

Green Mark 2021

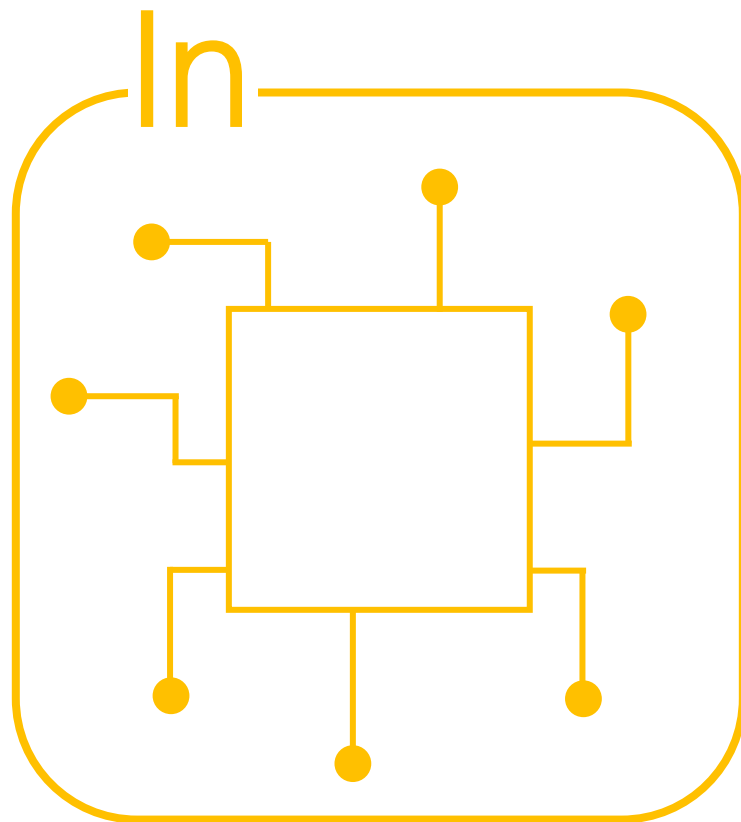
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Intelligence

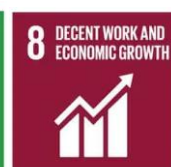
The Intelligence section looks at the adoption of relevant smart technologies and systems within the building design, construction, retrofit and operation that enable a fully integrated, automated, intelligent, responsive and aware building to delight its users.

The GM 2021 Intelligence section (In) has been created looking at the core principles of a smart building, looking at integration of systems, processes and technology, the collection of relevant data and the analytics of this with a view to direct response to improve aspects of the building performance from energy optimisation, health and wellbeing to spatial optimisation and user experience.

We are exploring recognition of robust smart building certification systems, and similar to the Resilience and Health and Wellbeing Section allowing them to be used in lieu of the criteria listed below.



Helps projects meet targets under the following SDGs



INTELLIGENCE

INTELLIGENCE		
IN1 Integrated	Green Mark Points	
IN1.1 Digital Life Cycle	New	Existing
<p>Use integrated delivery platforms to develop <u>Project Information Model (PIM)</u> with adequate levels of definition of geometry (levels of detail) and facility information (levels of information) to facilitate integrated and digitalized design, construction, operational and retrofit process.</p> <p>PIM shall be sufficiently developed and detailed for purposes of co-ordination, environmental simulations, statutory submissions, tender and construction documentation as well as forming the basis for conversion into Asset Information Models (AIM).</p> <p>(i) PIM developed in accordance with Singapore CDE Data Standard that align with the Principles of ISO 19650-2018</p> <p>(ii) Use of spatial model co-ordination platform basing on PIM for spatial analysis including identifying:</p> <p style="margin-left: 20px;">a. System clashes through an automatic model checking tool</p> <p style="margin-left: 20px;">b. Spatial analysis for effective construction, maintenance and future alteration or replacement.</p> <p>(iii) Digital building commissioning, performance and defect co-ordination platform basing on PIM to track, co-ordinate and manage the commissioning of systems and the tracking of defects and their rectification</p> <p>References:</p> <p>ISO 19650-1 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</p> <p>ISO 19650-2 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling - Part 2: Delivery phase of the assets</p> <p>CDE Data Standard defines what information is required for a building project and how it can be structured to facilitate sharing and collaboration among project team members using a Common Data Environment</p>	<p>(i) 2 Points</p> <p>(ii) 2 Points (1 point each for a and b)</p> <p>(iii) 1 Point</p>	<p>(i) 2 Points</p> <p>(iii) 1 Point (for re-commissioning or retro-commissioning)</p>

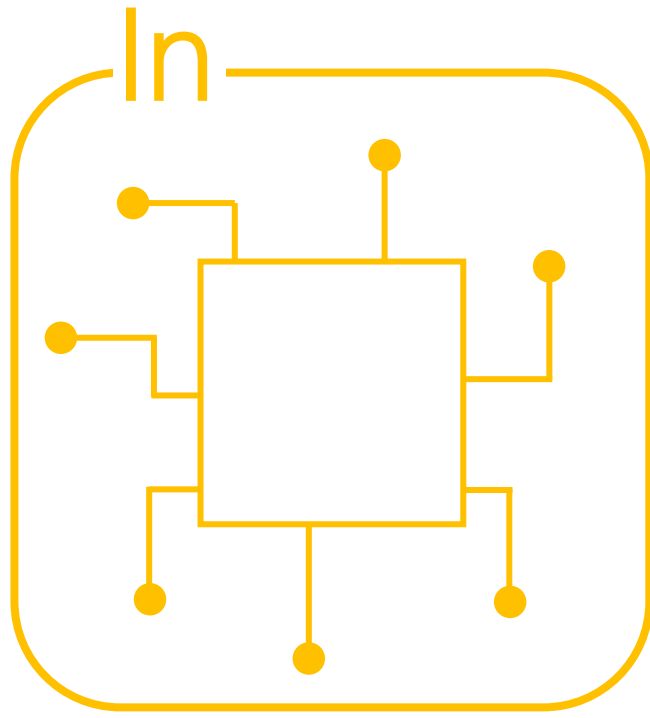
IN1.2 Common Data Environment		
<p>Use of a common data environment (CDE), which is a single source of information used to collect, manage, and disseminate information facilitating collaboration between project team members and helps avoid duplication and mistakes.</p> <p>(i) <u>Performance Dashboard</u> to monitor the different aspect of building assets' performance and operations from a single dashboard built on top of the CDE.</p> <p>(ii) Data Management and Integration with a platform that connects and manages asset and facility data, operational data, and real-time equipment data extracted from different sub-systems based on an <u>open protocol</u> (e.g. OPC, BACNET, MODBUS, DLMS, published REST/SOAP APIs and etc.)</p> <p>(iii) <u>Data Accessibility and Security</u> - information stored in the CDE platform can be accessed by facilities teams in a secured manner to facilitate operation and maintenance activities from anywhere and anytime.</p> <p><i>Note: The Common Energy Dashboard (CED) data requirements mentioned in section IN 1.3 set the requirements for building energy efficiency aspect under CDE. The copy of CED data requirements can be downloaded at this link.</i></p>	<p>(i) 1 Point</p> <p>(ii) 1 Point</p> <p>(iii) 0.5 Point</p>	<p>(i) 2 Point</p> <p>(ii) 2 Point</p> <p>(iii) 1 Point</p>
IN1.3 Voluntary Disclosure of Building Energy Performance Data		
<p>Sharing of non-sensitive information and data related to building energy performance to the Super Low Energy Building (SLEB) Smart Hub¹ on a voluntary basis, to enable dynamic energy performance benchmarking and Green Mark energy data reporting in a smart and automatic way.</p> <p>(i) Share basic information – follow Common Energy Dashboard data requirements to share basic information and data.</p> <p>(ii) Share additional information – follow Common Energy Dashboard data requirements to share additional information and data.</p> <p><i>Note: The copy of Common Energy Dashboard data requirements could be downloaded at this link.</i></p>	<p><u>Non-Residential</u></p> <p>(i) 0.5 Points</p> <p>(ii) 1 Point</p>	<p><u>Non-Residential</u></p> <p>(i) 0.5 Points</p> <p>(ii) 1 Point</p>
IN1 Integrated	Cap at 5 Points	

¹ Super Low Energy Building Smart Hub (www.sleb.sg) is Singapore's first digital knowledge centre for green buildings in the region, feature-filled with smart analytic tools, datasets, a directory and also the largest green building database in Singapore.

IN2.2 Digital Twins		
<p>Development of a digital twin of the project that represents the full asset virtually and includes geometric data, asset attributes, management data, asset performance and utilisation data.</p> <p>(i) Asset Digital Twin – the digital twin of the building assets to assist the facility management team to deliver efficient daily operation and maintenance, and to better plan and organize alteration of internal spaces and functions.</p> <p>(ii) System Digital Twin – detailed model based on operational data of individual systems to deep dive into its <u>performance</u>, conduct virtual stress tests and detailed analytics.</p> <p>(iii) Process Digital Twin – To model processes and scenarios to find the optimum solution based on actual and simulated data.</p> <p>For example: modelling users’ movements and journey in a building, looking at production processes in factories and labs.</p> <p>References: Smart Cities Council – Data Leadership Guidance Note – Digital Twin</p>	<p>(i) up to 2 Points</p> <p>(ii) up to 3 Points</p> <p>(iii) up to 1 Point</p>	<p>(i) up to 2 Points</p> <p>(ii) up to 3 Points</p> <p>(iii) up to 1 Point</p>
IN2 Data Driven	Cap at 5 Points	

IN3.3 Data Ethics		
<p>The set of key principles and processes that guide the ethical collection, processing, analysis, and application of data. The project team shall consider the risks such technologies present to the environment, society, and governance. Understanding data bias, privacy protection and the right to be forgotten.</p> <p>A data ethics plan shall be detailed for the building that identifies the various opportunities for the collection, analysis and use of data as well as a risk register that looks at the following risks and how they will be managed and mitigated.</p> <ul style="list-style-type: none"> a) <u>Personal Privacy</u> b) <u>Risks including data governance, monetarisation of data and data permissions</u> c) Workforce transitioning d) Transparency e) Data bias and data quality <p>References:</p> <p>Crossing the Threshold. A primer for sustainable digitalisation in real estate and cities.</p> <p>Global trends in Data Capture and Management in Real Estate and Construction (RICS)</p> <p>The use and value of commercial property data.</p> <p>Artificial Intelligence: What it means for the built environment</p>	<p>Up to 2 points (1 point for addressing item a and b, and 1 point for item c, d and e)</p>	<p>Up to 2 points (1 point for addressing item a and b, and 1 point for item c, d and e)</p>
IN3 Responsive	Cap at 5 Points	

IN - INNOVATION		
	Green Mark Points	
	New	Existing
<p>Where projects can demonstrate substantial performance to a specific Intelligence indicator or outcome innovation points can be awarded on a case by case basis. Points shall be awarded based on the strength of evidence of benefits and potential impact.</p> <p><u>Process:</u></p> <p>At Design / Pre-retrofit stage The project team is to submit a concise summary that articulates:</p> <ul style="list-style-type: none"> • The nature of the environmental benefit of their intervention • Justify the impact of the intervention through detailed calculations and comparisons with industry norms • Substantiate the calculations and comparisons with evidence and data. <p>At Verification (As Built/ In Operation): Details of the implemented intervention including measurements and monitoring of the environmental performance including lessons learnt if the intervention does not perform as expected</p> <p><i>Example:</i></p> <ul style="list-style-type: none"> • <i>Encourage the Use of Singapore Green Building Council certified smart building products or product with equivalent certification that allows integration with the Common Data Environment (CDE).</i> 	Up to 2 Points	Up to 2 points
IN3 Innovation	2 Points total	



Developed by:



With inputs from IDD IFM Workgroup Members