



## White Paper 2021-02

### How Projects Should Move from Being Document-Centric to Data-Centric

*Traditionally, projects are document centric. This applies to exchanges between parties or expected deliverables as well as to measurement of project management and engineering team progress. However, there would now be great benefits to move instead to a data-centric approach, where documents are only specific views of the underlying data. This approach would allow to fully benefit from the enriched information available, while assuring better consistency across the project. This White Paper explores the potential benefits and the challenges for projects to move towards a data-centric approach.*

#### The limits of the traditional document-centric project management

Traditional project management revolves around documents. Document registers are setup that list all project deliverables; progress is measured based on document stages, while documents are being transmitted between parties and reviewed and commented. In traditional approaches documents are really the elementary piece of work that is managed throughout the project.

Modern projects produce vast amounts of data, some of which do find their way in a summarised manner in documents. There is a substantial loss of usefulness of data that is transferred in a document: loss of detail, loss of recoverability for other usage, transformations that may not be reversible; etc. The underlying datasets include a much richer information. A simple example is when 3D engineering models are transferred to drawings. The transfer is not reversible as it would be quite cumbersome, and probably incomplete, to generate the 3D model from the collection of drawings it has generated. Limiting oneself to the drawings implies a significant loss of data. In a wider view, it is very difficult to extract useful information from document control databases even if they have been properly setup and tagged.

Also, using the document as the most basic block of project management is quite cumbersome in particular to maintain the full consistency of project configuration in case of changes. It appears that it would rather be easier to maintain elementary document content in databases to avoid any duplication, for example topical document sections. Such databases of elementary document content when updated could then automatically update all the documents that contain this information, therefore ensuring full consistency. A change tracking system will record all those changes and allow to manage possible non-regression analysis.

Finally, we can observe that today, in particular in the field of engineering, most of the effort is towards developing integrated models with documents just being the final formatting of the data.

While the use of documents as elementary blocks of data management in projects has proven useful at a time where modern data-management systems were not available, it

now appears that this approach has strong limitations and impedes drawing full benefit of the currently available datasets.

#### Issues about data-centric approaches

There are a few issues that prevent moving immediately towards a data-centric approach.

First, moving towards a data-centric approach requires a preliminary agreement on the data standards for exchange and data utilisation between all the parties involved in a project. An underlying benefit of the document-centric approach is the standardisation of printed documents or Acrobat pdf formats as neutral formats that can be read by anyone. It is less easy to organise when it comes to data where standards need to be set in advance considering the wealth of information that will be provided. Tools that are compatible with the data provided have to be purchased by each party. This includes of course the owner, the main contractors but also the main subcontractors that have to provide as-built data.

Second, the data structure and content must clearly respond to a specific purpose which also has to be defined in advance. For example, what is the aim at producing a “digital twin”? What should it comprise of? Should it contain original design data, as-built data and scans, or both? This is important to align with the expected objectives to avoid excessive work that would not result in any future value. This exercise will also define what are all the inputs that are expected during the project lifecycle into the model, be it from digital or manual sources.

Third, in data-driven systems, it is much more difficult to freeze the data, because the whole approach is to constantly upgrade the data model collaboratively based on new knowledge. It will therefore be difficult to freeze the data during a review period. Thus, reviews of datasets must be performed dynamically and not with a stabilised configuration as before with documents. This can create issues and also requires better reactivity from all stakeholders that participate in the project. Proper Management of Change also needs to be implemented with sufficient discipline to ensure that there is adequate stability after the design stage. In addition, new ways of measuring actual progress of engineering must be devised on the basis of the facility model maturity.

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Finally, there are substantial benefits in writing summary documents and ensuring there is adequate consistency across all the different aspects to be considered. Therefore, data-driven approaches should not supersede completely the need to produce certain key documents that require strategic thinking, such as project execution plans, project mandates and associated project definition documents.

### Challenges and vision of the transition towards a data-centric approach

The industry is currently in the process of transitioning towards a more data-centric approach. It proves easier when more scope of the project is under the responsibility of a single organisation (such as conventional civil works or building construction) than when numerous contractors and sub-contractors contribute and involve their own intellectual property in project execution in more complex industrial projects – making exchange of information and sharing of engineering models a bit tricky. This explains why civil construction works seem to be in advance on this topic. Still the trend is very much at the forefront of the owners' concern, who see great potential benefit in getting virtual models of the infrastructure they are getting built.

For the moment the data-centric approach tends to grow and develop in parallel with the document-centric approach without superseding it. At some stage the duplication of effort will become apparent thereby leading

to parts of the document-centric approach being dropped, starting with the technical and engineering aspects. This

will require new approaches for progress measurement and formal model review which still need to be standardised. We can expect this shift to happen in the next 5 years.

This will not completely replace the document-centric approach which will remain useful for a number of project

areas. In parallel, data-centric document generation solutions that will allow an improved configuration management of the entire project can be expected to become mainstream.

### Summary

In projects the trend is definitely to move towards data-centric approaches because the traditional document-centric approach now appears to be too reductionist and an impediment to easy utilisation of the underlying project data. The shift will certainly start on the technical and engineering side with enriched 3D models. The industry needs to overcome the issue of sharing and exchanging data throughout the value chain. The rest of project management will also certainly move to the data-centric approach, generating documents from data bases that will allow increased configuration control and improved usage of the data. This shift is still in its infancy but can be expected to become mainstream in the next few years.

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