

Digital Scotland

Blueprint for a 21st Century
Scottish Digital Nation



DigitalNation.scot

Digital Scotland - Blueprint for a Scottish Digital Nation



The purpose of Digital Scotland is to support and help accelerate the [Scottish Government's ambition](#) for the country to become a world leading digital nation, and our ebook will provide a complete blueprint for achieving this.

The first step in this exercise is to define what a 'Digital Nation' actually is, a concept so deep and broad it would form an ongoing debate, that we can start through identifying some key component parts:

- **A technical infrastructure,** for uniting all the disparate IT systems into a single environment, particularly that of Digital Identity – the core mechanism for commonality across multiple systems, as well as other key foundations notably the Blockchain and a national integration platform like Estonia's X-Road system.
- **A digital learning nation –** Online learning is ubiquitous, modernizing our schooling, empowering the disadvantaged with new skill sets and integrated with businesses to form route to work pathways.
- **A nation of digital entrepreneurs –** These skills are married with support programs and technology accelerators to enable the fast-tracked launch of a myriad of new digital businesses.
- **Wholesale digital capability across all the nation –** Key groups are lagging in their adoption of technology, such as small businesses and rural communities. Initiatives to address this will be implemented.

Building a Scottish Digital Supercluster

As we consider what steps could be taken to action the recommendations of the [Logan Review](#) we can look to other countries to learn from and emulate their approaches to accelerating economic innovation.

Canada in particular offers inspiring programs, notably their use of 'Technology Roadmaps' and the launch of 'Superclusters'.

Technology Roadmaps

Canada has made extensive use of [Michael Porter's cluster model](#) to underpin their economic development strategies, a focus on building industry sector collaborations that pool resources and encourage shared innovation that grows the success for all the participating members.

The backbone of these efforts are the creation of 'Technology Roadmaps', a common product innovation roadmap and business plan for the whole industry that each business contributes to and can benefit from.

Technology Roadmaps are introduced and explained in detail in [this guide](#), with [this page](#) providing a list of completed roadmap programs, for industries such as electric vehicles, intelligent buildings and smart grids among others.

A [whole book](#) is available that explores their usage in academic detail, and this document offers a guide on [how to develop them](#), where they describe:

"Technology roadmapping brings players together to work together in a far-reaching planning process and opens the door to collaborative research and development (R&D).

Building a Scottish Digital Supercluster

Technology Roadmaps (TRM) can play a key role in enhancing innovation. It is a document outlining future market demand and the recommended means to meet this demand. A roadmap does not predict future breakthroughs in science or technology; rather, it forecasts and articulates the elements required to address future technological needs. A roadmap describes a given future, based on the shared vision of the people developing the roadmap and provides a framework for making that future happen technologically."

Building a Digital Supercluster

Canada has built on and advanced this approach through the launch of a series of "[Superclusters](#)", concentrating large scale funding into keynote growth industries such as AI, Ocean Technology and Next Generation Manufacturing. Through an investment of up to \$950 million, which will be matched dollar for dollar by the private sector, the initiative is expected to create more than 50,000 jobs over ten years and grow Canada's GDP.

For Scotland's ambition to build a world leading digital nation the [Digital Supercluster](#) is especially relevant.

Although Canada's Superclusters program are regional in focus, the Digital Supercluster actually offers an R&D agenda that is ideal for defining a Digital Economy strategy for the whole country, described in detail in their [Capacity Building strategy](#).

Building a Scottish Digital Supercluster

The Digital Supercluster identifies an R&D framework ideal for chartering a network intended to develop Canada's digital economy, including:

- Leverage work-integrated learning platforms;
- Develop diverse talent through relevant certification, work experience, education and training;
- Develop industry-relevant secondary, post-secondary and/or post-graduate expertise in digital innovation;
- Leverage access to Canada's pool of scientific, technical, engineering expertise and capabilities;
- Encourage and enable senior-level digital and business development talent to work and develop skills in Canada;
- Support workforce transformation for industries facing digitization and automation, including re-skilling of Canadians;
- Use online or technology-based methods to reach potential talent, both to encourage them to pursue a career in tech and to train relevant skills; and,
- Develop best practices of diversity and inclusion that enable organizations to be more inclusive of participation by women and other under represented groups.

Building a Scottish Digital Supercluster

From Gaming to the Blockchain Scotland has a number of tech sub-sectors populated with very promising startups that offer global growth potential but aren't yet working at the scale required to achieve that. These types of innovation programs offer the structure the government can employ to create a national platform for reaching that scale that the whole industry can benefit from.

Estonia: The Baltic Tiger - Inspiration for an Independent Digital Scotland

A headline theme of our Digital Nation campaign is the inspiring story of E-Estonia, and how Scotland may emulate their success.

Lesley Riddoch and filmmaker Charlie Stuart traveled to Estonia in late February 2020 to make [a film about this story](#), about one of the most recent small north European states to become independent.

Tiny Estonia (pop similar to Wales) sees itself as a forgotten Nordic nation, sharing its language, forest and bog-covered topography and Baltic location with Finland.

And it's widely regarded as Europe's Digital Tiger economy, performing an incredible transformation from terrible poverty in the wake of reestablishing independence just 30 years ago.

Thirty years ago, Estonia became the latest small European nation to declare independence. Faced with terrible winters, they struggled to even find petrol for ambulances and the supermarket shelves were empty. But today, Estonia is one of the most successful small countries in the EU. How did they do it?

Video Summary

The Estonian people were preparing themselves for independence all their lives, and they actually planned a lot of this transformation ahead since they had a firm belief that they would become independent.

A wave of young people took over dismantling everything. So they said those people who have been working for the Soviet Union and have been supporting this kind of things have to leave now. They need to clean the entire state.

Estonia: The Baltic Tiger - Inspiration for an Independent Digital Scotland

And by cleaning the state, it means everything. The first years were tough for this new Baltic nation. They literally had nothing on the shelves of grocery stores in Tallinn or elsewhere in Estonia. They were in a very difficult situation. But Estonia embraced the new digital world, and in just 20 years, its GDP has increased fivefold. It's nothing short of extraordinary. This transition happened within a generation. The Estonians have adopted their independence day as the 24th of February. It's a holiday, everyone gathers together on this day.

Estonia first proclaimed independence in 1918 after two centuries of Russian rule, but soon the country was occupied, first by the Soviets, then the Nazis, then the Soviets again, who ruled for almost 50 years. In March 1949, 20000 people were deported, most to Siberia by the KGB. Two thirds were women and children under the age of 16.

In 1986, there was a seismic shift at the Kremlin. President Gorbachev introduced Glasnost to modernize and refresh the communist bloc. But in the Baltic states, the newfound political freedom gave the chance for dreams of nationhood to be rekindled. The Estonian people were preparing themselves for independence, all their lives through whole time in Soviet Union and then especially, intensely, during those three years they had the singing revolution, they were prepared.

Throughout the years of repression, huge singing events continued, the choirs were a symbol of Estonia's unique culture. As freedom can't be achieved by only movements, they not only were singing and shouting and streets, but they were undertaking hard legislative work too. In August 1989, the movements of Estonia, Latvia and Lithuania combined to form a 400 mile chain of two million people demonstrating their unity for freedom. This was to catch media's attention to pressurize Gorbachev. After all this, Estonia got its independence.

Estonia: The Baltic Tiger - Inspiration for an Independent Digital Scotland

Estonia set up its own currency pegged to the Deutschmark, but the country had traded almost exclusively with Russia and so the economy collapsed. It was a government in crisis from the start. In 1993, in the midst of a Baltic winter with daytime temperatures below minus 10, the state coffers are empty, businesses face bankruptcy, pensions might not be paid.

There was a struggle to find petrol for ambulances and the shops were empty. Mart Laar became the first formally elected prime minister at the age of just 32. The unemployment rate was 40-50%. No countries were buying anything from Estonia as their production was really bad. The changes were really very, very harsh because they didn't have money. People were patient, expecting that the country will grow up, will improve. And after this harsh time, there will be better times. The Estonians people had hope that Estonia will again flourish someday.

Very soon help and investment came from Nordic neighbors. There were even food and clothing parcels from abroad. Very quickly, Estonia began to grow as Europe's newest democracy. It was a society shaped by a new generation without baggage from the communist era, with new ideas and a blank canvas.

E-Estonia

Estonia's main claim to fame today is the Digital Economy. Estonian education has fueled 20 years of digital innovation, 90 percent of schools deliver subjects using digital technology by choice, not compulsion, and 70 percent of kindergartens have access to robotics. Scottish education was once the envy of the world. Now a different small country is turning educational heads.

The education system has spawned a nation of digital entrepreneurs and innovators. Three Estonian engineers have built Skype with almost 700 million worldwide users.

Estonia: The Baltic Tiger - Inspiration for an Independent Digital Scotland

In Estonia, everyone must have a digital ID. This is a compulsory document for absolutely every person who lives in Estonia. The citizens of Estonia use this smart electronical id card as their driving license also. They also get discounts from various shops by using this id card. This card is also essential for medical care because they need this card at hospitals and health care centre for their medical prescriptions.

This card is also used by the citizens for tax payment system. With the aid of this card it takes only one minute in order to declare citizens' taxes. The citizens of Estonia have a great faith on their state law authority as they provide their all information of themselves to one institution. Only one percent of entire state budget is used in order to keep up the system. The citizens' get back two percent of their GDP by using this one single solution.

It took three years after independence for the last Russian military to leave. Now, Estonia has an army of its own and an international peacekeeping role. It has 3000 full time soldiers with 20000 in reserve and the support of its Nato Family since it joined in 2004. Joining the NATO has cultural, economic, social and mostly political consequences on Estonia.

In Estonia 2/3 of the population live in the traditional country. They tried to keep alive their cultural heritage even when they were part of the Soviet Union. The country celebrates its traditions and identity big time.

The country has been criticized for a flat tax regime that leaves the well off paying the same as the lowest earners, just 20 percent. And corporations can skip tax altogether if they reinvest. One man well-placed to make international comparisons is the Estonian TV journalist Johannes Tralla, he is a former EU correspondent.

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According to him oligarchy does not exist in the Estonia every taxi driver here is an entrepreneur and the low tax system is really beneficial for the citizens. In Estonia there is no dramatic class gap in society. The taxation framework in Estonia is really appreciable in the whole Europe.

Inspiration for Scotland

[Another video](#) shares a short case study of E-Estonia from Freethink, interviewing Toomas Hendrik Ilves, President of Estonia from 2006 - 2016, telling the compelling story of the global success of Estonia as a digital nation leader, boasting the most advanced digital government in the world.

Ilves recalls how Estonia faced massive economic challenges upon achieving the restoration of independence in 1991, a time that soon saw the emergence of the Internet.

Toomas realized the opportunity was that Estonia was no further behind than any other country in this field, and so began pioneering their adoption, with all schools being online by 1998 and the framework for E-Estonia in place by the early 2000's.

Fast forward to today and Estonia now enjoys an entirely digital society - Via a single digital identity everything except weddings and real estate can be transacted online, including voting.

Not only is it a convenience but it's also the foundation for a prosperous and healthy society. Being entirely digital has meant Estonia has continued uninterrupted during Covid-19, and their 'E-Residency' program has [contributed €14m to its economy](#).

A keynote theme is that size and money isn't the essential ingredient for success.

Estonia: The Baltic Tiger - Inspiration for an Independent Digital Scotland

Toomas now lives in the heart of Silicon Valley in the USA, and despite their vast wealth and being surrounded by the behemoth tech giants like Apple, Google and Facebook, American digital government is surprisingly poor. Processes are still paper-based, requiring photocopies be taken to government offices, whereas Estonians can file taxes in only six clicks in two or three minutes.

Scotland, a similarly sized small nation and with an unparalleled history of invention, absolutely could emulate Estonia and achieve and enjoy an equally advanced digital nation.

As SNP leaders like [Martin Docherty](#), [Doug Chapman](#) and [Angus Robertson](#) have written for The National, Scotland's opportunity is to emulate the Baltic nation one fifth the size of Scotland but that has achieved the staggering accomplishment of becoming the world's leading digital nation, following their own independence.

[Writing for The Herald](#) the SNP's Spokesperson for SME and Innovation Douglas Chapman issues a rallying cry for Scotland to emulate the similarly sized digital nation exemplar, highlighting how their entirely online society has meant they could adapt easily to the challenges of Covid-19.

"Estonia dared to dream and took that leap of faith; Scotland should be next."

Scotland - Europe's Blockchain Capital

The objective of our [Digital Nation Action Plan](#) is to identify the individual entrepreneurs visions for how to achieve a world leading Scottish digital nation, and aggregate these into one overall action plan.

On [The Crypto Standard podcast](#) they interview Nick Jones of [Zumo](#), exploring the details of their exciting venture pioneering a cryptocurrency payments app.

Concluding the interview Jordan highlights how Wyoming is becoming a crypto and blockchain global hub, and asks if Scotland could replicate a similar success.

Nick believes this is entirely doable, given how Scotland is a small, relatively cash rich country with highly educated people, and with many pressing social inequality issues to address could act as an incredible 'sandbox' for cultivating innovative applications of the technology that leverage Scotland's [deep legacy of financial expertise](#).

To crystallize a strategy to unify Scotland's many different initiatives and assets around a single vision of making Scotland the Blockchain Capital of Europe, Nick quantifies the end result through stating key metrics such as having 10 of the top 50 startups, three relevant university courses and a £500m venture fund for supporting the ecosystem.

“Weak on Blockchain”

The nature of the challenge is very succinctly captured by Andrew Noble of Par Equity in [this TechCrunch article](#). While reporting on the general success of Scotland's startup scene in his analysis he comments that Scotland is “weak on Blockchain”.

Scotland - Europe's Blockchain Capital

He's not wrong. Scotland has a handful of great Blockchain startups like Zumo, Siccar and Appii, but to Nick's point we're well short of how many there should be, there's no real funding initiatives to address this and adoption in key 'big lever' sectors like Government is non-existent. Therefore the essence of our Action Plan should be to address exactly this.

A keystone foundation is regulation and legislation, the right approach could either inhibit innovation or unlock an unparalleled scale of economic growth. As [Coindesk reports](#) a new German law could theoretically bring as much as €350 billion (~\$425 billion) of institutional investment into their cryptocurrency market.

In [this blog](#) Bill Buchanan describes how countries should legislate a Blockchain Act, emulating pioneers like [Liechtenstein](#), providing the legal framework to truly achieve a wholly digital nation.

Scaling Scotland's Blockchain Ecosystem

Nick offers an ideal starting point for a Digital Nation Action Plan – A big audacious ambition and clear metrics for quantifying when it is achieved.

By incorporating the equivalent views from other Scottish tech entrepreneurs we can refine a detailed strategy and set of steps for truly realizing the goal of building a world leading Scottish digital nation.

Digital Education - Transforming Scottish Education for the 21st Century

The mission of Digital Scotland is to help build a world leading Scottish digital nation, and of course technology skills and careers are central to that ambition.

As the [Herald reports](#) Kate Forbes has announced £45m in funding to “transform Scotland into one of Europe’s leading economies to start or grow a technology business.”

However there are significant challenges standing in the way.

Key startup sectors like FinTech are facing a [skills crunch challenge](#), experiencing a talent shortage that could inhibit the growth of this booming industry and therefore limit the extent to which this overall goal can be achieved.

As far back as 2018 [Digital Skills Scotland reported](#) that Scotland faces a skills shortage challenge that would hamper our ambitions to build a world leading digital economy, and Scotland’s Auditor General [lambasted the government](#) for a lack of leadership with regards to workforce skills planning. Skills Development Scotland and the Scottish Funding Council have not been able to agree how integrated approaches to skills planning should work. Together, they spend over £2bn each year on training and post-school education.

Particularly concerning is Scotland’s general education performance, [their PISA results](#) pointing to declining performance in key subjects like Maths and Science. Especially poignant is the [collapse of Computer Science](#) adoption, the skill that is absolutely central to our ambitions to build a world leading digital nation.

Digital Education - Transforming Scottish Education for the 21st Century

A Vision for Transformation

There are of course many different technologies that have great potential for Scottish learning. The Cloud makes powerful new teaching tools more easily available, Virtual Reality provides an immersive experience, and so on, but these are at the level of individual teaching. To define the wholesale transformation of education we first need to craft a vision of what a future state transformed system might look like – Entirely new ideas, new models for how Education is delivered.

We can look to other countries for inspiration.

As described in a [previous blog](#) Estonia offers an exemplar of a small nation who has mastered technology to greatly advance their country. Education is one headline example of this, where they have leveraged technology to achieve [astounding levels of success](#) on the same rankings, the first in Europe. Indeed they describe it as a platform for enabling an 'Education Nation'.

The Times analyzes what it takes to build [Europe's best school system](#).

"Despite relatively low spending on education [Estonia is among the top countries](#) in the world in all three areas on which 15-year-olds are assessed: reading, mathematics and science. Its schools are also the best at promoting fairness and Estonian pupils are among the happiest in the OECD."

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Of course technology alone can't transform a policy system, especially one that has been concretely set in its ways for decades if not hundreds of years. James McEnaney notes this in [his tweet](#), highlighting that as well as technology mastery Estonia also have an entirely different approach to Education. It's both this different culture **and** technology Scotland needs to adopt.

Writing for TES James also sets the scene for the types of changes needed, describing [4 Ways to Transform Scottish Education](#), most notably a reformation of the exam system:

"Our current approach, the one that grinds students through a needless annual exam cycle and ties so much of their future to performance in just a few hours of a single day, has failed far too many people for far too long. The richest pupils are more likely to leave school with five Highers than the poorest are to leave with one. Those from the most deprived backgrounds are also more likely to fail their courses than achieve an A grade."

This of course is the backbone of the education system, how grades are assessed and rewarded, and it is here therefore where the biggest levers for change are possible

Resistance to Change

This leads us to the central challenge – Policy systems that are set in their ways and highly resistant to change.

For example in [this white paper](#) the authors document the [MySkills](#) project, a collaboration between the City of Glasgow College, The Scottish Qualifications Authority and APPII, to define a model for digital certification to be used and adapted by other awarding bodies throughout the rest of the UK.

This explores how academic certifications may be digitized, applying them to the Scottish Education and Employment market, demonstrating walk-throughs and process models for how it would work in practice and defining how the pilot project can be scaled to a nationwide roll-out.

Digital Education - Transforming Scottish Education for the 21st Century

Most notably it highlights the core challenge that really stands in the way of modernizing Scottish Education:

“Government policy can be driver. In Scotland, where this project is based, the adoption of digital certificates for vocational education qualifications is a good fit with the Scottish government ambitions for digital services and a digital economy.”

However:

*“Adopting digital certificates is not a very technically demanding challenge, it’s more an issue of cultural change. The challenge in going digital with certificates of learning is symptomatic of the wider challenge of adopting technology generally in education. We are dealing with a complex social, legal and economic system that is **resistant to change** – despite all the hype (and worse) about the ability of technology to transform education.”*

EdTech – Embedding Innovation in Policy Design

Therefore exploring new ways to overcome inertia and resistance, and to encourage wholesale policy transformation are key to Scotland’s goals of creating a world class Education program, and building on that to populate the jobs market with highly skilled candidates.

One example of a highly effective policy is to stimulate and accelerate related startup sectors, ie in this case ‘EdTech’.

A keystone foundation for rejuvenating Scotland’s Education sector is the role of commercial startups. Another function of E-Estonia’s holistic digital nation approach is that it also results in high-growth tech businesses: A country 1/5 the size of Scotland has [produced nine ‘unicorns’](#), startups valued at more than a \$ billion.

Digital Education - Transforming Scottish Education for the 21st Century

Embedding startups at the heart of a policy framework embeds raw innovation there, the most important ingredient needed – An ambition and ability to envision new ways of doing things and a hunger to disrupt an established order. Exactly what Scotland needs, a shake up of the establishment.

An extremely powerful dynamic for Scotland to harness is to utilize local startups to advance these broader national goals. This would encourage a compounding benefit as the improvement of Scottish Education would simultaneously drive the commercial success of Scottish businesses, critically providing them with case study success stories that would support their international expansion, further boosting the economy.