Virtual Taster Event

Talk: How far will technology take us?

Welcome to Worcester Business School

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WORCESTER BUSINESS SCHOOL

University of Worcester

THE HIVE

Europe's First University
and Public Library

Artificial Intelligence

What is artificial intelligence?

"the term used to describe a machine's ability to

simulate **human intelligence**"

Business Insider (2019) *Artificial Intelligence News*. Available at: https://www.businessinsider.com/artificial-intelligence?r=US&IR=T (Accessed: 9 January 2021).

What is artificial intelligence?

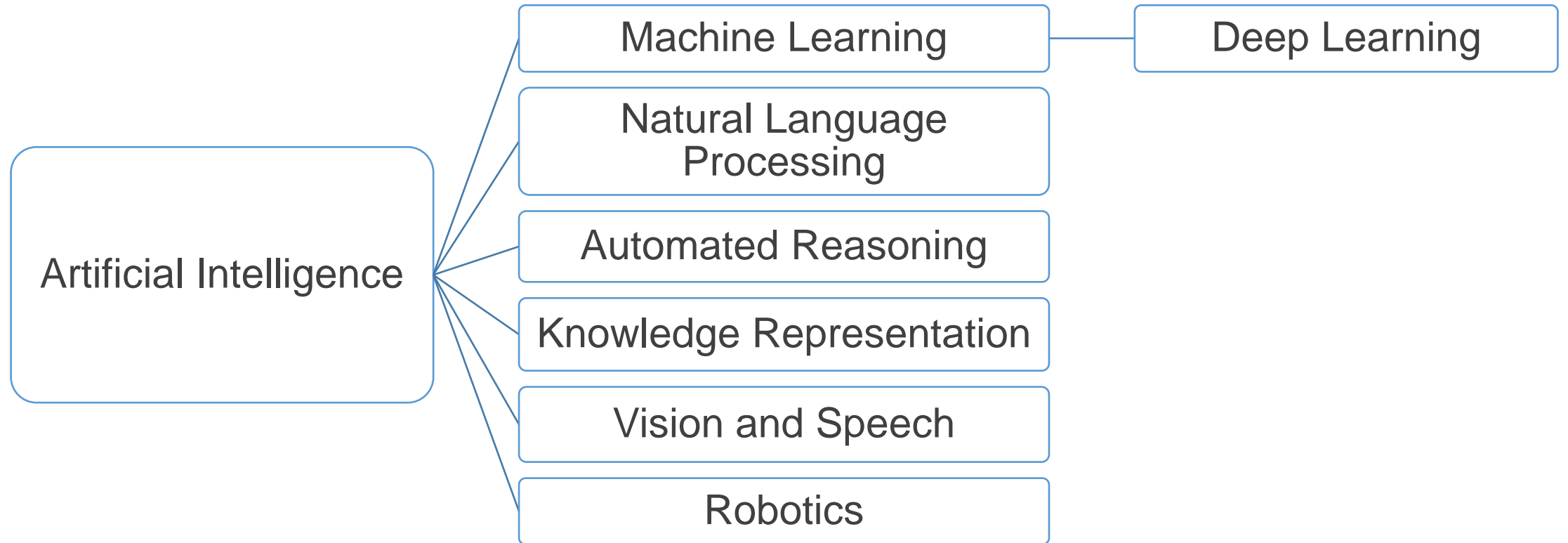"any code, technique or algorithm that enables machines to mimic, develop and demonstrate human **cognition or behaviour**."

Ghofrane, A. (2020) *How can machines think? Machine learning from scratch*. Available at: https://laabidigh.medium.com/how-can-machines-think-machine-learning-from-scratch-c554e041e88c (Accessed: 10 January 2021).

# History of artificial intelligence

- Academic concept in 1950 by Alan Turing after 'The Bombe' broke the Enigma code.

- In his article 'Computing Machinery and Intelligence' he discussed how to create and test the intelligence of machines.

- Focus on cognitive, emotional and social intelligence.

- The term 'Artificial Intelligence' was first used in 1955 by Marvin Minsky and John McCarthy.

Haenlein, M. and Kaplan, A. (2019) 'A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence', *California Management Review*, 61(4), pp. 5-14.

Branches of artificial intelligence

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                                      ┌─────────────────────────┐      ┌─────────────────────────┐
                                      │    Machine Learning     │──────│     Deep Learning       │
                                      └─────────────────────────┘      └─────────────────────────┘
                                      ┌─────────────────────────┐
                                      │    Natural Language     │
                                      │      Processing         │
                                      └─────────────────────────┘
  ┌─────────────────────────┐         ┌─────────────────────────┐
  │                         │         │   Automated Reasoning   │
  │  Artificial Intelligence│─────────└─────────────────────────┘
  │                         │         ┌─────────────────────────┐
  └─────────────────────────┘         │ Knowledge Representation│
                                      └─────────────────────────┘
                                      ┌─────────────────────────┐
                                      │    Vision and Speech    │
                                      └─────────────────────────┘
                                      ┌─────────────────────────┐
                                      │        Robotics         │
                                      └─────────────────────────┘
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Russell, S. and Norvig, P. (2020) *Artificial Intelligence*. Berkeley; Pearson Education.
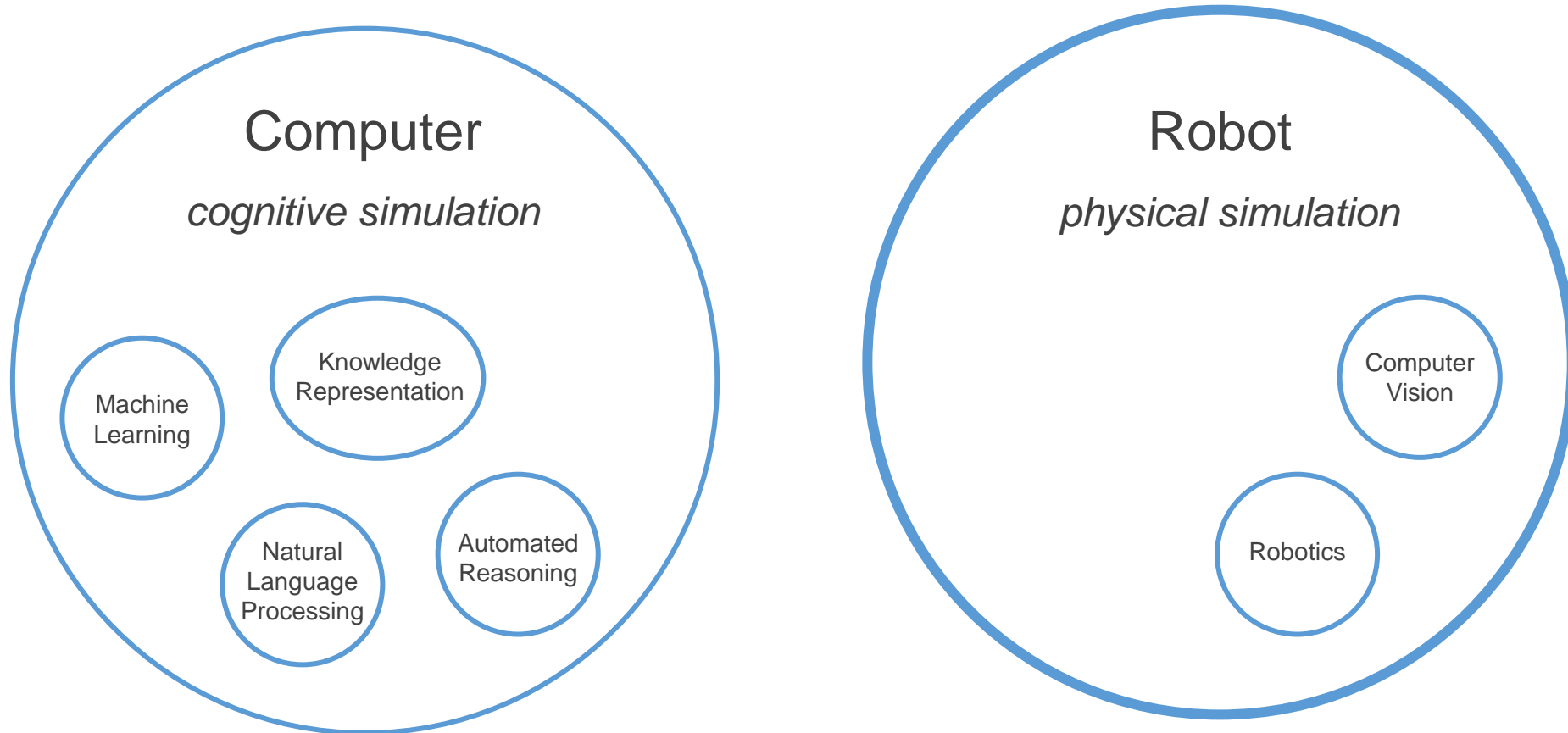
The Turing Test

- Used as a benchmark to measure machine intelligence.
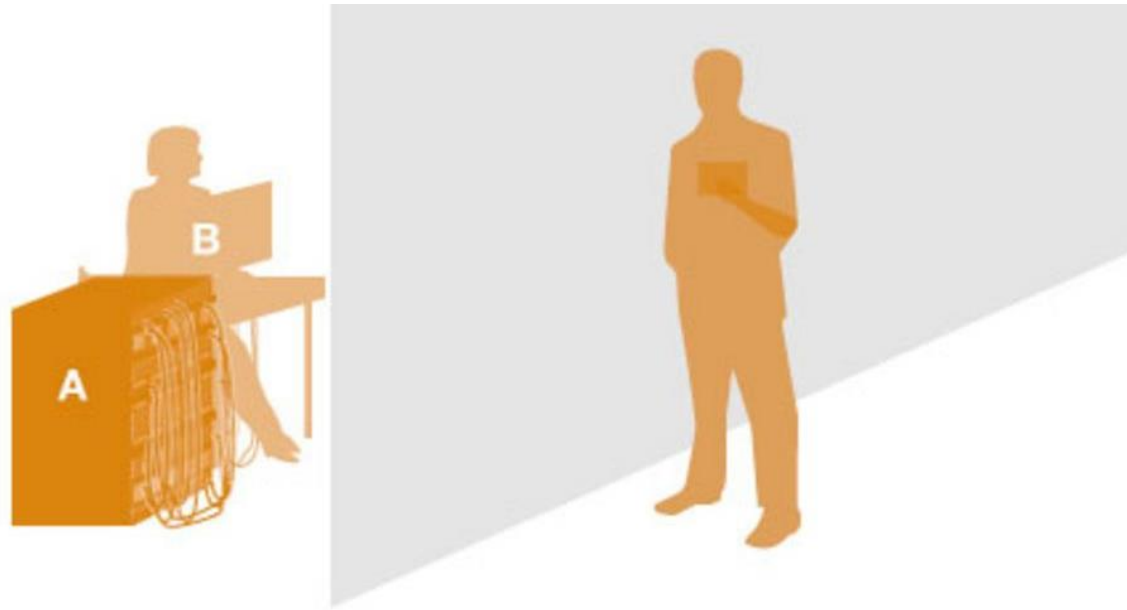
The machine is intelligent if a human is unable to distinguish between the machine and human.

BBC (2012) *Alan Turing: The experiment that shaped artificial intelligence*. Available at: https://www.bbc.co.uk/news/technology-18475646 (Accessed: 8 January 2021).
Haenlein, M. and Kaplan, A. (2019) 'A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence', *California Management Review*, 61(4), pp. 5-14.

Passing the Turing Test

Computer

cognitive simulation

Machine Learning

Knowledge Representation

Natural Language Processing

Automated Reasoning

Robot

physical simulation

Computer Vision

Robotics

Russell, S. and Norvig, P. (2020) *Artificial Intelligence*. Berkeley; Pearson Education.

Cognitive functions

Machine Learning

↓

learn and evolve based on experience

Knowledge Representation

↓

store what is known and heard

Automated Reasoning

↓

answer questions and draw conclusions

Natural Language Processing

↓

communicate in human language

Russell, S. and Norvig, P. (2020) *Artificial Intelligence*. Berkeley; Pearson Education.

Physical simulation

Computer Vision   **Robotics**

understand images and
speech recognition to
perceive the world

manipulate
objects and
move about

Russell, S. and Norvig, P. (2020) *Artificial Intelligence*. Berkeley; Pearson Education.

Machine learning and deep learning

**Supervised learning
e.g. human intervention**

**Learn from structured,
labelled data**

Artificial intelligence

Machine learning

Deep learning

**Unsupervised learning
e.g. without human intervention**

**Learn from unstructured,
unlabelled data**

IBM Cloud Education (2020) *Deep Learning.* Available at: https://www.ibm.com/cloud/learn/deep-learning (Accessed: 9 January 2021).
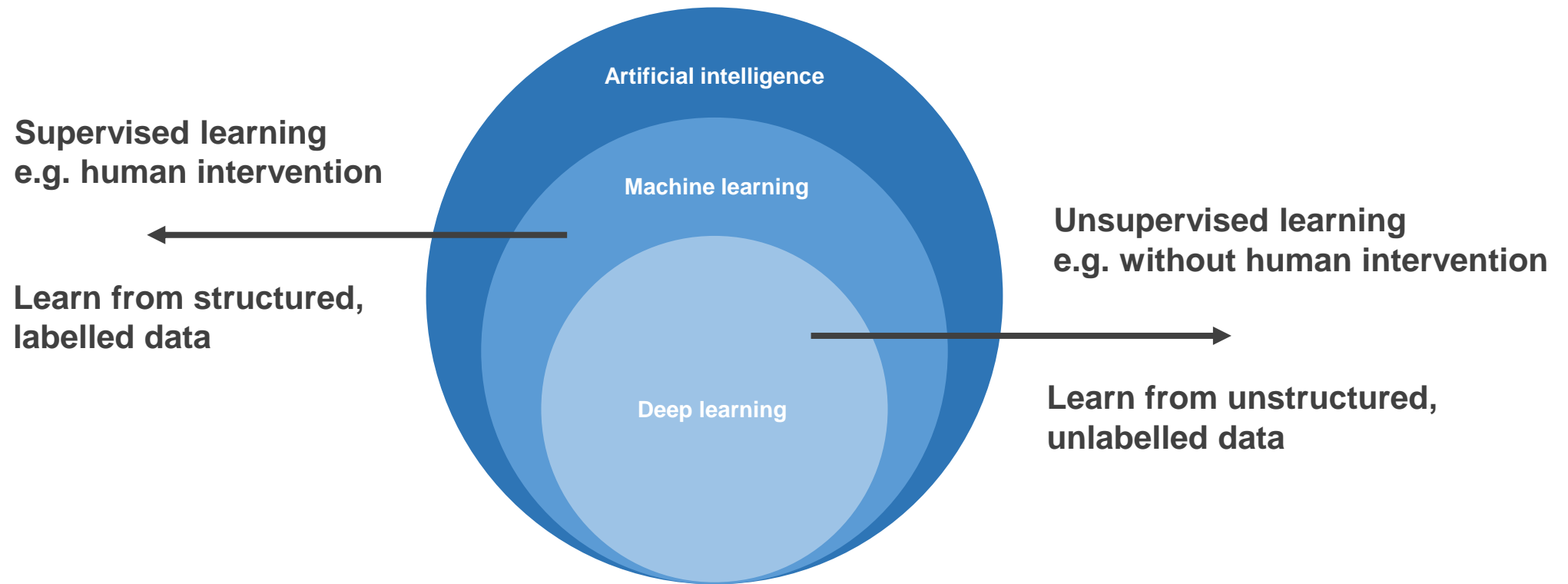
Categories of artificial intelligence
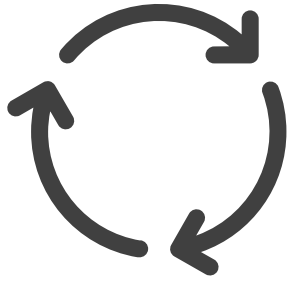
Weak/Narrow

focuses on one
particular problem or
task domain

Strong/General

any task or problem
in any domain

Super

surpass the capacity
of human intelligence
and ability

Walch, K. (2019) *Rethinking Weak Vs. Strong AI.* Available at: https://www.forbes.com/sites/cognitiveworld/2019/10/04/rethinking-weak-vs-strong-ai/?sh=c508f616da3f
(Accessed: 9 January 2021).

AI in everyday life…

Online Shopping

Search Engines

Smart Homes

Cars

Health

Cybersecurity

Fake News
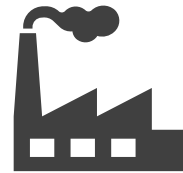
Manufacturing

Natural Disasters

Food

European Parliament (2020) *What is artificial intelligence and how is it used?* Available at: https://www.europarl.europa.eu/news/en/headlines/society/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used#:~:text=Artificial%20intelligence%20is%20widely%20used,%2C%20planning%20inventory%2C%20logistics%20etc. (Accessed: 10 January 2021).

Apple, Amazon and Google

- Virtual personal assistants use **speech recognition**, **natural language processing** and **deep learning** to:

Convert speech to text and text to speech

Understand questions or requests

Learn and evolve

European Commission (2018) *The rise of Virtual Personal Assistants.* Available at: https://ec.europa.eu/growth/tools-databases/dem/monitor/content/rise-virtual-personal-assistants (Accessed: 9 January 2021).

Netflix

- The company uses **machine learning** to:
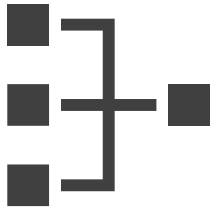
Provide recommendations

Identify characteristics of successful content

Find new members

Netflix (2020) *Machine Learning.* Available at: https://research.netflix.com/research-area/machine-learning (Accessed: 9 January 2021).
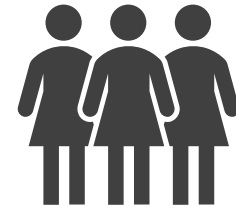
Future of
Artificial Intelligence

…
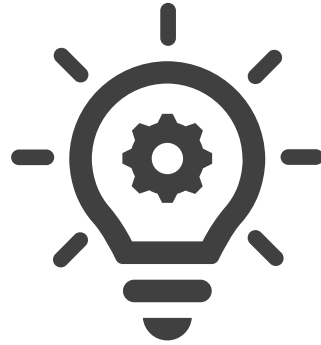
Imagine a world where your **driverless car** could take family members to **different** locations, whilst you are working.

No need for a <u>fixed parking location or multiple cars</u>.

Emerald Publishing (2020) *Driverless cars and their impact on our future.* Available at: <u>https://www.emeraldgrouppublishing.com/topics/blog/driverless-cars-and-their-impact-our-future</u> (Accessed: 10 January 2021).

...
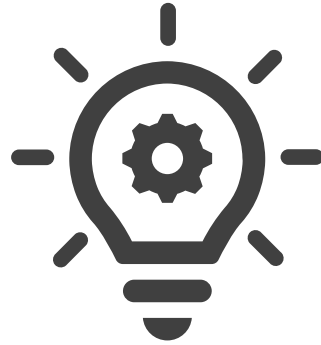
Imagine a world where your **digital assistant** can **call businesses** on your behalf to make appointments or reservations.

Google (2018) *Google Duplex: An AI System for Accomplishing Real-World Tasks Over the Phone.* Available at: https://ai.googleblog.com/2018/05/duplex-ai-system-for-natural-conversation.html (Accessed: 10 January 2021).

Brain Machine Interface (BMI)

What is brain machine interface?

- Brain machine interface (BMI) is a direct communication pathway between the brain and an external device.

- Research by Humphrey *et al*. (1970) and Fetz (1969) define present-day BMI.

Measures brain activity
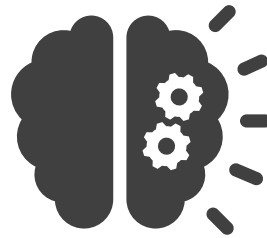
Extracts features

Converts into outputs

Krames, E., Peckham, H. and Rezai, R. (2018) *Neuromodulation: Comprehensive Textbook of Principles, Technologies, and Therapies*. Massachusetts: Academic Press.

Moxon, K. and Foffani, G. (2015) 'Brain-Machine Interfaces beyond Neuroprosthetics', *Neuron*, 86(1), pp. 55-67.

How is brain activity measured?

- Electrodes are used to capture electrical signals sent by the brain. They can be placed invasively within or on the surface of the cortex, or noninvasively on the surface of the scalp.

Visual Cortex

"Processes visual information from our eyes"

Auditory Cortex

"Assists with the perception and interpretation of sound"

Somatosensory Cortex

"Helps process sense of touch"

Motor Cortex

"Responsible for planning and executing motor movements"

Neuralink (2020) *Engineering with the Brain.* Available at: https://neuralink.com/applications (Accessed: 12 December 2020).

Application of Brain Machine Interface

History of brain machine interface technology

- Traditionally been used in healthcare to help people with motor disabilities have greater control over their environment.

- Used for prevention, detection, diagnosis, rehabilitation and restoration.

- For long-term disabilities, BMI is designed to replace, restore, enhance, supplement or improve human functions.

- Can give people an enhanced quality of life.

Krames, E., Peckham, H. and Rezai, R. (2018) *Neuromodulation: Comprehensive Textbook of Principles, Technologies, and Therapies*. Massachusetts: Academic Press.
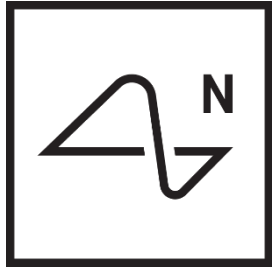
The American Society of Mechanical Engineers (2017) *Brain-Computer Interface Hold a Promising Future*. Available at: https://aabme.asme.org/posts/brain-computer-interface-the-most-investigated-areas-in-health-care-hold-a-promising-future (Accessed: 12 December 2020).

Brain machine interfaces in use…

- **Electroencephalography (EEG)** – a test which measures the electrical activity of a brain. It is usually non-invasive as electrodes are placed on the scalp and a computer is used to record the signals from the brain.

- **Cochlear Implants** – surgically implanted neuroprosthetic device that provides a sense of sound to people who are profoundly deaf or severely hard-of-hearing.

Rogers, S. (2019) *Brain-Computer Technology Is Accelerating. Will We Soon Be Typing With Our Minds?* Available at: https://www.forbes.com/sites/solrogers/2019/09/25/brain-computer-technology-is-accelerating-will-we-soon-be-typing-with-our-minds/?sh=241bb298483c (Accessed: 13 December 2020).

Future of Brain Machine Interface

The future of brain machine interface (BMI)

Neuralink

(founded by Elon Musk)

Facebook

(founded by Mark Zuckerberg)

Facebook (2020) *Imagining a new interface: Hands-free communication without saying a word.* Available at: https://tech.fb.com/imagining-a-new-interface-hands-free-communication-without-saying-a-word/ (Accessed: 12 December 2020).

Neuralink (2020) *Breakthrough Technology for the Brain.* Available at: https://neuralink.com/ (Accessed: 12 December 2020).

What is Neuralink?

- Neuralink was first introduced by Elon Musk in 2019.

- Designing a neural implant with 1,024 channels of communication.

- Allows people to control a computer or mobile device anywhere they go.

- For people with neurological injury or disease and for healthy individuals who want to enhance themselves.

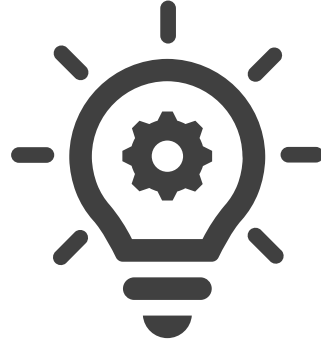- Live demonstration with Gertrude and Dorothy the pig in August 2020.

Neuralink (2020) *Breakthrough Technology for the Brain*. Available at: https://neuralink.com/ (Accessed: 12 December 2020).

Future of Neuralink

Other Abilities

- Connect the brain to the cloud

- Save and replay memories

- Summons a Tesla car

- Play video games

- Download new information

Neuralink (2020) *Neuralink Progress Update, Summer 2020.* Available at: https://www.youtube.com/watch?v=DVvmgjBL74w (Accessed: 12 December 2020).

...

Imagine a world where you can **control** your PowerPoint presentation or **write** an assessment by <u>using only your brain</u>

Course Talk and Q&A

Computing and business degrees, portfolio structure and module options

University of Worcester
www.worcester.ac.uk

Computing Courses

- Computing Foundation Year

- BSc (Hons) Computing

- BA/BSc (Hons) Computing and Education Studies

BSc (Hons) Computing Course Structure

Year 1	Web Technologies	Programming	Foundations of Computing	Creative Computing Information Systems
Year 2	Systems Analysis & Design	Distributed Systems OR OO Design & Development OR Web App Development	Option(s)	Option(s)

Optional 1-Year Placement or Year Abroad

Year 3	Project	Nature of Computing	Option(s)	Option(s)

Level 5

modules currently include:

- Web Application Development
- Data Mining
- Game Design and Engineering
- Robotics
- Advanced Creative Computing
- Mobile Application Development
- Digital Content Systems and Ecommerce
- Social Commerce
- Cultivating the Entrepreneurial Mind-set
- New Venture Formation

Level 6

modules currently include:

- Applied Software Engineering 3
- Machine Learning
- Internet of Things
- Advanced Web Application Development
- Advanced Game Design and Engineering
- Managing Cyber Risks
- Cyber Security
- Digital and Social Media Marketing
- Coaching and Mentoring
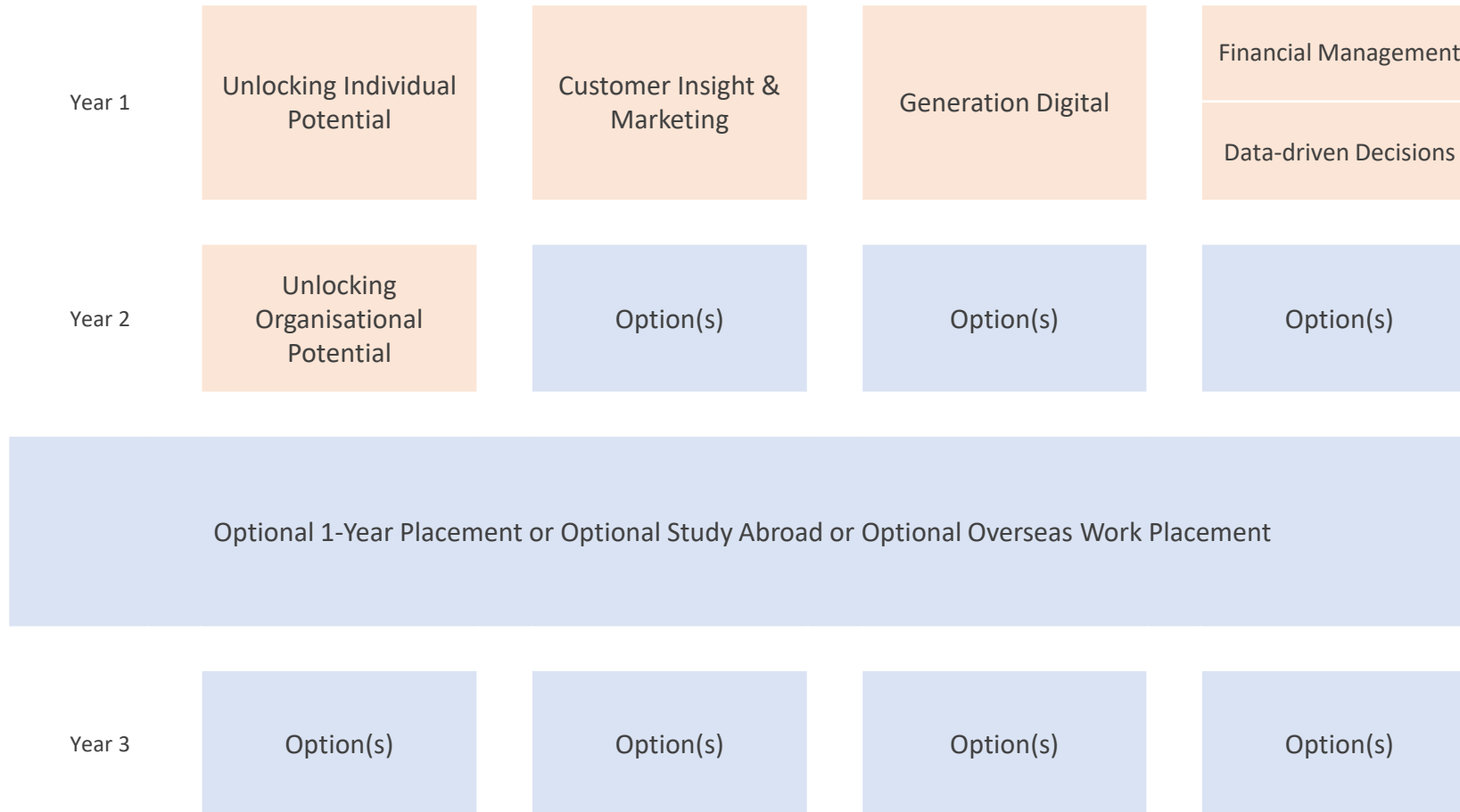- Digital Business

Flexible Degrees

Business   +

Finance

Human Resource Management

Marketing

- BA (Hons) Business Management

- BA (Hons) Business Studies

BA (Hons) Business Portfolio Structure

Year 1	Unlocking Individual Potential	Customer Insight & Marketing	Generation Digital	Financial Management / Data-driven Decisions
Year 2	Unlocking Organisational Potential	Option(s)	Option(s)	Option(s)

Optional 1-Year Placement or Optional Study Abroad or Optional Overseas Work Placement

Year 3	Option(s)	Option(s)	Option(s)	Option(s)

Level 5

modules currently include:

- Creating a High Performance Workforce
- Cultivating an Entrepreneurial Mindset
- Digital Advertising Applications
- Digital Content Systems & Ecommerce
- Financial Markets & Investment
- Managing Successful Projects
- PR & Campaigning
- Responsible Business
- Unlocking Organisational Potential
- Value Chain Management

Level 6

modules currently include:

- Advertising Digital Communications
- Consultancy Project
- Brand Management
- Coaching & Mentoring
- Digital Business
- Intercultural Business Perspectives
- Internship II
- Spin Doctors and other Persuaders
- Strategic Business Management
- The Next Big Thing

Specialist Degrees

- BA (Hons) Accounting and Finance

- BA (Hons) Graphic Design, Advertising and Marketing

- BA (Hons) International Business Management

- BA (Hons) Marketing, Advertising and Public Relations

BA (Hons) Accounting and Finance Course Structure

Year 1	Unlocking Individual Potential	Introduction to Management Accounting	Introduction to Financial Accounting	Law for Accounting and Finance
Year 2	Unlocking Organisational Potential	Financial Reporting	Management Accounting	Financial Markets & Investment

Optional One-Year Work Placement / Overseas Work Placement / Year Abroad

Year 3	Strategic Financial Management	Audit & Ethics -------------------------------- Limited Option	Advanced Financial Reporting -------------------------------- Advanced Management Accounting	Option(s)

Any questions?

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Virtual Taster Events

Wednesday 24 March

- Social Media Influencers: the new celebrities?

Wednesday 31 March

- How does Covid-19 contact tracing work using mobile applications

Book your place at **worcester.ac.uk/about/events/**

Thank you for listening

facebook.com/UniversityOfWorcester

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