

Why Wales should embrace Free and Open Source Software

An Afallen White Paper; February 2022



Image courtesy of Blender, a 3D open source creation suite



Summary

This paper was written by David Clubb, Partner in Afallen. The key points are:

- Free and Open Source Software (FOSS) has been calculated as having a cost:benefit ratio of 1:4 to the EU, with additional benefits to the public sector of lower cost, no vendor lock-in and increasing digital autonomy (1)
- FOSS has a value to the UK economy of tens of billions of pounds annually (2)
- FOSS is strongly aligned with the Future Generations Goals and Ways of Working, adding significant social value as well as having economic and cultural benefits, and is therefore particularly well-aligned with policy goals in Wales
- To not capitalise on this free, globally important resource, would be to miss a compelling educational and economic opportunity for the people and communities of Wales. We should aim to be a leading light for FOSS within the UK.

Recommendations

1. Welsh digital strategy be updated to reflect and capitalise on the economic, cultural, social and educational benefits of FOSS
2. Curriculum for Wales to include FOSS as a component of digital competency
3. The Centre for Digital Public Services to empower public sector bodies to pilot FOSS approaches to service and project delivery and help build networks of good FOSS practice for practitioners

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Foreword

The worlds of work, leisure and communications are changing irrevocably through the rapid adoption of digital technology at every moment of the day, and in many cases, literally from cradle to grave.

With these new technologies comes a huge opportunity to reduce costs and duplication of effort; to harness the power of the global community to support local projects; to communicate concepts and causes to huge numbers of people across the planet.

However, high profile scandals have demonstrated - and continue to do so - that we put huge faith in public bodies or private companies to regulate and perform in the interests of the citizens and communities they serve. In many cases, this faith is misplaced; our data is harvested and sold on to third parties; we are profiled; decisions are made about us, and opinions formed on us, in many cases without direct communication ever having been made.

It is probably not an exaggeration to say that the vast majority of people who use corporate software and proprietary social media platforms are unaware of what we sign up to.

Free and open source software has many of the advantages of proprietary software, but without the objective of being to increase shareholder value. There are no oligarchs, no dark money, no licence fees. Just open code to explore, understand, and hopefully contribute to.

Wales is a post-industrial country working hard to adapt to a new paradigm. We can not afford to ignore the huge potential of open source software to support education, industry and community empowerment.

I welcome this Afallen white paper as a positive step in charting the benefits of open source to Wales, and look forward to increasing the profile and the value of open source within every educational establishment, workplace and home. In an increasingly international and competitive digital economy, we can afford nothing less.



Sarah Murphy
Senedd Member for Bridgend

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Definition

Item	Definition
Free and Open Source Software (FOSS)	Software distributed on a licence that meets the Four Freedoms (3) and/or the Open Source Definition (4)

Introduction

FOSS underpins most of global digital communications. 43% of global websites and blogs are produced using Wordpress, an open source platform. 60% of the world's websites are hosted on Apache and Nginx (open source) web servers. When the IoT is included, free and open source software is estimated as constituting 80-90% of any modern piece of software. The ability to work with open source software opens up a huge and global potential career opportunity, accessible from Wales.

FOSS is inherently better aligned with Wales' Future Generations Goals and Ways of Working than proprietary software. In preparing our young people for the work environment of the future, we should strategically direct practical and philosophical understanding of software to encompass open source. Failure to do so will:

- Exacerbate the skills gap between the young people of Wales, and a growing cohort of their peers in the EU and elsewhere who benefit from a strategic approach to promoting open source software
- Continue the default approach of accepting commercial products without considering alternatives which could provide potentially far greater overall benefits

This White Paper sets out to describe the benefits of FOSS to Wales, and suggests some policy proposals that could demonstrate long-term and strategic value to the people, institutions and communities of Wales.

What is FOSS?

FOSS is typically software that is free to use, free to modify, and contributes to the sum of human knowledge. Users skilled in open source understand concepts more than products, making them producers rather than solely consumers of digital content. These users are adaptable, and potentially more valuable to an increasingly digital work environment, than people predominantly skilled in the use, rather than the design, of specific digital tools.

FOSS is free to use, and the licence cannot be revoked. This lessens the risk of stranded assets or systems that are dependent on proprietary products. Open source software can provide a new lease of life to old hardware, as there is a greater choice of operating systems that are specifically designed for hardware of lower specifications.

Finally, open source software can be freely modified, and this generally lends itself extremely well to translating into other languages. In the context of Wales, this means that most open source platforms or tools can be translated into Welsh; indeed, many already have been.

Infobox 1: Examples of FOSS products

Open source alternatives exist for many proprietary desktop or cloud-based products, a small number of which are listed in the table below. In some cases, such as [Blender](#) (3D animation software), they set the standard for the sector.

Proprietary product	Open source alternative(s) ¹
Microsoft Office	LibreOffice
Adobe Creative Suite	Inkscape , Kdenlive , Blender
Zoom, Microsoft Teams	Jitsi Meet
WhatsApp	Element , Signal
Microsoft Windows; Apple Mac OS	Linux
Twitter	Mastodon
Instagram	Pixelfed
Android or iOS	Linux on mobile (many types) ²
Google Drive, Google Docs, Dropbox	NextCloud
Goodreads	Bookwurm

¹ These are examples rather than an exhaustive list

² [Pine64](#) is an exemplar of a company creating an ecosystem to support open source alternatives to mainstream proprietary products

The Welsh Government's policy approach

The EU is starting to recognise the value of FOSS as a strategic asset, and allocating financial and policy resources accordingly (5).

We have yet to fully grasp the socio-economic benefits at the strategic level in Wales; the most recent Welsh Government policy

document, the Digital strategy for Wales (6), does not explicitly mention FOSS or open source.

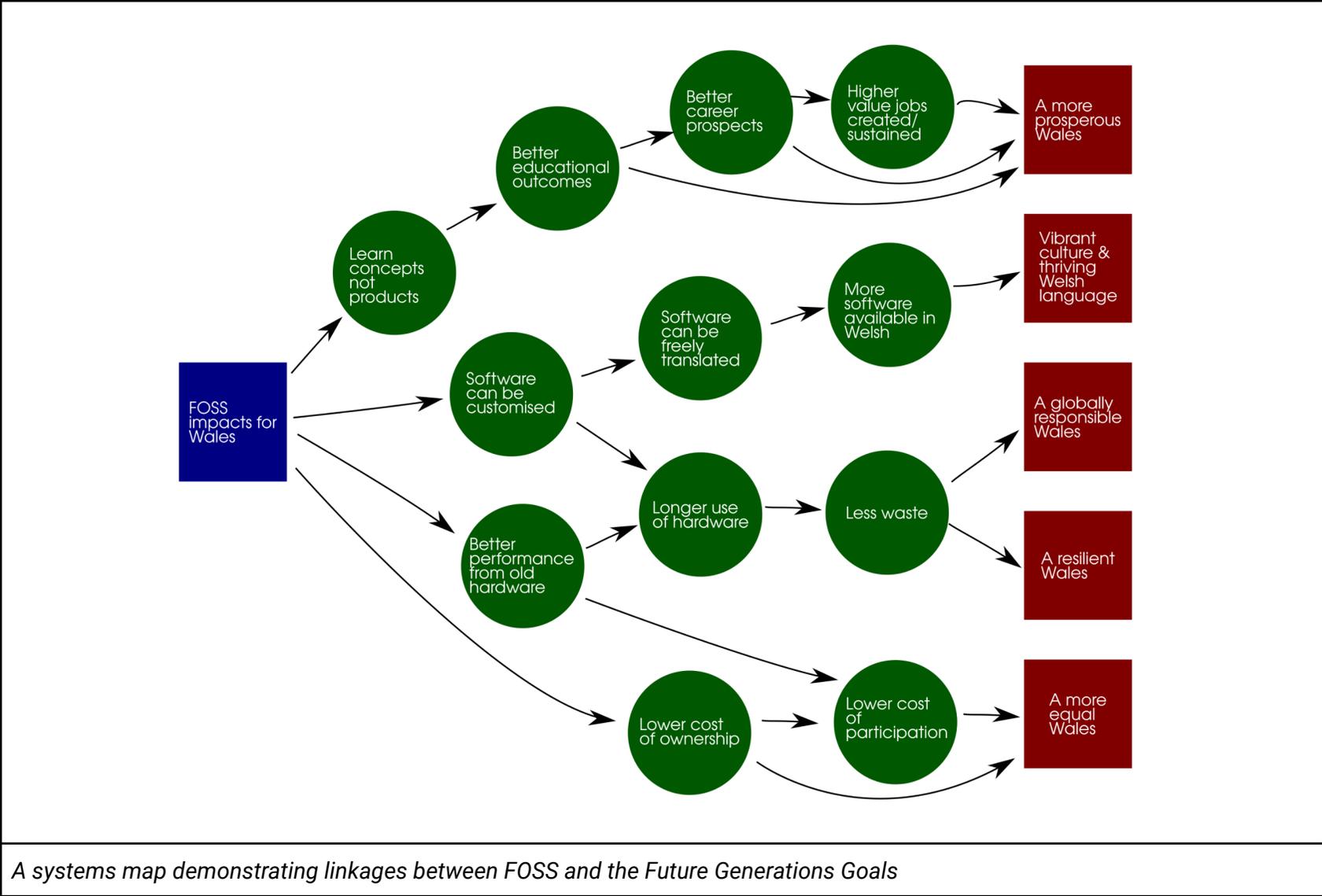
However, open source could play an important role in delivering on each of the missions within the digital strategy (see table below).

Digital strategy mission	Potential open source contribution
<p>1. Digital services. Deliver and modernise services so that they are designed around user needs and are simple, secure and convenient</p>	<p>This mission highlights language as one component of accessibility. Open source products are translatable by default, either by forking existing projects, or by joining established translation mechanisms, therefore supporting the 'bilingual from the outset' goal (7).</p> <p>Common standards of accessibility, design and service may be easier to attain through open source than through proprietary products.</p>
<p>2. Digital inclusion. Equip people with the motivation, access, skills and confidence to engage with an increasingly digital world, based on their needs</p>	<p>The Digital Inclusion Foundation mandates open source for its contributions and specifications to encourage inclusiveness, interoperability and broad adoption. An open source approach simplifies sharing of good practice elsewhere, as well as adopting good practice from elsewhere.</p> <p>The UN Secretary General's roadmap for digital cooperation emphasises the value for inclusion in creating "digital public goods".</p> <p>Mozilla's manifesto states "We believe that the internet is healthiest when a diversity of people and backgrounds contribute to its development" (i.e. through an open source approach)</p>
<p>3. Digital skills. Create a workforce that has the digital skills, capability and confidence to excel in the workplace and in everyday life</p>	<p>Open Educational Resources (OER) offer the prospect of freely-accessible educational materials, shared and improved continuously by a global community. A FOSS/OER approach promises the ability to adapt existing materials to the specific local educational needs of learners, and the development of educational tools co-created with learners. These aspects are fundamental to the Curriculum for Wales. They are also relevant to the guidance for careers and work-related experience.</p> <p>Learners skilled at working within a FOSS environment - concepts as much as products - will be able to offer their skills to a huge and varied global employment base.</p>

<p>4. Digital economy. Drive economic prosperity and resilience by embracing and exploiting digital innovation</p>	<p>FOSS is being increasingly emphasised as core to the EU's digital and technological strategy. A 2021 study on the impact of FOSS concluded that the cost:benefit ratio for investing in OSS was 1:4; and that an increase in 10% of FOSS contributions would boost GDP by 0.5%, as well as creating 600 additional ICT start-ups.</p> <p>A 2020 review (8) of the benefits of open source technology for developing custom scientific tools calculated savings of between 87 and 94% compared with proprietary tools or systems</p>
<p>5. Digital connectivity. Services are supported by fast and reliable infrastructure</p>	<p>B4RN demonstrates good practice in a community owned approach to broadband delivery, and could be replicated to retain more skills and revenue within Wales. Open Energy Monitor is a Welsh success story for expertise within digital connectivity with an emphasis on energy and a commitment to open source.</p>
<p>6. Data and collaboration. Services are improved by working together, with data and knowledge being used and shared</p>	<p>The FOSS sector is a collaborative community and concept by default. An open source strategy would likewise enable, empower and promote a collaborative approach to data, and would be a strong tool in delivering this mission.</p>

Recommendation 1: Welsh digital strategy be updated to reflect and capitalise on the economic, cultural, social and educational benefits of FOSS

Why FOSS for Wales?



Wales is a small bilingual country. Education and many other public sector functions are devolved, providing the opportunity for Wales to implement FOSS as a core component of education, from primary school upwards; and for public sector bodies to be encouraged to embrace and adopt FOSS as part of their operational and delivery models.

Wales also has a unique piece of legislation, the Well-being of Future Generations Act (WFGA) (9) that puts obligations on the public sector to achieve certain goals (the 'Well-being Goals') and practise 'Ways of Working'. The WFGA has shaped subsequent policy and legislation, giving rise to a policy direction that prioritises equality of outcomes (rather than just equality of opportunity) (10).

Taken together with research demonstrating the particular value for education in small countries from FOSS (11), these policy drivers suggest that FOSS should be considered as a strategic asset for Wales, and incorporated into the curriculum.

Whilst the Curriculum for Wales does not consider '[open source](#)' as a distinct component of digital learning or competence within the [digital competence framework](#), it is potentially agnostic on the topic of 'freedoms' of software. This has the advantage of being flexible enough to allow education policymakers to incorporate FOSS within the curriculum. However it is probably insufficiently prescriptive to ensure that all learners across Wales have an understanding of, and access to, FOSS philosophy and software during their school years.

In excluding FOSS from explicit consideration within the curriculum, the myriad advantages of learning and understanding that could arise in this sector are potentially lost.

Schools and teachers are also potential beneficiaries of FOSS, not just through education, but also through governance and learning platforms. The [Gibbon education management platform](#) is one example of a polished and globally-adopted suite of products that could be readily embraced by educators in Wales.

Recommendation 2: Curriculum for Wales to include FOSS within digital competency

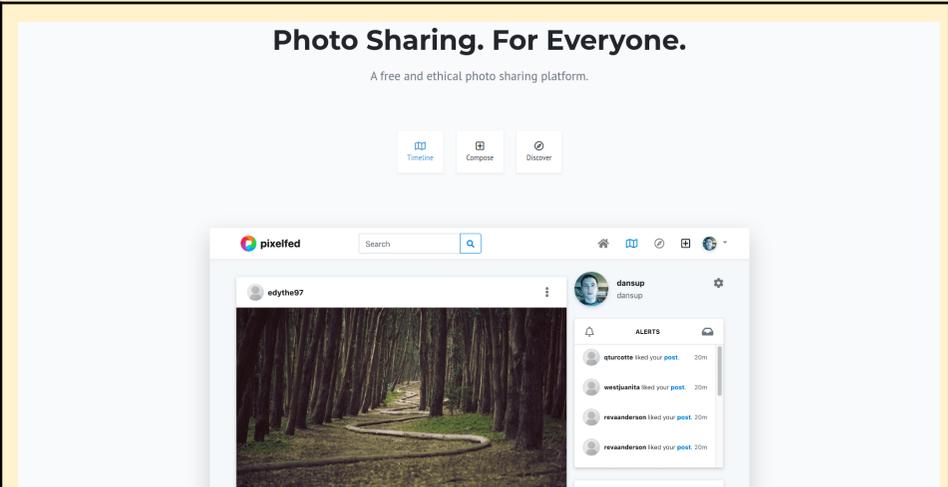
Infobox 2: pilot projects for open source in education?

Pixelfed

The alternatives to Instagram and GoodReads could prove to be a superb demonstration of the educational benefits of open source to students in Wales. Imagine school children sharing pictures of their school projects or their local environment, with pupils in schools in different parts of Wales.

Importantly, these sharing communities can be wholly set up and controlled by schools or education authorities, free from unauthorised access, advertising or surveillance.

This would demonstrate a number of Future Generations Ways of Working, and also provide a 'real life' demonstration of a different way of interacting on a social media platform.



Blender

Incorporating blender into the secondary school IT curriculum would be a powerful introduction to an open-source tool which is itself a *de facto* standard for the animation industry (12).

This is a path well-trodden, with examples of schools in the USA incorporating it as part of their teaching (13). There are also many national or language user groups, and no reason at all why Wales and/or Cymraeg should not join the list (14). The free training provision is extensive and highly suitable for secondary school students (15).

Where Aardman Studios has been an economic driver for Bristol over the last few decades, perhaps Blender could do the same for Wales?



Using existing resource wisely

Wales already has a digital infrastructure that could be used to rapidly mobilise support for organisations, particularly in the public sector, to experiment or adopt with FOSS systems.

The [Centre for Digital Public Services](#) is well-resourced and has a highly experienced board and advisory panel. It also has the remit to:

- Support public sector service providers to design and deliver services
- Build digital capability and skills
- Make good practice available and to network people and organisations

Recommendation 3: The Centre for Digital Public Services to empower public sector bodies to pilot FOSS approaches to service and project delivery and help build networks of good practice for practitioners

Examples of current good practice FOSS project participation in Wales

Mozilla Common Voice

The Mozilla Foundation is a global not-for-profit organisation that works to ensure the internet remains a public resource that is open and accessible to all.

The Common Voice project is an attempt to use real voices to help train machines to understand real spoken languages. Welsh is one of the supported languages, and in principle the project could help to make smart devices³ that understand and respond to people using Welsh in the home or workplace.

Various translation projects

Many open source projects are 'ready to go' but have yet to be translated into Welsh. In principle, the people of Wales have access

to a huge trove of software that would be accessible through the medium of Welsh. The systems for translation are user-friendly, and include [Crowdln](#) and [Transifex](#). In principle, with 250,000 Welsh speakers, Wales has the opportunity to contribute to a large number of projects, even if the contributors are not able to contribute towards the code-base.

Such translation projects could form a valuable part of the learner experience. For example, students studying for GCSE English and Welsh in first-language could undertake discrete translation as part of their coursework. There are many projects that require fewer than 100 words to be translated in total. Alternatively, a class could undertake a much larger project as a collaborative project.

³ [Mycroft](#) and [Plasma Bigscreen](#) are examples of open 'smart' devices that could integrate spoken Welsh language in future

Appendices

The European context

The European context is interesting because the European Commission (EC) views open source as a way to level the playing field against a digital dominance exerted by other major global economic entities. As such, the EC has been developing a philosophy and practice of open source that could short-cut the evidence base for anything developed in Wales.

On October 21st 2021, the EC published its Open Source Software Strategy (OSSS)(5) as part of the overarching European Commission Digital Strategy (1).

(17)



The principles of the European Commission's Digital Strategy

The OSSS marks another step in a relative renaissance in the recognition of open source as a valuable component of digital within the EU, coming shortly after an Open Source Study (8) concluded that investment in open source software produced four-fold returns to the EU, and could provide particular additional value to the public sector.

The six principles governing the OSSS are:

1. Open-source solutions will be preferred when equivalent in functionalities, total cost and cybersecurity
2. We harness the working principles of open source; we innovate and co-create, share and reuse, and together build user-centric, data-driven public services
3. We share our code and enable incidental contributions to related open-source projects
4. We strive to be an active member of the diverse open-source ecosystem
5. We make sure the code we use and the code we share is free from vulnerabilities by applying continuous security testing
6. We promote open standards and specifications that are implemented and distributed in open source.

On the face of it, none of these six principles are outwith the competence or powers of Welsh Government.

The UK Context

The most recent policy documents or actions relevant to FOSS (or open data/open hardware) adopted by the UK Government are:

- Open Source strategy for Government (16) (2010)
- Open standards principles (17) (2018)
- Open standards for government data and technology (18) (Published 2017, updated 2020)
- Open standards Board (19)
- The technology code of practice (20)

The UK is home to nearly half of Europe's contributors to open source projects (21)

Organisations of interest

Organisation	Geographic area	Remit
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Centre for Digital Public Services	Wales	We're here to support delivery of better public services in Wales. We're bringing Welsh public service professionals and digital transformation experts together. We provide guidance, training, standards and hands-on practical help.
OpenUK	UK	Open Technology is the 3 Opens: open source software, open hardware and open data. OpenUK promotes businesses, projects and people, who use and develop Open Technology in the UK and collaborates with existing organisations in Open Technology.
Committee for Open Interoperability Standards	UK	We are a group set up in the UK under the overall body of Open Forum Europe - that lobbies for an open and competitive IT market. We are a UK based group working with the existing public policies in the UK with more focus on the public sector. In particular the catalyst for our creation was the publication of the Open Standards Principles.
Open Source Observatory	EU	The Open Source Observatory (OSOR) serves as a place where the open source software community can come together to publish news, find out about events, find relevant open source software solutions and read about the use of free and open source in public administrations across and beyond Europe
Open Forum Europe	Europe	OpenForum Europe (OFE) is a not-for-profit, Brussels-based independent think tank which explains the merits of openness in computing to policy makers and communities across Europe.
Open source collective	Global	We are a non-profit working for the common interests of those who create and use open source software.
Open Knowledge Foundation	Global	Our mission is to create a more open world – a world where all non-personal information is open, free for everyone to use, build on and share; and creators and innovators are fairly recognised and rewarded.
Open Education Global	Global	We envision a world where everyone, everywhere has access to the high-quality education and training they desire; where education is seen as an essential, shared, and collaborative social good.
OER Commons	Global	OER Commons offers a comprehensive infrastructure for curriculum experts and instructors at all levels to identify high-quality OER and collaborate around their adaptation, evaluation, and use to address the needs of teachers and learners. Diving into OER Commons is an exciting opportunity to collaborate with other educators and learners, at the forefront of a new educational era.

Licence

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References

1. European Commission Digital Strategy [Internet]. European Commission - European Commission. [cited 2022 Jan 4]. Available from: https://ec.europa.eu/info/publications/EC-Digital-Strategy_en
2. 'State of Open: The UK in 2021' - OpenUK [Internet]. [cited 2022 Jan 4]. Available from: <https://openuk.uk/stateofopen/>
3. What is Free Software? - GNU Project - Free Software Foundation [Internet]. [cited 2022 Feb 16]. Available from: <https://www.gnu.org/philosophy/free-sw.en.html>
4. The Open Source Definition | Open Source Initiative [Internet]. [cited 2022 Feb 16]. Available from: <https://opensource.org/osd>
5. Open source software strategy [Internet]. European Commission - European Commission. [cited 2021 Dec 19]. Available from: https://ec.europa.eu/info/departments/informatics/open-source-software-strategy_en
6. Digital strategy for Wales [HTML] [Internet]. GOV.WALES. [cited 2022 Jan 4]. Available from: <https://gov.wales/digital-strategy-wales-html>
7. <https://plus.google.com/+UNESCO>. Open-source software can revitalize indigenous languages [Internet]. UNESCO. 2019 [cited 2022 Jan 11]. Available from: <https://en.unesco.org/news/open-source-software-can-revitalize-indigenous-languages>
8. Study about the impact of open source software and hardware on technological independence, competitiveness and innovation in the EU economy | Shaping Europe's digital future [Internet]. [cited 2021 Dec 19]. Available from: <https://digital-strategy.ec.europa.eu/en/library/study-about-impact-open-source-software-and-hardware-technological-independence-competitiveness-and>
9. Well-Being of Future Generations (Wales) Act ' [Internet]. 2015 anaw 2 Apr 29, 2015 p. 56. Available from: <http://bit.ly/2OWaQJK>
10. A More Equal Wales: The Socio-economic Duty [Internet]. GOV.WALES. [cited 2022 Jan 11]. Available from: <https://gov.wales/more-equal-wales-socio-economic-duty>
11. Krelja Kurelovic E. Advantages and Limitations of Usage of Open Educational Resources in Small Countries. Int J Res Educ Sci. 2016;2(1):136–42.
12. Behler C. Is Blender the future of 3D modeling and VFX? [Internet]. Medium. 2021 [cited 2022 Jan 20]. Available from: <https://uxdesign.cc/is-blender-the-future-of-3d-modeling-and-vfx-f3b4ceb2cc9d>
13. How to Teach Blender at School [Internet]. CG Cookie. [cited 2022 Jan 20]. Available from: <https://school.cgcookie.com/articles/how-to-teach-blender-at-school>
14. Foundation B. Community [Internet]. blender.org. [cited 2022 Jan 20]. Available from: <https://www.blender.org/community/>
15. Institute B. Training [Internet]. Blender Studio. [cited 2022 Jan 20]. Available from: <https://studio.blender.org/training/>
16. Open source, open standards and re-use: government action plan [Internet]. GOV.UK. [cited 2022 Jan 4]. Available from: <https://www.gov.uk/government/publications/open-source-open-standards-and-re-use-government-action-plan>
17. Open Standards principles [Internet]. GOV.UK. [cited 2022 Jan 4]. Available from: <https://www.gov.uk/government/publications/open-standards-principles/open-standards-principles>

18. Open standards for government data and technology [Internet]. GOV.UK. [cited 2022 Jan 11]. Available from: <https://www.gov.uk/government/collections/open-standards-for-government-data-and-technology>
19. Open Standards Board [Internet]. GOV.UK. [cited 2022 Jan 11]. Available from: <https://www.gov.uk/government/groups/open-standards-board>
20. The technology code of practice [Internet]. GOV.UK. [cited 2022 Jan 11]. Available from: <https://www.gov.uk/guidance/the-technology-code-of-practice>
21. March 12 OH in S on, 2021, Pst 6:35 Am. Is the UK becoming the open source capital of Europe? [Internet]. TechRepublic. [cited 2022 Jan 11]. Available from: <https://www.techrepublic.com/article/is-the-uk-becoming-the-open-source-capital-of-europe/>



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Afallen LLP
Britannia House
Van Rd
Caerffili
CF83 3GG

afallen.cymru

