

Briefing Document: Navenio's Covid-19 Assistance

27th March 2020

About Navenio

Navenio's AI-led location-based solutions help to transform the efficiency of hospitals by enabling healthcare teams to be in the right place, at the right time.

No investment in infrastructure is needed, so enabling a rapid improvement in patient care with the most effective use of limited resources, in areas where traditional GPS based location services do not work.

How can Navenio help with Covid-19?

Navenio are making their infrastructure-free indoor location and workforce AI solution available to hospitals which can help to address the very thing that Covid-19 is creating – much increased pressure on healthcare systems with reducing or constantly changing types of available staff to help.

It's a bit like Uber... but for Healthcare Teams



The Navenio solution has already proven in a number of NHS hospitals that it can **double the throughput of existing hospital teams** such as porters and cleaners, simply by making far better use of their time as they become increasingly stretched. This in turn has been shown to free up spare capacity (up to 30%) and create a truly reportable service level – increasing patient safety in the process.

Knowing team's precise locations in hospitals helps to ensure the right person is helping in the right location every time. This can relieve the increasing pressure on patient flow, whilst also ensuring each individual is helped to do their roles safely, which is so important at this critical time. It also avoids clinical time being taken up by portering and cleaning tasks, which often happens to keep things moving.

Specific solutions that Navenio can help with that are particularly relevant to Covid-19 are:

- **Infection Control Rapid Response Cleaning**
The system can be configured to help manage and account for a rising volume of infection cleans and associated workflows – maximising the use and effectiveness of available resources, to help fight the spread of infection through a site, including task overflow to additional workgroups at peak demand.
- **Porter Tasking**
The system can be configured to help manage and account for a rising volume of portering tasks and associated workflows – including the option to act as a 'gatekeeper' for patient moves, avoiding the inadvertent movement of patients with high risk infection states or moving potentially vulnerable patients to areas with infection risk, and providing task overflow to additional workgroups at peak demand.
- **Staff Support Module**
The system can be configured to help manage the extra workflows required to support staff working extended shifts - for example via the coordination of delivery of key equipment or sustenance.
- **Location Only**
The underlying indoor location technology provides details of current and past movements of staff via their smartphones - which can either provide valuable data to aid confirmation of where a staff member at infection risk has travelled between over a period of time, or can be integrated into existing applications to provide staff presence, proximity and audit services

Further details of these solutions are provided later in this document, and there are many more use cases that can be supported across further workgroups.

How ready is it to deploy?

The location technology is already live in a number of NHS hospitals where it is in full time 24x7 use, as is the Navenio Tasking solution. An effective working solution can often be provided at hospitals within one month, and we are gearing up to be able to deploy up to one site a day within 2 months.

How do Navenio charge?

There is a flexible recurring licence model that can adapt to multiple scenarios and varying levels of professional services support for organisations to deploy:

SaaS Platform pricing for

- Venues (per venue)
- Tasking Modules (per concurrent user)
- Location Only (per concurrent user)
- Integrations (per integration)

Professional Services for

- Module Setup & Configuration
- Training Support & Go-Live Assistance
- Integration Support

Additionally, Navenio can provide smartphone hardware and charging equipment, or the hospital is free to do this through its own supply chain to Navenio's specification.

Navenio has flexible payment terms, contract lengths and discount structures to accommodate varying scenarios (multiple sites, multiple modules, reference sites, rapid adopters etc...).

How does Navenio's Infrastructure-Free Indoor Location work?

Navenio's location technology is developed from world-class University of Oxford science. In brief, using only a smartphone's sensors, the fusion of four unique technologies creates a highly scalable indoor location, providing actionable insight immediately. This in turn feeds Navenio's intelligent workforce scheduler for optimum performance.



The technology can work with or without a building map and is robust to within a few meters. It also has no reliance on traditional location systems such as GPS, Beacons or RFID.

How about Privacy and IT Requirements?

Privacy and security are inherent within the Navenio technology and we are committed to protecting all confidential data. Navenio is Cyber Essentials certified, GDPR and NHS Data Security and Protection Toolkit compliant.



Navenio's technology is available as a standalone solution – devices simply need occasional WiFi access – or as part of interoperable environments. Navenio's modular system supports multiple standards including HL7 / FHIR, as well as bespoke integration where required.

How established is Navenio?

Navenio was spun out of the University of Oxford in 2015 and has an established team of 60+, which is growing rapidly.

Professor Niki Trigoni is the CTO & Academic Founder of Navenio. She is a Professor of Computer Science at the University of Oxford where she leads the Sensor Networks Group. She has over 15 years' experience in cyber physical systems and has won several awards for her group's work on indoor and underground positioning (IPSN 2014, EWSN 2014, EWSN 2013, SENSYS 2010). Professor Trigoni also co-directs the Centre for Doctoral Training in Autonomous and Intelligent Machines and Systems. Niki also recently won CTO of the Year at the Women in IT Awards.

Tim Weil is the CEO & Co-Founder. Tim has over 20 years' experience of developing businesses in telecoms, mobile, healthcare, infotainment and analytics. Throughout that time, he has delivered significant value to customers through the innovative application of highly usable technology. He has an MBA from INSEAD and an MA in Mathematics and Operations Research from the University of Cambridge.

Navenio are a finalist in the KPMG British Tech Pioneers 2020 Programme and Navenio has also closed out significant Series-A funding in March 2020, with its technology validated by funders from all over the world.





Navenio Rapid Response Cleaning Module

Based on an extensive series of infection states (including but not limited to COVID-19) and the differing parameters required for:

- Area Specific Cleaning (Side Room, Bay etc.)
- Cleaning Methodology (Fogging, Isolation etc.)
- Patient Occupation or Otherwise

The Navenio solution allows appropriate tasks to be generated by any member of staff through the easy to use **Navenio Tasking Portal** which then automatically prioritises & assigns them to the correctly skilled team member who is closest and best able to carry them out, via the **Navenio App** on a smartphone device, creating a full audit trail alongside options for approvals specific to each task or circumstance.

In addition, if the current rapid response cleaner's pool is fully utilised there is the option to overflow tasks to other pools of staff that may be on standby with spare capacity, all they need is the Navenio App. As the Navenio software systemises your own processes and ensures consistent communication, it also reinforces best practice, making it easier to draft in staff from other facilities to cope with demand.

The solution also creates significant data points for analysis live or in retrospect, using the **Navenio Dashboard**, ensuring transparency and the ability to **align staff rotas, resolve any blockages or refine processes to maximise efficiency**.

Overall the solution allows operators to:

- Transform throughput and reaction times
- Establish cleaning requirements for each infection state, and for all types of area/situation
- Create task types that conform to agreed operational procedures
- Automatically generate appropriate task types
- Automatically prioritise task requests, based on agreed rules
- Automatically assign tasks to nearest available users to ensure the task is actioned quickly
- Provide live updates on the status of tasks to portal users (with appropriate access controls) to improve visibility and bed availability
- Improve overall compliance to required policies and KPI's
- Establish resource requirement to achieve desired compliance levels (& make use of suitably trained temporary staff where available)
- Provide full audit trails to clinical teams
- Provide full audit trails for outsourced contract variation management
- Improve both Patient & Staff safety

Indicative Time & Effort

Navenio have made every effort to minimise the deployment time, and any actions required by the hospital team:

- A typical site can be completed within 6 weeks, with practical use at week 4 onwards – multi-site rollout subsequently can be much faster once the base workflows are set
- Navenio takes the lead but does require some input from the hospital teams – the table below shows a high level set of tasks
- At least half of Navenio's effort can be off-site, often more

Hospital Team (20% of Effort)	Navenio (80% of Effort)
Provide Plans, Room Lists, User Details and Order Smartphones	Process Data, Setup Venue, Configure Smartphones and Test Locations to Verify
Provide Operational Input to Help Configure the Existing Navenio 'Best Practice' Workflows	Assist Management with Config Options and Complete Config/Testing
Approve for Go-Live	Run and Complete UAT to Prepare for Go-Live
Nominate a small number of Staff Members to be Expert Users / Trainers	Train-The-Trainers and Provide Go-Live Support as Needed
Review the Insight Reports Provided as Needed	1 st , 2 nd And 3 rd Line Support and Provide Recommendations & Reporting



Navenio Porter Tasking Module

Based on an extensive series of configurable options (including but not limited to Infection Risk patient moves) and the differing parameters required for:

- Task Types (Patient Move, Specimen, Waste, Asset etc...)
- Protective Measures and Associated Equipment (Escort, Infection State, Medical Gases etc...)
- Skill Sets and Availability of Staff

The Navenio solution allows appropriate tasks to be generated by any member of staff through the easy to use **Navenio Tasking Portal** which then automatically prioritises & assigns them to the correctly skilled team member who is closest and best able to carry them out, via the **Navenio App** on a smartphone device, creating a full audit trail for each task or circumstance.

Particular to Covid-19 and Infection Control in general, this module has a 'gatekeeper' function to avoid the inadvertent movement of patients with high risk infection states or moving potentially vulnerable patients to areas with infection risk, by making all necessary requests for Patient Move (General Transfer) subject to the approval of Site Coordinators/Infection Control teams.

This means no transfer of patients would take place until the request is reviewed and authorised by these users, minimising cross contamination risks

In addition, if the current portering pool is fully utilised there is the option to overflow tasks to other pools of staff that may be on standby with spare capacity, all they need is the Navenio App. As the Navenio software systemises your own processes and ensures consistent communication, it also reinforces best practice, making it easier to draft in staff from other facilities to cope with demand.

The solution also creates significant data points for analysis live or in retrospect, using the **Navenio Dashboard**, ensuring transparency and the ability to **align staff rotas, resolve any blockages or refine processes to maximise efficiency**.

Overall the solution allows operators to:

- Transform throughput and service levels
- Establish portering requirements for all wards and departments
- Create task types that conform to agreed operational procedures, including heightened Infection Control scenarios
- Dynamic prioritisation, assignment and notification model
- Ability to require approval for Patient Moves for certain types of Infection states

- Automatically prioritise task requests, based on agreed rules
- Automatically assign tasks to nearest available, appropriately skilled user
- Provide live updates on the status of tasks to portal users
- Wards and departments will receive estimated arrival times of porters
- Establish common delays to allow discussions and changes where required
- Establish resource requirement to achieve desired compliance levels
- Provide Insightful Analytics & Dashboards

Indicative Time & Effort Types

Navenio have made every effort to minimise the deployment time, and any actions required by the hospital team:

- A typical site can be completed within 8 weeks, with practical use at week 6 onwards – multi-site rollout subsequently can be much faster once the base workflows are set
- Navenio takes the lead but does require some input from the hospital teams – the table below shows a high level set of tasks
- At least half of Navenio's effort can be off-site, often more

Hospital Team (20% of Effort)	Navenio (80% of Effort)
Provide Plans, Room Lists, User Details and Order Smartphones	Process Data, Setup Venue, Configure Smartphones and Test Locations to Verify
Provide Operational Input to Help Configure the Existing Navenio 'Best Practice' Workflows	Assist Management with Config Options and Complete Config/Testing
Approve for Go-Live	Run and Complete UAT to Prepare for Go-Live
Nominate a small number of Staff Members to be Expert Users / Trainers	Train-The-Trainers and Provide Go-Live Support as Needed
Review the Insight Reports Provided as Needed	1 st , 2 nd And 3 rd Line Support and Provide Recommendations & Reporting



Staff Support Module Add-On

As a simple example of an additional support module that can be added to any of the other main Navenio tasking modules post-implementation, this particular function is to allow wards and departments to order sustenance (such as Meal Boxes), as a replacement for meals they may have missed, to help keep them going throughout their shifts – but could easily be for any type of equipment or support function that requires a task.

- This function can be quickly and simply added to the list of available Task Types on the Tasking Portal
- Sustenance type options can be configured to be either a text entry, or to be displayed as a list of available options
- Requests can be viewed by the Catering Team to ensure they can keep track of demand and top-up stock when necessary
- Requests are automatically prioritised and assigned to an appropriate workgroup to deliver the items (based on pre-agreed rules)
- The status of these tasks, including estimated arrival and completion times, can be viewed in the normal way via the Task List – to keep the ward / department informed on progress

- The volume of requests, segmented by type and requesting location, will be automatically added to your usual reporting suite – to help you account for the activity correctly and ensure you are supporting the efforts of the clinical teams evenly

Indicative Time & Effort Types

As this is an add-on to an existing module the timeframe is very short:

- A typical site can be completed within 1 week, with practical use immediately thereafter – multi-site rollout subsequently can be much faster once the base configuration is set
- Navenio takes the lead but does require input from the hospital management
- Up to 100 % of Navenio's effort can be off-site



Location Only Module

The underlying indoor location technology provides details of current and past movements of staff via their smartphones - which can either provide valuable data to aid confirmation of where a staff member at infection risk has travelled between over a period of time, or can be integrated into existing applications to provide staff presence, proximity and audit services.

The Navenio indoor location module simply requires users to carry a compatible smartphone device running the **Navenio Location App**.

This app runs on the device without the need for any interaction from the user and provides a continuous trace of the users' movements throughout the building. Navenio uses GPS Geofences to ensure that if the device leaves the hospital then location tracking is shutdown, and vice-versa.

This data is, as standard, post-processed in our secure cloud and held in our data repository that can be passed at regular intervals via a data feed to your own data warehouse. In this scenario users are anonymous, only identified via the MAC address of the device.

If specific user identification is required, then an alternative version of the Navenio Location App is required which enables a user to log-in and out of their shift – this data can then be seen both in real-time via the **Navenio Tracking Portal** and can be downloaded via a CSV file too, or indeed passed to your own data warehouse at regular intervals. Several forms of integration can enhance this proposition further, for example

- Integration via a real-time XML / HL7 / FHIR or similar feed to an integration engine such as Rhapsody, or to any app that has an RTLS interface already
- Integration with SSO solutions, so that user details / identification tokens can be provided without the need for a separate login to the Navenio App

Location data includes any region or zone information configured at venue setup – for example a ward or corridor name, as well as geo-referenced XYZ coordinates.

Indicative Time & Effort Types

Navenio have made every effort to minimise the deployment time, and any actions required by the hospital team:

- A typical site can be completed within 3 weeks, with practical use thereafter
- Navenio takes the lead but does require some input from the hospital teams – the table below shows a high level set of tasks

- At least half of Navenio's effort can be off-site, often more

Hospital Team (20% of Effort)	Navenio (80% of Effort)
Provide Plans, Room Lists, User Details and Order Smartphones	Process Data, Setup Venue, Configure Smartphones and Test Locations to Verify
Approve for Go-Live	Run and Complete UAT to Prepare for Go-Live
Nominate a small number of Staff Members to be Expert Users / Trainers	Train-The-Trainers and Provide Go-Live Support as Needed