

# openBIM

## FOR A NORDIC SUSTAINABLE BUILDING INDUSTRY

### Sustainability by openBIM

Use of openBIM on the new Iceland National Hospital to achieve strict sustainability requirements

Óskar Valdimarsson  
Iceland

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# The development of design

- Originally the architect and the engineer were the same person. Therefore co-ordination was easy.
- When more complex building projects were introduced, specialization developed within the design sector.
- This specialization meant a separation of disciplines, which called for a change in communication.
- The separation started approx. 500 years ago.

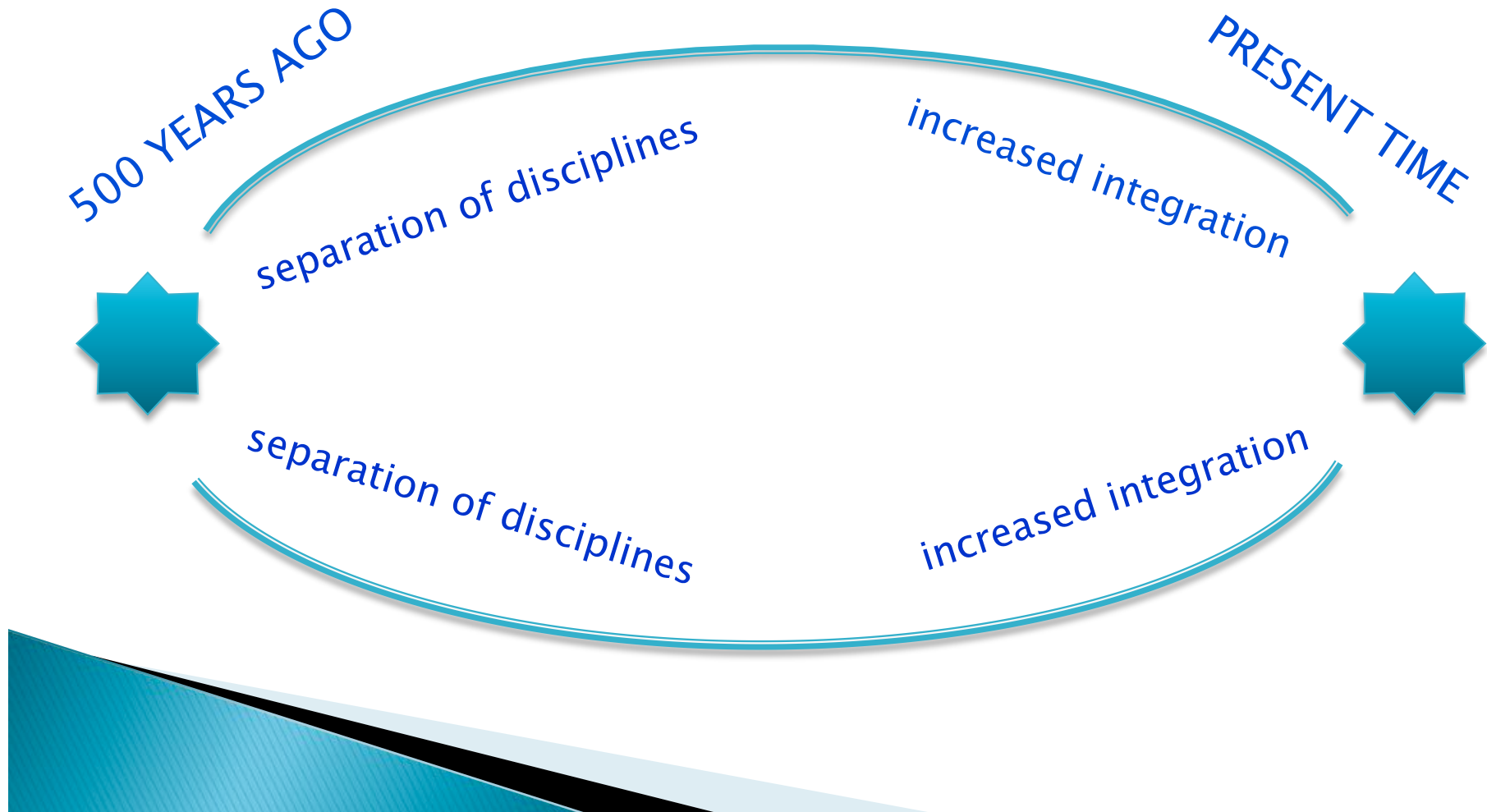


# The development of design

- The flow of information and knowledge between disciplines was inadequate and pushed for new approaches.
- A need for increased integration became obvious, both in the technical and organizational fields.
- The concept of “design teams”, “project teams” or “project offices” was introduced in an attempt to solve this problem.



# The development of design



# The development of design

- With the introduction of “The Cloud” physical project offices might be replaced by “virtual site offices”.
- Emphasis on sustainability and life cycle costing also pushed for increased collaboration, especially in the early stages of design.
- A new approach was needed.
- Building Information Modeling (BIM) and Integrated Planning and Design (IPD) were introduced.....



# Definition of BIM

Within the context of this presentation

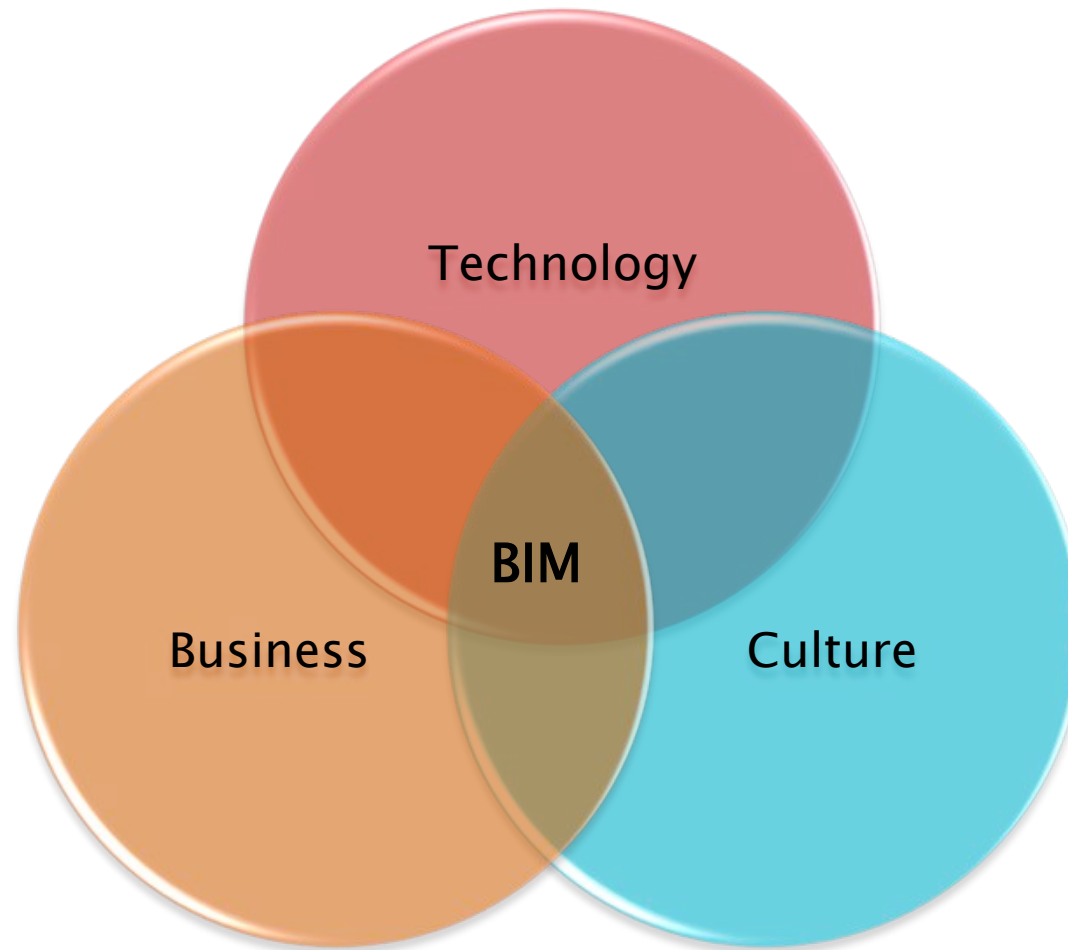
## Building Information Modeling – BIM:

- BIM is a process of generating and managing building data during its complete lifecycle, from conceptual design through maintenance and operation of the building.
- The process is based on the involvement of all stakeholders from the earliest stages where decisions are made with all the information shared – up front.
- The product is a three-dimensional virtual model that contains detailed information about the layout of the building, its components and materials and their main characteristics.



# Building Information Modeling

## The three drivers of change



# Definition of ID

Within the context of this presentation

## **Integrated planning and design – ID:**

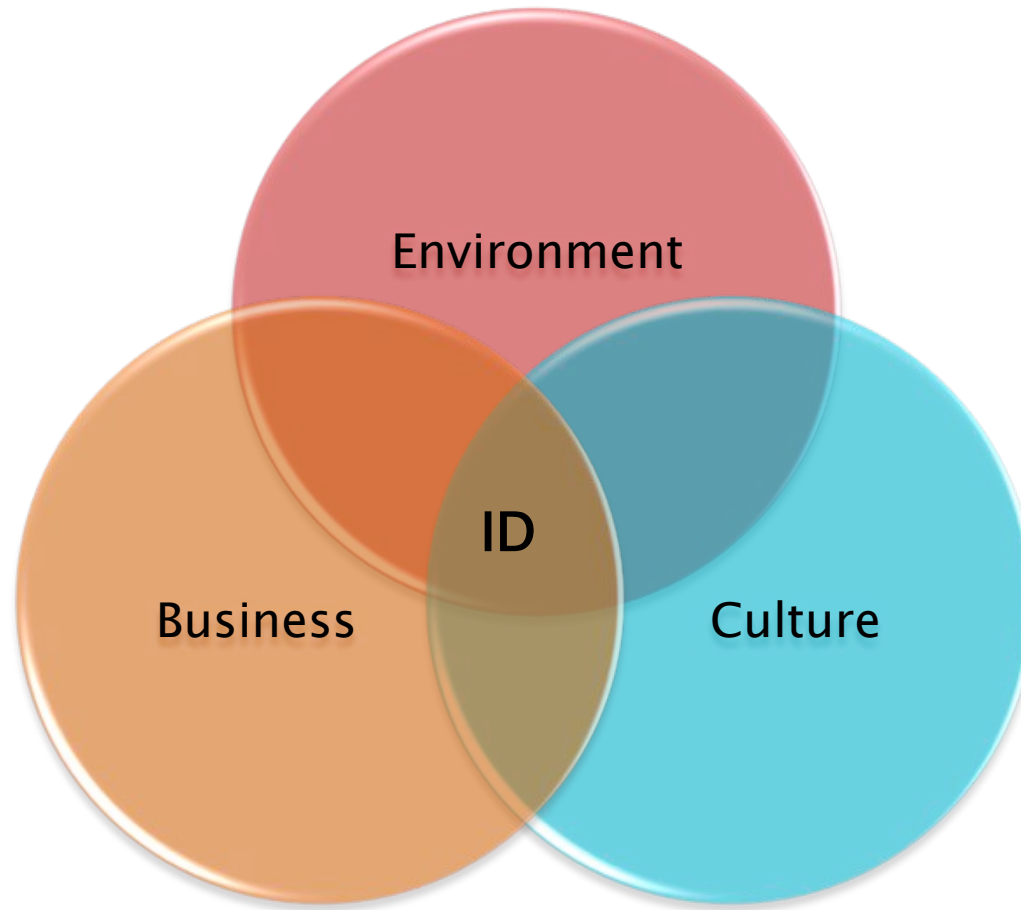
- ID is a collaborative approach to building design marked by the qualities of early participation by all team members.
- ID involves all stakeholders from the earliest stages where decisions are made with all the information shared – up front.
- ID stems from the environmental arena in its pursuit to create high-performing facilities, streamlining and going lean.

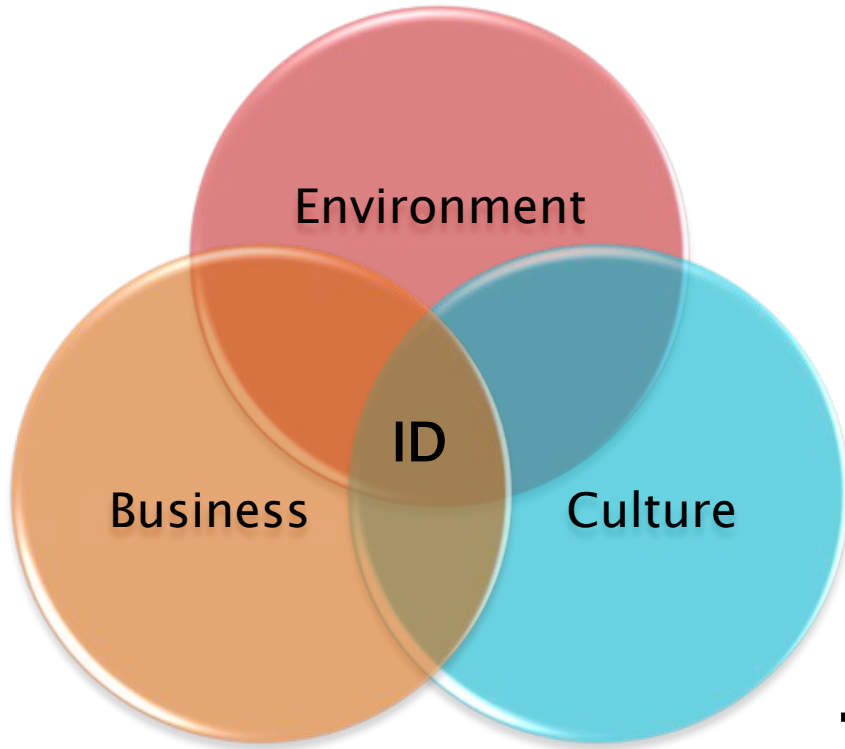




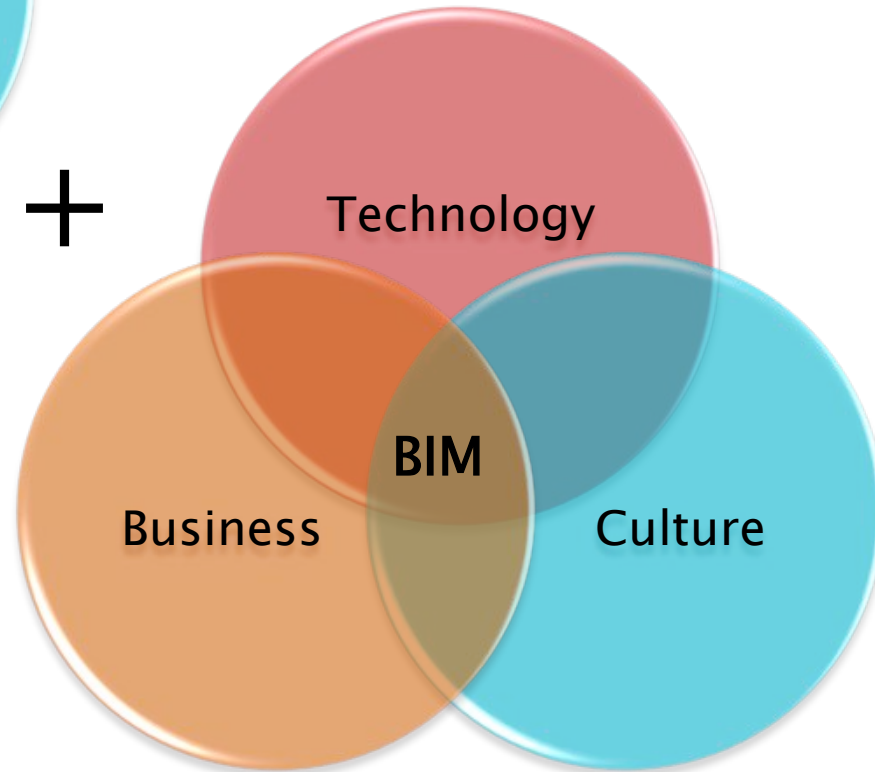
# Integrated Planning and Design

The three drivers of change

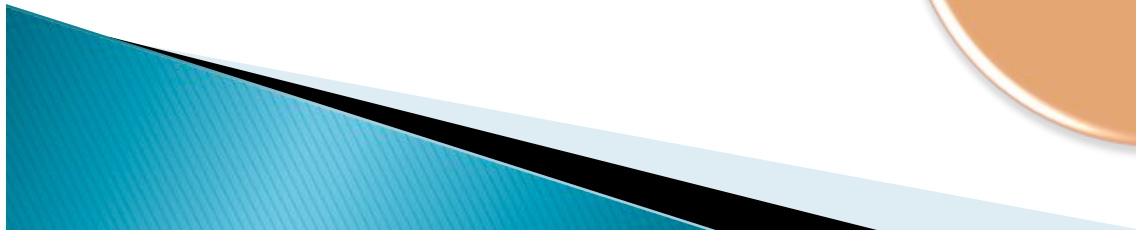


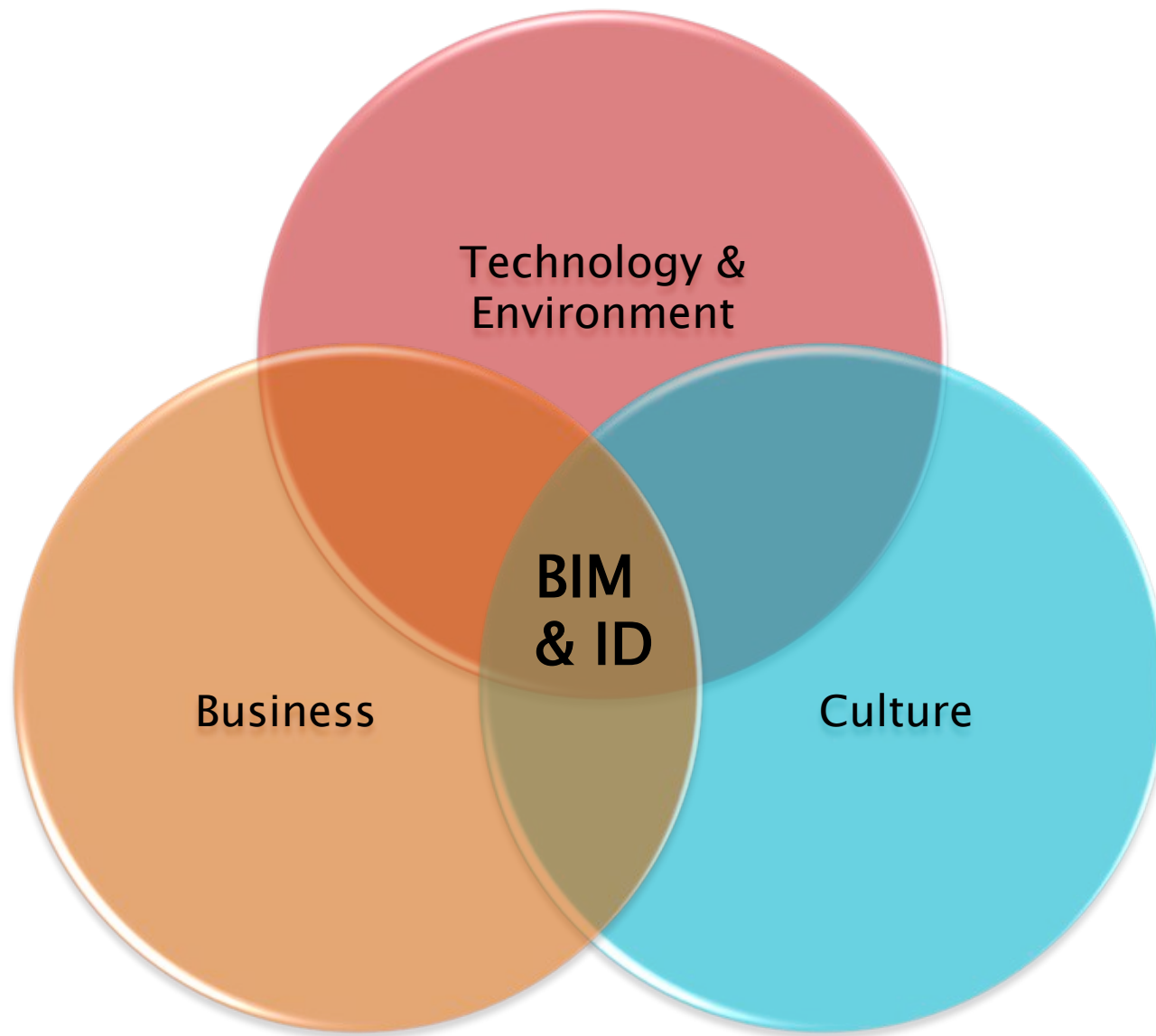


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# BIM and ID – Excellent partners

- The life cycle costing approach calls for decisions at a very early stage in the design process.
- Energy calculations, daylight considerations and other environmental issues also call for analysis to be carried out at an early stage in the design process.
- Before the introduction of BIM these demands were difficult to meet at an early stage in the design process, since there were no “common” models.
- For different disciplines to be able to transfer information between different software and receive feedback, openBIM with the IFC standard is a must.

A blue banner with a white grid pattern, mounted on a red wall. The banner is held in place by two black horizontal bars. The text on the banner is white and reads "WIFI 802.11B AVAILABLE" in a large, bold font, with "High-speed Internet Access" in a smaller font below it.

**WIFI 802.11B AVAILABLE**  
High-speed Internet Access

# Iceland National Hospital



65.000 m<sup>2</sup> new construction

# Iceland National Hospital



# Iceland National Hospital





# The Design Team SPITAL

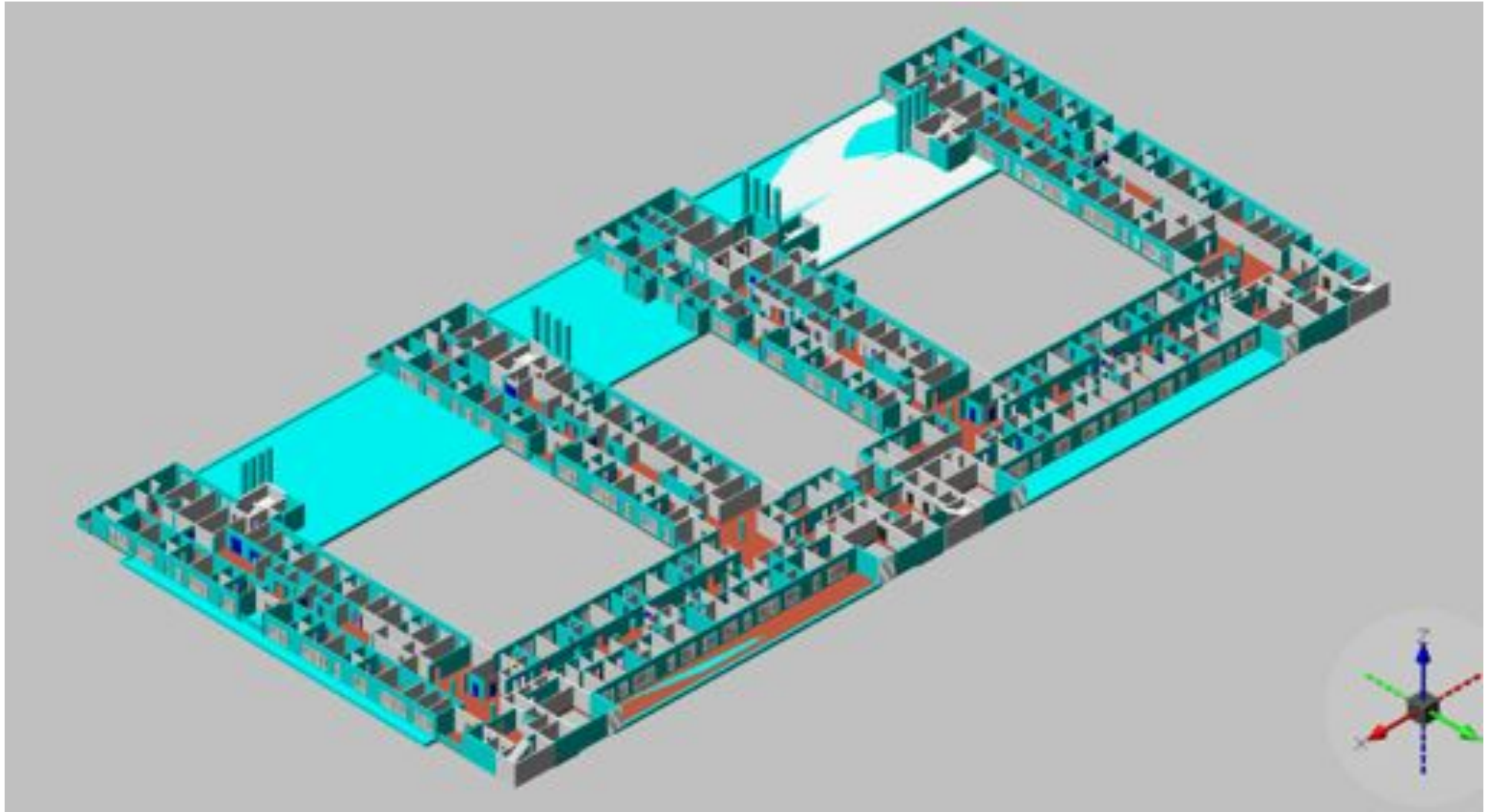
- The design team was composed of several smaller architectural firms and one larger engineering firm.
- The team used many different software packages in their design (however, same within each building):
  - MicroStation from Bentley
  - ArchiCAD from Graphisoft
  - Wectorworks from Nemetschek
  - TEKLA
  - Revit Structural and MEP from Autodesk
  - ...and some more



# The Design Contract

- The contract was for a 20% design – which is now completed.
- All design was to be carried out in BIM from the very start – using BIM requirements from either Statsbygg or Senaatti. SPITAL chose Statsbygg´s requirements.
- All BIM model delivery to the owner was carried out using the IFC format.
- The owner performed model checking with Solibri, using the IFC files.
- Contractual specifications were based on rules and forms published by the Danish bips.

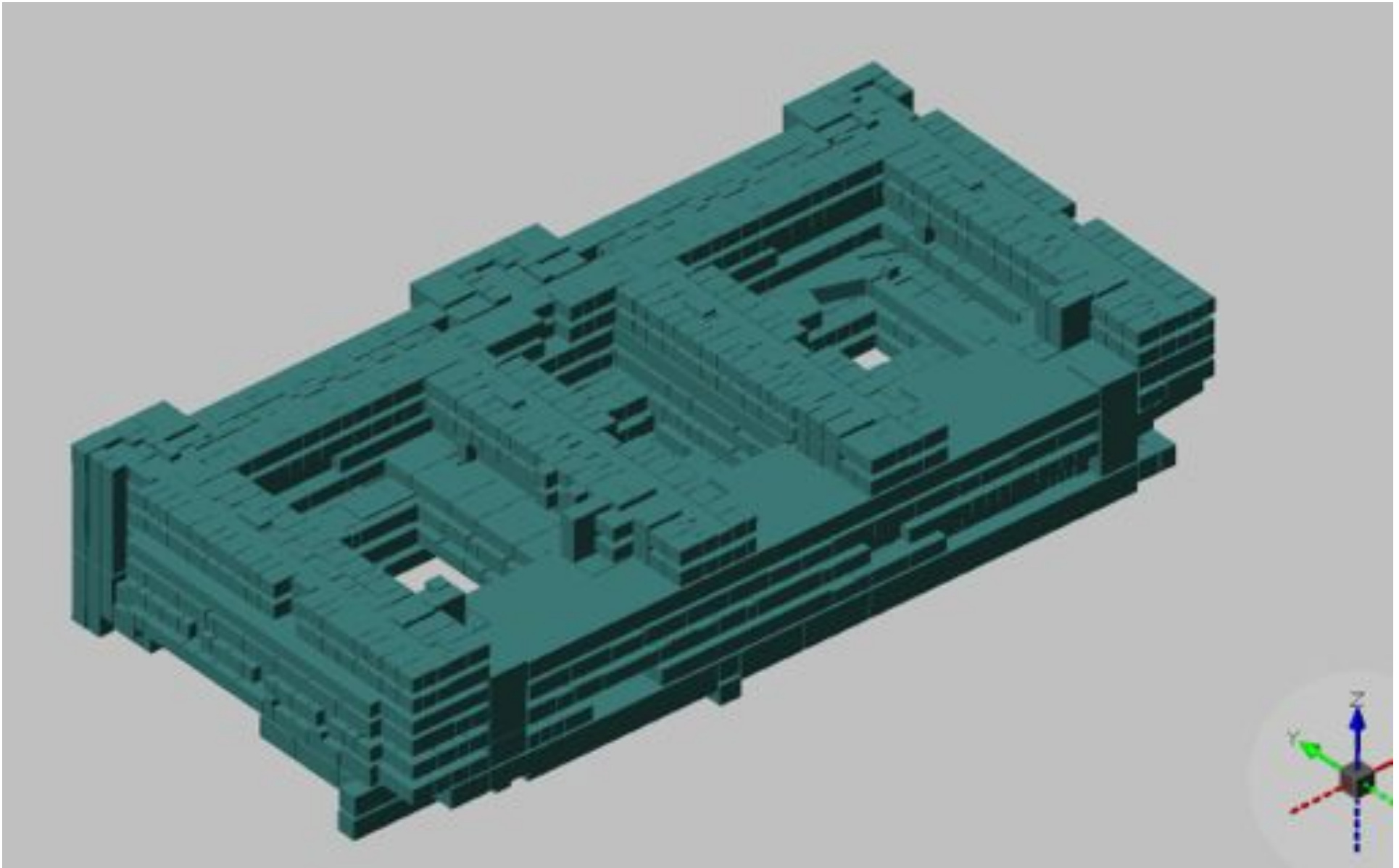
# Treatment center – First floor



# Environmental Certification

- The owner made a decision – before the design work started – to seek a BREEAM environmental certification.
- The goal is quite ambitious – the score “Excellent” which means 4 stars out of 5 possible (70% score).
- BREEAM has not been adopted to the Icelandic conditions, so we are using BREEAM International.
- Each one of the five buildings will have a separate environmental certificate.

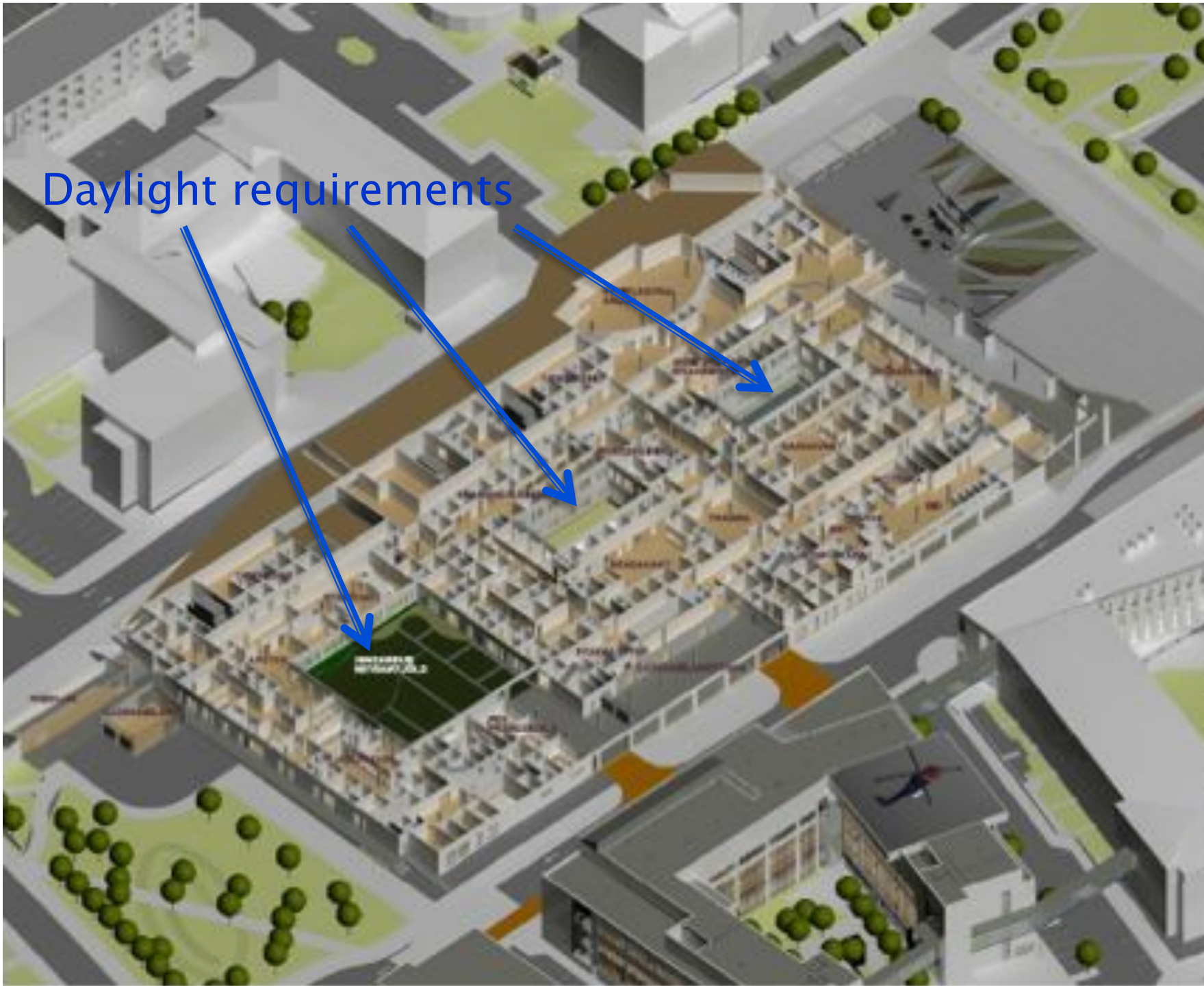
# Model for space analysis



# The BREEAM pre-score

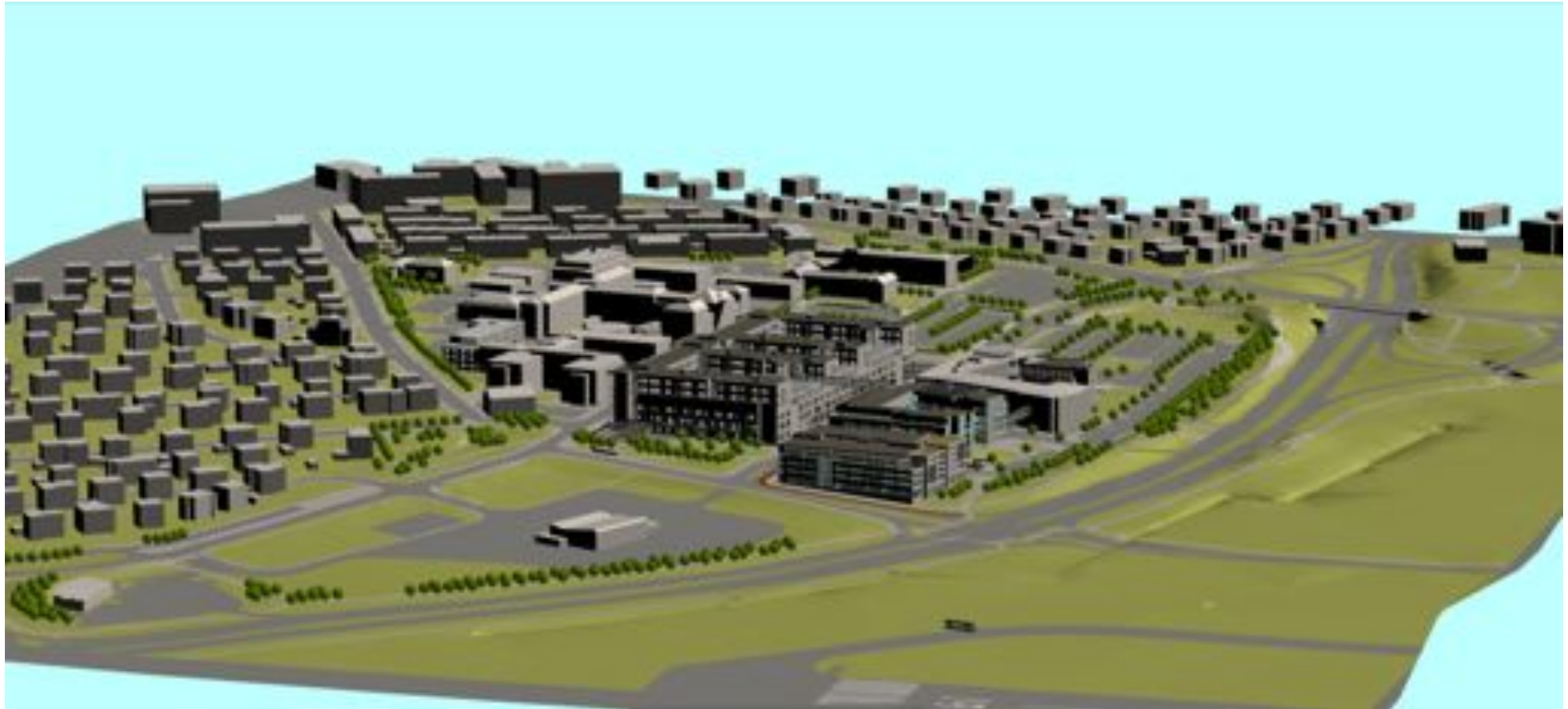
- At the completion of the 20% design, a BREEAM pre-score table was delivered to the owner, indicating that the “Excellent” score can be achieved.
- Each line item in the prescribed BREEAM requirements – for the score of Excellent – has been studied, some with the aid of the BIM models.
- The BREEAM requirements have formed the basis for the general requirements set forth in the project specifications for the contractor/design team.

# Daylight requirements



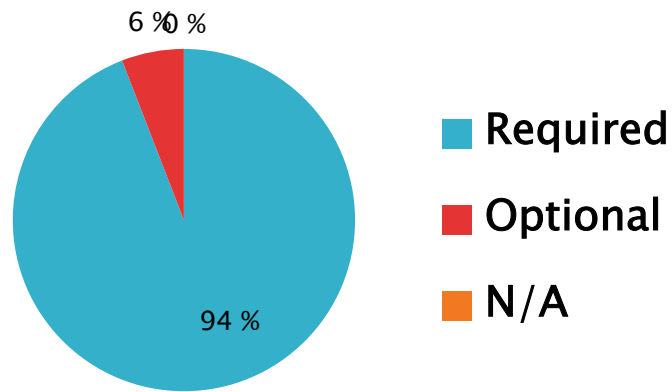


# Model used for traffic studies

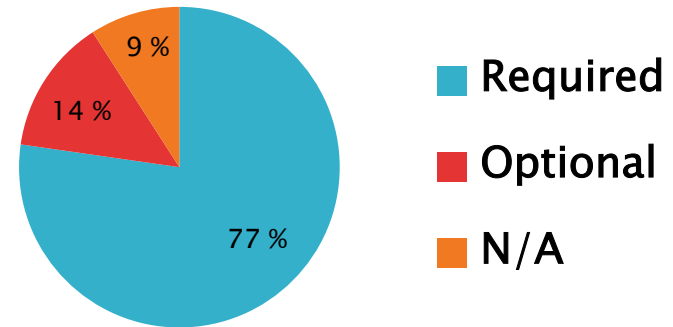


# The BREEAM pre-score

## Management (environmental)

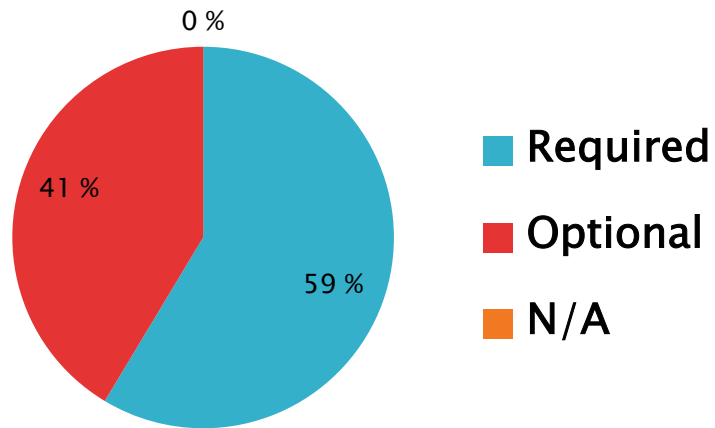


## Health and wellbeing

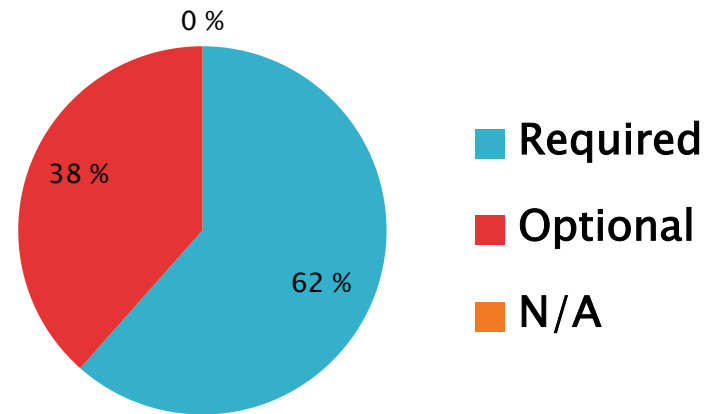


# The BREEAM pre-score

## Energy

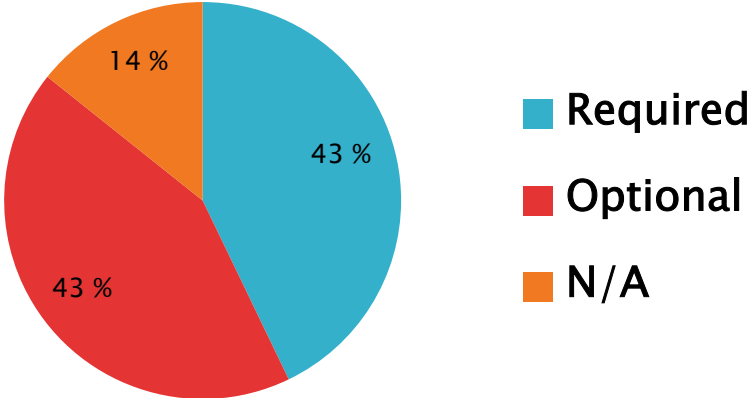


## Transport

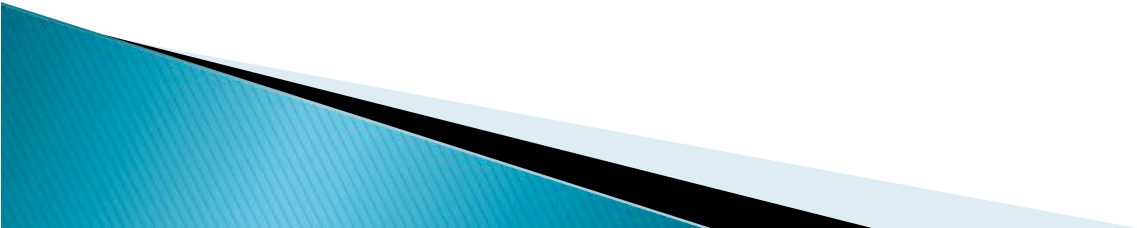
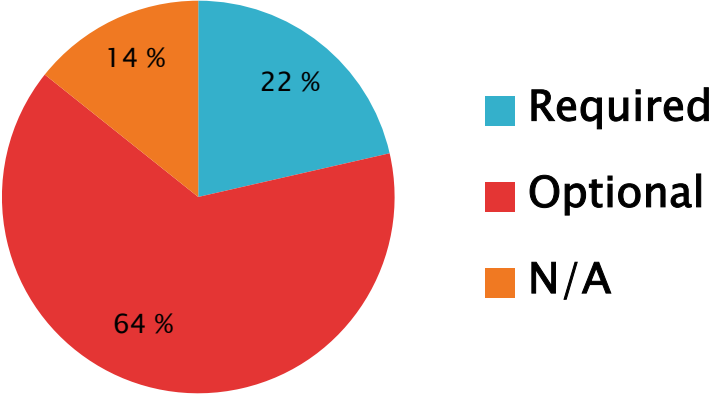


# The BREEAM pre-score

### Water

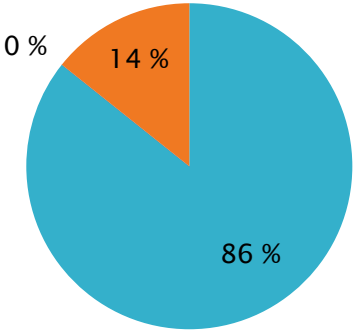


### Materials



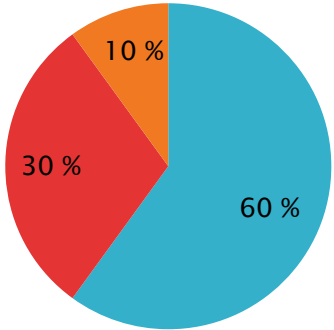
# The BREEAM pre-score

Waste

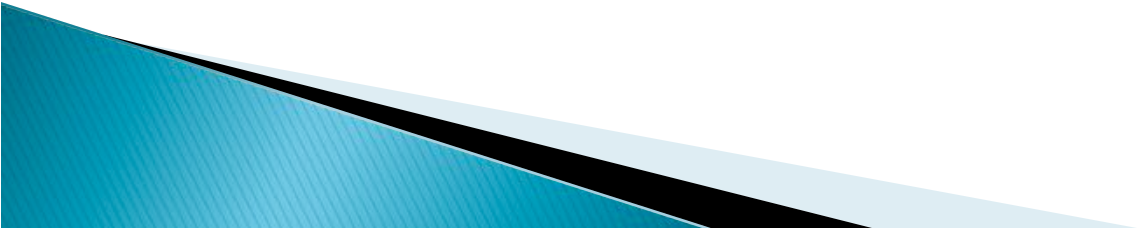


- Required
- Optional
- N/A

Land use and ecology

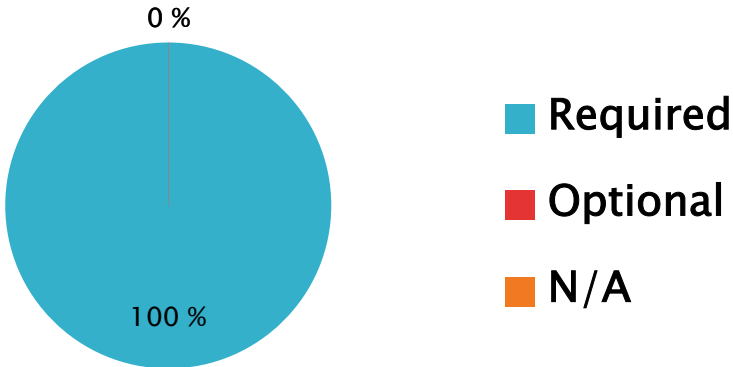


- Required
- Optional
- N/A

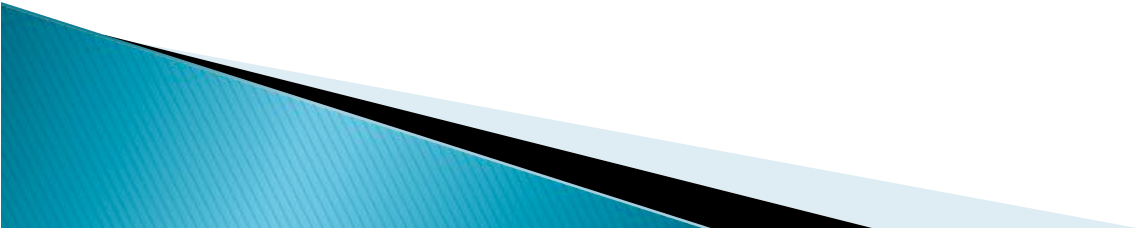
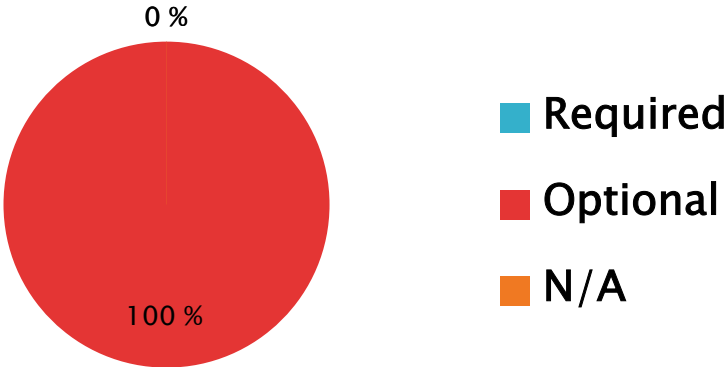


# The BREEAM pre-score

### Pollution

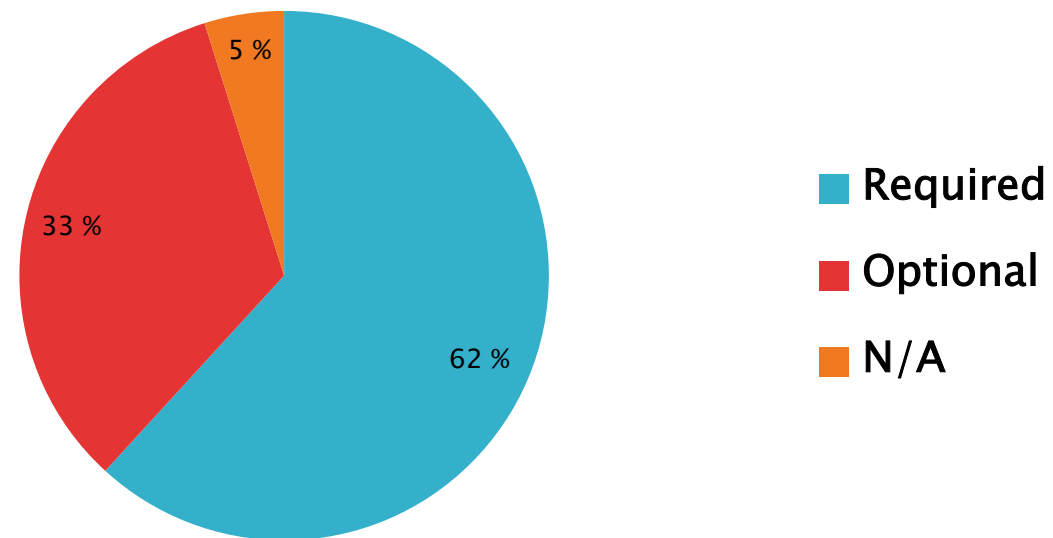


### Innovation



# The BREEAM pre-score

Total requirements



# The BREEAM final score

- A score of Excellent (4 stars out of 5) in the BREEAM certification system calls for at least 70% achievement.
- The pre-score defines 62% as required points and 33% as optional points. The contractor and his design team can select the “missing points” from the different categories. It is their choice.
- This method leans more towards performance specifications than prescriptive specifications.



# The Construction Site

- It is vital – for the development of the openBIM technology – to involve the contractors. Their feedback is extremely important.
- Before 2003 GCCA delivered printed drawings as a part of every tender document package. Since then we have only delivered CDs containing all documents – including drawings in the pdf format.
- From now on we will stop delivering drawings in a pdf format, but instead we will deliver them in “richer formats”, where the contractors can retrieve more info from them – using standard free viewers downloadable from the Internet.

# The Construction Site

- Our first project to go this route is the Center for Icelandic Studies – a 6.100 m<sup>2</sup> building now in the tender stage.
- All “drawings” are delivered in a “rich format”, derived from the BIM model.
- Free courses are offered to the bidders, where they are taught how to use this new technology.
- When a contract has been signed, GCCA will assist the contractor in taking his first steps in using these “rich drawings” for his benefit during the construction phase.

# The Construction Site

- The design team issues – in the tender documents – the most useful or relevant “rich drawings”.
- During the construction phase the contractor can ask for additional sections or views, all in this “rich format”.
- The BIM model itself will not be delivered to the contractor – at least not yet – since the knowledge how to make use of it is very limited.
- The BIM model will be updated to “as built” by the design team.

End.