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Closing the Gap between Big Data and the Design and Construction Industries with Building Information Modeling (BIM) Schema

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By simply making online dinner reservations, determining our global position, and mapping the restaurant directions while in transit, we instantly observe the amount of exponentially increasing data in our daily lives compared to years past. This is an example of big data that is facilitated by a global internet of interconnected communication channels which synchronously share information and resources through common network programming. The problem is that big data is noticeably absent in our industry.

Manyika et al. recognize that several industries such as government, finance, and insurance are well positioned to benefit from big data, while construction has the lowest productivity and the least potential [1]. Eastman and Sacks contend that negative trending is an outcome of how construction is defined and that the impacts of Building Information Modeling (BIM) have yet to be statistically extruded [2]. Construction is confined to the on-site activities, and does not include the manufacturing sector which does not have a comparable decline. Manyika et al. measure the big data opportunities through the amount of data, performance variability, stakeholder quantity, transaction intensity, and inherent turbulence. The segregation of manufacturing is a key contributor to reducing at least three of the aforementioned key metrics associated with construction. Regardless of this counterpoint, the notion of a gap between big data and our industry exists and poses two very fundamental questions; why are we in this position, and how do we better prepare for big data?

The construction along with the design industry has barriers that inhibit easy communications with big data applications. Big data employs an elementary open source global communications protocol such as the XML borne from the World Wide Web Consortium. The XML connectivity used in the design and construction industries is highly sophisticated. The building SMART alliance™ (bSa) developed an ifcXML (Industry Foundation Classes XML) format for representing and exchanging product data [3]. The format is a valuable and familiar resource for entities within the built environment domain, but engages only those capable of mastering the complex IFC. The barrier is twofold. First, many of the application software "apps" vendors are unaware of a need or potential connectivity with the design and construction industries. Second, when apps vendor are aware, they tend to detach when confronted with a wall built from the 20,000 lines of IFC-based code. This has paved the way for simplified and alternative approaches.

Kimon Onuma created a user-friendly, open standard BIMXML language that includes data and geometries [4]. The format has 1/100th the lines of code as the ifcXML, thereby embracing the novice user groups who lack BIM and IFC conventions. One example is a direct communication with the big data tool Devinco AS smart phone. A second example is where BIMXML may indirectly connect with industry BIM software through application programming interface. BIMXML also permits partial exchanges with the industry partners such as Construction Operations Building information exchange (COBie) and graphic information systems (GIS). Smith and Bordenaro cite several successful projects where the easier BIMXML has reached out to various clients [5]. The BIMXML precedes the forthcoming Simple ifcXML that has been in preparation, but is not publicly available [6,7]. Irrespective of whether the format is an open standard BIMXML or a bSa supported Simple ifcXML, the design and construction industries must readily offer a modest means of communicating with big data, while maintaining the full ifcXML for our industry partners. The consequences are the missed opportunities such as predicting the anticipated the environmental loads as diners approach the restaurant, correlated with the indoor and outdoor temperature differentials elicited from forecasting weather apps.

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