Building a Digital Ready Workforce:

Informatics Consultation 2017-2018

Building a digital ready workforce: Insight from first online workshop

Executive summary

Over the next three years, £6m will be spent to help improve the digital capabilities of the health and care workforce. To help prioritise how that money is invested, Health Education England, working in partnership with NHS Digital and NHS England, commissioned Clever Together to host a three-week national online workshop to explore the needs and experiences of people working in the system who have digital expertise, including informaticians, IT professionals, and clinical staff of all kinds.

Between 22 November and 13 December 2017, 1,061 people joined our national online workshop, *Building a Digital Ready Workforce*.

The following recommendations for change were put forward by contributors to the online workshop, and represent the actions that they felt that informaticians and others could take in relation to individual attitudes, organisational drivers, skills and technology. These four elements also make up a proposed framework for digital readiness that emerged from analysis of contributions to the workshop.

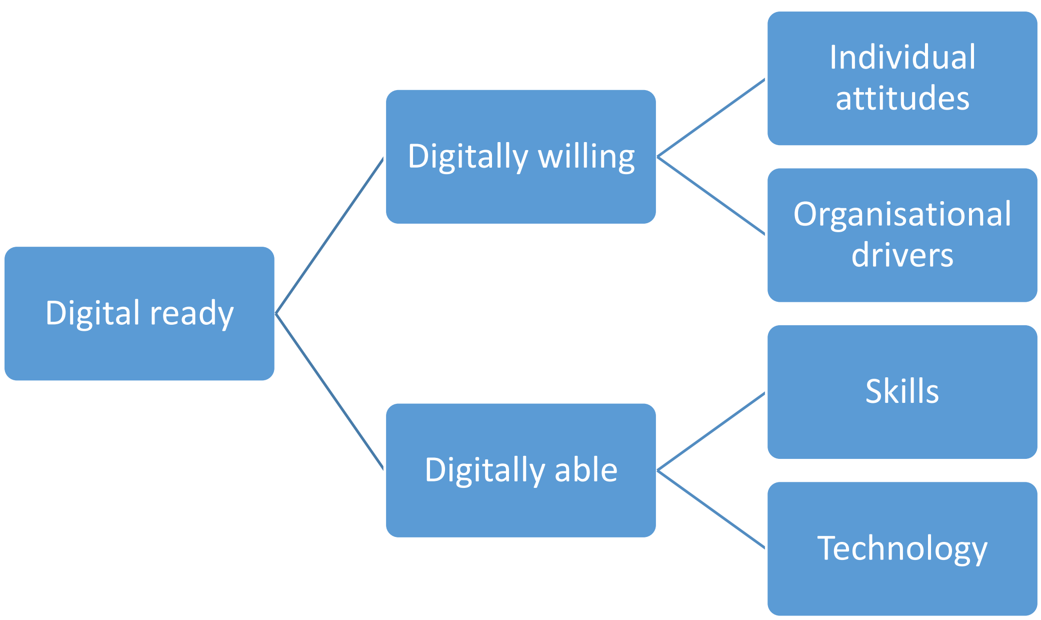

Figure 1: Proposed digital readiness framework

The recommendations in this report have not yet been tested against current workstreams in organisations that are working to improve the digital readiness of health and care. An immediate next step would be to analyse the gap between these recommendations and current activities and then to use this gap analysis to inform investment or divestment choices.

Recommendations

	For informaticians	For others and the system
Individual attitudes	• Keep a consistent focus on patients, always asking "how does this deliver quicker, better, safer care?" • Learn from success and failure • Act in a collaborative and open way, narrowing the gap between clinicians and non-clinicians, encouraging healthcare professionals to lead the implementation of projects • Ensure technical language is not a barrier to communication • Lead by example in innovation and the adoption of technology • Show empathy and understanding	• Ensure organisations have strategies that put digital front and centre, embedded as part of service transformation rather than a stand-alone activity • Support clinicians to understand the value of data • Encourage inspiring digital leadership at every level of organisations and the system • Fail fast: if something is not working, have the confidence to bring it to an early end • Ensure external suppliers are clearly focused on outcomes that should be achieved
Organisational drivers	• Build cultures in which every opinion is valued • Create forums to share knowledge and expertise with other informaticians • Help organisations understand the problems they are trying to solve, rather than purchase solutions and then find a problem to solve them with • Create CCIO networks within STP areas • Establish data science hubs to share expertise between organisations	• Establish and invest in incubators and innovation centres, not just to encourage and develop ideas, but to nurture people and enhance their potential as champions of change • Encourage chief executives and communications teams to give data, knowledge, information and technology change projects their vocal support, to support staff engagement • Support social care providers, particularly SMEs, to be partners in change
Skills	• Establish clear professional standards for informaticians • Develop expertise in specific areas of informatics. Examples put forward in the workshop included: ○ Ensuring informaticians have a solid grasp of statistical principles and can support clinicians to use statistics clearly and in an unbiased manner	• Invest in training and continuing professional development for informaticians • Replicate the successes of initiatives such as the Northwest Informatics Skills Network, and the Bournemouth Hospital Geek Club • Promote the role of libraries and knowledge services in support of digital skills development

	◦ Helping informaticians to gain a basic understanding of the medical terminology they will encounter in their work • When supporting others, informaticians should: ◦ communicate simply, avoid jargon and use plain English when training ◦ take every opportunity to teach about the importance of informatics ◦ be embedded in organisations, at the point of need	• Develop a clear framework for all health and care staff to describe the data, information, knowledge and technology skills required in all kinds of roles, and keep it up to date • Identify, train and support champions from a wide range of professional backgrounds, not just informaticians, to disseminate digital skills • Make digital health a core component of all undergraduate health disciplines • Integrate data, knowledge, information and technology into induction, and statutory and mandatory training • Encourage a diversity of trusted digital training tools, such as videos, websites and webinars • Recognise the importance of basic digital skills, such as touch typing and email techniques
Technology	• Give people the right technology, and the connectivity to use it • Before introducing new technologies, rely on the expertise of frontline staff to define the problems that need to be solved • When designing new systems, do not simply replicate paper-based processes • Keep a consistent focus on the quality of data and information, rather than the technologies used to collect and analyse it • Help to ensure technology is intuitive and invisible • Provide free wifi in all public areas • Work towards a common data dictionary for health and care	• Overhaul the procurement of external suppliers to ensure quality, collaborative approaches, compliance with common standards, a focus on interoperability, and to avoid unnecessary variations in technology that inhibit the ability of staff to use different IT systems as they move between different health and care • Reconsider how software licensing can be negotiated across health and care to reduce costs

About the workshop

To join the online workshop, each participant had to answer a series of simple questions to (a) help us understand more about them and their professional background, and (b) their digital experience and some key beliefs. We found:

- Participants came from a wide range of professional backgrounds, both clinical and non-clinical, the largest groups identifying themselves as project managers (11.69% of participants), doctors (8.01%), data analysts (6.79%), IT managers (6.41%), other technology workers (6.13%), clinical informaticians (5.84%) and nurses, allied health professionals, and healthcare support workers (5.56%).
- Two-thirds of participants (66.26%) were aged 40 to 65, and just under half (46.09%) were female.
- Overall, participants identified themselves as having a degree of digital expertise, with 9 out of 10 (90.01%) describing themselves as digitally leading or ready, while only 1 in 10 (9.99%) said they were digitally worried or lost.
- More than half (52.78%) said that data, knowledge, technology or informatics was the sole focus of their job.
- Participants were enthusiastic about the potential of a digitally ready workforce, with more than 9 out of 10 (93.52%) believing that it would make a large improvement to health and care, benefiting both people using services, and staff of all kinds working in them.
- Almost all the participants (95.85%) agree or strongly agreed that people with digital skills should help others, yet only two thirds (64.47%) felt empowered to improve the digital readiness of their organisations. And only slightly more than half (58.62%) said their organisations had programmes in place to improve their digital readiness of their workforce.

Despite the variety of professional backgrounds from which participants were drawn, their different levels of responsibility, and their geographical spread, we saw a remarkable degree of consensus and agreement among participants. In particular:

- Of the 2,968 votes cast for or against the 231 ideas or 453 comments, the pattern was overwhelmingly positive. Just 1 in 20 votes (4.95%) were downvotes. Comments were also largely positive, in support of the ideas put forward.
- We had a higher than usual percentage of spectators, that is, those who log in to read and observe the conversation but do not to contribute ideas, comments or votes. Indeed, one such participant logged in more than 50 times. People often remain quiet in workshops because they largely agree with what they are seeing; people who disagree tend to be more vocal in saying so.

Of those who joined the workshop, 448 people actively engaged, offering 4,160 ideas, comments and votes in response to four challenge questions and seed ideas[1] shared by the facilitation team:

[1] Seed ideas were captured in face to face workshops with informaticians proceeding the online workshop. They were shared at the launch of the online workshop as participant contributions to get the conversation started and to set the tone for the quality and breadth of the conversation from the start.

I. **A new vision:**
Imagine you woke up tomorrow and data, information, knowledge and technology were used to their fullest extent, how do you envision health and care could be different?

II. **Your role as an informatician/digital expert:**
What must digital experts/informaticians start, stop or do differently to better realise the potential of data, information, knowledge and technology, and WHY?

III. **The role of others and the system:**
What must other professionals and the system more broadly start, stop or do differently to better realise the potential of data, information, knowledge and technology, and WHY?

IV. **Great examples:**
What tools and methods have you seen directly help improve digital literacy/readiness/maturity of colleagues and organisations? Please share evidence of this impact where you can.

Insights

This report presents the results of our qualitative analysis. It extracts the key themes and narratives from the ideas offered by participants, reflecting particularly those subjects and ideas that received the largest support. For the purpose of analysis, some ideas were moved between questions and a handful of contributions were deemed not relevant so were excluded from the current report. Where counts of votes are provided in tables below, they represent the net of upvotes plus downvotes, and only for the ideas themselves, not for comments supporting those ideas.

Co-creating a new, clear vision was the most popular topic of conversation in our workshop, the balance of the conversation is presented below.

	Contributions	%
New vision	1,467	35.26%
The role of informaticians	796	19.13%
The role of the system	454	10.91%
Great examples	1,084	26.06%
Others ideas	361	8.68%
Total	4,160	100.00%

Table 1: Balance of contributions (ideas, comments, votes) across the five challenge questions

The conversation and debate about a shared vision for informaticians revolved around four themes as enablers of a fifth which was ultimately a statement of purpose for everyone who works in health and care: to improve the health and wellbeing of individuals and populations.

Our purpose is:	**To help improve the health and wellbeing of individuals and populations**			
Our vision is of health and care organisations where	It is easy to drive innovation, efficiency and quality	Patients and the public feel empowered	Staff feel empowered	Services feel integrated

In the conversation and debate about the role of informaticians and the system more widely, we found two analytical frames to be useful. The first is an extension and simplification of HEE's prior exploration into digital literacy work (Kennedy and Scott, 2016) with themes revolving around:

- Collaboration
- Data literacy
- Innovation
- Learning
- Using technology
- Leadership and culture
- Professionalism

The second, a new digital readiness framework, has additionally been used to help us surface and analyse potential recommendations as put forward by participants:

- Being digitally willing
    - Having the right attitude
    - Having the presence of the right drivers
- Being digitally able
    - Having the right skills
    - Having the right tech

Below we share insight from each of the challenges posed.

A new vision

Participants were challenged to imagine a health and care system in which data, information, knowledge and technology were used to their fullest extent. Supporting a vision of improving the health and wellbeing of individuals and populations, four key themes emerged.

	Ideas	Votes
Vision: Improve the health and wellbeing of individuals and populations	11	127
Driving innovation, quality and efficiency	27	336
Empowered patients	10	97
Empowered staff	7	63
Integration of services	31	375

Table 2: A new vision: ideas and votes cast for ideas (net +ve/-ve); some ideas are coded to multiple themes

The vision that participants described centres firmly on the needs of people needing or using health and care services, in which all things digital play a vital supporting role:

> *"My vision is of a world where people are able to receive care where they want it, when they want it, because technology enables clinicians to focus on what they are best at, leaving the machines to do the boring stuff ... In addition, by simultaneously being aware of the health of millions of people, the technology could also give early warning of potential issues such as flu outbreaks, or even local ones such as food poisoning, enabling the early mobilisation of appropriate resources."*

> *"I imagine a world where people really are at the heart of all we do and we aim to make their lives easier through tech and that's in living their lives to the full ... Practitioners could be digital advocates and help people to engage with it ... If we can connect people digitally to their circle of support then that would make a huge difference to the infirm, lonely and socially isolated."*

> *"We live in a digital age. Sharing information has literally never been easier. I can contact people on the other side of the planet in seven different ways from the mobile in my pocket. Booking appointments, referrals and accessing personal or patient data should not be a hard task."*

Four key themes emerged as enablers of that vision.

Integration of services, systems and records was felt to be important, particularly the role that informaticians can play in helping the system use data, information, knowledge and technology to its fullest potential. Participants discussed the importance of frontline staff being able to access data at the right time in the right place leading to support care and decision making. This was felt to be of particular benefit to patients with complex needs, who can find themselves repeating their story in different settings in health and care. Ideas for achieving this included the interoperability of existing systems, or giving each individual a health 'passport', enabling them to take responsibility for their own health and care journey. Participants shared a vision in which every clinician who has a legitimate interest can access the patient information they need with the NHS as a single data controller, and of a system that can more accurately and easily measure outcomes.

Participants also acknowledged the role that emerging technologies such as artificial intelligence could play in allowing **empowered patients** to check their symptoms, be directed to the most appropriate services and maintain their own health and wellbeing. Systems designed around the principles of person-centred care would focus on health outcomes, not technological innovation for its own sake, and simple changes, such as allowing patients to use email to communicate with health and care staff, were felt to be important. Participants, however, highlighted the importance of quality assuring publicly available health information, and improving health literacy for the general population.

Alongside empowered patients, participants highlighted the value to the health and care system of **empowered staff**, particularly as digital tools help them to make complex clinical decisions. They also discussed the benefits to staff of simplified systems and processes, alongside the need to ensure investment in digital readiness at the right level in the workforce, not relying on information and skills to be 'trickled down' from a senior level. With improved digital skills, speedier networks and shared records, the potential was created for significant culture change.

One result of this culture change would be the potential for **driving innovation, quality and efficiency**. Participants shared a vision of a health and care system in which a range of technologies, such as video, audio and voice recognition data capture at point of care, better health and care apps, mobile first solutions, and predictive algorithms could be used to enable more time with patients, more timely provision of services, and improved value and efficiency.

Ultimately, this would result in **improving the health and wellbeing of individuals and populations**. Technology could enable people to experience a seamless journey through the increasingly complex world of health and care provision, reducing queues and frustration, and enabling early intervention. Digital tools could enable interaction between health and care professionals, and people using these services.

The role of informaticians

In response to this challenge question, ideas that related to the professionalisation of informatics and the role of informaticians received the largest proportion of votes.

	Attitude	Drivers	Skills	Tech	Total
Collaboration	4	1	3	1	9
Data literacy	1		6	1	8
Innovation		1	1		2
Leadership and culture	1	1		1	3
Learning	2		2		4
Professionalism	1	1	8	3	13
Using technology			3	4	7
Total	9	4	23	10	46

Table 3: Role of informaticians: ideas coded: digital literacy vs digital readiness

	Attitude	Drivers	Skills	Tech	Total
Collaboration	41	4	11	30	86
Data literacy	7		25	22	54
Innovation		8	2		10
Leadership and culture	4	5		17	26
Learning	11		13		24
Professionalism	13	17	52	14	96
Using technology			17	47	64
Total	76	34	120	130	360

Table 4: Role of informaticians: total votes cast (net +ve/-ve): digital literacy vs digital readiness

Discussion centred on the need for clearer roles, better training, and the integration of informatics into the business as usual of health and care delivery. As one participant noted:

> *"The reliance on digital solutions to help provide care, to support safeguarding, the improve workflow, to aid decision making, to measure performance and to empower the public is greater than ever. The health and care sector can no longer see its digital world as a 'nice to have'."*

Several participants noted that technical language used by informaticians could prove a barrier to communication with frontline staff, suggesting that this barrier could be overcome if the focus of conversations were:

> *"'How does this help me improve care?' rather than 'Here is an amazing piece of technology.'"*

With that in mind, participants were clear that there needed to be greater collaboration between clinicians and information and IT professionals:

"All digital experts/informaticians need to work much closer (in collaboration) with frontline/patient-facing staff to understand what problems need solving ... They are the experts in their field, we are the experts in ours."

The adequacy and availability of technology appeared as an issue in the workshop. Participants raised the need to:

"Give people the right kit, and pay for the right connectivity for the job."

They cited the availability of wifi, consistent software licensing, and the need to develop basic systems as enablers. Participants noted the important role that informaticians can play as educators and advocates for technology, but also warned of the dangers in becoming bogged down in technical detail. Technology should be an enabler of the flow of data, which in turn requires the development of data literacy. Informaticians have a role to play in this:

"The language of the why around data, information, knowledge and technology needs to be primarily around the value it adds in terms of clinical outcomes, satisfaction, sustainability of services, etc."

The role of others and the system

Learning emerged as an important area of focus in the discussion on the role of others and the system.

	Attitude	Drivers	Skills	Tech	Total
Collaboration	1	3		1	5
Data literacy			2	1	3
Innovation	2			1	3
Leadership and culture	4	1		1	6
Learning			5		5
Professionalism	4	2			6
Using technology	1	1	3	2	7
Total	12	7	10	6	35

Table 5: Role of others: ideas coded: digital literacy vs digital readiness

	Attitude	Drivers	Skills	Tech	Total
Collaboration	3	28		6	37
Data literacy			11	10	21
Innovation	2			6	8
Leadership and culture	22	6		22	50
Learning			86		86
Professionalism	22	4			26
Using technology	3	13	20	23	59
Total	52	51	117	67	287

Table 6: Role of others: total votes cast (net +ve/-ve): digital literacy vs digital readiness

One participant suggested that organisations should:

> *"Include digital awareness as part of all job descriptions, and offer training. Include a digital awareness course as part of statutory/mandatory training in all organisations."*

Others argued that as technology develops, so training must be ongoing, to ensure a match between jobs and skills. One participant mentioned the role that NHS library and knowledge services can play in supporting training and development, particularly in the use of technology. This training could be at a basic level to enable staff to use technology effectively, for example by ensuring staff are taught to touch type. Some participants advocated for a more fundamental approach, by including digital skills in undergraduate and postgraduate education. Finally, one participant highlighted the importance of equality of access to technology:

> *"I am not sure if digital literacy is so much of the issue as opposed to digital diversity, that the tools we use are fit for our diverse workforce. We are now seeing online forms of recruitment being used such as online situational judgement tests in addition to online training modules, however, these are not*

always devised to meet the learning styles of those with a learning difficulty, visual/hearing impairment or neurodiversity."

But underpinning individual learning and development, and giving staff practical skills to use technology, leadership and culture emerged as the key issue impacting on the digital readiness of organisations, especially in controlling the procurement and design of systems. Participants argued for a closer regulation of the market of IT providers, the need for new systems and processes to be co-designed with those who are affected directly by them, and for there to be real leadership of initiatives:

"To support the development of new ideas and the person who is leading the vision. Developing new ideas in healthcare is a very difficult and tedious task. We need to equip the workforce, develop funding and nurture these people. Instead, we currently say do it alongside with your normal jobs and expect miracles."

Good examples

	Attitude	Drivers	Skills	Tech	Total
Collaboration	2	1		3	6
Data literacy	1			1	2
Innovation	1				1
Leadership and culture	1		1		2
Learning		2	12		14
Professionalism		1	2		3
Using technology	2		5	4	11
Total	7	4	20	8	39

Table 7: Good examples: ideas coded: digital literacy vs digital readiness

	Attitude	Drivers	Skills	Tech	Total
Collaboration	55	3		33	91
Data literacy	24			22	46
Innovation	3				3
Leadership and culture	13		20		33
Learning		28	203		231
Professionalism		6	40		46
Using technology	41		63	54	158
Total	136	37	326	109	608

Table 8: Good examples: total votes cast (net +ve/-ve): digital literacy vs digital readiness

Much work is already underway around the country to support digital readiness, and many participants shared examples of learning activities and programmes. These focused on supporting skills in organisations, for example through the use of digital champions to support the introduction of new technology, in education, through an e-health course for undergraduates in nursing, midwifery and allied health professions, and at a regional level, through an informatics network. They highlighted a range of ways to support individual learning, not just through continuing professional development, but also the establishment of informal networks, masterclasses, digital induction programmes and learning zones.

Participants also discussed specific technologies that were being used, for example, a dashboard that had been introduced, giving healthcare staff immediate access to the information that was most relevant to their work, including patient alerts, care milestones and gaps in data quality. Another participant highlighted an app that was being used in their trust to help plan shifts and rotas. While some participants were keen to discuss new technologies, other felt that existing products, such as spreadsheets and email, could be used to better effect. As one participant put it:

> *"Whilst a lot of the ideas on here are great, for reporting, in particular, trying to get the slickest/fastest/newest solution doesn't always work. Making use of familiar technology such as a spreadsheet ... may be dismissed by some as out of date, yet publishing well-designed reports online and setting them to*

refresh on opening allows more people ownership of data as they know what they're looking at."

A number of participants highlighted the need to actively engage with health and care staff, discussing for example how collaboration had improved the accuracy of data and record keeping. Another participant raised the issue of collaboration not just in day to day work, but also in transformation projects, and the importance of shared agendas. Improving data literacy also emerged as an important theme, with examples shared of the role a data science team had played in improving data within a trust, although they cautioned:

"Let's stop trying to do everything at an individual organisation level and share on a wider footprint. We need to recognise the pockets of expertise already in existence and grow these to enable application on a larger scale."

Digital ready = digitally willing + digitally able

The digital literacy framework rightly focuses on the skills and capabilities that individuals need, and is a useful guide for education and training to ensure that people working in health and care are digitally able. However, digital readiness is not simply about skills or access to technology. If the health and care system is going to use data, knowledge, information and technology to its fullest possible extent, attention should also be paid to individual attitudes towards digital, and how organisational drivers can support or impede progress. These two aspects – attitudes and drivers – are an essential part of ensuring that people are not just digitally able, but also that they are digitally willing.

Key attitudes that supported digital readiness included collaboration and openness across professional boundaries, learning from failure and success, leading by example, and willingness to move beyond comfort zones. Participants also highlighted the benefits of engaging with service users and enabling digital enthusiasts to innovate.

In terms of organisational drivers, participants acknowledged the need for informaticians to lead, but also for transformation to be seen not just as an IT project, but as an organisational project. Inevitably this means that organisations must find ways to bridge the unspoken chasm between different priorities, enabling professionals from different backgrounds to work together.

The recommendations for change which were put forward by contributors to the online workshop can be found at the beginning of this report. They represent the actions that informaticians and others should take in relation to attitude, drivers, skills and technology, in order to ensure the workforce in health and care is digital ready to improve the health wellbeing of individuals and populations.

Data

1. How would you describe your work role?

	Participants (no.)	Participants (%)	Contributors (no.)	Contributors (%)	Contributors as % of participants
Accountant	1	0.09%	1	0.22%	100.00%
Administrator	28	2.64%	9	2.01%	32.14%
CCIO	30	2.83%	15	3.35%	50.00%
CEO	17	1.60%	10	2.23%	58.82%
CIO	32	3.02%	21	4.69%	65.63%
Clinical coder	10	0.94%	6	1.34%	60.00%
Clinical informatician	62	5.84%	32	7.14%	51.61%
Data analyst	72	6.79%	27	6.03%	37.50%
Database administrator	9	0.85%	2	0.45%	22.22%
Dentist	7	0.66%	2	0.45%	28.57%
Director	41	3.86%	7	1.56%	17.07%
Doctor	85	8.01%	32	7.14%	37.65%
Estates and facilities	1	0.09%	1	0.22%	100.00%
Futurologist	12	1.13%	7	1.56%	58.33%
Health records manager	1	0.09%	1	0.22%	100.00%
Healthcare scientists	8	0.75%	3	0.67%	37.50%
Helpdesk worker	4	0.38%	3	0.67%	75.00%
Information manager	57	5.37%	24	5.36%	42.11%
IT director	18	1.70%	7	1.56%	38.89%
IT manager	68	6.41%	31	6.92%	45.59%
Knowledge manager	19	1.79%	6	1.34%	31.58%
Librarian	15	1.41%	7	1.56%	46.67%
Nurse/AHP/HSW	59	5.56%	22	4.91%	37.29%
Other data worker	4	0.38%	2	0.45%	50.00%
Other information worker	51	4.81%	19	4.24%	37.25%
Other knowledge worker	36	3.39%	15	3.35%	41.67%
Other technology worker	65	6.13%	28	6.25%	43.08%
Pharmacist	23	2.17%	8	1.79%	34.78%

Project manager	124	11.69%	49	10.94%	39.52%
Researcher	34	3.20%	17	3.79%	50.00%
Service manager	41	3.86%	19	4.24%	46.34%
Social technologist	7	0.66%	4	0.89%	57.14%
Software developer	20	1.89%	11	2.46%	55.00%
Total	1,061	100.00%	448	100.00%	42.22%

Participants chose a professional group from a list. Contributors are all those who actively engaged in the online workshop, through posting an idea, making a comment or voting. In total, 42.22% of participants made contributions to the workshop. For specific groups, the proportion of contributors ranged from 17.07% for directors, to 100.00%, although in these cases it was a single participant from a professional group who contributed. Overall, at least one person from each professional group represented made a contribution.

2. How involved with digital/knowledge/technology/informatics are you?

	Participants (no.)	Participants (%)	Contributors (no.)	Contributors (%)	Contributors as % of participants
Less than 25% of my time	131	12.35%	71	15.85%	54.20%
25-49% of my time	160	15.08%	80	17.86%	50.00%
50-75% of my time	210	19.79%	46	10.27%	21.90%
It is my full-time job	560	52.78%	251	56.03%	44.82%
Total	1,061	100.00%	448	100.00%	42.22%

More than half of participants identified themselves as working full-time with digital, knowledge, technology or informatics, and they made more than half the contributions to the workshop. Those who identified their focus in these areas representing 50-75% of their job were least likely to contribute, representing just 1 in 5 (21.90%) of participants of this type.

3. Which of the following reflects you? Compared to most people in health and care, I feel I am...

	Participants (no.)	Participants (%)	Contributors (no.)	Contributors (%)	Contributors as % of participants
Digitally leading	551	51.93%	250	55.80%	45.45%
Digital ready	404	38.08%	163	36.38%	40.35%
Digitally worried	95	8.95%	33	7.37%	34.74%

Digitally lost	11	1.04%	2	0.45%	18.18%
Total	1,061	100.00%	448	100.00%	42.22%

More than half of participants and contributors described themselves as digitally leading. People who were digitally worried or lost were less likely to contribute than those who were digitally leading or ready.

4. Which of the following do you believe to be true? Having a more digitally ready workforce will...

	Participants (no.)	Participants (%)
Make a large improvement	960	90.48%
Make a small improvement	92	8.67%
Make no difference	7	0.66%
Be a step back for health and care	2	0.19%
Total	1,061	100.00%

5. Which of the following do you believe to be true? Any benefits of having a more digitally ready workforce will be felt by...

	Participants (no.)	Participants (%)
Everyone	972	91.61%
Mostly clinicians	10	0.94%
Mostly informaticians/digital practitioners	17	1.60%
Mostly non-clinicians	11	1.04%
Mostly patients/service users	46	4.34%
Right now, I can't see any benefits	5	0.47%
Total	1,061	100.00%

6. People with digital skills should help others to develop their skills.

	Participants (no.)	Participants (%)
Strongly agree	704	66.35%
Agree	313	29.50%
Neither agree nor disagree	40	3.77%
Disagree	4	0.38%
Strongly disagree	0	0.00%
Total	1,061	100.00%

7. Within the organisation I work for we have programmes in place that are improving the digital readiness of our workforce.

	Participants (no.)	Participants (%)
Strongly agree	194	18.28%

Agree	428	40.34%
Neither agree nor disagree	288	27.14%
Disagree	124	11.69%
Strongly disagree	27	2.54%
Total	1,061	100.00%

8. I feel empowered to improve the digital readiness of the people in my organisation.

	Participants (no.)	Participants (%)
Strongly agree	236	22.24%
Agree	448	42.22%
Neither agree nor disagree	258	24.32%
Disagree	98	9.24%
Strongly disagree	21	1.98%
Total	1,061	100.00%

9. How likely are you to recommend the organisation to a family member needing care or treatment?

	Participants (no.)	Participants (%)
Recommend	624	58.81%
Neither/don't know	97	9.14%
Not recommend	15	1.41%
Not applicable - my organisation does not provide care or treatment	325	30.63%
Total	1,061	100.00%

10. How likely are you to recommend your organisation as a place to work?

	Participants (no.)	Participants (%)
Recommend	802	75.59%
Neither/don't know	189	17.81%
Not recommend	70	6.60%
Total	1,061	100.00%

11. How long have you been in your current role?

	Participants (no.)	Participants (%)
Less than a year	219	20.64%
1-3 years	358	33.74%
4-6 years	167	15.74%
7 years plus	317	29.88%
Total	1,061	100.00%

12. In which type of organisation are you substantively employed?

	Participants (no.)	Participants (%)
Academic institution	48	4.52%
Acute Trust	313	29.50%
Ambulance Trust	11	1.04%
Arm's Length Body	115	10.84%
CCG	52	4.90%
Charity	16	1.51%
Community Health Trust	37	3.49%
Education/training organisation	34	3.20%
General Practice	30	2.83%
Local Authority	15	1.41%
Mental Health Trust	69	6.50%
Other	85	8.01%
Primary care	25	2.36%
Private healthcare provider	10	0.94%
Private sector (large organisation)	41	3.86%
Private sector (SME)	61	5.75%
Professional body	19	1.79%
Public sector organisation (other)	78	7.35%
Voluntary sector	2	0.19%
Total	1,061	100.00%

13. In which county or country are you substantively employed?

	Participants (no.)	Participants (%)
Bath and North East Somerset	3	0.28%
Bedfordshire	3	0.28%
Berkshire	7	0.66%
Bristol	13	1.23%
Buckinghamshire	6	0.57%
Cambridgeshire	6	0.57%
Cheshire	23	2.17%
Cornwall	17	1.60%
County Durham	4	0.38%
Cumbria	7	0.66%
Derbyshire	7	0.66%
Devon	42	3.96%
Dorset	13	1.23%
East Riding of Yorkshire	6	0.57%
East Sussex	12	1.13%
England	92	8.67%
Essex	13	1.23%
Gloucestershire	22	2.07%
Greater London	167	15.74%
Greater Manchester	71	6.69%

Hampshire	24	2.26%
Herefordshire	2	0.19%
Hertfordshire	16	1.51%
Isle of Wight	2	0.19%
Kent	12	1.13%
Lancashire	35	3.30%
Leicestershire	4	0.38%
Lincolnshire	3	0.28%
Merseyside	35	3.30%
Norfolk	7	0.66%
North Somerset	1	0.09%
North Yorkshire	11	1.04%
Northamptonshire	2	0.19%
Northern Ireland	5	0.47%
Northumberland	1	0.09%
Nottinghamshire	21	1.98%
Outside the UK	29	2.73%
Oxfordshire	9	0.85%
Scotland	16	1.51%
Shropshire	5	0.47%
Somerset	9	0.85%
South Gloucestershire	2	0.19%
South Yorkshire	20	1.89%
Staffordshire	9	0.85%
Suffolk	8	0.75%
Tyne and Wear	23	2.17%
Wales	13	1.23%
Warwickshire	8	0.75%
West Midlands	54	5.09%
West Sussex	4	0.38%
West Yorkshire	111	10.46%
Wiltshire	9	0.85%
Worcestershire	3	0.28%
Total	1,061	100.00%

14. What gender are you/do you prefer to be recognised as?

	Participants (no.)	Participants (%)
Female	489	46.09%
Male	568	53.53%
Other	4	0.38%
Total	1,061	100.00%

15. How old are you?

	Participants (no.)	Participants (%)
Under 25	22	2.07%

25-40	316	29.78%
40-65	703	66.26%
Over 65	20	1.89%
Total	1,061	100.00%

Methodology

No single factor or combination of factors will provide the key that unlocks our understanding of complex social phenomena, and we should also acknowledge the limitations of the tools we have, both quantitative and qualitative, to explore them.

Quantitative research can be useful in identifying the 'what' of a phenomenon, and quantitative measures similarly can be useful to understand and track the experiences of a population over time. However, because it is abstracted from lived experience, quantitative research can fail to adequately reflect complex, dynamic and nuanced experiences, limiting our ability to derive actionable insight.

Where quantitative research can allow us to understand whole populations through extrapolating from smaller samples, qualitative research generally does not allow for the statistical generalisation of findings. The focus on depth rather than breadth can also lead to concerns about saturation, that is, how we can be sure that we have heard everything that there is to hear on a particular subject. Despite these limitations, well-designed qualitative studies should allow for the discovery of deep insight and are particularly useful in generating theories that can be transferred to broader populations. And particularly over recent years, the introduction of new technologies has allowed qualitative researchers to expand the numbers of people engaged in studies.

Based on the practice of co-operative inquiry (Heron and Reason, 2001) our approach is instead to conduct research 'with' rather than 'on' people, positioning them as experts and co-researchers, and fully acknowledging their vested interest in improvement and the development of solutions. This allows for research that is both informative, in that it answers questions, and is transformative, in that it engages individuals in the co-creation of new knowledge.

Clever Together uses crowdsourcing as a qualitative research method, which allows us to harness the scaling potential of technology and the co-creative potential of co-operative inquiry. Crowdsourcing provides a model for participative problem solving by blending an open creative process with a traditional, top-down, managed process (Brabham, 2013a), and is particularly useful for local knowledge problems, where the information required for action is spread among individual actors, and sits outside the knowledge of any central authority (Kietzmann, 2017).

Crowdsourcing has three core elements: an organisation having a task it needs to be performed; an online community voluntarily willing to perform the task; and the potential to create results that are of mutual benefit for the organisation and the online community (Brabham, 2013b). Unlike the Delphi technique, which relies only on the opinions of a small number of specialists, crowdsourcing can harness the opinions of a wider range of people to address "messy problems which require diversity of opinion" (Flostrand, 2017). It can, therefore, be useful in supporting management decision making (Chiu, Liang and Turban, 2014), through generating intelligence, ideas and alternative solutions, evaluating the generated alternatives, and even recommending or selecting the best course of action. Importantly, in the context of exploring a subject that inevitably touches on subject matter that may draw critical responses, crowdsourcing enables a cooperative style of engagement, acknowledging employees' interests in improving their organisations and their own working lives (Purcell and Hall, 2012).

Like any methodology, crowdsourcing is not without its challenges. By facilitating the exchange of ideas, compared to a survey in which opinions are expressed in individual isolation, it creates the potential for crowd think, where minority opinions are ignored, and crowd hijacking, where the crowd uses an initiative to push its own agenda. Anticipating the worst, being transparent, and working with rather than against the crowd have been identified as ways of avoiding these problems (Wilson, Robson and Botha, 2017).

Generating interest

The project steering group identified key stakeholder organisations and groups who would be instrumental in generating interest in the online workshop:

- Association of Project Managers
- ASHNs
- Association of Professional Healthcare Analysts
- British Computer Society
- CCIO Network
- CIO Network
- CILIP
- Digital Academy
- Digital Health readership
- Faculty of Clinical informaticians
- Federation of Informatics Professionals
- HEE TEL
- Health Education England
- IG Alliance
- IHRIM
- Interopen
- ISD Networks
- Local Government Association
- National School of Healthcare Science
- NHS Digital
- NHS Hack days
- NIHR
- Royal College of Physicians Health Informatics Unit
- Soc ITM
- Skills for Health
- Skills for Care

Steering group members engaged these groups and sent them packs to support their communications, including emails, GIFs, e-flyer and example tweets to use. Potential participants were offered the opportunity to pre-register for the workshop. In advance of, and during the workshop, promotional and reminder emails were sent.

Date	Activity
22 November	Invitation to join the online workshop sent to pre-registered individuals
30 November	Reminder email 1 to contributors and spectators
6 December	Reminder email 2 to contributors and spectators
11 December	48 hours to go reminder email to contributors and spectators

Over the course of the online workshop the steering group members, Clever Together, NHS Digital, and Health Education England carried out a twitter campaign to promote the online workshop, using the #digitalready. Digital Health also helped to generate interest in the online workshop through a series of tweets, emails and articles.

Gateway questionnaire

Potential participants who wanted to join the online summit registered using their email address, to prevent multiple registrations, and were invited to complete a gateway questionnaire.

Participants were asked to identify their job role, about the extent to which data, knowledge, information or technology were part of their work and their level of digital experience. We wanted to explore the extent to which participants felt that digital readiness would improve health and care services, and who these benefits, if any, would be felt by. Participants were also asked the extent to which they agreed or disagreed with a number of statements, about their responsibility to help those who are less digitally ready and their organisations' commitments to improving the digital readiness of the workforce. Finally, we asked a range of demographic questions, for example on gender, age, professional group, employer and region.

To preserve the anonymity of individual participants in our analysis, we do not combine all the data from the gateway questionnaire directly with data from the online workshop. However, we used the data to compare contributors to the workshop with all those who participated.

Coding and analysis

Ideas and comments contributed to the online workshop were coded thematically. Responses to the first challenge question were analysed to see what themes emerged from the data, aiming to distinguish inputs from outcomes. For the remaining challenge questions, two coding frames were developed. The first incorporated HEE's domains of digital literacy (Kennedy and Scott, 2016), alongside professionalism, and leadership and culture, reflecting the current scope of HEE's building a digital workforce workstreams. A second coding frame looked at how being digitally ready might be a combination of being both digitally able (reflecting the capabilities encompassed by the digital literacy domains) and digitally willing (capturing attitudes and behaviours, at an individual as well as a collective level).

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