Amazon Web Services Response to the Scottish Funding Council's Call for Evidence from Stakeholders to Help Shape Future Provision

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Submitted By:

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1.0 Introduction

We are pleased to provide this response to the Scottish Funding Council's Call for Evidence from Stakeholders to Help Shape Future Provision. As a commercial provider of cloud computing services, our position as a stakeholder is arguably tangential to your request. However, there are components in and aspects of the services that we offer which are central to the future operation and prosperity of educational institutions globally, and which are used by numerous universities and colleges already.

We've provided some brief headline responses to the six questions, and would hope that – if there are topics which you feel might be worth considering in greater depth – we could meet to discuss in more detail.

2.0 AWS as Stakeholder

This is a quick preface to provide some background on AWS and how educational institutions use our services.

2.1 Background to AWS

Amazon has a long history of using a decentralized IT infrastructure. This has enabled our development teams to access compute and storage resources on demand, and it has increased overall productivity and agility. By 2005, Amazon had spent over a decade and millions of dollars building and managing the large-scale, reliable, and efficient IT infrastructure that powers one of the world's largest online retail platforms. Amazon launched Amazon Web Services, Inc. (AWS) so that other organizations could benefit from Amazon's experience and investment in running a large-scale, distributed, transactional IT infrastructure.

AWS has been operating since 2006 and now serves millions of active customers every month worldwide. In 2006, AWS began offering IT infrastructure services to businesses as web services—now commonly known as cloud computing. One of the key benefits of cloud computing is the opportunity to replace upfront capital infrastructure expenses with low variable costs that scale with your business. With the cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly spin up and tear down hundreds or thousands of servers in minutes and deliver results faster. The instantaneousness of AWS services gives customers the ability to try a lot of experiments, without having to live with the collateral damage of failed experiments. This allows our customers to innovate and invent in the cloud, without exposing their business operations to risk.

Using AWS, customers can requisition compute power, storage, and other services in minutes and have the flexibility to choose the development platform or programming model that makes the most sense for the problems they are trying to solve. Customers pay only for what they use, with no upfront expenses or long-term commitments, making AWS a cost-effective way to handle a huge variety of workloads.

experience is that building skills (and doing so as early as possible in the education cycle) creates employment opportunities.

Our work in this area may be instructive and it might be useful to discuss in more detail. We have a range of initiatives including AWS Educate, AWS Academy, AWS Restart and AWS Institute. We also run a variety of projects to encourage BAME students to pursue careers with Amazon/AWS, and GetIT – a programme which reaches out to 12-13 year old girls to inspire them to take up STEM subjects with a view to pursuing a technical track in their education. We also run "AWS Activate" which is a programme to support startups with service credits, technical support and training.

In IT we feel that a coherent, structured national programme of activity which reaches across all age groups would embed a culture of technological excellence which will greatly benefit individual students, educational institutions, and the economy as a whole.

How can colleges, universities and specialist institutions best support Scotland's international connectedness and competiveness in the post-pandemic, post-EU membership environment?

We believe that using modern, fast, flexible and cost-effective cloud computing services is essential to the delivery of a sophisticated virtual teaching and research environment. A sophisticated virtual teaching environment will attract, retain and develop a talented international student and academic community. A community which starts its tertiary education in a virtual Scotland (which commits to becoming a global exemplar in online education) will implicitly promote a strong national academic identity. That will have global impact in terms of profile and credibility, and it will create networks which – though virtual - are embedded in Scotland. Whilst the impacts might be difficult to quantify at this point, if a university possesses the virtual equivalent of the very best libraries, buildings, laboratories, campus and social facilities, it is a university which will succeed on an international stage.

This response is not a case of "well, they would say that, wouldn't they?". Anyone who has observed the impact of COVID-19 in terms of the increase in online education will say it too. According to Business Wire there was a 425% increase in enrolments by consumers, and a 55% increase in course creation by instructors by the end of April alone.

Our view, therefore, is that by developing an online learning environment which is stable, available, flexible, robust, rich in features and accessible to all (regardless of the sophistication of an individual student's technology) Scotland will be able to establish a competitive advantage which will translate into longer-term gains for the academic community and the economy. From AWS's perspective, and from the viewpoint of hard-pressed CFOs, one of the critical components in this shift is the savings achievable. There is little certainty over future budgets or future student intake. Delivery via the cloud costs less. If Scotland is able to deliver an exemplary online student experience, the financial benefits will be substantial.

Today, AWS provides a highly reliable, scalable, low-cost infrastructure platform in the cloud that handles workloads for millions of businesses and governments around the world.

2.2 AWS in Education

We have a firmly established education practice. Visit https://aws.amazon.com/education/customer-experiences/ for brief summaries of the work that we do for institutions/educational software providers. These include 2U (platform for taking degrees online), Baylor College of Medicine (academic collaboration system), Carnegie Melon University, Code.org (originators of the "Hour of Code" initiative which attracts 20m students for a single week), Coursera (online learning platform which reaches 3m students per year), Echo360 (active learning platform), edX (on line "MOOC"), Harvard University (which runs its entire Computer Science department on AWS), Harvard Medical School (which uses AWS for "Translational Science" activities such as genome sequencing), Notre Dame University, UCAS, JISC, the University of East London, and the University of Manchester.

We are a critical provider to these organisations, in terms of management systems, collaboration tools, student/staff interactions, and content management. Whilst online learning has been a fast-growing feature in education, provision of such services will expand and proliferate at a vastly accelerated rate owing to COVID-19. It's in this area particularly that AWS has much to contribute: not simply because of the technology we provide but because we can provide solutions exceedingly rapidly (far far faster than would be possible in a conventional on-premises data centre environment) and – critically – at much lower cost.

We're also heavily involved in High Performance Computing and Research Computing with organisations such as the European Space Agency, NASA, the National Science Foundation in America, the National Institute of Health and the UK Biobank. We enable organisations to analyse massive data pipelines, to store petabytes of data, and to advance research using transformative technologies like artificial intelligence (AI), machine learning (ML), and quantum.

3.0 Responses

Below are responses to those of the six questions where we have input which may be of use to the Scottish Funding Council.

What do you think colleges, universities and specialist institutions should stop doing, or do differently, in order to contribute effectively to an inclusive social and economic recovery? (You may wish to comment on teaching and skills development, sectoral and employer needs and employability, research, innovation and knowledge exchange, widening access and equalities issues.)

From our perspective, and strongly linked to the response below, skills development in IT is absolutely essential – both for the delivery of education and training itself, and to lay the foundations for an expanded knowledge-based economy. Our

How Scotland chooses to go about this is a policy matter beyond the remit of this rapid response. A laissez faire approach based on the provision of information and recommendations and the natural evolution of each institution? Funding incentives for each institution? A consolidated, strategic national programme bringing together different institutions in a common framework?

What opportunities and threats does the post-pandemic environment hold for colleges, universities and specialist institutions? For institutional leaders, how are you planning to address these challenges and opportunities?

See above. The opportunity is to create a world-class virtual education system which makes Scottish institutions the natural destination of choice for tomorrow's online student, researcher and academic. The threat is that someone else does it first or they do it better.

What forms of collaboration within the tertiary education eco-system would best enable a coherent and effective response to these challenges and opportunities?

Again, without provoking a "they would say that, wouldn't they?" response, we believe that collaboration with commercial organisations such as ourselves would be highly effective in structuring a long term approach to this. This is because we have long expertise in the area. We've worked with a vast range or organisations in both the public and private sectors. That work has always been partnership-based and collaborative: assessing exactly what a customer's needs are, and working with the customer to find an answer that meets that need. A large number of AWS's innovations have come about simply because a customer wants something done, but there is no available solution anywhere in the marketplace.

4.0 Conclusion

These are some brief considerations only at this point. We would more than welcome the opportunity to explore some of the general points we've made and whether – or how – they might in part be absorbed into your plans for future provision. One thing is certain for us: the kinds of skills that we are discussing are skills that we know we need, and we know other suppliers in this sector need, as will companies across all industries. If Scotland can create the educational infrastructure to give students a head start in IT, it will be serving its future workforce in a way which will reap rich rewards.