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## NEW DRIVE TO USE EXISTING NHS SCOTLAND DATA TO IMPROVE CANCER CARE & OUTCOMES

- **Three projects win Cancer Innovation Challenge funding to demonstrate feasibility of tools to improve diagnosis, treatment and overall cancer care**
- **Data from mesothelioma, haematology and renal cancer treatments used to enhance clinical understanding and subsequently improve outcomes**

Three innovative projects have won up to £35,000 each from Cancer Innovation Challenge to demonstrate how insights gained from existing NHS Scotland data will be used to improve cancer patient care and outcomes in Scotland.

All three successful projects have the potential to have a significant impact on cancer treatment in Scotland in terms of improving diagnosis, treatment and overall care. They now have the funding and the opportunity to develop and demonstrate the feasibility of their innovation over the next three months. Two will then be selected to continue to the next stage of the Cancer Innovation Challenge process which will see them receive further funding of up to £125,000 to develop prototypes over a six month period.

The projects all seek to deliver at least one of these objectives:

- Enable analysis of unstructured data (e.g. clinical notes, medical imaging)
- Enable data driven clinical decisions
- Enable data driven service improvement in the NHS
- Enable data driven recruitment for clinical trials
- Enable the adoption of precision medical approaches

The three successful projects are:

- **Canon Medical Research Europe** (Edinburgh based) is working with NHS Greater Glasgow and Clyde on a project aimed at building a robust assessment tool for Malignant Pleural Mesothelioma (MPM), an asbestos-related cancer with particularly high incidence in Scotland. The lack of such a tool to date has limited the ability to evaluate new therapies for this cancer. Canon seeks to address this using machine learning to automate RECIST scoring, the widely used scoring system for assessing response to cancer treatment, from CT scan information for mesothelioma.
- **Jayex Technology** (London based) is working with NHS Lothian on a proof of concept focusing on haematology cancers as there is a shortfall of this data in the National Registry. They will seek to standardise and migrate existing data collected by clinicians over 30+ years from legacy systems, to a new, cutting-edge platform, mapped to a global data standard. Advanced analytics tools will enable meaningful data discovery to support clinical decision making. The platform will also enable adoption of precision medicine approaches it allows future mapping of genomics and analysis of unstructured data.
- **Sharpe Analytics** (Edinburgh based) will harness the power of machine learning to generate tools for the prediction of outcomes for Scottish cancer patients. It will begin with prognosis modelling for patients with renal cell carcinoma using routinely collected data recorded in repositories such as the Scottish Cancer Registry. This will set the foundation for further work to increase the accuracy of its models by incorporating additional variables, such as genetic

markers influencing the likelihood of tumour development. It is also working with NHS Lothian on the project.

(More information on each is detailed in the notes below.)

**Dr Hilary Dobson OBE** is Deputy Director of the Innovative Healthcare Delivery Programme (IHDP) Clinical Lead on this Cancer Innovation Challenge funding call. She says: “The response to this funding call was very strong. The selection criteria spanned clinical, technological, academic and business considerations, crucially with improving patient outcomes at their core. The three successful projects demonstrated really strong possibilities for revolutionising cancer care in this country. We are excited to see how each of them develops during this stage of the process.”

The Cancer Innovation Challenge aims to inspire novel data and tech innovations to help Scotland become a world leader in cancer care. It is funded by the Scottish Funding Council and delivered by three Scottish innovation centres – led by The Data Lab and supported by the Digital Health and Care Institute (DHI) and Stratified Medicine Scotland (SMS).

Minister for Business, Innovation and Energy, **Paul Wheelhouse** said: “We are committed to developing Scotland as a centre for innovation, life sciences and world-class clinical research.

“The £1 million Cancer Innovation Challenge Fund plays a key role in supporting entrepreneurship and new approaches in this crucial area of medicine. This funding will allow these companies to take the next step towards developing new approaches to the diagnosis and treatment of blood, kidney and tissue cancers, using advances in machine learning and automation to deliver better outcomes for patients.”

**Stuart Fancey**, Director of Research & Innovation at the Scottish Funding Council, adds: “The Cancer Innovation Challenge is driving collaboration and helping Scotland to become a world leading carer for people with cancer. The quality of the proposals and their potential to drive positive improvements is good news for the future care of cancer patients throughout Scotland.”

To find out more about the Cancer Innovation Challenge and its associated activities and funding opportunities, please visit [www.cancerchallengescotland.com](http://www.cancerchallengescotland.com)

## ENDS

### For further information, please contact:

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### About the Cancer Innovation Challenge

The Cancer Innovation Challenge is a project funded by the Scottish Funding Council (SFC) to encourage Innovation Centres in Scotland to work in partnership to help Scotland become a world leading carer for people with cancer.

The project brings together three Innovation Centres, led by The Data Lab in collaboration with the Digital Health and Care Institute (DHI) and Stratified Medicine Scotland (SMS). The Innovation Centres are funded by the SFC to support transformational collaboration between universities and businesses. The Centres aim to enhance innovation and entrepreneurship across Scotland’s key economic sectors to create jobs and grow the economy.

The Challenge has two major work streams:

- 1) An open innovation funding call to identify innovative cancer data science solutions
- 2) An open innovation funding call to develop new tools for cancer patient reported outcomes and experience measures

There will be a programme of activities surrounding each work stream involving industry, the public and a variety of stakeholders in the wider health sector. The aim is to utilise NHS data to support the delivery of more effective and

efficient cancer care to help derive new analytical insights into Scottish cancer data, inspire local start-ups to join in the effort, demonstrate ability to produce large scale NHS data for complex analysis under safe and secure conditions and to support informed discussion about the creation and use of synthetic data.

Organisations supporting the delivery of the challenge include:

- NHS National Services Scotland
- The Usher Institute of Population Health Sciences and Informatics at the University of Edinburgh
- The Innovative Healthcare Delivery Programme (IHDP) at the Farr Institute Scotland
- The University of Edinburgh
- The Nursing, Midwifery and Allied Health Professions Research Unit at the University of Stirling
- The Health and Social Care Alliance Scotland
- Find out more here: [www.cancerchallengescotland.com](http://www.cancerchallengescotland.com)

Twitter: @cancerchallscot, #DataSavesLives

Further detail on the projects:

#### **Canon Medical Research Europe Ltd**

##### **Automatic RECIST measurement in mesothelioma by deep learning**

'RECIST' is a widely used scoring system for assessing response to cancer treatment, and is considered the gold standard in clinical trials of new therapies. However, it is time-consuming and is not always conducted as part of routine NHS care, because of limited radiologist reporting time. RECIST is also subject to inter-reporter variability, which can impact on treatment decision and trial outcomes. This project aims to enable the introduction of automated RECIST reporting within the NHS, thus improving patient care and providing quantitative measures and analysis of patient outcomes.

Malignant Pleural Mesothelioma (MPM) is an asbestos-related cancer with particularly high incidence in Scotland. The lack of a robust response assessment tool is a major limitation in evaluating new therapies for mesothelioma and an accurate, efficient method is urgently required.

The project will develop a system for the automatic measurement of RECIST score in MPM, based on CT imaging and machine learning (deep learning) techniques. It will leverage data and ground-truth (i.e. manually-determined RECIST) from the PRISM (Prediction of Resistance to Chemotherapy using Somatic Copy Number Variation in Mesothelioma) study, which has been funded by the British Lung Foundation and is currently selecting previously treated patients in Glasgow and other UK centres.

The ultimate goal is for a fully automated reporting system. Phase 1 of the project will see the development of a semi-automated system, requiring user-provided seed points. The system would then automatically perform tumour delineation, measurement and baseline follow-up comparison. MPM is a particularly difficult test case, thus presenting the opportunity for a robust proof of principle, from which we can expand this work into other cancers and other modalities including Magnetic Resonance Imaging (MRI).

Canon Medical Research Europe Ltd is a wholly owned subsidiary of Canon Medical Systems that operates as a research and development centre creating healthcare image and data visualisation and analysis software and decision support tools. Our software is integrated into Canon Medical's scanners and radiology workstations and is in use in hospitals across the world. With around 130 software engineers, scientists, clinical specialists, testers and others at our Edinburgh office, we work closely with Canon colleagues in Japan, USA and China, and maintain strong links with local hospitals and universities.

Twitter: @CanonMedicalEDI

[www.research.eu.medical.canon](http://www.research.eu.medical.canon)

#### **Jayex Technology Ltd**

##### **Real-time Cancer Data Access - A Milestone for Precision Medicine Delivery in Scotland.**

Jayex engaged with NHS National Services Scotland, IDS and NHS Lothian stakeholders on a project to design and build a Clinical Access Platform (CAP) able to integrate with national data infrastructure and Scottish Cancer Registry. It will complement its functionality through real-time cancer data access for clinicians and policymakers.

The proof of concept will focus on Haematology Cancers, as there is a shortfall of this data in the National Registry. The project will seek to standardise and migrate the existing data collected by the clinicians locally over 30+ years - from the outdated, unsupported system, to the new, cutting-edge platform, mapped to a global data standard.

Working with expert partners Pulse Infotrame Inc., Jayex will include modern technology advances to develop a robust and scalable solution assisting in day-to-day clinical management, policymaking, as well as supporting clinical trial recruitment and clinical research. Integrated advanced analytics tools will enable meaningful data discovery for clinical decision

support. With a structure allowing future mapping of genomics and analysis of unstructured data our Platform will also enable adoption of precision medicine approaches.

The Platform will be interoperable and scalable, meaning that the investment can be leveraged across all other cancer types, rare diseases and other data types in the future, to eventually deliver a real difference to the lives of cancer patients in Scotland and beyond.

[www.jayex.com](http://www.jayex.com)

#### **Sharpe Analytics Ltd**

##### **Using Machine Learning to Estimate the Prognosis of Patients with Metastatic Renal Cell Carcinoma**

Sharpe Analytics will harness the power of machine learning in order to generate tools for the prediction of outcomes for Scottish cancer patients. Machine learning is driving a revolution across a great number of fields by unlocking the predictive power of large datasets. Within healthcare, critical clinical decisions rely on analysis and interpretation of various data types, including weight measurements, blood test results, and radiological and pathological findings.

Decisions on cancer treatments in particular require firm evidence and due deliberation, as the considerable side-effects of various therapies have the potential to bring more harm than good to patients. Therefore, a tool enabling clinicians to use data-backed evidence to inform treatment plans would aid patient management. In addition, more accurate predictions on areas of clinical need within cancer services may help guide resource allocation and planning.

In Phase 1 of the Cancer Innovation Challenge, Sharpe Analytics will begin with prognosis modelling for patients with renal cell carcinoma, using routinely collected data recorded in repositories such as the Scottish Cancer Registry. Secondary prediction models for other outcomes may also be constructed, as guided by the available data.

These efforts will set the foundations for further work to increase the accuracy of its models by incorporating additional variables, such as genetic markers influencing the likelihood of tumour development. Sharpe Analytics ultimately aims to build similar prediction tools for other tumour types and for application to patients both within Scotland, and beyond.

[www.sharpeanalytics.com](http://www.sharpeanalytics.com)

#### **Scottish Funding Council**

The Scottish Funding Council (SFC) is helping to make Scotland the best place in the world to educate, to research and to innovate. Investing around £1.5 billion of public money each year, SFC's funding enables Scotland's colleges and universities to provide life-changing opportunities for over half a million people. Its support for university research means every one of Scotland's 19 universities is able to carry out world-leading research. [www.sfc.ac.uk](http://www.sfc.ac.uk)

#### **The Data Lab:**

The Data Lab is an innovation centre focused on helping Scottish industry to capitalise on a growing market opportunity in data science. Established with an £11.3 million grant from the Scottish Funding Council, The Data Lab enables industry, public sector and world-class university researchers to innovate and develop new data science capabilities in a collaborative environment. Its core mission is to generate significant economic, social and scientific value from data for Scotland.

[www.thedatalab.com](http://www.thedatalab.com)

[www.datafest.global](http://www.datafest.global)