

D10.9 Guidelines for BIM implementation for public administration



This project has received funding from European Union's H2020 research and innovation programme under grant agreement N. 820660

The content of this document reflects only the author's view only and the Commission is not responsible for any use that may be made of the information it contains.



Programmes	H2020
Call for Proposal	LC-EEB-02-2018 Building information modelling adapted to efficient renovation
Project Title	BIM based fast toolkit for Efficient rEnovation in Buildings
Acronym	BIM4EEB
Project Grant Agreement	820660

D10.9 Guidelines for BIM implementation for public administration

Work Package	WP10
Lead Partner	RegLomb
Contributing Partner(s)	RegLomb, PoliMi, ACE, PROCHEM
Dissemination Level	Public
Туре	Report
Due date	30/04/2022
Date	24/06/2022
Version	1.0



DOCUMENT HISTORY

Version	Date	Comments	Main Authors		
0.1	27.05.2022	First draft to partners for comments	Giuseppe Barletta (RegLomb) Giuseppina Cristina Tola (RegLomb)		
0.2	30.05.2022	Comments from partners	Larissa De Rosso (ACE) Aleksander Bartoszewski (PROCHEM)		
0.3	09.06.2022	Editing, reviewing	Alessio Domenico Leto (PoliMI)		
0.4	10.06.2022	Editing, reviewing	Cecilia Bolognesi (PoliMI)		
0.5	13.06.2022	Editing, reviewing	Alberto Pavan (PoliMI)		
0.6	21.06.2022	Final version, WP Leader's approval	Giuseppe Barletta (RegLomb) Giuseppina Cristina Tola (RegLomb)		
1.0	24.06.2022	Final and formal review, plagiarism check, submission	Bruno Daniotti, Martina Signorini (PoliMi), Gabriele Canzi (FPM/PoliMi)		

Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

BIM4EEB action has received funding from the European Union under grant agreement number 820660.

The information in this document is provided "as is", and no guarantee or warranty is given that the information is fit for any particular purpose. The above referenced consortium members shall have no liability for damages of any kind including without limitation direct, special, indirect, or consequential damages that may result from the use of these materials subject to any liability which is mandatory due to applicable law.



EXECUTIVE SUMMARY

The outputs here described are the results of Task 10.3 "Development of guidelines for innovative BIMbased efficient renovation uptake" for the case of the public sector.

The document contains the guidelines for BIM implementation for public stakeholders in the case of renovation of residential buildings.

The guidelines define the procedures for producing, storing, managing, and transmitting organization's information digitally.

The guidelines derive from a case study based developed in the Region Lombardy Organization that is attached as appendix to this document.

The guidelines encompasse a main document that is the Organization Information Guidelines (OIL) and of other documents that are annexes to the OIL. All the documents are templates to be used in the public construction sector.

Namely, the documents are

- A. Organization Information Guidelines (OIL)
- A1. Organization Information Requirements (OIR)
- A2. Organization Information Maps (OIM)
- B. Asset Information Guidelines (AIL)
- B1. Asset Information Requirements (AIR)
- B2. Asset Information Models (AIM)
- C. Project Information Guidelines (PIL)
- C1. Project Information Requirements (PIR)
- C2. Project Information Model (PIM)
- D. Exchange Information Requirements (EIR)
- E. Common Data Environment (CDE)

These guidelines constitute a support for public organizations in the process of implementing BIM, with the aim of:

- Provide a clear and common vision of the BIM application process within the public organizations
- Provide the necessary information to encourage collaboration between the interested parties through BIM
- Provide the foundation for creating a Common Data Environment (CDE)
- Ensure the interoperability of the BIM models with the different software platforms used by parties involved
- Define BIM information roles taking into account their support to traditional roles (such as construction manager, safety coordinator, etc.)

GA N. 820660 24/06/2022 Page 4 Public



PUBLISHING SUMMARY

The document contains the guidelines for BIM implementation for public stakholders in the case of renovation of residential buildings.

The guidelines allow public stakeholders easy application of BIM methodology inside their organization and in the awarding of works and and services to appointed parties.

The outputs here described are the results of Task 10.3 "Development of guidelines for innovative BIMbased efficient renovation uptake" for the case of the public sector.



TABLE OF CONTENTS

1	Inti	roduction	16
2	Org	ganization Information Guidelines (OIL)	17
	2.1	Acronyms and Glossary	17
	2.2	Introduction	23
	2.3	Regulatory references	26
	2.3	3.1 Technical standards	26
	2.4	Objectives	27
	2.5	Features of hardware and software infrastructures	27
	2.5	5.1 Hardware:	27
	2.5	5.2 Software:	28
	2.6	Information development level for BIM Models	28
	2.7	Roles for information purposes	28
	2.8	Data sharing methods	29
	2.9	Protocol for data exchange of models and drawings	30
	2.10	Coding of project files	30
	2.11	Structure and organization of digital modelling	31
	2.1	1.1 Shared coordinate system	31
	2.1	1.2 Levels of coordination	31
	2.1	1.3 Levels of verification	31
	2.12	Management of Resources: skills and training	32
3	Org	ganization Information Requirement (OIR)	33
	3.1	Introduction	33
	3.2	Scope	33
	3.3	Information requirements of the organization	33
	3.3	B.1 External requirements	33
	3.3	B.2 Internal requirements	33
4	Orę	ganization Information Map (OIM)	35
	4.1	Introduction	35
	4.2	Purpose	35
	4.3	Information structure of GIS maps	35
	4.4	Information structure of the documents	35
	4.5	GIS object library information structure	35
5	As	set Information Guidelines (AIL)	36
(GA N. 24/06/2	820660 Pag 2022 Pu	e 6 blic



	5.1	Intro	oduction	36
	5.2	Purpose		
	5.3	Acti	vities	36
	5.3	.1	Products and services	36
	5.4	Rela	ational Organization chart for Asset Management	36
	5.4	.1	Management information roles organization	36
	5.4	.2	Matrix of information responsibilities	37
	5.5	Info	rmation flows of Asset Management	38
	5.5	.1	External information flows	38
	5.5	.2	In-house information flows	38
	5.5	.3	Coordination flows	39
	5.5	.4	Verification flows	39
	5.6	Spe	cial tools in asset management	39
	5.6	.1	Hardware tools	39
	5.6	.2	Software Tools	40
6	Ass	set In	formation Requirement (AIR)	41
	6.1	Intro	oduction	41
	6.2	Purj	pose	41
	6.3	Info	rmation structure, Operating LOIN	41
	6.4	Info	rmation structure, Operating model	41
	6.4	.1	Objectives and uses of the model	41
	6.4	.2	Delivery	41
	6.4	.3	Model documents (DOC)	42
	6.5	Info	rmation structure, LOIN of asset objects	42
	6.5	.1	Objectives and uses of objects	42
	6.5	.2	Processing of objects	42
7	Ass	set In	formation Model (AIM)	44
	7.1	Intro	oduction	44
	7.2	Pur	pose	44
	7.3	Info	rmation structure of graphic models	44
	7.3	.1	Modelling rules	44
	7.3	.2	Architectural Asset Model	44
	7.3	.3	Structural and MEP Asset Model	44
	7.3	.4	Common system of coordinates and reference specifications	44

GA N. 820660 24/06/2022 Page 7 Public



	7.3	.5	Specific for inserting digital objects into models	
	7.4	Info	prmation structure of the documents	
	7.4	.1	Processed generation	
	7.4	.2	Processed co-editing	
	7.5	Infc	ormation structure of the object libraries	
	7.5	.1	Object modelling rules	
	7.5	.2	Coding objects	
	7.5	.3	Geometric attributes (LOG)	
	7.5	.4	Non-geometric attributes (LOI)	
	7.5	.5	Objects libraries external to the organisation	
8	Pro	ject	Information Guidelines (PIL)	
	8.1	Intr	oduction	
	8.2	Pur	pose	
	8.3	Act	ivities	
	8.3	.1	Information Benchmark	
	8.4	Ref	erenced project management organization	
	8.4	.1	Organigram of information roles of intervention	
	8.5	Info	ormation flows of project management	
	8.5.1		External information flows	
	8.5	.2	In-house information flows	
	8.5	.3	Coordination flows	
	8.5	.4	Verification flows	50
	8.6	Spe	ecial tools in project management	51
	8.6	.1	Hardware tools	51
	8.6	.2	Software Tools	51
9	Pro	ject	Information Requirements (PIR)	
	9.1	Intr	oduction	
	9.2	Pur	pose	
	9.3	Info	ormation structure, Design LOIN	
	9.3	.1	Process Phase Objectives (LOD)	
	9.3	.2	Project objectives	53
	9.4	Info	ormation structure, project template LOIN	54
	9.4	.1	Objectives and uses of the model	54
	9.4	.2	Delivery	
C	A N. 8	8206	660	Page 8

24/06/2022



	9.4.3	Model processing (DOC)	55
9	.5 In	formation structure, LOIN of project objects	55
	9.5.1	Objectives and uses of objects	55
	9.5.2	Processing of objects	56
10	Projec	t Information Model (PIM)	57
1	0.1	Introduction	57
1	0.2	Purpose	57
1	0.3	Information structure of graphic models	57
	10.3.1	Modelling rules	57
	10.3.2	Coding templates	58
	10.3.3	Model attributes	58
1	0.4	Information structure of the documents	59
	10.4.1	Drawings generation	59
	10.4.2	Drawings coding	59
1	0.5	Information structure object libraries	59
	10.5.1	Geometric attributes (LOG)	59
	10.5.2	Non-geometric attributes (LOIs)	60
	10.5.3	External libraries	60
11	Excha	nge Information Requirements (EIR)	61
1	1.1	Introduction	61
	11.1.1	Regulatory references	61
1	1.2	Purpose	63
	11.2.1	Strategic information objectives of the EIR	64
	11.2.2	Strategic information objectives of the EIR	64
1	1.3	Technical Section	66
	11.3.1	HW and SW infrastructure made available by the appointing party	66
	11.3.2	HW and SW infrastructure of the Contractor	67
	11.3.3	Information management skills	73
	11.3.4	Data formats made available by the Appointing party	74
	11.3.5	Common coordinate system and reference specifications	77
	11.3.6	Process step system	78
	11.3.7	File encoding and naming system	78
	11.3.8	Object coding and naming system	79
	11.3.9	LOIN definition system	80



11.4 Management Section	81
11.4.1 Informative objectives and uses	81
11.4.2 Information content	84
11.4.3 LOIN	85
11.4.4 Roles, responsibilities and authorities for information purposes	88
11.4.5 Information references of the Appointing party (OIL)	90
11.4.6 Structure and organization of information content	91
11.4.7 Time scheduling of information content	93
11.5 Policies for the protection and security of information content	
11.5.1 Regulatory references for data security	
11.5.2 Additional data security requests	95
11.6 Common Data Environment (CDE)	95
11.6.1 Features of sharing infrastructures	
11.6.2 Deposit system	97
11.6.3 File Management	
11.6.4 Data management	
11.7 Supply Chain Information Content Management	
11.8 Verification procedures, validation of information content	
11.8.1 Definition of validation procedures	
11.8.2 Definition of the articulation of the verification operations	
11.9 Information coordination	
11.9.1 Coordination of models	
11.9.2 Information interference (clash detection)	
11.9.3 Information inconsistencies (code checking)	100
11.9.4 Defining how to resolve interference and inconsistencies	101
11.10 How to manage 4D, 5D, 6D and 7D information	101
11.10.1 Programming management (4D – Gantt, WBS, etc.)	102
11.10.2 Economic management (5D – calculations, estimations, etc.)	102
11.10.3 Management of the work (6D – management, maintenance and disposal)	102
11.10.4 Management of externalities (7D – Environmental sustainability, etc.)	102
11.11 How to storage	103
11.12 Template properties	104
12 The Common Data Environment (CDE)	105
12.1 Introduction	105
GA N. 820660	Page 10

24/06/2022



12.2 5	Scope	105
12.3 li	nformation flows	105
12.3.1	Information flows within the CDE	105
12.3.2	In and out information flows	106
12.3.3	Files metadata	106
12.4 ľ	T structure of the CDE	107
12.4.1	Information architecture	107
12.4.2	Dialogue protocols	107
12.5 E	Dedicated tools	107
12.5.1	CDE hardware tools	107
12.5.2	CDE software tools	107
13 Append	dix: Guidelines for ALERs (Region Lombardy)	108
13.1 C	Drganization Information Guidelines - OIL	108
13.1.1	Premise	110
13.1.2	Regulatory references	111
13.1.3	Introduction	119
13.1.4	Goals	123
13.1.5	Characteristics of hardware and software infrastructures	124
13.1.6	Level of information development for BIM Models	126
13.1.7	Roles for information purposes	127
13.1.8	Data sharing	128
13.1.9	Protocol for data exchange	130
13.1.10	Encoding project files	130
13.1.11	Structure and organization of digital modelling	131
13.1.12	2 Resource Management: skills and training	132
13.1.13	B Conclusion	132
13.2	Organization Information Requirements OIR	133
13.2.1	Introduction	135
13.2.2	Scope	135
13.2.3	Information requirements of the organization	135
13.3 A	Asset Information Guidelines – AIL	140
13.3.1	Introduction	142
13.3.2	Scope	142
13.3.3	Activities	142



13.3.4	Relational organization chart of Asset Management	142
13.3.5	Information flows of Asset Management	145
13.3.6	Coordination flows	145
13.3.7	Verification flows	145
13.3.8	Special tools in asset management	146
13.4 A	Asset Information Requirements - AIR	147
13.4.1	Introduction	149
13.4.2	Scope	149
13.4.3	Information structure, LOIN of Asset	149
13.5 A	Asset Information Model- AIM	151
13.5.1	Introduction	153
13.5.2	Scope	153
13.5.3	Information structure of graphic models	153
13.5.4	Information structure of the documents	154
13.5.5	Information structure object libraries	154
13.6 I	Project Information Guidelines- PIL	156
13.6.1	Introduction	158
13.6.2	Scope	158
13.6.3	Activities	158
13.6.4	Information flows of project management	159
13.6.5	Special tools in project management	162
13.7 F	Project Information Requirements – PIR	164
13.7.1	Introduction	166
13.7.2	Scope	166
13.7.3	Information structure, Design LOIN	166
13.7.4	Information structure, LOIN of project model	166
13.7.5	Information structure, LOIN of project objects	168
13.8 F	Project Information Model – PIM	169
13.8.1	Introduction	171
13.8.2	Scope	171
13.8.3	Information structure of graphic models	171
13.9 E	xchange Information Requirements – EIR	175
13.9.1	Introduction	177
13.9.2	Purpose	177
		10

GA N. 820660 24/06/2022 Page 12 Public



	13.9.3 T	echnical Section	181
	13.9.4 N	Ianagement Section	196
1	3.10 Co	mmon Data Environment - CDE	219
	13.10.1	Introduction	221
	13.10.2	Scope	221
	13.10.3	Information flows	221
	13.10.4	CDE IT structure	224
	13.10.5	Custom tools	224
14	Conclusio	ns	225
15	Bibliograp	hy	226

LIST OF FIGURES

Figure 1. Example of organization chart about the information exchange relations	23
Figure 2. Connection diagram of the manuals from EN ISO 19650/UNI 11337	25
Figure 3. Information structure according to ISO 19650-1:2019 (A.Pavan)	
Figure 4. Information flow according to ISO 19650-1:2019 (A.Pavan)	
Figure 5. Construction of CDEs and information flow (A.Pavan)	29
Figure 6. Example Information flow of the Client in the Contract (A.Pavan)	48
Figure 7. Example of model encoding	58
Figure 8. Award Information Flow (A.Pavan)	64
Figure 9. Example of Hardware graphic scheme	69
Figure 10. Example of Hardware tabular schema	69
Figure 11. Example of Software Chart Diagram	71
Figure 12. Example of Tabular Diagram Software	73
Figure 13. prEN17412 – ISO 19650 (A.Pavan)	85
Figure 14. Scheme of the LODs. Geometric and non-geometric information attributes (A.Pavan)	88
Figure 15. CDEs construction and information flow (A.Pavan)	
Figure 16. Construction of CDE and information flow (A.Pavan)	103
Figure 17. Principle of the Common data Environment (A.Pavan)	105
Figure 18. Organization chart of information exchange	120
Figure 19. Approval information flow (A.Pavan)	129
Figure 20. Typical scheme of Asset Management	142
Figure 21. Example of information flow of the Appointing party (A.Pavan)	159
Figure 22. Example of Coordination Levels (UNI 11337-5:2017)	160
Figure 23. Model encoding example	172
Figure 24. Award Information Flow (A.Pavan)	177
Figure 25. Example of Hardware Graphical Schema	183
Figure 26. Example Graphic Diagram Software	186
GA N. 820660	Page 13
24/06/2022	Public



Figure 27. Phases of the Process according to Legislative Decree 50/2016 - UNI 11337-1	196
Figure 28. UNI EN ISO 19650/17412 (A.Pavan)	200
Figure 29. Scheme of the LOD. Geometric and non-geometric information attributes (A.Pavan)	203
Figure 30. Construction of ACDat and information flow (A.Pavan)	218
Figure 31. Operating principle of the CDE - UNI EN ISO 19650-1:2018	222
Figure 32. Approval information flow (A.Pavan)	223

LIST OF TABLES

Table 1 List of file formats accepted	30
Table 2 Example of coding	30
Table 3 External Requirements	33
Table 4 Entities of the group	34
Table 5. Units of the organization	34
Table 6. Typical scheme of Asset Management by means of BIM	36
Table 7. RACI Matrix	37
Table 8. Example of external information flow	38
Table 9. Example of internal information flow	39
Table 10. Hardware tools used by the organisation	39
Table 11. Software tools used by the organization	40
Table 12. Phase objectives (LOIN)	41
Table 13. Management model used	41
Table 14. Asset model documents	42
Table 15. Master model coordinate system	44
Table 16. Geometric attributes	45
Table 17. Non-geometric attributes	46
Table 18. Information roles organization's chart	47
Table 19. Hardware tools	51
Table 20. Software tools	51
Table 21. Project phase objectives	53
Table 22. Project objectives	53
Table 23. Model objectives and uses	54
Table 24. Extrapolation table of the drawings to be developed for the design phase	55
Table 25. Reference systems	57
Table 26. Example of drawings coding	59
Table 27. Geometric attributes	59
Table 28. Non - geometric attributes	60
Table 29. List of acronyms and glossary	61
Table 30. Appointing party information	65
Table 31. Hardware Infrastructure	66
Table 32. Software Infrastructure	67
Table 33. Non digital infrastructure	67
Table 34. Required hardware infrastructure	68
Table 35. Required software infrastructure	70
Table 36. Models and drawings requested	75
GA N. 820660	Page 14
24/06/2022	Public



Table 37. Open formats required	75
Table 38. Open format required and proposed	76
Table 39. Interoperability Information Specification	77
Table 40. Reference system	78
Table 41. Other proposed references	78
Table 42. Example of RACI Matrix	90
Table 43. Information structure according to I SO 19650-1 (A.Pavan)	122
Table 44. Information flow according to I SO 19650-1 (A.Pavan)	122
Table 45. Example of data organization (A.Pavan)	124
Table 46. Table adapted from THE UNI 11337-4 standard	126
Table 47. Construction of ACDat and information flow (A.Pavan)	128



1 Introduction

With the implementation of the European Directive 2014/24/EU, EU Member States may require the use of specific electronic tools for public tenders, in the coming years.

The requirement of electronic tools includes a series of obligations that impact on the public organizations, relating to, for example, staff training, necessary hardware and software equipment and offices reorganization, in the name of more efficient control and management of the information exchange processes.

Furthermore, beyond the legal requirements, the in-depth knowledge of the heritage and its maintenance status, together with the correct management of information, are fundamental elements to ensure careful planning of ordinary and extraordinary maintenance interventions; all this to ensure the performance of buildings over the years, maintaining and improving their performance in terms of energy efficiency and environmental sustainability, while preserving their economic value.

In this context this document constitutes a guidance for public organizations in the process of implementing the use of BIM, with the aim of:

- Provide a clear and common vision of the BIM application process within the public organizations
- Provide the necessary information to encourage collaboration between the interested parties through BIM
- Provide the foundation for creating a Common Data Environment (CDE)
- Ensure the interoperability of the BIM models with the different software platforms used by parties involved
- Define BIM information roles taking into account their support to traditional roles (such as construction manager, safety coordinator, etc.)

The document presents the guidelines (OIL as main document) and the its attachments in the body text and the case study on Region Lombardy and ALERs in the appendix. Namely, the structure of the guidelines is

- A. Organization Information Guidelines (OIL)
- A1. Organization Information Requirements (OIR)
- A2. Organization Information Maps (OIM)
- B. Asset Information Guidelines(AIL)
- B1. Asset Information Requirements (AIR)
- B2. Asset Information Models (AIM)
- C. Project Information Guidelines (PIL)
- C1. Project Information Requirements (PIR)
- C2. Project Information Model (PIM)
- D. Exchange Information Requirement (EIR)
- E. Common Data Environment (CDE)



2 Organization Information Guidelines (OIL)

2.1 Acronyms and Glossary

ACRONYMS	DEFINITION TERMS			
BIM	Building Information Modelling	Digitalization system of the building process for the optimization and efficiency of the planning, construction and management of buildings through the use of Information Technology systems.		
	Integrated Design	Multidisciplinary building process aimed at optimizing the building process.		
	Client	Any physical or legal entity that commissions, in any form of contract, a job, a service or a supply.		
	Consultants	 Executor with a non-continuous collaboration with th organization for certain interventions E.g.: Engineering and / or architecture firms professionals in specific fields, installers, specialize companies etc. 		
	Supplier	Supplier of products for the performance of its activities. E.g.: manufacturers of components such as systems, finishes, etc.		
GIS	Geographic Information System	Tool that allows you to analyze, represent, interrogate entities or events that occur on the territory.		
WBS	Working Breakdown Structure	Tree (descending) structuring of activities for programming.		
	Requirements	Required qualities and conditions necessary to achieve a goal.		
	Asset	Term that indicates, in a very broad sense, any material or immaterial entity susceptible to economic evaluation for a certain subject. In this document, the term is synonymous with immovable property (buildings and land).		
	Asset management	Asset selection technique (also called <i>asset allocation</i>), conducted individually or by classes with the aim to achieve the best risk-return combination of the portfolio of assets resulting from such selection.		
BIM Manager	Building Information Modelling Manager	The BIM manager operates at the level of the organization regarding the digitalization of processes. The BIM manager works with the project manager, as part of the integrated management of information processes and decision-making processes. The BIM manager collaborates with the BIM coordinator and with the CDE manager, even when the latter belongs to a third party organization.		

GA N. 820660 24/06/2022 Page 17 Public



BIM Coordinator BIM Specialist PM	BuildinginformationModellingCoordinatorBuildingInformationModellingSpecialistProjectManager	 n The BIM coordinator works on the single order, in concert with the top management of the organization and according to the indications of the BIM management of digitized processes. n The BIM Specialist acts within the individual orders and operates through certain procedures digitalized through object modelling. It interfaces mainly with the BIM coordinator for the coordination and validation of the models and with the BIM manager to identify the instrumental resources useful for carrying out the order 		
	Code Checking	the project phases and has the main function of obtaining the expected results in compliance with the times and costs.		
		between objects, models and drawings from different disciplines.		
	Clash Detection	Verification and regulatory control (geometric / alphanumeric), on the models considered, through rule-set (set parametric rules).		
	Objects libraries	Digital environment for organized collection and sharing of objects for graphic and alphanumeric models.		
	Information objects	An information object is defined as the vehicle for the representation and contractualization of a product or process in the construction sector through information content of a graphic, documentary (alphanumeric), multimedia, etc. nature. The information documents are divided into: 1. Graphical objects (graphic representation:		
		drawings, technical tables, etc.);		
		2. Documentary objects (alphanumeric representation: relationships, calculations,		
		 Multimedial objects (multimedia representation: audio, photos, movies, etc.). 		
	Information model (or model)	An information model is defined as the vehicle for the simulation and contracting of a resulting product or a process in the construction sector, through information content of graphic, documentary (alphanumeric) and multimedia nature.		



	Objective	The specific purpose for which the model or object is requested. E.g.: obtaining authorizations, documentation concerning the fire safety, information necessary for the economic evaluation of the project, etc.
	Use	Specific use of the data and information enclosed in the model or object. E.g.: extraction of information related to materials, dimensions, quantities, etc.
	Federated model	Model consisting of the set of models related to specific disciplines (e.g.:architectural, structural, MEP)
	Object	Virtualization of geometric and non-geometric attributes of finite spatial entities, related to a work, or to a complex of works, and their processes. (UNI EN ISO 19650)
	Delivery	Transfer of data, information or documents intended as a result of an activity and transmitted at a specific time.
LOIN	Level of Information Required	Framework defining the scope and granularity of "information"; reinterpretable representation of data in a formalized way suitable for communication, interpretation or processing. (ISO 19650-1:2019) LOIN= LOG+LOI+DOC LOIN= LOD+DOC
LOD	Level of development of digital objects	Level of depth and stability of the data and information of the digital objects that make up the models. For uniformity with the terminology adopted in the international field, "LOD" is used as deduced from the English language "Level of Development". (ISO 19650-1:2019) LOD= LOG+LOI
LOG	Information level of objects – geometric attributes	Level of depth and stability of the geometric attributes of the digital objects that make up models. Constituent part of the LOD, together with the LOI, referring to the geometric attributes. (ISO 19650-1:2019)
LOI	Information level of objects – informational attributes	Level of depth and stability of the information attributes of the digital objects that make up models. Constituent part of the LODs, together with the LOGS, referring to the non-geometric attributes. (ISO 19650-1:2019)



DOC	Information level of documents	Level of depth of the input documents for the drafting of the models and of output from the models themselves. (ISO 19650-1:2019)
	Systems	Technological (physical) part of a work. More or less articulated composition of subsystems combined with each other due to the common correspondence to an aggregating function. Generally differentiated in construction or architectural systems, structural systems, plant systems, environmental systems. Examples of systems are: the internal walls and the outer shell of a building, the floors, the roofs intended as finished packages. The roadbed, the air conditioning system, the elevation structures. (ISO 19650-1:2019)
	Subsystems	Technological (physical) part of a system belonging to a work. More or less articulated composition of individual components combined with each other due to the common correspondence to an aggregating function. It performs its own characterizing function and is part of a system, performing (or helping to perform) one or more specific functions. Generally differentiated into construction or architectural subsystems, structural subsystems, plant subsystems are: the plaster layer, the insulating layer, screeds, etc. understood as functional layers or parts of finished packages. The tout-venant of the roadbed, the distribution network of the air conditioning system, the pillar or beam of the elevation structures. (ISO 19650-1:2019)
	Appointing party	Recipient of information concerning works, assets or services by a principal appointed party. (ISO 19650-1:2019)
	Appointed party	Provider of information concerning works, assets or services. (ISO 19650-1:2019)
	Information	Reinterpretable representation of data in a formalized way, suitable for communication, interpretation or processing. (ISO 19650-1:2019)
EIR	Employer's Information Requirements	Explanation of the needs and information requirements required by the Client / Appointing party for the execution of a contract for works, supply or services. (ISO 19650-2018)



BEP pre contract	Information Management offer/BIM Execution Plan pre contract	Clarification and specification of the information management offered by the competitor in response to the needs and in compliance with the requirements requested by the Client / Appointing party in the EIR.
BEP	Information Management Plan/BIM Execution Plan	(Operational) planning of the information management that will be implemented by the Contractor in response to the needs and in compliance with the requirements requested by the Client / Appointing party in the EIR. It is drawn up in strict compliance with the previous pre BEP.
IDP	Information Delivery Plan	The planning of the delivery of information is the responsibility of each Appointed party. Plans should be formulated in response to the information requirements set by the Appointing party and should reflect the purpose and scope of the assignment throughout the life cycle of the asset. (ISO 19650-1:2019)
CDE	Common Data Environment	Digital environment for organized collection and sharing of data relating to models and digital drawings, referring to a single work or a single complex of works. Information source agreed for a given order or immovable property, to collect, to manage and to forward each information container for the entire duration of the management of a contract. (ISO 19650-1:2019)
DR	Data Room	Paper archive, for the sharing of non-digital documents, referring to a single work or a complex of works.
DB	Database	Structured data store stored in a computer in order to rationalize the updating and management of information and allow the execution of complex searches.
DBMS	Database Management System	Software for manage the data stored into a Database.
ERP	Enterprise Resource Planning	Integrated management system of relevant business processes (sales, purchasing, warehouse management, accounting, etc.)
FTP	File Transfer Protocol	Protocol for data transmission with file storage and exchange environments.



ICT	Information and Communication Technologies	Set of technologies that provide access to information through telecommunications (internet, wireless networks, mobile phones, etc.).	
XML	eXtensible Markup Language	Language that allows the representation of documents and structured data on digital support.	
IFC	Industry Foundation Classes	Open language for saving and exchanging data for graphic models. (ISO 16739:2016)	
LC1	Coordination Level 1	Coordination of data and information carried out within a single model. (ISO 19650-1:2019)	
LC2	Coordination Level 2	Coordination between different models. (ISO 19650-1:2019)	
LC3	Coordination Level 3	Coordination to be carried out between models drawings generated by models and informatio documents not deriving from graphic models (for example, technical or calculation reports, CA graphs, etc.), for each of the disciplines concerned. (ISO 19650-1:2019)	
LV1	Verification Level 1	Formal internal verification: verification of the correct method of production, delivery and management of information in relation to what is indicated in the EIR and in the BEP. (ISO 19650-1:2019)	
LV2	Verification Level 2 Substantial internal verification: verification air ascertaining the readability, traceability consistency of the information contained in the v models. It is performed by carrying out a verifica the achievement of the information evolution models and drawings the level of development related objects, required in the specific according to when prescribed in the EIR and BEP. (ISO 19650-1:2019)		
LV3	Verification Level 3	Formal and substantial verification: verification carried out on what is deposited in the CDE (data sharing environment) and / or ACDoc (document sharing archive). That verification shall be carried out by a third party. (ISO 19650-1:2019)	
	Datum	Intangible, elementary cognitive element, interpretable within a communication process through previously shared rules and syntax.	



Metadata	Kit of information to computer documents, useful for
	their description and administration.

2.2 Introduction

The present Organization Information Guidelines (OIL) defines the procedures for the production, storage, management and transmission of digital information within the organization.

This guideline identifies the minimum contents of the specific information required by the Organization in the digital information exchange with the stakeholders. The application of the BIM methodology will allow the creation, sharing and delivery of a digital model that gathers and organizes the geometric, alphanumeric and documentary information that is collected, created, updated during the life cycle of the asset.

In order to better identify in which context the information relationship between the Organization and its stakeholders is placed, the schematic and simplified organizational chart of the information exchange relations of the Organization with external subjects is presented below.

Insert here the Organization chart about the information exchange relations



Figure 1. Example of organization chart about the information exchange relations

Depending on the production and management needs of the information exchanged between the Organization and its stakeholders, the following documents attached to the OIL may be produced,

- A1. Organization Information Requirements (OIR)
- A2. Organization Information Maps (OIM)
- B. Asset Information Guidelines (AIL)
- B1. Asset Information Requirements (AIR)
- B2. Asset Information Models (AIM)
- C. Project Information Guidelines (PIL) C1. Project Information Requirements (PIR) GA N. 820660 24/06/2022

Page 23 Public



- C2. Project Information Model (PIM)
- D. Exchange Information Requirementa (EIR)
- E. Common Data Environment (CDE)

The annexes listed above (proposed in the appendix to this document) aim to constitute a reference document structure to be detailed and deepened in accordance with the needs of digital information exchange between the Organization and its stakeholders.

It is specified that the OIL Annexes are interrelated in that they define the information structure provided for by ISO 19650-1:2019 (Errore. L'origine riferimento non è stata trovata.Errore. L'origine riferimento non è stata trovata. and Figure 3Errore. L'origine riferimento non è stata trovata.).







GA N. 820660 24/06/2022 Page 25 Public





Figure 3. Information structure according to ISO 19650-1:2019 (A.Pavan)

The annexes to the OIL therefore acquire a fundamental role for the digital flow of the order as specified in Figure 4



Figure 4. Information flow according to ISO 19650-1:2019 (A.Pavan)

2.3 Regulatory references

• The information management is governed by the following technical standards

2.3.1 Technical standards

- o ISO 9000:2015 Quality management systems Fundamentals and vocabulary
- ISO 9001:2015 Quality management systems Requirements
- ISO 9004:2018 Quality management Quality of an organization Guidance to achieve sustained success

GA N. 820660 24/06/2022 Page 26 Public



 ISO 19650 - Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling Part 1: Concepts and principles; Part 2: Delivery phase of the assets

2.4 Objectives

Decribe here the objective pursued by the organizations, through the digitalization of information exchanges and through the progressive use of specific digital methods and tools, such as BIM;

For example

- architectural, technical and functional quality of the assets;
- compliance with environmental, urban planning, protection of cultural and landscape heritage, protection of health and safety;
- constantly updated estimation of the life cycle and maintenance of the works;
- better coordination between the different disciplines;
- risk mitigation of design variants during construction;
- better control of the time and cost of execution of the works;
-

2.5 Features of hardware and software infrastructures

For the implementation of BIM methodology, it is necessary to have the necessary hardware and software infrastructures, as for example the one described below.

2.5.1 Hardware:

The Organization must be equipped with a hardware infrastructure suitable for the digital management of information processes (i.e. hardware infrastructure suitable for the operation of BIM software). In particular, it will refer to:

- CPU Type
- Ram
- Video resolution
- Video card
- Disk space
- Pointing devices
- Connectivity
- Operating system GA N. 820660 24/06/2022

Page 27 Public



- Browser
- .Net Framework
- Etc.

2.5.2 Software:

The software must have the ability to create three-dimensional parametric objects as well as have the tools of planning, structural calculation, metric calculation, energy analysis, Facility Management etc. In addition, it must allow the detection of interference (clash detection) and the verification of the implemented rules (code checking). Finally, it must allow coordination and collaboration between stakeholders (allowing the creation of the CDE).

The BIM software used by the Organization must have the ability to operate even with files in non-proprietary open format (IFC).

2.6 Information development level for BIM Models

The level of information need (LOIN) of an object should be considered as the set of geometric information, rearranged in 2D and 3D graphic form, and non-geometric (such as performance and regulatory information) described in alphanumeric form.

The LOIN to be achieved for the Data Model should be developed for:

- Architectural model
- Structural model
- MEP model
- ...

The integration of BIM Models (architectural, structural and MEP) aims to obtain the totality of data and information requested by the Organization, through the creation of an interoperable Model. This model must be delivered in the IFC format and in the native format.

2.7 Roles for information purposes

The Organization is required to carry out the information management activity with subjects in possession of the necessary experience and skills also in relation to roles and responsibilities. Below, by way of example, is a list of the "typical" roles of BIM management.

- BIM Manager
- BIM Coordinator
- BIM Specialist
- CDE Manager



2.8 Data sharing methods

The definition of a common standard for the production and sharing of information content will facilitate the creation of the Common Data Environment (CDE), so that the information management proceeds through a processing process consisting of four sequential phases (Errore. L'origine riferimento non è stata trovata.Errore. L'origine riferimento non è stata trovata.): WIP (Work In Progress), Sharing, Published, Archive.



Figure 5. Construction of CDEs and information flow (A.Pavan)

Therefore, the phases are

- 1. **WIP** (in progress): internal work environment and data acquisition not visible from subjects external to the organization;
- 2. sharing: data sharing environment processed but not completed or coordinated;
- 3. published: completed and coordinated data sharing environment;
- 4. archive (valid, outdated): internal working environment.

Futhermore the following definitions can be provided:

- **Consolidated**: models and drawings are sufficiently consolidated for sharing with third parties for the purpose of coordination.
- **approved**: the models and drawings, concluded internally and coordinated, are approved for publication and making available to third parties
- **concluded**: the models and the drawings are concluded and no longer necessary for the elaboration by third parties for the specific phase in place



 historical: the models and drawings are made accessible internally to the processing as a database for other phases or Contracts

2.9 Protocol for data exchange of models and drawings

About the data exchange protocol, in addition to the delivery of the file in IFC format and native for the Data Model, list in the following table the files formats accepted.

	docx,
	pptx,
DOCUMENTS	txt
	xls, xlsx
	pdf
	Bmp
	jpg;
	jpeg;
IMAGES	png;
	tiff
	pcx,
	gif
	dxf
DRAWINGS AND MODELS	dwg
	IFC
	rvt, rfa

Table	1.	List	of	file	formats	acce	pted
Iabio			•••		10111ato	4000	0.00

In addition, to facilitate reading and use, the size limits for file type must be defined.

2.10 Coding of project files

The coding is necessary to facilitate information flows between stakeholders involved in the the project. The stakeholders will be required to encode the Models, the respective drawings and the data contained therein. In the following is specified an example of coding.

Table 2. Example of coding

CODE	DESCRIPTION	NUMBER OF DIGITS or LETTERS
PROPERTY CODE	Describes the property	3 DIGITS
LEVEL	Indicates the level (plan)	3 LETTERS
FILE TYPE	Indicates whether it is a three- dimensional model, a calculation	2 LETTERS



	relationship, specification, etc.	an	operational	
DISCIPLINE				
DESIGN PHASE				

2.11 Structure and organization of digital modelling

2.11.1 Shared coordinate system

Models must share the same coordinate system (e.g. coordinate system based on WGS84) to ensure the correct reconstruction of the federated model (set of architectural, structural and MEP models). With particular reference to the geolocation of the Model, it must be georeferenced first in the proprietary platform, assigning the latitude and longitude coordinates, then verifying that these are correctly exported to the IFC model.

2.11.2 Levels of coordination

The data and information contained in digital models must be coordinated with each other. Coordination is carried out at the level of the model of the same discipline and between graphic models of the various disciplines. It is implemented through the verification of the interferences (*clash detection*) and the relative resolutions of the inconsistencies found (*code checking*).

Three levels of coordination are identified:

- LC1: First level coordination. This is the coordination of data and information within the graphic model relating to a single discipline;
- LC2: Second level coordination. This is the coordination of data and information between the individual models of the disciplines.
- LC3: Third level coordination. This is the Coordination of data and information generated by graphic models with data and information external to graphic models (they can be processed both digital and non-digital).

2.11.3 Levels of verification

Three levels of verification (LV) are identified, namely:

- LV1: First level verification. It is an internal, formal audit of the production, delivery and management of information.
- LV2: Second level verification. This is an internal verification of a substantial nature, as it aims to verify the readability and consistency of the data.
- LV3: Third level verification. This is an independent (external) verification of both formal and

GA N. 820660 24/06/2022 Page 31 Public



substantial character carried out by the Appointed party, who can make use of a third party.

2.12 Management of Resources: skills and training

To start or complete the transition from a traditional approach to the BIM approach, the presence within the public organizations of professional figures who are equipped with the specific required skills becomes of fundamental importance.

Actions applicable by the organization may include training, mentoring or reallocating staff currently employed; or hiring new staff, including recent graduates, who possess the required skills.

In particular, the organization must undertake to define and ensure an adequate level of competence for the persons who hold the function of:

- o BIM Manager
- o BIM Coordinator
- o BIM Specialist
- o CDE manager.



3 Organization Information Requirement (OIR)

3.1 Introduction

This document is Annex A1 to the OIL Organization Information Guidelines.

3.2 Scope

The purpose of this document is to identify the information requirements of the organization by providing useful information to the other annexes on Asset and Project requirements (AIR – PIR) and for the drafting of Asset and Project models (AIM – PIM).

3.3 Information requirements of the organization

3.3.1 External requirements

The following table shows on the one hand the subjects involved in relations outside the organization and on the other the information requirements necessary for each of them:

	INFORMATIO	N REQUIREMENTS		
SUBJECT	INPUT	OUTPUT		
Public entities:	e.g. Municipality: Detection of the presence of architectural barriers	e.g. Database / resource planning needed for interventions		
Private operators				
Other stakeholders				
European				
project partners				
Design studios				
Specialist				
studios				
(surveys,				
geology, etc.)				

Table 3. External Requirements

3.3.2 Internal requirements

3.3.2.1 Entities of the Organisation (if applicable)

The following table shows on the one hand the subjects involved in the internal relations of the Organisation and on the other the information requirements necessary for each of them:

GA N. 820660 24/06/2022 Page 33 Public



	INFORMATION REQUIREMENTS			
SUBJECTS	INPUT	OUTPUT		
General Manager	Programming acts; studies and research; administrative measures; communications to the inside and outside the DG	Approval of measures/documents of competence		
U.O. Manager	Administrative measures; communications to the inside and outside the DG	Approval of measures/documents of competence or verification for subsequent forwarding		

Table 4. Entities of the group

3.3.2.2 Areas of the Organisation (if applicable)

The following table shows on the one hand the areas of which the organization is composed and on the other the information requirements necessary for each of them:

	INFORMATION REQUIREMENTS		
AREA/DEPARTMENT	INPUT	OUTPUT	
Legislative			
Privacy and anti-corruption		Privacy by Design, DPIA, Information, etc.	
Budget	Verification of financial/accounting regularity	Approval of contribution disbursement acts	
Controls	Programme/beneficiary lists	Programme of checks	
Communication	Verification of the need for communication activities	Planning and management of communication activities	
Staff			

Table 5. Units of the organization



4 Organization Information Map (OIM)

4.1 Introduction

This document is Annex A1 to the OIL - Organization Information Guidelines.

For a better understanding of the Organization Information Maps (OIM), you should also refer to the Organization Information Guidelines (OIL) and the Organization Information Requirement (OIR).

4.2 Purpose

The purpose of this document is to identify the information requirements of the organization by providing useful information to the subsequent manuals on Asset and Project requirements (AIR – PIR) and for the drafting of manuals on Asset and Project models (AIM – PIM).

4.3 Information structure of GIS maps

Describe here if the Organization equipped with GIS maps useful for its activities.

If the Organization is not equipped, explain here how It retrieves information about the territory.

For example, the Organization could retrieve the data and information relevant to the areas of interest from the urban planning information provided, by the specific Municipality of reference; subsequently, once the area of intervention has been defined, through surveys and analysis, it establishes a starting information base to which reference should be made.

The reference coordinates of each land and property considered can be inserted in the following scheme:

REFERENCE SYSTEM			
Point ID			
Х			
Y			
Ζ			

4.4 Information structure of the documents

Describe here the flow of the design works developed by Organization starting from the maps described above

List here the drawings referred to for this purpose For example:

- CAD relief;
- Point cloud relief;
- Other...

4.5 GIS object library information structure

Describe here the GIS object libraries used by the Organization.



5 Asset Information Guidelines (AIL)

5.1 Introduction

This document is Annex B to the OIL Organization Information Guidelines regarding the asset level. The Asset Information Guidelines (AIL) are also completed through the Asset Information Requirement (AIR) and the Asset Information Model (AIM), which are also annexes to the OIL (Annexes B1 and B2).

5.2 Purpose

The purpose of this document is to provide the Organization with a tool through which to identify the activities, flows and tools used within the Organization's asset area.

5.3 Activities

5.3.1 Products and services

Describe here the focus/core activities of the Organization.

5.4 Relational Organization chart for Asset Management

5.4.1 Management information roles organization

Describe in the following the organization chart relating to the roles and management information roles related to the Asset of the Organization with reference to BIM. The scheme should be integrated and flanked by the existing organization chart (which may therefore not concern BIM).



 Table 6. Typical scheme of Asset Management by means of BIM

ROLE	NAME	MAIL	TELEPHONE	ACTIVITY
CDE				Example: The CDE manager work
Manager				with the BIM Manager and the BIM

GA N. 820660 24/06/2022 Page 36 Public


		Coordinator for the structuring of the CDE. The CDE manager manages the data sharing platform.
BIM Manager		Example: The BIM Manager establishes the information rules for asset management.
BIM Coordinator		Example: The BIM Coordinator receives the information from the BIM Manager and coordinates the activities of the BIM Specialists.
BIM Specialist ARCH		
BIM Specialist STR		Example: BIM Specialists follow the directives of the BIM coordinator and develop the model
BIM Specialist MEP		

5.4.2 Matrix of information responsibilities

The table below (RACI) shows the responsibilities of each role identified in the previous paragraph. Fill in the empty fields with an X,

Table 7. RACI Matrix

ACTIVITY	CDE manager	BIM manager	BIM coordinator	BIM Specialist ARCH	BIM Specialist STR	BIM Specialist MEP
Definition of information rules						
Incoming						
documentation						
verification						
Check						
outbound						
documentation						
Approval						



Clash/Code on			
coordinated			
models			
Clash/Code on			
individual			
models			
Model			
development			
Information			
Specifications,			
Offer and			
Information			
Management			
Plan			

R = Responsible

A = Accountable

C = Consulted

I = Informed

5.5 Information flows of Asset Management

5.5.1 External information flows

Insert below a graph (and explain it) that shows the flow used for the start of asset management activities between the Organization and the external parties involved during the process.

Table 8. Example of external information flow



5.5.2 In-house information flows

Insert below a graph (and explain it) that shows the internal information flow of Organization in reference to asset management.

GA N. 820660 24/06/2022 Page 38 Public





Table 9. Example of internal information flow

5.5.3 Coordination flows

In the case of the Asset, specific Coordination flows between models and / or actors of the process are not adopted because the only activity to be carried out is to "connect" useful documents during the management phase to the model developed for this purpose.

- However, it is necessary and useful to check that, for example:
 - The model is correctly exported in IFC 2X3 format;
 - The model thus exported contains Premises and Real Estate Units (U.I.);
 - The model thus exported is divided into AFO and ASO;
 - Each object is correctly linked to the necessary technical documentation;
 - Other...

5.5.4 Verification flows

Each asset model must undergo a verification process whenever there are changes to the initial conditions (internal / external restructuring, etc.).

5.6 Special tools in asset management

5.6.1 Hardware tools

In the following table the hardware tools used by the Organization:

Table 10. Hardware tools used by the organisation

HARDWARE				
No.	Typology	Prevailing features		

GA N. 820660 24/06/2022 Page 39 Public



Fixed Workstation	
Monitor	
Telecom Italia Business Network	
Multifunction printer	
Uninterruptible power supply	

5.6.2 Software Tools

The following table shows the software tools used by the Organization:

Table 11. Software tools used by the organization

SOFTWARE

Utilization	Model	March	Version	N° Postazioni
Coordination:				



6 Asset Information Requirement (AIR)

6.1 Introduction

This document represents Annex B1 to the OIL Organization Information Guidelines regarding the asset level. The Asset Information Requirements (AIR) is completed through the Asset Information Guidelines (AIL) and the Asset Information Model (AIM), which are also annexes to the OIL (B and B2).

6.2 Purpose

The purpose of this document is to identify the information requirements necessary for the Asset area of the Organization.

6.3 Information structure, Operating LOIN

The phase objectives (LOIN) are listed below with reference to the operating status.

Table 12. Phase objectives (LOIN)

PHASE	OBJECTIVE		
Management and Maintenance	Maintenance design criteria		

6.4 Information structure, Operating model

6.4.1 Objectives and uses of the model

The Organization defines in the following table the management model with its objectives and uses

Table 13. Management model used

MODEL	OBJECTIVES	USES
Architectural	Find a model rich in information used by the management of the immobile (vani, surface, etc)	Extract surfaces; Extract areas (real estate unit); Extract maintenance dates; Other
Structural		
MEP		

6.4.2 Delivery

The deliveries planned for the asset management of the Organization are:

- Management model (financial management, costs, revenues, leases, etc.)
- Maintenance model (technical management, etc.)
- <u>Definition Type of deliveries</u> By way of example, some types of deliveries are listed:

GA N. 820660 24/06/2022



- Graphic Templates
- Graphic elaborations extracted from the model
- Graphics not extracted from the model
- Documentary documents not extracted from the model
- Clash detection report
- o Other ..
- <u>Delivery</u> support

Deliveries must be made available through:

• CDE Sharing

6.4.3 Model documents (DOC)

The following table shows all the documents extracted (e) or linked (c) to the Asset model.

MODEL	DOCUMENT	CODE	
Architectural			
Architectural/			
Structural/ MEP			
Legend			
	e Document extrapolated from model		
	c Document related to the model		

Table 14. Asset model documents

6.5 Information structure, LOIN of asset objects

6.5.1 Objectives and uses of objects

The objective of digital objects in the operation phase is to guarantee the functionality of each element in the useful life cycle and its possible disposal and replacement; as well as understand the consequent costs and consumption.

Use of digital objects in the stage of operation is to ensure the extraction of the information necessary for the technical / economic management of the asset.

Define the attributes needed for the objects.

- ...
- ...
- ...

6.5.2 Processing of objects

Each object of the asset model must be linked through *links* and attributes to the following useful documents during the management phase:

GA N. 820660 24/06/2022 Page 42 Public



List the documents (e.g. technical sheet of a door)

- ...
- ...
- ...



Asset Information Model (AIM) 7

7.1 Introduction

This document is Annex B2 to the OIL Organization Information Guideline regarding the asset level. The Asset Information Model (AIM) is completed through the Asset Information Guideline (AIL) and the Asset Information Requirements (AIR), which are also annexes to the OIL (B and B2).

7.2 Purpose

The purpose of this document is to identify the information structure of the models, drawings and library of objects produced for the Organization's Assets.

7.3 Information structure of graphic models

7.3.1 Modelling rules

The Asset model is a model that follows the same principles as a project model (maximum file size, coordinate system, insertion of objects, attributes), but differs from the latter in the type of information from which it is populated. Indeed, the Asset model is configured as an as-built model that unloads the data necessary in the design/construction phase, because these data are superfluous in the management phase (for example, the number of reinforcing bars).

7.3.2 Architectural Asset Model

The Architectural Asset Model must be generated starting from an As-built Model present in the CDE.

7.3.3 Structural and MEP Asset Model

Regarding the management of structural or MEP parts, the Asset model referred to these disciplines will be generated and will undergo the same processes described for the Asset Architectural Model.

7.3.4 Common system of coordinates and reference specifications

In the Master Model, the coordinate system received through the survey must be used. By way of example, there is a useful table to specify the coordinates to be used:

ABSOLUTE REFERENCE SYSTEM				
Argument	Specification			
Intersection grids XX and YY				
Altitude				
Rotation from true north				
Ground floor PPF				
OTHER PF	ROPOSED REFERENCES			
Argument	Specification			
Origin of the axis system				
Offsets and distances between axes				
Encoding axes or grids				
GA N. 820660		Page 44		

Table 15. Master model coordinate system

24/06/2022



Units of measurement	

7.3.5 Specific for inserting digital objects into models

All asset models must be developed from an as-built model (derived from the Project area). Each object, therefore, will follow modelling criteria that allow its easy reading, interrogation and subsequent re-elaboration. In all cases where possible, the rules for a correct elements parameterization must be respected by using the proper geometric constraints.

7.4 Information structure of the documents

7.4.1 Processed generation

Specify whether specific processes should be extrapolated from the Asset Model, or whether any information can be accessed directly by querying the model in the platform.

7.4.2 Processed co-editing

Specify the encoding of the drawings extracted directly from the model.

7.5 Information structure of the object libraries

7.5.1 Object modelling rules

Specify if the Asset Models will be loaded in the platform and in what format (specifically, the objects contained in the platform derive from the design model, which then became as-built and, finally, skimmed unnecessary information during management).

7.5.2 Coding objects

Specify whether the Organization produces objects directly (and whether object encoding refers to the one proposed by the appointed party).

7.5.3 Geometric attributes (LOG)

All the objects produced for management and maintenance are characterized by a low level of geometric detail, sufficient to identify the overall geometries of the object itself and those necessary for maintenance. The following table shall contain the information which is useful and necessary for this stage:

Table 16. Geometric attributes

GEOMETRIC ATTRIBUTES

• height

• length

GA N. 820660 24/06/2022 Page 45 Public



7.5.4 Non-geometric attributes (LOI)

The non-geometric attributes related to the object are those referring to the correct maintenance and management. The following table shall contain the information that is useful and necessary for this phase:

Table 17. Non-geometric attributes

NON-GEOMETRIC ATTRIBUTES

- ...Health and safet information
- ...cost
- ...

7.5.5 Objects libraries external to the organisation

Indicate whether Organisation produces models and/or objects or whether it makes use of objects downloaded from external libraries (specifying which libraries).



8 **Project Information Guidelines (PIL)**

8.1 Introduction

This document represents Annex C to the OIL, Organization Information Guidelines, regarding the design of interventions (construction, restoration, renovation, demolition) of an Asset. The Project Information Guidelines (PIL) is also completed through the Project Information Requirement (PIR) and the Project Information Model (PIM), which are also annexes to the OIL (Annexes C1 and C2).

8.2 Purpose

The purpose of this document is to identify the activities, organizational charts, flows and information tools in reference to the design of interventions (from restructuring, demolition, and reuse).

8.3 Activities

8.3.1 Information Benchmark

Describe/Explain here if the Organization deals with design and/or controls and verifies externally commissioned projects.

In the case of projects commissioned externally, list here the external reference organizations:

8.4 Referenced project management organization

8.4.1 Organigram of information roles of intervention

Insert in the following table the organization chart relating to the information roles.

ROLE	NAME	EMAIL	TELEPHONE	ACTIVITY
				The CDE manager confronts
				the Project Manager and the
CDE				BIM Coordinator for the
manager				structuring of the CDE.
				The CDE manager manages
				the data sharing platform.
				The BIM Manager establishes
BIM manager				the information rules for
				GREEN BIM.
DIM				The BIM Coordinator receives
Divi				the information from the BIM
COOLUITATO				Manager and the Project

Table 18. Information roles organization's chart



		Manager and coordinates the activities of the BIM Specialists
BIM Specialist		BIM Specialists follow the directives of the BIM coordinator and develop the model

8.5 Information flows of project management

8.5.1 External information flows

Below is a diagram representing the information flows external to the organization



Figure 6. Example Information flow of the Client in the Contract (A.Pavan)

8.5.2 In-house information flows

The Organization must report below its internal information flow in relation to project management.

8.5.3 Coordination flows

The data and information contained in the models must be coordinated with the reference rules. This coordination (in the same model or between graphic models of the various disciplines) must take place through the verification of interference (*clash detection*) and relative resolutions of any inconsistencies (*code checking*) found.

For these coordination checks, three levels are identified, as indicated in ISO 19650-2:

- LC1 (first level coordination) Coordination of data and information within a graphic model of the same discipline;
- LC2 (second level coordination) Coordination of data and information between several individual models of the various disciplines.

GA N. 820660 24/06/2022 Page 48 Public



• LC3 – (third level coordination) Coordination of data and information generated by graphic models and data and information not generated by graphic models (digital or non-digital processing).

For **clash detection** you can refer to the following tables

• Non-exhaustive example of the coordination table of LC1 models

Model		Architectural							
	Object classes	Ceilings	Doors	Pavim.	Ringh.	Stairs	Walls	Windows	Other
	Ceilings								
	Doors								
Arch.	Floors								
	Railings								
	Stairs								
	Walls								
	Windows								
	Other								

LC1 - coordination of interferences of the same graphic model (based on ISO 19650-2)

• Non-exhaustive example of the coordination table of the LC1 – LC2 models

Model		Architectural							
	Object classes	Ceilings	Doors	Pavim.	Ringh.	Stairs	Walls	Finest.	Other
	Floors								
Structur.	Stairs								
	Structural pillars								
	Structural frame								
	Other								

LC2 - coordination of interferences between a model and other graphic models (UNI 11337-5:2017)

As regards the third-level coordination verification - LC3 a manual execution is foreseen. We tend to extrapolate as many documents as possible from the model for the purpose minimize the files not extracted from the model and make this coordination verification as less impactful as possible.

For **Code Checking**, traditional checks must be performed also referring to the following matrix:

GA N. 820660 24/06/2022



MODEL		Building Regulations	Hygiene regulations	Consolidated Law on Construction	Law 10	Q.M. 1444	House plan	NTC 2018	UNI EN	CEI
	Object									
Architectural	Model									
	Processed									
	Object									
Facilities	Model									
	Processed									
	Object									
BEM	Model									
	Processed									
	Object									
Electrical MEP	Model									
	Processed									
Mechanical MEP	Object									
	Model									
	Processed									
	Object									
Water-sanitary MEP	Model									
	Processed									

8.5.4 Verification flows

Within the information process inherent to the project, three levels of verification (LV) are identified as

- LV1 internal, formal verification;
- LV2 internal, substantial verification;
- LV3 independent, formal and substantive verification

The organization will carry out the level of internal verification LV1 and LV2 by the BIM Coordinators for each model or processed product and by the BIM Manager on a sample basis before their issuance to third parties.



8.6 Special tools in project management

8.6.1 Hardware tools

The following table shows the hardware tools used by the Organization

	HARDWARE				
Nr.	Typology	Prevailing features			
	Fixed Workstation				
	Monitor				
	NAS				
	Notebook				
	Telecom Italia Business				
	Network				
	Multifunction printer				
	Uninterruptible power				
	supply				

Table 19. Hardware tools

8.6.2 Software Tools

The following table shows the software tools used by the organization

Table 20. Software tools

SOFTWARE						
Utilization	Model	Brand	Version	N° workstation		
BIM authoring:						
Facilities						
Infrastructure						
CAD:						
Sharing:						
Of files						
Construction site						
Verification:						
Clash Detection						
Code Check						

GA N. 820660 24/06/2022



SOFTWARE						
Utilization	Model	Brand	Version	N° workstation		
Management of point clouds:						



9 **Project Information Requirements (PIR)**

9.1 Introduction

This document represents Annex C1 to the Information Management Manual – OIL Organization Information Guidelines regarding the design of the construction, restoration, renovation, and demolition of an Asset.

The Project Information Requirement (PIR) is also completed through the Project Information Guidelines (PIL) and the Project Information Model (PIM), which are also annexes of the OIL (at .C and C2).

9.2 Purpose

The purpose of this document is to identify the information structure for intervention projects, models and objects.

9.3 Information structure, Design LOIN

9.3.1 Process Phase Objectives (LOD)

Table 21. Project phase objectives

PHASE	PHASE OBJECTIVES
Initiative	
Initiation	
Concept design	
Preliminary design	
Developed design	
Detailed design	
Construction	
Buillding use	
End of life	

9.3.2 Project objectives

Table 22. Project objectives

PHASE	PROJECT OBJECTIVE
Initiative	
Initiation	
Design: concept	

GA N. 820660 24/06/2022 Page 53 Public



Design:	
preliminary	
Design:	
developed	
Design: detailed	
Construction	
Building use	
End of life	

9.4 Information structure, project template LOIN

9.4.1 Objectives and uses of the model

Table 23. Model objectives and uses

PHASE	MODELS	OBJECTIVE	USES
Initiative			
Initiation			
Design: concept			
Design:			
preliminary			
Design:			
developed			
Design: detailed			
Construction			
Building use			
End of life			

9.4.2 Delivery

During the determination of the modelling specifications, a delivery plan must be defined where the following information will be identified:

• Definition Type of deliveries

By way of example, some types of deliveries are listed:

- o Graphic Templates
- o Graphic elaborations extracted from the model
- Graphics not extracted from the model
- o Documentary documents not extracted from the model
- Clash detection report
- o Other..
- <u>Delivery</u> support

Deliveries must be made available through:

o CDE Sharing

GA N. 820660 24/06/2022



9.4.3 Model processing (DOC)

Example of extrapolation table of the drawings to be developed for the design phase.

Table 24. Extrapolation table of the drawings to be developed for the design phase

MODEL	DRAWING	TABLE
Arabitaatural		CODE
Architectural		
Chruchurol		
Structural		
BEM		
Mechanical		
Electrical		
Plumbing		
-		
Safety		
legend	•	· · · ·
e	drawing extrapolated from model	
с	drawing related to the model	

9.5 Information structure, LOIN of project objects

9.5.1 Objectives and uses of objects

PHASE	OBJECT	OBJECTIVE	USES
Initiative			
Initiation			
Design: concept			
Design:			
preliminary			
Design:			
developed			
Design: detailed			
Construction			



Building use		
End of life		

9.5.2 Processing of objects

Each object will be linked through *links* and attributes to the following drawings:

PHASE	OBJECT	OBJECTS DRAWINGS	
Initiative			
Initiation			
Design: concept			
Design:			
preliminary			
Design:			
developed			
Design: detailed			
Construction			
Building use			
End of life			



10 Project Information Model (PIM)

10.1 Introduction

This document Is Annex C2 to the OIL, Organization Information Guidelines, regarding the design of the construction, restoration, renovation and demolition of an Asset.

The Project Information Model (PIM) is also completed through the Project Information Guidelines (PIL) and the Project Information Requirements (PIR), which are also annexes of the OIL (annexes C and C1).

10.2 Purpose

The purpose of this document is to identify the information structure of graphic models, drawings and object libraries.

10.3 Information structure of graphic models

10.3.1 Modelling rules

10.3.1.1 Maximum size of modelling files

Developed models must have a minimum size of xx MB and a maximum of xxx MB.

10.3.1.2 Common system of coordinates and reference specifications

In the Master Model the system of coordinates received through the topographic survey is used. By way of example, there is a useful table to specify the coordinates to be used:

Table 25. Reference systems

ABSOLUTE REFERENCE SYSTEM		
Argument	Specification	
Intersection grids XX and YY		
Altitude		
Rotation from true north		
Ground floor PPF		
OTHER PR	OPOSED REFERENCES	
Argument	Specification	
Origin of the axis system		
Offsets and distances between axes		
Encoding axes or grids		
Units of measurement		

10.3.1.3 Inserting digital objects into models

Regardless of the format in which they will be originated and deposited, all graphic models must be developed by applying modelling criteria that allows their easy reading, interrogation and subsequent GA N. 820660 Page 57

24/06/2022

Public



reprocessing. In particular, in all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints. Each object shall be characterised so that at least the following basic information is legible or can be traced back to it, for example:

- All objects inserted within the graphic model must be associated to their reference level (according to the specific discipline);
- All structural elements must be bound to the axes associated with them;
- All plant engineering machines must be associated with the reference level of the discipline / environment underlying them;
- All machines and MEP devices must be modeled with the exact position of the joints and passages (where provided for by the reference LOD) with respect to the real element.
- ...

10.3.2 Coding templates

The models developed must follow the coding established by the Organization (an example is given below).

FIELD	FIELD 1		
DISC	IPLINE	s	
А	С	acoustics	
А	R	architecture	
S	F	Street furniture	
S	С	construction site safety	
S	S	subservices	
S	Т	structural	
Р	S	prefabricated structures	
Т	Р	topography	
U	Р	urban planning	
		more	

FIELD 2					
PRO	CESS P	HASE			
А	В	as built			
В	D	brief design			
С	D	construction design			
F	D	final design			
		more			

Figure 7. Example of model encoding

10.3.3 Model attributes

The geometric attributes of graphic models related to design should be shown in the following list:

- Address
- Coordinates

GA N. 820660 24/06/2022 Page 58 Public



- Property
- Client
- Designers
- Other...

10.4 Information structure of the documents

10.4.1 Drawings generation

All graphic drawings must be extrapolated from the model. For unmodeled parts, 2D parts linked to the model as described below must be made.

For non-graphic drawings any data present and / or extractable without duplication must be extrapolated from the models.

10.4.2 Drawings coding

The drawings developed for design by the Organization follow the coding below (to be developed by the Organization).

CODE	DESCRIPTION	NUMBER OF DIGITS or LETTERS
PROPERTY CODE	Describes the property	3 DIGITS
LEVEL	Indicates the level (plan)	3 LETTERS
FILE TYPE		2 LETTERS
DISCIPLINE		1 LETTER
ALPHANUMERIC		6 LETTERS

Table 26. Example of drawings coding

10.5 Information structure object libraries

10.5.1 Geometric attributes (LOG)

All objects produced for design are characterized by a level of detail necessary and useful for the development phase of the project. By way of example, some possible information related to objects is shown in the table:

Table 27. Geometric attributes

GEOMETRIC ATTRIBUTES

- ...
- ...
- ...



10.5.2 Non-geometric attributes (LOIs)

The non-geometric attributes related to the object are, for example, those referring to the technical characteristics of the object or to the correct maintenance and management. By way of example, the following table shows some of the useful and necessary information for the various phases:

Table 28. Non - geometric attributes

NON-GEOMETRIC ATTRIBUTE

• ...

- ...
- ...

10.5.3 External libraries

Specify any external libraries used.

GA N. 820660 24/06/2022 Page 60 Public



11 Exchange Information Requirements (EIR)

11.1 Introduction

11.1.1 Regulatory references

This document originates and is inspired by the provisions of the mandatory and technical regulations related to the field of digitalization in the construction sector. Therefore, in the following paragraphs the regulatory references taken into analysis are analyzed in detail.

11.1.1.1 Voluntary standards

For each principle of a technical nature the main references are the standards:

- UNI EN ISO 19650:2019
 - Parts 1, 2;
 - o prEN 17412:2020

In terms of software languages and BIM open formats the main references are the standards:

- ISO 16739:2016,
- Industry Foundation Classes (IFC).

In terms of privacy and security of digital data, digital archives, data retention, digital signature, encryption, use of the internet, web portals and e-mail – certified, the main references are

- GDPR, EU 2016/679;
- UNI EN ISO 19650.

Table 29. List of acronyms and glossary

Acronyms	Terms Definitions	
	Appointing party	receiver of information concerning works, goods or services from a lead appointed party (EN ISO 19650-1:2018)
	Appointed party	provider of information concerning works, goods or services (EN ISO 19650-1:2018)
	Client	actor responsible for initiating a project and approving the brief
	Information	reinterpretable representation of data in a formalized manner suitable for communication, interpretation or processing (EN ISO 19650-1:2018)
BIM	Building Information Modeling	Use of a shared digital representation of a built asset (3.2.8) to facilitate design, construction and operation processes to form a reliable basis for decisions (EN ISO 19650-1:2018)
GA N 8206	60	Pag

24/06/2022



EIR	Exchange Information Requirements BIM Execution Plan Information Delivery Plan	Information requirements in relation to an appointment (EN ISO 19650-1:2018) Plan that explains how the information management aspects of the appointment will be carried out by the delivery team. (EN ISO 19650-1:2018) The planning of the delivery of information is under the responsibility of each principal appointed party. Plans should be formulated in response to the information requirements set by the Appointing party and should reflect the purpose and scope of the assignment
		(EN ISO 19650-1:2018)
LOIN	Level of Information Need	framework which defines the extent and granularity of information (EN ISO 19650-1:2018)
CDE DB	Common Data Environment Database	Agreed source of information for any given project or asset, for collecting, managing and disseminating each information container through a managed process (EN ISO 19650-1:2018) Structured data stored in a computer in order to rationalize the updating and management of
		information and allow the execution of complex searches.
DBMS	Database Management System	Data Base Management System (Software).
ERP	Enterprise Resource Planning	Integrated management system of relevant business processes (sales, purchasing, warehouse management, accounting, etc.)
FTP	File Transfer Protocol	Protocol for data transmission with file storage and exchange environments.
ICT	Information and Communication Technologies	Set of technologies that provide access to information through telecommunications (internet, wireless networks, mobile phones, etc.).
XML	eXtensible Markup Language	Language that allows the representation of documents and structured data on digital support.
IFC	Industry Foundation Classes	Open language for saving and exchanging data for graphic models.
GA N. 8206 24/06/2022	60	Pag Pi

Page 62 Public



				(EN-IS	SO 16739:2016)			
WBS	Wo Stru	rking ucture	Breakdown	Tree progra	(descending) amming.	structuring	of	activities	for
СРМ	Critical Path Method		Critica	al path method.					
Extra-EU te	ərmir	nology							
Acronyms		Terms		Defini	tions				
BEP pre-contrac	t	BIM Execution Plan pre-contract		Anglo	-Saxon ACRON	IYM UK of o(GI (P	AS 1192-2)
BEP post-contra	ict	BIM Execution Plan post-contract		Anglo	-Saxon UK acro	onym for pGI	(PA	S 1192-2)	
LOD (USA))	Level of Development		BIM Forum 2016					
LOD (UK)		Level of D	Definition	PAS 1	192-2				
LOI		Level of Ir	nformation	PAS 1	192-2				

For any other term of an informative nature, reference is made to the mandatory reference legislation and, below, to the voluntary technical standard (EN ISO 19650, to the CEN standards and to the ISO standards, if not in contrast).

11.2 Purpose

The main purpose of this document is to define the requirements for the exchange of information between the appointing party and the appointed party (ISO 19650-2:2018).

Therefore, in the paragraphs of which it is composed, the information requirements to be respected for the order/project in question will be specified, the level of information needs, the criteria for accepting each information requirement, the ancillary information and the (informative) deadlines established for this order/project.

The EIR, therefore, is prepared as a general guideline and for the formulation of the BEP pre contract (ISO 19650), by the Competitors, and the subsequent BEP post contract (ISO 19650), by the appointed party.





Figure 8. Award Information Flow (A.Pavan)

The purpose of the EIR, therefore, is to define in a timely manner the needs and information requirements to which the competitor must respond and consider (binding as contractual minimums) in the development of its offer and report updated in its BIM Execution Plan, in case of award.

The EIR and the BIM Execution plan (BEP pre contract) constitute a minimum contractual constraint for the appointed party.

11.2.1 Strategic information objectives of the EIR

This EIR has the strategic information objective of optimizing the interoperability, transparency and adequacy of the data relating to the order/project in question.

This contract of □ Works □ Services □ Supplies concerns "... write the subject of the contract... ".

The activities covered by this contract are described in detail

 $\hfill\square$ in the Letter of Invitation to which this EIR is attached.

 \square in the Call for Tenders and in the other contractual documents prepared by the appointing party

 \Box in the Request for Quotation and in the other contractual documents prepared by the appointing party \Box Other: "... specify the type of engagement...".

11.2.2 Strategic information objectives of the EIR

To achieve the strategic information objectives described in the previous paragraph, it is intended to adopt "BIM methods and tools" (Building Information Modelling) and / or "information modeling", for the digital information management of contracts.

Therefore, for the purposes of the information flow of this contract, in addition to the production of legal and contract documentation will be \Box mandatory, \Box positively regarded the deposit on digital support and in the manner set out below of "graphic models" (ISO 19650), necessary for the fulfillment of the required information requirements.

11.2.2.1 Contractual prevalence

The EIR as well the BIM Execution Plan are contractual documents.

The EIR is *binding* only for digital information topics, information processes, Hardware and Software digital tools, BIM information modelling (compared to other contractual documents).

The EIR has an integrative character, on purely informative issues, with respect to other contractual documents.

GA N. 820660 24/06/2022 Page 64 Public



In the event of discrepancy, *primarily* \Box the data and information present \Box in the Letter of Invitation \Box in the Notice \Box in Offer Request \Box in the Request and of the other contractual documents, prevail over those of the EIR.

As a secondary step and with regard to data or information concerning only issues of an informative nature, the EIR and the related BIM Execution Plan prevail over any other tender and procurement document.

11.2.2.2 Identification of the project

The general indications reported in the following table and referring to the order find their exhaustive explanation in all the documentation constituting \Box the Letter of Invitation \Box The call \Box the request of offer \Box Other to which reference is made for any definition of necessary detail.

Table 30. Appointing party information

About the Appointing party	
Appointing party	
Web address	
Call web page	
Protocol Office	
Protocol web page	
Protocol address	
Protocol telephone number	
Protocol e-mail delivery	
Responsible for the Procedure	
Telephone number of the	
e-mail address of Responsible for the	
Procedure	
Project Supervisor	
Project Supervisor telephone number	
Project Supervisor e-mail address	

About the	project	
Project		
Category of	of Opera	
Type of Int	ervention	
Project We	eb Page	
Address of the Intervention		
Web page Construction site		
Construction site telephone number		
E-mail address construction site		
Brief description of the Project		
See:	Invitation letter	
Needs framework		



Project Initiation Documentation (PID)	
Feasibility Project	
Final Project	
Executive Project	
Maintenance Plan	

11.3 Technical Section

This section defines the minimum technical reference requirements for the computerization systems to be used in the implementation of the contract in terms of Hardware, Software, data, reference systems, levels of development, skills, etc.

The indications concern, to varying degrees, both the appointing party and the appointed party.

11.3.1 HW and SW infrastructure made available by the appointing party

The following paragraphs specify the Hardware (HW) and Software (SW) that the appointing party will make available for the specific order. Therefore, all the tools, digital and other, provided by the Appointing party for project information flow optimization are considered.

11.3.1.1 Hardware Infrastructure

The following table shows the Hardware infrastructure made available for the project by the appointing party.

Hardware				
Nr. Typology Prevailing features				
	Server Language			
HD				
	Network	LAN speed		
Wifi speed		Wifi speed		
	NAS			

Table 31. Hardware Infrastructure

NOTE: the information contained herein can be found in the OIL, AIL and/or PIL of the appointing party, where present.

11.3.1.2 Software Infrastructure

The following table shows the Software infrastructure made available for the project by the appointing party.

GA N. 820660 24/06/2022



Table 32. Software Infrastructure

		Software		
Utilization	Model	Brand	Version	N° of
				Workstations
Sharing:				
CDE				
Generic:				
Writing				

NOTE: the information contained herein can be found in the OIL, AIL and/or PIL of the appointing party, where present.

11.3.1.3 Non-digital infrastructure

The following table shows the non-digital infrastructure made available for the contract by the Appointing party.

	ACDoc			
Nr.	Typology	Location		
		City		
		Road		
		ZIP CODE		
		Building		
	Office, Archive	Plan		
		Days		
		Times		
		CDE Manager		
		(name)		
		CDE manager Email		
		CDE manager		
		Phone		

Table 33. Non digital infrastructure

NOTE: the information contained herein can be found in the OIL, AIL and/or PIL of the appointing party, where present.

11.3.2 HW and SW infrastructure of the Contractor

The following paragraphs specify the Hardware (HW) and Software (SW) requested from the appointed party and deemed necessary for the specific project.

GA N. 820660 24/06/2022 Page 67 Public



The appointed party will also be required to provide the technical specifications of the Hardware and Software infrastructures that he intends to use to meet the information requirements set out in the EIR.

11.3.2.1 Required Hardware Infrastructure

For the purposes of the information flows of this Contract and to support the activities described in this EIR, it is required that the appointed party makes available to the interested parties and to the appointing party an information infrastructure adequate to the correct functioning of the information flow.

□ If no special Hardware (HW) infrastructure is required

Specifically, no specific hardware infrastructure is required for this Contract.

□If special Hardware (HW) infrastructures are required

Therefore, the following table shows the Hardware infrastructure specifically required for the project.

	Hardware					
Nr.	Nr. Typology Prevailing features					
Server Language HD						
Network LAN s Wi-Fi		LAN speed Wi-Fi speed				
	NAS					

Table 34. Required hardware infrastructure

NOTE: the information contained herein can be found in the OIL, AIL and/or PIL of the appointing party, where present.

In the BIM execution plan, it is requested that the Hardware infrastructure that is intended to be used in the performance of the Contract and the activities described in this EIR to be explained.

The Hardware infrastructure already available and that one specifically intends to be used and / or integrated (purchase, rental, etc.) for this Contract must be indicated (specific integrations must be easily identifiable).

The above specification is equivalent to a declaration of availability and knowledge in the use (at an advanced professional level) of the infrastructure indicated, in the times and ways necessary for the use for this Contract.

The Hardware infrastructure and the related technical specifications must be summarized, by macro items, according to a graphic scheme and a tabular one to be reported in the IDP and consequently as part of the BIM Execution plan, as indicated in the following examples:





	Hardware					
Nr.	Typology	Prevailing features	Present	Guaranteed		
	Server	Language HD	х			
				х		
	Network	LAN speed Wi-Fi speed	х			
	NAS					

Figure 10. Example of Hardware tabular schema

NOTE: the information contained in the above diagrams can be found in the OIL, AIL and / or PIL of the appointed party where present (and certainly present in the IDP of the same).

In the case of numerous interested parties (e.g., temporary grouping of enterprises) the infrastructure used by each subject and their interaction must be explained.

In the case of suppliers and subcontractors, even during the Contract, the same schemes must be produced in the supply and subcontracting request and attached to the original BIM Execution Plan (BEP Pre contract).

11.3.2.2 Required Software Infrastructure

For the purposes of the information flows of this Contract and to support the activities described in this EIR, it is required that the appointed party makes available to the interested parties and to the appointing party an information infrastructure adequate to the correct functioning of the information flow.

□If no special software infrastructures are required (SW)

Specifically, no specific software infrastructure is required for this Contract.

□If special software infrastructures are required (SW)

Therefore, the following table shows the Software infrastructure specifically required for the order.

GA N. 820660 24/06/2022 Page 69 Public



	Software						
Utilization	Model	Brand	Version	N° of Workstations.			
BIM authoring:							
Architecture							
Facilities							
Mechanical							
plants							
Electrical plants							
Verification:							
Clash detection							
Code Check							
CAD:							
Architecture							
Facilities							
Mechanical							
plants.							
electrical plants							
•••							
Calculation:							
Schedules							
Structural							
calculation							
iviecnanical							
calculation							
electrical							
calculation							

Table 35. Required software infrastructure



	Software						
Utilization	Model	Brand	Version	N° of Workstations.			
Generic:							
Lighting							
Energy efficiency							
Programming							
GIS							
Generic:							
Writing							

NOTE: the information contained herein can be found in the OIL, AIL and/or PIL of the appointing party where present.

In the BIM Execution Plan it is requested to make explicit the Software infrastructure to be used in the performance of the Contract and the activities described in this EIR.

The software infrastructure already in use and the one that is specifically intended to be used and / or integrated (purchase, rental, etc.) for this Contract must be indicated (specific integrations must be easily identifiable).

The above specification is equivalent to a declaration of availability and knowledge in the use (at an advanced professional level) of the infrastructure indicated, in the times and ways necessary for the use for this contract.

The Software infrastructure and the related technical specifications must be summarized, by macro items, according to a graphic scheme and a tabular one to be reported in the IDP and consequently as part of the BIM Execution Plan, as indicated in the following examples:



GA N. 820660 24/06/2022



Software						
Utilization	Model	Brand	Version	N° of workstations	Included	Guaranteed
BIM authoring:						
Architecture					Х	
Facilities						Х
Mechanical equipment					Х	
Electrical equipment						
Verification:						
Clash detection					Х	
Code Check.					Х	
CAD:						
Architecture						
Facilities						
Mechanical equipment						
Electrical plants						
Calculation:						
Schedules						
Structural calculation.						
Mechanical calculation						
Electrical calculation						


	Software					
Utilization	Model	Brand	Version	N° of	Included	Guaranteed
				workstations		
Generic tec:						
Lightning						
Energy efficiency						
Programming						
GIS						
Generic:						
Writing						

Figure 12. Example of Tabular Diagram Software

NOTE: the information contained in the above diagrams can be found in the OIL, AIL and / or PIL of the appointed party where present and (certainly present in the IDP).

In the case of numerous interested parties (e.g., temporary grouping of enterprises) the infrastructure used by each subject and their interaction must be explained.

In the case of suppliers and subcontractors, even during the Contract, the same schemes must be produced in the supply and subcontracting request and attached to the original BIM Execution Plan.

11.3.3 Information management skills

In the BIM Execution Plan, the non-binding listing of any previous direct experience, considered significant with respect to the \Box Letter of Invitation \Box to the Call \Box Offer Request \Box Other in question, in terms of the use of processes and methods of digital information management "BIM", is required.

Therefore, by way of example and not exhaustive, a standard table is reported to be considered in the explanation of their own previous information management skills.

PREVIOUS INFORMATION EXPER	n°			
Name of the work/contract:				
Appointing party:				
Category of intervention				
Type of intervention				
Localization of the intervention				
Amount of invitation to tender for assistance*	discount:%			



Modelling and information management activities**		
of which carried out/assigned directly**		
Brief description of the activity		
Tender amount of the activity* information	€	discount:%
Statement by the Appointing party	Annex No.	Х

(*) The values are expressed gross of the discount subsequently applied (to be explained separately as a percentage) (**) Describe the modelling and information management activities applied to the contract and their specific contribution

11.3.4 Data formats made available by the Appointing party

Each file made available by the Appointing party will be delivered (where possible) in an open and interoperable format.

Any graphic models made available will be purely indicative and must in any case be verified according to the surveys on the places.

11.3.4.1 Supply and exchange of data

For the purposes of data exchange and storage, the files must be provided to the appointing party in the open format and, where specified, in the open format required in the following paragraphs. In case of disputes, it is the right of the appointing party to request the production of the original files in native format (even if proprietary).

□ If CDE made available to the appointed party

When the CDE is requested to the appointed party (see paragraph "Software Infrastructure required"), in order to guarantee reading, management and storage of data over time, the appointed party at the end of the Contract must provide a specific report on the architecture, language, structure, etc. of the Database used on which the Sharing Environment is built.

11.3.4.1.1 Tender phase

All digital documents and models made available by the appointing party will be delivered in open format (mainly in pdf, rtf, IFC, xml, etc.).

The digital copies of models and papers made available by the appointing party (announcement, attachments, etc.) will be visible and / or downloadable electronically at the following web address:

• http/... enter web address...

Any hard copies of the same, where possible the extraction, will be available:

- for the acknowledgment, in the CDE of the appointing party (see paragraph "non-digital infrastructure");
- for the withdrawal, upon request and payment of live reproduction costs and fees, at: ... enter address...; e-mail: ... enter mail...; telephone: ... enter phone number...; timetable: ... enter time for pick-up....

GA N. 820660 24/06/2022 Page 74 Public



On request, for the sole purpose of drafting the offers and without prejudice to the contractual prevalence of the open formats, the following models and digital elaborations may be requested (and will be provided in digital copy) also in native format:

Typology	Name	Format
Model:	Survey by point cloud	
	MEP Systems	
	Facilities	
Drawings:	Point Cloud	
	Metric computation	
	Price analysis	

Table 36. Models and drawings requested

11.3.4.1.2 Procurement phase

All digital drawings and models produced by the appointing party will be delivered in open format (mainly pdf, rtf, IFC, xml) and made available to the appointed party in the Publication space (UNI EN ISO 19650-1:2018) of the General CDE of the Contract.

However, this is without prejudice the contractual prevalence of the paper copy (or digital in open PDF format with Digital Signature) of the aforementioned works or of views of the models.

11.3.4.2 Required file formats

The open formats required, and permitted, by this Contract for digital models and drawings are as follows:

Typology	Required Format	Note
Graphic Templates	IFC 2.3; IFC 4.0; LAND XML	
Graphic drawings	PDF, DXF	
Interference Analysis Reports	PDF	
Inconsistency Analysis Reports	PDF	
Calculation	PDF	
Text	PDF, RFT	
Programming papers	PDF, XML	
Presentation papers	PDF	
Point Cloud		
Images	TIF	

Table 37. Open formats required



The file formats requested by the appointing party must be confirmed and possibly implemented with additional open formats, according to a tabular scheme to be reported in the IDP and consequently as part of BIM Execution Planning, justifying the advantages for the Contract and the appointing party in the notes, as indicated in the following example:

Tupology	For	mat	Noto	
туроюду	Required (*)	Proposed (**)	Note	
Graphic Templates	IFC 2.3; IFC			
Oraphic Templates	4.0; LAND XML			
Graphic elaborations	PDF, DXF			
Interference Analysis	PDF			
Reports				
Inconsistency Analysis	PDF			
Reports				
Calculation	PDF			
Text	PDF, RFT			
Programming papers	PDF, XML			
Presentation papers	PDF			
Point Cloud				
Imagery	TIF			

Table 38. Open format required and proposed

(*) request of the Client/Appointing party, minimum contract (**) proposal of the successful tenderer, additional to the (minimum) request of the Principal

11.3.4.3 File size

The individual models developed by the appointed party may have a maximum size of ... enter maximum size... Mb per single file.

Therefore, the appointed party have to respect the dimensional limits imposed here (decomposition of areas, buildings, etc.).

Specific information needs that may be limited by the size of the files imposed above must be explained according to a tabular scheme to be reported in the IDP and consequently as part of BIM Execution Plan justified in the notes and with the right of the Appointing party to accept or reject them according to the real necessity and solidity of the justifications themselves, as indicated in the following example:

Tupology		Dime	nsion	Nata
	Туроюду	Required (*)	Proposed (**)	Note
	Model			

(*) request of the appointing party, minimum contractual (**) proposal of the appointed party, additional to the (minimum) request of the appointing party



11.3.4.4 Interoperability Information Specifications

In order to guarantee the completeness of data and attributes in the graphic models provided in open format and their interoperability with other models or drawings, the appointed party in the BIM Execution Plan, must specify in addition to the version of the .IFC format (as well as in the table in the paragraph "Required file formats"), also the Model View Definition (MVD) chosen and any additional sets of properties (IFC property set; IFC proxy) justifying the advantages for the specific intervention and for the Appointing party. In general, the MVD "Coordination View – CV 2.0" is preferred, guaranteeing, in addition, the inclusion of all the fundamental geometric parameters and the required information, as reported by way of example and not exhaustive in the following table:

Table 39. Interoperability Information Specification

Element type	IFC Class	Required property sets	LOD
Example:			
Masonry	IfcWall	Project coding	All
		Object coding	All
		Price list coding	All
		WBS coding	All

In addition, depending on the specific software used for the development of information models, it is requested to specify any variations with respect to the association of native elements to IFC classes and with respect to the addition of additional information fields according to the tabular scheme proposed below.

All the information attributes requested by the Appointing party and / or declared Appointed party in the paragraphs:

- System of coding and naming of objects,
- LOIN,
- Defining how to resolve interference and inconsistencies

they must be present in the models filed in open format.

In the event of a request for the proprietary formats of the models, the Appointed party will verify the congruence of the information attributes present in the objects of the latter with the mandatory ones in open format.

11.3.5 Common coordinate system and reference specifications

Objects and graphic models must have a single common reference system.

For any other data, or information, for which its georeferencing is significant (regardless of the model or process that contains it) reference will be made to the common coordinates.

GA N. 820660 24/06/2022 Page 77 Public



Table 40. Reference system

Absolute reference system			
Argument	Specification		
Intersection grids XX and YY			
Altitude			
Rotation from true north			
Ground floor PPF			
Other references of	of the Appointing party		
Argument	Specification		
Origin of the axis system			
Offsets and distances between axes			
Encoding axes or grids			
Units of measurement			

In the BIM Execution Plan any other reference systems that are considered useful for the specific contract may be proposed by filling in the table below.

Table 41. Other proposed references

Other proposed references (BIM Execution Plan)			
Argument	Specification		
	·		

11.3.6 Process step system

Insert within the paragraph the system of phases of the process adopted.

11.3.7 File encoding and naming system

□If NOT in possession of a coding

In the BIM Execution Plan, the single reference system for the classification and naming of the files delivered must be defined, together with the criteria that will be applied for the management of the system itself within this Contract.

By way of example, but not limited to, there are some classification and naming standards that can be used:

- BS 1192:2007+A2:2016;
- ISO 19650

In the case of proprietary or mixed systems, the BIM Execution Plan must be accompanied by a specific Annex containing the guide to the interpretation and use of the coding system used (structure, areas of

GA N. 820660 24/06/2022 Page 78 Public



application, limits of use, translation - if in another language, etc.; Annex "X": Structure of the proposed file classification system).

□If in possession of a coding

The name of the files will follow the coding as follows:

... write the coding of the files. If necessary, prepare a Reference Annex or refer to the prepared paragraph of the Project Information Guidelines – PIL...

The Appointed party, in case of need, may propose any additions to the structure described.

11.3.8 Object coding and naming system

□If NOT in possession of a coding

In the BIM Execution Plan, the single reference system for the classification and naming of digital objects, graphic models, together with the criteria that will be applied for the management of the system itself within this Contract, must be defined.

By way of example, but not limited to, there are some classification and naming standards that can be used:

- OMNICLASS (latest version available; ref.: http://www.omniclass.org);
- UNICLASS (latest version available; ref.: https://toolkit.thenbs.com/articles/classification/);
- UNIFORMAT (latest version available; ref.: https://www.nist.gov);

In the case of proprietary or mixed systems, the BIM execution Plan must be accompanied by a specific Annex containing the guide to the interpretation and use of the coding system used (structure, areas of application, limits of use, translation - if in another language, etc.;

For the purposes of completeness of information, a correlation document is required of the classification system of the digital objects of the graphic models with any other classification and naming system used for the elements contained in other models or elaborations of the Contract and, in any case, mandatory, with the classification and naming systems used to define the elements contained in:

- tables/abacuses;
- descriptive and performance specifications;
- price lists;
- metric calculations;
- WBS.

NOTE: The combination could be one to one, one to many, many to one, etc. indifferently. Each proposed reference system will have to consider the compliance with the systems already used for the previous phase/stage.

Therefore, by way of example and not exhaustively, the following table shows the structure of correlation work of coding systems. The paper must be delivered in both open (PDF, XML) and native structured digital format.

GA N. 820660 24/06/2022 Page 79 Public



					CODING		
Object:	Model	Price list	WBS	CPV	Specifications	Descriptive specifications	International (e.g. Omniclass)
Masonry.	xx.xx.	xx.yy	yy.zz	Zz	kk.xxx.vv	000.vv	yy.00.ss

□If in possession of a coding

The coding and naming of the objects will follow the coding as follows:

... write the coding of objects. If necessary, prepare a Reference Annex or refer to the prepared paragraph of the Project Information Guideline – PIL (if in possession) ...

The Appointed party, in case of need, may propose any additions to the structure described.

11.3.9 LOIN definition system

Insert within the paragraph the system of definition of the LOIN adopted.

GA N. 820660 24/06/2022 Page 80 Public



11.4 Management Section

This section defines the minimum management requirements of reference in the implementation of the contract in terms of uses and objectives of models, information needs, coordination, identification of roles and liabilities as well as the methods and timing of delivery.

The indications concern, to varying degrees, both the Appointing party and the Appointed party.

11.4.1 Informative objectives and uses

Without prejudice to any qualitative and quantitative constraints referring to the legal services due by the Appointed party for the type of contract in question, the models and the documents must also guarantee a quantity and quality of information sufficient to ensure:

- compliance with the objectives of the process phase to which they refer;
- compliance with the (specific) objectives envisaged and required in this EIR in the following paragraphs;
- the (specific) uses envisaged and requested in this EIR in the following paragraphs.

11.4.1.1 Phase objectives

This EIR refers to the following phase(s) of the process as

Programming	
Requirements	
Two-year program of services and supplies	
Three-year work programme	
Economic Framework	
Design	
Investigations and surveys	
Technical and Economic Feasibility Project	
Feasibility document of design alternatives	
Final Project	
Executive Project	
Design verification	
Execution	-
Realization of the works	
Test	
Operations	
Management	
Maintenance	



Therefore, the objective of the phase of the contract in question is expressed in the following table:

Phase	Phase objective

NOTE: the information contained herein can be found in the OIL, AIL and / or PIL of the Appointing party where present or more generally in the ISO 19650-1:2018.

In the BIM Execution Plan, any additional objectives useful for improving the transparency, congruence and information management of this Contract may be proposed, by filling in the table below.

Phase	Phase objective

11.4.1.2 Objectives of models and elaborations

Without prejudice to any legal constraints and requirements, in relation to the phases considered, the minimum reference models for the phase and their objectives are defined as follows.

Phase	Model	Objective of the model

NOTE: the information contained herein can be found in the OLB, AIL and / or PIL of the Appointing party where present or more generally in the ISO 19650-1: -2018.

In the BIM Execution Plan, the proposed structuring of models that will be produced for the Contract must be explained and any further useful objectives may be proposed in a tabular scheme such as the one shown below, to improve the transparency, congruence and information management.

Phase	Model	Objective of the model

The graphic models can be divided, for example, according to the disciplinary areas and the various disciplines concerned (ISO 19650:2018). Type and quality of the models (and their subdivision) must be modulated in accordance with the current legislation, the phases, objectives and uses of the models required herein.

An illustrative and non-exhaustive scheme of structuring and subdivision of graphic models is used both as "survey models" and as "project models" (ISO 19650:2018):

- GIS graphic models (from survey and/or project)
 - Territorial (environmental, geological, etc.);

GA N. 820660 24/06/2022 Page 82 Public



- Cadastral;
- Toponymy;
- Urban planning;
- Constraints;
- o Other...
- BIM Authoring graphic models (from survey and/or project)
 - Site/grounds;
 - Urban planning;
 - Constraints (historical, artistic, environmental, servitude, etc.);
 - Urbanization;
 - Architectural (building);
 - o Finishes;
 - o Facades;
 - Structures;
 - Mechanical plant engineering;
 - Water systems;
 - Electrical systems;
 - o Security;
 - Fire prevention;
 - Energetic;
 - o Acoustic;
 - o Maintenance;
 - Disposal;
 - o Other...

The subdivision can also be by zones, by location (network systems), by buildings, by levels (underground plate, above-ground development, etc.), and more.

11.4.1.3 Uses of models and drawings

For illustrative and non-exhaustive purposes only, without prejudice to any constraint and legal prescription in relation to the phases considered, it is required that the models and the drawings can guarantee at least the minimum uses described below:

GA N. 820660 24/06/2022 Page 83 Public



Stage	Phase	Model	Use of the Model
Stage	Phase	Drawing	Use of the drawing

NOTE: the information contained herein can be found in the OIL, AIL and / or PIL of the Appointing party where present or more generally in the ISO 19650: 2018.

In the BIM Execution Plan, any further uses that are expected to be useful may be proposed, in a tabular scheme like the one shown below, to improve the transparency, congruence and information management.

Model	Using the Template
Drawing	Use of the paper
	Model Drawing

11.4.2 Information content

The following paragraphs contain the supporting information provided for this Contract and the indications on the minimum information content to be delivered at the end of the activities planned and described in the EIR.

11.4.2.1 Information content provided by the Appointing party

They are 🗆 listed below 🗆 in Annex "..." 🗇 Other files made available by the Proposed for this Contract.

11.4.2.2 Minimum information content required

Without prejudice to any legislative reference due to the nature and type of work and intervention, the minimum production of the graphic drawings (two-dimensional) is required, directly extrapolated or linked to the models reproducible on paper or digitally (PDF) at a scale appropriate to the level of the process phase, as reported \Box in the following list in Annex "..." Other \Box .

NOTE: the information shown here can be found in the PIR of the Appointing party where present.

In BIM Execution Plan, any additional objectives useful for improving the transparency, congruence and information management of this Contract may be proposed.

GA N. 820660 24/06/2022 Page 84 Public



11.4.3 LOIN

The level of information required - LOIN (ISO 19650) required from the Appointed party for the contract in question (Object), is defined in accordance with the requirements and subsequent amendments for the phases covered by the Contract (Purpose), according to the deposit times established in the \Box Letter of Invitation \Box in the Notice \Box in the Request for Offer \Box in the Request (Milestone of deliveries).



Figure 13. prEN17412 – ISO 19650 (A.Pavan)

The LOIN also have to meet the requirements of the phase objectives and the objectives and uses of the models identified in the previously. Furthermore, it must be specified (prEN 17412):

- The purpose of the information use;
- Information delivery milestones;
- The actors who will request and provide the information;
- Objects in one or more decomposition structures;

as better defined below

11.4.3.1 LOD

The Levels Of Development – LOD chosen for each discipline and for each object of each model are designed to guarantee the minimum legal constraints in force.

Phase	Model	LOD Required	Note

In the BIM Execution Plan different LODs must be confirmed or proposed, filling in the tabular scheme reported below, justifying the advantages for the Contract and the Appointing party in the notes.

GA N. 820660 24/06/2022 Page 85 Public



		LC	OD			
Phase	Model	Required	Proposed	Note		
		(*)	(**)			

(*) request of the Appointing party, minimum contractual (**) proposal of the Appointed party, additional to the (minimum) request of the Appointing party

It is also requested to define a summary synthesis matrix of the minimum (M) and prevailing (P) level of development of LOD, distinguished by phase and by model, as reported in the following example and not exhaustive general scheme.

							STA	GES						
		DATIMIMUS		PROG. FEASIBILITY						KEALIZATION		1 E3 111/0/43-2010		
MODEL				ſ	Minim	um/Pr	evale	nt LOI	D OB.	IECTS	3			
	М	Р	М	Р	М	Р	М	Р	М	Р	М	Р	М	Р
RELIEF:														
ARTISTIC HISTORY:														
TERRITORIAL:														
URBAN:														
URBANIZATIONS:														
SITE:														
ARCHITECTURAL:														
FINISHES:														
CURTAIN:														
FACILITIES:														
ELECTRICAL:														
MECHANICAL SYSTEMS:														
HYDRO-SANITARY SYSTEM:														
AIR CONDITIONING SYSTEM:														
ANTIFIRE:														



ENERGETIC:							
ACOUSTIC:							
SAFETY:							

By confirming the proposed LOD, the Appointed party assumes responsibility for the adequate compliance of the LODs with the minimum legal constraints in force, in addition to the phase objectives and the uses and objectives of the models described in these EIR.

The LOD responding to the legal constraints, the phase, the objectives and the defined uses, as well as the significance of the possible interferences or inconsistencies to be analyzed or verified (UNI EN ISO 19650:2018) will determine:

- the degree of modelling needed;
- the degree of possible integration through project works (2D drawings, texts, images, etc.);
- the quantity, quality and robustness (decision-making degree) of the necessary data and attributes.

These last indications will be specified in a dedicated annex. To ensure the correct reading and interpretation of the data, a special summary table must be prepared in support of the annex in which, for each information field included in the model and in the objects contained therein, the information necessary to eliminate possible ambiguities must be made explicit. Given the possible presence of predefined information fields within the specific modelling software used and not eliminable and / or alterable, it must be clearly specified which data provided are to be considered effective and which are not.

Therefore, by way of example and not exhaustive, a possible tabular scheme showing the indications reported is reported:

Class Information	Information field	Origin (ST/OW*)	Function	U.M. **	Good (YES/NO)
Model	Modeller	OW	Identify the responsible modeler	-	YES
	Project Status	ST	Identifies project status according to Contractor's internal specifications	-	YES
Walls	Absorption	ST	-	-	NO
	Coding	OW	Identifies the identification code in compliance with the classification indicated in the BIM Execution Plan	-	YES
Materials	Density	ST	Identify the density of the material	Kg/m	YES
	Description	ST	Identify the description of the material	-	YES

* ST- standard: default parameter in modelling software; OW-owner: parameter inserted as user customization

** U.M.: Units of measurement



The LODs defined must in any case guarantee the completeness and congruence of the information using graphic and non-graphic attributes connected / related to each other: object-model / drawing. By way of example, see the following outline of principle:



Figure 14. Scheme of the LODs. Geometric and non-geometric information attributes (A.Pavan)

11.4.3.2 LOG

The Level Of the Geometry - LOG must be taken from the LODs defined in the previous paragraph and currently in common use (ISO 19650:2018).

11.4.3.3 LOI

The Level Of Information - LOI must be taken from the LODs defined in the previous paragraph and currently in common use (UNI EN ISO 19650).

11.4.3.4 DOC

The information level of the Documents – DOC to be produced by the Appointed party, for the phases covered by the contract and as the minimum level for this Contract.

11.4.4 Roles, responsibilities and authorities for information purposes

For the purpose of ensuring collaboration between the interested parties and the efficiency and effectiveness of the information flow of the Appointed party, the following paragraphs identify the positions, roles and authority for the purposes of information of the Appointing party.

In the BIM Execution Plan, the positions, roles and authority for the information purposes of the Appointed party must be specified in the same way.

11.4.4.1 Organization chart of the Appointing party

The information structure of the Appointing party for this Contract, without prejudice to the reference functions referred to in ISO 19650 is structured as follows:

... Report the organization chart established for the order (you can refer to the chart presented in the OIL

GA N. 820660 24/06/2022 as a base)

Page 88 Public



The information flow of the Appointing party for this Contract, therefore, is structured as follows by the roles used:

... Report the flow established for the order (you can refer to the flow presented in the OIL as a base)

In the BIM Execution Plan, in addition to the identification of the organization chart of the Appointed party, it must be specified how it is intended to integrate into the process the coordination and verification activities required in the paragraph "Information Coordination" and which will be the figures who will deal with it.

11.4.4.2 Personal data of the subjects

Due to the information roles identified in the previous paragraph, the references of the relative figures of the Appointing party are reported.

... Report the personal data of the subjects

In the BIM Execution Plan, the references of the people involved in the information process of each organization involved must be explained, in line with the roles identified in the previous paragraph.

We report, therefore, an illustrative and non-exhaustive table on the personal data:

Organization A								
Figure		Compony		Email				
Name	Surnam	Company	Information role	corporat	Certi	Tel.	Mob.	
	е	TOIe		е	fied			
			CDE manager					
			Information					
			coordinator					

11.4.4.3 Information Responsibilities Matrix

Due to the information roles identified in the previous paragraph, the matrix of the Information Responsibilities of the Appointing party is reported.

... Report matrix of information responsibilities available (you can refer to the matrix presented in the OIL as a base)

GA N. 820660 24/06/2022 Page 89 Public



		1	1	1		
ACTIVITY	CDE manager	BIM manager	BIM coordinator	BIM Specialist ARCH	BIM Specialist STR	BIM Specialist MEP
Definition of information rules						
Incoming						
documentation verification						
Check						
outbound						
documentation						
Approval						
Clash/Code on						
coordinated						
models						
Clash/Code on						
individual						
models						
Model						
development						
Information						
Specifications,						
Offer and						
Information						
Management						
l Plan						

Table 42. Example of RACI Matrix

R = Responsible

A = Accountable

C = Consulted

I = Informed

In the BIM Execution Plan, the matrix of responsibilities for the contract in question must be defined, in line with what was declared in the previous paragraphs.

11.4.5 Information references of the Appointing party (OIL)

The Organization information Guidelines - OIL will be made available to the bidder within the CDE, which states the information references of the Appointing party.

Specifically, upon request and with adequate justification, you can refer to the following annexes:

A Organization Information Requirements (OIR)

GA N. 820660 24/06/2022 Page 90 Public



- A1. Organization Information Maps (OIM)
- B. Asset Information Guideline (AIL)
- B1. Asset Information Requirements (AIR)
- B2. Asset Information Models (AIM)
- C. Project Information Guideline (PIL)
- C1. Project Information Requirements (PIR)
- C2. Project Information Models (PIM)
- E. Common Data Environment (CDE)

11.4.6 Structure and organization of information content

The following paragraphs focus on the analysis and explication of the structure and organization of information content. Therefore, starting from the structure of the disciplinary models that will be described in the BIM Execution Plan (see paragraph *Objectives of models and drawings*) the following must be specified.

11.4.6.1 Information content tree

In the BIM Execution Plan, the tree structure of the information contents in reference to this Contract must be specified.

11.4.6.2 Object tree

In the BIM Execution Plan, the tree structure of the objects in reference to this Contract must be specified.

11.4.6.3 Specifications for inserting objects

Regardless of the format with which they will be originated and deposited, all graphic models must be developed by applying modeling criteria that allow their easy reading, interrogation and subsequent reelaboration.

In all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints. By way of example and not exhaustively, some reference rules are reported so that the following basic information can be readable and traceable to the object:

□Territorial

- All the points inserted inside the model must report the investigated stratigraphy;
- Other.

□Infrastructure



- All objects inserted within the graphic model must be associated with the natural level of belonging (according to the specific discipline);
- All horizontal elements shall be associated with the reference level at which they lie;
- All structural elements must be bound to the axes associated with them;
- ...
- Other.

□Buildings

- All objects inserted within the graphic model must be associated with the natural level of belonging;
- All the finishing layers of the floors placed on the intrados and the false ceilings must be associated with the level / environment below them;
- All vertical elements (walls, pillars, etc.) must be modelled as discrete elements in their vertical development according to a subdivision that is consistent with the decomposition of WBS applied to the specific class of objects;
- All structural elements must be bound to the axes associated with them;
- All machines and plant engineering devices must be modeled with the exact position of the joints (where provided for by the LOIN) with respect to the real element.
- ...
- Other.

□ Refer to the Project Information Model – PIM (if in possession)

In the BIM Execution plan any further specifications for the insertion of objects may be proposed, justifying the advantages for the Contract and the Appointing party.

11.4.6.4 Extrapolation of drawings from models

In the BIM Execution Plan must be explained the documents directly extrapolated from the graphic models or directly connected to them. By way of example and not exhaustive, a reference table is reported:

Model	Code	Drawing	Code	
architectural	XX.XX	ground floor plan	XX.XX.XXX	е
	xx.xy	first floor plan	XX.XX.XXY	е
	ZZ.ZZ	metric calculation of architectural	XX.XX.XXZ	е
		works		
		Estimation architectural works	xx.xx.xxk	С



legend								
	е	drawing extrapolated from model						
	С	drawing related to the model						
	•							

11.4.7 Time scheduling of information content

In the BIM Execution plan the time schedule envisaged for modelling and the general information process (information schedule) must be explained in relation to the planning of the work phases (work schedule). A tree structure of the information and modeling activities (Work Breakdown Structure: WBS) must be defined, which also includes the iterations with the Appointing party and any other legal entity interested in this Contract in the same phase of the process analyzed.

The activities, dependencies and temporalities must also be explained in graphic form through Gantt charts. The Critical Path Method (CPM) must be highlighted and all information must be updated at least weekly and published in the CDE.

For detailed planning, Agile programming systems and Kanban Boards are allowed, in addition not as a substitute.

In the planning of the information phases, however, the following milestones for the drafting/updating of the models must be envisaged:

□Programming

- Survey of the state of fact;
- Delivery;
- Other.

Design

- Survey of the state of fact;
- Specialist calculations and reports;
- BIM Review (Clash and Code);
- Delivery;
- Other.

□Execution

- Start of work, preparation of the construction site;
- Specialist calculations and reports;
- BIM Review (Clash and Code);
- End of works;

•	Testing;
GA N	. 820660
24/06	/2022



- Delivery;
- Other.

□Exercise

- As-built model;
- Delivery;
- Other.

11.5 Policies for the protection and security of information content

In the BIM Execution Plan, the security policies adopted for the protection of data and the guarantee of the rights connected to them (copyright, patent, etc.) must be explained.

In particular, the following must be explained:

- The pre-deposit rescue and backup systems and their timing;
- The specific IT and information insurance coverage;
- The levels and rights of access and modification provided for each information system adopted;
- The number of post-deposit copies retained and the storage and protection times adopted.

11.5.1 Regulatory references for data security

The main regulatory references on the security of computer and information data are reported by referring to UNI EN ISO 19650 and any other mandatory standard in question. For information security management systems:

- ISO/IEC 27000:2016 Information technology Security techniques Information security management systems - Overview and vocabulary
- ISO/IEC 27001:2013 Information technology Security techniques Information security management systems – Requirements
- ISO/IEC 27002:2013 Information technology Security techniques Code of practice for information security controls
- ISO/IEC 27005:2011 Information technology Security techniques Information security risk management
- ISO/IEC 27007:2011 Information technology Security techniques Guidelines for information security management systems auditing
- ISO/IEC TR 27008:2011 Information technology Security techniques Guidelines for auditors on information security controls

For privacy: GA N. 820660 24/06/2022



• ISO/IEC 29100:2011 Information technology - Security techniques - Privacy framework

For techniques and technologies:

- ISO/IEC 9798-1:2010 Information technology Security techniques Entity authentication Part 1: General
- ISO/IEC 18033:2015 Information technology Security techniques Encryption algorithms Part 1: General
- ISO/IEC 27039:2015 Information technology Security techniques Selection, deployment and operations of intrusion detection and prevention systems (IDPS)
- ISO/IEC 27040:2015 Information technology Security techniques Storage security
- ISO/IEC 29115:2013 Information technology Security techniques Entity authentication assurance framework.

11.5.2 Additional data security requests

Please list additional data security requests. Otherwise, please refer to current legislation.

For example: "... Any sensitive data (national security, national military security, supranational military security - NATO, state secrecy, etc.) must refer to the specific rules on the subject to which reference is made in full ...".

11.6 Common Data Environment (CDE)

For the purpose of efficiency in the sharing of data, the definition and approval status of information (and of information content, i.e. models and drawings) must always be recognizable according to UNI EN ISO 19650:

- Definition status:
 - being processed/updated;
 - in the process of sharing;
 - in the process of publication;
 - o archived:

"valid", version still in force; "exceeded", relating to versions prior to the one in force and therefore replaced.

• Approval status:

- A0: to be approved;
- A1: approved;
- A2: approved with comment;



o A3: Not approved

In the BIM Execution Plan the appointed party therefore specifies how it intends to satisfy this request.

11.6.1 Features of sharing infrastructures

The CDE of the Appointing party and of the Appointed party must be divided into at least four sections useful for the distribution of data, information and information content of the Contract according to the state of definition referred to in the previous point.

The data exchange flow from the CDE of the Appointing party to the CDE of the Appointed party will have to follow the proposed scheme:



Figure 15. CDEs construction and information flow (A.Pavan)

Where:

- 1. **in progress** (internal): internal work environment and data acquisition not visible from subjects external to the organization;
- 2. sharing: data sharing environment processed but not completed or coordinated;
- 3. **published**: environment for sharing completed and coordinated data;
- 4. **archive** (valid, outdated): internal working environment.
- **approved**: models and elaborations are sufficiently consolidated for sharing with third parties for the purpose of coordination
- **authorized:** the models and drawings, concluded internally and coordinated, are approved for publication and making available to third parties in the Contract
- **concluded**: the models and the elaborations are concluded and no longer necessary for the elaboration of the third parties for the specific phase in place



• **historical:** the models and the elaborations are made accessible internally to the processing as a database for other phases or Contracts

□If NOT in possession of a CDE

In the BIM Execution Plan, the access rules must be defined, the rights of the accredited subjects to operate in the CDE of the Appointed party.

The CDE of the Appointed party must guarantee the security of the data contained therein by also providing functions of backup and disaster recovery.

The same must guarantee the traceability of the operations carried out of which the Appointing party can make an explicit request in case of disputes.

□If in possession of a CDE

In detail, the characteristics of the data sharing infrastructure are better described in the Annex E CDE-Common Data Environment.

11.6.2 Deposit system

The deposit of data, information and information content (models and / or drawings ISO 19650) relating to services, works or supplies subject to contract, for each phase of the planned process, takes place, in general, through:

- Digital support
 - o of files in open format (PDF), Digitally Signed;
 - of files in open format, Electronically Signed by deposited in a structured data sharing environment with specific management rules, hereinafter CDE (UNI EN ISO 19650);
 - any files in proprietary format (not definable by the Appointing party, due to specific needs of transparency, congruence and data management), signed electronically through deposit in the CDE (above);
- Paper support
 - o of documents drawn up not digitally (UNI EN ISO 19650), with Handwritten Signature;
 - of reproductions (by print, plotting, etc.), with Handwritten Signature, of digitally drawn up works and extrapolations/views, etc. of models "graphic", "documentary", "multimedia" models

For the filing of tender and procurement documents of this specific Supply Service Work see the provisions of the"... report details of the reference document... ".

The contractual prevalence of data, information and information content always remains:

GA N. 820660 24/06/2022 Page 97 Public



- in the works on digital support in open format (PDF), Digitally Signed;
- in paper documents with Handwritten Signature.

It is duty of the Appointed party to declare the consistency of the information content deposited on paper with a Handwritten Signature or on digital support, in open format (PDF), with Digital Signature, according to the proprietary models and digital documents from which they originated.

For any other information concerning the storage of data on the data sharing platform – CDE, please refer to the Annex E: CDE – Common Data Environment.

11.6.3 File Management

Provide reference directions for file management.

11.6.4 Data management

Provide reference information for data management.

11.7 Supply Chain Information Content Management

In the BIM Execution Plan, the method of programming and managing the information content of any subcontractors must be explained.

The Appointing party considers as communicated and acquired the information rules of this EIR in question, but also those of the BIM Execution Plan of the Contractor, for each sub-contractor interested in the Contract.

The Appointed party is in any case responsible for the completeness and congruence of data, information, elaborations and models produced by each of its sub-contractors. In addition to the management of its CDE towards the same sub-contractors.

11.8 Verification procedures, validation of information content

All models, drawings and objects produced for this Contract will be subject to verification and consequent validation by the Contractor in compliance with current regulations.

11.8.1 Definition of validation procedures

In the BIM Execution Plan, the procedures for the informative validation of their data, information, models, documents and objects that the Appointed party intends to carry out in the execution of the Contract must be explained.

In particular, the following must be defined:

- The procedures;
- The timing;
- Responsibilities;
- The object of validation.



11.8.2 Definition of the articulation of the verification operations

In the BIM Execution Plan, the articulation of the verification operations that are intended to be applied and guaranteed must be explained:

- LV1: internal, formal verification of the methods of production, delivery and management of data;
- LV2: internal, substantial verification of readability, traceability and consistency of data in models and between models;
- LV3: independent, formal and substantive verification of readability, traceability and consistency of data in models, processes, objects and their iteration

11.9Information coordination

The following paragraphs analyse the methods of coordination of the data produced for this Contract. Therefore, in the BIM Execution Plan, the methods of coordination of the models, the methods of searching for interferences and inconsistencies and their resolution must be explained and analyzed.

11.9.1 Coordination of models

In the BIM Execution Plan, the methodology and timing of coordination of the graphic models and the related extrapolated or connected drawings must be explained.

The coordination must involve, even to different degrees, each model created for this Contract. Therefore, coordination is required:

- First level LC1 (first level coordination) Coordination of data and information within a graphic model of the same discipline;
- Second level LC2 (second level coordination) Coordination of data and information between several individual graphic models of the various disciplines. This coordination can take place through the simultaneous aggregation between several graphic models or through subsequent congruence checks (a sort of one-to-one comparison with clash detection).
- Third level LC3 (third level coordination) Coordination of data and information generated by graphic models and data and information not generated by graphic models (digital or non-digital processing).

The coordination must be reported through special reports that explain its completion and the result achieved.

11.9.2 Information interference (clash detection)

In the BIM Execution Plan, the procedures for analyzing information interference for models, documents and objects must be explained.

It is required that, when possible or significant for the economy of the intervention, not only interference with the objects themselves is considered, but also with respect to the relative areas of assembly, maneuvering and maintenance.

GA N. 820660 24/06/2022 Page 99 Public



For managing coordination for interference analysis, a matrix such as the one proposed in the following may be used:

OBJECT OF THE COORDINATION	Coordination level	Facilities	Electric	:	:	Safety	Other Models
Object/Object	LC1						
Model(s)	LC2						
Model/Papers	LC3						
Object/Object	LC1						
Model(s)	LC2						
Model/Papers	LC3						

NOTE: Empty cells can be used to indicate, by way of example and not exhaustively: which coordination will be ensured, the timing of coordination, the execution – or not – of a coordination, the outcome of the same (favorable, negative, partial, etc.).

The coordination analyses for interference are obviously free and called each time the Appointing party deems it necessary, but some cadenced and scheduled coordination milestones will still have to be defined.

At the end of each milestone analysis, a report of the interferences found for the successive resolution phases must be drawn up.

11.9.3 Information inconsistencies (code checking)

In the BIM Execution Plan, the procedures for analyzing information inconsistencies for models, documents and objects must be explained.

For managing code checking coordination, a matrix like the one proposed below can be used:



MODEL	OBJECT OF THE COORDINATION	Level of coordination	European legislation	National legislation	Regional legislation	Other legislation and standards	Energy saving	Acoustics	Contractual obligations	Design constraints	Constraints butnourishing	Other constraints
Facilities	Object	LC1										
	Model	LC2										
	Processed	LC3										
Other models	Object	LC1										
	Model	LC2										
	Processed	LC3										

NOTE: Empty cells can be used to indicate, by way of example and not exhaustive: which coordination will be ensured, the timing of coordination, the execution – or not – of a coordination, the outcome of the same: favorable, negative, partial, etc.

The coordination analyses of inconsistencies are obviously free and called whenever the Apoointing party deems it necessary, but some timed and scheduled coordination milestones will still have to be defined. At the end of each milestone analysis, a report of the inconsistencies found for the successive resolution phases must be written.

11.9.4 Defining how to resolve interference and inconsistencies

In the BIM Execution Plan, the methods for resolving interferences and information inconsistencies that may be found in the coordination processes must be explained.

In particular, at least the following points must be defined:

- The procedures for calling coordination meetings;
- The legal entity responsible for the coordination meetings (and any modalities of replacement or rotation);
- The methods of defining possible rules of prevalence between models or drawings;
- The methods of resolution of the critical issues that have emerged and the responsibilities of resolution;
- The mode of interest of the Appointing party.

11.10 How to manage 4D, 5D, 6D and 7D information

In the BIM Execution Plan, the methods of use of the models for the purpose of managing the planning of activities (4D), production costs (5D), management and maintenance of the work (6D), sustainability in production and operation (7D) must be explained.

GA N. 820660 24/06/2022 Page 101 Public



All information attributes that may be necessary to satisfy the methods of use specified herein must comply with the requests made in this EIR with reference to the chosen LOIN.

11.10.1 Programming management (4D – Gantt, WBS, etc.)

In the BIM Execution Plan, the methods of use of the models for the management of the planning of activities (4D) must be explained. By way of example and not exhaustively, it may be specified:

- The link between graphic model objects and WBS activities;
- The definition of the start/end times between the information attributes of the objects;
- Other...

11.10.2 Economic management (5D – calculations, estimations, etc.)

In the BIM Execution Plan, the methods of use of the models for the purpose of cost management (5D) must be explained.

By way of example and not exhaustively, it may be specified:

- The link between chart model objects and price list items;
- The definition of products among the information attributes of objects;
- Other...

11.10.3 Management of the work (6D – management, maintenance and disposal)

In the BIM Execution Plan, the first indications on how to use the models for the purposes of management during the exercise phase (6D) must be explained.

By way of example and not exhaustively, it may be specified:

- The link between graphic model objects and maintenance activities;
- The definition of the useful life cycles of products among the information attributes of objects;
- The definition of maintenance cycles among the information attributes of objects;
- Other...

11.10.4 Management of externalities (7D – Environmental sustainability, etc.)

In the BIM Execution Plan, the methods of use of the models for the sustainability management (7D) must be explained.

By way of example and not exhaustively, it may be specified:

- Energy Efficiency;
- Acoustic Analysis;
- Other...

GA N. 820660 24/06/2022 Page 102 Public



11.11How to storage

□ When CDE of the Appointing party

Once the Contract has been completed, each model or elaboration contained in the CDE of the Appointing party will be transferred from the "in publication" section to the "archive" section.



Figure 16. Construction of CDE and information flow (A.Pavan)

Each model or process is considered deposited, in a digital sense, at the time of uploading in its open format in the "shared" section of the CDE of the order. At the time of loading, the protocol will be recorded with date, time and person responsible for the upload itself.

The validity and usability towards third parties also takes place from the publication (transfer in the "in publication" section).

At the time of uploading, the files that need a Digital Signature will be indicated.

□ When CDE of the Appointed party

...

The digital filing does not conclude the terms of the filing of each hard copy required in the contract, nor of the delivery of the models in their native (even if proprietary) format.

The contractual relationship will be considered concluded after the delivery of the documents in the following order:

- Deposit of a hard copy with Handwritten Signature;
- Digital deposit with Digital Signature;
- Deposit models (in their native format, although proprietary).



11.12 Template properties

The models and all the objects contained therein and the elaborations, data and information relating to this Contract, also connected to the reading and use of the models as specified in this EIR, will be considered the property of the Appointing party who may manage this property at will without any duty to the Appointed party. Copyright is performed according to current legislation.



12 The Common Data Environment (CDE)

12.1 Introduction

This document represents Annex F to the OIL Organization Information Guidelines regarding data management within the Organization.

12.2 Scope

The purpose of this document is to identify the data management methods in the Organization, investigating flows, IT structure and dedicated instrumentation.

12.3 Information flows

12.3.1 Information flows within the CDE

The Organization (Appointing party) will indicate which product it will adopt as Common Data Environment – CDE.

Each project created within it provides a configuration in line with the indications provided ISO 19650. Therefore, users, with regulated and different permissions, will have the following folders available:

- L0_WORK IN PROGRESS (WIP), containing information under development and visible only to the individual;
- L1_SHARING, approved information to be shared with the Appointing party;
- L2_PUBLISHED, information authorized by the Appointing party for use in the most detailed design;
- L3_ARCHIVE, history of all information shared and published during the information management process. But also a protocol to verify their development.



Figure 17. Principle of the Common data Environment (A.Pavan)

GA N. 820660 24/06/2022 Page 105 Public



The documentation, therefore, passes through the folders according to its "state". Regarding the flow of operations initiated by the user, please refer to the platform-specific manual.

In addition, this CDE allows you to connect with other management environments (such as environment for construction management).

12.3.1.1 Deposit information flows

For the deposit of files on the platform, the Appointed party is invited to follow the instructions punctually described in the "upload documentation" step of the Approval Workflow. Every activity carried out by users is then visible within the "Events" section.

12.3.1.2 Approval information flows

Within the platform, an information flow of approval of the documentation has to be configured.

Insert here the approval information flow of the organization

Each document uploaded to the platform within the specific project undergoes an approval process structured in three distinct moments:

- Formal verification, aimed at identifying the consistency between the uploaded documents and the documents described in the Letter of Transmission;
- Substantial verification, designed to verify the consistency of the documentation and data delivered in line with what is required in the Information Specifications;
- Verification by Approval, designed to identify any deficiencies that escaped the previous verification.

12.3.2 In and out information flows

In this paragraph, the input and exit information flows are described as, for example, reported below:

You can identify two levels of input and output flows:

- Input and output flows external to the CDE;
- Input and output flows inside the CDE.

In the first case it is the exchange between CDE and the data sharing platform. In the second case, instead, of the movement of data within the CDE itself.

12.3.2.1 Storage and protocol functions

Describe here the CDE functions of storage and protocol. (For example, the CDE could include a "Events section" within it which concerns and performs the functions of filing and protocol).

12.3.3 Files metadata

Each file inserted within the platform is characterized by its TAGs that at the time of download are concretized in readable metadata and linked to the file itself.

GA N. 820660 24/06/2022 Page 106 Public



12.4 IT structure of the CDE

12.4.1 Information architecture

Describe the information architecture of the CDE. (e.g the areas: Work in progress, shared, published, archived)

12.4.2 Dialogue protocols

Describe the platform's dialogue protocols (e.g. available and personal APIs).

12.5 Dedicated tools

12.5.1 CDE hardware tools

The hardware tools used to manage the platform are those described in the Organization Information Guidelines - OIL. Therefore, please refer to the homonymous paragraph of the cited document.

12.5.2 CDE software tools

Describe here the characteristics of the CDE software, for example if it will be a product in the Cloud, or whether it will need to be installed.

GA N. 820660 24/06/2022 Page 107 Public



13 Appendix: Guidelines for ALERs (Region Lombardy)

13.1 Organization Information Guidelines - OIL





Organization Information Guidelines - OIL

Organization information management manual

GA N. 820660 24/06/2022 Page 108 Public


Summary

- 1 Premise
- 2 Regulatory references
- 3 Acronyms and Glossary
- 4 Introduction
- 5 Goals
- 6 Characteristics of hardware and software infrastructures
- 7 Level of information development for BIM Models
- 8 Roles for information purposes
- 9 Data sharing
- 10 Protocol for data exchange
- 11 Encoding project files
- 12 Structure and organization of digital modelling
- 13 Resource Management: skills and training
- 14 Conclusion
- ANNEXES



13.1.1 Premise

The Ministerial Decree 1 December 2017 n. 560 (so-called *Baratono decree*) identified the different phases of approaching BIM method in public procurement by the public administration operating in the construction sector.

The BIM implementation course includes a series of obligations that impact on the public administration, relating to staff training, the necessary hardware and software equipment and the different organization of the offices, in the name of more efficient control and management processes.

In addition, and this is the best-known aspect, the Ministerial Decree marks the timing, updated with the subsequent Legislative Decree no. 312 of 3 August 2021, within which the BIM methodology use must be compulsorily introduced in public procurement, identifying 1 January 2025 as the maximum deadline, except for ordinary and extraordinary maintenance works with a starting price of less than 1 million euros.

The process of digitalization of public procurement directly involves the Lombard companies for residential construction (ALER), public bodies belonging to the regional system (regional law 27 December 2006 n. 30) of which the Lombardy Region uses for the management of public residential real estate assets, consisting of 97,651 housing units (data resulting from 1 June 2021 from the Regional Registry of Housing Assets and Users).

Considering the regulatory obligations provided for by Legislative Decree 560/2017, in 2021 the Lombardy Region launched a specific training course to support ALER, as well as regional technical staff and regional system bodies, to define a minimum common level of knowledge of BIM methodology and tools.

The training course will have a further development, reserved for ALERs, during 2022; in the light of the skills and hardware and software equipment present in the various companies, specific modules will be structured to encourage the further development of the skills necessary to fulfill the BIM obligations, also associated to the modelling and management of information models.

Foreseen as part of the HORIZON 2020 – BIM4EEB project (deliverable D10.9 *Guidelines for BIM implementation for public stakeholders*), this document, with its annexes, constitutes a further support for ALERs in the process of approaching the use of BIM, with the aim of:

- Provide a clear and common vision of the BIM application process within the Lombardy Region and the bodies with which the Lombardy Region exchanges information (namely the ALERs)
- Provide the necessary information to encourage working collaboration between the interested bodies through BIM
- Provide the foundation for creating a Data Sharing Environment (ACDat/CDE)
- Ensure the interoperability of the BIM model with the different software platforms used by the ALERs
- Define BIM information roles taking into account their support to traditional roles (such the Responsible for the process, the site manager, the safety coordinator, etc.)

The issue of the use of BIM tools by ALERs for the management of their public residential assets does not only represent the fulfillment of an obligation deriving from a legal provision.

The identification in the BIM method to make the management of real estate assets effective can represent one of the suitable tools to better fulfill the role that the regional law of 8 July 2016, n. 16 "Regional discipline of housing services" assigns to the ALERs, paying particular attention to their social function.

The thorough knowledge of the heritage and its state of maintenance, and the correct management of information, are fundamental elements to ensure careful planning of ordinary and extraordinary maintenance interventions, starting from the design to the planning of the necessary economic resources, until the realization of the planned works. All this to ensure the buildings performance over the years, maintaining and improving their performance in terms of energy efficiency, seismic behavior, environmental sustainability, preserving the monetary value of the building.

The availability of energy-efficient buildings, in the specific case of public housing, has an immediate impact on the tenant, generally identifiable in economically weak sections of the population, translating into sustainability of energy consumption and related costs, as a tool to combat *fuel poverty*.

In addition, a better management of all processes allows a saving in terms of public resources, to the benefit of the entire population, as a taxpayer, and a better performance as a Public Administration.

In addition to the aspects already seen, the information relating to public housing buildings, structured and shared between ALER and the Lombardy Region, could constitute the information necessary for the planning of housing policies, of regional competence.

13.1.2 Regulatory references

• The information management is ruled by the following laws and technical standards

13.1.2.1.1 Laws

- \circ Legislative Decree 50/2016 and subsequent amendments.
- o Ministerial Decree no. 560 of 01.12.2017
- o Ministerial Decree no. 312 of 03.08.2021

13.1.2.1.2 Technical standards

- UNI EN ISO 9000:2015 Quality management systems Fundamentals and vocabulary
- UNI EN ISO 9001:2015 Quality management systems Requirements
- UNI EN ISO 9004:2018 Quality management Quality of an organization Guidelines for achieving lasting success
- UNI EN ISO 19650/11337-1:2017 Construction and civil engineering works Digital management of construction information processes - Part 1: Models, documents and information objects for products and processes
- UNI/TR 11337-2:2021 Construction and Civil Engineering Works Digital management of construction information processes - Part 2: Information flows and decision-making processes in the management of information by the client
- UNI EN ISO 19650/11337-3:2015 Construction and civil engineering works Criteria for coding construction works and products, activities and resources - Part 3: Models for the collection, organization and storage of technical information for construction products

GA N. 820660 24/06/2022 Page 111 Public



- UNI EN ISO 19650/11337-4:2017 Construction and civil engineering works Digital management of construction information processes - Part 4: Evolution and information development of models, drawings and objects
- UNI EN ISO 19650/11337-5:2015 Construction and civil engineering works Digital management of construction information processes - Part 5: Information flows in digitalized processes
- UNI EN ISO 19650/11337-6:2017 Construction and civil engineering works Digital management of construction information processes - Part 6: Guidelines for the preparation of the information specifications
- UNI EN ISO 19650/11337-7:2018 Construction and civil engineering works Digital management of construction information processes - Part 7: Knowledge, skills and competence requirements of the figures involved in the management and information modelling
- UNI EN ISO 19650/17412-1 Building Information Modelling Level of information needs
 Part 1: Concepts and principles



13.1.2.2 Acronyms and Glossary

ACRONYMS	TERMS DEFINITIONS		
BIM	Building Information	Digitalization system of the building process for the	
	Modelling	optimization and efficiency of the planning,	
		construction and management of buildings through	
	Integrated Design	the use of information Technology (11) systems.	
	Integrated Design	the building process itself	
	Client	Any natural or legal entity that commissions in any	
		form of contract, a job, a service or a supply.	
		(UNI 11337-5:2017)	
	Consultants	Executor with a non-continuous collaboration with the	
		organization for certain interventions.	
		Ex: Engineering and / or architecture firms,	
		professionals in specific fields (survey, VVF, ASL,	
	Supply/supplier	Subject "supplier" of products for the performance of	
	Supply/supplier	its activities	
		ES: manufacturers of components such as systems.	
		finishes, etc.	
GIS	Geographic Information	Tool that allows you to analyze, represent, interrogate	
	System or also Territorial	entities or events that occur on the territory.	
	Information System		
WBS	Working Breakdown	Tree (descending) structuring of the work of a project.	
	Structure	Dequired qualities and conditions percent to	
	Requirements	achieve a goal	
	Asset	English term that indicates, in a very broad sense, any	
		material or immaterial entity susceptible to economic	
		evaluation for a certain subject. In this document, the	
		term is synonymous with immovable property	
		(buildings and land).	
	Asset management	Asset <i>allocation</i> technique, conducted individually or	
		by classes in such a way as to achieve the best risk-	
		from such selection	
BIM	Manager of the digital	The BIM manager operates mainly at the organizatio	
Manager	process	level about the digitalization of processes.	
J		The BIM manager works with the project manager, as	
		part of the integrated management of information	
		processes and decision-making processes.	
		The BIM manager, together with the BIM coordinator,	
		collaborates with the CDE manager, even when the	
BIM	Coordinator of information	The BIM coordinator operator at the level of the	
Coordinator	flows	individual order in concert with the top management	
		of the organization and according to the indications of	



		the BIM manager in the overall management of	
BIM Specialist	Advanced operator of information management and modelling	The BIM Specialist acts within the individual orders and operates through certain procedures digitalized through object modelling. It interfaces mainly with the BIM coordinator for the coordination and validation of the models and with the BIM manager to identify the instrumental resources useful for carrying out the order.	
PM	Project Manager	The project manager is the figure responsible for all the project phases and has the main function of obtaining the expected results in compliance with the times and costs.	
	Code Checking	Verification and control of geometric interferences between objects, models and works from different disciplines.	
	Clash Detection	Verification and regulatory control (geometric / alphanumeric), on the models taken into consideration, through parametric rules.	
	Object libraries	 Digital environment for organized collection and sharing of objects for graphic and alphanumeric models. UNI EN ISO 19650/11337-1 An information document is defined as the vehicle for the representation of a product or process in the construction sector through information content of a graphic, documentary (alphanumeric), multimedia (etc.) nature. The information documents are divided into: 4. Graphs (graphic representation: drawings, 	
	Informative documents		
		technical tables, etc.);	
		5. Documentary (alphanumeric representation:	
		relationships, calculations, contracts, etc.);	
		6. Multimedia (multimedia representation: audio,	
		photos, movies, etc.).	
		(UNI EN ISO 19650/11337 – 1)	
	Objective	The specific purpose for which the model or object is requested. Ex: obtaining authorizations, documentation concerning the fire brigade, information necessary for the economic evaluation of the project, etc.	
GAN 820660	Use	Specific use of the data and information contained in the model or object. Ex: extraction of information related to materials, dimensions, quantities, etc.	



	Model	Information vehicle for the virtualization of products and processes in the construction sector. (UNI EN ISO 19650/11337-1)
	Federated model	Model consisting of the set of models related to specific disciplines (architectural, structural, MEP)
	Object	Virtualization of geometric and non-geometric attributes of finite spatial entities, related to a work, or to a complex of works, and their processes. (UNI EN ISO 19650/11337-1)
	Delivery	Transfer of data, information or documents intended because of a certain activity and transmitted at the end of a specific time.
LOIN	Level of Information Need	Framework defining the scope and granularity of "information"; reinterpretable representation of data in a formalized way suitable for communication, interpretation, or processing. (UNI EN ISO 19650/17412-1) LOIN= LOG+LOI+DOC LOIN= LOD+DOC
LOD	Level of development (or detail) of digital objects	Level of depth and stability of the data and information of the digital objects that make up the models. For uniformity with the terminology adopted in the international field, "LOD" is used as deduced from the English language "Level of Development". (UNI EN ISO 19650/11337-4) LOD= LOG+LOI
LOG	Information level of objects – geometric attributes	Level of depth and stability of the geometric attributes of the digital objects that make up models. Constituent part of the LOD, together with the LOI, referring to the geometric attributes. (UNI EN ISO 19650/11337-4)
LOI	Information level of objects – informational attributes	Level of depth and stability of the information attributes of the digital objects that make up models. Constituent part of the LODs, together with the LOGs, referring to the non-geometric attributes. (UNI EN ISO 19650/ 11337-4)
DOC	Information level of documents	Level of depth of the input documents for the drafting of the models and of output from the models themselves.
	Systems	Technological (physical) part of a work. Articulated composition of subsystems combined with each other due to the common correspondence to an aggregating function. Generally differentiated in construction or

GA N. 820660 24/06/2022 Page 115 Public



		architectural systems, structural systems, plant systems, environmental systems. Examples of systems are the internal walls and the outer shell of a building, the floors, the roofs intended as finished packages. The roadbed, the air conditioning system, the elevation structures. (UNI EN ISO 19650/ 11337-1)
	Subsystems	Technological (physical) part of a system belonging to a work. Articulated composition of individual components combined with each other due to the common correspondence to an aggregating function. It performs its own characterizing function and is part of a system, performing (or helping to perform) one or more specific functions. Generally differentiated into construction or architectural subsystems, structural subsystems, plant subsystems, environmental subsystems. Examples of subsystems are the plaster layer, the insulating layer, screeds, etc. understood as functional layers or parts of finished packages. The tout-venant of the roadbed, the distribution network of the air conditioning system, the pillar or beam of the elevation structures. (UNI EN ISO 19650/11337-1)
	(Subject) Appointed party	Recipient of information concerning works, immovable property, or services by a principal Appointed party. (UNI EN ISO 19650-1:2019) In the EIR synonym of: <i>Contracting Authority</i> in the case of public contracts
	(Subject) Appointing party	Provider of information concerning works, immovable assets, or services. (UNI EN ISO 19650-1:2019) In the EIR synonym of: <i>Contractor</i>
	Information	Reinterpretable representation of data in a formalized way, suitable for communication, interpretation, or processing. (UNI EN ISO 19650-1:2019)
CI/EIR	Exchange Information Requirements	Explanation of the needs and information requirements required by the Client / Appointing party for the execution of a contract for works, supply or services.
0 A NL 000000		B 11



oGI/Pre- contract BEP	pre contract BIM Execution Plan offer	Clarification and specification of the information management offered by the company in response to the needs and in compliance with the requirements requested by the Client / Appointing party in the EIR.
pGI /BEP	BIM Execution Plan	(Operational) planning of the information management that will be implemented by the Contractor in response to the needs and in compliance with the requirements requested by the Client / Appointing party in the EIR. Act of consolidation and specification of the offers, drawn up in strict compliance with the previous pre contract BEP, in view of the stipulation of the contract of which it is attached (see Legislative Decree 50/16, art. 23 and its implementing decrees).
IDP	Information Delivery Plan	The planning of the delivery of information is the responsibility of each Appointed party. Plans should be formulated in response to the information requirements set by the Appointing party and should reflect the purpose and scope of the assignment throughout the life cycle of the asset. (UNI EN ISO 19650-1:2019)
ACDat/CDE	Common Data Environment	Digital environment for organized collection and sharing of data relating to models and digital works, referring to a single work or a single complex of works. Information source agreed for a given order or a property, to collect, to manage and to forward each information container for the entire duration of the management of a contract. (UNI EN ISO 19650-1)
ACDoc	Document Sharing Environment	Paper archive, for the sharing of non-digital documents, referring to a single work or a complex of works.
DB	Database	Structured data store stored in a computer to rationalize the updating and management of information and allow the execution of complex searches.
DBMS	Database Management System	Software for the management of Data Base. The DBMS allows the query and modification of the Database.
ERP	Enterprise Resource Planning	Integrated management system of relevant business processes (sales, purchasing, warehouse management, accounting, etc.)



FTP	Files Transfer Protocol	Protocol for data transmission among files storage and exchange environments.
ICT	Information and Communication Technologies	Set of technologies that provide access to information through telecommunications (internet, wireless networks, mobile phones, etc.).
XML	eXtensible Markup Language	Language that allows the representation of documents and structured data on digital support.
IFC	Industry Foundation Classes	Open language for saving and exchanging data for graphic models. (UNI-EN-ISO 16739:2016)
LC1	Coordination Level 1	Coordination of data and information carried out within a single model.
LC2	Coordination Level 2	Coordination between different individual models.
LC3	Coordination Level 3	Coordination to be carried out between models, information documents generated by models and information documents not deriving from graphic models (for example, technical or calculation reports, CAD graphs, etc.), foreach of the disciplines concerned.
LV1	Verification Level 1	Formal internal verification: verification of the correct method of production, delivery and management of information in relation to what is indicated in the EIR and in the BEP.
LV2	Verification Level 2	Substantial internal verification: verification aimed at ascertaining the readability, traceability and consistency of the information contained in the various models. It is performed by carrying out a verification of the achievement of the information evolution of the models and drawings and the level of development of the associated objects, required in the phase as prescribed in EIR and in the BEP.
LV3	Verification Level 3	Formal and substantial verification: verification carried out on what is deposited in the ACDat (CDE) and / or ACDoc (paper document sharing archive). That verification shall be carried out by a third party.
	Datum	Intangible, elementary cognitive element, interpretable within a communication process through previously shared rules and syntax. (UNI EN ISO 19650/11337-1)



Metadata		Kit of information to computer documents, useful for their description and administration.
Digital Platform	Collaborative	Digital environment for the organized collection and sharing of data, information, models, objects and elaborations related to the construction chain. Ex: resulting products, component products and processes (objects, subjects, actions). (UNI EN ISO 19650/11337-1)

13.1.3 Introduction

This guideline identifies the minimum contents of the specific information required by Direzione Generale Casa e Housing sociale (Directorate General for Housing and Social Housing, even only the Directorate-General in the following) in the digital information exchange with the ALERs.

The application of the BIM methodology will allow the creation, sharing and delivery of a digital model of the work that collects and organizes the geometric, alphanumeric and documentary information that is collected, created, updated during the life of the property.

This document provides, therefore, indications on the production and sharing of information content relating to real estate. In particular, it identifies the information requirements in terms of:

- information process, i.e. the requirements of production, programming, delivery and verification of information;
- o information content, i.e. the requirements for the production and structuring of information;
- o information tools, i.e. requirements of the hardware and software tools to be used.

In order to identify in which context the information relationship between Direzione generale and the ALER is placed, the schematic and simplified organizational chart of Direzione generale with external subjects is presented below.

GA N. 820660 24/06/2022 Page 119 Public





Figure 18. Organization chart of information exchange

Depending on the production and management needs of the information exchanged between Direzione Generale and the ALER, the following documents may be produced, grouped into sets A, B, C, D, E. Especially:

A: the documents concern the production and management of information by Direzione generale in the exchange of information with the ALERs;

B: the documents concern the production and management of information by the ALERs for the management of their assets;

C: the documents concern the production and management of information by the ALERs for projects (new construction, renovation, etc.) in the context of the exchange of information with contractors.

D: the documents concern the definition of the requirements for the exchange of information between the Appointing party (the ALERs) and the Appointed party.

E: the documents concern the data management methods, with identification of the flows, the IT structure and the dedicated instrumentation, in order to better explain the administration and use of the same. They concern Direzione generale, the Appointing party (the ALER) and the appointed party, each with their respective competences.

Specifically, the documents are

A. Organization Information Guidelines (OIL)

This deals with the Organization's Information Management – which defines the procedures for the production, storage, management and transmission of the organization's digital information.

The following shall form an integral part of OIL and shall be annexed thereto:

A1. Organization Information Guidelines (OIR)

The purpose of the document is to identify the information requirements of the Directorate General by providing indications for the manuals on asset and project requirements (AIR and PIR) and for the drafting of asset and project models (AIM and PIM).

GA N. 820660 24/06/2022 Page 120 Public



B. Asset Information Management Manual – Asset Information Guidelines (AIL)

The purpose of the document is to identify the activities, flows and tools used within the asset area of the ALER

B1. Asset Information Requirements (AIR)

The purpose of the document is to identify the information requirements of the organization at the level of ALERs assets.

B2. Asset Information Models (AIR)

The purpose of the document is to provide guidance for the preparation of ALERs asset models.

C. Project Information Guidelines (PIL)

The purpose of the document is to identify the activities, flows and tools used within the design area of the interventions (construction, restoration, redevelopment, demolition) of an asset managed by the ALERs.

C1. Project Information Requirements (PIR)

The purpose of the document is to identify the information requirements at the project level of an asset managed by the ALERs.

C2. Project Information Modelling (PIM)

The purpose of the document is to provide guidance for the drafting of project models for an asset managed by ALERs.

D. Exchange Information Requirements (EIR)

The main purpose of the document is to define the requirements for the exchange of information between the Appointing party (the ALER) and the Appointed party (UNI EN ISO 19650-2: 2019).

E. Common Data Environment (CDE)

The purpose of the document is to identify the data management methods by investigating flows, IT structure and dedicated instrumentation to better understand the administration and use of the same.

The annexes listed above and appended to this document in the form of diagrams aim to constitute a reference document structure to be detailed and deepened according to the needs of digital information exchange between the Direzione generale and the ALERs. These are, therefore, *templates* to refer to for the correct production of documents of interest in the different design phases.

It is specified that the OIL Annexes are interrelated in that they jointly define the information structure provided for by ISO 19650-1 (**Errore. L'origine riferimento non è stata trovata.**). It is noted, in fact, how, for example, the AIR serves as a specification for the AIM and, at the same time, contributes to the EIR.





NIL appears therefore play a fundamental role in the digital flow of orders as specified in





Table 44. Information flow according to I SO 19650-1 (A.Pavan)

In particular, it is specified that

- The information specifications or EIR (Exchange Information Requirements) constitute the clarification of the needs and information requirements required by the Appointing party for the execution of a contract for works, supply or services. Therefore, the EIR is the document that forms the basis of the tender, to which the competitors respond with their own tenders.
- The BEP (BIM Execution Plan) is the operational planning of the information management that will be produced and applied by the Contractor in response to the requirements required by the Appointing party in the EIR. The BEP is, therefore, a document of consolidation and specification of the offers; with this document the Contractor explains how it intends to meet the requirements defined by the Appointing party at resources level (human, and infrastructural and technological) and necessary capabilities. Specifically, the BEP is the result of two successive phases: pre-BEP

GA N. 820660 24/06/2022 Page 122 Public



(i.e. the information management offer), a pre-contractual document, then prepared by the competitor to participate in the tender, and the contractual BEP (the information management plan) which is the document applied during the provision of the service.

Finally, in the information flow provided for by ISO 19650, another document is inserted, namely the IDP (Information Delivery Plan). The IDP is the plan for the delivery of information relating to the order (project). The document defines and the production times of the information, the person responsible for its preparation and the related procedures to be implemented.

13.1.4 Goals

The Direzione generlae within the scope of its functions aims, through the digitalization of information exchanges, to pursue the following objectives:

- optimization of design activities through the progressive use of specific digital methods and tools, such as BIM;
- architectural, technical and functional quality of the assets managed by the ALERs;
- compliance with environmental, urban planning, protection of cultural and landscape heritage, protection of health and safety;
- constantly updated estimation of the life cycle and use of the works;
- better coordination between the different disciplines;
- mitigation of the risk of variants during construction;
- better control of the time and cost of execution of the works;
- timely updating of information during the life cycle of the property (building);
- acquisition of exact data on the geometric and plant characteristics of the properties managed by the ALERs;
- availability of a wealth of information to support regional guidelines on housing policies.

The achievement of the aforementioned goals is achievable thanks to the peculiar characteristic of the BIM methodology of favoring the collaboration between all the actors involved in the different design phases. In fact, BIM requires the production of the model, shared and delivered by the actors involved in the different phases of the process, which collects in an organized way the geometric and alphanumeric information created and updated during the life cycle of the asset.

Therefore, the models developed by the contractors of the ALERs must meet the information requirements (graphic and alphanumeric) necessary during the management of the contract in compliance with the required level of design and consistent with the discipline, with the phase etc. It is clarified that the information requirements are the result of data (Errore. L'origine riferimento non è stata trovata.Errore. L'origine riferimento non è stata trovata.) that can be organized by information and content, and defined by typology, nature, representation, topic, complexity, status. The information requirements lie within the models, but it should be noted that not all the requirements can be comprised in the model: some, in fact, must be inserted directly into the ACDat / CDE in alphanumeric and documentary form.

GA N. 820660 24/06/2022 Page 123 Public





Table 45. Example of data organization (A.Pavan)

It is emphasized that it is of primary importance that the information provided by the various stakeholders (in particular the contractors) is attributable to the asset taken into consideration in a coherent and structured manner and therefore manageable in all phases, including maintenance. By BIM methodology, it will be possible to exploit consistent and consistent information between the different models and disciplines, and easily updated during the life cycle of the asset.

Considering the provisions of the UNI 11337 standards, these guidelines provide the indications provided for the creation and sharing and delivery of graphic models (levels of coordination and levels of verification) which therefore concern the entire BIM management process.

13.1.5 Characteristics of hardware and software infrastructures

In order for the BIM methodology to be applied it is necessary to equip oneself with the necessary infrastructure and hardware and software, as described below.

Hardware:

The ALER must equip themselves with a hardware infrastructure suitable for the digital management of information processes (i.e. hardware infrastructure suitable for the operation of BIM software). In particular, it will refer to:

- CPU Type
- Ram
- Video resolution
- Video card
- Disk space
- Pointing devices

GA N. 820660 24/06/2022

Page 124 Public



- Connectivity
- Operating system
- Browser
- .Net Framework
- Etc.

Software:

The software must possess and the ability to create parametric three-dimensional objects and have the tools of planning, structural calculation, metric calculation, energy analysis, Facility Management etc. In addition, they must allow the detection of interference (*clash detection*) and the verification of the implemented rules (*code checking*). Finally, they must allow coordination and collaboration between the actors of the project (ensuring the creation of the CDE).

The BIM software used by the ALERs must have the ability to operate even with non-proprietary open format (IFC) files in the version agreed by Direzione casa (e.g. IFC 4.0 or IFC 2X3). In addition, the ALERs must communicate to Direzione casa the characteristics of the hardware systems and software used.



13.1.6 Level of information development for BIM Models

The level of information need (LOIN) chosen for each discipline and for each object of each graphic model is designed to ensure the minimum necessary information: in particular, all the objects produced for the design are characterized by a level of detail necessary and useful for the development phase of the project (Errore. L'origine riferimento non è stata trovata.).



Table 46. Table adapted from THE UNI 11337-4 standard

The level of development of an object should be considered as the set of geometric information, provided into 2D and 3D graphic format, and non-geometric (such as performance and regulatory information) described in alphanumeric form.

Direzione casa believes that the level or information needs to be achieved for the Data Model should be developed by the ALERs to

- Architectural model
- Structural model
- Plant model

The integration of BIM Models (architectural, structural and plant engineering) aims to obtain the totality of the data and information required by Direzione Casa, through the creation of an interoperable data model. This model must be delivered by the ALERs in IFC format and in native format. The level of information requirement can be easily defined using as a reference the outdated LOD (levels of detail or levels of development).

In this regard, it is recalled that the LODs constitute the level of deepening of the data and information of the digital objects that make up the models. For uniformity with the terminology adopted in the international field, "LOD" is used as deduced from the English language "Level of Development". LODs consist of the set of LOGs and LOIs, i.e. LOD= LOG+LOI.

The LOGs represent the information level of the objects in terms of the geometric attributes, therefore the level of deepening of the geometric attributes of the digital objects that consitute the models. LOGs are part of LODs, together with LOIs, referring to geometric attributes.

The LOIs represent the information level of the objects in terms of the information attributes, therefore the level of deepening of the information attributes of the digital objects that make up the models. THE LOIs are part of the LOD, together with the LOG, referring to the non-geometric attributes.

Through the LODs it is therefore possible to define, in accordance with UNI EN 17412-1, the LOIN (Level of Information Need) that represent the scope and granularity of information; it is, therefore, a reinterpretable representation of the data in a formal way appropriate for communication, interpretation or processing. The LOIN consists of the set of LOGs, LOIs and DOCs, i.e. LOIN= LOGs+LOIs+DOCs, and therefore also LOIN= LODs+DOCs. Where the DOC represents the information level of the *Documents*, that is, the level of depth of the input documents for the drafting of the models and output documents from the models themselves.

GA N. 820660 24/06/2022 Page 126 Public



13.1.6.1 Specification for inserting digital objects into models

Regardless of the format in which they originate and deposit (native format and IFC format), all graphic models must be developed by applying modelling criteria that facilitate their reading, querying and subsequent reprocessing. In all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints. In detail, each object must be readable or attributable to it at least the following basic information:

• All objects inserted within the model must be related to the level of belonging (according to the discipline);

•All horizontal elements must be related to the reference level where they lie;

• All vertical elements (septa, pillars, etc.) must be modeled as discrete elements in their vertical development according to a subdivision that is consistent with the decomposition of WBS applied to the specific class of objects;

• All structural elements must be bound to the axes associated with them;

• All plants must be related to the corrensponding discipline/environment;

• All machines and plant engineering devices must be modeled with the exact position of the joints and passages (where required by the reference LOD) with respect to the real element.

13.1.7 Roles for information purposes

The ALERs are required to carry out the information management activity with subjects in possession of the necessary experience and skills also in relation to roles and responsibilities. Below, by way of example, is a list of the "typical" roles of BIM management.

- BIM Manager
- BIM Coordinator
- BIM Specialist
- ACDat/CDE Manager

Bim Manager is the "manager of digitalized processes" BIM Manager operates mainly at the organization level, regarding the digitalization of processes. The BIM manager, in collaboration with the BIM coordinator, collaborates with the CDE manager, even when the latter belongs to a third-party organization, and works with the project manager in the context of the integrated management of information processes and decision-making processes.

The BIM Coordinator is the "Coordinator of information flows". The BIM Coordinator operates at the level of the individual order, in concert with the top management of the organization and according to the indications of the BIM manager in the overall management of digitalized processes.

The BIM Specialist is the "Advanced Operator of Information Management and Modelling". The BIM Specialist acts within the individual orders and operates through certain procedures digitalized through object modelling. The BIM specialist interfaces mainly with the BIM coordinator for the coordination and validation of the models and with the BIM manager to identify the instrumental resources useful for carrying out the order.

Alongside these figures, typical of BIM management, we must consider the figure of the Project Manager. The Project Manager is therefore responsible for all the design phases and has the main function of obtaining the expected results in respect of time and costs. It should be noted that the figure of the project manager is present in any project, beyond the application of the BIM methodology.

GA N. 820660 24/06/2022 Page 127 Public



13.1.8 Data sharing

The definition of a common standard (between Direzione casa and the ALERs) for the production and sharing of information content will facilitate the creation of Common Data Environment (CDE), so that the information management, in accordance with the provisions of UNI11337, takes place through a manufacturing process (**Errore. L'origine riferimento non è stata trovata.**) consists of four sequential phases: Processing and Updating (WIP, i.e. Work In Progress), Sharing (Shared), Publishing (Published), Archiving (Archive).



Table 47. Construction of ACDat and information flow (A.Pavan)

Therefore, in the diagram represented in Figure **Errore. L'origine riferimento non è stata trovata.** we have the areas:

- 5. **in progress** (internal): internal work environment and data acquisition not visible from subjects external to the organization;
- 6. **sharing**: data sharing environment processed but not completed or coordinated;
- 7. in publication: completed and coordinated data sharing environment;
- 8. **archive** (valid, outdated): internal working environment.

In addition, the following adjectives are defined for models and drawings:

- **consolidated**: models and elaborations are sufficiently consolidated for sharing with third parties for the purpose of coordination.
- **approved**: the models and drawings, concluded internally and coordinated, are approved for publication and making available to third parties in the Contract
- **concluded**: the models and the elaborations are concluded and no longer necessary for the elaboration of third parties for the specific phase in place
- **historical**: the models and the elaborations are made accessible internally to the processing as a database for other phases or Contracts

GA N. 820660 24/06/2022 Page 128 Public



Within the ACDat a documentation approval information flow will be configured, which could be structured as follows (**Errore. L'origine riferimento non è stata trovata.**):



Figure 19. Approval information flow (A.Pavan)

Each document uploaded to the ACDat within the specific project undergoes an approval process structured in three distinct moments: Formal Verification, Substantial Verification, and Verification by Approval.



13.1.9 Protocol for data exchange

Considering the data exchange protocol, in addition to the delivery of the Model in IFC and native format, the following table lists the accepted file formats.

	docx,
	pptx,
PAPERS	txt
	xls, xlsx
	pdf
	Bmp
	jpg;
	jpeg;
IMAGES	png;
	tiff
	pcx,
	gif
	dxf
ELABORATIONS AND MODELS	dwg
	IFC
	rvt, rfa

Furthermore, to facilitate reading and use, the size limits for file type must be defined.

13.1.10 Encoding project files

Direzione casa is not currently equipped with a BIM coding standard; It is therefore proposed, through discussions with the ALERs, to agree on a standard, which will have to be adopted by the various companies. This standard is necessary to ensure a rapid search for information and to facilitate the flow of work between the parties involved in the development of the project. The ALER will be required to encode the models, the respective elaborations and the data contained therein, according to the coding (being defined and perfected by Direzione casa) which may have a structured such as that which, by way of example, is specified below.

CODE	DESCRIPTION	NUMBER OF DIGITS or
		LETTERS
PROPERTY CODE	Describes the property	3 DIGITS
LEVEL	Indicates the level (plan)	3 LETTERS
FILE TYPE	Indicates whether it is a three- dimensional model, a calculation relationship, an operational specification, etc.	2 LETTERS
DISCIPLINE	Indicates the discipline (installations, furnishings, etc.)	1 LETTER
DESIGN PHASE	Indicates the design phase (final project, executive, etc.)	1 LETTERA



The coding of the models and the elaborations will be defined to identify them in a univocal way. The coding must be concise but exhaustive.

13.1.11 Structure and organization of digital modelling

13.1.11.1 Shared coordinate system

The models must share the same coordinate system (e.g. coordinate system WGS84) to ensure the correct return of the federated model (set of architectural, structural and plant models). Therefore, the ALERs must refer to the coordinate system provided by the Directorate-General (with the same absolute orientation).

On a practical level, therefore, the reference point of the asset (recognizable or traceable on site by the contractor) serves to guarantee the federation of models, but also to insert the federated model within the territorial georeferencing system. The point of the asset can be re-examined in situ through GPS survey. With particular reference to the geolocation of the model in IFC format, it must be georeferenced in the proprietary platform, assigning the latitude and longitude coordinates, and then verify that these are correctly exported in the IFC model.

13.1.11.2 Levels of coordination

The data and information contained in digital models must be coordinated with each other. Coordination is carried out at the level of the model of the same discipline and between graphic models of the various disciplines. It is carried out through the verification of the interferences (*clash detection*) and the relative resolutions of the inconsistencies found (*code checking*).

In agreement with UNI11337-5, three levels of coordination are identified:

- LC1: First level coordination. This is the arrangement of data and information within the graphic model relating to a single discipline;
- LC2: Second level coordination. This is the sorting of data and information between the individual models of the various disciplines. Second-level coordination can take place by means of the simultaneous aggregation of several graphic models (it could be defined as a congruence check).
- LC3: Third level coordination. This is the Coordination of data and information generated by graphic models with data and information external to graphic models (they can be processed both digital and non-digital).

13.1.11.3 Levels of verification

Within the information process inherent to the project, three levels of verification (LV) are identified as defined by the UNI 11337-5: 2017 standard, namely:

- LV1: First level verification. It is an internal, formal audit of the production, delivery and management of information.
- LV2: Second level verification. This is an internal verification of a substantial nature, as it aims to

GA N. 820660 24/06/2022 Page 131 Public



verify the readability and consistency of the data.

• LV3: Third level verification. This is an independent (external) verification of both formal and substantial character carried out by the Appointed party, which can make use of a third party.

13.1.12 Resource Management: skills and training

To start or complete (depending on the current state of progress, which is not the same for the different ALERs) the transition from a traditional approach to the BIM approach, the presence within the ALERs of professional figures who are equipped with the specific technical skills required becomes of fundamental importance.

Actions applicable by the ALERs may include training, *mentoring* or reallocating staff currently employed; or hiring or contract assignment of staff, including recent graduates, who possess the required skills. In particular, the ALERs must undertake to define and ensure an adequate level of competence for the persons who hold the function of:

- o information manager (BIM Manager);
- o information coordinator (BIM Coordinator);
- o information modeller (BIM Specialist);
- ACDat manager (CDE Manager).

Moreover, considering that the average age of Italian public employees (including those of the Lombardy Region) is quite high, the technicians employed in the public administration are highly prepared from the traditional point of view but not from the point of view of new technologies. It is therefore appropriate, to make the most of the positive characteristics of experienced technicians, to combine an experienced technician with a young BIM technician, so that they can both benefit from the collaboration, with the ultimate goal of having fully qualified technicians in the future.

13.1.13 Conclusion

Recalling that D.M. 1 December 2017 n. 560 and the subsequent D.M. 3 August 2021 n. 312 defined the phases of implementation of the BIM methodology in public procurement and considering that the progress of the application of BIM within the ALER is still in its initial phase, this guideline (OIL and attached documents) provides useful indications for the implementation of the digitalization process based on the BIM. In particular, the main document, treating both technical and managerial aspects according to a high-level vision, wants to provide general indications for BIM process implementation, while the attachments assume operational value, as "Templates" modifiable to be used in operational context.

Specifically, this document provides general indications regarding the regulatory references to the hardware and software characteristics, the LOINs of the BIM models, the roles of the personnel for information purposes, the data sharing method, the file format, the encoding of the project files, at the levels of coordination and verification of digital models, at the skills and training of personnel who cover BIM roles.

GA N. 820660 24/06/2022 Page 132 Public



13.2 Organization Information Requirements OIR



DIPARTIMENTO DI ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO



Annex A1

Organization Information Requirements – OIR

Information requirements of the organization

GA N. 820660 24/06/2022 Page 133 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information requirements of the organization



13.2.1 Introduction

This document is Annex A1 to the OIL- Organization Information Guidelines.

13.2.2 Scope

The purpose of this document is to identify the information requirements of Direzione casa, providing useful information to the subsequent manuals on asset and project requirements (AIR – PIR) and for the drafting of asset and project models (AIM – PIM) under the responsibility of the ALERs.

13.2.3 Information requirements of the organization

13.2.3.1 External requirements

The following table shows the subjects involved in external relations to Direzione casa and the information requirements necessary for each of them:

	INFORMATION REQUIREMENTS		
SUBJECT	INPUT	OUTPUT	
ALER	Number of vacant accommodation	Database/programming resources	
	due to lack of maintenance	needed for interventions	
	Illegally occupied housing	Database	
	Number of requests for change of	Database	
	accommodation and related reasons		
	Mobility planning (forced and programmed)	Database	
	Arrears	Database and evaluation of arrears	
		(guilty/innocent)	
	Energy consumption data, where	Database/programming resources	
	detectable (bill paid by ALER on	needed for interventions	
	tenants)		
	Arrears on energy consumption	Database	
	Census of the presence of asbestos	Database/programming resources	
	(chimneys, pipes, roofs), with risk	needed for interventions	
	index		
	Detection of architectural barriers	Database/programming resources	
		needed for interventions	
	Regulatory adjustments: chimneys	Database/programming resources	
		needed for interventions	
	Programming of ordinary	Database/programming resources	
	maintenance	needed for interventions	
	Extraordinary maintenance	Database/programming resources	
	programming	needed for interventions	
	Cadastral data, identifying the	Database GIS	
		Detekses/Dressessing	
	Ungoing designs and related	Database/Programming Required	
	economic needs	Resources	



	Design	BIM Information Models
	Other	
MUNICIPALITIES	Number of vacant accommodation	Database/programming resources
	due to lack of maintenance	needed for interventions
	Census of the presence of asbestos	Database/programming resources
	(chimneys, pipes, roofs), with risk	needed for interventions
	index	
	Detection of architectural barriers	Database/programming resources
		needed for interventions
	Regulatory adjustments: chimneys	Database/programming resources
		needed for interventions
	Programming of ordinary	Database/programming resources
	maintenance	needed for interventions
	Extraordinary maintenance	Database/programming resources
	programming	needed for interventions
	Cadastral data, identifying the	Database GIS
		Detakara (Dragonara) and Dagoning d
	Ongoing designs and related	Database/Programming Required
Entition of the	ADIA C n a (information sustance)	Resources
regional system	ARIA S.p.a. (Information systems):	Framework agreements with
regional system	systems in use by the ALEP and the	insortions in activity plane:
	Municipalities for the request /	collaboration in the drafting of regional
	ranking of san accommodation	planning documents (e.g. PEAR
	ARIA S n a (energy part).	PRGR PRSA etc.)
	environmental sustainability	
	assessment of regional policies	
	POLIS-Lombardy:	
	collection and processing of	
	statistical data, studies and research	
	related to housing policies	
	FINLOMBARDA S.p.a.:	
	financial sustainability analysis of	
	the programs, both in the planning	
	phase and in the implementation	
	phase), ERSAF (sporadically, for the	
	theme of building materials - eg	
	wood),CHECK ATS / ASS IN	
	CASE IT EXPANDS TO THE	
	SOCIAL PART	
Other public	Support to the construction of	Studies and research
entities:	policies with scenarios, Prefectures	
University	("forced" mobility),	
Other public	Verification of contribution regularity	
entities INAII	prior to the disbursement of loans	



Other public	Forced mobility measures	
entities:		
Prefecture		
Private	Housing cooperatives (projects for	Calls for funding
operators	the construction/recovery of	
	housing)	
	real estate investment management	
	company (projects for the	
	construction of housing with public	
	residence shares)	
Other	ANCI, ANCE, UPI, ABI,: subjects	
stakeholders	consulted within the working tables,	
	preliminary to the definition of	
	policies	
European	Support to the construction of	Studies and research
project partners	policies with scenarios	
Design studios	Minimum reference standards;	Design patterns; Coordination and
	Reference standards;	verification models; As-built models;
	Other	Asset models; Management and
		maintenance models.
		Quote for purchase.
Specialized	Information and purpose of the	Specialized models and elaborations
studies	intervention;	(e.g. point clouds, geology report,
(surveys,	Design guidance document;	local seismic response, etc.)
geology, etc.)	Other	Quote for purchase.



13.2.3.2 Internal requirements

13.2.3.2.1 Internal subjects

The following table shows the subjects involved in the internal relations of Direzione casa and the information requirements necessary for each of them:

	INFORMATION REQUIREMENTS			
30BJECT3	INPUT	OUTPUT		
General Manager	Programming acts; studies and	Approval of		
	research; administrative	measures/documents of		
	measures; communications to	competence		
	the inside and outside the DG			
U.O. Manager	Administrative measures;	Approval of		
	communications to the inside	measures/documents of		
	and outside the DG	competence or verification for		
		subsequent forwarding		
Structure Manager	Administrative measures;	Approval of		
	communications to the inside	measures/documents of		
	and outside the DG	competence or verification for		
		subsequent forwarding		
Owner P.O.	Verification of technical-	Preparation of administrative		
	administrative preliminary	measure; preparation of		
	results and related measures,	communications to the inside		
	preparation	and outside the DG		
Official	lechnical and administrative	Results of the technical-		
	documentation	administrative investigation and		
		preparation of related		
		measures, preparation of		
		and outside the DG		
Assistant				
/ 1001010111	•••	•••		

13.2.3.2.2 Areas of the organization

The following table shows on the one hand the areas of which the organization is composed and on the other the information requirements necessary for each of them:

	INFORMATION REQUIREMENTS				
AREA/DEFAR I WENT	INPUT	OUTPUT			
Privacy and anti-corruption		Privacy by Design, DPIA, Information, etc.			
Budget	Verification of financial/accounting regularity	Approval of contribution disbursement acts			
Controls	Programme/beneficiary lists	Programme of checks			
Information systems					



Communication	Verification of the need for communication activities	Planning and management of communication activities
Legislative		
Staff		

GA N. 820660 24/06/2022 Page 139 Public



13.3 Asset Information Guidelines – AIL





Annex B

Asset Information Guidelines – AIL

Guidelines for the information management of assets

GA N. 820660 24/06/2022 Page 140 Public



Index

- 1 Introduction
- 2 Scope
- 3 Activities
- 5 Information flows of Asset Management
- 6 Special tools in asset management



13.3.1 Introduction

This document is Annex B to the OIL Organization Information Guidelines regarding the asset level. The Asset Information Guidelines (AIL) are also completed through the Asset Information Requirements (AIR) and the Asset Information Model (AIM), which are also annexes to the OIL (B1 and B2).

13.3.2 Scope

The purpose of this document is to provide ALERs with a tool through which to identify the activities, flows and tools used within the asset area.

13.3.3 Activities

13.3.3.1 3.1 Products and services

The ALERs offers the service of MANAGEMENT and MAINTENANCE intended for housing services, located in buildings in full ownership and mixed ownership.

13.3.4 Relational organization chart of Asset Management

13.3.4.1 Management information roles organization

The ALER must report below the organizational chart relating to the roles and management information functions related to the Asset with reference to BIM.

It is specified that this scheme must be integrated and flanked by the existing one (which may therefore not concern BIM).



Figure 20. Typical scheme of Asset Management

ROLE	NAME	EMAIL	TELEPHONE	ACTIVITY
CDE				Example: The CDE manager
Manager				confronts the BIM Manager and

GA N. 820660 24/06/2022 Page 142 Public



		the BIM Coordinator for the structuring of the CDE. The CDE manager manages the data sharing platform.
BIM Manager		Example: The BIM Manager establishes the information rules for asset management.
BIM Coordinator		Example: The BIM Coordinator receives the information from the BIM Manager and coordinates the activities of the BIM Specialists.
BIM Specialist Architecture BIM Specialist Structure		Example: BIM Specialists follow the directives of the BIM coordinator and develop the model
BIM Specialist MEP		



13.3.4.2 Matrix of information responsibilities

The table below shows the responsibilities of each role identified in the previous paragraph.

ACTIVITY	CDE manager	BIM manager	BIM coordinator	BIM Specialist ARCH	BIM Specialist STR	BIM Specialist MEP
Definition of information rules						
Incoming documentation verification						
Check						
outbound						
documentation						
Approval						
Clash/Code on						
coordinated						
models						
Clash/Code on						
individual						
models						
Model						
development						
Information						
Specifications,						
Offer and						
Information						
Management						
Plan						

R = ResponsibleA = Accountable

C = Consulted

I = Informed


13.3.5 Information flows of Asset Management

13.3.5.1 External information flows

ALER must report below the flow followed for the start of asset management activities with the external parties involved during the process (each activity started with external collaborators starts from an explicit request from ALER). Following the selection, the Appinted party has the task of delivering the products requested by the ALER, following the digital and informative conditions inserted in the EIR produced for the specific order.

13.3.5.2 Internal information flows

ALER must report below the internal information flow in reference to the management of the Assets.

13.3.6 Coordination flows

In the case of the Asset, specific coordination flows between models and / or actors of the process are not adopted because the only activity to be carried out is to "connect" useful documents during the management phase to the model developed for this purpose.

However, it is necessary and useful to check that, for example:

- The model is correctly exported in IFC format (2X3 for example);
- The model thus exported contains Premises and Real Estate Units ;
- The model thus exported is divided into AFO (Homogeneous Functional Area) and ASO (Homogeneous Space Area);
- Each object is correctly linked to the necessary technical documentation;
- Other...

13.3.7 Verification flows

Each asset model must undergo a verification process whenever there are changes to the initial conditions (internal / external restructuring, etc.).



13.3.8 Special tools in asset management

13.3.8.1 Hardware tools

The following table shows the hardware tools used by the ALER:

	HARDWARE				
Nr.	Typology	Prevailing features			
	Fixed Workstation				
	Monitor				
	NAS				
	Telecom Italia Business				
	Network				
	Multifunction printer				
	Uninterruptible power				
	supply				

13.3.8.2 Software Tools

In the following table the software tools used by the ALER:

SOFTWARE								
UtilizationModelBrandVersionN° workstation								
<u>Coordinations</u>								
Coordination.	Coordination:							



13.4 Asset Information Requirements - AIR



Regione Lombardia

Annex B1 Asset Information Requirements – AIR

Information requirements for immovable property

GA N. 820660 24/06/2022 Page 147 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information structure, Operating LOIN
- 4 Information structure, Operating model LOIN
- 5 Information structure, LOIN of asset objects



13.4.1 Introduction

This document represents Annex B1 to the OIL Organization Information Guidelines regarding the asset level. The Asset Information Requirements (AIR) is completed through the Asset Information Guidelines (AIL) and the Asset Information Model (AIM), which are also annexes to the OIL (B and B2).

13.4.2 Scope

The purpose of this document is to identify the information requirements necessary for the Asset area of the ALER.

13.4.3 Information structure, LOIN of Asset

The phase objectives (LOIN) are listed below with reference to the operating status.

STAGE	PHASE	OBJECTIVE
Exercise	Management and Maintenance	UNI 10366:2007: Maintenance – Maintenance design criteria

13.4.3.1 Information structure, LOIN of Asset Model

13.4.3.1.1 Objectives and uses of model

ALER defines in the following table the management model with its objectives and uses

MODEL	OBJECTIVES	USES
Architectural		
Structural		
MEP		

13.4.3.1.2 Delivery

The deliveries planned for the asset management of the ALER are:

- Management model (financial management, costs, revenues, leases, etc.)
- Maintenance model (technical management, etc.)
- Definition Type of deliveries

By way of example, some types of deliveries are listed:

- Graphic Templates
- Graphic elaborations extracted from the model
- Graphics not extracted from the model
- Documentary documents not extracted from the model
- Clash detection report
- Other..
- <u>Delivery</u> support Deliveries must be made available through:

GA N. 820660 24/06/2022 Page 149 Public



• Sharing in ACDat (CDE)

13.4.3.1.3 Model processing (DOC)

The following table shows all the extracted (e) or linked (c) to the Asset model.

MODEL	DRAWING	CODE
Architectural		
Structural		
MEP		
Legend		
	e Drawing extrapolated from model	
	c Drawing related to the model	

13.4.3.2 Information structure, LOIN of asset objects

13.4.3.2.1.1 Objectives and uses of objects

The objective of digital objects in the operation phase is to guarantee the functionality of each element in the useful life cycle and its possible disposal and replacement; as well as understand the consequent costs and consumption.

During the operation stage the use of digital objects ensures the extraction of the information necessary for the technical and economic management of the property.

For example, the above usage attributes and objective such as:

STAGE	PHASE	OBJECT	OBJECTIVE	USES

13.4.3.2.1.2 Object processing

Each object of the asset model must be linked through *links* and attributes to the following useful documents during the management phase:

STATE	PHASE	OBJECT	OBJECT PROCESSING



13.5 Asset Information Model- AIM





Annex B2 Asset Information Model – AIM

Information model of assets

GA N. 820660 24/06/2022 Page 151 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information structure of graphic models
- 4 Information structure of the papers
- 5 Information structure object libraries



13.5.1 Introduction

This document represents Annex B2 to the OIL - Organization Information Guideline regarding the asset level.

The Asset Information Model (AIM) is completed through the Asset Information Guideline (AIL) and the Asset Information Requirements (AIR), which are also annexes to the OIL (B and B2).

13.5.2 Scope

The purpose of this document is to identify the information structure of the models, documents and library of objects produced for the ALER Asset.

13.5.3 Information structure of graphic models

13.5.3.1 Modelling rules

The asset model is a model that follows the same principles as a project model (maximum file size, coordinate system, insertion of objects, attributes), but differs from the latter in the type of information from which it is populated. The Asset model, in fact, is configured as an as-built model unloading the data necessary in the design / construction phase and superfluous in the management phase (for example, the number of reinforcing bars).

13.5.3.2 Architectural Asset Model

The Architectural Asset Model must be generated starting from an s-built Model contained within the CDE.

13.5.3.3 Structural and MEP Asset Model

With regard to the management of structural or plant parts, the Asset model referred to these disciplines will be generated and will undergo the same processes described for the Architectural Asset Model.

13.5.3.4 Common system of coordinates and reference specifications

In the Master Model (federated model) the coordinate system transposed through the survey must be used.

By way of example, there is a useful table to specify the coordinates to be used:

ABSOLUTE REFERENCE SYSTEM				
Argument	Specification			
Intersection grids XX and YY				
Altimetry				
Rotation according to the real north				
Ground floor PPF				
OTHER PRO	OPOSED REFERENCES			
Argument	Specification			
Origin of the axis system				
Offsets and distances between axes				
Encoding axes or grids				



Units of measurement	

13.5.3.5 Specific for inserting digital objects into models

All asset models must be developed from an as-built model (derived from the Project area). Each object, therefore, will follow modelling criteria that allow its easy reading, interrogation and subsequent re-elaboration. In particular, in all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints.

13.5.4 Information structure of the documents

13.5.4.1 Processing generation

Specify whether specific processes must be extrapolated from the Asset Model, or whether any information can be used directly by querying the model in the platform.

13.5.4.2 Processed encoding

Specify the encoding of the drawings extracted directly from the model.

13.5.5 Information structure object libraries

13.5.5.1 Object modelling rules

Specify if the Asset Models are loaded in the platform and in what format (specifically, the objects contained in the platform derive from the design model, which then became as-built and, finally, skimmed unnecessary information during management).

13.5.5.2 Encoding objects

Specify whether ALER produces objects directly (and whether the encoding of objects refers to the one proposed by the trustee).

13.5.5.3 Geometric attributes (LOG)

All the objects produced for management and maintenance are characterized by a low level of geometric detail, sufficient to identify the overall geometries of the object itself and those necessary for maintenance. The following table shall contain the information that is useful and necessary for this phase:

GEOMETRIC ATTRIBUTES

•

- .

•

GA N. 820660 24/06/2022 Page 154 Public



13.5.5.4 Non-geometric attributes (LOIs)

The non-geometric attributes related to the object are those referring to the correct maintenance and management. The following table shall contain the information that is useful and necessary for this phase: **NON GEOMETRIC ATTRIBUTES**

٠	
٠	
•	

13.5.5.5 External libraries

Indicate whether ALER produces models and/or objects or whether it makes use of objects downloaded from external libraries (specifying which libraries).



13.6 Project Information Guidelines- PIL



DIPARTIMENTO DI ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO



Annex C Project Information Guidelines – PIL

Project Information Management Manual

GA N. 820660 24/06/2022 Page 156 Public



Index

- 1 Introduction
- 2 Scope
- 3 Activities
- 4 Referenced project management organization
- 5 Information flows of project management
- 6 Special tools in project management

GA N. 820660 24/06/2022 Page 157 Public



13.6.1 Introduction

This document represents Annex C to the OIL- Organization Information Guidelines regarding the design of interventions (construction, restoration, redevelopment, demolition) of an Asset. The Project Information Guidelines (PIL) is completed with the Project Information Requirements (PIR) and the Project Information Model (PIM), which are also annexes to the OIL (all. C1 and C2).

13.6.2 Scope

The purpose of this document is to identify the activities, organizational charts, flows and information tools in reference to the design of interventions (from restructuring, demolition and reuse).

13.6.3 Activities

13.6.3.1 Information benchmark

The ALER, in addition to the design activity carried out internally, deals with the control and verification of externally commissioned projects.

13.6.3.2 Relation organization chart

13.6.3.2.1 Organization chart of the information roles of intervention

The following figure shows the organization chart relating to the roles and information functions of the design of the ALER

ROLE	NAME	EMAIL	TELEPHONE	ACTIVITY		
				The CDE manager confronts the		
005				Project Manager and the BIM		
CDE				Coordinator for the structuring of		
manager				the CDE.		
				The CDE manager manages the		
				data sharing platform. The BIM Manager establishe		
				The BIM Manager establishes		
BIM manager			the information rules for GREEN			
				BIM.		
				The BIM Coordinator receives		
DIM				the information from the BIM		
Divi				Manager and the Project		
coordinator				Manager and coordinates the		
				activities of the BIM Specialists		
DIM				BIM Specialists follow the		
Specialist				directives of the BIM coordinator		
Specialist	and develop					

FLOWCHART



13.6.4 Information flows of project management

13.6.4.1 External information flows

Below is a diagram representing the information flows external to ALER. (Here's an example.)



Figure 21. Example of information flow of the Appointing party (A.Pavan)

13.6.4.2 Internal information flows

The ALER must report below the internal information flow in reference to project management.

13.6.4.3 Coordination flows

The data and information contained in digital models must be coordinated with each other. Coordination is carried out at the level of the model of the same discipline and between graphic models of the various disciplines. It is implemented through the verification of interference (*clash detection*) and the relative resolutions of the inconsistencies found (*code checking*).

In agreement with UNI11337-5, three levels of coordination are identified:

- LC1: First level coordination. This is the arrangement of data and information within the graphic model relating to a single discipline;
- LC2: Second level coordination. This is the sorting of data and information between the individual models of the various disciplines. Second-level coordination can be performed by means of the simultaneous aggregation of several graphic models (it could be defined as a congruence check).
- LC3: Third level coordination. This is the Coordination of data and information generated by graphic models with data and information external to graphic models (they can be processed both digital and non-digital).

GA N. 820660 24/06/2022 Page 159 Public





Figure 22. Example of Coordination Levels (UNI 11337-5:2017)

For clash detection you can refer to the following matrices

• Non-exhaustive example of the coordination table of LC1 models

Model		Architectural							
	Object classes	Ceilings	Doors	Pavim.	Ringh.	Stairs	Walls	Windows	Other
	Ceilings								
	Doors								
	Floors								
Arob	Railings								
AICH.	Stairs								
	Walls								
	Windows								
	Other								

LC1 - coordination of interferences of the same graphic model (UNI 11337-5:2017)

• Non-exhaustive example of the coordination table of the LC1 – LC2 models

Model	Architectural	
GA N. 820660		Page 16

GA N. 82066 24/06/2022 Page 160 Public



	Object classes	Ceilings	Doors	Pavim.	Ringh.	Stairs	Walls	Finest.	Other
	Floors								
	Stairs								
Structur e.	Structural pillars								
	Structural frame								
	Other								

LC2 - coordination of interferences between a model and other graphic model (UNI 11337-5:2017)

As regards the third-level coordination verification - LC3 a manual execution is foreseen. For this reason, we tend to extrapolate as many documents as possible from the model in order to minimize the files not extracted from the model and make this coordination verification as less impactful as possible. For **Code Checking**, traditional checks must be performed also referring to the following matrix

MODEL		Building Regulations	Hygiene regulations	Consolidated Law on Construction	Law 10/91	Q.M. 1444	House plan	NTC 2018	UNI EN	CEI
	Object									
Architectural	Model									
	Processed									
	Object									
Structural	Model									
	Processed									
DEM (Duilding	Object									
Energy Model)	Model									
	Processed									
	Object									
Electric MEP	Model									
	Processed									
Mechanical MEP	Object									
	Model									
	Processed									
	Object									
	Model									
MEP	Processed									



13.6.4.4 Verification flows

Within the information process inherent to the project, three levels of verification (LV) are identified as per UNI 11337-5: 2017:

- LV1 internal, formal verification;
- o LV2 internal, substantial verification;
- LV3 independent, formal and substantive verification

ALER will carry out the level of internal verification LV1 and LV2 by the BIM Coordinators for each model or processed product and by the BIM Manager on a sample basis before their issuance to third parties.

13.6.5 Special tools in project management

13.6.5.1 Hardware tools

The following table shows the hardware tools used by ALER

	HARDWARE				
Nr.	Туроlоду	Prevailing features			
	Fixed Workstation				
	Monitor				
	NAS				
	Notebook				
	Telecom Italia Business Network				
	Multifunction printer				
	Uninterruptible power supply				

13.6.5.2 Software Tools

The following table shows the software tools used by ALER

SOFTWARE					
Utilization	Model	Brand	Version	N° Workstation	
BIM authoring:					
Architecture					
Facilities					
Infrastructure					
CAD:					
2D Drawing					
File sharing					
Construction					
site					
Verification:					
GA N. 820660				Page	

24/06/2022



SOFTWARE					
Utilization	Model	Brand	Version	N° Workstation	
Clash Detection					
Code Check.					
Management of point cloud:					



13.7 Project Information Requirements – PIR





Annex C1 Project Information Requirements – PIR

Project information requirements

GA N. 820660 24/06/2022 Page 164 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information structure, Design LOIN
- 4 Information structure, LOIN of project model
- 5 Information structure, LOIN of project objects



13.7.1 Introduction

This document represents Annex C1 to the OIL Organization Information Guidelines on the design of the construction, restoration, redevelopment, and demolition of an Asset.

The Project Information Requirements (PIR) is also completed through the Project Information Guidelines (PIL) and the Project Information Model (PIM), which are also annexes of the OIL (all. C and C2).

13.7.2 Scope

The purpose of this document is to identify the information structure for intervention projects, models and objects.

13.7.3 Information structure, Design LOIN

13.7.3.1 Process Phase Objectives (LOD)

STATE	PHASE	PHASE OBJECTIVES
Programming	Feasibility study	Legislative Decree 50/2016, art. 25, paragraph 8
	Feasibility	Legislative Decree 50/2016, art. 23, paragraph 6; art. 25, paragraphs 8 and 9; art. 27, paragraphs 3 and 4; art. 147, paragraphs 2 and 3;
Design	Definitive	Legislative Decree 50/2016, art. 23, paragraph 7; art. 26, paragraph 4; art.27, paragraph 5 and 6
	Executive	Legislative Decree 50/2016, art. 23, paragraph 8; art. 25, paragraph 4; art. 147, paragraph 4;
Execution	Realization of works	Legislative Decree 50/2016, art. 101, paragraphs 3, 4 and 5; art. 149; art. 150; LEGISLATIVE DECREE 81/08
	Test	LEGISLATIVE DECREE 81/08
Exercise	Management	
	Maintenance	

13.7.3.2 Project objectives

STATE	PHASE	PROJECT OBJECTIVE
Design	Feasibility	
	Definitive	
	Executive	
Execution	Realization of	
	WORKS	
	Test	

13.7.4 Information structure, LOIN of project model

13.7.4.1 Objectives and uses of model



STATE	PHASE	MODELS	OBJECTIVE	USES
Design	Feasibility			
	Definitive			
	Executive			
Execution	Realization of works			
	Test			

13.7.4.2 Delivery

During the determination of the modelling specifications, a delivery plan must be defined where the following information will be identified:

• Definition Type of deliveries

By way of example, some types of deliveries are listed:

- Graphic Templates
- Graphic elaborations extracted from the model
- Graphics not extracted from the model
- o Documentary documents not extracted from the model
- Clash detection report
- o Other...
- <u>Delivery</u> support

Deliveries must be made available through:

• CDE Sharing (Example)

13.7.4.3 Model documents (DOC)

Extrapolation table of the drawings to be developed in the design phase.

MODEL	DRAWING	TABLE CODE	
Architectural			
Structural			
BEM			
Mechanical MEP			

GA N. 820660 24/06/2022 Page 167 Public



Mep Electric		
WATER MEP		
Safety		
legend		
	e drawing extrapolated from model	
	c drawing related to the model	

13.7.5 Information structure, LOIN of project objects

13.7.5.1 Objectives and uses of objects

STATE	PHASE	OBJECT	OBJECTIVE	USES
Design	Feasibility			
	Definitive			
	Executive			
Execution	Realization of works			
	Test			

13.7.5.2 Object processing

Each object will be linked through *links* and attributes to the following works:

STATE	PHASE	OBJECT	OBJECT PROCESSING
Design	Feasibility		
	Definitive		
	Executive		
Execution	Realization of works		
	Test		



13.8 Project Information Model – PIM





Annex C2 Project Information Model – PIM

GA N. 820660 24/06/2022 Page 169 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information structure of graphic models
- 4 Information structure of the papers
- 5 Information structure object libraries



13.8.1 Introduction

This document represents Annex C2 to the OIL - Organization Information Guidelines on the design of the construction, restoration, redevelopment and demolition of an Asset.

The Project Information Model (PIM) is also completed through the Project Information Guidelines (PIL) and the Project Information Requirements (PIR), which are also annexes of the OIL (All. C and C1).

13.8.2 Scope

The purpose of this document is to identify the information structure of graphic models, drawings and object libraries.

13.8.3 Information structure of graphic models

13.8.3.1 Modelling rules

13.8.3.1.1 Maximum size of modelling files

Developed models must have a minimum size of xx MB and a maximum of xxx MB.

13.8.3.1.2 Common system of coordinates and reference specifications

In the Master Model (Federated Model) the system of indicated coordinates received through the survey will be used.

By way of example, there is a useful table to specify the coordinates to be used:

ABSOLUTE REFERENCE SYSTEM		
Argument	Specification	
Intersection grids XX and YY		
Altimetry		
Rotation according to the real north		
Ground floor PPF		
OTHER PROPOSED REFERENCES		
Argument	Specification	
Origin of the axis system		
Offsets and distances between axes		
Encoding axes or grids		
Units of measurement		

13.8.3.2 Specific for inserting digital objects into models

Regardless of the format in which they will be originated and deposited, all graphic models must be developed by applying modelling criteria that allow their easy reading, querying and subsequent reelaboration. In particular, in all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints. Each object shall be characterized so that at least the following basic information is legible or can be traced back to it:

GA N. 820660 24/06/2022 Page 171 Public



- All objects inserted within the graphic model must be associated with the natural level of belonging (according to the specific discipline);
- All horizontal elements must be associated with the reference level in which they lie;
- All vertical elements (septa, pillars, etc.) must be modeled as discrete elements in their vertical development according to a subdivision that is consistent with the decomposition of WBS applied to the specific class of objects;
- All structural elements must be bound to the axes associated with them;
- All plant engineering machines must be associated with the reference level of the discipline / environment underlying them;
- All machines and plant engineering devices must be modeled with the exact position of the joints and passages (where provided for by the reference LOD) with respect to the real element.

13.8.3.3 Model encoding

The models developed must follow the coding established by ALER (an example is given below).



AR_PD_II4*604_Planimetria_001 ST_PE_21A*604_Cronoprogramma_004



13.8.3.4 Model attributes

The geometric attributes of graphic models related to design should be shown in the following list:

- Address
- Coordinates

GA N. 820660 24/06/2022 Page 172 Public



- Property
- Client
- Designers
- Other...
- •

13.8.3.5 Information structure of the documents

13.8.3.5.1 Processing generation

All graphic drawings must be extrapolated from the model. For unmodeled parts, 2D parts linked to the model as described below must be made.

For non-graphic drawings (UNI 11337-1:2017) any data present and / or extractable without duplication must be extrapolated from the models.

13.8.3.5.2 Processed encoding

The drawings developed for design by ALER follow the coding below.

CODE	DESCRIPTION	NUMBER OF DIGITS o LETTERS
PROPERTY CODE	Describes the property	3 DIGITS
LEVEL	Indicates the level (plan)	3 LETTERS
FILE TYPE		2 LETTERS
DISCIPLINE		1 LETTER
NUMERIC ALPHA		6 LETTERS

13.8.3.6 Object library information structure

13.8.3.6.1 Geometric attributes (LOG)

All objects produced for design are characterized by a level of detail necessary and useful for the development phase of the project. By way of example, some possible information related to the objects should be reported in the table:

GEOMETRIC ATTRIBUTE	

- ...
- ...
- ...

13.8.3.6.2 Non-geometric attributes (LOIs)

The non-geometric attributes related to the object are, for example, those referring to the technical characteristics of the object or to the correct maintenance and management. By way of example and not

GA N. 820660 24/06/2022 Page 173 Public



exhaustively, the following table shows some of the useful and necessary information for the different phases:

NON-GEOMETRIC ATTRIBUTE		
•		
•		
•		

13.8.3.7 Libraries outside the organization

Specify any external libraries used.



13.9 Exchange Information Requirements – EIR





Exchange Information Requirements-EIR

Information Specifications

GA N. 820660 24/06/2022 Page 175 Public



Index

- 1 Introduction
- 2 Scope
- **3** Technical Section
- 4 Management Section



13.9.1 Introduction

This document represents Annex D to the OIL - Organization Information Guidelines on the design of the construction, restoration, redevelopment and demolition of an Asset.

13.9.2 Purpose

The main purpose of this document is to define the requirements for the exchange of information between the Appointing party and the Appointed party (UNI EN ISO 19650-2:2019).

Therefore, in the paragraphs of which it is composed, the information requirements to be respected for the order in question will be specified, the level of information needs, the acceptance criteria for each information requirement, the supporting information and the (informative) deadlines established for this order.

The Information Specifications, therefore, is prepared as a general guideline for the formulation of the Information Management offer (UNI EN ISO 19650/11337-5:2017), by the Competitors, and the subsequent Information Management Plan (UNI EN ISO 19650/11337-5:2017), by the Appointed party.



Figure 24. Award Information Flow (A.Pavan)

The purpose of these Information Specifications, therefore, is to define in a timely manner the needs and information requirements to which the competitor must respond and take into account (binding as contractual minimums) in the development of its Information Management offer - oGI and report / consolidate updated in its Information Management Plan - pGI, in case of award.

The Information Specifications - CI and the Information Management Plan - pGI constitute a minimum contractual obligation for the Appointed party.

13.9.2.1 Strategic information objectives of the IC

These Information Specifications have the strategic information objective of optimizing the interoperability, transparency and adequacy of the data relating to the contract in question.

In particular, this contract of \Box Lavori Servizi Forniture concerns $\Box\Box$ "... write the subject of the contract...

GA N. 820660 24/06/2022 Page 177 Public



The activities covered by this contract are described in detail in the Letter of Invitation to which this Information Specification is attached. in the Call for Tenders and in the other contractual documents prepared by the Appointing party. in the Request for Quotation and in the other contractual documents prepared by the Appointing party.

13.9.2.2 Operative information objectives of the IC

In order to achieve the strategic information objectives described in the previous paragraph, it is intended to adopt "specific electronic methods and tools, such as modelling methods for construction and infrastructure" (Legislative Decree 50/16, art. 23 and its implementing decrees), hereinafter also: "BIM methods and tools" (Building Information Modelling) and / or "information modelling", for the digital information management of tenders.

Therefore, for the purposes of the information flow of this contract, in addition to the reduction of legal and contract documentation, it will be mandatory positively considered the deposit on digital support and in the manner set out below of "multidimensional models, oriented to objects" (Legislative Decree 50/16, art. 23 and its implementing decrees), hereinafter also "graphic models" (UNI EN ISO 19650/11337-1: 2017), necessary for the fulfillment of the required information requirements.

13.9.2.2.1 Contractal pre-validity

The Information Specifications - CI as well as the Information Management Plan - pGI are contractual documents.

The Information Specifications – CI is *binding* only for digital information topics, information processes, Hardware and Software digital tools, BIM information modelling (Building Information Model / Modelling) compared to other contractual documents.

The Information Specifications - CI has an integrative character, on purely informative topics, with respect to the other contractual documents.

In case of discrepancy, *primarily* the data and information present \Box in the Letter of Invitation in the Announcement in the Request for \Box Offer in the Request \Box and of the other contractual documents, prevail over those of the Information Specifications - CI.

As a secondary step and with regard to data or information concerning only issues of an informative nature, these Information Specifications - CI and the related Information Management Plan - pGI prevail over any other tender and procurement document.

13.9.2.2.2 Identification of the contract

The general indications reported in the following table and referring to the order find their exhaustive explanation in all the documentation constituting \Box the Letter of Invitation the Announcement the Request for Offer Other $\Box\Box\Box$ in question, to which reference is made for any definition of necessary detail.

About the Appointing party	
Appointing party	
Web address	
Call web page	
Protocol Office	
Protocol web page	
Protocol address	

GA N. 820660 24/06/2022 Page 178 Public



Protocol telephone number	
Protocol e-mail delivery	
Responsible for the Procedure	
Telephone number RUP	
RUP e-mail address	
Works Manager	
Telephone number RL	
RL e-mail address	



About the	project	
Project		
Category of Opera		
Type of Intervention		
Project Web Page		
Address of the Intervention		
Web page Construction site		
Construction site telephone number		
E-mail address Construction site		
Brief desc	cription of the Project	
See:	Invitation letter	
	Needs framework	
	DIP	
	Feasibility Project	
	Final Project	
	Executive Project	
	Maintenance Plan	


13.9.3 Technical Section

This section defines the minimum technical reference requirements for the computerization systems to be used in the implementation of the contract in terms of Hardware, type of Software, data, reference systems, levels of development, skills, etc.

The indications concern, to varying degrees, both the Appointing party and the Appointed party.

13.9.3.1 HW and SW infrastructure made available by the Appointing party

The following paragraphs specify the Hardware (HW) and Software (SW) that the Appointing party will make available for the specific order. Therefore, all the tools, digital and non-digital, provided by the Appointing party for the optimization of the order information flow are considered.

13.9.3.1.1 Hardware Infrastructure

The following table shows the Hardware infrastructure made available for the order by the Appointing party.

	Hardware				
Nr. Typology Prevailing features					
	Server	Language			
HD					
	Network	LAN speed			
	Wifi speed				
	Nas				

NOTE: the information contained herein can be found in the Appointing party's OIL, AIL and/or PIL where present.

13.9.3.1.2 Software Infrastructure

The following table shows the Software infrastructure made available for the order by the Appointing party.

Software						
Utilization	Model	Brand	Version	N°		
				Workstations		
Sharing:						
ACDat						
Generic:						
Writing						

NOTE: the information contained herein can be found in the Appointing party's OIL, AIL and/or PIL where present.



13.9.3.1.3 Non-digital infrastructure

The following table shows the non-digital infrastructure made available for the contract by the Appointing party.

	ACDoc					
Nr.	Typology	Location				
		City				
		Road				
		ZIP CODE				
	Office, Archive	Building				
		Plan				
		Days				
		Times				
		ACDoc Contact				
		Person				
		ACDoc Email				
		ACDoc Phone				

NOTE: The information contained herein can be found in the Appointing party's OIL, AIL and/or GDP where present.

13.9.3.2 HW and SW infrastructure of the Contractor

The following paragraphs specify the Hardware (HW) and Software (SW) requested from the Appointed party and deemed necessary for the specific order.

The Appointed party will also be required to provide the technical specifications of the Hardware (HW) and Software (SW) infrastructures that he intends to use to meet the information requirements set out in these Information Specifications - CI.

13.9.3.2.1 Hardware Infrastructure Required

For the purposes of the information flows of this Contract and to support the activities described in these Information Specifications - CI, it is required that the Appointed party make available to the interested parties and to the Appointing parties an information infrastructure adequate to the correct functioning of the information flow.

□ If no special Hardware (HD) infrastructure is required

Specifically, no specific hardware infrastructure is required for this Contract.

□If special Hardware (HD) infrastructures are required

Therefore, the following table shows the Hardware infrastructure specifically required for the order.

Hardware				
Nr.	Typology	Prevailing features		
	Server	Language HD		
	Network	LAN speed		

GA N. 820660 24/06/2022 Page 182 Public



	Wifi speed
Nas	

NOTE: the information contained herein can be found in the Appointign partie's OIL, AIL and/or PIL where present.

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, it is requested that the Hardware infrastructure that is intended to be used in the performance of the Contract and the activities described in these Information Specifications - CI be explained.

The Hardware infrastructure already available and how much you specifically intend to use and / or integrate (purchase, rental, etc.) for this Contract must be indicated (specific integrations must be easily identifiable).

The above specification is equivalent to a declaration of availability and knowledge in the use (at an advanced professional level) of the infrastructure indicated, in the times and ways necessary for the use for this Contract.

The Hardware infrastructure and the related technical specifications must be summarized, by macro-items, according to a graphic and a tabular scheme to be reported in the IDP and consequently as part of the Information Management - oGI offer and the final information management plan - pGI, as indicated in the following examples:



Figure 25. Example of Hardware Graphical Schema

	Hardware					
Nr	Typology	Prevailing features	Present	Guarantee d		
	Server	Language HD	х			
				Х		
	Network	LAN speed	Х			

GA N. 820660 24/06/2022 Page 183 Public



	Wifi speed	
Nas		

Example of Hardware Tabular Schema

NOTE: the information reported in the diagrams indicated above can be found in the OIL, AIL and / or PIL of the Appointed party where present and certainly present in the IDP of the same.

In the case of several interested parties (ATI, RTP, etc.) the infrastructure used by each subject and their interaction must be explained.

In the case of suppliers and subcontractors, even during the Contract, the same schemes must be produced in the supply and subcontracting request and attached to the original Information Management Plan - pGI.

13.9.3.2.2 Software Required

For the purposes of the information flows of this Contract and to support the activities described in these Information Specifications - CI, it is required that the Appointed party make available to the interested parties and to the Appointing parties an information infrastructure adequate to the correct functioning of the information flow

□ If no special Software Infrastructure (SW) is required

Specifically, no specific software infrastructure is required for this Contract.

□If special Software Infrastructures (SW) are required

Therefore, the following table shows the Software infrastructure specifically required for the order.

Utilization	Model	Brand	Version	N° Workstations
BIM authoring:				
Architecture				
Facilities				
Mecc plants.				
Plants el.				
Verification:				
Detec Clash.				
Code Check.				
GA N. 820660				Page
24/06/2022				Pu

84 Public



	Software						
Utilization	Model	Brand	Version	N° Workstations			
CAD:							
Architecture							
Facilities							
Mecc plants.							
 Electrical plants							
Calculation:							
Schedules							
Structural							
calculation.							
Calculation mecc.							
Calculation elet.							
Generic tec:							
Illuminotec.							
Energy Efficency							
Programming							
GIS							
•••							
Generic:							
Writing							

NOTE: The information contained herein can be found in the Appointing party's OIL, AIL and/or GDP where present.

In the Offer of Information Management - oGI, and consequently in the final Plan of Information Management - pGI, it is requested to make explicit the Software infrastructure that is intended to be used in the performance of the Contract and the activities described in these Information Specifications - CI.

GA N. 820660 24/06/2022 Page 185 Public



The software infrastructure already in use and the one that is specifically intended to be used and / or integrated (purchase, rental, etc.) for this Contract must be indicated (specific integrations must be easily identifiable).

The above specification is equivalent to a declaration of availability and knowledge in the use (at an advanced professional level) of the infrastructure indicated, in the times and ways necessary for the use for this contract.

The Software infrastructure and the related technical specifications must be summarized, by macro-items, according to a graphic scheme and a tabular one to be reported in the IDP and consequently as part of the Information Management - oGI offer and the final information management plan - pGI, as indicated in the following examples:



Software di Modellazione ed estrazione dati

Software di BIM Review e data analysis

Figure 26. Example Graphic Diagram Software

Software						
Utilization	Model	Brand	Version	N°	Present	Guaranteed
				Workstation.		
BIM authoring:						
Architecture					Х	
Facilities						Х
Mechanical					X	
MEP					~	
Electrical MEP.						
Verification:						
Clash Detection					Х	
Code Check.					Х	



Software						
Utilization	Model	Brand	Version	N° Workstation.	Present	Guaranteed
CAD:						
Architecture						
Facilities						
Mechanical						
				_		
•••						
Calculation:						
Schedules						
Structural						
calculation.						
Mechanical						
Calculation						
calculation						
Generic tec:						
lightning.						
Energy efficiecy						
 Dec encorreire e						
Programming						
615						
•••						
Generic:						
Writing						

Example Tabular Diagram Software

NOTE: the information contained in the diagrams indicated above can be found in the OIL, AIL and / or GDP of the Commissioner where present and certainly present in the IDP of the same.



In the case of several interested parties (ATI, RTP, etc.) the infrastructure used by each subject and their interaction must be explained.

In the case of suppliers and subcontractors, even during the Contract, the same schemes must be produced in the supply and subcontracting request and attached to the original Information Management Plan - pGI.

13.9.3.3 Information management skills

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, the non-binding listing of any previous direct experience, considered significant with respect to the Letter of Invitation to the Call for Tenders Other III question, in terms of the use of processes and methods of digital information management "BIM", is required.

Therefore, by way of example and not exhaustive, a standard table is reported to be taken into account in the explanation of one's previous information management skills.

PREVIOUS INFORMATION EXPER	n°				
Name of the work/contract:					
Appointing party:					
Category of intervention (ref. DI.50/2016)					
Type of intervention (ref. D I.50/2016)					
Localization of the intervention					
Amount of invitation to tender for assistance*	€	discount:%			
Modelling and information management					
activities**					
of which carried out/entrusted directly**					
Brief description of the activity					
Tender amount of the activity* information	€	discount:%			
Statement by the Appointing party	Annex No.	Х			

(*) The values are expressed gross of the discount subsequently applied (to be explained separately as a percentage) (**) Describe the modelling and information management activities applied to the contract and, in particular, their specific contribution

13.9.3.4 Data formats made available by the Appointing party

Each file made available by the Appointing party will be provided, where possible, in an open and interoperable format.

Any graphic models made available will have a purely indicative character and must in any case be verified according to the surveys on the places.

13.9.3.4.1 Supply and exchange of data

For the purposes of data exchange and storage, the files must be provided to the Appointing party in the open format (Legislative Decree 50/16, art. 23 and its implementing decrees) and, where specified, in the open format required in the following paragraphs.

GA N. 820660 24/06/2022 Page 188 Public



In case of disputes, it is the right of the Appointing party to request the production of the original files in native format (even if proprietary).

□ If ACDat made available to the Commissioner

In the case of ACDat requested by the Appointed party (see paragraph "Software Infrastructure required"), for the purpose of ensuring the reading, management and storage of data over time, the Appointed party himself at the end of the Contract must provide a specific report on the architecture, language, structure, etc. of the DB used on which the Sharing Environment is built.

13.9.3.4.2 Contraction phase

All digital documents and models made available by the Appointign party will be provided in open format (mainly in pdf, rtf, IFC, xml, etc.).

The digital copies of models and works made available by the Appointing party (announcement, attachments, etc.) will be visible and / or downloaded electronically at the following web address:

• http/... enter web address...

Any hard copies of the same, where possible the extraction, will be available:

- for the acknowledgment, in the ACDoc of the Appointing party (see paragraph "Non-digital infrastructure");
- for the withdrawal, upon request and payment of the out-of-pocket reproduction costs and rights, at: ... enter address...; e-mail: ... enter mail...; telephone: ... enter phone number...; timetable: ... enter time for pick-up....

On request, for the sole purpose of drafting the offers and without prejudice to the contractual prevalence of the aforementioned open formats, the following models and digital elaborations may be requested (and will be provided in digital copy) also in native format:

Typology	Name	Format
Model:	Detected by point cloud	
	MEP Systems	
	Facilities	
Drawing:	Point Cloud	
	Metric computation	
	Price analysis	

13.9.3.4.3 Contraction phase

GA N. 820660 24/06/2022



All digital documents and models produced by the Appointing party will be provided in open format (mainly pdf, rtf, IFC, xml) and made available to the Appointed party in the Publication space (UNI EN ISO 19650-1) of the General ACDat of the Contract.

However, the contractual prevalence of the paper copy (or digital in open PDF format with Digital Signature) of the aforementioned works or of the extractions / views of the models is reserved.

13.9.3.4.4 Required file formats

The open formats required, and permitted, by this Contract for digital models and drawings are as follows:

Typology	Required Format	Note
Graphic Templates	IFC 2.3; IFC 4.0; LAND XML	
Graphic elaborations	PDF, DXF	
Interference Analysis Reports	PDF	
Inconsistency Analysis Reports	PDF	
Calculation papers	PDF	
Text papers	PDF, RFT	
Programming papers	PDF, XML	
Presentation papers	PDF	
Point Cloud		
Imagery	ТҮРО	

The file formats requested by the Appointing party must be confirmed and possibly implemented with additional open formats, according to a tabular scheme to be reported in the IDP and consequently as part of the Information Management offer - oGI and the final information management plan - pGI, justifying the advantages for the Contract and the Appointing party in the notes, as indicated in the following example:

Tupology	For	mat	Noto
Туроюду	Required (*)	Proposed (**)	Note
Graphic Templates	IFC 2.3; IFC		
Chapme Femplatee	4.0; LAND XML		
Graphic elaborations	PDF, DXF		
Interference Analysis Reports	PDF		
Inconsistency Analysis Reports	PDF		
Calculation papers	PDF		
Text papers	PDF, RFT		
Programming papers	PDF, XML		
Presentation papers	PDF		
Point Cloud			
Imagery	TYPO		

(*) request of the Client/Contracting Authority, minimum contract (**) proposal of the successful tenderer, additional to the (minimum) request of the Principal

GA N. 820660 24/06/2022

Page 190 Public



13.9.3.4.5 File size

The individual models developed by the Appointed party may have a maximum size of ... enter maximum size... Mb per single file.

Therefore, the Appointed party will have to integrate the articulation of the structure of the models in such a way as to respect the dimensional limits imposed here (decomposition of areas, buildings, etc.).

Specific information needs that may be limited by the size of the files imposed above must be explained according to a tabular scheme to be reported in the IDP and consequently as part of the Offer of Information Management - oGI and the final information management plan - pGI, appropriately justified in the notes and with the right of the Appointing party to accept or reject them according to the actual necessity and solidity of the justifications themselves, as shown in the following example:

Tupology	Dime	nsion	Noto
Туроюду	Required (*)	Proposed (**)	Note
Model			

(*) request of the Proposed, minimum contract (**) proposal of the Commissioner, additional to the (minimum) request of the Appointing party

GA N. 820660 24/06/2022

Page 191 **Public**



13.9.3.4.6 Information specifications for interoperability

In order to ensure the completeness of data and attributes in the graphic models provided in open format and their interoperability with other models or drawings, the Appointed party in the Offer of Information Management - oGI, and consequently in the final Plan of Information Management - pGI, must specify in addition to the version of the .ifc format (as well as in the table in the paragraph "Required file formats"), also the chosen Model View Definition (MVD) and any other property sets (IFC property set; IFC proxy) justifying the advantages for the specific intervention and for the Appointing party. In general, the MVD "Coordination View – CV 2.0" is preferred, guaranteeing, in addition, the inclusion of all the fundamental geometric parameters and the required information, as reported by way of example and not exhaustive in the following table:

Element type	IFC Class	Required property sets	LOD
Example:			
Masonry	IfcWall	Project coding	All
		Object Encoding	All
		Price list encoding	All
		WBS encoding	All

In addition, depending on the specific software used for the development of information models, it is requested to specify any variations with respect to the association of native elements to IFC classes and with respect to the addition of additional information fields according to the tabular scheme proposed below.

All the information attributes requested by the Appointing party and / or declared by the Appointed party in the paragraphs:

- System of coding and naming of objects,
- LOIN,
- Defining how to resolve interference and inconsistencies

they must be present in the models filed in open format.

In the event of a request for the proprietary formats of the models, the Appointed party will verify the congruence of the information attributes present in the objects of the latter with the mandatory ones in open format.

13.9.3.5 Common coordinate system and reference specifications

Objects and graphic models must have a single common reference system.

For any other data, or information, for which its georeferencing is significant (regardless of the model or process that contains it) you must still refer to the common coordinates.

Absolute reference system				
Argument	Specification			
Intersection grids XX and YY				
Altimetry				
Rotation according to the real north				
CA N 820660	Pa	ao		

GA N. 820660 24/06/2022 Page 192 Public



Ground floor PPF	
Other references of	of the Appointing party
Argument	Specification
Origin of the axis system	
Offsets and distances between axes	
Encoding axes or grids	
Units of measurement	

In the Offer of Information Management - oGI, and consequently in the final Plan of Information Management - pGI, any other reference systems that are considered useful for the specific contract may be proposed by filling in the table below.

Other proposed references (oGI and pGI)					
Argument	Specification				

13.9.3.6 Process step system

Insert within the paragraph the system of phases of the process adopted.

13.9.3.7 File encoding and naming system

□If NOT in possession of an encoding

In the Information Management - oGI offer, and consequently in the final Information Management Plan - pGI, the single reference system for the classification and naming of the files delivered must be defined, together with the criteria that will be applied for the management of the system itself within this Contract.

By way of example, but not limited to, there are some classification and naming standards that can be used:

- BS 1192:2007+A2:2016;
- UNI EN ISO 19650/11337-6:2017

In the case of proprietary or mixed systems, the Offer of Information Management - oGI, and consequently the final Information Management Plan - pGI, must be accompanied by a specific Annex containing the guide to the interpretation and use of the coding system used (structure, areas of application, limits of use, translation into Italian - if in another language, etc.; Annex "X": Structure of the proposed file classification system).

□If you have an encoding

The name of the files will follow the encoding as follows:

... write the encoding of the files. If necessary, prepare a Reference Annex or refer to the paragraph prepared in the Project Information Guidelines – PIL (if in possession) ...

GA N. 820660 24/06/2022 Page 193 Public



The Appointed party, in case of need, may propose any additions to the structure described.

13.9.3.8 Coding and naming system of objects

□If NOT in possession of an encoding

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, the single reference system for the classification and naming of digital objects, graphic models, together with the criteria that will be applied for the management of the system itself within this Contract, must be defined.

By way of example, but not limited to, there are some classification and naming standards that can be used:

- UNI 8290-1:1981;
- OMNICLASS (latest version available; ref.: http://www.omniclass.org);
- UNICLASS (latest version available; ref.: https://toolkit.thenbs.com/articles/classification/);
- UNIFORMAT (latest version available; ref.: https://www.nist.gov);
- PC-SfB (latest version available; ref.: DIP. DIPE, La sapienza Rome, ITEC Milan; 1983).

In the case of proprietary or mixed systems, the Offer of Information Management - oGI, and consequently the final Information Management Plan - pGI, must be accompanied by a specific Annex containing the guide to the interpretation and use of the coding system used (structure, areas of application, limits of use, translation into Italian - if in another language, etc.; Annex "X": Structure of the proposed digital object classification system).

For the purposes of completeness of information, a correlation document is required of the classification system of the digital objects of the graphic models with any other classification and naming system used for the elements contained in other models or elaborations of the Contract and, in any case, mandatorily, with the classification and naming systems used to define the elements contained in:

- abacus;
- descriptive and performance specifications;
- price lists;
- metric calculations;
- WBS.

NOTE: The combination could be one to one, one to many, many to one, etc. indifferently. Each proposed reference system must conform to the systems already used for the previous phase/stage.

Therefore, by way of example and not exhaustively, the following table shows the structure of correlation work of coding systems. The paper must be delivered in both open (PDF, XML) and native structured digital format.

					CODING			
Object:	Model	Price list	WBS	CPV	Specifications	Descriptive specifications	International Omniclass)	(e.g.

GA N. 820660 24/06/2022 Page 194 Public



Masonry	XX.XX.	xx.yy	yy.zz	Zz	kk.xxx.vv	000.vv	yy.00.ss
	•••						

□If you have an encoding

The encoding and naming of the objects will follow the encoding as follows:

... write the encoding of objects. If necessary, prepare a Reference Annex or refer to the prepared paragraph of the Project Information Guidelines – GDP (if in possession) ...

The Appointed party, in case of need, may propose any additions to the structure described.

13.9.3.9 LOIN definition system

Insert within the paragraph the system of definition of the LOIN adopted.

GA N. 820660 24/06/2022 Page 195 Public



13.9.4 Management Section

This section defines the minimum management requirements of reference in the implementation of the contract in terms of uses and objectives of models, information needs, coordination, identification of roles and responsibilities as well as the methods and timing of delivery.

The indications concern, to varying degrees, both the Appointing party and the Appointed party.

13.9.4.1 Objectives and information uses

Without prejudice to any qualitative and quantitative constraints referring to the legal services due by the Appointed party for the type of contract in question, the models and the documents must also guarantee a quantity and quality of information sufficient to ensure:

- compliance with the objectives of the process phase to which they refer;
- compliance with the (specific) objectives envisaged and required in these Information Specifications CI in the following paragraphs;
- the (specific) uses envisaged and requested in these Information Specifications CI in the following paragraphs.

13.9.4.1.1 Phase objectives

These Information Specifications - CI refers to the following phase(s) of the process as defined/defined in Legislative Decree 50/16, art. 23 and its implementing decrees.



Figure 27. Phases of the Process according to Legislative Decree 50/2016 – UNI 11337-1

Programming	
Requirements	
Two-year program of services and supplies	
Three-year work programme	
Economic Framework	
Design Policy Document (DIP)	
Design	
Investigations and surveys	
Technical and Economic Feasibility Project	
Feasibility document of design alternatives	
GA N. 820660	Page 196
24/06/2022	Public



Final Project	
Executive Project	
Design verification	
Execution	
Realization of the works	
Test	
Exercise	
Management	
Maintenance	

Therefore, the phase objective of the contract in question is expressed in the following table:

Stadio	Phase	Phase objective					

NOTE: the information contained herein can be found in the OIL, AIL and / or GDP of the Appointing party where present or more generally in the o UNI EN ISO 19650/11337-5: 2017.

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, any additional objectives useful for improving the transparency, congruence and information management of this Contract may be proposed, by filling in the table below.

Stadio	Phase	Phase objective					

13.9.4.1.2 Objectives of models and elaborations

Without prejudice to any legal constraints and requirements, in relation to the phases considered, the minimum reference models for the aforementioned phase and their objectives are defined as follows.

Stadio	Phase	Model	Objective of the model

NOTE: the information contained herein can be found in the OIL, AIL and / or GDP of the Appointing party where present or more generally in the o UNI EN ISO 19650/11337-5: 2017.

In the Information Management - oGI offer and consequently in the final Information Management plan pGI, the proposed structuring of the graphic models that will be produced for the following Contract must be explained and any further useful objectives may be proposed in a tabular scheme such as the one shown below, for the purpose of improving the transparency, congruence and information management of this Contract.

GA N. 820660 24/06/2022 Page 197 Public



Stadio	Phase	Model	Objective of the model

The graphic models can be divided, for example, according to the disciplinary areas and the various disciplines concerned (UNI EN ISO 19650/11337-1: 2017). Type, quantity and quality of the models and their subdivision must be modulated according to the current legislation, the phases, objectives and uses of the models required in these Information Specifications - CI.

An illustrative and non-exhaustive scheme of structuring and subdivision of graphic models is used both as "survey models" and as "project models" (UNI EN ISO 19650/11337-1:2017):

- GIS graphic models survey and/or project
 - Territorial (environmental, geological, etc.);
 - Cadastral;
 - Toponymy;
 - Urban planning;
 - o Constraints;
 - o More ...
- Bim Authoring graphic models relevant and/or project
 - Site/grounds;
 - Urban planning;
 - Constraints (historical, artistic, environmental, servitude, etc.);
 - o Urbanization;
 - Architectural (building);
 - Finishes;
 - Facades;
 - Structures;
 - o Mechanical plant engineering;
 - Water systems;
 - Electrical systems;
 - Security;
 - Fire prevention;
 - o Energetic;
 - Acoustic;
 - o Maintenance;
 - Disposal;
 - $\circ \quad \text{More} \ldots$

The subdivision can also be by zones, by location (network systems), by buildings, by levels (underground plate, above-ground development, etc.), and more.

GA N. 820660 24/06/2022

Page 198 Public



13.9.4.1.3 Uses of models and elaborations

For illustrative and non-exhaustive purposes only, without prejudice to any legal constraint and prescription in relation to the phases considered, it is required that the models and the drawings can guarantee at least the minimum uses described below:

Stage	Phase	Model	Using the Template
Store	Dhana	Drowing	Lies of the paper

Stage	Phase	Drawing	Use of the paper

NOTE: the information contained herein can be found in the OIL, AIL and / or PIL of the Appointing party where present or more generally in the o UNI EN ISO 19650/11337-5: 2017.

In the Offer of Information Management - oGI and consequently in the final information management plan - pGI, any further uses that are expected to be useful may be proposed, in a tabular scheme such as the one shown below, for improving the transparency, congruence and information management of this Contract.

Stage	Phase	Model	Using the Template
Stage	Phase	Drawing	Use of the paper

13.9.4.2 Information content

The following paragraphs contain the supporting information provided for this Contract and the indications on the minimum information content to be delivered at the end of the activities planned and described in the Information Specifications - CI.

13.9.4.2.1 Information content provided by the Appointing party

They are Disted below in Annex "..." Other D files made available by the Appointing party for this Contract.

13.9.4.2.2 Minimum information content required

Without prejudice to any legislative reference due to the nature and type of work and intervention, the minimum production of the graphic drawings (two-dimensional) is required, directly extrapolated or linked to the models reproducible on paper or digitally (PDF) at a scale appropriate to the level of the process phase, as reported \Box in the following list in Annex "..." Other \Box .

GA N. 820660 24/06/2022 Page 199 Public



NOTE: the information contained herein can be found in the PIR of the Appointing party where present.

In the Offer of Information Management - oGI and consequently in the final information management plan - pGI, any additional objectives useful for improving the transparency, congruence and information management of this Contract may be proposed.

13.9.4.3 LOIN

The level of information required - LOIN (UNI EN ISO 19650) required from the Appointed party (Plaintiff) for the Contract in question (Object), is defined in accordance with the requirements of Legislative Decree 50/2016 and subsequent amendments for the phases covered by the Contract (Purpose), according to the filing times established \Box in the Letter of Invitation in the Call in the Request for \Box Quotation in the Request \Box (Milestone of deliveries).



Figure 28. UNI EN ISO 19650/17412 (A.Pavan)

The LOINs will also have to meet the requirements of the phase objectives and the objectives and uses of the models identified in the preceding paragraphs. In addition, it must be specified (UNI 17412):

- The purpose for the use of the information to be provided;
- Information delivery milestones;
- The actors who will request and provide the information;
- Objects in one or more decomposition structures;

as better defined in the following paragraphs.

13.9.4.3.1 LOD

The Levels Of Development (LEVEL Of Development) – LOD chosen for each discipline and for each object of each graphic model are designed to guarantee the minimum legal constraints in force, in addition

GA N. 820660 24/06/2022 Page 200 Public



to the phase objectives and the objectives and uses of the models described in these Information Specifications - CI.

Phase	Model	LOD Required	Note

In the Information Management offer - oGI, and consequently in the final Information Management plan pGI, different LODs must be confirmed or proposed, filling in the tabular scheme below, justifying the advantages for the Contract and the Appointing party in the notes.

		LC)D			
Phase	Model	Required	Proposed	Note		
		(*)	(**)			

(*) request of the Appointing party, minimum contract (**) proposal of the Commissioner, additional to the (minimum) request of the Appointing party

It is also requested to define a summary synthesis matrix of the minimum (M) and prevailing (P) level of development of LOD, distinguished by phase and by model, as reported in the following example and not exhaustive general scheme.

		STAGES												
				LYOG. LEASIBILIT					ם אין זבע דוסעו				EXERCISE	
MODEL					Minim	um/Pr	evale	nt LOE	D OBJ	ECTS				
	М	Р	М	Р	М	Р	М	Р	М	Р	М	Р	М	Р
RELIEF:														
ARTISTIC HISTORY:														
TERRITORIAL:														
URBAN:														
URBANIZATIONS:														
SITE:														

GA N. 820660 24/06/2022



ARCHITECTURAL:							
FINISHES:							
CURTAIN:							
FACILITIES:							
ELECTRICAL:							
MECHANICAL SYSTEMS:							
HYDRO-SANITARY SYSTEM:							
AIR CONDITIONING SYSTEM:							
ANTIFIRE:							
ENERGETIC:							
ACOUSTIC:							
SAFETY:							

By confirming the proposed LOD, the Appointed party assumes responsibility for the adequate compliance of the LODs with the minimum legal constraints in force, in addition to the phase objectives and the objectives and uses of the models described in these Information Specifications - CI.

The LOD responding to the legal constraints, the phase, the objectives and the defined uses, as well as the significance of the possible interferences or inconsistencies to be analyzed or verified (UNI EN ISO 19650/11337-5: 2017) will determine:

- the degree of modelling needed;
- the degree of possible integration through drawings (2D drawings, texts, images, etc.);
- the quantity, quality and robustness (decision-making degree) of the necessary data and attributes.

These last indications will be specified in a dedicated annex (Annex "XX": Structure of the LODs). In order to ensure the correct reading and interpretation of the data, a special summary table must be prepared in support of the annex in which, for each information field included in the model and in the objects contained therein, the information necessary to eliminate possible ambiguities must be made explicit. Given the possible presence of predefined information fields within the specific modelling software used and not eliminable and / or alterable, it must be clearly specified which data provided are to be considered effective and which are not.

Therefore, by way of example and not exhaustive, a possible tabular scheme showing the indications reported is reported:

Class Information	Information field	Origin (ST/PR*)	Function	U.M.**	Good (YES/NO)
Model	Modeller	PR	Identify the responsible modeler	-	YES
	Project Status	ST	Identifies project status according to Contractor's internal specifications	-	YES

GA N. 820660 24/06/2022



Walls	Absorption	ST	-	-	NO
	Coding	PR	Identifies the identification code in - compliance with the classification indicated in the pGI		YES
Materials	Density	ST	Identify the density of the material	Kg/m3	YES
	Description	ST	Identify the synthetic description of the material	-	YES

* ST- standard: default parameter in modelling software; PR-owner: parameter inserted as user customization ** U.M. : Units of measurement

The LODs thus defined must in any case guarantee the completeness and congruence of the information through the use of graphic and non-graphic attributes connected / related to each other: object-model / drawing-ACDat.

By way of example, see the following outline of principle:



Figure 29. Scheme of the LOD. Geometric and non-geometric information attributes (A.Pavan)

13.9.4.3.2LOG

The Information Level of the Geometries - LOG must be taken from the LOD defined in the previous paragraph and currently in common use (UNI EN ISO 19650/11337-4).

13.9.4.3.3LOI

The Information Level - LOI must be taken from the LODs defined in the previous paragraph and currently in common use (UNI EN ISO 19650/11337-4).

13.9.4.3.4 DOC

GA N. 820660 24/06/2022 Page 203 Public



The information level of the Documents – DOC to be produced by the Appointed party, for the phases covered by the contract and as the minimum level for this Contract, is defined by Legislative Decree 50/2016 and subsequent amendments and DM 143/13 (table Z2 performances and parameters).

13.9.4.4 Roles, responsibilities and authorities for information purposes

For the purpose of ensuring collaboration between the interested parties and the efficiency and effectiveness of the information flow of the Appointed party, the following paragraphs identify the figures, roles and authority for the purpose of informing the Appointing party.

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, the figures, roles and authority for the information purposes of the Appointed party must be specified in the same way.

13.9.4.4.1 Organigram of the Appointing party

The information structure of the Appointing party for this Contract, without prejudice to the reference functions referred to in UNI EN ISO 19650/11337-7 is structured as follows:

... Report the organization chart established for the order, available in the Project Information Guidelines – GDP where present ...

The information flow of the Appointing party for this Contract, therefore, is structured as follows according to the roles used:

... Report the flow established for the order, available in the Project Information Guidelines – GDP where present ...

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, in addition to the identification of the organization chart of the Appointed party, it must be specified how it is intended to integrate into the process the coordination and verification activities required in the paragraph "Information coordination" and which will be the figures who will deal with it.

Example of organizational chart:

Example of information flow:

...

. . .

13.9.4.4.2 Registry of subjects

Due to the information roles identified in the previous paragraph, the references of the relative figures of the Appointing party are reported.

... Report the personal data of the subjects available in the Project Information Guidelines – GDP where present...

GA N. 820660 24/06/2022 Page 204 Public



In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, the references of the figures involved in the information process of each organization involved must be explained, in line with the roles identified in the previous paragraph.

We report, therefore, an illustrative and non-exhaustive table on the personal data of the figures:

Organization A							
Figure		Company	Information role	Email		Tol	Mob
Name	Surname	role	mormation role	corporate	certified	Tel.	WOD.
			Manager of				
			Appointing party				
			CDE Manager				
			Contract manager				
			Coordinator				
	· · · · · · · · · · · · · · · · · · ·	•	·	•			·

13.9.4.4.3 Matrix of information responsibilities

Due to the information roles identified in the previous paragraph, the matrix of the Information Responsibilities of the Appointing party is reported.

... Report matrix of information responsibilities available in the Project Information Guidelines – GDP where present...

In the Offer of Information Management - oGI, and consequently in the final Information Management Plan - pGI, the matrix of responsibilities for the contract in question must be defined, according to what was declared in the previous paragraphs.

Example of a responsibilities matrix:

...

13.9.4.5 Information references of the Appointing party (OIL)

The Information Management Manual - OIL will be made available to the bidder within the AcDOC, which defines the information references of the Appointing party. Specifically, upon request and with adequate justification, you can take a look at the following annexes:

A Organization Information Requirements (OIR)

A1. Organization Information Maps (OIM)

- B. Asset Information Guidelines (AIL)
- B1. Asset Information Requirements (AIR)
- B2. Asset Information Models (AIM)
- C. Project Information Guidelines (PIL) C1. Project Information Requirements (PIR) GA N. 820660 24/06/2022

Page 205 Public



C2. Project Information Models (PIM)

E. Common Data Environment (CDE)

13.9.4.6 Structure and organization of information content

The following paragraphs focus on the analysis and explication of the structure and organization of information content. Therefore, starting from the structure of the disciplinary models that will be described in the Offer of Information Management - oGI and in the final Plan of Information Management - pGI (see paragraph *Objectives of models and drawings*) the following must be specified.

13.9.4.6.1 Tree structure of information content

In the Information Management offer - oGI and in the final Information Management Plan - pGI, the tree structure of the information contents in reference to this Contract must be specified.

Example of an information content tree structure:

13.9.4.6.2 Tree structure of objects

In the Information Management offer - oGI and in the final Information Management Plan - pGI, the tree structure of the objects in reference to this Contract must be specified.

Example of an object tree:

13.9.4.6.3 Specifications for inserting objects

Regardless of the format with which they will be originated and deposited, all graphic models must be developed by applying modelling criteria that allow their easy reading, interrogation and subsequent reelaboration.

In particular, in all cases where possible, the rules for a correct parameterization of the elements must be respected by introducing the appropriate geometric constraints. By way of example and not exhaustively, some reference rules are reported so that the following basic information can be readable and traceable to the object:

□Territorial

. . .

- All the points inserted inside the model must report the investigated stratigraphy;
- Other.

□Infrastructure

- All objects inserted within the graphic model must be associated with the natural level of belonging (according to the specific discipline);
- All horizontal elements must be associated with the reference level in which they lie;
- All vertical elements (septa, pillars, etc.) must be modeled as discrete elements in their vertical development according to a subdivision that is consistent with the decomposition of WBS applied to the specific class of objects;

GA N. 820660 24/06/2022 Page 206 Public



- All structural elements must be bound to the axes associated with them;
- All plant engineering machines must be associated with the reference level of the discipline / environment underlying them;
- Other.

□Buildings

- All objects inserted within the graphic model must be associated with the natural level of belonging;
- All the finishing layers of the floors placed on the intrados and the false ceilings must be associated with the level / environment below them;
- All horizontal elements, except for the roofs and finishing layers as identified above, will have to be associated with the reference level in which they lie;
- All vertical elements (walls, pillars, etc.) must be modeled as discrete elements in their vertical development according to a subdivision that is consistent with the decomposition of WBS applied to the specific class of objects;
- All structural elements must be bound to the axes associated with them;
- All plant engineering machines positioned on the ceiling must be associated with the reference level of the discipline / environment underlying them;
- All machines and plant engineering devices must be modeled with the exact position of the joints (where provided for by the LOIN) with respect to the real element.
- Other.

□Refer to the Project Information Model – PIM (if in possession)

In the Information Management offer - oGI and consequently in the final Information Management plan - pGI any further specifications for the insertion of the objects may be proposed, justifying the advantages for the Contract and the Appointing party.

13.9.4.6.4 Extrapolation of drawings from models

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI must be explained the documents directly extrapolated from the graphic models or directly connected to them. What is declared must be consistent with Legislative Decree 50/2016 and subsequent amendments.m and Ministerial Decree 143/13 (Table Z2 performance and parameters) and the requests and declarations made explicit in these Information Specifications - CI.

Model Code drawing Code architectural XX.XX ground floor plan XX.XX.XXX and first floor plan хх.хү xx.xx.xxy and metric calculation of architectural works and XX.XX.XXZ ZZ.ZZ c.m.e. architectural works xx.xx.xxk С

By way of example and not exhaustive, a reference table is given:



legend			
	and	drawing extrapolated from model	
	С	drawing related to the model	

13.9.4.7 Temporal planning of information content

In the Offer of Information Management - oGI and consequently in the final Information Management plan - pGI the time schedule envisaged for modelling and the general information process (information schedule) must be explained in relation to the planning of the work phases (work schedule).

A tree structure of the information and modelling activities (Work Breakdown Structure - WBS) must be defined, which also includes the iterations with the Appointing party and any other legal entity interested in this Contract in the same phase of the process analyzed.

The activities, dependencies and temporalities must also be explained in graphic form through diagrams of GANTT. The Critical Path Method (CPM) must be highlighted and all information must be updated at least weekly and published in the ACDat.

For detailed planning, Agile programming systems and Kanban Boards are allowed, in addition not as a substitute.

In the planning of the information phases, however, the following milestones for the drafting/updating of the models must be envisaged:

□Programming

- Survey of the state of affairs;
- Delivery;
- Other.

Design

- Survey of the state of affairs;
- Specialist calculations and reports;
- BIM Review (Clash and Code);
- Delivery;
- Other.

□Execution

- Start of work, preparation of the construction site;
- Specialist calculations and reports;
- BIM Review (Clash and Code);
- SAL;
- End of works;
- Testing;
- Delivery;
- Other.

□Exercise

GA N. 820660 24/06/2022 Page 208 Public



- As-built model;
- Delivery;
- Other.

13.9.4.8 Policies for the protection and security of information content

In the offer of Information Management - oGI and consequently in the final Information Management plan - pGI the security policies adopted for the protection of data and the guarantee of the rights connected to them (copyright, patent, etc.) must be explained.

In particular, the following must be explained:

- The pre-deposit rescue and backup systems and their timing;
- The specific IT and information insurance coverage;
- The levels and rights of access and modification provided for each information system adopted;
- The number of post-deposit copies retained and the storage and protection times adopted.

13.9.4.8.1 Data security regulatory references

The main regulatory references on the security of computer and information data are reported by referring to UNI EN ISO 19650/11337-6: 2017 and any other mandatory standard in question.

For information security management systems:

- ISO/IEC 27000:2016 Information technology Security techniques Information security management systems Overview and vocabulary
- ISO/IEC 27001:2013 Information technology Security techniques Information security management systems – Requirements
- ISO/IEC 27002:2013 Information technology Security techniques Code of practice for information security controls1
- ISO/IEC 27005:2011 Information technology Security techniques Information security risk management
- ISO/IEC 27007:2011 Information technology Security techniques Guideliness for information security management systems auditing
- ISO/IEC TR 27008:2011 Information technology Security techniques Guideliness for auditors on information security controls

For privacy:

• ISO/IEC 29100:2011 Information technology - Security techniques – Privacy framework1

For professional profiles:

- UNI 11506:2013 Non-regulated professional activities Professional figures operating in the ICT sector Definition of knowledge, skills and competence requirements
- UNI 11621-2:2016 Non-regulated professional activities Professional profiles for ICT Part 2: "Second generation" professional profiles

GA N. 820660 24/06/2022 Page 209 Public



• UNI 11621-4:2016 Non-regulated professional activities - Professional profiles for ICT - Part 4: Professional profiles related to information security

For techniques and technologies:

- ISO/IEC 9798-1:2010 Information technology Security techniques Entity authentication Part 1: General
- ISO/IEC 18033:2015 Information technology Security techniques Encryption algorithms Part 1: General
- ISO/IEC 27039:2015 Information technology Security techniques Selection, deployment and operations of intrusion detection systems (IDPS)
- ISO/IEC 27040:2015 Information technology Security techniques Storage security
- ISO/IEC 29115:2013 Information technology Security techniques Entity authentication assurance framework.

13.9.4.8.2 Additional data security requests

Please find the list of additional data security requests. Otherwise, please refer to current legislation. For example: "... Any sensitive data (national, national military, supranational military security - NATO, state secrecy, etc.) must refer to the specific rules on the subject to which reference is made in full ...".

13.9.4.9 Data sharing methods (CDE/ACDat)

For the purpose of efficiency in the sharing of data, information and information content (models and documents) their status of definition and approval must always be identifiable according to UNI EN ISO 19650/11337-4: 2017:

- Definition status:
 - L0: being processed/updated;
 - L1: in the process of sharing;
 - L2: in the process of publication;
 - L3: archived:
 - L3. V "valid", version still in force;
 - L3. S "outdated", relating to versions prior to the one in force and therefore replaced.
- Approval status:
 - A0: to be approved;
 - A1: approved;
 - o A2: approved with comment;
 - A3: Not approved

In the Offer of Information Management - oGI and consequently in the final Information Management plan - pGI the Appointed party must, therefore, specify how he intends to satisfy this request.

13.9.4.9.1 Characterization of sharing infrastructures

GA N. 820660 24/06/2022 Page 210 Public



The ACDat of the Appointing party and the Appointed party must be divided into at least four sections useful for the distribution of data, information and information content of the Contract according to the state of definition referred to in the previous point.

The data exchange flow from the ACDat of the Appointing party to the ACDat of the Appointed party must follow the proposed scheme:



Construction of ACDat and information flow (A.Pavan)

Where:

- 5. **in progress** (internal): internal work environment and data acquisition not visible from subjects external to the organization;
- 6. sharing: data sharing environment processed but not completed or coordinated;
- 7. in publication: completed and coordinated data sharing environment;
- 8. archive (valid, outdated): internal working environment.
- **Consolidated**: models and elaborations are sufficiently consolidated for sharing with third parties for the purpose of coordination
- **approved***: the models and drawings, concluded internally and coordinated, are approved for publication and making available to third parties in the Contract
- **concluded**: the models and the elaborations are concluded and no longer necessary for the elaboration of the third parties for the specific phase in place
- **historical**: the models and the elaborations are made accessible internally to the processing as a database for other phases or Contracts

□If NOT in possession of an ACDat

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the access rules must be defined, the rights of the accredited subjects to operate in the ACDat of the Appointed party.

The ACDat of the Appointed party must guarantee the security of the data contained therein, also providing for special backup and disaster recovery functions.

GA N. 820660 24/06/2022 Page 211 Public



The same must guarantee the traceability of the operations carried out of which the Appointing party can make an explicit request in case of disputes.

□If you have an ACDat

In detail, the characteristics of the data sharing infrastructure are better described in the Annex: Data Sharing Platform.

13.9.4.9.2 System of deposit

The deposit of data, information and information content (models and / or drawings UNI EN ISO 19650/11337-1: 2017) relating to services, works or supplies subject to contract, for each phase of the planned process, takes place, in general, through:

- <u>Digital support</u>
 - of files in open format (PDF), Digitally Signed;
 - of files in open format, Electronically Signed by deposited in a structured data sharing environment with specific management rules, hereinafter ACDat (Legislative Decree 50/16, art. 23 and its implementing decrees; UNI EN ISO 19650/11337-1-5:2017);
 - any files in proprietary format (not definable by the client / Contracting Station, due to specific needs of transparency, congruence and data management), signed andlethally through deposit in the ACDat (above);
- Paper support
 - of documents drawn up not digitally (UNI EN ISO 19650/11337-1:2017), with Handwritten Signature;
 - of reproductions (by print, plotting, etc.), with Handwritten Signature, of digitally drawn up works and extrapolations/views, etc. of models ("multidimensional models, objectoriented", Ministerial Decree no. 560 of 01.12.2017, art. 4, paragraph 1), "graphic", "documentary", "multimedia" models (UNI 11337-1:2017).

For the filing of tender and procurement documents of this specific Supply Service Work see what is provided in the "... report details of the reference document... ".

The contractual prevalence of data, information and information content always remains:

- in the works on digital support in open format (PDF), Digitally Signed;
- in paper documents with Handwritten Signature (Legislative Decree 50/16, art. 23 and its implementing decrees).

It is the obligation of the Appointed party to declare the consistency of the information content deposited on paper with a Handwritten Signature or on digital support, in open format (PDF), with Digital Signature, with respect to the proprietary models and digital documents from which they originated.

For any other information concerning the storage of data on the data sharing platform – ACDat, please refer to the Annex: Data Sharing Platform.

GA N. 820660 24/06/2022 Page 212 Public



13.9.4.9.3 File management

Provide reference directions for file management.

13.9.4.9.4 Data management

Provide reference guidance for data management.

13.9.4.10 Management of supply chain information content

In the Offer of Information Management - oGI and consequently in the final Plan of Information Management - pGI, the method of programming and managing the information content of any sub-contractors must be explained.

The Appointing party considers as communicated and acquired the information rules of these Information Specifications - CI in question, as well as those of the Information Management offer - oGI and the final Information Management Plan - pGI of the main Distributor, for each sub-contractor interested in the Contract.

The Processor is in any case responsible for the completeness and congruence of data, information, elaborations and models produced by each of its sub-contractors. In addition to the management of its ACDat towards the same sub-contractors.

13.9.4.10.1 Verification procedures, validation of information content

All models, drawings and objects produced for this Contract will be subject to verification and consequent validation by the Contractor in compliance with current regulations.

13.9.4.10.2 Definition of validation procedures

In the Information Management offer - oGI and consequently in the final Information Management plan - pGI, the procedures for the informative validation of their data, information, models, documents and objects that the Appointed party intends to carry out in the performance of the Contract must be explained.

In particular, the following must be defined:

- The procedures;
- The timing;
- Responsibilities;
- The object of validation.

13.9.4.10.3 Definition of the structure of verification operations

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the articulation of the verification operations that are intended to be applied and guaranteed, defined according to the Verification Levels referred to in UNI EN ISO 19650/11337-5: 2017, must be explained:

- LV1: internal, formal verification of the methods of production, delivery and management of data;
- LV2: internal, substantial verification of readability, traceability and consistency of data in models and between models;

GA N. 820660 24/06/2022 Page 213 Public



• LV3: independent, formal and substantive verification of readability, traceability and consistency of data in models, processes, objects and their iteration

13.9.4.11 Information coordination

The following paragraphs analyse the methods of coordination of the data produced for this Contract. Therefore, in the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods of coordination of the models, the methods of searching for interferences and inconsistencies and their resolution must be explained and analyzed.

13.9.4.11.1 Coordination of models

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methodology and temporality of coordination of the graphic models and the related extrapolated or connected drawings must be explained.

The coordination must involve, even to different degrees, each model created for this Contract.

Therefore, coordination is required according to UNI EN ISO 19650/11337-5:2017:

- LC1: Coordinamento of the first level. This is thearrangement of data and information within the graphic model relating to a single discipline;
- LC2: Coordinamento di secondo livello. This is the sortingof data and information between the individual models of the various disciplines. Second-level coordination can take place by means of the simultaneous aggregation of several graphic models (it could be defined as a congruence check)..
- LC3: Cor third level order. This is the Coordination of data and information generated by graphic models with data and information external to graphic models (they can be processed both digital and non-digital).

The coordination must be reported through special reports that explain its completion and the result achieved.

13.9.4.11.2 Information interferences (clash detection)

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the procedures for analyzing information interference for models, documents and objects must be explained.

It is required that, when possible or significant for the economy of the intervention, not only interference with the objects themselves is considered, but also with respect to the relative areas of assembly, maneuvering and maintenance.

For the purpose of managing coordination for interference analysis, a matrix such as the one proposed below may be used:



OBJECT OF THE COORDINATION	Coordination live	Facilities	Electric		Safety	Other Models
Object	LC1					
Model(s)	LC2					
Model/Papers	LC3					
Object	LC1					
Model(s)	LC2					
Model/Papers	LC3					

NOTE: Empty cells can be used to indicate, by way of example and not exhaustively: which coordination will be ensured, the timing of coordination, the execution – or not – of a coordination, the outcome of the same (favorable, negative, partial, etc.).

The coordination analyses for interference are obviously free and called each time the Appointing party deems it necessary, but some cadenced and scheduled coordination milestones will still have to be defined.

At the end of each milestone analysis, a report of the interferences found for the subsequent resolution phases must be drawn up

13.9.4.11.3 Code checking

In the offer of Information Management - oGI and consequently in the final Plan of Information Management - pGI, the procedures for analyzing information inconsistencies for models, documents and objects must be explained.

For the purpose of managing coordination for the analysis of inconsistencies, a matrix such as the one proposed below can be used:



MODEL	OBJECT OF THE COORDINATION	Level of coordination	European legislation	National legislation	Regional legislation	Other legislation and standards	Energy saving	Acoustics	Contractual obligations	Design constraints	Constraints butnourishing	Other constraints
Facilities	Object	LC1										
	Model	LC2										
	Processed	LC3										
Other models	Object	LC1										
	Model	LC2										
	Processed	LC3										

NOTE: Empty cells can be used to indicate, by way of example and not exhaustively: which coordination will be ensured, the timing of coordination, the execution – or not – of a coordination, the outcome of the same: favorable, negative, partial, etc.

The coordination analyses of inconsistencies are obviously free and called whenever the Appointing party deems it necessary, but some timed and scheduled coordination milestones will still have to be defined. At the end of each milestone analysis, a report of the inconsistencies found for the subsequent resolution phases must be drawn up.

13.9.4.11.4 Definition of how interference and inconsistencies are resolved

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods for resolving interferences and information inconsistencies that may be found in the coordination processes must be explained.

In particular, at least the following must be defined:

- The procedures for convening coordination meetings;
- The legal entity responsible for the coordination meetings (and any modalities of replacement or rotation);
- The methods of defining possible rules of prevalence between models or drawings;
- The methods of resolution of the critical issues that have emerged and the responsibilities of resolution;
- The mode of interest of the Appointing party.

13.9.4.12 How to manage 4D, 5D, 6D and 7D information

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods of use of the models for the purpose of managing the planning of activities (4D), production costs (5D), management and maintenance of the work (6D), sustainability in production and operation (7D) must be explained.

GA N. 820660 24/06/2022 Page 216 Public


All information attributes that may be necessary to satisfy the methods of use specified herein must comply with the requests made in these Information Specifications - CI with reference to the chosen LOIN.

13.9.4.12.1 Management of programming (4D – Gantt, WBS, etc.)

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods of use of the models for the management of the planning of activities (4D) must be explained. By way of example and not exhaustively, it may be specified:

- The link between graphic model objects and WBS activities;
- The definition of the start/end times between the information attributes of the objects;
- More...

13.9.4.12.2 Economic management (5D – calculations, estimates, etc.)

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods of use of the models for the purpose of cost management (5D) must be explained. By way of example and not exhaustively, it may be specified:

- The link between chart model objects and price list items;
- The definition of products among the information attributes of objects;
- More...

13.9.4.12.3 Management of the work (6D – management, maintenance and disposal)

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the first indications on how to use the models for the purposes of management during the exercise phase (6D) must be explained.

By way of example and not exhaustively, it may be specified:

- The link between graphic model objects and maintenance activities;
- The definition of the useful life cycles of products among the information attributes of objects;
- The definition of maintenance cycles among the information attributes of objects;
- More...

13.9.4.12.4 Management of externalities (7D – Environmental sustainability, etc.)

In the Offer of Information Management - oGI and consequently in the final Information Management Plan - pGI, the methods of use of the models for the purposes of sustainability management (7D) must be explained.

By way of example and not exhaustively, it may be specified:

- Energy Efficiency;
- Acoustic Analysis;
- More...

GA N. 820660 24/06/2022 Page 217 Public



13.9.4.13 Deposit methods

□If ACDat of the Appointing party

Once the Contract has been completed, each model or elaboration contained in the ACDat of the Appointing party will be transferred from the "in publication" section to the "archive" section.



Figure 30. Construction of ACDat and information flow (A.Pavan)

Each model or process is considered deposited, in a digital sense, at the time of uploading in its open format in the "shared" section of the ACDat of the order. At the time of loading, the protocol will be recorded with date, time and person responsible for the upload itself.

The validity and usability towards third parties also takes place from the publication (transfer in the "in publication" section).

At the time of uploading, the files that need a Digital Signature will be indicated.

□If ACDat of the Appointed party

The digital filing does not conclude the terms of the filing of each hard copy required in the contract, nor of the delivery of the models in their native (even if proprietary) format.

The contractual relationship will be considered concluded following the delivery of the documents in the following manner and order:

- Deposit of a hard copy with Handwritten Signature;
- Digital deposit with Digital Signature;
- Deposit models (in their native format, although proprietary).

13.9.4.14 Model Properties

The models and all the objects contained therein and the elaborations, data and information relating to this Contract, also connected to the reading and use of the models as specified in this Information Specification - CI, will be considered the property of the Appointing party who may manage this property at will without any duty to the Contractor. Copyright is reserved according to current legislation.

GA N. 820660 24/06/2022 Page 218 Public



13.10 Common Data Environment - CDE





Annex E

Common Data Environment – CDE

Data Sharing Environment

GA N. 820660 24/06/2022 Page 219 Public



Index

- 1 Introduction
- 2 Scope
- 3 Information flows
- 4 CDE IT Structure
- 5 Custom tools

GA N. 820660 24/06/2022



13.10.1 Introduction

This document represents Annex E to the OIL - Organization Information Guidelines regarding the management of data within the Organization.

13.10.2 Scope

The purpose of this document is to identify the data management methods of Direzione Generale (and ALERs), investigating flows, the IT structure and the dedicated instrumentation to better understand the administration and use of the same.

13.10.3 Information flows

13.10.3.1 Information flows within the CDE

Direzione Generale will indicate which product it will adopt as Data Sharing Environment – ACDat (or CDE).

Each project created within it will review a configuration in line with the indications provided by UNI EN ISO 19650. Therefore, users, with regulated and different permissions, will have the following folders available:

- L0_LAVORAZIONE, containing information under development and visible only to the individual;
- L1_CONDIVISONE, information approved by the Distributor for sharing with the Appointing party;
- L2_PUBBLICAZIONE, information authorized by the Appointing party for use in the most detailed design;
- L3_ARCHIVIO, history of all information containers that have been shared and published during the information management process as well as a protocol to verify their development.





Figure 31. Operating principle of the CDE - UNI EN ISO 19650-1:2018

The documentation, therefore, passes through the folders according to its "state". Regarding the flow of operations initiated by the user, please refer to the platform-specific manual.

In addition, this ACDat allows you to connect with other management environments such as:

• Insert reference once the other management environments have been defined.

The connection with this environment is visible within each project specially made in a multifunctional bar that allows you to navigate inside:

- Project settings (e.g. "Edit Project");
- The specific area of the project structured according to the folders suggested by UNI EN ISO 19650/11337-5:2017;
- The area of investigation on the operations carried out on the platform (for example "Events");

•••

13.10.3.2 Deposit information flows

For the deposit of files on the platform, the Appointed party is invited to follow the instructions duly described in the "documentation upload" phase of the Approval Workflow. Every activity carried out by users is then visible within the dedicated section (for example, this section could be indicated with the name of "Events").

13.10.3.3 Approval information flows

Within the ACDat, an information flow of documentation approval can be configured, which is structured as follows:

GA N. 820660 24/06/2022 Page 222 Public





Figure 32. Approval information flow (A.Pavan)

Each document uploaded to the platform within the specific project undergoes an approval process structured in three distinct moments:

- Formal verification, aimed at identifying the consistency between the uploaded documents and the documents described in the Letter of Transmission;
- Substantial verification, designed to verify the consistency of the documentation and data delivered in line with what is required in the Information Specifications;
- Verification by Approval, designed to identify any deficiencies that escaped the previous verification.

13.10.3.4 Input and output information flows

This paragraph describes the input and exit information flows such as, for example, the following:

You can locate two levels of input and output flows:

Input and output flows external to the ACDat;
GA N. 820660
24/06/2022

Page 223 Public



• Input and output flows inside the aACDat.

In the first case it is the exchange between ACDat and the data sharing platform. In the second case, instead, of the movement of data within the ACDat itself.

13.10.3.4.1 Storage and protocol functions

Explain the deposit and protocol functions of the chosen ACDat.

13.10.3.5 File metadata

Each file inserted within the platform could be characterized by its TAGs that at the time of download are concretized in readable metadata and linked to the file itself.

13.10.4CDE IT structure

13.10.4.1 Information architecture

Describe the information architecture of the platform

13.10.4.2 Dialogue protocols

Describe the platform's dialogue protocols (e.g. available and personal APIs).

13.10.5 Custom tools

13.10.5.1 CDE Hardware Tools

The hardware tools used for platform management are those described in the Organization Information Guidelines - OIL. Therefore, please refer to the homonymous paragraph of the cited document.

13.10.5.2 CDE software tools

Describe whether this Data Sharing Environment will be a Cloud product, or whether you will need to install it on your hard drive.



14 Conclusions

Foreseen as part of the HORIZON 2020 – BIM4EEB project, these guidelines are a support for public organizations in the process of implementing BIM, with the aim of:

- Provide a clear and common vision of the BIM application process within the organization
- Provide the necessary information to encourage working collaboration between the public organization and the stakeholders through BIM
- Provide the foundation for creating a Common Data Environment (CDE)
- Ensure the interoperability of the BIM model with the different software platforms used
- Define Define BIM-based approach roles taking into account their support to traditional roles (such as construction manager, safety coordinator, etc.)

The deep knowledge of the heritage and its state of maintenance, and the correct management of information are fundamental elements to ensure careful planning of ordinary and extraordinary maintenance interventions, starting from the design to the realization of the works. All this to ensure the performance of buildings over the years, maintaining and improving their energy efficiency and environmental sustainability, and preserving their monetary value. In addition, a better management of all processes allows a saving in terms of public resources, to the benefit of the entire population, as a taxpayer, and a better performance as a public Administration. In particular, the main document, dealing with both technical and managerial aspects according to an overall view, wants to provide general indications for the implementation of the BIM process, while the annexes assume operational value as "Templates" modificable according to the needs to be applied in real operational contexts.

Furthermore, this document provides general information regarding the regulatory references to hardware and software characteristics, the LOINs of the BIM models, the roles of the personnel for information purposes, the data sharing method, the file format, the encoding of the project, at the levels of coordination and verification of digital models, at the skills and training of the personnel who cover BIM roles.

GA N. 820660 24/06/2022 Page 225 Public



15 Bibliography

BS 1192:2007 Collaborative production of architectural, engineering and construction information - code of practice (+A2:2016)

BS PAS 1192-2: 2013 Specification for information management for the capital/delivery phase of construction projects using building information modelling

Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries (ISO 16739:2013)

ISO 19650 - Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling Part 1: Concepts and principles; Part 2: Delivery phase of the assets

ISO 55000: 2014 Asset management - Overview, principles and terminology

ISO 9000:2015 - Quality management systems - Fundamentals and vocabulary

ISO 9001:2015 - Quality management systems - Requirements

ISO 9004:2018 - Quality management - Quality of an organization - Guidance to achieve sustained success

ISO/IEC 18033:2015 Information technology - Security techniques - Encryption algorithms - Part 1: General

ISO/IEC 27000:2016 Information technology - Security techniques – Information security management systems - Overview and vocabulary

ISO/IEC 27001:2013 Information technology - Security techniques – Information security management systems – Requirements

ISO/IEC 27002:2013 Information technology - Security techniques - Code of practice for information security controls

ISO/IEC 27005:2011 Information technology - Security techniques – Information security risk management

ISO/IEC 27007:2011 Information technology - Security techniques - Guidelines for information security management systems auditing

ISO/IEC 27039:2015 Information technology - Security techniques - Selection, deployment and operations of intrusion detection and prevention systems (IDPS)

ISO/IEC 27040:2015 Information technology - Security techniques - Storage security

ISO/IEC 29100:2011 Information technology - Security techniques - Privacy framework

GA N. 820660 24/06/2022

Page 226 Public



ISO/IEC 29115:2013 Information technology - Security techniques - Entity authentication assurance framework

ISO/IEC 9798-1:2010 Information technology - Security techniques - Entity authentication - Part 1: General

ISO/IEC TR 27008:2011 Information technology - Security techniques - Guidelines for auditors on information security controls

OMNICLASS available at: http://www.omniclass.org; [Accessed 2 September 2021]

Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

UNICLASS. available at:: https://toolkit.thenbs.com/articles/classification/; [Accessed 2 September 2021]

UNIFORMAT available at: : https://www.nist.gov; [Accessed 2 September 2021]

UNI 11337-1:2017 Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 1: Modelli, elaborati e oggetti informativi per prodotti e processi

UNI/TR 11337-2:2021

Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 2: Flussi informativi e processi decisionali nella gestione delle informazioni da parte della committenza

UNI/TS 11337-3:2015 Edilizia e opere di ingegneria civile - Criteri di codificazione di opere e prodotti da costruzione, attività e risorse - Parte 3: Modelli di raccolta, organizzazione e archiviazione dell'informazione tecnica per i prodotti da costruzione

UNI 11337-4:2017 Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 4: Evoluzione e sviluppo informativo di modelli, elaborati e oggetti

UNI 11337-5:2017 Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 5: Flussi informativi nei processi digitalizzati

UNI/TR 11337-6:2017 Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 6: Linea guida per la redazione del capitolato informativo

UNI 11337-7:2018 Edilizia e opere di ingegneria civile - Gestione digitale dei processi informativi delle costruzioni - Parte 7: Requisiti di conoscenza, abilità e competenza delle figure coinvolte nella gestione e nella modellazione informativa

GA N. 820660 24/06/2022