GEOBIM MARKET IN AEC INDUSTRY

Technology Trends, Value Propositions,
Market Size, Readiness Index and Maturity Model

EXECUTIVE SUMMARY

The world infrastructure has undergone a significant transformation over the last decade. Countries who have often ignored the co-dependency of economic growth, resiliency and population growth on infrastructure development, are now realizing infrastructure to be a key engine of growth and the most tangible hallmark of economic development and progress. The existing physical infrastructure worldwide continues to be in undue stress as the global population is estimated to touch 8.5 billion in 2050 and 10.9 billion in 2100 – severely impacting economic progress and necessitating the governments to catalyze significant investments in infrastructure foreseeing its potential as an economic multiplier. To meet the rising infrastructure needs/demands, the traditional AEC industry is witnessing a radical technology disruption that is redefining it.

Digital construction is the new 'normal' for the AEC industry wherein new technology models and outlooks are created while the old isn't wholly shunned. The ever-increasing technology mainstreaming and convergence of digital technologies across the construction lifecycle, driven by 4IR technologies (Big Data, IoT, Cloud, AI) and immersive solutions (AR/VR), is creating a seamless synchronization between geospatial and BIM technologies for hassle-free decision making and higher productivity levels. The industry has begun to realize the importance of co-existing in a 3D spatial environment – with BIM, immersive solutions along with the traditional construction tools which lead to better coordination and collaboration. The use of geospatial and BIM technologies has made it possible for the delineation between plan, design, construction and operations, and maintenance phases lead to an emergence of a more holistic approach which is unprecedentedly detailed and accurate. Drones, IoT, AI, AR/VR, Ground-penetrating radar (GPR), Digital Twin technologies, construction robotics, are few of the innovative solutions that are transforming the AEC industry today to deliver more sustainable and resilient infrastructure. It is noteworthy, integrated geospatial and BIM technologies are at the forefront of this digital transformation.

The **'GEOBIM Market in AEC Industry'**, focuses on the AEC industry and the set of empowering digital technologies – primarily, geospatial and BIM – and in combination – GEOBIM solutions, Digital Twins, Artificial Intelligence, 4IR technologies, etc., that helps raise the productivity, efficiency, and brings full transformation of the AEC industry. The study brings forth:

→ Market assessment and estimation for the AEC industry, the geospatial industry, the geospatial technology segments (GIS and spatial analytics, GNSS and positioning, earth observation, scanning), BIM, Digital Twins, and 4IR technologies (AI/ML, IoT, cloud, and big data) along with GEOBIM technology trends and directions; emerging technology trends, and strategic policies and initiatives in the domain.

→ GEOBIM Maturity Model ranges from Level 0 to 3 cutting across three stages of technology use – conventional, collaborative, and connected. The GEOBIM Maturity Model aims to be an assessment tool to critically evaluate and assess the ability of an AEC firm to operate in a collaborative and connected environment.

→ GEOBIM Readiness Index-2020 sets out to quantitatively and qualitatively measure the preparedness alongside the existing adoption capabilities of geospatial and BIM technologies in the AEC industry for 25 countries across six regions. GBRI-2020 aims to understand the maturity of

the countries in utilizing GEOBIM solutions while establishing of the role of industry offerings in the technological segment, policy framework mandated by the respective governments, and user adoption capabilities for improving digitalization in the AEC industry.

The study does not provide a one-size fits all solution for solving complex issues in project delivery, but can be used by project owners, construction companies, policymakers, technology providers, and research experts alike. The study is a comprehensive document that complements the increasing awareness amongst all stakeholders to take note of the leading digital advancements and disruptions that should be leveraged at a larger scale by the AEC industry.

Key Findings:

→ **AEC Market:** The cumulative global AEC market in 2019 witnessed the slowest growth in 2019 and is estimated reach or touch at US$ 11.13 trillion, growing at a CAGR of 3.3% during the forecast period. Asia-Pacific and North America emerge as dominant markets with 66.97% and 11.9% of the global AEC market in 2019, respectively. The global construction sector is expected to grow, albeit at a slow pace despite economic uncertainties. Revenue growth will be highest in China, followed by India, the new engine of global growth or construction and other south-east Asian economies such as Indonesia, Vietnam and the Philippines.

→ **Geospatial Market:** The cumulative geospatial industry's value in AEC is valued at US$ 71.28 billion in 2019 and is estimated to reach US$ 117.59 billion by 2023. From a regional perspective, the market for geospatial technology in AEC industry is likely to accelerate in the buildings and transport sector in the Asia-Pacific; the geospatial technologies market for the industrial sector likely to be the highest in North America – primarily driven by the United States. In Europe, new housing construction/residential construction will be a critical driver for the growth of geospatial technologies.

→ **BIM and Digital Twins Market:** The cumulative BIM market size is estimated to be US$ 7.9 billion in 2019 and is projected to grow at a CAGR of 11.06% during the forecast period. The Digital Twin market size is estimated to be US$ 3.12 billion in 2019, projected to grow at a CAGR of 37.62%. North America dominates the BIM and Digital Twin market due to increased spending on IIOT infrastructure. The Asia-Pacific is the fastest-growing market for digital twins, due to a surge in government investments in large-scale digitalization projects like the smart city project.

→ **Return on Investment:** The use of GEOBIM solutions helps in saving an average design time by 22.2%, approximately about 45 days of construction work and an average of 5.9% of the overall project cost in small scale construction projects. For large-scale projects, GEOBIM solutions help in saving approximately 13.1% of the overall project cost. In terms of time, around 90 days of construction time and about 28.3% of design time can be saved.

→ **Mergers and Acquisitions and Partnership Trends:** 2019 saw the GEOBIM technology ecosystem enter into a phase of consolidation, wherein geospatial and engineering solutions tech giants forayed into the digital engineering domain via strategic partnerships instead of mergers and acquisitions. Many companies who invested heavily in 2018 in the construction technology segment to acquire added capabilities of engineering/geospatial and frontier tech capabilities; used 2019, to reap the short and the long-term benefits of their acquisitions.

→ **GEOBIM Readiness Index-2020:**

- United States leads the industry offering pillar as it is home to the software enterprises, consultancies and system integrators in the AEC industry, offering solutions on a par with Level-3 of the GEOBIM Maturity Model. The GEOBIM technology in the United States has integrated BIM solution with emerging technologies like AR/ VR, drones, automation, 3D printing and advanced ERPs to boost operational efficiency by minimizing wastages, accidents and errors.

- China is the undisputed leader in the adoption of GEOBIM solutions across the construction lifecycle and has long moved up from Level 2: collaborative model of the GEOBIM Maturity Model, to Level 3, i.e., the most sophisticated model of GEOBIM maturity, utilizing Digital Twin solutions, bidirectional mixed reality design, GPR solutions, immersive solutions (AR/VR), additive construction, among other technology advancements.

- United States is a leader in GEOBIM policy framework, being one of the first countries to implement guidelines – National 3D-4D BIM Program in 2003. The guidelines focus on providing support and resources for ongoing capital projects to incorporate 3D, 4D and BIM technologies, BIM data in asset and facility management, and the use of the spatial program and 3D laser scanning in construction projects.

COVID-19
IMPACT ON THE AEC INDUSTRY

The novel Coronavirus (abbreviated as CoVID-19), now characterized as a global pandemic, has sparked global anxiety and concern as the outbreak has increased 25-fold in the first quarter of 2020. The UN estimates the worldwide market to shrink up to 1 per cent, disrupting global supply chains and international trade as a result. The impact of COVID-19 on the construction and engineering sector is volatile and in need of flexible resilience plans. The construction sector will face subsequent difficulties owing to supply chain shortages, labour shortages, material shortages, site closures and liquidity issues.
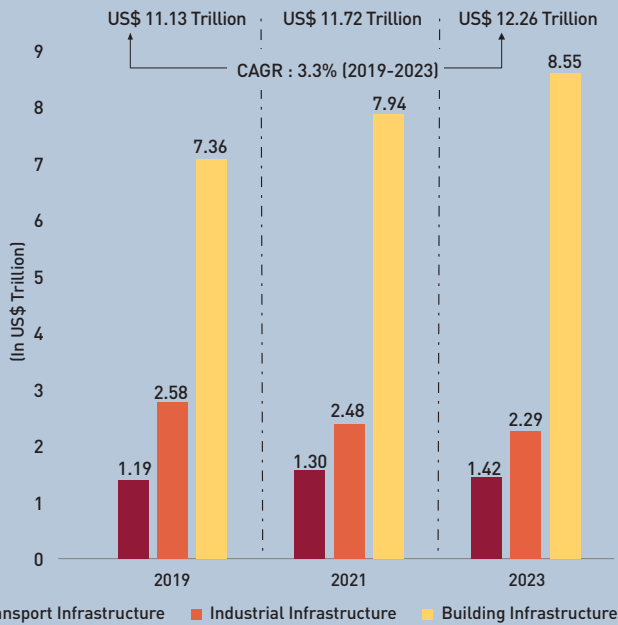
Taking the impact of CoVID-19 on the AEC market – we present the **first indicative figure**[*] of the revised global AEC market and the global geospatial market for 2020. Taking into account the estimations by the International Monetary Fund (IMF) on the year-on-year change in construction output due to COVID-19, we estimate the AEC market to be US$ 10.6 trillion if significant measures are not taken by the governments to revive this economic sector on time. Simultaneously, the downsizing of the AEC market is likely to also create tough times for the geospatial industry, wherein the revised market estimate for the geospatial industry is expected to US$ 71.58 trillion in 2020. The situation for the same depends on the extent of lockdown in major AEC markets, economic stimulus packages by the government for infrastructure development, labour movements, among other things.

Geospatial Media to release a detailed report on Impact of COVID-19 on GEOBIM Market for AEC Industry in August 2020.

GEOBIM MARKET IN AEC INDUSTRY

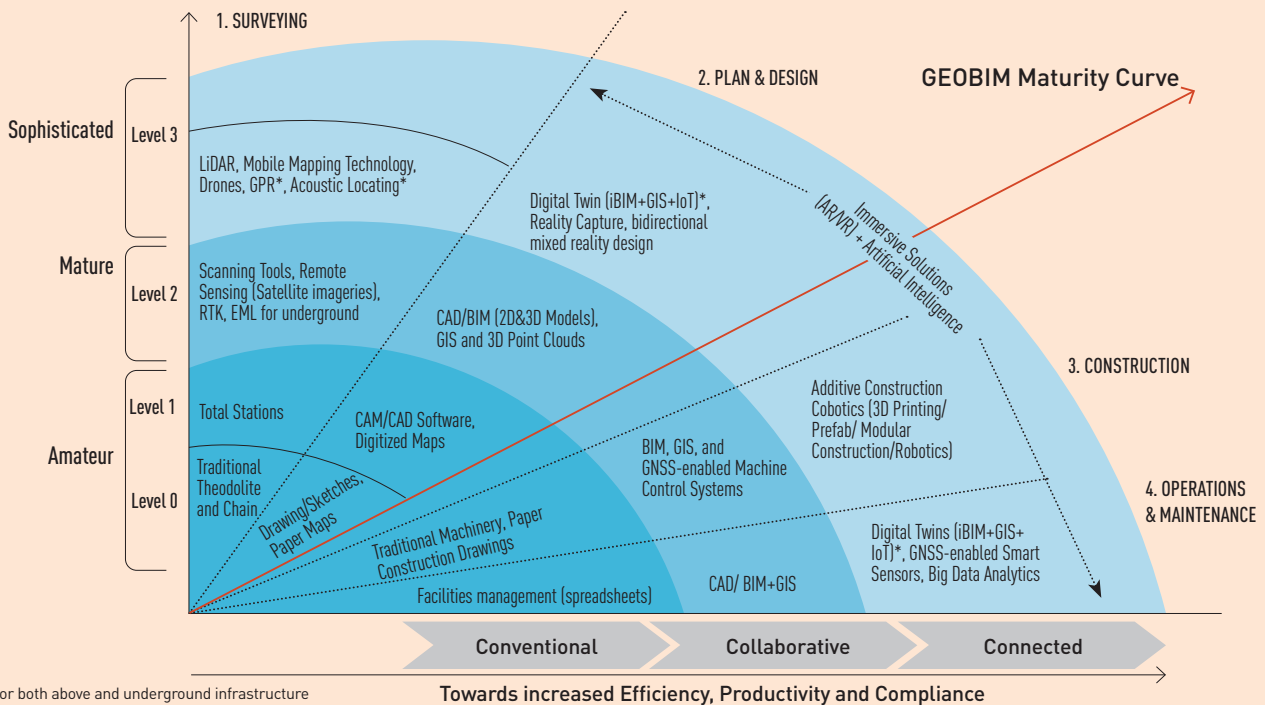## GLOBAL AEC MARKET, BY SUB-SEGMENT, 2019-2023 (IN US$ TRILLION)

US$ 11.13 Trillion   US$ 11.72 Trillion   US$ 12.26 Trillion

CAGR : 3.3% (2019-2023)

(In US$ Trillion)

2019: Transport Infrastructure 1.19, Industrial Infrastructure 2.58, Building Infrastructure 7.36
2021: Transport Infrastructure 1.30, Industrial Infrastructure 2.48, Building Infrastructure 7.94
2023: Transport Infrastructure 1.42, Industrial Infrastructure 2.29, Building Infrastructure 8.55

■ Transport Infrastructure   ■ Industrial Infrastructure   ■ Building Infrastructure

The cumulative global AEC market witnessed the slowest growth in 2019 and is estimated to be US$ 11.13 trillion, growing at a CAGR of 3.3% during the forecast period. Asia-Pacific and North America emerge as dominant markets with 66.97% and 11.9% of the global AEC market in 2019. The global construction sector is expected to grow, albeit at a slow pace despite economic uncertainties. Revenue growth will be highest in China, followed by India – the new engine of global growth or construction and other south-east Asian economies – Indonesia, Vietnam and the Philippines.

GLOBAL GEOSPATIAL MARKET IN AEC INDUSTRY, BY REGION, 2019-2023 (US$ BILLION)

CAGR - 13.3% (2019-2023)

2019: 71.28
2020: 78.67
2021: 89.68
2022: 102.53
2023: 117.59
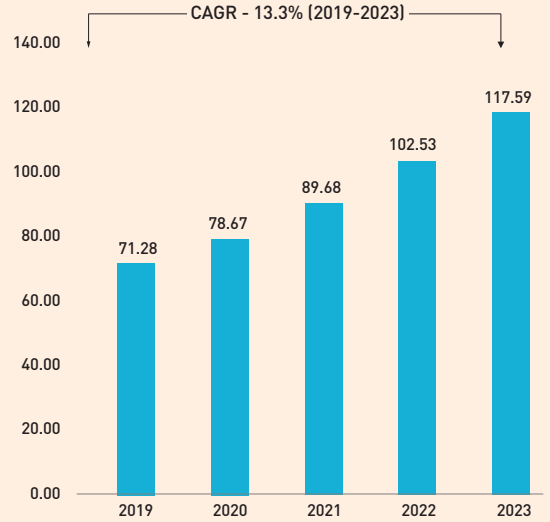
The cumulative geospatial industry's value in AEC is estimated to be US$ 71.28 billion in 2019 and is estimated to reach US$ 117.59 billion by 2023, growing at a CAGR of 12.69 per cent between 2015 and 2023. The Asia-Pacific region is going to continue being the largest geospatial technology market in AEC having a share of 53.83 per cent of the total US$ 117.59 billion market in 2023.
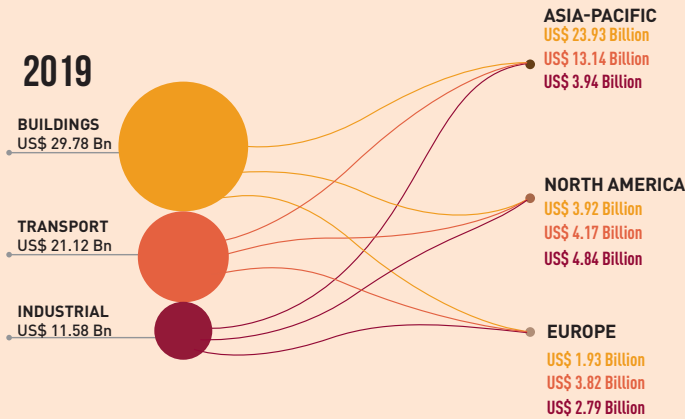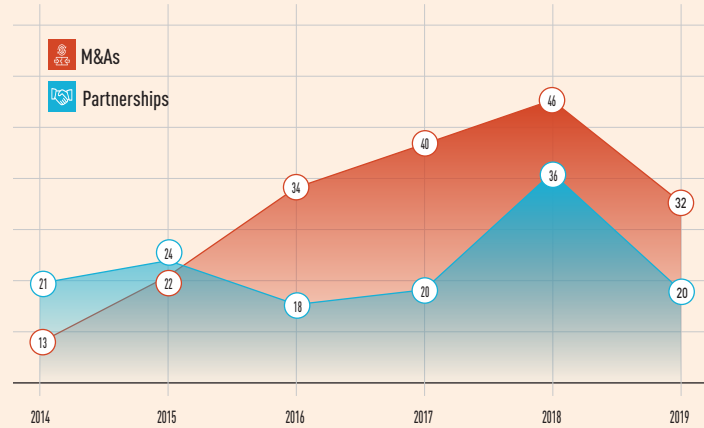
GEOBIM MATURITY MODEL

1. SURVEYING

2. PLAN & DESIGN

GEOBIM Maturity Curve

Sophisticated — Level 3
LiDAR, Mobile Mapping Technology, Drones, GPR*, Acoustic Locating*

Digital Twin (iBIM+GIS+IoT)*, Reality Capture, bidirectional mixed reality design

Immersive Solutions (AR/VR) + Artificial Intelligence

Mature — Level 2
Scanning Tools, Remote Sensing (Satellite imageries), RTK, EML for underground

CAD/BIM (2D&3D Models), GIS and 3D Point Clouds

3. CONSTRUCTION

Amateur — Level 1
Total Stations

CAM/CAD Software, Digitized Maps

Additive Construction Cobotics (3D Printing/ Prefab/ Modular Construction/Robotics)

BIM, GIS, and GNSS-enabled Machine Control Systems

Amateur — Level 0
Traditional Theodolite and Chain.

Drawing/Sketches, Paper Maps

4. OPERATIONS & MAINTENANCE

Traditional Machinery, Paper Construction Drawings

Digital Twins (iBIM+GIS+IoT)*, GNSS-enabled Smart Sensors, Big Data Analytics

Facilities management (spreadsheets)

CAD/ BIM+GIS

Conventional   Collaborative   Connected

* For both above and underground infrastructure

Towards increased Efficiency, Productivity and Compliance

The GEOBIM Maturity Model is critical to evaluate and assess the ability of an AEC firm to operate in a collaborative and connected data environment. The GEOBIM Maturity Model ranges from Level 0 to 3 and beyond as more innovation takes place in the GEOBIM technology ecosystem and the integration of geospatial and BIM technologies becomes an 'accepted' definition across the construction lifecycle.

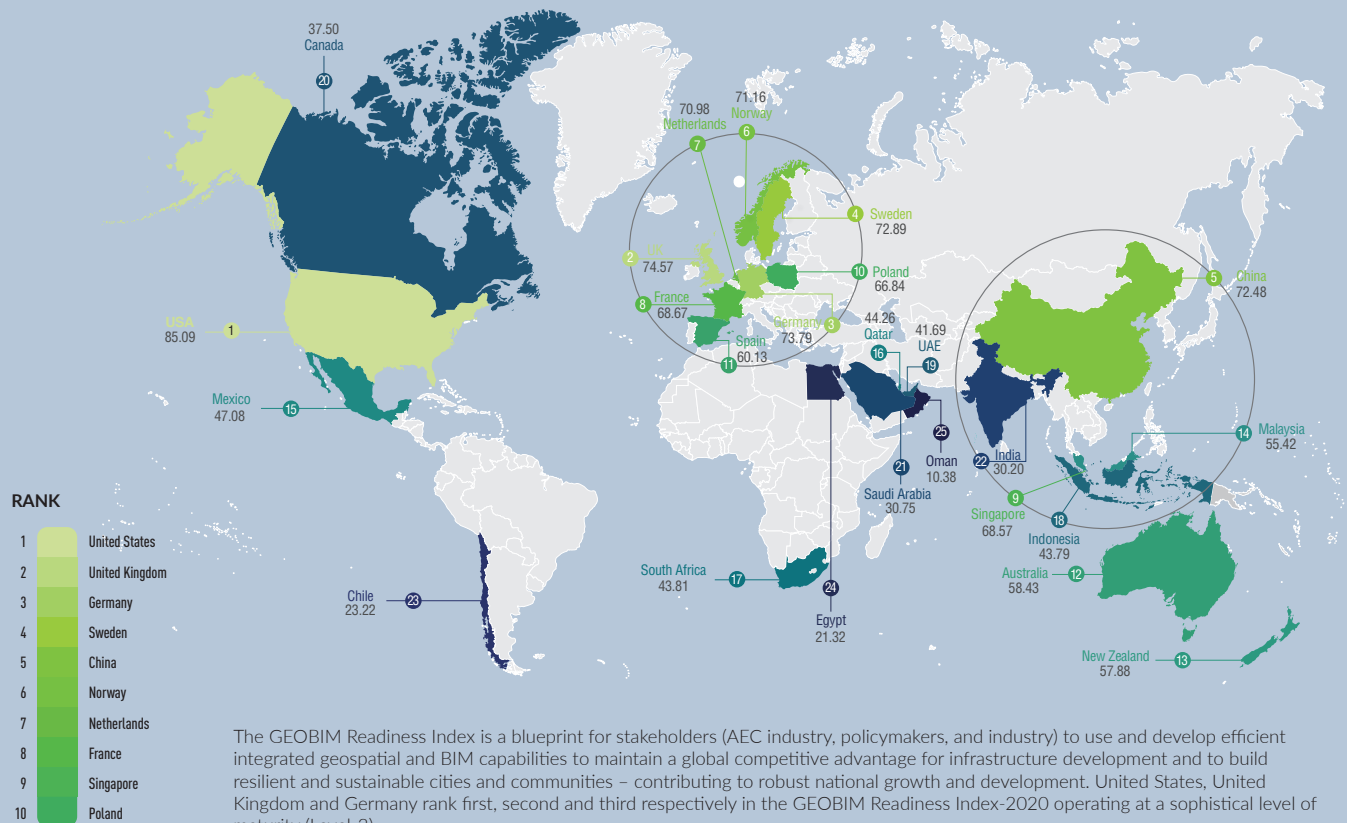## GLOBAL GEOSPATIAL MARKET IN AEC INDUSTRY, BY SUB-SECTORS AND BY REGION, 2019

2019

BUILDINGS
US$ 29.78 Bn

TRANSPORT
US$ 21.12 Bn

INDUSTRIAL
US$ 11.58 Bn

ASIA-PACIFIC
US$ 23.93 Billion
US$ 13.14 Billion
US$ 3.94 Billion

NORTH AMERICA
US$ 3.92 Billion
US$ 4.17 Billion
US$ 4.84 Billion

EUROPE
US$ 1.93 Billion
US$ 3.82 Billion
US$ 2.79 Billion

The geospatial industry's value in 2019 for the building's segment is estimated to be US$ 29.78 billion spread across Asia-Pacific, North America and Europe. In Asia-Pacific, the market size of geospatial technologies in the building sector (residential and non-residential) is estimated to be US$ 23.93 billion in 2019 and is estimated to be US$ 34.45 billion in 2023. This growth is primarily driven by rapid urbanization in India, China, Indonesia, Malaysia, Vietnam and Philippines, and the increase in housing requirements in these regions.

MERGERS AND ACQUISITIONS AND PARTNERSHIP TRENDS IN AEC INDUSTRY, 2014-2019

M&As
Partnerships

M&As: 13, 22, 34, 40, 46, 32 (2014–2019)
Partnerships: 21, 24, 18, 20, 36, 20 (2014–2019)

2018 was the year of M&As, 2019 was the year of consolidation. 2019 mostly witnessed partnerships by geospatial companies to strengthen their portfolios in construction workflow management.

GEOBIM READINESS INDEX - 2020

37.50 Canada — 20
70.98 Netherlands — 7
71.16 Norway — 6
74.57 — 2
Sweden 72.89 — 4
Poland 66.84 — 10
France 68.67 — 8
Germany 73.79 — 3
Spain 60.13 — 11
China 72.48 — 5
44.26 Qatar — 16
41.69 UAE — 19
25
USA 85.09 — 1
Mexico 47.08 — 15
Malaysia 55.42 — 14
India 30.20 — 22
Oman 10.38 — 21
Saudi Arabia 30.75
Singapore 68.57 — 9
Indonesia 43.79 — 18
Australia 58.43 — 12
South Africa 43.81 — 17
Egypt 21.32 — 24
Chile 23.22 — 23
New Zealand 57.88 — 13

RANK

1	United States
2	United Kingdom
3	Germany
4	Sweden
5	China
6	Norway
7	Netherlands
8	France
9	Singapore
10	Poland

The GEOBIM Readiness Index is a blueprint for stakeholders (AEC industry, policymakers, and industry) to use and develop efficient integrated geospatial and BIM capabilities to maintain a global competitive advantage for infrastructure development and to build resilient and sustainable cities and communities – contributing to robust national growth and development. United States, United Kingdom and Germany rank first, second and third respectively in the GEOBIM Readiness Index-2020 operating at a sophistical level of maturity (Level-3).

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GEOBIM MARKET IN AEC INDUSTRY

The cumulative global AEC industry is valued at US$ 11.16 trillion in 2019 and is projected to reach US$ XX.XX by 2023. During this period, the global geospatial market is projected to reach approximately US$ XX. XX by 2023. The growth in the global geospatial market is expected to be highest in the Asia-Pacific region owing to new construction and the increasing awareness and adoption of the new and upcoming technologies like artificial intelligence (AI), automation, Internet of Things (IoT), enabled by strategic technology policies and infrastructure stimulus packages announced by various government bodies. The regional geospatial market size across the six regions – North America, Europe, Asia-Pacific, Latin America, Middle East and Africa and for the sub-sectors Transport, Buildings, and Industrial sector shows that the global geospatial market is highest in buildings in 2019 with US$ 23.49 billion followed by the geospatial market-size of transport and the industrial sub-sectors.
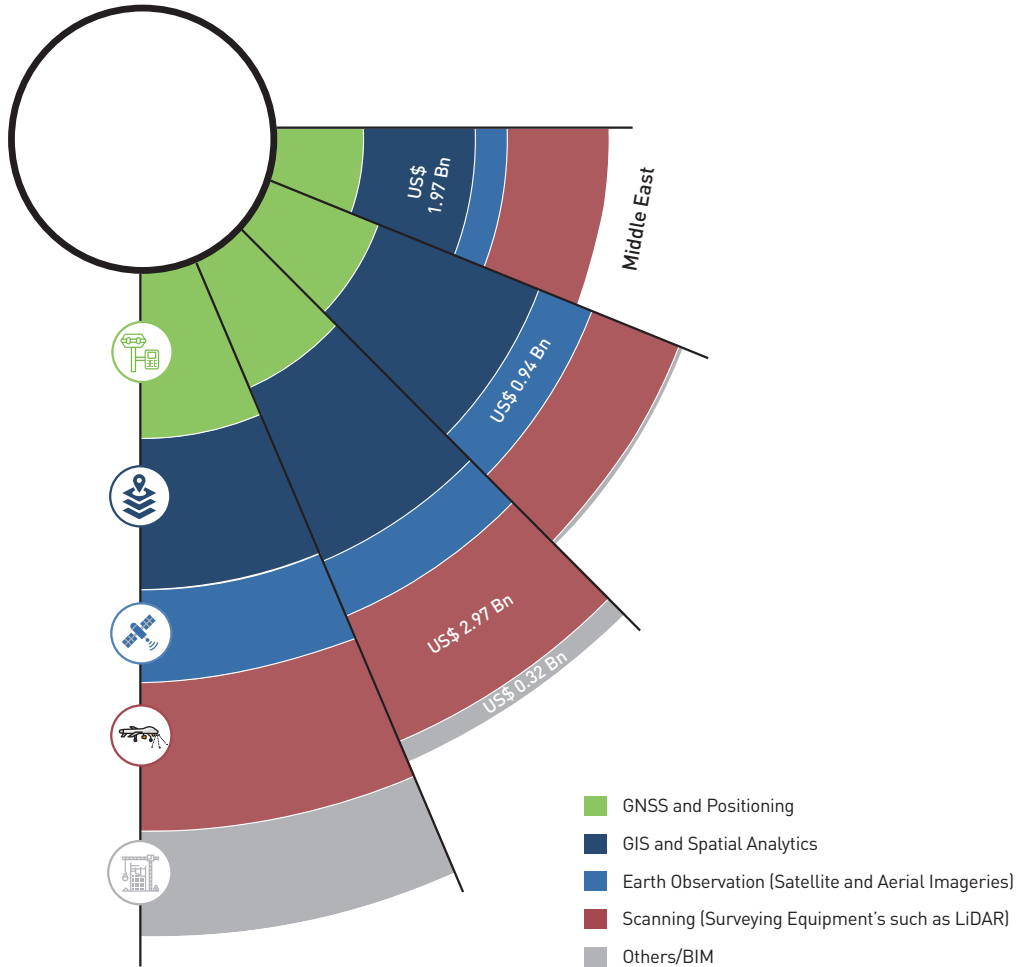
Geospatial Market Size in AEC Industry, by region and by sub-sectors, 2019 (US$ Billion)

Regional MS (in $ bn)

6.12

XX   XX1   XX2   XX3

🟥 Transport   ⬜ Buildings   ⬛ Industrial   🟦 Regional
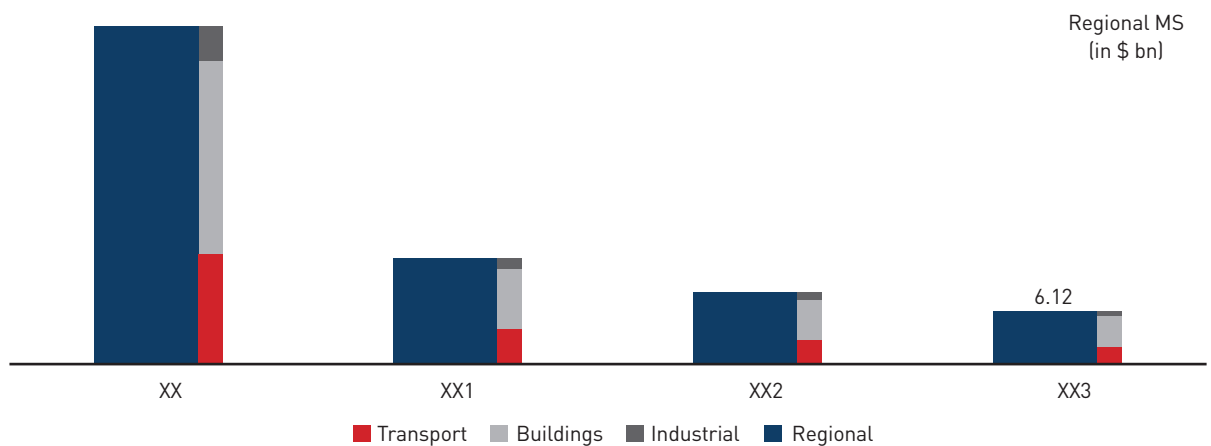
Key Findings:

→ The cumulative geospatial industry's value in 2019 is estimated to be US$ 71.28 billion, i.e. approximately, 18.4% of the total global geospatial market valued at US$ 385.3 billion is engaged in the AEC industry.

→ The cumulative market share for geospatial technologies in the industrial sector in 2019 for North America is estimated to be US$ 4.84 billion – the highest in the sector.

→ In 2019, the GNSS and Positioning Systems is estimated to be US$ 17.47 billion with Asia-Pacific having the largest market share.

→ The global market size of Artificial Intelligence (AI) in construction activity is estimated to be US$ 24.05 billion in 2019.

→ The GEOBIM Maturity Curve transcends from being conventional to convergence and finally to a Connected Environment.

→ If 2018 was the year of mergers and acquistions; 2019 was the year of consolidation!

→ Venture Capitalists funding in the ConTech segment shot by 1600 per cent between 2016 and 2018 – with at least US$ 5.6 billion invested upto 2019 Q3 in the sector.

Geospatial Market in AEC Industry, by technology segment, 2019 (US$ Billion)

US$ 1.97 Bn

US$ 0.94 Bn

US$ 2.97 Bn

US$ 0.32 Bn

Middle East

- GNSS and Positioning
- GIS and Spatial Analytics
- Earth Observation (Satellite and Aerial Imageries)
- Scanning (Surveying Equipment's such as LiDAR)
- Others/BIM

The BIM and Digital Twins market size is estimated to grow at a CAGR of 11.06% during the forecast period. North America leads the regional share of the market with approximately 30% of the global BIM and Digital Twins market – closely followed by Europe with a market share of 25.11%. The increasing market share of the BIM and Digital Twins across these two regions is due to the increasing adoption of BIM across the construction lifecycle project and the policy strategies and initiatives which mandate the use of BIM in public-sector construction projects.

BIM and Digital Twins Market Size in AEC Industry, by region , 2019 & 2023 (US$ Billion)

BIM, Market Size in $ billion

- 2019
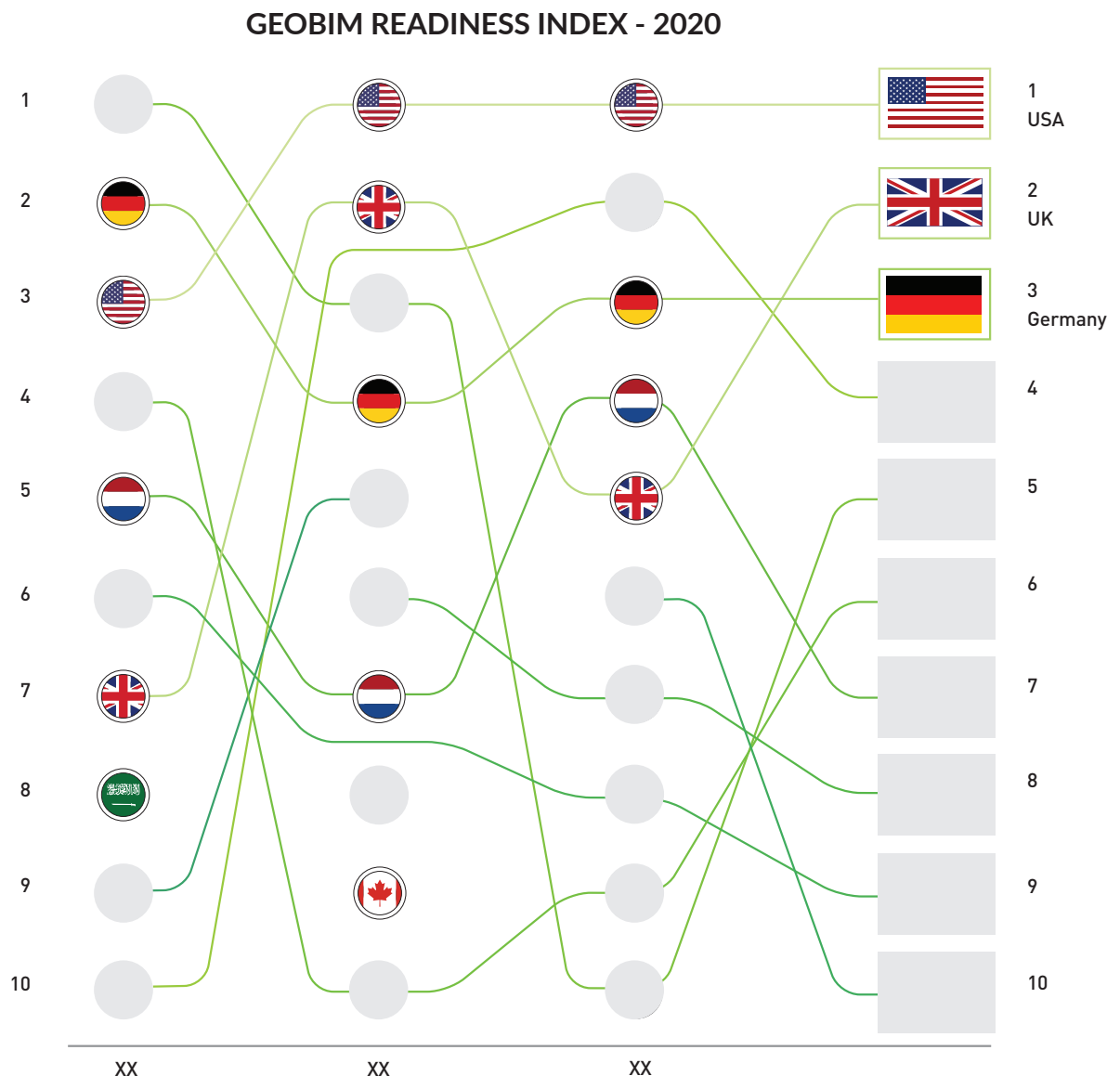- 2023
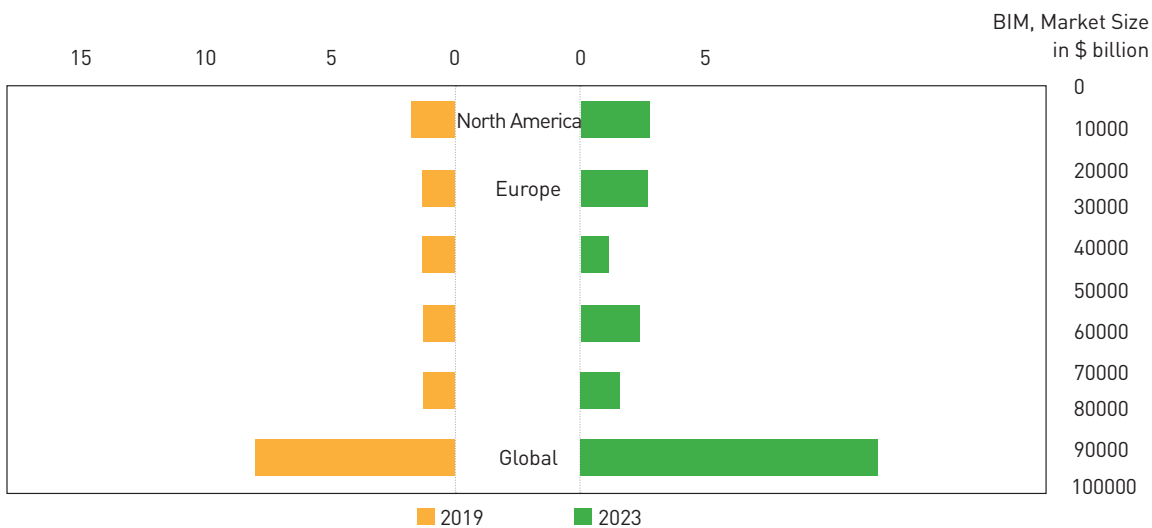
The GEOBIM Readiness Index

The GEOBIM Readiness Index-2020 of 25 countries, is a blue-print for stakeholders (AEC industry, policymakers, and industry) to use and develop efficient integrated geospatial and BIM capabilities to maintain a global competitive advantage for infrastructure development and to build resilient and sustainable cities and communities – contributing to robust national growth and development.

The GEOBIM Readiness Index-2020 is based on the following selected parameters:

→ Policy Strategies and Initiatives
→ User Adoption Level
→ Industry Offering`

The 25 countries evaluated in the GEOBIM Readiness Index-2020 are: Australia, Canada, China, Chile, Egypt, France, Germany, India, Indonesia, Malaysia, Mexico, New Zealand, Norway, Oman, Poland, Qatar, Saudi Arabia, Singapore, South Africa, Spain, Sweden, The Netherlands, UAE, UK, and USA

United States of America, United Kingdom and Germany are the top three countries in the GEOBIM Readiness Index on the three parameters. Do you want to know where does your country stand?

GEOBIM READINESS INDEX - 2020

Scope of the Report:

Report Metric	Details
Market size Calculations	AEC Industry Geospatial Industry and Technologies Emerging Technologies BIM and Digital Twins
Base Year Considered	2019
Forecast Period	2020-2023
Forecast Units	Value (US$)
Segments Covered	Technology, Company Service Offerings, Regions
Geographies Covered	North America, Asia-Pacific, Europe, Middle East, Latin America, and Africa
Sample of the companies covered	Topcon Positioning Systems Inc. (Japan), Trimble (USA), Hexagon (Sweden), Esri (USA), FARO Technologies (Germany), Autodesk (USA), Bentley Systems (UK), AECOM (USA), Pix4D (Switzerland), Dassault Systemes (USA), Fugro (The Netherlands), Riegl (Austria), Jacobs Engineering Group (USA), Cyient (India), Archibus (USA), Nemetschek Group (Europe), Ecodomus (USA), Oracle – Construction and Engineering (USA), among many others.

AEC industry, by sub-sectors, has been segmented as follows:

- Building Infrastructure
- Industrial Infrastructure
- Transport Infrastructure

The geospatial industry market, by technology, has been segmented as follows:

- GIS and Spatial Analytics
- GNSS and Positioning
- Scanning
- Earth Observation

The geospatial industry market, by service offerings, has been segmented as follows:

- Hardware
- Software
- System Integration and Solutions
- Services

Key questions addressed in the report:

→ How has the AEC industry market evolved since 2015-2016 and what is the AEC industry market going to be in 2023?

→ What is the impact of COVID-19 on the AEC industry and what are the economic stimulus by major economies of the world?

→ What is the cumulative global geospatial industry market in 2019 and what is it estimated to be in 2023?

→ Which regions have the maximum geospatial share in the AEC industry and what is their market share in 2023?

→ What is the market for Building Information Modelling (BIM) and Digital Twins in 2019 and what is the market share projected to be in 2023)?

→ How is Artificial Intelligence (AI) shaping the AEC industry and what is the current level of AI adoption in the AEC industry? (based on 300+ interviews)

→ What is the Return on Investment (RoI) being generated by construction companies all over the world by using GEOBIM technologies in their construction process?

→ How has the GEOBIM Industry evolved in a year and how have geospatial companies expanded their BIM and Frontier Tech capabilities via Mergers and Acquistions (M&A) and Partnerships?

→ Where does your country rank in the GEOBIM Readiness Index-2020 and how do 25 countries fare in the three pillars of GEOBIM Readiness?

For more details on the report; and the analysis, please write to

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