Open:UK *Ezine*

USABLE

Open Source is...

...*Usable for any purpose without restriction*

Issue 6

Hi!

One of the themes that we have introduced in the second summer camp is sustainability. That's something that the UK is very focused on in 2021 because the UK hosted the United Nations' Climate Conference, COP26 in Glasgow in November and OpenUK hosted the first Open Technology for Sustainability Day looking at the themes on sustainability covered in this course.

The United Nations is a supra-national organisation that works globally to support cooperation between nations and Governments. It has focused a great deal of its efforts on the Sustainable Development Goals which our OpenUK Chief Sustainability Officer, Cristian, has discussed in more detail in his column.

Often when we hear people talk about sustainability, they focus on net-zero and carbon emissions. This means that they focus on things like fossil fuels and green energy which we discuss in this lesson. That's important but, as Cristian explains, sustainability is much more than just this and we look at the societal values of Open Technology too.

One thing I have learned about sustainability is that there are also Digital Development Principles. Principle 6 requires us to use open source software, open data, and open standards. We'll talk more about standards in lesson 10, but I hope you are already understanding how open source software and open data help to create a more sustainable world.

Amanda

CEO, OpenUK
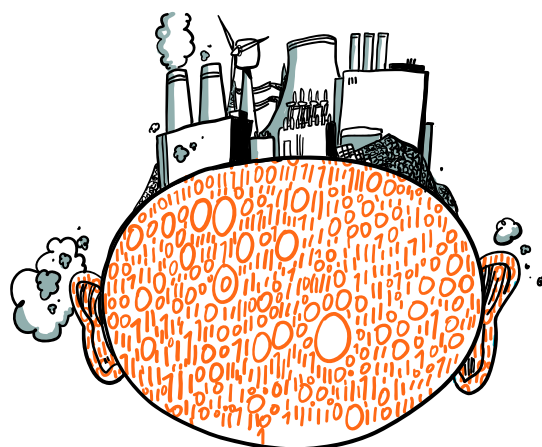
Ask Ashleigh

Ashleigh Monagle

Diversity - difference is good

Welcome back! In this column, we are going to talk about diversity. What does that mean?

Well, imagine if you wore the same clothes, ate the same food, or watched the same movie every day. Chances are, you would probably get bored of the same things - these actions
are not very diverse.

This is exactly the same when it comes to thinking about people. Imagine if we all looked the same or ate the same food? The world would be pretty boring and you might not have that favourite takeaway anymore. My point here is that diversity is good and exciting as it helps us to think about the world differently and embrace people and things that are different from us.

Think about your friends, family, and school mates. In what ways are you different? You could be a different age, speak a different language, be of a different race or religion for example. By doing this exercise you will realise that we are all different and that's what makes the world interesting. Being surrounded by people who are different from you will provide you with a greater understanding of the world we live in.

Ashleigh

Digital Inclusion Lead, OpenUK
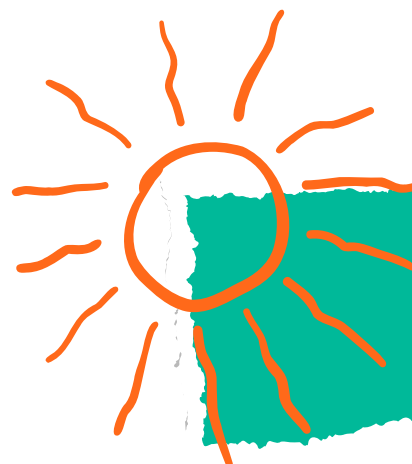
Sustainability

Cristian Parrino

Systems Change

By now, you may be thinking how complicated this whole sustainability thing is. So many interconnected parts: climate change, social and financial inequality, loss of biodiversity, health, air, and ocean pollution. And it doesn't stop there. So, who can fix this?

Changing this system is a task beyond any one government, business, NGO (not for profit), or individual. It's a collective task in which everyone has a role and must work together. In fact, SDG-17 is precisely about partnering together to achieve The Sustainable Development Goals. The system has many elements to it:

Regulatory: The policies, taxes, laws, and regulations governments need to change and create to shift our economy, infrastructure, and behaviours so they are centred on the well-being of all people and the planet.

Infrastructure: Investing in clean and renewable energy, transportation infrastructures, and the rapid transition from fossil fuel-based energy. Investing in the restoration of biodiversity, including reforestation and rewilding of land. Always ensuring fair and equitable access to everyone.

For a company, success is measured by how much more profit it earned over the previous year.

Economic and Industry: Governments and businesses changing the goal from growth, to prosperity for all people and the planet.

Businesses eliminating carbon emissions and producing products and services that design out waste, stay in use for as long as possible, and restore nature. Businesses need to transform themselves from organisations that extract wealth and natural resources, to organisations that are fair, equitable, and give back to local communities and nature.

Behavioural: Individual people need to improve their everyday actions to use less energy, to walk and cycle more, to eat less meat and more vegetables, buy less stuff, and ensure that what they buy, they buy from organisations that have committed to protecting people and our planet's wellbeing.

In the same way the current system was created by people, people can create a new system that works for everyone and the planet.

Keep Coding!

Christian
Chief Sustainability Officer, OpenUK

DECOMPOSITION

EXTRACTION

USE

CARBON FUELS

OIL

GAS

COAL

EARTH

TIME PAST

Please Miss Boal

Pamela Boal

Keep it green!

As computer scientists, we often celebrate all of the good that comes from technology and the fantastic inventors and innovations that are a common occurrence. However, it is important to reflect on our responsibilities that are necessary to protect the environment. This is an ethical responsibility but also an economic opportunity to quote John Doer "Green tech could be the largest economic opportunity of the 21st century".

Green tech is technology that is environmentally friendly and is designed to have a better impact on the world around you. For example, think of energy efficiency, renewable resources, and recycling. These are all part of green technology and all elements in producing green products, or products designed to be more environmentally friendly and kind to the planet.

The need for green technology has never been more apparent. Climate change has brought about melting ice caps that mean rising sea levels; unpredictable weather patterns which mean more droughts, hurricanes, tornadoes, floods, and earthquakes. As well as conditions that are more favorable for diseases. Green technology might not be able to fix all those problems, but it can help by providing products gentler on the environment and that encourage behaviors kinder to the planet.

Our hope is that by the time young people doing this course enter the technology sector, all technology will be green technology. Your challenge in this lesson is to research green tech and find simple ways that you can be more environmentally friendly on your programming journey.

Keep Coding!

Pam

Computer Science Lead, OpenUK

Open Source Hero

Feel the power!

What's changing?
Our electricity used to come from a few big power stations, feeding the national grid to safely feed homes and businesses, hospitals, and schools. The future will have millions of things making electricity (e.g. wind turbines) feeding millions of buildings, systems, and vehicles—a lot of our electricity will be driving around!

It's complicated
Getting this to balance properly gets really complicated really quickly: millions of things talking to millions of other things to ensure energy flows in the right amount, at the right time to the right place. It needs to be safe, reliable, affordable, simple—and green!

It's all about the data
At the heart of this energy revolution is data. Data and software are needed to automatically balance supply and demand, and to 'self-heal' (e.g. a hospital's lights need to keep on even if it's cloudy).

It's all about open
For systems to talk to each other (all the time!) they need to be open. Some need to be open to control each other (but not you!). Others need to be open so you can work out whether to add another solar panel.

It's about you?
We need a whole new generation to make sure that our energy systems work for everyone, and don't destroy the planet. Is this you?

Gavin
CEO, Icebreaker One

Industry
Building up new energy!

We need and consume energy in various forms every day. It could be the electricity that powers various devices or the petrol that fuels our cars and planes in our daily lives. This energy has been traditionally produced from fossil fuels which are formed by natural processes, such as anaerobic decomposition of buried dead organisms.

Although fossil fuels are continually formed by natural processes, they are generally classified as non-renewable resources because they take millions of years to form and known viable reserves are being depleted much faster than new ones are generated. Due to environmental concerns raised by fossil fuels, other sources of energy have been identified that are renewable, naturally replenished, like sunlight, wind, rain, tides, waves, and geothermal heat.

The production of energy involves its exploration, extraction, transmission and distribution. There are many companies that engage in these phases across the globe. For this energy to reach more than 7 billion people in the globe, there is a lot of data and information that needs to be exchanged between these companies. Sharing such data and innovative, scientific techniques will make it much easier for the energy to improve the quality of life overall on Planet Earth.

Open Source represents a global network of software and hardware engineers and technologists who work around the globe on exciting projects that advance various technological concepts. Open Source can be viewed as a large network of multiple study groups that work with each other. Open Source, thus, is an environment where we freely share our knowledge and grow through collaboration. When we willingly help out each other with scientific, innovative techniques, we progress faster as a team.

This type of collaboration is essential for the world of energy. Energy is a global need that impacts every human on our planet. We need to work together to ensure that the right types of energy are available to everyone across the globe while ensuring the health of the environment we live in as well.

Collaboration is in the DNA of Open Source, and collaboration is exactly what is needed to make advances in the exciting world of energy for generations to come.

You can start by <u>collaborating with your peers</u> with open source hardware and software on your own.
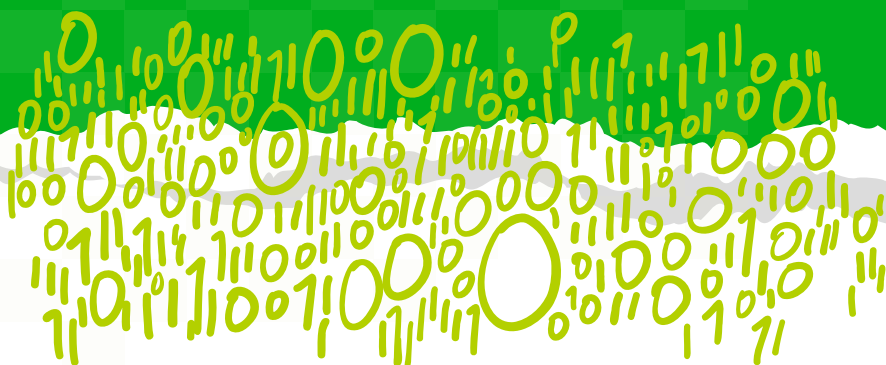
Red Hat
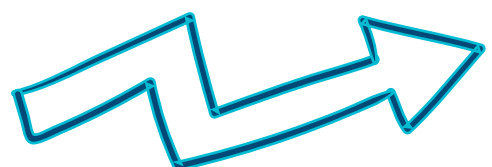
Open Data

What can data be used for?

Data can be used to help make decisions. These might be day-to-day choices, like how to get from home to college, or how to find your nearest yoga class. They also include industry-level decisions, like the best time for farmers to harvest their crops, and what to do to help prevent accidents at sea.

Data can help with global problems like poverty, hunger, and climate change by providing critical information on natural resources, public services, and carbon emissions. For example, farmers can use weather and soil data to decide how and when to fertilise, plant, or harvest to ensure the best sustainable yield.

Data can also help tackle issues like inactivity and obesity by helping people find out about exercise activities. For example, in OpenActive, organisations that offer exercise classes (like gyms) share data about the activities they offer. This data is published as open data which means anyone can use it to develop apps and websites to help people find and book exercise classes and activities.

Preventing accidents at sea is also an area where data is making a big impact. The HiLo initiative uses data to help prevent major incidents at sea. It encourages the shipping industry to report data about accidents, which can then be used to help predict and prevent frequent, low-level incidents that could escalate into major problems.

Open Data Institute

Kubernetes

An illustrated guide.

Phippy And Zee Go To The
MOUNTAINS
A Prometheus Story

"Aunt Phippy, what's that beautiful mountain?", asked Zee. "That's Prometheus mountain!", explained Phippy, "It's made up of timeseries data. Its Y axis measures high into the sky, and its X axis stretches from the present to the distant past…" "Wow", said Zee, "Let's go on a 4-dimensional hike!"

As they ascended up the slope, they came across a swarm of flies. "Those," said Phippy, "are samples. Each one tells us a number and a time."

"Are they wearing name tags?", asked Zee. "Yes," said Phippy. Those are the labels. The labels tell us more about their story.

Zee noticed one fly with a tag reading "status: 404". "That one looks lost," Zee said. "I hope she finds her way home."

They came to the top of a peak, overlooking a valley below. "I wonder how high up we are?" asked Zee, starting to feel lightheaded. From down below came the rumbling voice of a big brown bear, "10 feet up!" Zee looked confused. "We must be higher up than that! And who said that anyway?"

"That," said Phippy, "is an Instant Vector. He can only measure things right where he is."

As Phippy and Zee hiked on, they came to a series of jagged peaks. Suddenly a hawk swooped down from the sky, scanned her eyes across the ridge, and loudly screeched a whole bunch of numbers. "This is a Range Vector," explained Phippy. She can see all the samples as far back as you ask her to."

Suddenly the ground started to shake. Phippy and Zee jumped up in surprise as the shape of the mountain started to change underneath them. "What was that?!" cried Zee.

Phippy smiled and explained, "that was a function! Each function has magical powers to change the shape of the landscape. This one listened to the Range Vector and gave us a moving average."
Just then Zee looked down and saw that the once spikey and precarious landscape was now smooth and easy to walk on. "Wow, that makes it much easier!" said Zee.

Phippy and Zee came to the edge of a cliff. "Where did our path go?" wondered Zee. "Prometheus mountain didn't find any more samples, so our trail stops here," explained Phippy. "In about 5 minutes, this trail will be marked stale and disappear. We'd better climb down!"

"Good idea," agreed Zee. "But can we get a couple of Captain Kube's Cliff Bars for the trip home?"
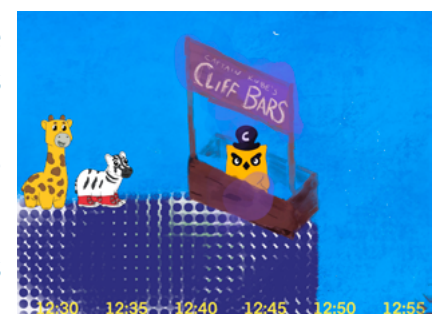
Learn with Lowena

Lowena Hull

What makes a good project for a competition

Before I start a project whether for a competition or otherwise, I take time to research the project idea. This includes checking if it's feasible- no point spending time on something that will never work- and seeing whether it's already been done before.

Part of checking feasibility involves researching potential modules I can use (or reuse) and reading their documentation. This helps me get a feel of what a module can and cannot do. When I get to creating the project, I split it up into parts and then allocate time to create each part. A good way to do this is splitting it by functions, like "I'll create the evaluate_score function today and I expect it'll take about an hour". Something rough like that.

It makes a daunting project look much more manageable if you break it down like this!

Sometimes I look at the work I have to do and it seems frankly terrifying, but then I take a look at when everything is due, what do I have to do today, and what can I leave until I'm more free.

And remember: even if it seems like the work is never ending, remember that each small step is a pathway to a bigger journey. Even a little bit of work done is work done.

Lowena

Student, Cambridge Univeristy

NASA

Chris Mattaman

Governance

Governance means setting up a framework for managing an open source project. This could define voting rules or what consensus means. It could also define a process for adding new contributors to your project. It could define how often you release the software produced by the project, how you tag and version it, or how you should accept contributions from the broader community who in the beginning may not have direct ability to modify your shared software.

All of this, when put together, is the governance for your project.

Governance sounds like a lot of rules but in fact, having these rules and procedures defined upfront ensures that there is no ambiguity in the key lifeblood of the project - the people - and the way they should interact. Good governance begets good and even better software projects in the open source world.

Governance should be the start of your open source project and not something that you shoehorn in at the end.

Chris

Chief Technology and Innovation Officer,
NASA Jet Propulsion Laboratory
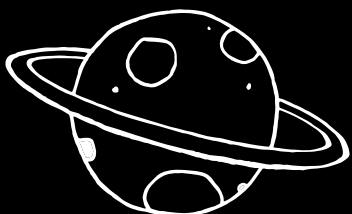
Entrepreneur in residence

Matt Barker

How do you make money with open source?

Many early open source projects came into existence thanks to practicality. As engineers tried to solve interesting and useful technical challenges, they found that opening the code and welcoming collaboration enabled more people to engage around their project and led to better outcomes.

Often the opening of code was not driven by profit but in the spirit of sharing and inclusion. In principle, however, the open source community has no problem with the monetisation of their software, but the inherent openness means that thought must go into how to monetise it.

The growth in adoption and use of open source software by businesses has led to a number of developing business models. One of the simplest ways of making money is to sell training, support, and integration services for the businesses trying to adopt the software. It is also possible to create paid-for proprietary features that enhance the usage of the open source software in an open core model.

More recently, vendors have taken open source software and packaged it up into a 'service', often in the cloud. This means all of the difficulties found in running and maintaining the software are managed by the vendor, often making it much easier to consume.

As open source requires no discrimination in the field of endeavour, once code is open it can be used by others to make money should they wish.

Matt

President & Co-Founder, Jetstack

Word game

```
Y  N  I  R  Y  H  Q  X  F  E  G  B  C  A  Q  R  D  Y  Q  O
F  C  W  N  Q  G  P  M  L  G  S  S  L  P  U  X  G  A  G  L
E  L  N  T  T  Y  R  B  H  M  B  O  C  O  Y  V  U  R  C  Z
A  S  B  E  E  E  A  E  A  S  C  L  V  O  G  R  L  R  O  B
T  U  I  G  D  W  R  R  N  A  W  A  R  F  P  H  L  A  N  P
U  V  K  L  E  N  T  A  L  E  E  M  O  R  S  E  C  O  D  E
R  Q  B  N  A  P  E  V  C  D  U  H  O  K  Q  L  O  O  I  X
E  J  E  K  H  I  A  P  N  T  L  G  U  F  E  E  N  V  T  B
P  R  B  O  S  R  T  E  E  O  I  I  V  T  G  U  S  C  I  Y
H  F  N  O  I  J  F  I  U  D  I  O  S  A  A  F  U  E  O  M
O  E  H  A  D  O  L  V  N  T  R  I  N  T  R  L  M  W  N  E
N  J  B  N  D  W  H  X  C  I  T  E  G  S  E  I  P  M  A  M
E  L  L  L  L  U  U  K  Z  P  Z  O  T  P  V  S  T  H  L  A
E  C  E  V  W  Y  E  H  S  A  C  L  A  N  A  S  I  E  L  U
O  I  P  G  H  N  O  I  T  C  N  U  F  Y  I  O  O  W  O  A
F  A  T  A  D  S  S  E  C  O  R  P  K  G  K  F  N  Z  O  V
E  L  E  C  T  R  I  C  A  L  N  A  W  F  B  B  G  J  P  M
E  L  B  A  I  R  A  V  L  A  B  O  L  G  C  O  W  K  L  G
A  C  C  E  L  E  R  A  T  I  O  N  V  F  T  I  A  M  H  R
D  Y  Y  F  M  X  F  A  X  M  M  L  T  G  D  J  P  U  P  Z
```

Acceleration
Array
Average
Conditional
Loop
Consumption
Electrical
Energy
Feature Phone
Field of Endeavour
Fossil Fuel

Function
Global Variable
Initialise
Interactions
Interdependency
List
Local Variable
Morse Code
Process Data
Renewable
Scope
Smart Phone

Thanks for reading!

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CNCF - Kubernetes An Illustrated Guide https://www.cncf.io/phippy/
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Instructions Lesson 6

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