

Digitalisation of the construction planning in Poland

Roadmap for the implementation of the BIM
methodology in public procurement

Brochure



Ministerstwo Rozwoju,
Pracy i Technologii

Roadmap for BIM implementation in Poland – introduction

Status quo

The current activities in promoting BIM in the Polish market are practically not integrated with each other. Some entities, mainly private or organisational institutions have financed or developed standardisation activities, but they are not universal for the entire sector because they contain solutions specific to a given undertaking or professional group.

Goals

Construction processes are subject to outdated procedures and are based on outdated sets of requirements, which prevents any progress in this area without introducing more radical measures. The Roadmap is an attempt to outline the direction of changes that will allow the construction industry to shift to modern and, at the same time, more effective tracks.

Direction

Developing a national strategy is necessary because it is not possible to adopt solutions or regulations that work successfully in other countries due to different conditions of the Polish market. The purpose of this document is to outline a clear framework for implementing BIM so that specific solutions can be applied modified over the next years to the benefit of the performance and efficiency of the construction industry in Poland.

Structure

The recommended package of changes in conducting construction investments is divided into parts. Each of them is based on a relevant legislative and normative basis. The document should be read chronologically on the horizontal axis (process timeline 1-2-3-4) and anywhere on the vertical axis (driving elements of the investment).

Considerations

One of the basic conditions that will determine the success of a BIM implementation strategy is the right approach to the most important resource – people. Technology and business processes can be measured, calculated, analysed and subjected to a series of simulations, while the human factor is the biggest challenge that Polish construction industry is facing in the BIM implementation processes.

The goal of the Roadmap implementation is to achieve by 2025 a level close to the currently required British BIM implementation level, but enriched with many additional elements such as Digital Twin, distributed ledger technology, Lean and sustainability. The Roadmap should be read as an indication of the direction necessary for the development of Polish construction industry and a basis for a detailed strategy of BIM implementation in public procurement.

Elements of the BIM strategy from selected countries used in the Roadmap for Poland



Push-pull strategy, high and understandable degree of graphic representation of the Roadmap, initiative to build a digital country model based on related digital twins, focus on open formats in further stages of BIM implementation, public financing of implementation works (government grants), initiation of BIM standardisation for ISO standards, basing the Polish road to BIM at the British Level 2, enriched with the use of digital twins, distributed ledger technologies, Lean methodology and the sustainability aspect.



Different implementation dates for BIM obligation depending on the type of project.



An approach based on the practical use of BIM in pilot projects from the beginning of the implementation process. Establishing a Steering Committee to activate all central players in the BIM implementation process.



A comprehensive process of digitisation of public services, the use of distributed processing technology for data security.



A comprehensive process of digitisation of construction, the use of open formats in data exchange, a high degree of prefabrication in construction.



Clearly written BIM implementation strategy based on several stages and early pilot projects, introduction of the concept of convergence to unify the goals of participants in construction process.



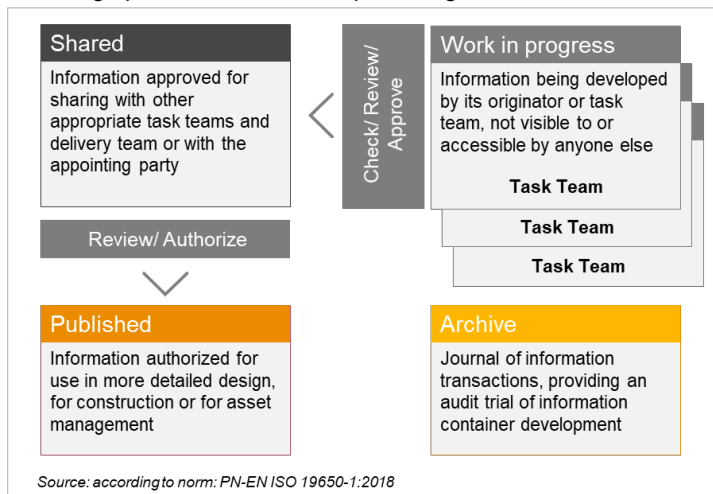
Public leadership of BIM implementation process, a high degree of advancement in design of large-scale fabrication and prefabrication, BIM obligation assigned to industries and types of investments, recommendation of regrouping project costs into early investment phases, motivation of BIM pioneers.

Preparation of BIM strategy (1/2)



Structuring the project environment

The first step is to organise the current BIM evolution phase (traditional CAD with 3D elements for visualisation). The ISO 19650-1 standard introduces, based on the British proposal, the organisational chart of the digital process environment (CDE) in the design process in the subsequent stages:

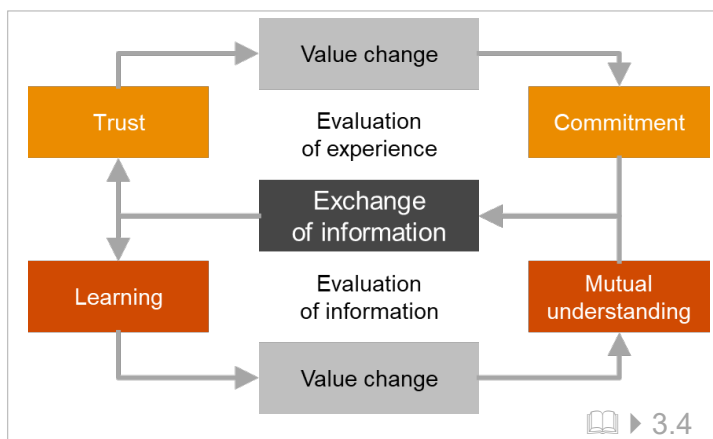


British standards also offer a systematic naming of drawings, files and project folders.



BIM process management methods

The added value of the integrated process organisation is based on additional sources of knowledge about the process and tools for better production management and information flow. The „pull“ approach defines the requirements that should be met for the integrated process to be successful. The Roadmap also contains elements corresponding to “push” activities, i.e. initiated on the part of entities working in design offices and on construction sites in public investments. The integration of “pull” and “push” activities, is necessary to unify activities and to facilitate cooperation. The most important practical goal is to create motivated and committed work teams for all investment tasks.



Evolution of the work ethos

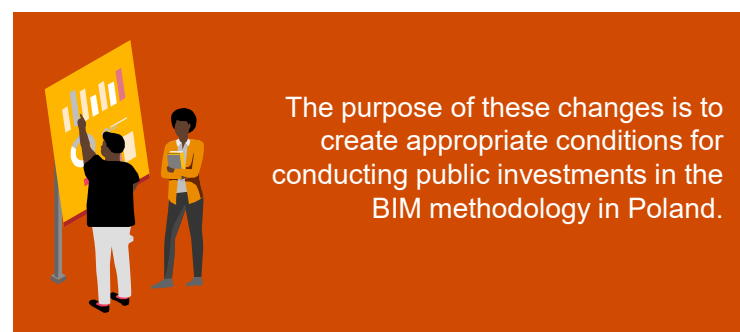
The human factor is the most important asset in national economies. The basic aspects conducive to both the professional development of the individual and his integration in organisational structures is the right learning climate, resulting in understanding and trust, which are the basis for commitment. This creates a development spiral, which is catalysed by the exchange of information in the process. The need for cooperation between all participants in construction processes is also highlighted in the PN-EN ISO 19650-1 standard as a basis for the proper flow of information in order to reduce risk, losses or misinterpretation.



Legal considerations for BIM

The national regulation of public procurement does not prevent the use of BIM in public procurement. For a wider application of this model, however, it may be necessary to take strategic actions with the use of the state procurement policy tools by defining BIM as a priority in the area of public procurement or legislative measures in the scope of the Public Procurement Law Act. The most important Polish legislative activities should, first and foremost, focus on the following elements: → **PPL** (obligation for certain categories of contracting authorities to use BIM in the case of investments with an estimated value exceeding the set value threshold; introducing obligatory criteria for evaluation of bids related to BIM); → **Implementing regulations** (development of building classification in accordance with BIM digital processes); → **Activities in IT field** (digitisation of administrative procedures and implementation of an IT platform for technical support for public procurers).

Subsequently: → **Amendments to the Regulation** on methods of calculating the life cycle costs of buildings and the method of presenting information about these costs; → **Amendment to the Cybersecurity Act**, including the new distributed technologies.



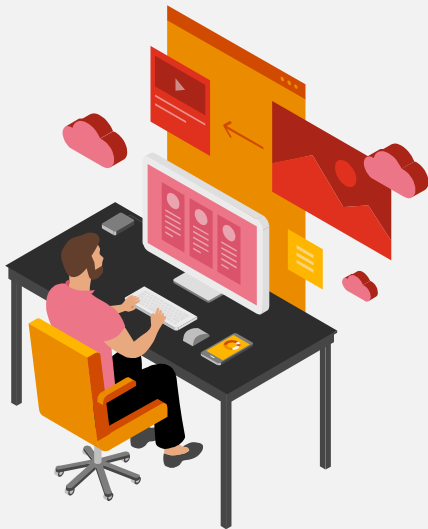
Preparation of BIM strategy (2/2)



Structure

The Roadmap is in a form of a matrix of 9 elements, of which four represent the stages of investment preparation and delivery (1-4), and the remaining five (A-E) support them in terms of substance. The remaining 3 control factors (legislation, standardisation and financial outlays, including necessary training) are present in each of the other 9 elements.

The matrix is not a list of any elements from which you can choose your own set, but a target system. Relying on standards, technology or environmental requirements will not be sufficient when the human perspective is not taken into account in the integrated processes or the classifications or optimal cybersecurity conditions are not developed. The system will function fully only as a complete and integrated whole.



	Plan of Work	Macro BIM	Capital phase	Operational phase	
Technology	A1	A2	A3	A4	A
Cyber security	B1	B2	B3	B4	B
Lean	C1	C2	C3	C4	C
Classification, LOG/LOI	D1	D2	D3	D4	D
Ecology	E1	E2	E3	E4	E
	1	2	3	4	

Matrix elements (main issues)

1. Plan of work	It is not an investment phase, but it covers all the elements that will build the BIM ecosystem, including the BIM Strategy for Poland, detailed strategies, e.g. ICT, Polish BIM standards, pilot projects
2. Macro BIM	New pre-capital phase of project implementation (programming and Target Cost analysis). It requires the development of new, cooperative forms of contracts
3. Delivery phase	Design and construction, Risk register, automation, PIM (Project Information Model)
4. Operational phase	Facility Management: COBie, AIM (Asset Information Model), Digital Twin
A. Technology	Push and pull initiatives; Standardisation of information, CDE (Common Data Environment), open formats
B. Cyber security	GDPR; copy rights, distributed processing, reports on cyber security
C. Lean	Integrated Project Team, Agile, Target Value Design; Last Planner® System
D. Classification, LOG/LOI	Building classification, LOD = LOG + LOI
E. Ecology	Sustainable development, Circular Economy, PEDs (Positive Energy Districts)

Elements of the matrix – key items



1. Plan of work

5.1

- BIM normalisation for Poland, incl.: endorsement of BIM ISO standards, adoption of actual and future world strategies in areas of sustainability, technology, data security and others, adoption of the structuring arrangements of the Roadmap matrix.
- Boundary conditions from the Roadmap (structuring of the current BIM Level 1 according to PN-EN ISO 19650-1; support for the evolution of the work ethos: gaining trust, cooperation, learning and transparency; legislative changes).
- Changes in the environment of the building sector and public administration (create the Steering Committee to manage the BIM implementation, increase the outlays for BIM research and development activities; establish closer cooperation of the industry with the academic sector, implement BIM curriculum at universities and technical schools in Poland).
- Pilot projects.
- Information campaign on the BIM implementation strategy in Poland.

2. MacroBIM

5.2



The MacroBIM phase is a part of the project procurement process which covers delivery of the project concept with proposed indicative project cost based on benchmarks. MacroBIM constitutes the stage of the project award procedure in public procurement and is not different to the traditional procurement processes. Nonetheless the emphasis is put on the early preparation stage so as to assure its economic security. MacroBIM should be obligatory for high risk investments with a budget of over 10 million euro.

Stage 1

Recommendation to introduce legislative changes by specifying the BIM obligation for public investments of the central administration with an estimated value exceeding 10 million euro. An additional recommendation is to oblige the contracting authorities to apply non-price criteria with a minimum weight of 20% for evaluating BIM-related bids.

Stage 2

The obligation to use BIM in investments with an estimated value of more than 10 million euro will cover all contracting authorities.

Ultimately, the obligation to use BIM should apply to all contracting authorities, regardless of the value of investment.

The use of the MacroBIM model may require legislative changes to the Public Procurement Law in order to allow the contracting authority to cancel the procedure if the value of initial bids significantly exceeds the estimated contract costs.

Step 1

Define requirements by contracting authority

Step 2

Announcement of the procedure

Step 3

Prequalification

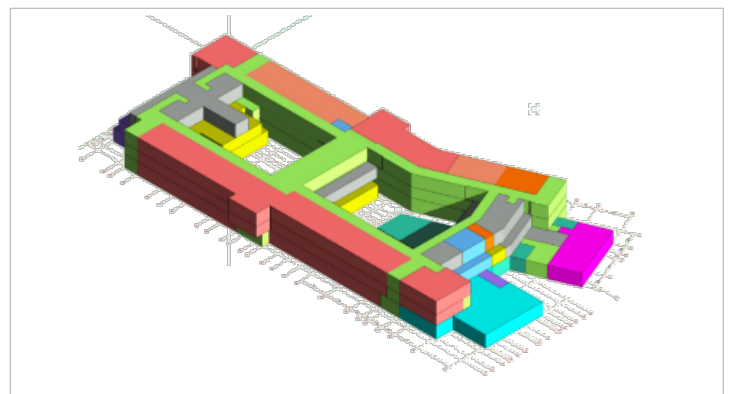
Step 4

Concept design

Step 5

Negotiations of the target cost for initial bids

The evaluation of the concept assumes the benchmark calculations for sqm of the gross/net area, qm cubature and others to obtain from the block models (without building partitions and openings) and lists of groups of functions (without division into individual of rooms). The benchmark-based cost is extrapolated in the minimum-maximum range and compared by the bidder with the market costs for the investments of a similar type. The proposition of the Target Cost of the investment is presented as the final product in the MacroBIM phase. In case of accepting the offer, Target Cost is further negotiated between the contracting authority and the bidders as the basis for further procedure. This is a project approach coming from the cost to the design rather than calculating the cost based on a design.



For the MacroBIM economic evaluation stage it is recommended to apply a maximum detail of LOD 100 for the concept model and LOD 200 for the functional model.

The task of the contracting authority is to prepare the investment in the way the use of BIM is possible:

- Compile the list of BIM goals (based on the POP matrix - Product-Organization-Process),
- Prepare the procedural rules for BIM goals (form of organization of the contracting authority, form of contract and cooperation during the investment, information exchange strategy, asset management strategy),
- Prepare the financial policy for the investment, provided for all three MacroBIM options.

All entities involved in the asset delivery process should participate in the tender preparation and its financial evaluation as part of multilateral cooperation. Similar simulations and analyzes should usually start every BIM process, and not only appear later.

The project delivery model based on the transfer of all design and construction risks to the contractor, should not be a practice model for BIM-based investments.

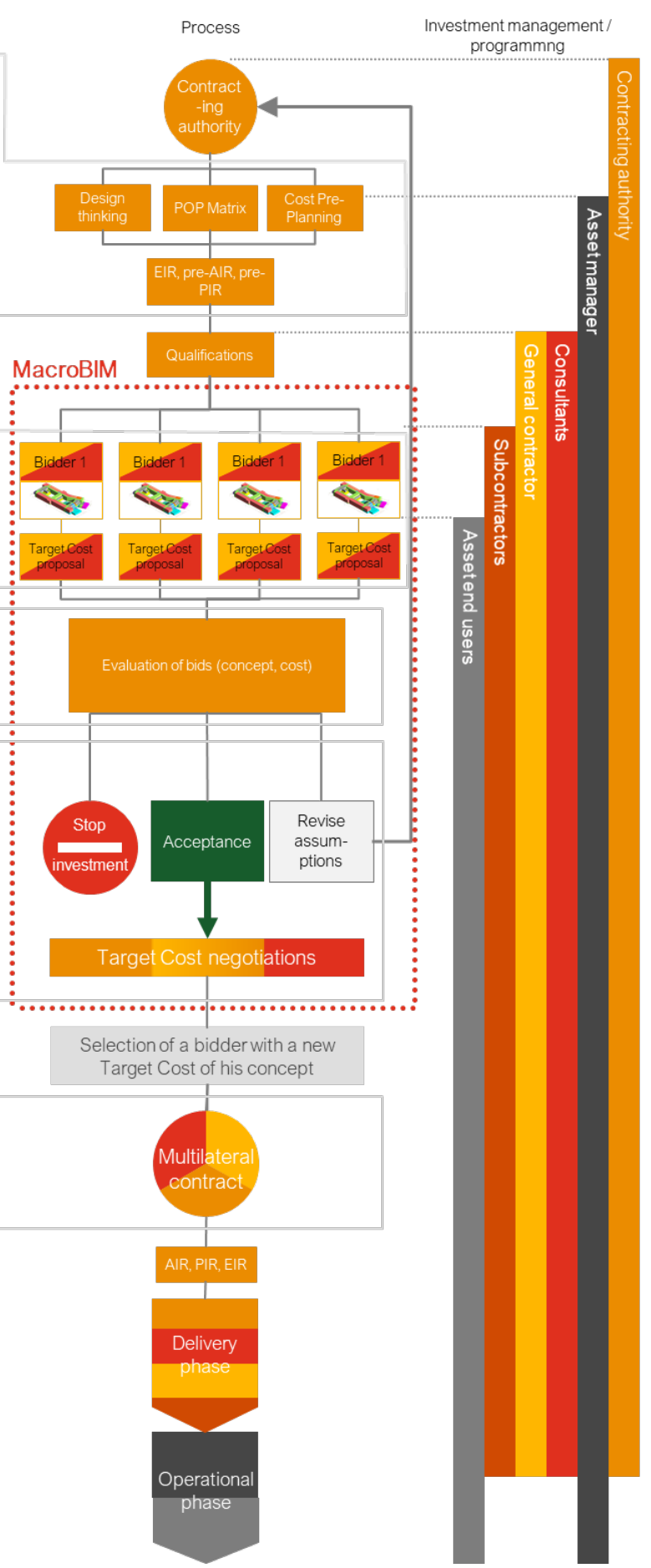
The contracting authority assesses the substantive quality of the concept and its economic value. The selected offer with the agreed Target Cost serves as the basis for the delivery of the capital works phase.

The task of the contracting authority at the completion of the MacroBIM stage is:

- Reject the investment when the Target Cost proposed by the bidders exceeds the financial capacity of the contracting authority (not forecasting the improvement during negotiations) or
- Negotiate the final Target Cost, which will be applicable for the delivery phase carried out by the interdisciplinary delivery team which won the procedure in the MacroBIM phase

In its assumption **BIM is to support the delivery of the investment based on integrated and mutual cooperation of the parties.** The BIM contracts are characterised with rejecting the antagonist positions and adopting the cooperative model of work. Such contracts (eg. Joint Venture) require:

- Multilateral nature - one common agreement for all parties
- Waiver of mutual claims (except for third party claims or willful misconduct)
- Criterion of economic evaluation of the investment in the form of Target Cost from the MacroBIM phase, monitored for the project duration
- Element of incentive in the form of the financial pillow to share between the parties (members of the Core Group) in case the project is delivered on time and in the Target Cost or to cover losses in case of failure to maintain these requirements
- Establish a Core Group, managing the investment in the design and delivery phase and consisting of the representatives of the main contractors (design + construction) and the contracting authority



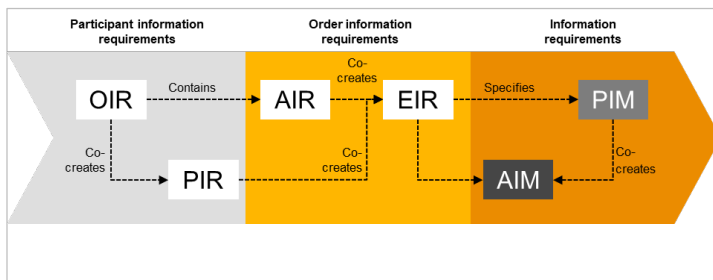
Elements of the matrix – key items



3. Delivery phase

5.3

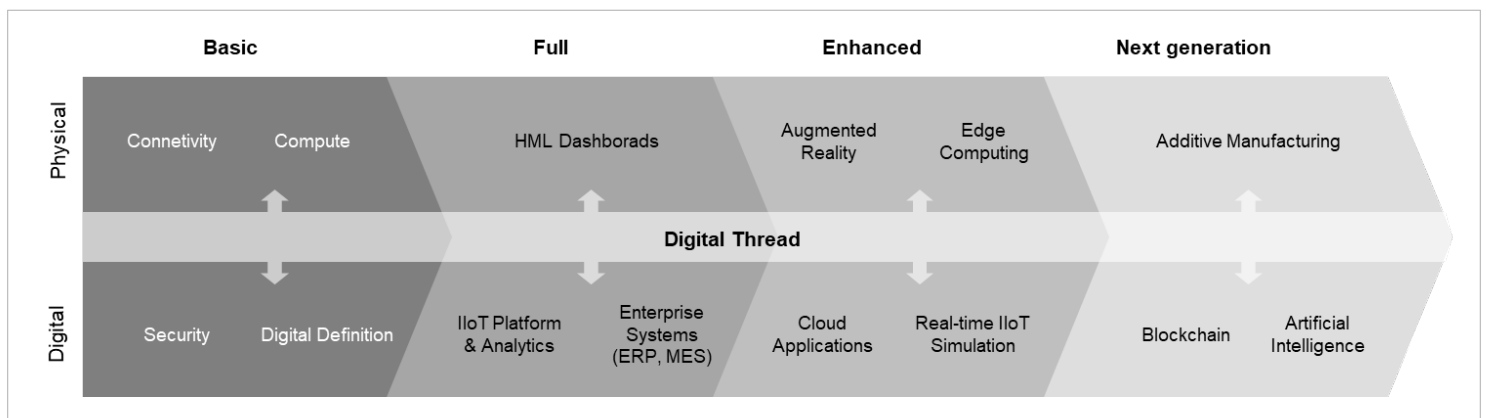
- MIDP / TIDP: the plans for delivery of the information from the contractor concerning the stages of the project-execution process, recorded as the schedule of Master Information Delivery Plan / plans of particular tasks in a form of a Task Information Delivery Plans. These requirements should be addressed by the Integrated Team and by the Task Teams.
- Risk Register – a tabular electronic catalogue created with a participation of all parties to the investments and due to this it constitutes a complete set of possible risks, entered from all possible perspectives. A cooperative nature of contracts in BIM projects is able to assure a collective risk management within common liability.
- Automation and prefabrication.



5.4

4. Operational phase

- COBie (Construction Operations Building information exchange): form of passing sets of information on the delivered asset for the period of its operation. It constitutes the sub-set of the IFC format (called MVD – Model View Definition (the view of part of complete data of the digital information model on the asset prepared for a specific purpose, in this case managing operation).
- Digital Twins: Digital form of representation of the asset with the highest degree of technological development. Digital twin with physical twin allow both for managing asset from any place on the earth and processing information of any type, jointly with so called Big Data. The digital twin in combination with the distributed processing technology (DLT) are an integral part of the Polish Roadmap for BIM in order to ensure the security of sensitive or strategic data.
- Life-Cycle Assessment: Estimating the costs if Life Cycle of assets should be conducted from the very beginning of the investment, namely from the MacroBIM phase. Maintenance costs in connection with the personal costs of the operational phase of the facility constitute an overwhelming majority of investment outlays. Monitoring of the Target Cost during the creation and delivery of the asset include the decisions affecting the economy in the operational phase.



The basis for the effective implementation of the operational phase is the data security of recorded information for the entire life cycle of the asset by standardising its physical form by the ISO standard.

Elements of the matrix – key items



A. Technology

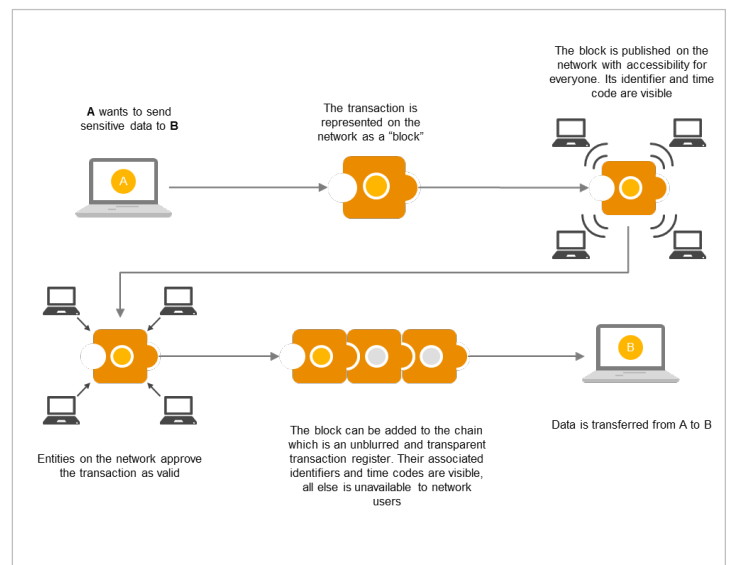
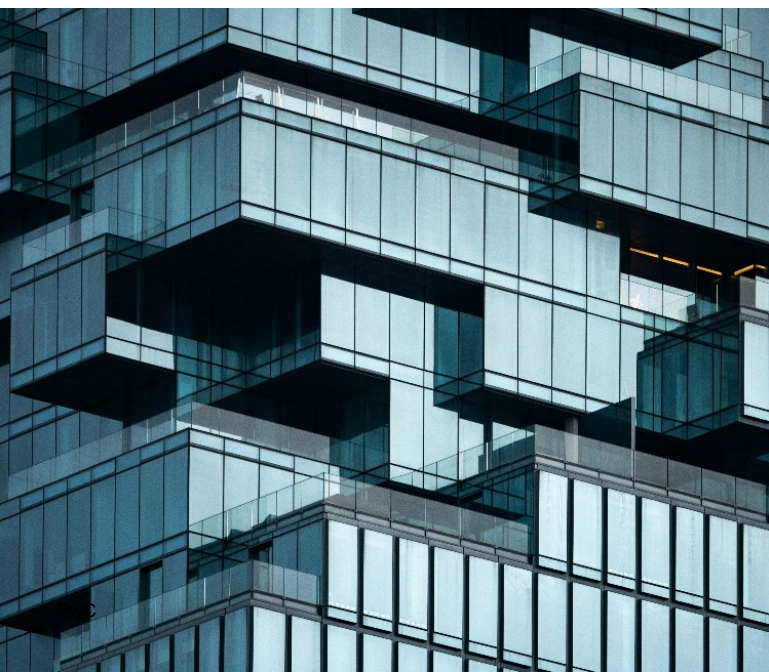
5.5

- Information structuring: the evolution of BIM is moving towards the management of design, construction and operational processes as the basis for information about an asset throughout its life and operation. Types of methods of collecting and storing information: Not structured – chaotic; Partially structured – object-oriented; Structured – higher level of data storing – relational model; Personalised – complex method of storing information from dedicated sets of data.
- Open standards and formats: There are two types of formats of computer files: native formats, specific for vendors of the software, generally technically reserved and rarely compatible with native formats of other producers; open formats, available for each user, also in the form of source code. For BIM the IFC format was developed (Industry Foundation Classes), based on ISO standard 16739 and therefore it constitutes safe form of information generating and exchange. The advantage of the open formats is their light nature, resulting in small sizes of model files. The IFC system, developed and certified for the computer applications by the not-for-profit buildingSMART International organisation, constitutes the guarantee of fulfilling another requirement of the integrated processes: so-called “interoperability” - a lossless information exchange between any computer software, certified for import and/or export of IFC files.
- CDE (Common Data Environment): The principles for creating digital environment of the investment are recorded in first both parts of the standard PN-EN ISO 19650. The function of providing the CDE is ascribed to the contracting authority, but the standard allows to fulfill the function both to the contractor and the separate entity. CDE is a digital environment for conducting the investment in the design and delivery phase.

5.6

B. Cyber security

- GDPR (General Data Protection Regulation).
- Copyright: one of the oldest in the package of legislative forms related to the implementation of BIM. Personal rights of the authors are not transferable and belong to the authors as natural persons. These rights extend up to 70 years after the death of an author. Property rights are subject to any contract, but it should be specified for what period they are to apply. For works in BIM processes (files with industry-specific solution model), the current IFC2x3 certified IFC format is uneditable and secures all copyrights to an author. Native formats do not guarantee any copyright protection.
- DLT (Distributed Ledger Technology) – distributed processing technology: It is based on the concept of decentralising the Internet by transferring the information processing power to electronic devices located in the network, instead of relying on individual servers. The transactions, broken down into blocks, are visible in the network to all users, but only as global identifiers with a timecode, without sharing the details of these operations. The degree of security of Blockchain-based applications also responds in this way much better than traditional Internet security to the current requirements of the GDPR and the data protection issues relevant to construction processes, accumulated in long design, construction and operation processes, particularly sensitive in public contracts financed by taxpayers. The advantages of this safer data processing are appreciated by local and national governments when introducing them to public services.



Elements of the matrix – key items



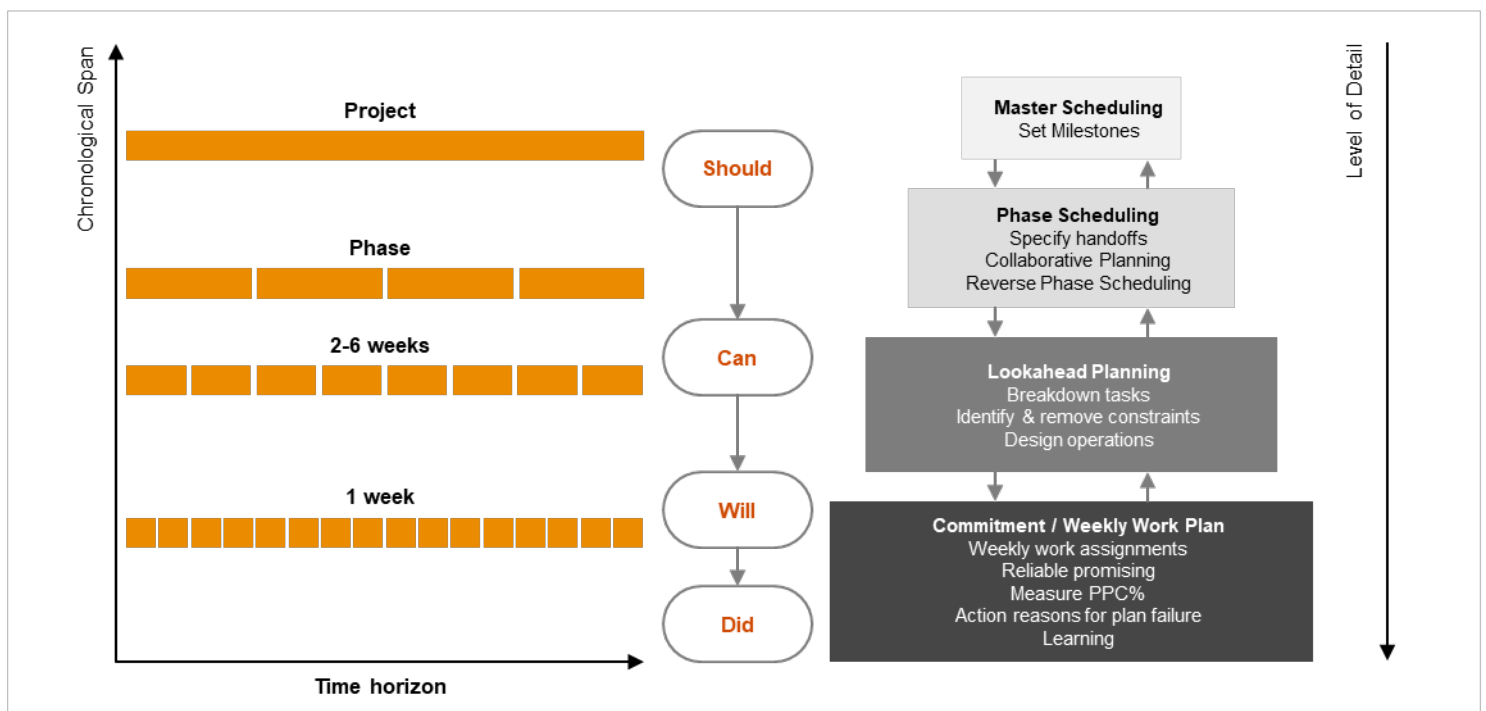
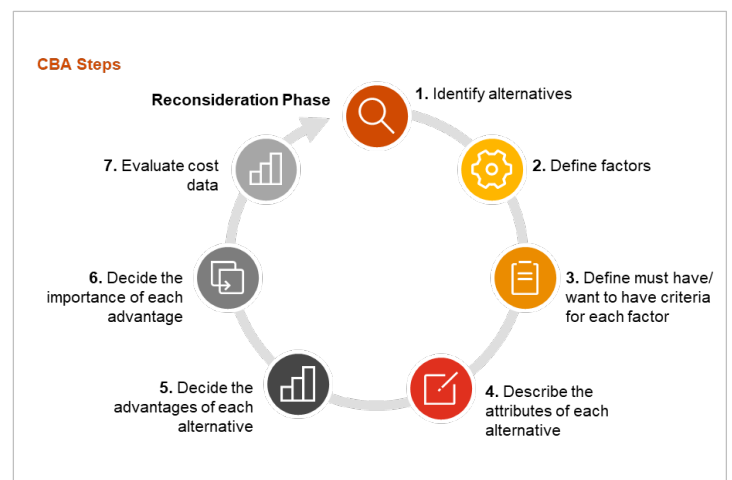
C. Lean ecosystem

5.7

- Value Stream Mapping: Analysing faulty procedures and finding the correct steps to remove their negative effects. For construction projects it is recommended to establish the role of the Value Stream Mapping Manager to analyse the implementation of procedures, corrective actions and implementation of new, improved flows.
- A3 Strategy: Record the company strategy with an action plan on one A3 sheet.
- Elimination of eight sources of waste (jap. "Muda,"): A key tool in the Toyota Production System strategy and the essence of the entire Lean direction: **REDUCTION OF WASTE IN PRODUCTION PROCESSES**. Other objectives were added to the original strategy in later years. There are 8 types of waste: overproduction, stocks, quality defects, unnecessary movement, unnecessary transport, overprocessing, waiting, waste of human potential.
- PDCA strategy (Plan-Do-Check-Act): A method of implementation and testing the procedures in execution processes independently of the business sector.
- Choosing by Advantages (CbA) – A decision-making method based on the criterion of the greatest possible benefit. The decision is based on the degree of importance of its benefits.
- Target Value Design: Used for monitoring the Target Cost in the form of selection of the best alternative solutions for the entire life cycle cost of the investment. TVD differs from the Value Engineering in that the decisions are qualified, made jointly with each member of the group with the assistance of a validation tool, selection in terms of the greatest benefit (CbA).

The characteristic feature of the target value design is the constant presence of all participants of the investment process from the core group until the asset is handed over for use.

- Last Planner® System: System of execution processes schedules of different time granulation. The aim is to develop cooperation and teamwork for the win-win model (everyone wins). LP®S schedules can be used as tools for the implementation of TIDP and general MIDP task plans, as they visually and clearly introduce task teams into investment activities.



Elements of the matrix – key items

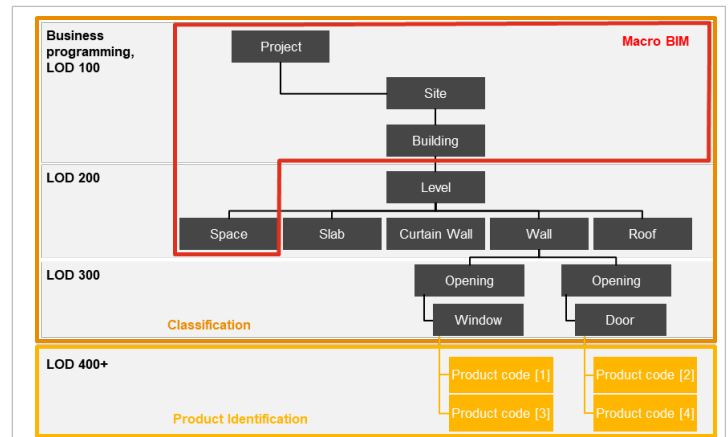


D. Classification, LOG/LOI

5.8

- **Construction Classification:** The standard classification systems for construction are faceted classifications – Colon Classification. They allow only simple classes based on a single subdivision criterion, and for complex classes, simple class syntheses are used. This system has become the standard for all construction or infrastructure classifications worldwide. The structure of the hierarchical heritage of parameters lies at the basis of BIM data transfer formats (IFC, BCF) and the information saturation levels of the modelled component objects. It is a coherent and integrated system, corresponding with its degree of advancement of the investment process, starting from project programming, through concept, design, execution to preparing assets for use in the business process.
- **Product Identification:** In order for the specific physical product (LOD 400+) to become part of the digital PIM model, and then the AIM, and consequently the Digital Twin the procedure involves mapping sets of information in following order: **IFC (+ classification code) ▶ bSDD ▶ product and materials** with the use of (GU)ID. In this way, it is known where the product or material sent to the construction site is to be built in. The combination of these identifiers retains this information for the whole life cycle of the asset. **Such mapping enables a smooth process of the digital supply chain. There is no such classification in Poland yet.**

- **Saturation of objects with LOD information:** The classification codes are related to the degree of saturation of object information, called LOD (Level of Development). This information is divided into: LOG (Level of Geometry) and LOI (Level of Information). The basic structure of saturation of objects with information assumed five levels: LOD 100 – corresponds to the concept model; LOD 200 – schematic design; LOD 300 – detail (construction) project; LOD 400 – executive (technical) design; LOD 500 – as-built.
- **Construction classification for Poland:** Currently, in the Polish branch (chapter) of buildingSMART International, work is underway to select the best classification option for the Polish market.



E. Ecology

5.9

- **Green public procurement:** green procurement places great emphasis on including the entire life cycle of a product, service or construction works in procurement costs.
- **Circular Economy** – this model assumes that the value of products, materials and resources will be maintained in the economy for as long as possible in order to minimise the generation of waste. The EU legal tool supporting the transition to a circular economy is the so-called Waste Package.
- **PED (Positive Energy Districts):** PEDs are urban developments with zero primary energy demand and zero carbon emissions with the additional objective of energy overproduction for use in local and central networks. This also has an impact on urban planning, which puts this concept within the scope of the competence of the construction industry.



Matrix nodes – tasks

The individual nodes do not have a chronology of implementation, but for the application in pilot projects, they should be read in the chronology of the columns (e.g. C1, C2, C3). Graphic designation:

	The implementation of a component of the node has not yet been initiated
	The implementation of a component of the node is in progress
	The implementation of a component of the node has been achieved

In order to update the Road Map, the status of elements and matrix nodes should be regularly reviewed in the 2-3-year mode.

	Plan of Work	Macro BIM	Capital phase	Operational phase	
Technology	A1	A2	A3	A4	A
Cyber security	B1	B2	B3	B4	B
Lean	C1	C2	C3	C4	C
Classification, LOG/LOI	D1	D2	D3	D4	D
Ecology	E1	E2	E3	E4	E
	1	2	3	4	

Package components		
A1 Technology in the Work Plan	1	Adoption of BIM standards for Poland (PN-EN ISO 19650 series), previously published and new that have been announced
	2	A media campaign promoting the BIM Roadmap and BIM implementation process
	3	Adoption of open formats and open BIM principles (interoperability) for exchange of information in BIM
A2 Technology in MacroBIM	1	Adoption of the PN-EN ISO 19650-1:2019 standard for the organisation structure of the investment team
	2	Adoption of a phased division of work with the introduction of an additional investment verification phase – MacroBIM
	3	Introduction and application of investment conceptual programming principles: block models max. LOD 100, models of grouped functions max. LOD 200
A3 Technology in Delivery phase	1	Adoption and use of open information exchange formats in BIM projects (IFC, BCF, CityGML)
	2	Adoption for each investment in BIM of the digital information processing environment (CDE)
	3	Develop a complete digital, multidimensional model of information about the created asset – Project Information Model (PIM)
A4 Technology in Operational phase	1	Adoption of the COBie data format as the primary information management format in the asset maintenance – operational phase
	2	Develop a complete digital, multidimensional model of information about the created asset - Asset Information Model (AIM)
	3	Adoption and use of a complete digital, multidimensional model of information about the created asset - Asset Information Model (AIM)
B1 Cyber security in Work Plan	1	Use of optimal digital security in accessing Internet network services (Digital Safeguards)
	2	Amendment to the Act on the national cyber security system to use secure methods of processing information on the network
B2 Cyber security in MacroBIM	1	Check and update digital security in business entities and public institutions in the form of IT services
B3 Cyber security in Delivery phase	1	Establish the role of access to CDE – a digital information environment for management of investments
	2	Develop a PN-EN ISO 19650-5 standard for the security of information service during the investment period
	3	Adoption of the PN-EN ISO 19650-5 standard for the security of information service during the investment procedure
B4 Cyber security in Operational phase	1	Widespread adoption of DLT (Distributed Ledger Technology) for various forms of services in the construction industry and management of assets

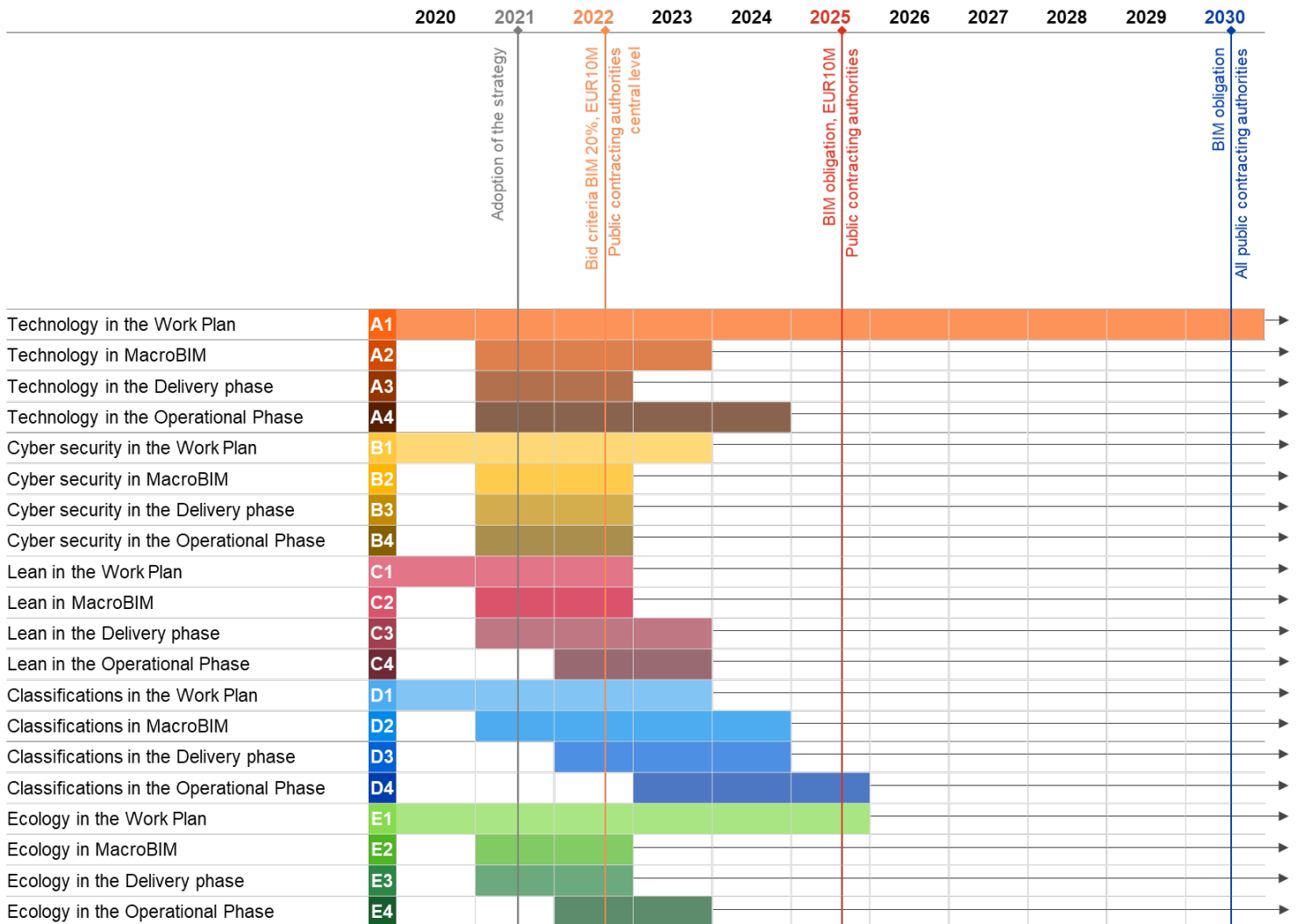
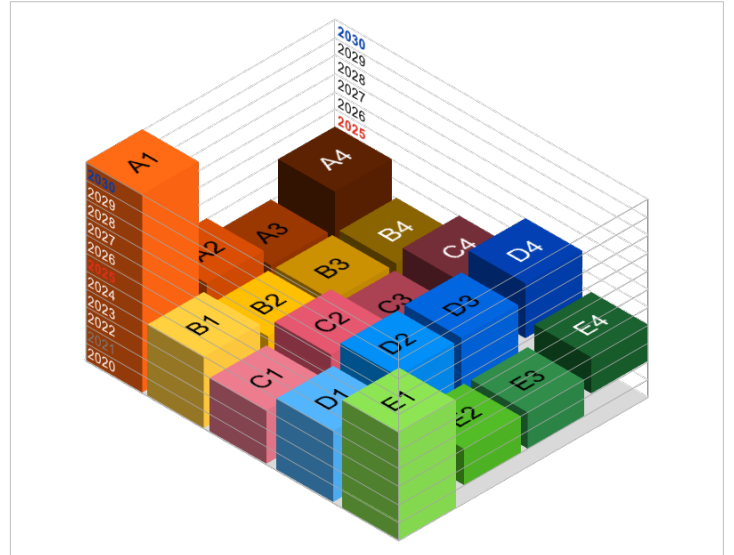
Matrix nodes – tasks

Package components		
C1 Lean in Work Plan	1	Introduction and adoption of Plan-Do-Check-Act (PDCA) method for process management
	2	Introduction and application of the A3 one-page strategy tool for the organisation's goal setting process
	3	Development of a strategy for the implementation and monitoring of pilot projects using BIM
C2 Lean in MacroBIM	1	Introduction and application of holistic project information management methods (System thinking and other methods)
	2	Introduction and use of the POP matrix tool (Product - Organisation - Process) for the evaluation of goals and expectations regarding the planned investment
	3	Introduction and use of the visual Value Stream Mapping (VSM) tool for creating and correcting investment processes in construction
C3 Lean w Delivery phase	1	Create a decision-making Core Group, the Integrated Team and task teams - organisation of the process
	2	Introduction and application of the method of joint resolution of current investment tasks in one room (Big Room)
	3	Introduction and use of Lean visual tools in everyday construction production practice (asset creation)
C4 Lean in Operational phase	1	Application of the principles of elimination of 8 types of losses ("muda") in asset management processes
	2	Apply Lean Six Sigma principles: a reduced list of solutions with increased control and elimination of losses
D1 Classification in Work Plan	1	Develop a construction classification system for Poland adequate for BIM processes
	2	Include the new construction classification in all legislative documents relevant for carrying out construction processes in Poland
	3	Implementation and use of classification on the Polish market
D2 Classification in MacroBIM	1	Introduction of LOD 100 for blocks and LOD 200 for functions in the MacroBIM phase
	2	Introduction and application of relevant information modelling for elements at LOD levels corresponding to investment phases
	3	Introduction and application of linking the classification system with levels of information LOD and IFC units
D3 Classification in Delivery phase	1	Limit the number of LOD levels for the models to three: schematic (LOD 200), construction (LOD 300), technical (LOD 400)
	2	Use of sensors embedded in a physical asset to remotely handle information
	3	Introduction of classification codes into elements of industry models for IFC format exports
E1 Ecology in Work Plan	1	Implementation by Poland of the provisions of the European Green Deal
	2	Poland's accession to the European clean economy arrangements with a reduced carbon footprint by 2050
E2 Ecology in MacroBIM	1	Apply the principles of sustainable design in the preparation of environmentally friendly concept design
E3 Ecology in Delivery phase	1	Introduction and application of energy certification standards
	2	Introduction and application of the principles of the Circular Economy
	3	Adoption of the ISO 1400X series of standards for the environmental impact management
E4 Ecology in Operational phase	1	Amendment to the Regulation on the method of calculating the cost of lifecycle for buildings and the method of presenting information on these costs
	2	Apply the methods of the building life cycle cost calculation and the method of presenting information on these costs

Timeline



The Roadmap strategy for Poland has been divided into elements and their common nodes and thus entered into the spatial time chart. Recommended updates of the Roadmap may introduce time corrections for the maturity level of individual matrix nodes. The matrix concept is prepared for such corrections.







Key success factors (selection)



A strategy of small steps in the zero-one system (is-is-not) is recommended.

Each of these activities, even the smallest ones, will advance the BIM implementation process if it is repeated consistently.

It is recommended to adopt key success factors consistent with the steps of the implementation plan for Poland, specified in the matrix nodes. As a tool for monitoring the progress of introducing BIM on the Polish market, 2-3-year reports updating the status of implementation are recommended. Reports should be coordinated by the Steering Committee. As the first practical step in the implementation of BIM by public entities in Poland, it is recommended to carry out selected pilot projects. The process of BIM implementation in Poland should be based both on top-down activities (legislative, normalisation, standardisation and pilot) as well as self-organisation of the construction market in the form of bottom-up activities (work in Lean methodology, integration of processes, systems and information).

 Criteria for Work Plan	<ul style="list-style-type: none"> • Joint declaration of all parties involved in the investment in the BIM methodology • Record the investment goals by the contracting authority using the POP tool
 Criteria for MacroBIM phase	<ul style="list-style-type: none"> • Sign the project delivery contract at least in the “design-build” formula • Submit and negotiate the project Target Cost • Conduct BIM and Lean initiating workshops
 Criteria for Delivery phase	<ul style="list-style-type: none"> • Divide the competences of the Integrated Team into a decision-making Core Group and task groups • Establish nearby the construction site the Big Room for the duration of the design-delivery works • Create a financial incentive framework • Create a common catalog of risks and declare their joint resolution • Develop cost estimates only from 3D design models, not from 2D drawings • Create an intelligent spreadsheet for Target Cost monitoring
 Criteria for Operational phase	<ul style="list-style-type: none"> • Manage the asset using models rather than paper documentation • Use COBie files to manage maintenance and spare parts orders



Recommendations



- > Basing on the adopted Roadmap develop a detailed BIM implementation strategy for Poland, broken down into scopes, tasks, entities and adequate cost scales.
- > Prepare the industry through education to meet the forthcoming digitisation tasks (not only in terms of BIM).
- > Prepare local authorities to process the construction documentation in non-paper form, systemise the names and forms of digital documents so that the information about the design is clear and that its content is readable from the names of the file.
- > Prepare legislation on the Construction Law for digital processes for obtaining a building permit (as well as notification processes).
- > Monitor the results of using MacroBIM in pilot projects (if this option is applied).
- > Provide all products and materials in the construction market with identification codes to further streamline the digital supply chain.



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