Amazon Longitude Explorer Prize

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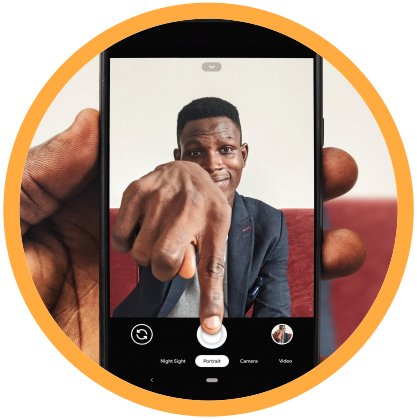
How can you use technology in you application?

What do we mean by technology?

The term technology is most often used to describe **tools, machines** and the **skills needed** to develop these, which are utilised to solve real world problems or challenges.

There are lots of different types of technology that can be used for different purposes. **Can you make a list of all the technology you think you use in normal day?** E.g. laptop, phone, smart speaker etc.

When technology is used to help people to solve social and environmental issues this is most often described as **"Tech for Good"**.



What about your application?

You will be asked in your application to describe <u>how</u> your idea uses technology, including the type/s of technology it use and how you might develop it.

This information sheet can help your team to explore some of the different functions and types of technology for your own idea.

Note: often these technologies work together in some way. For example, an app on a mobile device connected to many other users, like google maps which allows us to see traffic on the roads and then tells us how that will impact our current journey time.

How can you use technology to create an app, product or service that will make the world a better place, enabling people to Live Better, Live Longer, Live Greener and Live Together?

Types of technologies and their functions

Functions

Interact	Connect & Store	Analyse & Decide

Technologies

- Internet of Things sensors
- Robots
- Mobile devices
- Wearables
- Human computer interfaces
- Virtual Reality, Augmented Reality, Mixed Reality & haptics

- Wifi
- Mobile connectivity (e.g.3G, 4G,5G)
- LPWAN
- Lifi
- Bluetooth
- Cloud storage & access

- Artificial intelligence & Machine Learning
- Predictive modelling
- Analytics
- Data science
- Data processing

- Computational devices

Where do <u>you</u> think people fit into this diagram?

Interact: Interaction with the environment and world around technology

Technology	Description	Examples
Internet of Things (IoT)	A network of physical devices or "things" with sensors, software, and other technologies which connect and exchange data with other devices over the Internet. These are often described as "smart devices"	- Smart TV - Smart Speakers (Alexa, Google Home, Amazon Echo) - Environmental sensors e.g. temperature, humidity and light
Wearables	Many wearables are also considered IoT devices as they are smart devices worn close to and/or on the surface of the skin, where they detect, analyse, and transmit information e.g. body signals such as vital signs, and/or ambient data.	- Smart watch (Apple watch, fitbit)
Robots	A robot is a machine programmable by a computer that can carry out complex actions or tasks automatically. Robots are being used already in some aspects of day to day life.	- Manufacturing automation like robotic welding. - medical robots which can assist doctors with task. - Personal robots e.g. assistants for tasks or companionship.
VR, AR & MR	Virtual Reality is a fully artificial environment. Augmented Reality is virtual objects overlaid on real-world environment. Mixed reality is a virtual environment combined with real world.	- VR: Google Cardboard glasses - AR: Pokemon Go - MR: Holograms
Mobile devices	A mobile device is a general term for any type of handheld computer.	- Phone - E-reader - Tablet
Human computer interfaces	A term to describe any tool, device or even approach to interacting with a computer or computational device.	- Examples can range from using a regular computer to implantable brain–machine interfaces!

Tip!
Think about the ways in which these different technologies also interact with one another.

Connect & Store: Technology for sharing and storing information.

Technology	Description	Examples
Wifi	Wireless communication technology enabling devices to connect to the Internet or communicate with one another within a particular area.	
Lifi	Wireless communication technology which uses light to transmit data (in a similar way to WiFI) however this technology is still not as widely used.	
Mobile connectivity networks	Wireless communication technology which enable devices to make calls, messaging, use the internet, streaming and use apps.	- 2G, 3G, 4G & 5G
LPWAN (low-power wide-area network)	A type of wireless telecommunication network designed to allow long range communications at a low bit rate among connected objects, such as sensors operated on a battery.	
Bluetooth	A wireless communication technology used for transmitting data between devices over short distances using UHF radio waves.	

Tip!
Different communication technologies are suited to different purposes. With different connectivity ranges, coverage, power, cost and more, think about what purpose might be suited to your ideas.

Connect & Store: Technology for sharing and storing information.

Technology	Description	Examples
Cloud computing, storage & access	Cloud computing is most often described as using computer hardware or software which is not stored in your desktop but instead accessed over the internet. It is also most often a service you use but managed by a provider (company). Data and information can also stored on the Internet through a cloud computing provider who manages and operates data storage as a service - including the physical servers, and then this is described as "the cloud". These cloud storage providers are also responsible for keeping the data available, and the physical environment protected and running. People and organisations can then buy or rent storage capacity from the providers. If you've ever used a google drive or microsoft teams to collaborate with your classmates then you've been using "the cloud"!	- Google Drive - Dropbox - OneDrive - Google Cloud Platform - Amazon Web services - Microsoft Azure

Analyse & Decide: Technology for examining information and decision-making.

Technology	Description	Examples
Artificial intelligence	Artificial intelligence is (predominantly) the ability for a computer or machine to mimic certain types of human intelligence, such as learning, problem solving, seeing and understanding images or language. Machine Learning: technology that can learn from huge amounts of data with minimal input from humans. Computer Vision: technology that is able to see and understand the physical world in a similar way to us. Natural Language Processing: technology that understands us when we speak or write and can speak or write back to us. Deep Learning: this is a type of Machine Learning, which uses many layers of neural networks. The neural networks are usually trained with millions to billions of real world data. Predictive modelling: this works by analysing historical and current data and generating a model to help make predictions about what will happen in the future. For more on A.I. https://longitudeexplorer.challenges.org/artificial-intelligence/	- Netflix, spotify (recommendations) - Siri, Alexa (virtual assistants) - Uber
Data science, analytics & processing	The term data is used to refer to facts and figures that can be used in calculations, reasoning or planning. Examples can include images, measurements from sensors, text, sound or video recordings etc. Data science is described as a field that uses computer programming, statistics and maths to gain helpful insights from data. Data analysis is described as process of looking through, cleaning, and modeling data with the aim of finding out useful information. Data processing can be described as any use of computers performing a task using data.	

Tip!
Think about why these types of technologies could be so useful. The use of computers and machines to help us with tasks has become more and more common in many different industries.

What are some of the tasks a computer can now do without a human having to give any input? Are there any tasks that you think still need human input?

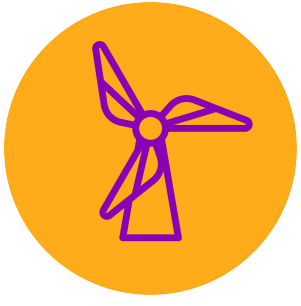
Technology	Description	Examples
Computational devices	A term which can describe a range of electronic devices which take inputs (data), processes this and then calculate results e.g. a computer	- cloud computing data centres - advanced A.I. chipsets - Mobile phone chipsets - Computers within autonomous vehicles & machines

Cyber security and ethics

Tip!
Use Lesson plan 5 and the technology & ethics worksheet to explore these issues further!

Cyber security	Ethics
The protection from the theft of or damage to hardware, software, or data, as well as from the disruption of the service being provided.	Technology has the potential to have a impact for social good but it also has the potential to have negative impacts.
Examples of security challenges: - Hacking *(breaching a computer network for the purpose of the denial of services, ransoming etc.)* - Data breaches *(people getting access to other people's information without their consent)* - Phishing & malware *(malicious software)* - Physical damage to devices	**Examples of ethical challenges:** - Bias *(bias can affect the data we collect and use when developing or designing systems or programs)* - Privacy *(the collection and accessibility of personal data)* - Automation *(tasks completed by technology with minimal human intervention)* - Liability *(who is responsible if anything goes wrong)*

Explore how technology can be used in each of the four themes:



Living Better

There have been huge leaps and bounds in technology and medicine to help us live healthier lives, but that we are also faced with ongoing health challenges, these can be both physical and mental.

Explore this theme further.

Live Greener

It is becoming increasingly important to transform the way we live to reduce our negative impacts on the environment, including challenges like pollution and climate change.

Explore this theme further.

Living Longer

We are living longer than ever. But as we get older, our needs change, with challenges around mobility and isolation, re-skilling, and access to care.

Explore this theme further.

Living Together

We are presented with more and more options that can help us move about, access vital services and supplies and stay connected to each other however these may also have negative consequences, such as impact on our environment and mental health.

Explore this theme further.

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