Great Ormond Street Hospital for Children NHS Foundation Trust

Meeting of the Trust Board
Wednesday 26th June 2013 at 3:30pm

AGENDA

	Agenda Item **STANDARD ITEMS**	Presented by	Attachment
1.	**Apologies for absence**	Chairman	
Declarations of Interest All members are reminded that if they have any pecuniary interest, direct or indirect, in any contract, proposed or other matter which is the subject of consideration at this meeting, they must disclose that fact and not take part in the consideration or discussion of the contract, proposed contract or other matter, nor vote on any questions with respect to it.			
	FOR APPROVAL		
2.	**Annual Orders for Blood Products**	Chief Finance Officer	**1**
3.	**Creation of a Southwood imaging suite including investment in a new 3T MRI and replacement CT Scanner**	Acting Chief Operating Officer	**2**
4.	**Any Other Business** (Please note that matters to be raised under any other business should be notified to the Company Secretary before the start of the Board meeting.)		

Great Ormond Street Hospital for Children NHS Foundation Trust

Trust Board
26th June 2013

Annual Orders for Blood Products **Prepared by:** Claire Newton, Chief Finance Officer	**Paper No: Attachment 1** FOR APPROVAL

Aim
To request approval for a series of annual orders for blood products

Summary

The Trust orders a range of 20 blood products through framework procurement arrangements with 9 different suppliers. Annual orders are placed in advance, to provide suppliers with indicative volume requirements, and there is then a call off arrangement operated during the year. The orders expire at the earliest of the 30th June 2014 or the quantities being fully called off.

The total value of all major orders for the year from 1st June 2013 is £20.5M. In 2012/13 the amount spent on these products was £19.2M which includes £16.9m under home delivery contracts which are pass through funded.

Under the current SFIs orders of budgeted expenditure valued at £1m or more are required to be authorised by the Trust Board. The attached schedule includes four orders exceeding £1m and two other orders below £1m which are included for completeness. We propose that when the SFIs and SOs are updated later in this financial year, approval of the blood orders be delegated to executives on the basis that the amounts are recurring purchases and within the approved budget.

Action required from the meeting
The Board is asked to approve the orders for blood products included in the attached schedule.

Contribution to the delivery of NHS Foundation Trust strategies and plans
To achieve best practice governance processes.

Financial implications
N/A

Legal issues
N/A

Who needs to be / has been consulted about the proposals in the paper (staff, councillors, commissioners, children and families) and what consultation is planned/has taken place?
N/A

Who needs to be told about any decision? Members Council

Who is responsible for implementing the proposals / project and anticipated timescales?
Chief Finance Officer

Who is accountable?
Chief Finance Officer

ANNUAL BLOOD ORDERS REQUIRING APPROVAL

Supplier			Annual order value
			£
BUPA Home Healthcare		Home delivery service including blood products	12,460,050
Baxter Healthcare Ltd		Home delivery service including blood products	4,709,000
Grifols UK Ltd		One specific category of blood product used in hospital and home delivery	1,400,000
Unidrug Distribution Group Limited		One very high cost blood product used in hospital and home delivery	1,238,875
Alliance Healthcare (Distribution) Ltd.		Two blood product categories	354,000
Bayer		One blood product category	340,000
			£20,501,925

NB Orders with three other blood product suppliers were not cumulatively of sufficient value to be included in this list

Attachment 2

Great Ormond Street Hospital for Children NHS Foundation Trust

Trust Board
26th June 2013

Creation of an imaging suite in Southwood and investment in a 3-T MRI and CT Scanner	**Paper No: Attachment 2**
Submitted by: Robert Burns, Acting Chief Operating officer	**For approval**

Aim

To request approval to invest up to £6.7m to create a new imaging suite including a new 3T MRI and a new CT scanner.

GOSH Charity has already committed £3.4m to fund a 3-T MRI. The Trust is currently in discussion with the Charity in terms of funding the remaining balance; elements of the new project were included in the budget for the 2B business case and it is possible that the remaining elements might be funded from undrawn amounts in the infrastructure and annual envelopes. Any remaining amounts not funded by the Charity will be funded directly by the Trust by deferring other items within the Trust's capital plan for 1314 or 1415.

Summary

In October 2011 the Trust Board approved a business case for a 3-T MRI scanner at a cost of £3.4M. At that time it was proposed to locate the 3-T MRI in the space vacated by our oldest MRI scanner (MR1) in the basement of the Cardiac Wing.

In addition the budget for the 2B project, approved by the Board in July 2011, included amounts for putting temporary arrangements in place both for accessing alternative MRI capacity and CT capacity due to the 2B site work reducing access to imaging equipment in the Cardiac wing at certain times of the day.

Further investigation of the plans for alternative imaging provision coupled with unforeseen problems with installing a 3-T MRI in the original location without incurring substantial extra costs, has resulted in a change in plans and the development of this business case. This case offers a different and significantly lower risk solution for maintaining imaging capacity during the 2B project involving repositioning of the 3-T MRI and CT scanning capability in the Southwood wing combined with the original project to invest in a "new generation" 3-T scanner.

The additional elements within this project are the proposal to include a new superior CT scanner within the new imaging suite and the provision of anaesthetic rooms and a recovery area adjacent to the suite.

While the project incurs increased revenue pay costs of approximately £200K the cost of the "do nothing" option is far worse due to reductions in clinical income related to insufficient MRI capacity.

Benefits

The immediate benefits of the proposed investment are:

- Improved diagnostic ability across key specialties and increased MRI capacity post the 2B build period
- New generation 3-T MRI would support GOSH reputation as the leader in paediatric epilepsy.
- Mitigate significant risks to maintaining imaging capacity during 2B for both MR and CT.
- Reduce risks of delay to 2B as a result of limitations of carrying out building work close to the existing imaging suite
- Allows for replacement of current CT with one providing much lower radiation dose without loss of service

Further less immediate benefits to the Trust are:

- Enhance opportunities for increased translational research for both GOSH and ICH.
- Support renewal of BRC funding (imaging and diagnostics stream)
- Support development of post-mortem imaging service for London and South England
- A 5th Magnet will allow for upgrade or replacement of MR2, MR3, MR4 in the future without seriously impacting capacity of the remaining 4.

Action required from the meeting : Approval of the proposed investment of up to £6.7m in the project. The final capital amount will depend on the amount of VAT within the capital cost.

Contribution to the delivery of the NHS Foundation Trust's strategy

1. Supports improved clinical diagnostic ability
2. Supports research
3. Mitigates risks to 2B around maintaining imaging capacity during the project
4. Facilitates clinical growth by increasing imaging capacity

Financial implications

An option appraisal considered a number of scenarios. The base case option was to "Do nothing" and buy in some temporary imaging capacity from another provider and provide a temporary alternative CT scanner as envisaged in the 2B business case. However, the potential amount of imaging capacity purchasable from third parties who can offer paediatric facilities was only a fraction of the potential lost capacity during the 2B build.

The two investment options evaluated were the purchase of an exact replacement MRI, a 1.5-T or the recommended option, the investment, a 3-T. Purchase of a 1.5-T rather than a 3-T would limit the amount of growth possible in neurosciences and restrict research. The CT scanner investment is included in both options. Charity funding of the capital investment is not included in the NPV but the impact of the funding on the amount of PDC paid by the Trust is.

	NPV (at 3.5%) £'m	**Average annual revenue impact £'m**	**CAPITAL (undiscounted)**
Do Nothing	-15.1	-2.1	£1.4m
Incremental NPV/revenue:			
Option 1: 1.5-T	3.3	0.7	£5.7m
Option 2: 3-T	5.7	1.1	£6.7m

The options have been evaluated on the basis of current activity levels, so the revenue impact is the combination of lost revenue due to loss of imaging capacity during the 2B build, and the additional depreciation and PDC associated with the investment. If the Charity funds all of the investment, ie the remaining £3.3m, then the NPV under Option 2 would improve by £0.5m as a result of reduced PDC payments.

Legal issues n/a

Who needs to be / has been consulted about the proposals in the paper (staff, councillors, commissioners, children and families) and what consultation is planned/has taken place?
Clinical Divisions, Redevelopment have been consulted

Who needs to be told about any decision?
Senior management, redevelopment, clinical divisions

Who is responsible for implementing the proposals / project and anticipated timescales?
Director of Redevelopment and the Redevelopment project team

Who is accountable for the implementation of the proposal / project?
Director of Redevelopment

BUSINESS CASE

1. Aim and objectives

The aim of the project is to provide an enhanced imaging service through the delivery of a 3-Tesla MRI, provide an improved CT service, deliver clinical and research benefits, increase capacity related to predictions in future growth and significantly mitigate the operational risks associated with the delivery of Phase 2b. The preferred option is to deliver a second imaging suite in Southwood level 1. This would house the 3-Tesla MRI along with an upgraded low dose CT scanner. The suite would have its own anaesthetic rooms and recovery area and access would be via an opening created in MSCB level 1.

Key objectives of the proposal

1 Improve diagnostic ability across key clinical specialties and research:

- A new generation 3-T MRI will support GOSH's reputation as the leader in paediatric epilepsy.
- Enhanced opportunities for increasing translational research including support for the BRC renewal (imaging and diagnostics theme) and expanding research in ICH.
- Support development of post-mortem imaging service for London and South England

2 Mitigate significant risks to maintaining imaging capacity during 2B for both MR and CT:

- Reduce risks of delay to 2B which would cause increased project costs
- Reduce risk of restrictions on Trust services due to insufficient MR and CT capacity

3 Improve quality:

- Allows for replacement of current CT with one providing much lower radiation dose without loss of service

4 Create additional imaging capacity post 2B:

- Leave MR1 room intact allowing for potential move to 5 scanners if required
- A 5th Magnet will allow for upgrade or replacement of MR2,MR3,MR4

2. Project background:

MRI capacity is currently under heavy pressure, waiting times are unacceptable. The current wait for planned patients is now 20 weeks (we are therefore unable to meet for example planned oncology follow up scans at 12 weeks).This impacts on the quality of services at GOSH and carries clinical risks associated with delayed treatment. Demand for MRI is probably understated due to patients accessing alternative modalities (e.g. CT with associated radiation risks) due to difficulty accessing MRI. Access to MRI is a high risk on many department risk registers. The need to replace MR1 without significantly reducing capacity has not previously been resolved.

Currently the Trust has four 1.5 Tesla MRI scanners. The oldest (MR1) is over 10 years old and due for replacement. The Trust has previously identified the strategic requirement for 3-Tesla MRI on GOSH site. This is led particularly by the emergence of 3-T as a key modality for paediatric neurosciences at a time when a Safe and Sustainable review of paediatric neurosurgery is underway looking at centralisation of services. In October 2011 the Trust Board approved a business case to replace MR1 with a 3-T MRI with a budget of £3.4M. Initial investigations had suggested that a 3-T MRI could physically fit in the existing room but further work identified that the stronger magnetic field of 3-T needed a larger containment

area and that the scheme could not be delivered within budget and that it would include logistical complexities and risks in relation to the overall hospital redevelopment programme.
One of the main risks on the 2B risk register is maintaining imaging capacity during the 2B works. Due to dependency of 2b on the completion of this project in the original proposal, a review of the risks around maintaining imaging capacity and with current developments in 3-T technology a reassessment of the project was undertaken. An alternative location has been identified in Southwood Level 1. The space is large enough to also accommodate CT.
The Charity has already attracted donations of £3.4M for 3-T MRI.

3. Strategic context:

3.1 Improving clinical quality

3.1.1Improve diagnostic ability across key specialties

Over the last few years magnetic resonance (MR) imaging at 3T has matured into a clinically useful imaging modality, and now represents an essential piece of imaging equipment for a Hospital and Research Centre of our size and calibre. The availability of such a scanner to all clinical departments would enable clinicians and radiologists/imagers to select the most appropriate imaging strategy (state-of-the-art Dual-source CT, 1.5T MR or 3T MR) to best manage their patients. Key specialties across the Trust would benefit including neurosciences, cardiovascular and oncology. See appendix 1.

3.1.2 New generation 3-T MRI would support GOSH reputation as the leader in paediatric epilepsy

The Neurosciences Unit at Great Ormond Street Hospital and UCL-Institute of Child Health is the leading centre in the UK, and in the top three in Europe. The specialist expertise is especially based in stroke and epilepsy, for both of which state of the art imaging is required to maintain our position.
In November 2012 the Children's Epilepsy Surgery Service (CESS) was launched, a national programme designating four centres as comprehensive epilepsy surgery centres with Great Ormond Street Hospital nominated as the lead. Money will only follow patients who are referred to a designated centre. There are standards set which need to be met by centres to continue to be funded as such; this will be first assessed in 2014. Access to a 3T MRI scanner is a desirable requirement in the specification but is the preferred diagnostic modality for epilepsy. We have been requested to build toward assessment of 250 patients.
GOSH is the only UK CESS provider currently without 3-T MRI. We are also in a position to procure a later generation 3-T than those other centres which would support us as the lead centre. It is estimated that if we did not go ahead with 3-T we would risk 25% of epilepsy growth (£450K recurrent) to other centres.

3.1.3 Allows for replacement of current CT with one providing much lower radiation dose without loss of service

An upgraded CT would offer 30-85% dose reduction depending on the type of scan.
We have CT equipment which is becoming outdated as technology moves ahead and as newer scanners deliver lower radiation doses. It is therefore becoming suboptimal for our paediatric population and not what we would want to provide as a flagship tertiary paediatric hospital (children's tissues are more biosensitive to the effects of radiation and as they will live longer they will have a longer time to express any DNA changes induced by radiation, which includes a higher cancer risk when they are adults). (See Brenner et al NEJM 2001). This risk is multiplied by our paediatric population often having to have regular repeated scans for follow-up of their condition. Improvements include tube current reductions, the availability of previously un-settable lower tube energies, through to state of the art detectors using new materials which are much more efficient with lower 'noise' so sharper and better definition images at lower dose.
CT cannot be replaced in situ as the Trust cannot be without CT on site for 16 weeks which would be necessary. The existing room is not big enough for an upgraded scanner. So an alternative location is required.
As it will always be clinically necessary to have another CT running on site during any replacement/downtime of current CT, this proposal identifies a key opportunity to replace the CT in a

different location whilst the old CT continues to run, therefore eliminating the unacceptable risk of downtime.

3.1.4 Support development of post-mortem imaging service for London and South England
Currently post mortems are not carried out for 50% of prenatal deaths, in significant part due to parental refusal. A GOSH-ICH research project has recently published findings of a large post-mortem MRI study in the Lancet. High field strength magnets (including above 3-Tesla) at the Queens Square Imaging Centre were used. This showed the utility of MRI in fetuses and neonates for post-mortem assessment. In combination with this research guideline documents from the Royal Colleges of Radiology & Pathology and the Departments of Health & Justice, this will support the use of cross-sectional imaging in post-mortem assessment. It is believed that many parents who at the moment would not allow post-mortem would be prepared to allow a non-invasive procedure. For post-mortem imaging, signal is everything (the study included images at 9.4T), and a cutting edge 3T scanner will provide a crucial platform to support any development of this service.

3.2 Improved Research

3.2.1 Enhance opportunities for increase in translational research.
Translational research developments in epilepsy and cardiovascular in particular require cutting edge 3-T MRI.

3.2.2 Support renewal of BRC funding (imaging and diagnostics stream)
The availability of a 3T scanner will considerably benefit the GOSH/ICH BRC, as it will add to the current Diagnostic theme portfolio of imaging capabilities and provide a platform for novel 3T research, which has been missing at GOSH and is advancing in other Institutions. This will also make us considerably stronger from an imaging perspective when we reapply for BRC funding in 4 years, funding that underpin a significant amount of GOSH income.

3.2.3 Increase research income for ICH
Over the last 10 years ICH have received grant funding rejections with feedback regarding scanning capability. This lost revenue in research grants is estimated at £500,000 per year. It is estimated that having a cutting edge 3T will reduce the impact from £500,000 p.a. to £200,000 per annum for the next 5 years (i.e. an additional £300K per annum). We can assume that some of this would lead to income gain for GOSH. A prudent estimate of £50K is suggested. Work is ongoing in negotiating a new contract and tariff for ICH usage of GOSH MRI.

3.3 Improved sustainability of service

3.3.1 Mitigate risks to maintaining imaging capacity during 2B for both MR and CT.

A reduction in capacity is unacceptable for the following reasons:

- Patient safety – MRI is already struggling to cope with demand. Any further capacity reduction would mean that patients would be directly impacted – new referrals would not get diagnostics within 6 weeks, existing oncology patients would not receive follow up scans on time – there would be an unacceptable level of patient risk.
- Trust reputation – the MRI department would be unable to achieve the national 6 week diagnostic target which would cause significant reputational damage and would be unacceptable to commissioners.
- Income risk – reductions in capacity would have a direct impact on the Trust's ability to deliver any growth in the coming year, and onwards. This would impact on the diagnostic ability of all specialties across the Trust.
- Patient safety in relation to CT – the hospital requires 24/7 access to CT and it is not acceptable clinically to have a period where there is no access. The ability of the hospital to quickly scan a

patient in an emergency and to take lifesaving action would be removed with no CT, and this is not acceptable.

There are 2 broad areas of risk to imaging during the 2B project.

- Reduced imaging capacity

Testing has confirmed that much of the work involved in the deconstruction of the Cardiac Wing (expected to take up to 12 months) would impact on access to the existing Level 1 imaging suite. Noise would make working conditions unacceptable and vibration would impact on use of MRI in particular. In addition large masses of moving metal also impact on MR. The proposed mitigation to this will allow the contractor only to carry out disruptive works between 8am-1pm Monday to Saturday during which times the imaging suite will be out of use. Imaging will then take place Mon-Fri 1-9pm. These constraints impact on access to MR1, MR2 & CT.

This presents several difficulties. As we are already proposing to use evening sessions to increase current capacity this would push working into the weekends; this increase in out of hours working will present considerable problems to staffing by what is already a small and highly specialised staff group. The other more intractable problem is the fact that GA lists can only safely happen during core hours due to the way the rest of the hospital currently operates. It is not considered realistic that this could be changed within the timeframe.

Additionally there is a period of up to 12 weeks when the MR1 equipment room will be decommissioned along with the existing recovery area due to the need to reroute services in the ceiling. This has an additional adverse impact on MR capacity and even more significantly reduces the number of GA lists possible due to the lack of recovery space.

- Risk of water ingress (flooding)

In discussion with the 2B project manager, it has been highlighted that this is a significant risk. The control of works will ensure that the selected contractor has well developed plans in place to ensure that L1 Cardiac Wing in maintained during the construction period. The evaluation criterion being used to select the preferred contractor places a substantial weighting on this element of the works. However, while significant mitigation plans are in place and the likelihood of disruption is considered to be very low the impact should it occur could cause major disruption to our imaging services. Whilst there is obviously a range of outcomes should a flood occur should we lose CT capacity we would have to close to all Neurosurgery activity.

3.3.2 Reduce risks to delay of 2B

Likely required morning access to CT is anticipated to also put pressure on deconstruction works (20% extra cost £400K) and potentially extend by additional 3 months. This also extends the 12 month reduced hours scenario to 15 months. Estimates are £280K per month of delay (Gardiner & Theobald). Cost impact on 2B: 3*£280K + £400K = £1,240K

3.3.3Leave MR1 room intact allowing for potential move to 5 scanners if required

The existing MR1 suite would be left intact which allows options to either continue running MR1 or a replacement of MR1 with a new 1.5T scanner (cost estimate £1M) if capacity requirements supported a business case. Current modelling suggests a 5th MR will become a requirement between 2015 and 2017.

3.3.4 Provides support/flexibility to upgrade or replace the other MR scanners

The other 3 magnets (MR2, MR3, XMR) are all the same model and were all purchased around the same time 2006-2007. They are all due for upgrade or replacement over a short period of time – assumed life is circa 10 years. The proposal and possibility of a 5th magnet would make these changes more manageable.

4. Proposal:

The proposal is for the provision of a second imaging suite in Southwood Building Level 1. This would include:

- the co-location of high specification 3-T MRI and
- a new CT.
- A separate recovery area and two additional anaesthetic rooms would be provided.

Although this proposal does not offer any additional capacity immediately it is possible that following the completion of 2B, the older equipment being replaced may continue in use for a period of time. Future cases may be developed to staff additional capacity but that is outside of the scope of this proposal.

5. Timeframes:

June 2013 - business case approval
August 2013 – July2014 - design and build
July 2014 - acceptance testing
August 2014 - go live

6. Risks to project:

Risk Description	Impact [I]	Likelihood [L]	Rating	Mitigation	Owner
Unforeseen construction difficulty	4	4	High	Building and M&E surveys undertaken.	Redevelopment Project Manager
Late design changes	4	2	Medium	Substantial consultation with users. Technical specifications from suppliers.	Redevelopment Project Manager
Delay to procurement process	4	2	Medium	Mini competition through framework. Dialogue with potential suppliers aware of timetable.	Procurement Lead
Supply and installation	4	2	Medium	Close working with supplier	Procurement lead/ Radiology Head of Service
Availability of capital funding	4	2	Medium	Discussions with GOSHCC. Identified in capital plan	Chief Finance Officer
3-T MRI new technology at GOSH. Protocols to be developed/transferred and training undertaken.	3	3	Medium	While technology new to GOSH other sites have 3-T MRI. Discussion with suppliers about switching protocols. Comprehensive training package part of specification.	Radiology Head of Service
Staffing recruitment – additional staff required to run remote site.	4	2	Medium	Early recruitment drive. Robust communication programme.	Radiology Head of Service/ Head of Nursing
Trucking route	2	2	Low	Trucking route agreed	Redevelopment Project Manager

7. Targeted benefits performance management:

- Increasing epilepsy (and other neuro) activity – growth targets in the Integrated Business Plan.
- Maintaining imaging capacity through Cardiac Wing deconstruction and beyond evidenced by the ability to maintain waiting lists at manageable levels
- Meet waiting times targets for MRI both for clinical need and national targets
- Increased research income of £50K per annum
- Reduced radiation dose for patients receiving CT– at least 30% but dependent on test
- Ability to grow MR activity at high marginal rate

8. Financial appraisal

The options considered and modelled were as follows:

1. **"Do nothing"**
   i. A true do nothing scenario would involve the unmitigated loss of MRI capacity during the 2B project with potentially adverse long term effects – most notably in neurosciences and then the MR1 ceasing use. This would result in significant loss of activity and is regarded as a catastrophe scenario and therefore not a credible base case
   ii. The alternative do nothing scenario which is used as the base case in this business case is that a replacement of MR1 would occur prior to the equipment needing to be taken out of use after the completion of the 2B project. This would not in any way mitigate the issues we have during the 2B project
2. **Invest in a 1.5-T** and locate in Southwood – this would also include a CT in this option and be either Trust funded or charitably funded
3. **Invest in a 3-T** and locate in Southwood– trust funded and charitably funded also including the CT

Other options evaluated including locating the same equipment in the Cardiac wing but these all involved significant additional building costs and did not mitigate capacity restrictions and so were rejected.

The projects were appraised over a seven year period equal to the expected minimum life of a new scanner. The appraisal ignores the source of funding other than recognising that Trust capital has a cost in terms of PDC dividend that impacts the NPV and we have assumed that VAT on the equipment is only recoverable to the extent of the committed charity funding of equipment.

The NPV appraisal considers the incremental benefits the investment relative to the base case (Do nothing ii above). Cash flows were discounted at 3.5%.

The impact of different funding of the investment has also been considered.

The main reasons for the benefits from the two options evaluated against the base case arise from the consequences of not relocating imaging capacity away from the Cardiac wing. Location of equipment in Cardiac Wing is impacted by loss of use (income net) of the scanner during the construction period, and then additional down time associated with the removal of a scanner and installation of a replacement (income net) at a later date. Although part of the income losses can be mitigated by extended evening shifts and a limited amount of outsourcing – this triggers additional pay and non-pay costs. There is also the risk of loss of CT capacity

The investment in the 3-T has a greater incremental NPV due to the fact that it will ensure our epilepsy and neuro research (with UCL) activity is maintained.
In addition to the NPV calculations the Trust has also modelled the revenue statement impact.

Table 2: capital costs '000s	"Do nothing"	SW with 1.5T& CT	SW with 3-T
MRI	£1,583	£2,487	£3,429
CT	£0	£1,714	£1,714
Anaesthetic room/recovery	£0	£1,420	£1,491
Commissioning	£60	£60	£60
Total	**£1,643**	**£5,682**	**£6,694**

Table 3: NPV

	NPV		Average annual
	(at 3.5%)		revenue impact
	£'m		£'m
Do Nothing	-15.1		-2.1
Incremental NPV/revenue:			
Option 1: 1.5 T	3.3		0.7
Option 2: 3 T	5.7		1.1

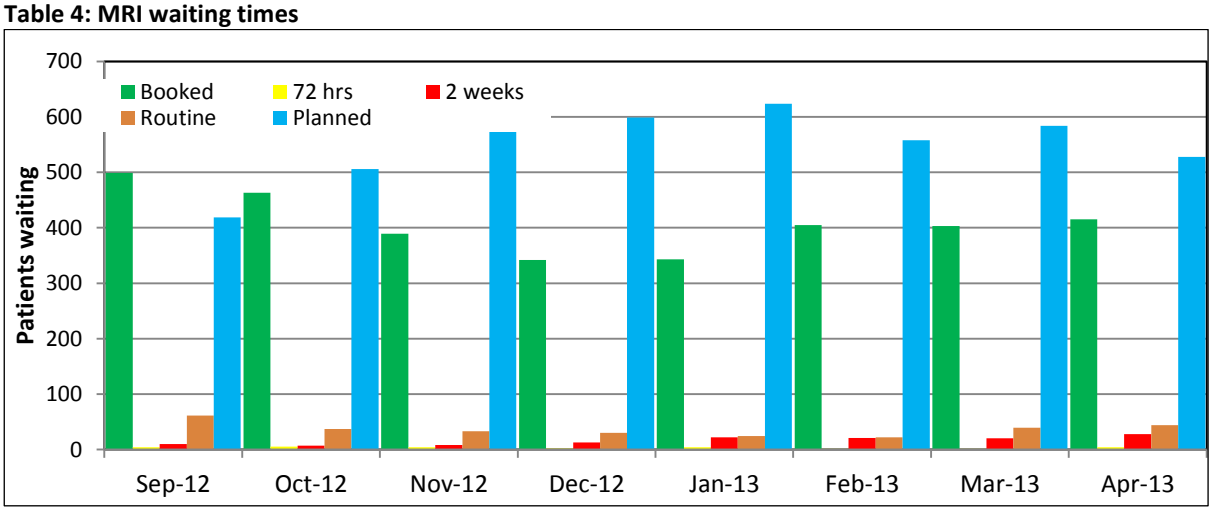
Notes:

- All options will cost money as we are replacing two scanners which are almost at the end of their economic life
- In addition to the benefits modelled, this investment positions us to grow scanning capacity to meet future growth

9. Activity volumes and capacity:

Current waiting times for MRI are significant and shown below

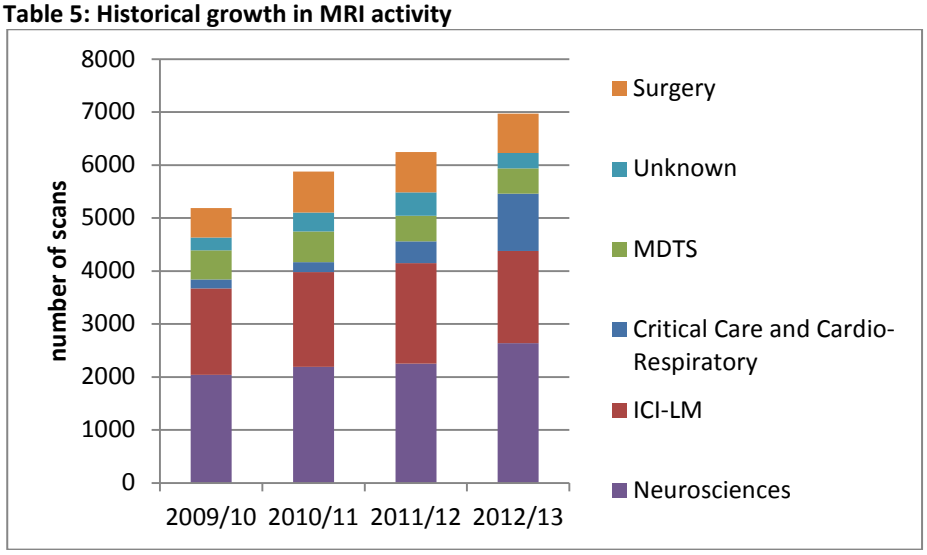
Table 4: MRI waiting times



Demand for MR has been consistently rising

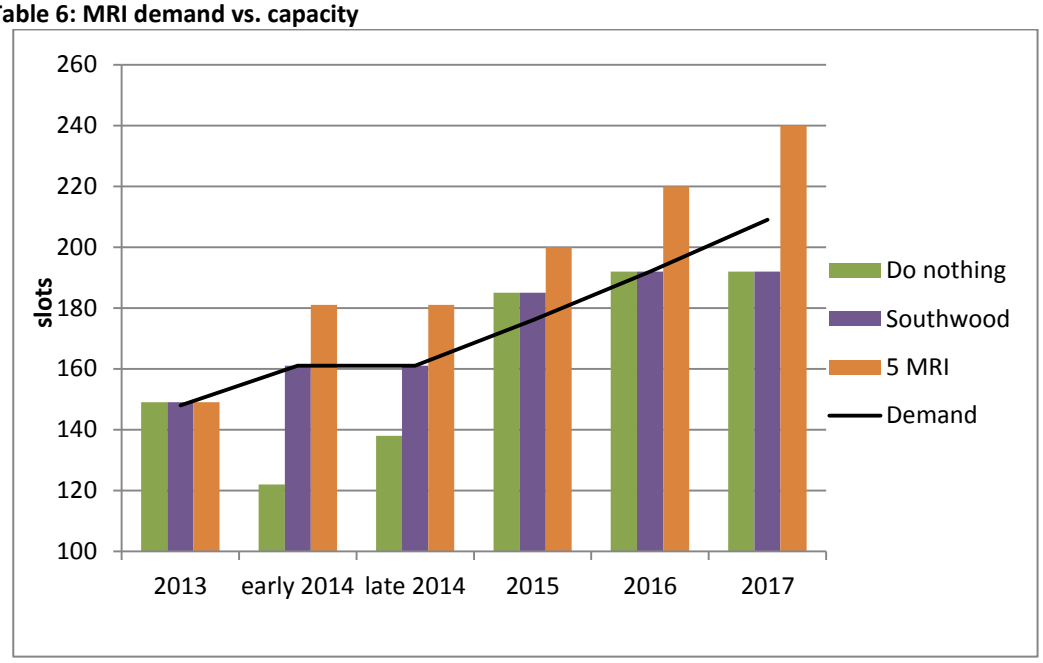
Historic growth in MR activity by clinical division is shown in table and averages 11%. Changes in coding mean that this slightly overstates activity growth.

Table 5: Historical growth in MRI activity



Future predicted growth for MR runs at 9% per annum. This is slightly higher than the 7% growth in the Integrated Business Plan but we are aware that we are suppressing MR activity due to lack of capacity – we have prudently added an extra 2%. The chart below illustrates MR growth in demand versus capacity offered by the different options.

Table 6: MRI demand vs. capacity



This illustrates the capacity difficulties GOSH faces if we do not create an additional imaging suite outside of the Cardiac Wing.

In the do nothing option we encounter a 12 week period when we are 39 slots short per week. This is then followed by another 40 weeks where we are still short 8 slots. Were we to operate at this level of reduced capacity we would be forced to close to referrals for those MR dependent specialties (i.e neurology, neurosurgery, oncology) as we would be unable to provide a safe service.

The Southwood option allows us to keep up with capacity although the amount of out-of-hours' work will be challenging.

With the possibility of running 5 MRI at this time we can see that running more sessions in core hours provides more capacity. By 2016 modelling suggests that we would have to run at 100% utilisation (as opposed to a recommended 85-90%) to cope with demand and will likely only cope with demand after that with 5 MRI scanners running.

Note: All evening sessions available are used in the do nothing and Southwood options. The table below show the number of MR sessions (2-4 slots depending on patient) that must run in the evening and at the weekend to provide capacity.

Table 7: Out of hours sessions

	Evening and weekend sessions									
	early 2014		late 2014		2015		2016		2017	
	E	WE	E	WE	E	WE	E	WE	E	WE
Do nothing	15	12	20	10	20	6	20	9	20	9
Southwood	20	3	20	3	20	6	20	9	20	9

10. Resources required:

Staffing:

Additional staffing required running remote site:

Due to the Southwood Imaging suite being located remotely from the main MRI and recovery area there is a requirement to provide additional staff and equipment resources to ensure that we are able to provide safe, appropriate and effective services for MRI and CT scanning.

This includes an additional patient reception, anaesthetic and recovery rooms and associated equipment and staff resources as outlined below:

- Additional clerical Band 3 to cover checking patients in and Reception
- Additional 1.0 Band 6 and 1.5 Band 5 Recovery Nurses in order to provide safe airway management and recovery due to this additional recovery unit in this location.
- Additional Band 2 Housekeeper for stock ordering and maintenance, cleaning and local co-ordination
- Additional Band 7 radiographer Normally MR1 & MR2 would operate with 5 Radiographers split between 2 co-located machines. However, with the machines operating in different locations it is necessary to have a staff compliment of three for each increasing the total from 5-6.

There would also need to be additional equipment procured in order to equip these areas, including the fitting out of a 3 bedded recovery area and two anaesthetic rooms and monitoring and IT equipment (costings included in financial analysis section)

There is already a demand/Capacity mismatch within MRI and any reduction in efficiency or utilisation through a reduction in scanner staff compliment would seriously adversely affect this further, compromising patient care and treatment.

Table 8: Staffing for remote imaging suite	**WTE**	**Cost**
Band 3 Receptionist	1	£26,439
Band 6 Recovery Nurses	1.5	£65,424
Band 5 Recovery Nurses	1	£36,229
Band 2 Housekeeper	1	£24,028
Band 7 radiographer	1	£51,205
		£203,325

11. Options appraisal:

Three options were considered in detail:

Do nothing and assume that MR1 is maintainable

- Option 1: Create Southwood imaging suite with 1.5T MRI and CT
- Option 2: Create Southwood imaging suite with 3-T MRI and CT

These options were appraised against the following criteria and scored with weighting applied.

Option	Financial impact	Access to MR/CT	Clinical quality	Deliverability	Strategic fit	Acceptability
Includes	See finance section	waiting list Demand and capacity out of hours Emergency access	Improved diagnostic ability	recruitment retention logistics sign up from anaesthetics and research	Impact on redevelopment programme Neuro reputation Trust Ethos	

Table 9: Options appraisal against weighted criteria

	Criteria													
Option	**Financial impact**		**Access to MR/CT**		**Clinical quality**		**Deliverability**		**Strategic fit**		**Acceptability**			**Total weighted score**
Score 0-5														
Do nothing	2	4	2	4	2	4	2	2.5	2	2.5	2	3	**12**	**20**
1. CT and 1.5T in Southwood	3	6	5	10	3	6	4	5	3	3.75	3	4.5	**21**	**35.25**
2. CT and 3-T in Southwood	3	6	5	10	5	10	4	5	5	6.25	4	6	**26**	**43.25**
Weighting		2		2		2		1.25		1.25		1.5		10

In summary the 'Do nothing' option is hampered by severe constraints on capacity due to the 2B works and is seen to contain unacceptable levels of clinical risk along with detrimental financial consequences. Only option 2 supports the strategic procurement of 3-T MRI.

CONCLUSION: Option 2 (3-T MRI and CT in Southwood) is the recommended option.

Appendix 1

Clinical case for 3-T MRI

Over the last few years magnetic resonance (MR) imaging at 3T has matured into a clinically useful imaging modality, and now representsan essential piece of imaging equipment for a Hospital and Research Centre of our size and calibre. At this time we are seeing the introduction of a new generation of 3T MRI scanners with 80 mT/m gradient strengths. The gradient strength is a limiting performance criteria that determines the speed, resolution and quality of the MRI scans. This in turn translates as measure of the diagnostic ability of an MRI scanner. These factors become more critical the smaller the body parts that are being examined and therefore particularly important for our paediatric population. The availability of such a scanner to all clinical departments would enable clinicians and imagers to select the most appropriate imaging strategy (state-of-the-art Dual-source CT, 1.5T MR or 3T MR) to best manage their patients.

Neurosciences – A 3T scanner would impact most significantly on the neurosciences service which constitutes almost 40% of all MRI examinations performed. GOSH is currently the largest clinical paediatric neuroscience centre in the UK and acquisition of 3T MRI is considered vital for the continuation of this premier position. A considerable body of literature shows that 3T MR imaging is indicated for many conditions, where it is now considered to be standard imaging technology for adult examinations. The clinical evidence for 3T MRI efficacy in paediatric neuroimaging is clear. The improved image quality and resolution at 3T is critical for lesion detection and will increase the yield of MRI positive cases which would otherwise have been classified as negative at 1.5T. This has important implications for patient management and would greatly enhance, for example, the epilepsy surgery programme for which lesion localisation is critical. Functional imaging examinations are also greatly enhanced at 3T and this methodology is now considered essential for pre-surgical evaluation. At 3T, enhanced diagnostic opportunities are also available for the detection of microscopic levels of iron and calcium using a method called susceptibility-weighted imaging to detect subtle brain haemorrhages and degenerative brain diseases. The enhanced imaging signal at 3T also profoundly improves neurovascular and perfusion assessments and this will greatly benefit children with cerebrovascular disease. 3T MR research in children is underway in a number of centres worldwide and is now considered absolutely critical for the continued excellence in neuroscience imaging research that is carried out at GOSH/ICH.

Cardiovascular MR (along with neuroimaging) place the highest needs on MRI specifications. For cardiovascular imaging the drive is to image faster, whist maintaining image quality. In order to achieve ultrafast imaging, it is necessary to have the faster available MR gradients. This combined with a higher field strength (3T) means that less information can be acquired in a shorter time, but with the same signal to noise (image quality)

The clinical benefit of ultrafast imaging at high field strength will be less need for general anaesthetic, as smaller children will be able to co-operate with shorter overall scan times and the reduction in the need to breath-hold, that comes with ultrafast sequences (data acquired in real-time during normal respiration. This also has the potential to reduce individual scan times and increase efficiency and throughput through the MR scanner, dealing with our ever-increasing demand for CMR.

Cancer – The better resolution provided by 3T will enable improved primary diagnosis of smaller tumours, and provide improved surgical road maps. 3T would also provide superior image quality for mapping for pre-surgical evaluation and treatment planning of cancer.

Other body imaging (Renal, Gastrointestinal) – Improved signal at 3T may enable MR to provide a complete assessment of the renal tract (anatomy and function), possibly reducing the number of nuclear imaging examinations of the renal tract.

Supporting translational research

We have long been leaders in the investigation and understanding of both epilepsy and cerebrovascular disorders in children. Research initiated in the early 1990s led to improved detection of localised brain abnormality allowing an increased number of children access to surgery in the treatment of their drug resistant epilepsy. Subsequent developments have enhanced our understanding of acute changes in stroke, and we have also been instrumental in the development of functional MRI to locate functionally eloquent cortex leading to safer surgery. Although all these techniques have been initiated as part of research programmes, our proximity to the clinic has enabled rapid translation into clinical practice. Developments in tractograophy and EEG-fMRI are showing similar promise.

Motor and language fMRI enable us to locate functionally eloquent cortex relative to the area of the brain where seizures are coming from, and consequently wish to remove at surgery. We anticipate a number of important areas with increasing clinical application: fMRI, DTI and ASL. Each of these methods requires highly stable systems with high gradient performance.

It has to be remembered that MRI is a non-invasive method and so can be used for repeated measurements to monitor treatment progress in a way not possible with most other modalities. It is expected that MR biomarkers will be used increasingly to monitor and plan treatment strategies requiring a commitment to MRI technology and knowledge base. Without these two things GOSH cannot attract funding for certain clinical trials and developments.