DIGITAL HORIZONS

Spring 2018

The future of healthcare

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Arden&GEM

NHS
Arden and
Greater East Midlands
Commissioning Support Unit

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Welcome

… to the latest edition of Digital Horizons - our regular update on developments in healthcare technology.

In this edition we'll be looking at what the recently announced Life Sciences Industrial Strategy, and subsequent Sector Deal, means for the NHS and how NHS organisations can take advantage of the associated funding streams.

With the potential benefits that Artificial Intelligence (AI) can offer the NHS widely debated in the media at the moment, we hear more from two current AI projects. Ufonia aims to evaluate health and wellness via an autonomous computer assistant while Arden & GEM, and its partners, are exploring the role of automated image analysis for gastrointestinal diseases.

We will also be taking a look at the latest from the GDE programme, developments supported by satellite technology and how digital transformation can help improve patient journeys.

We are always keen to share our thinking and understand your ambitions, so whatever your digital healthcare challenges, we'd love to engage in an exploratory discussion with you.

Adrian Smith
Head of Digital Transformation at Arden & GEM CSU

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What does the Life Sciences Industrial Strategy mean for the NHS?

2017 saw the Government's Industrial Strategy gather pace, with additional funding announced in a number of key areas, alongside the release of the Life Sciences Industrial Strategy and Sector Deal. But how will this benefit the NHS and how can NHS organisations take full advantage of the new funding available?

Industrial Strategy Challenge Fund

In summer 2017, the Government announced an additional £1 billion would be invested in research and development over the next 4 years as part of the Industrial Strategy Challenge Fund (ISCF).

A significant portion of this investment has been earmarked for healthcare and associated technologies, with funding being focused on the following six key areas:

- Healthcare and medicine
- Robotics and artificial intelligence
- Batteries for clean and flexible energy storage
- Self-driving vehicles
- Manufacturing and materials of the future
- Satellites and space technology.

While the healthcare and medicine area offers clear benefit for the NHS, what is exciting about this initiative is the potential for joint working across complementary areas. For example, Arden & GEM CSU is already working with the satellites and space technology industry to identify major healthcare challenges that the ICSF could consider.

The investment is already being realised through the UK's innovation agency. Innovate UK awarded the first £10 million from the ISCF to 35 projects, all led by SMEs but including a wide range of collaboration partners. A number of the initial projects have potential benefits for the NHS, including using aerospace coating technology in prosthetics and 3D scanners for wound care in hospital. Further funding opportunities, administered by The Research Councils and Innovate UK, opened in June 2017, with healthcare bids shortlisted in the following areas; healthy ageing, early diagnostics and mental health.

Life Sciences Industrial Strategy

The Life Sciences Industrial Strategy, published in August 2017, engaged industry, the third sector and the NHS to publish a vision and strategy for the life sciences sector. The report's author, Professor Sir John Bell, was keen to point out that many of the opportunities identified in the strategy were uniquely available to the NHS and could not be realised in many insurance-based healthcare systems.

The strategy laid out key challenges which, for the NHS, included collaboration with industry and facilitating better care for patients through better adoption of innovative treatments and technologies. Core recommendations to meet these challenges included:

- Creation of the Health Advanced Research Programme (HARP) to develop and support platforms for genomics, early diagnostics, AI and digitalisation.
- Adoption of the Accelerated Access Review (AAR) with the intention that the NHS should actively engage in collaborative programmes in late-stage clinical trials, real world data collection, or in the evaluation of diagnostics or devices.
- Establishment of Digital Innovation Hubs (DIH) to provide data across regions of three to five million people to deliver a national approach for the generation of real world data which can be accessed by researchers.

The Strategy Board believes that the same innovation that drives global economic growth can be used to improve outcomes and reduce cost within the NHS, creating a virtuous circle of investment.

Life Sciences Sector Deal

Announced in December 2017, the Life Sciences Sector Deal will help ensure pioneering treatments and medical technologies are produced in the UK, improving patient lives and driving economic growth. The deal brings together the government with universities, charities and businesses to make a joint commitment to investment. It involves substantial investment from private and charitable sectors and significant commitments in research and development from the government. Key to the long term success of the deal will be the engagement of the NHS as a research partner.

What next?

The NHS provides a unique environment where technologies can be developed and tested, and used to transform services to improve outcomes and reduce cost. In order to take full advantage of the opportunities offered by the Industrial Strategy, STP leaders should look to:

- engage with the Department for Business, Energy and Industrial Strategy and fund administrators to shape how unallocated money is invested
- actively partner with SMEs in their local area to access funds which can support the development of innovative healthcare solutions.

> "...the same innovation that drives economic growth can be used to improve outcomes and reduce cost within the NHS"

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How the GDE programme is identifying the best approach for future digital initiatives

The Global Digital Exemplar (GDE) programme - the government's national initiative to create a network of NHS providers which deliver exceptional care through the use of world-class digital technology - focuses funding on those acute and mental health trusts that already have a high degree of digital capability and capacity.

A key priority for the programme is to disseminate early knowledge, while concurrently identifying the best approach for future digital initiatives. NHS Arden & GEM CSU is supporting this priority in two different ways.

The GDE Learning Network

The GDE Learning Network, run by Arden & GEM on behalf of NHS Digital, supports exemplars to share their learning and experiences, enabling other trusts to follow in their footsteps as quickly and effectively as possible.

The CSU co-produced the network in partnership with all stakeholders, establishing a common purpose and shared benefits to ensure buy-in from all participants from the outset.

A range of knowledge sharing activities, such as webinars, conferences and roundtables take place every month - each aligned to developing the capabilities identified in the Digital Maturity Framework.

Digital Maturity Framework

THEMES

READINESS	CAPABILITIES	INFRASTRUCTURE
Are providers set up effectively to deliver paper-free at the point of care?	Do providers have the digital capabilities they need to deliver paper-free at the point of care?	Are the underpinning technical enablers in place to deliver paper-free at the point of care?

SECTIONS

Strategic Alignment	Records, Assessments & Plans	Wi-Fi (staff & public)
Leadership	Medicines Management & Optimisation	Mobile Devices
Resourcing	Asset & Resource Optimisation	System Performance
Governance	Transfers of Care	Disaster Recovery
Information Governance	Decision Support	Business Continuity
	Business & Clinical Intelligence	
	Remote & Assistive Care	
	Orders & Results Management	
	Standards	

If you would like to learn more about the GDE Learning Network, including access to resources developed so far, contact the team at **GDE.LearningNetwork@ardengemcsu.nhs.uk**

Evaluating the GDE programme

In January 2018, Arden & GEM began working in partnership with the University of Edinburgh to develop and deliver a long term evaluation of the Global Digital Exemplar (GDE) programme.

The evaluation, which will take place over the life of the GDE programme, will look at the key deliverables and benefits from the perspective of both the organisations participating and the wider system in which they operate. By comparing exemplar sites, types and experiences, it is hoped that the best approach to future digital initiatives, including barriers and facilitators, can be identified.

Arden & GEM will be responsible for extending previous baseline evaluation work across all exemplar sites while the University of Edinburgh will host the project from the Usher Institute of Population Health Science and Informatics, co-locating their research associates in each GDE site.

Supporting exceptional care through digital technology is at the heart of the Global Digital Exemplar programme, and this evaluation will make an important contribution to accelerating wider digitisation across the NHS.

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Using Artificial Intelligence (AI) in healthcare

Evaluating health and wellness through AI

By Nick de Pennington, Founder & CEO of Ufonia

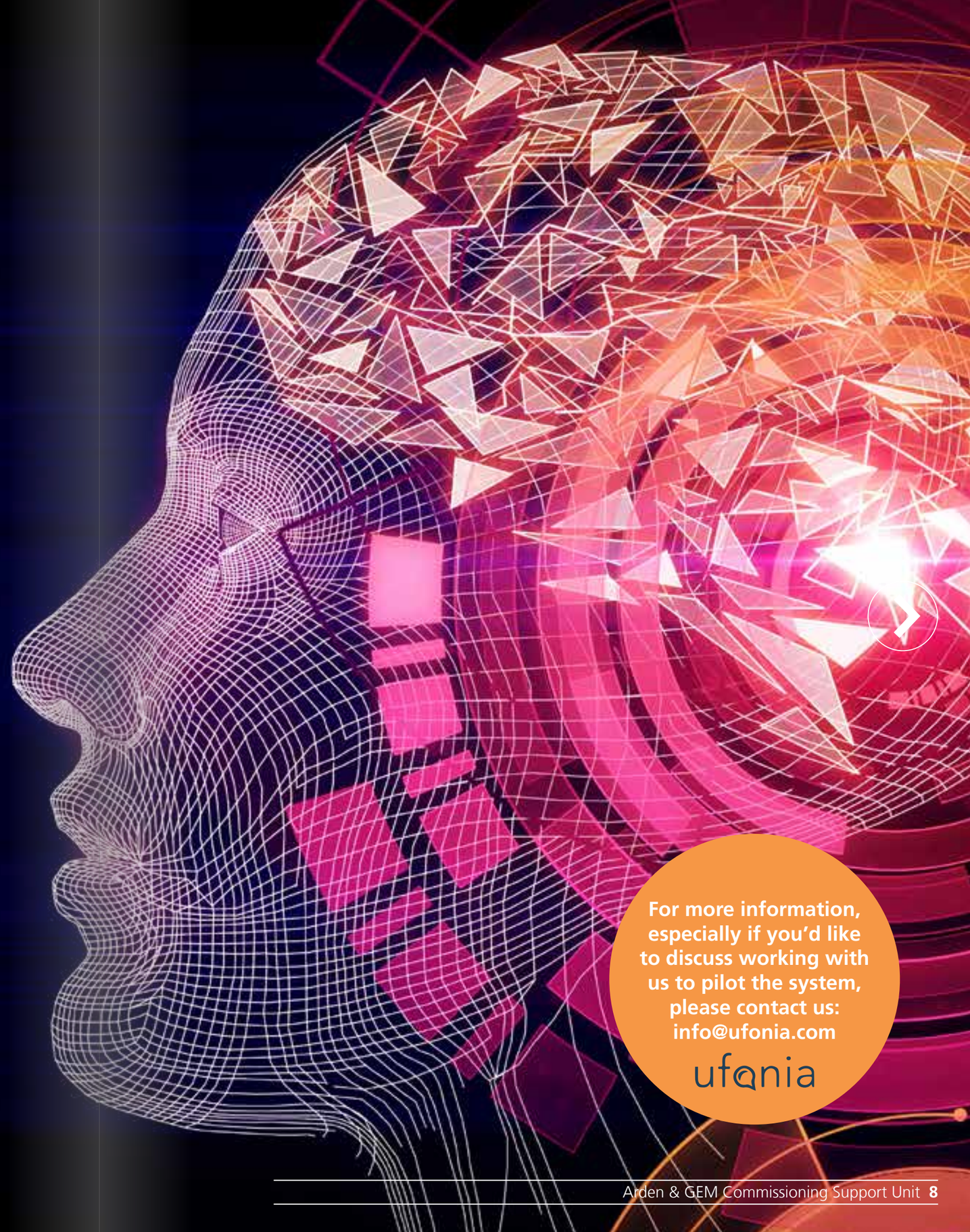
No-one can fail to have noticed the recent proliferation of voice assistants, such as Amazon's Alexa and Apple's Siri. In 2017, 24 million smart speakers are projected to be sold, and last Christmas one-in-five households intended to buy one. This huge consumer demand has come on the back of a technology revolution. For the first time, artificial intelligence techniques can now deliver real-time, engaging, speech transcription and understanding. Ufonia is a digital health company taking advantage of the same technologies to deliver higher value healthcare.

Ufonia's product is an autonomous computer assistant that can evaluate health and wellness via a 'natural' speech conversation. Our system moves digital health from text-based apps and 'chat-bots' to voice user interfaces. The company was founded in early 2017 as part of Oxford University Innovation's Start-up Incubator programme. The inspiration came when the founder - Dr Nick de Pennington – won the Science and Technology Facilities Council's (STFC) first 'cognitive computing hack' in 2016. His concept was a speech-based system that was able to assess patients with long term conditions such as asthma, diabetes and heart failure. Since then the company has been awarded support and funding from IBM, the STFC, Harwell HealthTech Cluster and Innovate UK.

We believe that our solution can augment existing health services by automating the routine monitoring of care. Ufonia will monitor patients at a scale and frequency that is not possible with the increasingly limited capacity of health professionals. We are able to safety-net patients who remain stable while highlighting those whose status is changing. In this way, we can allow thinly stretched healthcare professionals to focus their skills on individuals who need them most, at the times they need them most.

The key to such a system is how to undertake the monitoring in a way that accurately and effectively assesses patients. Ufonia engages users through carefully crafted conversations which we then validate against existing measures of health and wellness. We contact our users via a standard telephone call. This means we can proactively engage them without requiring download of an app, provision of a device, or delivery of any training. This is particularly important for the relatively increased proportion of digitally disenfranchised individuals who suffer from chronic disease. In the near future, for other demographics, such as young people with mental health concerns, we anticipate delivering our platform over smart speakers themselves.

Currently, the system is in the late stages of testing with GPs, other healthcare professionals, and members of the public. Our current grant funding is supporting us to work with an academic team at the University of Oxford to validate our results against existing outcome measures. In parallel, we are working with an industry partner to pilot the system to support patients, and explore outcome based commissioning. We plan to go-live with the first full users in the second half of 2018.



For more information, especially if you'd like to discuss working with us to pilot the system, please contact us: info@ufonia.com

ufonia

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Can AI improve effectiveness in cancer imaging?

Gastrointestinal (GI) diseases, from inflammatory bowel diseases (IBD) to bowel cancer are a growing burden on society. Bowel cancer is the only cancer that can be fully prevented if its precursors - polyps - are detected early. Even if already developed, the majority of early cancer is truly curable. Currently the vast majority of endoscopies are undertaken at a clinic with expensive, invasive technologies that require intensive operator support.

However, resource constraints have led to a "diagnostic bottleneck" especially in bowel cancer screening. With over 750,000 colonoscopies being performed per year just in England (projected to double due to the increased acceptance and expansion of bowel screening programmes) and 80% of those from the waiting lists, Bowel Cancer UK has called for the NHS to urgently tackle this "endoscopy crisis".

Capsule endoscopy - in which ingestible capsules capture and wirelessly transmit images from the stomach and digestive system as patients go about their daily lives has been around for more than ten years. Despite a clinically proven effectiveness, the solutions have not scaled due to the absence of mechanisms to deliver outside the clinic and the resource constraints mentioned.

Arden & GEM are working closely with a world-leading set of partners including CorporateHealth, Openbrolly and Wollfram Research Europe as well as with leading Universities and the Highlands and Islands Enterprise to tackle the challenge - improving early diagnosis and shifting the burden on hospitals while reducing cost and improving patient convenience.

Currently, the analysis of images from the gastrointestinal tract, taken via ingestible cameras or traditional tube-mounted cameras, is undertaken by human operators. But the volume of images and the number of patients requiring screening, places unmanageable loads on the operators. Moreover, for many images, computer recognition software that continuously improves (learns) with increasing numbers of images that are analysed, can spot abnormalities more effectively than human operators. We are working with our partners to test the latest approaches to automated image analysis, quantify benefits to the patient, clinician and NHS - financially and clinically - and make recommendations on how to implement the solution.

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Where next with Healthy New Towns?

As reported in a previous issue of Digital Horizons, Arden & GEM CSU was pleased to be involved in an important piece of work in 2017 with the NHS Healthy New Towns programme. The work sought to look at a number of ways in which satellite applications and solutions could enhance the journey towards healthier new towns.

The Healthy New Towns programme continues to be a flagship NHS initiative and we are helping to focus on one particular component around air quality. The World Health Organisation reports that 92% of the world's population lives in locations where their own air quality guidelines are not met. A major factor in this is the dramatic shift to urban living - from 34% in 1960 to around 60% today.

Poor air quality has a major detrimental impact on COPD and other respiratory conditions. More recently it has been shown to be a factor in the prevalence of Type 2 diabetes. Whilst long-term the drive is to improve air quality there is an important intermediate step which can be taken - provide reliable and usable advice and guidance that enables individuals to better manage their exposure to poor air quality.

To this end we are working alongside world-leading SMEs who are monitoring and modelling air quality in urban areas.

The aim is to build tools (including the inevitable apps!) that will allow citizens to take life-style decisions based on air quality data - for example, when and where is a good time to go for a run today that minimises my exposure to poor air quality.

At the time of writing we are seeking funding to accelerate the work which we believe could have a major impact on tackling the preventative agenda in towns and cities.

Arden & GEM's expertise is significant in the success of this initiative. Like all technology-based healthcare solutions, the role of technology is that of an enabler. Delivering benefit comes from redesigning and rethinking pathways, while encouraging and activating patients to change their behaviour.

We have experience of providing these critical components as well as evaluating impact to enable wider adoption of proven change across the NHS.

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Improving maternity healthcare in Peru

On the Amazon river, deep in the heart of Peru, there are few medical services available locally and it's challenging to communicate with services further afield. There are 'health posts' dotted along the river but the only way of travelling to them is by canoe, which from many villages can be a 4-6 hour round trip; often to find that the health visitor isn't actually at the post that day.

For young expectant or new mothers this creates an enormous challenge. Travelling by canoe while heavily pregnant, or with a young baby, is exceedingly risky and often the mother has no companion in support.

Unsurprisingly the statistics on childbirth are saddening - mothers are often in their late teens with one in four dying in childbirth. Mortality rates for their infants are equally poor with 30 deaths per 1000 births (more than eight times greater than the UK infant mortality rate).

The UK government, third-sector organisations and industry are working together to support the Peruvian health ministry in tackling the situation. With a well-equipped boat on the river - the Amazon Hope Medical Ship - there is now access to more professional and readily available support. But the key to delivering change with this service - as with so much in the UK - is connectivity. Community agents have been trained in the care women should receive during pregnancy, partum and postpartum, and on how to perform pregnancy tests but they need to be able to report this information to the medical ship. Old mobile phones from other countries have been shipped in and solar panels (no electricity connections are available to homes) are provided to charge phones. Satellite coverage ensures phones can connect when they are needed. On the boat connectivity also allows community agents to seek better advice and support decisions for mothers.

Giving community agents the appropriate training and communication equipment has significantly improved antenatal care in this region, more than doubled the number of women who delivered at health posts or on the medical ship, and directly prevented neonatal and maternal deaths. The next stage in the project is to look at how this approach can be rolled out across the Peruvian Amazonia.

How CSUs are helping to deliver the Five Year Forward View

Last winter, Arden & GEM's Consultancy Services Director, Wendy Lane, and Head of Digital Transformation, Adrian Smith, were filmed as part of two programmes focusing on 'Models of Care' and 'Improving Patient Journeys'.

The programmes have been put together by In Focus Broadcasting and fronted by BBC World presenter, Samantha Simmonds. Focusing on how the transformation and redesign of care services - including primary, secondary, community and social care - can relieve pressure on the system through more access, more partnerships, better information, better integration, better services and connected approaches to patient care.

Wendy and Adrian were able to talk about examples of how the CSU is helping to achieve this, and deliver the Five Year Forward View, through transformation programmes, including digital technology.

The programmes will be available on the Arden & GEM website in the Spring following a premiere event for senior healthcare executives taking place in London in March.

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