State of Open:
The UK in 2024

Phase One
AI and Open Innovation

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1 Overview

1.1 Executive Summary

This report is the first phase of OpenUK's 2024 reports and draws attention to the UK and its global positioning with respect to AI, open source and open innovation. It begins a process of exploration of what these terms mean, building on the OpenUK first AI Openness report[1].

Data shared in this report includes the output of a temperature check poll in December that represents a snapshot of hope for openness in AI models. 80% of respondents agree that AI models that are open source are important to creating transparency and security in business processes and technical infrastructure and, more generally, transparency, accessibility, fair competition and collaboration.

With the help of Runa Capital's analysis of GitHub repositories, data included in the report explores the growth in GitHub repositories for open AI projects globally. Of note is AutoGPT (from Significant Gravitas) which had, by the close of 2023 secured 156,000 GitHub stars was the fastest growing AI repository in the world. The report includes Fireside Chat interviews with Scotland's Toran Bruce Richards, the Founder / creator of AutoGPT and Emad Mostaque, founder of the British company StabilityAI.

The data shows that the number of AI repositories from the UK has grown from 5 in 2015 to 91 in 2023. We saw a spike in growth in 2017 with 19 created that year, and then a more steady growth pattern into 2023 coming up second with 14.

A comparison of the number of AI repositories with 1,000 or more GitHub stars hosted from the UK and Europe demonstrates that 5.6% of all UK repositories are AI as opposed to a 4.45% in Europe. The number of AI repositories with 1,000 or more GitHub stars in each of the UK, Germany, France, China, the US and India illustrate the global production of AI repositories and their relationship to the UK. In Europe, Germany with 103 such repositories sits ahead of the UK's 91.

The data and conversation is set within the broader context of current government push towards AI innovation and framing the conversation on openness in AI for policy and law makers . The debate on AI continues as does building understanding of the meaning and impact of open innovation and openness in AI.

Our reporting reflects the UK's place in AI and openness and the importance of these collectively to the UK.

1.2 Introduction - A year in review, 2023 The Year of AI Panic

Amanda Brock
CEO
OpenUK

2023 was an important year for "open innovation" and "open source AI" as discussion around their meaning and impact was forced centre stage in the global AI discussion. Kicking off 2024, we see a shift from AI pessimism to AI pragmatism. It is now crucial to build greater understanding around openness and AI, to understand the place of open source software, and open innovation in weights, models and algorithms, and open data in training AI.

It has been clear throughout the discussions amongst regulators, policy makers and Governments that they have been struggling to get the level of detailed understanding necessary to understand openness and risk and benefits in AI.

Open source software, its history and value to the digital ecosystem in the UK and global economy is nuanced and technical and detailed understanding is necessary.

AI and Open Innovation
In July 2023, OpenUK issued its first AI openness report[2], looking at the interaction between AI, open source and open innovation as it stood at that time. 2023 had already become the year of Generative AI. In a few short months, from March to July, the leak of the Llama generative AI model which was initially released with a licence allowing its use for research. And of course the game changing launch of ChatGPT 4.

Behind the scenes OpenUK had partnered with meta. We released the last report only a few days before the launch of Llama 2, with OpenUK as the only Open Tech Industry Organisation supporting its launch.

Launch of Llama 2 is not open source

OpenUK supported the launch of Llama 2 as "open innovation", and a look at the meta website [3]shows how carefully this was framed by meta pre-launch. OpenUK as an organisation is not focused purely on open source software but on "Open Technology", having realised the importance of the width of opens across subject matters - software, hardware, data, standards and increasingly AI - and also across the shades of open, since 2020.

Open source software requires a free flow of code which is enabled by software licensing meeting the Open Source Definition (OSD)[4]. Definitions 5 and 6 of the OSD enable anyone to use the technology shared for any purpose, thereby democratising technology through open source software.

Llama 2 was however released with both commercial restrictions in its Llama Community Licence[5] and an Acceptable Use Policy[6]. These both (individually and collectively) have the impact

1   https://openuk.uk/stateofopen/state-of-open-the-uk-in-2023/

2   https://openuk.uk/stateofopen/state-of-open-the-uk-in-2023/
3   https://ai.meta.com/llama/#partnerships
4   https://opensource.org/osd/
5   https://ai.meta.com/llama/license/
6   https://ai.meta.com/llama/use-policy/

of restricting the free flow of the code in the AI components. This means that the code is not open source software. The Llama Community licence is also not approved by the Open Source Initiative[7] (OSI) nor could it be as it is not a licence complying with the OSD.

Open source is not the wild west

Those in a state of AI panic are often concerned about existential risk - the concern that significant progress in the Artificial General Intelligence (AGI) might lead to human extinction or other catastrophic ending.

Where they lack deep understanding of open source software, this may be accompanied with an incorrect assumption that open source is the wild west and frequently AI risk has been incorrectly equated with openness. The contrary may often in fact be the case and closed systems which do not allow users access to the underlying technology may in fact pose more risk.

When Sam Altman, founder and CEO of OpenAI was ousted from his role as CEO panic ensued. This panic stemmed from its many customers losing trust in the closed source product. Although Altman was reinstated only a few days later, the damage was done and a lesson of the risk in closed AI was likely learned.

Use of an open source licence to enable software distribution and a free flow of innovation does not mean that open source software is not subject to restriction through regulation. Regulation trumps licensing. This fact is well understood across open source software development. Policing compliance or noncompliance may be simpler with the transparency offered by open source than it is with proprietary software. This transparency enables trust.

Open source done well with true community participation is actually a very controlled environment and often one with a great deal of structure and self-regulation/ good practice around development. All purported contributions are not necessarily accepted.

Open source licences generally require attribution of the code's creator(s) (directly, or indirectly through copyright requirements), and disclaim liability, by stating that the distribution of the code and its use is granted without liability as the code is effectively a gift of the creator(s). A gift allowing others to recycle and reuse code thereby enabling them to stand on the shoulders of giants. However any disclaiming of liability is only effective to the fullest extent permitted by law.

The creator of open source software choses the licence under which the code will be distributed. In the case of open source, a standard licence which is known and well established will be chosen. Whichever licence is applied it will enable usage without judgement as to how the code will be used. There is no room for the licensor of the software to make an ethical or commercial restriction or choice.

Decisions and judgements on ethics and values are left to the Government and regulators. Their laws primarily impact the use case of the software and not the creators - legal requirements for technology are different in a consumer transaction, a general commercial one and in a regulated sector. They reflect risk management and establish where liability ought to lie, i.e. the point of use.

The choice to use the software in a particular situation is made by those who use it and not by those who created it. In reality the risk has historically been expected to be passed to the user making that choice. Without the transfer of monies no liability would apply to the creator.

Should a user want to establish some level of responsibility on the part of the creator that would require an economic shift and money to change hands.

AI Regulation and codes

Existing regulations apply to AI as they do with other technology tools. Whether regulation is actually required specific to AI when viewed in this way is questionable. There may well be a need for some light touch regulation or something along the lines of a code of conduct for creators of AI. To the extent that these apply to open source software, there is a need for a clear understanding and definition of what amounts to open source/ what it means. In the context of AI there ought to be a distinction between true free flowing open source and other levels of open innovation in AI.

2023's AI panic led to a situation where open source and for that matter open innovation was massively misunderstood. Whilst the OECD clarified its definition of AI[8] enabling clarity in the European Union's AI Act. Sadly, the same clarity was not created around the meaning of open source and open innovation.

Llama FUD

Unfortunately, from the moment of launch and Mark Zukerburg's Facebook announcement[9] of the launch of Llama 2 both he and its Head of Product, Yann Le Cun, wrongly described Llama 2 as open source. This has created confusion and something that open source software is no stranger to, FUD - fear, uncertainty and doubt. Whether this is "open washing" - an attempt to take open source's value and pass off something that doesn't quite cut the mustard as open source - or whether this is genuinely a lack of understanding of the nuances of open source and its freeflow remains to be seen. In many respects it does not matter. What matters is that it was unfortunate and has caused confusion.

Why does the OSI or open source community not stop this FUD? It has no legal tools. In the early stage of the OSI Bruce Perens was advised by a lawyer not to register the trade mark. When much later the OSI attempted to do so, the mark was not approved, as it was deemed to have become generic. This is like the use of the term "hoover" to mean all vacuum cleaners rather than the brand Hoover. This means the OSI lacks the tool - a trade mark - to enforce the meaning of the term open source software.

Does it really matter if we call open innovation that doesn't meet the standard of open source software enabling free flow, open source?

It does and here's why.

Understanding the meaning of open source

In OpenUK's response to the House of Lords' LLM Enquiry, OpenUK described a situation where all of the different shades of openness are treated the same despite their differences, as being like vehicles on a road. If we say that all vehicles are means of transport, with wheels which get us from A to B and then we characterise all vehicles in the same way, then we would uniformly regulate a bicycle, a car and an Heavy Goods Vehicle. That is obviously not appropriate as they have differences that must be taken into account.

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7   https://opensource.org/

8   https://oecd.ai/en/wonk/ai-system-definition-update
9   https://www.facebook.com/share/p/PoW53QGZXktFPaFv/?mibextid=WC7FNe

The same is true in the case of AI. The different levels of openness have different impacts. Whilst OpenUK supported meta's release of Llama 2 as a positive step in the open direction with huge benefits, that was in the context of its being described as open innovation. The mis-characterisation of that as open source is a different matter.

The Llama 2 licences include commercial restrictions which impact the free flow which comes with consequences. For example the requirement to obtain a commercial licence the terms of which are unknown at 7 million users creates a restriction on use that will have an impact. There is likely also a benefit for meta that may have implications to a successful user, and may effectively give meta the ability to control an ecosystem around LLama 2.

As legislation and codes are put in place which offer carve outs, exceptions or preferential treatment to open source in AI, it will be essential to recognise what amounts to open source, just as it was necessary to know what AI means.

Such recognition will ensure that truly open source AI like the UAE's Falcon LLM (on the OSI approved Apache 2.0 licence) or the recently released Microsoft Tiny Model, Phi-2 (released on the OSI approved MIT licence) which enable the free flow of the code so that anyone can use them under theses licences for any purpose - is treated as open source. On the other hand open innovation such as Llama 2, subject to a restriction on commercialisation as well as the AUP might well not merit the same carve out being applied in legislation as this might have a different impact withmeta potentially having control over the ecosystem despite a level of openness. A level of openness which is of course better than the code being closed but not as beneficial as entirely free flowing code.

Differentiating the shades of Open and their impact on regulation and legislation

There is a clearly defined risk in the term open source being used to cover differing "things" where the term open source is used inconsistently.

The EU Approach

Both the Cyber Resilience Act and the AI Act in Europe offer exceptions to the regulatory requirements for free and open-source software" and this is explored in more details at 1.5, in an analysis of the Act.

However, it is worth noting that the "final" text of the EU Cyber Resilience Act released in January 2024, uses the term "free and open-source software" and this has been defined to be something different from the historic usage of these terms and does not use either the OSD for open source nor the four freedoms for free software.[10]

"10 (c) Free and open-source software is understood as software the source code of which is openly shared and the license of which provides for all rights to make it freely accessible, usable, modifiable and redistributable. Free and open-source software is developed, maintained, and distributed openly, including via online platforms. In relation to the economic operators covered by this regulation, only free and open-source software made available on the market, and therefore supplied for distribution or use in the course of a commercial activity should be covered by this Regulation."

It remains to be seen whether the same text and definition will be applied within the AI Act.

The US Approach

The US Office of Management and Budget (OMB) released Implementation Guidance[11] relating to the 30 October 2023 Executive Order on the Safe, Secure and Trustworthy use of AI[12] fo comment by 5th December 2023, and on 29th January 2024, provided an update on the status of the actions required within 90 days of the Executive Order[13].

The AI Alliance

Meta, IBM, and dozens of private and public sector partners launched the AI Alliance to advocate for open source AI, in December 2023[14].

Defining Open Source AI

The OSI ecognised that AI is made up of more than software and has been undertaking a consultation on the meaning of open source AI. In one of those consultations in San Jose in December, half the room I was in did not believe a new definition was needed. AI may require new licences but whether it requires a new definition remains to be seen.

However, as OpenUK did 4 years ago, the OSI recognises that we need to consider more than software. We need to look at data, weights and models too. Clarification is required as to whether the existing definitions are adequate and this is a question for our community as the OSI brings forward its draft for consideration. It may be that a new definition is not needed but what is instead required is clarity on the components of AI and their licensing and there may be need for a new approved licence that meets the existing definition for software and which incorporates licensing terms for the other elements included in AI, as opposed to a new definition.

The way forward

However, it is absolutely clear that clarity and definition in the use of the term "open source" as used by policy and law makers is essential. It is also essential for them to understand that there are shades of open and that licences with commercial or other restrictions on use that do not enable the truly free flow of code have different consequences - different risks and fewer benefits. These ought therefore to have different impacts on the approach taken to risk and liability.

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10 https://www.gnu.org/philosophy/free-sw.en.html

11 chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.whitehouse.gov/wp-content/uploads/2023/11/AI-in-Government-Memo-draft-for-public-review.pdf
12 https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/
13 https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/29/fact-sheet-biden-harris-administration-announces-key-ai-actions-following-president-bidens-landmark-executive-order/#:~:text=The%20Order%20directed%20sweeping%20action,around%20the%20world%2C%20and%20more.
14 https://apnews.com/article/ai-opensource-meta-ibm-chatgpt-dd61e99ac8135b36872b3987601067ec

2 The Approach to Law and Policy

The UK

2.1 Office of AI White Paper and OpenUK Roundtable

The Office of AI published a White Paper for consultation on 29 March 2023, entitled "AI Regulation: A Pro-Innovation Approach"[15].

The white paper stated:
"There is a relatively small number of organisations developing foundation models. Some organisations exercise close control over the development and distribution of their foundation models. Other organisations take an open-source approach to the development and distribution of the technology. Open-source models can improve access to the transformational power of foundation models, but can cause harm without adequate guardrails. The variation in organisational approaches to developing and supplying foundation models introduces a wide range of complexities for the regulation of AI. The potential opacity of foundation models means that it can also be challenging to identify and allocate accountability for outcomes generated by AI systems that rely on or integrate them"
Its consultation questions included: "F1. What specific challenges will foundation models such as large language models (LLMs) or open-source models pose for regulators trying to determine legal responsibility for AI outcomes?"
OpenUK hosted a roundtable discussion with the Office of AI bringing open source experts to the discussion in July 2023.

2.2 AI Summit and the AI Minister's thoughts

In November 2023, the UK Prime Minister hosted around 100 people at the AI Risk Summit in Bletchley Park.

Open source was specifically not included at the summit although it was raised as a discussion topic by China and France. The UK AI Minister stated that the UK did not yet have a position on open source, whilst the Deputy Prime Minister Oliver Dowden stated[16] "It's not just economies like the U.K. and other European countries that benefit from open source. I see it in so many applications that are being created right now. I see tiny startups that are already billion dollar plus companies within a matter of literally months off the back of open source.""It's also the case if we want to make sure it spreads globally, in terms of the developing world. So I think there was a very high bar to restrict open source in any way," said Dowden.

The Bletchley Declaration[17] signed by 29 participating counties and released on day one of the Summit does not mention open source.

2.3 The Lords LLM Inquiry[18]

The Lords inquiry was set up in July 2023 to examine large language models and what needs to happen over the next 1–3 years to ensure the UK can respond to their opportunities and risks. This will involve evaluating the work of Government and regulators, examining how well this addresses current and future technological capabilities, and reviewing the implications of approaches taken elsewhere in the world.

2.3.1 Oral evidence:

Oral evidence was given in relation to open source on 8 November by Hugging Face, Mozilla, Holistic AI and Professor John McDermid of the University of York, but no representation of the open source community was included.

2.3.2 Written Evidence:

A number of parties responded to specific questions asked by the Lords and provided written evidence[19].

2.3.3 OpenUK Written Submission to the House of Lords LLM Inquiry[20]

OpenUK became aware of this opportunity after the closing date and was given a pass - allowed to make a late submission in November 2023. This was put together in a short space of time. Considered to be beneficial to explain open source as the process had involved little to no representation of the open source community itself, the response does unfortunately contain a couple of factual errors - a typo on exponential risk which should be existential for example.

The full text is included at section 6 for ease of reference and in particular draws attention to the disconnect in the use of the term open source.

2.3.4 Lords' Report

At the time of writing this report, the House of Lords report on its Enquiry into LLMs is due for imminent publication.

15   https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper
16   https://www.politico.eu/article/british-deputy-pm-throws-backing-behind-open-source-ai-downplays-risks/
17   https://www.gov.uk/government/publications/ai-safety-summit-2023-the-bletchley-declaration/the-bletchley-declaration-by-countries-attending-the-ai-safety-summit-1-2-november-2023

18   https://www.parliament.uk/business/lords/media-centre/house-of-lords-media-notices/2023/july-2023/how-will-ai-large-language-models-shape-the-future-and-what-is-the-right-regulatory-approach/
19   https://committees.parliament.uk/work/7827/large-language-models/publications/
20   https://committees.parliament.uk/work/7827/large-language-models/publications/written-evidence/

2.4 Competition and Markets Authority Initial Report and Workshop, December 2023

On 18 September 2023, the UK's Competition and Markets[21] Authority published its draft report. This was followed by a consultation in December 2023, including a non-expert group discussion of open source.

The report focuses on open source models in respect of Deployment, routes to market and monetisation strategies and at 2.20 (a) defines "Open-source models are freely shared, and can be used at no cost, subject to their licences (which can prohibit commercial use). 24 An open-source release can consist of the underlying code, model architecture, and training data, enabling others to replicate the training process. In some cases, it also includes the weights and biases (i.e., the 'knowledge') of the model, such that others can use or fine-tune the model without conducting their own pretraining. Some fine-tuned models have also been made open-source, such that others can use it as trained or conduct additional fine-tuning for their purposes." The report acknowledges that the use of the term "open source" has been disparate and confusing with respect to AI.

2.5 Intellectual Property Office and Code of Conduct

Following on from the Vallance Report in 2022, the Intellectual Property Office (IPO) is considering the publication of a Code of Conduct which was due to be released initially in September 2023, then by end of year and at the time of publication is due imminently. This has been delayed to "get it right" according to the UK AI Minister, Lord Camrose.

Concerns about potential restrictions on access to data for the purpose of text and data mining have led to and open letter signed by open data advocates[22] highlighting critical need to clarify UK intellectual property laws to facilitate safe AI development and to support innovation with the UK being a favourable place to develop and use safe AI, by clarifying that public and legally accessed data is available for AI training and analysis in its code of practice.

2.6 UK Government Consultation at State of Open Con 24 in February 2024

State of Open Con 24[23], will take place in London on 6 and 7 February 2024, and will include an AI Policy Zone. The UK Government Departments, The Home Office and the Department for Science, Innovation and Technology's AI Team, will be conducting direct consultation with the attendees. They will attend in "listening mode" to undertake a direct consultation with the open source communities to enable them to gain a better understanding of open source. They will benefit from the community's experience and thoughts on both open source and its role in AI.

This is believed to be the first such direct consultation of this nature, engaging with the open source community as opposed to a few select representatives, in respect of understanding of open source and AI to have been undertaken by any Government Department in any country in the world.

2.7 Report Review: Open Sourcing the AI Revolution

In the 2023 report, *Open Sourcing the AI Revolution Demos*[24] presents an overview of the private discussion forum they convened among CEOs and public policy leads from leading technology companies, AI investors, civil society specialists and government officials and senior advisors. Their review tends to be a critical take on the relationship between Open Source and AI, focusing on security concerns and risk.   The open source community was not represented in these discussions.

The report suggests that there is a growing need for regulation in the rapidly advancing field of AI, particularly in the context of the relationship between AI and open source. The key challenge is balancing the open source ethos with the need for safety and control. It goes on to say that open source principles promote transparency and collaboration which can build confidence in their positive potential, there are concerns about potential misuse and the lack of guardrails. The debate revolves around finding a balance that ensures positive contributions while addressing ethical and safety considerations, similar to the challenges faced in the regulation of encryption software and general software development.

The conversation was structured around three themes: open source and security, competition and concentrations of power and how to understand risk.

On security, the discussion centred on whether software, including open source AI models, becomes safer and more accountable through transparency. One side argued that openness enhances safety, while opposing views suggested a pause in development, regardless of whether it was open or closed-source, to prevent potential existential risks. The second aspect focused on the offensive and defensive balance. A vulnerability only has to be found once for all versions of a piece of software to be patched - a defensive advantage. In the context of secure encryption - vital for the modern internet - the open source community's approach was validated, rejecting the notion of "security through obscurity." The ability to deploy, test, and audit strong encryption was deemed effective in building the internet's foundational security system.

Market concentration was highlighted as a potential risk is open source AI is restricted. A small number of well-capitalised companies may take their models behind closed doors, limiting competition from smaller innovators. However, some argue that open source development is not purely organic or volunteer-driven, as it is often large companies that contribute to it. They emphasised that only well-capitalised companies, capable of extensive funding for intensive training runs, have the resources to develop transformational foundation AI capabilities.

Ultimately it comes down to how to understand open source risk - whether the burden of proof for model safety lies with developers or regulators. Different actors have diverse incentives but the discussion emphasises the need for a proactive approach to risk management, as retrospective changes to licensing rules may hinder legitimate users without effectively preventing malicious misuse by criminal or state actors. The framework discussed considers the societal balance between the speed of technological advancements and our ability to mitigate potential negative effects, influencing decisions on where AI companies choose to launch or invest.

21   https://www.gov.uk/government/publications/ai-foundation-models-initial-report
22   https://www.ipfederation.com/download/text-data-mining-tdm-uk/
23   https://stateofopencon.com/

24   Reference: Ball, J. & Miller, C. (30 October, 2023). Open Sourcing the AI Revolution. Published by Demos. Available here:https://demos.co.uk/research/open-sourcing-the-ai-revolution-framing-the-debate-on-open-source-artificial-intelligence-and-regulation/

While Demos suggests that open AI would allow small companies or startups to gain access or market share of AI development it argues that it is only large and well capitalised companies that can truly invest in pushing AI forward - those with enough funds to run 'enormously intensive training runs'. This thinking would certainly curtail the work of many start-ups and entrepreneurs so important to the UK economy. A final four premises are put forward to set the stage for further conversation:

1. Generative AI is a very specialised form of software, for which open source may not bring the same beneficial effects as it does to most other forms of software
2. Neither closed nor open AI models are unalloyed goods nor unalloyed evils and so any regulatory position, including being entirely laissez-faire, involves trade-offs – this debate is not an exception to that norm
3. There is a broad consensus that there will be a level of AI capability that would merit restrictions on its openness, though not what that level would be, nor how soon that might arise
4. Given that it is currently impractical to curb the use of a model that has been made fully open, regulation of an AI model of a certain capability level would need to be in place before that breakthrough was made

The report is however unclear on what open source actually is considered to mean and this significantly impacts the depth of understanding necessary to analyse risk. The audience participating in the discussions lacked deep open source expert participation or community representation.

2.8 Thought Leadership: The International view

Margaret Hartnett
Co-founder,
Progressio AI Ltd.

While several EU laws (e.g., the General Data Protection Regulation (GDPR)) already apply to AI applications, the AI Act is the EU's first comprehensive horizontal, cross-sectoral regulation focusing on AI. The AI Act addresses fundamental rights and safety risks stemming from the development, deployment, and utilisation of AI systems within the EU. The primary goals of the AI Act are to ensure the responsible and ethical use of AI technologies while fostering innovation and competitiveness in the EU. Another objective is to avoid fragmentation of the EU single market by setting harmonised rules on the development and placing on the market of 'lawful, safe and trustworthy AI systems' thereby ensuring legal certainty for all actors in the AI supply chain.

In essence, the AI Act regulates entry to the EU single market. Companies and state authorities that provide or deploy AI systems in the EU must comply with the rules set out in the AI Act. The AI Act also has extraterritorial effect, because it will apply whenever an AI-based system is used in the EU, regardless of where the provider or operator is based – or whenever an output of such a system is used within the EU, regardless of where the AI system itself is based. However, the AI Act will not apply to AI systems "which are used exclusively for military or defence purposes" or to "AI systems used for the sole purpose of research and innovation".

The AI Act adopts a risk-based approach, categorising AI systems into different risk levels based on their potential impact on fundamental rights, health and safety, and societal well-being. This classification includes four categories of risk ("unacceptable", "high", "limited" and "minimal"), plus one additional category for general-purpose AI ("GPAI").

AI applications deemed to represent unacceptable risks are banned. These include:

- biometric categorisation systems that use sensitive characteristics (e.g. political, religious, philosophical beliefs, sexual orientation, race);
- untargeted scraping of facial images from the Internet or CCTV footage to create facial recognition databases;
- emotion recognition in the workplace and educational institutions;
- social scoring based on social behaviour or personal characteristics;
- manipulation of human behaviour to circumvent free will;
- exploiting the vulnerabilities of people (due to their age, disability, social or economic situation);
- certain applications of predictive policing; and
- some uses of "real-time" biometric systems in publicly accessible spaces by law enforcement.

AI systems deemed to be high risk are required to undergo extensive evaluation before being introduced to the market and ongoing monitoring throughout their operational life cycle. Specifically, high-risk AI systems must comply with comprehensive obligations regarding risk mitigation, data governance, detailed documentation, human oversight, transparency and provision of information to users, robustness, accuracy, and cybersecurity. Such AI systems may also be required to undergo fundamental rights impact assessments.

High-risk AI systems will also be subject to conformity assessments to evaluate their compliance with the Act. Conformity assessments may be done by self-assessment or third parties (i.e. a notifying body appointed by EU member states under the AI Act). Notifying bodies may also carry out audits to check whether a conformity assessment is carried out properly.

A final agreed list of high-risk AI system categories is not yet available. However, while changes may be expected to specific details, the broad application areas covered by the original draft text of the AI Act are likely to remain, namely those associated with critical sectors, such as healthcare, education, employment and recruitment, critical infrastructure, access to public and private services (including credit-scoring), law enforcement, border control and administration of justice.

AI applications classified as being limited-risk, such as chatbots, certain emotion recognition and biometric categorization systems and systems for generating deep fakes are only subject to transparency obligations. These include informing users that they are interacting with an AI system; and marking synthetic audio, video, text and images content as being artificially generated or manipulated for users and in a machine-readable format.

AI systems representing minimal risks are not regulated. Instead, stakeholders are encouraged to build codes of conduct.

In recent trilogue negotiations, an amended tiered approach was agreed for obligations of GPAI systems/models. The first tier applies to all GPAI models. It requires providers to adhere to transparency requirements by drawing up technical documentation (unless the GPAI models are in the R&D phase or they are open source); to comply with EU copyright law; and to provide detailed summaries about the content used for training.

The second tier applies to GPAI models with systemic risk. These GPAI models are subject to more stringent obligations including conducting model evaluations; assessing and mitigating systemic risks; conducting adversarial testing; reporting serious incidents; ensuring cybersecurity and reporting on their energy efficiency". GPAI models with systemic risk may comply with the AI Act by adhering to codes of practice, until harmonised EU standards are published.

Fines for violations of the AI Act will depend on the type of AI system, size of company and severity of infringement and will range from:

- 7.5 million euros or 1.5% of a company's total worldwide annual turnover (whichever is higher) for the supply of incorrect information; to
- 15 million euros or 3% of a company's total worldwide annual turnover (whichever is higher) for violations of the AI Act's obligations; to
- 35 million euros or 7% of a company's total worldwide annual turnover (whichever is higher) for violations of the banned AI applications.

In cases of persistent non-compliance, the high-risk AI systems may be restricted or withdrawn from the EU market.

The final text of the AI Act has not yet been published and adopted by the Council and the EU Parliament. However, it may be published in early 2024 and a leaked version of the text was available on 22 January[25]. Until the official text, certain details remain unknown, for example, the precise definition of "AI systems" and the final list of classifications for high risk AI systems. We also look forward to greater clarity regarding the obligations of developers and deployers of open source.

25   https://iapp.org/news/a/eu-ai-act-draft-consolidated-text-leaked-online/

3. Open Innovation in AI

3.1 UK AI Repositories

3.1.1. Top UK AI Repositories, January 2024

The UK's AI repositories continue to be topped by AutoGPT the open source software Agent from Edinburgh's Significant Gravitas founded by Toran Bruce Richards[26], which was the second AI repository in the world to achieve 100,000 GitHub stars and today sits at 156,929 stars.

3.1.2 UK AI Repositories by year created

More AI repositories with 1,000 GitHub stars were created from the UK on GitHub in 2017, than 2023. This reflects that AI is ML models, big data, etc. and most of the fundamental repos started in 2017-2019.

3.1.3 The Number of UK AI Repositories

The total number of AI repositories with 1,000 GitHub stars in the UK has seen a steady pace of growth and saw an unsurprising increase in the total number in 2023.

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26   See Fireside Chat with Toran Bruce Richards at 3.2 herein

3.1.4 Repositories in the UK versus Europe

A comparison of the number of AI repositories with 1,000 GitHub stars hosted from the UK and Europe demonstrates a 5.67% share of these repositories being AI repositories in the UK as opposed to a 4.45% share of these being AI in Europe. In this context this is the share of the total number of repositories with 1,000 stars or more that focus on AI.

3.1.5 Repositories in the UK versus global

This figure illustrates the AI repositories with 1,000 GitHub stars or more in each of the UK, Germany, France, China, the US and India and their relationship to the UK. In Europe Germany with 103 such repositories sits ahead of the UK's 91.

3.1.6 The changing landscape

With a broader lens, we see the number of UK repositories which have 1000 plus GitHub stars growing in each quarter of 2023 and by a total of 12 across the year.

3.2 A Fireside Chat: Toran Bruce Richards, Founder of AutoGPT

Toran Bruce Richards
Founder,
AutoGPT
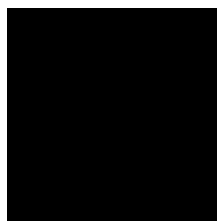
OpenUK spoke with Toran Bruce Richards, Founder of AutoGPT. AutoGPT works with passionate individuals all over the world.

1. What is your personal background and how did you come to work in AI?

My mission in life is to help see humanity thrive. From a young age I could clearly see that the two paths to having the largest hand in this mission were Artificial Intelligence, and space.

I have a deep fascination with space and our place within it. When I was deciding what to study in University, I was initially going for Astrophysics, but noticed a post from SpaceX stating that if you love Physics and Computers, and want to work in the space industry, do not study Software Engineering, but rather Games Development! Initially this surprised me, but the reason is that Games, rather than traditional programming, is deeply reliant on complex mathematics for computer graphics, and physics for simulation of virtual worlds.

I pivoted my life on this sentence and studied games development.

At university I went from knowing nothing about programming, way out of my depth, to a deep passion for building things, which naturally led to me spending all my free time doing it.

Out of university I ran a small business bringing video game technology to non-game industries. I noticed that at the time, traditional businesses didn't take game technology seriously, this didn't realise how far ahead it was in many ways. This enabled us to impress clients such as governmental ecological centres and defence contractors with real-time, high-fidelity simulation and visualisation. Whilst this was at times fulfilling, and I enjoyed the impact our work had on people, I wasn't having the global impact that my mission demanded. It was around this time that OpenAI came out with their Davinci Large Language Model, and I realised that the AI revolution was about to happen.

I always knew that when it came, AI would be the single most important technology that humanity has ever seen. The capacity for impact is immeasurable, and surely beyond our comprehension.

I immediately started doing what I love the most, and building things. As new technologies and techniques surfaced I picked them up immediately and brought my creations to life. It seemed obvious to me that the holy grail here was Artificial Intelligence that could actually "do things", rather than predict the next word in a sentence, and it was clear to me how this could be, in principle, achieved.

2. What is your background in and understanding of open source software?

I currently coordinate and run one of the biggest open source projects in the world, AutoGPT. Open source is simply technology that is built in public, rather than behind closed doors, with all the computer code available for anyone to scrutinise and use for free.

This creates an environment where individuals, both independent and from large enterprises, identify potential problems and contribute their solutions back to the public project. Practically every large enterprise relies on open source technology in some way, and they often prefer it. This is due to the fact that it offers a stable foundation to build on that isn't reliant on the survival of a single company.

Open source props up far more of human civilization than the vast majority of people realise.

3. You run a UK based company - views on building in the UK in terms of finding talent and skills, taking investment and Government support?

We are lucky enough to have access to a global pool of passionate talent. Many people believe in our vision, so we don't have trouble finding passionate individuals to help.

The UK Government could certainly provide financial support for hiring in the UK specifically if that was a priority for them.

4. You created AutoGPT in one month in 2023, can you explain what triggered this? What is AutoGPT? What does an AI Agent do?

AutoGPT was the culmination of many different projects over a wide period of time, so it's not fair to say that it only took a month.

I created AutoGPT based on the belief that a large language model's next word prediction abilities were a reasonable simulacrum to a single "thought", and that these thoughts could be chained together using traditional programming techniques, (especially those used in games), into a "mind".

It was clear to me that AIs that can actually "do" something, rather than just output information, was the holy grail of AI, and the technology that would be the greatest benefit to humanity.

AutoGPT simply acts on behalf of a user, based on their given task. It observes its environment, plans, self-reflects and finally carries out actions (with the user's express authorisation) in order to achieve that task.

5. What is its potential impact on Generative AI and AI generally?

The potential impact of AI is hard for even the best Sci-Fi writers of our time to imagine.
It is capable of indirectly solving almost every problem that humanity faces today, as it solves intelligence. This means technology around Climate, Energy, Food, Health have the potential to see vast leaps forward.

Before Super Intelligence, however, AI like AutoGPT has the potential to remove all the mundane drudgery that comes with our day-to-day interaction with computers. Our technology transforms computers from a tool that you work on, to a tool that works for you.

And the implications of that are extraordinary - it's like having a team in your pocket that's able to perform any kind of work you need done - programming, designing, communicating, researching.

AutoGPT can bring a new age where we are able to focus on what we are most passionate about, and to say goodbye to the boredom and frustration that modern computers bring.

6. AutoGPT is distributed under the OSI approved open source MIT licence. How important is it that it is open source software and why did you choose to make it open source software?

When I saw that this technology was possible, I instantly knew that it had the potential to either improve the world, or make it far worse, depending on who had access to it.
It doesn't take much imagination to realise that if this technology was developed behind closed doors by one of the corporate giants of today, they would keep it to themselves and use it to automate away expensive jobs. This would turn companies which make billions, but also pay people billions, into companies that just make and keep billions.

By open sourcing this technology; giving everyone equal access, the playing field is levelled somewhat. This means that the individual can have just as much ability to utilise this technology as a corporate giant. Instead of creating inequality, this creates opportunities for people to achieve their dreams, previously only accessible for those with access to large amounts of money.

7. AutoGPT now has 156,000 GitHub Stars and was the second AI repo on GitHub to reach 100,000 stars - why is it so popular and growing so fast?

Our vision resonates with a lot of individuals, as they see the potential to achieve opportunities with AutoGPT that wouldn't otherwise be possible.

8. With 49,000 forks it is clear that many are working on AutoGPT and creating their own iterations. What is the impact of this and do you have knowledge of what they are building?

AutoGPT instantly inspired a plethora of projects and services which are now commonly referred to as "AI Agents".

The fact that there are nearly fifty thousand projects trying to build impactful things based on AutoGPT technology is brilliant for our project.

We are constantly seeing the benefits of people pushing this technology and making breakthroughs, as they are most commonly fed back into the global open source community.

9. You have recently taken a reported $12m in US investment - did this require a shift to a US company and if not where is the company registered? Did you consider funding from the UK and if so why did you not take it?

Taking US investment did not mean shifting to a US entity, the company is registered in the UK.

We did consider funding from a wide range of sources, and there are many factors that go into such a decision.

Ultimately Redpoint proved the best partner for us, in part due to their deep commitment to, understanding of and history in Open Source.

10. What do you believe the future holds for AutoGPT?

I couldn't be more excited about the future.

We are, as we speak, going through multiple significant technological breakthroughs which have me and the team very excited.

In 2024 this technology will become an indispensable part of the lives of individuals all over the world. Carrying out day-to-day digital chores on your behalf, freeing you to spend time on what's actually important.

We will help to provide social mobility for individuals with a dream to build something, but who are currently held back by a lack of money, expertise and time.

Our vision resonates with a lot of individuals, as they see the potential to achieve opportunities with AutoGPT that wouldn't otherwise be possible.

3.3 Contributors to AI Open Innovation

3.3.1 UK AI contributors in 2024

3.3.2 Growth in UK contributors to AI Open Innovation

3.4 A Fireside Chat: Emad Mostaque, Founder Stability AI

Emad Mostaque
Founder,
Stability AI

OpenUK spoke with Emad Mostaque, Founder of Stability AI. Stability AI has over 150 employees based in the UK, the US and across the world including Germany, Japan and the UAE. It is based in the UK.

1. What is your personal background and how did you come to work in AI?

I am a mathematician and problem solver at heart. I started my career in finance, with a background in engineering having studied mathematics and computer science at the University of Oxford. I later founded Stability AI, with a view of using AI to solve some of the world's greatest challenges and to help humanity to achieve its potential.

2. What is your background in and understanding of open source software?

Open source technology is what will power the world and help to level the playing field in this next revolution.

At Stability AI, we are committed to developing and releasing open models because we recognise and welcome the benefits of open source software. Open models are innovation enablers. They democratise access and allow grassroots developers anywhere in the world to develop specialised models tailored to specific needs so that one day every sector and every nation can have their own AI.

Our commitment to open models is driven by democratising access to this technology and empowering the grassroots developer community in order to ensure transparency and competition.

The grassroots development of new businesses outside of the US is also essential to mitigate against a likely geographical AI divide and the development of local models will help to reduce bias and improve transparency.

3. You run a UK unicorn. Can you share your views on building in the UK in terms of finding talent and skills, taking investment and Government support?

We are hugely proud to be a British AI company with talent based both in the UK and all over the world.

We continue to attract some of the best and brightest talent in the world, who choose to work at Stability because our technology is cutting edge and our researchers have freedom to create.

4. Can you share the personal motivation behind founding Stability AI and how you've achieved your vision for the company in the world of open source AI?

When I worked at a hedge fund, I was a big investor in video games and AI. But my real interest in AI came when my son was diagnosed with autism. I wanted to see how AI could help to review existing research and detect commonalities.

Stability AI is now the leading independent multi-modal generative AI company. The goal is to make foundational AI technology accessible to all and enable the development of multi modal models for every sector and nation. This cannot be done without open models, which is why they are at the heart of Stability AI.

Achieving this vision takes a lot of hard work along with a lot of collaboration across our world class teams. Having the goal of making this technology accessible to all has been very important in driving us.

5. Stability AI is currently dealing with some challenges around copyright and intellectual property. Can you explain?

As with any groundbreaking technology, AI raises important questions about the integration of these tools into the digital economy.

We believe that the benefits of AI will accrue to jurisdictions with clear, fair, and practical rules governing AI development. We have been engaging with governments and regulators around the world, including in the United Kingdom to assist them with these important questions as they consider the future of AI and intellectual property.

In March 2023 I was one of the first CEOs in the AI industry to sign an open letter[27] calling for greater caution in the development of powerful AI models and in May 2023 I sent an open letter[28] to the US Senate Subcommittee on Privacy setting out suggestions for the future of oversight.

6. You've recently started offering a subscription service in order to standardise and change how customers can use your models for commercial purposes. How do you envision balancing the company's commitment to openness with the need for profitability?

Having delivered best in class models at the cutting edge of generative AI, we are commercialising our offering in order to better serve enterprise customers whilst remaining committed to providing open models to small developers, academics and non-commercial entities.

This closer collaboration with companies will also ensure that we are creating useful models that not only help to solve problems and boost efficiency, but also augment creativity. This will make us even better and more relevant and ensure that we stay ahead of the curve.

We remain committed to releasing our models openly to empower researchers and developers to use our models and build upon this transformational technology.

27   https://s3.documentcloud.org/documents/24117937/stabilityai-stable-diffusion-etc.pdf
28   https://static1.squarespace.com/static/6213c340453c3f502425776e/t/6463b486b97b333044ea2564/1684255881952/State-ment+from+Stability+AI+to+the+Senate+Judiciary+Subcommittee+on+Privacy,+Technology,+and+the+Law.pdf

We will continue to release open source models and open research through our grants and collaborations with non-commercial researchers and academics. Our membership programme has been deployed in close consultation with researchers and our community.

We will always be a foundation model powerhouse.

7. With the evolving landscape of AI technologies, how does Stability AI navigate the balance between encouraging open source innovation and prioritising safety to mitigate potential risks and malicious use of your AI tools?

Safety comes first, always. We have taken proactive steps and developed layers of mitigation including filtering datasets that our models are trained on to remove unsafe content, adding filters to intercept unsafe prompts or outputs and investing in content labelling features to help identify images generated on our platform.

We also collaborate with academics and NGOs and support their efforts to strengthen these guardrails. Our researchers are working closely with researchers at John Hopkins University and have granted compute power to jointly develop better defence mechanisms.

With half the world's population set to vote in national elections this year, preventing the misuse of AI has never been more important. In addition to our existing safeguards, we are focused on mitigating disinformation and misinformation. We are also working with organisations in the US that provide solutions to the threats that disinformation, AI, deep fakes, and other emerging technologies could pose to elections.

The pace of innovation is accelerating and collaboration between regulators, law enforcement, technology platforms, AI developers and AI deployers is key to ensuring safety.

8. Why do you think music and image generating systems such as Dance Diffusion and Stable Diffusion are such popular tools?

What our research and product teams have achieved in such a short space of time is nothing short of extraordinary. Our models are the most downloaded and the most liked on Hugging Face and have been downloaded over 100 million times by developers. Nearly 300,000 developers and creators actively contribute to the Stability AI online community highlighting the strength of our collaboration with the open source community.

I think that one of the reasons our models are so popular is because we are focused on developing technology that is human augmenting. It is designed to enable humanity to do more by prompting a wave of productivity and creativity. SDXL Turbo can now generate 100 images a second and our StableLM Zephyr model works without the internet at the same performance of models 20 times the size. The fact that these models are openly available for researchers to build on is something we are incredibly proud of and is core to our ethos.

9. What do you believe the future holds for Stability AI?

I am hugely excited about the future of Stability AI. 2023 was the year of talking about AI. 2024 is going to be the year of action and we will see exponential adoption. It's not a case of if, but when and the UK can lead the charge.
 Open technology is already playing a huge role in promoting transparency, improving accessibility, lowering the barriers to entry and driving innovation and we look forward to continuing to play our part as the leading developer of world class models across modalities, including audio, video and 3D. We are focused on generative media, which means that every pixel is going to be digital.

We are going to see the increased adoption of AI across different sectors, from the creative industries to fintech, healthcare and beyond driven by the development of specialised models for those sectors.

Open models allow for the development of local models too, which will help to mitigate bias. This, coupled with Stability's focus on building open edge models, so that anyone with a device can benefit from this technology, will help to democratise access to this technology, something which is at the heart of the open source movement.

Ultimately, we remain laser focused on delivering models that fit the needs of our customers and the research community and we are excited about what is to come.

3.5 Report Review: Octoverse: The State of Open Source and Rise of AI in 2023

In Octoverse: *The State of Open Source and Rise of AI in 2023*[29], GitHub revealed the significant impact of AI on the developer experience, particularly in the realms of open source activity, cloud technology, and Git usage. Key trends include a surge in developers building with generative AI, with open source projects entering the top 10 most popular by contributor count. The growth of generative AI is evident, moving from specialist-oriented work to mainstream adoption, with a substantial increase in projects throughout 2023.

The report emphasises the diverse and individual ownership of top AI projects on GitHub, signalling ongoing innovation. Generative AI projects show substantial global growth, with the United States, India, and Japan leading the way. The increase in developers learning about generative AI is anticipated to impact businesses positively contributing to a growing talent pool.

A partnership with Harvard Business School and Keystone.AI suggests that the productivity gains from generative AI could add $1.5 trillion to the global economy by 2030, creating 15 million "effective developers." The use of foundational models like ChatGPT is on the rise, impacting various applications, and AI is making its way into GitHub actions.

AI coding tools are already widely adopted, with 92% of developers using them, and there's a belief among 81% of developers that these tools enhance collaboration, satisfaction, and productivity. GitHub also notes a growing interest in responsible AI tooling, emphasising trust, safety, fairness, and ethical considerations in AI development. Commercially backed projects and generative AI projects like GitHub Copilot are attracting attention. Open source maintainers are adopting generative AI, with almost a third of such projects having a maintainer using GitHub Copilot.

GitHub serves as a central platform for the mainstream emergence of AI, with a remarkable adoption rate of AI coding tools and a surge in generative AI experimentation, suggesting a transformative impact on the developer landscape and global collaboration.

4. What the public feels about AI

4.1 OpenUK Flash Opinion Poll, 2023

OpenUK delivered a short opinion poll and achieved 165 responses in just one week in October 2023. While this was a quick temperature check, it did reach across sectors including technology and media, finance and professional services, education and the public sector. The poll asked questions about openness, transparency and accessibility in AI and sought to raise the voices of citizens and communities on the issues of transparency, ethics, safeguarding, innovation and

29   Github. Octoverse: The state of open source and the rise of AI in 2023. Found online at https://github.blog/2023-11-08-the-state-of-open-source-and-ai/

4.2 Report Review: Linux Foundation 2023 Open Source Generative AI Survey

development amidst broader governmental conversations on AI.
The Linux Foundation's 2023 Open Source Generative AI Survey Report[30] suggests that GPT-3's release in 2020 sparked a revolution in AI, but access was limited due to proprietary models. In 2023, there was a shift towards open source AI, fostering diversity and accessibility. However, barriers remain, and it's crucial to empower individuals to use AI according to their values. Looking ahead to 2024, there's optimism for further democratisation of AI, including diverse regional models and a focus on responsible AI beyond corporate interests.

Generative AI has transformative potential across various sectors. Open Source initiatives are significantly advancing GenAI technologies, promoting transparency, collaboration, and innovation. The integration of GenAI into business operations is gaining momentum, prompting LF AI & Data and Linux Foundation Research to conduct a global survey to explore its impact. The report aims to provide insights, highlight best practices, and ensure sustainable, ethical, and innovative development in GenAI. Additionally, it clarifies terminology and defines open source AI systems based on four freedoms:study, use, modify, and share.

Generative AI Openness

Open source is greatly beneficial for GenAI, fostering learning, sharing, and collaboration, promoting autonomy and transparency. It is important to apply these principles to GenAI to ensure the development of reliable and transparent AI systems. While many GenAI models lack full openness due to limited access to code, data, and documentation, there is an ecosystem of open source applications that can complement closed models, allowing for integration and innovation. Survey results reveal that 71% of organisations have concerns about the openness of GenAI technologies they use or develop. The level of concern correlates with the extent of organisational involvement in GenAI development or customisation. This concern influences organisational preferences, with a significant portion leaning towards open source GenAI technologies compared to proprietary ones.

Security & Trust

Security is a distinct obstacle when it comes to GenAI, with privacy, trust, unintended consequences, data breaches, and misuse being major concerns. GenAI systems handle vast amounts of data, including sensitive or biased information, raising the risk of security breaches. Ensuring security is essential not only technically but also for maintaining trust and regulatory compliance. The complexity of black-box models complicates effort to understand and mitigate security risks. While addressing these concerns, there's no clear evidence that proprietary solutions are more effective than open source ones in resolving security issues, challenging arguments favouring proprietary solutions for GenAI development.

Open source as a solution for accessibility and reproducibility of GenAI

Open source models are favoured for their accessibility and collaborative opportunities, facilitating rapid dissemination and iteration among users. The preference for open source suggests a perception of richer data and modelling options, crucial for developing robust and unbiased AI systems. Transparency and reproducibility are valued attributes in the AI community, with open source solutions seen as conducive to these principles. Additionally, open source solutions are perceived as more cost-effective, particularly important in maximising AI investments, especially under budget constraints.

Neutral Governance and Responsible Innovation

Survey results show that 88% of respondents consider neutral governance extremely or very important in the development of GenAI technologies. Neutral governance complements open source models by ensuring innovation isn't monopolised by a few companies and by establishing ethical standards to prevent misuse. It fosters collaboration, community involvement, long-term sustainability, and responsible AI development. Sure governance promotes diversity and inclusion, aligns innovation with ethical principles, and ensures sustainable development, potentially leading to more equitable outcomes in the GenAI space.

Performance and Business Needs

Performance indicators like accuracy and speed are crucial for evaluating GenAI. Data indicates a balanced preference between open source and proprietary solutions across various technical considerations. Both types of solutions are almost equally preferred in terms of accuracy, support and maintenance, and performance/scalability. While slightly more respondents prefer proprietary solutions for user experience, the overall distribution of preferences reflects a competitive landscape where open source solutions are seen as nearly as favourable as proprietary ones in meeting critical technical needs.

There are significant concerns among businesses regarding the openness of GenAI technologies they utilise, with transparency and control being paramount. Open source GenAI is favoured by a majority of respondents, seen as enhancing data control and transparency crucial for ethical AI development. The survey underscores a general inclination towards open source solutions, driven by their perceived benefits such as transparency, reproducibility, and ease of integration. Security concerns do not hinder open source GenAI adoption, as proprietary solutions are not considered inherently more secure. Additionally, neutral governance is important in GenAI development, with 95% of respondents supporting this. Neutral governance fosters ethical and equitable GenAI development through community involvement, ensuring alignment with societal values and maintaining integrity and sustainability in advancements.

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30   The LInux Foundation, 2023 Open Source Generative AI Survey Report https://www.linuxfoundation.org/hubfs/LF%20Research/
GenAI_Report_2023_011124.pdf?hsLang=en

4.3 Thought Leadership: The software of the past versus the Software of the Future

Professor Neil Lawrence
Google Deep Mind Professor
of Machine Learning,
University of Cambridge
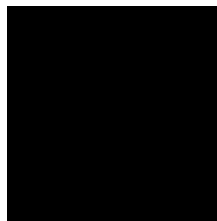
In Goethe's poem The Sorcerer's Apprentice, a young sorcerer learns one of their master's spells and deploys it to assist in his chores. Unfortunately, he cannot control it. The poem was popularised by Paul Dukas's musical composition, in 1940 Disney used the composition in the film Fantasia. Mickey Mouse plays the role of the hapless apprentice who deploys the spell but cannot control the results.

When it comes to our software systems, the same thing is happening. The Harvard Law professor, Jonathan Zittrain calls the phenomenon intellectual debt. In intellectual debt, like the sorcerer's apprentice, a software system is created but it cannot be explained or controlled by its creator. The phenomenon comes from the difficulty of building and maintaining large software systems: the complexity of the whole is too much for any individual to understand, so it is decomposed into parts. Each part is constructed by a smaller team. The approach is known as separation of concerns, but it has the unfortunate side effect that no individual understands how the whole system works. When this goes wrong, the effects can be devastating. We saw this in the recent Horizon scandal, where neither the Post Office or Fujitsu were able to control the accounting system they had deployed, and we saw it when Facebook's systems were manipulated to spread misinformation in the 2016 US election.

When Disney's Fantasia was released, the philosopher Karl Popper was in exile in New Zealand. He wrote The Open Society and its Enemies when his hometown of Vienna was under Nazi rule. The book defends the political system of liberal democracy against totalitarianism. For Popper, the open society is one characterised by institutions that can engage in the pragmatic pursuit of solutions to social and political problems. Those institutions are underpinned by professions: lawyers, the accountants, civil administrators. To Popper these "piecemeal social engineers" are the pragmatic solution to how a society solves political and social problems.

In 2019 Mark Zuckerberg wrote an op-ed in the Washington Post calling for regulation of social media. He was repeating the realisation of Goethe's apprentice, he had released a technology he couldn't control. In Goethe's poem, the master returns, "Besen, besen! Seid's gewesen" he calls, and order is restored, but back in the real world the role of the master is played by Popper's open society. Unfortunately, those institutions have been undermined by the very spell that these modern apprentices have cast. The book, the letter, the ledger, each of these has been supplanted in our modern information infrastructure by the computer. The modern scribes are software engineers, and their guilds are the big tech companies. Facebook's motto was to "move fast and break things". Their software engineers have done precisely that and the apprentice has robbed the master of his powers.

This is a desperate situation, and it's getting worse. The latest to reprise the apprentice's role are Sam Altman and OpenAI who dream of "general intelligence" solutions to societal problems which OpenAI will develop, deploy, and control. Popper worried about the threat of totalitarianism to our open societies, today's threat is a form of information totalitarianism which emerges from the way these companies undermine our institutions.

So, what to do? If we value the open society, we must expose these modern apprentices to scrutiny. Open development processes are critical here, Fujitsu would never have got away with their claims of system robustness for Horizon if the software they were using was open source. We also need to re-empower the professions, equipping them with the resources they need to have a critical understanding of these technologies. That involves redesigning the interface between these systems and the humans that empowers civil administrators to query how they are functioning. This is a mammoth task. But recent technological developments, such as code generation from large language models, offer a route to delivery.

The open society is characterised by institutions that collaborate with each other in the pragmatic pursuit of solutions to social problems. The large tech companies that have thrived because of the open society are now putting that ecosystem in peril. For the open society to survive it needs to embrace open development practices that enable Popper's piecemeal social engineers to come back together and chant "Besen, besen! Seid's gewesen." Before it is too late for the master to step in and deal with the mess the apprentice has made.

5. Conclusion

Dr Jennifer Barth
Chief Research Officer,
OpenUK

The data published in this report suggests that 14 AI repos with 1000+ stars were created in the UK in 2023. Looking just at the one year in comparison to others puts it in second place - less than the 19 created in 2017.   This spike In 2017 is the growth of big data, ML models and automation and, maybe even more clearly, the echoes of the release of the term AI into the public consciousness. Then, creating AI repos becomes more commonplace - we see the steady progression of a particular technology as it continues to grow in breadth and sophistication. It's a useful reminder that although LLMs and all of the tools released into the world lately feel like a sudden explosion onto the global news cycle in fact, it's a process that is working as it should - steady, albeit speedy, progression with a lot of people doing a lot of work to develop and innovate. The story is the cumulative effect, the growing sum of the parts, rather than any one singular year.

Building trust - through awareness - is an important part of the process and of the broader 'openness' conversation. Fear, uncertainty and doubt are not just the arena of the loudest players, but also the people in the world misunderstanding AI's potential and risks and ultimately misunderstanding what role 'openness' has to play in the process of building trust.

As always, let's return to the values that underpin open source and hope to ensure that continues to be central to the conversation- be that at the level of government-convened meetings, declarations or policy, the UK business ecosystem, developers or among the daily lives of the UK population. As we have seen with open source software development more broadly, open source allows for collaborative production of innovations, learning and opportunity creation. Openness as a concept needs to continue to be central, and even protected, as AI gains strength.   Transparency, accessibility, fair competition and business practices that allow clear transfer of information and provenance were all strongly agreed upon in the opinion poll OpenUK delivered in October 2023.

OpenUK is pleased to present the voices of groundbreaking individuals in AI - Toran Bruce Richards and Emad Mostaque who are leaders in innovation in this space - with some openness, both open source and open innovation in various amounts. Margaret Hartnett helps to put the UK government regulatory conversations in context of the international view and Neil Lawrence points to the open society and its collaborative potential.

A part of the conversation will always be about knowledge production and ensuring that the research that is at the very soul of technological breakthroughs continues to be resourced by a mix of the world's population. The recently updated article, "A Survey of Large Language Models" published on arXiv by academics mostly located in China in November 2023[31] suggests that there has been an unprecedented rise in AI research in the past three years. This dramatic rise in research papers implies a similar rise in underlying research, which is a prerequisite to new AI breakthroughs. A sharp increase in research progress occurs after the release of ChatGPT: the average number of published arXiv papers that contain "large language model" in title or

abstract goes from 0.40 per day to 8.58 per day. That said, data from the State of AI[32] notes that <20% of the most cited AI papers in the last three years have authors from UK-based institutions and organisations. Moreover, most of this research is now coming out of industry rather than academia or even academic-industry collaborations, data from Epoch[33] in 2023 suggests .

I point to this because this is knowledge production and knowledge sharing and the heart of innovation. It is possibly the proprietary development of cutting edge technologies from inception that just might close the door to open innovation.   Being at the forefront of AI is not only creating products and selling a lot of stuff. It's the opportunity to lead the world in creating safe, ethical, collaborative and conscientious development of incredibly powerful systems of knowledge.

31   Xin Zhao, Wayne. 'A Survey of Large Language Models'. arXiv, v.13, November 2023. https://arxiv.org/pdf/2303.18223.pdf

32   https://docs.google.com/presentation/d/156WpBF_rGvf4Ecg19oM1fyR51g4FAmHV3Zs0WLukrLQ/edit#slide=id. g24daeb7f4f0_0_4377
33   https://ourworldindata.org/grapher/affiliation-researchers-building-artificial-intelligence-systems-all

6. OpenUK Written Evidence to the House of Lords

OpenUK—written evidence (LLM0115)

House of Lords Communications and Digital Select Committee inquiry: Large language models

OpenUK is a globally unique organisation representing the business of Open Technology in the UK and this spans open source software, open hardware, open data and open standards as well as increasingly open AI. It sits at the intersection of software engineering, business, law and policy and is a world leader in Open Technology and focuses on the people in the UK who work in the business of open source and the UK companies creating and using open source. It collaborates globally with open organisations, including the open source foundations which are the custodians of open source software. It is a member of many such organisations and projects run by them. OpenUK is recognised within those as an important part of the global open source leadership[34] and creates a cohesive voice for UK open source.

OpenUK is uniquely placed within the UK to offer comment and clarification on Open Source and to bring together the UK's deep expertise in open source software, open data and AI to support UK Government, regulators and the public sector in building their understanding.

It has provided an initial group of software engineers, data scientists, lawyers and policy experts at a round table for the Office of AI's White Paper Consultation in July 2023 and is working to support various departments in this way. Its second annual conference[35] in February 2024 will offer a consultation room in which public sector departments can consult through round tables, workshops and the like via direct engagement with both the local and global Open Source communities.

UK Open Source Software Market:

The UK's open source software engineering community is number one in Europe by number of developers and lines of code contributed, and number five (generally) on a global basis. In 2022 27% of GVA contributed by the UK tech sector was based upon open source software businesses and individuals working in this space.[36]

In 2023 96% of all software was found to have open source software "dependencies" requiring open source software to run or including open source software. This was the case across open source and proprietary software. And 76% of the software stacks were open source software.[37]

Primarily home-working this community collaborates on global technology projects creating software, providing governance and community building and developer relations as well as commercialisation skills. Employed by global companies including the Big or High Tech companies these individuals are often not well known within the UK yet have "rock star" status in the global tech sector. Open source software may be considered the submarine under the UK digital economy.

With 3.2m GitHub accounts, the standard method of measuring open source software developers, this is 4.5% of the UK population and more per capita than any country in the world.

The UK was the first country in the world to have an open source software first public sector policy and Government Digital Services and GCloud were built on this.[38]

Security vulnerabilities like 2021's Shell4J demonstrated the risk of proprietary software which did not disclose the use of open source software failing to fix such vulnerabilities and understanding the code that is being used is critical to trust.

In considering any requirements or regulations around open source not only must the term be better understood and defined but also the impact of decisions on open source.

The UK's open source expertise and AI leadership enable it to be uniquely placed to succeed in "open AI" as what that means become clear.

Questions:

Capabilities and trends
1.   **How will large language models develop over the next three years?**
        a)   Given the inherent uncertainty of forecasts in this area, what can be done to improve understanding of and confidence in future trajectories?

Answer:
Opening up AI will democratise technology, build trust, improve innovation, break lock-in and allow competition.

34   https://openuk.uk/participants/our-memberships/
35   https://stateofopencon.com/
36   chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://openuk.uk/wp-content/uploads/2023/07/FINAL-State-of-Open-The-UK-in-2023-Phase-Two-Part-1.pdf
37   https://www.synopsys.com/blogs/software-security/open-source-trends-ossra-report.html
38   https://www.gov.uk/guidance/be-open-and-use-open-source

1.1   Access to data

Development of large language models (LLMs) today and in future necessitates training models on data. It is understood that no LLMs are being trained in the UK due to confusion around the ability to use publicly available data. To enable understanding of and confidence in future trajectories the ability to train LLMs on UK data must be clarified and confirmed.

The Text and Data Mining exception believed to enable LLMs to be trained on UK publicly available data is currently shrouded in unnecessary uncertainty. Following the Vallance Report a Code of Conduct confirming this ability was expected but concerns about content use led to this being retracted. There are now grave concerns about the creation of sage AI in the UK and that innovation in the UK will be further stifled by a new Code of Conduct restricting this legitimate use.

Whilst the need for our creative industries to be financially supported is absolutely recognised and supported, the revenue streams to do so must be forward-thinking and progressive. They cannot inhibit innovation or, irrespective of UK actions, they will fail on the global arena. The ability to innovate safely in AI on an equal footing with competitive nations is critical. Options to protect this sector must be explored but not at the detriment of innovation. Possibilities like bulk payments or taxes may be more suited than the outdated royalty model.

It is understood that the Intellectual Property Office will shortly produce a code of conduct and this must clarify the UK's current position to allow use of publicly available data if the UK is to succeed and be pro innovation.[39]

Many nations have specifically enacted exceptions to copyright law to allow for this training whilst the US has a fair use provision, all allowing LLMs to be trained.

In order to have trust in the data upon which an LLM is trained there must be transparency, which in turn allows for safe AI and control. Additionally this may support alleviating concerns around bias.

Opening up data will enable a more competitive marketplace and support the removal of lock-out, a current blocker to innovation currently impacting the potential for competition.

1.2   Opening up code/software:

There are various aspects of AI that must be considered - weights, models and algorithms primarily as well as documentation and research and the data upon which it was trained. Each and all of those individual aspects may be "open" and shared. The US approach may focus on the weights being open to define what makes an LLM open.

For all countries beyond the US and possibly China the opening up of AI and LLMs will be critical to its ability to control its technology future.

Opening each component and the whole must be considered to determine what will amount to open source AI.

In opening up the software elements we see both "open source software" and "open innovation". These are fundamentally different and have different characteristics and do not both offer the same advantages. In turn this impacts the risk profiles of each.

Risk is of course not only exponential but sits also at a commercial and societal level with respect to AI. Such risks include the lack of access to LLMs and ensuing inability to innovate and that technology may sit in the hands of only a few large companies with the ability to preclude others. History will judge today's decision makers on the choices made with respect to AI and in particular to its being opened up. Their learning from our recent tech history. Learning from history and making informed decisions based on that knowledge is entirely reasonable.

The LLM landscape faces the risk of market dominance and foreclosing competition and innovation if a few players are the exclusive holders of critical technology that others must pay to use and may not inspect or modify.

During the next three years LLMs will inevitably and increasingly open up creating transparency and trust. At the same time some will understandably remain closed and there is room for each. The opening up of AI will involve multiple "shades of open" which must be explored, understood and appropriately accommodated in regulation, codes of conduct etc.

Unfortunately at the present time the varying shades of open do not all have labels or definitions that are universal even amongst those with understanding.

Regulation must recognise this evolution of the levels of openness and different benefits and impacts.

Differing Understandings and shades of openness in software licensing

The open source software community categorises software as either open source or proprietary whilst regulatory approaches often categorise it as open or closed. There is a disconnect in understanding.

Open innovation - code that does not meet the Open Source Definition and which may also be labelled distributed source, public source or shared source - due to its licensing is deemed to be proprietary. Proprietary code can be open or closed. This means that code like LLama 2 with its commercial restrictions would be deemed to be proprietary.

39   https://www.ipfederation.com/news/text-data-mining-tdm-uk/

The proposed EU AI Act will offer an exception for "free and open source software" which will likely utilise the recognised definition and this term may be purposefully used to avoid the confusion being created by LLMs like Llama 2 being described as "open source" when it is not.

However regulators have generally failed to grasp this nuance and generally contrast open and closed placing the code which has openly available source but does not meet the Open Source Definition under the heading open source software.

These diagrams demonstrate the confusion that currently exists around categorisation of software as open source and the shades of open created by licensing software with the source available but with commercial restrictions.

Attempting to regulate all AI software currently labelled "open source" may be the equivalent to saying that all vehicles will be regulated with identical law, as vehicles rather than understanding the differences between a lorry, a car and a bicycle. Clearly understanding what each is and its impact means that they would never have the same benefits or

The OECD created a new definition of AI being utilised by the EU in its AI Act but we do not have the same regulatory clarity for "open source". This is unfortunate and extremely problematic.

The varying levels of openness might also mean that there ought to be differing levels of benefits correlated to the differing levels of openness and liability.

The shades of openness, their impact and different regulations will be essential to improve understanding of and confidence in future trajectories.

Opening up of Llama 2 and Falcon and shades of openness

The initial leak of Llama 1 LLM in the Spring was not on an open source licence and not open source (despite many wrongly describing it as such) but rather it gave access to an LLM for the open communities. The LLM, a hugely expensive piece of the AI jigsaw, had been missing and access to it enabled faster innovation than had been previously seen across AI through the work of the open communities. This was recognised in the now infamous "Google We Have no Moat Memo."[40] In short this memo recognised that with the level and pace of innovation from the open source communities large company AI despite its finesse was not protected by enough of an IP Moat to allow it to sell AI when close equivalents created by the open source communities were readily available. What the big techs could provide over and above what the open source communities were able to freely deliver through their collaborative innovation would not be enough of a differentiator.

The memo was of course simply the opinion of one employee but speaks to the value of opening up this technology had on the pace of innovation through collaboration and community contribution.

The initial provision of Llama was a leak and not open source software. It was not provided with a licence that allowed its use let alone an open source one. For the sake of clarity, open source software is licensed on standard approved licences approved by the Open Source Initiative as complying with the Open Source Definition. Use of open source software is based upon a copyright-respecting approved licence. Licences for open source comply with the Open Source Definition which celebrated its 30th birthday in 2023. Definitions 5 and 6 allow anyone to use the code for any purpose subject to complying with the licence.

In a commercial context distributors of open source software enable their competitors with their own innovation. Not a choice lightly made.

This has led to further and legitimised opening up of LLMs with the "Open Innovation" of Llama 2 in July, giving not only a formal if not open source software licence and documentation. OpenUK partnered with Meta on the release of Llama 2 and was the only "open source" organisation to do so. Unlike the pure open source organisations OpenUK focuses on the gambit of opens and was able to partner on the basis that it viewed the shade of open offered by the Llama Community Licence which is not open source as a positive step in the right direction. Meta's web site clearly states that Llama 2 is open innovation and does not claim that it is open source.[41]

The Falcon LLM also released in 2023, by the UAE, is distributed on an open source software licence, the Apache 2.0 licence which meets the Open Source Definition and does not allow for any commercial restrictions. Falcon is open source software.

Disclaiming liability
Almost all open source software licences disclaim developer liability "to the fullest extent permitted by law" and require attribution of the creator of the code. Note - The open source community recognises that laws trump licences and commercial providers of open source (providers of services or enterprise/curated editions of open source not the base open source itself which is freely licensed) as a matter of course comply with laws in their businesses. There appear to be many who have misconceptions around this.

Open source is not about law breaking, it is about building the best software to fix a challenge.

40   https://www.semianalysis.com/p/google-we-have-no-moat-and-neither
41   https://ai.meta.com/llama/

Code of Conduct to manage Risk

Development of AUP/ Code of Conduct requirements will provide guidelines for this innovation encouraging responsible practices from the "Open AI Communities".

This will be particularly important to innovators in AI outside of the US and China giving access to LLMs which had been prohibitively expensive in terms of resource, compute and finances, meaning that these had prior to their being opened up been locked into companies in the US and China.

2.   What are the greatest opportunities and risks over the next three years?
a)   How should we think about risk in this context?

Risk is not something that is always bad, but something that must be understood.

Once understood a risk appetite must be applied to the facts to allow an informed decision. The UK has a reputation for being risk averse which has historically hindered its ability to innovate.

From understanding will come the ability to balance the need to protect citizens against encouraging innovation. Without the latter there will be no future for those citizens. Work must be done to understand better as the technology evolves.

The approach to risk must be a modern tech friendly one, agile by nature as opposed to the prescriptive waterfall approaches taken in the past. This will allow flexibility and the ability to adapt as the technology emerges.

Following a light touch principles based approach will allow the regulation of LLMs and AI not to fall into the trap we saw with the internet regulation of 30 years ago which has been so painfully replaced when long since redundant and certainly not fit for purpose in the unimaginable future it was not designed for.

Much of the regulation needed relates to use of technology and is already in place. Exciting as LLMs are, they are another form of technology which is subject to the law of the use case and users and distributors must be responsible and exercise discernment. Clearly this is stricter in a regulated sector like finance or health care, as opposed to general commerce.

A limited amount of AI specific regulation would be adequate to manage risk and this could well be managed appropriately through a code of conduct. Certainly this would also potentially offer the UK a leadership position in tech regulation.

The approach to risk must also be collaborative and span geo-politics, engaging with as many countries as possible.

3.   How adequately does the AI White Paper (alongside other Government policy) deal with large language models? Is a tailored regulatory approach needed?
a)   What are the implications of open-source models proliferating?

Proliferation of open source models - the first risk is the lack of understanding and all shades of open being treated the same and the second is whether the software, models and weights are open but

1.   Dealing first with the understanding of the meaning of open source, is a proper name and ought not to be hyphenated. See an explanation of the shades of open and risk of treating a model with any level of commercial restriction in its licensing the same way as a truly open source model.

1.1   The failure to understand the meaning of open source across the discussions we have seen to date and whilst a few companies offering open source products have been included in discussions the representatives of the open source community have not been included. Likely as a consequence of the failure to understand what open source is and how it works.

It is extremely nuanced and this will be a critical failure in understanding and the risk that bad law will be made.

1.2   There are many loud voices shouting and clambering to be part of a conversation to be relevant which it is clear have no understanding. There needs to be an understanding of both nuances of open source development and the wider open source benefits and value to society and economic benefit to the UK.

Greater recognition and engagement of the open source communities - its foundations and representative bodies - is a critical next step if this is to work and risk is to be managed.

1.3   There must also be recognition that blurring the lines of definition and understanding the impacts of the shades of open is in the commercial interests of the commercial parties concerned. If an LLM has commercial restrictions in its licensing the party releasing that may have long term control of a commercial ecosystem. The commercial terms are unknown and the long term impact is unclear.

1.4   Creates a need for regulators and Governments to understand that the open communities respect laws in the same way as society as a whole does and are generally people with a collaboration value set driven by fixing challenges and improving systems.

2.   Open source brings many benefits:

- Ability to build on the technology opened up - "to stand on the shoulders of giants" and not repeat unnecessary and costly innovation, access to LLMs and other technologies
- Better innovation through collaboration
- Community contribution allowing ongoing participation and input
- Better response to security vulnerabilities through a collective response - "many eyes make bugs shallow"
- Democratisation of technology allowing skills development in the UK through access to otherwise restricted technology
- Allowing individuals to gain experience in key technologies opened up which may access international and local jobs
- Removing Lock-in to large vendors of critical technology which may be abused over time
- Access to critical innovation allowing new market entrants and enabling competition
- Allowing local autonomy
- Understanding of the data used to train assuming an appropriate open data licence is also used

3.   The risks - the risks in opening up LLMs are largely the same as for closed systems

- Opening up AI may allow bad actors to access innovation, however bad actors are generally able to access innovation and the leak of Llama is a key example of this
- Undermine dominant positions

4.   Do the UK's regulators have sufficient expertise and resources to respond to large language models?[5] If not, what should be done to address this?

No they have not taken adequate stock of the voice of the open source software community or its 30 year history and must now engage.

5.   What are the non-regulatory and regulatory options to address risks and capitalise on opportunities?
    a)   How would such options work in practice and what are the barriers to implementing them?
    b)   At what stage of the AI life cycle will interventions be most effective?
    c)   How can the risk of unintended consequences be addressed?

International context

6.   How does the UK's approach compare with that of other jurisdictions, notably the EU, US and China?
    a)   To what extent does wider strategic international competition affect the way large language models should be regulated?
    b)   What is the likelihood of regulatory divergence?
What would be its consequences?

The UK would be well advised to look to the US approach on opening weights and to learn from the EU that being first mover is not always best. Overly complex and overly prescriptive legislation will not only fail it will create regulatory capture leaving only a few companies able to comply and to take the contractual risk and liability required to supply LLM based products.

7. Formalities

7.1 Contributors

Amanda Brock, CEO, OpenUK

CEO of OpenUK ,the UK organisation for the business of Open Technology – open source software, open hardware, open data, open innovation, open standards and open AI. She is also the Executive Producer of State of Open Con 24 taking place 6 and 7 February 2024 in London. An appointed member of the Cabinet Office's Open Standards Board; and both UKRI's UK Exascale Science and Industry Advisory Board and Digital Research Infrastructure Advisory Board. She is a commercial Advisory Board Member at California Cyber Security company Mimoto and at the Scottish Geo Spatial Data company Space Aye. She is also an Advisory Board Member of KDE and a European Representative of the Open Invention Network.

A lawyer of 25 years' experience, she previously chaired the Open Source and IP Advisory Group of the United Nations Technology Innovation Labs; sat on the OASIS Open Projects, Initiative; was a Member of the British Computer Society Inaugural Influence Board; and of the UK Government Energy Sector Digitalisation Task Force Advisory Board; as well as being an elected Board Member of the Open Source Initiative. Formerly General Counsel of Canonical for 5 years from 2008 she set up and ran their legal function and has been part of the open source community since.

Amanda was a judge in the IDG Foundry CIO 100 2023 having been a Judge in the We are Tech Women Rising Star Awards 2020-22. Listed as the 37th Most Influential Woman in UK Tech by Computer Weekly in 2023 and in Computing's IT Leaders 100 2023, and the INvolve HERoes list of 100 global women executives driving change by example in 2022 and 2023.
Amanda was awarded the Lifetime Achievement Award in the Women, Influence & Power in Law Awards UK in 2022.

Amanda writes regularly for the tech press and is the editor of Open Source Law, Policy and Practice (2nd edition) published by Oxford University Press in October 2022, with open access thanks to the Vietsch Foundation https://amandabrock.com/books
linkedin.com/in/amandabrocktech @amandabrockUK @openuk_uk
https://openuk.uk/ https://amandabrock.com/

Emad Mostaque, Founder Stability AI

Emad Mostaque is a British entrepreneur and the founder and CEO of the artificial intelligence company Stability AI. Under his leadership, Stability AI has helped further generative AI systems like Stable Diffusion, creating a community of more than 200,000 creators, developers, and researchers, as well as several research hubs worldwide. His open source ethos and approach to AI puts ownership back into the hands of the people to activate humanity's potential.

A mathematician and problem solver at heart, Mostaque started his career in finance with a background in engineering. With multiple entrepreneurial endeavors and the ability to spot emerging market trends, he has built the only independent, multi-modal AI company in the world. Mostaque studied mathematics at the University of Oxford and later obtained a BA and MA in mathematics and computer science from Oxford.

Dr Jennifer Barth, Founder and Research Director, Symmetry and Research Director OpenUK

Jenn has more than 15 years of experience leading independent research on the intersections of emerging technologies and socioeconomic change. She provides companies with independent thought leadership and media engagement opportunities on global issues impacting and shaping our current and future technical-social lives.

Her work spans the digital through to social and economic change. She has looked at sustainability, workforce skills and organisational competitiveness strategies through and beyond the pandemic with Microsoft and many other big and small organisations and works as the Chief Research Office researching the role of Open Source Software and its potential to fuel the circular economy with OpenUK.

She has experience working on the human impact of artificial intelligence (AI) through fieldwork experiments with IBM Watson, Microsoft and other providers. She is skilled at blending research methods and working with people to bring to life the stories behind numbers. Dr Barth earned her DPhil in Geography from the University of Oxford.

Dr Margaret Hartnett, Co-founder of Progressio AI Ltd.

Holding a PhD in AI & Analytical Chemistry, Dr Margaret Hartnett has been working with AI and algorithms in industry and academia for over 30 years.

A senior researcher, European Patent Attorney, Chartered Patent Attorney and company director, Margaret has a track record of growing and exiting a hugely successful AI scale-up. Indeed, Margaret has spent almost 20 years developing into an executive-level research, innovation and Intellectual Property (IP) specialist.

Bringing a rare interdisciplinary skill and perspective, Margaret bridges the gap between the commercial and technology functions of fast-growth, high-tech businesses. As co-founder of Progressio AI, she brings this expertise to bear to help AI-driven companies meet their obligations under the forthcoming EU AI Act.

Neil Lawrence, Google Deep Mind Professor of Machine Learning, University of Cambridge

Neil Lawrence is the inaugural DeepMind Professor of Machine Learning at the University of Cambridge where he leads the University's flagship mission on AI, AI@Cam.

He has been working on machine learning models for over 20 years. He recently returned to academia after three years as Director of Machine Learning at Amazon. His main interest is the interaction of machine learning with the physical world. This interest was triggered by deploying machine learning in the African context, where 'end-to-end' solutions are normally required. This has inspired new research directions at the interface of machine learning and systems research, this work is funded by a Senior AI Fellowship from the Alan Turing Institute.

Neil is also visiting Professor at the University of Sheffield and the co-host of Talking Machines. He is the author of the forthcoming book The Atomic Human (release date 30th May 2024).

Toran Bruce Richards, Founder, AutoGPT

Toran Bruce Richards, a prominent figure in AI innovation from the UK, and is chiefly known for creating Auto-GPT, an Autonomous AI System.

Launched Open Source in March 2023, Auto-GPT represents a leap in the application of advanced large language models (LLMs), capable of independently managing complex, multi-step tasks without continuous human input. The scale of the project and its community impact is significant, with Auto-GPT's GitHub Repository achieving the #23 rank globally, amassing over 157k stars.

Additionally, it has fostered a vibrant community of over 50k AI enthusiasts on Discord, marking its position as a prominent and influential project in the open-source AI landscape.

7.2 About the Creators of this Report

7.2.1 OpenUK

As the UK's organisation for the business of Open Technology - Open Source Software, open hardware, open data, and increasingly open ai, implemented through open standards and open innovation our Purpose is UK Leadership and global collaboration in Open Technology.

OpenUK has a unique focus as a country organisation with this breadth of Open Technology. This arises partly from the breadth of its focus and recognition of the need to amalgamate the "Opens" in a future facing tech sector.

Also unique is the breadth of its activities which is not currently reflected in other country organisations in this space as can be seen in our Mission:
Community: Convene the UK's Open Technology community to harness its power;
Legal and Policy: Lead and advocate for the use and development of Open Technology; and
Learning: Encourage education and skills for all in Open Technology.

Our third unique factor is that OpenUK's focus is on people not companies. OpenUK is not a traditional membership organisation but reinvents this model.

Of course our home grown companies - the normal focus of Open Source country organisations - are important to OpenUK and many participate in our work. We also recognise the importance of the global companies employing much of our remote-working, UK-based, Open Technology workforce.

Our focus on people is important to us, to our sector and to a better understanding of it as a whole. People and their skills and talent are a fundamental basis of all technology. The founders interviewed for this report reiterate and emphasise this through their interviews. People are not only the users but the creators of tech.

As is borne out by our research, there are a significant number of UK-based workers who form part of a globally-dispersed Open Source workforce, and an equally significant UK leadership in this sector. This workforce, and its impact on the economy and UK tech sector is often missed domestically. They form the subject matter of this Part Three of our 2023 State of Open Report.

Open Source has been the "Submarine under the Digital Economy" for many years. The internet, cloud, blockchain, AI, and importantly our national digital infrastructure are all built on it.

OpenUK's reporting allows this "force of open", to "up periscope" and share their value with you.

Within our Policy remit we have worked in partnership with Symmetry for 3 years, researching to build ground breaking reporting specific to Open Source Software[42]. This research allows the boundaries to be pushed and the importance of the Values of "Open" to be clarified for all.

OpenUK is not a pay to play organisation and is funded by Sponsorship, Donations and Grants. We are grateful to our many sponsors and partners who make our work possible[43]. All are welcome to participate.

Contact OpenUK on admin@openuk.uk

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42   "Open Source Software" is used throughout this report as a capitalised term to mean software where the source code is freely shared and the code is made available on an Open Source Initiative approved licence. However we recognise that this is more than a legal definition and the additional value of "Curated" Open Source Software - code with contributions, collaboration, community and good technical hygiene and governance all form a necessary part of "Open Source Software."
43   https://openuk.uk/participants/sponsors/

7.2.2 Symmetry

Symmetry looks beyond the surface and behind the curtain of the fundamental innovations and trends shaping our society, markets, culture, and values. We are academics and researchers looking at the intersections of emerging technology and socioeconomic impact, producing independent research for thought leadership and business solutions.

Symmetry's mission is to share and grow knowledge about the interaction of technology and everyday lives. We want to understand the past, present, and future of human interaction with emerging technologies and socioeconomic changes—from behaviour to context, nature to nurture, origin to experiences—helping our clients engage their clients and public imagination.

www.symmetry.is

7.2.3 Runa Capital

Runa Capital is a Luxembourg-based global venture capital firm, focusing on enterprise software, deep tech and fintech startups. Since 2010, we have invested in more than 100 European and US startups, including over ten Open Source companies.

Runa's early-stage investments include cloud banking platform Mambu ($5.5B last round valuation), Open Source web server Nginx (acquired by F5 for $700 million), cloud ERP vendor Acumatica (acquired by EQT) and quantum computing company Pasqal.

Runa has supported UK startups like Zopa, DigitalGenius, Chattermill, Evidently AI and Lumai. Its London-based general partner Konstantin Vinogradov focuses on AI and Open Source Software.

7.3 Methodology

7.3.1 OpenUK Data

The OpenUK research used a mixed method approach to explore and demonstrate the state of AI and Open Source in the UK. Interviews were conducted with industry leaders, founders and Open Source Software experts and included as case studies and thought leadership on AI and Open Source. A short opinion poll was conducted in October 2023 and received 165 responses. The demographic breakdown of the respondents follows.

7.3.2 Runa Capital Data

Runa Capital created a dashboard collecting data on open source repositories, users and activities. The data collection processes are automated, leveraging the APIs and tools provided by GitHub and updated daily. Runa gathers data about all repositories with more than 1000 stars at the

time of collection. The author of the repository can be an individual or an organisation and where they own multiple repositories, each is considered as a separate entity. For any author who has at least one repository exceeding 1000 stars, information is collected on all repositories they own. A commit in the content of version control with Git is a record of changes made to a set of files. All commits to 1000+ stars repos are collected. Every instance where a user makes a change to the code is monitored. Users are collected in terms of repository authors and contributors including profile information, number of repositories owned and largest repository. To determine the user's geolocation the process uses the Google Maps API. This is updated for user profiles once per 6 months.

Contributors from the United Kingdom are defined as users who have been geographically pinpointed as being in the United Kingdom through the geolocation process. These users are identified based on the location data they provide in their GitHub profiles, which is then verified and refined using geolocation tools. Repositories are categorised as being from the United Kingdom based on the location of their authors. If an author is identified as being based in the United Kingdom, either through their GitHub profile or through additional reliable sources, their repositories are included in this category. Additionally, companies as authors from the United Kingdom can be verified based on credible external sources, such as Crunchbase and Dealroom, which confirm the company's base of operations in the United Kingdom. This allows inclusion of repositories from these companies in the United Kingdom-specific analysis.

To determine the Repo's location, the repo owner's location is first checked. If this is unavailable, analysis of company data from Dealroom and Crunchbase by repo domain may resolve the location. If not, then the top-3 contributors' countries are taken as the location. An AI repository is identified if its description or topics section contains any keyword from the AI keyword list[44].Repos are filtered by location that have at least 1k stars for the target moment (2023-12-31, 2023-09-30, etc.) and active in the current moment (26 Jan 2024).

7.4 Acknowledgements

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44   AI keyword list: ai, alphafold, artificial intelligence, automl, bayesian network, bert, big data, computer vision, deep learning, deeplearning, deepmind, diffusion model, face recognition, gan, generative adversarial network, generative ai, gpt, image processing, image recognition, image synthesis, keras, language model, llm, machine learning, machine translation, machinelearning, ml, natural language processing, neural machine translation, neural network, neurons, nlp, ocr, openai, opencv, predictive analytics, pytorch, reinforcement learning, scikit learn, speech recognition, stable diffusion, supervised learning, tensorflow, tensorflow, transformer, unsupervised learning

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