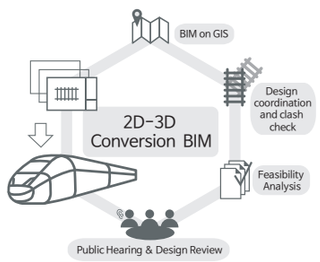
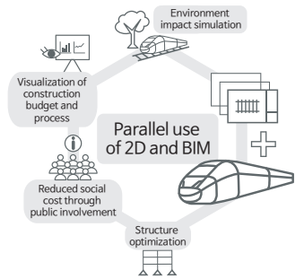
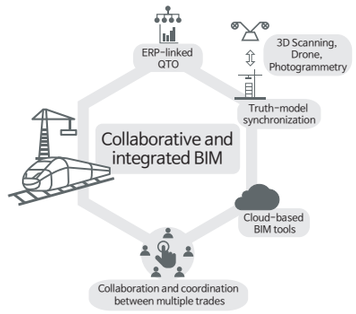
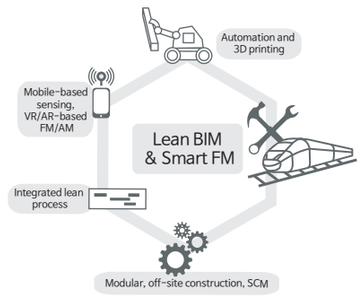
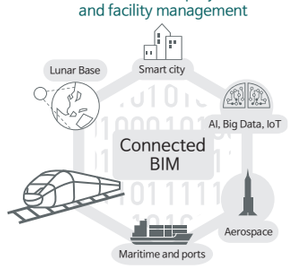
Rail BIM 2030 Roadmap

BIM Goals

		BIM 1.0 Conversion BIM (2018)	BIM 2.0 Two-Track BIM (2020)	BIM 3.0 Integrated BIM (2022)	BIM 4.0 Lean BIM (2024)	BIM 5.0 AI BIM (2030+)
		Introduction Stage	Growth Stage	Maturity Stage	Advancement Stage	Intelligence Stage
		Public hearing and design review	BIM-based design, engineering, error detection	BIM-based integrated project and facility management	Smart factory and off-site construction	Smart construction 4.0 and AI-based project and facility management
						
	Procurement & Planning	• Communication between managers and project participants using BIM visualization tools • Application of AR/VR for design reviews or public hearings				
	Design **Expansion of BIM application**		• Application for environmental assessment • Design review and coordination, budget review • Elimination of unnecessary social cost using visual information • Visualization/digitalization of construction plans and budgets			
	Construction **Expansion of BIM application**			• Coordination between multiple trades • Quantity takeoff data linked with an ERP system • A BIM based total project management system for managing cost, progress, and field data		
	Maintenance **Expansion of BIM application**				• Application of mobile devices, sensors, and VR/AR technologies • Real-time update of project construction and maintenance information • Lean-based off-site modular construction	
	Expansion of application on whole life cycle of construction industry					• Big data, IoT, AI-technology-based decision-making • Continuous collection and analysis of projects, maintenance data • Visual management of a rail network linked with other traffic information
PEOPLE Culture Organization Education	Company-wide level	Company-wide BIM team	Monitoring, support, and management of multiple BIM projects	Continuous management of success and failure factors	BIM-based real-time project management during design, construction, and maintenance Lean-construction-based project management	A data science team that can run and use a decision support system to collect, maintain, and analyze big data
	Individual project manager level	Ability to manage the 2D to 3D conversion process Ability to handle BIM models	Ability to lead two-track BIM Design review using BIM	Ability to coordinate the multiple trade areas Quantity takeoff and progress management using a BIM model	BIM-based real-time project management during design, construction, and maintenance Lean-construction-based project management	Big data collection and analysis Big-data-based decision-making
PROCESS Policy Infrastructure Service & Reward Work Process	Coordination process	Design coordination between a limited number of team members	Increased importance of coordination between drawings and BIM models Limited use of BIM for specific issues by specific teams	Increased importance of interoperability of BIM tools, version control, and model synchronization; collocated and collaborative work process	Lean based management process, final scheduling system, and other pull-planning/scheduling system, manufacture-to-order (MTO) or engineer-to-order (ETO)	Data-driven decision-making processes, Data-driven design, construction, and FM/AM, Automated data processing and exchange, Automated production for on-site and off-site construction
	Tendering and management process	Application of existing tendering and project management methods	Little use of the lowest bid or the like Recommended use of services and CM at risk	Technology assessment system Personnel evaluation system	Use of tendering methods in which the owner can participate during the design and construction phases (e.g., IPD or the like) Tendering and management methods that can support off-site and modular construction	Contractor selection based on reliable quality, cost, time, and safety information, Risk prediction and management based on informed decision
TECHNOLOGY Software Hardware Information	Fundamental technology	BIM authoring tools BIM model checkers BIM viewers	BIM analysis tools Detailing tools Interoperability	Cloud based tools BIM servers, Field BIM tools 3D Scanning and photogrammetry for model-site synchronization Actual-progress-based 4D schedule management	Integrated lean-based BIM management tools, Construction automation 3D printing Off-site construction, Modular construction, IDM/MVD for automated data exchange, VR/AR	Semantic and intelligent information interfacing technologies, BIM data science (big data,) IoT-based manufacturing, project, and facility management AI-based design, engineering, and model quality checking, Construction automation, Modular construction, IDM/MVD for automated information requirements checking, Integration of "Smart Cities" and BIM
	Management technology	A system that enables project participants to share BIM models and error reports acquired through design conversion (e.g., CDE, Big Room System) A system that tracks and manages design errors	Coordination technology between 2D and BIM processes (e.g., 3D scanning, model version management)	Interoperability between various BIM software A change management system An integrated BIM and ERP system that can manage quantity takeoffs and progress	A company-wide system for monitoring and managing the progress and quality of projects A company-wide platform for lean-based railway construction progress management	A system that can collect and manage project information as big data A real-time decision support system based on big data