

Planning and delivering infrastructure that lasts



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With Special thanks to Terry Bills (Esri Inc)



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SkyCity may get \$40 million from Fletcher Building for convention centre delays, analyst says



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"We are thrilled to partner with SKYCITY to realise their vision for a truly world-class facility. We will build and complete the design of the 32,000m² NZICC, the five-star, 300-room Horizon hotel, the retail laneway linking Nelson and Hobson streets, and 1327 carparks under the NZICC."

SkyCity withholds \$26.9m liquidated damages from Fletcher over NZICC

14 Sep, 2018 9:22am (2) Consider to read



SkyCity to seek damages from Fletcher Building for delayed delivery of convention centre

f t o g

SkyCity may get \$40 million from Fletcher Building for convention centre delays, analyst says

2 May, 2018 11:27am (2) Consider to read



SkyCity Entertainment Group could be paid \$40 million from construction firm Fletcher Building because of delays in completing its convention centre in Auckland. Photo: iFile



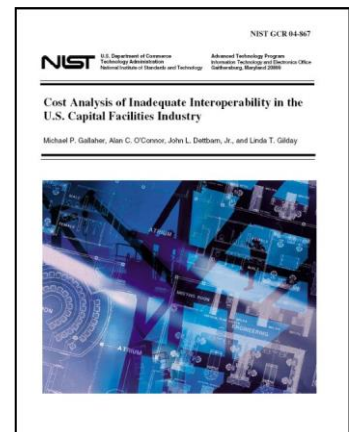
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It doesn't have to be so costly

- 40% to 60% of Engineering time is spent locating and validating information
- Effective data and information communication can reduce project delivery time by 20% to 50%
- Poor communication between systems wastes up to 30% of project costs
- Effective data management from the early project stages could save up to 14% of Operation and Maintenance costs



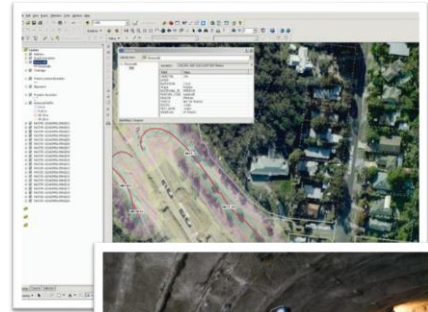
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Integrated Information Systems

- Modern Infrastructure Projects are Complex Multi-Year Projects which require careful monitoring, coordination, and management
- Require access to large amounts of data and information in real-time



Australia's Eastlink Project



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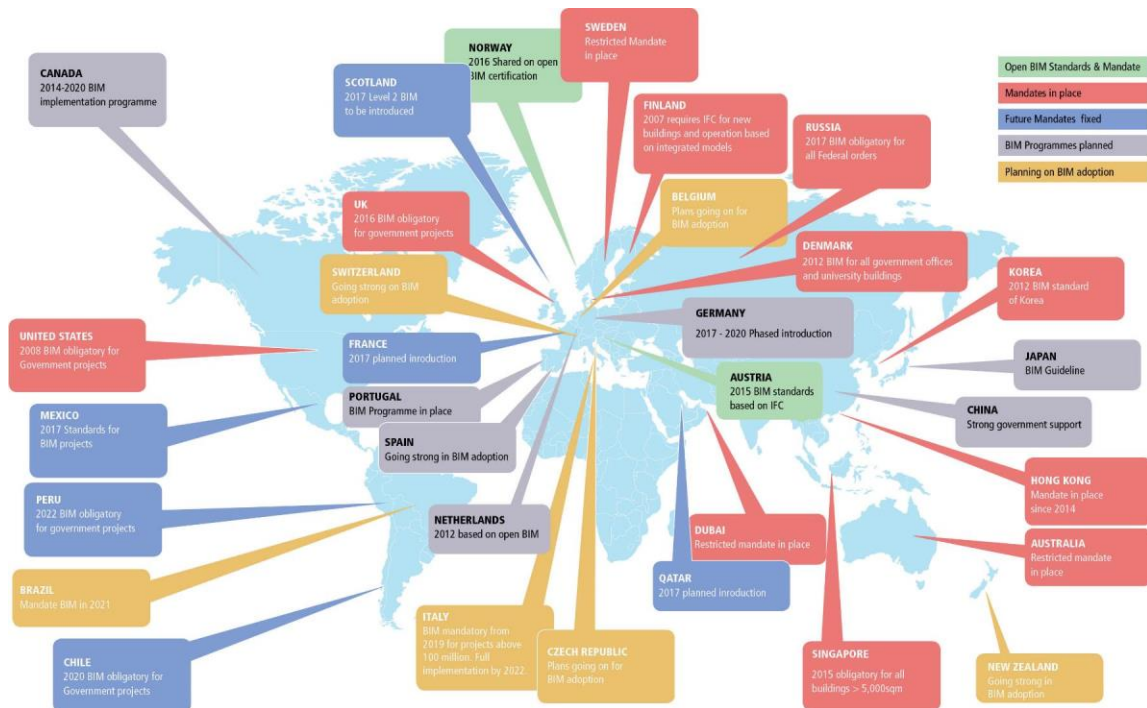
What is BIM?

- You really should know this by now!

“Building Information Modeling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to more efficiently plan, design, construct, and manage buildings and infrastructure”

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BIM in Europe

- PAS 1192 → ISO 19650
- UK: Level 2 Required on All Large Public Projects
- France: Required on Govt. Projects - PTNB
- Nordic Countries have High Requirements

BIM brings impressive benefits

Today, most BIM projects are Level 2 BIM. The UK government mandated Level 2 BIM for its public projects in April 2016 and it suggests that this has resulted in construction savings of 20%. Its SmartMarket Brief on BIM, Dodge Data and Analytics found that half of those surveyed had reduced project costs by at least 5% while accelerating project completion by over 5%. Other research has shown that 52% of BIM project teams deliver higher quality projects with 61% reducing project errors.

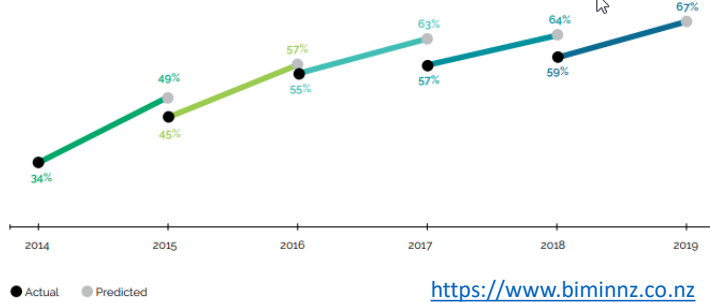
This has added up to impressive return on investment (ROI) from BIM implementation: contractors have reported ROI of over 25% while some design firms suggest their ROI was over 300%.



BIM in New Zealand

- No government mandate but:

Estimated proportion of industry projects that use BIM



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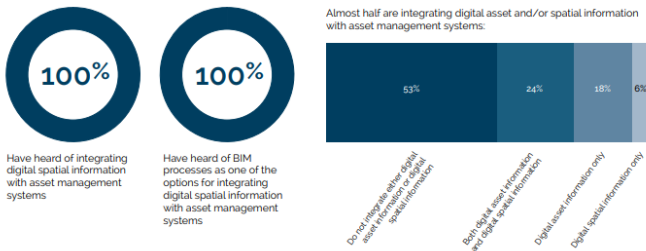


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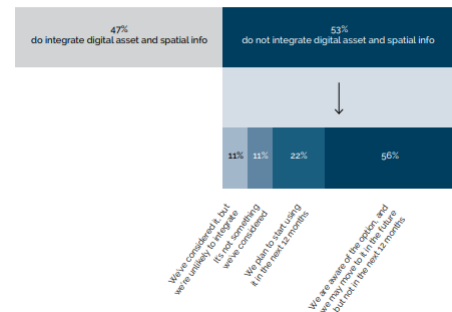
BIM in New Zealand

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Integrating digital spatial and asset information with management systems



Client use and consideration of integrating digital asset and spatial information



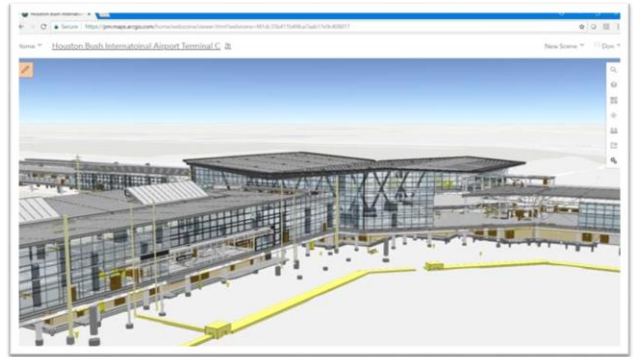
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BIM in the US

- Furthest along in airports
- Requirement to manage CAD, BIM and GIS data
- Decision is which is going to be the system of record
- Data is accessed through the GIS



<https://houstonairports.maps.arcgis.com/apps/webappviewer3d/index.html?id=f9a87dfa41437ca6e424950ffdafce>

**I thought this was
supposed to be
about transport?**

What if I'm building road or rail?

- Good point!
- Challenges presented by infrastructure construction are different from building construction
 - Potentially larger
 - Spatially awkward
 - More complex
- BIM becomes CIM!
- **Civil Integrated Management**
 - Still a new term/concept



“Civil Integrated Management (CIM) is the technology-enabled collection, organization, managed accessibility, and the use of accurate data and information throughout the life cycle of a transportation asset.

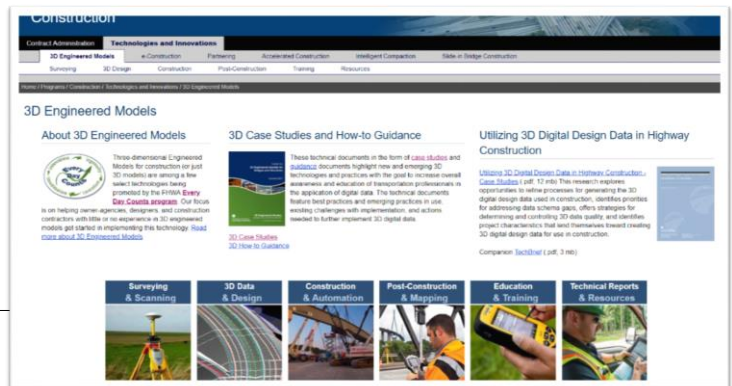
The concept may be used by all affected parties for a wide range of purposes, including planning, environmental assessment, surveying, construction, maintenance, asset management, and risk assessment.”

Federal Highway Administration, American Association of State Highway and Transportation Officials, American Road and Transportation Builders Association (2012)

CIM in the US

States with Major BIM / CIM Initiatives:

- Wisconsin
- Florida
- Oregon
- Utah
- New York
- Ohio



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CIM in the NZ...

The Chartered Institute of Marketing (CIM) Reviews | Glassdoor.co.nz
<https://www.glassdoor.co.nz/.../The-Chartered-Institute-of-Marketing-CIM-Reviews-E...>
 ★★★★★ Rating: 3.2 - 32 reviews
 Apr 3, 2019 - 32 The Chartered Institute of Marketing (CIM) reviews. A free inside look at company reviews and salaries posted anonymously by employees.

Certificate in Irrigation Management : Irrigation NZ
<https://www.irrigationnz.co.nz/EventsAndTraining/Irrigators/CIM/>
 With new environmental requirements around water management, irrigation ... I definitely gained in knowledge and got new ideas to take to the farm." Julien.

OMF New Zealand - CIM/OMF International
<https://omf.org> > Home > About
 The China Inland Mission (CIM) was established by James Hudson Taylor on June 25, 1865. Eager to reach the inland provinces of China with the gospel, the ...

Cardiac Image Modeller (CIM) - The University of Auckland
<https://www.fmhs.auckland.ac.nz/en/faculty/camr/.../cardiac-image-modeller-cim.htm...>
 The Cardiac MRI Analysis Software, CIM, has been developed at the University of Auckland, New Zealand over the last eight years by Drs Alistair Young and ...

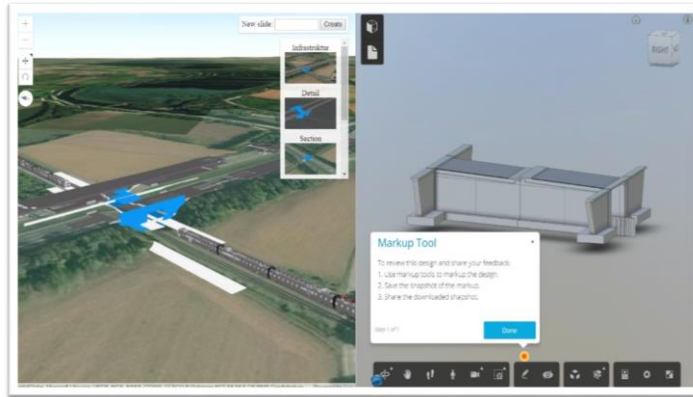
Construction Installation Management Ltd
constructioninstallationmanagement.co.nz/
 Logos cim mobile. CONSTRUCTION CAPABILITIES. COMMERCIAL. NEW HOME BUILDS. RENOVATIONS. VIEW FEATURED PROJECTS. NAVIGATION.

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Esri / Autodesk Collaboration



Esri / Autodesk Cloud Side by Side: <https://oertac.github.io/A99-slides/>

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Enabling point workflows through integration

- Enabling engineers to access GIS data for preliminary design and design evaluation
 - Connect engineers to proprietary project information in the GIS system of record
 - Autodesk Connector for ArcGIS in Infraworks
- Enabling GIS users to access BIM for visualization, planning, and engagement
 - Enable GIS staff to use BIM models for visualization, program management and communication
 - Direct Revit reading in ArcGIS Pro
 - Direct read of IFC/BIM 360/other formats (Future)
- Enabling Civil engineers and architects access to GIS data for design and construction
 - Connect engineers to proprietary project information in the GIS system of record
 - Autodesk Connector for ArcGIS in Infraworks
 - Autodesk Connector for ArcGIS in Civil 3D (Future)
 - ArcGIS for Revit (Future)
- Connecting field collection to design and construction workflows
 - Put integrated GIS location and condition collection in the hands of field staff
 - ArcGIS Collector
 - Survey123
 - ArcGIS Collector integration with Autodesk (Future)

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Realizing Smart Cities workflows with BIM and GIS



- Capture sites and urban areas in high res for use as basemap context
 - Capture reality
 - Use multiple inputs
 - At diverse scales
 - Extract features
 - Use in analyses and reports



- Integrate BIM and GIS into planning and design evaluation workflows
 - Create plans and projects
 - Assign indicators
 - Evaluate BIM models against constraints and context
 - Report and estimate



- Provide a common operational dashboard view into asset performance
 - Combine GIS and BIM
 - Link to detailed BIM, asset, and project information
 - Initiate work orders and events
 - View real time information

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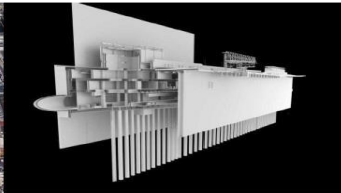
Crossrail



Physical



Virtual

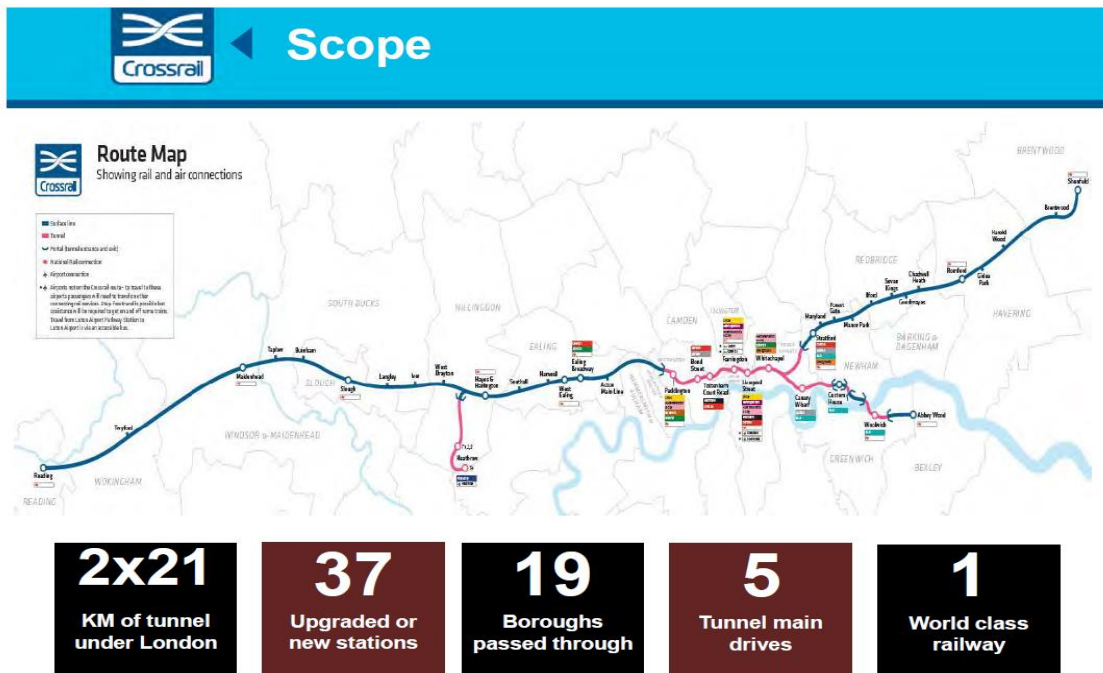


- Crossrail, currently Europe's biggest civil engineering project, is being built under central London to link existing Network Rail lines to the east and west of the capital.
- When it opens in 2021 it will provide rail services from Maidenhead and Heathrow in the west to Shenfield and Abbey Wood in the east.

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Home Gallery Map Groups Sign In

Crossrail Maps






What's New?

02/12/2016 - 1:250 scale added to all basemaps. Default basemap changed with new styling. New layers include Asset Spaces, Linear Referencing System. Minor changes to individual apps.

27/08/2016 - All apps have been updated with new functionality, and have had some UI tweaks and minor bug fixes. For full details please check the 'About' section in the apps, as well as the highlighted QRGs in the Help section.

For further information about new features/updates, or if you have any questions, please get in touch with the GIS team.

Legal Information

Crossrail Maps is a data viewer which offers immediate access to spatial information relating to the Crossrail projects. By 'Spatial Information' we mean information linked to a location or an asset, which can be searched and viewed via maps. Crossrail Maps and all data contained or associated with Crossrail Maps is made available for information only and for the purpose of the ongoing design and construction of Crossrail ('the Purpose').

By accessing Crossrail maps you agree to the following:

- All data contained in Crossrail Maps is confidential and you shall not disclose any data or information obtained from Crossrail Maps to any person without the prior written consent of Crossrail Limited;
- In the event that any data or information is disclosed to any person without the written consent of Crossrail Limited, you will be liable to Crossrail Limited for any costs or claims or

Help

- What's on this page?
- What's in the standard Map Viewer?
- How do I interact with the data?
- How do I build my own map?
- How do I change my password?
- How do I set up mobile access?
- Watch/Event Items
- Utilities Access
- 3D Scenes
- Crossrail Maps FAQ

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US Construction Costs

While construction has appeared stuck in a time warp, other sectors have transformed themselves. Consider that in the United States between 1947 and 2010, agriculture achieved cumulative real growth in its productivity of 1,510% and manufacturing 760%. Construction managed only 6%. U.S. construction-sector productivity is lower today than it was in 1968, and investment has fallen over the past decade. *Market Watch:*

<https://on.mktw.net/2CICN7W>

Why It's So Expensive to Build Urban Rail in the U.S.

ALON LEVY JAN 26, 2018

It's not just the Second Avenue Subway: Nearly all urban rail projects in the U.S. cost much more than their European counterparts.

SHARE TWEEET

In late December, *The New York Times* published a bombshell article by Brian Rosenthal about [high construction costs on the New York](#)

(The article: [Public transportation investment costs too high in U.S.](#))

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The Infrastructure Crisis

- State and Local Infrastructure Spending at a 30 Year Low
- Federal Investment in Infrastructure has Dropped by Half During the Past 30 Years, from 1 Percent to 0.5 Percent of GDP
 - China: 8.6% of GDP
 - India: 5.2% of GDP
 - Australia: 4.7%
 - Canada: 3.5%
 - US: 2.4%



TABLE 2
Cumulative Infrastructure Needs By System Based On Current Trends Extended to 2020 (Dollars in 2010 Billions)

Infrastructure Systems	Total Needs	Estimated Funding	Funding Gap
Roads, Bridges, & Transit ¹	\$1,723	\$877	\$846
Electricity ²	\$736	\$629	\$107
Schools ³	\$391	\$120	\$271
Public Parks & Recreation ³	\$238	\$134	\$104
Airports ^{1,4}	\$134	\$95	\$39
Dams, Levees, Waterways & Ports ^{1,5,6}	\$131	\$28	\$103
Water & Wastewater ⁷	\$126	\$42	\$84
Rail ⁸	\$100	\$89	\$11
Hazardous & Solid Waste ⁷	\$56	\$10	\$46
Total	\$3,635	\$2,024	\$1,611
Yearly Investment Needed	\$454	\$253	\$201

Source: American Society of Civil Engineers 2013 Report Card for American Infrastructure

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Rethink Data?

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Rethinking Data: Issues

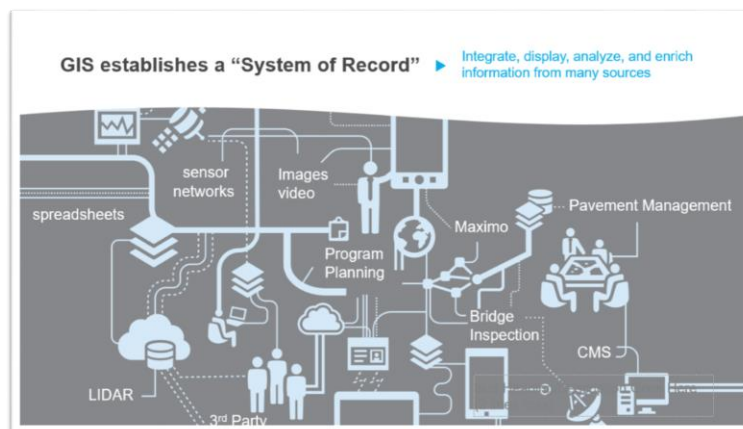
- Think about workflows
- Interoperability
- Data formats / data management
- Data governance
- Accessibility of data is critical
- Linking field to office



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Interoperable System of Record?

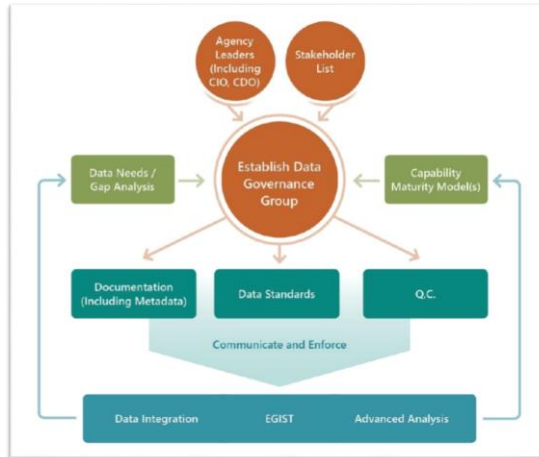


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Importance of Data Governance



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New Data Types and Big Data



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Rethinking Data



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Additional Sources

<https://www.geospatialworld.net/article/gis-bim-to-drive-digitalization-in-aec-industry-nicolas-mangon-autodesk/>

<https://www.geospatialworld.net/article/bim-adoption-around-the-world-how-good-are-we/>

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