

	BIM Qualification and Certification Schemes	
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DELIVERABLE: D32 – D5.4

BIM Qualification & Certification Schemes

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WP Leader: FLC (ES)

Author: CS Aziendale by Subcontracting AICQ Sicev Srl

Contributors: Partners

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Brief description

The Deliverable D3.2 – Requirements for learning outcomes, contain all Learning Objects (LO) for each one of Project target profile:

- N. 06 Learning Outcomes for Public Administrations;
- N. 12 Learning Outcomes for Professionals;
- N. 05 Learning Outcomes for Public Technicians;
- N. 08 Learning Outcomes for Owners and Building Administrators.

JUST FOR CONVENIENCES, in section B of Deliverable D3.2 was put the Qualification and Certification Schemes, constituting the present deliverable D5.4

The subsequent certification schemes, are applicable for all 4 Project Target Group:

- Public Administrations,
- Professionals,
- Technicians,
- Owners and Building Administrators;

with the same requirements.

All human resources (potentially) of this Target Groups can be certified, on the base of under described schemes:

- BIM Coordinator;
- BIM Expert Specialist;
- BIM Manager;
- BIM Model Evaluator;
- BIM User.

This document has the purpose to define the minimum requirements for the certification of competences of the professional profile. It contains requirements that BIM profiles must have after the training process.

The certification scheme for BIM professional profiles will be translated into a draft standard following the CEN guide n14 “Common policy guidance for addressing standardisation on qualification of professions and personnel”.

The document produced will be transferred to the CEN and/ or ISO technical Committee dealing with BIM issues and BIM professional profiles in order to include energy performance requirements.

The standardization of BIM professional Certification Scheme will be used by C.A.B. UNI EN ISO 17024 UNI

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BIM Expert Specialist

BIM Manager Final

BIM Model Evaluator

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1. PURPOSE AND FIELD OF APPLICATION

The present QUALIFICATION AND CERTIFICATION SCHEME has the purpose to define the minimum requirements for the certification of competences of the professional profile of BIM COORDINATOR (or equivalent).

2. PROFESSIONAL PROFILE¹

BIM COORDINATOR is a professional specialized in the integration of different models, with background in one of the following working fields: construction management, architecture, building management, structural engineering, mechanical engineering, electrical engineering.

For the Net-UBIEP purpose, the profile of the BIM COORDINATOR is integrated with additional SPECIFIC COMPETENCES of Energy Efficiency:

- C0.CO Have basic BIM knowledge and skills;
- C1.CO Understand BIM tools;
- C2.CO Apply information management;
- C3.CO Apply procurement management;
- C4.CO Use BIM technology;
- C5.CO Analyse BIM Model.

For each of the above-mentioned competences, the ASSESSMENT CRITERIA will be described, which will constitute the outgoing evaluation elements of the Professional Profile.

3. BASIC DOCUMENTS

- Net-UBIEP D10 – D2.1 Report on Existing BIM Professional Profiles / Results
- Net-UBIEP D13 – D2.4 List of Competences related to energy performance needed for each BIM Professional Profiles
- Net-UBIEP D14 – D3.1 Three-dimensional Matrix
- Net-UBIEP D15.A – D3.2 A Requirements for Learning Outcomes for the four Target Groups
- PROF/TRAC Technology and Interdisciplinary Competences Per Target Group

4. SUPPORT DOCUMENTS

- 2017/C 189/03 Official Journal of the European Union - Council Recommendation of 2017/05/22: European Qualification Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning
- ISO/IEC TC 59/SC 13 V5-7 ISO/CD 19650-1 Information management using building information modelling

¹ Definition indicated in Net-UBIEP D10 – D2.1 Report on existing BIM Professional Profiles / Results

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5. DEFINITION AND ACRONYMOUS

Qualification means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards;

National qualifications system means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. That includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework;

National qualifications framework means an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims at integrating and coordinating national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society;

International qualification means a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body;

Learning outcomes means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

The acronyms "Cx.Ky" means "Knowledge number Y necessary for the Competence Number X";

Skills mean the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments). The acronyms "Cx.Sy" means "Skill number Y necessary for the Competence Number X";

Responsibility and autonomy means the ability of the learner to apply knowledge and skills autonomously and with responsibility;

Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The acronyms "Cx.CO" means "Competence Number X necessary for the BIM COORDINATOR";

Validation of competences matured during informal and non-formal contexts means the process of confirmation by a competent authority that an individual has acquired competences in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification;

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Recognition of competences means the process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers;

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6. SPECIFIC REQUIREMENTS FOR THE QUALIFICATION OF THE BIM COORDINATOR (or equivalent)

Minimum access requirements

The minimum access requirements of BIM COORDINATOR's (or equivalent) Qualification and Certification path are shown below, in tabular form:

Minimum access requirements	BIM COORDINATOR (or equivalent)
<i>Education</i>	<p>EQF7 (or higher)</p> <ul style="list-style-type: none"> ✓ Level of knowledge: BIM COORDINATOR has highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research. He has critical awareness of knowledge issues in a field and at the interface between different fields. ✓ Level of skills: BIM COORDINATOR has specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields. ✓ Level of responsibility and autonomy: BIM COORDINATOR manages and transforms work or study contexts that are complex, unpredictable and require new strategic approaches. He takes responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams. He works in staff with BIM Manager, BIM Information manager, Project Manager or similar figures.
<i>General Work Experiences</i>	<p>To access to the Qualification and Certification path as "BIM COORDINATOR " (or equivalent) it is necessary to document an appropriate work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • work experiences of at least three years in architectural, construction or engineering role as designer
<i>Specific Work Experiences</i>	<p>To access to the Qualification and Certification path as "BIM COORDINATOR" (or equivalent) it is necessary to document an appropriate specific work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • proven experiences of at least three years in modelling new nZEB projects or the refurbishment of existing buildings up to nZEB level, with particular attention to energy efficiency and BIM • proven experiences in design of projects with IT skills • great verbal and written skills acquired during previous experiences

Minimum requirements after the Qualification and Certification path

The minimum requirements reached after the Qualification and Certification path are shown below, in tabular form. They are defined according to the correspondent phase of the Building Life Cycle.

BIM COORDINATOR (The EQF Level of each one of the competences are described inside the 3D Matrix – deliverable D4.8)	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C0.CO Have basic BIM knowledge and skills								
Knowledge								
C0.K1. BIM basic concepts, terminology, principles, strategies and its value proposition								
C0.K2. Benefits and uses of BIM compared to traditional methods for improving energy efficiency of new or existing buildings								
C0.K3. Project information development cycle: information specification, development, exchange and maintenance throughout all the building life cycle								
C0.K4. Reasons for open and interoperable solutions to ensure collaboration among professionals of different disciplines								
C0.K5. Methodology to identify, plan, develop and evaluate organization's BIM implementation capabilities and BIM uses								
C0.K6. Relevance of maintenance to maintain the foreseen energy performance								
Skill								
C0.S1. Read a BIM Execution Plan (BEP)								
C0.S2. Read a Information Delivery Manual								
C0.S3. Identify information requirements for his own role								
C0.S4. Identify the format to read information and transfer information within the supply chain								
C0.S5. Identify the EIR (Employer Information Requirements)								
C0.S6. Identify and/or verify the stages of PIM (Project Information Management)								
C1.CO Understand BIM tools								
Skill								
C1.S1. Specialised skills to incorporate information in a BIM Model, evaluating openBIM software								
C1.S2. Stay up to date on BIM trends, current developments and new directions of BIM technologies								

BIM COORDINATOR	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C2.CO Apply information management								
Knowledge								
C2.K1. Principle of data mining, data base and back up in the CDE (Common Data Environment)								
C2.K2. Principle of data transferring among different software and/or data federating into an integrated design								
C2.K3. Principle of data security and administrative law in the archiving of data in a CDE (Common Data Environment)								
C2.K4. Principle of information management in building sustainability and lean design								
Skill								
C2.S1. Manage and coordinate information related to energy performance								
C2.S2. Identify which graphic and/or non-graphic information are necessary for a better management of works and for define the completeness of the Information Delivery Plan in relation to energy performance								
C2.S3. Archive the model ensuring that the information provided is kept intact and not manipulated for any future use								
C2.S4. Evaluate the completeness of the maintenance plan to be used in EPC (Energy Performance Contracting)								
C2.S5. Evaluate the completeness of the handover strategy								
C2.S6. Verify the correspondence between the "as built" and the final BIM model								
C2.S7. Identify requirements for the management of data in the CDE (Common Data Environment) for any professionals involved in the process								
C2.S8. Transfer building information using BIM to facility managers and final users								
C2.S9. Ensure that construction process and product information is transferred into BIM Model / Technical Specifications and provide information on status of works when request								
C2.S10. Ensure the update of the BIM Model / Technical Specification when a maintenance is performed								
C2.S11. Use BIM for assessing the reusability and recycling of building materials and components								
C2.S12. Develop a CDE (Common Data Environment) to exchange data through the building life cycle as well as through the supply chain								

BIM COORDINATOR	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C3.CO Apply procurement management								
Knowledge								
C3.K1. Processes, methods and principles of decision-making on procuring services and suppliers								
C3.K2. Processes, methods and principles of decision-making on materials and products								
C3.K3. Legal and technical aspects on green procurement, state and rules for using public funding and international good practices of energy performance contracting								
C3.K4. Strategies for training programs to increase energy efficiency with the support of BIM								
Skill								
C3.S1. Select or evaluate selected companies with experience in the technologies defined								
C3.S2. Select products that fit specifications and demands on given quality aspects making financial calculation related to contracting phase								
C3.S3. List and collaborate with several stakeholders who participate in the sustainable project, distinguishing roles/needs and involving them in the information delivery plan preparation and management								

BIM COORDINATOR

Phases

Strategic Definition	Preparation and Definition	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
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C4.CO Use BIM technology

Knowledge

C4.K1. Techniques and principles of integrated digital production and rendering							
C4.K2. Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standards							
C4.K3. Principle of planning and scheduling for BEP (BIM Execution Plan)							
C4.K4. Principles of interplays between all aspects of building design, building use and outdoor climate for dynamic evaluation							
C4.K5. Principles and systems of sustainable buildings, including renewable energy production							
C4.K6. Design techniques for different scenarios for new resilient buildings to future climate changes and for the refurbishment of existing buildings							
C4.K7. Techniques of automatic code checking and management of software e-permit							
C4.K8. Principle of information maturity level representation of the model defining the methodology for BIM maturity level							

Skill

C4.S1. Produce a digital 3D model of building / any BIM object needed for the library in the Common Data Environment							
C4.S2. Develop a BEP (BIM Execution Plan)							
C4.S3. Develop site utilization planning, set-up organized management systems, track the effectiveness distribution of appropriate spaces and related resources							
C4.S5. Use BIM enabled simulation techniques to reduce the environmental impact							
C4.S6. Integrate different RES (Renewable Energy Sources) and energy efficiency systems into buildings without clash detection							
C4.S7. Produce a maintenance plan and a maintenance manual for building systems							
C4.S9. Use code checking to verify the respect of energy performance requirements							
C4.S10. Use 4D and 5D BIM technologies to evaluate time and cost							

BIM COORDINATOR	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C5.CO Analyse the BIM Model								
Knowledge								
C5.K1. Principle of global environmental impact of different building products and technologies (RES use, insulation, HVAC systems and building automation systems)								
C5.K2. Techniques of passive measures needed for the management of nZEB								
C5.K3 Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standard								
Skill								
C5.S1. Coordinate the work of different disciplines in order to obtain a consolidate BIM model that satisfy all the requirements								
C5.S2. Apply Quality Management and coordinate team members of different disciplines								
C5.S3. Apply BIM enabled energy and lighting analysis with periodic monitoring								
C5.S4. Validate BIM Model								
C5.S5. Use BIM to assure the technical supervision of construction works								
C5.S6. Use BIM models to communicate installation instructions								

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7. METHODS OF VERIFICATION OF THE POSSESSION OF MINIMUM REQUIREMENTS TO BE REACHED AFTER THE QUALIFICATION AND CERTIFICATION PATH

The methods below for the recognition of competences will be applied to each competence defined in Chapter 6 (Minimum requirements after the Qualification and Certification path).

Methods of verification of requirements	BIM COORDINATOR
<i>Knowledge and skills</i>	The possession of knowledge is verified by one of the following points: <ul style="list-style-type: none"> • possession of validation certificate complied with BIM Qualification and Certification Schemes proving the previous formal recognition of learning outcomes under international qualification perspective; • validation of competences maturated during informal and non-formal contexts proving the experiences with support documents.
<i>Responsibility and autonomy</i>	Curricular analysis (of Curriculum Vitae and any additional support documents proving the experience such as the Project Portfolio).

The candidate able to document the possession and validation of all the requirements defined in Chapter 6 (Minimum requirements after the Qualification and Certification path) is admitted to the final exam to became BIM COORDINATOR.

8. ACCREDITATION METHODS OF CERTIFICIATION BODIES

To be defined as accredited Certification Body, the learning provider need to apply to National Accreditation Body, according to National Qualification System.

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9. FINAL EXAM

Final Exam	BIM COORDINATOR
<i>Evaluation</i>	<p>The final exam is composed by two evaluation sections:</p> <ol style="list-style-type: none"> 1. an initial practical exercise on subjects and issues related to the integration of information of new nZEB projects or the refurbishment of existing buildings, with weight of 40%. 2. and an oral interview to verify the sue of interoperability among different software integrating energy efficiency strategies related to BIM Models, with weight of 60%. <p>The exercises and questions will be chosen from the database of the Qualification/Certification Body.</p>
<i>Commission</i>	<p>The Commission is composed by:</p> <ul style="list-style-type: none"> • at least one Relevant Commissioners who fulfil the following requirements: <ul style="list-style-type: none"> ○ being in possession of BIM COORDINATOR Qualification; ○ being in possession of proven experiences in field of professional training <p>The possession of higher qualification and/or developed skills/experiences as BIM COORDINATOR will be preferential requirements.</p> • a Commission President who fulfils the following requirement: <ul style="list-style-type: none"> ○ acted as Relevant Commissioner of BIM Professional Profiles over the past 3 years.

10. PARTICULAR SITUATION

The Qualification and Certification Scheme intends to recognize the great professionalism present in the world of industry and services, simplifying the process of assessment of knowledge, skills and responsibility and autonomy, which however cannot be separated from an objective assessment.

The Qualification and Certification Scheme leaves the possibility to recognize a JUNIOR or SENIOR profile based on the level of experiences acquired in the past (in accordance with the minimum years of work experiences defined in Chapter 6). The Qualification and Certification Scheme could be applied in specific market sectors.

During the first 5 years after the publication of this document, The Commission needs to fulfil the following requirements (in substitution of the requirement in Chapter 9):

- for each Relevant Commissioners:
 - being in possession of proven experiences in construction industry;
 - being in possession of proven experiences in field of professional training.
- for Commission President:
 - acted as Relevant Commissioner (in whatever field) over the past 5 years.

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11. RENEWAL OF THE QUALIFICATION AND CERTIFICATION OF COMPETENCES

To ensure that BIM COORDINATORS remain well-versed once they have attained the certification, they are required to complete 16 hours per year of continuing education by attending e-learning courses, workshops, conferences and seminars in order to improve their competences in Chapter 6. The three-year Qualification and Certification of Competences Renewal is foreseen by means of a verification test to maintain and update the competences.

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1. PURPOSE AND FIELD OF APPLICATION

The present QUALIFICATION AND CERTIFICATION SCHEME has the purpose to define the minimum requirements for the certification of competences of the professional profile of BIM EXPERT-SPECIALIST (or equivalent).

2. PROFESSIONAL PROFILE²

BIM EXPERT-SPECIALIST is a professional specialized in the production and checking of BIM Models, with background in architecture, mechanical engineering (including plumbing), electrical engineering and structural engineering.

For the Net-UBIEP purpose, the profile of the BIM EXPERT-SPECIALIST is integrated with additional SPECIFIC COMPETENCES of Energy Efficiency:

- C0.ES Have basic BIM knowledge and skills;
- C1.ES Understand BIM tools;
- C2.ES Apply information management;
- C3.ES Apply procurement management;
- C4.ES Use BIM technology;
- C5.ES Analyse BIM Model.

For each of the above-mentioned competences, the ASSESSMENT CRITERIA will be described, which will constitute the outgoing evaluation elements of the Professional Profile.

3. BASIC DOCUMENTS

- Net-UBIEP D10 – D2.1 Report on Existing BIM Professional Profiles / Results
- Net-UBIEP D13 – D2.4 List of Competences related to energy performance needed for each BIM Professional Profiles
- Net-UBIEP D14 – D3.1 Three-dimensional Matrix
- Net-UBIEP D15.A – D3.2 A Requirements for Learning Outcomes for the four Target Groups
- PROF/TRAC Technology and Interdisciplinary Competences Per Target Group

4. SUPPORT DOCUMENTS

- 2017/C 189/03 Official Journal of the European Union - Council Recommendation of 2017/05/22: European Qualification Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning
- ISO/IEC TC 59/SC 13 V5-7 ISO/CD 19650-1 Information management using building information modelling

² Definition indicated in Net-UBIEP D10 – D2.1 Report on existing BIM Professional Profiles / Results

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5. DEFINITION AND ACRONYMOUS

Qualification means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards;

National qualifications system means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. That includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework;

National qualifications framework means an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims at integrating and coordinating national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society;

International qualification means a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body;

Learning outcomes means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

The acronyms "Cx.Ky" means "Knowledge number Y necessary for the Competence Number X";

Skills mean the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments). The acronyms "Cx.Sy" means "Skill number Y necessary for the Competence Number X";

Responsibility and autonomy means the ability of the learner to apply knowledge and skills autonomously and with responsibility;

Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The acronyms "Cx.ES" means "Competence Number X necessary for the BIM EXPERT-SPECIALIST";

Validation of competences matured during informal and non-formal contexts means the process of confirmation by a competent authority that an individual has acquired competences in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification;

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Recognition of competences means the process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers;

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6. SPECIFIC REQUIREMENTS FOR THE QUALIFICATION OF THE BIM EXPERT-SPECIALIST (or equivalent)

Minimum access requirements

The minimum access requirements of BIM EXPERT-SPECIALIST's (or equivalent) Qualification and Certification path are shown below, in tabular form:

Minimum access requirements	BIM EXPERT-SPECIALIST (or equivalent)
Education	EQF 6 (or higher) ✓ Level of knowledge: BIM EXPERT-SPECIALIST has advanced knowledge of a field of work or study, involving a critical understanding of theories and principles ✓ Level of skills: BIM EXPERT-SPECIALIST has advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study ✓ Level of responsibility and autonomy: BIM EXPERT-SPECIALIST manages complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts. He takes responsibility for managing professional development of individuals and groups.
General Work Experiences	To access to the Qualification and Certification path as "BIM EXPERT-SPECIALIST" (or equivalent) it is necessary to document an appropriate work experience, in the last years as specified below: <ul style="list-style-type: none"> • work experiences of at least three years in architectural, construction or engineering role as designer
Specific Work Experiences	To access to the Qualification and Certification path as "BIM EXPERT-SPECIALIST" (or equivalent) it is necessary to document an appropriate specific work experience, in the last years as specified below: <ul style="list-style-type: none"> • proven experiences of at least three years in modelling new nZEB projects or the refurbishment of existing buildings up to nZEB level, with particular attention to energy efficiency • proven experiences in design of projects with IT skills • great verbal and written skills acquired during previous experiences

Minimum requirements after the Qualification and Certification path

The minimum requirements reached after the Qualification and Certification path are shown below, in tabular form. They are defined according to the correspondent phase of the Building Life Cycle.

BIM EXPERT-SPECIALIST (The EQF Level of each one of the competences are described inside the 3D Matrix – deliverable D4.8)	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C0.ES Have basic BIM knowledge and skills								
Knowledge								
C0.K1. BIM basic concepts, terminology, principles, strategies and its value proposition								
C0.K2. Benefits and uses of BIM compared to traditional methods for improving energy efficiency of new or existing buildings								
C0.K3. Project information development cycle: information specification, development, exchange and maintenance throughout all the building life cycle								
C0.K4. Reasons for open and interoperable solutions to ensure collaboration among professionals of different disciplines								
C0.K5. Methodology to identify, plan, develop and evaluate organization's BIM implementation capabilities and BIM uses								
C0.K6. Relevance of maintenance to maintain the foreseen energy performance								
Skill								
C0.S1. Read a BIM Execution Plan (BEP)								
C0.S2. Read an Information Delivery Manual								
C0.S3. Identify information requirements for his own role								
C0.S4. Identify the format to read information and transfer information within the supply chain								
C0.S5. Identify the EIR (Employer Information Requirements)								
C0.S6. Identify and/or verify the stages of PIM (Project Information Management)								
C1.ES Understand BIM tools								
Skill								
C1.S1. Specialised skills to incorporate information in a BIM Model, evaluating openBIM software								
C1.S2. Stay up to date on BIM trends, current developments and new directions of BIM technologies								

BIM EXPERT-SPECIALIST	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C2.ES Apply information management								
Knowledge								
C2.K2. Principle of data transferring among different software and/or data federating into an integrated design								
C2.K3. Principle of data security and administrative law in the archiving of data in a CDE (Common Data Environment)								
C2.K4. Principle of information management in building sustainability and lean design								
Skill								
C2.S2. Identify which graphic and/or non-graphic information are necessary for a better management of works and for define the completeness of the Information Delivery Plan in relation to energy performance								
C2.S4. Evaluate the completeness of the maintenance plan to be used in EPC (Energy Performance Contracting)								
C2.S5. Evaluate the completeness of the handover strategy								
C2.S6. Verify the correspondence between the "as built" and the final BIM model								
C2.S11. Use BIM for assessing the reusability and recycling of building materials and components								
C2.S12. Develop a CDE (Common Data Environment) to exchange data through the building life cycle as well as through the supply chain								
C3.ES Apply procurement management								
Knowledge								
C3.K3. Legal and technical aspects on green procurement, state and rules for using public funding and international good practices of energy performance contracting								
Skill								
C3.S3. List and collaborate with several stakeholders who participate in the sustainable project, distinguishing their role and needs								

BIM EXPERT-SPECIALIST

Phases

Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
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C4.ES Use BIM technology

Knowledge

C4.K1. Techniques and principles of integrated digital production and rendering							
C4.K2. Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standards							
C4.K4. Principles of interplays between all aspects of building design, building use and outdoor climate for dynamic evaluation							
C4.K5. Principles and systems of sustainable buildings, including renewable energy production							
C4.K6. Design techniques for different scenarios for new resilient buildings to future climate changes and for the refurbishment of existing buildings							
C4.K7. Techniques of automatic code checking and management of software e-permit							

Skill

C4.S1. Produce a digital 3D model of building / any BIM object needed for the library in the Common Data Environment							
C4.S3. Develop site utilization planning, set-up organized management systems, track the effectiveness distribution of appropriate spaces and related resources							
C4.S4. Use laser scanning in order to produce a point of cloud of existing buildings, comparing and evaluating facilities and related systems							
C4.S5. Use BIM enabled simulation techniques to reduce the environmental impact							
C4.S6. Integrate different RES (Renewable Energy Sources) and energy efficiency systems into buildings without clash detection							
C4.S9. Use code checking to verify the respect of energy performance requirements							
C4.S10. Use 4D and 5D BIM technologies to evaluate time and cost							

BIM EXPERT-SPECIALIST

Phases

Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
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C4.ES Analyse the BIM Model

Knowledge

C5.K1. Principle of global environmental impact of different building products and technologies (RES use, insulation, HVAC systems and building automation systems)


C5.K3 Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standard

Skill

C5.S3. Apply BIM enabled energy and lighting analysis with periodic monitoring

C5.S4. Validate BIM Model

C5.S6. Use BIM models to communicate installation instructions

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7. METHODS OF VERIFICATION OF THE POSSESSION OF MINIMUM REQUIREMENTS TO BE REACHED AFTER THE QUALIFICATION AND CERTIFICATION PATH

The methods below for the recognition of competences will be applied to each competence defined in Chapter 6 (Minimum requirements after the Qualification and Certification path).

Methods of verification of requirements	BIM EXPERT-SPECIALIST
<i>Knowledge and skills</i>	The possession of knowledge is verified by one of the following points: <ul style="list-style-type: none"> • possession of certificate of validation comply with BIM Qualification and Certification Schemes proving the previous formal recognition of learning outcomes under international qualification perspective; • validation of competences maturated during informal and non-formal contexts proving the experiences with support documents.
<i>Responsibility and autonomy</i>	Curricular analysis (of Curriculum Vitae and any additional support documents proving the experience such as the Project Portfolio).

The candidate able to document the possession and validation of all the requirements defined in Chapter 6 (Minimum requirements after the Qualification and Certification path) is admitted to the final exam to became BIM EXPERT-SPECIALIST.

8. ACCREDITATION METHODS OF CERTIFICATION BODIES

To be defined as accredited Certification Body, the learning provider need to apply to National Accreditation Body, according to National Qualification System.

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9. FINAL EXAM

Final Exam	BIM EXPERT-SPECIALIST
Evaluation	<p>The final exam is composed by two evaluation sections:</p> <ol style="list-style-type: none"> 1. an initial practical exercise on subjects and issues related to the checking of information of nZEB projects with weight of 60%. 2. and an oral interview to verify check strategies related to BIM, with weight of 40%. <p>The exercises and questions will be chosen from the database of the Qualification/Certification Body.</p>
Commission	<p>The Commission is composed by:</p> <ul style="list-style-type: none"> • at least one Relevant Commissioners who fulfil the following requirements: <ul style="list-style-type: none"> ○ being in possession of BIM EXPERT-SPECIALIST Qualification; ○ being in possession of proven experiences in field of professional training <p>The possession of higher qualification and/or developed skills/experiences as BIM EXPERT-SPECIALIST will be preferential requirements.</p> • a Commission President who fulfils the following requirement: <ul style="list-style-type: none"> ○ acted as Relevant Commissioner of BIM Professional Profiles over the past 3 years.


10. PARTICULAR SITUATION

The Qualification and Certification Scheme intends to recognize the great professionalism present in the world of industry and services, simplifying the process of assessment of knowledge, skills and responsibility and autonomy, which however cannot be separated from an objective assessment.

The Qualification and Certification Scheme leaves the possibility to recognize a JUNIOR or SENIOR profile based on the level of experiences acquired in the past (in accordance with the minimum years of work experiences defined in Chapter 6). The Qualification and Certification Scheme could be applied in specific market sectors.

During the first 5 years after the publication of this document, The Commission needs to fulfil the following requirements (in substitution of the requirement in Chapter 9):

- for each Relevant Commissioners:
 - being in possession of proven experiences in construction industry;
 - being in possession of proven experiences in field of professional training.
- for Commission President:
 - acted as Relevant Commissioner (in whatever field) over the past 5 years.

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11. RENEWAL OF THE QUALIFICATION AND CERTIFICATION OF COMPETENCES

To ensure that BIM EXPERT-SPECIALISTS remain well-versed once they have attained the certification, they are required to complete 16 hours per year of continuing education by attending e-learning courses, workshops, conferences and seminars in order to improve their competences in Chapter 6. The three-year Qualification and Certification of Competences Renewal is foreseen by means of a verification test to maintain and update the competences.

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1. PURPOSE AND FIELD OF APPLICATION

The present QUALIFICATION AND CERTIFICATION SCHEME has the purpose to define the minimum requirements for the certification of competences of the professional profile of BIM MANAGER (or equivalent).

2. PROFESSIONAL PROFILE³

BIM MANAGER is a professional specialized in the leading and management of BIM (project) implementation, with a background in one of the following working fields: construction management, building management, financing and procurement and architecture.

For the Net-UBIEP purpose, the profile of the BIM MANAGER is integrated with additional SPECIFIC COMPETENCES of Energy Efficiency:

- C0.MA Have basic BIM knowledge and skills;
- C1.MA Understand BIM tools;
- C2.MA Apply information management;
- C3.MA Apply procurement management;
- C4.MA Use BIM technology;
- C5.MA Analyse BIM Model.

For each of the above-mentioned competences, the ASSESSMENT CRITERIA will be described, which will constitute the outgoing evaluation elements of the Professional Profile.

3. BASIC DOCUMENTS

- Net-UBIEP D10 – D2.1 Report on Existing BIM Professional Profiles / Results
- Net-UBIEP D13 – D2.4 List of Competences related to energy performance needed for each BIM Professional Profiles
- Net-UBIEP D14 – D3.1 Three-dimensional Matrix
- Net-UBIEP D15.A – D3.2 A Requirements for Learning Outcomes for the four Target Groups
- PROF/TRAC Technology and Interdisciplinary Competences Per Target Group

4. SUPPORT DOCUMENTS

- 2017/C 189/03 Official Journal of the European Union - Council Recommendation of 2017/05/22: European Qualification Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning
- ISO/IEC TC 59/SC 13 V5-7 ISO/CD 19650-1 Information management using building information modelling

³ Definition indicated in Net-UBIEP D10 – D2.1 Report on existing BIM Professional Profiles / Results

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5. DEFINITION AND ACRONYMOUS

Qualification means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards;

National qualifications system means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. That includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework;

National qualifications framework means an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims at integrating and coordinating national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society;

International qualification means a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body;

Learning outcomes means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

The acronyms "Cx.Ky" means "Knowledge number Y necessary for the Competence Number X";

Skills mean the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).


The acronyms "Cx.Sy" means "Skill number Y necessary for the Competence Number X";

Responsibility and autonomy means the ability of the learner to apply knowledge and skills autonomously and with responsibility;


Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The acronyms "Cx.MA" means "Competence Number X necessary for the BIM MANAGER";

Validation of competences matured during informal and non-formal contexts means the process of confirmation by a competent authority that an individual has acquired competences in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification;

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Recognition of competences means the process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers;

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6. SPECIFIC REQUIREMENTS FOR THE QUALIFICATION OF THE BIM MANAGER (or equivalent)

Minimum access requirements

The minimum access requirements of BIM MANAGER's (or equivalent) Qualification and Certification path are shown below, in tabular form:

Minimum access requirements	BIM MANAGER (or equivalent)
Education	<p>EQF7 (or higher)</p> <ul style="list-style-type: none"> ✓ Level of knowledge: BIM MANAGER has highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research. He has critical awareness of knowledge issues in a field and at the interface between different fields. ✓ Level of skills: BIM MANAGER has specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields into BIM modelling process. ✓ Level of responsibility and autonomy: BIM MANAGER manages and transforms work or study contexts that are complex, unpredictable and require new strategic approaches. He takes responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams. He may be a Project Manager (at organizational level or at project level) as well or support the project Manager in charge.
General Work Experiences	<p>To access to the Qualification and Certification path as "BIM MANAGER " (or equivalent) it is necessary to document an appropriate work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • work experiences of at least five years in architectural, construction or engineering role as lead designer
Specific Work Experiences	<p>To access to the Qualification and Certification path as "BIM MANAGER" (or equivalent) it is necessary to document an appropriate specific work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • proven experiences of at least three years in management of new nZEB projects or the refurbishment of existing buildings up to nZEB level, with particular attention to energy efficiency and using of BIM • proven experiences in management of projects with IT skills • great verbal and written skills acquired during previous experiences

Minimum requirements after the Qualification and Certification path

The minimum requirements reached after the Qualification and Certification path are shown below, in tabular form. They are defined according to the correspondent phase of the Building Life Cycle.

<div> BIM MANAGER (The EQF Level of each one of the competences are described inside the 3D Matrix – deliverable D4.8) </div>	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C0.MA Have basic BIM knowledge and skills								
Knowledge								
C0.K1. BIM basic concepts, terminology, principles, strategies and its value proposition								
C0.K2. Benefits and uses of BIM compared to traditional methods for improving energy efficiency of new or existing buildings								
C0.K3. Project information development cycle: information specification, development, exchange and maintenance throughout all the building life cycle								
C0.K4. Reasons for open and interoperable solutions to ensure collaboration among professionals of different disciplines								
C0.K5. Methodology to identify, plan, develop and evaluate organization's BIM implementation capabilities and BIM uses								
C0.K6. Relevance of maintenance to maintain the foreseen energy performance								
Skill								
C0.S1. Read a BIM Execution Plan (BEP)								
C0.S2. Read a Information Delivery Manual								
C0.S3. Identify information requirements for his own role								
C0.S4. Identify the format to read information and transfer information within the supply chain								
C0.S5. Identify the EIR (Employer Information Requirements)								
C0.S6. Identify and/or verify the stages of PIM (Project Information Management)								
C1.MA Understand BIM tools								
Knowledge								
C1.K1. Principle of economic subjects for the cost estimation and evaluation of energy refurbishment								
Skill								
C1.S1. Specialised skills to incorporate information in a BIM Model, evaluating openBIM software								
C1.S2. Stay up to date on BIM trends, current developments and new directions of BIM technologies								
C1.S3. Decrease the life cycle cost of the building using methods described in ISO 15686-5								
C1.S4. Evaluate and compare different plans and related ROI (Return of Investments) using methods described in ISO 15686-5								

BIM MANAGER	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C2.MA Apply information management								
Knowledge								
C2.K1. Principle of data mining, data base and back up in the CDE (Common Data Environment)								
C2.K2. Principle of data transferring among different software and/or data federating into an integrated design								
C2.K3. Principle of data security and administrative law in the archiving of data in a CDE (Common Data Environment)								
C2.K4. Principle of information management in building sustainability and lean design								
C2.K5. Principle of reusing and recycling of materials and components of a building								
Skill								
C2.S1. Manage and coordinate information related to energy performance								
C2.S3. Archive the model ensuring that the information provided is kept intact and not manipulated for any future use								
C2.S4. Evaluate the completeness of the maintenance plan to be used in EPC (Energy Performance Contracting)								
C2.S5. Evaluate the completeness of the handover strategy								
C2.S6. Verify the correspondence between the "as built" and the final BIM model								
C2.S7. Identify requirements for the management of data in the CDE (Common Data Environment) for any professionals involved in the process								
C2.S8. Transfer building information using BIM to facility managers and final users								

BIM MANAGER	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C3.ME Apply procurement management								
Knowledge								
C3.K1. Processes, methods and principles of decision-making on procuring services and suppliers								
C3.K2. Processes, methods and principles of decision-making on materials and products								
C3.K3. Legal and technical aspects on green procurement, state and rules for using public funding and international good practices of energy performance contracting								
C3.K4. Strategies for training programs to increase energy efficiency with the support of BIM								
Skill								
C3.S1. Select or evaluate selected companies with experience in the technologies defined								
C3.S2. Select products that fit specifications and demands on given quality aspects making financial calculation related to contracting phase								
C3.S3. List and collaborate with several stakeholders who participate in the sustainable project, distinguishing roles/needs and involving them in the information delivery plan preparation and management								
C3.S4. Apply change management, identifying and handling deviations / breach of the contract with particular guarantees								
C3.S5. Define building environmental impact as part of the contract								
C3.S6. Include measurable Quality Analysis criteria as part of the contract								
C4.MA Use BIM technology								
Knowledge								
C4.K2. Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standards								
C4.K3. Principle of planning and scheduling for BEP (BIM Execution Plan)								
C4.K8. Principle of information maturity level representation of the model defining the methodology for BIM maturity level								
Skill								
C4.S2. Develop a BEP (BIM Execution Plan)								

BIM MANAGER	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C5.MA Analyse the BIM Model								
Knowledge								
C5.K1. Principle of global environmental impact of different building products and technologies (RES use, insulation, HVAC systems and building automation systems)								
C5.K2. Techniques of passive measures needed for the management of nZEB								
C5.K3 Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standard								
Skill								
C5.S5. Use BIM to assure the technical supervision of construction works								
C5.S6. Use BIM models to communicate installation instructions								

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7. METHODS OF VERIFICATION OF THE POSSESSION OF MINIMUM REQUIREMENTS TO BE REACHED AFTER THE QUALIFICATION AND CERTIFICATION PATH

The methods below for the recognition of competences will be applied to each competence defined in Chapter 6 (Minimum requirements after the Qualification and Certification path).

Methods of verification of requirements	BIM MANAGER
Knowledge and skills	The possession of knowledge is verified by one of the following points: <ul style="list-style-type: none"> • possession of certificate of validation comply with BIM Qualification and Certification Schemes proving the previous formal recognition of learning outcomes under international qualification perspective; • validation of competences maturated during informal and non-formal contexts proving the experiences with support documents.
Responsibility and autonomy	Curricular analysis (of Curriculum Vitae and any additional support documents proving the experience such as the Project Portfolio).

The candidate able to document the possession and validation of all the requirements defined in Chapter 6 (Minimum requirements after the Qualification and Certification path) is admitted to the final exam to become BIM MANAGER.

8. ACCREDITATION METHODS OF CERTIFICATION BODIES

To be defined as accredited Certification Body, the learning provider need to apply to National Accreditation Body, according to National Qualification System.

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9. FINAL EXAM

Final Exam	BIM MANAGER
Evaluation	<p>The final exam is composed by two evaluation sections:</p> <ol style="list-style-type: none"> 1. an initial practical exercise on subjects and issues related to the management of information of new nZEB projects or the refurbishment of existing buildings, with weight of 40%. The choice of these exercises will be relied to the qualification and certification commissioner. 2. and an oral interview to verify management strategies related to BIM Models, with weight of 60%.
Commission	<p>The Commission is composed by:</p> <ul style="list-style-type: none"> • at least one Relevant Commissioners who fulfil the following requirements: <ul style="list-style-type: none"> ○ being in possession of BIM MANAGER Qualification; ○ being in possession of proven experiences in field of professional training <p>The possession of higher qualification and/or developed skills/experiences as BIM MANAGER will be preferential requirements.</p> • a Commission President who fulfils the following requirement: <ul style="list-style-type: none"> ○ acted as Relevant Commissioner of BIM Professional Profiles over the past 3 years.


10. PARTICULAR SITUATION

The Qualification and Certification Scheme intends to recognize the great professionalism present in the world of industry and services, simplifying the process of assessment of knowledge, skills and responsibility and autonomy, which however cannot be separated from an objective assessment.

The Qualification and Certification Scheme leaves the possibility to recognize a JUNIOR or SENIOR profile based on the level of experiences acquired in the past (in accordance with the minimum years of work experiences defined in Chapter 6). The Qualification and Certification Scheme could be applied in specific market sectors.

During the first 5 years after the publication of this document, The Commission needs to fulfil the following requirements (in substitution of the requirement in Chapter 9):

- for each Relevant Commissioners:
 - being in possession of proven experiences in construction industry;
 - being in possession of proven experiences in field of professional training.
- for Commission President:
 - acted as Relevant Commissioner (in whatever field) over the past 5 years.

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11. RENEWAL OF THE QUALIFICATION AND CERTIFICATION OF COMPETENCES

To ensure that BIM MODEL MANAGERS remain well-versed once they have attained the certification, they are required to complete 16 hours per years of continuing education by attending e-learning courses, workshops, conferences and seminars in order to improve their competences in Chapter 6. The three-year Qualification and Certification of Competences Renewal is foreseen by means of a verification test to maintain and update the competences.

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1. PURPOSE AND FIELD OF APPLICATION

The present QUALIFICATION AND CERTIFICATION SCHEME has the purpose to define the minimum requirements for the certification of competences of the professional profile of BIM MODEL EVALUATOR (or equivalent).

2. PROFESSIONAL PROFILE⁴

BIM MODEL EVALUATOR is professional responsible for the alignment between the BIM Model and the pre-set contract objectives, with background in one of the following working fields: architecture, structural engineering, mechanical engineering (including plumbing), electrical engineering, construction engineering.

For the Net-UBIEP purpose, the profile of the BIM MODEL EVALUATOR is integrated with additional SPECIFIC COMPETENCES of Energy Efficiency:

- C0.ME Have basic BIM knowledge and skills;
- C1.ME Understand BIM tools;
- C2.ME Apply information management;
- C3.ME Apply procurement management;
- C4.ME Use BIM technology;
- C5.ME Analyse BIM Model.

For each of the above-mentioned competences, the ASSESSMENT CRITERIA will be described, which will constitute the outgoing evaluation elements of the Professional Profile.

3. BASIC DOCUMENTS

- Net-UBIEP D10 – D2.1 Report on Existing BIM Professional Profiles / Results
- Net-UBIEP D13 – D2.4 List of Competences related to energy performance needed for each BIM Professional Profiles
- Net-UBIEP D14 – D3.1 Three-dimensional Matrix
- Net-UBIEP D15.A – D3.2 A Requirements for Learning Outcomes for the four Target Groups
- PROF/TRAC Technology and Interdisciplinary Competences Per Target Group

4. SUPPORT DOCUMENTS

- 2017/C 189/03 Official Journal of the European Union - Council Recommendation of 2017/05/22: European Qualification Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning
- ISO/IEC TC 59/SC 13 V5-7 ISO/CD 19650-1 Information management using building information modelling

⁴ Definition indicated in Net-UBIEP D10 – D2.1 Report on existing BIM Professional Profiles / Results

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5. DEFINITION AND ACRONYMOUS

Qualification means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards;

National qualifications system means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. That includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework;

National qualifications framework means an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims at integrating and coordinating national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society;

International qualification means a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body;

Learning outcomes means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

The acronyms "Cx.Ky" means "Knowledge number Y necessary for the Competence Number X";


Skills mean the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments). The acronyms "Cx.Sy" means "Skill number Y necessary for the Competence Number X";

Responsibility and autonomy means the ability of the learner to apply knowledge and skills autonomously and with responsibility;

Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The acronyms "Cx.ME" means "Competence Number X necessary for the BIM MODEL EVALUATOR";

Validation of competences matured during informal and non-formal contexts means the process of confirmation by a competent authority that an individual has acquired competences in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification;

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Recognition of competences means the process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers;

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6. SPECIFIC REQUIREMENTS FOR THE QUALIFICATION OF THE BIM MODEL EVALUATOR (or equivalent)

Minimum access requirements

The minimum access requirements of BIM MODEL EVALUATOR's (or equivalent) Qualification and Certification path are shown below, in tabular form:

Minimum access requirements	BIM MODEL EVALUATOR (or equivalent)
Education	<p>EQF 5 (or higher)</p> <ul style="list-style-type: none"> ✓ Level of knowledge: BIM MODEL EVALUATOR has comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge. ✓ Level of skills: BIM MODEL EVALUATOR has a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems. ✓ Level of responsibility and autonomy: BIM MODEL EVALUATOR exercises management and supervision in contexts of work or study activities where there is unpredictable change. He reviews and develops performance of self and others.
General Work Experiences	<p>To access to the Qualification and Certification path as "BIM MODEL EVALUATOR " (or equivalent) it is necessary to document an appropriate work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • work experiences of at least two years in architectural, construction or engineering role as designer
Specific Work Experiences	<p>To access to the Qualification and Certification path as "BIM MODEL EVALUATOR" (or equivalent) it is necessary to document an appropriate specific work experience, in the last years as specified below:</p> <ul style="list-style-type: none"> • proven experiences of at least two years in modelling new nZEB projects or the refurbishment of existing buildings up to nZEB level, with particular attention to energy efficiency • proven experiences in design of projects with IT skills • great verbal and written skills acquired during previous experiences

Minimum requirements after the Qualification and Certification path

The minimum requirements reached after the Qualification and Certification path are shown below, in tabular form. They are defined according to the correspondent phase of the Building Life Cycle.

BIM MODEL EVALUATOR	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In Use
C2.ME Apply information management								
Knowledge								
C2.K1. Principle of data mining, data base and backup strategies and its value proposition								
C2.K2. Principle of data security and administrative law in the archiving of data in a CDE (Common Data Environment)								
C2.K3. Principle of information management in building sustainability and lean design, exchange and maintenance throughout all the								
C2.K4. Principle of reusing and recycling of materials and components of a building								
Skill								
C2.S1. Identify which graphic and/or nongraphic information are necessary for a better management of works and for the complete delivery of the information								
C2.S2. Archive the model ensuring that the information provided is kept intact and not manipulated for any future use								
C2.S3. Evaluate the completeness of the maintenance plan to be used in EPC (Energy Performance Contracting)								
C2.S4. Evaluate the completeness of the handover strategy								
C2.S5. Verify the correspondence between the "as built" and the final BIM model								
C2.S6. Identify requirements for the management of data in the CDE (Common Data Environment) for any professionals involved in the process								
C2.S7. Identify the EIR (Employer Information Requirements)								
C2.S8. Ensure the update of the BIM Model/Technical Specification when a maintenance is performed								
C3.ME Apply procurement management								
Knowledge								
C3.K1. Processes, methods and principles of decision making on procuring services and suppliers								
C3.K2. Theories and principles for the selection of products								
C3.K3. Legal and technical aspects on green procurement, state and rules for using public funding and international good practices of energy performance								
C3.K4. Evaluate and compare different plans and related ROI (Return of Investments) using methods described in ISO 15686-5								
Skill								
C3.S1. Define building environmental impact as part of the contract								
C3.S2. Include measurable Quality Analysis criteria as part of the contract								

BIM MODEL EVALUATOR	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C4.ME Use BIM technology								
Knowledge								
C4.K2. Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standards								
C4.K3. Principle of planning and scheduling for BEP (BIM Execution Plan)								
C4.K7. Techniques of automatic code checking and management of software e-permit								
C4.K8. Principle of information maturity level representation of the model defining the methodology for BIM maturity level								
Skill								
C4.S8. Produce a visualization design in order to report back to costumers, users and reviewers								
C4.S9. Use code checking to verify the respect of energy performance requirements								
C5.ME Analyse the BIM Model								
Knowledge								
C5.K1. Principle of global environmental impact of different building products and technologies (RES use, insulation, HVAC systems and building automation systems)								
C5.K2. Techniques of passive measures needed for the management of nZEB								
C5.K3 Principle of integrated design and data transferring, with particular knowledge of IFC (Industry Foundation Classes) structure using international standard								
Skill								
C5.S4. Validate BIM Model								

7. METHODS OF VERIFICATION OF THE POSSESSION OF MINIMUM REQUIREMENTS TO BE REACHED AFTER THE QUALIFICATION AND CERTIFICATION PATH


The methods below for the recognition of competences will be applied to each competence defined in Chapter 6 (Minimum requirements after the Qualification and Certification path).

Methods of verification of requirements	BIM MODEL EVALUATOR
<i>Knowledge and skills</i>	The possession of knowledge is verified by one of the following points: <ul style="list-style-type: none"> • possession of certificate of validation comply with BIM Qualification and Certification Schemes proving the previous formal recognition of learning outcomes under international qualification perspective; • validation of competences maturated during informal and non-formal contexts proving the experiences with support documents.
<i>Responsibility and autonomy</i>	Curricular analysis (of Curriculum Vitae and any additional support documents proving the experience such as the Project Portfolio).

The candidate able to document the possession and validation of all the requirements defined in Chapter 6 (Minimum requirements after the Qualification and Certification path) is admitted to the final exam to became BIM MODEL EVALUATOR.

8. ACCREDITATION METHODS OF CERTIFICATION BODIES

To be defined as accredited Certification Body, the learning provider need to apply to National Accreditation Body, according to National Qualification System.

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9. FINAL EXAM

Final Exam	BIM MODEL EVALUATOR
Evaluation	<p>The final exam is composed by two evaluation sections:</p> <ol style="list-style-type: none"> 1. an initial practical exercise on subjects and issues related to the production of information of nZEB projects with weight of 60%. 2. and an oral interview to verify design strategies related to BIM, with weight of 40%. <p>The exercises and questions will be chosen from the database of the Qualification/Certification Body.</p>
Commission	<p>The Commission is composed by:</p> <ul style="list-style-type: none"> • at least one Relevant Commissioners who fulfil the following requirements: <ul style="list-style-type: none"> ○ being in possession of BIM MODEL EVALUATOR Qualification; ○ being in possession of proven experiences in field of professional training <p>The possession of higher qualification and/or developed skills/experiences as BIM MODEL EVALUATOR will be preferential requirements.</p> • a Commission President who fulfils the following requirement: <ul style="list-style-type: none"> ○ acted as Relevant Commissioner of BIM Professional Profiles over the past 5 years.


10. PARTICULAR SITUATION

The Qualification and Certification Scheme intends to recognize the great professionalism present in the world of industry and services, simplifying the process of assessment of knowledge, skills and responsibility and autonomy, which however cannot be separated from an objective assessment.

The Qualification and Certification Scheme leaves the possibility to recognize a JUNIOR or SENIOR profile based on the level of experiences acquired in the past (in accordance with the minimum years of work experiences defined in Chapter 6). The Qualification and Certification Scheme could be applied in specific market sectors.

During the first 5 years after the publication of this document, The Commission needs to fulfil the following requirements (in substitution of the requirement in Chapter 9):

- for each Relevant Commissioners:
 - being in possession of proven experiences in construction industry;
 - being in possession of proven experiences in field of professional training.
- for Commission President:
 - acted as Relevant Commissioner (in whatever field) over the past 5 years.

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11. RENEWAL OF THE QUALIFICATION AND CERTIFICATION OF COMPETENCES

To ensure that BIM MODEL EVALUATORS remain well-versed once they have attained the certification, they are required to complete 16 hours per years of continuing education by attending e-learning courses, workshops, conferences and seminars in order to improve their competences in Chapter 6. The three-year Qualification and Certification of Competences Renewal is foreseen by means of a verification test to maintain and update the competences.

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1. PURPOSE AND FIELD OF APPLICATION

The present QUALIFICATION AND CERTIFICATION SCHEME has the purpose to define the minimum requirements for the certification of competences of the professional profile of BIM USER (or equivalent).

2. PROFESSIONAL PROFILE⁵

BIM USER includes the set of customers, clients, contractors, producers and other project information users.

For the Net-UBIEP purpose, the profile of the BIM USER is integrated with additional SPECIFIC COMPETENCES of Energy Efficiency:

- C0.US Have basic BIM knowledge and skills;
- C1. Not applied;
- C2.US Apply information management;
- C3.US Apply procurement management;
- C4.US Use BIM technology;
- C5.US Analyse BIM Model.

For each of the above-mentioned competences, the ASSESSMENT CRITERIA will be described, which will constitute the outgoing evaluation elements of the Professional Profile.

3. BASIC DOCUMENTS

- Net-UBIEP D10 – D2.1 Report on Existing BIM Professional Profiles / Results
- Net-UBIEP D13 – D2.4 List of Competences related to energy performance needed for each BIM Professional Profiles
- Net-UBIEP D14 – D3.1 Three-dimensional Matrix
- Net-UBIEP D15.A – D3.2 A Requirements for Learning Outcomes for the four Target Groups
- PROF/TRAC Technology and Interdisciplinary Competences Per Target Group

4. SUPPORT DOCUMENTS

- 2017/C 189/03 Official Journal of the European Union - Council Recommendation of 2017/05/22: European Qualification Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning
- ISO/IEC TC 59/SC 13 V5-7 ISO/CD 19650-1 Information management using building information modelling

⁵ Definition indicated in Net-UBIEP D10 – D2.1 Report on existing BIM Professional Profiles / Results

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5. DEFINITION AND ACRONYMOUS

Qualification means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards;

National qualifications system means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. That includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework;

National qualifications framework means an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims at integrating and coordinating national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society;

International qualification means a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body;

Learning outcomes means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

The acronyms "Cx.Ky" means "Knowledge number Y necessary for the Competence Number X";

Skills mean the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

The acronyms "Cx.Sy" means "Skill number Y necessary for the Competence Number X";

Responsibility and autonomy means the ability of the learner to apply knowledge and skills autonomously and with responsibility;

Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The acronyms "Cx.US" means "Competence Number X necessary for the BIM USER";

Validation of competences matured during informal and non-formal contexts means the process of confirmation by a competent authority that an individual has acquired competences in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification;

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Recognition of competences means the process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers;

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6. SPECIFIC REQUIREMENTS FOR THE QUALIFICATION OF THE BIM USER (or equivalent)

Minimum access requirements

The minimum access requirements of BIM USER's (or equivalent) Qualification and Certification path are shown below, in tabular form:

Minimum access requirements	BIM USER (or equivalent)
Education	EQF 3 (or higher) ✓ Level of knowledge: BIM USER has knowledge of facts, principles, processes and general concepts, in a field of work or study. ✓ Level of skills: BIM USER has a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information. ✓ Level of responsibility and autonomy: BIM USER takes responsibility for completion of tasks in work or study. He adapts own behaviour to circumstances in solving problems.
General Work Experiences	To access to the Qualification and Certification path as "BIM USER" (or equivalent) it is necessary to document an appropriate work experience, in the last years as specified below: <ul style="list-style-type: none"> work experiences of at least one year in the construction sector
Specific Work Experiences	To access to the Qualification and Certification path as "BIM USER" (or equivalent) it is necessary to document an appropriate specific work experience, in the last years as specified below: <ul style="list-style-type: none"> proven experiences in operations related to nZEB with particular attention to energy efficiency proven experiences in operation related to IT skills

Minimum requirements after the Qualification and Certification path

The minimum requirements reached after the Qualification and Certification path are shown below, in tabular form. They are defined according to the correspondent phase of the Building Life Cycle.

<div> <div>BIM USER</div> <div>(The EQF Level of each one of the competences are described inside the 3D Matrix – deliverable D4.8)</div> </div>	Phases							
	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C0.US Have basic BIM knowledge and skills								
Knowledge								
C0.K1. BIM basic concepts, terminology, principles, strategies and its value proposition								
C0.K2. Benefits and uses of BIM compared to traditional methods for improving energy efficiency of new or existing buildings								
C0.K3. Project information development cycle: information specification, development, exchange and maintenance throughout all the building life cycle								
C0.K4. Reasons for open and interoperable solutions to ensure collaboration among professionals of different disciplines								
C0.K6. Relevance of maintenance to maintain the foreseen energy performance								
Skill								
C0.S2. Read a Information Delivery Manual								
C0.S3. Identify information requirements for his own role								
C0.S5. Identify the EIR (Employer Information Requirements)								
C2.US Apply information management								
Knowledge								
C2.K1. Principle of data mining, data base and back up in the CDE (Common Data Environment)								
C2.K2. Principle of data transferring among different software and/or data federating into an integrated design								
C2.K5. Principle of reusing and recycling of materials and components of a building								
Skill								
C2.S1. Manage and coordinate information related to energy performance								
C2.S5. Evaluate the completeness of the handover strategy								
C2.S6. Verify the correspondence between the "as built" and the final BIM model								
C2.S9. Ensure that construction process and product information is transferred into BIM Model / Technical Specifications and provide information on status of works when request								
C2.S10. Ensure the update of the BIM Model / Technical Specification when a maintenance is performed								
	Phases							

BIM USER	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In use
C3.US Apply procurement management								
Knowledge								
C3.K2. Processes, methods and principles of decision-making on materials and products								
C3.K3. Legal and technical aspects on green procurement, state and rules for using public funding and international good practices of energy performance contracting								
Skill								
C3.S3. List and collaborate with several stakeholders who participate in the sustainable project, distinguishing roles/needs and involving them in the information delivery plan preparation and management								
C3.S4. Apply change management, identifying and handling deviations / breach of the contract with particular guarantees								
C3.S5. Define building environmental impact as part of the contract								
C3.S6. Include measurable Quality Analysis criteria as part of the contract								
C4.US Use BIM technology								
Knowledge								
C4.K5. Principles and systems of sustainable buildings, including renewable energy production								
C5.US Analyse BIM Model								
Knowledge								
C5.K2. Techniques of passive measures needed for the management of nZEB								
Skill								
C5.S6. Use BIM models to communicate installation instructions								

7. METHODS OF VERIFICATION OF THE POSSESSION OF MINIMUM REQUIREMENTS TO BE REACHED AFTER THE QUALIFICATION AND CERTIFICATION PATH

The methods below for the recognition of competences will be applied to each competence defined in Chapter 6 (Minimum requirements after the Qualification and Certification path).

Methods of verification of requirements	BIM USER
<i>Knowledge and skills</i>	<p>The possession of knowledge is verified by one of the following points:</p> <ul style="list-style-type: none"> • possession of certificate of validation comply with BIM Qualification and Certification Schemes proving the previous formal recognition of learning outcomes under international qualification perspective; • validation of competences maturated during informal and non-formal contexts proving the experiences with support documents.
<i>Responsibility and autonomy</i>	Curricular analysis (of Curriculum Vitae and any additional support documents proving the experience such as the Project Portfolio).

The candidate able to document the possession and validation of all the requirements defined in Chapter 6 (Minimum requirements after the Qualification and Certification path) is admitted to the final exam to became BIM USER.

8. ACCREDITATION METHODS OF CERTIFICIATION BODIES

To be defined as accredited Certification Body, the learning provider need to apply to National Accreditation Body, according to National Qualification System.

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9. FINAL EXAM

Final Exam	BIM USER
<i>Evaluation</i>	<p>The final exam is composed by two evaluation sections:</p> <ol style="list-style-type: none"> 1. an initial multiple-choice test on subjects and issues related to the use of information of nZEB projects with weight of 60%. The multiple-choice test consists in 20 questions with 5 options of which only one is right. The learner gets 5 points per each right answer and he passes the exam with 80 points. 2. and an oral interview to verify strategies related to BIM, with weight of 40%. The exercises and questions will be chosen from the database of the Qualification/Certification Body.
<i>Commission</i>	<p>The Commission is composed by:</p> <ul style="list-style-type: none"> • at least one Relevant Commissioners who fulfil the following requirements: <ul style="list-style-type: none"> ○ being in possession of BIM USER Qualification; ○ being in possession of proven experiences in field of professional training The possession of higher qualification and/or developed skills/experiences as BIM USER will be preferential requirements. • a Commission President who fulfils the following requirement: <ul style="list-style-type: none"> ○ acted as Relevant Commissioner of BIM Professional Profiles over the past 5 years.

10. PARTICULAR SITUATION

The Qualification and Certification Scheme intends to recognize the great professionalism present in the world of industry and services, simplifying the process of assessment of knowledge, skills and responsibility and autonomy, which however cannot be separated from an objective assessment.

The Qualification and Certification Scheme leaves the possibility to recognize a JUNIOR or SENIOR profile based on the level of experiences acquired in the past (in accordance with the minimum years of work experiences defined in Chapter 6). The Qualification and Certification Scheme could be applied in specific market sectors.

During the first 5 years after the publication of this document, The Commission needs to fulfil the following requirements (in substitution of the requirement in Chapter 9):

- for each Relevant Commissioners:
 - being in possession of proven experiences in construction industry;
 - being in possession of proven experiences in field of professional training.
- for Commission President:
 - acted as Relevant Commissioner (in whatever field) over the past 5 years.

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11. RENEWAL OF THE QUALIFICATION AND CERTIFICATION OF COMPETENCES

To ensure that BIM USERS remain well-versed once they have attained the certification, they are required to complete 8 hours per years of continuing education by attending e-learning courses, workshops, conferences and seminars in order to improve their competences in Chapter 6. The three-year Qualification and Certification of Competences Renewal is foreseen by means of a verification test to maintain and update the competences.