Digitalisation of construction planning in Poland

Project results and lessons learnt

October 2020

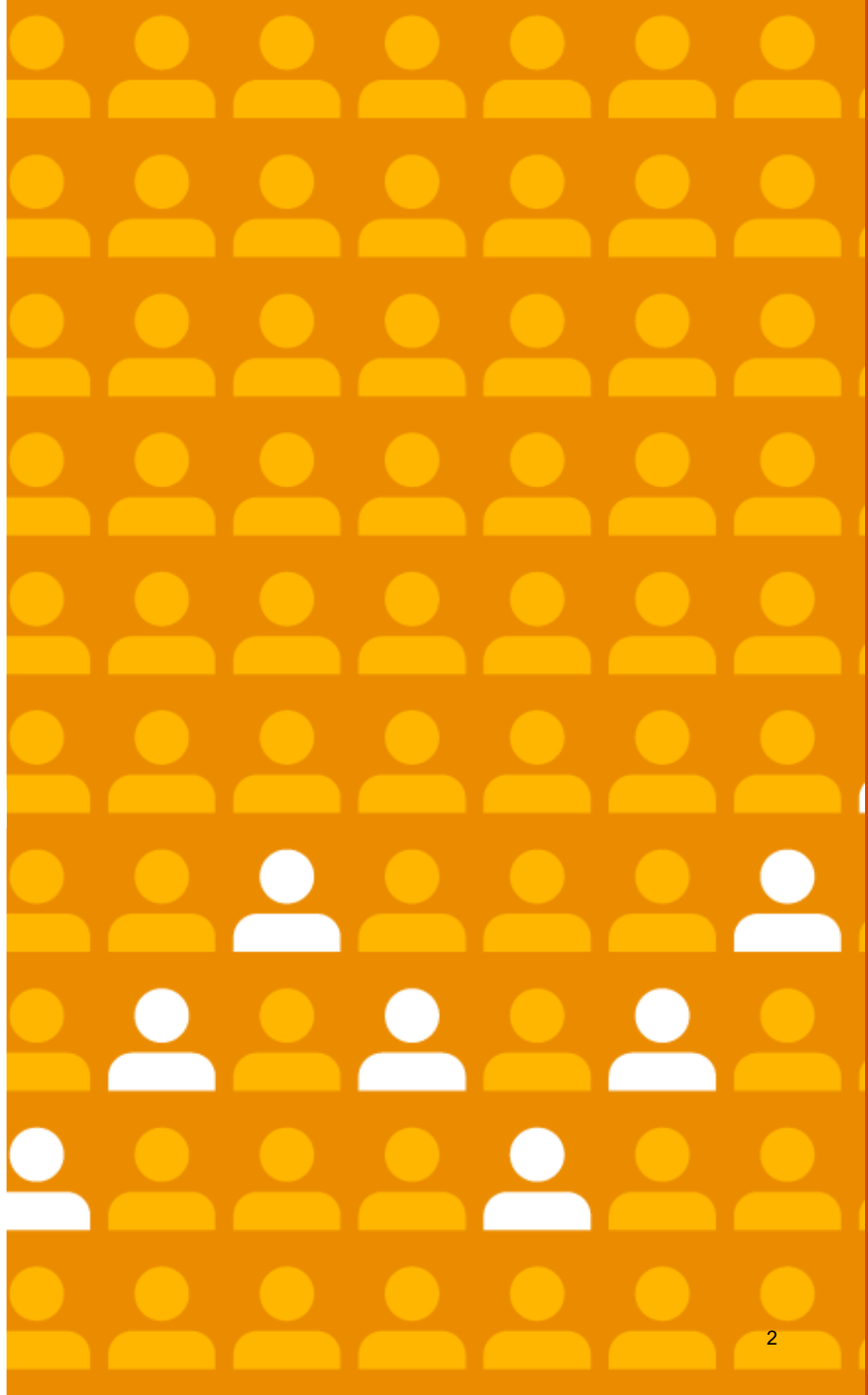
pwc

European Commission

MINISTERSTWO ROZWOJU

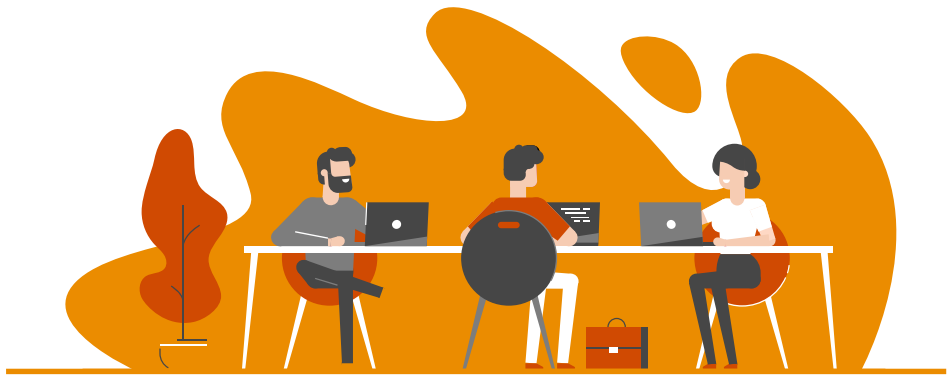
1

Project context and general information



The project has been implemented with the substantive and financial support of the European Union under the Structural Reform Support Programme of the European Commission (DG Reform)

Project team



Contracting Authority

European Comission. The mission of the DG Structural Reform Support (DG Reform) of the European Commission is to provide support for the preparation and implementation of growth-enhancing administrative and structural reforms by mobilising EU funds and technical expertise

Beneficiary

Ministry of Economic Development, Labour and Technology. The project is coordinated by the Department of Architecture, Construction and Geodesy. Mission of the Ministry is to support entrepreneurship, stimulate employers to take responsible actions for employees, increase the efficiency of Polish business through the development of innovative solutions

Consultant

PwC. Advising clients on BIM projects internationaly. Through our global network, we support national governments and businesses in the development and implementation of the BIM strategies and preparation of BIM procurement

Association Cluster of Information Technologies in Building Industry. Polish and international experts representing an Association of Information Technologies in Building Industry Poland. Knowledgeable of the BIM penetration in the Polish market with its challenges and specifics

DZP. Legal team experienced in Polish and EU public procurement law

Project objective

Perspective

- European Commission
  - Support structural reforms with a view to achieve efficiency gains through digitalisation in a very important economic sector
- Ministry of Economic Development, Labour and Technology
  - Optimise the investment process: procurement-design-implementation-operation-demolition
  - Commencement of the process of building a BIM implementation strategy in public procurement
- Stakeholders
  - Public sector leadership of BIM implementation
- Consultant
  - Technical support and stakeholder consultations, liaison of push and pull approach

BIM requirements (ang. *Building Information Modelling*) exist in Polish public tenders as a result of initiatives of some public procurers.

70+ public projects in the BIM methodology at various stages of the procurement and delivery.

BIM tender specifications are based on the expertise of external consultants or are prepared by the investor's technical team and vary by project.

Tools for the implementation of BIM in public tenders:

Roadmap – strategic guidelines for the implementation of the BIM methodology in public procurement in the area of technology, legal and the way of working

BIM documents templates - templates of documents for the implementation of residential projects in BIM, possibility of using them in the implementation of other types of cubature projects, unification of BIM tender documentation requirements

BIM IT platform – build capacity among contracting authorities to conduct investments in the BIM methodology, market monitoring tool

Stakeholders consultations 2020

8 meetings / 2 surveys

January

MEETINGS

- 3xMEETINGS
  - Public and private investors
  - Local authorities
  - Facility managers
  - Consultants
  - Contractors
- SURVEY 1 – knowledge of BIM methodology, market expectations, market potential and challenges (533 respondents)

March / April

CHANGE to WEBINARS (COVID-19)

- SURVEY 1 results, workshop with BIM experts from the UK, Czech Republic and Spain
- Roadmap – Consultations with public stakeholders

June

- IT BIM platform – internal and external consultations
- SURVEY 2 – BIM documents templates (68 respondents)

July 2020

- SURVEY 2 results, discussion of comments to documents templates, conclusions

October 2020

- Final presentation

Ministeries

MINISTERSTWO INFRASTRUKTURY

Ministerstwo Cyfryzacji

MINISTERSTWO EDUKACJI NARODOWEJ

Ministerstwo Nauki i Szkolnictwa Wyższego

Ministerstwo Funduszy i Polityki Regionalnej

Urząd Zamówień Publicznych

Local authorities

Miasto Stołeczne Warszawa

GDAŃSK

Kraków

ŁÓDŹ KREUJE

POZnań

PKP POLSKIE LINIE KOLEJOWE S.A.

Generalna Dyrekcja Dróg Krajowych i Autostrad

GUNB

PZFD Polski Związek Firm Deweloperskich

PFR Nieruchomości

STOWARZYSZENIE ARCHITEKTÓW POLSKICH

IZBA ARCHITEKTÓW RZECZYPOSPOLITEJ POLSKIEJ

MAZOWIECKA OKRĘGOWA IZBA INŻYNIERÓW BUDOWNICTWA

POLSKA IZBA INŻYNIERÓW BUDOWNICTWA

Universities

Politechnika Warszawska

AGH Akademia Górniczo-Hutnicza im. Stanisława Staszica w Krakowie

Politechnika Śląska

Politechnika Wrocławska

BIM organisations and consultants

ecobim

BIM dla Polskiego Budownictwa

buildingSMART Polska

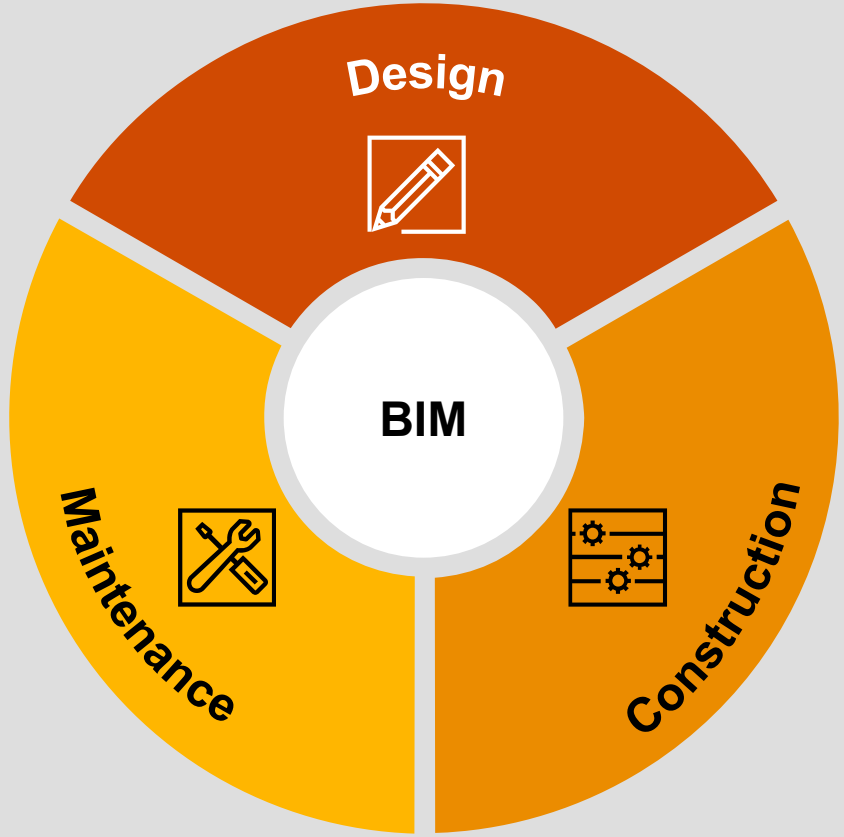
General contractors

Building Information Modelling

- BIM (Building Information Modeling) this term appeared in the world at the beginning of the 21st century. Earlier it operated under the name BPM (Building Product Models).

- "Building information modeling (BIM) is a digital representation of the physical and functional characteristics of an object. BIM is a shared resource of knowledge / information about an object creating a solid basis for decisions during its life cycle; defined from the moment the concept was created to its demolition."[1]

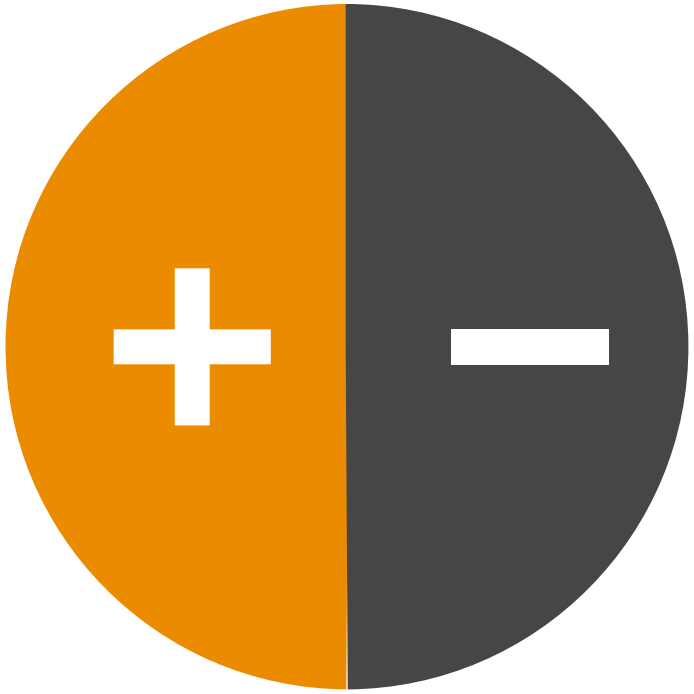
- **BIM is cooperation between all participants of the investment process at all its stages, it is a change in the way of thinking and perceiving the process as a whole, it is transparency of actions taken**



[1] "Frequently Asked Questions About the National BIM Standard-United States – National BIM Standard – United States". Nationalbimstandard.org. Archived from the original on 16 October 2014. Retrieved 17 October 2014.

BIM implementation – benefits and barriers

- Cost efficiency
- Ensuring quality and timely delivery
- Improved communication and cooperation
- Project optimisation
- Sustainable development and life cycle analysis
- …



- Financial barriers
- Technological barriers
- Legal barriers
- Cybersecurity
- Contracting authority requirements
- Cultural barriers
- …

For whom?

Contracting authorities

- Access to the current model of the object, where the client can follow the progress of design and in an accessible way - to supervise the design process.
- Ability to quickly develop various project options.
- Conceptual changes introduced in the project are applied to the 3D model and are automatically reflected in quantitative reports and project documentation.
- More control over project quality: services coordination, automatic clash detection, model showing a picture of the planned state of the asset in its envisaged environment
- Minimising project risks
- High quality of the final product

Designers

- Efficient design coordination
- Automatic clash detection
- Drawings generated from the model.
- Work based on the IFC standard.
- Advanced options for creating bills of quantities
- The design process reflects the stages of construction
- Compliance of the model with the project documentation and the possibility of using it on the construction site with free tools.
- Improving competitiveness
- Increased customer confidence

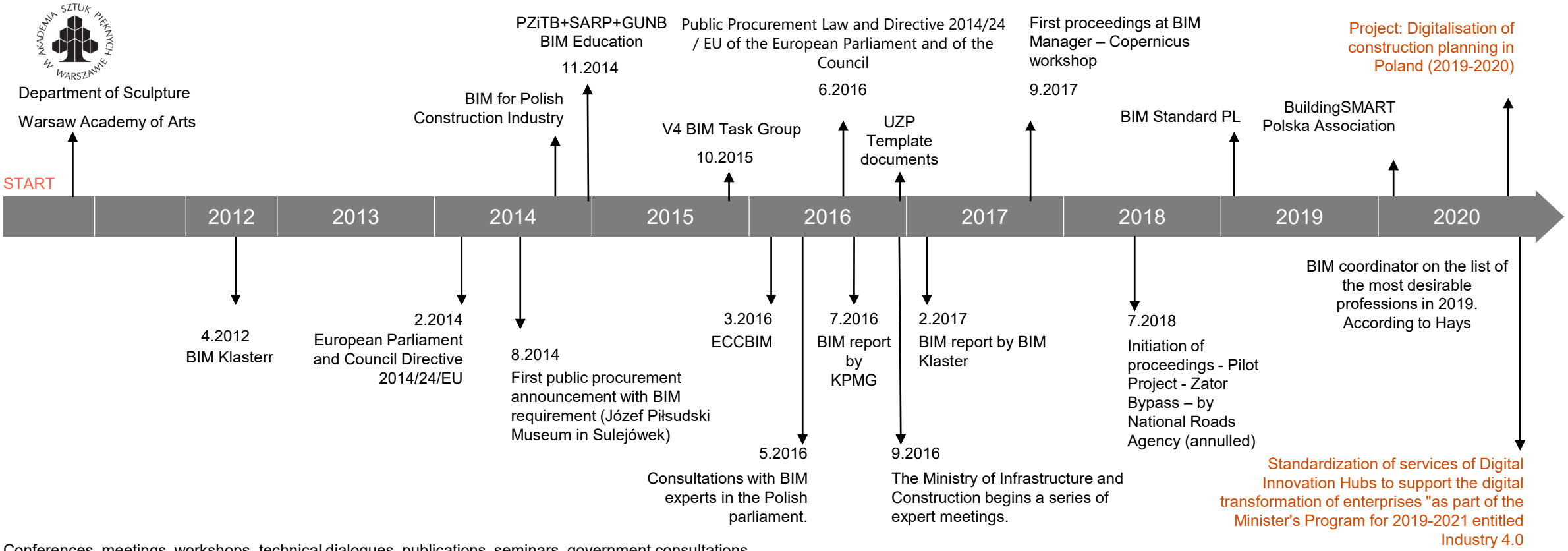
Contractors

- Automatic re-measuring and preparation of bill of quantities
- Streamlining the change management process
- Automatic clash detection
- Programme of works related to the model
- Minimizing project risks
- Full control over the supply chain

Suppliers

- The use of automatically generated files for numerical machines
- Detailed and precise tools for modeling, analysis and development of detailed workshop documentation

The history of BIM in Poland



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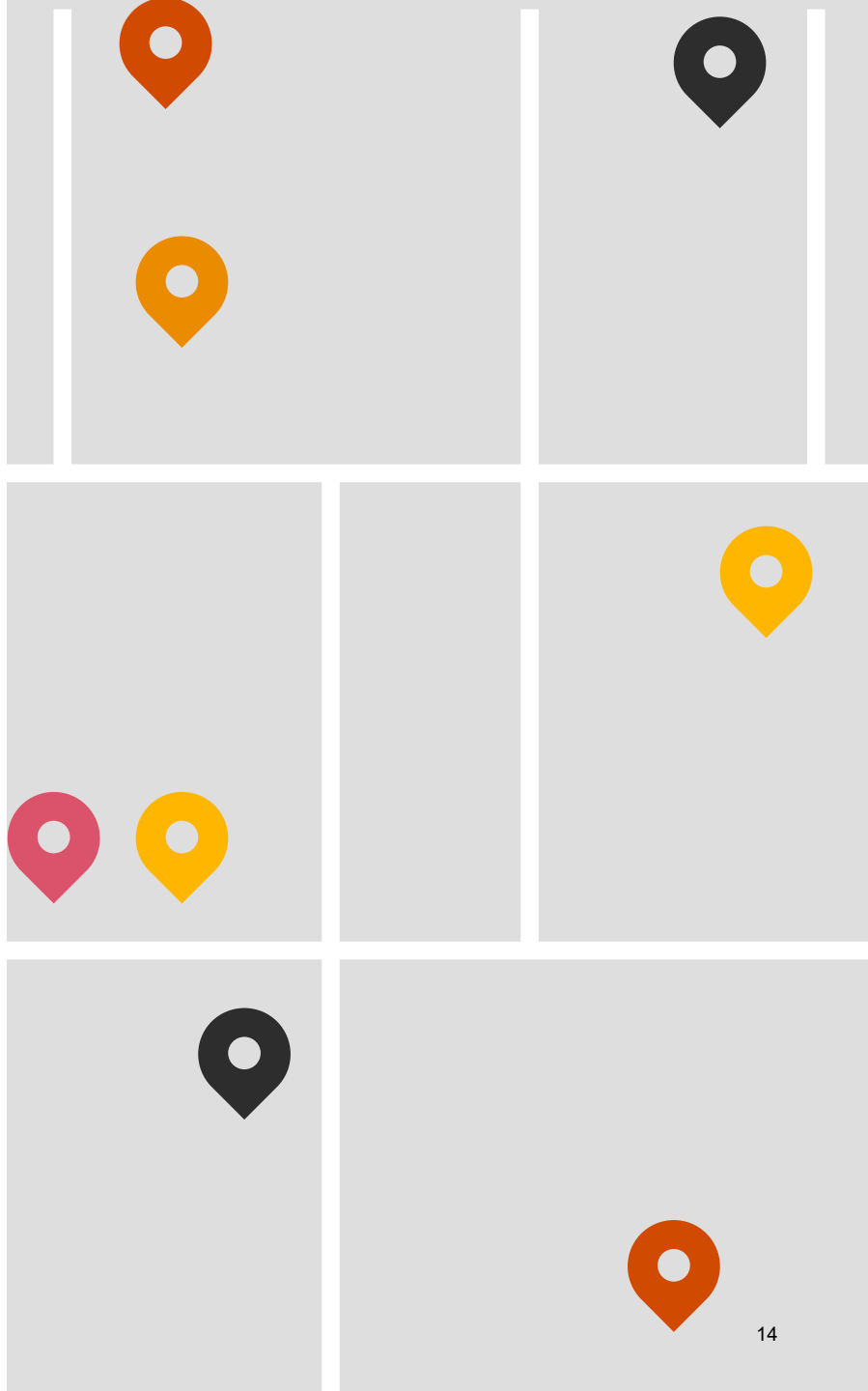
Project results

Roadmap



Roadmap objectives

1. Review issues underlying the BIM methodology in terms of legislative, normative, cultural and social background

2. Create a clear, coherent and flexible strategy for the implementation of BIM in Poland based on all the analysed factors

3. Enable the integration of all documents standardising and organising the BIM methodology for Poland

4. Launch the structured works on the future of BIM in Poland

BIM for Poland

1. The Polish road to BIM should take into account the specifics of the Polish market. It is difficult to transfer the implementation strategies of other countries

2. Polish road to BIM should take into account the Polish way of thinking, capabilities and capacity of the domestic market

3. There is no guiding document in Poland

4. The strategy for implementing BIM in Poland should be consistent and flexible

International experience used

Item	Country	Elements of the strategy implemented in the Roadmap for Poland
1	United Kingdom	Push-pull strategy, high and understandable degree of graphic representation of the Roadmap, initiative to build a digital country model based on interconnected 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 in PAS and BS standards, basing the Polish road to BIM at the UK Level 2, enriched with the use of digital twins, distributed ledger technologies, Lean methodology and the sustainability aspect
2	Spain	Different implementation dates for BIM obligation depending on the type of project
3	Czech Republic	An approach based on the practical use of BIM in pilot projects from the beginning of the implementation process
4	Estonia	A comprehensive process of digitalisation of public services, the use of distributed processing technology for data security
5	Finland	A comprehensive process of digitalisation of construction, the use of open formats in data exchange, a high degree of prefabrication in construction
6	Germany	Clear BIM implementation strategy based on several stages and early pilot projects, introduction of the concept of convergence to unify the objectives of participants in construction process
7	Singapore	Public leadership for the process of BIM implementation, a high degree of design for 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

Norms PN-EN ISO 19650

- The Roadmap is based on published international standards, including Polish BIM PN-EN ISO 19650 series standards
- These standards assume the use of Lean tools as one of the key tasks in the process of managing information about the created resource (PDCA and Kaizen). PDCA (Deming cycle) is also in the PN-EN ISO 9001 standard

> The following key principles (as set out in ISO 9001) are important for asset information management as set out in the ISO 19650 series:
>
> — there is a focus on the customer (the recipient or user of asset or project information);
>
> — a Plan-Do-Check-Act cycle is used (to develop and provide asset or project information);
>
> — engagement of people and the encouragement of appropriate behaviours is central to the delivery of consistent outputs; and
>
> — there is a focus on sharing of lessons learned and continual improvement.

- The sum of all activities in the integrated BIM process is holistic (comprehensive). This process cannot be fully implemented with the old procedures and tools

Old habits cannot be removed, only new ones can be introduced

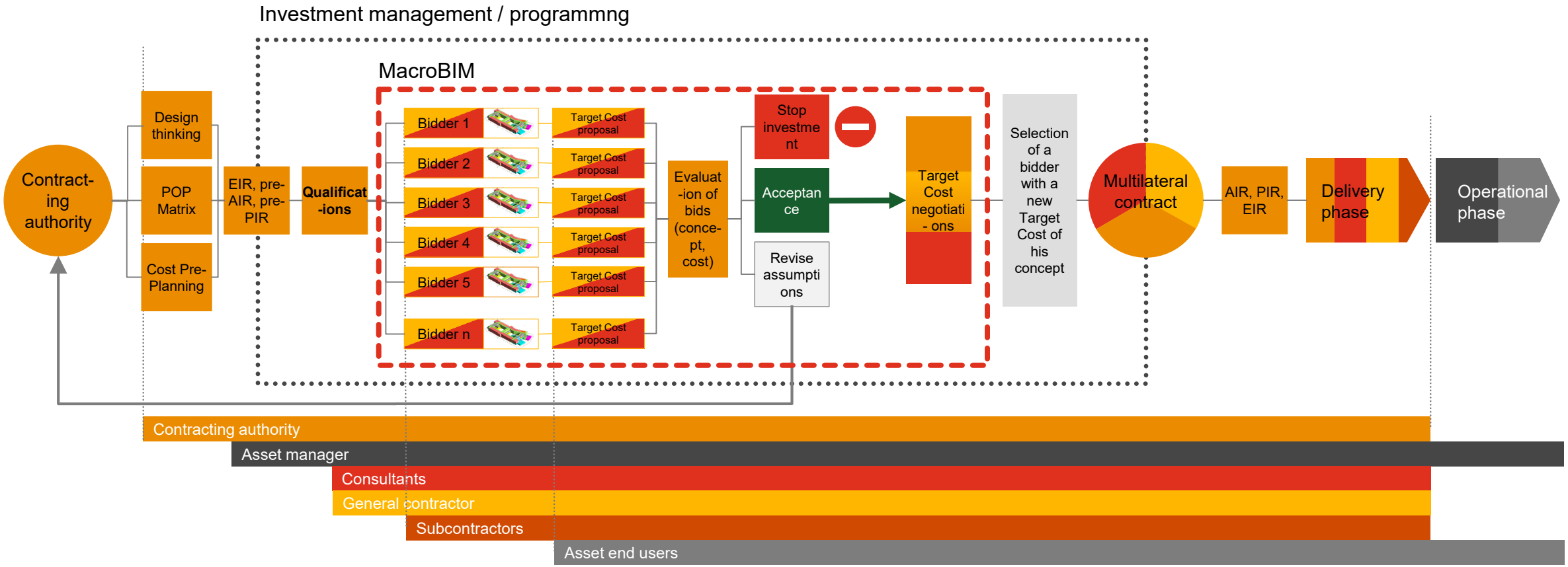
PUSH

PULL

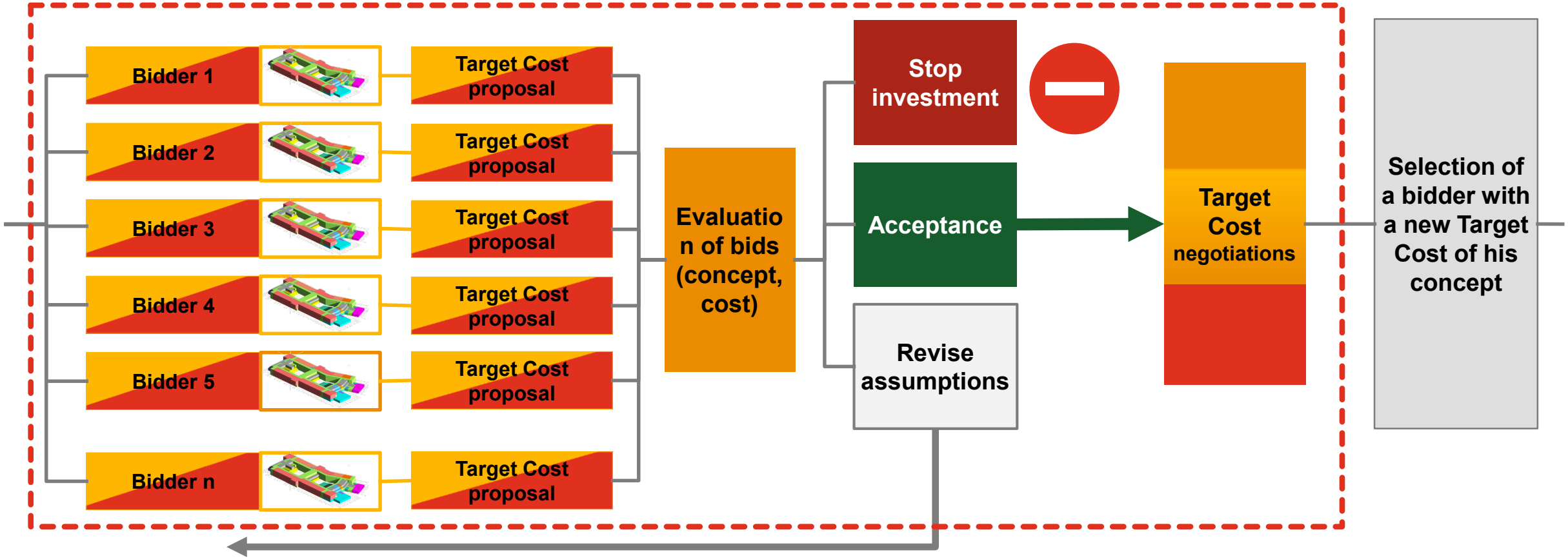
- Bottom-up activities (market / competition)
- Tactical approach
- Involvement of line and middle level personnel
- Micro BIM

- Top-down activities (regulatory framework)
- Strategic approach
- Commitment of the highest level of management and public authorities
- Macro BIM

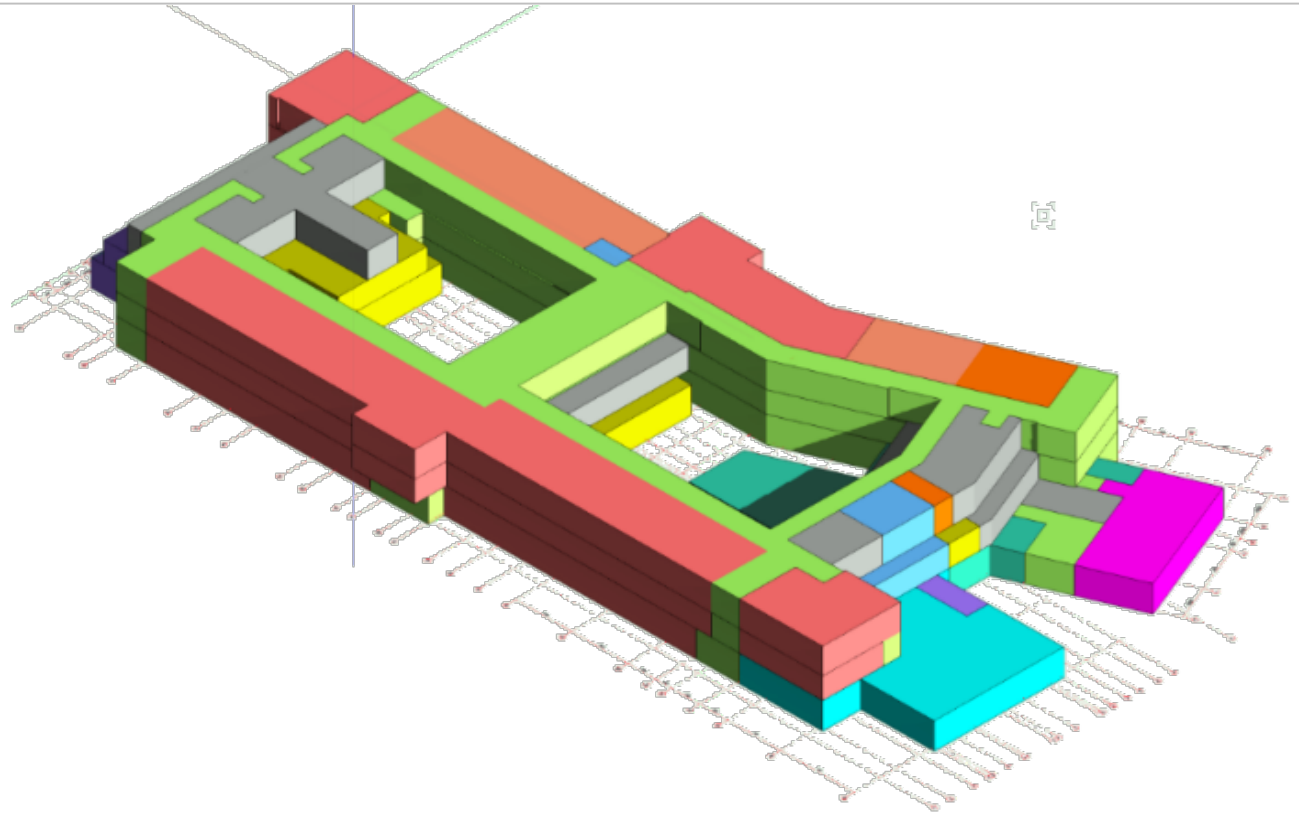
MacroBIM in the investment process



MacroBIM in detail

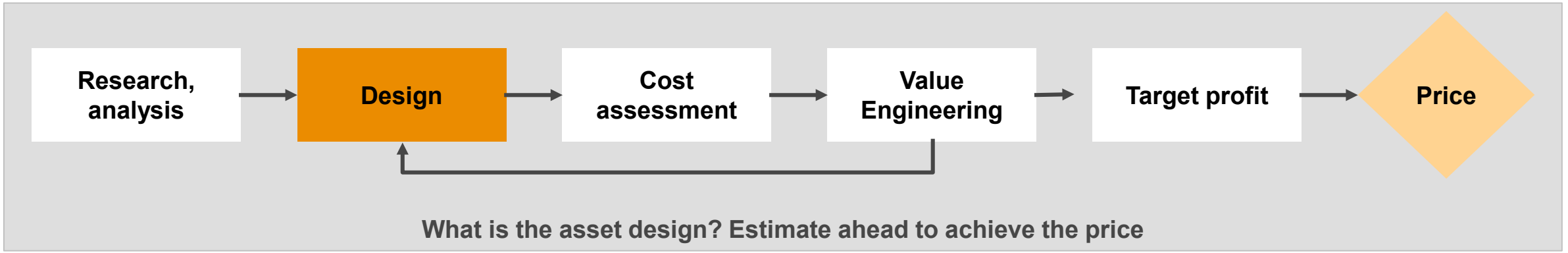


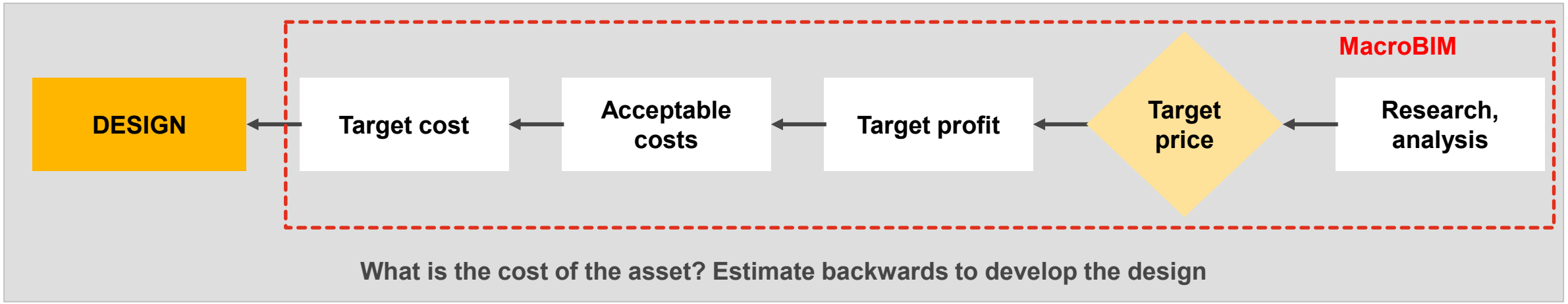
Concept model (max. LOD 100/200) in MacroBIM phase



Source: Own 3D elaboration. Concept 2D: arch. Jan Gorgul, Łódź according to the Roadmap document

Methods of cost assessment – traditional and Target Costing





Legal considerations – Roadmap

Legal status

- **Directive 2014/24 / EU of February 26, 2014 on public procurement -** Art. 22 sec. 4:

  Member States **may require** the use of specific electronic tools such as electronic construction data modeling tools or similar
- **Public Procurement Law(2019)** – Art. 69:

  The Contracting Authority **may require the preparation and presentation of tenders or competition entries using electronic construction data modeling tools** or other similar tools that are not generally available

CONCLUSION: no obstacles to the use of BIM

Activities aimed at promoting BIM

Roadmap recommendations

Obligation of BIM use in public projects, through:

- State procurement policy, or changes in PPL:
  - Obligation to use BIM use for projects value above 10M EUR
  - Obligation to use BIM by government administration bodies
  - Non-price evaluation criteria related to BIM (min. 20%)
  - Target date 2030

BIM as a promotion tool

- Principles of efficiency
- Green public procurement
- Life cycle cost calculation

Legal considerations – selection of contractor MacroBIM (1)

Assumptions for MacroBIM

- Limit the number of bidders
- Submit the initial offers
- Carry out negotiations, adjust requirements and costs
- Final bids with a Target Cost

Legal considerations – selection of contractor MacroBIM(2)

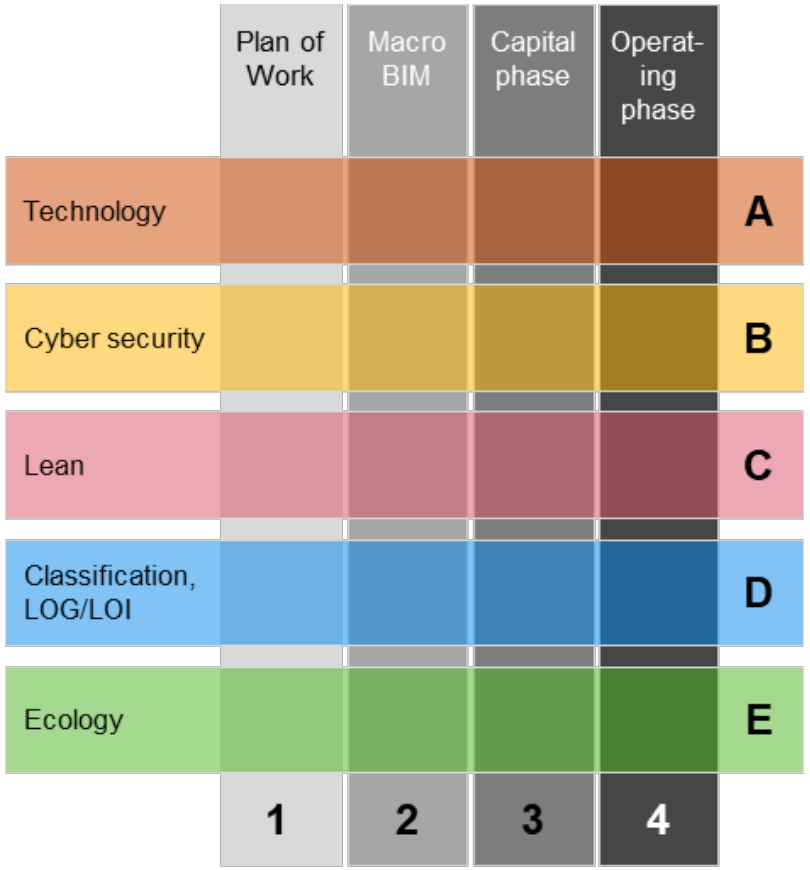
Negotiation with announcement / competitive dialogue

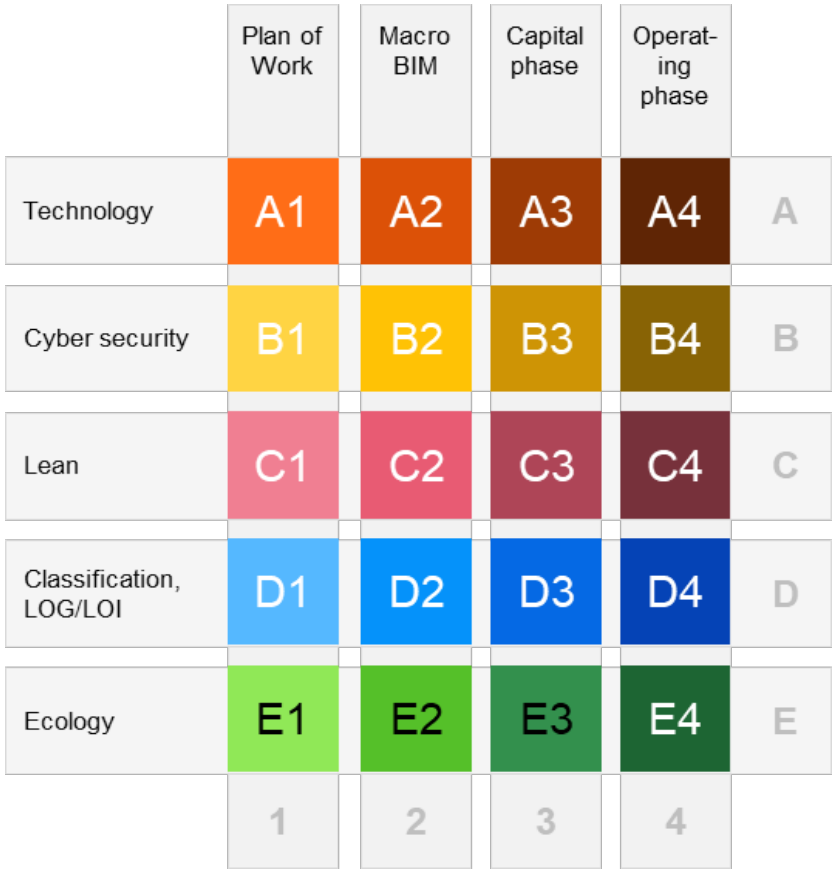
- Prequalification of contractors
- Condition: works or services include design or innovative solutions
- Invitation to submit initial offers
- Conduct negotiations with contractors / possibility of submitting offers during negotiations - negotiations of the Target Cost

STOP ! Option to terminate the procedure [consider legislative changes]

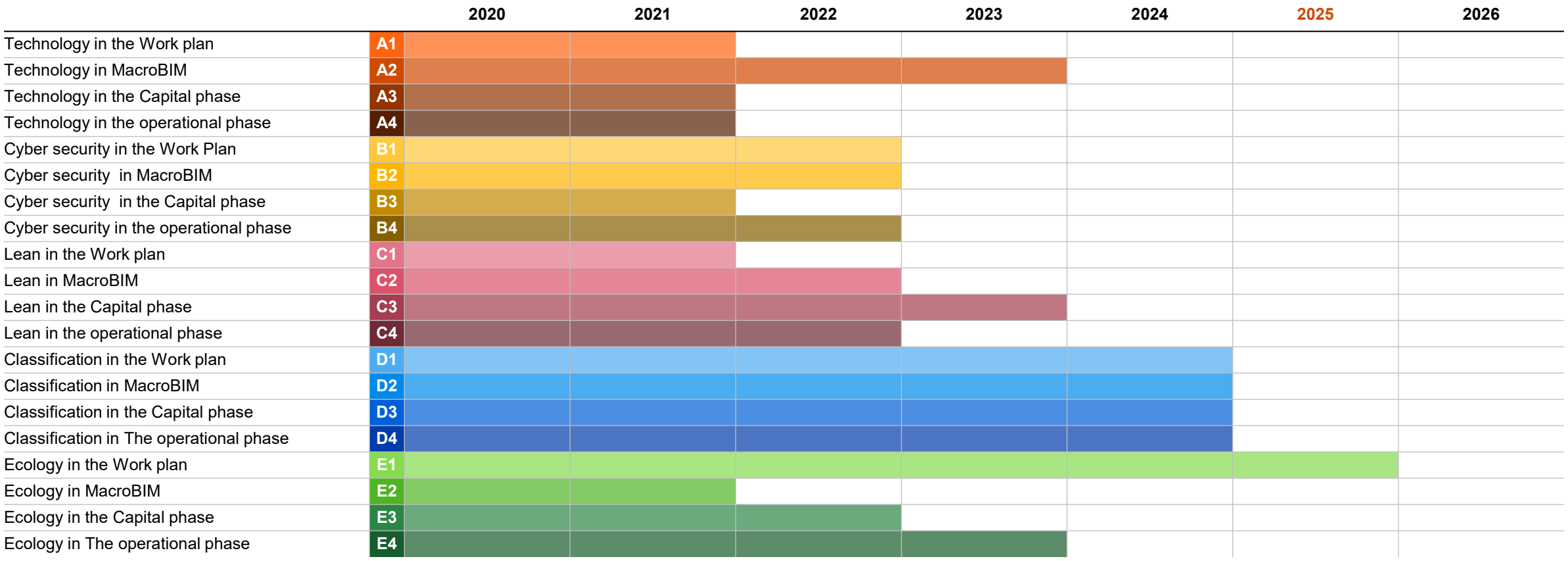
- **Submission of final offers and selection of the best one**

Roadmap – open structure of matrix elements and task nodes





Timeline for Roadmap elements



Role of the Roadmap

- The Roadmap describes a set of tools for the holistic implementation (push-pull) of the integrated methodology in Poland. By introducing top-down norms and standards, parallel actions should be taken to improve the efficiency of construction processes (Lean ecosystem)

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- There is no development without leaving your comfort zone

Further work on the BIM strategy

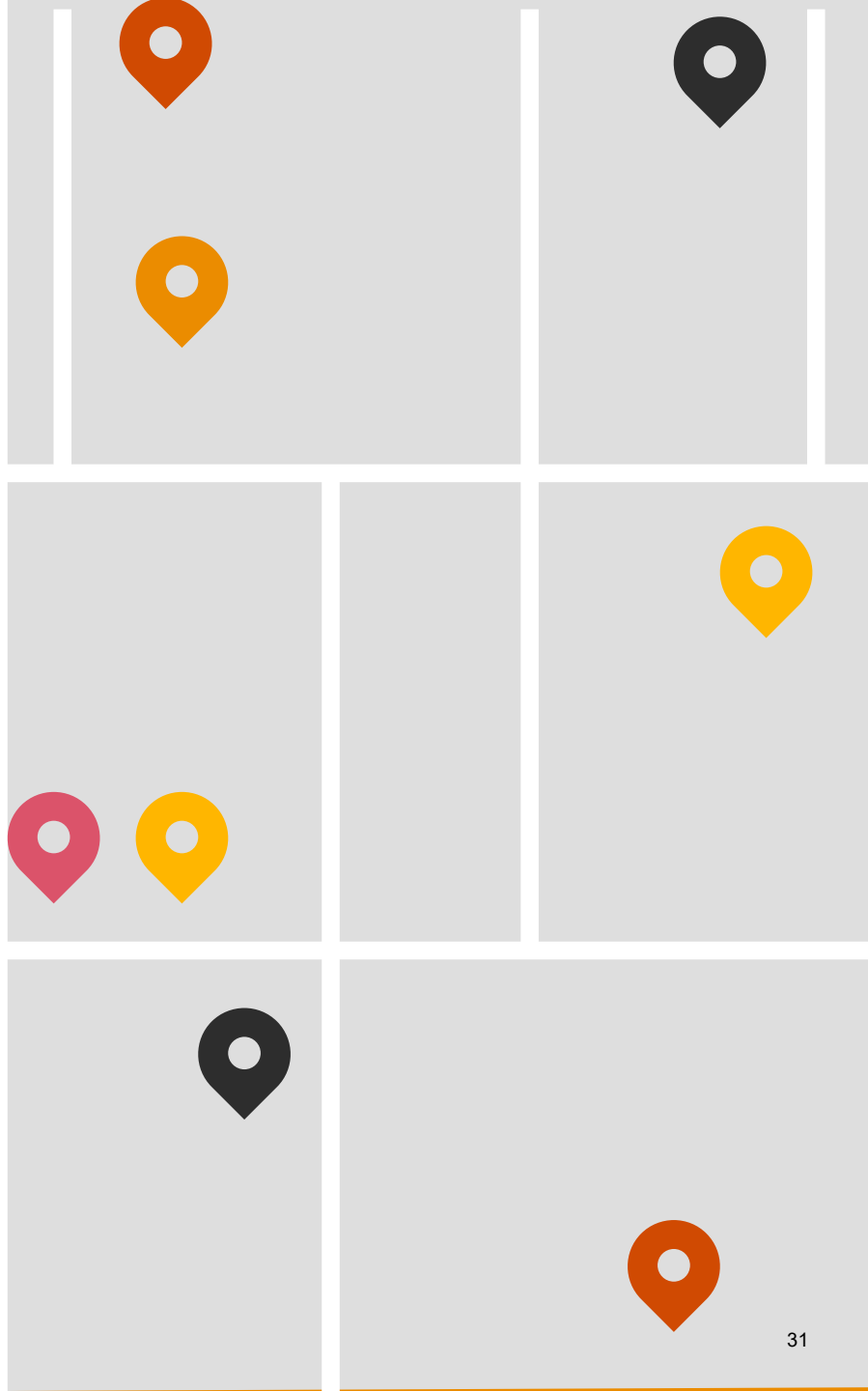
Endorsement of the Roadmap by the Beneficiary as the basis for creating a BIM implementation strategy in Poland

Establish an interdepartmental Steering Committee under the leadership of the Minister for Economic Development, Labour and Technology to coordinate further strategic work for the implementation of BIM in Poland

Select, implement and monitor pilot projects based on the recommendations of the Roadmap and future strategic documents

Implement and monitor on the regular basis the progress of tasks recommended for all nodes of the Roadmap

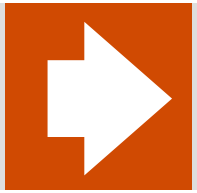
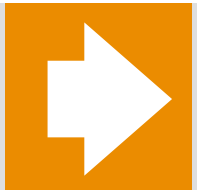
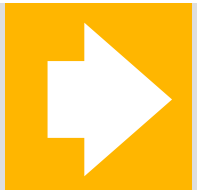
BIM documents templates



The purpose of BIM documents templates

- Support for the cubature construction sector
- **Implementation of pilot projects**
- Delivery of other cubature facilities
- Basis for development of similar documents for other types of projects

Process of development

Conclusion from previous project stages		BIM **draft** documents templates developed
Stakeholders consultations – survey		Almost 250 comments
Stakeholders consultations - meeting		BIM **final** documents templates developed

Assumptions of BIM documents templates

„Design and built”

Formula, the closest one to the collaborative assumptions recommended for BIM

MacroBIM

Ensure real cost estimation before the start of the project, and in particular cases – to abandon an unprofitable investment

Scope

The procurement, design and built phase is addressed (operation phase excluded).

Compliance with PN-EN ISO 19650

Cooperation

It is at the heart of BIM.
Without it, the implementation of new methods and technologies, and running the project is at risk of failure

Who is it for?

Primary group

- Public authorities – procurement of residential projects
- Contractors (consultants and contractors) – design and delivery of residential projects
- Subcontractors

Others

- Private investors – procurement of housing projects
- Public and private investors – procurement of other cubature projects
- Contractors (consultants and contractors) – design and delivery of other cubature projects
- Subcontractors

BIM documents templates – next steps (selected key success factors)

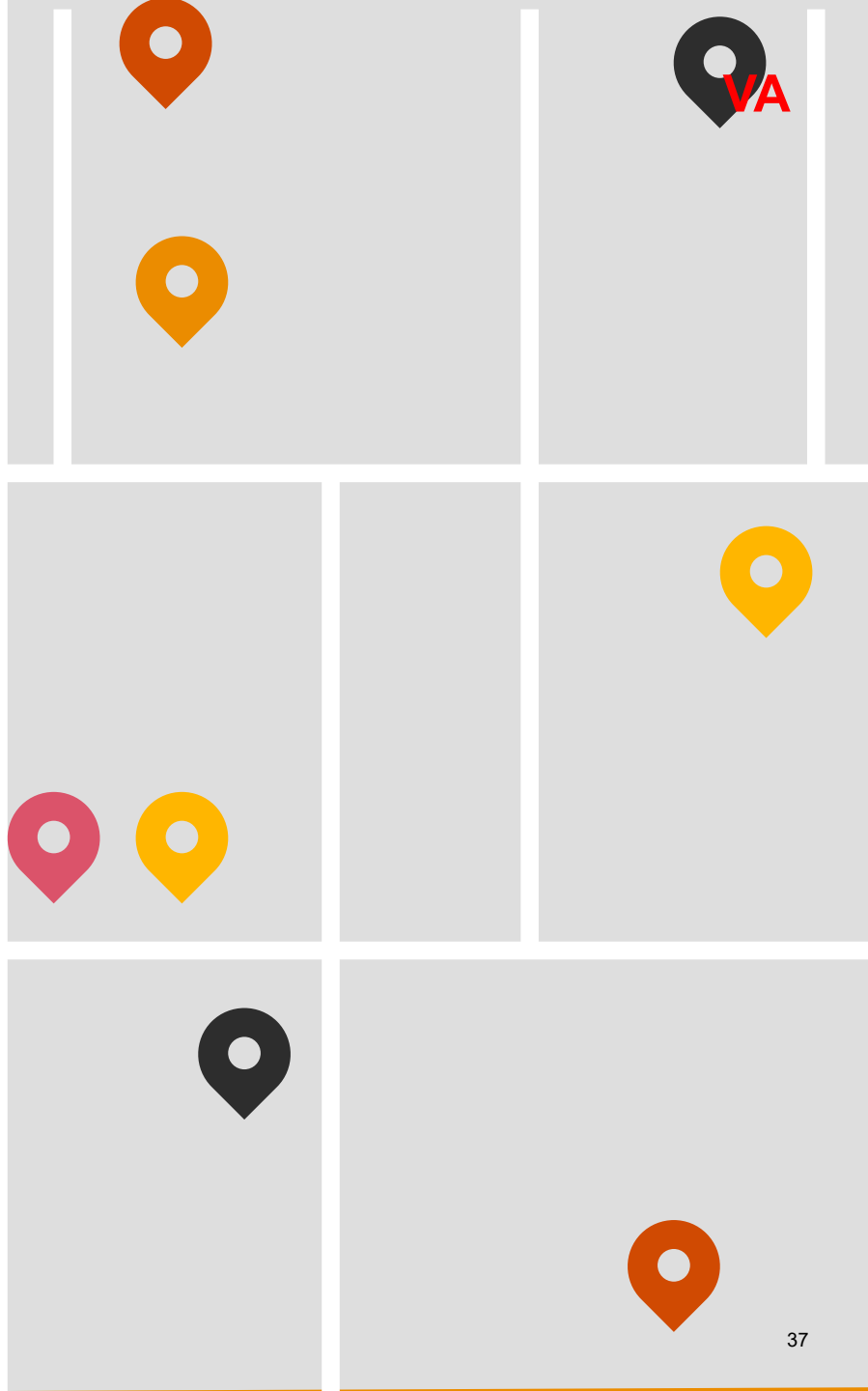
Implement pilot projects with "lesson learnt" approach, update BIM templates and publish conclusions

Develop further documents and standards (e.g. construction classification, national annex to PN-EN ISO19650 standards)

Extend the templates with operational phase elements

Continue the consultation process to supplement BIM templates system (i.a. templates for infrastructure projects)

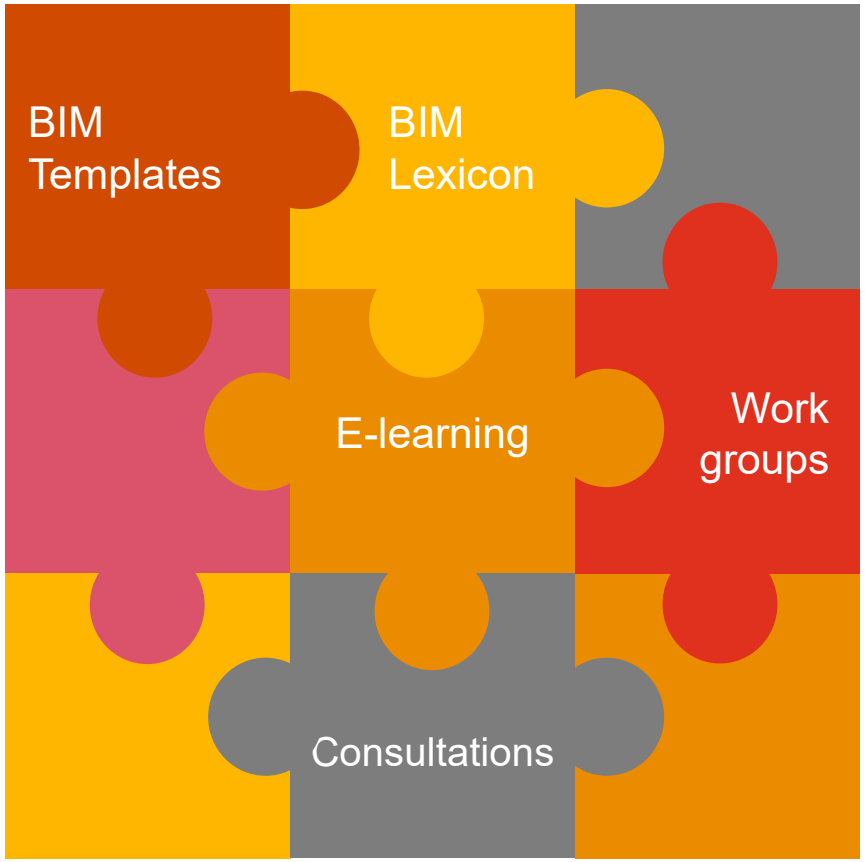
IT BIM Platform



Development of BIM IT platform concept

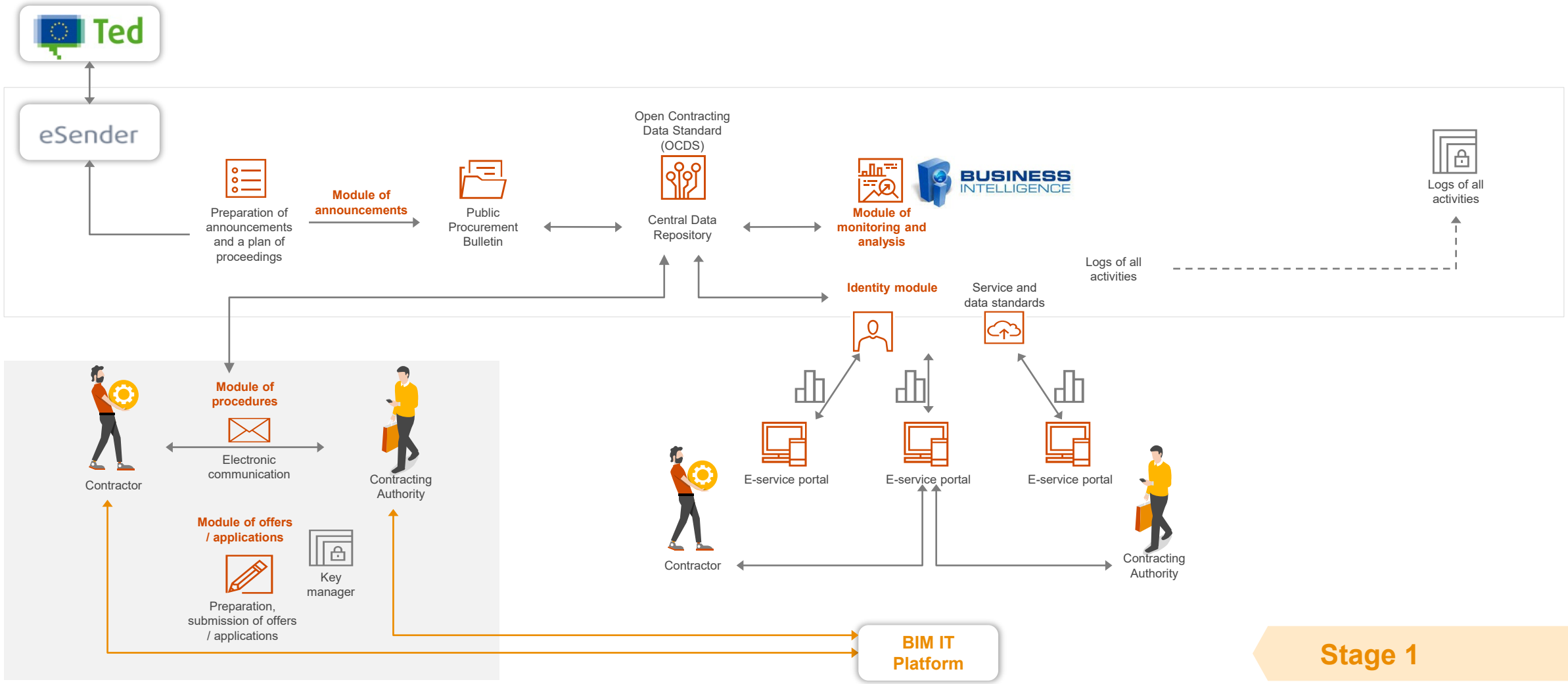
Tools for creating, verifying, coordinating and managing a project	→	Saturated, self-organising market, dynamically changing needs
Project procurement with BIM requirements	→	BIM obligation doesn’t affect the procurement process, „e-Procurement” platform
Other market needs related to the projects with BIM requirements	→	Needs for education and exchange of experiences between the stakeholders ☑

Assumptions for BIM IT platform



- **Modularity and flexibility:** the platform should be modifiable and expandable in response to stakeholder needs
- **Simplicity and intuitiveness: p**latform users will have varying level of BIM knowledge
- **Compliance with the BIM path for Poland**: consistency and development of the Platform's content in accordance with direction of changes and progress of standardisation
- **Market neutrality:** public nature of the platform requires objectivity

Programme of implementation: Stage 1



Stage 1: Platform modules

BIM Documents

A module dedicated to contracting authorities and contractors providing one-stop access to published studies on BIM implementation in Poland, including:

- Studies developed as part of the project
- Good practice manuals developed as part of the implementation of the action plan set out in the Roadmap
- BIM documents templates created as part of the project and / or additionally created by the platform manager

BIM Lexicon

Database of terms related to BIM along with their interpretation

BIM Navigator

An interactive tool dedicated to specific target groups (e.g. housing, public buildings, hydraulic engineering, roads, railways) that allows to determine their level of BIM maturity. Initially, only the section on residentinal building will be active

BIM Targets

An interactive tool supporting the determination of BIM supported targets for a project in the form of a survey, charts or support questions (PLQ)

Video/e-learning

Custom made animated instructional videos, e-learning

Working Groups

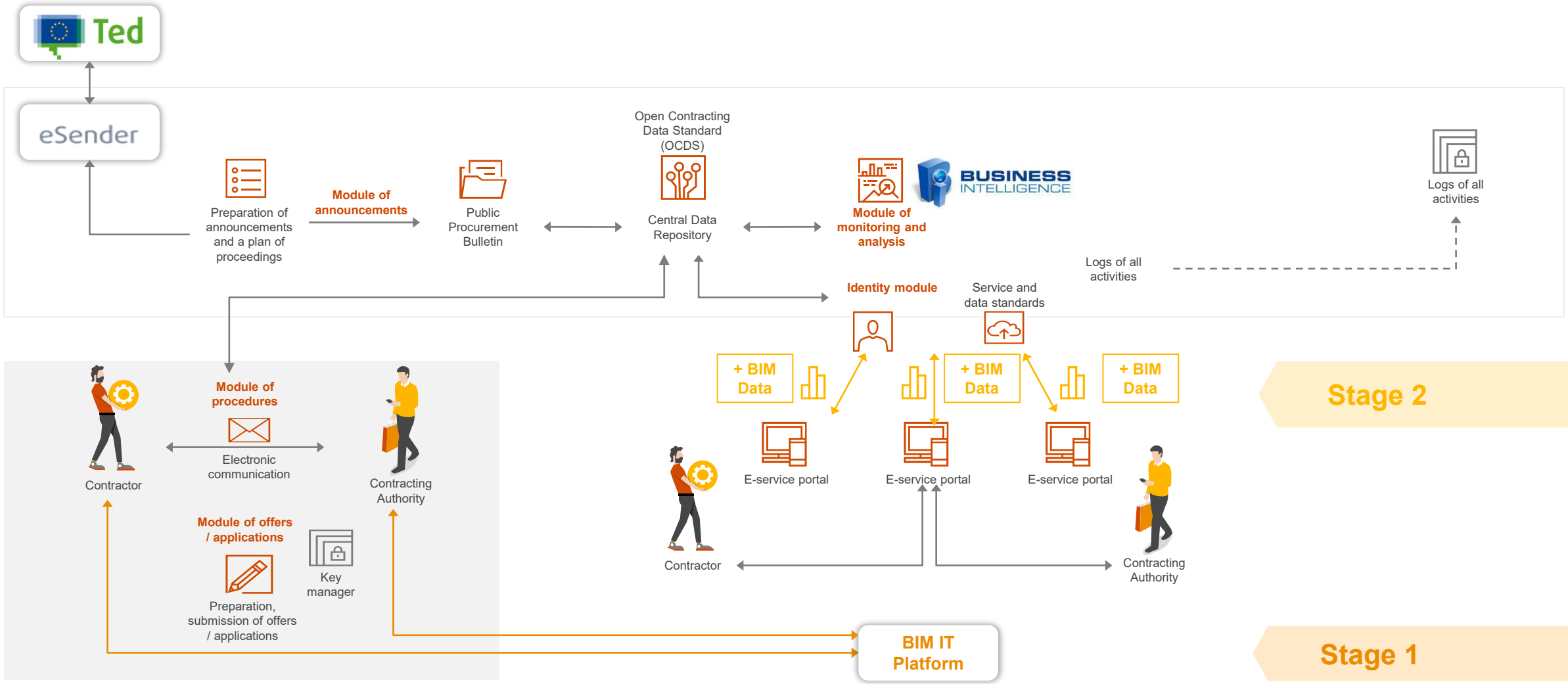
Module containing information, about teams aimed at supporting the public sector in implementing the BIM methodology.
Results, news and work progress will be published

Surveys

Periodic surveys will allow the leader to study changes in the maturity of the market in relation to BIM implementation.

The resources will also include reports on research carried out in previous years. The user can compile selected results, create charts based on them (e.g. with regard to time) and download.

Programme of implementation: Stage 2



Stage 2: Development of BIM platform > „TO BE”

1 Data aggregation between e-services and e-procurement platform

Connection to the e-procurement portal	Extend the Monitoring and Analysis Module of the e-procurement platform with a functionality that will ensure the collection of data on ongoing BIM proceedings, e.g. investment value, scope of BIM use, non-price criteria (type and weight), etc. These data can be used to monitor the level of BIM implementation in public investments in Poland

2 Proposals for further platform modules

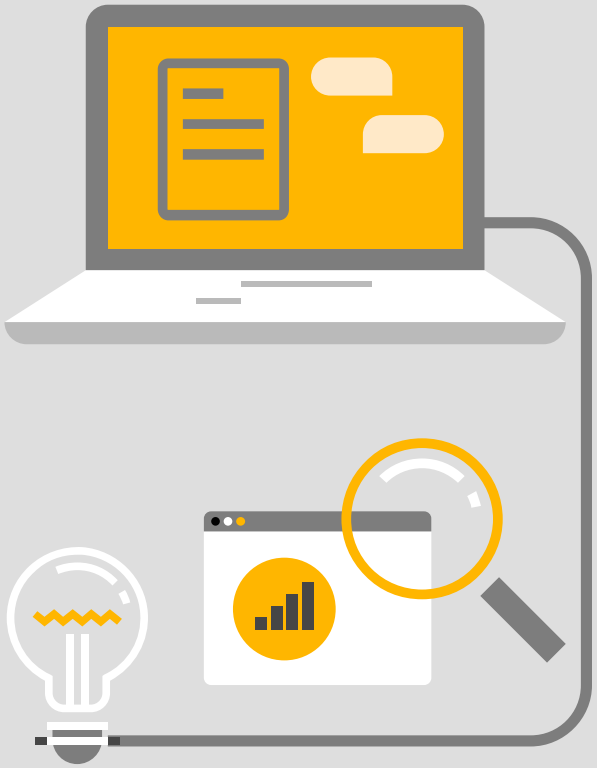
Settings templates for BIM class software	In connection with the future necessity of electronic submission of building permits, in order to standardise these documentation (BIM L1 standardisation), the government develops and provides templates for leading software producers
ROI calculator	An interactive form indicating potential savings with a certain level of use of the BIM methodology

Further actions

- Procurement of the Plaftorm
- Content development
- Ongoing analysis of development possibilities of individual modules and entire Platform
- Continuous development: update modules and incorporate new ones

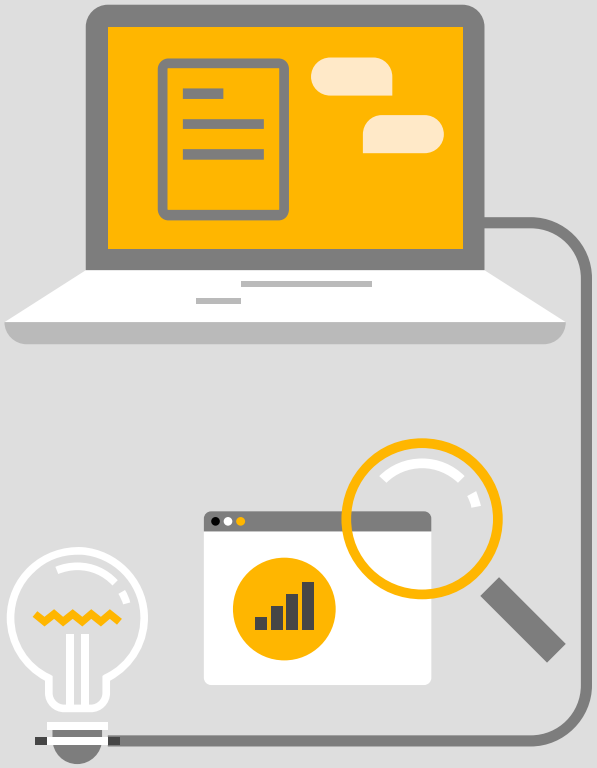
3

Lessons learnt and recommendations



Lessons learnt and recommendations (1/3)

- **Endorsement of the project results by the Beneficiary as the basis for further implementation works** – continue the BIM implementation works and develop a detailed strategy of BIM use in public procurement
- **Public sector leadership –** taking the role of implementation leader by the Ministry of Economic Development, Labour and Technology, coordinate the implementation activities of public stakeholders, develop project communication plan, monitor the public entities' activities in the field of BIM
- **Interministerial cooperation –** inter-ministerial Steering Committee to manage the implementation process and monitor progress
- **Stakeholder consultations** – Working Group composed of representatives of the construction industry and academia, divided into thematic and task groups. Technical support for the Steering Committee

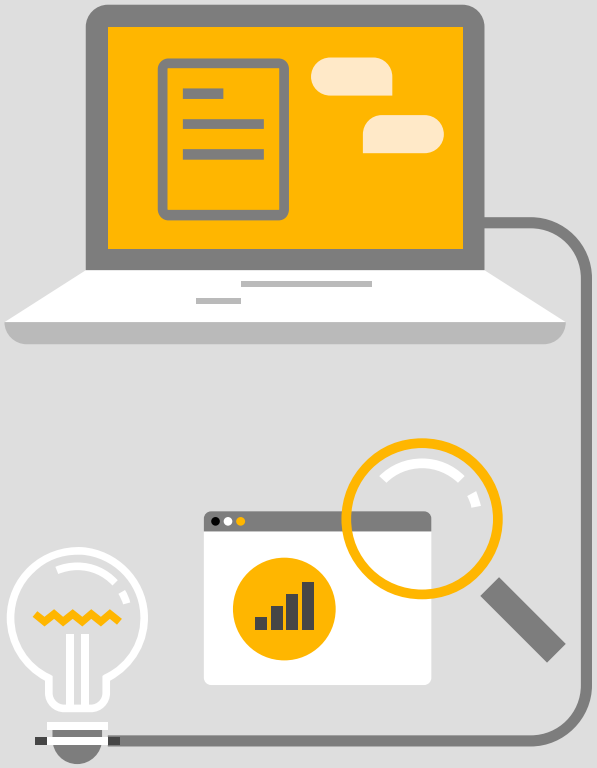


Lessons learnt and recommendations (2/3)

- Select and launch the pilot projects - practical application of BIM, apply document templates, project procurement guidelines (MacroBIM) and way of work according to the recommendations of the Roadmap document

- Continue the construction market survey in 2021 (apply temporary measures pending the launch of the IT BIM platform) - market monitoring to validate the direction and pace of implementation

- Update the Roadmap every 2-3 years – BIM implementation monitoring, review and revise the scope of works, confirm the direction of changes



Lessons learnt and recommendations (3/3)

- Continue the open policy of conducting implementation works – gain the stakeholders trust in public institutions and stakeholder involvement
- Avoid non-profit activities – ensure team commitment at a constant level and availability of experts
- Hybrid form of stakeholder consultations: meetings, webinars, surveys – to match the needs and purpose

Thank you

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