



Developing more Sustainable Software with Open Source & the Tech Carbon Standard

Oliver Cronk, Feb 2024

Oliver's Sustainable Tech Journey

- Computer Science vs Science
- Developer
- Energy and Environmental Consultancy
- Tech Architect in the Energy Sector
- Chief Architect – Big 4 and Cyber
- How do we Architect a better Tomorrow?
- Leading on Sustainable Tech at Scott Logic



Where are you on your
tech sustainability journey?



Two sides of the tech coin



Digital



Physical



Tech as a force for good vs the impact of Tech





Environmental Impacts

Embodied Carbon
& Materials for Electronics



Energy
Consumption

Cloud / sharing models



Land usage
(DCs, factories)

(Carbon Offsetting
involving land usage /
changes)

Impacts of Mining and
Supply Chain
e-Waste to Landfill

"Fast fashion" for
devices
Built-in obsolescence

Mining & Waste
metals run off

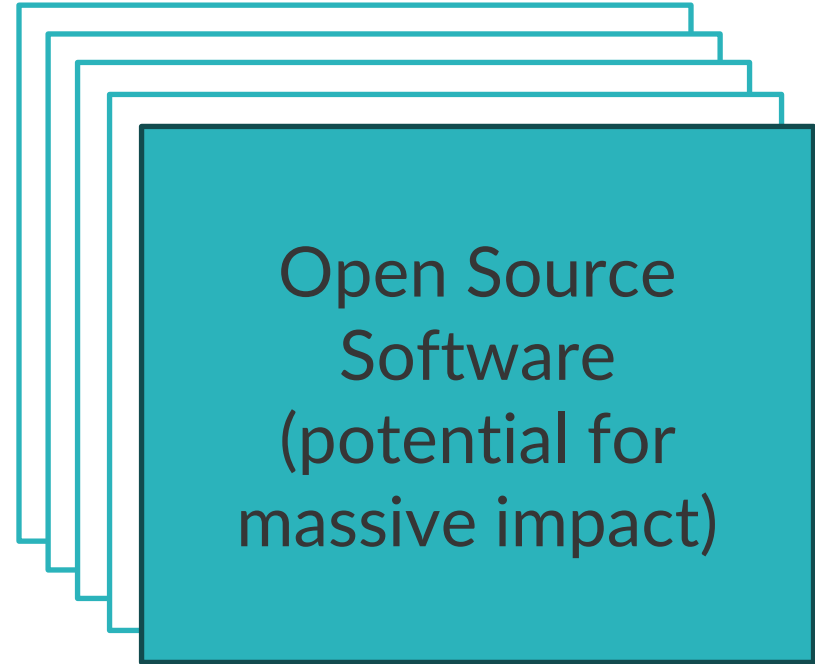
Water used to cool
data centres



Lets just design and
code better
software?...

... but what software?!

Internal software
development project
(probably small impact?*)



Medium to large impacts?:

* Large consumer facing brand
or high complexity product

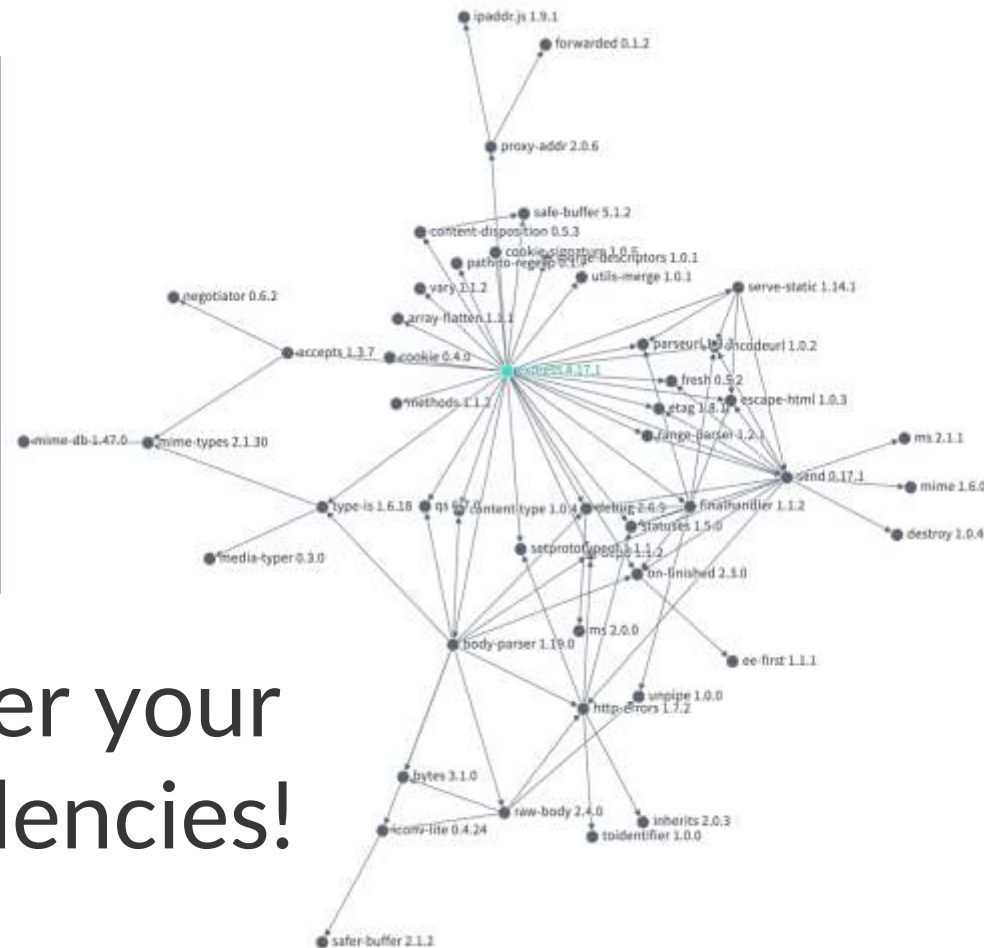
* Or tech to optimise energy
intensive business processes

Maintaining a
Popular OSS
project with lots
of deployments?

Sustainable defaults?

The world of
deployed OSS is
big
= massive
downstream
impacts

Consider your
dependencies!



Beyond code - identifying
significant areas of the tech
landscape...



Technology Carbon Standard (Proposed)

Category Carbon Standard Category
1/2/3 GHG Protocol Scope

Upstream Emissions

Category U 3

Upstream emissions relating to the embodied carbon of hardware and the development of software.

Commercial Software



Commercial Off The Shelf (COTS) Software

Hardware Manufacture, Transport and Installation



Employee Hardware (laptops, printers, etc.)



Networking Hardware



Data Center and Server Hardware

Operational Emissions

Operational emissions are associated to the running of business IT functions and systems. Each operational function may have a hybrid of IT infrastructure across direct and/or indirect emissions.

Direct

Category O 2

Direct running costs that are attributed to the electricity powering servers, networks and devices.



Servers and Storage



Networking Devices



Employee Devices



Generators

Category G 1

Indirect

Category C 3

Indirect running carbon costs that are attributed to external hardware and service solutions.



Cloud Services



SaaS



Managed Services

Downstream Emissions

Category D 3

Carbon associated with the use of products and services produced by the business.

End Use (B2B, B2C)



End-User Devices



Network Data Transfer

Out of Scope



People, Buildings and Travel

Value of Open Data, Sustainable Tech Advice and Projects



Global challenge - So use the power of the commons

Transparency = peer review & refinement

Shared reference data points to find significant areas and ignore the noise



E.g. how much power does device X consume?

How much energy did training an AI model take?







Green Software Principles



Energy Efficiency

Consume the least amount of electricity possible



Simpler solutions are often more secure



Hardware Efficiency

Use the least amount of embodied carbon possible

Minimise / manage your **hardware** attack surface



Carbon Awareness

Do more when the electricity is clean and less when it's dirty

Promotes **adaptability**, resilience and availability



Security Benefits

What are we doing?

Our Open Source project to help navigate the complexity of
Technology Sustainability...



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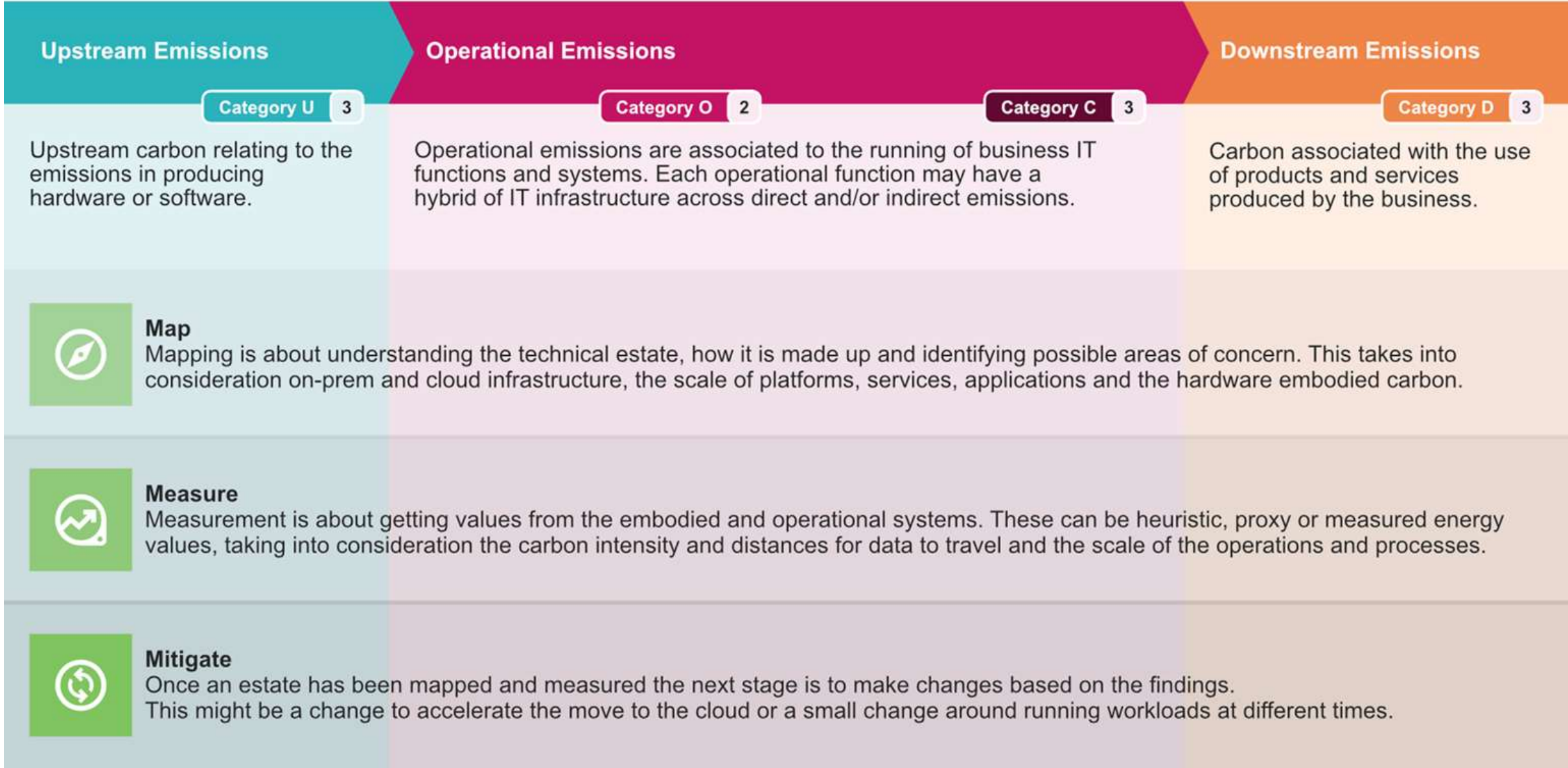
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People, Buildings and Travel

Technology Carbon Standard



Want to collaborate?

- <https://www.techcarbonstandard.org>
- <https://blog.scottlogic.com>
- Get involved in our project / GSF etc
- Feel free to contact us for a friendly chat

