Client Story

Building the UK's first Smart Hospital

National Rehabilitation Centre

BLOCK

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"We're going to have access to things that we've never even dreamt of having access to. We're really pioneering rehabilitation and working towards creating a centre of excellence where we can create the national standard for rehabilitation."

Sarah Davies, Ward Sister at National Rehabilitation Centre

The vision

In 2023, Nottingham University Hospitals NHS Trust received £105 million in government funding, as part of the New Hospital Programme.

The funds were for a new National Rehabilitation Centre: a purpose-built 70-bed facility offering rehabilitation to those who have experienced a life-changing illness or injury. Once at full capacity, the centre will treat 750 patients per year. This is a seven-fold increase on the 100 patients per year treated at the Trust's current rehabilitation unit, Linden Lodge.

The project marks a huge shift in how England delivers rehabilitation. The long-term ambition for the NRC is to be a national hub in a future 'hub and spoke' model, with regional rehabilitation units (spokes) established across the country to extend the benefits to as many patients as possible.

The Trust's goal for the NRC is 'To become a world-leading national centre of excellence for rehabilitation':

It will achieve this outcome through:

1) Placing new research at the heart of innovation to create better treatments for patients.
2) Training and educating rehabilitation professionals with new skills and establishing clear pathways for progression.
3) Designing a new building that optimises the rehabilitation environment for patients, staff, and researchers via connected pathways, efficient workflows, and secure data access.
4) Fostering new technologies that could enhance treatment plans and provide patients with independence at a faster rate.

The patients

The National Rehabilitation Centre will treat patients with life-changing illnesses or injuries, including some of the most severe cases in the East Midlands.

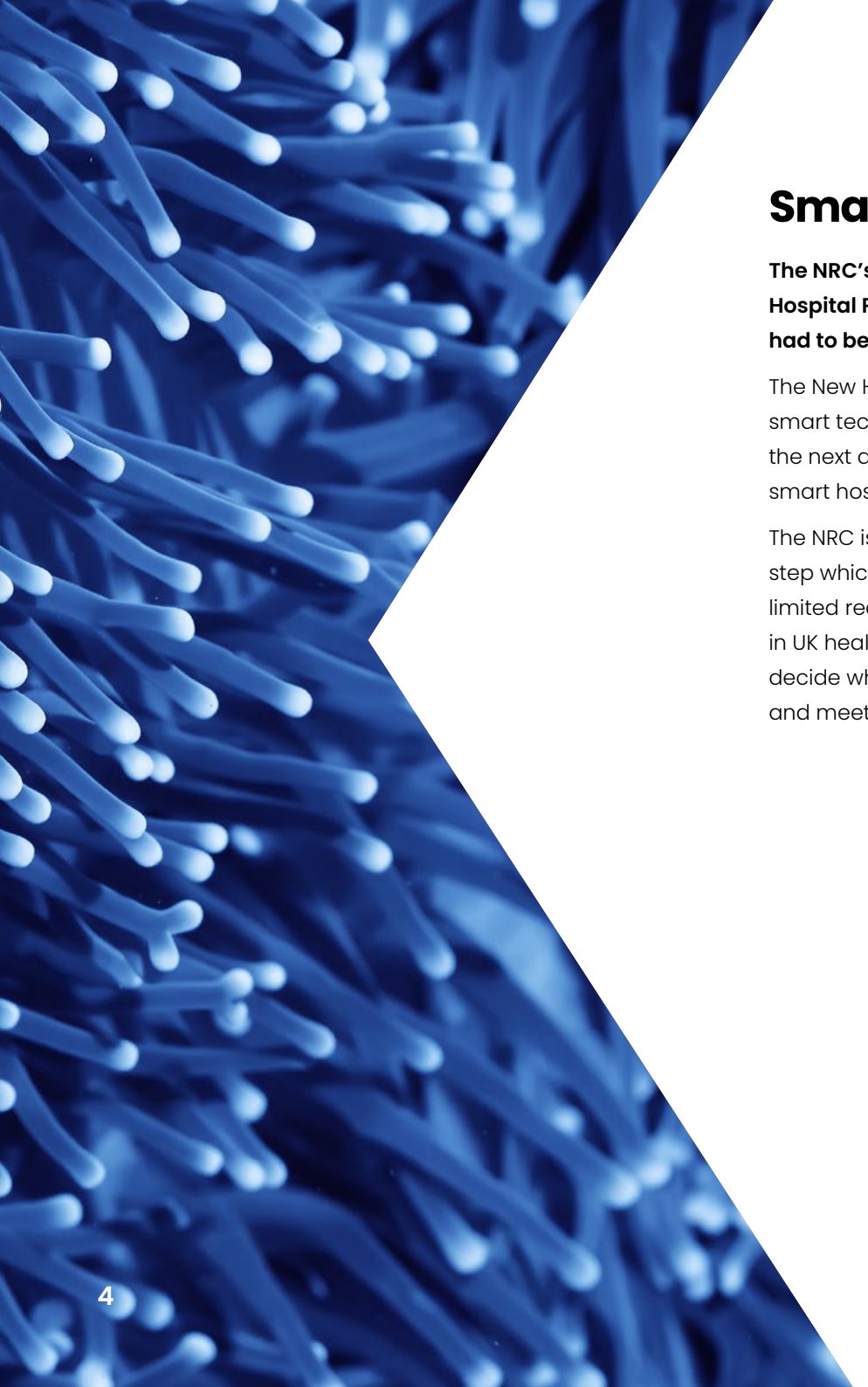
Often, these patients will have been involved in a sudden and unexpected incident, such as a car crash or farming machinery accident.

In other cases, they may have developed illnesses such as Guillain-Barré Syndrome, where the immune system suddenly attacks the nerves and creates muscle weakness.

The reason for patients attending the NRC is often sudden and life-changing. It may involve limb loss, and they may need to learn to walk and talk again. This creates physical and psychological challenges for patients as they come to terms with a new way of living.

Until now, inpatient NHS rehabilitation services in England have often been limited to patients with head or spinal injuries. However, the NRC has expanded that provision to many more patients who will benefit from intensive rehabilitation.

Patient recovery is front and centre at the NRC and therefore requires reliable and connected care equipment.



Smart technology

The NRC's ambitions and its links to the New Hospital Programme mean smart technology had to be integral to the building's design.

The New Hospital Programme defines clear smart technology criteria. So those built over the next decade will need to operate as smart hospitals.

The NRC is one of the first hospitals to take this step which created a challenge. There were limited real-life examples of smart technology in UK healthcare and the team had to test and decide what would benefit rehabilitation services and meet the New Hospital Programme's needs.

However, smart technology also presented an exciting opportunity. The NRC's building would collect real-time data. The insights from this would feed into smart devices that could optimise clinical outcomes for patients, improve staff experiences, and find new process efficiencies.

> **"The New Hospital Programme itself is a once-in-a-generation opportunity. We never get the ability to build multiple hospitals at the same time, engage with commercial partners, and really make a monumental shift."**
> Jamie Clegg, Former Digital Strategy Lead at Nottingham University Hospitals NHS Trust

Co-design and piloting

In 2023, Nottingham University Hospitals NHS Trust began piloting smart technologies at Linden Lodge, the Trust's current 25-bed neuro-rehabilitation unit.

The pilot worked closely with frontline staff to test technology in real-life scenarios and feed back to technical teams and partners. This insight was then used to co-design solutions that were perfectly suited for rehabilitation services at the NRC.

Creating a collaborative feedback loop early-on in the project achieved:

- **Cultural buy-in:** Many of the staff testing technology at Linden Lodge will go on to work at the NRC.
- **Verified investment:** The Trust could prove the technology was capable of delivering patient outcomes before scaling across the NRC.
- **Perfected technology:** Clinical feedback identified where solutions could be easily tweaked, making them completely fit-for-purpose.

> "One of the main things I've really enjoyed about the process of rolling out these trials is the co-design that we've had. We were presented with how we would access asset tracking. We needed something that was more at hand, and between our discussions and [the digital team's] technological expertise we were able to come up with an app using a device that we'd already carry."
>
> Sarah Davies, Ward Sister at Linden Lodge

Technologies tested

Smart technology's impact was tested throughout the pilot at Linden Lodge. The Trust conducted extensive benefits realisation analysis to maximise value. Data shows increased staff satisfaction with digital tools. Meanwhile, scores across 2024 and 2025 show the piloted solutions created lower noise stress and higher patient satisfaction with check-in and screen systems. The results set out a firm blueprint for the NRC smart build.

Ascom Smart Nurse Call means patients can contact nurses on their devices. It's anticipated to save the NRC £1,424 per shift by reducing back and forth, as well as show patterns of high demand which can help with staff allocation.

Geo-fence alerts and 360° visualisation of the patient's room using data decreases falls and improves response times. This visibility creates more autonomy for patients with lower risks, which reduces anxiety and improves inpatient experiences.

AI-driven CCTV and geo-fence alerts reduce abscond risks among vulnerable patients. Connected staff lanyards also mean clinicians can discreetly press a silent button on their ID, which will send an alert to security with their location.

Kio Nurse's asset tracking means staff can find where medical equipment is by searching on a device. The anticipated time-saving is one hour per nurse, which equates to a £1,100 cost saving per shift for the 53 nurses that will be at the NRC at any one time.

Creating connectivity

Network infrastructure is foundational to the NRC's success as a smart hospital. Connectivity is what enables smart technologies to securely collect data and produce patient-focused outcomes.

Nottingham University Hospitals NHS Trust chose to work with Block on this element of the project. The task was to build the NRC's network so data could flow between smart technologies, creating faster data access, reducing admin, optimising visibility, and streamlining workflows.

Block's engineers worked with the NRC team throughout concept, development, realisation, and application stages, which included contributing to bespoke training for non-technical staff.

The Trust's chosen smart technologies were deployed within a secure and segmented network to decrease vulnerabilities from potential technical outages and cyber threats.

> **"Ultimately, Block were pivotal to that because they were the integrator sitting in the middle of it all. It's really important that it's not just a case of putting technology in, it's putting it in in a way that's resilient and also secure. So having that partner integration and having someone who can work with these disparate technologies and converge then into one ecosystem is really, really valuable."**
>
> Jamie Clegg, Former Digital Strategy Lead at Nottingham University Hospitals NHS Trust

Managing the build

The National Rehabilitation Centre was built across two years in Stanford-on-Soar, near Loughborough. The project was unprecedented for the Trust and a huge undertaking for all involved. Being a greenfield project meant starting from the very foundations up, working alongside multiple partners and various timelines, as well as navigating around building plans.

In response, Block built a large project team with three project managers, three technical leads, and multiple engineers. Together, they covered Block's three core practices: networking, collaboration, and smart buildings.

Creating a solid plan before moving onsite was integral to the NRC's success. It's easy to get wrapped up in the excitement of doing something innovative and wanting to get on site quickly to make those changes.

However, effective project management relies on effective planning, otherwise there's no control. By devoting significant time to planning, Block and the NRC team were able to define exactly what was required, how it would be achieved and by whom, what the timeline would be, and how achievable the deliverables were in line with time quality, cost, scope, risks, and benefits.

The team worked through Block's methodology which mapped a clear route, while also factoring in flexibility for unexpected building delays.

Block's delivery model

1) **Initiation:** Project setup, approved Project Initiation Document (PID), and project kick-off.
2) **Planning and design:** Physical and logical audits, design workshop, and low level design.
3) **Preparation:** Implementation plan, test plan, and Request For Comments (RFC).
4) **Implementation and testing:** Installs and migrations, plus test plan execution.
5) **Handover and support:** Handover to BAU.
6) **Project close:** Lessons learned and project closure.

The silent ward

It can take time for rehabilitation patients to come to terms with what's happened. The NRC provided the opportunity to design and construct a purpose-built rehabilitation centre, as well as review the technology used in the building to ensure the best possible experience for patients.

Most patients spend their early days at the NRC in a four-bed bay. As they progress in their rehabilitation journey, each patient has their own individual bedroom, with a window overlooking the leafy trees of Stanford Estate.

Rooms are equipped with wardrobes, a safe, a fully accessible bathroom, and a bed with a connected infotainment device. The tablet gives patients the ability to call loved ones and access their streaming services to unwind after a long day of rehabilitation.

They can also find instructions on self-guided rehabilitation exercises assigned to them by their clinicians and information about the centre.

One of the most stark changes from traditional wards is the device's role in cutting noise, via the Nurse Call app.

For example, patients can contact a nurse for assistance and the nurse will be able to read the message from anywhere in the hospital (thanks to the NRC's full connectivity), speak to the patient through the device if needed, and therefore come to the room with any item the patient may need.

Requests such as a glass of water can also be triaged to the catering team to reduce the burden on nurses.

This functionality improves efficiency and time usage for staff, increases independence for patients, and importantly removes the noise that traditional nurse call systems produce. This enables patients to truly recover in peace.

Gyms, labs, and treatment rooms

The NRC will be the centre point for innovating and rolling out new methods of rehabilitation in England. Most of the equipment driving this innovation relies on secure connectivity, which has emphasised the importance of getting the NRC's network infrastructure right.

The NRC has labs onsite which need the ability to process large data sets quickly and keep intellectual property safe from potential cyber-attacks. It also needs the interoperability to share findings with the Defence Medical Rehabilitation Centre which shares Stanford Estate with the NRC.

Treatment rooms are equipped with traditional rehabilitation equipment but also include gamified options. These digital treatments are dependent on a connected device and ultimately aim to keep the long process of rehabilitation interesting for patients.

The rehabilitation gyms are also a hive of connected devices that get patients moving as soon as they enter the centre. A stand-out piece of equipment is the Zero 3G 360 hoist, which is the first to be deployed in the UK.

The hoist supports patients in moving in multiple directions on their own, unlike traditional hoists. It's also able to work out how much weight it needs to support and how much weight to give the patient, as they learn to walk again.

Connectivity underpins all of these smart devices so staff can continue moving towards achieving improved patient outcomes.

Social areas

The NRC's architecture has been designed to promote collectiveness. Every patient at the NRC is expected to get dressed and make their own way down to a self-service dining hall, which they share with other patients and staff members. There's also a private room attached for patients to host family celebrations such as birthdays.

During their stay, patients are encouraged to be as independent as possible. Patient lounges equipped with smart TVs and speakers are dotted around the wards, there's a laundry room for patients to do their own washing, and there are multiple patient pantries throughout the building for patients to make their own drinks and snacks.

When patients prepare to leave the NRC, they can also stay with their family for a few days in one of the two rehabilitation flats within the building. The flat is equipped with a kitchen, bedrooms, and a living room with devices. This allows the patient and their family to practice living together as there may be some new family dynamics.

The outdoors is also an important area of rehabilitation for patients. NRC patients have access to the 365 acres of Stanford Estate, which includes a 5km trim trail, a fishing lake, a hand-cycle track, steps and various terrains to practice walking, and alfresco dining spaces. Dogs can also visit for walks with their owners if they're staying at the centre.

Connectivity is not at the forefront of any of these social spaces. But it's there and a necessary part of making these patient experiences possible, whether that's through AI-CCTV, smart HVAC, or connected TVs.

The network you'll forget exists

Experiencing a life-changing injury or illness creates a lot of stress for patients. However, there's so much that staff at the NRC can do to support and rehabilitate those staying at the centre. This relies on creating a calm and stable environment.

While connectivity is foundational to the NRC, it should be invisible. The fact is most people only notice network infrastructure when frustrating connectivity issues occur. Bringing that stress to a rehabilitation centre is detrimental to care, innovation, and operations.

So, at Block, we've worked extensively with the NRC team to deploy secure network infrastructure that doesn't give patients or staff something extra to worry about. However, if an issue does occur, digital teams are equipped with AI-driven diagnostics that troubleshoot and resolve as soon as errors happen.

The NRC is a breakthrough example of the next generation of hospitals in England. Smart technology ties connectivity even closer to patient outcomes.

Our smart building experts have been able to build a network strong enough to connect an ecosystem of smart technologies, as well as easily integrate future investments. They've achieved this by retrofitting the existing building at Linden Lodge as well as starting with a clean canvas at the National Rehabilitation Centre.

Block is continuing to work with Trusts to deliver projects like the NRC, as part of the New Hospital Programme and beyond.

Are you interested in taking on a smart hospital project like Nottingham University Hospitals NHS Trust has?

- Speak to our experts to see how we can make this happen for you.

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