

Asset life cycle management digitalization

From physical to digital – how tower companies are reaping significant benefits from digitalization



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How tower companies are reaping significant benefits from digitalization

Executive summary

Financial requirements of large service providers, technological advancements in networks, and consumer demand have all been driving forces in the emergence of a new trend in the telecommunications (telecoms) infrastructure market.

Tower companies are growing their market share through mergers and acquisitions of passive infrastructure, such as ground or rooftop-based towers, across several countries. It is believed that, globally, up to 50 percent of all towers are now owned or operated by tower companies.

To establish a long-term relationship with their customers – or tenants – and to attract new ones, tower companies

will need to achieve higher efficiency through complete digitalization of the operational flow of their assets. This digitalization will allow better quality, first-time-right (FTR) service, a faster time-to-market (TTM) and lower operational costs, resulting in better pricing and attractiveness for their customers.

A key aspect for tower companies to be able to sell cost-effective location rentals, and also offer added value services, will be full ownership of the site data and the possibility to fully exploit the data potential by digitalizing the life cycle management of the assets.

Another important aspect for tower companies that have a strategy to expand into active network services,

will be understanding 5G technology and the implied technological challenges their customers face when expanding and densifying 5G networks.

To help tower companies address the full digitalization of their asset life cycle management, Ericsson has developed Intelligent Deployment – a suite of capabilities built around open and standard data models, native cloud technology and leading artificial intelligence (AI) and machine learning (ML)-driven automation capabilities. This will assist in optimizing costs, while improving quality and service TTM, enabling tower companies to capture the growing market potential of 5G expansions.

An emerging market

Increasing numbers of service providers are creating spin-offs or new companies to own and manage their mobile tower infrastructure. Known as “tower companies”, they can be either fully or partially owned by the service provider’s mother company, or sold and acquired by independent tower companies looking to grow their footprint in the market.

The technological evolution of 4G and 5G ecosystems, and changing consumer demands and traffic consumption, means service providers require large capex investments to expand their networks to 5G and capture data growth opportunities. For this reason, the externalization of passive infrastructure is becoming an attractive choice to ease the

financial pressure on balance sheets and prioritize investment, focusing on “core activities” like building and expanding networks.

The market relationship between service provider and tower company can vary from being a purely passive provider of hosting to a value-added service provider who, beside selling traditional passive hosting services, also offers other assets and communication services to their customers. This change, in turn, impacts the relationship between network equipment providers (NEPs), service providers and tower companies, stretching the value chain and creating new opportunities in the market.

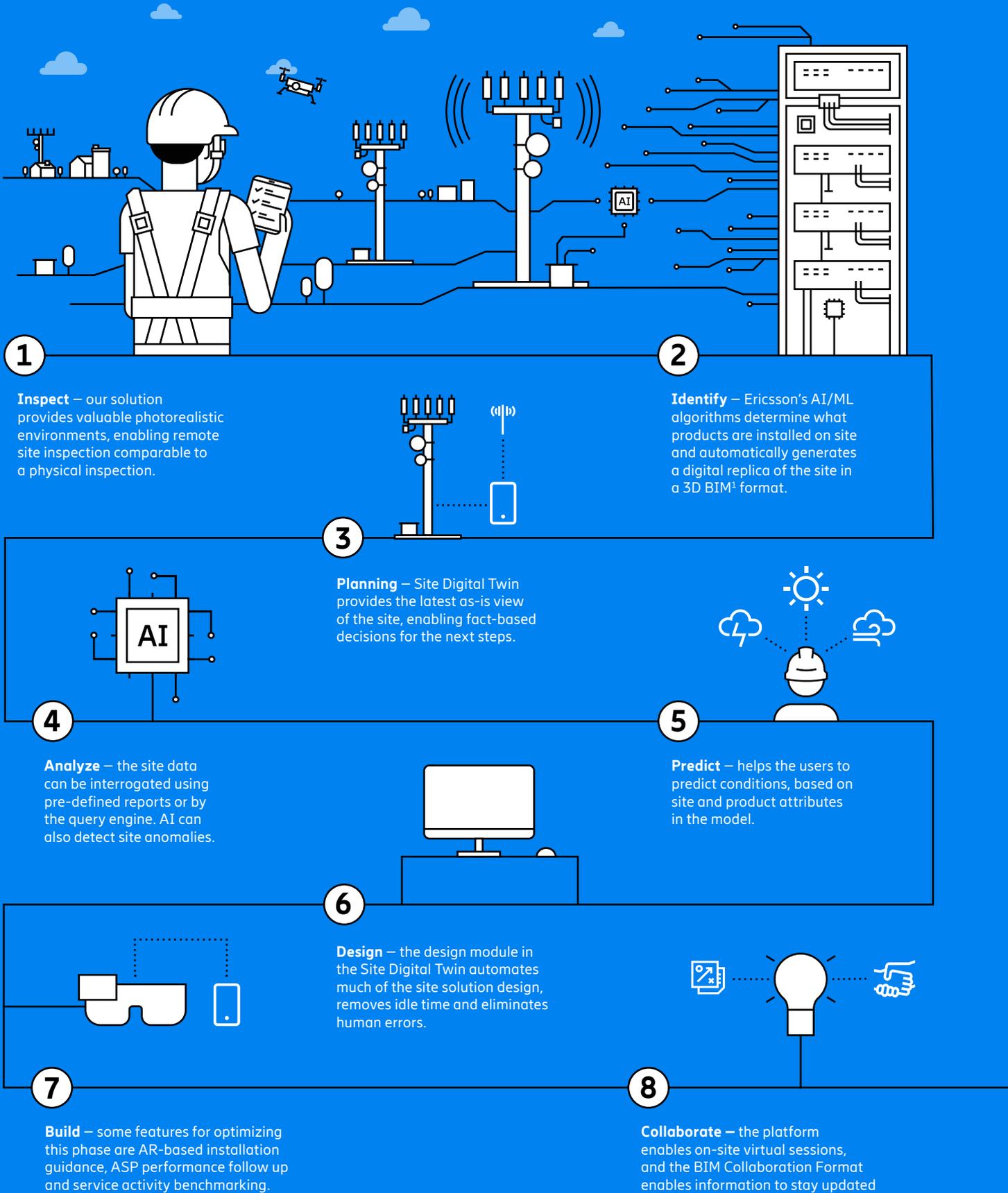
Tower companies have strategic plans to attract new customers on their infrastructure, increasing the tenancy ratio with more efficiency

and better services, including asset diversification and value-added communications services.

As the vast majority of tower companies’ revenue originates from hosting and managing hosted sites, it is critical for them to efficiently manage the full life cycle of their assets and to fully understand their customers’ challenges for expanding and upgrading networks.

Beside the traditional Radio Access Network (RAN) and transport equipment offering for tower companies that are aiming to enter the active equipment segment, Ericsson have reshaped the way networks are deployed from the ground up with a digital, agile and modular suite of tools and services that enable service providers and tower companies to capture the full benefits of their valuable assets in a way that fits them best.

Exploring Site Digital Twin use cases



¹Building Information Modeling is the process of creating and managing digital information about a physical space.

Tower company opportunities and challenges

There are plenty of opportunities for tower companies in the telco ecosystem, yet they also need to be aware of the complexities and risks of this value creation transformation.

Tower companies' core business model mainly focuses on maximizing infrastructure sharing, exploiting synergies and economies of scale to reduce costs of rentals, and increasing the number of hosted service providers.

With the expected traffic growth driven by 5G penetration, new use cases, and the need for service providers to expand and densify their mobile networks, there are plenty of forthcoming opportunities for tower companies to capture relevant portions of this business opportunity – if they can manage to fully control their assets and understand the technological challenges both they and their customers are facing with 5G expansions and densifications.

As service providers are challenged from a total cost of ownership (TCO) point of view, tower companies need

to become more efficient by reducing the cost of rentals while also expanding their offerings if they want to increase tenancy ratios, attract more customers and expand their revenue streams.

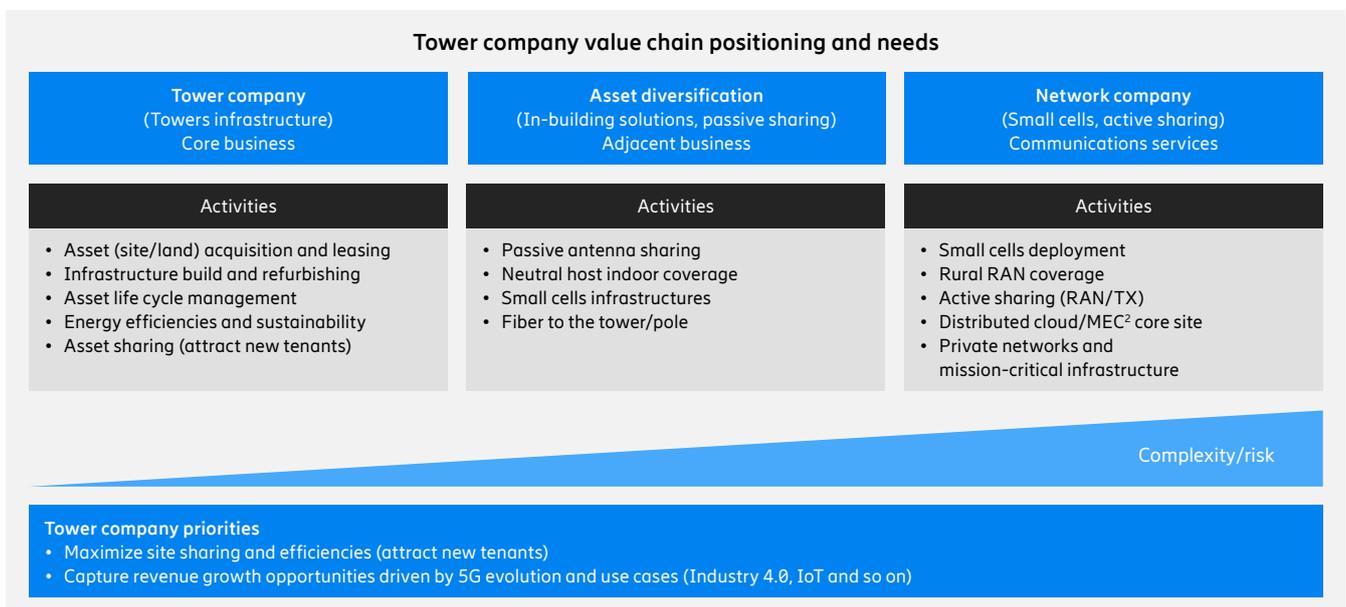
Tower companies have understood this well, as beside their traditional passive infrastructure business, they are committed to differentiating their offering through expansion into the value chain with strategic planning. This includes building and renting other infrastructure (like fiber to towers or passive antennas), and acquiring and managing active infrastructure (RAN and microwave) to provide communications services to their tenants like indoor coverage, urban small cells, specific venue coverage or rural area coverage, leveraging on government funding for closing the digital divide.

Figure 1 shows the complete tower company value chain positioning and implied complexities and risk of transformation.

The most critical aspects tower companies need to control in order to achieve this value creation transformation are:

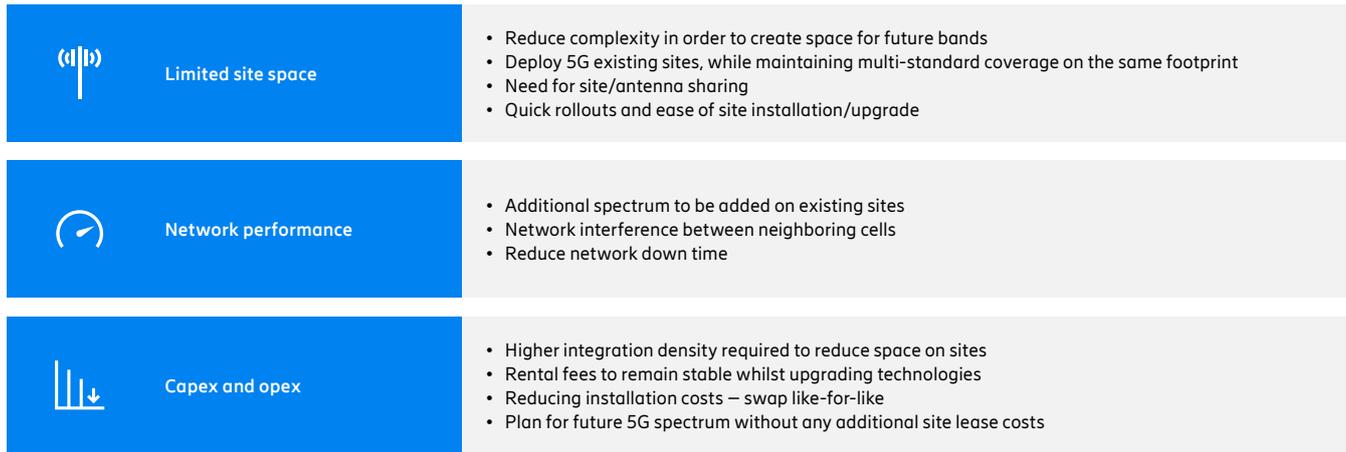
- the need to own site data and effectively leverage asset life cycle management to be able to provide superior performance at a reasonable cost for their customers
- the need to fully understand the technological implications and challenges their customers are facing with expansion and densification of 5G networks, to create value added offerings

Figure 1: Tower company's value chain positioning



²Multi-access edge computing enables cloud computing capabilities at the edge of any network.

Figure 2: Summary of major challenges facing tower companies



Service providers are facing numerous challenges when planning for 5G expansions and densification (see Figure 2). The challenges include the higher number of antennas to be installed, along with increased weight of new multiple-input, multiple-output (MIMO) intelligent antenna systems, as well as higher power consumption, electromagnetic impact and so on, will require tower companies to develop a full understanding of 5G technology and related operational aspects, from deployment to operation.

Site life cycle

The ownership of site data and a full understanding of life cycle impacts is paramount for tower companies, as this is the only way to allow fast and cost-effective verification of infrastructure capabilities to host more antennas, due to network expansion and/or addition of new tenants.

For this reason, it is required that the assets are not only digitalized, but also that the entire operational flow of the sites is digitalized – from design, build and operations to providing exposure and commercialization for customers or partners.

Each telecom site has its own life cycle, from initial site establishment to operations and maintenance. The site life cycle is visualized in Figure 3.

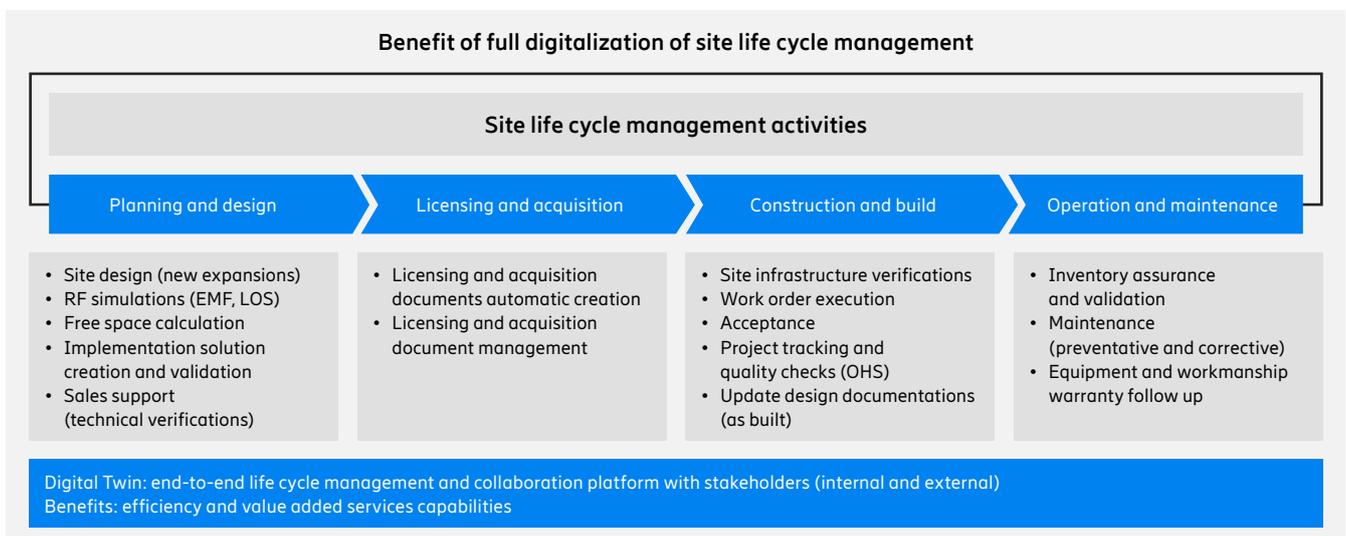
Telecom site life cycle

The management of the site life cycle can be summarized into the following specific phases and functions:

- planning and design
- licensing and acquisition
- site build and construction activities
- operations and maintenance

Ericsson’s value proposition is to help tower companies in the digitalization of all aspects, phases and functions of the site life cycle, which in turn will provide significant benefits.

Figure 3: Telecom site life cycle



Example of a digitalized site life cycle and benefits

Full digitalization of site data provides many benefits throughout the entire life cycle process – from planning and design, licensing and acquisition to construction and operations.

To visualize the benefits that derive from the digitalization of the site data, it is useful to examine the overall process including site implementation and operational activities.

Figure 4 illustrates the complete life cycle with details of the overall digitalization process.

In its fully digitalized form, the site life cycle process can provide several benefits including:

- accuracy of site infrastructure and establishment of site models
- efficient utilization of site space
- ability to simulate implementation and maintenance scenarios by adding or removing equipment, plus real-time analysis of impacts
- reduction of site visits for planning, acceptance, and maintenance
- ability to perform remote audits from anywhere
- automated defect detection
- improved operations
- streamlined maintenance campaigns by allocating specific status to each site, thus enabling prioritization based on actual site information
- create tickets and relevant reports with enriched information (geo reference) including history and inventory of each site
- spare part allocation and accuracy

Ericsson's experience from actual project deliveries and trials shows that it is possible to achieve efficiencies per network functions, utilizing Ericsson-developed use cases (see Figure 5).

Figure 4: Digitalized site life cycle

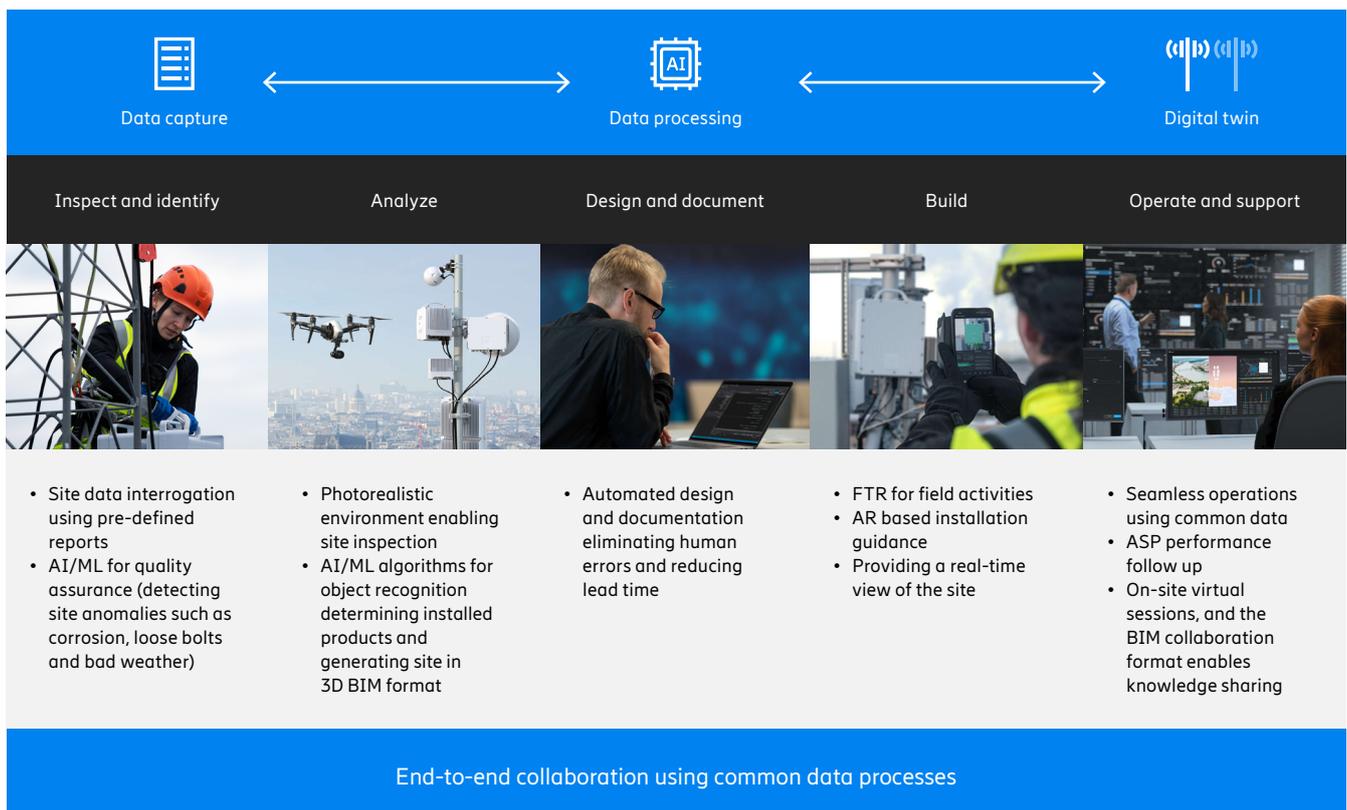




Figure 5: Use case examples

Functions	Use cases examples
Planning and design	Automatic design rules, automatic bill of quantities creation, automatic design document creation, automatic method of procedure in services
Licensing and acquisition (planning)	Measurements including space, area, distance, and EMF. Automatic licensing documents creation
Construction (build)	Virtual and remote acceptance, automatic installation document creation
Operations	Site inventory report, structural analysis

Higher quality (FTR), higher efficiency, fastest TTM – improve customer partnership and attract new tenants

Site Digital Twin

Through using data as the foundation of the platform, full digitalization of both passive and active site asset management can be achieved with the Site Digital Twin solution.

As part of Intelligent Deployment capabilities, Ericsson has developed a solution that will allow full digitalization of both passive and active site asset management.

Ericsson Site Digital Twin is taking network sites and digitalizing them in a 3D environment, where the data structure is a telecom application based on the BIM standard. It draws on off-the-shelf applications paired with Ericsson's intellectual property rights (IPRs) in AI/ML, radio products, and design and telecom experience.

The Site Digital Twin solution components are depicted in Figure 6.

Data is the foundation of the platform, allowing easy scalability, insights and automation through the use of:

- an open standard of data, which can be portable and integrated to other systems as required
- a flexible structure that is able to relate complex digital twin models, but is also easy to customize to a customer's specific needs
- building upon the scaling insights, and not forcing the user into a specific BIM design software

The platform logical architecture is represented in Figure 7.

Site data can be collected with different methodology – for example, drones and laser cameras, or more traditional site survey reports or existing CAD drawing and design documentation. This information is ingested into a platform that creates a photographic 3D site model and

a point cloud, which can be used for virtual site tours with the ability to zoom in for checks and measurements. Finally, the photogrammetry data is used to create the 3D site models using available library components for passive and active equipment and using AI and ML algorithms to bring powerful analytics, automation of design and other operational activities.

The Digital Twin user interface is shown in Figure 8. The platform will allow for easily manageable site design and upgrades through simple manual 'drag and drop' of available library components. Once built, the 3D model of sites can be used for a variety of use cases spanning through the whole life cycle of the site, enabling process efficiency, quality and data accuracy.

Figure 6: Site Digital Twin solution components

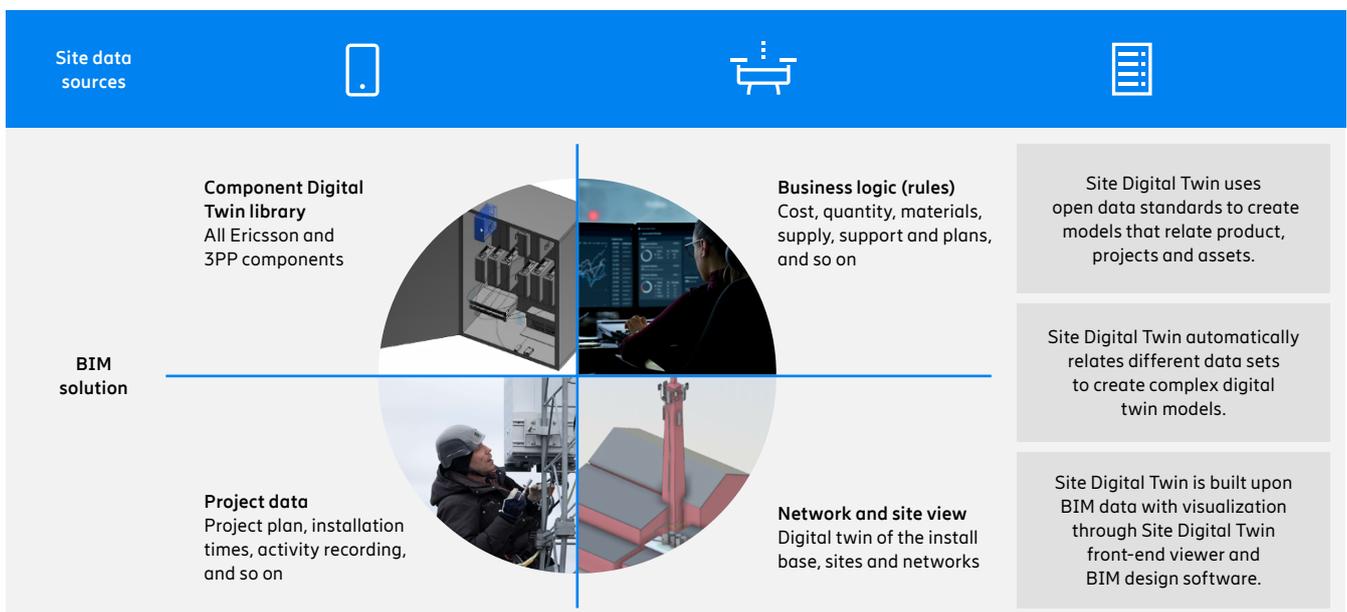


Figure 7: Site Digital Twin platform architecture

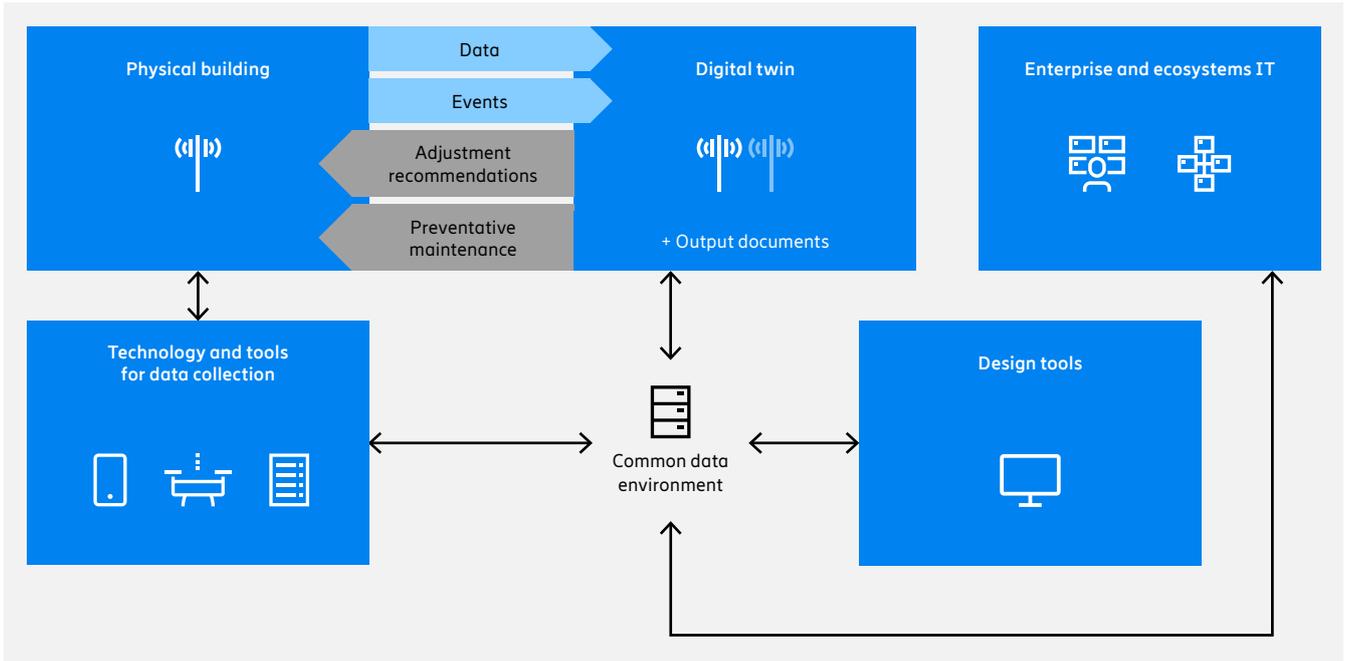
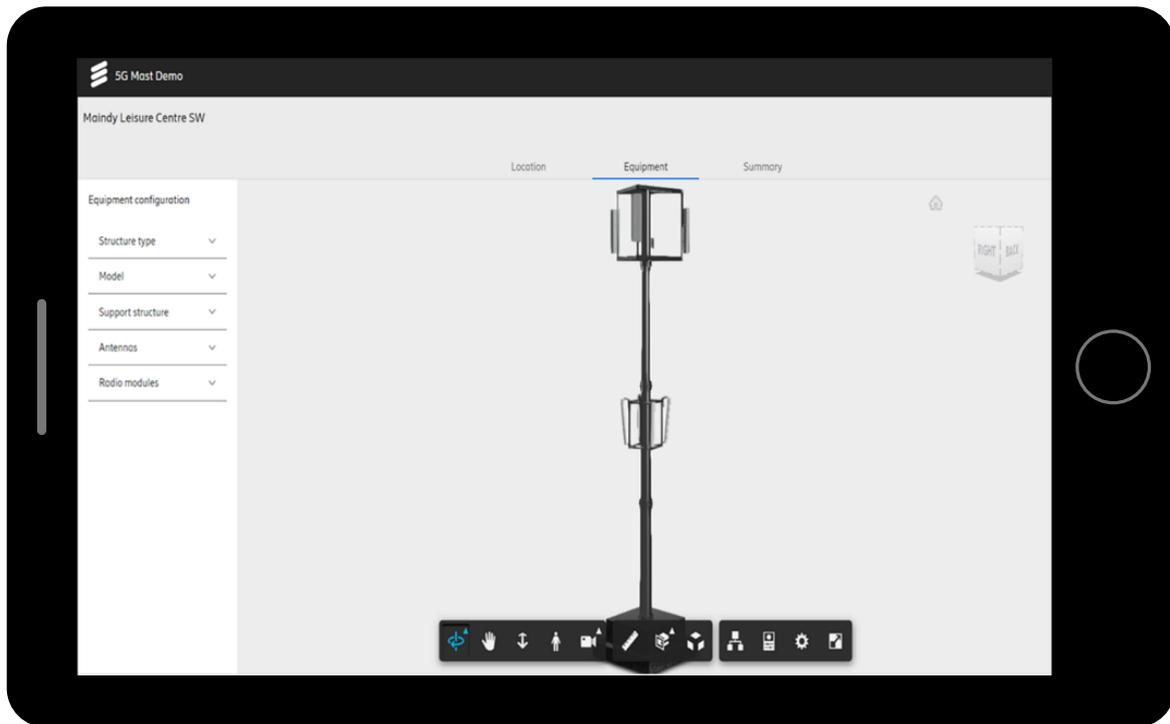


Figure 8: Digital Twin platform user interface



Intelligent Deployment for tower companies

Addressing the full digitalization of their asset life cycle management enables tower companies to capture the growing market potential of 5G expansions.

Beside the traditional RAN and transport equipment offering that is tailored for tower companies aiming to enter the active equipment segment, Ericsson has developed Intelligent Deployment solutions with leading AI and automation capabilities, which can help tower companies address the challenges implied by the required digitalization of their asset life cycle, optimizing costs and improving quality and service TTM.

This new offering is based on the following key pillars:

- a structured data model compliant to ISO standards (BIM)
- cloud-native platforms
- AI and ML-based applications to support automation use cases
- Ericsson's full understanding of telco technology, business logics, and methodology

Ericsson have combined tools that leverage international data standards with proprietary data and processes to provide tower companies with unified digitized experiences – from designing, building and maintaining to commercializing their infrastructural assets – assuring quick return on investments and higher efficiency and quality in day-to-day infrastructure operations. It delivers standardization and digitalization of the full network life cycle using a modular suite of capabilities that focuses specifically on network deployment.

Intelligent Deployment is a new data-centric framework, which consists of enablers such as image recognition, standard data and libraries, cloud-native technology and automation by AI/ML algorithms. When integrated together, these can allow – with a seamless and unified user experience – digital capabilities like digital twins, auto inspection and recognition of installed equipment, impact simulation, site-remote supervision and operation team collaboration.

This can be assessed by the customer directly from the cloud, with secured access and restricted visibility to their own assets, with the new cost-efficient business model of platform as service.

Benefits that tower companies can reap from Intelligent Deployment include:

- fast TTM by leveraging on standard data and application programming interfaces (APIs)
- lower opex through better control of the site inventory and status with reduced site visits
- transparency through access to relevant data from the end-to-end deployment process
- data integrity and higher quality for maximum monetization of assets
- cost efficiency through building of assets such as digital twins, and higher accuracy with reduced site visits
- reduced platform TCO, as the software with a service (SWaS) business model frees tower companies from capex and opex for building and management dedicated, on-premises IT infrastructures
- flexibility in planning opex and capex availability and change management

Why Ericsson?

Ericsson products and services are designed so that customers can secure the most optimal end-to-end total cost of deployment and ownership. The company is a leader in 5G technology, having consolidated experience acquired over the years through the successful delivery of many deployments and managed service contracts. With a highly capable portfolio of Intelligent Deployment, site solutions, transport, antennas and radio offerings, Ericsson is uniquely placed to support tower companies in their digital transformation journey.

Having managed hundreds of managed services contracts for operators worldwide, and with decades of experience, Ericsson have a clear understanding of how to operate mobile networks and have the credibility and experience to manage network equipment in multi-vendor technology scenarios.

Key benefits of Ericsson's

Intelligent Deployment offering:

- platform sits on the cloud, in line with latest technological trends in IT and business applications, allowing immediate deployment and no cost of hardware and software infrastructure building, integration and life cycle maintenance
- adoption of international and open data models (BIM) to allow easy production of digitalized site models with all relevant attributes and also production of design documents, leveraging on building construction practices
- ability to integrate Ericsson components and also other vendors' components (both passive and active), available as part of standard BIM data libraries
- to this standard platform and capabilities, Ericsson are adding AI to enable efficient automation of the above use cases. This will achieve significant reduction in the time needed for site design documentation production, site verification for maintenance and commercialization to tenants
- a tailored commercial model that can allow gradual investment

About Ericsson

Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.
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