

Digital Strategy

March 2017

1. Executive summary

‘We will become a digital archive by instinct and design’, *Archives Inspire*

Archives are special. They are the homes for our collective memory. We use them to help understand the past, make sense of the present, and to guide us for the future. Our ability to preserve and make available digital records will decide what evidence people in the future will have of today. Archives need to develop extraordinary capabilities to ensure digital records can be kept.

Until relatively recently records were tangible – often boxes of papers, photographs and maps. This is no longer the case. Now we have digital records, which not only comprise written or intelligible content but also intangible bits, data and code. Use of digital technologies has profoundly shaped what types of records are created, captured, shared and made available. The challenge of digital records means that archives need to make some big changes. It requires nothing less than a revolution in archival practice led by disruptive digital archives.

Digital technologies have also transformed how archives are accessed and used by the public. We see millions of visitors each month to our websites. Users rely on digital services like Discovery to explore our catalogue and catalogues held by other archives, the UK Government Web Archive to access archived government websites and legislation.gov.uk to read the law. Expectations are high and we have to keep pace, for example with the increasing use of mobile devices. Social media platforms give us new archiving challenges but also exciting new ways of engaging the public and reaching new audiences. There is also the potential to transform how people contribute to the archive by helping to improve the cataloguing of our collections.

This digital strategy sets out an ambitious plan over the next three years to deliver the aims in *Archives Inspire*. To do this we plan to:

- create the disruptive digital archive
- extend our reach and engaging new audiences using the web
- transform how the physical archive is accessed and used
- develop our digital capability, skills and culture
- forge partnerships with other archives progressing digital transformation

We will deliver this strategy in three phases over the next three years:

- Phase 1 - Reshape
- Phase 2 - Grow
- Phase 3 - Accelerate

The strategy is ambitious. It gives shape to the steps we plan to take to realise the ambitions set out in *Archives Inspire*. As a functioning digital archive we have learnt much. We are confident about many of the capabilities we now need. The scale of the challenge is large and there is a significant gap between the level of resources we have and the level of resources we need, which we will bridge as we take forward this strategy. There is also much that we still don't know. To manage that uncertainty we will work in an agile way, continuing to adjust our plans as we learn more. We will refine our priorities as we develop, iterating this digital strategy as we move forwards.

2. Digital challenges

Our business strategy, *Archives Inspire*, says that 'digital' is our biggest strategic challenge. The National Archives is not alone in this. Archives around the world are grappling with the digital challenge. There are several reasons for this.

1 Records move from the physical to the virtual

Digital records are information encoded and stored as 0s and 1s. They are not in a form we can either preserve or produce to a user without using a computer. Archivists have understood for a while that this is a transformative change.

We have known for a long time how to be an archive of physical records. Deputy Keeper Sir Hilary Jenkinson's *Manual of Archive Administration*, published in 1922, set the standard for a generation of archivists. Things have moved on since then but much of The National Archives' current archival practice would be recognisable to Sir Hilary.

Traditionally only a relatively small proportion of what is created is appraised and selected for long-term preservation. Appraisal, selection and sensitivity review are largely done manually relying on expert judgment. The archive aims to have intellectual control of the collection through a descriptive inventory (the catalogue), which is also the principal finding aid for researchers. To give context for the records this is organised hierarchically, starting with the originating organisation, with the fonds, sub fonds and series all arranged underneath. It is an approach which relies on the originating organisations being relatively stable in terms of function, and having broadly hierarchical structures and reasonably systematic approaches to record keeping. The papers which make up the record are retained in their original order. The description, provided by the originator to help provide context for the records, is kept by the archive and does not change. Records are stored in purpose-built repositories and made available to the public in a reading room. This whole body of archival practice hinges on the tangibility of the physical record and a thoroughly established record keeping tradition.

Digital records are very different. Records are not just documents but can be all sorts other types of content, from threaded discussions using a web based tool, video, websites, structured datasets and computer code. Digital records are often a composite of different components, potentially with different creators and owners. We can relatively easily compute over large collections of digital records, using data to understand what might be important and search to find potentially significant items. This has already had an impact on how the records are organised in the first place, with 'digital heaps' of unsorted information being held in some government departments. It changes what might have value and also impacts the approaches for appraisal and selection. The context and provenance of records can be described in different ways too. Our contextual data can become more fluid and interlinked.

2 Digital preservation is difficult

There is no long term solution to the challenge of digital preservation. All that archives can do is make the institutional commitment to continue to invest, through generations of technological change, in the engineering effort required for records to continue to be available.

This involves several things. The first is to keep the bits because, as yet, there is no viable long term data storage medium for digital records; over time, copies need to be made, and each copy must be the same.

The second is to have the ability to produce or enable use of the record. Digital records are data which depend on code. This data may itself be or contain code. The digital archive needs to understand and manage a complex set of dependencies: data on code, code on other code, code on data. It also needs to manage those dependencies over time and through generations of technological change. Both emulation and migration have important roles to play for managing digital preservation risks. It is much easier for an archive to manage long-term preservation risks when it knows what it is preserving; 20 years - the current time period before records are transferred to The National Archives under the Public Records Act - is a long time to wait before finding out what needs to be done to manage digital preservation. Tools like PRONOM, our registry of file format signatures, and DROID, which uses PRONOM data to identify which files are of what type, are foundational and of huge importance to digital archives.

3 Expectations have changed

Users have high expectations of digital products. They expect services to be intuitive, for transactions to be simple, for results to be immediate. We need to deliver services that keep pace with rising expectations as well as changes in how people access and consume information. Trends like the shift to mobile and tablets have a significant impact.

Archives need to be used in order to be useful. We have to respond to changing expectations around access and use. Discovery was developed to provide search over a catalogue of descriptions of primarily physical records, along with related services (downloads, record copying). It is not a convincing presentation system for digital records.

Digital records are not in a presentation form. To produce a digital record the archive needs to decide how to process the data being preserved, taking into account the technical capabilities of the end user. The diverse nature of digital records (document formats, email, multimedia, datasets, code) and the changing context of users (from Desktops PCs to tablets and smartphones) makes this challenging. For example, as yet there is no convincing presentation solution for email.

It is not just people who want to access and read records who have expectations. Digital records have data users too, people want to write and run computer code over the records. There is also a tension between keeping things safe (keeping potentially harmful code away from the data being preserved) and enabling use (making it easy to run code over the collection).

4 Change is continual from here onwards

The nature of the record is changing. The use of computers has given us new ways to record information and to communicate it. When computers first started being used in government, ways of working that had been established using paper were often just digitally simulated: email replaced letters. Digital transformation projects are enabling the government to move on from the digital simulation of old paper processes. There's just no paper equivalent to a Google Docs document, Slack channel or tweet. We are also seeing records that are themselves quite complex mixtures of information content and computer code – for example a statistical report produced using R markdown.

Each new technology brings a fresh challenge for the digital archive and this change is continual. We were not worrying about big data analytics, distributed ledger technology or the internet of things ten years ago. Digital archives must ride the rise and fall of successive waves of technological change and make decisions about where best to apply their efforts.

5 Digital skills are at a premium

Archives Inspire says we will invest in our capacity and skills, in particular our digital skills. There is huge demand for medium and high-level digital skills in the UK. In evidence to the Parliamentary Committee on Digital Skills in 2015 the Confederation of British Industry (CBI) said that nearly 20% of vacancies for digital roles were proving difficult to fill. The UK economy will need at least 300,000 further digital recruits by 2020. In particular it is the 'digital makers', people capable of inventing and applying new technologies, who are most in demand in the labour market. These are exactly the skills that digital archives most need to tackle all the other challenges. Archives are finding it increasingly difficult to compete in the labour market to recruit the people with the digital skills they need.

3. Where we are today

The National Archives is a multi-channel archive with a significant range of digital services. Our website provides rich context for our collection and help for users. It also contains supporting resources, such as materials for teachers. Discovery enables people to search our catalogue and also descriptions of records held by other archives. It integrates services for accessing digitised records and for obtaining digital copies. The UK Government Web Archive is a comprehensive record of government on the web. Through commercial partnerships and our own efforts we have digitised a significant portion of our holdings.

We are also one of only a handful of fully functioning digital archives in the world. Our Digital Records Infrastructure is capable of safely, securely and actively preserving very large quantities of data on tape in the Dark Archive (several petabytes) with associated descriptive metadata, modelled using an inherently flexible approach. It is operated by some very expert teams. We also own and maintain the best register of file format signatures in the world, PRONOM. This underpins our digital preservation solution and through its maintenance we actively collaborate with dozens of archives internationally.

The digital challenge is two pronged: it is simultaneously to our practice as an archive and also to our capacity. We are moving from an era of relative stability in archival practice to one of continual change. Each new generation of technology gives rise to a new set of issues in terms of preservation and access – and the digital archive must keep pace. Against these demands there is a large gap between the level of resources we have as a digital archive and the level of resources we need, which we will bridge as part of taking forward this strategy and through developing our future workforce.

We are not alone in facing the challenge of digital records. We know from our leadership role for the archives sector that it is a challenge shared by many other archives, in the UK and around the world. The UK has some significant strengths that we can call on. We have a world-class research base. For example the European Archival Records and Knowledge Preservation (E-ARK) project, which has been developing a wide range of new digital preservation tools with archives around Europe, is coordinated by the University of Brighton. There is also a long tradition of archives and other memory institutions working together and supporting each other, through organisations like the Digital Preservation Coalition and international groups like the DLM Forum, European Archives Group (EAG) and the International Council on Archives (ICA).

4. Vision for the disruptive digital archive

Our current practice as a digital archive borrows heavily from the approaches we take to physical records. We are a **first generation digital archive**, simulating digitally a body of archival practice devised for paper. Digital records are appraised and selected like physical records, according to guidance shaped by the records lifecycle model. The digital transfer process follows paper transfer gateways with a significant level of manual intervention at each stage. When records are transferred they are described using long established cataloguing standards. Search and access are provided through the catalogue and Discovery.

Our vision is to become a **second generation digital archive** that is digital by instinct and design. The **disruptive digital archive** fundamentally rethinks archival practice from first principles.

The disruptive digital archive:

- establishes a clear value proposition that delivers different types of value at different times to users;
- preserves all types of digital record created by government not just a set of common formats;
- contributes to discussions about new systems so digital preservation issues are thought about as early as possible;
- develops new ways for providing context, managing risk and giving assurance that records have not been changed;
- adopts approaches that are significantly informed by the records continuum model which views records as archival from the moment of their creation and ‘always in a state of becoming’, to quote Sue McKemmish;
- develops descriptive practice that recognises records as evidence for multiple perspectives that contributed to the record’s formation, and which continue to evolve and change through ongoing use;
- recognises, in the era of large scale data analytics, that digital records have value as whole collections in aggregate that goes beyond the value of the sum of the constituent parts;
- reaches new audiences through the web and seizes the opportunity for greater relevance by enabling use of its whole collection;
- shares tools, experience and work with others to develop new archival practice and standards;
- engages collaboratively as part of a growing global community of digital archives.

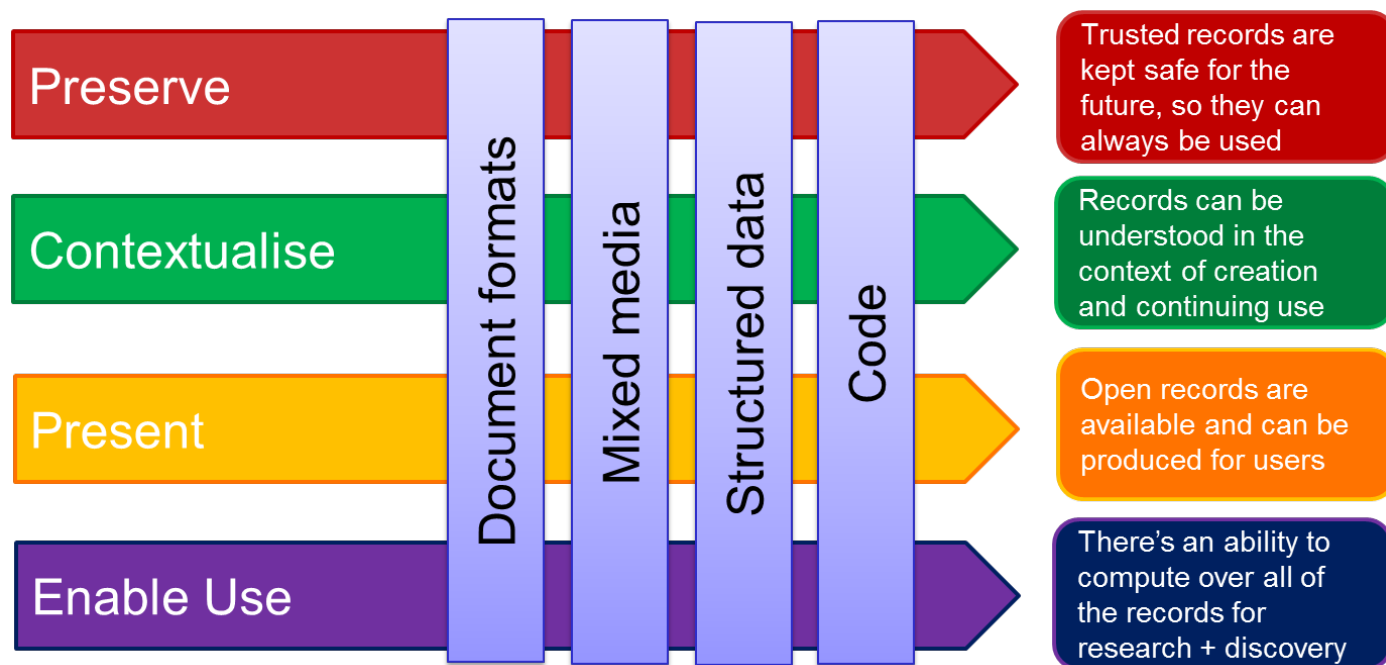
5. Digital archive

5.1 How the digital archive provides value

There are four categories for the value the digital archive offers its users:

- preserve
- contextualise
- present
- enable use

Archives provide value to society by keeping records and by providing access to them. Fundamentally digital archives provide value the same way. In that context, **preserve** means trusted digital records are kept safe for the future so they can always be used. **Contextualise** means that digital records can be understood in the context of their creation and continuing use. **Present** means that open digital records are available and can be produced for users. **Enable use** means that we offer the ability for users to compute over all open digital records for research purposes as well as to enable indexing for search and discovery.



The digital archive has the opportunity to provide different types of benefit at different times. Our work to preserve digital records needs to start before a record is even created. We should advise on digital preservation issues as new systems are being specified and developed. We can also be ahead of the curve by understanding what software is in use and then having the right capability to preserve records of different types. Most government digital records are not published. We can start to give the records context as soon as they are created. We can do this by actively archiving government on the web so we capture what is published. We can also keep track of department's statutory functions, powers and duties through data we manage in the legislation.gov.uk database and use this for record descriptions as well as to aid appraisal and selection. We need the capability to present and enable use of open records at the right time under the Public Records Act and in the most appropriate ways.

5.2 Preserve

We will widen the types of digital record we can preserve. We currently concentrate on images, document formats (for example, Word or Excel), email, videos and mixed media (including websites and tweets). We need to develop the capability to preserve structured datasets and computer code. This involves developing new capabilities for example to preserve geospatial information.

We will manage preservation risks to digital records much earlier. Through developing expert knowledge – both internally and externally – and taking practical steps like enabling earlier transfers for digital records, or advising government departments when they are developing new systems, we can counter some of the known difficulties of digital preservation. We need to develop tools such as DROID so that the digital preservation risks can be managed effectively for records we do not hold.

We also need to make sure that any medium-term archiving solution used by government departments is also capable of managing medium-term digital preservation risks.

We will engage with the software industry and developer communities to develop their understanding about digital preservation issues. There are opportunities for us to work more closely with these communities, particularly some of the developer networks around open source software. We will actively contribute to open source projects and tools.

We will develop new methods to help manage appraisal, selection and sensitivity review. We need to explore the use of e-discovery tools for appraisal, selection and sensitivity review. We should investigate the use of machine learning, applying techniques such as 'anomaly detection' with our growing collection to incrementally aid digital sensitivity review.

We will develop new methods for capturing the digital record. As well as digital transfers we should develop harvesting strategies to acquire digital records. Operating the UK Government Web Archive has given us some powerful capabilities for capturing complex digital records that we aim to develop further. With much government information now moving to cloud we need to develop our 'data liberation' capabilities for the most commonly used cloud-based services to capture digital records in a format that is appropriate for long term preservation.

We will standardise and streamline the process for transferring digital records. We need to develop a self-service digital interface for government departments to use so we can automate the accessioning (registration, transfer and ingest) of new records. We also need to change how we describe digital records so that the creation of metadata we can be fully automated, moving the focus of our digital experts from the relatively mundane (fixing up metadata) to the more fiendish and difficult.

We will preserve digital records in their original format. We will continue not to alter the digital records we are preserving. We will use emulation to produce digital records that cannot be read or used with current software, as our preferred approach. We will only migrate digital records to another format only when there is no alternative to managing the preservation risks. When we transform records from the preservation format to present them to users (like we do for the web archive) or create substitution versions for presentation purposes (for example, turning an email message into a PDF document), we will explain what we have done so users can fully understand the provenance of the record.

We will reinforce our commitment to PRONOM as a cornerstone of the digital archive. We will work with other archives to extend its coverage and scope. We also need to explore new approaches to file format identification, signature creation, verification and use.

We will measure preservation risks and publish the results. We will develop a preservation risk model to measure which digital records can be presented and used, identifying those at risk, for example where we do not have the ability to run the software needed to produce the record. With others, we need to explore the possibility of 'archival use' licences from software vendors to address these risks.

We will manage data storage in the most cost effective way. We will develop a storage cost model to understand how much data we can afford to keep. In the era of cloud computing, compute and storage have become commodities but moving data remains relatively difficult. We need to use the storage cost model alongside projections about data volumes as part of our business planning

process to decide on the best blend of storage (cloud, tape archive etc.) that keeps the record safe while enabling use.

We will be transparent about our practice as the basis for trust in the digital archive. We need to evaluate the benefits of the Trusted Digital Repository status. We should investigate publishing data about the records we are preserving in a cryptographically assured way so users can verify the authenticity of the record themselves. We should explore new technologies, such as distributed ledgers, to understand their relevance to archival practice.

We will assess our progress against established maturity models and evaluation methods for digital archives.

We will work with other archives to collaboratively develop new archival practices, tools and standards. We will actively engage in international groups and forums with other archives. As one of the world's big archives we will be a contributing partner to the research and development of archival practice, digital archiving tools and standards.

5.3 Contextualise

We will rethink how we describe and contextualise digital records. We need to adopt an entirely new approach to record description based on user needs. We should learn from other archives and from alternatives like the Australian Series System. We need to explore breaking the tight association between individual records and the description and look at more flexible approaches.

We will reduce the burden on government departments. Only preservation metadata should be managed at the level of the item: reference, provenance, fixity and access rights. Item level metadata should be automatically generated wherever possible.

We will explore new opportunities for contextual description. Digital records can contextualise each other. Contextual understanding is fluid and can grow with our collection and in relation to other collections of digital records. We already hold two important datasets of our own that we can use to help contextualise the record: legislation (functions of government are set out in law) and an archive of government websites. Other institutions (for example the BBC, British Library, Internet Archive) have large, temporally-aware collections which could be similarly used. We need to move from an era of silos, fragmented information held by different institutions, to merely distributed data. We should develop, use and support tools and approaches that make this easier.

We will investigate how best to manage uncertainty in our data about records and the risks that result. Mathematical probability provides good ways of expressing certainty and we have learnt some valuable lessons from the Traces Through Time research project. We need to begin to develop quantitative methods to deal with risk and uncertainty in our data for decision making, in particular by using Bayesian Networks.

We will investigate how best to manage record descriptions that change over time. Digital records and their descriptions need not be 'frozen' information supplied by the department at the time of transfer. Digital records can be continually processed and used. We need to explore what it means to have a continually evolving and changing contextual understanding of digital records.

5.4 Present

We will develop a new presentation system for producing digital records on the web. This will be designed to meet users' needs, and should be capable of presenting a variety of different types of digital record. Good presentation of email and multimedia content is essential. The new presentation system will have an open API, to meet the needs of users, developers and machines. It should offer presentation versions in different formats and certified preservation copies.

We will gradate access to open records to manage presentation risks. Opening a record and publishing a record are very different acts. The new presentation system needs to gradate access to help manage presentation risks (like intellectual property rights issues). We need to be able to flexibly decide what is available to index by search engines, what is on the web, what is adapted, what is only available on site.

5.5 Enable use

We will copy our collection to the cloud to enable it to be processed by ourselves or by researchers using commodity computing power. We need to find ways to manage the risks involved with providing bulk access to data. Some cloud providers are very keen to help host large datasets in the cloud (for example, NASA's big open datasets are hosted for free, the cloud provider making their money by selling the compute, not the storage).

We will actively process the collection ourselves to ever expand our contextual descriptions. By processing digital records in the right ways, using big data and machine learning techniques, our collection has value in aggregate, which we should actively help realise.

We will learn from others with similar challenges, including other digital archives as well as parts of government with lots of data such as the Office for National Statistics. We need to develop our practice for enabling use having regard to legal, ethical and public acceptability considerations that stem from processing large volumes of data.

6. Digital services

Our website is part of our public face. It is an important communication channel through which we engage the public. It enables researchers of all types to learn about our records, search our catalogue and to access our collection, either by visiting us on site or through downloading a digitised image. For digital records the website is also the reading room, where the record is produced. We also provide other important digital services, notably legislation.gov.uk and the UK Government Web Archive.

We will understand the needs of users through user research. Digital services that aren't usable don't work. We have some big challenges to deliver an intuitive user experience. Most people using our website do not understand how archives organise their collections and many find searching our catalogue bewildering. Most users of legislation.gov.uk do not understand how legislation works. User research is the only way to find out what works best when developing or improving these services.

We will develop our user research capability so that we can develop services that meet users' needs. We need to gather evidence from user research and analyse data, for example about usage. We should establish our own user research laboratory on site where we can test concepts and ideas.

We need to bring together data from all our digital services, so there is comparable information from each about the level of satisfaction, number of visitors, and length of visit. We should develop common analytical methods and capabilities so our decision making is consistently evidence led.

We will develop our website so that it is an integral part of our public programming strategy. We need to link our understanding of user behaviour with our wider understanding of audiences. We need to develop high quality content that captures people's imagination. We need to find inventive ways of promoting events and exhibitions as well supporting other types of interaction with the archives.

We will improve Discovery by better integrating record descriptions with supporting information like research guides. We should explore opportunities to improve the whole user journey, from a search using a search engine through to accessing a record.

We will support users of Discovery to search other archives' collections. We need to make it easy for other archives to share and maintain their catalogue descriptions through Discovery, as part of our offer to the archives sector.

We will improve the UK Government Web Archive by employing a mixture of powerful capture and replay technologies as well as developing the user interface and enhancing the search capabilities. We will continue to capture a comprehensive record of government on the web, across channels and content types.

We will make our catalogue descriptions available as open data by improving the Discovery API. We should encourage re-use and support others, who are often targeting a particular user community, to include our catalogue descriptions in their products and services. We need to investigate the feasibility of providing bulk downloads.

We will investigate new ways of managing record descriptions and digitised records that use the latest web standards such as HTML5 and schema.org. The Traces Through Time research project developed some important ideas as well as some valuable lessons. We should investigate web-based tools for cataloguing and annotation, opening new opportunities for collaborative and volunteer projects.

We will move our public facing digital services to the cloud (our website, Discovery, legislation.gov.uk and the UK Government Web Archive), improving service availability and performance through resilient hosting. We should investigate cloud search technologies and other benefits we can gain through using commodity cloud based services.

7. Evolving our culture

Our culture has grown up over many years of shared experiences. Archives Inspire says that 'we will think and organise ourselves differently'. Organisational cultures evolve over many years and are slow to change. Our digital challenge is in part technological, in part to our practice as an archive, but it is also a cultural challenge. The whole of The National Archives needs to be digital by instinct and design. We are too small to be divided, with an elite cadre of digital archivists forging ahead whilst everyone else is left behind. Our digital challenge is a whole business challenge and our culture needs to develop over the longer term. These commitments are just the beginning.

We will develop our digital culture by having modern IT. We need to find ways for people to use more of the digital skills they have developed in their out-of-work lives. Having modern and flexible IT equipment, as set-out in our IT Strategy, is transformative to how we work and of huge importance.

We will create opportunities for people across the organisation to lead digital initiatives. As our public facing services become more digital so our culture will evolve. There are internal entrepreneurs who embody a more digital culture, and who we can enlist to help and encourage everyone. We will be recruiting new leaders for our digital services and the digital archive who have a crucial role. We can also create opportunities for people across the organisation to take or lead digital initiatives. We need to look at the incentives that might support the development of a more digital culture. That means giving people permission to experiment and supporting them to take some risks, for example by talking about work-related topics using social media. We will need to develop some consistent messaging around this in keeping with the Civil Service Code.

We will make sure that people working in digital teams have the time to learn about all aspects of our work as an archive. How people behave ripples through an organisation. Digital, while different, cannot be separate. Digital people can help nudge along the whole organisation's digital culture. To do that, it is important that the digital teams are engaged in all aspects of the archive's work and have an appreciation for all our audiences. There are many points of connection. For example, the collection care department and the digital preservation team can share approaches for quantifying preservation risks. The public engagement programme potentially affords many opportunities for the digital teams to be involved in other aspects of the archive's work as well as sharing what we are doing as a digital archive with the public. Through connections and understanding we will grow together.

We will evolve everyone's understanding about digital archiving. We will enlist expertise from Human Resources, Marketing and Communications. We will look for opportunities to capture people's interest in digital archiving and to develop our digital culture. Big Ideas, a series of talks covering innovation and creativity in research, works well. We will invite motivational speakers to talk to us about their work. We will demystify digital archiving and the Digital Records Infrastructure. We will offer training for staff in digital archiving. We will run show and tell events that are open for all staff, and a regular 'tour of the walls' so people can find out what is going on in our agile projects.

We will further embed our use of agile. Agile is good for developing solutions in a changing context. It is also important because it helps change our culture, by embracing user needs, creativity and change. It is easier to act your way into new thinking than to think your way into new actions. We will create physical environments, with appropriate wall spaces and seating layouts, that support agile working. We will support product owners and service managers so they have the skills they need to deliver in an agile context. We will work to reconcile the demands of agile delivery, business planning, financial management and benefits realisation.

8. Digital skills

We will promote working at The National Archives. We are a brilliant place for people to start and develop their digital careers and we need to communicate that to current and potential employees. We need to highlight the unique opportunities from working at The National Archives, developing our profile as a digital employer through our website, blogs and social media presence. We should encourage participation in conferences and events to share knowledge and skills, inspire and create buzz around the organisation.

We will strengthen our career offer. We need to create pathways for people with digital skills to progress in the organisation in expert specialist roles not just through taking on additional managerial responsibilities.

We will develop our own digital skills. We need to make it easier for individuals to develop digital skills within the organisation, include the chance to move between functions and also to undertake digital research. We should develop a training programme to teach specialist digital archiving skills to existing staff as well as new entrants to help meet the skills needs of the archives sector. We also need to nurture and develop talented but less experienced staff with digital skills.

We will provide opportunities for research and innovation. We need to create space for experimentation. High priority digital projects should have time for research and development activities factored in. We will allocate time each month for digital team members to progress free form projects in a context and culture that enables the results to be used. We need to establish communities of practice within the organisation in key digital areas (agile, user research, data analytics) that cross team boundaries.

We will work with training partners such as Ada, the National College for Digital Skills, to recruit and train people in digital skills. We will appoint five digital apprentices in software development during 2017. We also need to develop other initiatives to attract staff, particularly in the local area, appealing to people who may only want to work part time or who are returning to work. We will develop relationships with other archives, the Government Digital Service (GDS) and other parts of government, identifying opportunities for training and collaborative development. We will formalise academic partnerships, influencing the curricula, attracting Masters and PhD students to work at the archives on secondment, developing a graduate scheme.

9. Digital research

Research and development are essential to addressing our digital challenges. Our digital research plans are set out in detail in our Digital Research Roadmap. It groups the digital research themes in line with this strategy: preserve, contextualise, present and enable use. To summarise the main actions:

We will develop our digital research skills. This means giving people the opportunity to undertake research and making this part of our career offer to people with digital skills. Building on our experience with Traces Through Time and Big Data for Law, we will seek opportunities to lead digital research projects as the principal investigator or to collaborate as co-investigator.

We will create an environment for digital research and experimentation. This means allocating time to staff to undertake research. We also need to embed research methods in our digital work, thinking about projects in terms of research questions as well as deliverables.

We will actively participate in research networks and communities. This means working with the archives sector in the UK and with archives around the world to address shared research challenges as we develop new archival practice.

10. Roadmap

Implementation of this strategy is closely linked with developing our future workforce. There needs to be regular reviews both of this strategy as we learn more, and of progress through the business planning process. The phases offer natural gateway points for reflection, review and reprioritisation by the Executive Team and the Board.

Phase 1 - **Reshape** (January 2017 to June 2017)

We will reshape the digital teams so we are best shaped to deliver this strategy.

We will make key appointments, in particular a Head of Digital Services, a Head of Digital Archiving, a Head of Web Archiving and a Technical Architect in Digital Preservation to develop our digital leadership capability, as well as four other new appointments.

We will prioritise the following aims from the strategy:

- standardise and streamline the process for transferring digital records
- reinforce our commitment to PRONOM
- manage data storage in the most cost effective way
- work with other archives to collaboratively develop new archival practices, tools and standards
- further embed our use of agile
- promote working at The National Archives
- strengthen our career offer

Phase 2 - **Grow** (July 2017 to September 2018)

We will grow our digital teams in line with developing our future workforce.

We will develop our capability as a digital archive by prioritising the following aims from the digital strategy:

- widen the types of digital record we can preserve
- manage preservation risks to digital records much earlier

We will improve our offer to government by prioritising the following aims from the strategy:

- develop new methods to help manage appraisal, selection and sensitivity review
- standardise and streamline the process for transferring digital records
- reduce the burden on government departments

We will improve our services to the public, researchers and the sector by prioritising the following aims from the strategy:

- develop our website so that it is an integral part of our public programming strategy
- improve Discovery
- support users of Discovery to search other archives collections
- improve the UK Government Web Archive
- move our public facing digital services to the cloud

Phase 3 – **Accelerate** (October 2018 to December 2019)

We will quicken our pace, developing our capabilities more rapidly with expanded digital teams.

We will further grow our digital teams in line with developing our future workforce.

We will develop our practice as a digital archive by prioritising the following aims from the strategy:

- develop new methods for capturing the digital record
- preserve digital records in their original format and explore our use of emulation
- measure preservation risks and publish the results
- be transparent about our practice as the basis for trust in the digital archive
- work with other archives to collaboratively develop new archival practices, tools and standards
- rethink how we describe and contextualise digital records
- investigate how best to manage uncertainty in our data about records
- develop a new presentation system for producing digital records on the web
- graduate access to open records to manage presentation risks
- actively process the collection ourselves

We will improve our digital services by prioritising the following aims from the strategy:

- develop our website so that it is an integral part of our public programming strategy
- make our catalogue descriptions available as open data
- investigate new ways of managing record descriptions and digitised records

We will develop our digital culture by prioritising the following aims from the strategy:

- further embed our use of agile
- evolve everyone's understanding about digital archiving

We will develop our digital skills by prioritising the following aims from the strategy:

- promote working at The National Archives
- strengthen our career offer