CZECH STANDARDIZATION AGENCY

BIM KONCEPCE

Implementing BIM in an organisation

START

For the public sector

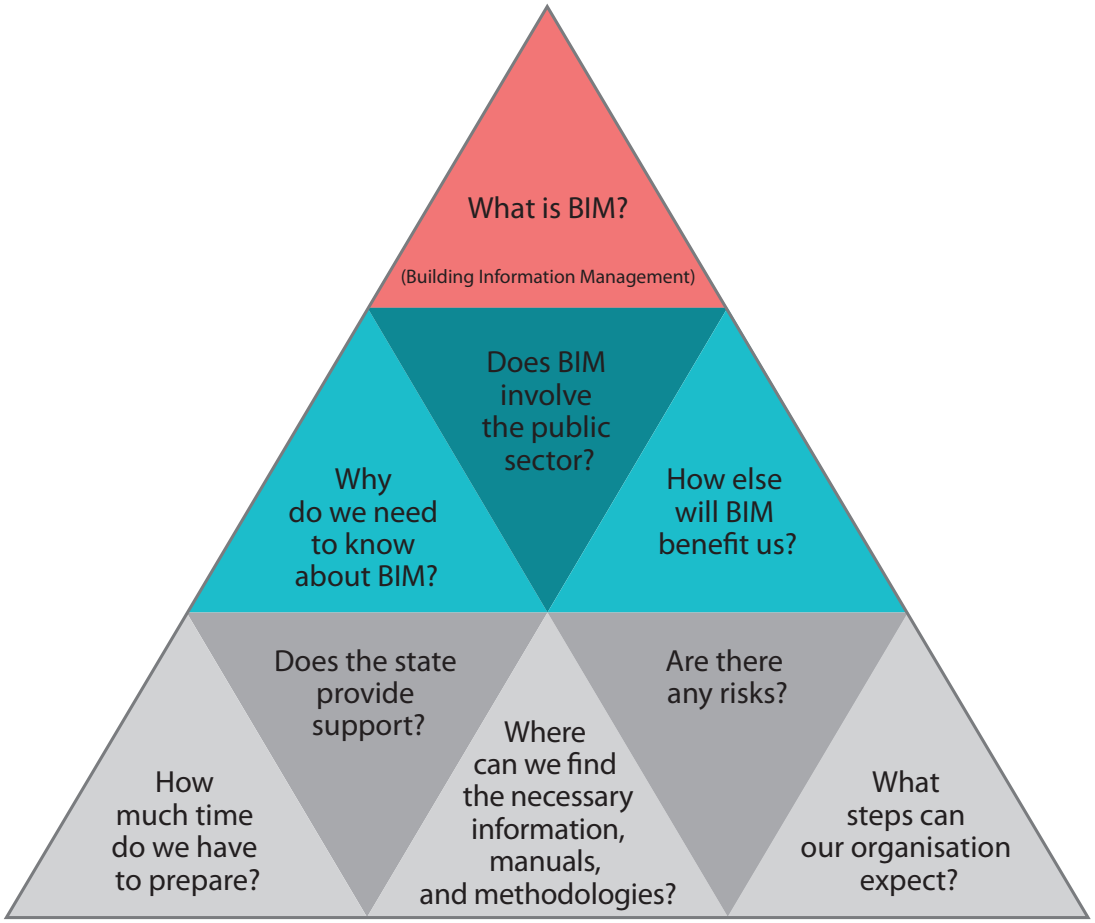
Top management

BIM in the organisation – questions and answers

Change is a constant throughout our lives. The current transformations of public administration are mainly marked by the 3E principles (Effectiveness, Efficiency, Economy), meaning acting effectively, efficiently, and economically. The digitisation of public administration greatly helps to achieve these principles. We should see this transformation as a societal change that will affect as well our mindset.

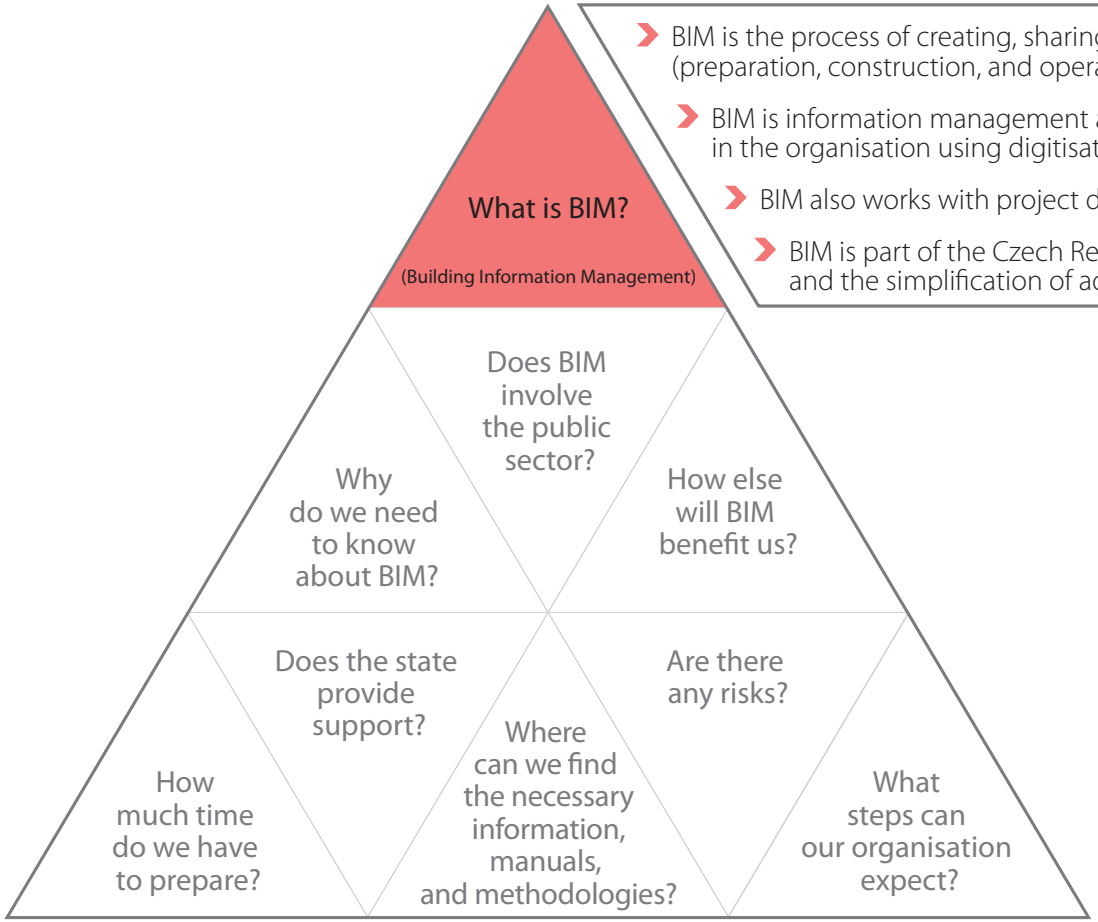
Digital technologies help to simplify, speed up and optimize activities, therefore are beginning to be used in all areas of the economy and industry. The construction sector is no exception, and is now becoming a field in which transformations are becoming real. Part of the transformation is also the use of a procedure that positively changes the view of construction and related activities. This procedure is called the BIM method.

So let's take a look at what BIM means, how it affects the public sector, what benefits it brings and how to use the BIM method in the management and maintenance of public assets.



BIM in the organisation – questions and answers

BIM KONCEPCE

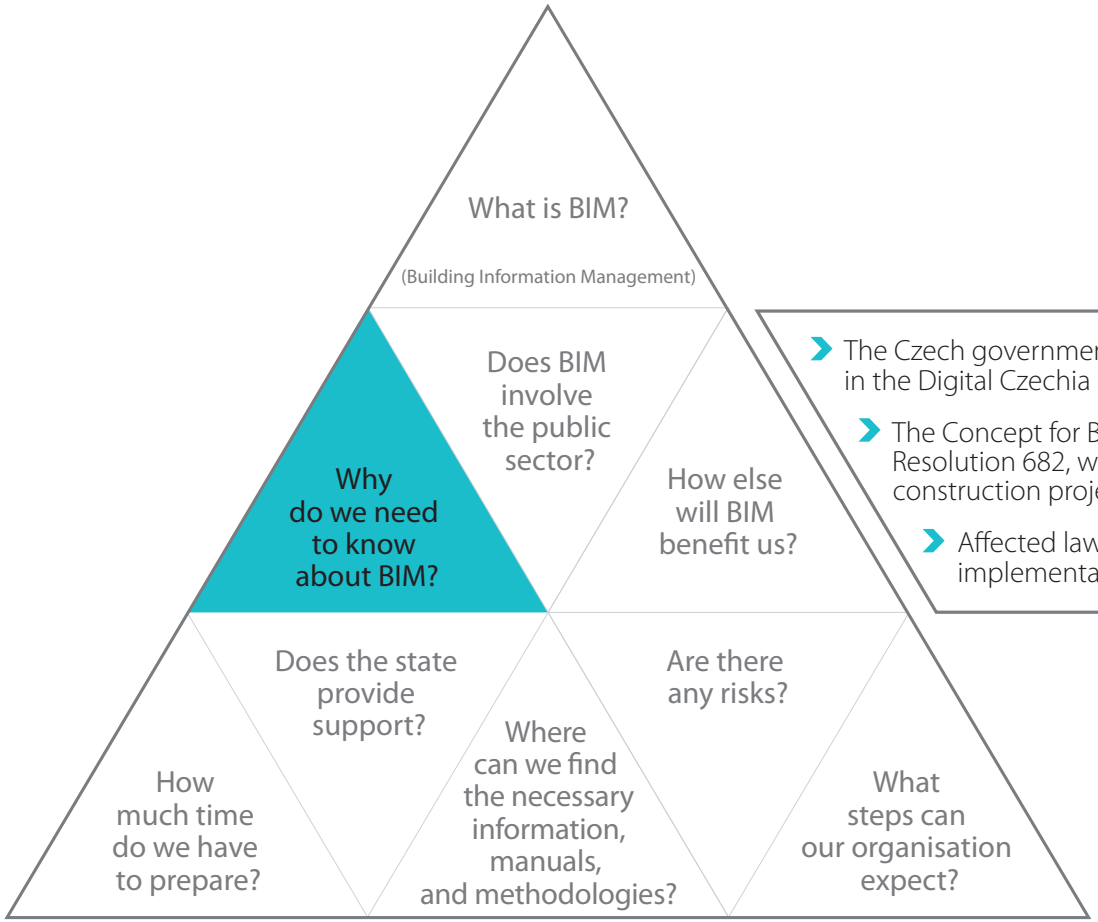


- BIM is the process of creating, sharing, and managing information about a building throughout its life cycle (preparation, construction, and operation).
- BIM is information management and facilitates the connection of often pre-existing processes in the organisation using digitisation.
- BIM also works with project documentation in digital form shared by the participating entities.
- BIM is part of the Czech Republic's national plan aimed at the digitisation of the public sector and the simplification of administrative proceedings.

All questions

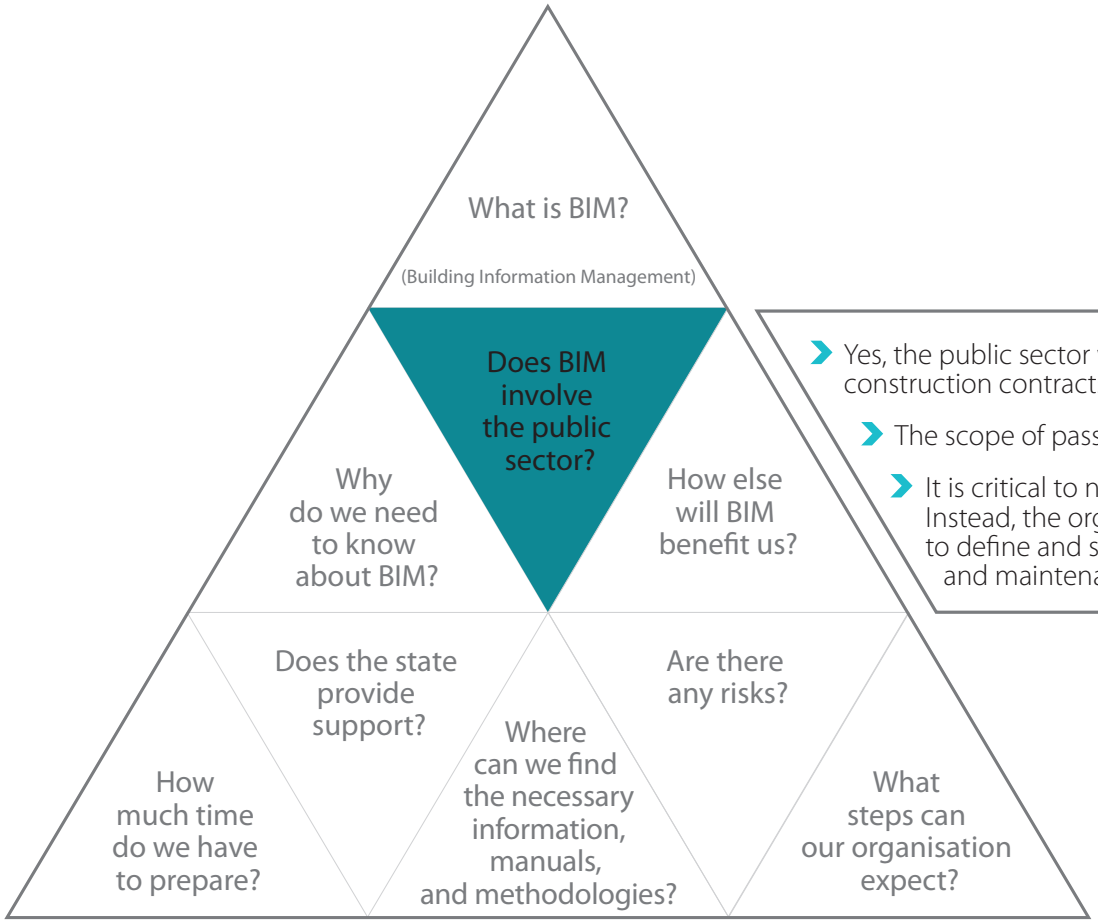
All answers

BIM in the organisation – questions and answers



- The Czech government has made the decision to digitalise the public sector as enshrined in the Digital Czechia program. (www.digitalnicesko.cz)
- The Concept for BIM Method Deployment was approved within the adoption of Government Resolution 682, which inter alia includes the obligation to use these methods for selected construction projects.
- Affected laws and related decrees are being amended in connection with BIM implementation.

BIM in the organisation – questions and answers

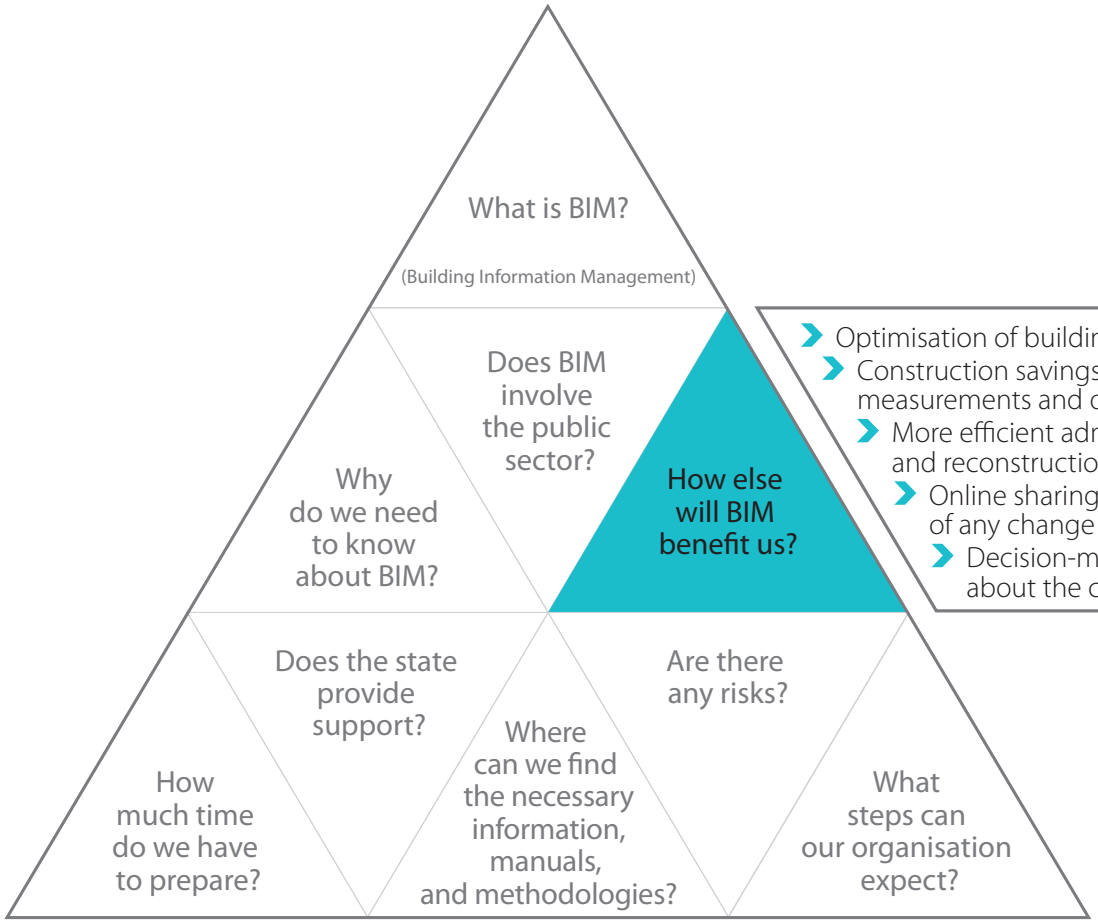


- Yes, the public sector will be obliged to apply the BIM method for overlimit public construction contracts.
- The scope of passportization using the BIM method is under consideration.
- It is critical to note that one-shot try "to insert construction project into BIM" is not enough. Instead, the organisation must precisely prepare themself to the new situation, to define and start to follow new rules that will allow to process tendering, realization and maintenance of buildings using BIM method in standard daily routine.

All questions

All answers

BIM in the organisation – questions and answers

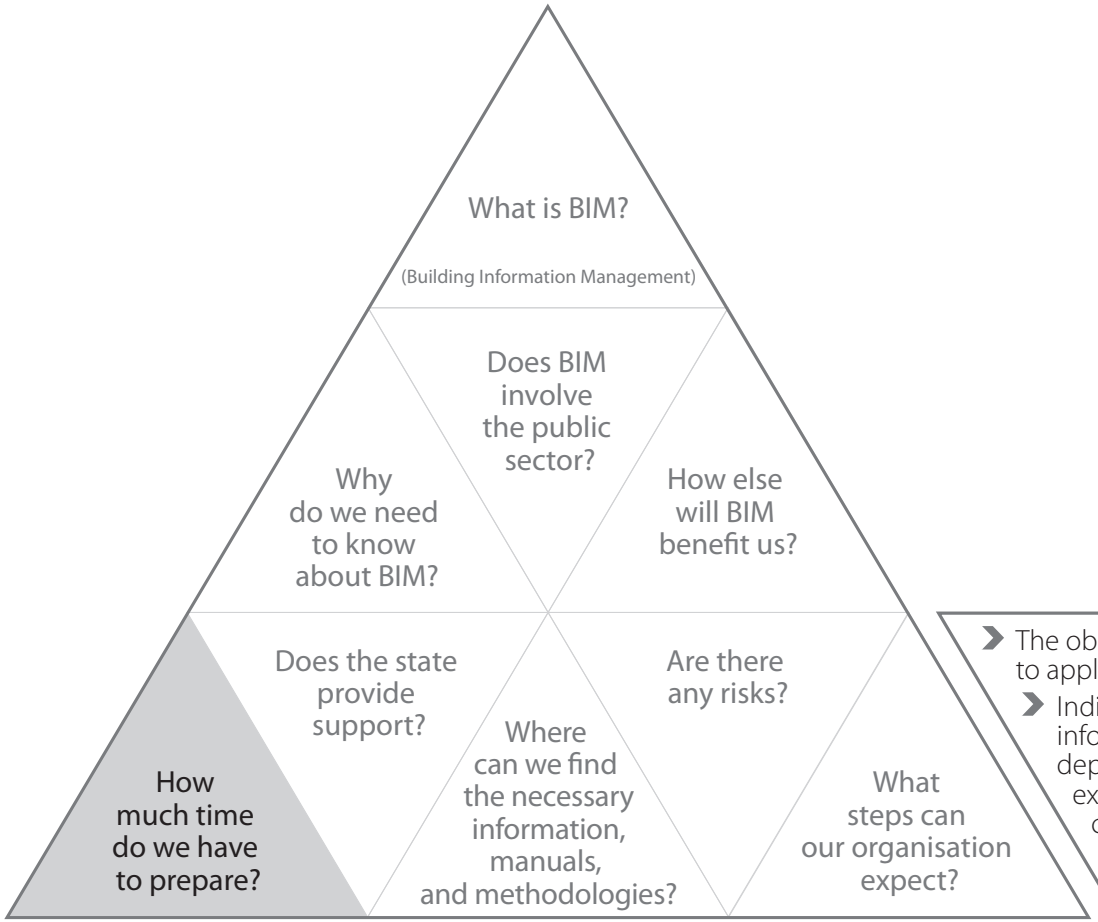


- Optimisation of building design (clearer data for decision-making).
- Construction savings (construction preparation and management, more accurate measurements and quantities).
- More efficient administration and maintenance, as well as savings during renovations and reconstruction work.
- Online sharing of data, information and "single truth" among all participants in case of any change in shared documentation.
- Decision-making based on complete, up-to-date and interconnected information about the construction.

All questions
All answers

Top management | Middle management | Work teams

BIM in the organisation – questions and answers

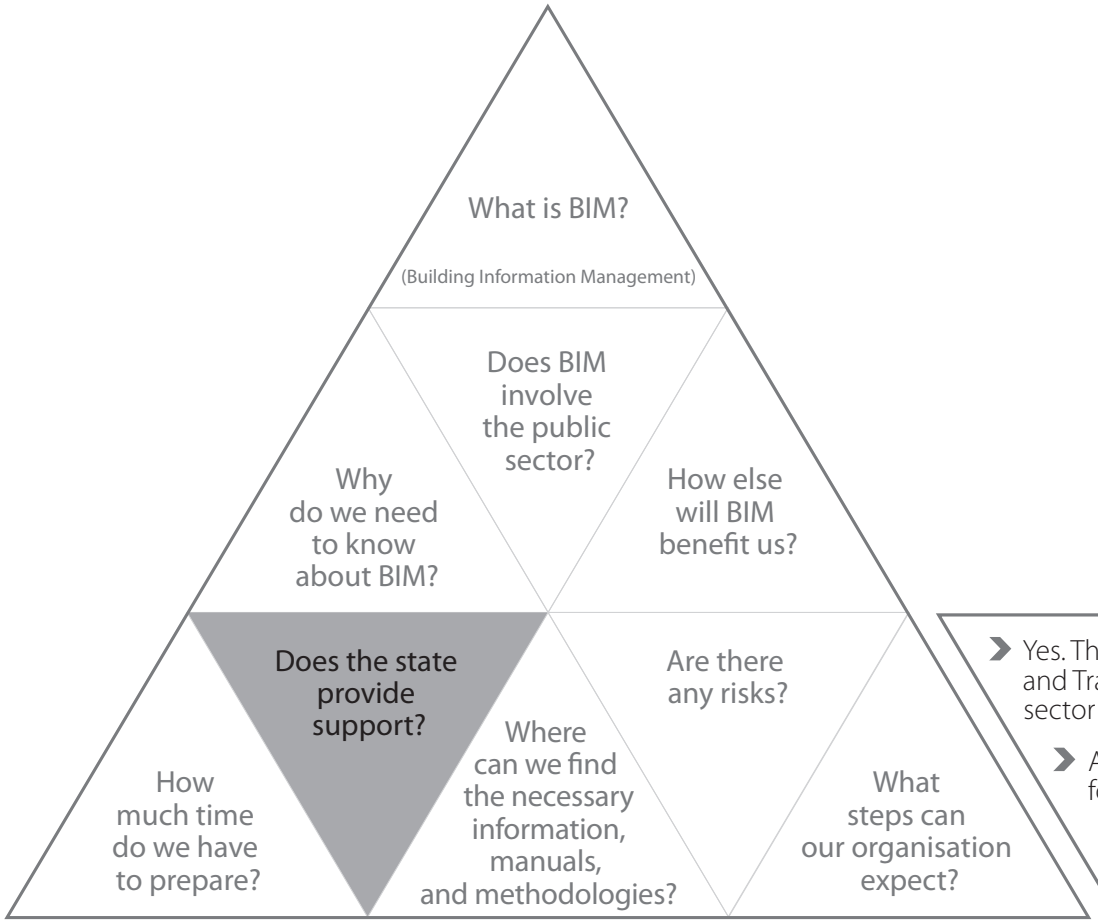


- The obligation for overlimit public construction contracts is expected to apply from July 2023.
- Individual sub-steps depend on the organisation's readiness for building information management (i.e. the BIM method). Implementation depends on the level of digitisation, IT readiness, the sophistication and expertise of processes and departments within the organisation and the commitment to change.
  - The key is to start preparing, testing and taking the gradual steps to achieve the final objective.

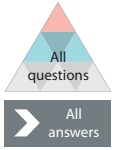
All questions

All answers

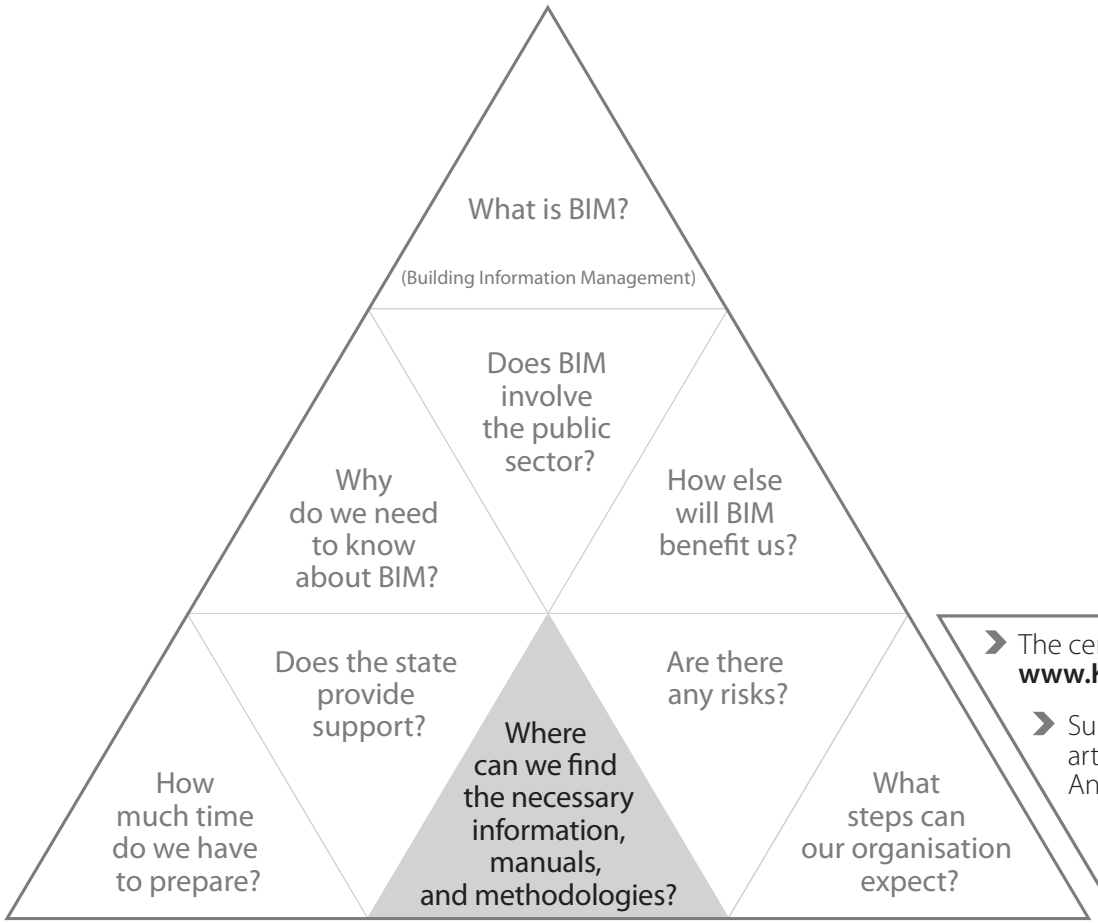
BIM in the organisation – questions and answers



- Yes. The Czech government commissioned the Ministry of Industry and Trade to coordinate the preparation and implementation of public sector support.
  - Among other things, the Czech Standardization Agency is responsible for providing this support.
    - Support includes the provision of methodologies, standards, models, support for pilot projects, education and training.



BIM in the organisation – questions and answers

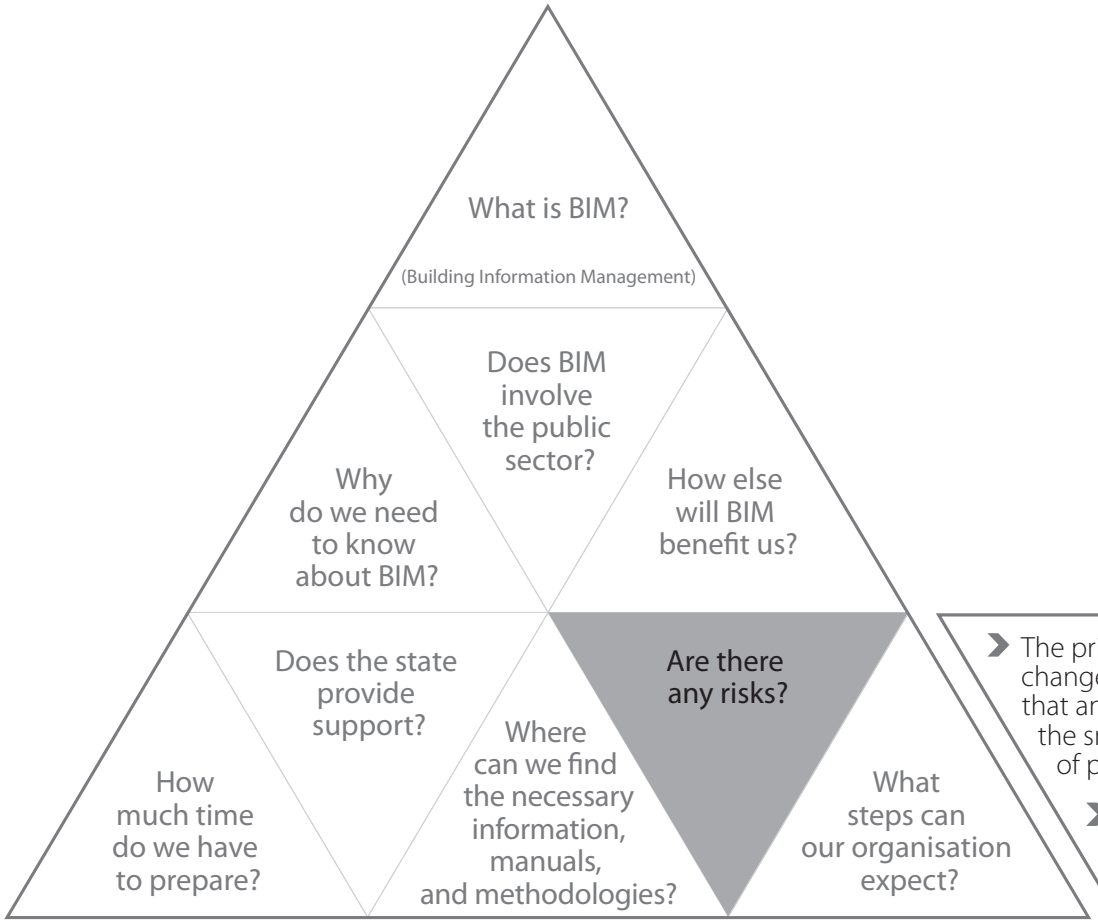


- The central point for access to information is the interactive portal **www.KoncepceBIM.cz**.
- Supporting materials, methodology, information brochures, specialised articles and other useful items are available at www.KoncepceBIM.cz. And also experience from pilot projects of public investors.
- Other sources of information include workshops, training sessions, conferences and other activities organised by the Czech Standardization Agency.

All questions

All answers

BIM in the organisation – questions and answers

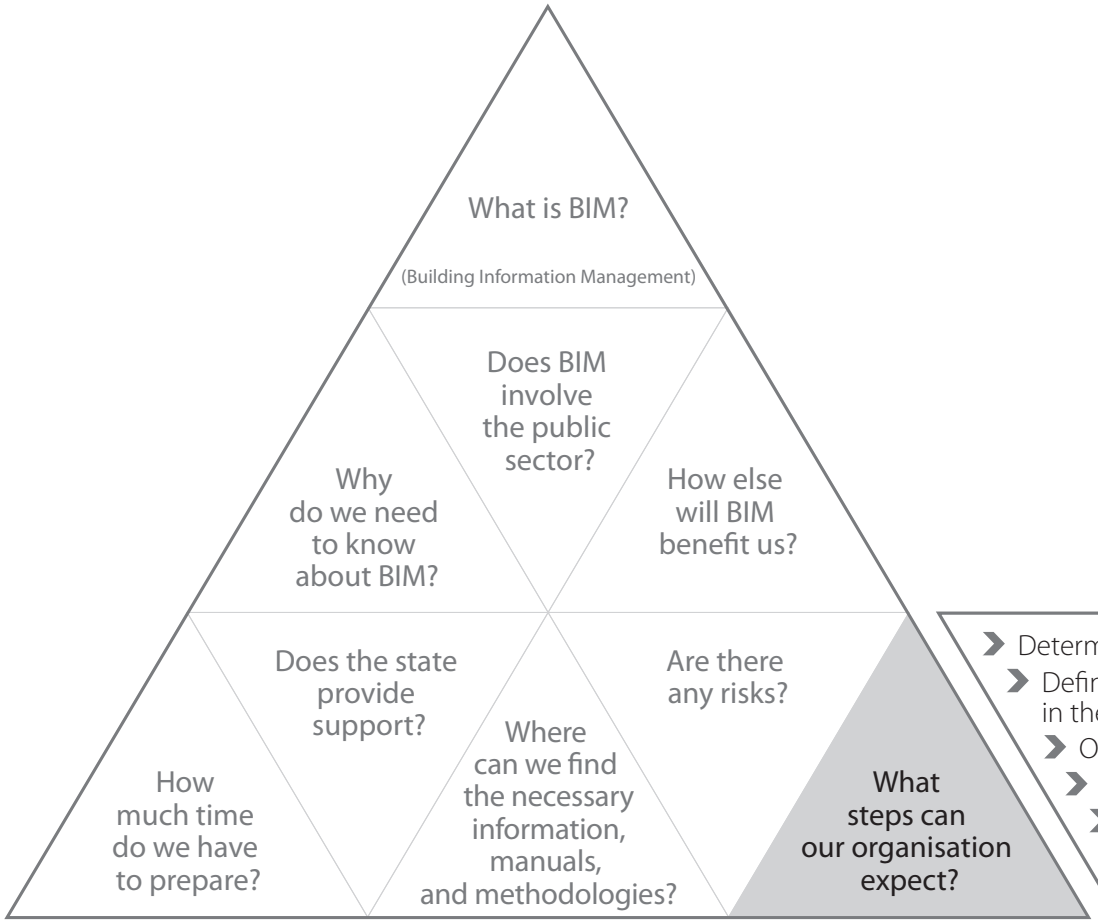


- The primary risk is when organisation has a low readiness for such change in organisational, operational and temporal terms. It is critical that an organisation begins training and setting up processes to ensure the smoothest possible BIM implementation prior to the execution of projects using the BIM method.
  - Inadequacy of the scope and pace of the implementation of the BIM method due to the level of readiness of the organisation.

All questions

All answers

BIM in the organisation – questions and answers



- Determine the level of the organisation's readiness.
- Define a person (BIM Manager) responsible for BIM implementation in the organisation.
- Organise an internal BIM team for the implementation of the BIM method.
- Conduct a review of human resources, processes, and IT infrastructure.
- Set up changes to the processes and preparation of building documentation.
- Implement a pilot project to verify new rules and procedures.

All questions

All answers

BIM in the organisation – questions and answers

BIM KONCEPCE

What is BIM? (Building Information Management)

- BIM is the process of creating, exploiting, and managing data about a building throughout its life cycle (preparation, construction, and operation).
- BIM enables what are often existing processes in the organisation to be linked up using digitisation.
- BIM also works with project documentation in digital form shared by the participating entities.
- BIM is part of the Czech Republic's national plan aimed at the digitisation of the public sector and the simplification of administrative proceedings.

Why do we need to know about BIM?

- The Czech government has made the decision to digitalise the public sector as enshrined in the Digital Czechia program (www.digitalnicesko.cz).
- The Concept for BIM Method Deployment was approved within the adoption of Government Resolution 682, which inter alia includes the obligation to apply this method for select construction projects.
- Affected laws and related decrees are being amended in connection with the implementation of BIM.

Does BIM involve the public sector?

- Yes, the public sector will be obliged to apply the BIM method for over-limit public construction contracts.
- The scope of passportization using the BIM method is under consideration.
- It is critical to note that one-shot try "to insert construction project into BIM" is not enough. Instead, the organisation must precisely prepare themself to the new situation, to define and start to follow new rules that will allow to process tendering, realization and maintenance of buildings using BIM method in standard daily routine.

How else will BIM benefit us?

- Optimisation of building design (clearer data for decision-making).
- Construction savings (construction preparation and management, more accurate measurements and quantities).
- More efficient administration and maintenance.
- Online sharing of data, information and single truth among all participants and in case of any changes in shared documentation.
- Savings during renovations and reconstruction work.

How much time do we have to prepare?

- The obligation for overlimit construction contracts is expected to apply from July 2023.
- The individual steps depend on the organisation's readiness for building information management (i.e. the BIM method). Implementation depends on the level of digitisation, IT readiness, the sophistication and expertise of processes and departments within the organisation and the commitment to change.
- The key is to start preparing, testing and taking gradual steps to achieve the final objective.

Is the state providing support?

- Yes. The Czech government commissioned the Ministry of Industry and Trade to coordinate the preparation and implementation of public sector support.
- Among other things, the Czech Standardization Agency is responsible for providing this support.
- Support includes the provision of methodologies, standards, models, support for pilot projects, education and training.

Where can we find the necessary information, manuals, and methodologies?

- The central point for access to information is the interactive portal **www.KoncepceBIM.cz**.
- Supporting materials, methodology, informational brochures, specialised articles and other useful items are available at www.KoncepceBIM.cz. And also experience from pilot projects of public investors.
- Other sources of information include workshops, training sessions, conferences and other activities organised by the Czech Standardization Agency.

Are there any risks?

- The primary risk is when organisation is not ready for such change in organisational, operational and temporal terms. It is critical that an organisation begins learning and setting up processes to ensure the smoothest possible BIM implementation prior to the execution of projects using the BIM method.
- Inadequacy of the scope and pace of the implementation of the BIM method due to the level of readiness of the organisation.

What steps can our organisation expect?

- Determine the level of the organisation's readiness.
- Define a person (BIM Manager) responsible for BIM implementation in the organisation.
- Organise an internal BIM team for the implementation of the BIM method.
- Conduct a review of human resources, processes, and IT infrastructure.
- Set up changes to the processes and preparation of building documentation.
- Implement a pilot project to verify new rules and procedures.

What steps can our organisation expect?

BIM KONCEPCE

Construction projects using the BIM method

2023 START

Complete pilot projects

- identify suitable pilot projects
- verify the Process Documentation in pilot projects
- monitor functionality, interconnectedness across the organisation
- modify Process Documentation based on findings from pilot projects

2021-2022 VERIFY

Prepare the Process Documentation

- design processes and information flows
- configure the method used to communicate and work with information
- configure internal standards, prepare template documentation
- configure a uniform data standard

2021-2022 PREPARE

Define a project plan for the implementation of the BIM method

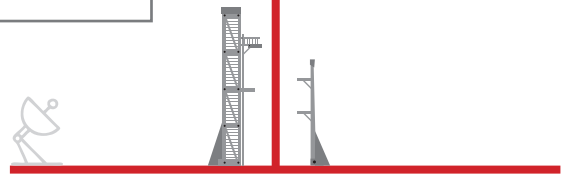
- establish a BIM project team and define roles and responsibilities
- define requirements and conditions for the preparation of the organisation's Process Documentation
- define a realistic schedule for the implementation of the BIM method in the organisation
- define a change management strategy in the organisation and manage defined risks

2021 DESIGN

Verify readiness for the implementation of the BIM method

- define a responsible person = BIM Manager
- define an internal or external analytical project team
- conduct a difference (GAP) analysis
- set change management conditions in the organisation

2021 FIND OUT



What questions need to be answered?

How can we determine, that an organisation is sufficiently prepared for the implementation of the BIM method?

- Do we have described construction-related process flows and processes?
- Do we have sufficient IT infrastructure for the digitisation of building records and management, or do we use cloud solutions?
- Do we have sufficient human resources in terms of specialisation, and above all capacities?

Should we assign a person responsible for implementing BIM in the organisation?

Yes. To ensure proper deployment, we recommend to assign a person responsible to lead the project of implementation the BIM method into organisation timely before executing construction projects using BIM. He/she may also play the role of the contact person for BIM implementation team in the Czech Republic (Czech standardisation agency) and share the necessary information.

How to implement the BIM method?

We recommend defining an internal project team to handle the implementation of the BIM method within an organisation. This should be represented by roles that will be responsible for analysis of the current state, the definition of the rules for the implementation of the BIM method, and the preparation of BIM documentation. The following roles are involved*: BIM Manager, Legal counsel, IT specialist, Investment specialist, Civil engineer, Technologist (building systems), Information manager, Facility manager

* these roles may be outsourced if internal capacities are insufficient

Does BIM implementation impact existing processes within the organisation?

Yes. Implementation of BIM method within the organisation may result in changes in processes and activities tied with construction projects. Simplification and streamlining are the objectives of this process. Examples include activities involved in public procurement, the preparation of project engineering documentation and asset management.

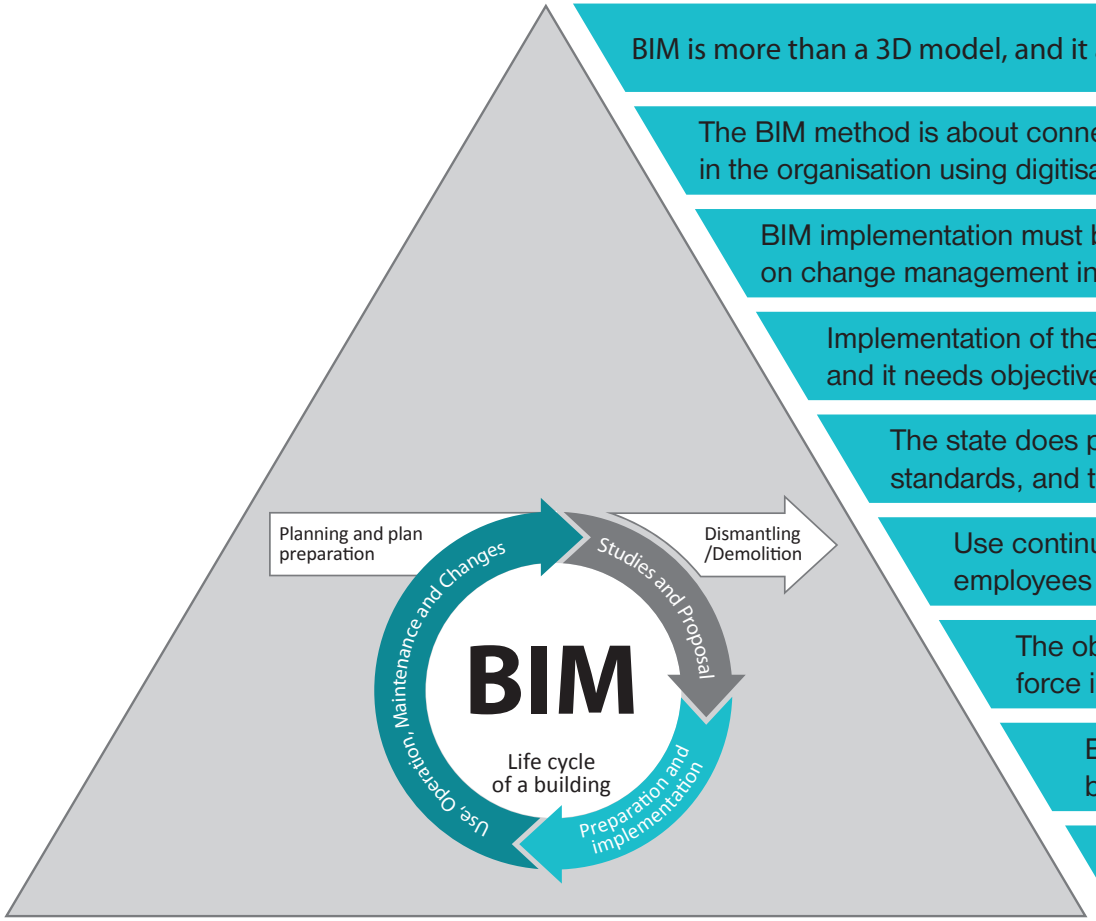
What documentation needs to be prepared for BIM?

Documentation should be prepared by the project team to permit easy modification when executing a specific project in BIM. This particularly involves the following: BIM Protocol (contractual arrangements for the use of models) including annexes on information and CDE requirements, the BIM execution plan (BEP), Contractual Standard, Template of procurement documentation to permit easy adaptation to a specific construction project using BIM.

How can we check that the defined rules are correct?

Pilot project(s) should be used to verify these rules. Information can be obtained from the Czech Standardization Agency's pilot project program.

Executive summary



- BIM is more than a 3D model, and it accompanies a building throughout its life cycle.
- The BIM method is about connecting and modifying existing processes in the organisation using digitisation.
- BIM implementation must be resolved as a project with an emphasis on change management in the organisation.
- Implementation of the BIM method is a long-term process and it needs objectives, a strategy, and a plan.
- The state does provide support in the form of methodology, standards, and templates.
- Use continuing training and educational events, motivate employees to change.
- The obligation concerning overlimit public contracts enters into force in 2023.
- BIM may be used in digital construction proceedings beginning in 2023.
- BIM is part of the Digital Czechia program.

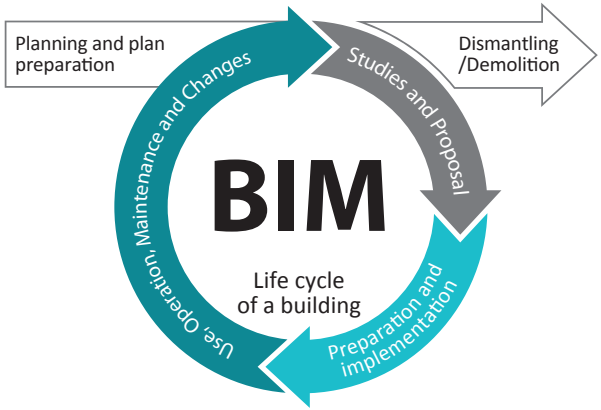
Middle management

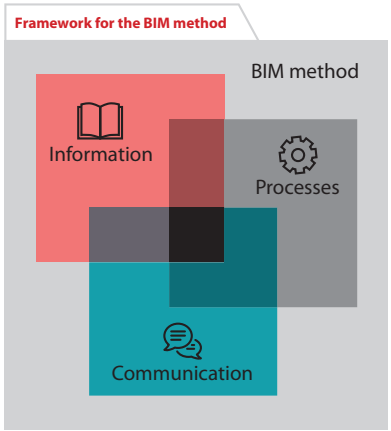
Middle management

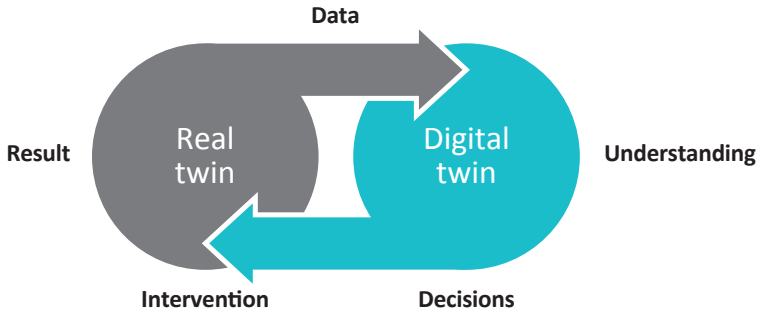
Implementation of the BIM method is a complex activity involving numerous tasks that occur across and inside an organisation. It is more than simple digital modelling; it primarily involves aggregating and sharing information, communication between participants, and the configuration of optimal processes.

This part of the brochure contains a procedure specifically for the organisation's middle management. Middle management within public administration is defined as the managers and directors of individual units (agendas). Like management, which already has sufficient authority and responsibility for actions aimed at implementing the BIM method in the organisation, middle management plays a key role in the implementation process.

The main task of middle management is to set up building information management (BIM) so as to achieve greater work efficiency by digitising the entire life cycle of the building, from the initial plan to its use and management. Significant cost savings can undoubtedly be ensured thanks to better management and decision-making options at various stages of the building life cycle and on the basis of easily accessible information.







What steps can our organisation expect?

BIM KONCEPCE

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2021 DESIGN

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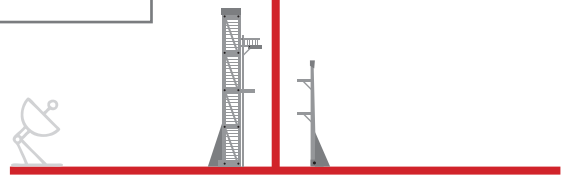
2021 FIND OUT



Verify the organisation's readiness for the implementation of the BIM method

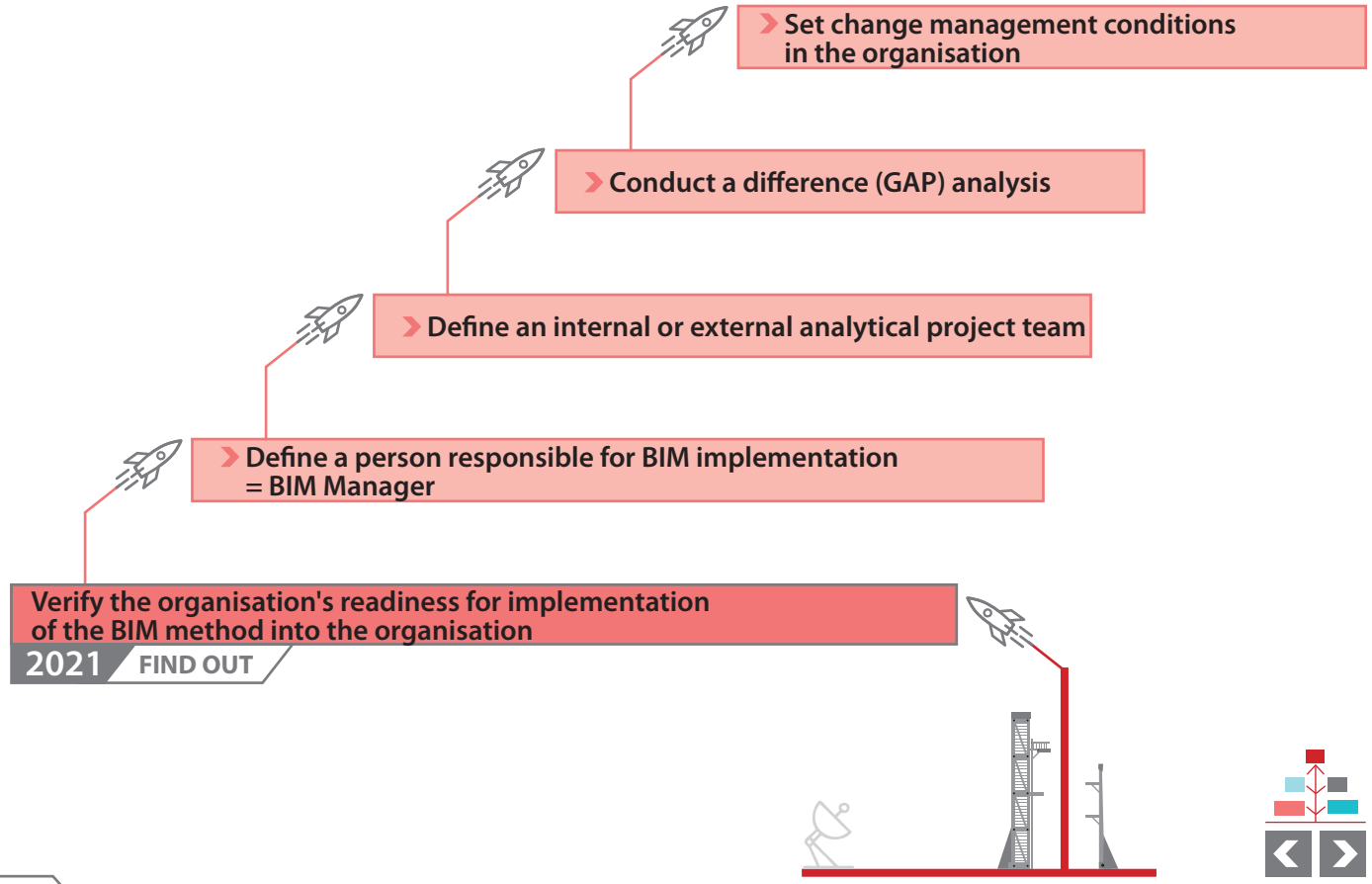
BIM KONCEPCE

Every organisation has its own style of doing things, its own processes, mode of operation, level of education among employees and technical facilities. As part of major legislative changes, such as the introduction of the BIM method, the organisation will face the task of designing its own feasible way for making such a change.

From the organisation's point of view, it is then necessary to define institutional conditions that will enable and support the entire process of change.

The first step is to check readiness in terms of human resources, the organisation, processes and technology. A comparative (GAP) analysis is available as a means of determining existing conditions and should compare the current state of the organisation with its future state.

This analysis should be performed by a motivated analytical project team led by the person responsible for the success of the entire change. Motivation to change is the decisive factor for success in implementing the BIM method in an organisation!



Verify the organisation's readiness for the implementation of the BIM method

Verifying the readiness of the organisation for the implementation of the BIM method is one of the most important steps. This role should be assigned to a liable person who takes responsibility for analytical aspects as well as implementation and managing the changes that accompany implementation of the BIM method in the organisation.

This person, the **BIM Manager**, will be responsible for and coordinate activities that take place within the organisation (internal) and cooperation with entities outside the organisation (external). His first task is defining an analytical team. The BIM Manager should definitely not be an employee with professional responsibility for ICT issues in the organisation; but a person who is able to cover internal processes and process flows of specific units.

The BIM Manager needs skills in the form of the ability to manage the changes that will occur during the implementation of the BIM method, and must have good communication and negotiation skills. However, it is essential that his role and the associated powers and responsibilities be clearly defined in advance and integrated into the governance structure throughout the organisation, including their adequate capacity for that role.

Activities / responsibilities of the BIM Manager (examples)

Internal activities / responsibilities

- inform management of the status of the project
- communicate risks
- lead the project team for the implementation of the BIM method
- coordinate touched departments and activities accross the organisation

External activities / responsibilities

- cooperate with external entities
- contact person for the organisation

The BIM Manager is a key role for the organisation and will lead the implementation of the BIM method throughout the organisation. The organisation should therefore pay close attention to the abilities, knowledge and skills of the person who will play this role.

Verify the organisation's readiness for the implementation of the BIM method

The task of the analytical project team is primarily to analyse the current state in order to assess the level of readiness of the organization for the change, that the use of the BIM method will bring in the organization. The project team must be represented by roles (professions) who are able to assess such readiness in terms of human resources, the organisation, processes, and technology.

If the organisation lacks such professions, it is possible to use external services provided by consultants in this field available on the market.

Define an internal or external analytical project team

Role (examples)

- BIM Manager
- Legal counsel
- IT specialist
- Investment specialist
- Civil engineer
- Technologist (building systems)
- Information manager
- Facility manager

Verify the organisation's readiness for the implementation of the BIM method

The task of the analytical team will be to perform a GAP analysis, which simply means creation of list of change requests and their conditions based on the difference between the initial readiness of the organisation to implement the BIM method and its proposed goal to use it.

Below are examples of roles for the analytical team and their activities that demonstrate their expertise.

Define an internal or external analytical project team

Role (examples)	**Activity**
BIM Manager	Manages and coordinates the activities of analytical and project team members for the implementation of the BIM method in the organisation.
Legal counsel	Analyses contractual documentation and procurement documentation for public construction contracts and the implementation of the BIM method.
IT specialist	Conducts analysis of IT infrastructure (SW tools in use, data connectivity, HW, etc.), proposals for the selection of CDE solutions set up conditions of SLA or/and decide forcloud solutions.
Investment specialist	Analyses processes and impacts in the preparation and implementation of investments using BIM.
Civil engineer	Analyses processes related to construction expertise within a construction project using an information model.
Technologist (building systems)	Analyses the technical records for managed buildings, which will relate to the technological side of the project in the design of the model, proposals for new technologies – more efficient solutions.
Information manager	The role is only important once the execution phase of BIM implementation begins, but it is good practice to have them at least partially involved in the analytical part. This role checks the model and information according to the execution of the project and buildings.
Facility manager	Analyses the impacts of the proposed solutions on the buildings maintenance, including the cost of these impacts and on services for end users, designing more effective solutions from the perspective of building maintenance.

Verify the organisation's readiness for the implementation of the BIM method

A difference (or GAP) analysis compares the current state to a future (or desired) state. The objective is to provide the organisation's management with a clear picture that will support decision-making. The GAP analysis includes three activities:

- Analysing the current state
- Proposing the future state
- Compile a list of requirements (difference between the current and future state).

The organisation reflects on its current state in the first step. This is nothing more than a thorough mapping of processes and resources, in order to clearly see how the organisation works with information. The second step means the active collection of knowledge about the future. Such as where the market is going, how the laws will change, what's going on. Based on this, the organisation considers how to incorporate these changes into its own plans. The last point is the result (difference) of the two previous ones. Within it, the organisation will compile a list of activities that need to be carried out to achieve the future state.

This list will then be expanded in the next steps with further detail. Therefore, it is extremely important to pay due attention to this analysis.

Conduct a difference (GAP) analysis

- Analyse the current state of the organisation
- Propose the future state of the organisation
- Prepare a list of requirements (difference between the current and future state)

The difference analysis is a key analysis for identifying needs when implementing the BIM method in an organisation and the quality of its implementation should not be underestimated!

Verify the organisation's readiness for the implementation of the BIM method

The primary questions involved in any analysis are what is being analysed and why. The process of managing this change primarily involves human resources, processes, the organisation, and technology. Within human resources, the primary focus is on verifying that the organisation has sufficient capacities among employees and sufficient expertise in areas concerned with the implementation of the BIM method in the organisation.

Within processes and the organisation, all activities, along with the information needed to execute such activities, involved in the changes are mapped and it is determined if the organisation is sufficiently ready to adopt these changes. The assessment of sufficient technical and software equipment related to buildings, including existing asset registration systems, is also important for digitisation.

The analytical team should use all the information and tools available as of the date of the analysis and use the prepared check-lists to monitor the organisation's readiness to implement the BIM method. Consistent and truthful analysis is the most important step in this regard in the successful transition to the use of the BIM method in the organisation.

Conduct a difference (GAP) analysis

Analyse the current state of the organisation

What is analysed?

- Human resources
- Processes
- Organisation
- Technology

What is used for the analysis? (examples)

- Organisational rules and structure
- Job descriptions
- Internal regulations related to construction and buildings maintenance and public contracts
- Interviews with responsible persons in the organisation
- Valid legislation concerning the BIM method
- IT infrastructure solutions for the organisation

Verify the organisation's readiness for the implementation of the BIM method

Analysis of the current state helps us define the initial level of the organisation's readiness to change. It is necessary to be aware of the processes involved in implementing BIM in an organisation. Since the managed change is a change in human resources, the organisation, processes, and technology, it is necessary to analyse the activities that affect them in these areas. The basic document of each organisation is its organisational rules and structure, which define the competencies of individual organisational units and individual job descriptions. Within them, the analytical team should focus on activities related to the construction, buildings maintenance, as well as the award of public construction contracts and related activities.

Internal regulations, such as rules, guidelines, methodological guidelines and documents related to the organisation's information policy within the ICT infrastructure, will help to understand the sub-processes. Interviews with those responsible for the analysed sub-activity should be used for clarification, unless that person is directly a member of the analysis team. During the interview, it is also necessary to find out whether the current practice corresponds in detail to the documents, to accept suggestions for improvement and at the same time to explain the purpose for which the change is being made. Acquaint key people with the valid and forthcoming legislation in the field of BIM and at the same time motivate them for the planned changes and thus informally obtain support from lower levels of the organisation and at various stages of the implementation of these changes.

Conduct a difference (GAP) analysis

› Analyse the current state of the organisation

What is analysed?

- Human resources
- Processes
- Organisation
- Technology

What is used for the analysis? (examples)

- Organisational rules and structure
- Job descriptions
- Internal regulations related to construction and buildings maintenance and public contracts
- Interviews with responsible persons in the organisation
- Valid legislation concerning the BIM method
- IT infrastructure solutions for the organisation

Verify the organisation's readiness for the implementation of the BIM method

To provide the right proposal of BIM usage that fit to specifics of their organisation, the analytical team can draw knowledge from the information related to the strategic documents of the Czech Republic, such as Digital Czechia, digital strategies of the relevant resort and CZ BIM Strategy Department (Koncepce BIM). It must also take into account the strategic documents of the organisation. Inspiration and instructions can be found in supporting documents, methodologies and workshops prepared by the Czech Standardization Agency and websites dedicated to BIM issues*.

To ensure a Common Data Environment (CDE), it is appropriate to use market research to clarify the necessary requirements for selecting the appropriate solution for the size and type of organisation.

** when searching for available information on the Internet, always thoroughly check the sources!*

Conduct a difference (GAP) analysis

- Analyse the current state of the organisation
- Propose the future state of the organisation

What do I propose from? (examples)

- From Czech government strategic documents
- From Czech Standardization Agency methodology
- From BIM workshops and conferences on the market
- From software availability market surveys (e.g. CDE)
- From information available on the websites of competent professional organisations
- From the organisation's strategic documents

What do I propose? (examples)

- Adding roles to the project team if the organisation does not have them
- Changes in the organisational structure, internal regulations and related processes in the organisation
- Changes in public procurement processes in the organisation associated with the construction and buildings maintenance
- Changes in IT infrastructure and existing software

Verify the organisation's readiness for the implementation of the BIM method

The proposed future state is tied with legislative obligation to implement the BIM method, and above all to the ability to exploit the introduced method to further improve the organisation's activities. The BIM method offers many advantages, for example in the effective management and maintenance of assets, as well as the sharing of information about these assets in one place for follow-up units (departments).

Therefore, the analytical team should propose the target state in the form of objectives, from short--term to long-term, as well as define changes that transfer the organisation to this future state. These are changes in the organisational structure, internal regulations, processes related to the construction and buildings maintenance and public contracts related to them.

The team's primary focus in the design phase is the Common Data Environment (CDE) solution, which is an integral part of the BIM method and associated with the achievement of the expected benefits and objectives.

Conduct a difference (GAP) analysis

- Analyse the current state of the organisation
- **Propose the future state of the organisation**

From what are they proposed? (examples)

- From Czech government strategic documents
- From Czech Standardization Agencymethodology
- From BIM workshops and conferences on the market
- From software availability market surveys (e.g. CDE)
- From information available on the websites of competent professional organisations
- From the organisation's strategic documents

What is proposed? (examples)

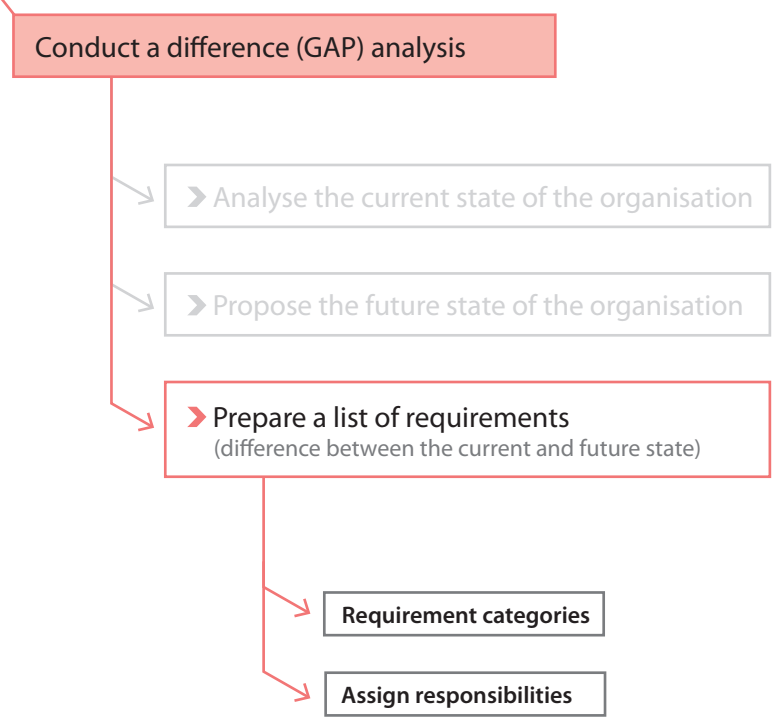
- Adding roles to the project team if the organisation does not have them
- Changes in the organisational structure, internal regulations and related processes in the organisation
- Changes in public tendering processes in the organisation associated with the construction and buildings maintenance
- Changes in IT infrastructure and existing software

Verify the organisation's readiness for the implementation of the BIM method

Within the analysis of the current and future state, the analytical team should be able to prepare a list that gives rise to specific requirements and proposal of changes to help manage the process of implementing the BIM method in the organisation.

These requirements must be sorted by priority and categorised based on areas and departments affected by such changes. This is done primarily to ease the process of tasks splitting to individual phases of overall BIM implementation plan.

Categorisation is mainly used for filtering and easier orientation. As mentioned earlier, the list that will be created here is not just a static one-off table, but a living document that is constantly updated and will accompany the organisation throughout implementation.



Verify the organisation's readiness for the implementation of the BIM method

During implementation of the BIM method, the analytical project team closely cooperates with the management of the organisation to identify suitable change management conditions. These conditions depend on the objectives that the organisation sets at the very beginning.

It is clear that the main objective of the project is the implementation of the BIM method in the organisation. Sub-objectives set based on GAP analysis may vary widely from simple fulfilment of the legislative obligation to exploitation of the BIM method at the management level and disposal of the organisation's assets, including their administration. Defining an objective / objectives is a prerequisite for the organisation, but nevertheless sufficient.

The conditions for achieving it, the risks that need to be identified and the method of mitigation are linked to the configuration of change management itself. It is clear that setting appropriate and realistic objectives in different time frames is crucial from the perspective of directing the project outputs, the introduction of the BIM method. The next steps described in this document focus on short-term objectives.

The Catalogue of BIM Objectives serves as inspiration for BIM-specific objectives

Set change management conditions in the organisation

- **Identify potential objectives during implementation of the BIM method in the organisation (examples):**
  - short-term objective (by 2023)
    - fulfilment of legislative obligations
    - configuration of BIM processes and their implementation
    - CDE deployment in the organisation
    - DSS use in the organisation
    - preparation of technical infrastructure
    - execution of pilot projects
    - ...
  - medium-term objective
    - execution of buildings using the BIM method
    - more efficient transmission of information
    - digital building model (DIMS)
    - project duration reduction
    - total cost savings over the entire life cycle of buildings
    - effective management and buildings maintenance (FM)
    - unification of DSS (data standard of construction) into the organisation's individual SW
    - ...
  - long-term objective
    - ensuring the principles of 3E
    - transparency in construction operations
    - proper and uniform records of buildings and their parts
    - effective asset management and maintenance (FM)
    - CAFM implementation
    - ...
- **Identifying the conditions for achieving objectives**
- **Identifying risks and mitigating them**

Executive summary for the "Find out" step

BIM KONCEPCE

- [ ] **Do we have assigned a person responsible for implementing BIM in the organisation?**
  - [ ] Has a BIM Manager been appointed and has he/she received sufficient support from the organisation's management?
  - [ ] Does he have sufficient knowledge of the organisation's activities and procedural context?
  - [ ] Have competencies and responsibilities been set for him, both inside and outside the organisation?
- [ ] **Has the analytical project team analysed the current state inside the organisation in terms of the implementation of the BIM method?**
  - [ ] Has the project team assessed the current state in terms of change management in the organisation and with respect to the organisation, processes, human resources and technology?
  - [ ] Have all available resources been used in the analysis?
- [ ] **Has an analytical project team been defined?**
  - [ ] Is the analytical project team represented by the corresponding roles?
  - [ ] Were the roles missing in the organisation covered by an external service?
- [ ] **Has a list of requirements for the implementation of the BIM method in the organisation been prepared?**
  - [ ] Has a list of requirements for the implementation of BIM in the organisation been compiled?
  - [ ] Were the requirements categorised according to departments or priorities?
- [ ] **Did the analytical project team propose the future state of the organisation?**
  - [ ] Did it use all available resources for the proposed solutions?
  - [ ] Did it propose a future state in relation to the organisation, processes, human resources and technology?
- [ ] **Have the conditions been set for the implementation of the BIM method in the organisation?**
  - [ ] Were the objectives defined by the organisation's management?
  - [ ] Have the conditions for the achievement of objectives been defined?
  - [ ] Have risks been identified?

What steps can our organisation expect?

BIM KONCEPCE

Construction projects using the BIM method

2023 START

Complete pilot projects

- identify suitable pilot projects
- verify the Process Documentation in pilot projects
- monitor functionality, interconnectedness across the organisation
- modify Process Documentation based on findings from pilot projects

2021-2022 VERIFY

Prepare the Process Documentation

- configure internal standards, prepare template documentation
- configure the method used to communicate and work with information
- define information exchange rules
- configure a uniform data standard

2021-2022 PREPARE

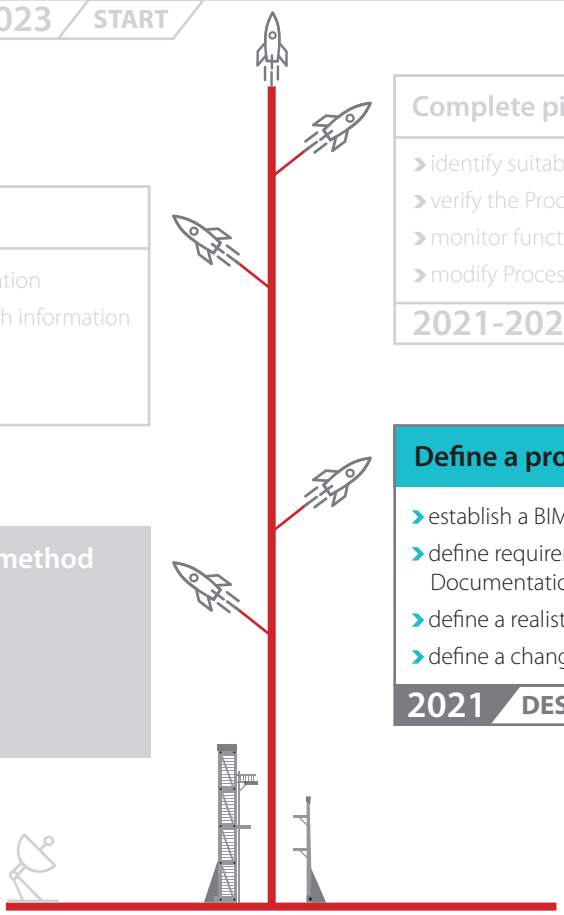
Define a project plan for the implementation of the BIM method

- establish a BIM project team and define roles and responsibilities
- define requirements and conditions for the preparation of the organisation's Process Documentation
- define a realistic schedule for the implementation of the BIM method in the organisation
- define a change management strategy in the organisation and manage defined risks

2021 DESIGN

Verify readiness for the implementation of the BIM method

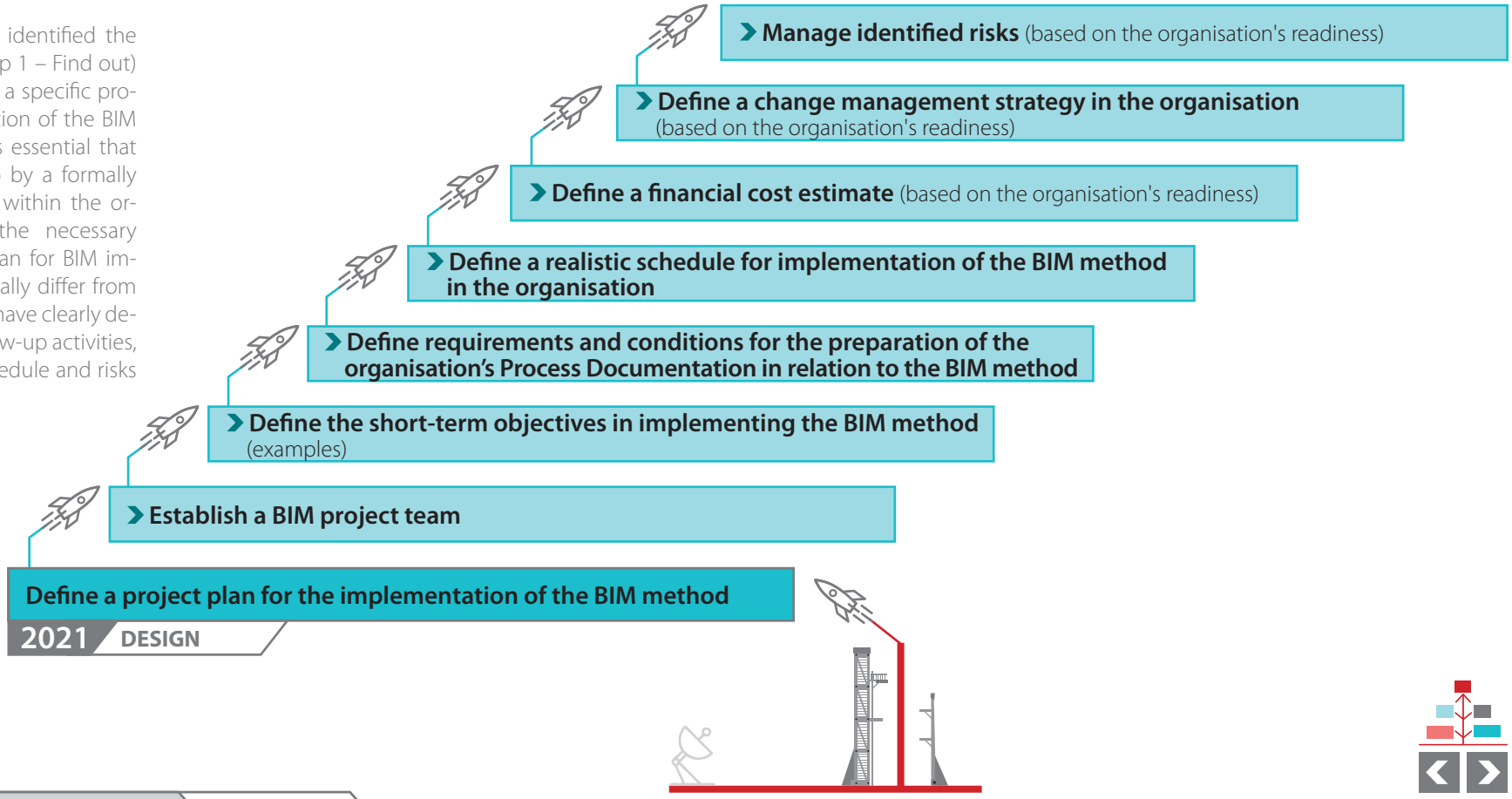
2021 FIND OUT



Define a project plan for the implementation of the BIM method

BIM KONCEPCE

The organisation has already identified the current or initial state (see Step 1 – Find out) it is currently in and therefore a specific project plan for the implementation of the BIM method may be defined. It is essential that the project plan is drawn up by a formally appointed BIM project team within the organisation equipped with the necessary competencies. The project plan for BIM implementation does not generally differ from the standard plans, so it must have clearly defined objectives to which follow-up activities, changes, implementation schedule and risks are linked.



Establish a BIM project team

Just as in the analytical phase, in the design stage it is necessary to establish a project team comprised of the same nominees who proved their skills and utility during analysis. The team should also include people with experience and skills in planning, budgeting, risk management and, last but not least, change management. If the organisation does not have such experts, it can use external cooperation. However, in the absence of a project management department in the organisation, it is essential that this BIM project team be formally appointed by the organisation's management (e.g. statutory body) and become an executive branch within its organisational structure. Ideally, the BIM project team leader, the BIM Manager, should be responsible for the activities of his team to the organisation's management (e.g. statutory body) or to a designated representative. The reason is that within the organisation there may be fundamental changes in processes, the system of organisational structure, changes in software settings and personnel changes. It is the implementation of such systemic changes that is within the competence and can only be enforced by the organisation's management or a representative appointed by them.

The appointment document must identify the individual nominees, their roles, clear competencies and responsibilities, as well as the duration of the BIM project team organisational structure.

Establish a BIM project team

- roles of team members
- competencies
- responsibilities
- time frame

The BIM Manager is a key role for the organisation and will guide the implementation of the BIM method throughout the organisation. The organisation should therefore pay close attention to the abilities, knowledge and skills of the person who will play this role.

Define the short-term objectives in implementing the BIM method (examples)

Objectives were identified in the implementation of the BIM method within the organisation in the "Find out" phase. In addition to a clear main objective, the introduction of the BIM method sub-objectives were therefore identified, which can be divided into short-term, medium-term and long-term according to the complexity of their fulfilment. In the "Design" phase, the BIM team must focus primarily on short-term objectives that are achievable and verifiable during the project to implement the BIM method in the organisation.

The objectives for the BIM method must focus on the following two areas: the organisation as such and then for individual pilot construction projects. The objectives of both areas follow and complement each other. Defining sub-objectives is essential in the design of the plan, so the BIM team must focus on their detailed elaboration, including the exact means of verifying the fulfilment of the objective.

The objectives must be realistic and achievable; these conditions will mean the BIM team avoids a situation where the impracticability of the objective ruins the whole objective.

Define short-term objectives when implementing the BIM method (possible examples)

- Fulfilment of legislative obligations
- Configuration of BIM processes and their implementation
- Implementation of a Common Data Environment (CDE) within the organisations
- Use of the Building Data Standard (DSS) in the organisation
- Preparation of technical infrastructure
- Execution of pilot projects

Examples of objectives:

Fulfilment of legislative obligations

This objective is the basic objective of every contracting authority, and the complexity of achieving this objective will depend on the output of the GAP analysis, i.e. the initial state the organisation is operating in and what it wants to achieve.

Implementation of BIM processes

This objective is an essential part of implementing the BIM method in an organisation. The organisation's readiness to implement the BIM method is reflected in the organisation's processes. Thanks to this new configuration, the organisation can ensure the implementation of construction projects using the BIM method.

Implementation of the Common Data Environment (CDE)

This objective is a significant innovation in the implementation of projects using the BIM method. It is a way of sharing information and communication within one common environment.

Execution of pilot projects

This objective is the result of the project to implement the BIM method into the organisation. As part of the pilot projects, the correctness of the process settings, methodology and readiness of the organisation for the implementation of construction projects using the BIM method will be verified.

Define the short-term objectives in implementing the BIM method (examples)

If the BIM team identifies multiple objectives, their priority should be determined. Obviously, there are several ways to achieve the objective, but the BIM project team should be the one that still focuses on the fulfilment of the defined objective and should not be allowed to disperse ad-hoc ideas outside the project plan, but should be constantly open to new stimuli in this area. The right balance between fulfilling the defined objective achievement plan and its minor correction based on suggestions is one of the fundamental skills of the BIM Manager.

At this point, it is necessary to draw attention to the fact that the preparation of the plan will also include objectives that are determined within specific construction projects, the achievement of which will be subject to verification on pilot projects and which are different from the objectives of the project to implement the BIM method.

The Catalogue of BIM Objectives published by the Czech Standardization Agency serves as inspiration for BIM-specific objectives

Define short-term objectives when implementing the BIM method (possible examples)

- Fulfilment of legislative obligations
- Configuration of BIM processes and their implementation
- Implementation of a Common Data Environment (CDE) within the organisations
- Use of the Building Data Standard (DSS) in the organisation
- Preparation of technical infrastructure
- Execution of pilot projects

The BIM Manager is a key role for the organisation and will guide the implementation of the BIM method throughout the organisation. The organisation should therefore pay close attention to the abilities, knowledge and skills of the person who will play this role.

Define a realistic schedule for implementation of the BIM method in the organisation

An organisation's Process Documentation is documentation that determines how the organisation works. The Process Documentation includes in particular approved strategies, organisational rules, internal regulations, as well as operating rules of systems or manuals. Proposing requirements and conditions for change is the task of the BIM project team, in several areas.

This phase is about drafting the Process Documentation, which will be refined during the next phases and will be verified on pilot projects.

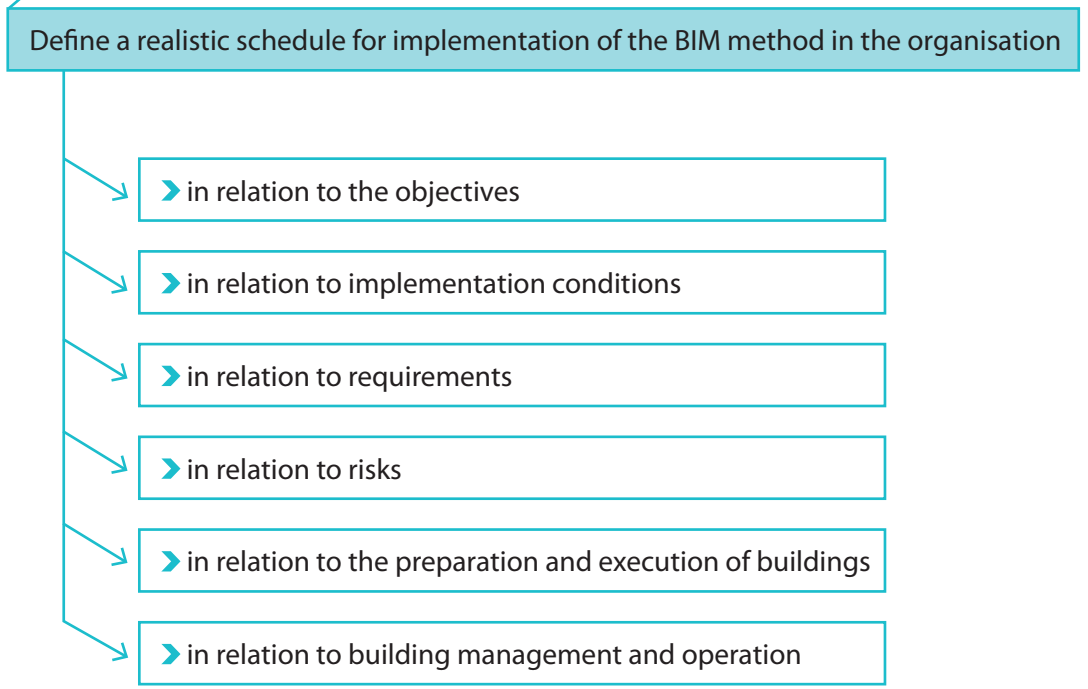
Define requirements and conditions for the preparation of the organisation's Process Documentation in relation to the BIM method

	Activity
to processes	Above all, it is necessary to focus processes in touched units (department) and address them.
to human resources	Changes to the organisational structure are then defined based on the new processes if desirable, and new job descriptions are then defined where appropriate. In the event that a new job is created, it is necessary to specify the requirements for the selection procedure for that position.
to public procurement	As the introduction of the BIM method also affects public procurement, it is necessary to set new rules in the documentation related to this area.
to education	When implementing the BIM method, it is also necessary to think about the education of existing or new employees in the form of training, or modify training plans in the organisation.
to IT infrastructure	The change will also affect the documentation defining IT infrastructure, including its maintenance and use, both in terms of the implementation and use of the system in the form of the Common Data Environment (CDE) and in terms of changes to existing information registration systems affecting buildings.
to management and disposal of the organisation's assets	Another area is the preparation of new regulations concerning construction projects, operation and maintenance of buildings…
to suppliers	…and the related change in rules and requirements for supplier relationships.

Define a realistic schedule for implementation of the BIM method in the organisation

The real schedule is tied to the set objectives. The BIM project team must set a schedule that will include sub-activities, including deadlines and responsible persons. The objective of scheduling is to determine which activities need to be performed and when. The activities must be arranged in a logical sequence on the timeline and the links between them established.

The schedule includes the communication interface between the sub-activities and the persons responsible for the assigned task and depends on the relative priority of the activities, the availability of resources, conditions, requirements and risks. The schedule within the implementation of the BIM method must take into account the fact that all public processes affected by the new method continue to run in the organisation. Therefore, it is necessary to prepare such a plan very carefully, which would take this fact into account and would not disrupt the implementation of public processes such as the preparation and execution of buildings or the operation and maintenance of these buildings.



Define a financial cost estimate (based on the organisation's readiness)

Every change involved in the introduction of a new method, such as the BIM method, brings with it a change in the budget. However, it is important to emphasize that the costs associated with the project to implement the BIM method must be seen as an investment that, when fully utilised, will be recouped in the form of savings in the planning, construction, management and maintenance of buildings. The funds required, their structure and distribution over time are affected by the readiness of the organisation, which results from the GAP analysis.

Within budget planning, the BIM project team must take into account at least the costs of external experts, if the organisation does not have them, and other costs according to the proposed sub-objectives of the introduction of the BIM method into the organisation.

Define a financial cost estimate (based on the organisation's readiness)

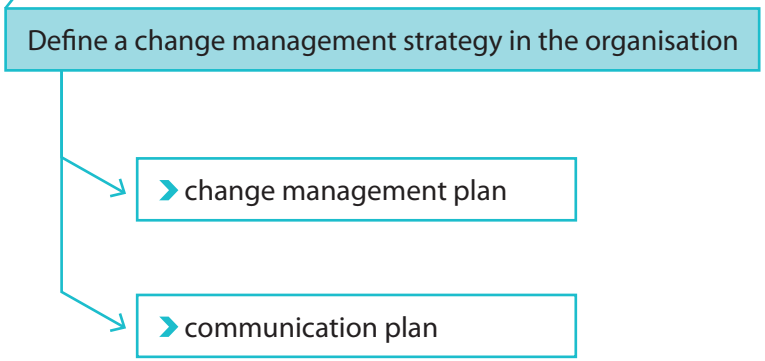
- Common Data Environment (CDE) – information system
- staffing with specialists
- IT infrastructure
- supplementing existing systems with a data standard for BIM

Define a change management strategy in the organisation

For most organisations the introduction of the BIM method will mean a change in their current approach to the various stages of the building life cycle, which will consist of working with a single shared database of building information, a shift towards digitisation in the organisation, changes in related processes, the possible reorganisation of departments and the interfaces between them and promoting the active use of the relevant applications and technologies.

In addition to the "substantive" components of such extensive changes as mentioned above (introduction of new internal regulations, process updates, newly created or organised information, implementation of supporting tools and applications), which are usually conceivable despite their complexity, the organisation must not forget the "soft" part of change (the human factor), which are typically underestimated in projects involving change.

Therefore, the overall project plan for the implementation of the BIM method, as well as its sub-project plans (e.g. for the implementation of a supporting application) must include strategic work with people in the organisation in terms of their needs and attitudes associated with change.



Define a change management strategy in the organisation

The change management plan takes into account the project plan in the individual stages of the project to implement the BIM method. Every introduction of change into processes, organisations and technologies raises the need to deal with people not only in terms of their numbers (do I have enough resources?), knowledge (are they properly trained?), but above all their attitudes and emotions associated with change.

It is therefore necessary to seek answers to these fundamental questions: who are the drivers and supporters of change; how to extend their positive impact to the relevant departments; what are the main objections to the change from the opponents and what are the possible variants of the answers; how is it going with getting the guru interested in the departments; what generational support for change looks like; how we can combine the knowledge of experienced fighters and the enthusiasm of young people longing for a change in often long-established orders; how to take into account continued mobility in the performance of work and work from home; what means of digital communication will we put in place to support the BIM implementation project and in a common routine day after the end of the project; how we achieve the required level of digital literacy, a sense of mastery and acceptance of change.

The change affects not only the executives, but also the management of the organisation: how we modify the management system; what competencies we will delegate related to the BIM method; how we will support change through our actions. The answers to these questions form the framework of a change management plan.

Define a change management strategy in the organisation

BIM KONCEPCE

It is appropriate to support the change management plan with a communication plan, i.e. an idea of how the objectives and the status of the project will be communicated, the introduction of the BIM method into the organisation. In addition to leveraging the organisation's existing communication channels, it may be appropriate to create a new channel to support the organisation's digitisation, combining this way of communicating with the upcoming changes. In addition to internal communication, it is also possible to consider communication about the status of the project with external partners with whom the BIM method will be practised in the future.

Communication should emphasize teamwork as an important prerequisite for implementing the BIM method. Open communication acknowledging potential difficulties and celebrating partial milestones gradually overcome on the way to the introduction of BIM in the organisation will certainly improve awareness and increase support for this method.

Formal and informal communication should include not only the core people in the organisation who are directly affected by the change, but also communicate in clear language what is happening around, what challenges the organisation faces and what benefits the BIM method can have for other units and departments.

Manage identified risks

BIM KONCEPCE

A subset of the project plan for implementing the BIM method in an organisation is a risk management plan, which sets out procedures and rules for managing these risks. The first step is to determine the risks. The task of the BIM project team is to find any circumstances that may jeopardize the project. Such risk must be described as best as possible to ensure the list compiled covers all possible risks.

Some organisations may already have a risk list prepared from other projects, so it can be used as the basis for creating an up-to-date list. After defining the risk register, the risks will be qualitatively analysed in terms of the probability of their occurrence and degree of impact. The purpose of such a step is to decide which risks need to be mitigated and to set up adequate measures and a responsible person to manage the risk.

Manage identified risks

Examples of risks:

- The culmination of other tasks of the organisation (for example, inventory, annual financial statements = the risk that the change will not be reflected in the organisation in the required time and scope).
- Underestimation of the extent of the change, no / low preparation (= risk that the change will not be reflected in the organisation in the required time and extent).
- Low starting level of knowledge and skills of key roles / positions.
- Reluctance of certain managers / workers to change.

Executive summary for the "Design" step

BIM KONCEPCE

- [ ] **Have we established a BIM project team?**
  - [ ] Have we defined people's roles and assigned clear competencies and responsibilities?
  - [ ] Have we set a time frame?
  - [ ] Were the above activities carried out in the form of a binding document?
- [ ] **Have we defined short-term objectives for the implementation of the BIM method in the organisation?**
  - [ ] Are the objectives clear, realistic and achievable?
  - [ ] Were all stakeholders involved in the implementation of the BIM method?
  - [ ] Has a plan been set to achieve the set objectives?
- [ ] **Have we defined requirements and conditions for the preparation of the organisation's Process Documentation in relation to the BIM method?**
  - [ ] Are these requirements directed towards processes and staffing?
  - [ ] Were the requirements sufficiently reflected in the public procurement documentation?
  - [ ] Have the conditions taken into account the training of staff in the new area of the BIM method?
  - [ ] Were the requirements incorporate into the organisation's IT infrastructure?
- [ ] **Have we defined a realistic schedule for implementation of the BIM method in the organisation?**
  - [ ] Is the schedule linked to the objectives and plan to achieve them and does it take into account the conditions, requirements and risks?
  - [ ] Is the schedule in line with the processes involved in construction design and execution, and activities related to building management and operation?
- [ ] **Has a cost estimate been compiled?**
  - [ ] Has the introduction of a Common Data Environment (CDE) been taken into account?
  - [ ] Will there be a need to provide specialists for professional activities?
- [ ] **Have we defined a change management strategy in the organisation and identified risks?**
  - [ ] Has a realistic plan been drawn up in relation to human resources, processes and technology?
  - [ ] Do we have a change management communication plan in relation to the BIM method?
  - [ ] Is a risk list prepared and treatment plan in place to minimise them?

What steps can our organisation expect?

BIM KONCEPCE

Construction projects using the BIM method

2023 START

Complete pilot projects

- identify suitable pilot projects
- verify the Process Documentation in pilot projects
- monitor functionality, interconnectedness across the organisation
- modify Process Documentation based on findings from pilot projects

2021-2022 VERIFY

Prepare the Process Documentation

- design processes and information flows
- configure the method used to communicate and work with information
- configure internal standards, prepare template documentation
- configure a uniform data standard

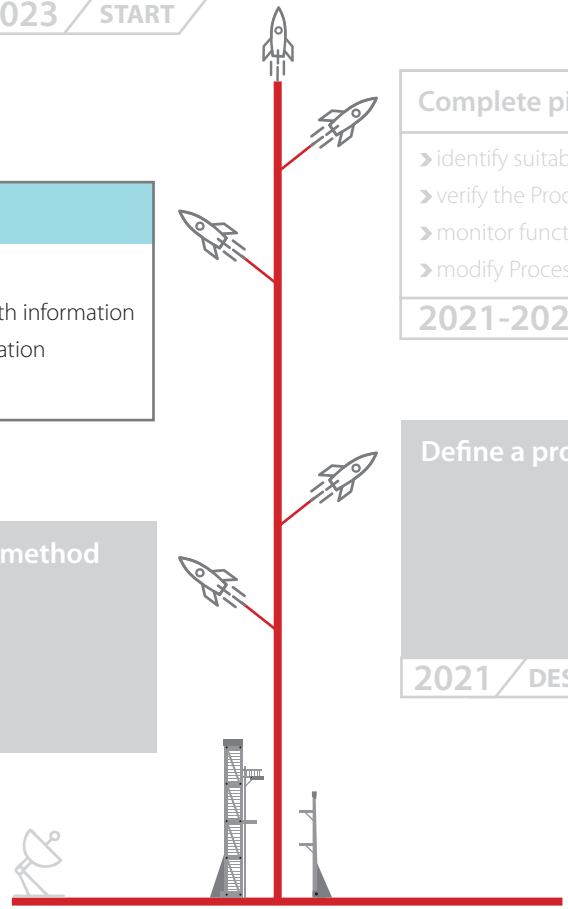
2021-2022 PREPARE

Define a project plan for the implementation of the BIM method

2021 DESIGN ✓

Verify readiness for the implementation of the BIM method

2021 FIND OUT ✓

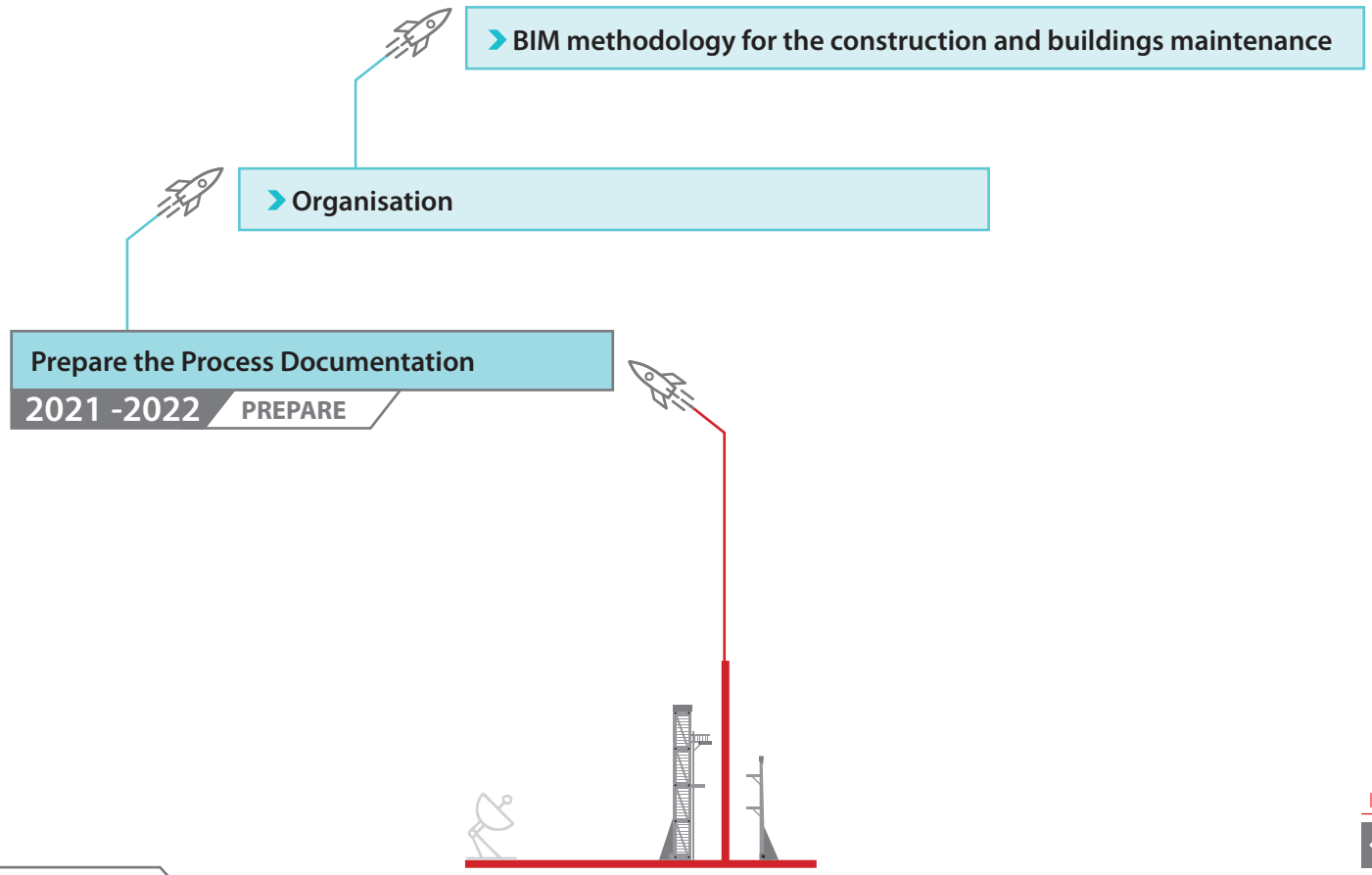


Prepare the Process Documentation

Organisation | BIM methodology

As part of the "Find out" step, the organisation analysed which governing documents would need to be modified to implement the BIM method. It is obvious that the change to processes and settings must be reflected in the organisational rules and structure of the organisation, and job descriptions.

And also in the internal regulations that relate to the construction and buildings maintenance or the award of public contracts associated with them. To achieve the change, it will also be necessary to create new Process Documentation, which is necessary for the effective use of the BIM method in the organisation.



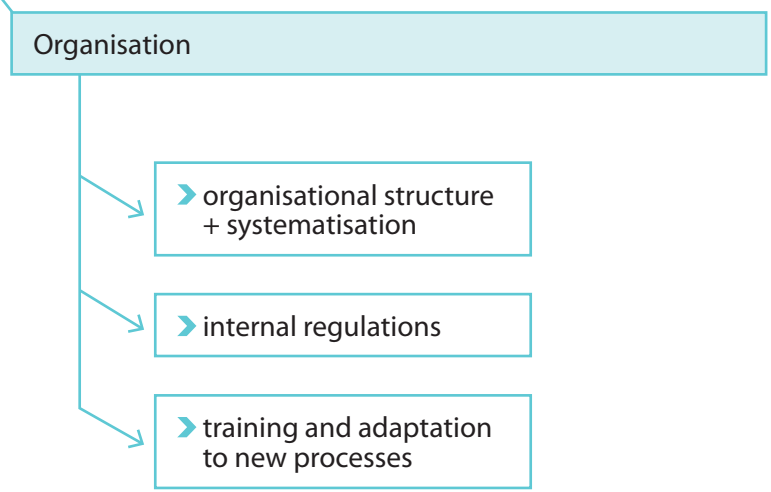
Organisation (organisational structure and internal regulations)

BIM KONCEPCE

Changes in the organisational rules and structure mainly concern departments that are responsible for the preparation, realisation and of buildings maintenance; however, changes in processes caused by the introduction of the BIM method will be reflected throughout the organisation. Therefore, the BIM project team must consistently prepare a process description in the Process Documentation that would capture the cross-functional impact.

Next to execution steps and work activities the processes also cover approvals (approval flow, matrix) , for example in the framework of regulations on financial control (preliminary management control) or public procurement. Within these regulations, it is necessary to prepare a document in which the roles and activities in the various phases of the project of implementing the BIM method or constructions processed using the BIM method will be precisely defined. Adaptation to the correct new terminology is also an important part of the documentation modifications.

The changes include adaptation to new work activities related to the new BIM method and therefore it is necessary to prepare employees for these changes in the form of training.



Organisation (organisational structure and internal regulations)

BIM KONCEPCE

Organisation

Example of a document defining roles and activities in an organisation

Plan for information exchange (IPD) within the organisation per the BIM method

	Strategic requirements(implementation of BIM method)	Implementation requirements(implementation of BIM method)	Preparation of project and materials for tender	Tender for designers	Project documentation	Tender for contractor	Construction	Operation
	Strategic level	Implementation level	Execution level	Execution level	Execution level	Execution level	Execution level	Operation
Management of the organisation	› Appointment of BIM manager › Definition of requirements on the BIM project team › Strategic requirements for the BIM project › Identification of project needs and goals using the BIM method	› Establishment of the BIM project team › Decisions on technical support per the BIM method › Change management › Provision of training						
Analytical BIM team	› Determination of the current state of the organisation › Specification of target state of BIM method implementation › GAP analysis › Design of BIM method implementation							
BIM project team		› Definition of general requirements per the BIM method › Preparation of contractual documentation templates › Processing of templates for BIM protocol and annexes › Configuration of the process › Preparation of BIM-related internal regulations › CDE decision › Preparation of possible uses › DSS design according to the purposes of use › Preparation of pilot projects and verification of rule configuration › Unification of code lists and DSS	› Implementation plan › Preparation of documentation › Modification of DSS, customer's requirements for information, BIM protocol and annexes, tender conditions) › Definition of general selection criteria for DIMS supplier › Definition of requirements vis-a-vis the purpose for which information is used (e.g. operations, FM) › CDE configuration	**Bid check** › Check of framework BEP › Supplier reference check › Check of the customer's information requirements › DIMS cost check	**Management and monitoring** › BEP management -(delegate the task to the Information Manager) › Check of code lists › DIMS check › DIMS approval **Preparation for pricing and building contractor selection** › Check of bill of quantities › Check of gross costs › Check of PD	Bid check	**Process control and monitoring** › Check of costs and budget implementation › Construction quality control › Check for conflicts in DIMS › Data compliance control › Control of DIMS connection to CAFM	**Project revision** › Check of project outputs › Modification of the organisation's BIM standards › Proposals for connecting other variants of use to the BIM modelling process › Control of DIMS connection to CAFM
Organisation's department responsible for construction		› Selection of information manager › Implementation plan › Defining the purpose for which information is used		Selection of designer	**Decision-making and monitoring** › Review of the construction control plan, including subsequent approval › Monitoring of implementation plan › Decision on outputs › Decision on design variant selection (primarily BEP) › Decision on changes	Selection of building contractor	**Decision-making and monitoring** › Review of the construction control plan, including subsequent approval › Monitoring of implementation plan › Decision on outputs › Decision on design variant selection (primarily BEP) › Decision on changes	**Decision-making and monitoring** › Decision on updating documentation › Decision on securing additional technical support › Decision on implementation of additional projects › Decision on use of DIMS options (area management, acquisition and operational analysis) › Defining the purpose for which cost information is used for building systems)
Legal counsel		› Preparation of contractual documentation › Defining the method used to award public contracts	Preparation of contractual documentation	Preparation of contractual documentation	Updating of contractual documentation	Preparation of contractual documentation	Updating of contractual documentation	Check of outputs
Asset manager			Definition of operational requirements	Documentation comments	Documentation comments	Documentation comments	Process control and monitoring	

- organisational structure + systematisation
- internal regulations
- training and adaptation to new processes

Organisation (training and adaptation to new processes)

BIM KONCEPCE

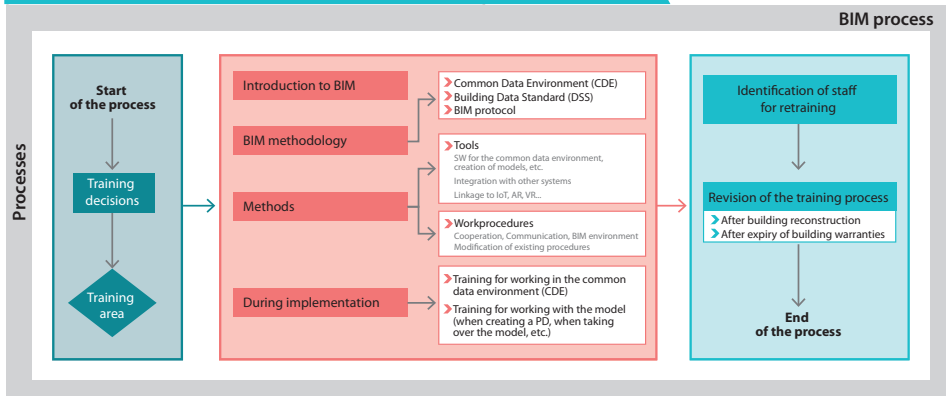
Another important point is preparation and acquainting the organisation's employees with the changes related to the implementation of the BIM method. The process of training the organisation's employees sets up a system of training individual employees with regard to their level of knowledge of BIM.

The training must become part of the organisation's training program and can be set up in the following areas, such as an introduction to the BIM method, methodologies for individual areas, tools and work procedures, working with models.

Organisation

- organisational structure + systematisation
- internal regulations
- **training and adaptation to new processes**

Example of a training process schematic in an organisation



BIM methodology

Unlike previous Process Documentation, which changes or slightly amends existing processes, Process Documentation regarding the use of the BIM method is completely new documentation and must be prepared by the BIM project team. To simplify preparation, it is divided into four basic areas: communication, data, contracting and procurement. The first area is the implementation of the Common Data Environment (CDE) into the organisation and its preparation for use in construction projects using the BIM method.

The second area is the data standard of the organisation and its connection with the existing information systems in the organisation (e.g. budgets, asset management), including CDE, or CAFM. The third and fourth, equally important area is the contractual arrangement, which is closely related to the procurement procedure for the supplier, which also includes the contractual documentation, including specific contractual conditions in connection with the use of the BIM method (BIM Protocol). Supporting documents in the form of standards, methodologies and examples are available for all these areas as prepared by the Czech Standardization Agency and available on the portal www.KoncepceBIM.cz.

Detail on following slides.

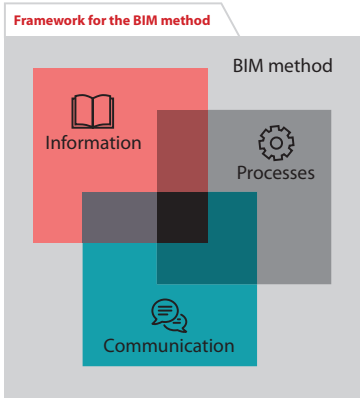
- CDE, DSS and Contractual arrangements
  - Common Data Environment (CDE)
  - Building Data Standard (DSS)
  - Contractual arrangements and procurement documentation

BIM methodology

The technical centre of the entire BIM method is the Common Data Environment (CDE), which includes and thus manages the entire information model of the building (digital twin of the building). This means not only the digital construction model (DIMS) and its non-graphic data (formerly referred to as the 3D model), but also all other documents, communication between project participants and processes in the various phases of the construction life cycle. The Common Data Environment is a key information management system and is therefore one aspect of compliance with the obligation to use the BIM method. The owner of the building, just as he owns and manages the physical appearance of the building, should manage the deployment and operation of CDE, which is home to the digital twin of the building.

The use of CDE goes across different departments and suppliers, i.e. internal and external roles. Therefore, it will often be the first step in a real and profound digital transformation of the entire organisation. The way of work, processes and communication must go through a digital transformation so that all information can be interconnected in the same way. It is the digital connection in CDE that can create a broader context for information, and only in this way can higher efficiency, lower error rates and, ultimately, lower construction project prices be achieved.

- CDE, DSS and Contractual Arrangements
  - Common Data Environment (CDE)
    - technical solution for acquisition, licensing
    - integration with other systems
    - definition of workflow
    - form of communication over the project
    - documents and records management
    - reporting
    - archiving
  - Building Data Standard (DSS)
  - Contractual arrangements and procurement documentation



BIM methodology

BIM KONCEPCE

Rules for handling documents must be defined, including the method of archiving them, the form of reporting, and possible integration with the organisation's other information systems.

The implementation and use of CDE in the organisation needs to be addressed in relation to the set objectives, which offer different ways of proceeding. The decision on the most suitable one can also depend on the number of construction projects implemented, their size and the need to use the CDE for other departments of the organisation. The objective should be to run a CDE for the entire organisation so that the digital twin construction is fully under control for all the organisation's buildings in the same environment.

The initial stages of CDE implementation can also be followed by a scenario to test various CDEs on individual pilot projects or their operation by the supplier (designer or construction contractor). Consideration of how to proceed and assess the benefits and risks are key activities and decisions in the preparation of the organisation.

CDE, Building Data Standard and Contractual Arrangements

- **Common Data Environment (CDE)**
  - technical solution for acquisition, licensing → software solutions > hardware/cloud solutions
  - integration with other systems → preference for open formats > electronic data and model transmission
  - definition of workflow → approval matrix > process flows > user roles and rights
  - means of communication over the project → method of information transfer > change management > handover protocols > electronic forms > records
  - documents and records management → numbering/versioning/nomenclature > logical linking > publishing
  - reporting
  - archiving
- Building Data Standard (DSS)
- Contractual arrangements and procurement documentation

BIM methodology

The digital building model data standard (DIMS) is the most significant new form of required construction information provided by the BIM method, both from within and outside the organisation. The data standard is the key for interconnecting all systems that will continue to use the information obtained in digital form for buildings implemented using the BIM method. The basis of the data standard for the public sector is DSS issued by the Czech Standardization Agency, which each organisation configures and, if necessary, expands according to selected or its own use case.

The DSS and its standardized data templates, together with the classification system, are the common language enabling the interconnection and sharing of information on buildings in public administration information systems according to the Digital Czechia concept. One current example is the planned digital construction proceedings and the digital technical maps, which have already been launched. The common language for passing information in DIMS is the open IFC format, which is a general data schema that allows data to be exchanged between different "BIM-ready" software.

Within the organisation, on the basis of DSS, it is possible to specify the organisation's own use case both for the construction project and for the operation and maintenance of the building and to incorporate these specifications into the own construction registration and management systems.

- CDE, DSS and Contractual Arrangements
  - Common Data Environment (CDE)
  - Building Data Standard (DSS)
    - specify own BIM uses for construction projects (PIM)
    - specify own BIM uses for building operations (AIM)
    - data template requirements
    - classification system (CCI)
    - adaptation of the Building Data Standard (DSS)
    - DSS and IFC integration for other software
  - Contractual arrangements and procurement documentation

BIM methodology

The procurement documentation is an essential document in public procurement, which is subject to Act No. 134/2016 Coll. on Public Procurement within public administration. The contractual documentation is also part of the procurement documentation. As part of the elaboration of contractual arrangements, it is recommended to use the Contractual Standard prepared by the Czech Standardization Agency, especially in the event that the organisation does not have its own set of rules or does not use another contractual standard (e.g. FIDIC). This is the Czech contractual standard for Design – Bid – Build, D-B-B ⬇ and Design-Build, D-B ⬇ contracts.

Contractual arrangements therefore include everything that the organisation must carefully contract beyond the legal rights and obligations in order to avoid unpleasant situations that could prolong the construction and handover of the building. For this purpose, a special annex to the contract called the BIM Protocol and its three specific annexes are designated for BIM.

When preparing the realization of construction projects using the BIM method, a document prepared by the Czech Standardization Agency for the Evaluation of Tenders in Public Procurement is also recommended. ⬇

Note: The slides on BIMPro will be updated according to the end of the external review process, depending on the final form of individual attachments.

- CDE, Building Data Standard and Contractual Arrangements
  - Common Data Environment (CDE)
  - Building Data Standard (DSS)
  - Contractual arrangements and procurementdocumentation
    - BIM Protocol (annex to the contract for work or assignment to the project documentation)
      - intellectual property, copyright and licensing agreements
      - rights and obligations of the client / supplier
      - definition of roles in the project
      - annexes to the BIM Protocol

BIM methodology

The most important part from the perspective of the BIM method within the contractual documentation is the BIM Protocol, which forms an integral part of the contract for construction or services (e.g. design engineering or other consulting activities – technical supervision). The BIM Protocol is therefore part of the procurement documentation when selecting a construction contractor or service provider and contains all the rules for the creation, transmission and use of the information model. The protocol is a model document that will be developed during the implementation of the organisation's projects in order to serve its purpose as effectively as possible.

The BIM Protocol is used for contractual arrangements covering specific obligations, legal liability and related restrictions, such as the permitted use of models, treatment of intellectual property and copyright aspects, definition of roles, responsibility for the use of models and data, exchange of information in electronic form.

Annexes to the BIM Protocol

- CDE, Building Data Standard and Contractual Arrangements
  - Common Data Environment (CDE)
  - Building Data Standard (DSS)
  - Contractual arrangements and procurement documentation
    - BIM Protocol (annex to the contract for work or assignment to the project documentation)
      - intellectual property, copyright and licensing agreements
      - rights and obligations of the client / supplier
      - definition of roles in the project
      - annexes to the BIM Protocol
        - Annex 1 Customer's information requirements
        - Annex 2 Common Data Environment (CDE) requirements
        - Annex 3 BIM execution plan (BEP) requirements

BIM methodology

BIM KONCEPCE

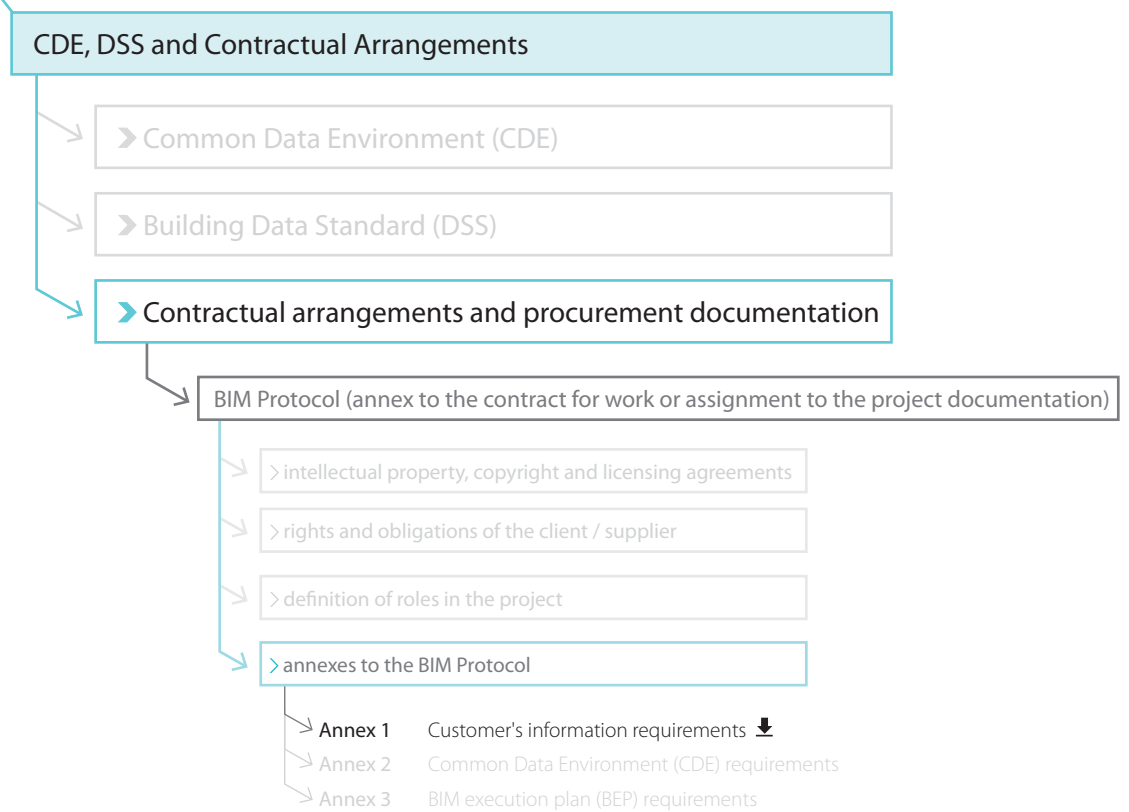
Annex 1 Customer information requirements

The client (public investor) information requirements constitute a single document specifying the customer information requirements for the phases of preparation, realization and buildings maintenance.

As part of the requirements for the information model, the document prepared by the Czech Standardization Agency is divided into seven areas, namely:

- general information requirements,
- requirements in terms of the structure and organisation of the digital building model (DIMS),
- requirements for its geometry,
- requirements for descriptive information (properties) in the DIMS,
- requirements for spatial affiliation of digital model data objects (spatial linking),
- requirements for system affiliation of DIMS data objects (system linking) and their classification,
- requirements for the classification of modelled data objects.

However, each organisation must supplement the above examples with additional requirements, which must always be adapted to the type and needs (use cases) of the specific project and its milestone.



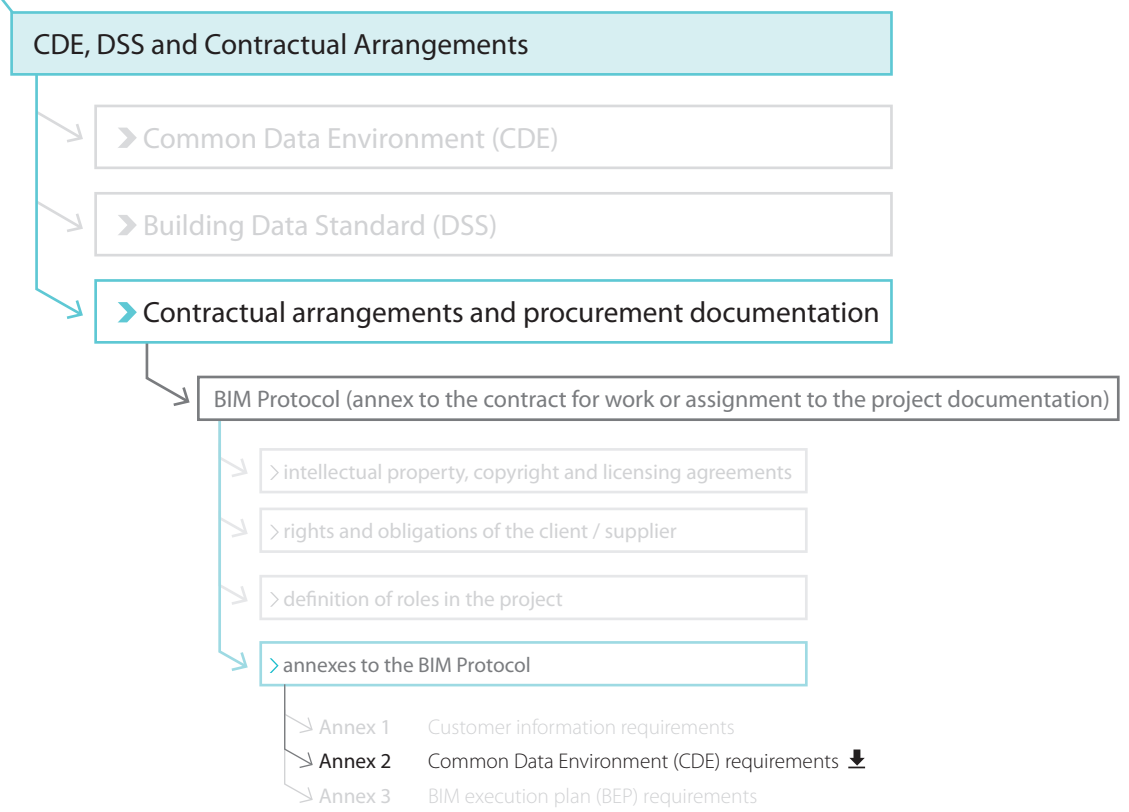
BIM methodology

BIM KONCEPCE

Annex 2 to the BIM Protocol – Common Data Environment (CDE) requirements

The Common Data Environment (CDE) is an information management system. The CDE is more than just a "data repository". It includes the procedures and rules required by the contracting authority. The annex to the BIM Protocol therefore defines the precise requirements for the method of accessing and using the CDE, in particular the method of communication, processes, comments and approvals, the links between the contracting authority's data standard and the method of storing records in the CDE.

The annex must be adapted to the specific CDE deployed on the project. In the case of the pilot phase, where the CDE is operated by the supplier, the annex must be adapted accordingly to include the contracting authority's general requirements (for example, ensuring post-delivery access).

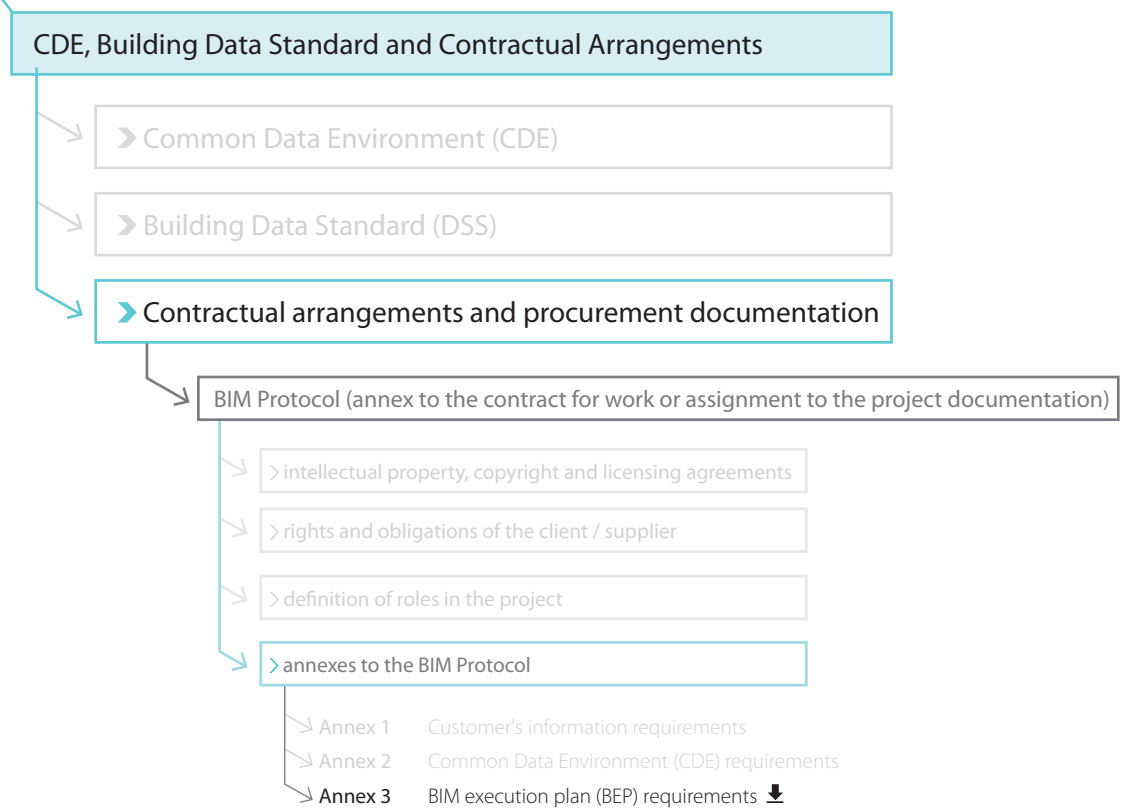


BIM methodology

BIM KONCEPCE

Annex 3 to the BIM Protocol – BIM execution plan (BEP) requirements

The BEP document is key for the implementation and management of BIM projects. The BEP specifies the requirements and outputs of the project set out in the contract and the client's information requirements. The execution plan is also closely related to the CDE, especially in the description of the software tool, data formats and communication principles. The BEP processes and proposes to the contracting authority first the model supplier (architect / designer) and then the construction contractor for the construction and acceptance phase. The BEP is an operational document, which is updated during the implementation of the contract with the agreement of both parties according to the needs of project development.



Executive summary for the "Prepare" step

BIM KONCEPCE

- [ ] **Have we prepared Process Documentation?**
  - [ ] Are the changes related to the BIM method taken into consideration in the organisational structure and internal regulations?
  - [ ] Have changes to the education system and adaptation to new processes been taken into account?
- [ ] **Is the BIM methodology prepared?**
  - [ ] Do we know what a Common Data Environment (CDE) is and how to adapt it to a pilot project/projects?
  - [ ] Do we have a building data standard (DSS) ready for a pilot project?
  - [ ] Do we have a contractual agreement and procurement documentation needed in public procurement process?
- [ ] **Have we resolved the introduction of the Common Data Environment (CDE)?**
  - [ ] Have we considered the technical solution and licensing?
  - [ ] Will we integrate the CDE with other systems?
  - [ ] Do we have prepared a way to pass on information in the CDE?
  - [ ] Do we have a system for numbering, versioning, reporting and archiving documentation?
  - [ ] Have we defined roles, processes, approval matrices and user rights?
- [ ] **Have we resolved the building data standard (DSS)?**
  - [ ] Do we have specified our own use case for construction projects (PIM) and for building operations (AIM)?
  - [ ] Do we have specified any custom requirements for data templates?
  - [ ] Do we have resolved the classification system?
  - [ ] Do we have a proposal for DSS and IFC integration for the organisation's software?
- [ ] **Do we know how the contractual arrangements and procurement documents will be set up?**
  - [ ] Do we have a BIM Protocol ready?
  - [ ] Have we dealt with intellectual property, copyright and licenses?
  - [ ] Have we sufficiently addressed rights and obligations?
  - [ ] Have the BIM Protocol annexes (Customer information requirements, CDE requirements) been prepared?
- [ ] **Are we ready to move to the pilot phase of the implementation of the BIM method?**

What steps can our organisation expect?

BIM KONCEPCE

Construction projects using the BIM method

2023 / START

Complete pilot projects

- identify suitable pilot projects
- verify the Process Documentation in pilot projects
- monitor functionality, interconnectedness across the organisation
- modify Process Documentation based on findings from pilot projects

2021-2022

Prepare the Process Documentation

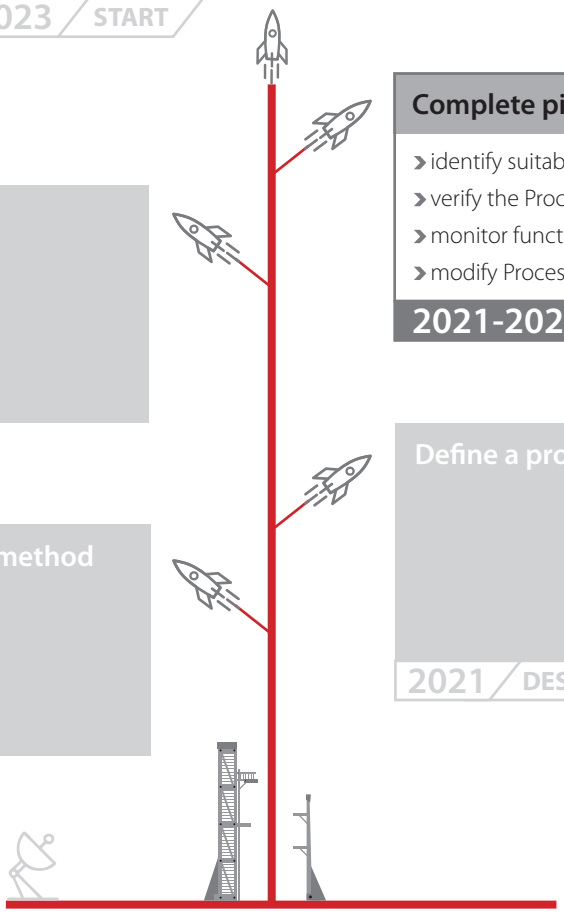
2021-2022 / PREPARE ✓

Define a project plan for the implementation of the BIM method

2021 / DESIGN ✓

Verify readiness for the implementation of the BIM method

2021 / FIND OUT ✓



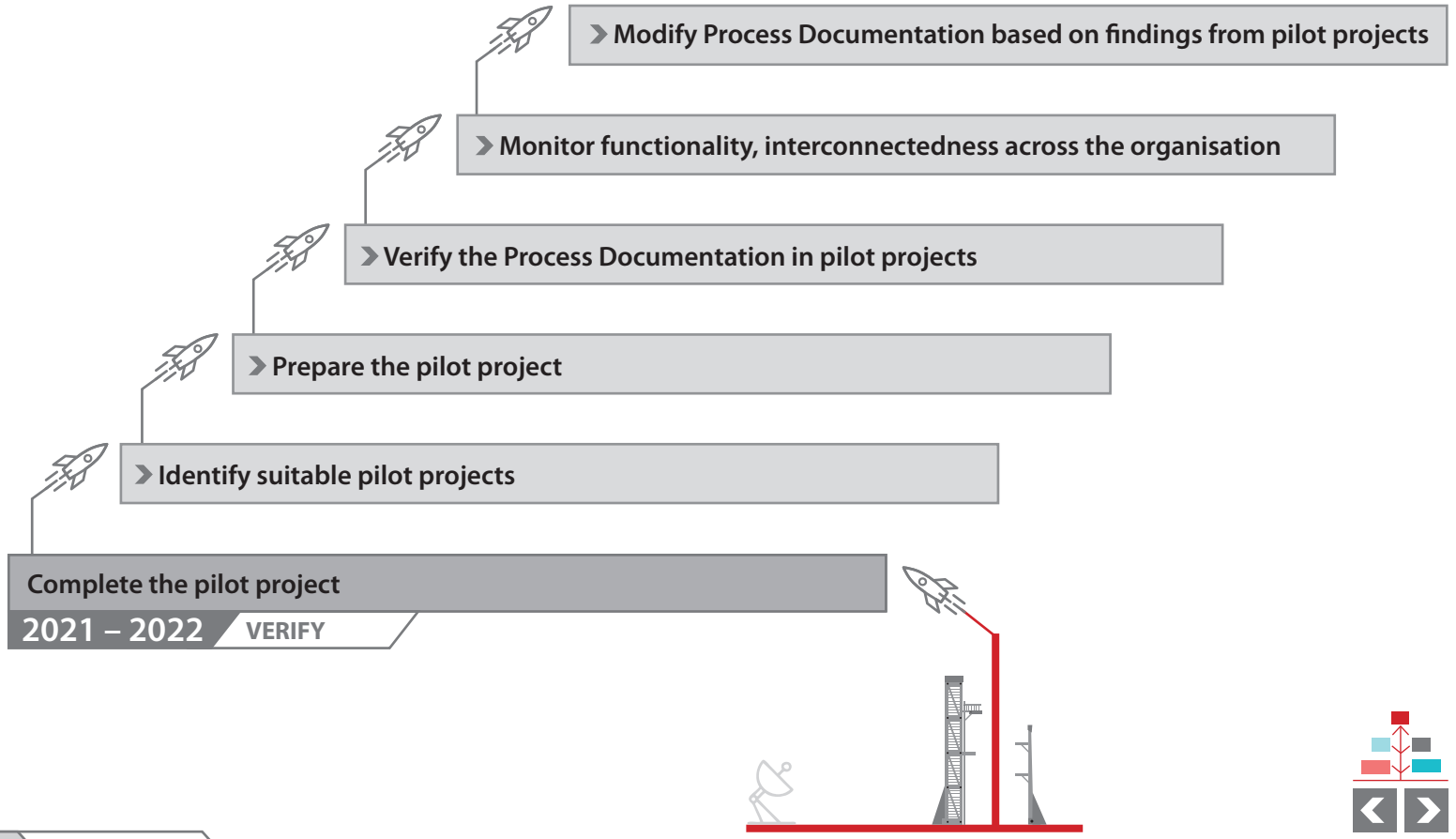
Modify Process Documentation based on findings from pilot projects

BIM KONCEPCE

The "Verify" step for the organisation is where it reaps the benefits from the previous activities that led to the preparation of the implementation procedures for the full-scale deployment of BIM. Prior to full-scale deployment, it is critical to verify the created methodology and procedures on real pilot projects. Pilot projects will vary according to the performance of the organisation's primary activities and the stage of completion of the organisation's existing construction project at the time of piloting.

Pilot projects should thus provide an answer to whether the organisation is ready to award public contracts, whether for supplies, services or buildings, including defining requirements related to the BIM method (information requirements, their exchange, etc.).

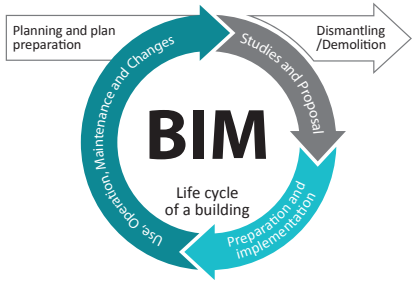
And above all, they will subsequently provide answers to how the organisation is able to work digitally with the supplier, work with the information again, use it for project management and then for the subsequent building maintenance.



Modify Process Documentation based on findings from pilot projects

Pilot projects should be used to verify the established Process Documentation concerning the BIM method of the organisation so that each step of the already defined procedure, contractual arrangements, communication, sharing and transfer of information and data is verified. It is clear that organisations have their investment plans and projects in various stages of development, and therefore it is necessary to choose not only according to the type of construction (civil engineering, infrastructure construction), but especially according to the life cycle phase of construction so that various pilot projects cover all the phases in the necessary short time frame.

The size of the building is also subject to careful consideration in order to choose moderate buildings, neither too small nor too large.



- Identify suitable pilot projects in the organisation
  - building type
    - select the project phase according to the building life cycle
      - Planning, Plan preparation
      - Study and Design
      - Preparation and Realization
      - Use, Operation, Maintenance and Changes
      - Dismantling/Demolition
    - choose a building of a suitable size

Modify Process Documentation based on findings from pilot projects

When preparing a pilot project, the organisation chooses the scope of BIM verification on a specific pilot project or its phase. The organisation can use the Catalogue of BIM Objectives issued by the Czech Standardization Agency as inspiration for BIM objectives in projects (pilot and later routine). Once the objectives have been set, the organisation must determine what the information will be used for and turn it into requirements that are reflected in the procurement documents and contractual arrangements represented by the BIM Protocol and its annexes.

In its own preparation for the implementation of the pilot project, the organisation must not forget to ensure adequate capacity of the persons participating on pilot projects and their training, including the preparation of manuals. These are the people who will play the well-defined roles necessary during the pilot projects. The scope of this team will vary both according to the type of phase tested and, above all, according to the size of the project. One of the most important roles in the pilot project is that of the BIM coordinator.

Prepare the pilot project

- define the scope of BIM method verification for a construction project (or a phase thereof)
- determine the information deliverables satisfying information requirements
- issue the BIM Protocol for the pilot project
- train the BIM coordinator

Modify Process Documentation based on findings from pilot projects

The Process Documentation concerning the BIM method must become a binding internal regulation of the organisation and as such must comply with the applicable legislation, and the actual processes in the organisation. Before determining commitment, it is necessary to verify the documentation pre-defined by the BIM project team in pilot projects. The organisation should therefore focus on documentation that covers, for example, procurement documentation and contractual arrangements, the BIM Protocol and its annexes, the data standard, the Common Data Environment (CDE), as well as the process workflow.

For each pilot project, it is necessary to determine, according to the selected sub-objectives, the specific Process Documentation or part thereof, which will be verified in the form of work procedures. At the same time, the organisation must provide training for internal and external persons so that they know and understand the documentation and what they really need to monitor.

The key is to deliberately select the appropriate parts for verification on a specific pilot project. An effort should be made to avoid verifying everything unrealistically at once, while also attempting not to verify too slowly.

Verify the Process Documentation in pilot projects

- Work procedures including the BIM method
- Common Data Environment (CDE)
- Building data standard (DSS)
- Contractual arrangements and procurement documentation
  - BIM Protocol, including annexes

Modify Process Documentation based on findings from pilot projects

BIM KONCEPCE

Monitoring must take place using pilot verification (test) scenarios that will be prepared for this purpose. The verification scenarios will contain the procedures that are defined in the prepared Process Documentation, and each employee who participates in the pilot project will record the course of the process in the verification scenario according to the actual situation.

Thanks to this, the BIM project team obtains detailed information about differences or, conversely, confirmation of defined procedures in the Process Documentation. The BIM project team must have periodically updated scenarios at its disposal.. This is the only way to detect any major differences or new needs or procedures that can be corrected on the ongoing project in a timely manner. You cannot wait for the project phase to end. During monitoring, the BIM team must record the real outputs, not just the formally fill up the scenario. Otherwise, the pilot project would not serve its purpose.

The purpose of monitoring is also to monitor the overall implementation process and to evaluate individual objectives. If the organisation determines during monitoring that it has already managed the set objective, it may decide to include another objective in the test in accordance with agile management (Czech Standardization Agency monitoring report template for pilot projects is available here).

Monitor functionality, interconnectedness across the organisation

Sample scenarios:

Purpose: Monitoring the overall course of the project (monitoring):
- Implementation of the BIM method in the organisation.
- Fulfilment of individual objectives (the organisation adapts the wording to its own objectives).

Organisation monitoring for xxx (specify / break down the purpose above):

Task description	Verification			Note
	done	not done	partially done	
Establishment of the BIM project team.				
Defining roles for BIM team members.				
Assignment of competencies and responsibilities to BIM team members.				
...				

Verification scenario 1: Communication over the project in CDE

Construction project phase	Order	Description of activities	Who (role)	Complete	Incomplete	Reason
Preparation and implementation	1	Set approval matrix	Contracting authority / supplier)	x		
Preparation and implementation	2	Provide inputs to all parties involved / trial	Contracting authority / supplier)	x		
Preparation and realization	3	Verify contract approval – various practical options (approve, reject, edit request, versioning, etc.)	Contracting authority / supplier)		x	Missing approval matrix (to whom to send for approval?)
...						

Modify Process Documentation based on findings from pilot projects

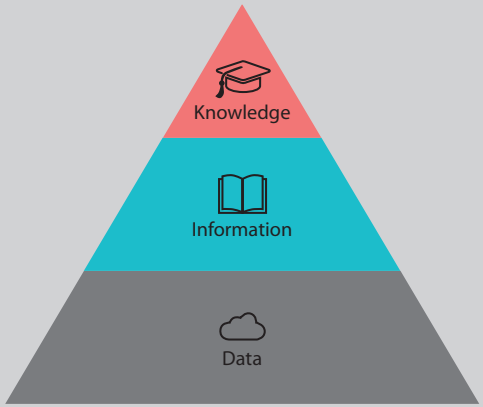
BIM KONCEPCE

Modify Process Documentation based on findings from pilot projects

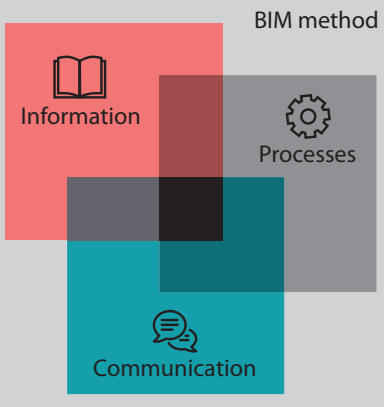
Feedback will be provided upon completion of the pilot projects or parts thereof. The BIM project team will evaluate whether there were predefined processes in the pilot projects for the specified objectives according to the Process Documentation. Above all, it must evaluate their feasibility and usefulness. This mainly involves digital communication, not only in the CDE environment, compliant with the contractual documentation, but also the transfer of information to the organisation's existing information systems, such as the file service (sort of DMS), construction budgets, records, asset and accounting systems, CAFM, etc.

If discrepancies are found, the BIM project team must assess why the discrepancies have occurred and decide about an update of related procedures or processes in the Process Documentation. In such a case, the documentation will be amended or supplemented, and will be issued by the organisation's management in a new version for widespread use in the organisation as valid and effective internal regulations.

Relationship between knowledge, information and data



Framework for the BIM method



Executive summary for the "Verify" step

BIM KONCEPCE

- [ ] **Do we have identified suitable projects?**
  - [ ] Were the pilot projects selected in relation to the building life cycle?
  - [ ] Has the appropriate building size been chosen?
- [ ] **Was the pilot project sufficiently prepared?**
  - [ ] Have the sub-objectives of the project been identified?
  - [ ] Have been determined what information will be used for?
  - [ ] Has a BIM Protocol been drawn up for the pilot project?
  - [ ] Did we train the BIM coordinator?
- [ ] **Have we determined what Process Documentation we will verify in the pilot project?**
  - [ ] Were BIM process schemas included in the verification?
  - [ ] Has CDE been included?
  - [ ] Are we verifying the data standard?
  - [ ] Has the contract standard and procurementdocumentation been included in the verification?
- [ ] **Have we sufficiently monitored the functionality and interconnectedness of the processes within the BIM method?**
  - [ ] Was the monitoring performed by a trained BIM team?
  - [ ] Were verification scenarios prepared and evaluated?
- [ ] **Were the outputs from the pilot projects taken into account in the Process Documentation?**
  - [ ] Has feedback been provided?
  - [ ] Have the outputs been reflected in possible changes in the processes?
  - [ ] Have changes to the organisation's file service (DMS), CDE and other systems been taken into account?
  - [ ] Were changes necessary in the contractual arrangements and procurement documentation, especially in the BIM Protocol?
- [ ] **Are we sufficiently prepared to implement construction projects using the BIM method?**

What steps can our organisation expect?

BIM KONCEPCE

Construction projects using the BIM method

2023 START

Complete pilot projects

2021-2022 VERIFY ✓

Prepare the Process Documentation

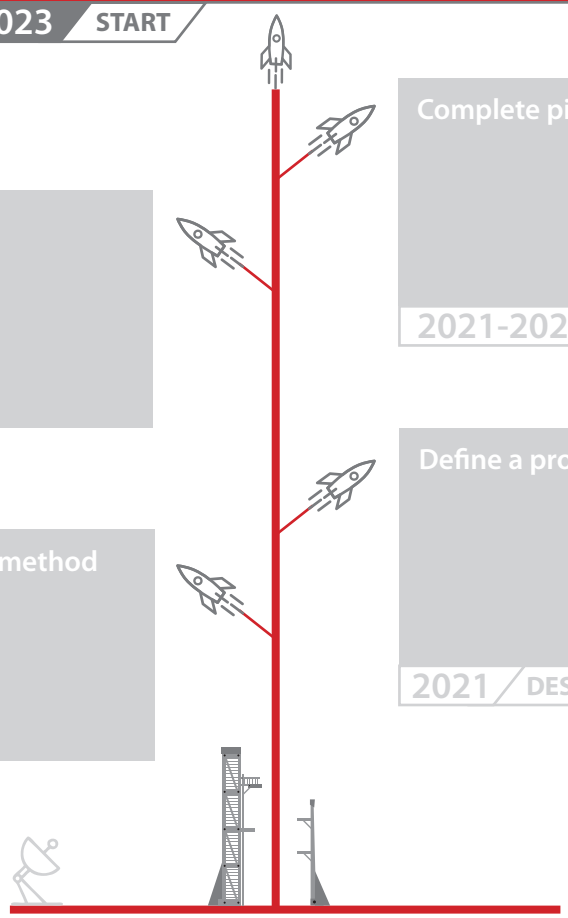
2021-2022 PREPARE ✓

Define a project plan for the implementation of the BIM method

2021 DESIGN ✓

Verify readiness for the implementation of the BIM method

2021 FIND OUT ✓



Work teams

– we are preparing for you –

Abbreviations for brochure

DSS – data standard for construction, i.e. a set of information requirements for the structured information model (one well-known example is Cobie, used in the UK, so the Czech local standard is also called DSS). DSS includes CCI.

Digital Czechia program –the strategy national document for digitisation of the public sector.

DIMS – a digital building model is a structured and object-oriented representation of a building or its parts, containing representations of individual building elements with their properties and in the graphical form needed for the required display. It is usually created as an output of software tools intended for the construction design phase.

IMS – building information model. This is a shared digital representation of the physical and functional characteristics of structures or parts thereof used to examine their properties and for specified purposes, including documentation associated with all phases of the construction life cycle. This means data, process workflows, communication etc. This is a database that includes complete data in the form of digital models, spreadsheets, text documents and more types of files compiled from the initial design through construction, building maintenance and possible changes to completed constructions through to their removal, i.e. all information usable during the whole life cycle of the construction.

FM – facility manager or facility management.

GAP analysis – a very standard analysis of the current and future state used for any more extensive changes. Through the analysis process the organisation starts to better understand its needs, can imagine its future and thus clarify its goals, assess means of achieving them, and consequently set a list of requirements needed for change, draw up a realistic plan and start to meaningfully bring about the hange.

Life cycles of buildings – each country may have a slightly different name for phases owing to long-term usage or compliance with the country's laws. In CZ and our brochure we use Preparation, Realisation and Maintenance.

- Preparation – includes planning and preparation of the investment plan, procurement/tendering, design, in short everything up to the realisation of the building
- Realisation – means the building phase
- Maintenance – means the usage, operation and maintenance phases

Process Documentation – primarily means internal process documents, methodical directions, approval matrix, and manuals. However, it can include also organigrams, job descriptions and other of the organisation's strategic documents, such as budgets, financial plans or even details such as IT backbone structures (internal coding, name lists, etc.) set up for an internal environment actually in place. It is impossible to list all the documents that need to be updated. It may vary from organisation to organisation.

Procurement documentation – also known as Tender documentation. Covers all documents needed for the public procurement procedure (process).

Use case – means what the organisation is going to achieve by implementing a specific part of the BIM method (e.g. elimination of mistakes in project documentation, optimisation of construction processes, timely clash detection, etc.).

Verification scenarios – analogous with test scenarios; however a test scenario is more detailed in that it uses IT testing that cannot always be simulated in our case. The aim is to create a simple checklist that will allow the verification of new procedures drafted in Step 3 to be monitored and any discrepancies to be recorded.

CZECH REPUBLIC
DEVELOPMENT COOPERATION

ÚNMZ CZECH OFFICE FOR STANDARDS, METROLOGY AND TESTING

The preparation of this English interactive version of the publication was financed from the Czech Development Cooperation within the project „Support for the improvement and development of the Serbian infrastructure sector" implemented by the Czech Office for Standards, Metrology and Testing.

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