course outcomes [3]

OUTCOME HEADINGS	PgC	PgD	MSc
Problem Solving	Evaluate issues systematically making sound judgements in predictable situations.	Evaluate complex issues systematically, making sound judgements in complex and unpredictable situations.	Evaluate complex issues both systematically and creatively, make sound judgements in the absence of complete data, and employ appropriate decision-making in complex and unpredictable situations.
Communication	Communicate their conclusions clearly to specialist and non-specialist audiences.	Communicate their conclusions clearly to specialist and non-specialist audiences.	Able to evaluate the audience and communicate your conclusions clearly and at an appropriate technical level.



Robotics and Smart Technologies: MSc

Course outcomes [4]

OUTCOME HEADINGS	PgC	PgD	MSc
Application	Demonstrate the application of knowledge in engineering.	Demonstrate the application of knowledge in engineering especially Robotics and Smart Technologies.	Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in engineering.
Reflection	Demonstrate the qualities and transferable skills necessary for continued study.	Demonstrate the qualities and transferable skills necessary for independent study and research. Show initiative, personal responsibility, self-direction and originality in tackling and solving problems.	Demonstrate the qualities and transferable skills necessary for employment Show initiative, personal responsibility, self-direction and originality in tackling and solving problems. Act autonomously in planning and implementing tasks at a professional or equivalent level.



Robotics and Smart Technologies: MSc

Course Structure

Sem 1 (FT) Year 1 (PT)	ENGG71000 The Professional Engineer (Masters) (15 Credits)	ELEC71090 Artificial Intelligence & Machine Learning (15 Credits)	TRAN71010 Autonomous Vehicles (15 Credits)	MECH71020 Engineering Design & Manufacture (15 Credits)
Sem 2 (FT) Year 2 (PT)	ELEC71020 Internet of Things Devices (15 Credits)	ELEC71120 Real-Time Embedded Systems & Control (15 Credits)	ELEC71100 Advanced Robotic Systems (15 Credits)	ENGG71010 Research Methods & Project Management (15 Credits)
Sem 3 (FT) Year 3 (PT)	ENGG71020 MSc Project (60 Credits)			

Robotics and Smart Technologies: MSc

Course Structure

Sem 1 (FT) Year 1 (PT)	ENGG71000 The Professional Engineer (Masters) (15 Credits)	ELEC71090 Artificial Intelligence & Machine Learning (15 Credits)	TRAN71010 Autonomous Vehicles (15 Credits)	MECH71020 Engineering Design & Manufacture (15 Credits)
Sem 2 (FT) Year 2 (PT)	ELEC71020 Internet of Things Devices (15 Credits)	ELEC71120 Real-Time Embedded Systems & Control (15 Credits)	ELEC71100 Advanced Robotic Systems (15 Credits)	ENGG71010 Research Methods & Project Management (15 Credits)
Sem 3 (FT) Year 3 (PT)	ENGG71020 MSc Project (60 Credits)			



Robotics and Smart Technologies: MSc

Course Structure

Options:

- No options

Potential Awards:

- **Postgraduate Certificate** - **60** credits from any of the taught modules listed above.
- **Postgraduate Diploma** - **120** credits from any of the taught modules listed above.
- **Master of Science** - **180** credits from any of the modules listed above including MSc Project.



Robotics and Smart Technologies: MSc

Assessment

- Most modules on the course are assessed by a mixture of **coursework** and **examination**.
- The **coursework** is designed to assess **practical skills** and **problem-solving** ability.
- The **examination** will focus more on assessing **knowledge** and **understanding**.
- Some modules will be teaching **practical applied skills** and so may be assessed **entirely by coursework** which might include **laboratory** work, **report writing** and **presentations**.
- **Majority** of the assessment for any module will be on **individual** work.



Robotics and Smart Technologies: **MSc**

Additional Information

- **Entry Requirements such as:**
 - **IELTS.**
 - **The required qualifications to join this course.**
 - **Advanced Prior Learning (APL) or Advanced Prior Experiential Learning (APEL) .**
- **Disability Statement.**



Robotics and Smart Technologies: MSc

Modules' Details

Modules' Descriptors:

<u>ENGG71000</u>	<u>The Professional Engineer</u>
<u>ELEC71090</u>	<u>Artificial Intelligence & Machine Learning</u>
<u>TRAN71010</u>	<u>Autonomous Vehicles</u>
<u>MECH71020</u>	<u>Engineering Design & Manufacture</u>
<u>ELEC71020</u>	<u>Internet of Things Devices</u>
<u>ELEC71120</u>	<u>Real-Time Embedded Systems & Control</u>
<u>ELEC71100</u>	<u>Advanced Robotic Systems</u>
<u>ENGG71010</u>	<u>Research Methods & Project Management</u>
<u>ENGG71020</u>	<u>MSc Project</u>



Robotics and Smart Technologies: **MSc**

Additional Information

Modules Descriptors Link

Course Handbook Sample

Staffordshire University: Students' engagement

 Reply  Reply All  Forward

Tue 24/10/2017 17:36



@staffs.ac.uk <do-not-reply@bl

All MSc Awards: Digital Champions

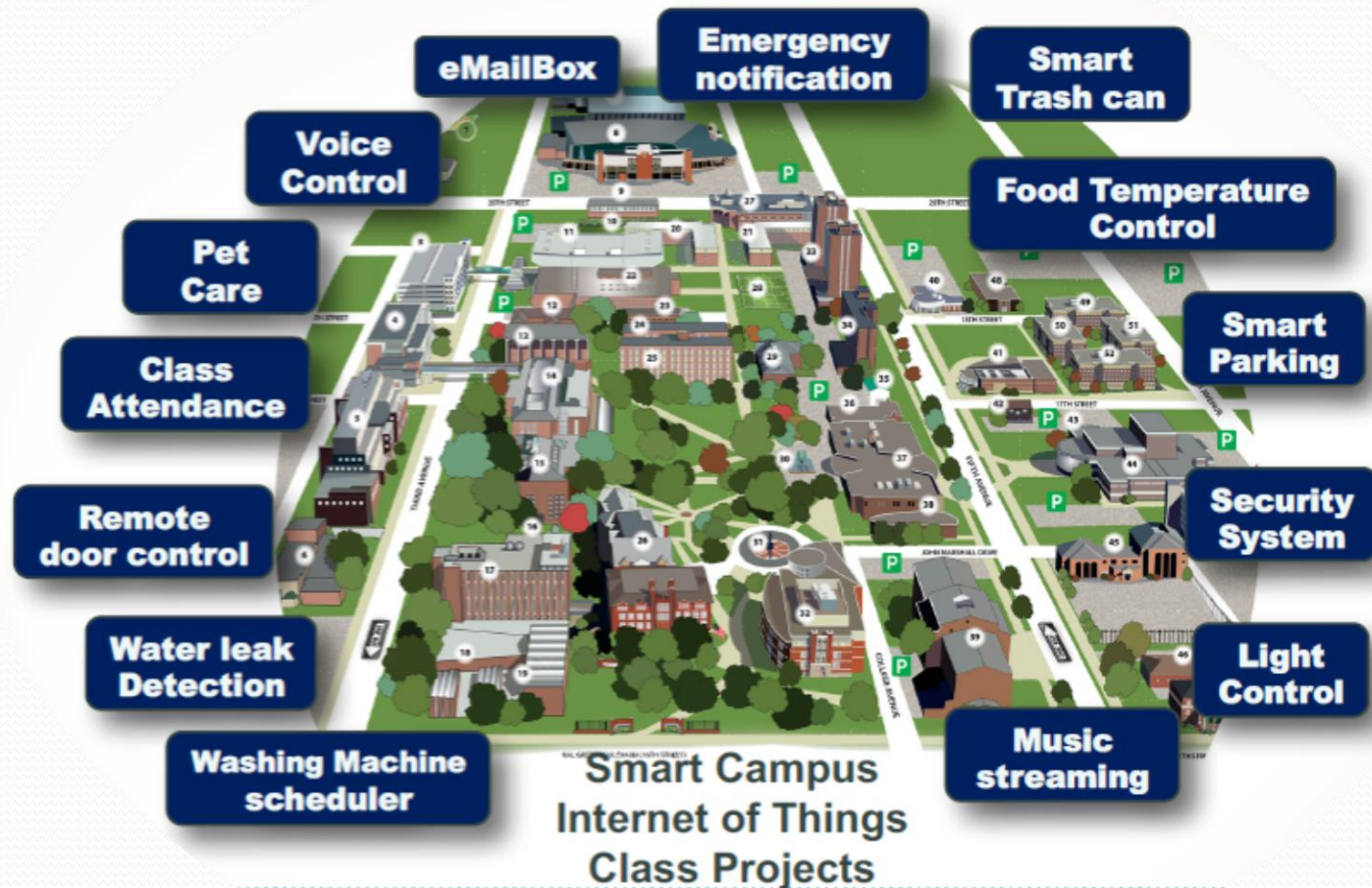
To

The University are looking to recruit a team of enthusiastic, passionate Student Digital Champions to work collaboratively with each other, Digital Services and with the wider university. This opportunity is open to all students at Staffordshire, we want to encourage a range of viewpoints and experiences, so welcome applications from all disciplines. A key part of our "Connected University" strategy is to put Staffordshire at the forefront of its use of technology and the digital skills of both its staff and students. You might be a magician with Microsoft, adept with Adobe, a wizard with Wordpress, formidable with Flashback, brilliant with Blackboard, a queen of Qualtrics, legendary with LinkedIn, spectacular on Skype, or just dynamite with data.

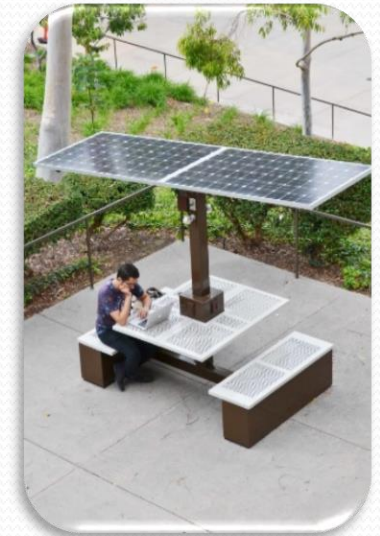
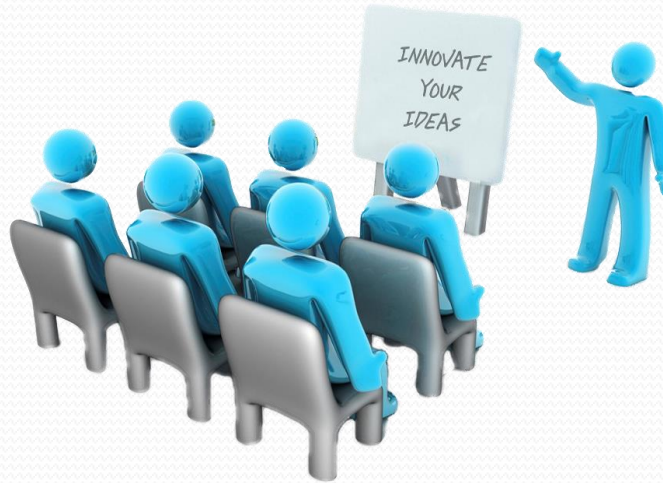
This sort of opportunity is often ignored by engineering students as 'we are too busy' but we would love to see engineers getting involved. So if you are excellent at engineering software why not get involved and GET PAID FOR YOUR SUPPORT.

Apply through <https://www.unitemps.com/Search/JobDetails/16161>

Marshall University: Example



Student/staff Innovation & Entrepreneurship





Smart Systems: Opportunities

Partners Universities Curricula discussions

Co-funded by the
Erasmus+ Programme
of the European Union



ELEGANT

Enhancing Teaching, Learning and Graduate Employability
through University-Enterprise Cooperation



Thank You

