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# Post-Occupation Evaluation Study Report

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Biodiscovery Institute Expansion

April 2023



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# INTRODUCTION

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Building Understanding was asked to conduct a Post Occupation Evaluation study of the Biodiscovery Institute (BDI) by the University of Nottingham. The building was completed in September 2019 with the post occupancy study conducted in 2023, having been delayed by the coronavirus pandemic. A mixture of remote interviews via Teams and a face-to-face focus group were used to gather data.

## PROJECT BACKGROUND

This Biodiscovery Institute building formed a continuation of phases one and two of the development. A new 6,625 sq.m facility was built on University Park to house staff from a number of schools working in the field of biomolecular science. People moved into BDI from a variety of older laboratories in other locations, including Queen's Medical Centre and City Hospital.

The goal was to create a building where each floor has a different primary functional use. This means that laboratories and equipment are shared between different schools and research groups, with a goal to increase efficiency and maximise use.

The facility was aimed at meeting commitments to funders and researchers, as well as creating more space in areas of significant research growth. A need was identified to bring together smaller teams all working in fields such as stem cells and cancer research, as well as developing teaching in cancer research, all housed within modern, world-class facilities.

The facility was expected to assist groups in partnering with industry and improve leverage when applying for funding.

## PROJECT DATA

<b>Name of facility:</b>	Biodiscovery Institute
<b>Location:</b>	University Park
<b>Gross area:</b>	6625 sq.m
<b>Number of storeys:</b>	Six
<b>Users of the facility:</b>	Biomolecular research
<b>Room types:</b>	Laboratories and offices
<b>Start on site:</b>	15 <sup>th</sup> January 2018
<b>Date completed:</b>	19 <sup>th</sup> September 2019
<b>Period on site:</b>	21 months
<b>Gross construction cost:</b>	£17,956,431
<b>Funding:</b>	University capital budget
<b>Contract type:</b>	JCT Design & build

## OBJECTIVES OF THIS POST-OCCUPATION EVALUATION

- To highlight issues and best practice associated with the project during procurement, and the construction phase.
- To bring to light any key issues associated with the operation and management of the project during all phases of the development process.
- To draw out stakeholder feedback concerning the design of the building and the experience of those who use the facility.
- To analyse all output from the interviews, focus group and the workshop to provide a summary report with recommendations.

# SCOPE OF THE STUDY

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## STUDY PARTICIPANTS AND METHODOLOGIES

The University of Nottingham's Estates team provided Building Understanding with background to the BDI project. Building Understanding used this information to generate questionnaires aimed at three main groups of stakeholders: the University's Estates team, consultant stakeholders who delivered the project, and end users of the finished facility.

Building Understanding gathered feedback from 11 individuals via interviews. In addition to a comment, some of the interview questions involved giving a satisfaction rating, where 1 = 'totally dissatisfied' and 10 = 'Totally satisfied'.

### Interview methodology

To create an environment which matched a face-to-face interview as closely as possible, whilst achieving the efficiency of remote working, all interviews were conducted over Microsoft Teams.

Feedback, mainly by interview, was gathered from the following:

#### Estates Office staff

- The Capital Projects Manager
- Assistant Senior Engineer

#### Consultants

Respondents represented the following stakeholders involved in the project's delivery:

- The architect
- The M&E designer
- The cost manager
- The external project manager
- The main contractor

#### End Users

Feedback was gathered from an academic working within the building as well as from members of the facilities team.

- The Professor of Stem Cell Biology and Director of BDI
- Building and Operations Manager
- Campus Services Manager
- Electrical Compliance Manager

### **The focus group**

- The focus group gathered feedback from people who use the BDI day-to-day. This included researchers, technicians and operations staff. The focus group was carried out 2<sup>nd</sup> March 2023 at the BDI. There were five attendees.
- Building users were also asked to complete a questionnaire to gather quantitative ratings of their satisfaction with this building. These were returned by nine respondents.

### **The workshop**

The workshop objectives were to:

- Present the feedback gathered through the interviews.
- Examine to what extent the BDI has delivered against the original vision.
- Discuss any issues raised.
- Identify best practice.
- Generate recommendations for application to future University projects.

The workshop took place on 30<sup>th</sup> March 2023. There were eight attendees from the project group.

## **SAMPLE SIZES**

It is important to note that quantitative feedback in this report is based on small sample sizes. The qualitative feedback given, however, was extremely rich in detail from the interviews, focus group and workshop.

# FINDINGS OF THIS POE

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## THE BIG PICTURE

The BDI expansion has been a very successful project both in relation to the project journey and the finished facility. It was delivered on time and to budget.

The completed building has a striking external and internal aesthetic, and it is a workplace that people enjoy coming to. It is in a prime location on University Park, close to other buildings where similar research is taking place, and also near Queen's Medical Centre.

Despite some challenging demands in terms of understanding stakeholder requirements and some complex mechanical requirements, the project journey was remarkably smooth. It was not simply that the project was easy, but rather that the whole project group worked together to resolve difficulties. The right stakeholders appear to have been engaged at the right time, and everyone involved had the same desire for the project to succeed.

Feedback in relation to the main contractor was extremely positive. The project manager at the main contractor was praised for being knowledgeable and open. The main contractor had established relationships with the university, and this was utilised to benefit delivery. Their contribution was a key part of the project success.

There were some challenges in delivery. The supplier of cryogenic equipment went into administration, and this caused some anxiety in terms of handover. In addition, there were some issues with the commissioning of safety cabinets, which could have been game-changing for laboratory usage. Fortunately, both of these issues were overcome by the project group and lessons have been learned for the future.

The move-in process was challenging. Numerous research groups were moving in at the same time without any individual identified as the lead to coordinate logistics. This resulted in some disorganisation. It was not a fault with the building, but rather in relation to the university's planning and process.

The project aimed to bring together multiple groups working in similar fields and to maximise equipment usage by having floors dedicated to functional work, rather than to specific research groups. In many respects this has been successful, increasing equipment sharing and collaboration. It does, however, compromise experimental flow with users finding the need to move between floors to complete work somewhat difficult.

The success of the building has meant that large numbers of researchers wish to work in BDI. Whilst very positive, this does mean that space is becoming an increasing issue. The advent of hybrid working, following the pandemic, has probably been helpful in mitigating against the fact that the building is possibly a little smaller than ideal.

Overall, most users are very satisfied with BDI, and stakeholders feel that their vision has broadly been met.

Below are some quotes from people involved in the evaluation:



## Positives

Overall, the Biodiscovery Institute is a high-quality research facility which people enjoy working in. There is recognition that the facilities are far better than those that researchers would often be based in. They are based in a location which is convenient and makes collaboration easier.

Users said:

*'It is a fantastic space. Someone actually said, when they first moved in, 'this is a chance in a lifetime to work in a building like this'.'*

*'It is very close to other specialist science buildings which makes it very convenient for coordinating work with people outside of this building.'*

The building has a good internal and external aesthetic and there was feedback that it shows its best side to the public facing aspect of the site. Users enjoy working in the building.

Focus group members commented:

*'It is very aesthetically pleasing from the tram side which is the side where the vast majority of the public will see it from.'*

*'I love coming here. We do a lot of inductions and people always say what a beautiful building it is.'*

The project journey was extremely positive, with excellent engagement. All of the project group members and stakeholders worked well together and were committed to the goals of the project.

One project group member remarked:

*'It was a good project and a really good building. It is high up on my most enjoyable list of projects to work on.'*

Another said:

*'Everybody was so keen to get it right, even down to the academics that were coming into the building.'*

The main contractor received extremely positive feedback, and it is clear that they were instrumental in the success of the project.

One interviewee reported:

*'The main contractor was really good. They were really proactive and good at communicating and managing the team.'*

## Negatives

There were some issues with commissioning, and the move into the building was not as structured as it could have been. This wasn't related to the building specifically, but rather as a result of lots of different research groups trying to move in at once with no-one clearly managing this process.

One respondent said:

*'There were 37 research groups moving in at the same time, and it was so chaotic. Each operates independently, so there was considerable disorder.'*

A very large number of people have moved into the building, probably as a result of having the opportunity to work in such a good facility. However, this has meant that space is very tight, and storage is an issue.

Users remarked:

*'We need more space, possibly everywhere. There were more people rammed into the building than it was possibly designed for.'*

*'I don't think storage, which is important for us, was really factored in. It isn't sufficient for the science stuff.'*

The building was designed with an innovative approach to laboratory usage. The labs are functional spaces, rather than being assigned to a particular team. This has brought some benefits in terms of equipment use and collaboration, however, users report that it impacts experiment flow negatively. The approach hasn't been entirely successful and there are adjustments that could be considered to improve performance if a similar approach was taken in another facility.

A focus group respondent said:

*"The concept of having dedicated floors for the themed work that we do, then having to change floors to do another part of the experiment, doesn't quite work."*

## **HOW CLOSELY THE BDI FULFILS THE ORIGINAL VISION**

Overall, there is a strong feeling that the BDI fulfils the original vision for the project. There was a good engagement with stakeholders and the correct people appear to have been engaged at the right time.

Floors are split between labs and offices, with all floors linked to the main stairwell. There is also a link via a bridge to the original BDI building. The facilities are state-of-the-art and technical equipment was moved from other sites, as well as being supplemented with new equipment.

Early in the design phase, an idea was considered to create a covered area between the BDI and Boots Science Building. This was investigated, but the costs would have been very high and the practicalities of building it very difficult, given the existing neighbouring structure. In general, the project group do not feel this was ever a realistic option, but one member of the faculty felt that this was a missed opportunity to create a hub that would have drawn people to the facility.

They said:

*'I think we should have pushed for the covered area because I think that would have been a magnificent use of space whereas it is just wasted space now.'*

If the project were being completed now, a feasibility and benefits analysis would be completed to better answer the question of affordability. This would have ensured that the reasons for not progressing with this option would be better understood.

# FEEDBACK FROM THE PROJECT TEAM

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## THE DESIGN AND CONSTRUCTION PHASE

The contract for the Biodiscovery Institute was Design & Build. Many of the project group members had worked with the university before, and their experience and knowledge helped to smooth the design and construction phases, which were extremely successful. The project was delivered on time and to budget.

The design was developed over several years with the university. The same architect was involved throughout the design period and the construction phase which brought continuity. The university had a clearly defined target of what they wanted to achieve, which was helpful.

At the start of the project, there was considerable consultation about specific requirements, and this was, at times, challenging. This is because it wasn't initially understood how shared laboratory spaces would work for various groups of researchers, previously working across multiple sites. Some of the consultation groups were very large and, with hindsight, the consultation would have been easier to manage had the consultation groups been smaller and more focussed. However, regular meetings and workshops were successfully used to liaise with stakeholders and the project group, and to ensure that the design progressed appropriately.

The mechanical aspect of the design was particularly complex, and the M&E designers had to take into consideration new equipment, and equipment that was being moved from other sites. The details of equipment was not clear in all cases, and the M&E designer took the proactive step to visit sites to review the equipment to try to ensure that their design was correct.

The construction phase went extremely well. The main contractor managed their team, sub-contractors and suppliers well. They understood the constraints of the university, meaning they planned disruptive elements outside of term-time when possible. The project manager from the main contractor was excellent and kept the project group and stakeholders informed throughout delivery. They had both an excellent high-level understanding of the project and an in-depth knowledge of the detail allowing them to communicate well across the board.

One respondent said:

*'The construction was a bit of breeze with the main contractor. We had no real issues and finished on time and budget.'*

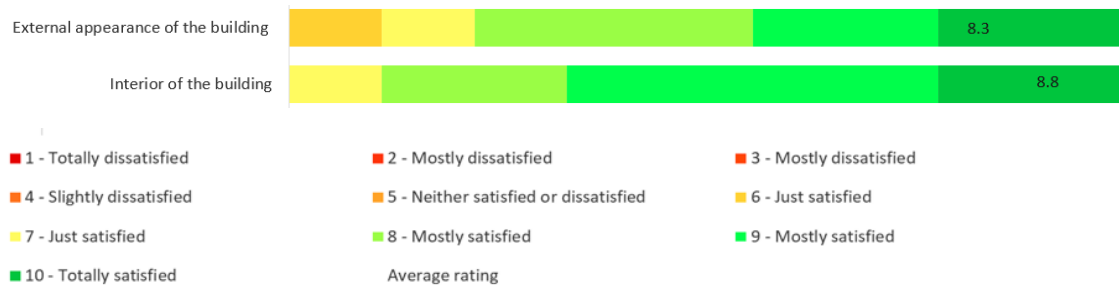
There were some challenges with suppliers. The cryogenics supplier went into administration during construction, and this caused some anxiety during the delivery and handover phases. Ultimately, a visit to the supplier was made to ensure that the equipment would be delivered on time. In addition, the commissioning of safety cabinets was done when the facility was empty, and performance was found to be an issue when users started to fill the space. The problems were overcome but could have been game-changing if they hadn't been resolved.

Overall, the project journey was exceptionally positive and the project group members found it to be an enjoyable project to be involved in, as well as being very proud of the end product.

## Recommendations

- Where extensive consultation is required to understand user needs, ensure that the size and focus of the groups is correct. Information from several smaller groups may be easier to manage than from one large group.

## FEEDBACK RELATED TO THE DESIGN AND LAYOUT



Overall, there is very positive feedback about how the building looks and feels both internally and externally. Focus group respondents rated both internal and external appearance above '8'.

The building is close to other specialist science buildings which is helpful for working with teams not based in BDI. The bridge between the new building and older BDI building makes it convenient to move between the spaces and is appreciated by users. Whilst making this bridge enclosed brought additional cost, the mid-tier option selected is believed to be the correct solution.

The design has created a pleasant environment and users feel that the building presents a good aesthetic to the public passing University Park. Some users also identified that the building and facilities are significantly better than many researchers get to work in.

One user said:

*'There is some nice signage outside that is lit up with LED lights, that is lovely, and I think that looks great.'*

Another respondent commented:

*'It is a fantastic space. Someone actually said, when they first moved in, 'this is a chance in a lifetime to work in a building like this'.'*

The architect had an open approach and worked with the contractors to create a building that was buildable but retained the original vision.

One respondent remarked:

*'We have altered the design, enhanced it from a buildability and durability point of view. That was another key area that worked. The architect was flexible, so the overall design philosophy is still there.'*

## Flexibility

Flexibility in the design was introduced by creating multi-user labs with a defined work function on each floor, rather than a more traditional approach where each team has its own lab. This has been an effective way to utilise the limited space to its maximum potential, but now in use it is believed that workflow should have been considered in more detail. The layout has created some issues in experimental flow, particularly related to the movement between floors. Users do understand why this design approach was taken, but for future projects greater consideration of workflow may improve the outcome.

One user said:

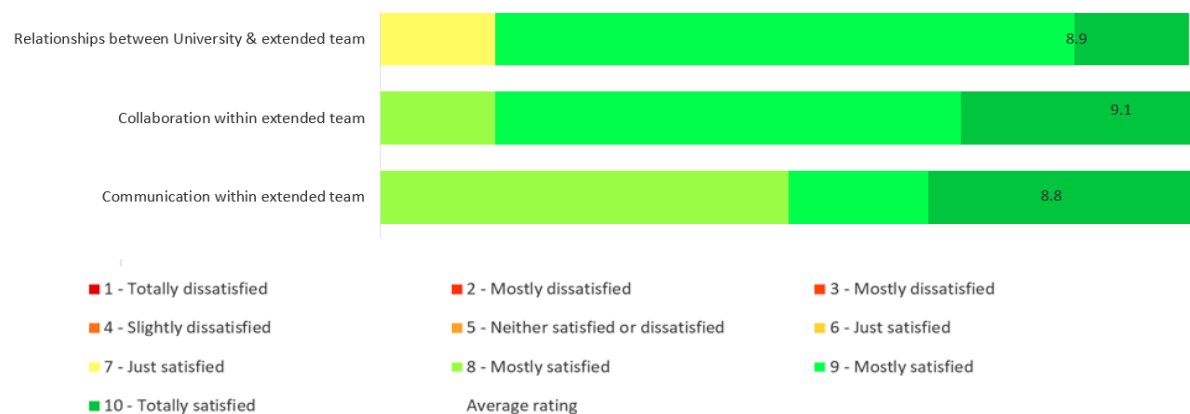
*'I don't necessarily think that a traditional model should have been used because I do understand that the funding bodies put an emphasis on collaborative use of the building.'*

Space is tight in BDI. 80% occupancy was allowed for in the design, but more people have moved into the building than it was originally designed for. An additional floor was added during the design phase, but the overall footprint could not have been any larger due to the restrictions of the available building plot. Building further upwards may have created planning issues due to the impacts on neighbours of a very tall building. The solution to this issue therefore appears to lie outside of design and through stronger management by the faculties about who would be based in the building.

## Recommendations

- If a future building is planned with a similar multi-user lab approach, ensure that workflow is considered within the design phase. Create a user group to look at this aspect with the design team.
- Faculties need to carefully manage the amount of people based in the building to avoid overcrowding.

## FEEDBACK RELATING TO RELATIONSHIPS, COMMUNICATION AND COLLABORATION



Relationships and communication between the project group members was excellent, with the feedback given extremely positive from respondents overall.

There were challenges in relation to coordinating the requirements from multiple stakeholder groups but despite the difficulties, consultation was well managed through workshops and open dialogue.

One interviewee said:

*'Obviously there was some friction sometimes around certain things but generally everyone worked together to deliver the project.'*

Some members of the team had worked with the university before and this experience helped with the complex aspects of the project.

Another had this to say:

*'We had a good team that worked well together and was experienced with working with one another.'*

It was noted that the strong relationships mean that project group members are still in contact and willing to assist the university team when required.

## **Collaboration**

All respondents were positive about collaboration and this aspect received an average rating of '9.1' from the project group.

The project group worked together to identify solutions and it was noted that some key stakeholders were very engaged in making sure that the project went well.

One consultant commented:

*'Compared to some other projects I have been involved in, it went really well. The whole team pulled together and worked in the same direction. They all wanted the same thing and were there for each other. That made a huge difference.'*

It was suggested that faculty management could have been stronger during the consultation phase, and there could have been greater engagement from academics throughout the project journey. There may also have been benefits in engaging with users earlier in the process. A lot of responsibility fell to one member of the BDI operational team and it may have been beneficial to make them feel more supported by embedding them in the project team.

## **Communication**

Communication was also rated with an average rating of '8.8'.

There were workshops during the consultation phase to engage with stakeholders and throughout the project regular progress meetings. All of the feedback indicated that the university team, consultants and contractors maintained open, honest and easy routes of communication throughout the project.

The main contractor was willing to host regular site visits for future users, which maintained engagement and ensured that people understood project progress and what the final building would be like.

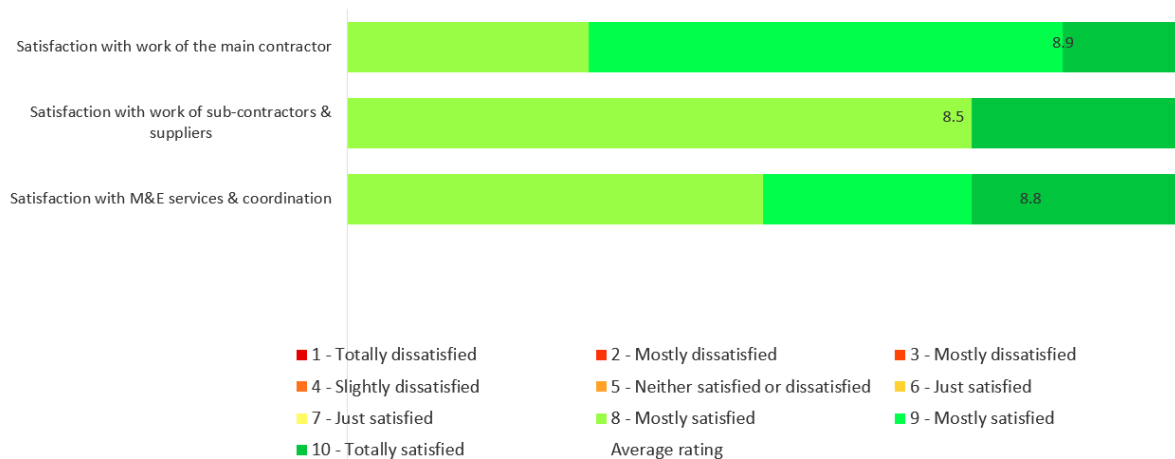
One stakeholder said:

*'We never felt like we were in the dark.'*

## Recommendations

- Ensure that users are engaged at the earliest opportunity, so that their needs can be understood by the project group.
- Faculties should ensure that managers understand the requirements from them and give a clear steer on the project. Academic staff need to remain engaged throughout the project journey.
- For complex projects consider embedding a member of the operational team in the project group to ensure that they have time for the project and feel supported.

## FEEDBACK RELATING TO MAIN CONTRACTOR AND SUPPLY CHAIN



### Main Contractor

The main contractor was very highly praised by all respondents and received an average rating of '8.9'. This is extremely high when compared to the ratings normally seen in post occupancy evaluations.

One consultant said:

*'This is the first time I have worked with them, but I have subsequently recommended them to be on the tender list for projects.'*

Willingness to recommend is often used as an industry standard measure for performance and it is an extremely positive indicator of how well the contractor performed on the project.

BDI is on a tight plot in a busy area of University Park. The main contractor had worked with the university before, and this meant that they understood the challenges of working on the campus and hence planned work such as crantage to minimise the disruption to staff and students.

The project manager from the main contractor was particularly praised and identified as a key component in the success of the project. He managed the programme and team well. In addition, he demonstrated an excellent knowledge of both the high-level and detailed aspects of the project. This gave people confidence.

One stakeholder said:

*'I thought that the site project manager's range of knowledge across the entire build was exceptional. Because of that, he could then have a really meaningful two-way conversation.'*

Another commented:

*'I would have them on every project if I was able to, certainly the project manager for the main contractor.'*

The contractor welcomed visits to the building during the construction phase, allowing future users to arrange to come to look round at quieter periods. This kept people engaged and meant that they had the opportunity to feel in touch with the project throughout the build.

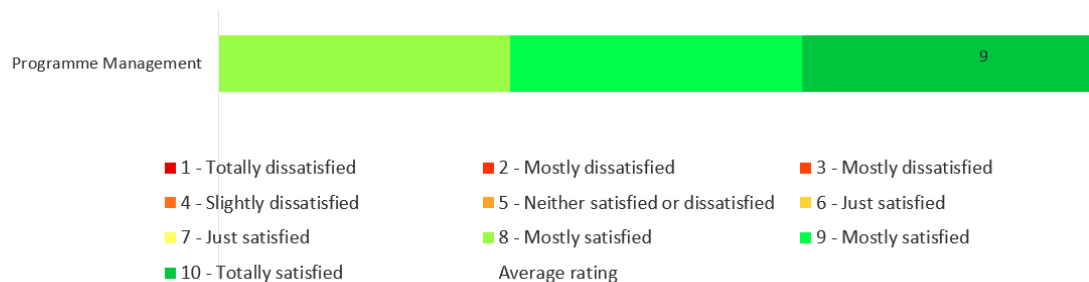
## Supply Chain

Feedback in relation to the M&E services and sub-contractors was also very good. The M&E contractor had worked on other University of Nottingham projects and was rated as '8.8'. Other sub-contractors and suppliers were rated as '8.5'.

A new substation was built as part of the project and the contractors who worked on this were considered very efficient.

All respondents were satisfied with the performance of the supply chain, which would also indicate that it was well managed by the main contractor.

## FEEDBACK RELATING TO PROGRAMME



Programme management received an average rating of '9', with all people who answered this question satisfied.

The project was delivered on time and to budget. It was well managed throughout the project, with regular review of elements which were ahead or behind, so that action could be taken.

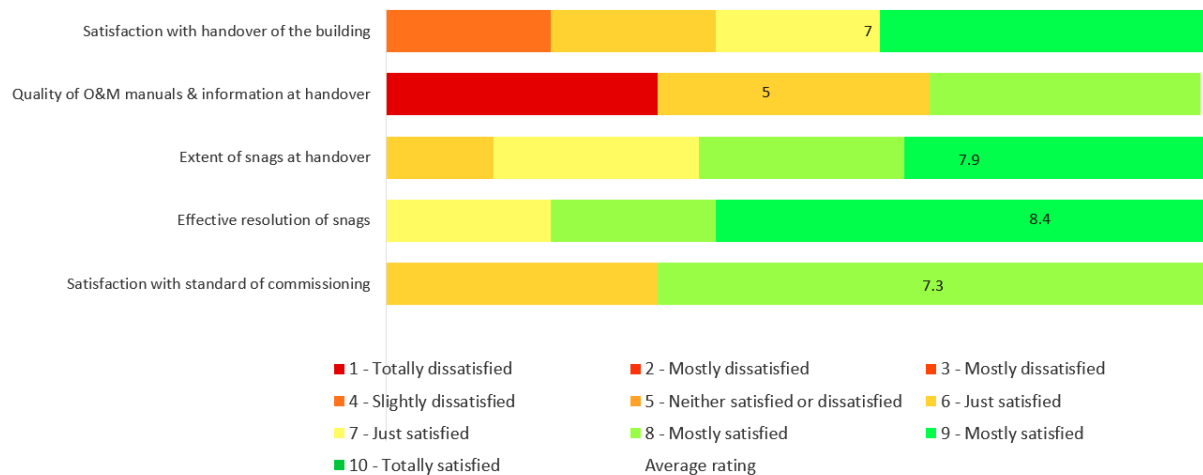
The programme was not without challenge or risk, and was a complex design, but the team worked well together to ensure that the programme and budget went well.

One interviewee said:

*'It was well managed. Programmes were presented at every meeting, with a dropline to show where they were, and any areas that were slipping or areas that were in front.'*



## FEEDBACK RELATING TO HANDOVER AND DEFECTS



The handover of the building received an average rating of '7'. It was suggested that this could have been improved through greater engagement with the wider Estates team. The correct people from the maintenance team did not visit site regularly during the build or attend handover training sessions. This meant that they did not fully understand the building and its systems when it was handed over. Availability from the maintenance team is a challenge due to resource, but changes have been made to the team's structure which should assist with this in future. Videos are understood to have been made, but it may have been helpful to have some refresher training. For the best outcome, external contractors who are appointed to work on university property should be included in training sessions.

There was some anxiety at handover about the cryogenics system as the supplier went out of business during the project. Ultimately, a visit was made to the supplier to ensure that the system would be correctly supplied.

Commissioning received an average rating of '7.3'. Commissioning of the safety cabinets was problematic because it was done when the laboratories were empty. Once equipment had been moved in it was found that there were issues with performance that could have significantly affected the work that takes place. Ultimately this was overcome, but it is recognised that additional commissioning visits after rooms have been filled are required in future.

The extent of snags at handover was rated as '7.9' and the resolution of snags with a slightly higher rating of '8.4'. One of the real positives here was that the representatives from the contractor stayed on-site to manage the early defects period. This is something that it's felt should be carried through for future projects because of the benefits it brings.

One of the most problematic elements of the project was the move in. The physical move of equipment and belongings went very well. However, there was no soft landing, and numerous research groups were all moving in at once. These were not teams who had previously been based together and there was no one clearly assigned to manage the move in. Whilst not a fault with the building directly, this did affect people's initial impression of the building. In future, having a structure for the move and someone assigned to manage it would bring many benefits.

One focus group respondent said:

*'There were 37 research groups moving in at the same time, and it was so chaotic. Each operates independently, so there was considerable disorder.'*

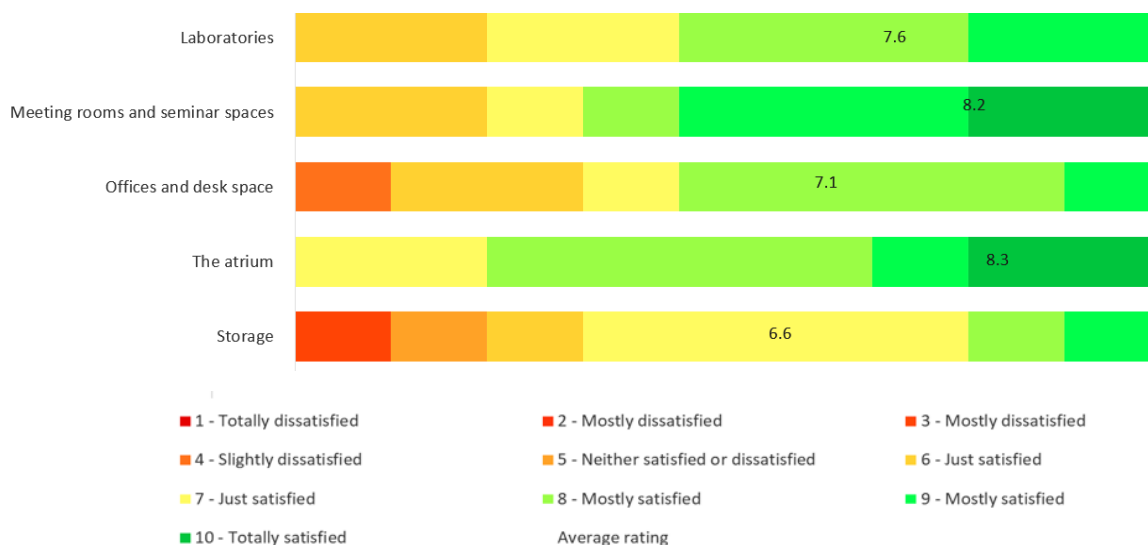
The O&M manuals received the lowest rating of the study, being rated as '5'. One respondent didn't know whether they existed and another identified looking for a piece of information but being unable to find it. Whilst the manuals are good in electronic format, they don't print well and this can be difficult when people are visiting to carry out maintenance or repairs. Work should be done to ensure that manuals are stored in a common, accessible location and that they are complete and meet operational needs.

## Recommendations

- Within the contract include the requirement for additional commissioning visits. These should take place between the pre-use installation commissioning check and the 12 month maintenance visit, once the room is occupied and in normal use.
- Within the contract, include the requirement for someone from the main contractor to stay on-site during the first three months of the defects period.
- For future projects, the faculty needs to define individuals to manage the relocation from one building to another. This will give a clear lead for the move and give users a communication point during the transition.
- The main contractor should have meetings with members of the wider Estates team after appointment; to address key issues and so that they feel engaged with the project.
- Maintenance staff should feel they can visit the construction site during the build process and be given the opportunity to arrange ad-hoc visits if scheduled meetings are missed.
- Maintenance staff and external contractors should attend training sessions when offered. Refresher training should be considered if it will be beneficial.
- Ensure that maintenance personnel know where to find O&M manuals and that the manuals are always accessible from the agreed location.
- Engage with end users at the point when the contractor is collating the O&M manual to ensure that all the required information is included.
- Where appropriate, create a bespoke building user guide, to assist operational staff in the ongoing maintenance, repair and improvement of the building.

# POST OCCUPATION – END USERS

## FEEDBACK RELATING TO KEY SPACES IN THE BDI



The BDI has created state-of-the-art labs with modern offices and meeting rooms, in a building that is in a convenient location close to other researchers working in similar fields.

One interviewee said:

*‘It is very open, very visual. It is modern looking and doesn’t try to be fancy, it has white walls which speaks volumes. I like the colour coding on the floors.’*

Users are proud to bring visitors to BDI and believe the building gives a professional impression of the university and the work being done. The atrium gives the ‘wow’ factor when first entering the building but is not so big as to be considered as wasted space. It was given an average rating of ‘8.3’.

One focus group respondent commented:

*‘Whenever I take visitors around there is always a sense of awe and they are always impressed by how professional the building appears. The atrium seems very modern and is very welcoming when you walk in.’*

Laboratories were given an average rating of ‘7.1’. The lab spaces are considered to be the right size for the work being done.

One user reported:

*‘I feel that we have got enough lab space to do what we need to do in this building.’*

Meeting rooms and seminar spaces are rated very well with an average rating of 8.2. Office and desk spaces were rated a little lower with an average rating of ‘7.1’. Some feel that office space should have been a little bigger and lab space a little smaller, to better meet the needs of people using the building.

BDI has a mixture of individual offices, large open plan offices and smaller office areas. Overall, it is felt that the smaller office areas are more successful than the very large open-

plan areas. On C floor, more desks have been installed in the open plan area than it was originally designed for.

One user said:

*'I think the smaller office areas with the kitchenette and the offices either side and a bank of roughly 20 desks, that set up works better.'*

From the outset, there was a plan to ensure that all offices and meetings rooms could be booked by building users, to maximise the utilisation of space. This included individual offices assigned to academic staff, when those staff were on holiday or working elsewhere. Overall, this is believed to be an innovative and positive approach, which should be developed and utilised elsewhere. Unfortunately, the success of this approach has been affected, as tablets outside the rooms showing the availability status are not working. A software update has resulted in devices no longer being supported, and rectifying this is not currently being treated as a priority.

There is an issue relating to storage and this received a lower average rating of '6.6'. This relates to the storage of equipment and the space available for 'goods in' deliveries. There is no loading bay, and this has also made the receipt of materials difficult. These issues are all as a result of the building being on a tight plot on the campus, and because more people are occupying the building than it was originally designed for.

## Recommendations

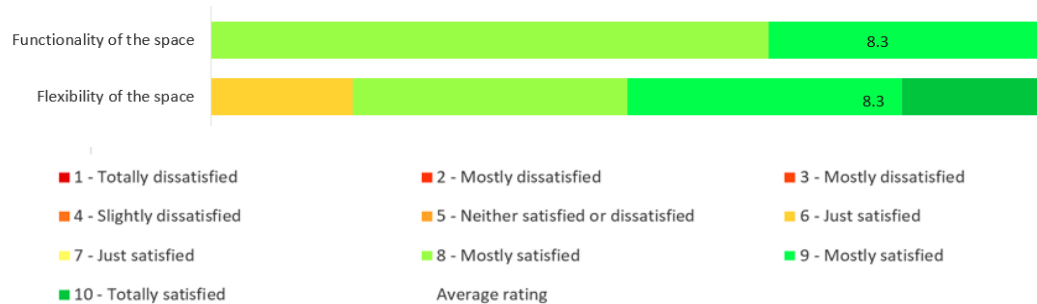
- Tablets outside offices and meeting rooms are key to ensuring that users know when spaces are available for use. This was a fundamental principle in the operation of the building and the maximisation of limited space. This issue needs to be rectified as a priority.
- For future developments, consider whether individual offices are necessary or whether offices could be shared between several staff.



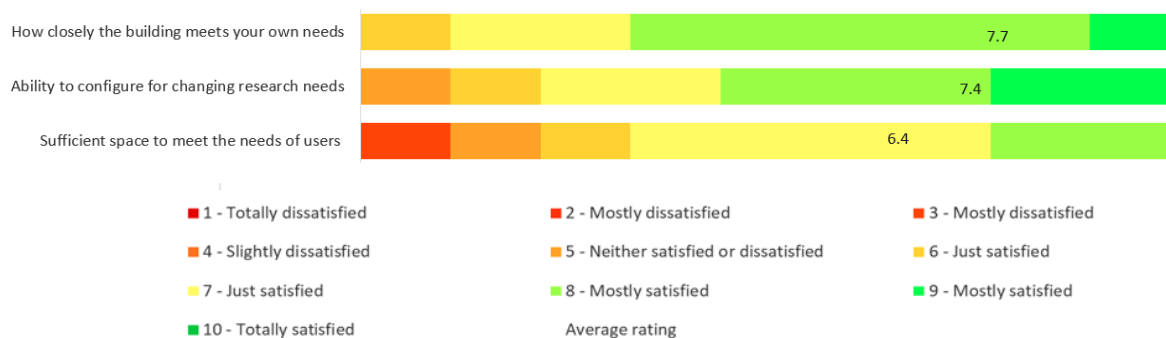
## POST-OCCUPATION – FEEDBACK FROM KEY STAKEHOLDERS

### Flexibility and Success of the Spaces

#### Interviewee Responses



#### Scoresheet Responses



Interviewees were happy with both the functionality of flexibility of spaces, rating both with an average rating of ‘8.3’.

User ratings were slightly lower with similar questions about how the building meets needs and the ability to reconfigure for changing needs both receiving ratings above ‘7’.

The move to multiuser floors was required to ensure that there was enough lab space available. It has brought some positives but also some issues. Users recognise that this way of working is flexible, collaborative and increases utilisation of equipment. However, the need to move between floors to complete different aspects of an experiment affects experimental flow. Some feel that it is simply an inconvenience, but others also feel that it slows work. A solution to this would be to have an access route which is designated as part of the lab containment zone to avoid the need to change in and out of lab coats. This should be considered if a similar layout were to be planned for a future building.

A stakeholder commented:

*‘I think that the large multiuser labs with the level of flexibility which we have to potentially repurpose them, that is one of the greatest successes.’*

Focus group respondents said:

*‘The problem in this building is that the specialist parts of the work have been divided up by floor. That is great for sharing, great for planning; it is basically great for everything except experimental flow.’*

*‘Perhaps something to ease that flow between lab floors would be to have a lift or stairs classed as a lab area so that people don’t have to keep removing lab coats.’*

The sufficiency of space overall received a comparatively low rating of ‘6.4’, with some scoresheet respondents not wholly satisfied. Space utilisation is good but the number of people who want to work in BDI is higher than it was originally designed for, meaning that space feels tight. Whilst it is extremely positive that so many people want to work in BDI, a greater control by the faculties about who would be based in the building may have been beneficial. It is likely that hybrid working, post pandemic may have eased the space issue, and this may need to be maintained going forward.

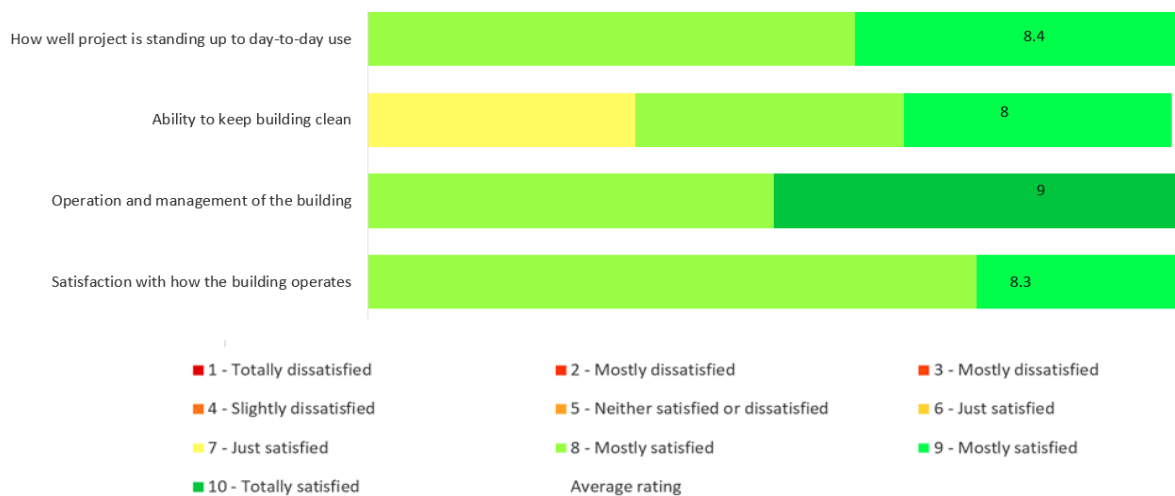
A larger breakout area would have been a positive addition to the facility. Users’ desire for this may have increased following changes to ways of working post-pandemic. However, increasing breakout space may have compromised other spaces due to the limited overall size of BDI.

### Recommendations

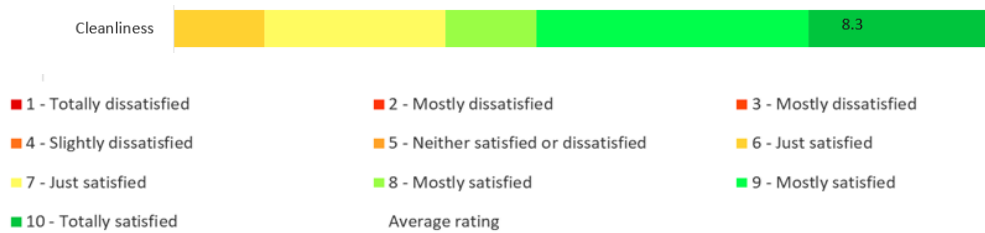
- For future projects with multi-user labs on different floors, include access between floors within the containment zone to improve experimental flow.
- Faculties need to carefully manage the amount of people based in the building to avoid overcrowding.
- Maintain hybrid working if this assists the issues with lack of space. This could be formalised if it would be advantageous.
- For future projects, consider break-out spaces which are viewed positively by users. Install booths if they support the need for video calls and small discussion groups.

## FEEDBACK RELATING TO OPERATIONAL ISSUES

### Interviewee Responses



## Scoresheet Responses



Overall feedback about how the building operates is positive. The majority of respondents were 'satisfied' when asked to rate factors linked to day-to-day use.

There have been minor issues relating to plumbing and electrical issues, but nothing excessive based on the size of the building. The building was initially occupied in late 2019 but shut down in March 2020 due to the Coronavirus pandemic. When the building re-opened there were some minor issues that needed to be addressed.

A respondent reported:

*'Especially towards the end of 2021, when it reopened, issues arose at that point, possibly because it had been stagnant for so long.'*

The goods-in room is too small and there is no loading bay. There is a layby which can be used for short periods and this need to be re-assessed by security to assist with unloading. The door to goods-in is too heavy and it may be beneficial to consider whether this needs to be automated or whether a roller shutter door should be installed.

After occupation, it was found that the isolation points for the carbon dioxide and nitrogen gas lines were not accessible enough. Whilst these need to be hidden to avoid accidental operation, the location was up a ladder and too difficult to access in the event of a gas leak. Work totalling £7,500 was required to move the carbon dioxide isolation valves.

Some breakdowns were identified within the cold rooms, which can impact stored materials. It is believed that by the project group that the wrong contractor had been engaged with in relation to equipment issues. In addition, if there are defined suppliers for university maintenance they need to be considered when selecting equipment.

## Cleanliness

The majority of feedback in relation to cleanliness was positive. Interviewees rated the ability to keep the building clean with an average rating of '8' and scoresheet respondents awarded an average rating of '8.3'.

A minor issue was raised in relation to the shape of the handwashing sinks in the laboratories, which don't drain fully resulting in soap scum. However, there appear to be no significant operational issues in relation to cleaning.

One respondent said:

*'When I speak to the domestic services manager, it is a building that they don't have any issues with, in terms of cleanliness.'*



## Day-to-day use

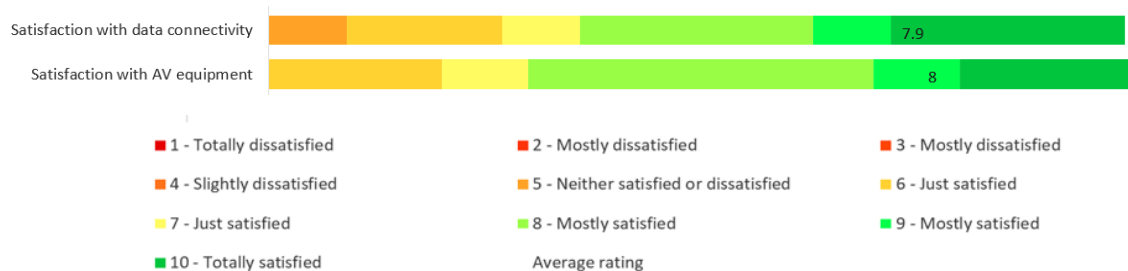
Overall, the building operates well and the team that manages the day-to-day operations were praised. University processes to get issues resolved are considered a little slow and it can take a long time for faults to be rectified. The helpdesk process is not appropriate in the event of an emergency, such as alarm going off.

BDI has three boilers and two should be running at any time on a rotation. This is to stop individual units from working too hard and to maximise lifespan. On occasion, the heating has been working on only one boiler with the other in fault. This has not been identified or prioritised by the Estates team as it is not on an alarm, but it could have an impact on the long-term life of equipment. If the building operations team had access to view BMS this, and other systems, could be monitored and issues locally resolved more effectively.

## Recommendations

- Get security to re-assess the layby to assist with the unloading of goods.
- Consider automation of the heavy good-in doors, or installation of a roller shutter, if this becomes a major issue.
- Create a BMS page to allow the local operational team to easily view the BMS data and monitor for issues, so they can be rectified by staff on-site.
- For future projects ensure that isolation valves for piped gases are in locations which are hidden but make them reasonably accessible in the event of a gas leak.
- Ensure that the correct equipment supplier is engaged when discussing issues and that long term maintenance is considered when making equipment selections.

## FEEDBACK ON AV AND DATA CONNECTIVITY



Data connectivity received average ratings of '7.9' and AV equipment '8'. Any issues with data connectivity appear to relate to the university's systems rather than the connectivity available within the building.

The building was future proofed, by the installation of a blown fibre network which can be used when the university moves to this technology. This should avoid the building becoming quickly outdated.

The AV equipment is considered more complicated than it needs to be, with one respondent saying:

*'It looks impressive, there are lots of big screens, but whether or not people get the full functionality out of that, I don't know.'*



The most significant issue relates to the provision of electronic tablets outside of meeting rooms and offices to show, at a glance, whether they are available. These were put in as part of a pilot project and were very successful popular with users. Unfortunately, these have now stopped working following a software update and there appear to be no plans by the DTS team to resolve this at the current time.

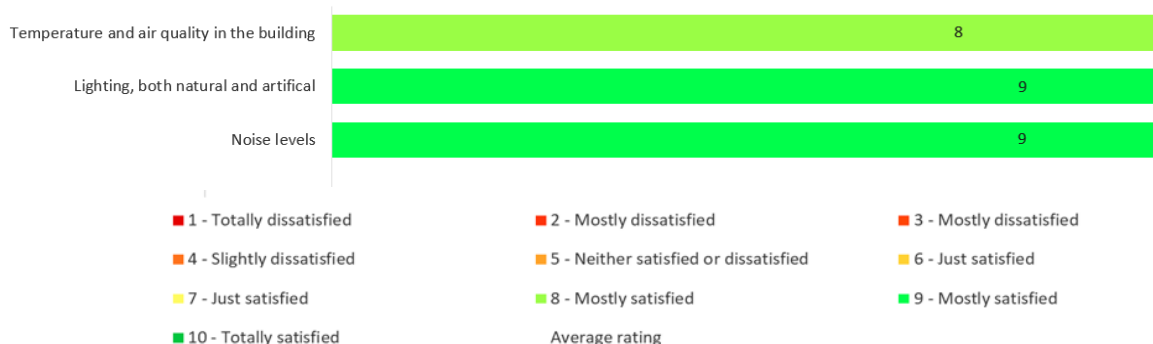
The approach of all office and meeting rooms being bookable and available for general use is a fundamental principle of the long-term BDI operation. It significantly assists in relation to the high occupancy levels and helps those that need it in finding quiet spaces to work. The BDI approach is being held up as a modern, flexible way of working within the University of Nottingham. In addition, the team has been asked to share this best practice with senior staff at other educational institutions. The tablets being out of use is a significant hinderance to these principles and opportunities, as well as creating a poor impression for visitors and other users. Due to all these factors, it is suggested that the prioritisation of the works to get the tablets working again should be revisited.

### Recommendations

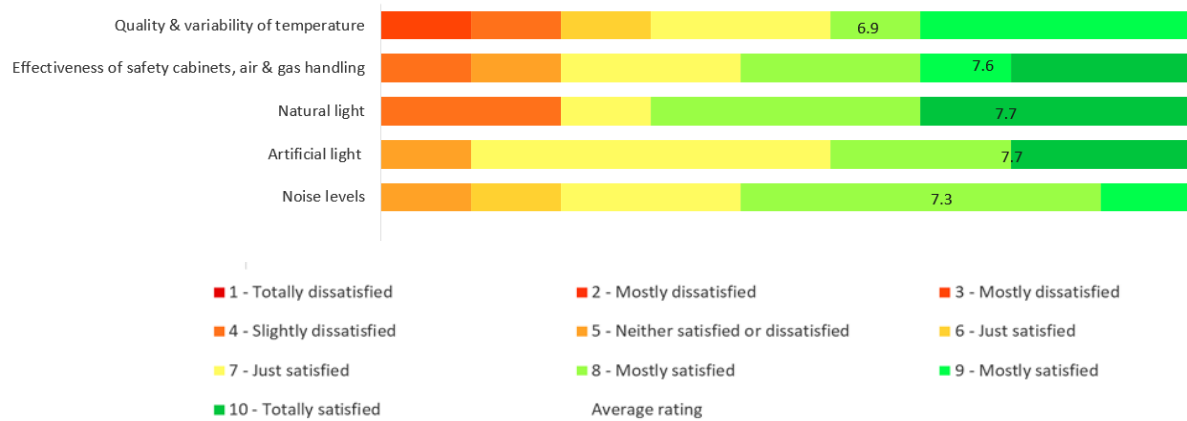
- Works to restore operation of the tablets outside of the offices and meeting rooms should be re-prioritised. This equipment is fundamental to the operating principles laid out for the BDI facility and will assist with the issue of the building being very densely occupied. It will also maximise the first impression of the building on visitors, including other educational institutions.

## FEEDBACK RELATING TO THE QUALITY OF THE INTERNAL ENVIRONMENT

### Interviewee Responses



## Scoresheet Responses



## Heating and cooling

Temperature was rated on average as '8' by interviewees and '6.9' by users. There were a wide range of ratings for temperature which likely indicates the factors of personal preference.

Overall, the temperature appears to be comfortable and well managed. There is some variation between different working areas but overall temperature in the building is a lot better than in other buildings, including the earlier BDI buildings. There was only one issue raised, with temperature during the 2022 heatwave, which suggests that temperature management is working effectively. Some users would like more local control but overall, it is believed to be better that this is centrally managed. Local control is likely to create problems through constant adjustment based on personal preference and reduces sustainability.

Issues were raised in relation to F floor where a large number of freezers were put into a relatively small space, creating an overheating issue. This has been resolved through BMS air-conditioning but needs to be considered for future projects.

## Recommendations

- For future projects, consider the heat being produced by equipment and ensure that mitigation, such as air-conditioning or ventilation, has been put in place to prevent over-heating.

## Lighting

Light is generally good. Interviewees gave an average rating of '9' and scoresheet respondents rated both artificial and natural light as '7.7'.

There could be some improvement to artificial lighting in relation to placement and the ability to dim lights. This would also be beneficial for those with neurodiversity, as the existing lights are rather bright. Whilst it would be costly to retrofit this now, it is something that should be considered for future projects.

Some areas have a lot of windows and hence very good natural light, but other areas are a lot darker. Some of this is related to the cost of glazing within the design but much is due to the location of the building and its close proximity to other buildings. One respondent said:

*'The stairway is beautiful, with all the natural light, and I love all the big windows. It is a shame they aren't on the other side because it has made those offices on that side a bit dark and dingy.'*

## Recommendations

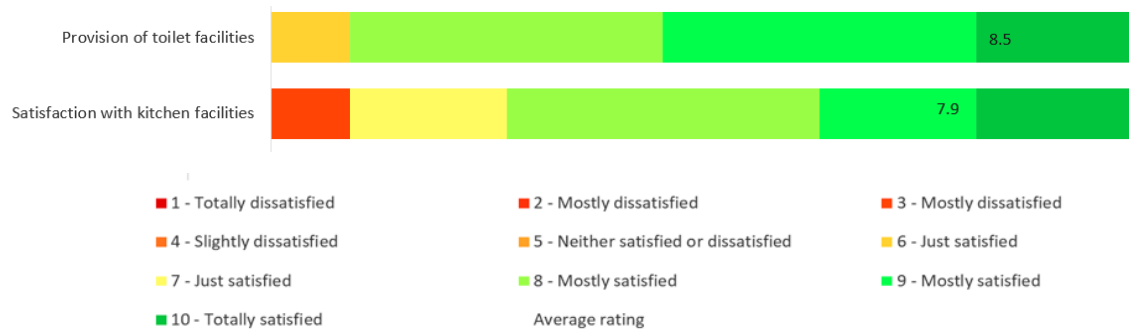
- For future projects, consider the ability to dim lights in appropriate areas; both for work purposes and to aid those with neurodiversity.

## Sound

Noise does not appear to be a significant issue within the building. Interviewees gave an average rating of '9' and scoresheet respondents '7.3'.

The only issues relating to noise were low level issues such as the noise of lab equipment, such as autoclaves, running and the sound from conversations within the coffee area.

## General Facilities



The vast majority of users were happy with toilet and kitchen facilities. Toilets were rated with an average score of '8.5' and kitchens '7.9'.

The only negative comment about kitchens was that there is not a kitchen on 'A' floor. However, this is the area with the fewest people working in it.

This is one of the last university buildings developed with traditional 'male' and 'female' facilities, although there is one gender neutral toilet.

One user said, *'The toilets are clean, bright and modern.'*

The building does not contain a specific prayer room and there is not a specific location for Muslims to carry out ablutions before prayer. Due to time constraints, it is not always possible for people to go to a specific prayer room in another building. A space has been set aside in an office in BDI1 for this and other needs such as nursing mothers, but it is important that such spaces meet individual needs.

## Recommendations

- When developing facilities consider spaces for prayer, nursing mothers etc. If there are no available facilities nearby on the campus, then specific provision may be required.

## Additional elements end users would have liked to have seen:

- Tablets working outside offices and meeting rooms.
- Stairs within the laboratory containment zone.
- More storage.
- Loading bay and larger 'goods in' area.
- Larger breakout area.
- Larger office space and smaller lab space.
- Dimmable lights.
- Kitchen on A floor.

## FEEDBACK RELATING TO ACCESSIBILITY AND NAVIGATION

The BDI is in a good location on University Park, close to other buildings that people working on similar research are based in, as well as Queens Medical Centre. A bridge was built between the new BDI building and the earlier BDI developments, which is considered a benefit and it assists with easy flow between the facilities.

There is successful colour coding of each floor and meeting rooms are clearly signed with floor and number referenced. There was a name change during the project which as resulted in deliveries going to the wrong building, as the wrong name appears in some systems.

Users would view it as beneficial to have a lift or stairs within laboratory containment zone so there was not a need to remove lab coats when moving between floors for the purposes of experiments. The changing areas are also considered a little small, and it would be helpful to have a shelf to put items which are being carried on.

The goods-in door is extremely heavy and can be difficult to open, particularly when it is windy. This may benefit from automation, or replacement with a roller shutter door.

An issue was raised by users in relation to door handles coming loose. If a handle failed when someone needed to exit some of the lab spaces, this could be a health and safety issue. The door handles should be checked and maintained on a regular basis, and faults reported by users.

Provision for the disabled was rated as '7' by interviewees and '7.5' by scoresheet respondents. One interviewee said, *'If we had people who came in with real accessibility issues or who use wheelchairs, that would be difficult.'*

Overall, the building is accessible but internal doors are not powered, which may make movement about it difficult for those with severe mobility issues. There are accessible toilets on all floors and an accessible shower. There are lifts at either end of the building which have Braille and an audible indicator to advise of the floor, to assist the blind and partially sighted. The lift from the foyer is considered fairly small. It was identified that there could have been more up/down desks available for use by those with disabilities.

The large open plan office areas may cause some issues for those with neurodiversity; however, no problems have been specifically raised. The ability to step into an office or meeting room which is not in use may be useful if an individual needed a quieter space.

Unfortunately, the ability to do this has been hampered by the fact that the tablets indicating that the room is available are not in use.

The university is currently setting up a guide for neurodiversity and hidden disabilities which will assist with the design of future facilities.

### Recommendations

- Once compiled, use the design guide for neurodiversity and hidden disabilities to inform the requirements for future buildings.
- Consider automation of the heavy good-in doors or installation of a roller shutter, if this becomes a major issue.
- Operations team to carry out a door handle survey so that any outstanding issues can be reported.
- Only release the names and numbers for buildings once they are finalised to ensure consistency of records across all systems.

## FEEDBACK RELATING TO SECURITY

Security was rated with an average score of '7' from interviewees and '8.3' from scoresheet respondents. Some people feel like there could be better CCTV provision for the building and surrounding area, and some loss of items was identified.

One stakeholder said:

*'We have a number of locks and door codes which work fine, but I do think that we need more CCTV in certain areas. I know that there are legal issues around that, but we have had quite a few expensive items that have disappeared.'*

The laboratories have access restriction to avoid visitors from entering them. In extreme wind and heat the front door has occasionally remained open which would allow access by an unauthorised person. However, this has not been a regular occurrence.

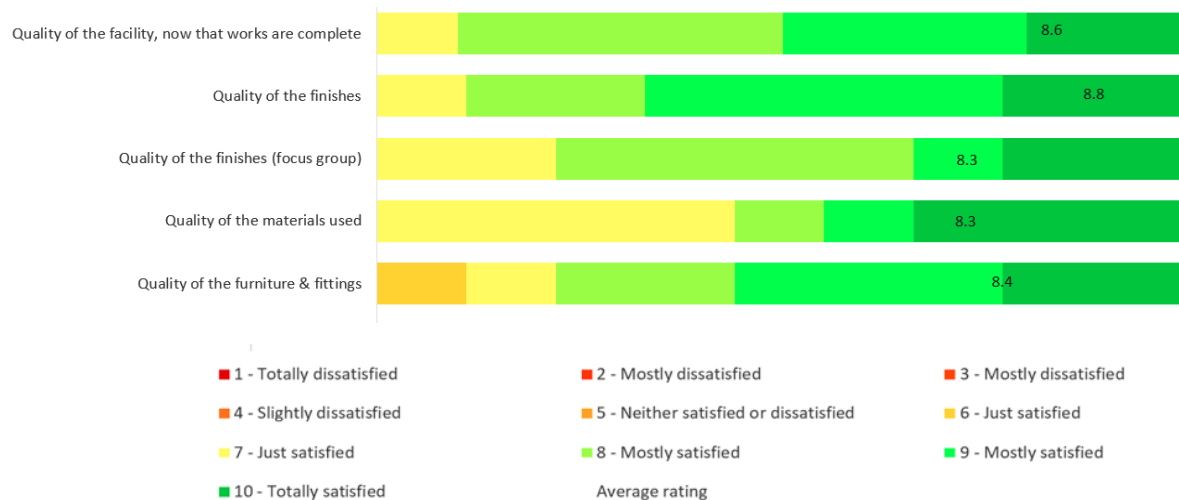
## FEEDBACK RELATING TO ENVIRONMENTAL PERFORMANCE AND SUSTAINABILITY

The BDI was certificated as BREEAM Excellent and was well above the sustainability regulation levels at the time that it was built. It is still considered a good building by the current standards. Sustainable features such as photovoltaic panels were installed to reduce the ongoing carbon usage.

The project group felt that making the building significantly more sustainable would have substantially increased the cost of the build, and this was not the core priority of the project when it took place. Retrospective improvements would also come with significant expense.

As with many projects built at this time, the decisions regarding sustainability may have been different were BDI being designed at the current time. However, the belief is that the balance between sustainability and space was correct at the time that BDI was built.

## FEEDBACK RELATING TO QUALITY OF BDI



Overall quality and the quality of finishes, materials and equipment were rated above ‘8’ by both interviewees and scoresheet respondents. Most respondents were satisfied, with some giving ratings of ‘10’ for quality.

One interviewee said:

*‘The quality and finish of the building was to a high standard. Someone was reported to have said that ‘some people would never get to work in a facility of such a high standard’.’*

## DOES BDI MEET THE NEEDS OF THOSE WHO USE IT?

Overall, BDI does meet the needs of its users. It is a space that people enjoy working in and are proud to bring visitors to. The building looks good both inside and out. Its location and aspect have allowed the university to present itself to the public passing on the tram and promote the research being done at the University of Nottingham.

The BDI has welcomed people from outside of the university, including other educational institutions to show what has been achieved with the building and the research within it.

To some extent, the BDI has been a victim of its own success, with more people wanting to work in the facility than it was originally designed for. This can make the space feel a little tight and with hindsight the offices could perhaps have been a bit bigger and the laboratories slightly smaller. These challenges could be improved by resolution of the issues with the tablets outside rooms. This is because it would allow the principle of all offices and meeting rooms being available for use to be fully realised.

# WHAT MIGHT HAVE BEEN DONE DIFFERENTLY?

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During the design phase, the consultation could have been managed differently to make it easier to capture user requirements. Having smaller focussed consultation groups was identified as a methodology that would be useful in future.

Due to the complex requirements of the spaces, it may have been beneficial to have someone from the BDI operational team embedded in the project group, so that they had the time to focus on the project and feel supported by the university.

The commissioning element could have been more thorough, with further commissioning visits taking place once people had moved in and filled the spaces. This would have more quickly identified the issues with the safety cabinets and avoided considerable anxiety in relation to performance.

The amount of people given the opportunity to work in the new BDI building could have been better controlled, to avoid it being over-populated. In addition, there needed to be someone from the faculties clearly identified to manage the move and tell people where they were going. This would have improved both the move-in process and users initial impression of the building.

Now that the multi-user labs are in use, there are some improvements identified that would improve experimental flow. These were not understood at the time of development but had access between floors been possible within the laboratory containment zone this would have eased experimental flow. This can be a learning point for any future buildings adopting a similar approach to workspaces.

Suggestions identified included:

## **Project team**

- Adapting the consultation process to ease the gathering of user feedback.
- Additional commissioning once users have moved in.
- Management of how many people moved into the building.

## **End users**

- Better management of the move in.
- Improved consideration about experimental workflow and movement between the multi-user labs.

# BEST PRACTICE

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Although there are some improvements identified, it is clear from the feedback gathered that this project has, overall, been extremely successful. Ratings given are appreciably higher than usually seen in post occupancy evaluation, most particularly in relation to the project journey but also in relation to quality and overall operation.

Several members of the project team had worked with the university on previous projects and this experience was a benefit to the project. Continuity with the architect from the previous BDI developments meant lessons learned from that project were not repeated. However, new members were also welcomed to the team and quickly felt committed to the project.

The project group universally felt that the project vision had been clear, that engagement and communication had been good, and the relationships played a key role in the project success. The right people were engaged at the right time, and all went the 'extra mile' because they understood the valuable contribution that the building would make to important research.

There are a number of learning points which were highlighted as best practice, which should be utilised on future projects wherever possible.

## Recommendations

- Have a clear vision and brief for the project goals at the time that consultants are engaged. Ensure that adequate time is set aside to understand and develop the design with the architects.
- Complete extensive consultation with end users, ensuring that the right people are involved. There should be a willingness and flexibility to develop and reject ideas on both sides.
- Where experience exists with consultants and contractors from previous, similar developments, this should be utilised as the continuity can bring significant benefit.
- Ensure key roles and responsibilities are clearly understood by the whole team.
- Ensure that the project team understand the 'story' of the building and the benefits that the building will bring to research or facilities. This understanding helps the project team to understand the purpose of the work and can inspire feelings of pride and deeper meaning.
- Ensure that a culture of open and honest communication is cultivated across the team. Team members should know who to speak to about queries and there should be regular meetings with documentation to record actions and information required.
- Where value engineering is required, ensure that this is done in a holistic manner by the right people. It is important to spend money on the features that really matter, to get maximum satisfaction. Consider long-term lifespan and maintenance when making value engineering decisions.



- Where complex equipment is being installed or moved, formalise the need for the M&E designers to potentially visit sites to gather data so that the M&E design is correct.
- Take building users along on the project journey by giving them opportunities to visit the building during the construction phase. This will ensure that they feel engaged and know the efforts being made to meet their needs.
- Formalise the process of having someone from the main contractor remaining on-site for three months post project completion. This ensures that snags and minor defects are swiftly resolved and has been demonstrated to improve user satisfaction.

# OVERALL OUTCOME

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Overall satisfaction in the outcome was extremely high. 85% of all respondents said that they were 'satisfied'. 60% awarded a rating of '9' or '10' when asked about their overall satisfaction.

Despite complexities in the design and requirements, the project journey was extremely positive, and the end product is excellent. People are proud of the building, were glad to be in the project team and have formed lasting working relationships.

One respondent said:

*'I am very proud of BDI. I think it looks great, it feels great when you are inside, and the process of delivering it was really enjoyable.'*



# CONCLUSION

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Overall, this was a very successful project which has resulted in a building that looks good, is a pleasant place to work, and provides state-of-the-art facilities for important research in the field of bio-medical science.

The project team were proactive and used prior experience of working together to benefit the design and construction phases. New team members were welcomed, and stakeholders engaged. Communication routes were open and honest, resulting in trust and confidence. Throughout the process stakeholders felt informed and involved.

These factors came together to result in a project that was delivered on time and to budget, with an end product that meets the needs of users. In addition, those involved in the project had a positive experience, meaning that they would like to work together again and have continued to support the university where appropriate.

There is much that can be taken from this project as best practice learning, which would be helpful to ensure the success of future projects.

To sum up, one project group member said:

*'It was potentially a very difficult project; with lots of risk for the university, risk for the contractor and complexities in design. It was handed over on time, on budget and with everyone working successfully. It was a lovely project for all parties.'*

# APPENDIX I: RECOMMENDATIONS

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## Best Practice

The BDI expansion project was extremely successful with works delivered on time and to budget, with an end product which meets users' needs. The project team and stakeholders found the process positive and collaborative, meaning strong, lasting relationships were built. A significant number of best practice suggestions were identified which can be utilised to improve the delivery of future projects.

- Have a clear vision and brief for the project goals at the time that consultants are engaged. Ensure that adequate time is set aside to understand and develop the design with the architects.
- Complete extensive consultation with end users, ensuring that the right people are involved. There should be a willingness and flexibility to develop and reject ideas on both sides.
- Where experience exists with consultants and contractors from previous, similar developments this should be utilised as the continuity can bring significant benefit.
- Ensure key roles and responsibilities are clearly understood by the whole team.
- Ensure that the project team understand the 'story' of the building and the benefits that the building will bring to research or facilities. This understanding helps the project team to understand the purpose of the work and can inspire feelings of pride and deeper meaning.
- Ensure that a culture of open and honest communication is cultivated across the team. Team members should know who to speak to about queries and there should be regular meetings with documentation to record actions and information required.
- Where value engineering is required, ensure that this is done in a holistic manner by the right people. It is important to spend money on the features that really matter, to get maximum satisfaction. Consider long-term lifespan and maintenance when making value engineering decisions.
- Where complex equipment is being installed or moved, formalise the need for the M&E designers to potentially visit sites to gather data so that the M&E design is correct.
- Take building users along on the project journey by giving them opportunities to visit the building during the construction phase. This will ensure that they feel engaged and know the efforts being made to meet their needs.
- Formalise the process of having someone from the main contractor remaining on-site for three months post project completion. This ensures that snags and minor defects are swiftly resolved and has been demonstrated to improve user satisfaction.

## Availability of offices and meeting rooms for open use

A central principle to the operation of BDI was the ability for all offices and meeting rooms to be booked by users when they were not in use, including those assigned to staff. This is

fundamental to manage capacity challenges and is recognised as best practice. In addition, the BDI team are being asked to promote this to other academic institutions. Unfortunately, this core way of working is being undermined because tablets outside of rooms are no longer operating. It is suggested that the works to rectify this issue need to be reprioritised so that the BDI working model can be maintained and reputational damage is avoided.

- Works to restore operation of the tablets outside of the offices and meeting rooms should be re-prioritised. This equipment is fundamental to the operating principles laid out for the BDI facility and will assist with the issue of the building being very densely occupied. It will also maximise the first impression of the building on visitors, including other educational institutions.

## **Space**

The number of people based in BDI is higher than the 80% occupancy that it was originally planned for, meaning that space feels tight. This needs to be monitored and managed going forward to prevent the issue with space becoming worse. In the future, the university needs to consider different provision of space, including reviewing the need for individual offices differently and increased desire for informal breakout spaces.

- Faculties need to carefully manage the amount of people based in the building to avoid overcrowding.
- Maintain hybrid working if this assists the issues with lack of space. This could be formalised if it would be advantageous.
- Tablets outside offices and meeting rooms are key to ensuring that users know when spaces are available for use. This was a fundamental principle in the operation of the building and the maximisation of limited space. This issue needs to be rectified as a priority.
- For future developments, consider whether individual offices are necessary or whether offices could be shared between several staff.
- For future projects, consider break-out spaces which are viewed positively by users. Install booths if they support the need for video calls and small discussion groups.

## **Multuser labs and experimental flow**

It is recognised that multuser labs have maximised the use of lab spaces and improved collaboration. However, as a new way of working there are some limitations to experimental flow which were not understood until the spaces started to be used. Lessons can be learned from BDI if a similar approach were to be planned for a future building.

- If a future building is planned with a similar multi-user lab approach, ensure that workflow is considered within the design phase. Create a user group to look at this aspect with the design team.
- For future projects with multi-user labs on different floors, include access between floors within the containment zone to improve experimental flow.

## **Consultation and engagement**

Significant efforts were made to engage with faculties and users; to ensure that requirements were understood and delivered. Whilst this was very positive and gave good outcomes, there were improvements that could have been made including increased involvement from faculties and the Estates team.

- Where extensive consultation is required to understand user needs, ensure that the size and focus of the groups is correct. Information from several, smaller groups may be easier to manage than from one large group.
- Ensure that users are engaged at the earliest opportunity, so that their needs can be understood by the project group.
- Faculties should ensure that managers understand the requirements from them and give a clear steer on the project. Academic staff need to remain engaged throughout the project journey.
- For complex projects consider embedding a member of the operational team in the project group to ensure that they have time for the project and feel supported.
- The main contractor should have meetings with members of the wider Estates team after appointment; to address key issues and so that they feel engaged with the project.
- Maintenance staff should feel they can visit the construction site during the build process and be given the opportunity to arrange ad-hoc visits if scheduled meetings are missed.

## **Handover, commissioning, and management of the move**

The management of the move, in terms of people, was not as well organised as it could have been. Though not a result of the building itself, this still impacted the first impression of users when they came to BDI. There were also some issues in relation to training and commissioning which could be learnt from for future projects. Having someone from the contractor remain on-site for the initial post-contract period did mean that snags were dealt with very effectively and this should become standard practice for projects.

- For future projects, the faculty needs to define individuals to manage the relocation from one building to another. This will give a clear lead for the move and give users a communication point during the transition.
- Maintenance staff and external contractors should attend training sessions when offered. Refresher training should be considered if it will be beneficial.
- Within the contract include the requirement for additional commissioning visits. These should take place between the pre-use installation commissioning check and the 12-month maintenance visit, once the room is occupied and in normal use.
- Within the contract, include the requirement for someone from the main contractor to stay on-site during the first three months of the defects period.

## **O&M manuals**

O&M manuals were rated poorly with staff finding them hard to use or simply not knowing where to find them. The manuals need to be stored in an agreed location where they are

accessible to staff, and the format of user manuals refined to make them useful to the staff who are managing building operations.

- Ensure that maintenance personnel know where to find O&M manuals and that the manuals are always accessible from the agreed location.
- Engage with end users at the point when the contractor is collating the O&M manual to ensure that all the required information is included.
- Where appropriate, create a bespoke building user guide, to assist operational staff in the ongoing maintenance, repair, and improvement of the building.

## **Goods-in and unloading**

Taking deliveries at the BDI is challenging because of a small goods-in area which has a very heavy door. In addition, there is not an allocated loading bay for the building. These issues were unavoidable due to the size of the building plot, but some actions could be considered to make deliveries easier to manage. Some large deliveries have gone to the wrong location due to changes in the name used for BDI, which are recorded incorrectly in some university systems.

- Get security to re-assess the layby to assist with the unloading of goods.
- Consider automation of the heavy good-in doors, or installation of a roller shutter, if this becomes a major issue.
- Only release the names and numbers for buildings once they are finalised to ensure consistency of records across all systems.

## **Diversity and inclusion**

Efforts were made to be inclusive when the BDI was designed and there is provision for those with additional needs, or disabilities. However, for future buildings there are improvements which should be considered to improve inclusivity.

- Once compiled, use the design guide for neurodiversity and hidden disabilities to inform the requirements for future buildings.
- For future projects, consider the ability to dim lights in appropriate areas; both for work purposes and to aid those with neurodiversity.
- When developing facilities consider spaces for prayer, nursing mothers etc. If there are no available facilities nearby on the campus, then specific provision may be required.

## **Operational management and equipment**

Overall, the operational management of the building is good, and equipment and services have worked well to meet the needs of users and those running the building day-to-day. However, there are some actions which could improve the ongoing management of BDI or be used to inform future projects.

- Create a BMS page to allow the local operational team to easily view the BMS data and monitor for issues, so they can be rectified by staff on-site.

- For future projects ensure that isolation valves for piped gases are in locations which are hidden but make them reasonably accessible in the event of a gas leak.
- Ensure that the correct equipment supplier is engaged when discussing issues and that long term maintenance is considered when making equipment selections.
- For future projects, consider the heat being produced by equipment and ensure that mitigation, such as air-conditioning or ventilation, has been put in place to prevent over-heating.
- Operations team to carry out a door handle survey so that any outstanding issues can be reported.