Integrating user research into an agile project at NHS Digital: A case study

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Abstract This article discusses how user experience (UX) research can be integrated into agile projects, giving special attention to remote research methods. Using a case study about the NHS Data Security Centre, the article shows how UX research can be successfully applied in a fast-paced project. The case study describes how by working together in a cross-functional team, client (NHS) and supplier (Valtech) employees, designed, user-tested and developed a new website for the NHS Data Security Centre in just seven weeks, to include a new homepage, a suggestion for a new information architecture, and a new concept, layout and content for several further pages. Special challenges included a distributed team and the advent of the coronavirus, which meant recruiting users for research became more difficult.

KEYWORDS: user experience, lean UX, remote user research, agile, minimum viable product, remote teamwork, cross-functional teams, NHS

INTRODUCTION

In an ideal world, user research should drive development. In reality, however, it is frequently allocated insufficient time or budget. In other cases, research is only conducted at the end of the project — an

exercise in validating prior decisions rather than something that drives development.

In LaiYee Ho's guide to using user experience (UX) research to guide an agile process,[1] the author suggests that instead of conducting validation research at the end of an agile cycle, foundational (discovery) research should be conducted at the beginning of the cycle, supported by evaluation research during the cycle. Ho recommends starting the process with a kick-off workshop for team alignment. This should be followed by foundational research. This research could be in the form of contextual research or one-on-one interviews. The evaluation research should test either a concept or a prototype, or possibly something that is already live. It is important for the team to have full access to the research results.

Agile is not easy for UX.[2] In those cases where UX in agile works very well, it has more to do with the organisation as a whole than any one individual. For example:

- Managers and leadership understand the value of UX, and especially the need for qualitative UX research. They know the lean approach, meaning assumptions are tested and iterated continuously.
- UX people show leadership and are proactively pushing research, involving the team, advocating for the user, and pointing out risks.
- Unlike, for example, the Scrum methodology, the agile process is not strict and controlled. Agile was designed to take into account change as something to be expected and to be flexible and transparent.
- Agile involves cross-functional teams. It is especially important that UX professionals are part of the team, working closely together with developers. In this way, everyone in the team will feel ownership of the product.

Agile UX research must be fast and focused, with sprints lasting only a week or two. At the same time, however, quality standards cannot be compromised, as important product decisions are based on the research results. In the words of Sarah Christopher: 'for user research under Agile, quality should override quantity'.[3] UX research can adapt to an agile environment by being creative and pragmatic.[4] Sometimes a decision has to be made whether research should be conducted remotely or not at all, or whether having no user feedback is better than usability testing with colleagues who are unfamiliar with the product.

Agile teams need a dedicated user researcher to help them integrate user research more fully into their work, and give the team a sense of ownership of the research.[5] For best results, designs should be tested at least fortnightly, with everyone in the team taking part in the research.

Although remote user research is nothing new, in-person testing has traditionally been seen as the better option as it takes more effort to build a relationship with a user via video, and it is more difficult to observe behaviour and emotions. Certainly, face-to-face interaction has many advantages, not least as it is easier to win participants' trust and attention.[6] However, remote research offers such benefits as flexibility in project funds, increased inclusiveness and attendee convenience.

As the COVID-19 pandemic continues to prevail, however, remote research is the only viable method. Luckily, most people are acclimatising to communicating remotely and via video. In many cases, the advantages of remote research are outweighing the minor disadvantages, and it seems likely that the use of remote testing will continue to increase even after the pandemic has been contained.

One thing to be aware of is the increased level of technical knowledge and preparation needed, in addition to the user requiring equipment and a quiet space. This is important as certain user groups are at

risk of being excluded, for example, those lacking a smartphone or high-speed internet connection.

Although remote user testing tools are improving, there are still challenges to tackle, and each tool has its own 'personality', which is to say, different tools have different ways of working — and not working. Users may have to download an app before the session, use a particular browser or work around firewalls, any of which can be an obstacle to testing or, for that matter, adoption. Some users struggle with video or audio. Sometimes they are unable to attend the session, and the session will have to be conducted by telephone. However, when the remote session is up and running, the whole team benefits as it is easy to observe the research session remotely.

Alexis Gerome from Testing Time, has created a comprehensive list of tools for remote research and team collaboration.[7]

In the words of InVision's Lindsey Redinger — whose remote team-mates are spread over more than 25 countries — remote research is a matter of inclusion: 'Remote research allows you [to] expose yourself (and your team!) to new people in new geographies who challenge your assumptions'.[8]

Jake Knapp, John Zeratsky and Jackie Colburn recommend sending users a how-to-guide with step-by-step instructions for the video tool and a non-disclosure agreement to e-sign before the test.[9] They remind the moderator to be extra friendly because video calls are more exhausting than real-life meetings. They also suggest anticipating every possible technical failure and creating a list of what can go wrong and how to be prepared. But, as Amr Khalifeh from AJ&Smart says in the same article, remote testing has many advantages, and sometimes users 'get more comfortable talking than they would in an in-person test'.

NHS DIGITAL'S DATA SECURITY CENTRE: A CASE STUDY

Background and goals

NHS Digital (https://digital.nhs.uk/) planned to create a new hub for its Data Security Centre (DSC). A previous discovery project found that users interacting with the DSC website (https://digital.nhs.uk/cyber-and-data-security/) were having a disjointed experience because information about data security services was in multiple locations, and key content areas were not intuitive for users.

The whole project started with a kick-off workshop with the NHS DSC team and the Valtech team. The purpose of this workshop was for everyone to get to know each other, acquire background information about the NHS DSC and identify areas to focus on. In small teams, new landing pages were sketched. This in-person workshop formed the basis of the team's future work.

In this seven-week project, a new DSC website was created. The team worked in weekly sprints (see Table 1). The goal of this project was to create a minimum viable product with redesigned, improved key content areas using a content management application.

The sprint plan in Table 1 shows the rough plan at the beginning of the project. It illustrates what design and content had to be created in each week. All team members worked in parallel. The designer started immediately by drafting design options in InVision, the content designer began with content work, and the researcher made a research plan and initiated user recruiting. Users were interviewed continuously as soon as they were available.

This sprint plan was based on the statement of work — the contract between agency and client. One challenge in agile projects is the proposal and description of deliverables. Agile is a flexible process, and does not define the outcome in detail (like

Table 1: Sprint plan

Sprint 0	Sprint 1	Sprint 2	Sprint 3	Sprint 4	Sprint 5
Kick-off workshop	Draft content for 'Services and resources' page, CSSM	Test landing page, 'Services and resources' page and new naming options for DSC	Development of landing page	Start development 'Services and resources' page	Approval of P1 content
Prioritise deliverables	Create wireframe 'Services and resources', CSSM	Draft content for all P1 services	Test 'Services and resources' and 'Secure boundary' with users	Create wireframes for forms	Draft content for P2
Create user research plan	User research focus on landing page	Create template for services	Review draft content	Continue content review and approval	Finalise and document user research
Create wireframe landing page	Map as-is process of 'Raise an enquiry and incident'	Create to-be sitemap	Service content creation in CMS	Continue content review and approval	Review/update existing personas
Draft content landing page	Card sort to test categories and labels		Review forms	Test all service pages and forms with users	Finalise IA recommendations
Create as-is site map				Create recommendations for forms	Finalise designs of forms and 'Contact us'
Analytics					Finalise development
					Backlog creation

requirements describing a planned product in a waterfall model way of working). For this reason, the plan at the start of the project showed only the major areas that had to be covered and did not specify any details of how to implement them. For example, it was not defined how much user research was required, eg a specific sample size or method. The user researcher decided how many users would take part in the research, as well as when and how.

This plan served as a guideline for the work. In order to work this flexibly and quickly, close collaboration and trust were essential.

The team redesigned the landing page and prioritised content pages, continuously making changes according to user feedback from interview sessions. Google Analytics from the current site provided input for the content redesign. Card-sorting exercises with users provided the basis for a new navigation concept and information architecture.

The UX colleagues applied user-centred design methods to explore users' needs and goals. They collected continuous feedback on the prototype, which was created step by step throughout this project with 16 remote interview sessions (Table 2 lists the users' roles) and a survey with five users (due to coronavirus, they had to switch to surveys). Table 3 presents the sprint goal and the number of users in each sprint. Alongside this, a card-sorting exercise with 12 end users and 22 internal

Table 2: Users' roles

User	Role
1	Chief Technology Officer
2	Associate Director of Digital
3	IT Security Manager
4	Deputy Director of ICT – Strategic Development
5	Senior IT Engineer
6	IT Network Services Manager
7	Head of Cyber Security
8	Chief Information Security Officer
9	Information Governance Manager
10	Higher Business Analyst
11	Senior Consultant — Digital Workstream
12	Information Security Officer
13	IT Security Officer
14	Cyber Security Manager (Managing, Operational + Director)
15	IT Security Manager
16	IT Network and Server Team Leader

Table 3: Sprints and user research

Sprint 1 2 March	Sprint 2 9 March	Sprint 3 16 March	Sprint 4 23 March	Sprint 5 30 March
Landing page	Landing page + services page	Landing page + services page + secure boundary page	Landing page + services page + secure boundary page + more service pages	Landing page + services page + secure boundary page + more service pages + contact form
Interviews with four users	Interviews with four users	Interviews with three users	Interviews with four users	Interview with one user Survey with five users

users was conducted. Three personas were created to summarise the findings from the pre-interviews.

Content

Google Analytics was used to identify user search criteria on both NHS Digital and within the DSC pages (Figure 1).

The analytics data indicated that the key search term used on the NHS Digital website was 'cyber security' rather than 'data security centre' — ie the actual name.

On the DSC pages, meanwhile, the data indicated that users were primarily looking for DSC services and alert information. By contrast, users were not seeking background information about the DSC — the 'What we do' page had less than 500 visits in a year. Data security protection toolkit, CareCERT and cyber essentials were found to be the most searched-for products/services.

It appears that users were spending a high amount of time on the service pages, showing interest in engaging with the

Figure 1: (a) Cyber-related search terms from the NHS Digital homepage, taken from the top 1,000 searches; (b) top search terms from within the DSC pages

content of these pages. Pages sitting at lower levels of the sitemap had less usage.

The exit rate was generally higher for service pages, suggesting that most users were getting what they wanted from the page, without needing to look for more information. The bounce rate was also high on service pages — users were landing directly on a specific service page and then leaving the site. This was possibly an indicator of the page not offering the content the user expected.

Card sorting

An online card-sorting exercise using Optimal Workshop was conducted with 12 participants, all of whom worked in cyber security.

The task entailed grouping 34 items from the NHS DSC website. Participants spent an average of 12 minutes on the exercise. None of the participants experienced a major problem in grouping the items. Participants divided the 34 items into five or six groups, with the most common being 'Training items', 'Technical day-to-day stuff', 'Incidents and Alerts', 'Compliance' and 'About us'.

Some users differentiated between preventing and responding to incidents. One user distinguished between offers for managerial roles and hands-on roles. Common unclear items were 'Compromised credentials' and 'Innovation'.

The same card-sorting exercise was conducted with 22 internal NHS DSC users. These users created around six groups. They named groups slightly differently, and tended to use more sophisticated terminology, such as 'Incident response' (vs 'Incidents and alerts' by users) and 'Improving posture' (vs 'Technical day-to-day stuff' by users). Aside from this, the primary groupings and group names were somewhat similar.

Table 4 summarises the results of the card sorting.

Internal technical experts proposed an alternative navigation mechanism, but this was discounted based on user research and feedback.

Renaming NHS DSC

Qualitative and quantitative research was carried out to explore users' opinions

about the existing name, 'Data Security Centre', and possible new names for the service.

Many users indicated that they would prefer a name containing 'cyber' because they considered it more accurate. Suggestions included:

- 'Cyber Security';
- 'Cyber security covers a wide portfolio; perhaps services: NHS Cyber Security Services'; and
- 'Cyber and Data Protection Services'.

To gather more quantitative feedback about which name users would prefer, a poll was added to the NHS DSC homepage (Figure 2).

Fifty-four users responded, and the results (Figure 3) were clear: 'Cyber Security for the NHS' was by far the preferred option, with 46.3 per cent of users. The second most popular option was 'Cyber and Data Security', with 31.5 per cent. The least popular choice with 3.7 per cent was the existing name 'Data Security Centre'.

The landing page

The first sprint started with the landing page. The UX designer created a new page, and the page was tested with four users. After each test, the designer made any necessary changes to the landing page (Figure 4).

The landing page was perceived as clean and well laid out. The top priorities for the users were alerts, policies, secure boundary and services.

'Report an incident' was expected near alerts at the top. Users wanted to be able to report an incident straight away and rejected the concept of an in-between page as this would mean a further step.

The design was adapted according to these findings.

Most users indicated a preference for navigating via content and menu rather than using the search function. Some users assumed the footer belonged to NHS DSC. This could be a possible source of confusion regarding the navigation. The findings stress the importance of content for guiding users.

Case studies were regarded as attractive because users wanted to hear about other

Table 4: Results of grouping and naming of cards following the sorting exercise

Training	Incidents and alerts	Managing security	Assessment and compliance	About the DSC
Clinician e-learning	Alerts/news	NHS Secure Boundary	Cyber Security Support Model	About us
GCHQ board-level training	Data security helpline	On-site assessment	DSP Toolkit	Statistics about us
IAO training	Report an incident	Patch downloads	Identifying cyber security risks	Innovation
SIRO training	SMS alerts	Protective monitoring	Policies	Cyber Associates Network
Specialist training	Threat intelligence	Technical remediation	Preparation for onsite assessments	Data Security Knowledge Library
Immersive labs	Compromised credentials	Threat hunting	Case studies	Cyber awareness campaign
Cyber awareness campaign	Incident support	Vulnerability assessments		
		Windows 10 ATP		
		Simulated phishing		

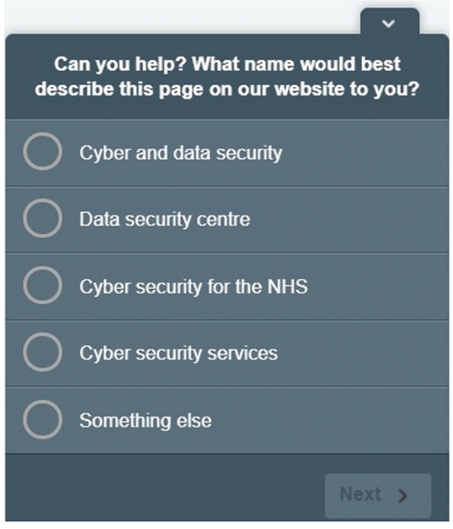

Figure 2: Renaming the service poll on the homepage

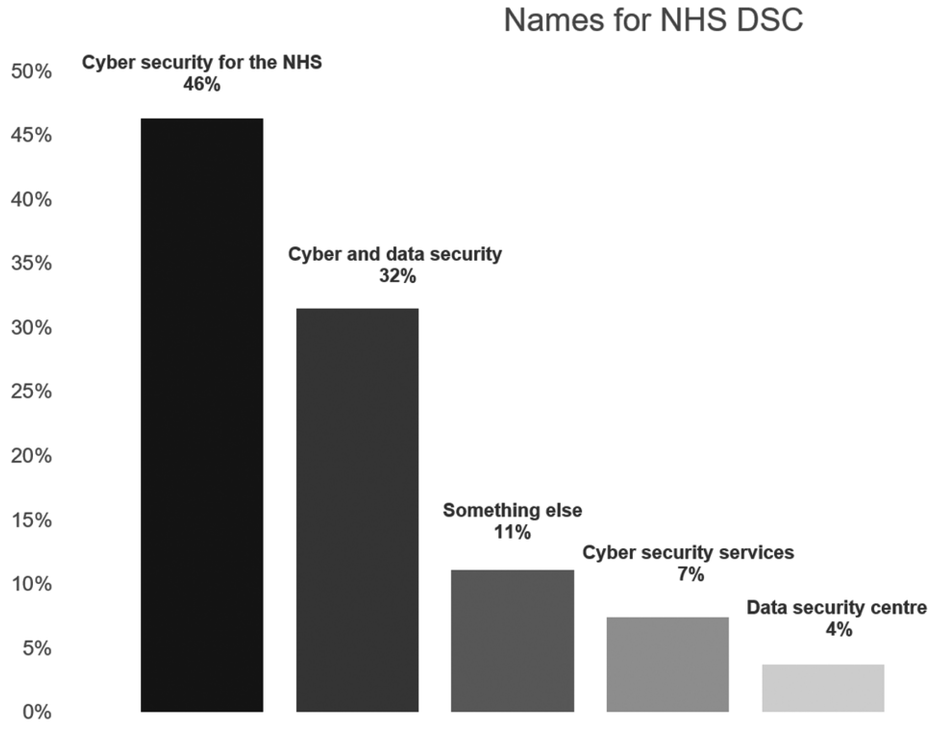

Figure 3: Renaming the service poll results

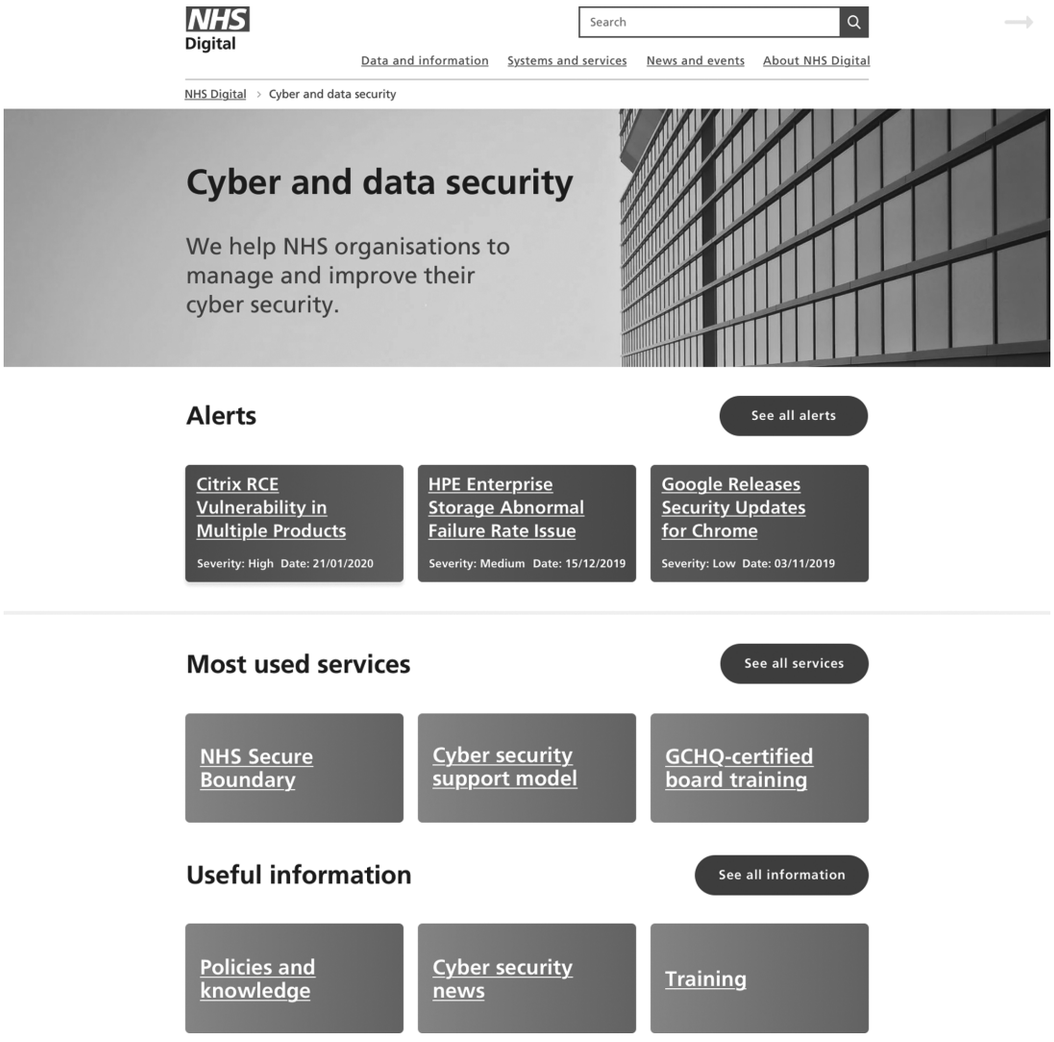

Figure 4: The landing page

trusts' approaches — several users emphasised that NHS trusts should learn from each other and avoid waste by not duplicating efforts and creating their own solution. Sample comments included:

> 'Case studies are a good idea, not reinventing the wheel.' (User 7)
>
> 'Understand what other trusts are doing.' (User 16)

The landing page was included in the user research in all five sprints. The designer made changes to the landing page whenever user feedback indicated doing so. Several versions of the landing page were created. By testing the page every week, with all users, the design of the final landing page could be based on a reliable number of users and iterations.

The UX designer made on-the-fly changes to the InVision prototype during team meetings. This sped up the iterative process by enabling the team to make consensus-based design changes at the very moment of a decision. The option for the

whole team and key stakeholders to join research sessions remotely enabled more collaborative dialogue and decision making.

The three versions of the services page

After the landing page, the services page is the most important page as it lists the various services offered by the DSC. The page provides users with global search functionality.

Iterations started with the services page version A with the design pattern of a blue block of letters from A–Z, as used on other NHS pages, and with version B displaying A–Z horizontally.

After initial user feedback indicating a preference for version B, the team felt it necessary to go beyond these two designs and create something different, resulting in version C, which was designed on the fly during a team meeting.

Version C did not use A–Z navigation but instead offered tabs with categories. By clicking on a category, only the services in those categories were shown on the page.

The three versions (Figure 5) were tested during multiple sprints until the results were clear: version C was the winner. Seven out of 11 users preferred C because they liked the layout better and they valued the tabs with the categories. Sample comments included:

> 'It [C] suits me better.' (User 6)
>
> 'This is the best version [C]. Very well laid out. All services on one page; I can see them all. Making the best use of space.' (User 15)

All users except one preferred B over A (for four of 11 users, page B was the favourite). Users preferred the horizontal presentation of A–Z of version B over the letter block of version A because they found it more intuitive (see Figure 2). Sample comments included:

> 'I prefer letters on the top horizontally. It [B] is more logical.' (User 15)
>
> 'I like the second [B] better. I can easily and quickly click on the letter.' (User 9)

Users found filtering useful, but wanted more categories to filter in version A and B; in version C, users valued the categories in the tabs (see Figure 2). Sample comments included:

> 'Filtering by tags is helpful.' (User 6)
>
> 'I would like more filters in there. Like GDPR compliance, threats, vulnerabilities.' (User 9)
>
> 'The categories are useful.' (User 8)
>
> 'It helps you to focus when having that top line (categories).' (User 6)

Secure boundary page

User testing started with the existing version of the secure boundary page before switching to the new version. The latter page was received much more positively.

On seeing the old version of the page, one user commented: 'That would make it less long; my fingers are getting worn out from scrolling up and down' (User 5).

Users liked the shorter length of the new secure boundary page, and the way that it is possible to expand content by clicking on the plus icons. Sample comments included:

> 'I can go through the content quicker. It doesn't have pages and pages of text. I like the page.' (User 16)
>
> 'It is intuitive to click on the plus sign to get more information.' (User 12)

Users found the content easy to read, well structured, and relevant. Sample comments included:

> 'It's easy to read, and the content is easy to follow.' (User 21)
>
> 'That's really good. It quickly sells the value of that to me. The best page I've seen so far. It's not too long, clean, concise. Answering the questions that come up as people ask them. Well ordered, too.' (User 13)

Figure 5: The three versions of the services page

Figure 6: Versions A and B with category filter and version C with the tab categories

Cyber security support model page

The new cyber security support model page (Figure 7) was mostly seen as clean and the content as relevant. As one user commented:

> 'The page is good. It provides the necessary information. It looks very simple.' (User 16)

Some users, however, did not like the layout. This page had a slightly different layout versus the other DSC pages because the video and the picture were presented at the top. One user commented:

> 'The layout is not so good on this page — I have to scroll to the bottom before useful content links are displayed.' (User 19)

Several users said they would not watch the video:

> 'I am a cyber lead; I don't watch videos. It could be good for execs; they prefer videos or pictures.' (User 14)

> 'I wouldn't watch the video because I am in a shared office, and I prefer to read.' (User 16)

The image was regarded as useful, but users felt it should be clickable. For example:

> 'Images are good to get attention.' (User 12)

> 'If the image was interactive so I can learn more, maybe link it to info below.' (User 15)

Recommendations

The final recommendations for the NHS DSC project are rather short, and many are on a more general level because most of the recommendations based on user feedback have already been considered during the project and integrated into the prototype:

- Make the NHS DSC website a 'one-stop shop' for all cyber security information with up-to-date and hands-on information.

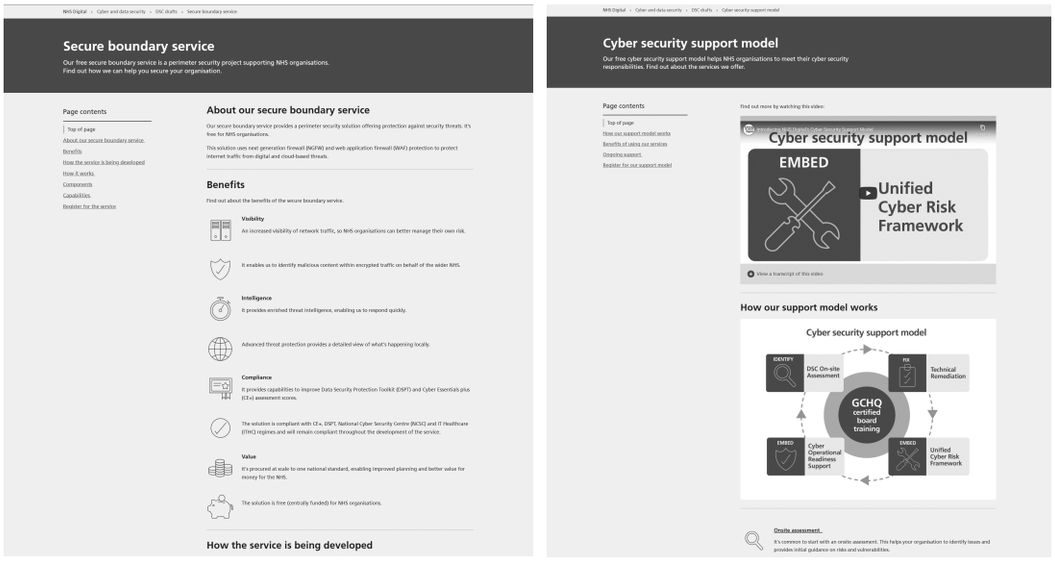

Figure 7: Secure boundary page and cyber security support model page.

- Change the name of the service to 'Cyber Security for the NHS' or to 'Cyber and Data Security'.
- Strengthen the NHS DSC branding to make it more recognisable.
- Offer an option to report an incident on the landing page at the top, near alerts.
- Make it clear where a search function is searching (NHS Digital, NHS DSC, or services page).
- Make it clear whether the footer section belongs to NHS Digital or DSC.
- Implement version C of the services and resources page (with the tabs) and add a search function to search within the services.
- For training, offer information on how much time is needed and an agenda.
- Make images on the site clickable.
- Do not put videos at the most prominent place at the top.
- Offer case studies for individual services that show how other trusts are implementing solutions.
- Create templates for policies.
- Integrate a contact form at the end of each service page.

LEARNINGS

For a successful project, the following actions are recommended:

- Start the project with a kick-off workshop for the whole team.
- Conduct virtual stand-ups with the entire team on a daily basis.
- Ensure frequent communication, eg on a dedicated Slack channel.
- Document work in progress using a collaboration tool such as Confluence.
- Conduct weekly show-and-tell sessions.
- Ensure the user recruiting process is clear at the outset of the project.
- Consider how users will be scheduled (eg via Calendly) and what needs to be included on the digital consent form.

- Use remote user research software, such as Lookback, that provides the option to record and to invite the team to observe the sessions.

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