



NHS

North Bristol
NHS Trust

How robots are helping to map out the future for the NHS

*Paul Jenkins
Head of Operational Facilities*



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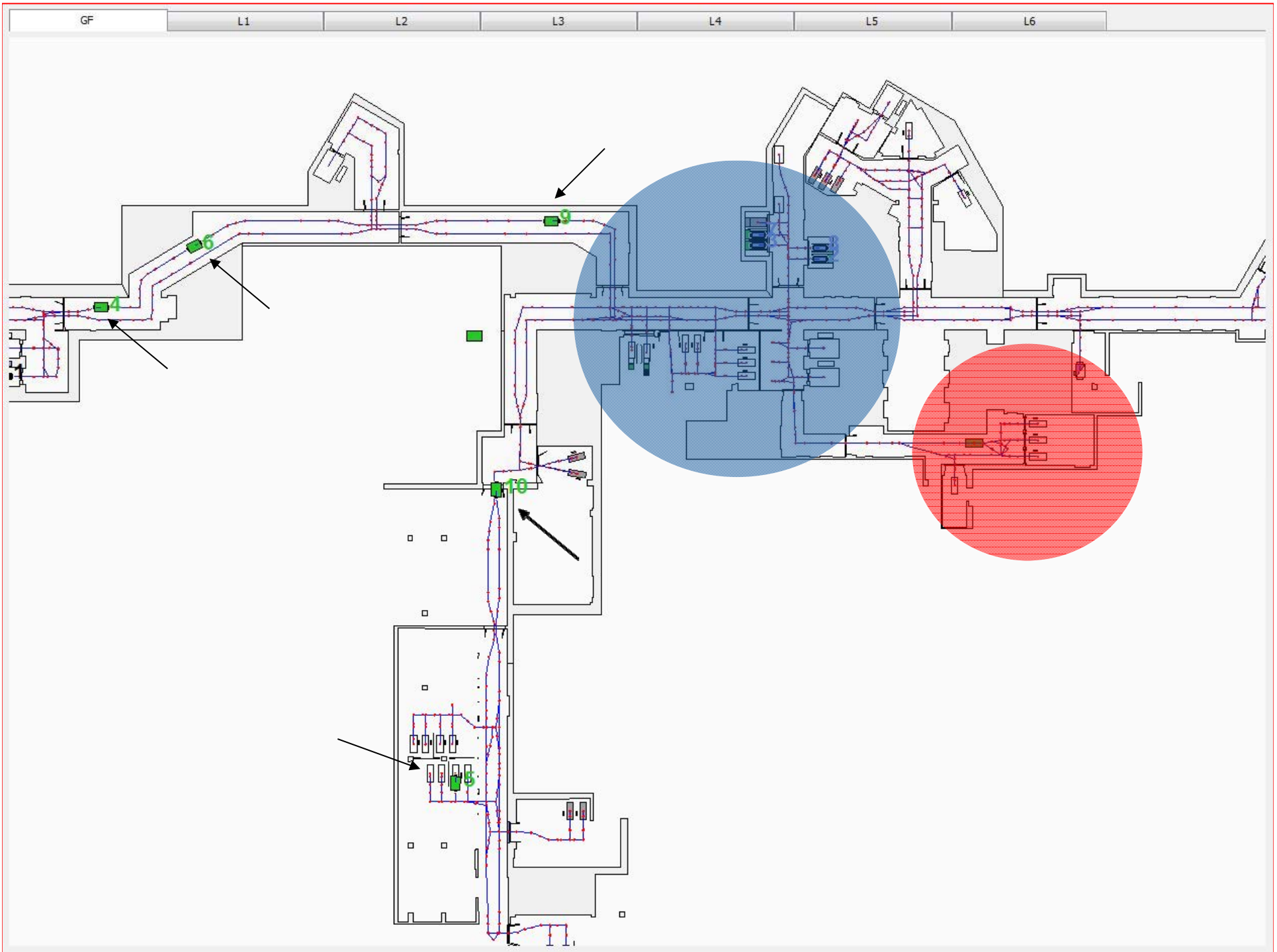


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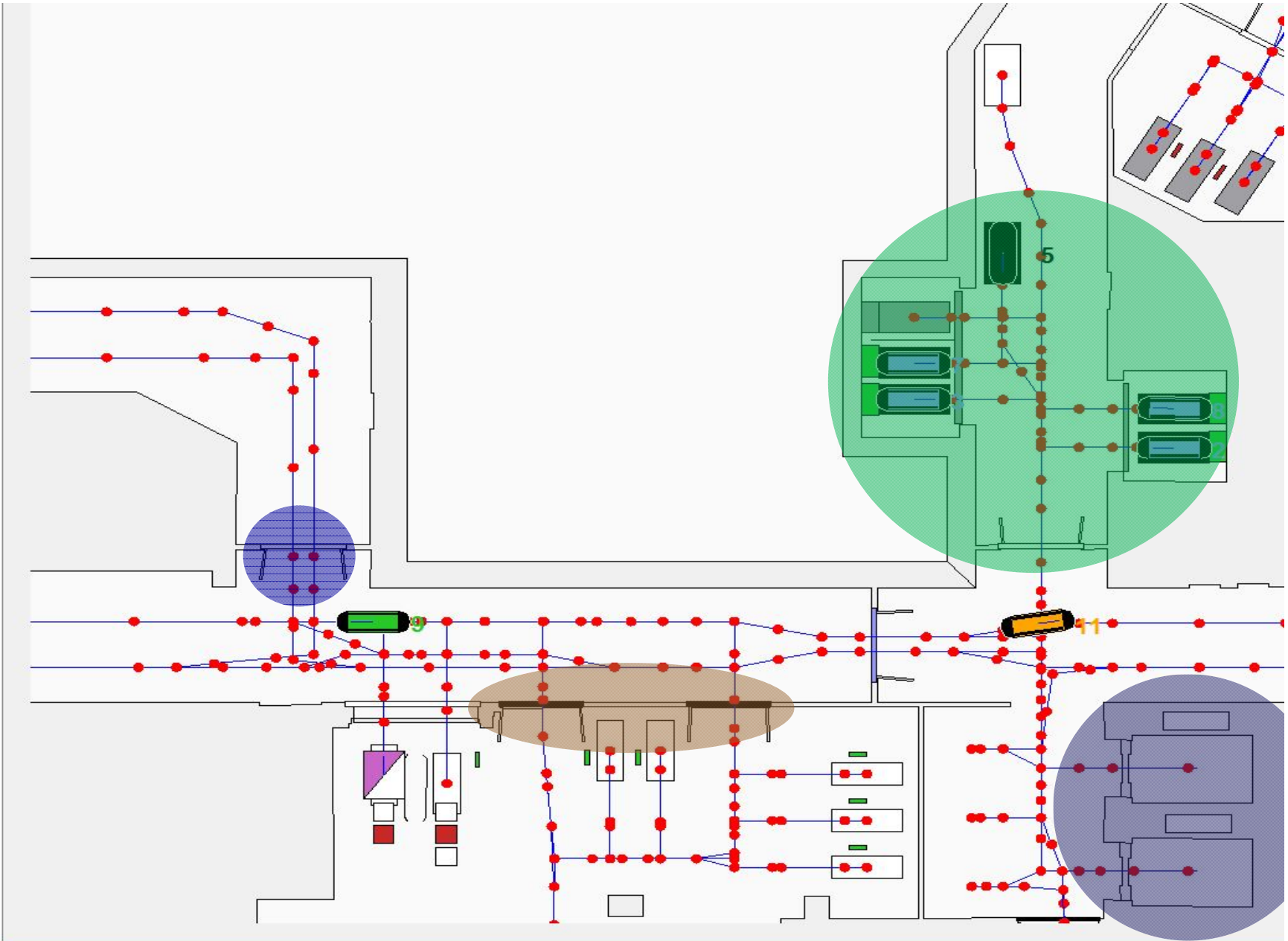


Why we introduced robots into Southmead Hospital

- **We had an opportunity to think differently!**
- **Financial** – *funded as part of the PFI (Carillion) project & workforce budget*
- **Manual handling** – *push / pull injuries*
- **Time constraints** – *minute by minute fluctuating portering resource*
- **Distances to be covered** – *¼ mile over 7 levels*
- **Minimise damage to the building** – *primarily doors and walls*
- **Dedicated ‘Send’ and ‘Receive’ hubs** – *throughout the hospital*



-  Messages
-  Time Table
-  Jobs
-  AGVs
-  Elevators
-  Stations
-  Park&Charge
-  Doors
-  Arrival Signals
-  Signals
-  External Dev...



System

Time: 09:42:37
 State: **Running**
 #AGVs: 8
 #Carts: 21
 #Jobs: 5
 #Today: 104

Error Messages

<2018-11-16 09:39:32.001> E External Unit Device 'SHB.PLC.P2.CR1': device error.
 <2018-11-16 09:39:32.003> E External Unit Device 'SHB.PLC.P2.CS1': device error.





What our Automated Guided Vehicles (AGV's) can do

They can be scheduled or called on demand to carry:

- **Linen** – *24,000 scrubs / 98,000 bed sheets / 60,000 towels per month*
- **Sterile Services** – *13,000 surgical instrument tray sets per month*
- **Catering** – *start to finish the whole patient meal service within 45 mins*
- **Pharmacy** – *22 cages of IV fluids and medication per day*
- **Materials Management** – *from a toilet roll to a bespoke surgical implant*
- **Waste** – *800 litre containers of black bag and recycled, **not clinical***

But they are never used for patients!



Job Id	Battery Value
779887	49%
0	100%
0	100%
0	62%
779890	46%
779891	62%
0	57%
0	90%
779892	47%
779884	48%
0	50%
779889	33%

Agvs							Current Node
Id	Host	State	Electronic State	Mode	Tcms2 State		
1	tc1	Halt	Charge	Autom...	To Charger		GF.C.CP_PP.CP5.Charger.Or
2	tc2	Confirmed Er...	On	Autom...	Normal		GF.W.X8.TG1.fromF12_10
3	tc3	Halt	On	Autom...	Reserved		GF.C.Kitchen.WL.Place1
4	tc4	Action	On	Autom...	Normal		L3.Core11.3Q-DP3(TH2).R1
5	tc5	Halt	On	Autom...	Normal		GF.C.DomesticWaste.XR.tof
6	tc6	Action	On	Autom...	Normal		GF.C.P2-D31.fromR_D_2a
7	tc7	Halt	Charge	Autom...	To Charger		GF.C.CP_PP.CP2.Charger.Or
8	tc8	Pre Action	On	Autom...	Normal		Lift.LG4_5.F4.Cabin.InBSOu
9	tc9	Halt	On	Autom...	Normal		GF.W.toCentral_51
10	tc10	Action	On	Autom...	Reserved		GF.W.AF6.X.toF6_14
11	tc11	Halt	Charge	Autom...	Battery L...		GF.E.CP_PP.CP6.Charger.On
12	tc12	Halt	Charge	Autom...	Battery L...		GF.C.CP_PP.CP4.Charger.Or

Job Id	State	Type	Source	Target	Alternative Target	Appearance	Priority	Pick Up	Arrival	Agv	Cart Type
1	779890	Transport	L4.Core11.4G-DP3.SR3.S	GF.C.DomesticWaste.Return.R...		09:48:35	+00:00:00	09:52:04	10:01:37	5	DomesticWaste
2	779892	Transport	L2.Core1.2A-HUB1.SR2.S	GF.C.Conveyor.R1.R		09:49:01	+00:00:00	09:59:24	10:09:09	9	StockItems-NHS_Supply...
3	779893	Fetch Reserv...	GF.C.RandD.SR.5.S	L3.Core11.3Q-DP3(TH2).R1.R		09:53:36	+00:00:00	00:00:00		4	CleanLinen
4	779895	Fetch	L3.Core9.3P-DP2(TH1).SR2.S	GF.C.Conveyor.R1.R		09:53:56	+00:00:00	00:00:00		8	StockItems-NHS_Supply...
5	779896	Waiting	L2.Core9.2N-DP2(TH1).SR...	GF.C.Conveyor.R1.R		09:54:22	+00:00:00	00:00:00		10	StockItems-NHS_Supply...
6	779897	Fetch	GF.C.RandD.SR.4.S	L3.Core9.3P-DP2(TH1).R1.R		09:54:28	+00:00:00	00:00:00		10	NonStockItems-NHRP
7	779898	Fetch	L1.Core4.1L-RENAL-W2.S...	GF.C.DomesticWaste.Return.R...		09:54:43	+00:00:00	00:00:00		2	DomesticWaste

The benefits achieved to date

- **Reduced manual handling** – *less reported H&S / RIDDOR incidents*
- **More time for patient logistics** – *mundane tasks carried out by AGV's*
- **Minimise damage to the building** – *PFI building 'life cycle' costs*
- **Time bound food delivery** – *circa 900 patient meals (3 x a day)*
- **Reduced delivery location errors** – *single cage dedicated moves*
- **Financial saving** – *estimated to be circa £500,000 per annum*
- **Clear corridors** – *in normal operation and in the event of fire alarm*
- **Easy expansion / increase of activity** – *9 out of 12 is the current norm*



Not everything is perfect



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Gate Directory

Level	Gate	Destination
6	6.1	Platform 6
6	6.2	Platform 6
5	5.1	Platform 5
5	5.2	Platform 5
4	4.1	Platform 4
4	4.2	Platform 4
3	3.1	Platform 3
3	3.2	Platform 3
2	2.1	Platform 2
2	2.2	Platform 2
1	1.1	Platform 1
1	1.2	Platform 1
0	0.1	Platform 0
0	0.2	Platform 0

ADY & F&E
Transports Only
Please Use
Handrails

Lessons learned

- **Culture and acceptance** – *it takes time for people to adapt to change*
 - **Education / training** – *staff turnover and minimum interaction*
 - **Information Technology** – *doors, lifts, bleeps and a PlayStation controller*
 - **Maximum capacity** – *one long journey or 10 short ones*
 - **Responsibilities, who does what?** – *hospital provider or Trust*
 - **Who has priority** – *patient food!*
 - **The disappearing card** – *I'm unable to do my job*
 - **Other robots!** – *we are currently trialing a robotic floor scrubber*
-



Thank you for listening



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Thursday 30 and Friday 31 January 2020

APSE Facilities, Catering and Cleaning Management Seminar 2020

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