	CATEGORY	DESCRIPTION		CAPABILITY SET	DESCRIPTION
1	PROCESS	Encompasses aspects related to the permitting process itself, including the steps, procedures, methods, and overall understanding of how the process flows.	1.1	Process and Methods	This covers the overall workflow, steps, and methodology of the permitting process. It looks at how well the process is defined, mapped, understood and followed by all stakeholders.
			1.2	Regulatory	This focuses on how standardized the process is to regulations and codes. It involves having benchmarks, indicators, quality controls, and standardized procedures to ensure regulatory compliance.
			1.3	Procedure	This looks at the accessibility, transparency, timelines and overall ease of use of the permitting process for stakeholders. It involves clear communication, tracking, and efficient flows of information.
2	ORGANISATION	Covers aspects related to the organisational structure, capabilities, readiness for change, and the people involved.	2.4	Readiness for changes	This focuses on the organizational and human readiness to adopt new digital technologies and processes. It looks at openness to change, infrastructure, and strategic planning for digital transformation.
			2.5	Organisational structure of units	This covers how the organization structures its departments, teams, training, and personnel dedicated to implementing digital technologies like BIM. It involves strategic planning, expertise, and knowledge management.
			2.6	Social aspect	This looks at the overall knowledge and level of expertise of the staff and stakeholders involved in the permitting process. It involves assessing skills, sharing knowledge, and building competencies.
3	TECHNOLOGY	Deals with the various technologies utilised throughout the permitting process for data management, verification, visualisation, analysis, and exchange.	3.7	Technology for data management	This focuses on the systems used to store, submit, communicate, and manage data throughout the permitting process. It ranges from fully paper-based to integrated digital platforms.
			3.8	Technology for data analysis	This covers the technologies available for validating, visualizing, analysing and checking project data for regulatory compliance and quality control.
			3.9	Interoperability and open format	This looks at how capable the technologies are at integrating and exchanging data across different formats, platforms, and systems involved in the process.
4	INFORMATION	Focuses on the data standards, formats, regulations, and overall information used within the process.	4.10	Data standardisation and quality	This focuses on having guidelines, protocols, and standards in place to ensure high quality, standardized data. It involves monitoring quality control and refinement of standards.
			4.11	Data and information	This focuses on the types of data utilized throughout the permitting process, including both the building/intervention design data and the city context data.
			4.12	Codes and regulation	This looks at how digitized, accessible, and machine-readable the codes and regulations are. It ranges from paper to fully parameterized and integrated rule databases.

CAPABILITY SET	#	KMA	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	CURRENT LEVEL OF MATURITY	DESIRED LEVEL OF MATURITY
Process and Methods	1.1.1	Understanding of the process and mapping of steps	There is no clear understanding and the process is not formally mapped.	The process is mapped at a general level and publicly available.	The process steps are identified and documented, providing a clear understanding of the process. The digitalized process is defined and it is on initial steps.	The process is mapped in detail and is integrated into a digital environment for the management of all technical-administrative processes. However, not all steps are fully implemented.	The whole process is mapped and coordinated in central digital environment. All steps are implemented and technical-administrative process can be monitored with the aim of constantly simplifying it.	The whole process is mapped and coordinated in a central digital environment. There is automation throughout the steps in order to increase efficiency, constant monitoring for feedback and lessons learned.	0	0
Process and Methods	1.1.2	Stakeholders are aware of process steps and required information they must provide	There is no clear understanding and the process is not formally mapped.	Stakeholders have limited understanding of the process steps. Lack of awareness regarding the required information and documentation needed to complete the process. Minimal guidance provided about their roles and responsibilities in the process.	Stakeholders have clear understanding of the process steps. There are guidelines and standards to assist about their roles and responsibilities in the process.	Comprehensive process documentation and checklists enable stakeholders to self-serve. Online resources help stakeholders prepare required information. The digital solution reduces ambiguity.	Stakeholders are fully aware of the steps, the required information and documentation needed to complete the process. Data can be visualised and shared digitally; however, they work in their own digital environment.	Stakeholders are fully aware of their roles the process. There is simultaneous communication and support allowing all different stakeholders to follow the process progression and access the same source of data.	0	0
Regulatory	1.2.3	Benchmarks and key performance indicators	There is informal or no quality control plans; neither for process, data, or documentation. There are no performance benchmarks for processes or services.	Process, data, and documentation standards are initially defined. Quality targets and performance benchmarks are set; however, there is no official measuring.	Process, data, and documentation standards are defined and established for quality plans. KPIs and benchmarks are clear defined, but not officially measured.	Proactive quality monitoring is conducted through spot checks and structured reviews. Some KPIs are measure, but not all implemented. Metrics provide visibility into performance vs targets.	Performance against benchmarks and KPIs are measured and monitored. KPIs and performance benchmarks are incorporated into quality management and performance improvement systems.	Quality improvement and adherence to regulations and codes are continuously aligned and refined. Benchmarks and KPIs are repetitively revisited to insure highest possible quality in processes and services.	0	0
Regulatory	1.2.4	Standardised process	There are no guidelines or standards for the processes.	The process is mapped primarily from an administrative perspective. The technical checks within the process are performed by individual knowledge of technicians based on the normative documents. There are informal internal guidelines to help technicians on the steps of process to follow.	In addition to the process map and the normative documents, technicians receive support from a detailed guideline that outlines the specific checks to be performed for each step of the process, with comprehensive instructions and specifying the aspects that need to be examined during each stage.	The supporting guideline for technicians provides a comprehensive list of urban planning and construction aspects that need to be checked for each phase of the building permit process. The guideline serves as a reference tool, ensuring that technicians have clear instructions on the specific aspects they need to assess.	The guideline is continuously refined to reflect lessons learned. Quality improvement and adherence to regulations and codes are continuously aligned and refined. The guideline to support the technicians is updated and monitored based on the KPIs and benchmark measures to simplify the process.	There is a detailed standardised procedure, defined at municipality level for all stakeholders involved in the process whose use is constantly monitored and content updated.	0	0
Regulatory	1.2.5	Data templates, use of common data formats, and documentation requirements	There are no data templates, use of common data formats, or documentation requirements.	Limited standardisation of data formats, templates, or documentation requirements. Inconsistency in data formats and documentation across different permit processes or projects.	Some steps of the process have standardised data formats, templates and documentation. However, the effort to create single standardised data is ongoing.	There are standardised data formats and templates internally. They are not followed by external stakeholders and there is only an informal quality control verification.	There are standardised data formats and templates. They are easily accessible by all stakeholders and there is a control to maintain the standardisation across the process. Best practices are identified and shared across all the stakeholders.	There are standardised data formats and templates following open data standards. Continuous improvement are implemented to enhance the use of the open formats. Automatised control is done during the process.	0	0
Procedure	1.3.6	Timelines and response time	There is no clear knowledge of timelines and response time is not pre-defined.	There is an informal understanding of the timelines, but they are not clearly communicated and mostly not followed.	There are defined timelines for each step of the process, they are internally shared, but not clear communicated to all stakeholders.	The timelines are clear defined and communicated. They are followed in more than 80% of the processes; however, there are no official measurement or no efforts to optimise the timelines.	Timelines and response time are clear defined and communicated. They can be monitored by all stakeholders. Measurements are done to allow optimisation of timelines.	Timelines are monitored and measured in all steps of the process. They are continuously open by all stakeholders, they are constantly reviewed and improved based on performance metrics and feedback.	0	0
Procedure	1.3.7	Accessibility of stakeholders	The information may be accessible through physical documents.	Limited accessibility to the stakeholders involved in the process. The information has a different source and changes workflow for each stakeholder.	Stakeholders can have access to the same source of information and the defined workflows are standardised. However, changes made in the data have to be reloaded by other participants in the process.	Automated workflows push permit status alerts and relevant information to some stakeholders (e.g. applicants).	There is a unique source of data where all stakeholders can retrieve their data. All exchanges happens inside the same digital ecosystem, the data is shared and updated to all stakeholders.	A digital ecosystem enables access to information, include real-time data updates, interactive interfaces, personalised notifications, and collaborative features, allowing stakeholders to actively engage and retrieve the necessary information efficiently from the same source of data.	0	0
Procedure	1.3.8	Transparency	There is no transparency on the information workflow. Different stakeholders are not able to access or visualise any information not owned by them, other than the final outcome.	There is limited access to information, and stakeholders have difficulty tracking and understanding the flow of information. The documentation and communication processes may be fragmented and limited accessible to stakeholders.	Stakeholders have access to the information that influences their workflow. Information on the process are not clearly communicated or documented. Applicants can check status online throughout process. Basic process metrics reported occasionally.	Real-time permit tracking with notifications to stakeholders(e.g. applicants) and internal staff. Performance trends regularly monitored. Improved transparency.	The information is visible to all stakeholders, with the defined permissions. There is a clear workflow for documentation and communication that can be followed by all stakeholders. External transparency might be through APIs.	Automated workflow tracking and advanced data analytics provide visibility. The information workflow is transparent and collaborative. Reporting tools are utilised to gather insights and monitor the performances while continuous improvement initiatives are implemented to enhance the transparency of the process.	0	0

CAPABILITY SET	#	KMA	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	CURRENT LEVEL OF MATURITY	DESIRED LEVEL OF MATURITY
Readiness for changes	2.4.9	Internal staff	Staff does not express openness to change or digitalisation.	Less than 25% of staff acknowledge the need for digital transformation. There is ad-hoc cooperation between limited individuals on digitalisation.	25-50% of staff participate in cross-functional team to identify digitalisation needs and benefits. Regular meetings are held to discuss digital technology opportunities.	50-75% of staff exhibit proactive mindset about adopting digital innovations. Training incorporates adaptability and readiness for new technologies.	Over 75% of staff are open to digitalisation, some participate in networks to promote digital innovation. Defined processes in place for cooperation on digital best practices.	Staff members are constantly seeking new digital innovations to improve operations. There are knowledge sharing programs across stakeholders to spread digital best practices.	0	0
Readiness for changes	2.4.10	Higher management	Management does not express openness to organisational changes or digital transformation.	The management supports the vision; however, a strategy is needed to direct the utilisation of digital process including technologies such as BIM and GIS.	There is a movement to kickstart the implementation of digital processes, including BIM, GIS, or other technology. However, the initiative starts from the bottom-up. Management does not have clear plans supporting the implementation.	The management recognises digital innovation and processes advancements including BIM, GIS, or other technology as important strategic plan for the organisation. The efforts for implementation start from a top-down approach.	Digital innovations such as BIM, GIS, and/or other technologies are a part of the IT strategy. An implementation plan of the strategic goals has been promoted at all levels in the organisation.	Digital innovation planning is fully integrated into organisational strategic planning decisions. Visionary awareness of the possibilities of the utilisation of digital technology supports the development of services provided.	0	0
Readiness for changes	2.4.11	Infrastructure	Hardware/software infrastructure is not capable of supporting required tools for the digital permitting process.	Less than 20% of infrastructure can support required software. There are limited pilot permitting software and test servers, used by less than 20% members of the staff.	20-50% of infrastructure capable of supporting required software. 20-50% of staff have access to software licenses or have it installed. There is an internal network available for file sharing.	Up to 80% of infrastructure is capable of supporting required software. All core permitting software purchased or installed. Redundant permitting servers, cloud backup, common data environment for management of data and files.	100% of hardware can run required software and platforms. All hardware/software for digital permit system fully implemented. Permits database cluster, software integration, online network enables sharing within and outside organisation.	Continuous lifecycle upgrades of hardware/software. Established program for continuous infrastructure upgrades. Regular server refreshes, software updates, new feature additions.	0	0
Readiness for changes	2.4.12	Legislative system	Not open for changes.	There is no flexibility for creating clear and easy to interpreted rules from the existing regulation. However, there might be current ongoing efforts to simplify the process.	There are a few technical requirements within rule texts that are clearly formulated. However, more than 50% of requirements are subject to human interpretation.	There is an effort at municipal level to ensure that the technical requirements in the normative texts are formulated in a clear and direct way, reducing subjective interpretation.	More than 50% of the regulation under the scope of the municipality have clear and easily interpretable normative text. Facilitating rule interpretation and simplifying the compliance checks.	There is an effort at regional or national level to minimise the subjective interpretability of the texts, facilitating the rule interpretation and simplifying the compliance checks.	0	0
Organisational structure of units	2.5.13	Strategic objectives for data ecosystem implementation	There is no implementation strategy.	Implementation is conducted without a guiding strategy. There is a lack of awareness and understanding and limited use of tools. Processes are limited integrated into the workflow, and there is a lack of standardised practices.	The implementation strategy has some specific actionable details. There is a general plan of implementation, but processes are not fully integrated and there are no formal standardised guidelines for the implementation.	The implementation strategy is accompanied by comprehensive action plans and a monitoring regime. The organisation recognises that data ecosystem encompasses technological advancements, process improvements, and policy changes.	The vision is shared by staff across the organisation and external stakeholders. The organisations seeks maximum efficiency and effectiveness in data ecosystem implementation. There is integration on process using multiple technologies, e.g. BIM-GIS.	There is a culture of innovation and continuous improvement in data ecosystem practices. The organization seeks for integrating recent innovative tools in their processes (e.g. AI, AR, data spaces).	0	0
Organisational structure of units	2.5.14	Dedicated personnel	There is no staff fully dedicated to work on BIM, GIS, or other technologies.	Up to 20% staff work part-time on BIM, GIS, or other technologies.	Small team of 3-5 staff dedicated to implementing BIM, GIS, or other technologies within the organisation and internal processes.	Multiple teams working full-time with BIM, GIS, or other technologies. Each team is dedicated to a specific part of the process or data technology. There are high individual and collective knowledge on digital processes and tools.	There is a department dedicated to digital data, such as BIM, GIS or others. With internal teams dedicated to distinct parts of the processes or technologies. There is high individual and collective knowledge, and sharing is stimulated.	There is a team inside the department working with digital process dedicated to maintaining the quality of process, data, standards, and guidelines.	0	0
Organisational structure of units	2.5.15	Training, preparation and support	There is no type of training or support.	There is a lack of dedicated training or support for technicians to resolve BIM, GIS, or other technologies related issues. There is ad hoc external training as needed. However, less than 8 hours of training per employee per year is stipulated.	There are documented training requirements for digital and data technologies related roles. Annual training is provided to staff members that work directly with BIM, GIS, or other technologies, when needed. 8-16 hours of training per employee per year is stipulated.	Training requirements are managed to meet competency and performance objectives. Regular training is provided to staff members that work directly with BIM, GIS, or other technologies. 16-24 hours of training per employee per year is stipulated.	Training plans based on roles and competencies; training program uses real work examples and lessons learned. There is support inside the organization and fostering collaboration with internal and external partners. 24-40 hours of training per employee per year.	Training is integrated into organizational strategies. On-demand training program are established to cater to the organization's needs and requirements, allowing personnel to access training resources when necessary. More than 40 hours average training per employee per year.	0	0
Social aspect	2.6.16	Overall knowledge of technicians	No technicians have knowledge or practical experience in data technology (BIM, GIS, or other).	Less than 25% have basic conceptual knowledge, minimal skills. They may have a basic understanding of concepts but lack practical skills and experience in using it.	25-50% have basic knowledge, while less than 20% have practical skills on the tools.	50-75% of staff members regularly use data tools and spatial analysis to enrich permit workflows. There is a tendence to pursue formal certifications to expand capabilities.	Over 75% have good working knowledge and skills on required data technologies with good practical skills. 20% of individuals are experts in BIM, GIS, or other technology.	50% of the technicians are experts in BIM, GIS, or other technology. They possess extensive knowledge and experience and serve as mentors or trainers for other technicians. They are constantly sharing their knowledge and expertise to build a strong digital ecosystem competency for the organisation.	0	0
Social aspect	2.6.17	Stakeholders' knowledge	None of the stakeholders work with data technologies (BIM, GIS, or other).	Up to 50% of key stakeholders use basic digital data. However, there is no data re-use throughout the process between stakeholders.	50-80% of key stakeholders use digital data such as BIM or GIS. Primarily isolated use, minimal interoperability, collaboration, and little communication or data re-use.	More than 80% of key stakeholders use shared data in a digital ecosystem. Model data is accessible to multiple stakeholders.	100% of key stakeholders use integrated digital ecosystem. All involved parties have access to the same source of information through digital data (e.g. BIM-GIS) in their specific domain.	Data fully integrated across all stakeholders and steps in process with real-time data sharing and collaboration. Data is consistent throughout the multiple stakeholders' digital ecosystem. There are metrics on data re-use and value creation.	0	0

CAPABILITY SET	#	KMA	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	CURRENT LEVEL OF MATURITY	DESIRED LEVEL OF MATURITY
Technology for data management	3.7.18	Data management environment and network platform	No platform support.	Digital platform only for submission, communications and data exchanges between applicant and building authority. There is no digital process for data management.	Closed or proprietary tools supporting the different steps. There is a digital tool for managing data; however, not 100% of the information is digitally accessible through it. There are different sources of data depending on the step of the process.	Modular platform. The digital tool stores and manages the data through the whole process. Staff members of the organisation have access to the same data, but external stakeholders' data is not integrated.	Open API-based microservices ecosystem. The tool for data management, works for sharing, storing and managing the data. All internal staff of the organisation can collaborate, while external stakeholders can interact with the data according to defined permissions.	Distributed data space based ecosystem. There is simultaneous working collaboration within all stakeholders of the process and automated workflows.	0	0
Technology for data management	3.7.19	Data storage/ repository	The process is analogue. Information is stored in paper files and documents.	There is a repository for files of archived processes. There are digital document storage but no centralised repository. Multiple disparate drives and shares.	There is a centralised repository for files that stores ongoing and archived processes that serves as a database and can be accessible by internal staff.	Formal data governance for repository. Lifecycle management with archiving and retention policies.	Centralised digital repository integrates all data throughout the process with backups, archiving, and governance. Integrated with data ecosystems and accessible by all stakeholders according to assigned permissions. Automated backups, archiving and governance.	There is possibility of automatising tasks and workflows in the platform within the data ecosystem increasing the effectiveness of the process. Harmonised access and structures within data space between various data hubs.	0	0
Technology for data management	3.7.20	Submission system and identification (e.g. electronic signature)	There is not a submission platform. Signature is done manually.	Documents are submitted digitally using non machine-readable formats. The signature is not machine recognisable.	Required information is submitted in a digital ecosystem, using machine-readable data. Models are electronic signed; however, other required information is not automatically verified.	Signature application is available combining all the required information but no automatic validation is performed. Internal systems are integrated with the applicant's portal, directly or via API.	Integrated validation of submission packages (required files and data). There is an application integrated in the process ecosystem that allows digitally sign correspondent submitted content.	Documents and models are digitally signed, integrated within submission process and with the ID authorities. There is automated checking of the identification validation embedded in the process.	0	0
Technology for data management	3.7.21	Communication system	The communication is done in an analogue way.	The communication is done digitally. However, there is a lack of clear channels and procedures for timely and effective communication between stakeholders.	There is a tool that allows communication internally on the organisation. However, external communication is done in a separate digital environment.	An online portal is introduced for external stakeholders to track permit status, submit documents, communicate with staff. Internal systems are integrated with the applicant's portal, directly or via API.	There is an official tool that allows communication between different stakeholders, both internally and externally to the organisation. Standard API enables communication with other external databases.	There is an official integrated tool that allows live communication between different stakeholders, both internally and externally to the organisation. Automation and digital tools are utilised to streamline communication and enhance responsiveness.	0	0
Technology for data analysis	3.8.22	Verification of procedural data	Manual inspection of physical formats and documents. Analog process.	Data can be obtained in a digital format to be verified. Electronic infrastructure available but usage of software is unmonitored and irregulated.	Digitisation of data with semi-digital verification process. Software usage is unified within organisation.	Procedural data is provided in machine readable formats. Basic analytical functionalities for data verification.	Advanced analytical functionalities for data verification. Possibility of operational and decision-making actions. Standard API enables automatic connection with databases representing different systems' information (e.g. IDs, professionals registrations and certifications, etc.).	Fully digitalised and automated verification process. Information submitted can be automatically verified against the connected databases. Procedural data is integrated in the cloud and supported by high-performance computing for decision making.	0	0
Technology for data analysis	3.8.23	Data inspection and visualisation	Manual inspection of physical models or drawings of planned objects. No use of software applications.	2D map data can be obtained to produce 2D deliverables. Proprietary Software is used to produce 2D renderings of planned objects. Usage of software is unmonitored and irregulated.	3D city models can be obtained to produce 3D deliverables. Proprietary Software is used to produce and visualize 3D models of planned objects in specified proprietary formats. Software usage is unified within an organisation or team.	Deliverables are provided in open file formats. Web-based viewers enable dynamic and seamless visualisation in 2D and 3D space by all stakeholders as well as basic analysis functionalities.	Advanced analysis functionalities for operational decision-making are introduced. Open interfaces allow for exchange of data between specialised software applications and multidisciplinary applications in a system-of-systems infrastructure.	Powerful numerical simulation through cloud and high-performance computing model the expected impacts of potential change to make evidence-based strategical decisions. Integration with immersive visualisation technologies, such as AR/VR, to support decision making for non-quantifiable phenomena (e.g. perception of safety due to urban density/lighting)	0	0

CAPABILITY SET	#	KMA	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	CURRENT LEVEL OF MATURITY	DESIRED LEVEL OF MATURITY
Technology for data analysis	3.8.24	Data validation for building data	There is only manual validation of the data, based on human input.	Manual validation, based on official data requirements, supported by tools that allow visualisation and manual inspection of the data.	(Semi)automatic validation, based on standard-based formal data requirements	Advanced validation rules implemented with complex logic and integration. Automated notifications of issues needing manual review.	Automatic validation against machine-readable standardised data requirements.	Automatic validation against comprehensive machine-readable standardised data requirements. Support for automatic fixing the data.	0	0
Technology for data analysis	3.8.25	Data validation for spatial data	There is only manual validation of the data, based on human input.	Manual validation, based on official data requirements, supported by tools that allow visualisation and manual inspection of the data (including consistency and clash-detection).	(Semi)automatic validation, based on standard-based formal data requirements	Advanced validation rules implemented with complex logic and integration. Automated notifications of issues needing manual review.	Automatic validation against machine-readable standardised data requirements.	Automatic validation against comprehensive machine-readable standardised data requirements. Support for automatic fixing the data.	0	0
Technology for data analysis	3.8.26	Content analyser and Regulations' Checking tool	Manual inspection of rules and regulations.	Manual checking, the content analysis and checking of rules is done in a digital environment; supported by data viewers or inspectors.	Semi-automatic checking of rules and regulations, based on digital building data.	Automatic checking based on digital data. Automated rule-checking is done based on project for a limited number or rules.	Automatic checking based on multiple digital data, e.g. BIM-GIS, depending on the rule. Including mostly simple analysis.	Automatic checking based on multiple digital data, e.g. BIM-GIS, depending on the rule. Including all possible regulations and complex analysis.	0	0
Interoperability and open format	3.9.27	Data format interoperability	No use of digital formats	Use of mainly proprietary formats, reduced capacity to manage and create open format files. Limited support for exchanging data with external systems using standard formats.	Possible use of open formats; however, proprietary formats are still the main practice.	Use of open formats in internal processes is mandatory; however, there are still interoperability related issues when exchanging with external stakeholders.	Support of only open format files, following the standards and best practices for data exchange. Full capability of data exchange within the process and among the different stakeholders.	There are APIs to facilitate interoperability by establishing a common language and protocol for different systems to communicate and exchange data internally and externally.	0	0
Interoperability and open format	3.9.28	Building data to geospatial data (e.g. BIM to GIS)	No use of building or geospatial data.	Joint visualisation in a geospatial environment, with manual location of building data into geospatial data.	Joint visualisation in a geospatial environment, with correct building data georeferencing.	Conversion of building to geospatial data through semantic mapping and building data georeferencing.	Thorough automatic mapping, generalisation and conversion of building to geospatial data (georeferencing, geometry, semantics, structure).	Automatic communication and real time / on-the-flight thorough mapping, generalisation and conversion of the two models in the respective environments.	0	0
Interoperability and open format	3.9.29	Geospatial data to building data (e.g. GIS to BIM)	No use of building or geospatial data.	Joint visualisation in a building data environment, with manual location of geospatial data respect building data.	Joint visualisation of geospatial data in a building data environment, with automatic reciprocal registration.	Conversion of geospatial to building data through semantic mapping and automatic reciprocal registration.	Thorough conversion of geospatial to building data (georeferencing, geometry, semantics, structure) via manual enrichment, possibly supported by partially automated routines.	Automatic thorough mapping, enrichment and conversion using Artificial intelligence and Machine Learning methods, implying possible connection to further data sources to achieve reliable resulting building data.	0	0

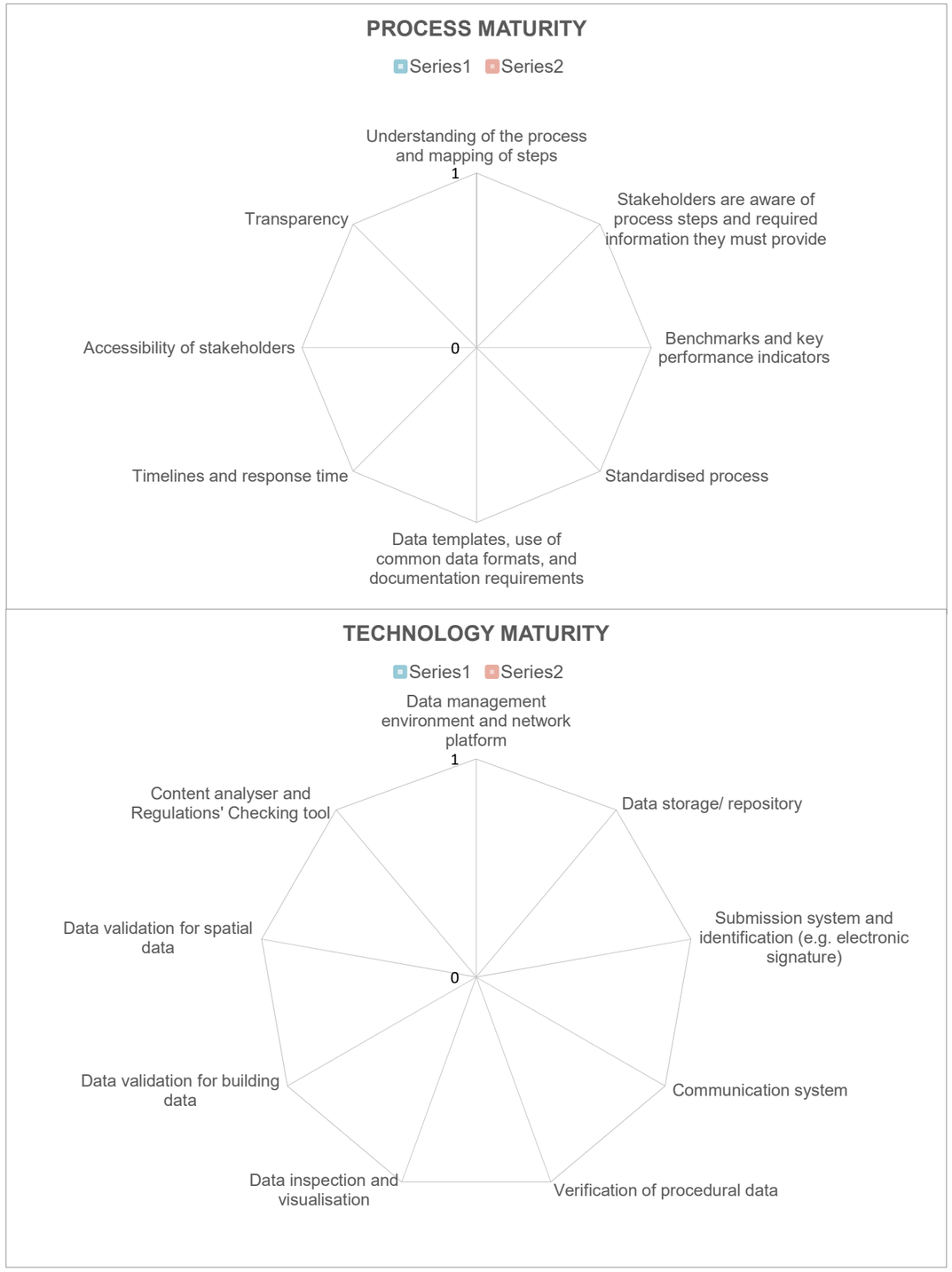
CAPABILITY SET	#	KMA	LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	CURRENT LEVEL OF MATURITY	DESIRED LEVEL OF MATURITY
Data standardisation and quality	4.10.30	Data standards and guidelines	There are no guidelines or data requirements specification.	Human readable data requirements specification as basic guidelines, documentation protocols or data standards.	Standard-based data requirements. There are basic guidelines for data standardisation, such as training manual and delivery standards.	Standard-based and Machine-readable data requirements. The organisational standards are aligned with industry standards.	Detailed and comprehensive standard-based and formal data requirements covering geometrical, semantical, structural, syntactical, organisational, and legal aspects enabling easy interoperability and usability.	Organisational modification to Model View Definitions and Information Delivery Manuals are balloted for inclusion in industry standards. Data standards and guidelines are fully integrated into the organisation's policies.	0	0
Data standardisation and quality	4.10.31	Data quality control	There are no quality control of data.	There are informal quality control plans.	Quality targets and performance benchmarks have been set to maintain high standards.	Proactive processes for monitoring guidelines through audits and spot checks. Metrics track quality trends.	There are comprehensive quality plans to ensure accuracy and consistency. Guidelines are tightly integrated with data validation workflows. Automated reporting on adherence and anomalies.	Quality improvement and adherence to data standards are consistently prioritised and refined. Automated feedback loop from lessons learned.	0	0
Data and information	4.11.32	Building/intervention design data	The data is analogue. Use only of 2D drawings.	2D drawings, with basic semantic data information.	Building model with geometric data and semantic data. (e.g. BIM)	Building model with standardised data.	Building data is compliant to open standard formats (e.g. IFC) and to specific standard-based data requirements (e.g. MVD, IDS etc.) including metadata.	Integrated dynamic building model. Virtually all authoritative information loaded with metadata and linked to fully integration of data ecosystems.	0	0
Data and information	4.11.33	City context data	The data are analogue. Use of only 2D maps	There is a city model; however not all model is populated with the correspondent semantic data. Use of geospatial data, e.g. GIS.	3D city model is more than 80% loaded with semantic data; however the data is not standardised.	3D semantic city model with standardised data.	Open-standard based 3D city model. Specific data requirement compliant. City model with relevant information loaded with metadata however, not linked to other data systems (e.g. BIM).	Integrated dynamic 3D city model, digital twin. Virtually all authoritative information loaded with metadata and linked to fully integration of data ecosystems.	0	0
Codes and regulation	4.12.34	Regulations formats	Natural language, needing interpretation and referring to several external laws and definitions.	Unambiguous natural language, containing the needed definitions and related rules, including exceptions. No reference to customs, priorities of different governance levels (municipal, regional, national) are clear.	Regulations are also defined as (semi)formalised language or pseudocode	Regulations are machine-readable	Regulations are machine-readable and refer to standardised information. Fully parameterised rules integrated across platforms.	There is a database used as repository of rules, allowing the creation of new rules according to the updates in the regulation.	0	0
Codes and regulation	4.12.35	Regulations accessibility	Normative texts can be consulted only in paper and/or pdf format, in the same way by both internal and external stakeholders.	The normative texts can be consulted online according to queries and through a webGIS system associating the regulations to zoning areas	The normative texts can be consulted online according to specific queries in a geographic system. Limited integration and dependencies are managed manually.	Validation rule sets formalised with version control. Central repository established with some real-time updating. Web-based portals for external access, data can be imported into checking software, directly or via APIs.	There is a tool allowing the automatised analysis of data contents and check compliances according to the defined rules. Automated synchronisation and versioning from centralised repository.	The codes are available in a machine-readable format and there are available tools to support the translation of non-translated rules, or to modify parameters in the existing available rules.	0	0

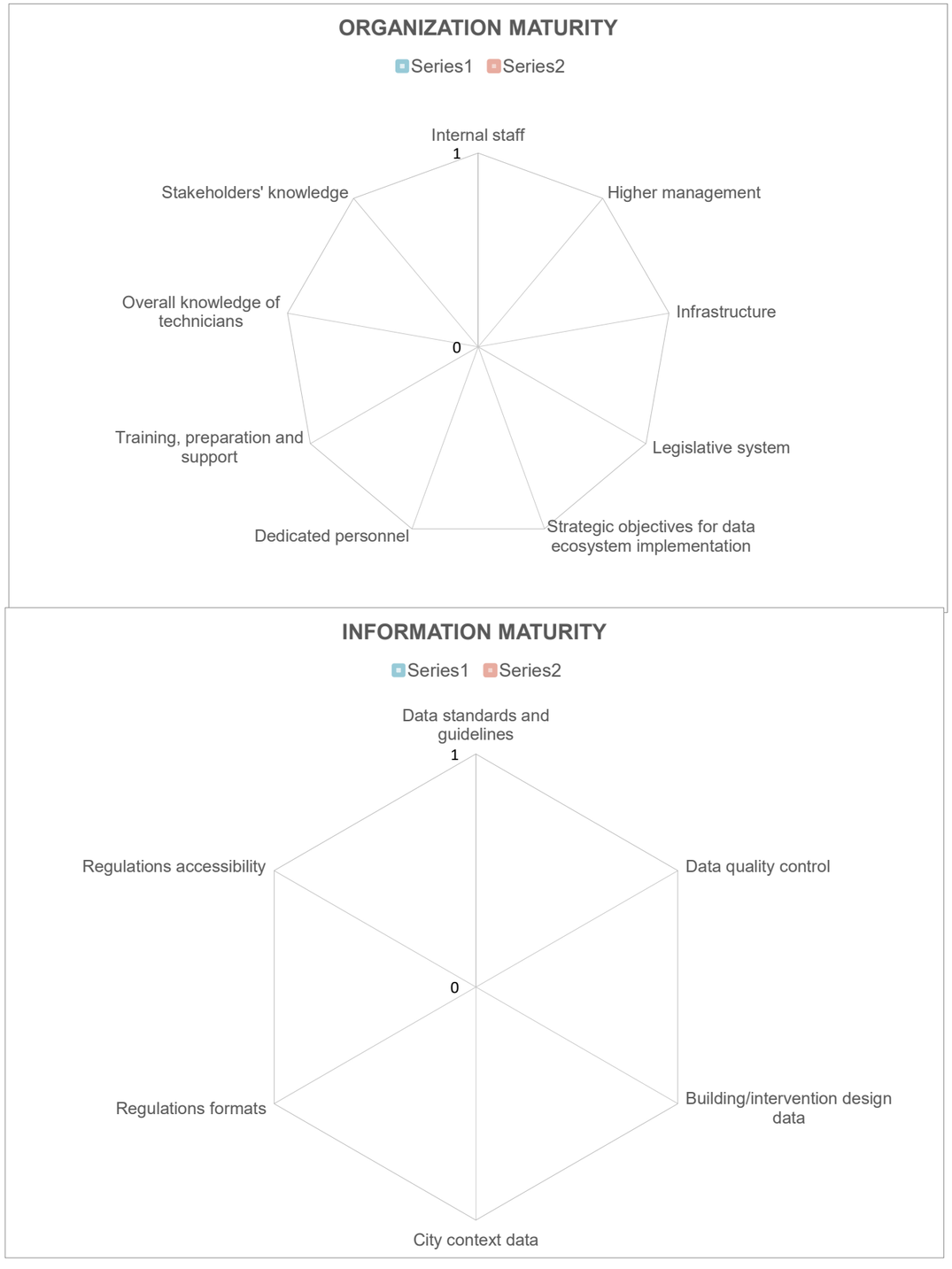
		Current		Desired		Maximum
	PROCESS	0		0		**400**
1.1	Process and Methods	0	0%	0	0%	100
1.2	Regulatory	0	0%	0	0%	150
1.3	Procedure	0	0%	0	0%	150

	ORGANIZATION	0		0		**450**
2.4	Readiness for changes	0	0%	0	0%	200
2.5	Organisational structure of units	0	0%	0	0%	150
2.6	Social aspect	0	0%	0	0%	100

	TECHNOLOGY	0		0		**450**
3.7	Technology for data management	0	0%	0	0%	200
3.8	Technology for data analysis	0	0%	0	0%	250
3.9	Interoperability and open format	0	0%	0	0%	150

	INFORMATION	0		0		**300**
4.10	Data standardisation and quality	0	0%	0	0%	100
4.11	Data and information	0	0%	0	0%	100
4.12	Codes and regulation	0	0%	0	0%	100


PROCESS MATURITY
Series1
Series2
Understanding of the process and mapping of steps
1
Stakeholders are aware of process steps and required information they must provide
Benchmarks and key performance indicators
Standardised process
Data templates, use of common data formats, and documentation requirements
Timelines and response time
Accessibility of stakeholders
Transparency
0


ORGANIZATION MATURITY
Series1
Series2
Internal staff
1
Higher management
Infrastructure
Legislative system
Strategic objectives for data ecosystem implementation
Dedicated personnel
Training, preparation and support
Overall knowledge of technicians
Stakeholders' knowledge
0

TECHNOLOGY MATURITY
Series1
Series2
Data management environment and network platform
1
Data storage/ repository
Submission system and identification (e.g. electronic signature)
Communication system
Verification of procedural data
Data inspection and visualisation
Data validation for building data
Data validation for spatial data
Content analyser and Regulations' Checking tool
0

INFORMATION MATURITY
Series1
Series2
Data standards and guidelines
1
Data quality control
Building/intervention design data
City context data
Regulations formats
Regulations accessibility
0