response

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THE ASSOCIATION FOR UK INTERACTIVE ENTERTAINMENT

Ukie response to the Education Committee's inquiry on the Fourth Industrial Revolution

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Response from Ukie, the Association for UK Interactive Entertainment

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Ukie response to Fourth Industrial Revolution inquiry

Introduction

1. UK Interactive Entertainment (Ukie) welcomes the opportunity to respond to this inquiry. Our response aims to provide the committee with a grounded understanding of the ways in which the video games industry has been at the bleeding edge of the Fourth Industrial Revolution technologically. It will also consider the ways the industry has developed case studies of best practice to support the education of school age students, for example through Ukie's Digital Schoolhouse initiative, and how they meet several of the aspirational criteria of the Industrial Strategy Sector Deal.

About Ukie

2. Ukie is the trade body for the UK's games and interactive entertainment industry. A not-for-profit, it represents games businesses of all sizes from small start-ups to large multinational developers, publishers and service companies, working across online, mobile apps, consoles, PC, esports, Virtual Reality and Augmented Reality. Ukie aims to support, grow and promote member businesses as well as the wider UK games and interactive entertainment industry by optimising the economic, cultural, political and social environment needed for businesses to thrive.

The importance of the UK's games industry

3. With 95% of UK games businesses exporting at least some of their products overseas, the UK games industry generates over £2bn of global sales and is well placed to take a greater share of what is now a $100bn[1] worldwide market.

4. Blending technological innovation with imagination and design, we are a growing part of the UK's creative industries sector; one of the six economic sectors noted by the Government to be of particular strategic importance in the negotiations as we leave the EU and in the post-Brexit environment. Whether it is in AI, data analytics or virtual reality, we put into practice and develop some of the innovations that can and will be increasingly applied elsewhere in the economy to boost productivity and forward the ambition for the UK to be at the forefront of the fourth industrial revolution.

5. The UK games industry is a major generator of IP and a leading example of the UK's growing reputation as a home for creative, high-tech talent from across the world. By way of illustration, games as diverse as the globally successful Lego games series and Grand Theft Auto V, the biggest-selling entertainment product of all time (generating $1 billion in global revenues in just three days following its release), are both made in the UK.

6. The UK's over 2,255[2] and growing games companies are spread right across England, Scotland, Wales and Northern Ireland with economic clusters including Leamington, Sheffield, Dundee and Cardiff. Two-thirds of these companies were founded after 2010. 12,100 people are directly employed by the industry, most as developers; with the industry in all supporting the jobs of 23,900 people[3]. While most games companies employ under 10 people, the UK is also host to a high number of international and European HQs, such as those of Microsoft, Sony and Nintendo.

[1] Newzoo, 2014
[2] Ukie UK Games Map0, 2016
[3] BFI, 2015

7. 68% of the industry's employees are under 35 years old; and the average wage is £33,900.[4] Our industry provides good jobs, right across the country.

Digital skills and the games industry

8. As a relatively young industry which relies on cutting-edge technical talent, games businesses often compete not only with themselves but with the wider technology industry – like the financial technologies sector who are often able to provide higher salaries - to secure top candidates with highly sought-after skills in emerging fields like machine learning and artificial intelligence. By way of illustration a cross-disciplinary research and development team within a global games publisher was recently looking to fill the following roles: "Virtual Human – Development Director", "Virtual Humans – Research Engineer", and "Deep Learning Engineer". Such roles have only recently come into existence in our industry and accordingly there are few candidates globally with the skills needed to excel in them.

9. The future of the games industry depends on maintaining a strong talent pipeline, but games businesses report that our current education system is not performing as well or as quickly as we need it to. UK nationals with games degrees are often found to be unprepared for a role in industry upon graduation, and the games degrees themselves are considered hugely variable in quality. Whilst the industry does engage with universities and training providers by offering industry placements and curriculum advice, the rapidly-evolving nature of the sector and the roles available in it can often prove challenging to reconcile with universities' planning frameworks and timelines.

10. Digital skills play a fundamental role in society. It is essential therefore to equip children with the computational and critical thinking skills that will enable them to fully experience online experiences safely as well as to innovate, develop and interact with technology rather than simply to be passive observers. Creativity, computational thinking and problem solving[5] are key features in the computing curriculum, yet a lack of access to training and pedagogical expertise often means that it's these very concepts and skills that teachers are struggling to embed into their lessons. Effectively delivering creativity and computational thinking in the classroom is a challenge. Preparing students for the future world of work and motivating them to continue studying computing in further education requires teachers to change not just *what* they are teaching but also the *how* they teach it. As games play a leading role in the emergence of new technologies– artificial intelligence, data analytics, augmented and virtual reality etc. - which are being increasingly used in workplaces across all sectors, we believe the games industry ideally placed to inspire students to pursue computer science academically.

11. Further, there is a lack of available CPD and upskilling training available in the games industry and the tech industry more broadly to allow individuals looking to change industries to update their skill-sets – in a sector where the required skill sets change within a few years, greater opportunity for technical retraining is crucial.
12. Nevertheless, the games industry is taking steps to ensure that future domestic skills provision more closely matches the needs of businesses. Ukie, with the support of our members and the wider industry, hosts and delivers a range of resources and opportunities to support the skills agenda, both regionally and nationally.

Games and the computing curriculum

[4] Creative Skillset, 2015
5 These skills have been identified by the World Economic Forum as the top three skills needed for jobs of the future. World Economic Forum, 2016

13. As outlined above, games are a powerful tool for inspiring and engaging students, across age, gender and social background. In turn they stimulate creativity and problem solving, they utilise computational thinking skills, and they effectively fuse the sciences and arts. The Digital Schoolhouse play-based learning programme recognises this and builds upon it to engage and motivate students and educators alike. Digital Schoolhouse harnesses that curiosity, to encourage all students, regardless of age and experience, to develop not just their practical programming skills but also their conceptual knowledge, creativity and computational thinking skills.

14. The Royal Society report on computing education[6] identified five key policy areas that required improvement – computing for all, widening access, teacher supply, teacher confidence and improving computing education through research (pedagogy, engagement techniques, effective assessment etc.). While significant progress has been made implementing the curriculum in schools, much work is still to be done. The current delivery of the subject continues to fail to engage enough students with the subject, particularly girls. While schools are now building in computer science skills and concepts such as programming into younger years, we now need to work on how these skills and concepts are delivered in the classroom. By engaging with industry, we can ensure that the delivery in the classroom remains relevant to the needs of industry, as well as encouraging students to pursue their computing education.

15. Ukie's Digital Schoolhouse programme addresses many of these recommendations as well as hitting many of the key points proposed by the Industrial Strategy Sector Deal.

Digital Schoolhouse:

- develops creative, computing clusters among educational institutions and links up the learning between primary school, secondary school and FE institutions – host schools can deliver the programme to many schools in their area.
- is a holistic offering which operates out of a school based network for improving computing education and digital skills.
- teachers learn alongside their students in a way that increases subject knowledge, confidence and motivation to better embed computing into their school provision. The unique approach to CPD enables teacher upskilling in a way that works for school timetables and doesn't cost the school financially
- is accessible and inclusive. The programme delivers to entire class sets, and therefore equally engages students across diversity categories (i.e. equal numbers of boys and girls engage with DSH).
- workshops are bespoke, meeting the individual needs of the visiting schools.
- is industry led and funded. Industry is linked to schools using a variety of means, to ensure relevant upskilling of teacher knowledge, and to enhance and enrich the delivery of computing in educational institutions.
- teaches computational thinking and the theory behind computational concepts in a tangible way that enables all learners to understand and engage with the skills and concepts being taught.

16. In addition to the core Digital Schoolhouse programme we have also developed the Digital Schoolhouse National School Esports tournament, a hugely successful careers programme available to all Digital Schoolhouses and in 2018/2019 will be open to all schools. The Digital Schoolhouse National Esports tournament is supported by Video Games Ambassadors (an

[6] The Royal Society "After the reboot: computing education in UK schools", 2017

initiative run by Ukie) which connects industry professionals and schools/students to encourage students to see games as a career opportunity. This also opens ups channels for students to engage with industry professionally. This year the tournament was shown to increase students' interest in computing education as well as in pursuing opportunities in the creative digital sector. The tournament also develops a range of soft skills such as leadership, team work and communication and has been shown to positively affect factors such as improved attendance to school.

Games as an education tool

17. Games have a place in schools more generally as an educational tool of the Fourth Industrial Revolution. All games require some element of problem solving skills, and multiplayer games often require the use of effective team work. Some great examples of commercial and educational games being used include:
    - Ruby Rei – a mobile/tablet based-game that teaches languages by playing as Ruby, a girl who has just landed on a planet and has to engage with monsters and aliens in their own language with reading, writing, listening and speaking skills. Find out more here: https://www.wibbu.com/about-ruby-rei/
    - There is potential to use the historically accurate environments of Assassins Creed: Origins to teach Ancient Egyptian History in a tangible way by removing elements of the gameplay for use in schools
    - The incredible success of Minecraft for education is well known. Its popularity with students and within schools to deliver a range of subjects from History to Mathematics to Computing, Engineering and Science led its developers to especially release an educational version

18. Games can be the most straightforward and engaging ways to teach computational thinking and inspire children and students to pursue computer science and creative careers. The growing Edtech sector creates educational tools and resources that often use game-based elements to teach students. Resources such as "Code Kingdoms", "Erase All Kittens" and others use the mechanics of gameplay to teach computing and programming.

19. Other organisations also run programmes that engage children through game-play and game creation. BAFTA Games runs a Young Games Designers competition each year for schools and students. It highlights and illustrates how through the medium of developing games we can teach students not only computer science skills but also mathematics, art, science and much more.
20. While teachers recognise that video games uniquely engage students, further support is needed to show this can be practically done. Industry has a role to play here, to share simple game design and development strategies with students and teachers to enable them to more effectively use this as a method for teaching creative digital skills and preparing students for the fourth industrial revolution.

Games as a career

21. With the global games audience estimated between 2.2 and 2.6 billion people and the global software market expected to grow from $116 billion in 2017 to an estimated $143.5 billion by the end of 2020, the opportunities for the UK games industry have never been greater. The UK is home to a growing games sector that requires highly skilled people to continue this growth.

22. The workforce is highly qualified, with 63% having a degree compared to 57% of the wider Creative Media workforce and 37% of the wider UK economy in 2011. The video games sector

is a major provider of employment for the UK creative Industries with a workforce of over 20,000 people. At an average GVA per employee of almost £68,000 [7]– the highest and most productive of all the sectors creative industries – there is an opportunity for significant growth.

23. The Government's Industrial Strategy Creative Industry Sector Deal includes provision a package of support to ensure there is a larger and more diverse intake of talent and a broader range of routes into the creative industries[8] which includes the development of a creative careers campaign. Whilst this is welcomed, the focus on encouraging young people to consider a career in the creative industries is only one side of the issue.

24. Unfortunately, as highly skilled, highly productive, creative and innovative sector as the games industry is, there is still a sense that teachers and parents need to be made more aware that games are a valid and growing industry that is a perfectly legitimate and futureproof career choice for their students and children.

Games and Public Perception of the Fourth Industrial Revolution

25. As games are played ubiquitously across the UK by all age groups, genders and social backgrounds, they have a large potential role to play in normalising new and emerging technologies to the general public as well as on policy makers.

26. The way new technologies and their risks and benefits are presented can markedly influence their development, regulation and place in public opinion. We believe that the games industry can play an important role in both helping to improve the public's engagement and technical understanding of emerging technologies such as AI, IoT and robotics, as well as foster a positive perception and the innovative new experiences and tools for creativity it offers to players and creators alike.

27. A major barrier to the widespread adoption of these technologies across society is overcoming some of the misconceptions and fears people might have, which can often come from a lack of everyday experience in interacting with intelligent software. Games provide a unique opportunity to prepare society for the future, offering them a safe space where people can take risks, make mistakes and be curious.

28. Unlike other playful AI tools, like photo filters on smartphones, games are a two-way immersive interactive entertainment experience resulting in players interacting with an AI and seeing the results. They are, therefore, a great medium for people to learn how to interact and engage with AI systems, which is an important area of research for AI, especially in enabling greater safety of systems. There is already a wide range of games driven by their AI[9], such as *Black And White* (in which players train a machine learning system, under the guise of training an animal) or *Alien: Isolation* (in which players must understand the strengths and weaknesses of an AI, represented as a dangerous alien). Both of these milestone AI-based games were developed by UK game developers.

29. Games also serve as an effective medium to capture the public' imagination and drive enthusiasm for the creative potential and uses of New technologies. *No Man's Sky*, for example, offers a vivid depiction of the artistic possibilities opened up by AI, by providing players the opportunity to marvel and explore beautiful and expansive planets, in which every rock, flower, tree, creature and scene is generated by an AI algorithm. Media Molecule's

[7] https://www.o-spi.co.uk/wp-content/uploads/2015/02/SPI-Economic-Contribution-Study-2015-02-24.pdf
[8] https://www.gov.uk/government/publications/creative-industries-sector-deal/creative-industries-sector-deal-html#people-5
[9] http://julian.togelius.com/Treanor2015AIBased.pdf

Dreams, soon to be released, uses AI, robotics and logic to allow users to create their own worlds and share them with others online.

30. Moreover, by acting as an example for the ways technologies can empower and fuel human creativity, the games industry can be used to help develop the public's understanding of the various opportunities that exist for society in the development and use of technology. AI presents huge potential to unlock individual creativity in areas that traditionally have a high barrier to entry. The creation of videogames is a good example of this, as it requires many artistic and technical skills to create even a simple game. Over the next decade, academics predict that we will see the emergence of 'computationally creative' systems that can tackle highly creative problems, which historically have been problematic for AI. Dr. Michael Cook at Falmouth University has done work in this area that vividly demonstrate this.- His ANGELINA[10] system has created videogames on its own as well as in conjunction with humans, and is designed to be able to explain its actions, understand cultural references and common knowledge, and be inventive and novel.

31. Creative AI that can work with people and converse with them about creative tasks could change everyday creative expression, making it easier and increasing everyone's potential for creating and sharing things like videogames. Increasing the public's understanding of the creative opportunities presented by the development of AI is important to foster an informed and balanced perspective on how AI will impact society.

Conclusion

We hope our response has highlighted to the committee:

- The creative and innovative contributions the games industry makes to the industrial and cultural landscape at the bleeding edge of the Fourth Industrial Revolution
- The contribution of the games industry to the educational sphere, particularly around Digital Schoolhouse and other student focused, industry supported initiatives

The role games can play in supporting the general public's understanding of developing technological changes in the fourth industrial revolution.

[10] http://www.gamesbyangelina.org/