



INNOVATIVE EDUCATIONAL INTEGRATION OF URBAN
PLANNING BASED ON BIM-GIS TECHNOLOGIES AND
FOCUSED ON CIRCULAR ECONOMY CHALLENGES

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TASK 02/A1.4 REPORT ON THE DEGREE OF IMPLANTATION OR USE OF BIM AT PROFESSIONAL LEVEL IN POLAND

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REPORT ON THE DEGREE OF IMPLANTATION OR USE OF BIM AT PROFESSIONAL LEVEL IN POLAND



Universitatea
Transilvania
din Braşov



ROMANIA
GREEN
BUILDING
COUNCIL



Centro Tecnológico
del mármol, piedra y materiales



Warsaw University
of Technology



Consortium members: Universitatea Transilvania din Braşov (UTBV), Asociația Romania Green Building Council (RoGBC), Universidad de Sevilla (USE), Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM), Politechnika Warszawska (WUT), Datacomp sp. z o.o. (Datacomp).



1. Introduction

So far, Polish government administration and other decision makers have not been able to get involved in implementing BIM at the national level. Despite this, many bottom-up initiatives can be noted that aim to familiarize the construction community with BIM issues. Courses and trainings, numerous conferences are organized and curricula taking dozens of studies, articles and books on BIM appear. The Polish Committee for Standardization is gradually implementing BIM standards. BIM is the subject of many engineering organizations; several new organizations dedicated to BIM were established.

There is a bimblog dedicated to BIM and the bim4u knowledge base. This report covers various aspects of BIM in Polish construction segment.

2. Analysis of the current legal status in Poland in terms of the possibility of using BIM technology

A review and analysis of the existing legal status was carried out in terms of the possibility of using BIM technology in Polish construction sector. In particular, it is about answering the question whether existing legal regulations constitute restrictions in this respect. In the absence of other recognized standards and BIM definitions, the equivalent of BIM Level 2 was adopted as a reference to the analyses.

In the first place, the analysis covers those areas that have the greatest impact on the use of BIM in public investments. These are:

- Intellectual property law.
- Public procurement law.
- The administrative law.
- The act on the computerization of entities performing public tasks.
- Broadly understood construction law.
- The act on spatial planning and development.
- Environmental law.
- The so-called. special act.
- Civil law together with the Code of Civil Procedure and criminal law.



2.1 Intellectual property law

Intellectual property issues include the following legal acts:

- The Act on Copyright and Related Rights (Journal of Laws of 1994 No. 24 item 83 as amended).
- Industrial Property Law (Journal of Laws 2001 No. 49, item 508, as amended).
- Act on database protection (Journal of Laws 2001 No. 128 item 1402 as amended).
- Act on combating unfair competition (Journal of Laws 1993 No. 47 item 211 as amended).

The above acts may have a significant impact on the possibility of using BIM in Polish construction sector.

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Copyright

Analysing the problem under the Act on Copyright and Related Rights in relation to BIM, it can be stated that the situation is analogous to design using CAD or older classic solutions, in which designers transfer property rights to the part of the project they have developed. We are dealing here with a practice in which individual industries can be distinguished as separate parts also in terms of copyright. In the projects developed in BIM, we are dealing with a greater integration of works where the model is created in cooperation with designers of various industries who work on one integrated model and it is often difficult to separate the copyrights of individual designers, or rather the whole project as a joint work of the entire team.

The solution used is the authorship matrix model, which defines the scope of intellectual property of individual model creators. Copyright must be taken into account when modifying the model, e.g. when using and managing the object. The solution here may be granting dependent rights by designers to the entire model.

Then the contracting authority possessing these rights may use it as needed. To sum up - the existing laws on copyright and related rights do not constitute a legal obstacle preventing the use of BIM at Level 2.



Industrial property Law

With regard to the BIM methodology, the law on the protection of industrial inventions and objects, in particular utility models and industrial designs, may be related to the use of library elements that may be protected as for industrial designs. This can apply to any library equipment or fittings. The use of libraries can be decided on a license basis. *Ustawa o ochronie baz danych.*

BIM documentation files are database files. Databases are protected on the basis of the Database Protection Act. There are currently no court judgments regarding copyright for BIM data from the perspective of the Database Protection Act. Due to the fact that the right to use data is transferable, it can be assumed that it may be transferred to the customer for the purposes of protecting BIM documentation.

Therefore, this Act does not limit the use of the BIM methodology.

Act on combating unfair competition

Acts of unfair competition include, among others, breach of business secret, which is made up of publicly disclosed technical, technological or economic information. There is a view that along with the native files some kind of "know-how" of the company related to the model's construction can be transferred. To avoid these concerns, it is recommended to use the IFC format, which only contains data about the model, excluding any indications as to the path of its creation.

The law on combating unfair competition is not in any way contrary to the possibility of using BIM technology.

2.2 Public procurement law

On June 22, 2016, there was a change in public procurement law (Journal of Laws 2004 No. 19 item 177 as amended). The amendment introduces an article that transposes the recommendation of the EU directive regarding the application of the BIM methodology in public procurement.

In accordance with art. 10e of the Public Procurement Law:

"In the case of works contracts or competitions, the contracting authority may require the use of electronic building modelling tools or similar tools. In this case, the contracting authority provides means of access to these tools in accordance with Article 10d until such tools become publicly available".

In the PZP draft of June 21, 2019, an analogous entry reads:

Art. 69. 1. In the case of works contracts or competitions, the contracting authority may require the preparation and submission of bids or competition works using electronic building modeling tools or other similar tools that are not generally available.

2. The contracting authority shall provide contractors with the option of using an alternative means of access to the tools referred to in paragraph 1.

This provision applies to works contracts, i.e. execution (build mode) or design and execution of construction works (design and build mode), and to the competition mode (in architectural terms).

In addition, paragraph 9. art. 30 states that in the case of service contracts (design), the contracting authority may require, inter alia, specific levels of quality.

Two remarks arise:

- The record therefore does not refer to the design of the object itself.
- There is no precedent or case-law to determine which 'building data modeling tools' are currently available to the public under law.

There is a risk, therefore, that in proceedings with the requirements of the use of BIM, contractors will demand "sharing of BIM access means".

Taking this into account, it can be concluded that commissioning services with the participation of BIM is therefore possible under current public procurement law.

Regulations to the Public Procurement Law

The scope of the description of the subject of the contract for construction works is regulated by the ordinance of the Minister of Infrastructure of September 2, 2004 regarding the detailed scope and form of design documentation, technical specifications for the execution and acceptance of construction works, and the functional and utility program. Design documentation for the purpose of performing construction works requiring a building permit consists of:

- Construction project.
- Detailed designs.
- Bill of quantities.
- Information on safety and health protection.

The ordinance also describes the form of the bill of quantities and detailed designs. These provisions do not prevent the use of BIM. Detailed designs are described as drawings, but they can be generated from any BIM system. It is similar with the bill of quantities.

None of the elements of public procurement law excludes the possibility of using BIM at a level corresponding to BIM Level 2.

2.3 The Code of Administrative Procedure and the Act on the computerization of entities performing public tasks

The Code of Administrative Procedure (Journal of Laws 1960 No. 30, item 168 as amended), regulates relations with public administration bodies and their conduct. The administrative procedure was historically based on written documents, which constituted a real barrier to the use of IT tools, e.g. in designing. The Act of 2014 on the computerization of the activities of entities performing public tasks introduced into the Code of Administrative Procedure a number of provisions aimed at the use of electronic documents. The data formats are specified in the Journal of Laws of January 25, 2016 on the National Interoperability Framework, minimum requirements for public registers and electronic exchange of information, as well as minimum requirements for ICT systems. The document formats listed in the document are pdf (for text and graphic files), xls, xlsx (for calculation), ppt, pptx (for scheduling), doc, docx (for descriptive documents), zip, gzip, 7z for compressing files.

Attachments provide formats for graphic design information:

- *.dwg* - AutoCAD binary file with Autodesk vector graphics.
- *.dwf* - compressed AutoCAD Autodesk file.
- *.dxf* - AutoCAD file encoded with Autodesk ASCII characters.
- *.dgn* - MicroStation vector graphics files from Bentley Systems.
- *.jp2* - Joint Photographic Experts Group 2000.

As you can see, the regulation does not yet provide for the use of the *.dxf* format, native formats such as *.rvt*, *.nwd*, *.nwc*, *.nwf*. or *.ifc* format.

Certainly, the question arises whether enabling public entities to accept electronic documents in formats other than those permitted by the Regulation will be a significant change for the implementation of the BIM methodology in Poland. It is postulated to extend the regulation by *.ifc*.

2.4 Construction law

In addition to many matters, the Construction Law Act also specifies the procedure to be followed when a building permit is obtained. In particular, in accordance with art. 33 should be attached to the building permit:

"Four copies of the construction design together with opinions, arrangements, permits and other documents required by specific provisions (...)".

The shape of this special provision indicates that it is to be paper documentation. This was clarified in the Regulation of the Minister of Transport, Construction and Maritime Economy of 25 April 2012 on the detailed scope and form of a construction project (Journal of Laws 2012 item 462): a cover adapted to A4 format in a way that prevents project decompletion'. Because drawings can be generated from any BIM design system and can be printed, this does not limit the use of BIM. A separate issue is the efficiency of using paper-based drawings.

Pursuant to the Construction Law, there is also an obligation to provide as-built documentation, which is documentation with changes introduced during the execution of works. BIM systems are perfectly suited for this purpose - the task of people working in BIM is the ongoing updating of project documentation during the work. Therefore, after the works are completed, drawings can be generated, adequate to the generation of the architectural and construction design.

The construction law also specifies the obligations of the property manager. The manager is obliged to ensure the safe use of the building and maintain and use the object in such a way as to prevent excessive deterioration of its performance and technical efficiency. In addition, managers are required to keep complete records of the construction of the facility. In most cases, there is also an obligation to keep a building book.

Documentation in BIM created at BIM Level 2 meets the requirements of the construction law.

Regulations regarding technical conditions

Technical conditions are a group of ordinances which include a large group of technical requirements for particular groups of buildings. These include, but are not limited to, technical conditions regarding:

- Buildings.
- Public roads.
- Railway constructions.



- Road engineering facilities.
- Subway lines.
- Junction of railway lines and sidings with roads.
- Civil airports.
- Telecommunication buildings.
- Construction works other than buildings, serving the defense of the State.
- Gas networks.

The group is very large, and each act presents requirements for many types of objects. These conditions can be met by developing project documentation in a BIM environment. They do not conflict with the possibility of implementing BIM at BIM Level 2.

2.5 Act on spatial planning and development

The Act on spatial planning and development (Journal of Laws of 2003, No. 80, item 717, as amended) defines the procedure for obtaining a decision on the location of a public investment as well as on determining the development conditions. The Spatial Planning and Development Act does not limit the possibility of using the BIM methodology at Level 2. In addition, the implementation of the concept using this methodology, which will be used to obtain administrative decisions under the above Act, may lead to earlier notice of potential incompatibilities or discrepancies, thanks to the use of three-dimensional modeling.

2.6 Environmental law

The Environmental Protection Act (Journal of Laws 2001 No. 62, item 627, as amended) is neutral from the point of view of the design process and concerns systemic matters. In turn, the Act on providing information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (Journal of Laws 2008 No. 199 item 1227 as amended) sets out the rules for obtaining decisions on environmental conditions. In order to obtain it, it is necessary to prepare a project information card or an environmental impact report. These documents can be successfully created, among others, using BIM tools. Given the above, environmental law does not prevent the use of BIM at Level 2.



2.7 Road "special act"

It describes the procedure for obtaining a decision authorizing the implementation of a road investment. One of the necessary elements attached to the application are four copies of the construction project, i.e. the same document that is required by building law in the event of obtaining a building permit. As mentioned, this requirement does not preclude the use of BIM, and therefore also in the case of road legislation it is possible to use this technology.

2.8 Civil law and civil court proceedings

The contact between law and construction in the Civil Code (Journal of Laws 1964 No. 16 item 93 as amended) is regulated by two types of contracts - a work contract and a construction work contract. The first type of contract regulates the relationship between, for example, the contracting authority and the designer. A work contract is a specific type of work contract. It can be used when ordering construction works and in designing and carrying out construction works.

The Act does not define what a project is, so it can be both a construction project, functional and utility program or BIM documentation.

Accordingly, the provisions of the Civil Code in no way restrict the use of BIM at BIM Level 2.

Undoubtedly, the necessary minimum condition for conducting the civil proceedings by the contracting authority based on BIM documentation is the establishment of very good file management and communication protocols in the project, on the basis of which it will be possible to recreate the exact time of creation of the file and its author / co-authors, the order of making changes and the person to do it affecting - and the like. This, among other things, should be served by the so-called BIM Protocols and requirements for CDE Systems.

2.9 Summary of the legal status analysis

The current legal status does not exclude the possibility of using BIM at a level adequate to the British BIM Level 2. Some elements of legal provisions hamper the use of this methodology or do not encourage its use, but do not prohibit its use.

Introduction of art. 10e to the Public Procurement Law is widely recognized by BIM supporters as unfortunate and its effects difficult to determine. Also the draft

amendment to the PZP from 2019 does not improve here. At present, the literal



interpretation of this article enables the inclusion of BIM.

The introduction of BIM technology is associated with the change of work tools in the investment process. The investment process and mutual dependencies remain unchanged. BIM does not change the scope of responsibility or releases additional obligations over those that exist using standard engineering solutions.

In addition, a number of changes should be introduced, in the first government it concerns the Regulation of the Council of Ministers of April 12, 2012 on the National Interoperability Framework, minimum requirements for public registers and exchange of information in electronic form, as well as minimum requirements for ICT systems - to the extent that they accept electronic document files in the format *.ifc*.

Electronic document vs. Paper

As technology progresses, one can imagine adapting the civil, administrative or even criminal procedure to the use of electronic documents, including BIM files, as evidence in court. The circulation of paper documentation will remain in the public space as long as an ordinary electronic document will not guarantee proof in court.

3. BIM technical conditions in Poland

3.1 Standards

Currently, there are no works at the national level devoted to the development of BIM standards in Polish construction.

First of all, legal regulations related to public projects should be developed, in particular the Public Procurement Law and other regulations listed in item 2.

The second area concerns standards directly related to BIM, such as a classification system adapted to Polish construction. Polish companies implement technical BIM technology solutions such as LOD and organizational (EIR, BEP).

Appropriate standards of these documents are created at the level of construction companies.

3.2 Hardware and software

There is a lack of detailed research of Polish construction companies in this area, however, hardware problems are not raised as significant, which indicates that companies meet these needs without major obstacles. There are no restrictions on software; Due to cooperation with companies from all over the world, Polish companies



use a wide range of software. As you know, the largest costs for hardware and software are borne by designers, while the beneficiaries of BIM are contractors and investors for whom the software is not a heavy burden. Software supporting the investment process on the CDE platform is increasingly used.

4. BIM in Polish construction companies - market analysis

4.1 Polish construction sector - general data

There is no single source of data on Polish construction. Some data are from 2-3 years ago, other from this year. The following are the data that was obtained; they give an overall picture of the Polish market.

The number of construction companies in Poland in 2017 - approx. 390 thousand (source 'Construction sector in Poland 2017'). Medium-sized companies around 2 thousand 190 - large.

Sectors:

- Design offices – ok. 27 000.
- Contractors – over 120 000.
- Property management - ca. 20 000.
- Public Investors – ca. 5 000.

Housing construction 2019 (according General Statistic Office - GUS).

Dwellings completed:

According to preliminary data, 63.9 thousand were put into use in January-April 2019. Apartments (an increase of 9.3% than a year before). Developers have commissioned 39.3 thous. dwellings (15.7% more than in the same period last year), while individual investors - 23.1 thous. apartments, i.e. 0.5% more than in 2018.

As part of these forms of construction, a total of 97.7% of the total dwellings completed were built.

The usable floor space of apartments completed in the period of January-April 2019 amounted to 5.8 million m², i.e. 5.9% more than in the corresponding period of the previous year. In comparison to the period of January-April 2018, the average usable floor space of one flat decreased by 2.9 m² - to the level of 90.6 m².



4.2 Market research in the field of BIM

The basis of the analysis are:

- Tests performed by Autodesk Polska (2015) and KPMG (2016).
- Survey UrbanBIM survey - made by Datacomp and WUT.

The studies have different scope, are not consistent with each other and were not carried out by specialized companies, so we do not know the research methodology or the development of results. Despite many reservations, they give a general view on the state of knowledge about BIM in Polish companies and its acceptance.

Users rate the high level of BIM use by themselves at 6% (KPMG), 20% (Survey UrbanBIM), 25% (Autodesk). Similar and even greater scatter also occurs in other questions.

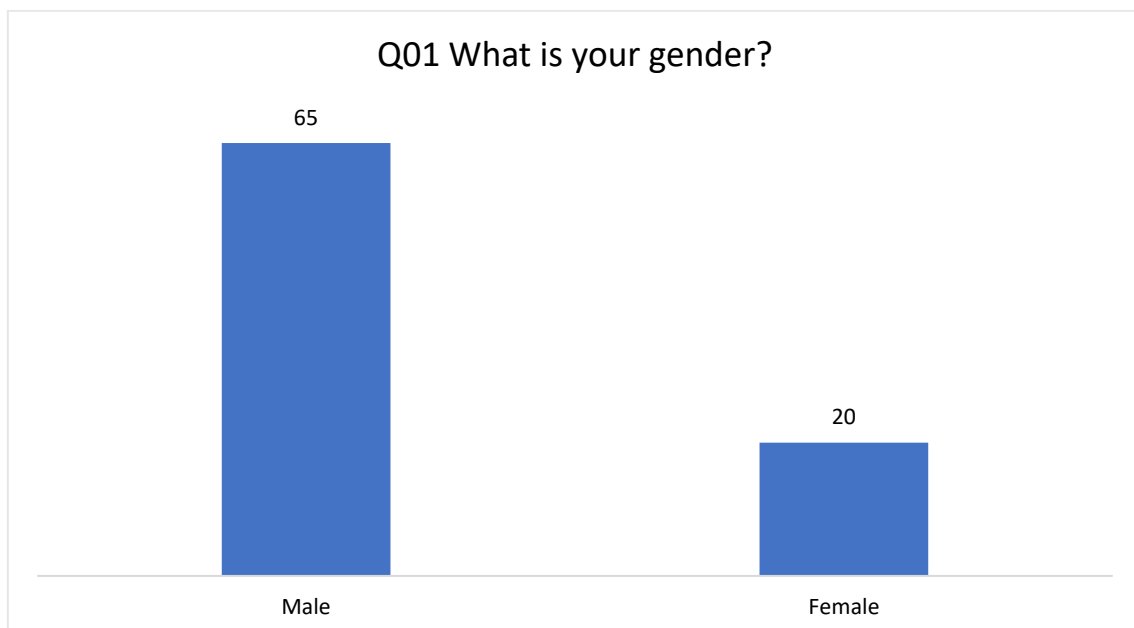
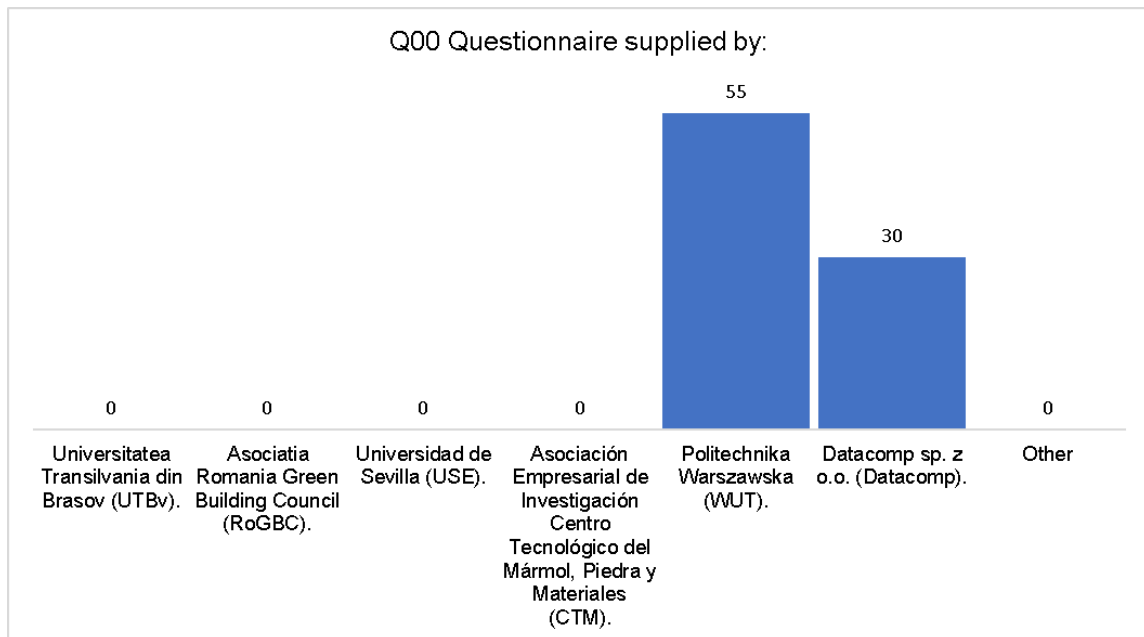
The opinion that BIM allows to achieve a number of benefits in the design and construction process is widely shared; about 60% of respondents who use BIM consider the highest quality of created projects as the greatest benefit; 60% - fewer errors at the investment implementation stage. Further indications are better cooperation involved in the project (40%), improved design (38%) and greater efficiency (35%).

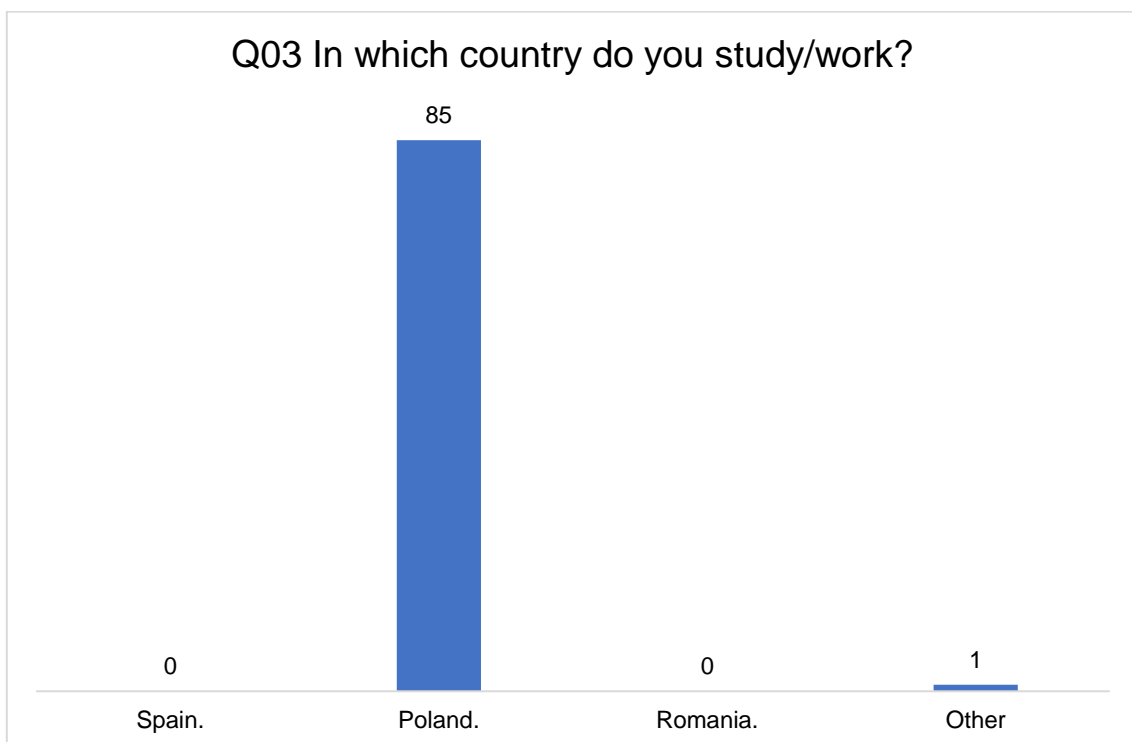
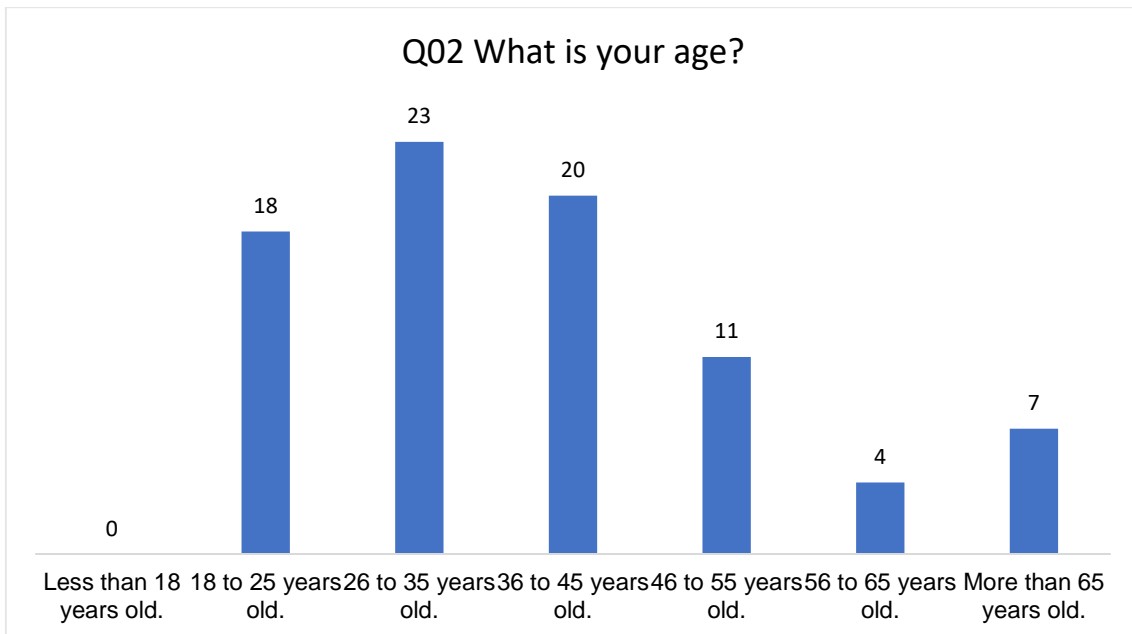
As the research methodology was mentioned as well as the questions (especially in KPMG surveys) raise doubts, e.g. the question "At what time would you be able to carry out public procurement, analogous to the ones currently carried out using the BIM methodology?" The dominant group of answers concerns companies that previously declared little knowledge of BIM.

If such research were to be the basis for organized activities at the national level, they should be performed in cooperation with a company professionally involved in market research.

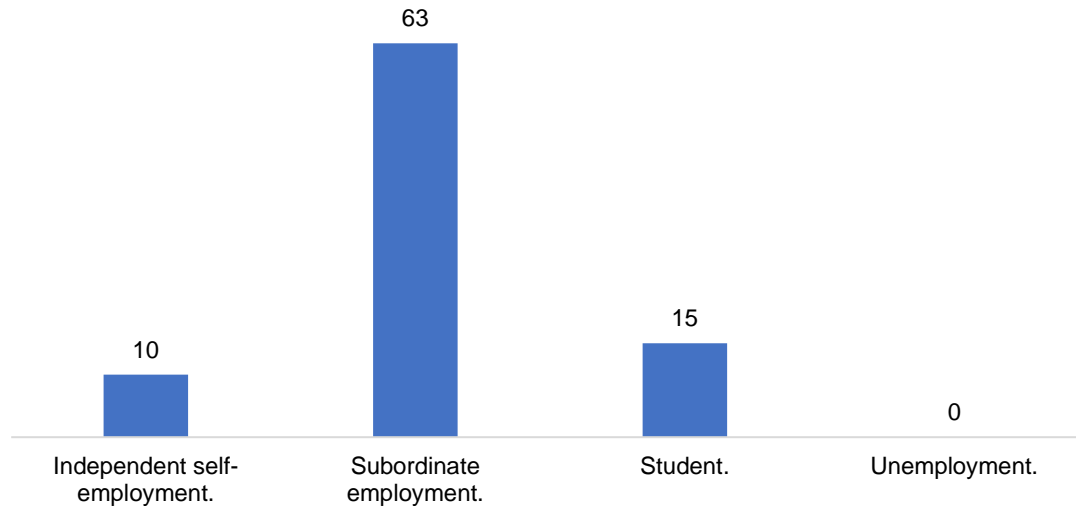
5. Results of the survey

A survey has been carried out to make a first assessment of the current situation, to propose the work to be developed, as well as strategies and future actions. Datacomp and University of Technology of Warsaw compiled the surveys.

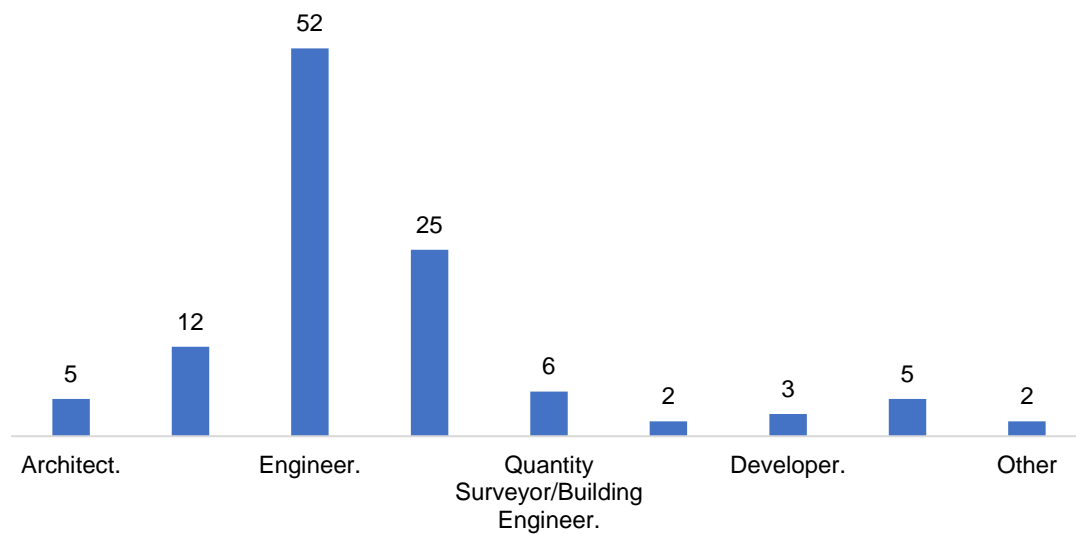




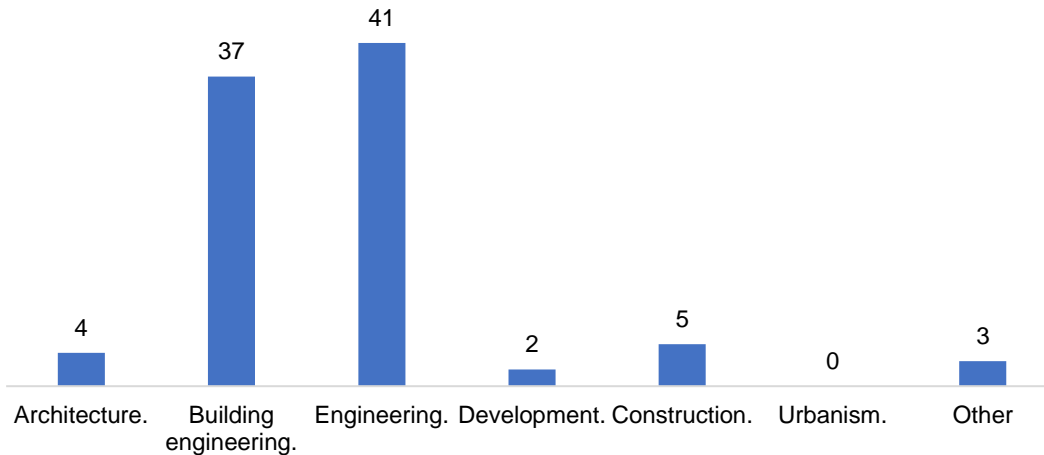
Q04 What is your current employment situation?



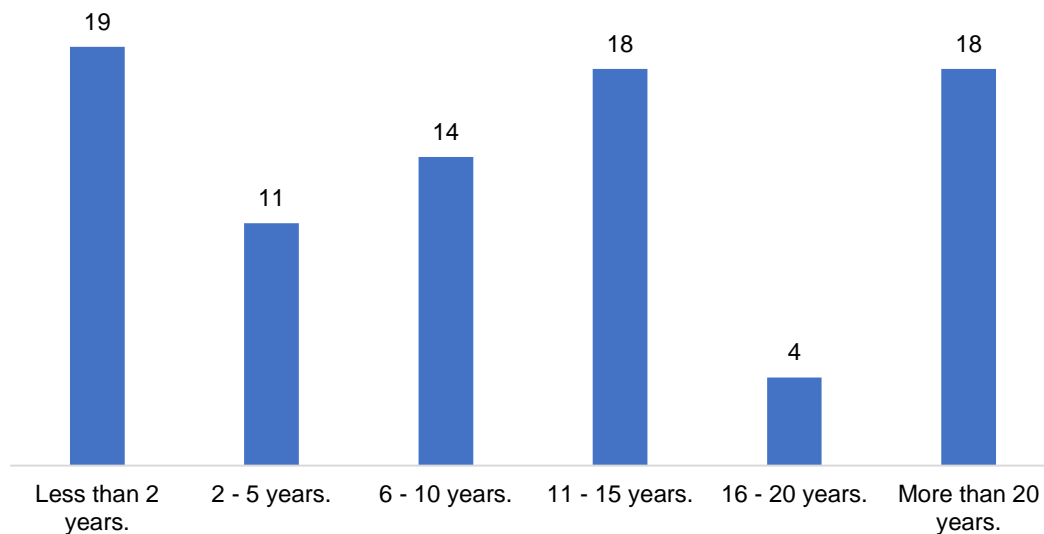
Q05 What profession are you linked to?

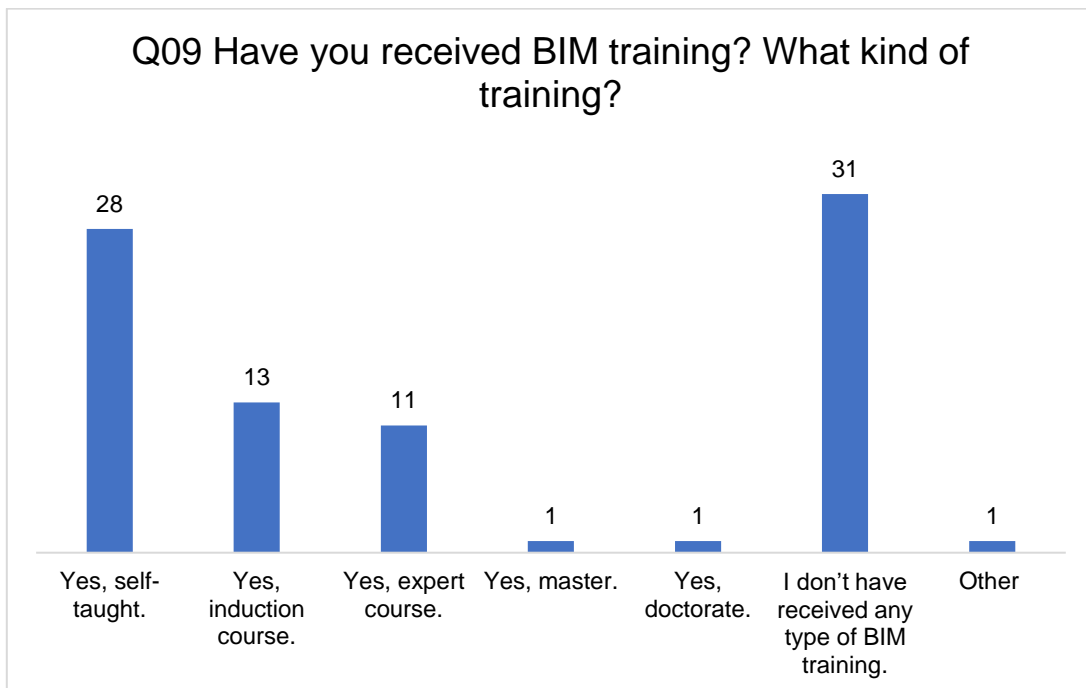
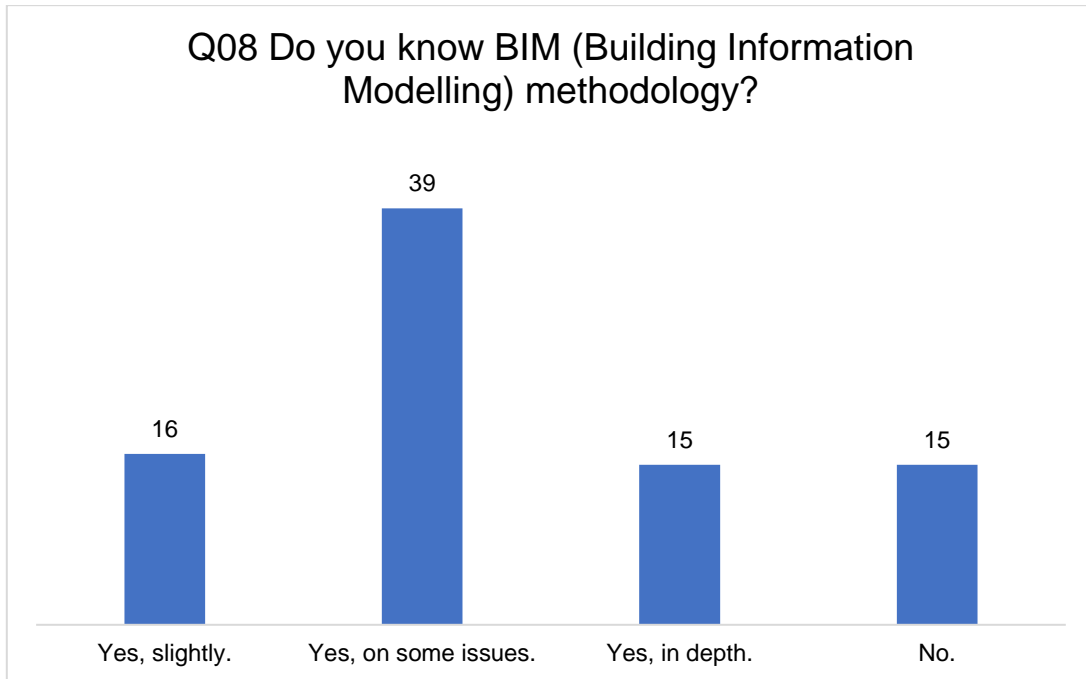


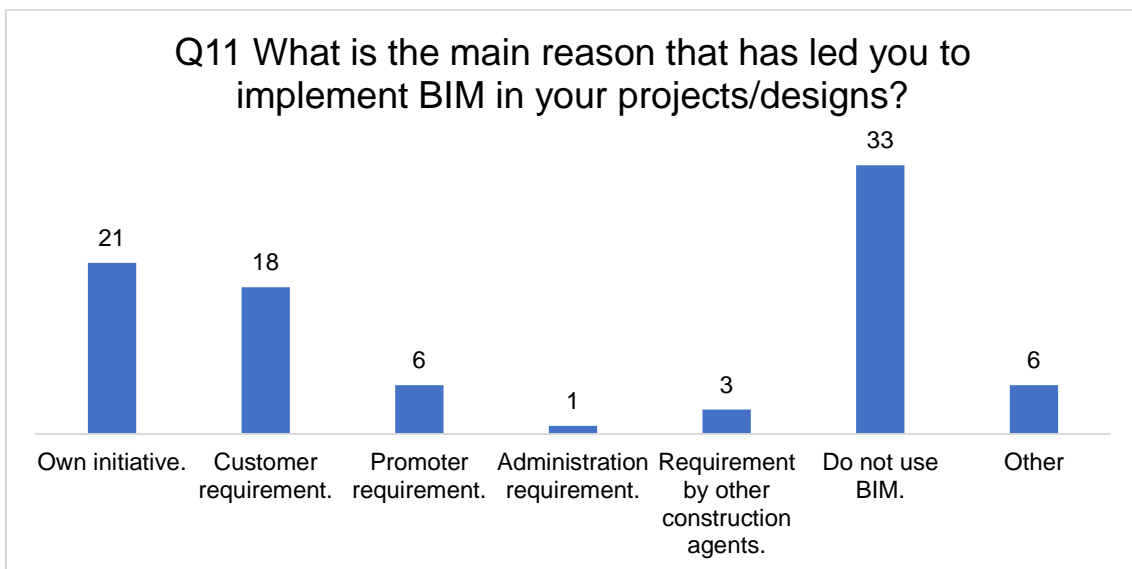
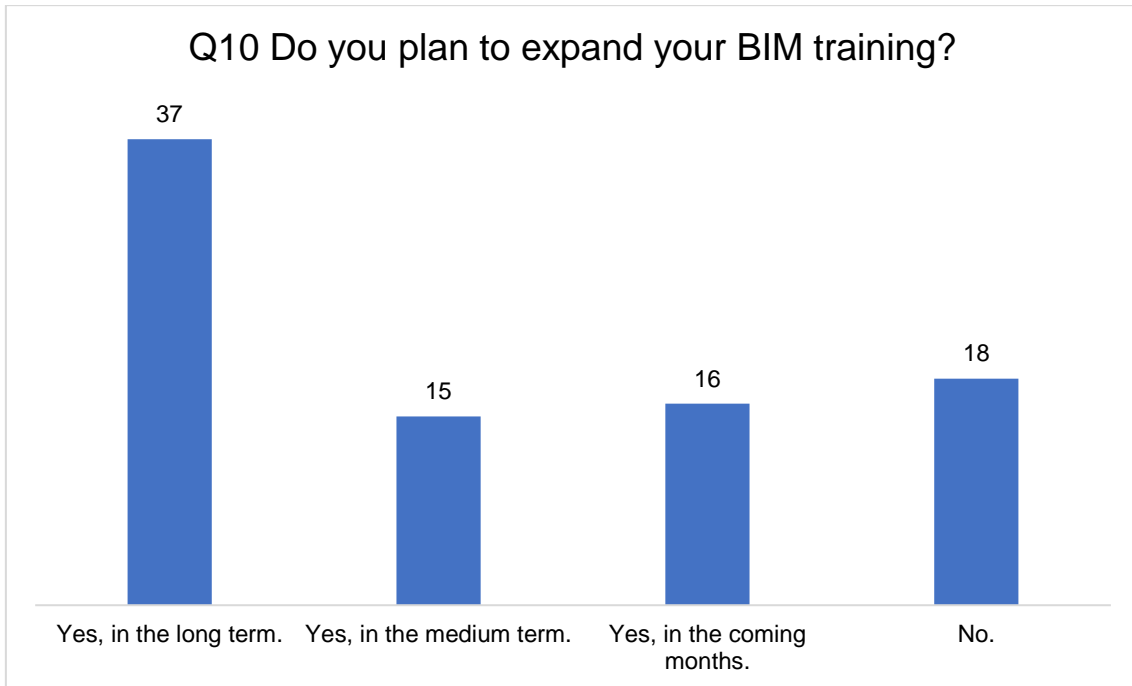
Q06 Which discipline best fits the organisation in which you work/study?

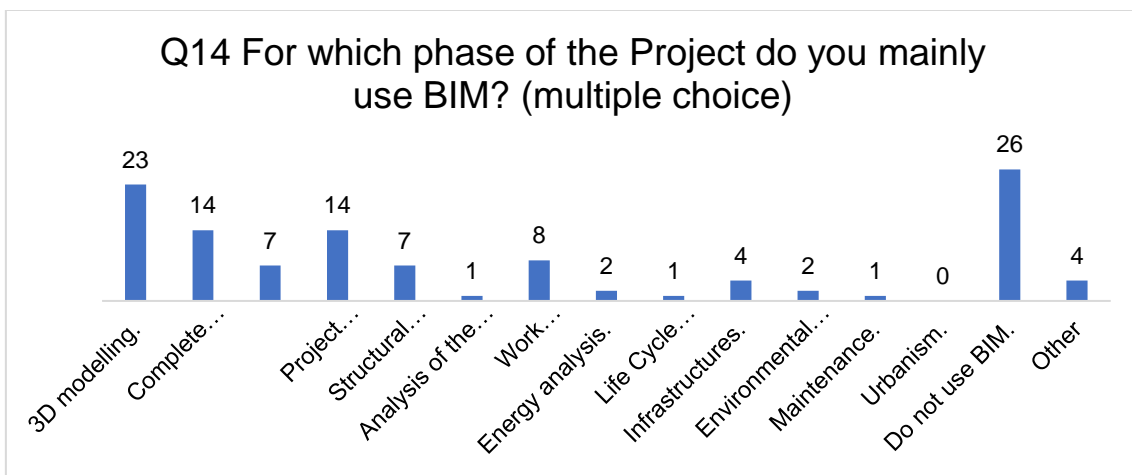
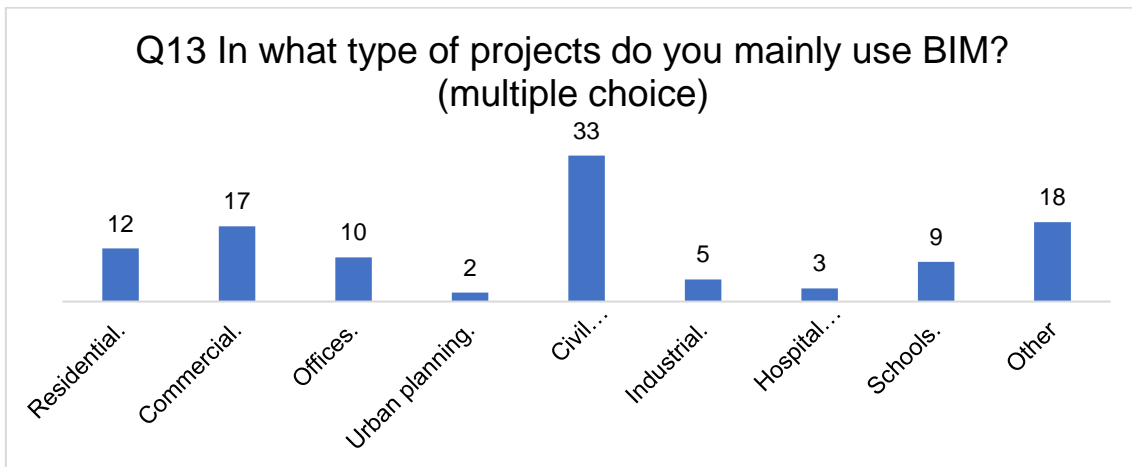
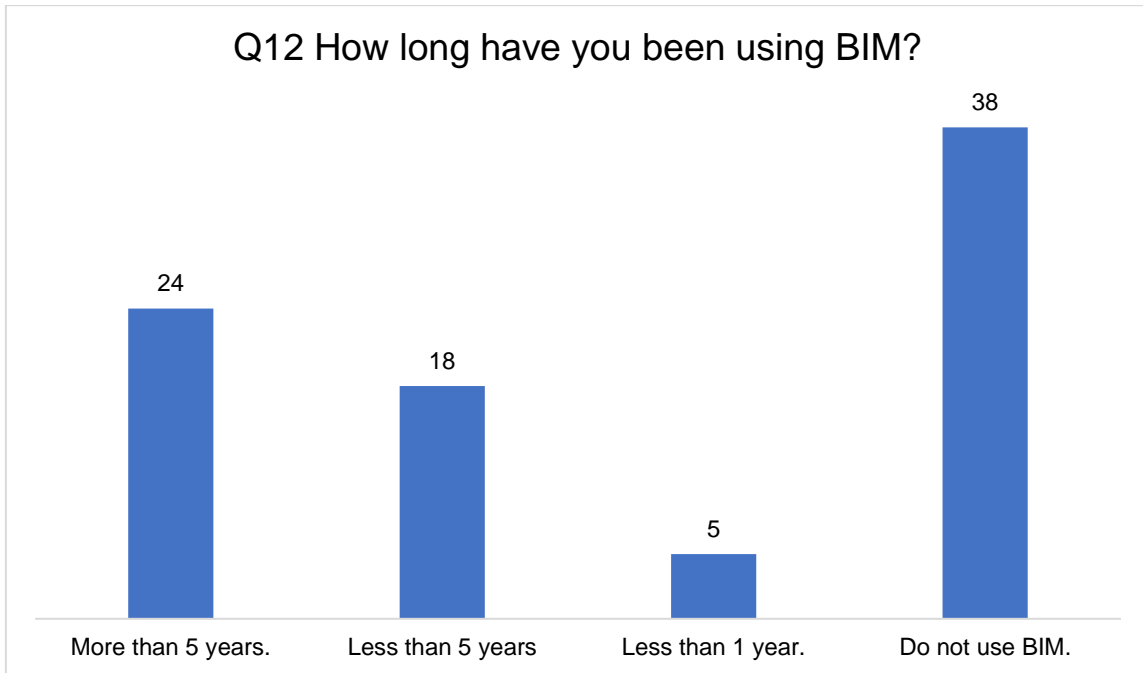


Q07 For how many years have you worked linked to in construction sector?

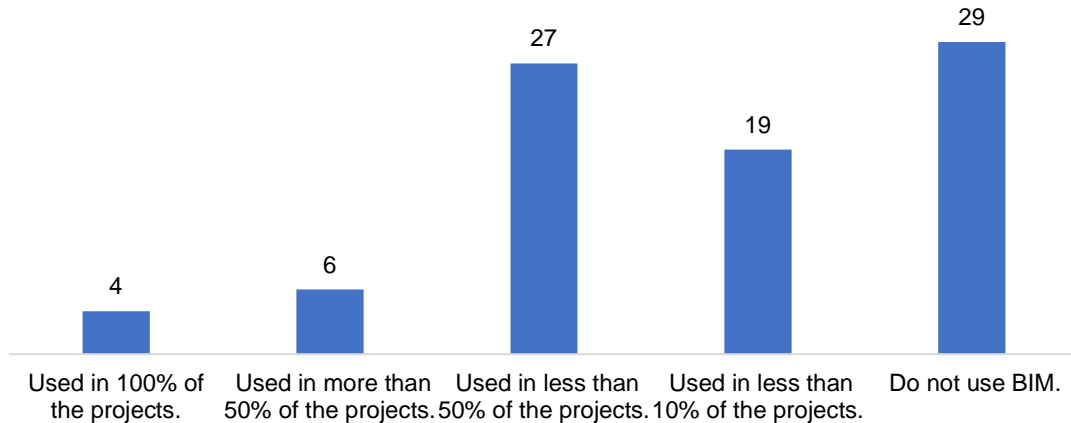




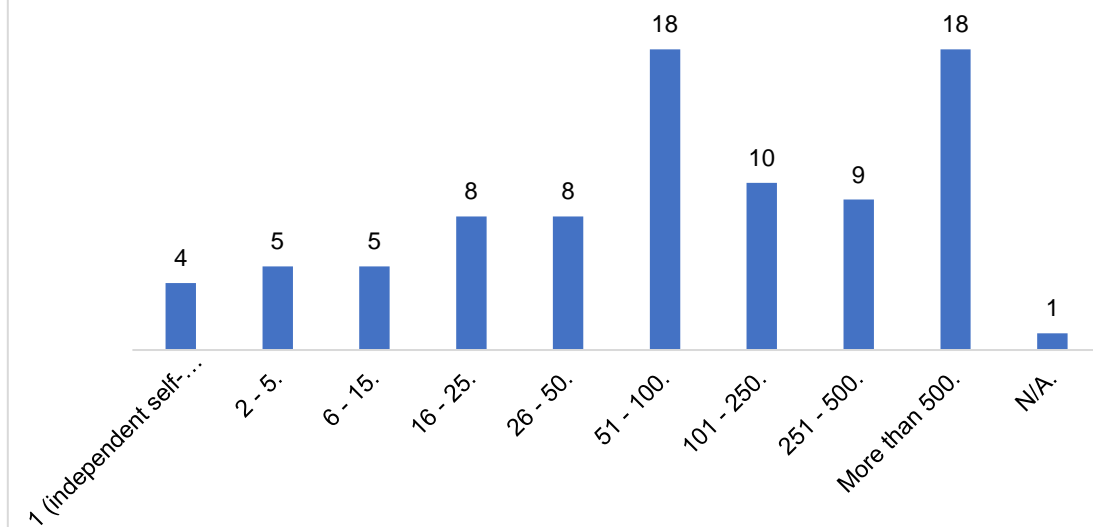




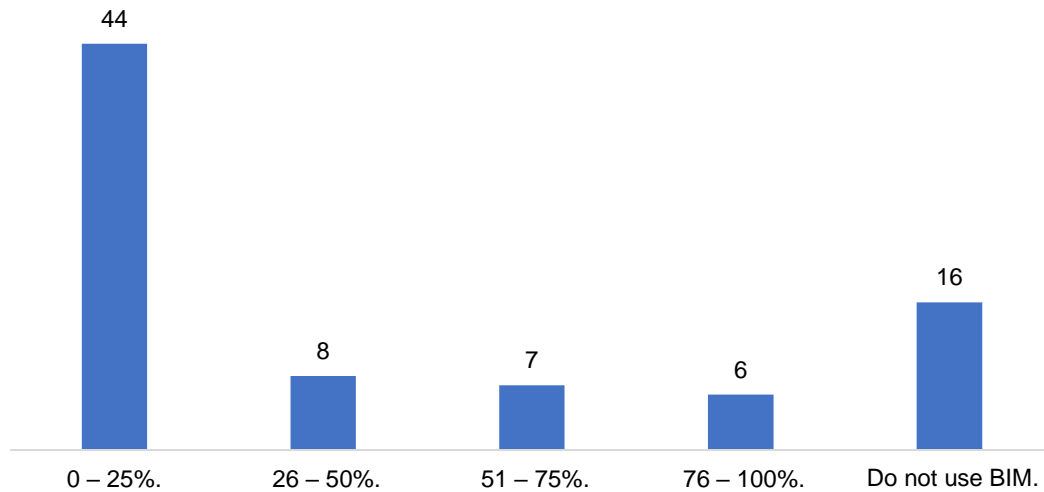
Q15 What is the level of implementation of BIM in your organisation/studies centre?



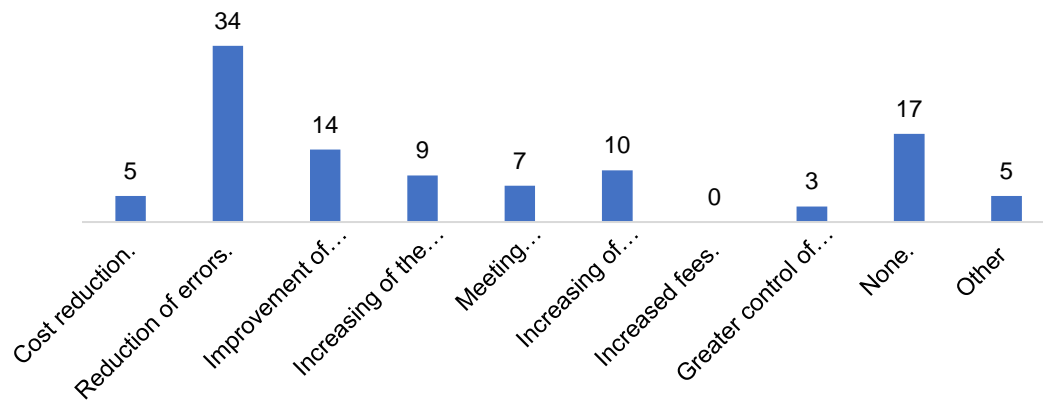
Q16 How many people work in your organization/studies centre?



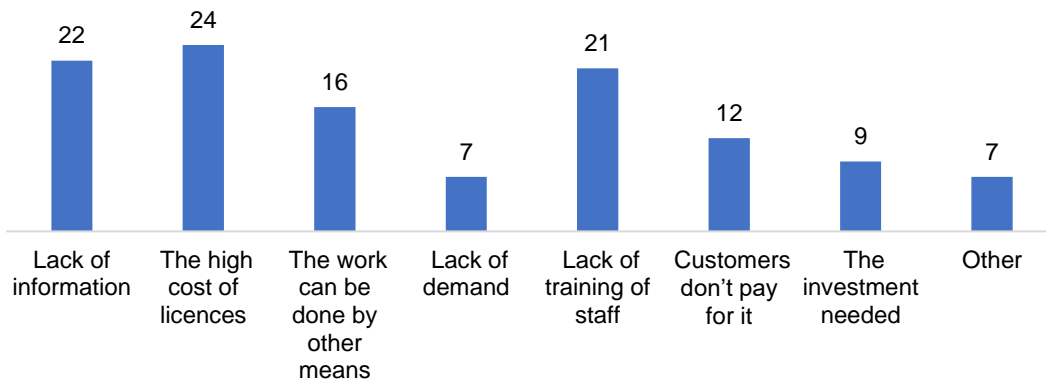
Q17 What is the proportion of people in your organisation/studies centre who use BIM?



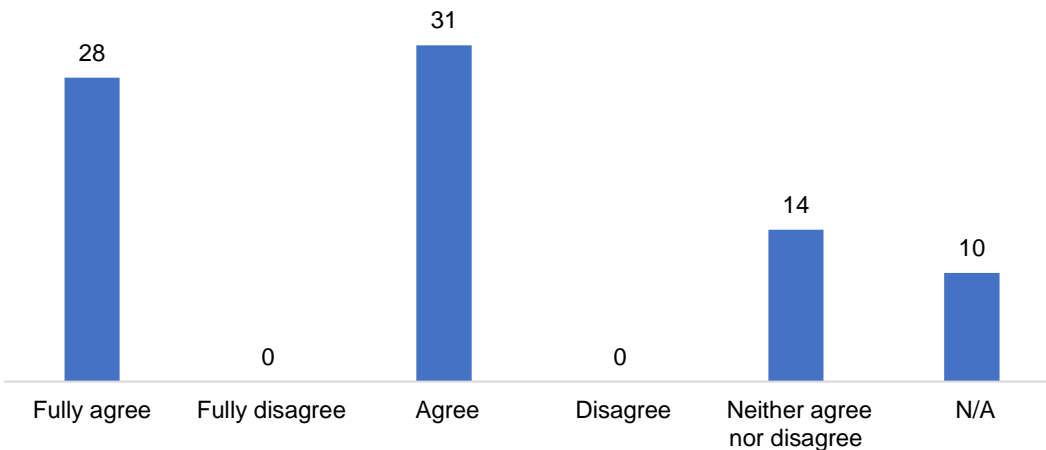
Q18 What are the main benefits that BIM has brought to your projects?



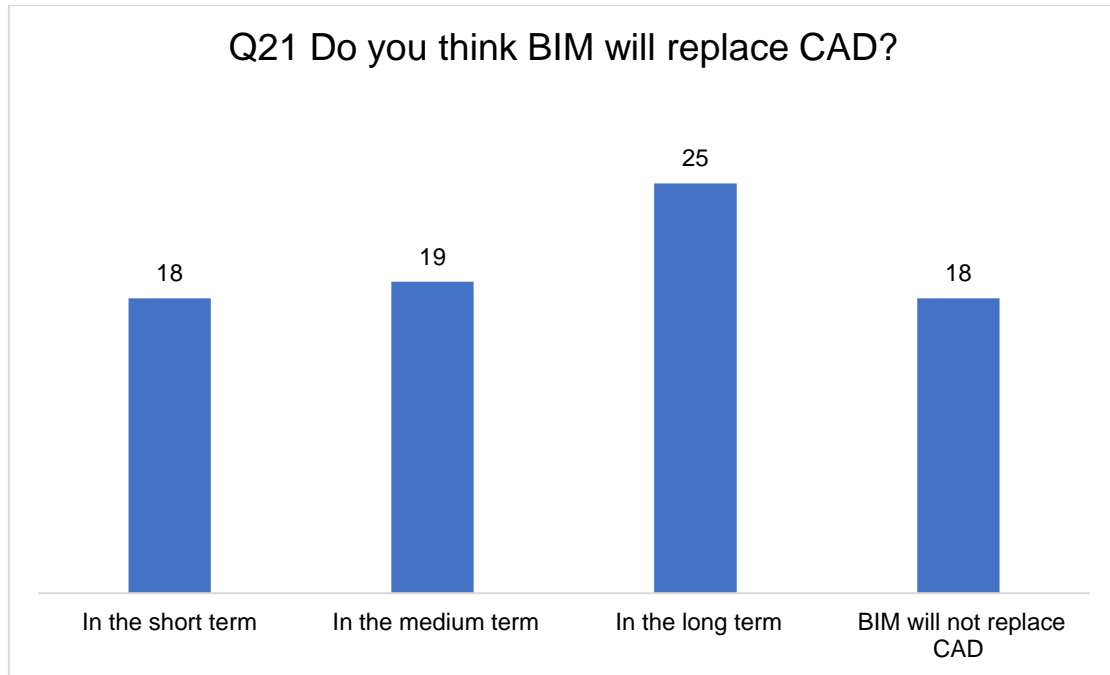
Q19 Which of the following do you consider to be the primary cause for a company's failure to adopt BIM?



Q20 Indicate your degree of agreement/disagreement with the following assertion: "BIM is not sufficiently standardized yet":



Q21 Do you think BIM will replace CAD?



Q22 What factors do you think may influence more widespread use of BIM?

