NPEx
NEWSLETTER

NPEx — The National Pathology Exchange

NHS — The Health Informatics Service

Issue 17
December 2020

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1 - A LETTER FROM MAT BARROW

A warm welcome to all of our users to the December 2020 NPEx newsletter.

Thank you for the part you've played in the COVID-19 response this year. Whilst our front-line colleagues may be the visible faces of the NHS, the work that you, our NPEx users, do is no less critical, and you should all be rightfully and immensely proud of your contribution.

The thing that has impressed me most about the NHS this year is the resilience and commitment with which everybody has seemingly stepped up to face the challenge. The same has been true of the NPEx team working across X-Lab and The Health Informatics Service (THIS) both.

At the start of March, traffic through NPEx was around 1.2 million tests per year. We passed 1.2 million tests per month in June, 1.2 million tests per week in August, and 1.2 million tests per day in November. To cope with Mass Population Testing, we're now working on scaling the service to process 1.2 million tests in less than an hour.

This huge increase in demand at a time when people have been forced to work in a very different way has required not just an evolution, but a revolution in how we operate our business.

Building upon our strong partnership with THIS, we have migrated most of the COVID-19 workload to Cloud; recruited 30% more staff, implemented 24/7 support and a 7-day working week; and we are rewriting the User Interface to significantly improve performance and usability of NPEx itself. This scale-up hasn't been entirely smooth, and I would like to apologise again to any of you who experienced a service degradation of any kind during the year. I make no excuses but promise that with each incident we have learned something that makes the service incrementally better in future.

Over the next year, we anticipate completing the migration to Cloud for all users; connecting the Labgnostic diagnostic exchange (or NPEx, on a global scale) in three continents; and launching the new User Interface. With vaccines on the horizon, we enter 2021 hopeful, but intrepid and confident, that we have never been better prepared to face whatever the future holds.

Thank you once again, happy holidays and I hope you all manage to enjoy a well-deserved break.

2 - NEW YEAR, NEW USER INTERFACE

NPEx users have been aware for some time about the X-Lab team's drive to deliver the solution which has proved so valuable in the UK to an international audience. The lab-to-lab, or any-system-to-any-system, offering of NPEx provides a clear answer to globally common informatics challenges. Technical and system updates are a key part of readying the NPEx service for a global rollout in 2021 and these updates will benefit the NPEx user base in the UK as much as they aid our new users across the globe.

With this in mind, it is with pleasure that the NPEx team can announce a fresh face (and fresh internal workings) for the NPEx User Interface. Working with our NPEx users and seasoned User Experience designers and systems engineers, the NPEx team are working on a more useable, more functional and more efficient version of the service.

The key priorities of the project are:
• Streamline the NPEx user experience
• Increasing NPEx user satisfaction
• Decrease number of NPEx support requests
• Increase volume of tests transferred through NPEx
• Increase number of unique NPEx users
• Improve the aesthetic aspect of NPEx
• Support new NPEx opportunities

Tom Keble, X-Lab's Chief Technology Officer (CTO), explained:

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"The objectives for us are about bringing a more intuitive user experience and improving, not just the look and feel of the UI but, the way that the users interact with it so that it is easier for them to navigate; there is less overhead in terms of training; there are fewer clicks and fewer things to do so that they can do their job more efficiently when they are using it, and indeed, make fewer mistakes."

The NPEx user interface is being rebuilt from the ground up and the internal technology stack will be more modern, which will mean significantly better performance. Rebuilding it will enable the NPEx team to move faster when they need to add new features and respond to user feedback. When the system is live, the NPEx team will work to a plan roadmap of improvements for users and, with the help of a new system, will be able to deliver those faster, and more easily than is current NPEx practice. A new User Interface means a new version of NPEx; one that works more directly in users' interests, responds to industry demands, and delivers more reliably.

It is important that NPEx users accompany NPEx on its international journey; with this in mind, as X-Lab launch the international brand under which NPEx is marketed, it is crucial that NPEx users remain informed and updated on the process. The new User Interface is due for completion in spring 2021 and, following this, NPEx users will begin the process of transition and the next stages of their NPEx journey.

If you would like to take part in user testing and research please register your interest **here.**

3 - SCALING THE SERVICE

COVID-19 has provided the NPEx team with many challenges this year- one of which was dealing with the extra load on the system created by high volumes of COVID-19 testing.

Early on in the pandemic, NPEx was approached by NHSX who sought help with the national testing response to the pandemic. The scale of the outbreak created a substantial logistical challenge and it was imperative that the testing capacities of labs across the UK were fully utilised for COVID-19 testing. Time spent filling out paper test referral forms, and time spent rectifying the inevitable errors, was time wasted. NPEx was, therefore, well placed to join the National COVID-19 response, and has since and become involved in all of the five testing pillars.

NPEx is supporting all five pillars by aggregating and enriching test results where needed; directing them towards the relevent bodies; streamlining and speeding up result returns; and putting years of industry expertise at the UK's diagnostic data infrastructure to use in a crucial time.
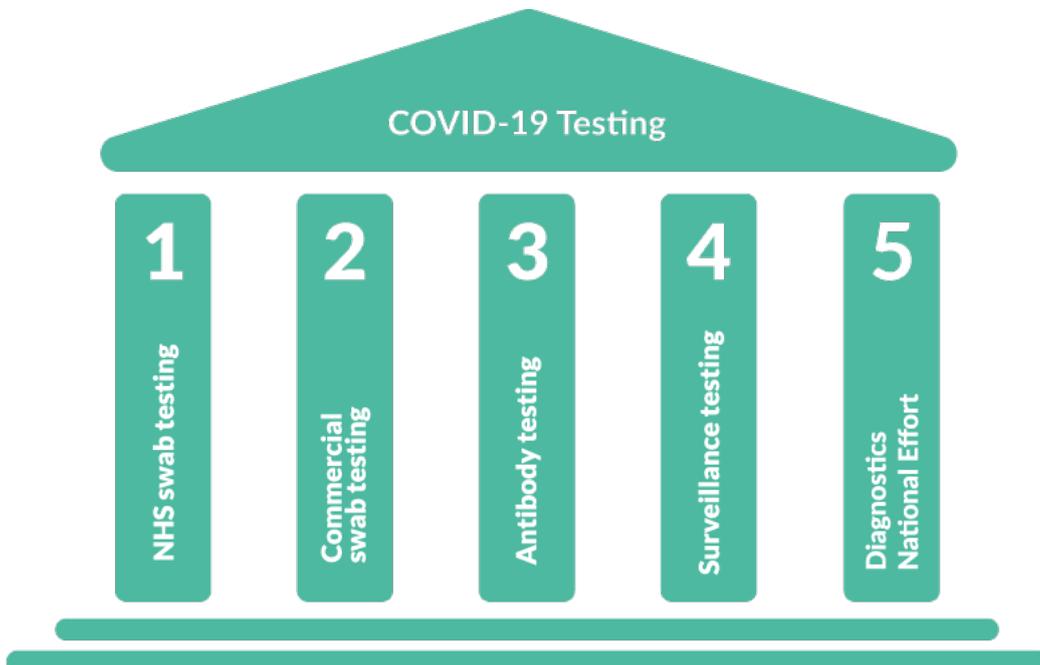
NHS COVID-19 testing response

Pillar 1 testing is swab testing in Public Health England (PHE) labs and NHS hospitals for those with a clinical need, and health and care workers.

Pillar 2 testing is swab testing for the wider population, including in-person tests at national drive or walk though testing sites and home test kits delivered to homes

Pillar 3 is NHS Serology Testing.
These are blood tests to determine whether someone has COVID-19 antibodies, which can indicate whether they may have been infected with COVID-19 in the past.

Pillar 4 testing is blood and swab testing for national surveillance supported by PHE, the Office for National Statistics (ONS), and research, academic, and scientific partners to learn more about the prevalence and spread of the virus

Pillar 5 is a national initiative to build mass-testing capacity. The Department of Health and Social Care has called on the diagnostics industry to develop a high capacity, accurate, COVID-19 testing solution.

COVID-19 Testing

1	2	3	4	5
NHS swab testing	Commercial swab testing	Antibody testing	Surveillance testing	Diagnostics National Effort

With the volume of tests travelling through NPEx increasing so dramatically, some NPEx users experienced delays and outages over the summer.

The NPEx team was always fast to respond and rectify these issues so the impact was reduced. However, it was clear that a structural solution was needed to support these volumes. The NPEx team quickly identified the Cloud as the answer.

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"We've moved all of the Pillar 2 and 3 traffic onto the Cloud which gives us much greater scalability and resilience across what we do. It also, for existing NPEx users, means that there is less load on the platform that they are accessing on a daily basis. The load is now significantly reduced to give them priority for their own workloads outside of what's happening with COVID testing."

Tom Keble, CTO, X-Lab.

Not only has this improved service for current NPEx users, but it also opens up opportunities for new areas of expansion. NPEx is already connected to the Mater Misericordiae University Hospital in the Republic of Ireland and Eurofins Biomnis in France using 'https' connections, which has opened doors for our current users.

Using the Cloud will enable NPEx users to make even more international connections like these outsides of the UK that may have previously been inhibited by cost or practicality. Historically, NPEx users have had to access the HSCN network in order to connect to the service, but the successful migration to Cloud has shown that NPEx will continue to be a byword for interoperability. The team intend to transition current NPEx users onto the cloud platform during 2021, so they too can realise the improved performance, resilience and features a Cloud environment has to offer.

Daily National Test Volumes, past 12 months
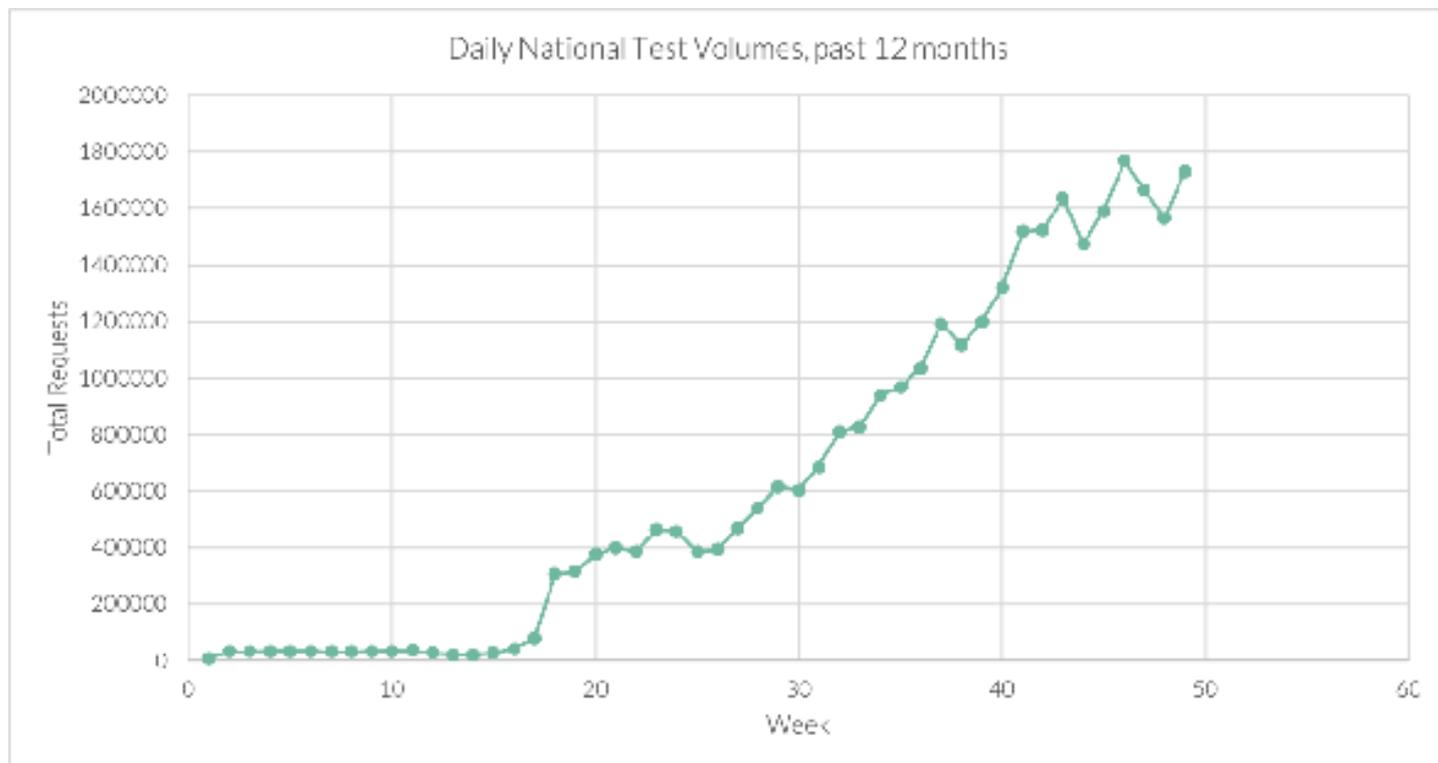
For the first 17 weeks of 2020, on average 33,256 tests were requested and resulted through NPEx every week. In stark contrast, week 18, which fell at the end of April, saw 305,963 tests requested and resulted through NPEx. Now that the UK is offering COVID-19 testing in a 'business as usual' style', volumes travelling through NPEx across all Pillars have continued to increase, last week topping 1.7 million per day.

4 - TECH UPDATE: WAYS OF WORKING

In June, Tom Keble joined the X-Lab team as Chief Technology Officer (CTO). His role is to define short- and long-term technology strategies for NPEx and focus the service's resources to produce the best service possible.

When discussing new ways of working for the NPEx team, Tom said;

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"We've moved to a more agile structure. We have dedicated cross-functional squads, with prioritised backlogs, and we are now working in two-week sprints, to focus on realising value to customers as quickly as possible."

Working in these two-week sprints is more appropriate for a climate which experiences a lot of change.

It allows the flexibility to adjust as users give feedback, and as NPEx takes on even more widely varied functions.

At the start of a sprint period, each team designates a set of goals to be achieved within a fortnight. This incremental style of working delivers functional features in smaller doses, but more often. This means that users will see a consistent stream of improvements.

NPEx's new technology strategy also reflects the importance of a high-functioning and efficient service, which is apparent now more than ever. As the strain on pathology laboratories only increases, it is crucial NPEx continues to alleviate the pressure. The team have introduced holistic monitoring and alerting so that all traffic can be monitored across the platform at any given time. If anything goes wrong, the NPEx team are immediately alerted to it. There is also now out-of-hours monitoring, so that if a critical incident occurs outside of working hours, engineers are able deal with it quickly as it appears. The outcome of this is a better NPEx user experience with less downtime, and less potential for delay due to incidents.

NPEx users will have already experienced the benefits of these new practices, and should look forward to more evidence of improvement in the coming months.
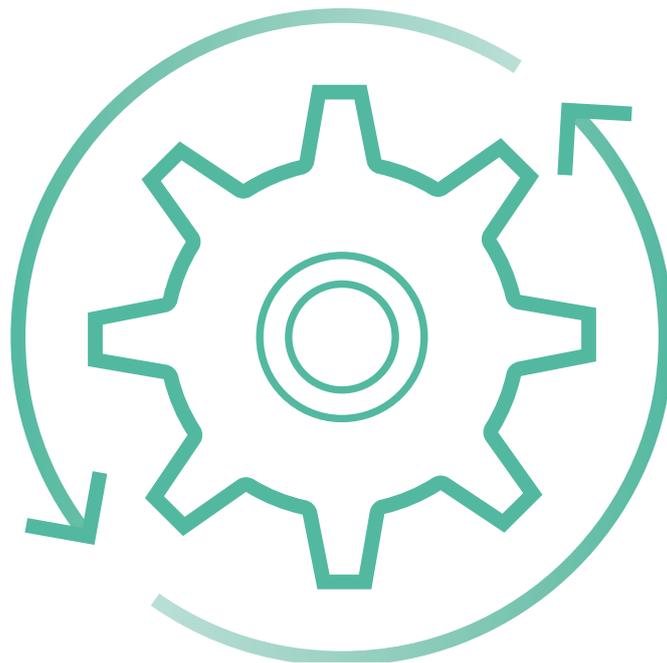
5 - ICS SUCCESS

December 2020 marks the end of NPEx's Integrated Care Systems Project, which has concluded with a series of successes for NPEx. The project had four deliverables; to provide greater connectivity options outside of the Health and Social Care Network (HSCN), to implement and improve a point of care testing (PoCT) initiative, improved business continuity, and transferring complex data sets. To learn more about the project and it's aims, please see **here.**

Greater Connectivity Options
NPEx achieved great success for this deliverable by connecting to the Mater Misercordiae University Hospital in Dublin, who are now live with NPEx. The Mater is not on the HSCN and so could not connect to NPEx in the same way as NHS labs. The NPEx team had previously explored the option of Remote Ethernet Device (RED) boxes, but ultimately have turned to 'https' (HyperText Transfer Protocol Secure) connections. These are secure, require less set-up and maintenance than RED boxes, and are not constrained to the NHS. NPEx used an 'https' connection to connect to the Mater, and hope to roll this out to a wide variety of other labs. Additionally, after migrating COVID-19

pillars 2 and 3 work to the Cloud, NPEx users, seasoned and new, will connect to the service via the Cloud to to enable more users across the world to access the network.

Improved Business Continuity
In order to deal with the increased service load caused by taking on Pillar 1, 2 and 3 traffic, as well as standard NPEx traffic, Pillars 2 and 3 were moved to the Cloud. The effect on resilience, however, has ensured secure NPEx connections which are unaffected by physical limitations of space and geography.

The outbreak of COVID-19 has shown us that service overload and employee sickness can also be issues for business continuity. The NPEx team is working to make sure that there can never be a single point of failure. However, it was also an excellent stress-test as it showed the team that the existing measures have worked well.

As part of ensuring the service has resilience to a range of threats, NPEx has achieved DCB0129 and IASME certification. The DCB0129 is a risk management standard created by the NHS Digital Clinical Safety team, specifically for health IT systems. IASME is a Cyber Security Essentials Certification which ensures X-Lab can ensure that NPEx is protected from a wide range of cyber attacks.
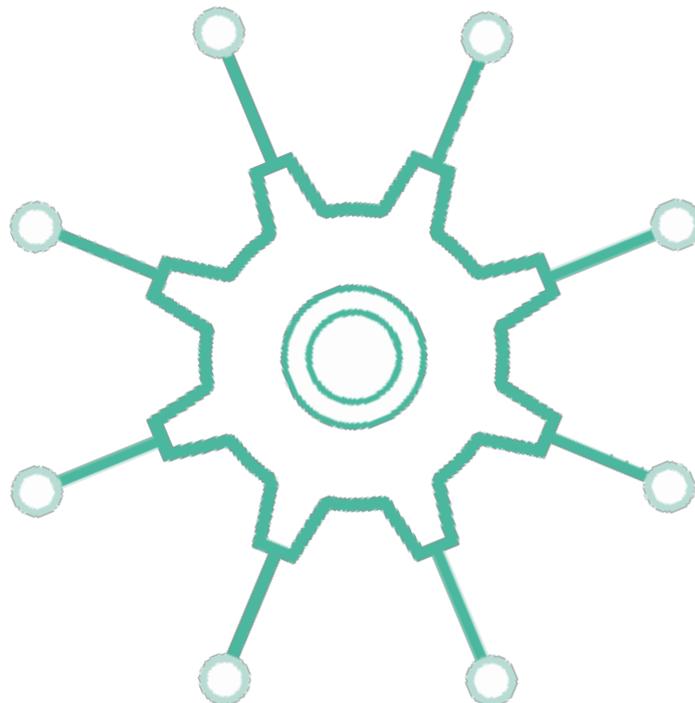
Transferring Complex Data Sets

Over 40 sites now have microbiology modules enabled for NPEx, and NPEx can handle cultures and sensitivities testing, as well as soon being able to handle blood transfusion.

Lucy Mairs, who was the project delivery manager, reflects that:

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"It was here that the greatest benefits were realised during the outbreak of COVID-19. Virology pilots had been successfully conducted as part of the complex data reporting stream in 2019, which meant that NPEx could respond quickly to the need for large scale COVID-19 testing."

NPEx is working to further facilitate complex reporting across these disciplines of Microbiology, Cell Pathology and Genetics to enable HL7 result messaging within all their subdisciplines.

The NPEx team recently held a roundtable discussion with a group of users who are actively engaged with transferring complex data sets. This discussion highlighted the need to work towards greater standardisation of reportables in result messages. The team hopes to be able to work collaboratively with laboratories to achieve this and realise even more successes with transferring complex data sets.

EQA for Point of Care Testing Devices

NPEx has several exciting opportunities in development for POCT. You can read more about the HiPRES app later in this edition. NPEx is also engaged with Weqas, an External Quality Assurance (EQA) provider specifically for POCT, which is lined up for deployment.

Connecting to Weqas through NPEx will allow EQA results to be returned automatically and immediately. This will reduce the time taken to transcribe results, and reduce the opportunity for human error in the process. The quality of data, and therefore patient safety levels, are improved as a result.

Overall, the ICS project has had a vastly positive

impact on NPEx and the service it can provide to users. Not only has it provided improvements to standard NPEx traffic, but it also ensured that NPEx was able to react quickly and constructively to the need for mass COVID-19 referrals. Expanding the catalogue of users outside the HSCN will continue to add value to the service as the options for connections increase. The work on business continuity and accreditation will ensure that NPEx remains resilient in the face of any challenge.

Finally, constant development, adding disciplines and new types of connections means that NPEx can offer increasingly more solutions to users. NPEx's project was part of the wider NHS initiative of Integrated Care Systems, which were formerly known as Sustainability and Transformation Partnerships (STPs). Their aim is to improve collaboration between health and care services and local authorities. NPEx has been integral for facilitating this collaboration. The project has demonstrated that NPEx can deliver a whole host of benefits to a broad variety of users.

6 - USER SPOTLIGHT: UK NEQAS

Over the past few years NPEx has been working with multiple UK NEQAS centres to enable digital workflows for EQA testing. The team are pleased to announce that a bespoke solution for UK NEQAS Haematology has recently been finalised, and that the project is now in deployment. NPEx is already live with Birmingham Quality UK NEQAS, and will soon be live with UK NEQAS Immunology, Immunochemistry and Allergy.

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"We are looking forward to working with the NPEx team to enable automated reporting of EQA results. NPEx will improve the process for both UK NEQAS Haematology and Transfusion, and the laboratories who opt to use NPEx for EQA returns; results can be returned directly from laboratory IT systems to UK NEQAS, reducing the risk of transcription errors. Connecting to NPEx will open doors for us as an organisation by facilitating connections with a wide range of pathology labs."

Barbara de la Salle (Director, UK NEQAS Haematology) and Richard Haggard (Director, UK NEQAS BTLP)

Connecting to EQA providers through NPEx provides a number of crucial improvements to the EQA process. The immediate and automatic transfer of data means that there is no room for human error, which improves patient safety and data quality.

If you would like to connect to an EQA through NPEx, please get in touch with **npex@x-lab-systems.co.uk**.

7 - USER SPOTLIGHT: HIPRES

The Health Imaging Patient Rapid Exchange Service (HiPRES) is a solution for localised digital end-to-end COVID-19 antibody testing. The project is hosted jointly by Healthier Lancashire, South Cumbria, and BridgeHead Software to streamline the COVID-19 antibody testing process in Lancashire and Cumbria. The solution uses mobile devices to digitally associate test and sample data with patient demographics. This allows the process of ordering a test and delivering results to be done via an app which reduces the time this takes, therefore improving the patient experience.

NPEx is a key enabler for the process. Data is stored in Lancashire and South Cumbria Integrated Care System's Data Hub, called NEXUS, but NPEx is needed to create the test requests themselves. NPEx has therefore provided the necessary link between the HiPRES app and the order-communications systems of the laboratory performing the test. This collaboration demonstrates the breadth of interoperability offered by NPEx.
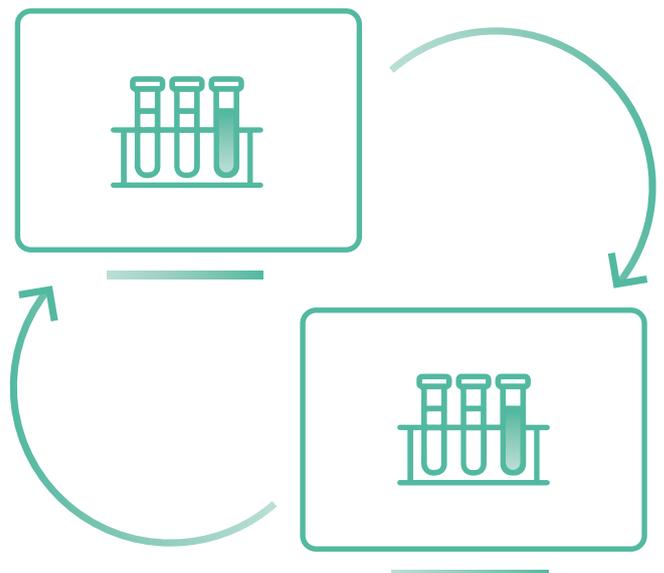
8 - USER SPOTLIGHT: PINPOINT

PinPoint Data Science is one of the NPEx service's newest users. PinPoint uses machine learning to improve the cancer diagnosis process. The PinPoint test delivers a calibrated probability that a patient has cancer from a single blood sample based on ten years of data.

PinPoint's relationship with NPEx may have begun in a coffee shop at the University of Leeds, but now NPEx is allowing PinPoint to scale across the whole of the NHS. NPEx has enabled PinPoint to access labs on the secure Health and Social Care Network, enabling PinPoint to enrich its samples with patient data. This is essential to the utility of the service. Giles Tully, CEO of PinPoint Data Science, said;

"Connecting to NPEx allows PinPoint to focus on its core function without the distraction of managing the logistics of the result messaging. The virtual analyser is currently being service evaluated prior to going fully live nationally, but I can see a long future ahead with NPEx, with the potential to expand globally."

This is an example of yet another kind of connection that NPEx is capable of; because NPEx is technologically agnostic it can connect to any web-based server. PinPoint uses an algorithm to produce its results and NPEx is facilitating a connection between a physical lab LIMS and a virtual analyser. This opens the door to a variety of other similar projects, such as the HiPRES app, which is discussed in more detail later on in this newsletter. Both demonstrate that NPEx is no-longer just a facilitator for Lab-to-Lab connections but a fully-fledged diagnostic network providing benefits for patients and healthcare providers alike.

A blood sample is taken from a patient who is showing symptoms of cancer

The sample is sent to a lab to be tested

These test results are sent through NPEx to the PinPoint virtual analyser/algorithm

The analyser algorithm returns a calibrated percentage risk of cancer

This % risk is returned to the GP who can use it to inform their decision

The NPEx team join in sending season's greetings with good wishes for the New Year.