

DELIVERABLE: D11-D2.2

Report on Roles of Target Groups in the Building Life Cycle and their role in NZEB implementation

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Author(s): All the partners

Network for Using BIM to Increase the Energy Performance

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The present deliverable will be update during the project in order to align the outcome to the market needs as well as to other BIM related projects realized within Horizon 2020 program.

The updated version of the deliverable will be only available in the website of the project www.net-ubiep.eu.

Some deliverables could also be translated in partners national languages and could be find in the respective national web pages. Click on the flags to open the correspondence pages:



International web page



Italian web page



Croatian web page



Slovak web page



Spanish web page



Dutch web page



Estonian web page



Lithuanian web page

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1. Deliverable details

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2. Brief Description

This report describes the identification of the target groups and their role in BIM. Each role of each actor is identified in the construction workflow and focused on energy aspects. Four types of actors are considered in this task as having a relevant role in the building sector: Public Administrations, Professionals (Architects-Engineers), Technician (Installers-Maintainers), Tenants/Owners/Building Administrators.

For understanding the role of each actor in the different building life cycle phases, each partner is asked to inventory the role, tasks and competences for each actor.

3. The building life cycle and the roles, tasks and competences of target groups in it

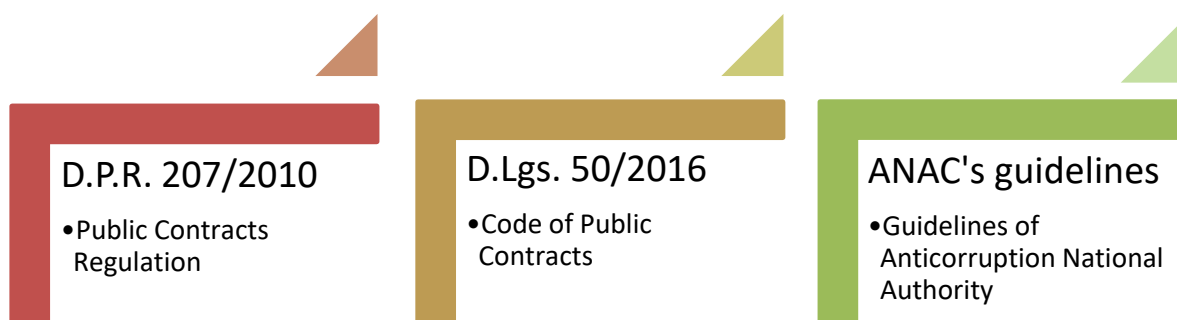
3.1 Italian Situation

Contributed by		Italy
Author		Claudio Rosso - Anna Moreno
Contact		rosso@gruppocs.com - anna.moreno@enea.it
Source		D.P.R. 207/2010 D.Lgs. 50/2016 ANAC's guidelines

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➤ General overview of the Building Life Cycle

In Italy, there are two main decrees in which the phases of the Building Life Cycle are mentioned. At this it is possible to add the ANAC's guidelines.



Considering these decrees, seven phases (plus an additional starting phase) are individuated:

Phases	0. Organization	
Sub Phases	Quantification and identification of needs	Planning

In the initial phase, there are:

- quantification and identification of needs and requirements from the commitment side;
- planning of the activities made by Public Administration every three years to define how much of the budget will be dedicated for each project

In the phase 1, there are:

Phases	1. Start of the design		
Sub Phases	Definition of DPP (Preliminary Production Document)	Assignment to the level of criticality	Services conference (only in particular cases)

- definition of DPP (Preliminary Production Document)
- assignment to the level of criticality
- services conference

Phases	2. Design						
Sub Phases	Technical and economical feasibility project	Check and validation of the basic design	Definitive Design	Check and validation of the definitive design	Executive Design	Check and validation of the executive design	Approval of the Public Administration

In the phase 2, there are:

- technical and economic feasibility project, which includes the basic design
- check and validation of the basic design made by internal controls body
- definitive design
- check and validation of the definitive design made by internal controls body
- executive design
- check and validation of the executive design made by internal controls body
- approval of the Public Administration

Phases	3. Commitment to Engineering Services		
Sub Phases	Call for Proposal	Assignment of construction works	Contract Stipulation

In the phase 3, there are:

- call for proposal (for public construction works) or collection of three different estimates (for private construction works)
- assignment of construction works
- contract stipulation

Phases	4. Realization			
Sub Phases	Plan and set-up the construction site	Work in progress and changes	Updating of BIM Model	Finish of construction works

The phase 4 is not regulated by Italian Legislation but, from different experiences, it is possible to find:

- plan and set-up of the construction site
- work in progress and changes
- updating of BIM Model made by BIM Coordinator
- finish of construction works

Phases	5. Test and Control			
Sub Phases	Ongoing Testing	Static test	Technical-functional test of the systems	Update of data in 7D BIM Model

In the phase 5, there are:

- ongoing tests
- static tests
- dynamic tests (technical and functional test of the systems of the building)
- update of data in 7D BIM Model made by BIM Coordinator

Phases	6. Management and Maintenance				
Sub Phases	Management and control	Systems operation	Plan of maintenance using 7D BIM Model	Ordinary Maintenance	Extraordinary Maintenance

In the phase 6, there are:

- management and control
- systems operation
- plan of maintenance using 7D BIM Model made by Facility Manager
- ordinary maintenance (for change of components)
- extraordinary maintenance (for malfunctions, obsolescence, technological progress)

Phases	7. End of Life		
Sub Phases	Recycling and reuse	Extrapolation of environmental data using BIM Model	Demolition and recycling of components

In the phase 7, there are:

- recycling and reuse
- extrapolation of environmental data using BIM Model by Environmental Engineer
- demolition and recycling of components

➤ Role of the Public Administration in the BLC

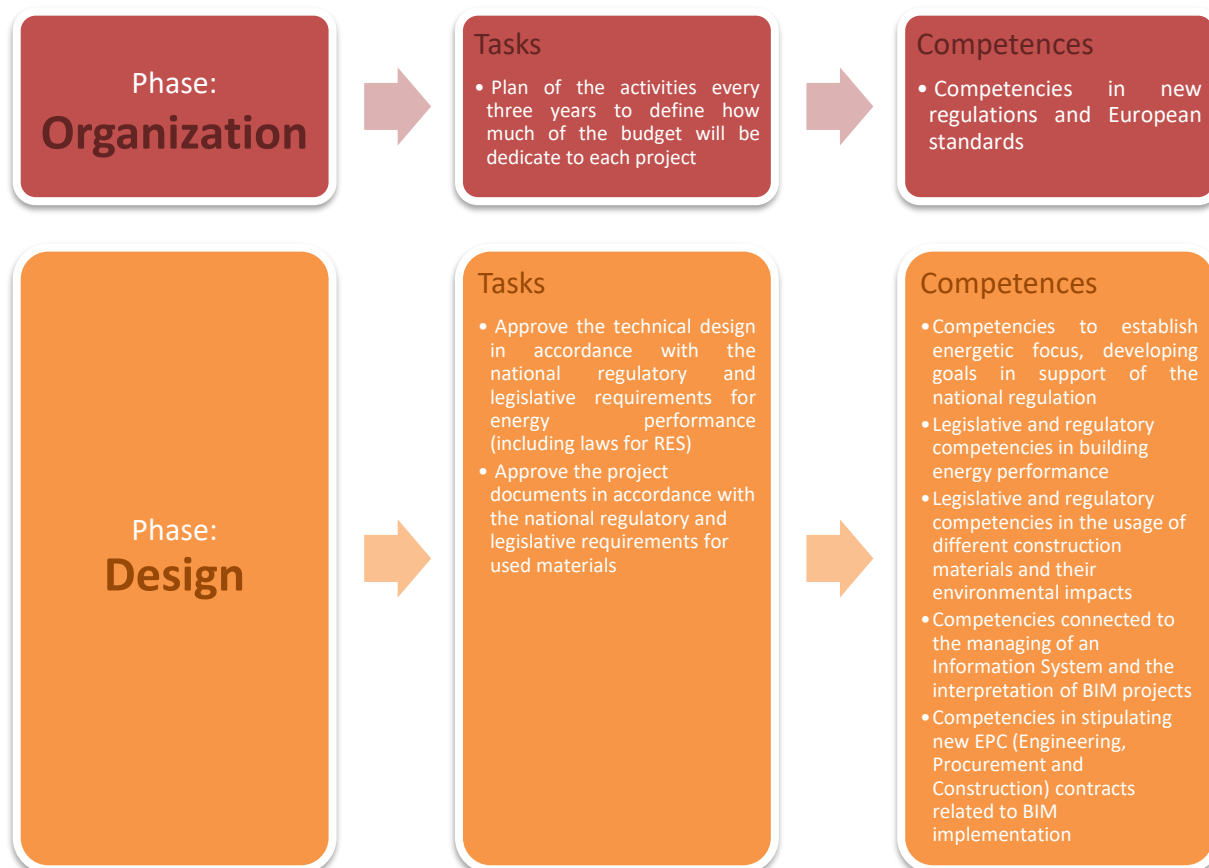
In Italy, the Public Administration is the authority who disciplines, supervises and approves the main activities of the Building Life Cycle, controlling the respect of national regulatory and legislative requirements and supervising contracts between privates. If the commitment is public, the authority quantifies and identifies needs at the beginning and stipulates contracts with professionals and technicians after the call for proposal. In the end of the cycle it supervises the way to recycle and dispose waste.

➤ Role of the Public Administration when focusing on energy aspects

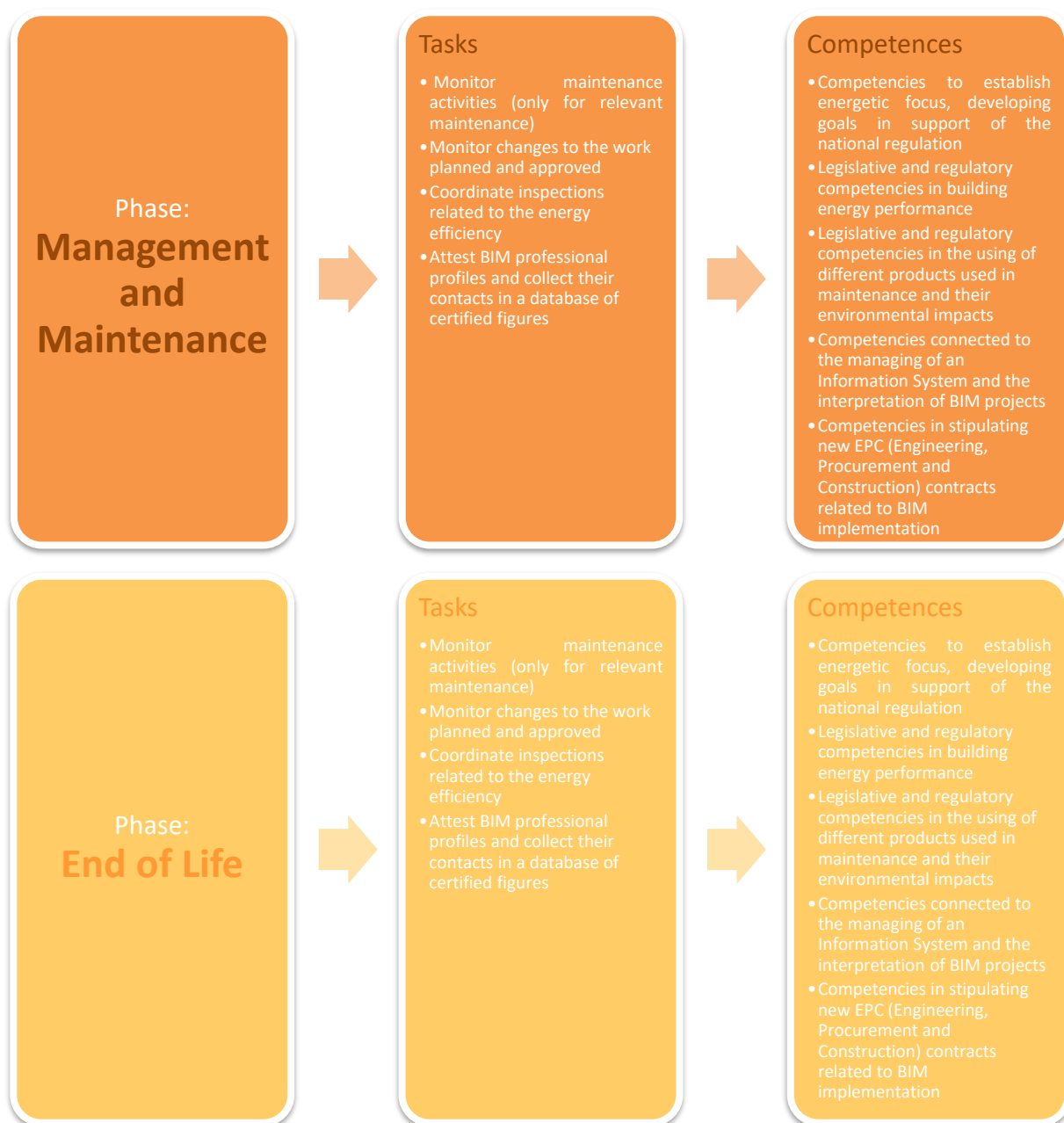
Focusing on the energy aspects, the Public Administration is the entity who pilots the new constructions in the NZEB implementations, controlling the respect of national regulatory and legislative requirements in the field of energy performances for the constructions and the materials used.

➤ Tasks and Competencies of the Public Administration in the BLC

Its tasks (and consequent competences) in the Building Life Cycle are:







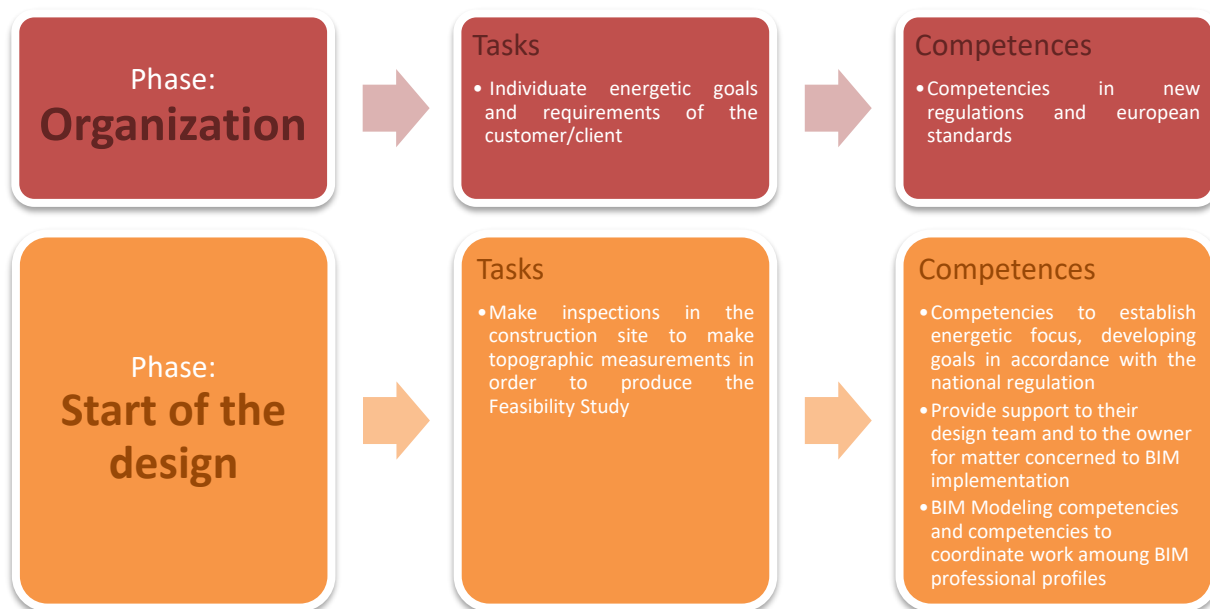
➤ **Role of the Professionals in the BLC**

“Professional” includes Architects and Engineers who are in charge to quantify and identify needs of the customers, in the first stages of the Building Life Cycle, and design building features. In addition, during the construction works, they are responsible to test and control works conducted by blue-collar workers.

➤ **Role of the Professionals when focusing on energy aspects**

Professionals interested in Energy Efficiency try to pilot construction works in NZEB implementation, controlling that each law and best practice is respected.

➤ **Tasks and Competencies of Professionals in the BLC**



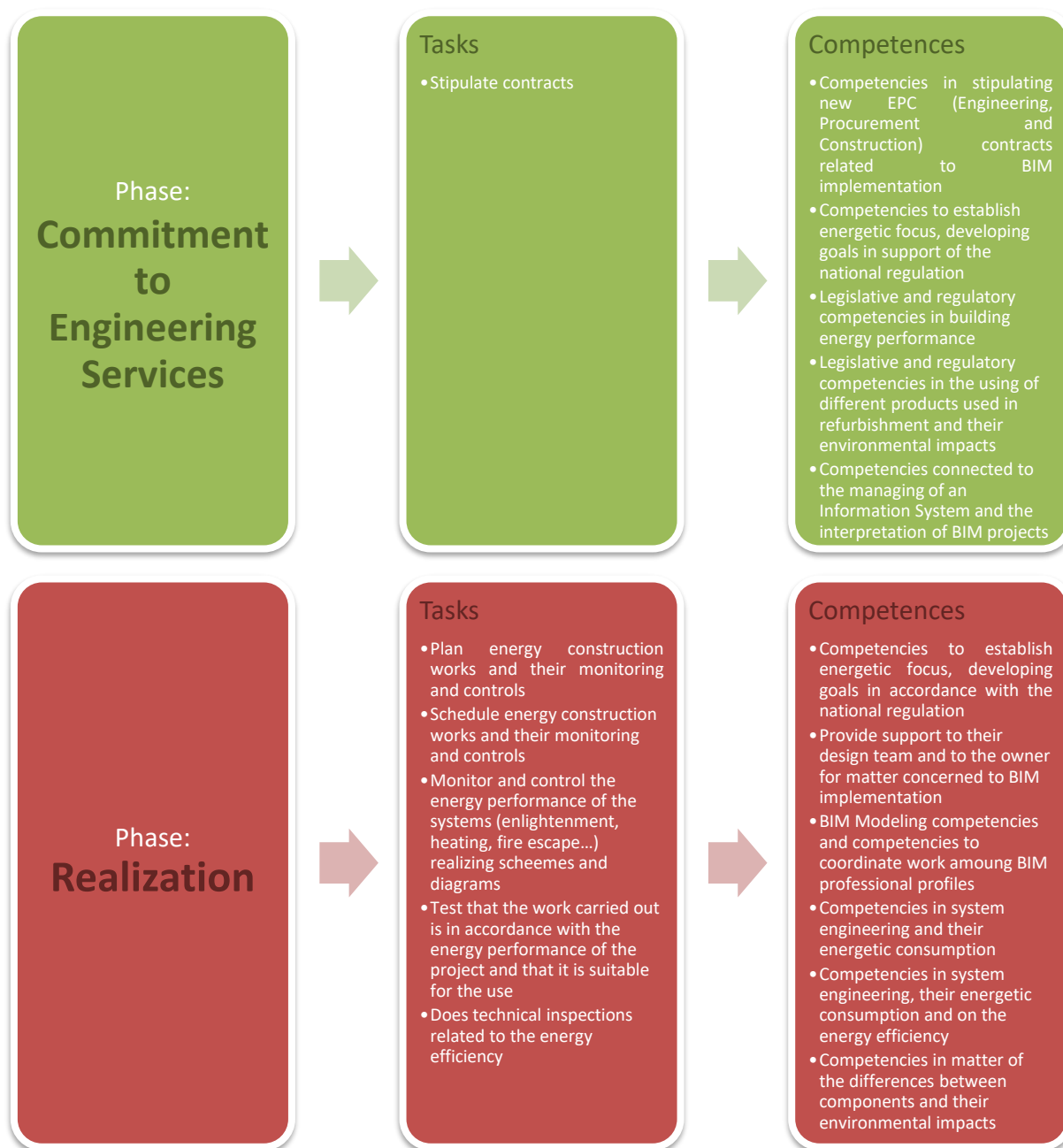
Phase: Design

Tasks

- Realize energetic models and simulations to individuate the solution which performs in the best way
- Realize Energetic and Technical Documentations and define specifications to respect laws on environmental impacts
- Individuate optimal technical/energetic solutions to satisfy the building requirements
- Estimate total budget, total time at completion and total resources needed to fulfill starting energetic goals
- Plan energy refurbishment works and their monitoring and controls
- Schedule energy construction works for the refurbishment and their monitoring and controls
- Monitor and control the energy performance of the systems for the refurbishment (enlightenment, heating, fire escape...) realizing schemes and diagrams
- Test that the refurbishment work carried out is in accordance with the energy performance of the project and that it is suitable for the use
- Does technical inspections related to the energy efficiency in the refurbishment

Competences

- Competencies to establish energetic focus, developing goals in accordance with the national regulation
- Provide support to their design team and to the owner for matter concerned to BIM implementation
- BIM Modeling competencies and competencies to coordinate work among BIM professional profiles
- Competencies in system engineering and their energetic consumption
- Competencies in system engineering, their energetic consumption and the energy efficiency
- Competencies in matter of the differences between components and their environmental impacts



Phase: Test and Control

Tasks

- Plan test and control and their monitoring
- Monitor and control the energy performance of the systems (enlightenment, heating, fire escape...) realizing schemes and diagrams
- Test that the work carried out is in accordance with the energy performance of the project and that it is suitable for the use
- Does technical inspections related to the energy efficiency

Competences

- Competencies to establish energetic focus, developing goals in accordance with the national regulation
- Provide support to technicians and owner for matter concerned to BIM implementation
- Competencies in system engineering and their energetic consumption
- Competencies in matter of the differences between components and their environmental impacts
- Competencies in system engineering, their energetic consumption and on the energy efficiency

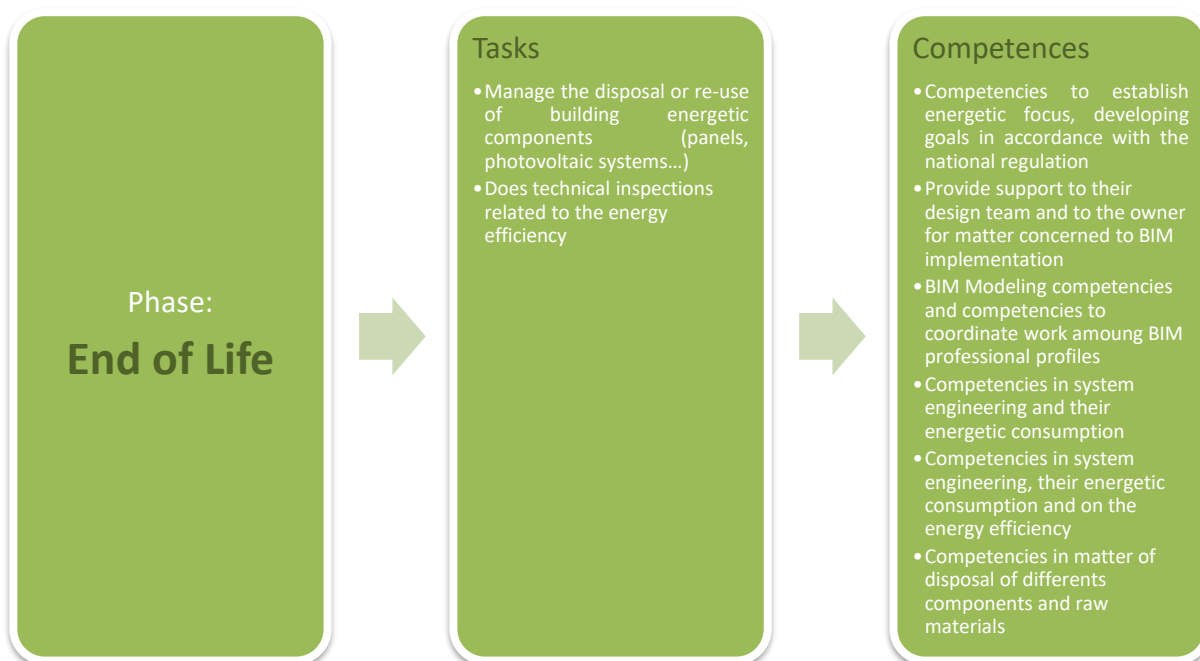
Phase: Management and Maintenance

Tasks

- Plan energy maintenance works and their monitoring and controls
- Schedule energy construction works and their monitoring and controls
- Monitor and control the energy performance of the systems (enlightenment, heating, fire escape...) realizing schemes and diagrams
- Test that the work carried out is in accordance with the energy performance of the project and that it is suitable for the use
- Does technical inspections related to the energy efficiency
- Does external audit to guarantee a continuous high-performing maintenance

Competences

- Competencies to establish energetic focus, developing goals in accordance with the national regulation
- Provide support to their design team and to the owner for matter concerned to BIM implementation
- BIM Modeling competencies and competencies to coordinate work among BIM professional profiles
- Competencies in system engineering and their energetic consumption
- Competencies in system engineering, their energetic consumption and on the energy efficiency
- Competencies in matter of the differences between components and their environmental impacts



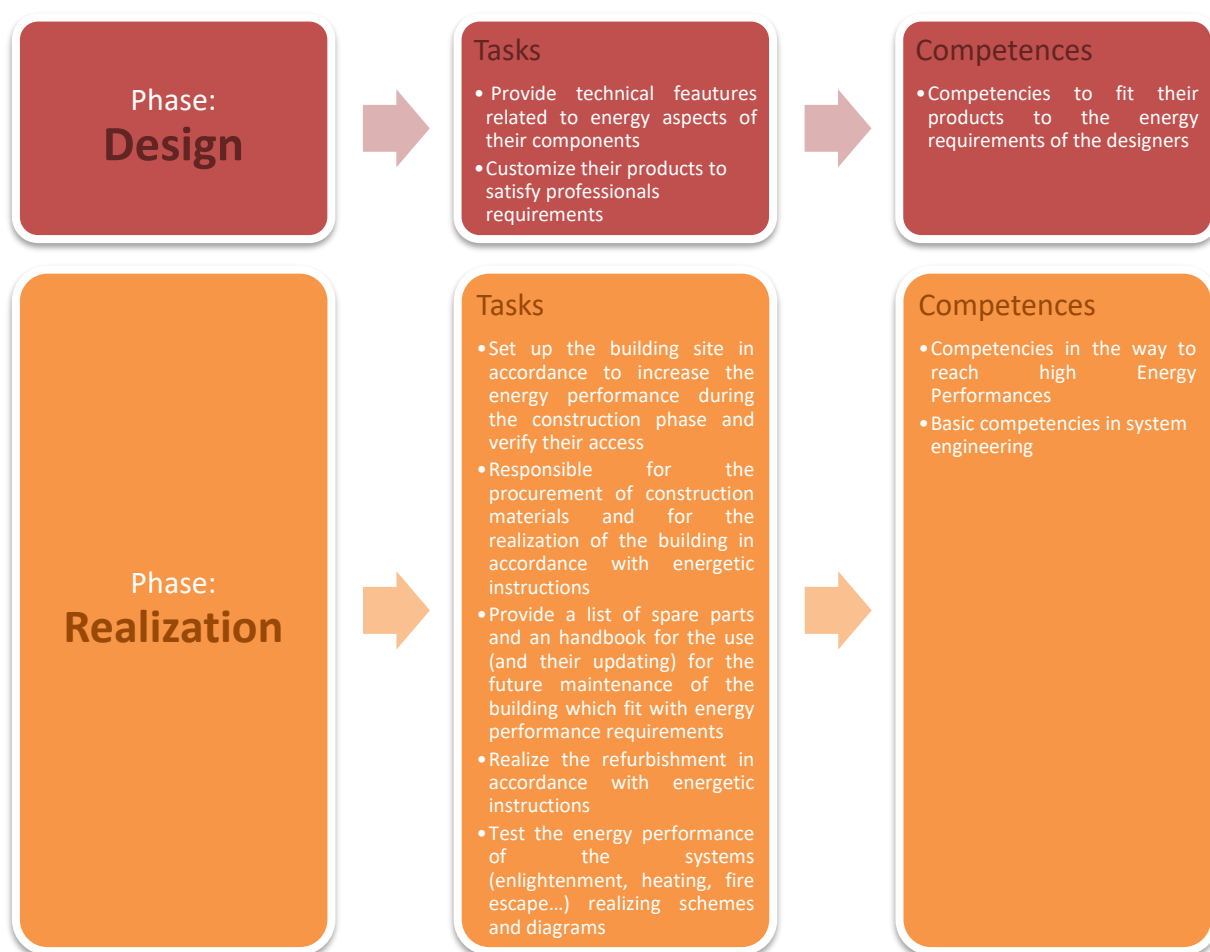
➤ Role of the Technicians in the BLC

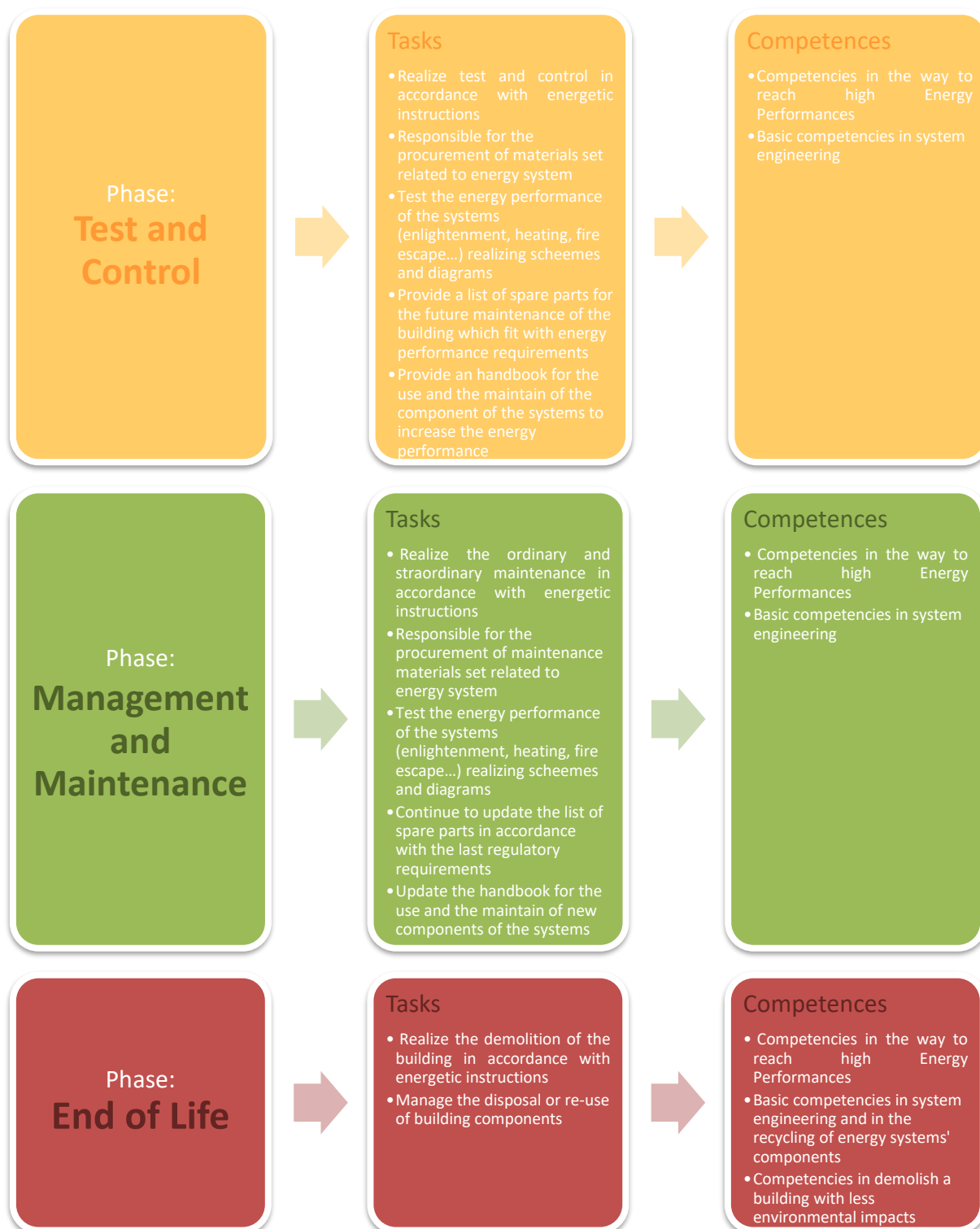
In this Target Group are included supplier of raw materials and components, workers, installers and demolition companies.

➤ Role of the Technicians when focusing on energy aspects

The enterprises of technical works are less interested in implementing an innovative construction strategy but, if the other target groups are involved in BIM implementation, they are tempted to adapt their way of work to the changes.

➤ Tasks and Competencies of the Technicians in the BLC





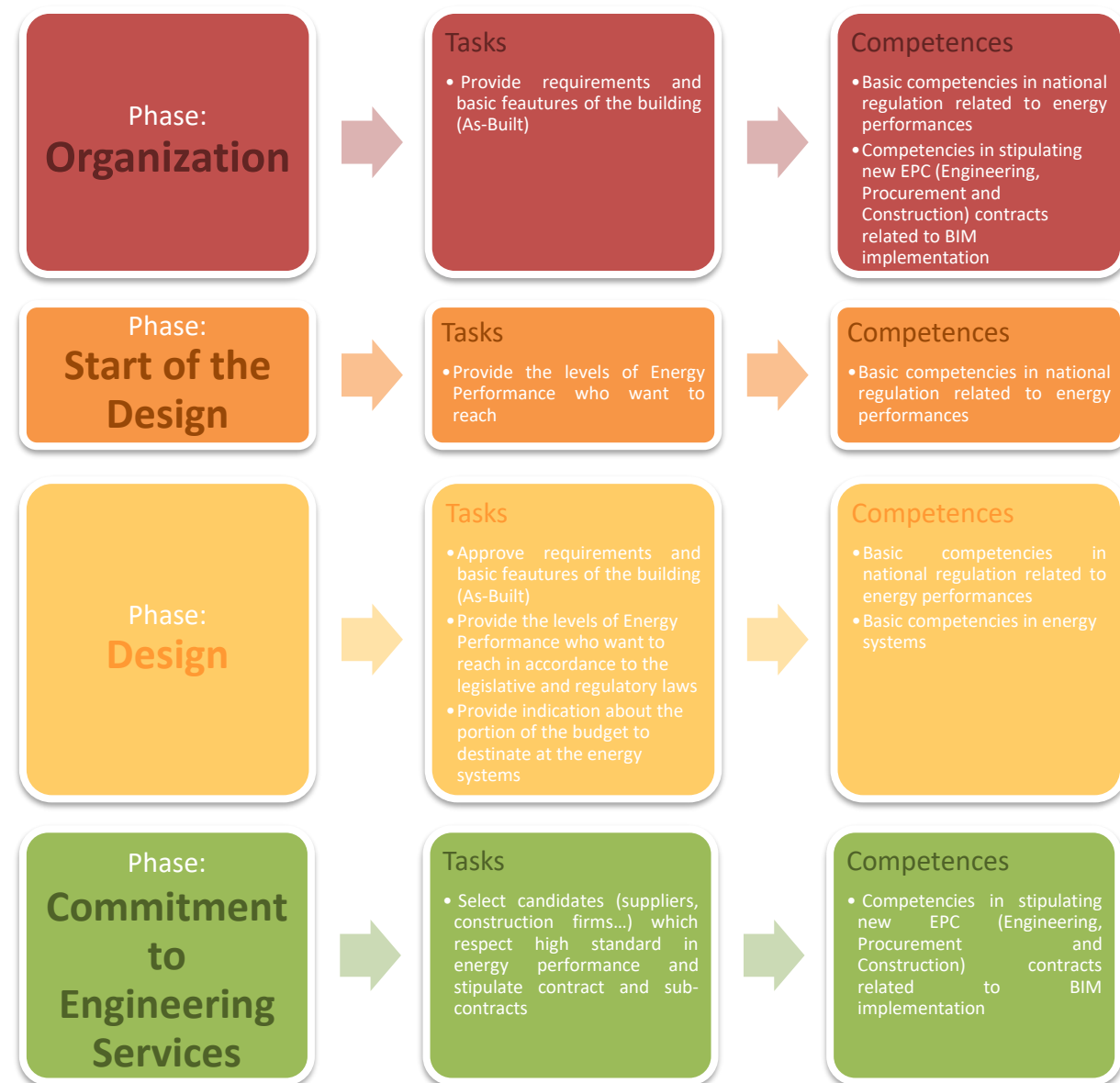
➤ Role of the Tenants/Owners in the BLC

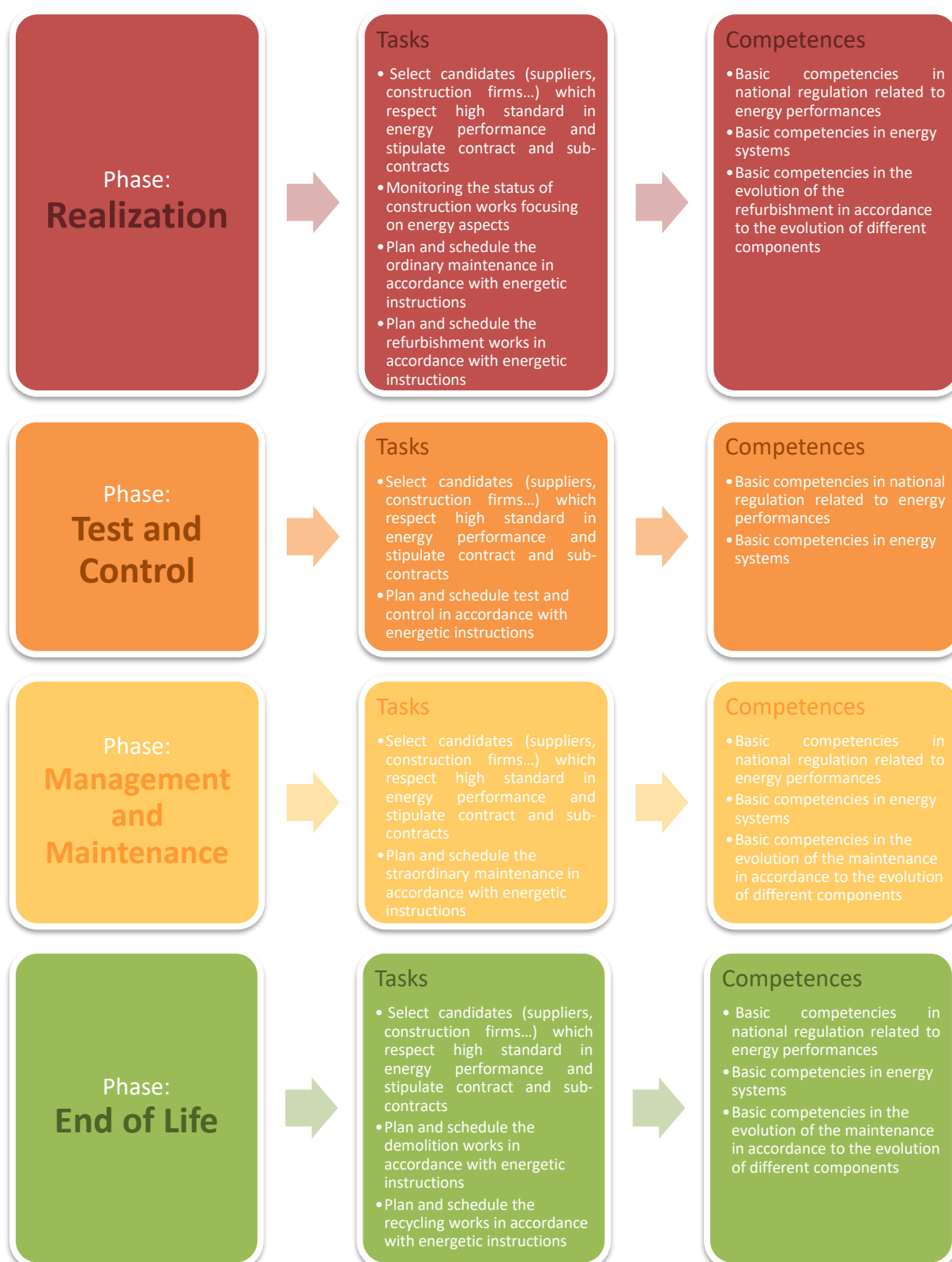
Tenants and Owners are the commitment part who want to invest in private buildings or who works for the management of public buildings.

➤ Role of the Tenants/Owners when focusing on energy aspects

Tenants and Owners are the commitment part who want to invest in private buildings or who works for the management of public buildings.

Tasks and Competencies of the Tenants/Owners in the BLC





3.2 Spanish Situation

Contributed by	Fundación Laboral de la Construcción (FLC)
Author	Silvia Santos
Contact	ssantos@fundacionlaboral.org
Source	'Código Técnico de Edificación' (Technical Code on Edification) Act 38/1999 on Ordenation of the Edification (LOE)

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➤ General overview of the Building Life Cycle

In Spain, the following table shows the main stages and sub-stages applied to the BLC, although it is not possible to find one single and common diagram, since the life cycle usually depends on the author. The following integrates the most usual ones:

Phase 1	Phase 2		Phase 3			Phase 4	Phase 5	Phase 6
Conceptual idea	Feasibility analysis		Design-planning			Execution	Use & maintenance	Demolition
	Technical feasibility	Financial feasibility	Technical specifications	Economic specifications	Contractual specifications			

The main reference to be applied is the current 'Código Técnico de Edificación' (Technical Code on Edification), which encompasses the set of main regulations applied to the construction industry in Spain, according to the Act 38/1999 on Ordenation of the Edification (LOE).

This document integrates the stages of *Project, Building, Maintenance and Conservation*. Its compliance is compulsory for all the new buildings, whereas for those needing to be modified or refurbished obligation depends on the nature of the intervention to be done.

➤ Role of the Public Administration in the BLC

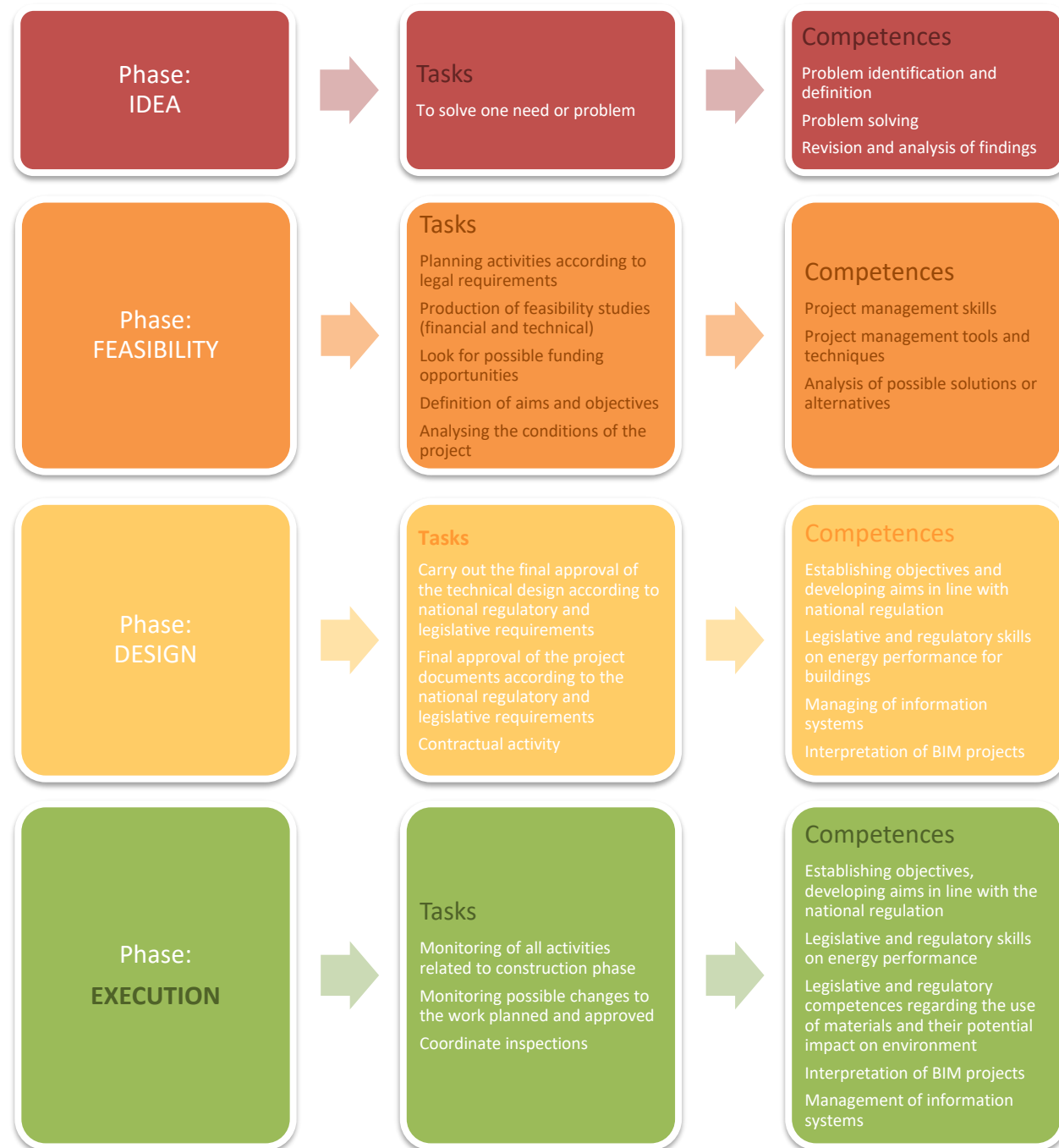
The Public Administration is the competent authority who makes the final approval and permission of the project design, in line with the regulations in force. They will deal with any of the aspects that a building project may affect: environment, occupational health and safety for workers, energy, waste, etc.

➤ Role of the Public Administration when focusing on energy aspects

Energy is one of the aspects that is being regulated. In Spain, the Energy Performance of Buildings Directive (EPBD) is transposed through different documents:

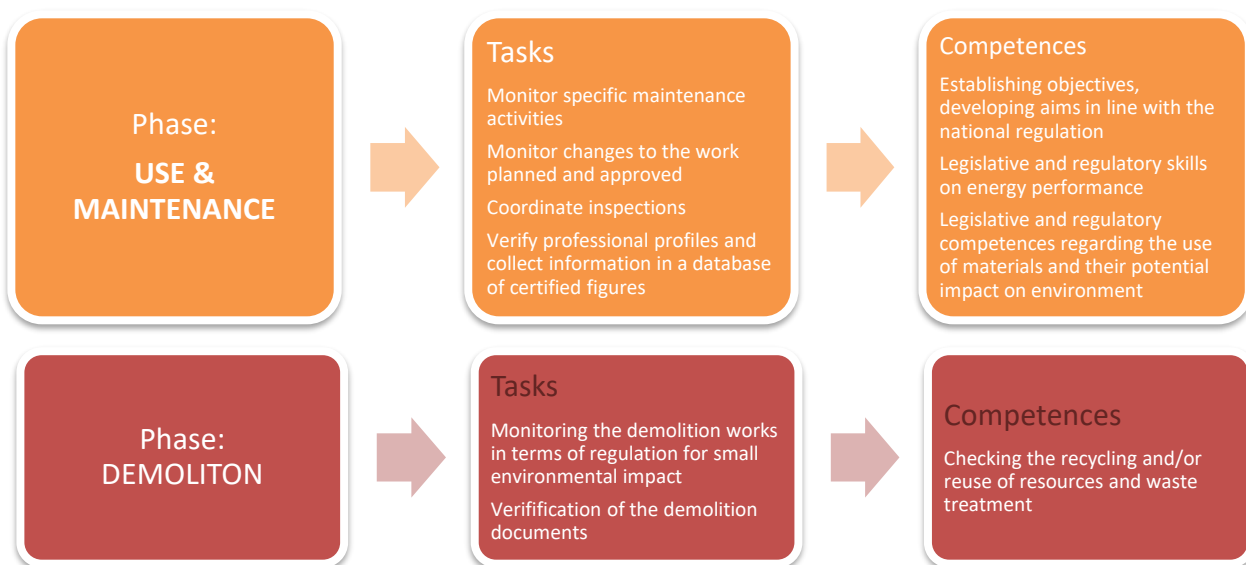
- Basic document on energy savings of the Technical Code on Edification;
- Regulation on Thermal Installation on Buildings;
- Sustainable Economy Act
- R.D. 235/2013 on Basic procedure for the certification of the energy efficiency of the buildings.

➤ **Tasks and Competencies of the Public Administration in the BLC**



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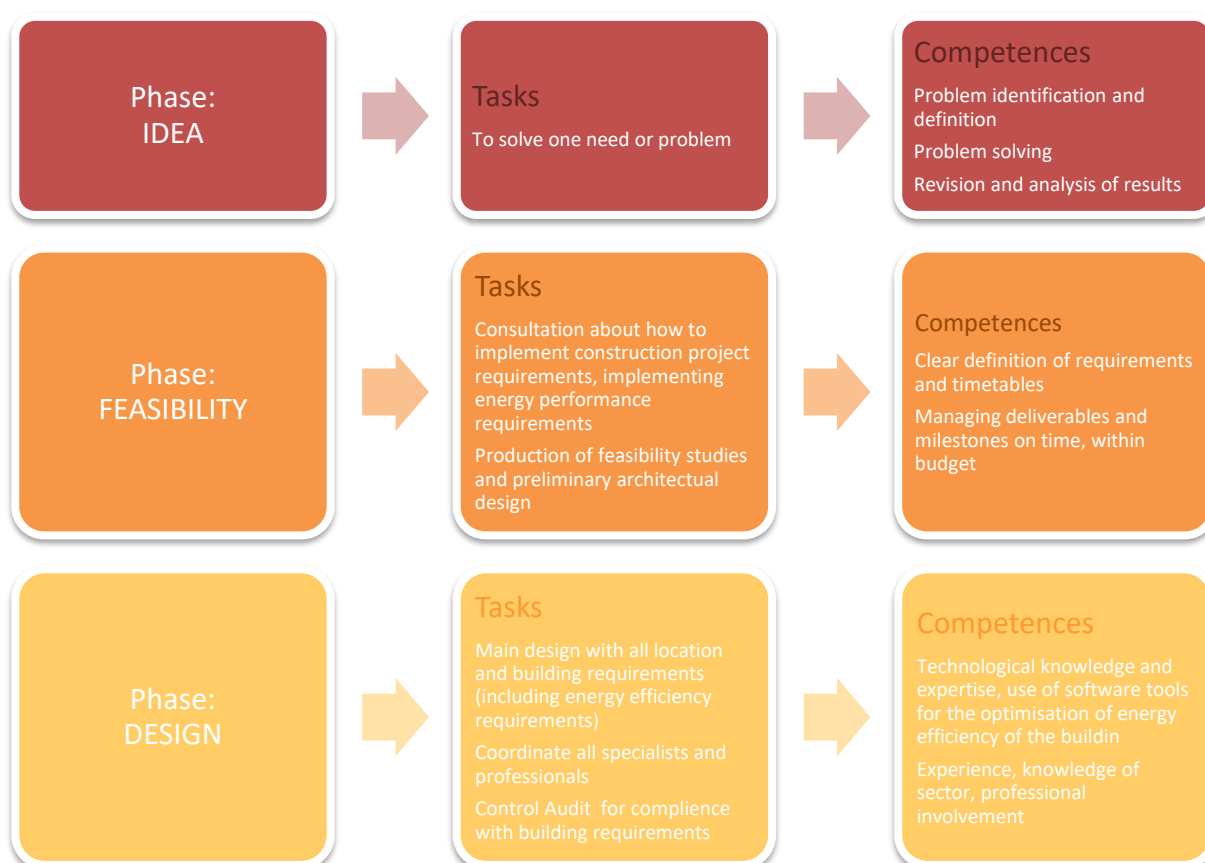
➤ Role of the Professionals in the BLC

In the first stages of the BLC, Architects, Engineers, Project Managers, Consultants, etc. are in charge of drafting the necessary documentation and analyzing all those needs and requirements by the competent authorities, customers, users, contractors, building managers/maintainers, and of designing according to these needs and requirements. Furthermore, they will need to test and carry out a monitoring of each activity performed by other workers, especially operators. After the construction works, these Professionals will be also in charge of the maintenance activities and will deal with refurbishment projects when necessary or even for demolition.

➤ Role of the Professionals when focusing on energy aspects

Professionals will act as consultants for all those topics related to energy efficiency for new buildings and as energy auditors for existing buildings.

Tasks and Competencies of the Professionals in the BLC





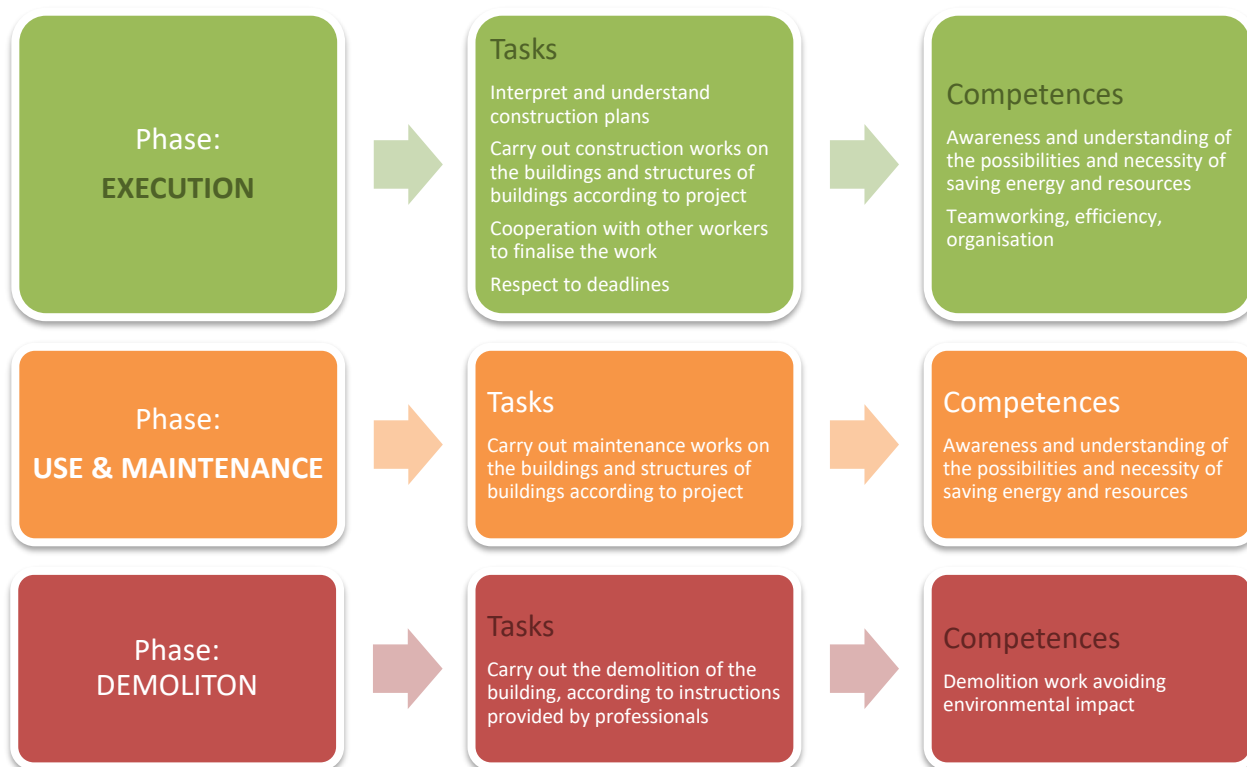
➤ Role of the Technicians in the BLC

In this Target Group are included suppliers of materials and components, blue-collar workers and operators, maintainers, installers and demolition companies, being responsible for the execution and delivery of final work.

➤ Role of the Technicians when focusing on energy aspects

The technicians work on the building thermal and RES envelope and for this reason they need a certain certification (gas installers, for instance). Certified construction workers and installers install systems related to energy efficiency.

➤ Tasks and Competencies of the Technicians in the BLC



➤ Role of the Tenants/Owners in the BLC

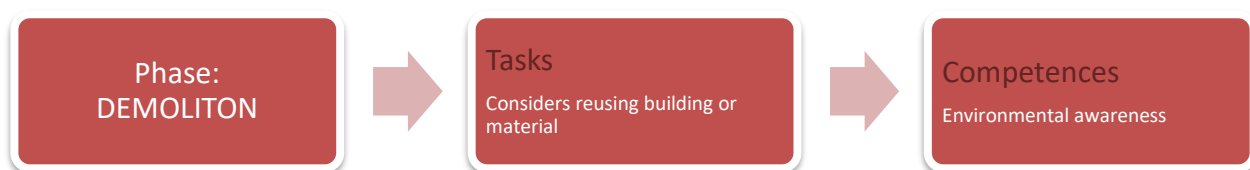
These are the persons who start the stages of the Building Life Cycle. They could be public entities or private parties.

➤ Role of the Tenants/Owners when focusing on energy aspects

Owners/Tenants will indicate what are the requirements of the new building in terms of energy aspects (energy efficiency, renewable energy systems...), always taking into account the budget and the legislation. They may subcontract different roles to ensure the compliance of the requirements. Also, they will use the building with the energy aspects in mind.

➤ Tasks and Competencies of the Tenants/Owners in the BLC





3.3 Slovak Situation

Contributed by	ViaEU - Slovakia UVS - Slovakia
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Contact	doktorfr@icloud.com kyrinovicova@uvs.sk
Source	Act on spatial planning and building codex (Building Act) No 50/1976 Coll. And all relevant amendments, Energy Efficiency Act No 321/2017 Coll. and their following regulations, Energy Performance of Buildings Act No 555/2005 Coll. and relevant amendments (last one in 2017, No 144/2017 Coll.), Construction project tasks and activities which are common practice

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➤ General overview of the Building Life Cycle

List of phases:

- Initiation
- Conceptual design/main design
- Build
- Exploitation/maintain/operate
- End of life/recycling/reuse

➤ Role of the Public Administration in the BLC

Initiation

- Enforces the acts / Representative of regulatory body (public authority)
- Set (some) physical area requirements for certain locations or physical areas in country / region / city

Conceptual design/main design

- Enforces the acts / Representative of regulatory body (public authority)
- Checks the compliance of the building design with the acts and regulations in force

Build

- Enforces the acts / Representative of regulatory body (public authority)
- Checks the compliance of the finished building with the design and acts and regulations in force.

Exploitation/maintain/operate

- Enforces the acts/ Representative of regulatory body (public authority)
- Checks the issuance and validity of Energy performance certificate and/or inspection reports on technical systems according to the acts and regulations in force. Checks the compliance of possible refurbishments with the acts and regulations in force. Regulates the ownership and other property rights.

End of life/recycling/reuse

- Enforces the acts / Representative of regulatory body (public authority)
- Checks the compliance of the deconstruction design with the acts and regulation in force. Checks the recycling and/or reuse of resources and waste treatment.

➤ **Role of the Public Administration when focusing on energy aspects**

Initiation

- Enforces the act / Representative of regulatory bodies (public authority, importance of authorities which defines energy efficiency requirements, shape and size of the building)
- Defining the possibilities and mandatory use of RES, defining the requirements for the use of different energy sources in future building.

Conceptual design/main design

- Enforces the act / Representative of regulatory bodies (public authority, importance of authorities which defines energy efficiency requirements)
- Checks the requirements regarding the energy efficiency of the design, compliance of the design (architectural, civil engineering, mechanical and electrical engineering, fire safety)

Build

- Enforces the act / Representative of regulatory bodies (public authority, importance of authorities which defines energy efficiency requirements). Decides on the possibility of connection to the grid of RES
- Checks the fulfillment of designed properties of buildings regarding the quality of conducted works and installed materials and systems regarding energy efficiency, i.e. building envelope airtightness requirements, etc.

Exploitation/maintain/operate

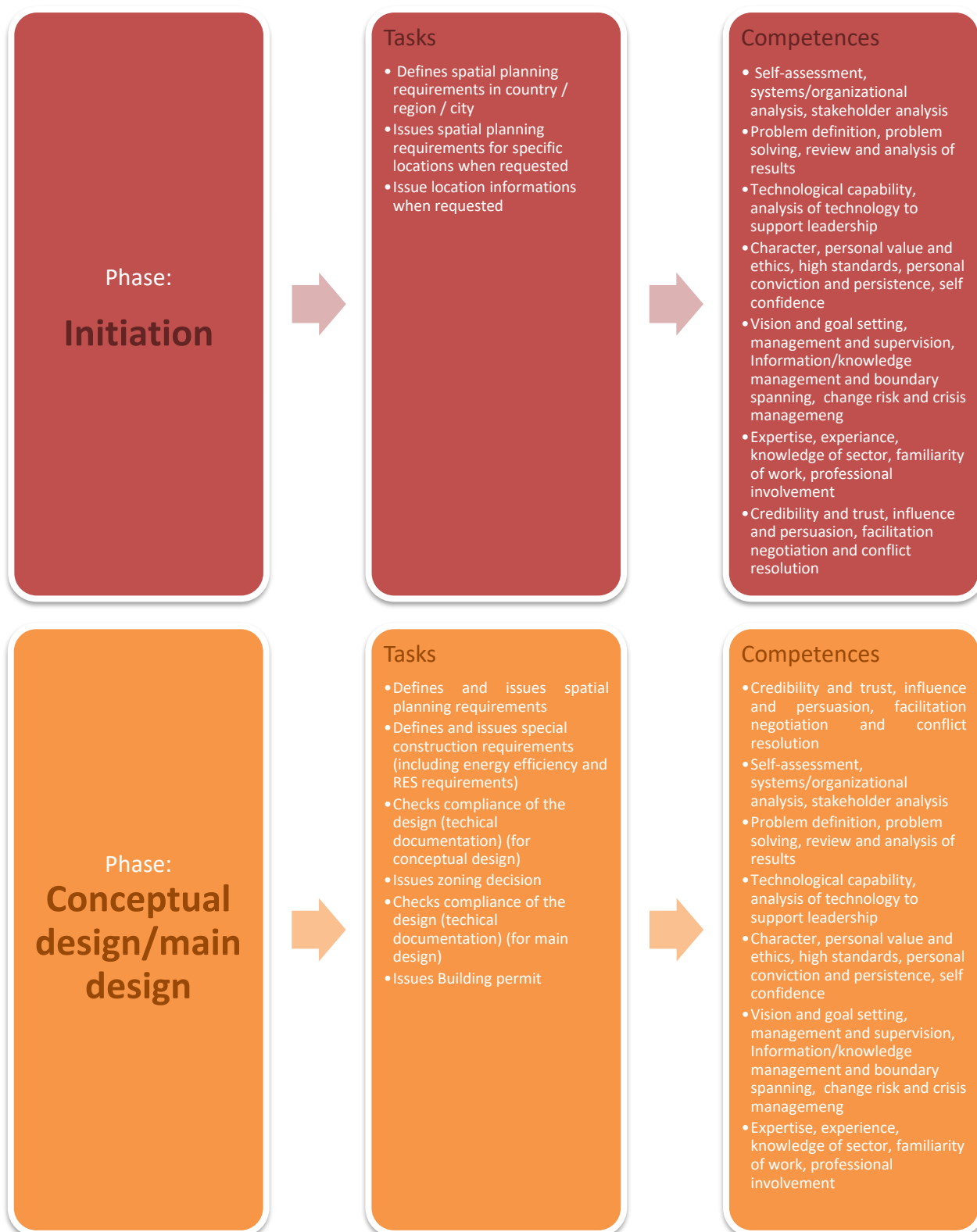
- Enforces the act / Representative of regulatory bodies (public authority, importance of authorities which defines energy efficiency requirements)
- Checks the issuance and validity of Energy performance certificate and/or inspection reports on technical systems according to the acts and regulations in force. Checks the compliance of possible refurbishments with the acts and regulations in force.

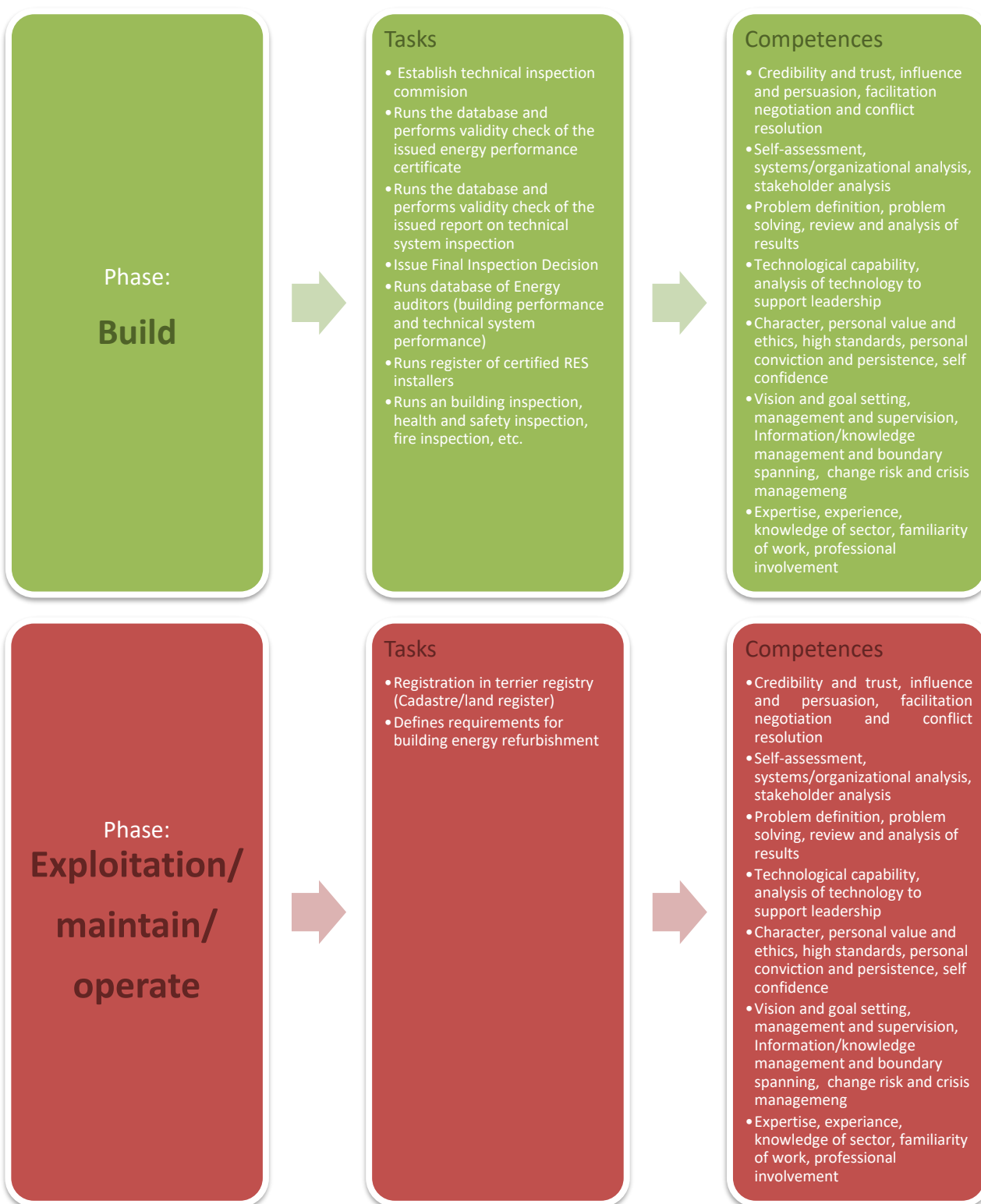
End of life/recycling/reuse

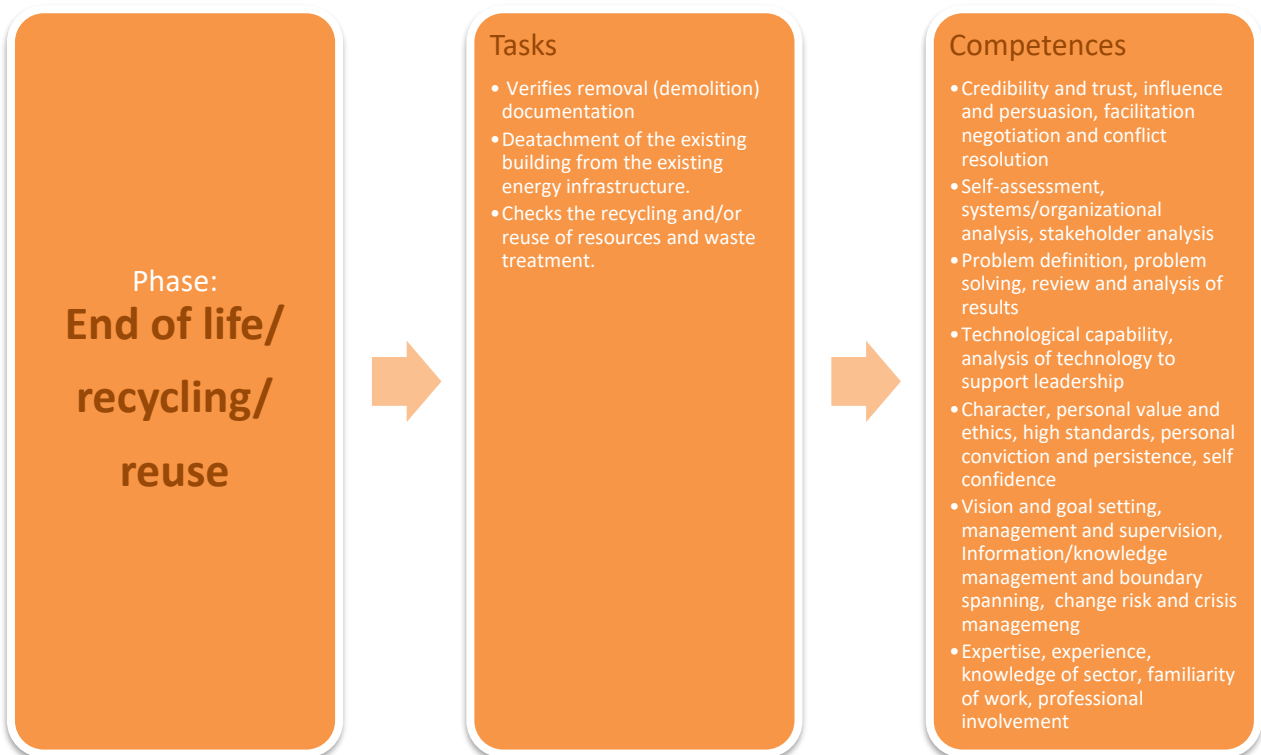
- Enforces the act / Representative of regulatory bodies (public authority, importance of authorities which defines energy efficiency requirements)
- Detachment of the existing building from the existing energy infrastructure. Checks the recycling and/or reuse of resources and waste treatment.

➤ **Tasks and Competencies of the Public Administration in the BLC**

Its tasks (and consequent competences) in the Building Life Cycle are:







➤ Role of the Professionals in the BLC

Initiation

- Consultant to Owner (Project manager or Consultant)
- In charge of production of design technical documentation (Architect - leading designer)

Conceptual design/main design

- In charge of production of design technical documentation / designs (Architect - leading designer)
- Auditor for design technical documentation

Build

- Supervisor on behalf of the Owner
- Building site manager, Energy Auditor

Exploitation/maintain/operate

- Performing maintenance works (Contractor, Craftsman), design and execution of energy refurbishment projects
- Energy Auditor

End of life/recycling/reuses

- Consultant to Owner
- In charge of production of technical documentation for demolition of existing building

➤ Role of the Professionals when focusing on energy aspects

Initiation

- Consultant to Owner regarding the issues related to energy efficiency (Project manager or consultant). Consultant regarding energy refurbishment.
- In charge of production of design technical documentation (Architect or Civil engineer - leading designer)

Conceptual design/main design

- In charge of production of some project technical documentation / designs (Architect - leading designer, architectural design, energy efficiency and building physics, mechanical engineering design, electrical engineering design, fire protection design)
- Auditor of the technical documentation

Build

- Supervisor (Main supervisor and supervisors for specific integral parts of construction works. Building site manager. Performs all prescribed (necessary test) on the finished building, i.e. blower door, thermography, etc.
- Energy Auditor for new build

Exploitation/maintain/operate

- Performing maintenance works on building envelope and technical systems (Contractor, Craftsman). Design and execution of energy refurbishment projects
- Energy Auditor for existing building

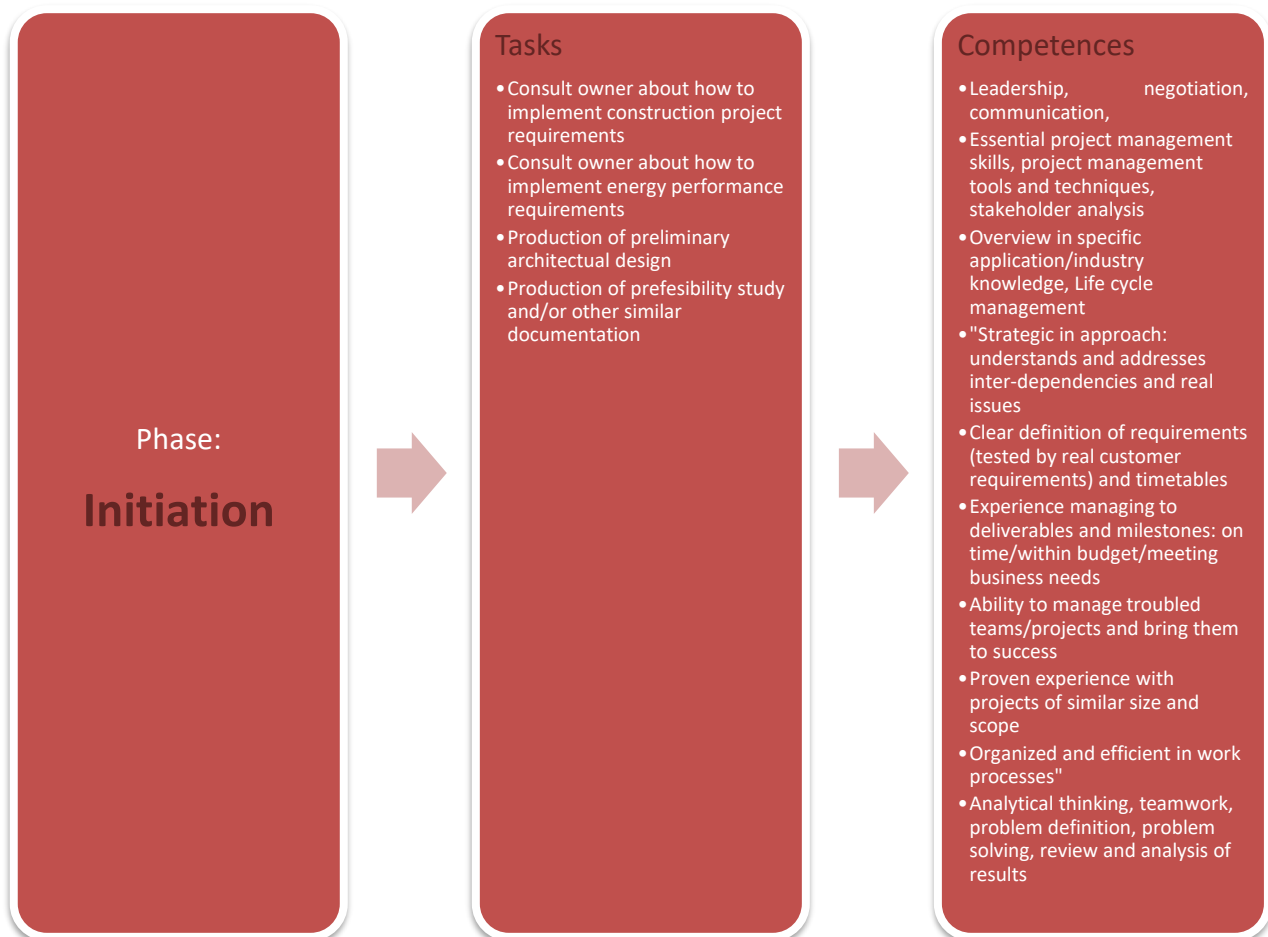
End of life/recycling/reuses

- Consultant to Owner
- In charge of production of technical documentation

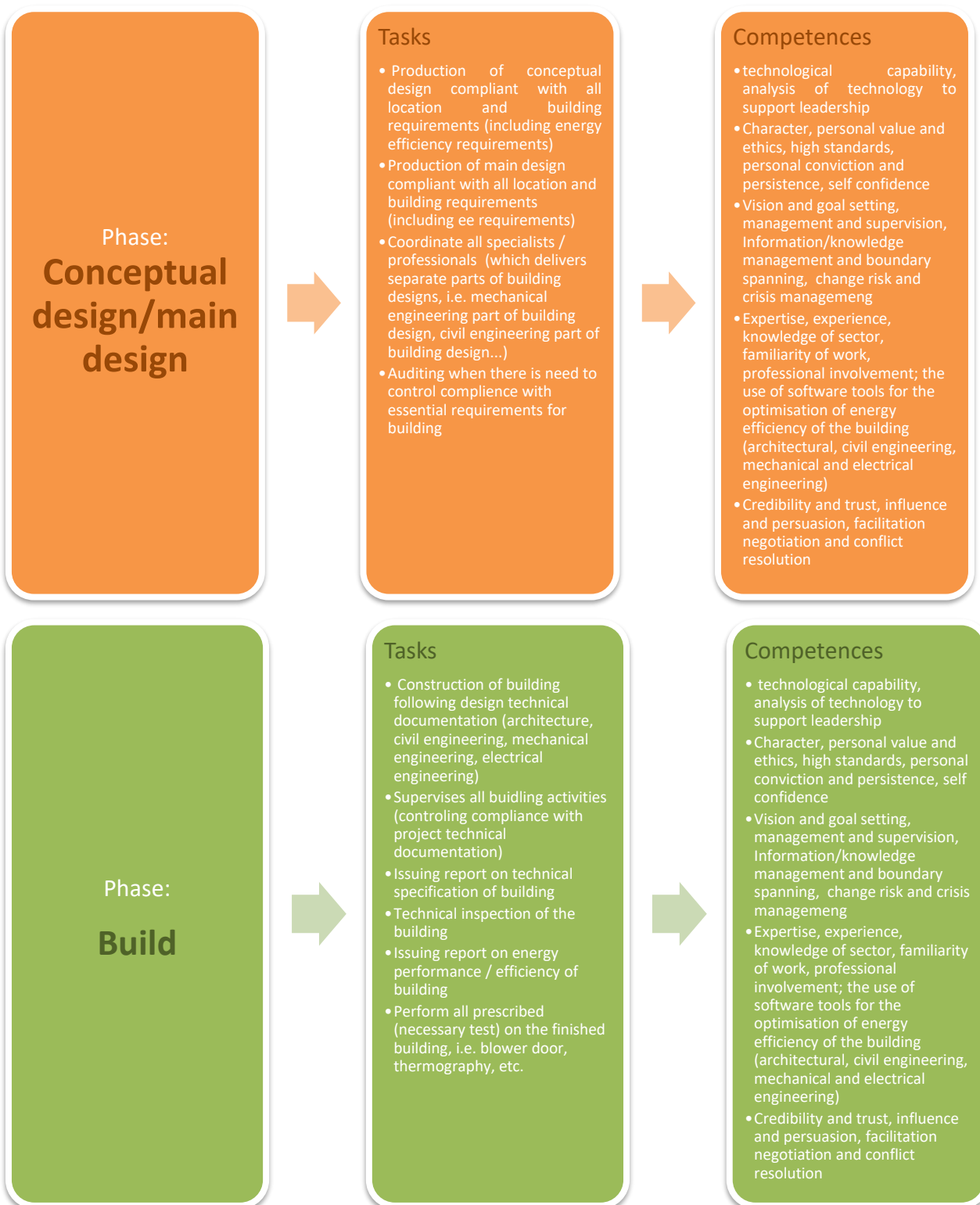
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➤ Tasks and Competencies of the Professionals in the BLC

Its tasks (and consequent competences) in the Building Life Cycle are:



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Phase:
**Exploitation/
maintain/
operate**

Tasks

- Leading maintenance works if requested on the building thermal envelope and technical systems
- Leading construction works if requested on the building thermal envelope and technical systems
- Design and execution of energy refurbishment projects
- Energy Audits

Competences

- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- Vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement; the use of software tools for the optimisation of energy efficiency of the building (architectural, civil engineering, mechanical and electrical engineering)
- Credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

Phase:
**End of life/
recycling/
reuse**

Tasks

- Removal / demolition design
- Lead construction works on building removal or building reuse
- Consulting owner and professionals about possibilities of building reuse

Competences

- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- Vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement; the use of software tools for the optimisation of energy efficiency of the building (architectural, civil engineering, mechanical and electrical engineering)
- Credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

➤ **Role of the Technicians in the BLC**

Build

- Craftsmen, on-site workers and installers (HVAC, RES, TEE)
- Installing materials and systems on the building envelope, HVAC, automation and control, lighting as well as RES.

Exploitation/maintain/operate

- Craftsmen, on-site workers and installers (HVAC, RES, TEE)
- Maintaining and installing materials and systems on the building envelope, HVAC, automation and control, lighting as well as RES.

End of life/recycling/reuse

- Craftsmen, on-site workers and installers (HVAC, RES, TEE)

➤ **Role of the Technicians when focusing on energy aspects**

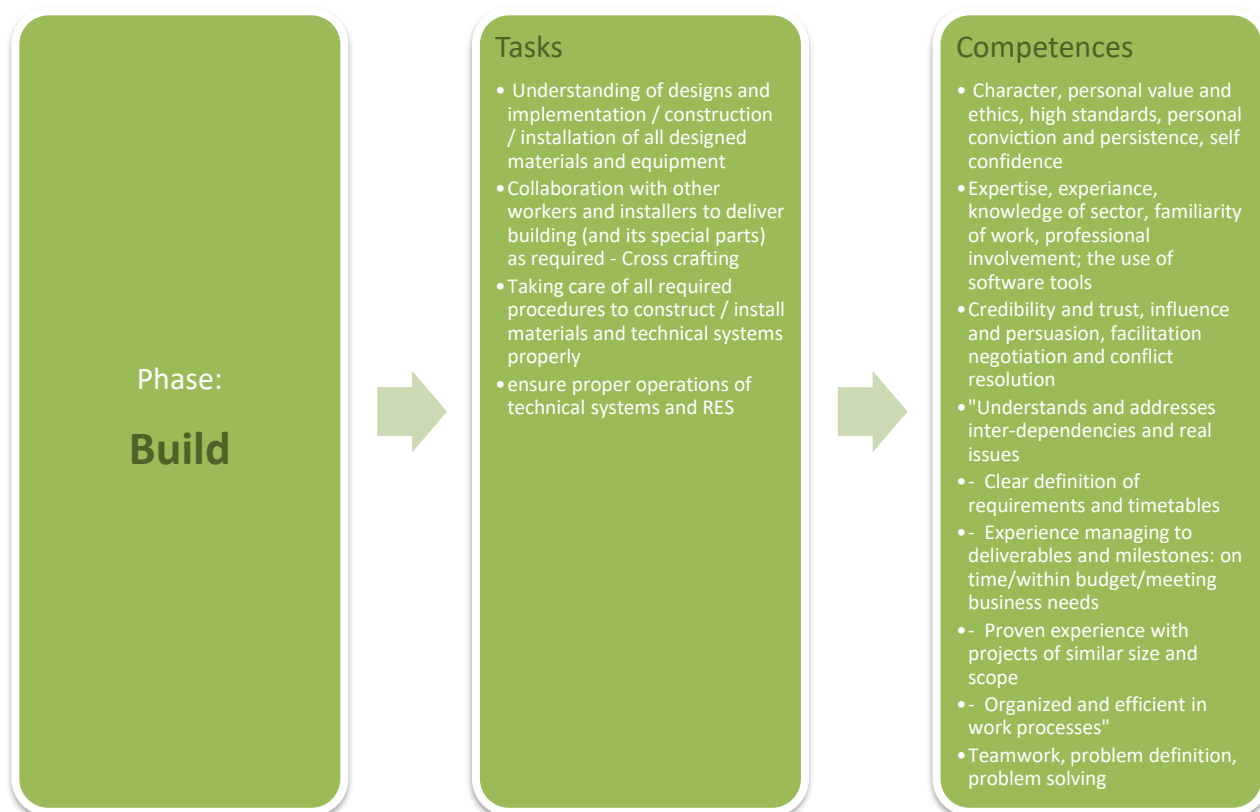
Build

- Work on the building thermal envelope and install HVAC systems, automation and control as well as lighting, RES, etc.
- Certified RES installers (mandatory from the implementation of nZEB). Certified construction workers which install systems related to energy efficiency. Certified installers of gas burners.

Exploitation/maintain/operate

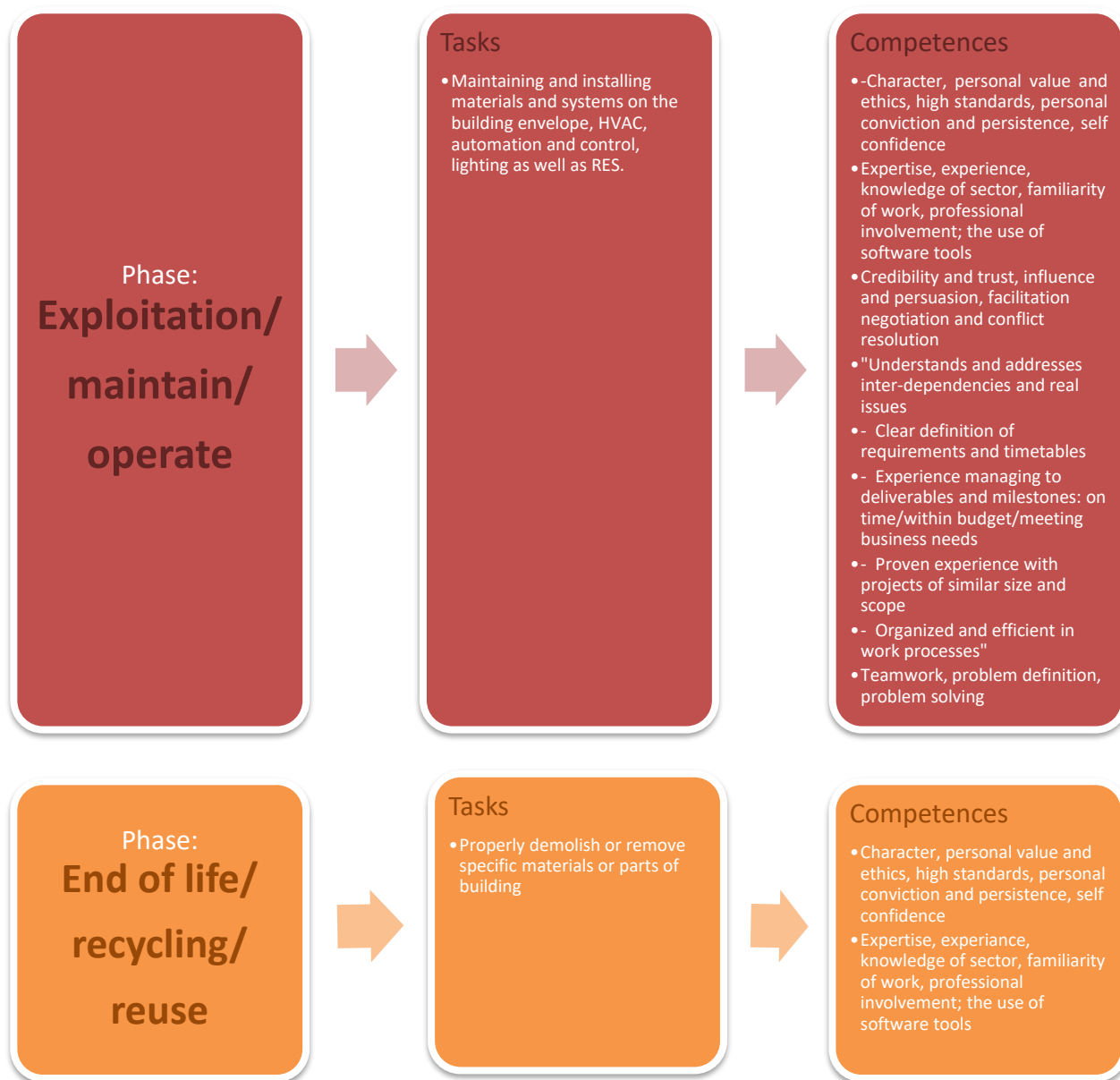
- Maintain the building thermal envelope, and HVAC and automation systems and lighting as well as installation of new systems, RES, etc.
- Certified RES installers (mandatory from the implementation of nZEB). Certified construction workers which install systems related to energy efficiency. Certified installers of gas burners.

➤ **Tasks and Competencies of the Technicians in the BLC**



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D11 – D2.2 Report on roles of Target Groups in the Building Life Cycle and their role in NZEB implementation



➤ Role of the Tenants/Owners in the BLC

Initiation

- Owner - initiator and investor, taking all needed actions to start with the project

Conceptual design/main design

- Owner - initiator and investor, taking all needed actions to start with the design

Build

- Owner - initiator and investor, taking all needed actions to start with the construction

Exploitation/maintain/operate

- Owner / Tenant / User / Building administrator
- Maintenance of the building

End of life/ recycling/reuse

- Owner / Tenant / User / Building administrator

➤ Role of the Tenants/Owners when focusing on energy aspects

Initiation

- Setting project requirements and a wishlist regarding energy efficiency and RES

Conceptual design/main design

- Decision on the project budget, and the direction of the design (RES, nZEB, sustainable materials, etc.)
- List of requirements regarding the shape and size of the building, definition of spaces, orientations etc.

Build

- Supervisor in the name of investor checks the compliance of the works with the design and legislation in force

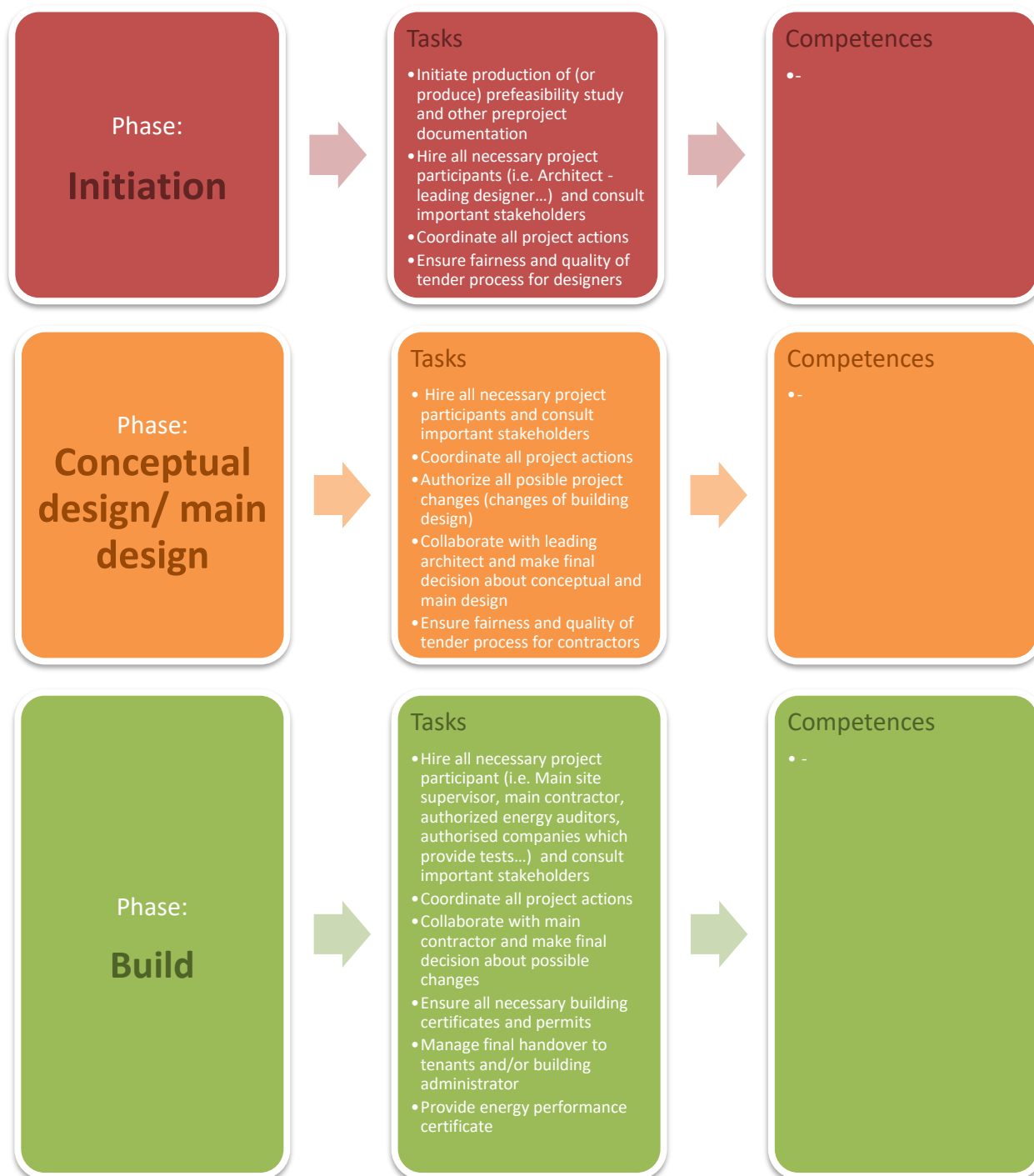
Exploitation/maintain/operate

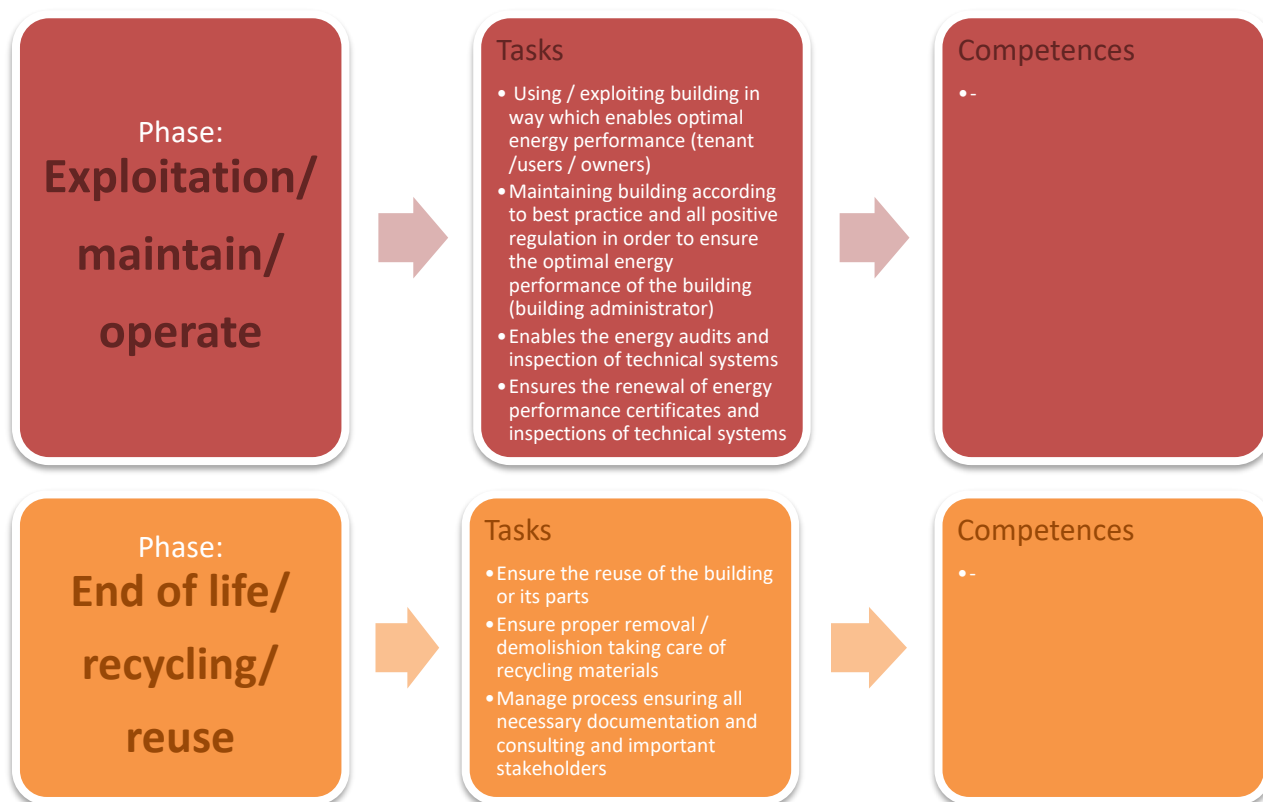
- Owner / Tenant / user / Building administrator. Enable the energy refurbishment process of existing buildings, and installation of RES
- Enable the renewal of energy performance certificate and inspection of technical systems, maintenance of the building and ensuring the safe operation of technical systems

End of life/ recycling/reuse

- Owner / Tenant / User / Building administrator

➤ **Tasks and Competencies of the Tenants/Owners in the BLC**





3.4 Lithuanian Situation

Contributed by	Lithuania
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Sources	<ul style="list-style-type: none"> • Construction Act • Technical regulation of construction STR 1.12.06:2002. • Technical regulation of construction STR 1.04.04:2017. • Technical regulation of construction STR 2.01.02:2016. • Technical regulation of construction STR 1.06.01:2016. • Statybos projekto etapai ir BIM taikymo būdai. VŠĮ "Skaitmeninė statyba. Prieiga per internetą: www.skaitmeninestatyba.lt • Aušrinė Verbylaitė. ANALYSIS OF BIM MODEL USES THROUGH BUILDING LIFECYCLE STAGES FOR EMPLOYER'S INFORMATION REQUIREMENTS. Master thesis, 2017.

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➤ General overview of the Building Life Cycle

In Lithuania, there are five main legal acts in which the phases of the Building Life Cycle are mentioned:

1. Construction Act (Lietuvos Respublikos Statybos įstatymas, Žin. 1996, Nr. 32-788, i. k. 09610101STA00I-1240)
2. Technical regulation of construction STR 1.12.06:2002 "STATINIO NAUDOJIMO PASKIRTIS IR GYVAVIMO TRUKMĖ" (*Building operation purpose and lifetime*)
3. STR 1.04.04:2017 „Statinio projektavimas, projekto ekspertizė“ (*Building design. Expertize of the design*)
4. STR 2.01.02:2016 "Pastatų energinio naudingumo projektavimas ir sertifikavimas" (*Design and certification of energy performance of buildings*)
5. Technical regulation of construction STR 1.06.01:2016 „STATYBOS DARBAI. STATINIO STATYBOS PRIEŽIŪRA“ (*Construction works. Supervision of construction*)

Different activities on building life cycle, the participants, their roles and obligations regulated by 64 technical regulations of construction. For full list of technical regulations see <http://www.am.lt/VI/index.php#a/16982>.



Currently Building Life Cycle divided to 4 stages: 1. **Planning**; 2. **Design**; 3. **Construction** and 4. **Building Operation**.

Currently, the system is being reorganized to include BIM processes, so the current situation and proposed changes are presented.

Lithuania for BIM projects uses 7 stages approach developed by RIBA adopted to Lithuanian national needs (developed by Public institution "Skaitmenine statyba" ("Digital Construction")):

S0	S1	S2	S3	S4	S5	S6	S7
Feasibility Study	Project program	Concept project	Technical project	Detail project	Construction	Construction closure	Use and maintenance

Original documents presented for market could be found:

<http://skaitmeninestatyba.lt/bim-dokumentai/246-statybos-projekto-etapai-ir-stadijos-suderintos-su-bim-metodologija>

http://skaitmeninestatyba.lt/files/Dokumentai/STATYBOS_PROJEKTO_ETAPAI_IR_STADIJOS.pdf

Considering mentioned main five decrees and rebuilding of system, seven phases are individuated (S0 – S7). Within phases S0 – S7 the sub phases presented using conditional coding (UC – use cases, D – deliverables).

Explanation of colors used in figures and text to mark the changes planned (**red**), existing processes incorporated in new formed BIM processes (**black**), and optional recommended use cases (**grey**).

Phases	S0. Feasibility	
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments

The phase **S0** is the part of **Planning stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;
- UC1. D1.2. Planning of investments.

Phases	S1. Project Program						
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modeling of existing conditions	UC3. D3.1. Planning of the project phases	UC4. D4.1. Site analysis	UC5. D5.1. Functional, volumetric, and area analysis	UC6. D6.1. Visualization and review of alternative solutions

Phase **S1** is the part of **Planning stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;
- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC4. D4.1. Site analysis.
- UC5. D5.1. Functional, volumetric, and area analysis.

- UC6. D6.1. Visualization and review of alternative solutions.

Phases	S2. Conceptual Design											
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modeling of existing conditions	UC3. D3.1. Planning of the project phases	UC4. D4.1. Site analysis	UC5. D5.1. Functional, volumetric, and area analysis	UC6. D6.1. Visualization and review of alternative solutions	UC7. D7.1. Design / Modelling	UC8. D8.1. Engineering calculations and analysis	UC10. D10.1. Sustainability assessment	UC11. D11.1. Structural analysis and design	UC13. D13.1. Engineering system analysis

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Phase **S2** is the part of **Design stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;
- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC4. D4.1. Site analysis.
- UC5. D5.1. Functional, volumetric, and area analysis.
- UC6. D6.1. Visualization and review of alternative solutions.
- UC7. D7.1. Design / Modelling.
- UC8. D8.1. Engineering calculations and analysis.
- UC9. D9.1. Energy analysis (Optional).
- UC10. D10.1. Sustainability assessment.
- UC11. D11.1. Structural analysis and design.
- UC12. D12.1. Lighting Analysis (Optional).
- UC13. D13.1. Engineering system analysis.
- UC14. D14.1. Other cases of analysis (Optional).
- UC15. D15.1. Conformity assessment / project expertise (Optional).

UC9. D9.1., UC12. D12.1., UC14. D14.1., UC15. D15.1. – other recommended use cases (optional).

Phases	S3. Technical Design											
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modelling of existing conditions	UC3. D3.1. Planning of the project phases	UC4. D4.1. Site analysis	UC6. D6.1. Visualization and review of alternative solutions	UC7. D7.1. Design / Modelling	UC8. D8.1. Engineering calculations and analysis	UC10. D10.1. Sustainability assessment	UC11. D11.1. Structural analysis and design	UC13. D13.1. Engineering systems analysis	UC16. D16.1. 3D coordination

Phase **S3** is the part of **Design stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;

D11 – D2.2 Report on roles of Target Groups in the Building Life Cycle and their role in NZEB implementation

- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC4. D4.1. Site analysis.
- UC6. D6.1. Visualization and review of alternative solutions.
- UC7. D7.1. Design / Modelling.
- UC8. D8.1. Engineering calculations and analysis.
- UC9. D9.1. Energy analysis (Optional).
- UC10. D10.1. Sustainability assessment.
- UC11. D11.1. Structural analysis and design.
- UC12. D12.1. Lighting Analysis (Optional).
- UC13. D13.1. Engineering system analysis.
- UC14. D14.1. Other cases of analysis (Optional).
- UC15. D15.1. Conformity assessment / project expertise (Optional).
- UC16. D16.1. 3D coordination.

UC9. D9.1., UC12. D12.1., UC14. D14.1., UC15. D15.1. – other recommended use cases (optional).

Phases	S4. Detailed Design											
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modelling of existing conditions	UC3. D3.1. Planning of the project phases	UC6. D6.1. Visualization and review of alternative solutions	UC7. D7.1. Design / Modelling	UC8. D8.1. Engineering calculations and analysis	UC10. D10.1. Sustainability assessment	UC11. D11.1. Structural analysis and design	UC13. D13.1. Engineering systems analysis	UC16. D16.1. 3D coordination	UC17. D17.1. Building site planning (site masterplan)

Phase **S4** is the part of **Design stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;
- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC6. D6.1. Visualization and review of alternative solutions.
- UC7. D7.1. Design / Modelling.
- UC8. D8.1. Engineering calculations and analysis.
- UC9. D9.1. Energy analysis (Optional).
- UC10. D10.1. Sustainability assessment.
- UC11. D11.1. Structural analysis and design.
- UC12. D12.1. Lighting Analysis (Optional).
- UC13. D13.1. Engineering system analysis.
- UC14. D14.1. Other cases of analysis (Optional).

- UC15. D15.1. Conformity assessment / project expertise (Optional).
- UC16. D16.1. 3D coordination.
- UC17. D17.1. Building site planning (site masterplan).
- UC18. D18.1. Planning of health and safety measures.
- UC19. D19.1. Structural-technological analysis.
- UC20. D20.1. Simulation of construction technologies (technological schemes) and installation simulation.

UC9. D9.1., UC12. D12.1., UC14. D14.1., UC15. D15.1., UC18. D18.1., UC19. D19.1., UC20. D20.1. – other recommended use cases (optional).

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Phases	S5. Construction									
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modelling of existing conditions	UC3. D3.1. Planning of the project phases	UC16. D16.1. 3D coordination	UC17. D17.1. Building site planning (site masterplan)	UC21. D21.1. Construction logistics planning	UC22. D22.1. Modelling and management of construction processes	UC24. D24.1. Technical surveillance of construction works	UC25. D25.1. As-built model

Phase **S5** is the part of **Construction stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study.
- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC15. D15.1. Conformity assessment / project expertise (Optional)
- UC16. D16.1. 3D coordination.
- UC17. D17.1. Building site planning (site masterplan).
- UC18. D18.1. Planning of health and safety measures.
- UC19. D19.1. Structural-technological analysis.
- UC20. D20.1. Simulation of construction technologies (technological schemes) and installation simulation.
- UC21. D21.1. Construction logistics planning.
- UC22. D22.1. Modelling and management of construction processes.
- UC23. D23.1. Digital manufacturing.
- UC24. D24.1. Technical surveillance of construction works.
- UC25. D25.1. As-built model.

UC15. D15.1., UC18. D18.1., UC19. D19.1., UC20. D20.1., UC23. D23.1. – other recommended use cases (optional).

Phases	S6. Construction completion									
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modelling of existing conditions	UC3. D3.1. Planning of the project phases	UC17. D17.1. Building site planning (site masterplan)	UC21. D21.1. Construction logistics planning	UC22. D22.1. Modelling and management of construction processes	UC24. D24.1. Technical surveillance of construction works	UC25. D25.1. As-built model	UC26. D26.1. Data model

Phase **S6** is the part of **Construction stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study;
- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC17. D17.1. Building site planning (site masterplan)/
- UC18. D18.1. Planning of health and safety measures.
- UC19. D19.1. Structural-technological analysis.
- UC20. D20.1. Simulation of construction technologies (technological schemes) and installation simulation.
- UC21. D21.1. Construction logistics planning.
- UC22. D22.1. Modelling and management of construction processes.
- UC23. D23.1. Digital manufacturing.
- UC24. D24.1. Technical surveillance of construction works.
- UC25. D25.1. As-built model.
- UC26. D26.1. Data model.

UC18. D18.1., UC19. D19.1., UC20. D20.1., UC23. D23.1. – other recommended use cases (optional).

Phases	S7. Operation and Maintenance									
Sub Phases	UC1. D1.1. Technical and economic feasibility study	UC1. D1.2. Planning of investments	UC2. D2.1. Modelling of existing conditions	UC3. D3.1. Planning of the project phases	UC26. D26.1. Data model	UC27. D27.1. Planning of building maintenance	UC30. D30.1. Asset management			

Phase **S7** is the part of **Building Operation stage** and includes following sub phases:

- UC1. D1.1. Technical and economic feasibility study.

- UC1. D1.2. Planning of investments.
- UC2. D2.1. Modelling of existing conditions.
- UC3. D3.1. Planning of the project phases.
- UC26. D26.1. Data model.
- UC27. D27.1. Planning of building maintenance.
- UC28. D28.1. Building (engineering) systems analysis.
- UC29. D29.1. Energy analysis.
- UC30. D30.1. Asset management.
- UC31. D31.1. Space Management and Monitoring.
- UC32. D32.1. Sustainability monitoring and analysis.
- UC33. D33.1. Accident Prevention.

UC28. D28.1., UC29. D29.1., UC31. D31.1., UC32. D32.1., UC33. D33.1. – other recommended use cases (optional).

➤ Role of the Public Administration in the BLC

Lithuania:

Public administration institutions carry out public management related to the construction sector at all stages of the building life cycle.

State Territorial Planning and Construction Inspectorate under the Ministry of Environment of the Republic of Lithuania participates in the forming of the policy on the state supervision of territorial planning and construction as well as the use of the buildings, controls and coordinates its implementation:

- carries out state supervision of territorial planning and controls the projecting of the buildings;
- carries out and coordinates state supervision of construction;
- methodically manages public administration entities carrying out the supervision of the use of buildings;
- verify the legality of the construction permit;
- verifies the compliance of the actions of construction actors with the requirements of the legal acts regulating construction;
- verifies the legality of the execution of the construction;
- verifies the construction completion procedures;
- carries out buildings accident investigation;
- performs mandatory instructions to provide the necessary information, documents, and to eliminate the violations of the provision established during the inspections;
- carries out supervision of compliance with the terms of issuance of admissions and special architecture requirements, special requirements for heritage protection and special protected area management, verifies the legality of the conditions of admission and/or special requirements issued;
- examines personal requests, complaints or reports related to the construction process;
- provides counselling and methodological assistance;
- carries out other preventive actions aimed at reducing the number of violations;
- carries out other actions related to the state supervision of construction.

Municipal administrations:

- controls compliance with the protection requirements of all objects including architectural and cultural monuments during construction, development and reconstruction,

- Issues specific architectural requirements, construction permits,
- carries out the supervision of the use of structures,
- performs other functions of construction management.

State Enterprise „Turto bankas“ (Asset Bank):

- implementation of centralised management of the state-owned real estate,
- organisation of privatisation of shares belonging to the State and municipalities by the right of ownership,
- management, use and disposal of the state-owned real estate transferred under the right of trust,
- organisation of public auctions of redundant state-owned property,
- administration of the unified state-owned assets informative online search system,
- other functions delegated to the enterprise under the efficient legal acts.

Other organizations act as public authorities in the life-cycle of a building:

- National Center for Public Health at the Ministry of Health of The Republic of Lithuania,
- State Labor Inspectorate of the Republic of Lithuania,
- Department of Disabled Affairs under the Ministry of Social Security and Labor,
- Fire and Rescue Department under the Ministry of the Interior of the Republic of Lithuania.

At the pre-design stage, the special requirements for design are issued by (Section 24 (3) of the Construction Act):

- Special requirements for architecture - Administration of Municipality.
- Special requirements for protection and management of protected area - Directorate of Protected Territory.
- Special requirements for Heritage protection - Department of Cultural Heritage under the Ministry of Culture.

At the stage of building design special state authorities in accordance with their competence, set specific requirements for building design and (or) check building projects.

At the construction phase the special state authorities in accordance with the competence verify the construction process and (or) participate in the verification of the completed structure (involved in the procedures of the completion).

At the stage of use, special public administration authorities in scope of their competence carry out supervision of the building use and maintenance.

At the stage of use, public authorities also participate as public building owners, respectively, in the use and maintenance functions.

Legislation authorizes other institutions to participate in public administration of the construction.

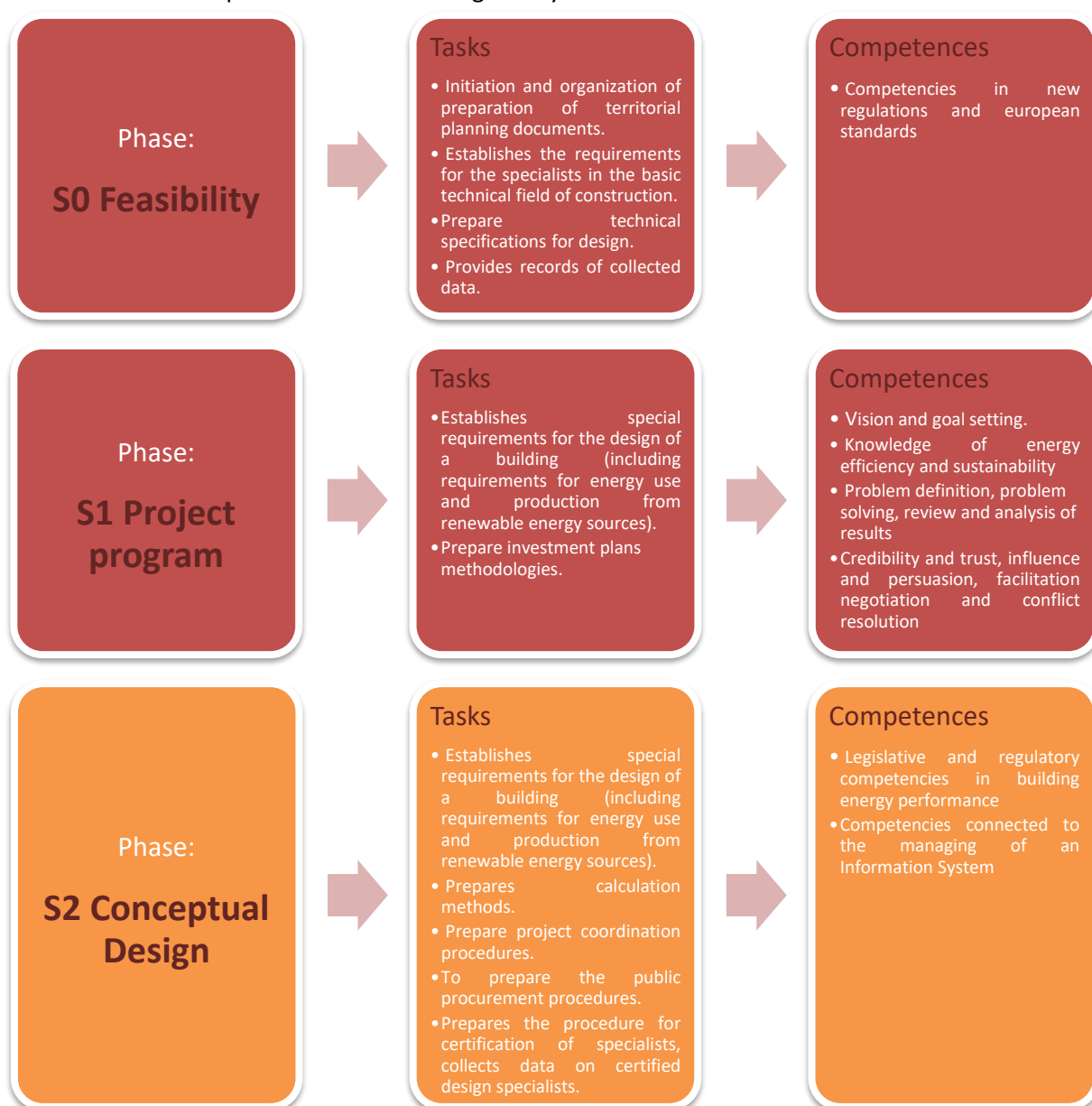
Provisions of the National Land Service under the Ministry of Agriculture, 7.19 p. provides that the National Land Service under the Ministry of Agriculture issues certificates of competence for the preparation of land management planning documents, certificates of geodesist, surveyor qualifications, suspends or revokes them.

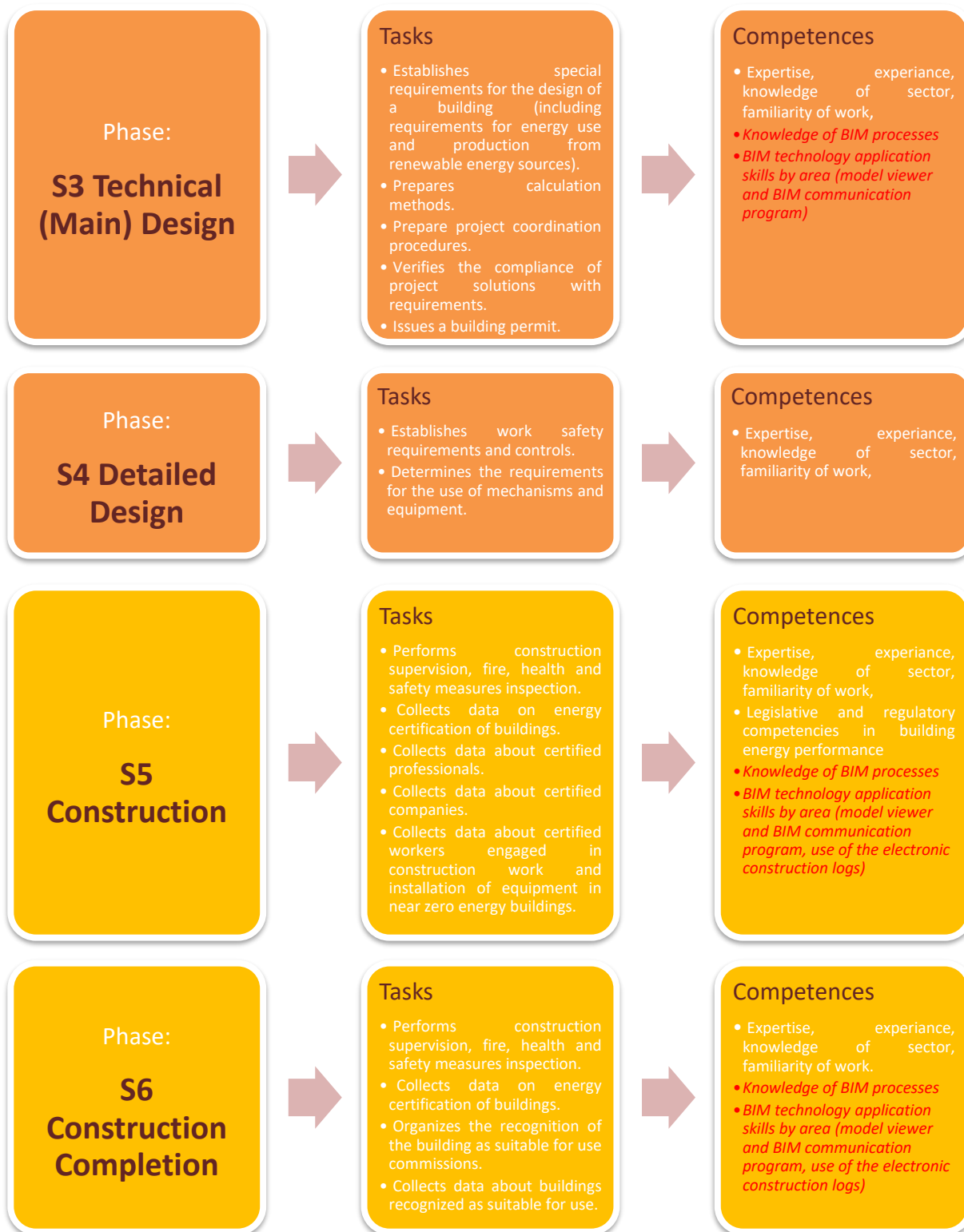
➤ Role of the Public Administration when focusing on energy aspects

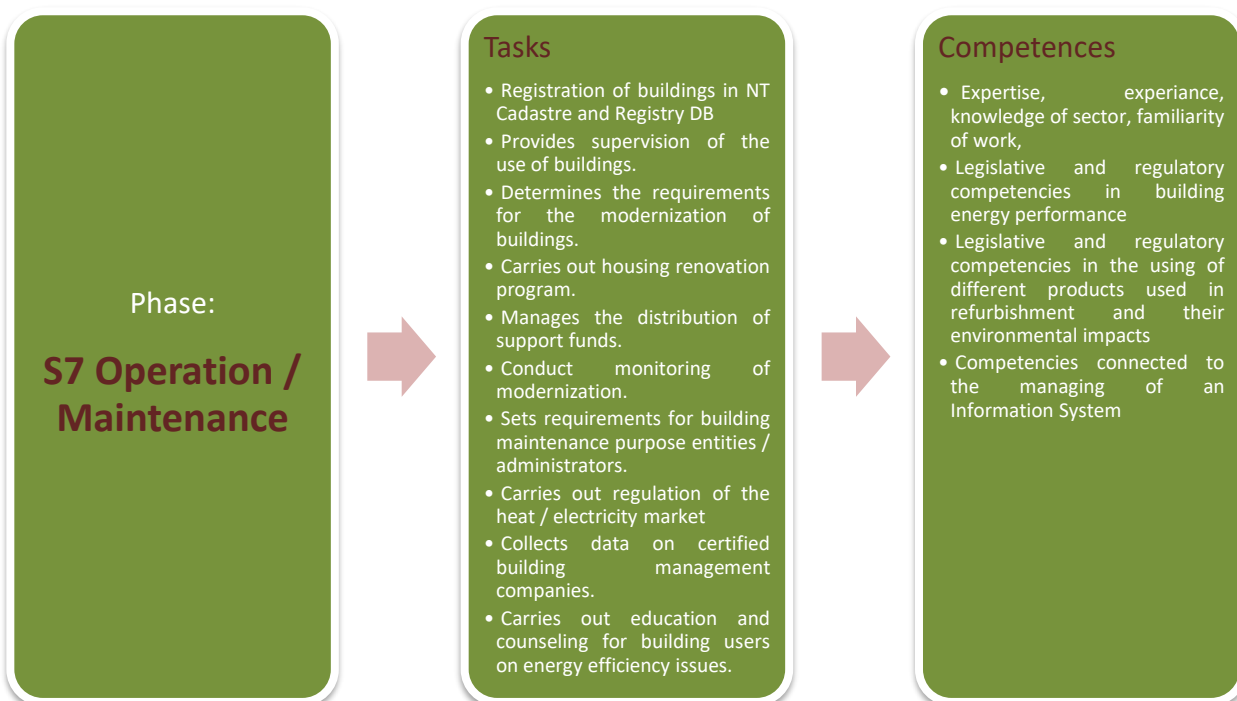
Lithuania: Focusing on the energy aspects, the Public Administration sets national regulatory requirements in the field of energy performance for construction process and construction participants. The defining of requirements includes the use of different energy sources and the possibility to use RESs for NZEB construction. In addition, the Public Administration checks the issuance and the validity of energy performances' certificates.

➤ Tasks and Competencies of the Public Administration in the BLC

Its tasks and competences in the Building Life Cycle are:







➤ Role of the Professionals in the BLC

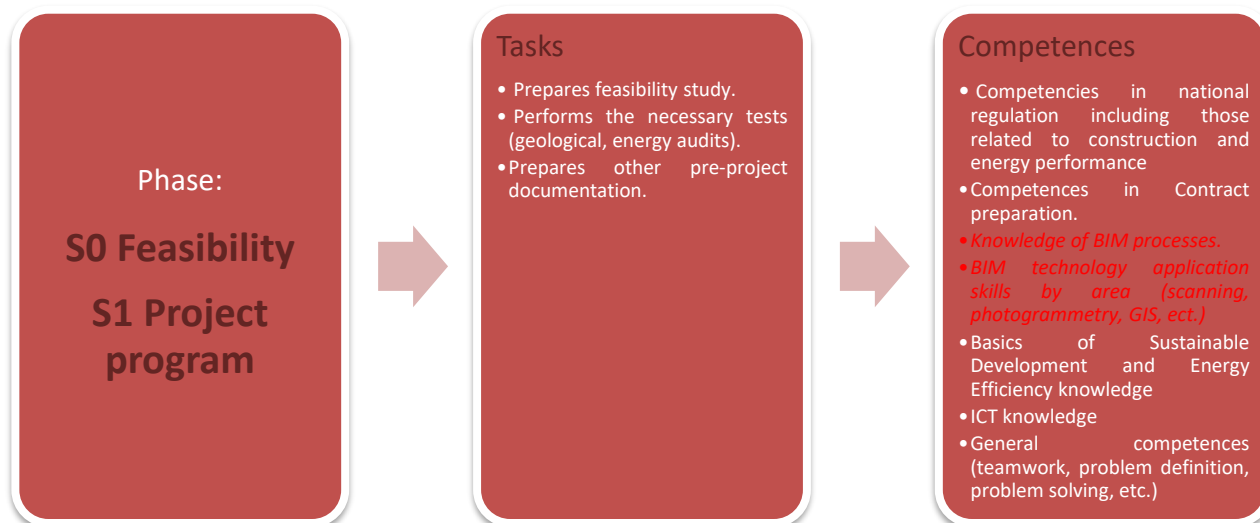
Lithuania: The target group of Professionals includes Architects, MEP Designers, Structural Designers, Project Managers, Construction Site Managers, Construction Technical Supervisors, Surveyors, Facility Managers, BIM Coordinators*, BIM Managers*, other Specialists, and Experts. This target group is active and have important roles on all stages of Building Life Cycle. They are consultants of Owners (Technical Supervisors, Energy Auditors, Experts), in charge of production of design documentation (Architects, MEP Designers, Structural Designers), main supervisors and supervisors for specific integral parts of construction works (Construction Site Managers), perform maintenance works (Facility Managers, Building Administrators), etc.

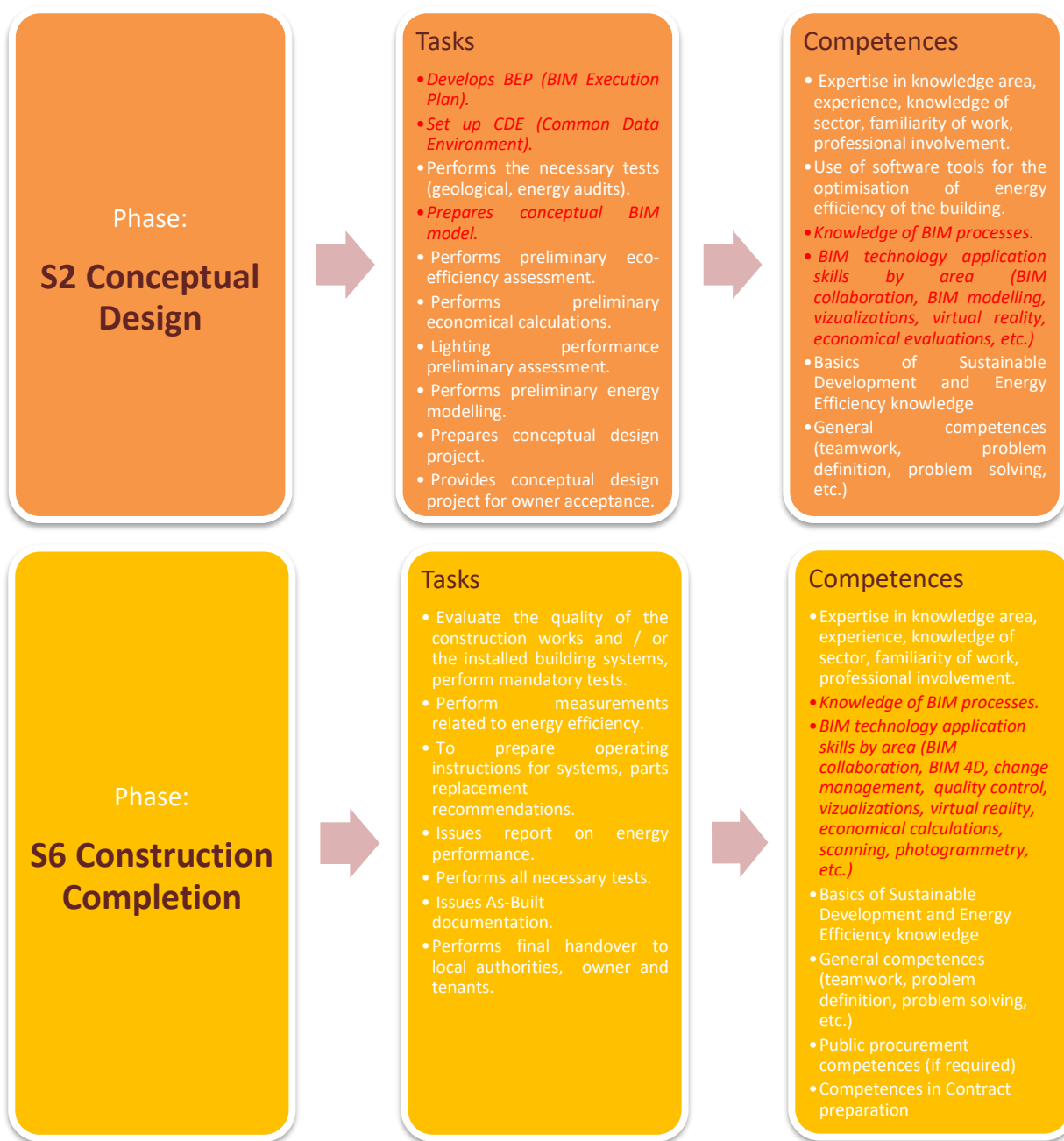
* Competences described in documents issued by Public organization "Digital Construction" (www.skaitmeninestatyba.lt)

➤ Role of the Professionals when focusing on energy aspects

Lithuania: The roles of the Professionals when focusing on energy aspects, participating in all stages of Building Life Cycle, include the energy audits, energy modelling, design solutions, construction works of airtight and thermal resistant building envelope, installment of HVAC systems, and RES systems. Professionals need certain certification to organize construction works and installments not only in NZEBs, but in all types of buildings.

➤ Tasks and Competencies of the Professionals in the BLC





Phase:
**S3 Technical
(Main) Design**

Tasks

- *Adjustment of BEP (BIM Execution Plan).*
- *Adjustment of CDE (Common Data Environment).*
- *Prepares BIM model.*
- Performs the necessary tests (geological, energy audits).
- Performs modelling of engineering systems.
- Performs economical calculations.
- *Performs other calculations agreed in BEP.*
- Prepares building technical documentation.
- Coordinates technical design project preparation.
- Performs the expertise of technical design project.
- Coordinates project with local authorities (if assigned by client).

Competences

- Expertise in knowledge area, experience, knowledge of sector, familiarity of work, professional involvement.
- Use of software tools for the optimisation of energy efficiency of the building and other simulations.
- *Knowledge of BIM processes*
- *BIM technology application skills by area (BIM collaboration, BIM modelling, change management, quality control, visualizations, virtual reality, economical evaluations, etc.)*
- Basics of Sustainable Development and Energy Efficiency knowledge
- General competences (teamwork, problem definition, problem solving, etc.)
- Public procurement competences (if required)
- Competences in Contract preparation

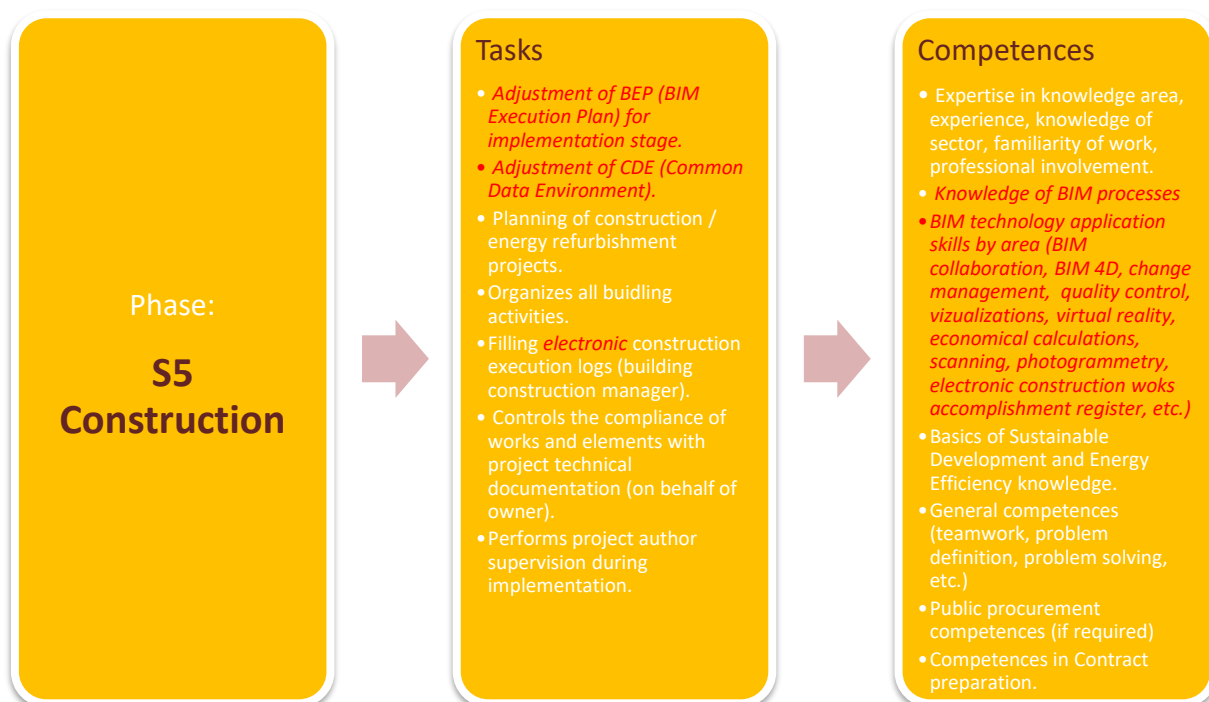
Phase:
**S4 Detailed
Design**

Tasks

- *Adjustment of BEP (BIM Execution Plan).*
- *Adjustment of CDE (Common Data Environment).*
- *Detailed BIM model (agreed in BEP).*
- Prepares detailed project documentation (including technology and organization parts).
- Performs the additional expertise of detailed design project (if needed).
- Provides information for procurement and organization of construction.

Competences

- Expertise in knowledge area, experience, knowledge of sector, familiarity of work, professional involvement.
- *Knowledge of BIM processes*
- *BIM technology application skills by area (BIM collaboration, BIM modelling, change management, quality control, visualizations, virtual reality, economical calculations, etc.)*
- Basics of Sustainable Development and Energy Efficiency knowledge.
- General competences (teamwork, problem definition, problem solving, etc.)
- Public procurement competences (if required)
- Competences in Contract preparation



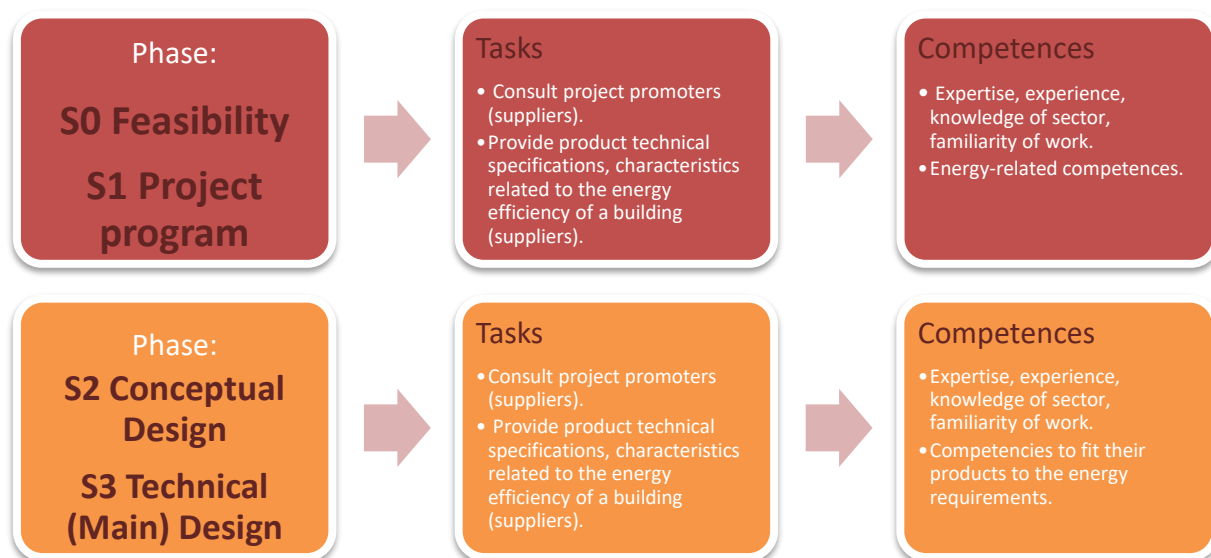
➤ Role of the Technicians in the BLC

Lithuania: The target group of Technicians includes blue-collar workers, installers, suppliers of materials and components. This target group is active mainly during **Construction** and **Building Operation**, and doesn't have specific role in **Planning** and **Design Stages** except suppliers of materials and components, who can have some influence during Design stage, specifically, in terms of the technologies, prices and availability of products on market.

➤ Role of the Technicians when focusing on energy aspects

Lithuania: The roles of the Technicians when focusing on energy aspects include the construction works of airtight and thermal resistant building envelope, installment of HVAC systems, and RES systems. Technicians (workers and installers) may need certain certification to perform construction works and installments in NZEBs. So far, certification of NZEB workers and installers is voluntary in Lithuania (started by Lithuanian Builders Association (as manager of certification scheme) within ENERGOTRAIN project).

➤ Tasks and Competencies of the Technicians in the BLC



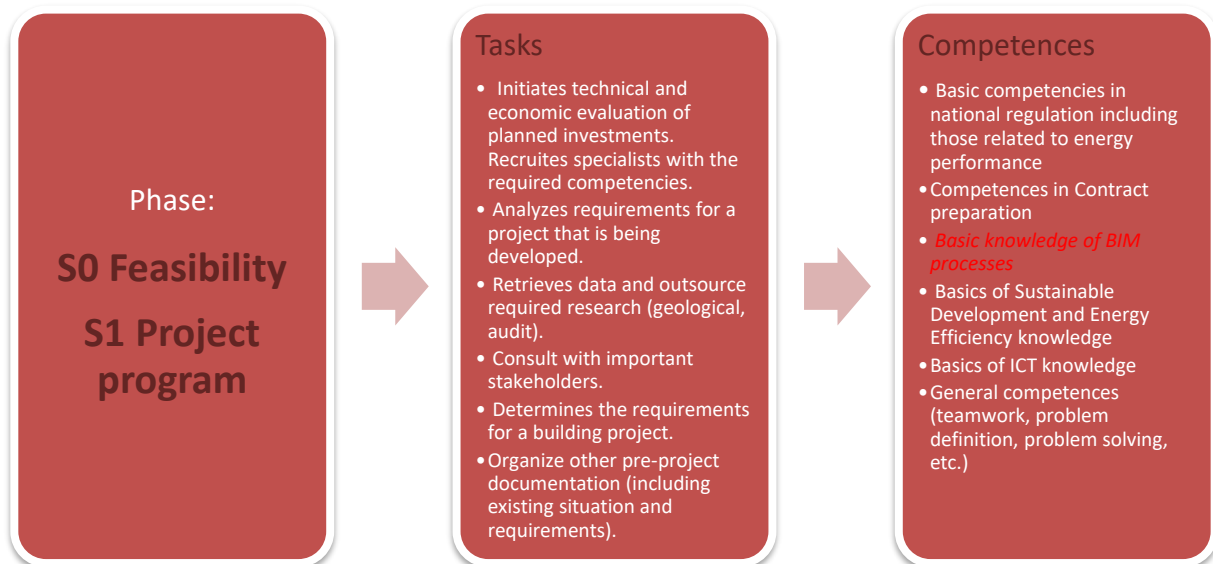
➤ Role of the Tenants/Owners in the BLC

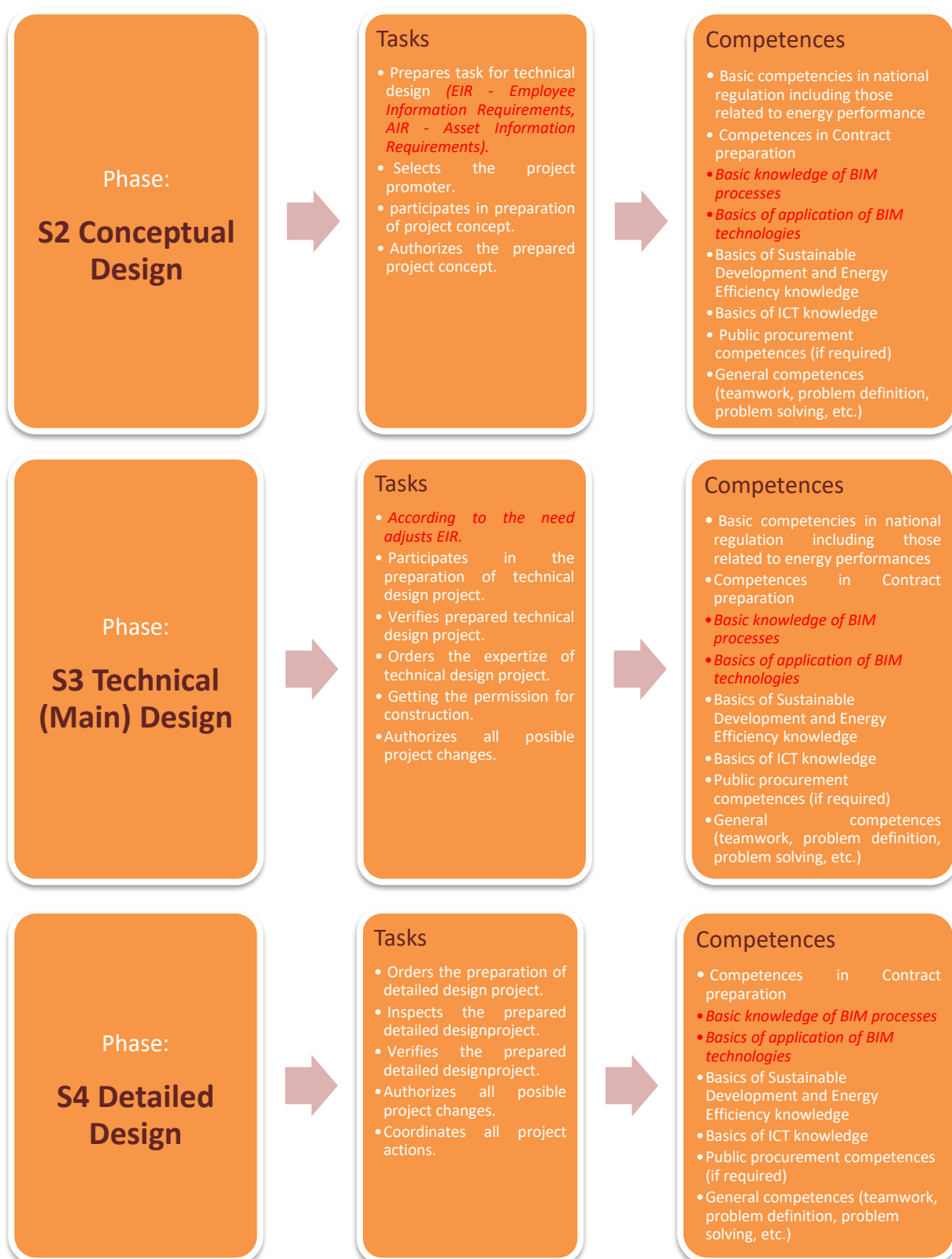
Owners acting as Investors set up project requirements, take all needed actions to start Design and Construction/Refurbishment, hire the technical supervisors for control of the compliance of the works with the design and valid legislation. During Building Operation, they organize the maintenance of building and inspection of systems. At the end of BLC they initiate building refurbishment or demolition. Tenants have no specific roles, however, Owners take into account their needs and expectations regarding the indoor comfort parameters and quality of inner spaces.

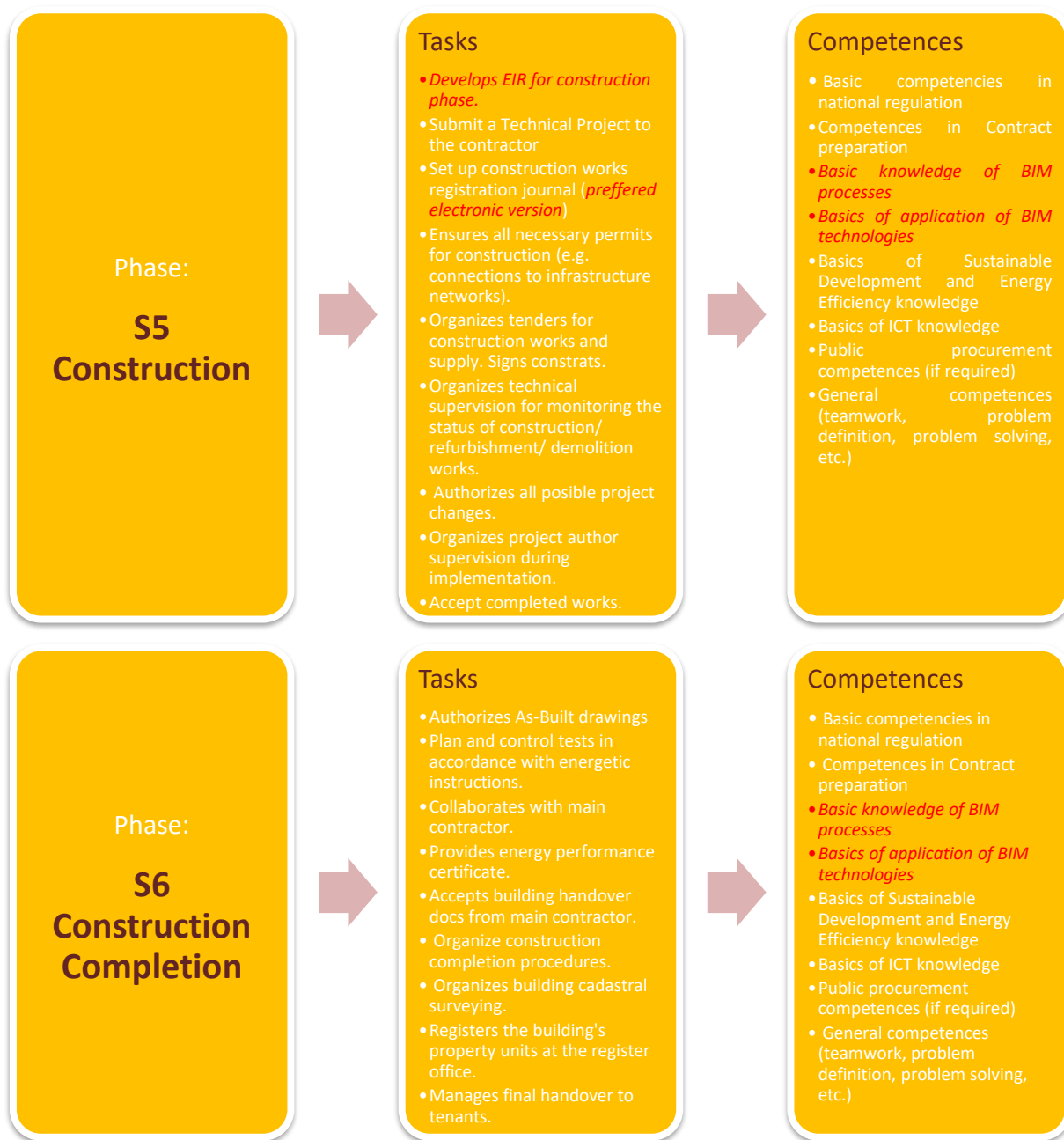
➤ Role of the Tenants/Owners when focusing on energy aspects

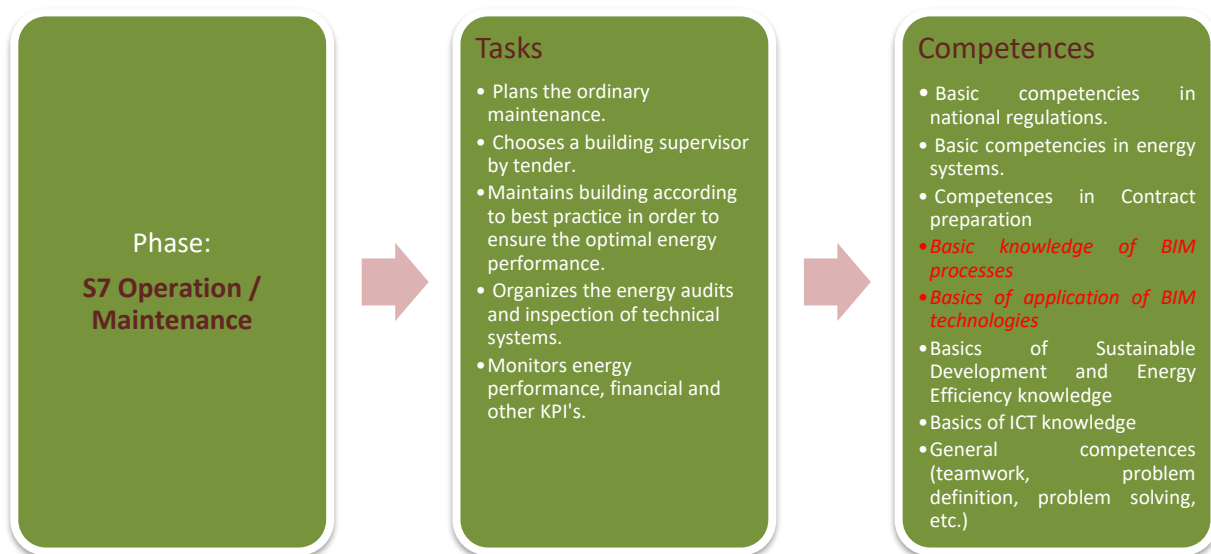
Owners set up requirements for building in terms of energy efficiency (no less that required in regulations), choose the materials and make decisions on energy systems to be installed in building. Owners analyze the alternative modernization measures and select the set that ensures the required energy performance, is affordable and sustainable. During Construction they check the compliance of the works with the design and valid legislation and accept works done. In case of new Construction (after), in case of Refurbishment (before and after) they initiate energy performance certification of building. During Building Operation Owners/Building Administrators organize the maintenance of building.

➤ Tasks and Competencies of the Tenants/Owners in the BLC









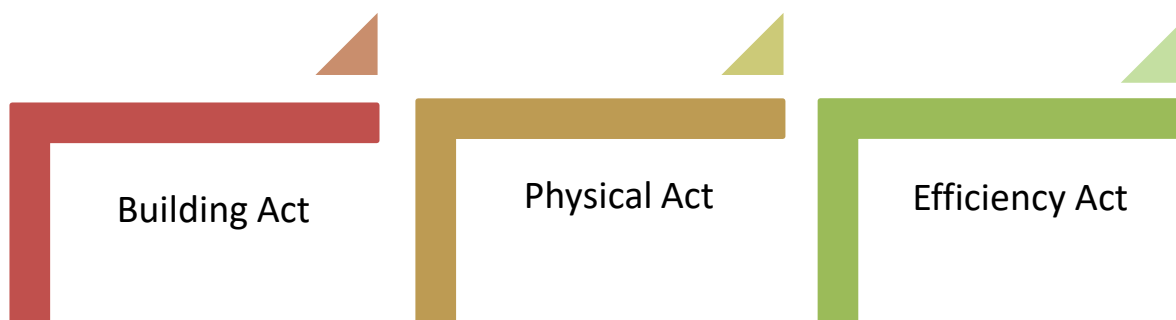
3.5 Croatian Situation

Contributed by	Croatia
Author	Rosso Claudio
Contact	rosso@gruppcos.com
Source	Building Act, Physical Planning Act, Energy Efficiency Act and their following regulations, Construction project tasks and activities which are ingrained in practice

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➤ General overview of the Building Life Cycle

The Building Life Cycle organizes the process of briefing, designing, constructing, maintaining, operating and using building projects in a different number of key stages. In Croatia, there are three different Acts (and their following regulations) which can help to better understand the process:



Starting from these three Acts and adding experiences in construction projects, it is possible to individuate five stages:

Phases	1. Initiation		
Sub Phases	Development of preliminary architectural design		

In the first phase, there are the definition of special physical area requirements and the development of the preliminary architectural design. Therefore, this initial phase has a duration which depends on the complexity of the project.

Phases	2. Conceptual Design, Main Design							
Sub Phases	Development of architectural part of conceptual design	Development of mechanical engineering part of conceptual design	Development of civil engineering part in conceptual design	Development of electrotechnical part of conceptual design	Development of architectural part of main design	Development of mechanical engineering part in main design	Development of civil engineering part of main design	Development of electrotechnical part of the main design

In the second phase, it is possible to define the Conceptual and Main Design with the development of:

- architectural part of Conceptual Design
- mechanical engineering part of Conceptual Design
- civil engineering part of Conceptual Design
- electrotechnical part of Conceptual Design

The Conceptual Design doesn't have a substantial impact on surrounding physical area and is correlate with a Location Permit for gas, electric power, construction and physical planning, water supply and sewerage system.

- architectural part of Main Design
- mechanical engineering part of Main Design
- civil engineering part of Main Design
- electrotechnical part of Main Design

The Main Design provide technical definition of the project and the design work of specialist subcontractors is concluded.

Phases	3. Build							
Sub Phases	Construction of structural part of building	Construction of mechanical engineering parts of building	Construction of electrical installations	Internal final (craft) works	Audit of structural part of building	Inspection of HVAC system	Inspection of electrical installations	Inspection of other internal works

During the Build phase, the building is constructed on site in accordance with the Construction Programme. The Build includes the construction of:

- structural parts
- mechanical engineering parts
- electrical installations
- internal final works

At the end of the construction works there are the respective audit and inspection of HVAC systems, electrical installations and other internal works.

Phases	4. Exploitation / Maintain / Operate				
Sub Phases	Maintenance of structural part of building	Maintenance of HVAC system of building	Maintenance of other shared internal parts of building		

During the fourth phase, there are maintenance of:

- structural part of building
- HVAC system of building
- Other shared internal parts of buildings

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Phases	5. End of life / recycling / reuse		
Sub Phases	End of usage period		

At the final stage, there are the activities of the end of use period.

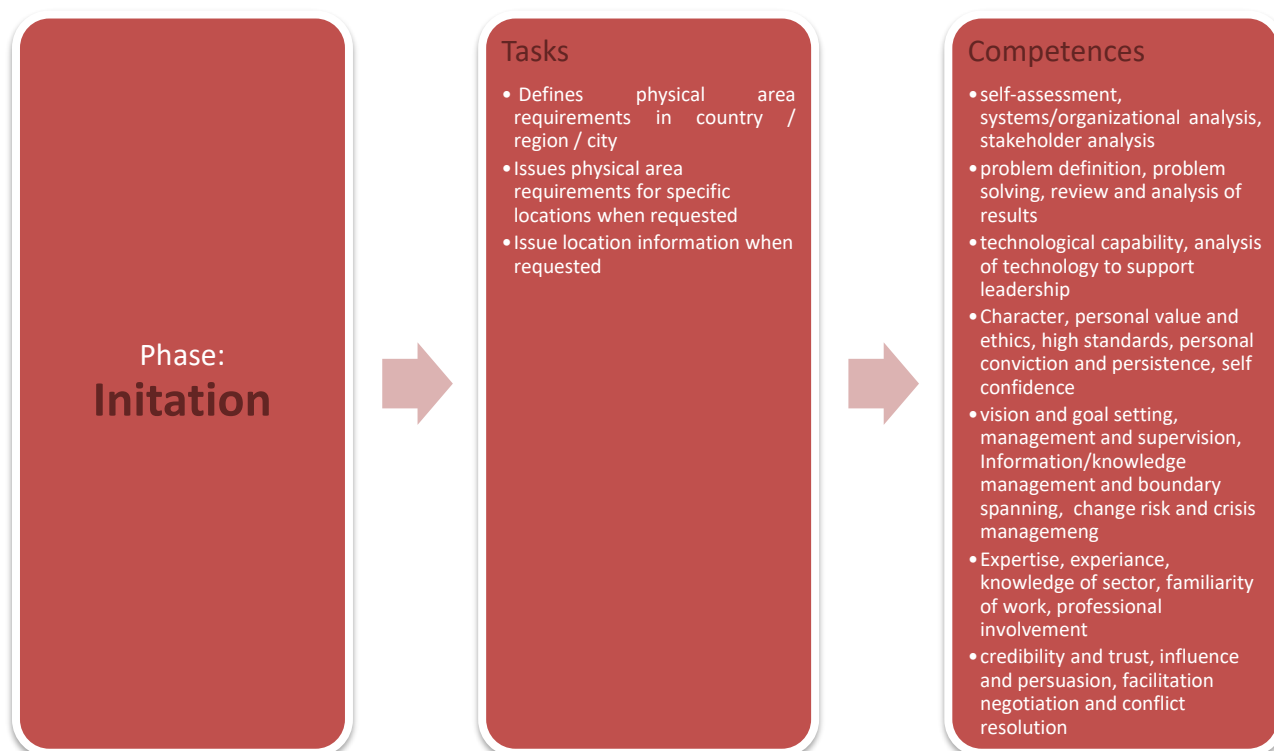
➤ Role of the Public Administration in the BLC

The Public Administration enforces acts and is the public authority who represents the regulation body. It sets physical area requirements for certain locations or in country/region/city in the initial phase, checks the compliance of the finished building with the design, acts and the regulation in force, provides inspections and possible refurbishments. At the end of the Building Life Cycle, it checks the compliance of the deconstruction design with the acts and the regulation in force and dispose the recycling and/ or reuse of resources (or, in case of waste, it controls their treatment).

➤ Role of the Public Administration when focusing on energy aspects

Focusing on energy aspects, the Public Administration shows the importance of energy efficiency requirements to the construction enterprises, contributing to shape and size the building. The defining of requirements includes the use of different energy sources in the future construction industry and the possibility to use RESs. In addition, the Public Administration checks the issuance and the validity of energy performances' certificates and of the inspections' reports on technical systems.

➤ Tasks and Competencies of the Public Administration in the BLC



Phase:
**Conceptual
Design, Main
Design**

Tasks

- Defines and issues special physical area requirements
- Defines and issues special construction requirements (including energy efficiency and RES requirements)
- Checks compliance of the design (technical documentation) (for conceptual design)
- Issues Location permit
- Checks compliance of the design (technical documentation) (for main design)
- Issues building permits

Competences

- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution
- self-assessment, systems/organizational analysis, stakeholder analysis
- problem definition, problem solving, review and analysis of results
- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement

Phase:
Build

Tasks

- Establish technical inspection commission
- Runs the database and performs validity check of the issued energy performance certificate
- Runs the database and performs validity check of the issued report on technical system inspection
- Issue As-built permit
- Runs database of Energy auditors (building performance and technical system performance)
- Runs register of certified RES installers
- Runs register of certified construction workers working in the field of energy efficiency
- Runs an building inspection, health and safety inspection, fire inspection, etc.

Competences

- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution
- self-assessment, systems/organizational analysis, stakeholder analysis
- problem definition, problem solving, review and analysis of results
- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement

Phase:
**Exploitation /
Maintain /
Operate**

Tasks

- Registration in cadastre and land registry
- Keep records of authorized building administrators
- Defines requirements for building energy refurbishment
- Defines subsidies and criteria for building energy refurbishment
- Performs the measurement of the energy use for public buildings (some 13 000 public buildings)
- Regulates the energy market and obligations of energy providers and owners of public buildings regarding the education of users on energy efficiency

Competences

- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution
- self-assessment, systems/organizational analysis, stakeholder analysis
- problem definition, problem solving, review and analysis of results
- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement

Phase:
**End of Life /
Recycling /
Reuse**

Tasks

- Verifies removal (demolition) documentation
- Detachment of the existing building from the existing energy infrastructure.
- Checks the recycling and/or reuse of resources and waste treatment.

Competences

- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution
- self-assessment, systems/organizational analysis, stakeholder analysis
- problem definition, problem solving, review and analysis of results
- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement

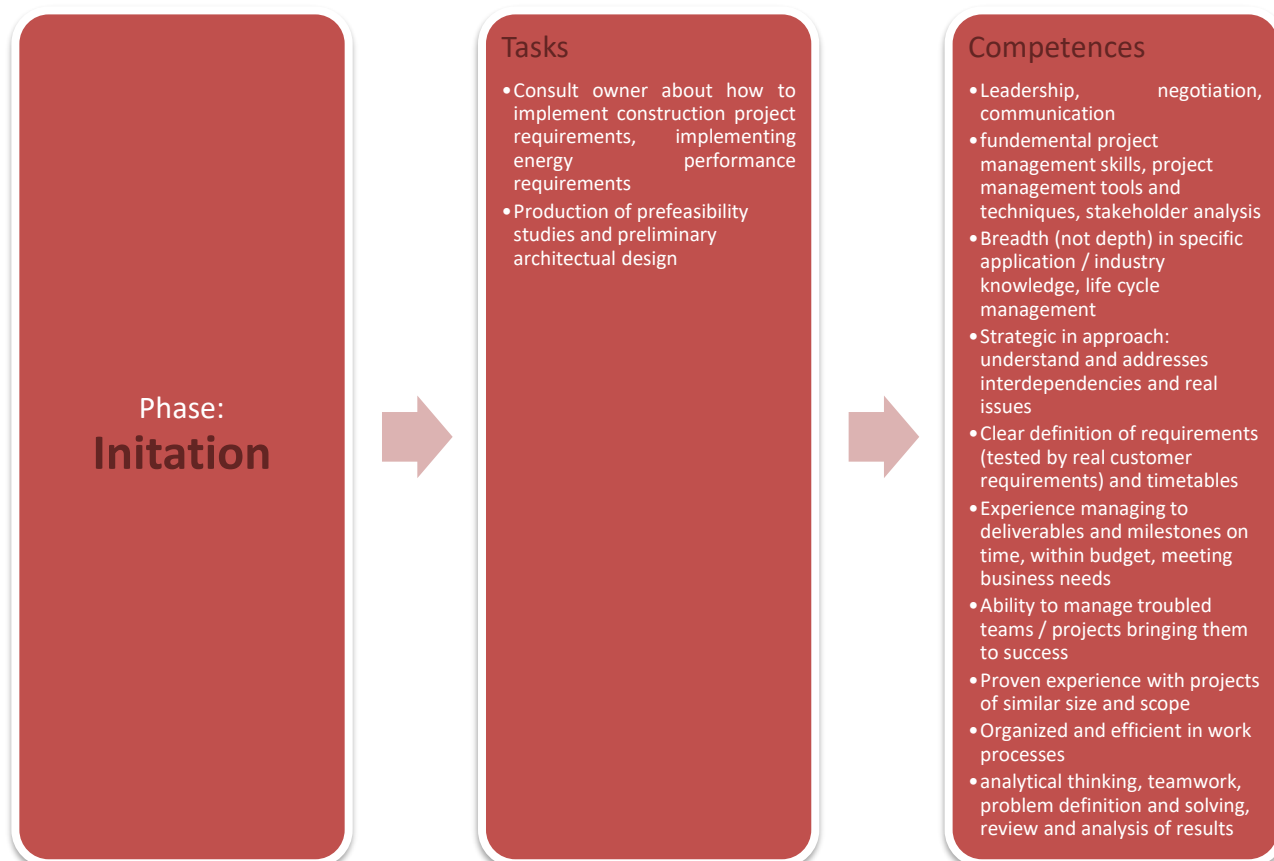
➤ Role of the Professionals in the BLC

The Professionals are Project Managers and Consultants who oversee the production of design technical documentation (such as architectural design, mechanical engineering design, electrical engineering design, fire protection design) and audits. They supervise specific integral parts of construction works and performs all prescribed tests on the finished building. After the construction works, the Professionals performs the maintenance of the building and provide refurbishment projects, up to the production of technical documentations for the demolition of existing buildings.

➤ Role of the Professionals when focusing on energy aspects

Focusing on the energy aspects, the Professionals work as consultants of issues related to energy efficiency for new buildings and as energy auditors for existing buildings, inspecting the technical systems every year and monitoring the measurement of energy consumption for public buildings.

➤ Tasks and Competencies of the Professionals in the BLC



Phase:
Conceptual Design, Main Design

Tasks

- Production of conceptual and main design compliant with all location and building requirements (including energy efficiency requirements)
- Coordinate all specialists / professionals (which delivers separate parts of building designs, i.e. mechanical engineering part of building design, civil engineering part of building design)
- Audit when there is need to control compliance with essential requirements for building

Competences

- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information and knowledge management and boundary spanning, change risk and crisis managing
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement and use of software tools for the optimisation of energy efficiency of the building
- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

Phase:
Build

Tasks

- Construction of building following design technical documentation (architecture, civil engineering, mechanical engineering, electrical engineering)
- Supervises all building activities (controlling compliance with project technical documentation)
- Issuing report on technical specification of building
- Technical inspection of the building
- Issuing report on energy performance / efficiency of building
- Perform all prescribed (necessary test) on the finished building, i.e. blower door, thermography, etc.

Competences

- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement; the use of software tools for the optimisation of energy efficiency of the building (architectural, civil engineering, mechanical and electrical engineering)
- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

Phase:
**Exploitation /
Maintain /
Operate**

Tasks

- Leading maintenance works if requested on the building thermal envelope and technical systems
- Leading construction works if requested on the building thermal envelope and technical systems
- Design and execution of energy refurbishment projects
- Energy Audits for existing building, inspections of technical systems (every 10 years) measurement of the energy consumption (public buildings)

Competences

- technological capability, analysis of technology to support leadership
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information knowledge management and boundary spanning, change risk and crisis managing
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement; the use of software tools for the optimisation of energy efficiency of the building
- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

Phase:
**End of Life /
Recycling /
Reuse**

Tasks

- Removal / demolition design
- Lead construction works on building removal or building reuse
- Consulting owner and professionals about possibilities of building reuse
- producing reports on recycling and/or reuse of construction and demolition waste.

Competences

- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- vision and goal setting, management and supervision, Information/knowledge management and boundary spanning, change risk and crisis management
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement; the use of software tools for the optimisation of energy efficiency of the building (architectural, civil engineering, mechanical and electrical engineering)
- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution

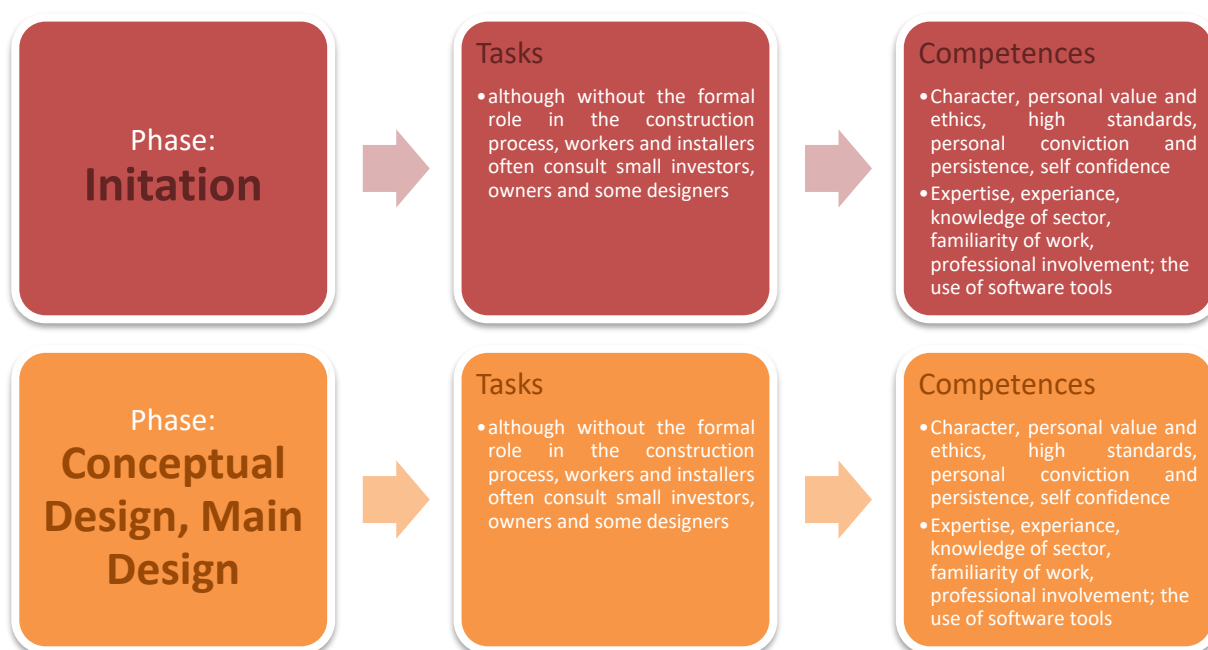
➤ Role of the Technicians in the BLC

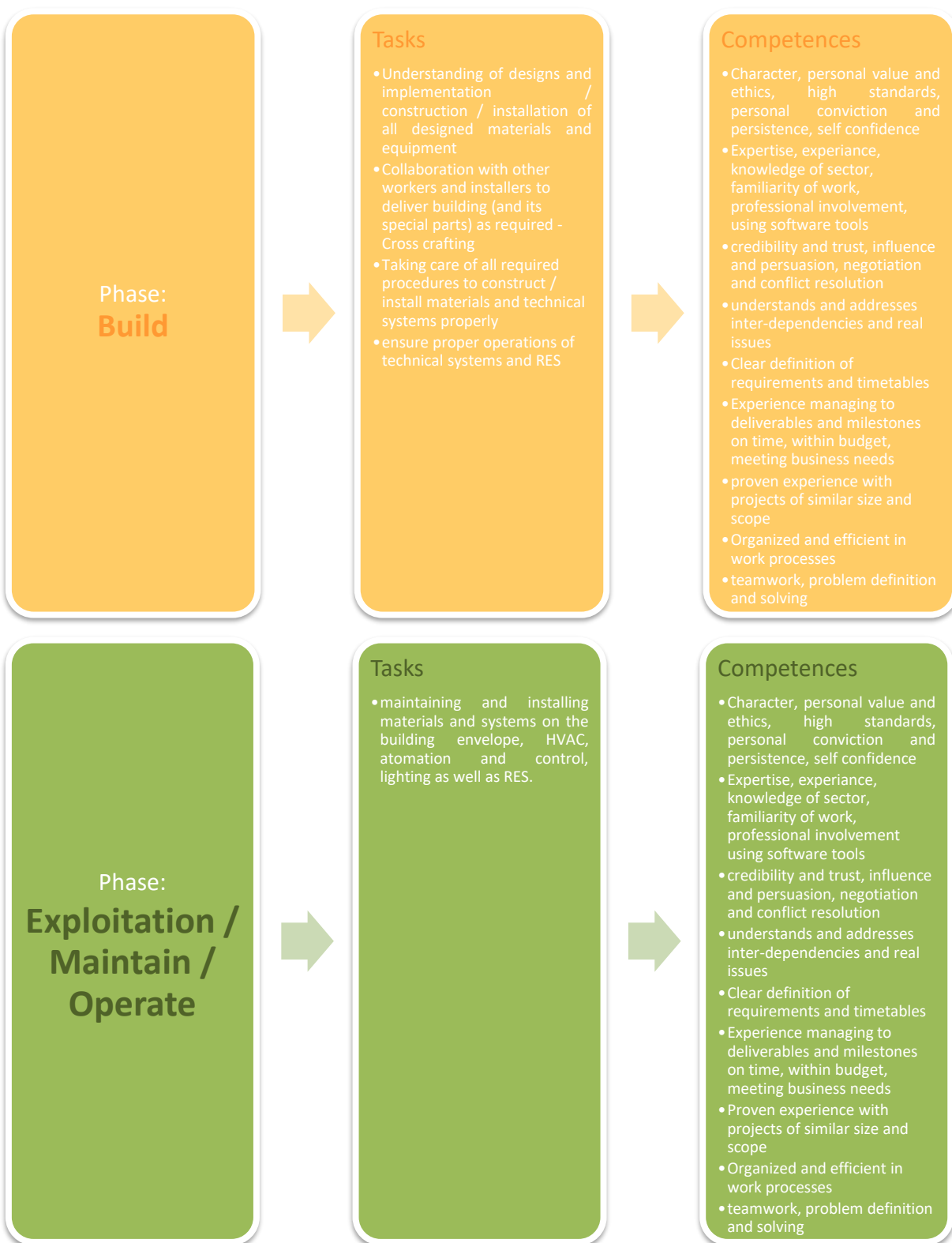
The Technicians are workers and installers who provide installing materials and systems for the building such as HVAC, lighting and RES.

➤ Role of the Technicians when focusing on energy aspects

The technicians work on the building thermal and RES envelope and for this reason they need a certain certification (mandatory for the implementation of NZEBs). Certified construction workers and installers (for instance for gas burners) install systems related to energy efficiency (not mandatory but ordinance is in force).

➤ Tasks and Competencies of the Technicians in the BLC





Phase:
**End of Life /
Recycling /
Reuse**

Tasks

- Properly demolish or remove specific materials or parts of building

Competences

- Character, personal value and ethics, high standards, personal conviction and persistence, self confidence
- Expertise, experience, knowledge of sector, familiarity of work, professional involvement using software tools
- credibility and trust, influence and persuasion, facilitation negotiation and conflict resolution
- understands and addresses inter-dependencies and real issues
- Clear definition of requirements and timetables
- Experience managing to deliverables and milestones on time, within budget, meeting business needs
- Proven experience with projects of similar size and scope
- Organized and efficient in work processes
- teamwork, problem definition and solving

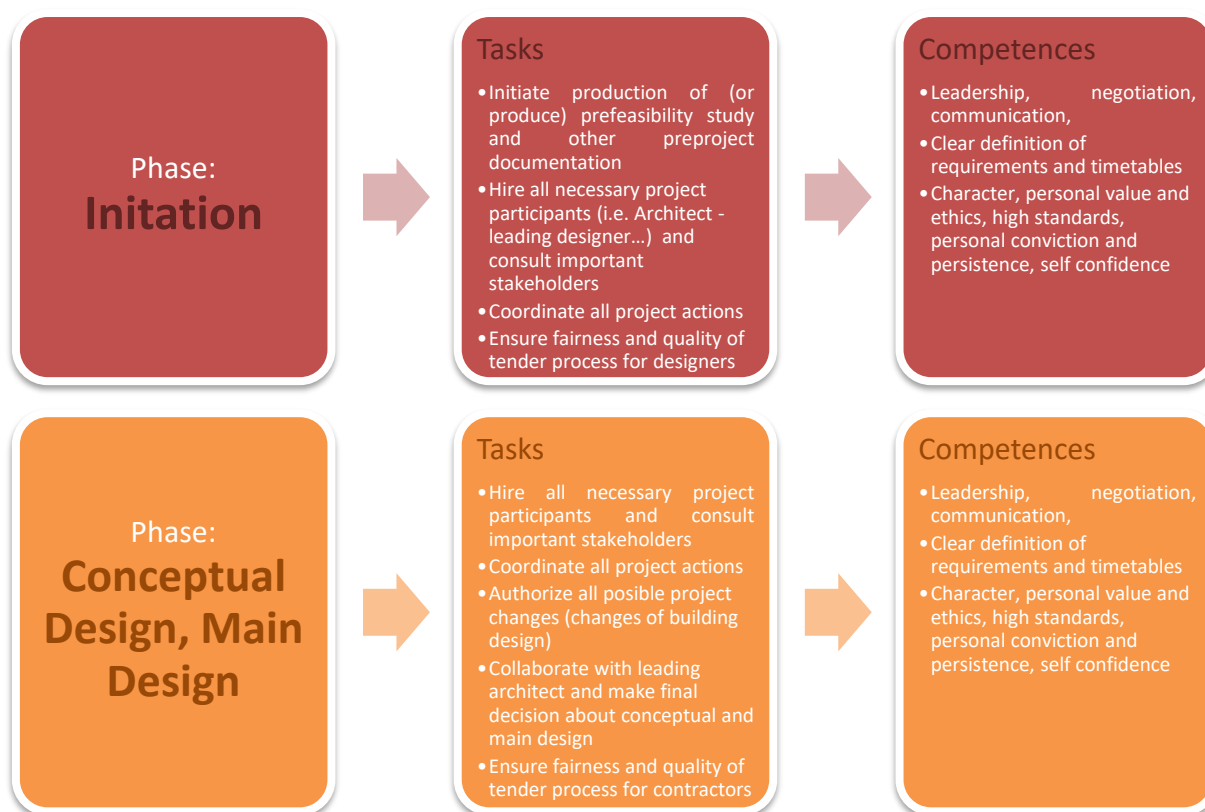
➤ Role of the Tenants/Owners in the BLC

Owners (such as Initiators and Investors) take all needed actions to start with all the phases of the Building Life Cycle.

➤ Role of the Tenants/Owners when focusing on energy aspects

Owners / Tenants / Users and Building Administrators set project requirements and a wish-list regarding energy efficiency and RES, make decisions on the project budget and the direction to take in order to construct NZEBs with sustainable materials. The supervising engineers, in name of the investor, check the compliance of the works with the design and legislation in force. At the end of the Building Life Cycle, they enable the renewal of energy performance certificate and the inspection of systems, maintaining the building and ensuring the safe of the operations.

➤ Tasks and Competencies of the Tenants/Owners in the BLC





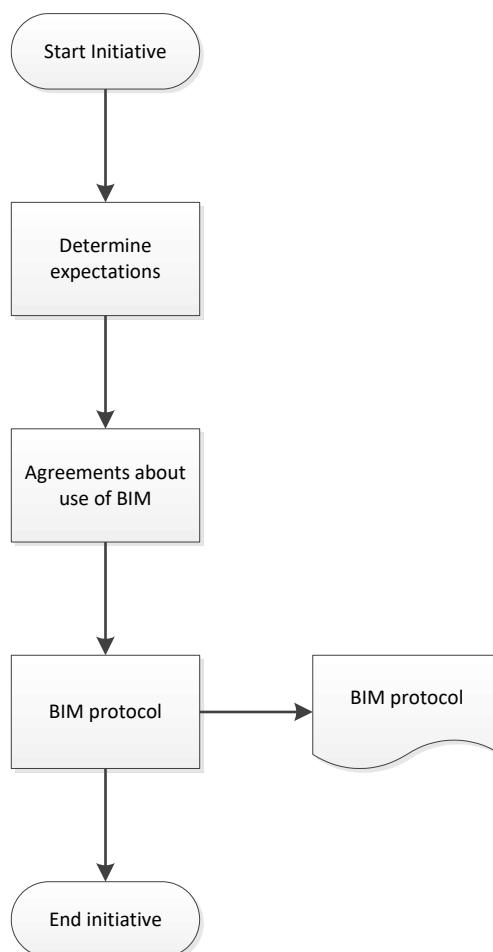
3.6 Dutch Situation

Contributed by	Stichting ISSO
Author	Arjan Schrauwen
Contact	a.schrauwen@isso.nl
Source	

➤ General overview of the Building Life Cycle

In the Netherlands the following phases are used in a project with BIM:

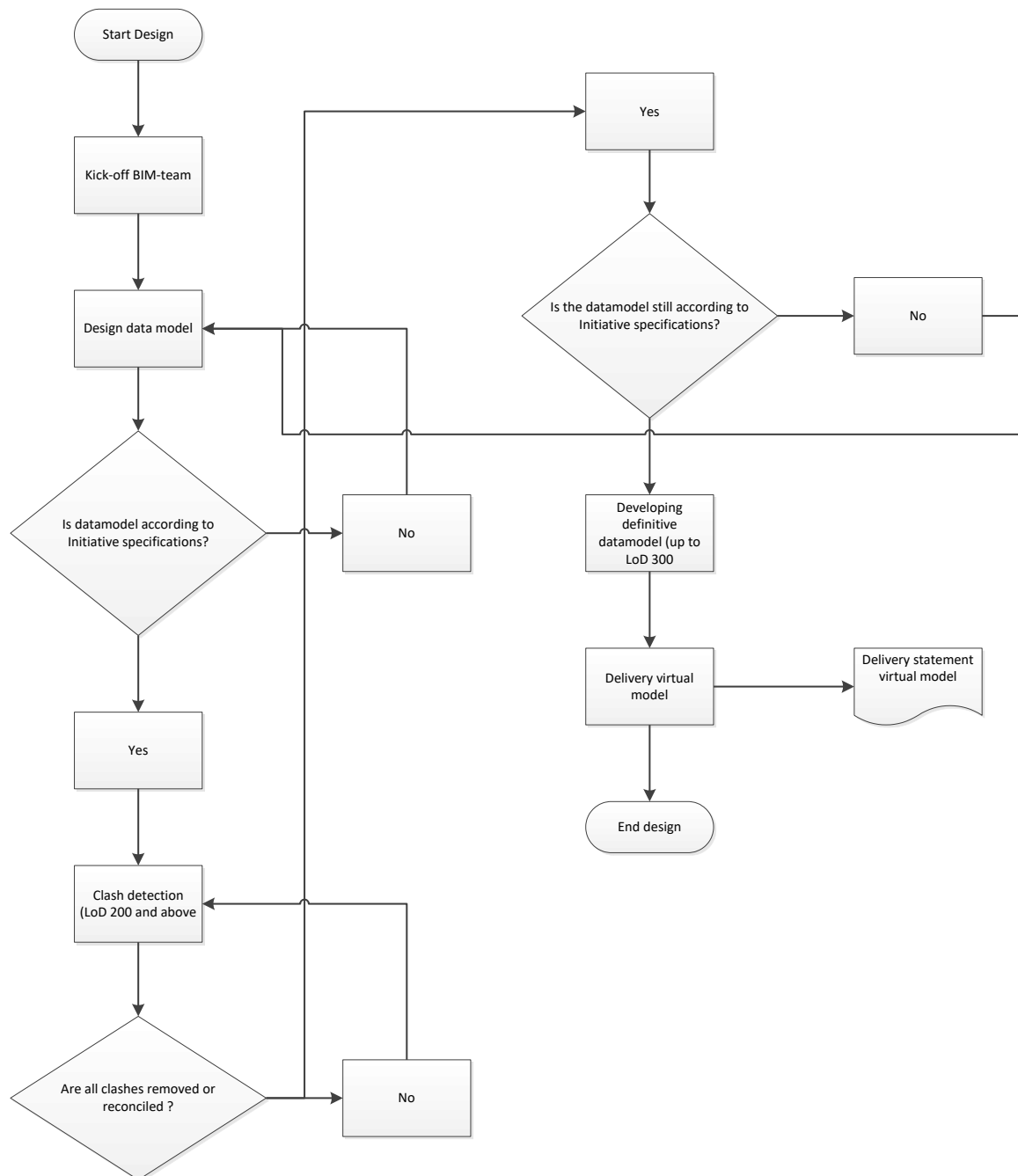
- Initiative or program phase: In this phase the client/future owner defines the requirements of the new building, such as location, needed floor area, number of people etc. There are no design activities in this phase.



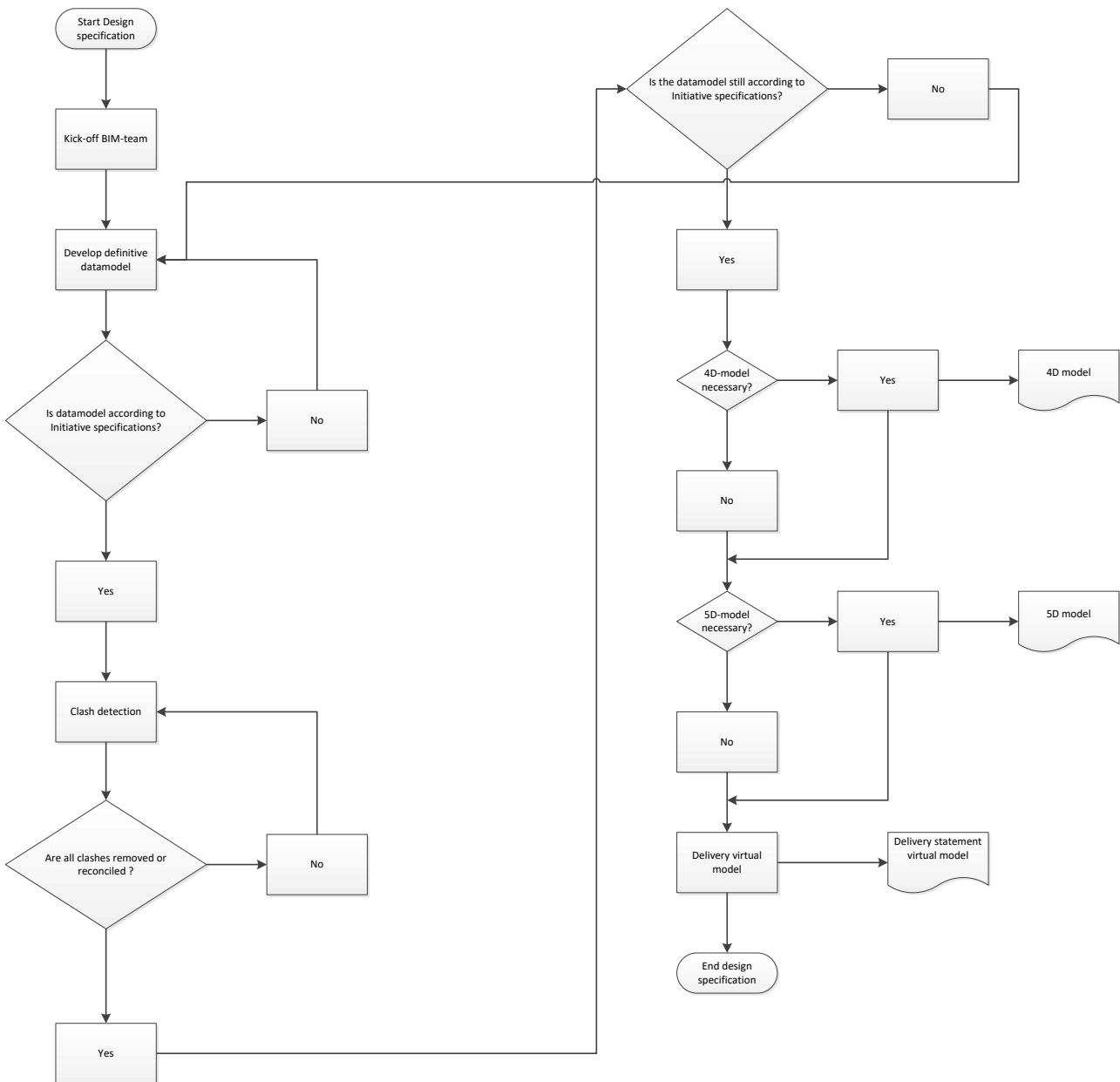
Design: In the design phase the building is designed by designers and engineers. The result of this phase is a detailed design. With this detailed design contractors and installers are able to construct the building.

This phase can be divided in two subphases:

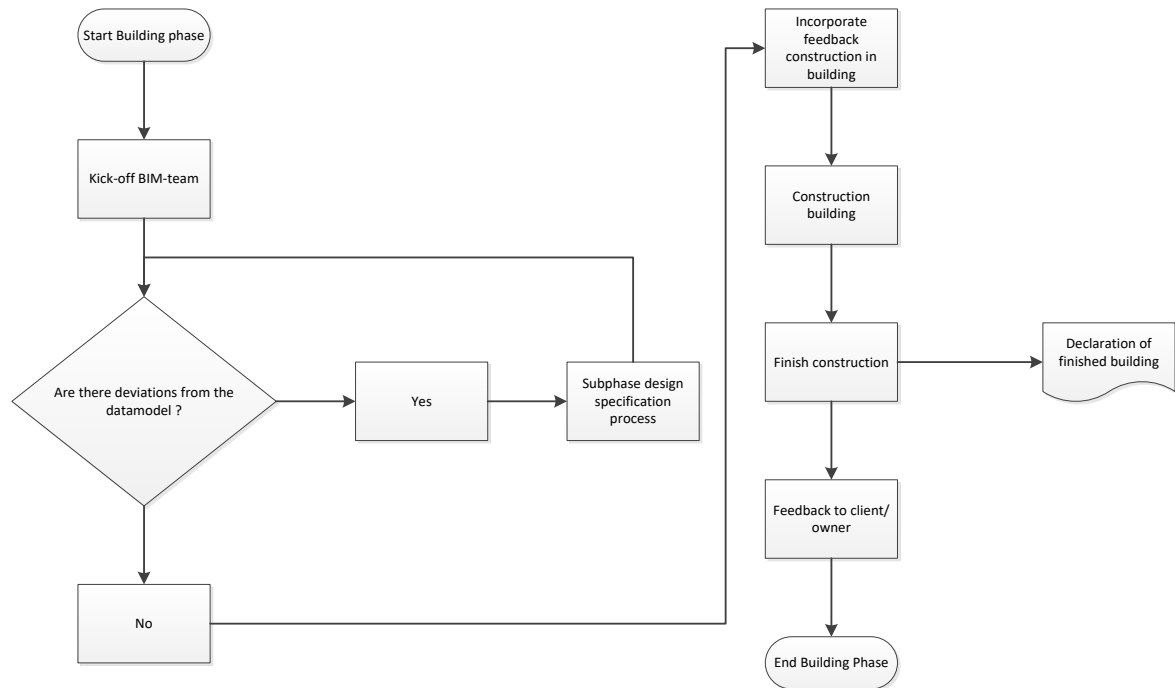
Subphase design:



Subphase design specification:

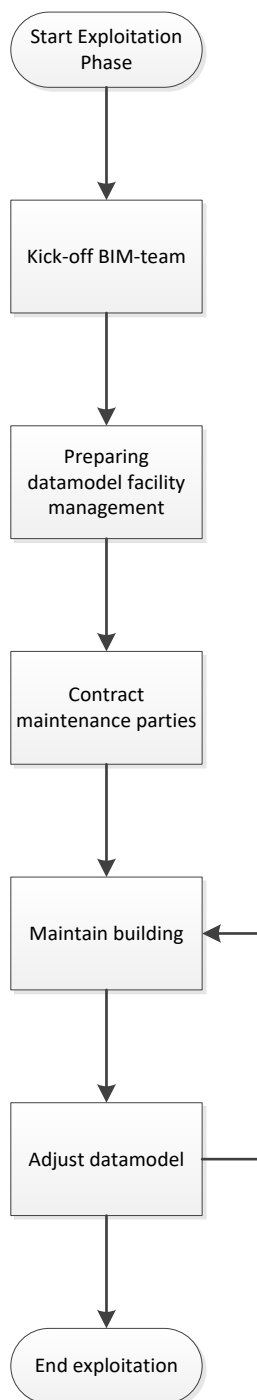


Build: In the building or constructing phase the building is realized. At the end of this phase the building can be used by its tenants/owners.

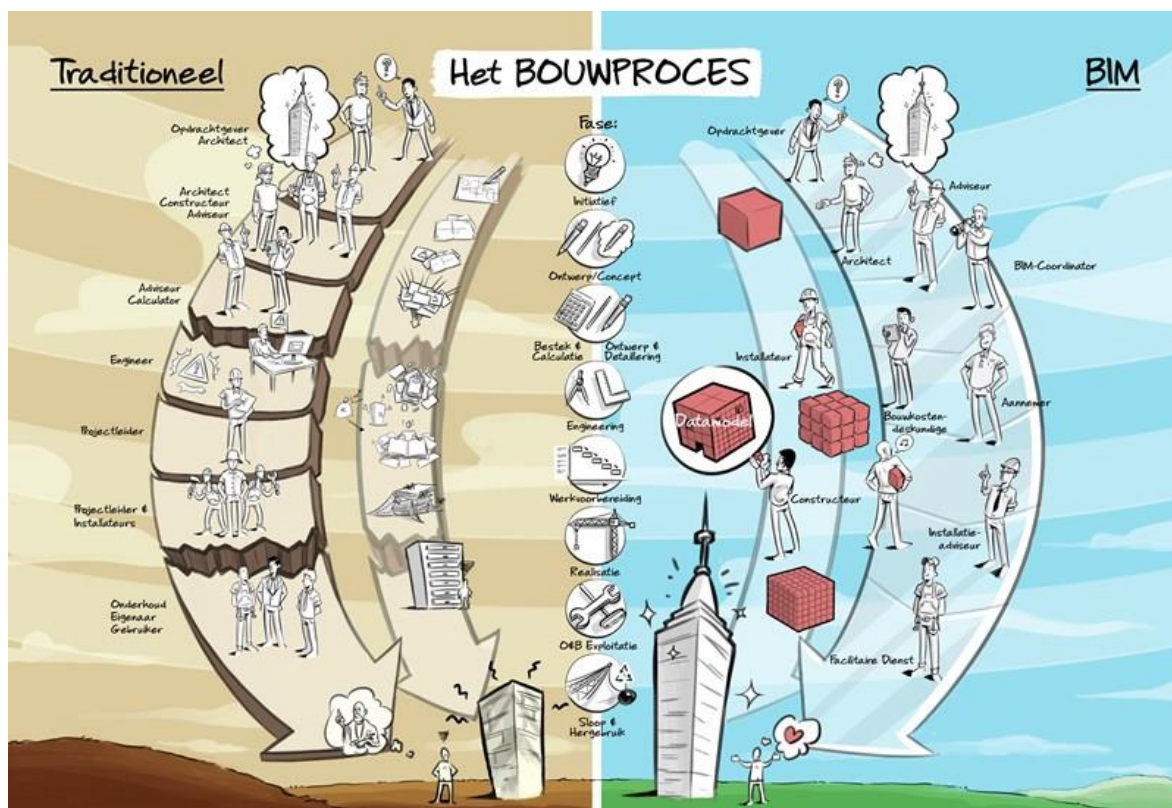


Exploitation/maintain/operate: In the maintain/operate phase the building is used and maintained by its tenants or owners.

End of life/recycling/reuse: In the end of life phase the building will be demolished and recycled. It is also possible the building is reused for other purposes.



The traditional and BIM methods compared for the Dutch situation



➤ Role of the Public Administration in the BLC

In the Netherlands, the Public Administration is the authority who approves the final design according to the Dutch regulations (Bouwbesluit) with a building permit (Omgevingsvergunning). Depending on the activities within the building, extra approval of the use of the building may be necessary. This is when activities may harm the environment. When the building will be demolished a permit is necessary to recycle and/or dispose waste.

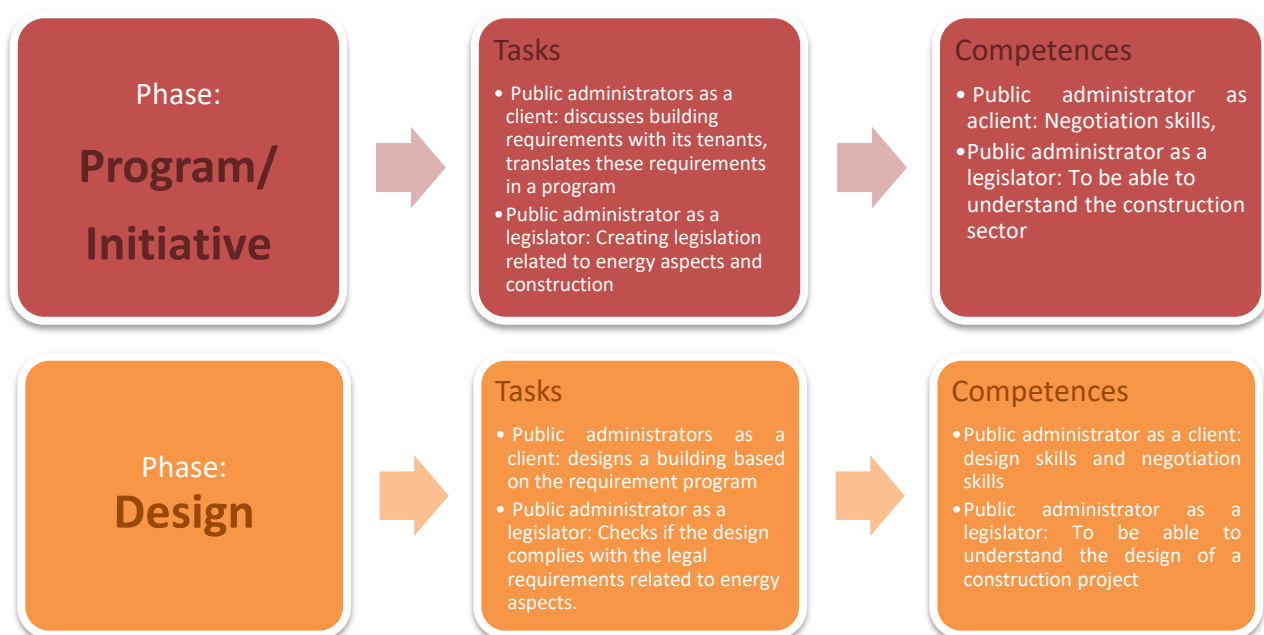
It is also possible the public administrator itself is the owner and user of a new building.

➤ Role of the Public Administration when focusing on energy aspects

The Public Administration has energy aspects incorporated in its legislation. When a contractor receives a building permit, the design complies with this legislation. In the realization phase the public administrator checks if the contractor has realized the building according to the building permit.

➤ Tasks and Competencies of the Public Administration in the BLC

Its tasks (and consequent competences) in the Building Life Cycle are:





➤ Role of the Professionals in the BLC

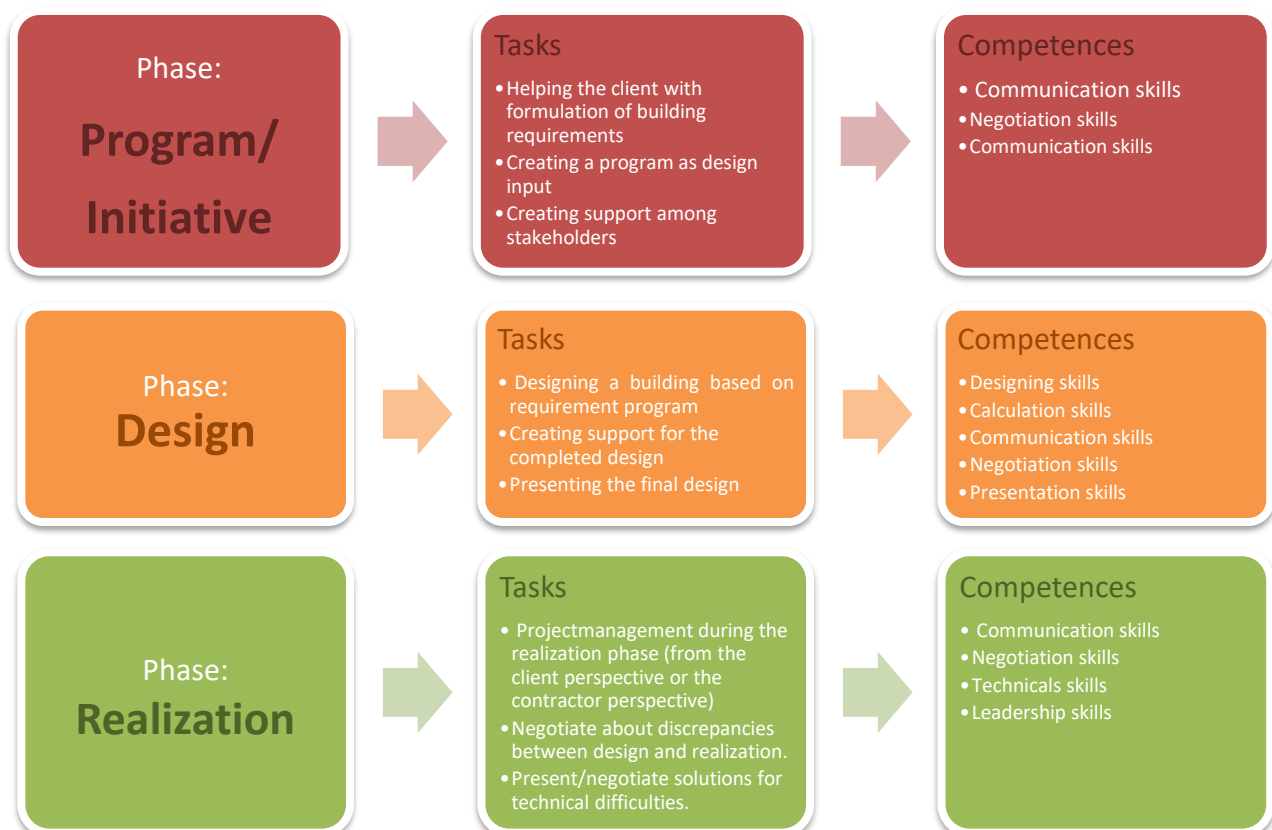
- To help the client specify building requirements
- To design a building based on client requirements
- To manage a building project from the client perspective
- To maintain the building in sufficient condition
- To manage a recycle or reusing project.
- To manage a building project from the contractor perspective.

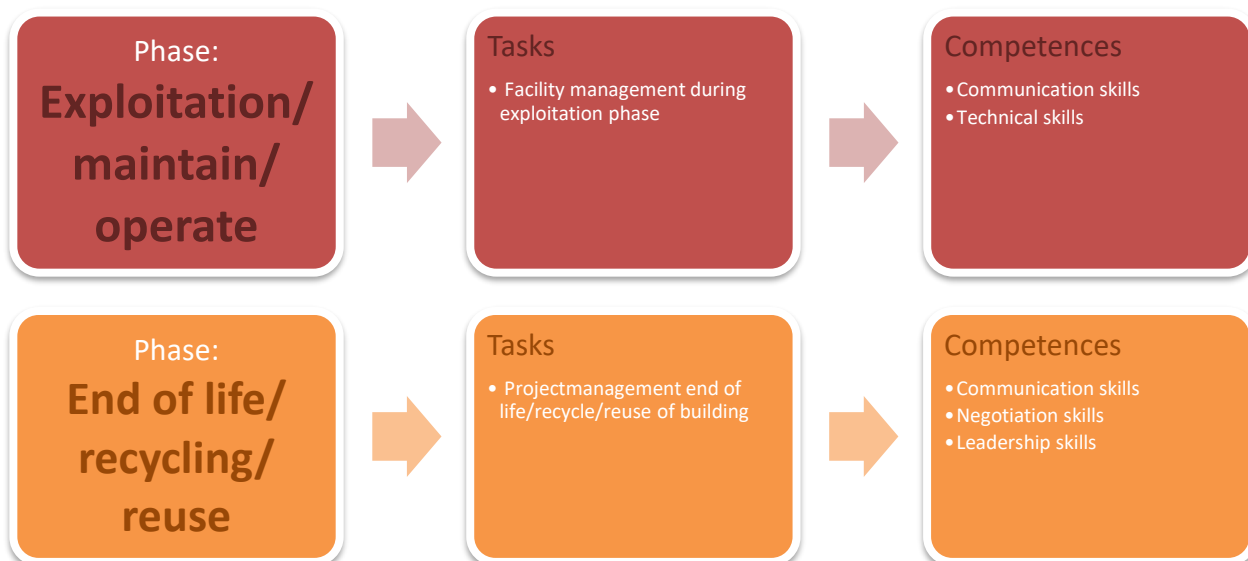
➤ Role of the Professionals when focusing on energy aspects

- To help the client specify building requirements in respect to energy aspects
- To design a building with respect to energy aspects
- To manage a building project in respect to energy aspects
- To operate and maintain the building with respect to energy aspects.
- To design a reuse of the building in respect to energy aspects.

➤ Tasks and Competencies of the Professionals in the BLC

Its tasks (and consequent competences) in the Building Life Cycle are:





➤ Role of the Technicians in the BLC

To transfer knowledge from the realization phase with the purpose to obtain a practical feasible design.

To realize the design in a correct way.

To operate and maintain the building according to the design.

To transfer knowledge about the building, how it is/was maintained with the purpose of reusing or recycling the building.

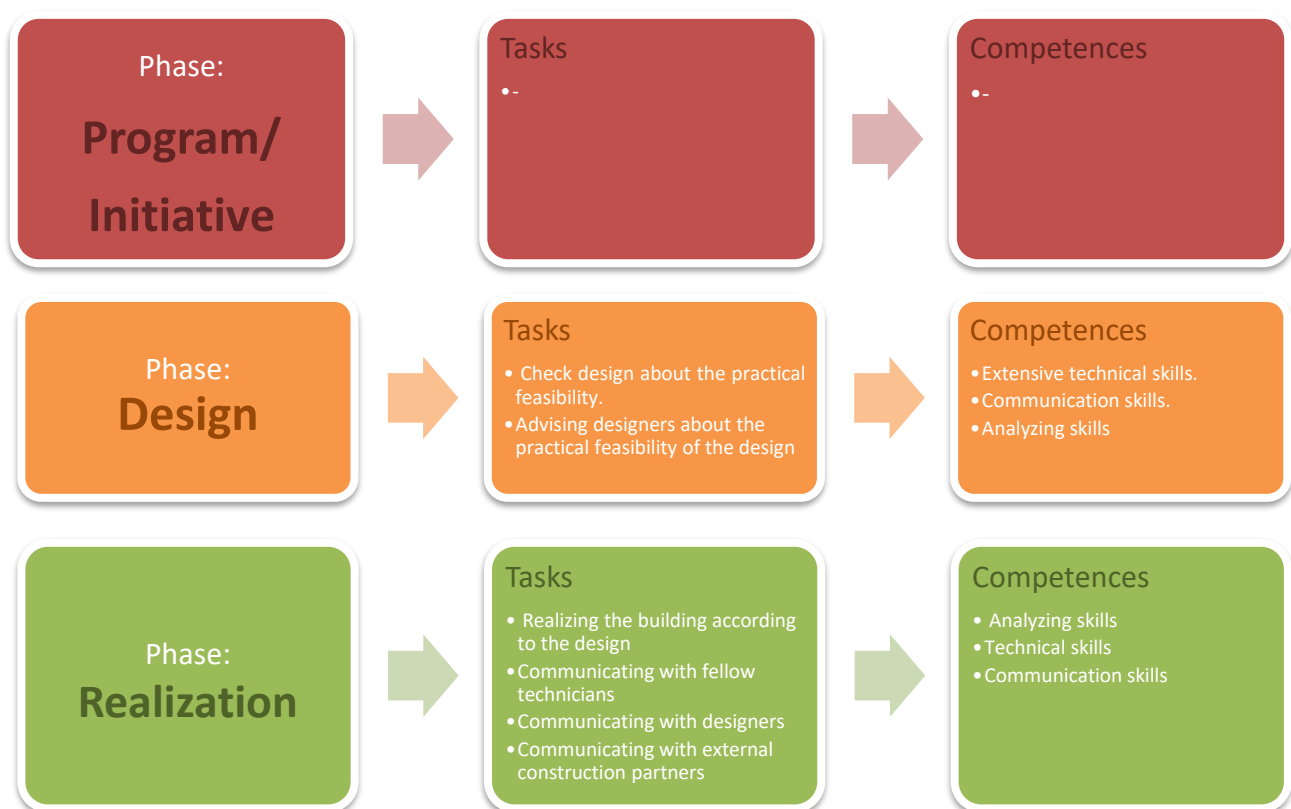
➤ Role of the Technicians when focusing on energy aspects

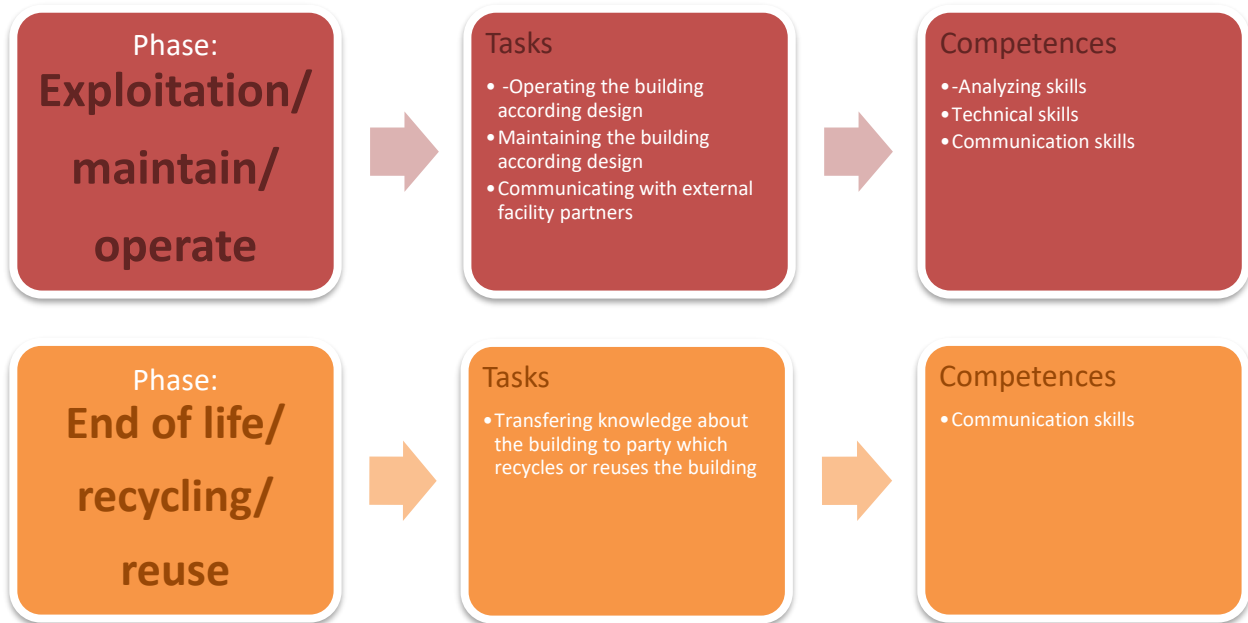
To transfer knowledge from the realization phase with the purpose to obtain a practical feasible design.

To realize the design in a correct way.

To operate and maintain the building according to the design.

➤ Tasks and Competencies of the Technicians in the BLC





➤ Role of the Tenants/Owners in the BLC

To transfer building requirements to designers

To check the design with the building requirements To check the building requirements with the actual building

To use the building according the building requirements/design

To transfer knowledge about the building to third parties

➤ Role of the Tenants/Owners when focusing on energy aspects

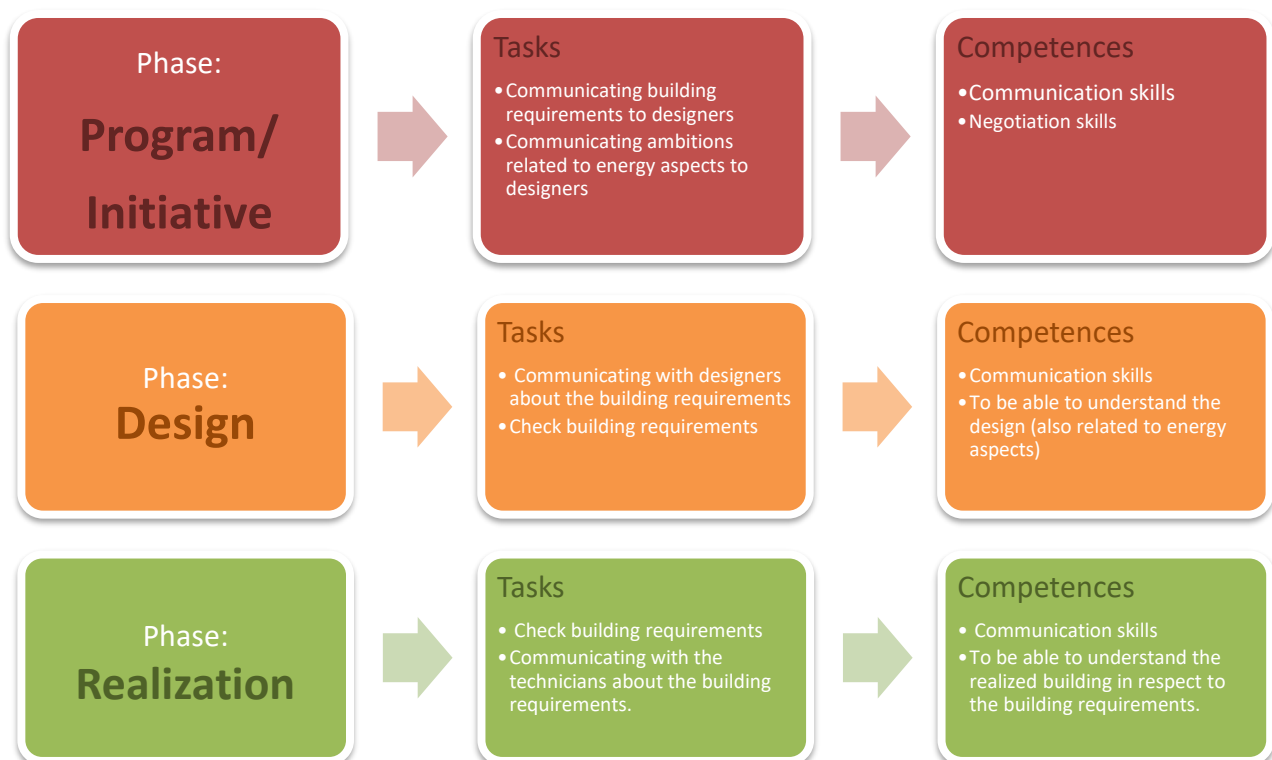
To transfer ambitions related to energy aspects to designers

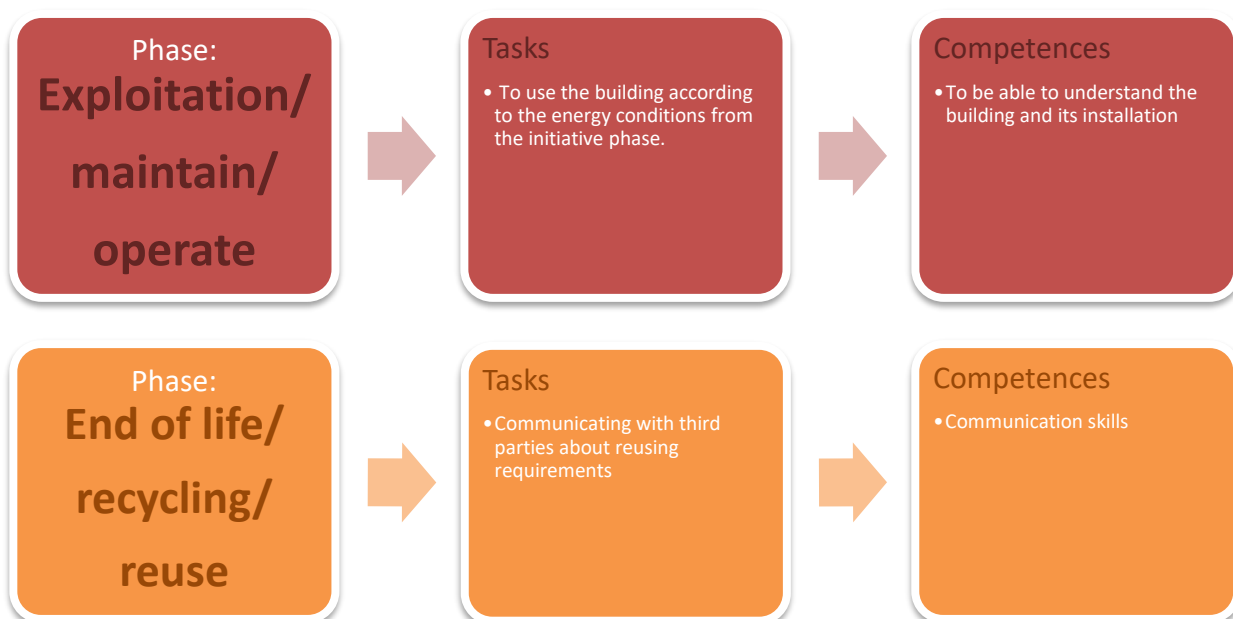
To check the energy related ambitions with the design

To check the energy related ambitions with the actual building related to energy aspects

To use the building with the energy aspects in mind. The building is built according to the energy aspects ambitions, it has to be used in this way.

➤ Tasks and Competencies of the Tenants/Owners in the BLC





3.7 Estonian Situation

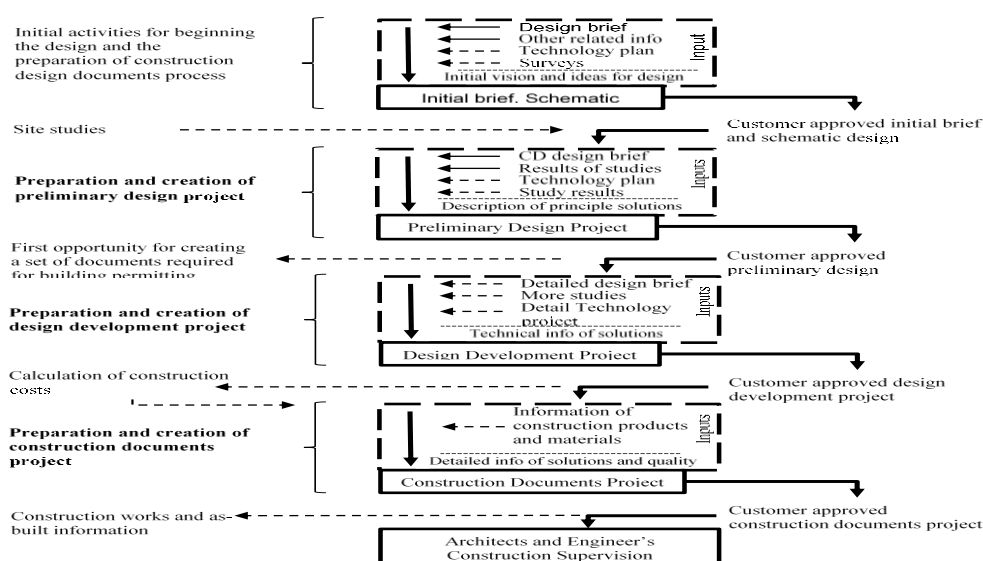
Contributed by	Estonia
Author	Ergo Pikas and Targo Kalamees
Contact	
Source	

➤ General overview of the Building Life Cycle

In Estonia, there is no commonly agreed life-cycle model for the built environment on a legislative level, and the model in the standards (not mandatory in Estonia to use) are concerned only with the design project delivery. Thus, the process outline proposed below is a rough synthesis of different documents, including legislative acts, standards, and guidelines by the authors.

Time periods:		Plan & Program	Design	Construction	Use	End of Use and/or Life
Phases:	Spatial Planning, Legislation and Standards	Strategic Brief Building Programming	Schematic Design Preliminary Design Design Development Construction Documents	Pre-construction Planning Procurement, Fabrication and Delivery Construction/ Installation	Commissioning and Handover Operations and Maintenance Remodeling/ Renovation	Deconstruction/ Recycling

Currently, the formal document explicitly defining the project delivery phases is the EVS 932:2017 Construction design documents. However, the focus in that document is on the delivery of design projects, excluding all the phases before and after the design project and only stating the formal connections to these on a high level. This process maps is shown below.



➤ Role of the Public Administration in the BLC

In Estonia, the Public Administration by different public organizations are acting in different phases of the project delivery and are mainly responsible for planning, monitoring, controlling and/or conducting spatial planning and construction works. During pre-project phases, the main tasks of the Public Administration are related to spatial planning and the development of Building Code:

- The aim of this **Planning Act** is to create, through spatial planning, by promoting environmentally sound and economically, culturally and socially sustainable development, the preconditions that are necessary for democratic, long-term and balanced spatial development that takes into account the needs and interests of all members of the Estonian society to occur, for democratic, long-term and balanced land use pattern that takes into account the needs and interests of all members of the Estonian society to form and for high-quality living and built environment to develop.
 - The authorities that organize planning work are, according to their competence, the Ministry of Finance, other relevant government agencies or local authorities:
 1. ensuring the existence of spatial plans corresponding to the land area;
 2. arranging the preparation of spatial plans;
 3. the preparation of spatial plans or commissioning the preparation of spatial plans;
 4. the taking of the procedural steps required in the course of preparing spatial plans;
 5. assessment of the relevant economic, social, cultural and environmental impacts resulting from the implementation of the spatial plan, including arranging the strategic environmental assessment;
 6. following, reviewing and implementing adopted spatial plans to the extent of the duties imposed by legislation on the authority that organizes planning work.
- The aim of **Building Code** is to promote sustainable development and to ensure the safety, purposeful functionality and usability of the built environment. Code applies to construction works: their design, building, use and maintenance insofar as this is not governed by other Acts, ratified international treaties or EU legislation. This Code also applies in the territorial sea and exclusive economic zone. The tasks assigned to public organizations as part of the Building Code include:
 - Public authority issues design specifications (local authority unless otherwise provided by law).
 - Authority is authorized to demand the submission of a building notice (Building Notice), when there is no building permitting requirement.
 - Public (local) authority issues the building permit, unless otherwise provided by law (Building Permit).
 - Competent authority decides on the need to initiate the assessment of environmental impact during building permitting process.
 - Authority is authorized to demand the notice of the commencement of building work and notice of the complete demolition of a construction work, when building permitting was required.

- Authority is authorized to require the submission of a use and occupancy notice in advance of the use and occupancy of the construction work or of a change in its purpose of use, when there is no occupancy permitting requirement.
- Public (local) authority issues the use and occupancy permit, unless otherwise provided by law (Use and Occupancy Permit).
 - **In three cases it is the Technical Regulatory Authority that is responsible for use and occupancy permitting:** when construction works were built on the basis of a national special spatial plan; when the issuing of the use and occupancy permit is in the competency of the government; and when issuing of the use and occupancy permit is in the competency of several government agencies

➤ Role of the Public Administration when focusing on energy aspects

Tasks related to energy efficiency according to spatial Planning Act:

- When preparing spatial plans, preference must be given, where possible, to solutions that are environmentally sound and ensure good energy performance.
- To determine the principles and directions of other infrastructure, including energy, gas and communication networks;
- To determine the principles and directions of other infrastructure, including energy, gas and communication networks;

Tasks related to energy efficiency according to Building Code:

- May make regulations to establish the procedure for assessing the average building cost
- Makes regulations to establish requirements for the energy audits of buildings
- Makes regulations for the methodology of calculating the energy performance of buildings
- Makes regulations to establish the minimum requirements for energy performance, including the requirements for technical systems that consume significant amounts of energy, and the conditions for introducing the use of renewable energy in buildings:
 - The minimum requirements for energy performance are reviewed at least once every five years
- Makes regulations to establish the requirements for energy performance certificates and for the issuing of such certificates
- Makes regulations to establish the precise definition of the heating and cooling equipment, the list of the particulars to be entered in the register of construction works and the procedure of transmitting the particulars
- Makes regulations to establish the extent of protection zones, their protection and marking out and the recommendations for carrying out operations within protection zones

➤ Tasks and Competencies of the Public Administration in the BLC

(Local) authority verifies during the building permitting that designed construction works meet the energy efficiency requirements.

Authority assures that owners have entered the energy certifies during different stages of design.

The competencies of public authorities do not differ from the architecture and engineering as these are the prerequisite educations for working in publication administration positions

➤ Role of the Professionals in the BLC

“Professional” includes Architects and Engineers who are responsible for identifying and quantifying needs and requirements of the authorities, customers, users, contractors, building managers/maintainers, and design to these needs and requirements. In addition, during the construction, designers are responsible to provide test and control works conducted by blue-collar workers.

➤ Role of the Professionals when focusing on energy aspects

Architects (Applied Architect EQF 6, Diploma/Certified Architect EQF 7, Principal Architect 7, Principal Architect-Expert 8):

- Participate, lead, manage, coordinate, carry-out designs related spatial planning and architecture of the building projects. Use knowledge and principles to conceive systems as whole in architecture and energy efficiency in mind

Engineering, including civil engineer in buildings and structures; automation engineer; hydro-technical engineer; heating, ventilation and air conditioning (HVAC); road engineering; Water Supply and Sewerage Engineering on different levels, including EQF 6, 7, 8:

- Participate, lead, manage, coordinate, carry-out designs related spatial planning and engineering of the building projects. Use knowledge and principles to conceive systems as whole in technical and energy efficiency in mind

➤ Tasks and Competencies of the Professionals in the BLC

Architects (Applied Architect EQF 6, Diploma/Certified Architect EQF 7, Principal Architect 7, Principal Architect-Expert 8) tasks:

- Conception and design of spatial plans across all different types of plans (National Spatial Plan, National Designated Plan, County-Wide Spatial Plan, Comprehensive Plan, Local Government Designated Spatial Plan, Detailed Spatial Plan)
- Conception and design of building project architecture (interior, building, site) through all the phases (according to EVS 932:2017) of design project
- Auditing of design works related to building project architecture (interior, building, site), spatial planning, and built environment
- Facilitation and coordination of work related to spatial planning in public sector
- Management of spatial planning projects
- Management of building design projects

Architecture personal qualities:

Spatial imagery, creativity, logical thinking, generalization and abstraction, autonomy, decision-making, accuracy, collaboration, communication, stress tolerance, achievement needs and aesthetic skills.

Engineering, including civil engineer in buildings and structures; automation engineer; hydro-technical engineer; heating, ventilation and air conditioning (HVAC); road engineering; Water Supply and Sewerage Engineering on different levels, including EQF 6, 7, 8:

- Construction project design with respect to buildings, external utilities and spatial planning
- Management of design projects with respect to buildings, construction site and external utilities
- Auditing of works with respect to buildings, construction site and external utilities
- Construction management with respect to buildings, construction site and external utilities
 - Feasibility and cost-benefit analysis
 - Management of construction procurement processes
 - Preparation of design works
 - Preparation of building processes
 - Owner's supervision and representation
 - Management of commissioning and handover processes
- Building process management
 - Preparation of tenders
 - Planning of construction works
 - Management and coordination of production of construction products and materials
 - Operations management
 - Quality management
- Building cost evaluations
- Surveys
- Maintenance and operations
 - Management and operation of buildings and equipment
- Training
- Research and Development

Engineering personal qualities:

Analytical, accuracy, spatial imagery, creativity, problem-solving, autonomy, decision-making, adaptability and communication, leadership and co-operation/collaboration skills

➤ **Role of the Technicians in the BLC**

In this Target Group are included supplier of raw materials and components, workers, installers and demolition companies. Thus, these groups are in or another part of the supply chain, responsible for the execution and delivery of work results.

➤ **Role of the Technicians when focusing on energy aspects**

- Carry out construction and maintenance works on the buildings and structures of buildings

➤ **Tasks and Competencies of the Technicians in the BLC**

- Carry out construction and maintenance works on the buildings and structures of buildings
- Understands the possibilities and necessity of saving energy and resources in the real estate environment and works accordingly
- Only awareness of energy consumption and energy efficiency is required

➤ **Role of the Tenants/Owners in the BLC**

According to Building the owner must ensure the conformity of the construction work, of building work and of the use of the construction work to the requirements arising from legislation; amongst other things, the owner must ensure:

- the conformity of the construction work to spatial plans or to design specifications;
- the existence of permits required for building work and for the use and occupancy of the construction work and the making of the required notifications and notices;
- that any work which is performed directly at the owner's instruction and which is governed by this Code is performed by a person possessing sufficient skills and knowledge (hereinafter, 'qualifications') that correspond to the specific character of the work;
- the maintenance and safety of use of the construction work;
- owner supervision in the cases provided in law.

➤ **Role of the Tenants/Owners when focusing on energy aspects**

The customer must ensure socially sustainable development, through the planning stage, a high-quality natural and built environment. It also includes energy performance as part of it based on following standards:

- Minimum energy performance requirements for buildings have been established in the state (03.03.2017)
- Nationally established methodology for calculating energy performance of buildings (07/01/2015)
- The contracting authority must take into account the requirements set out above when designing the initial task

➤ **Tasks and Competencies of the Tenants/Owners in the BLC**

Customer/Owner must ensure the fulfilment of legislative requirements throughout the life cycle of the building with respect to responsibilities stemming from the spatial Planning Act and Building Code.