Information Management on Large Construction Projects

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Keywords: project controls, risk management, project management, classification, documentation.

Abstract – The operation of large-scale power plants is well understood and largely standardized, yet the management of the design and construction of such plants is not subject to the same rigor and standardization. The uniqueness and decentralized nature of large construction projects is dictated by their organizational structures, which ultimately lead to many difficulties, including cost and schedule overruns. This is partially caused by the inability to quickly locate the project information critical for timely decision making. This paper explores why these difficulties occur and offers a vision for improving the information management methodologies and tools available to managers of large construction projects.

Construction projects currently rely on multiple information systems, with overlapping areas of responsibility. These systems are poorly integrated and offer only rudimentary capabilities for classifying the information they manage. Experience demonstrates that state of the art of information management does not meet the current needs of large construction projects.

It is the authors' belief that:

- All project information should be centralized at one location.
- The information shall be accessible to all parties irrespective of their global position.
- A single project-wide classification system should be applied to all project information.
- The classification system should consist of a well-defined sequence of common activity based criteria.
- The classification criteria should be based on concepts already understood by engineers: e.g. location, project phase, work type, etc. Existing drawing numbering systems should form the basis of the system.
- The classification system should be suitable as the basis for a well-structured quality assurance system.
- The classification system should be scalable and extendable to meet the needs of all parties (including major suppliers and subcontractors), and all different forms of contract (FIDIC design-build, construction, etc).

The authors explain a number of extensions that need to be made to current drawing numbering systems, in order to convert them into a classification system suitable for the diverse range of information found in a typical project. A key point is that the classification system must be designed specifically for the construction industry. The immediate benefits of such a system include improved abilities to manage the design specification, work in progress, site queries, risk management, claims, correspondence, work scheduling and cost management. A further advantage is that the combined centralized information archive and classification system provide the database necessary to ensure compliance with the rigorous requirements of the latest international insurance joint code of practice, compulsory on many projects involving large underground works.

The authors propose a *universal classification system* suitable for *all* construction projects, which can easily be extended to satisfy local conditions. A universal system provides significant additional benefits, specifically helping to monitor standards compliance, conditions of contract compliance, and reducing problems associated with language and terminology differences. The classification system is one part of the methodology the authors recommend for managing project information. Other components include the appointment of a project information manager (a librarian with additional responsibilities) and the use of modern computer techniques to improve the efficiency of the repetitive activities associated with entry and classification of new information.

The authors then discuss practical considerations associated with the deployment of a centralized information archive and classification system, particularly given the limited capabilities of the current generation of computer systems. Metrics are proposed for evaluating information management software, including specific requirements necessary to enable systems to be integrated with the classification system. Key success factors for the methodology and tips for improving common project workflows are also provided.

Partial implementations of the methodology have been used in over ten major hydro, railway, highway and industrial projects in Europe, Asia, the Middle East and Africa. The authors offer feedback from more complete implementations currently in use at the Kárahnjúkar Hydro-Electric project in Iceland and the Budapest Metro Line 4 project in Hungary. This paper concludes with a short outline of a more complete implementation of the authors' vision, currently under development.

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