Implementing Integrated Vehicle Health Management (IVHM) Protocol for Support and Reliability of Digital Project Engineering.

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Abstract

Project comes up with a lot of hurdles and unnecessary obstacles due to situational and appropriate eccentricity of engineering which usually left manager and engineers to take on these challenges with their exceptional managerial skills and to work effectively in the given scenarios. Engineering Project Health management (EPMH) is an important term for management engineers which is based on framework for observation of engineered program/structure with in context understanding. This paper presents a novel framework approach of integrated vehicle health management (IVHM) in engineering management. It is applied to four industrial cases through which mutual understanding of project activity is increased. The purpose of implementing IVHM protocol in management position is reduce the analytical efforts and to increase the reliability of project analysis.

Keywords: Project Engineering, Engineering Management, integrated vehicle health management (IVHM), Project analysis, Reliability.

I. Introduction

With the advancement of structural and technological development, project and engineering management significant issue as compared to traditional approaches [I-V] as factors responsible for project success have increased. In higher project cases such as Aircraft constructions, ship designs and huge construction process in terms of urban planning to modern downtown, thousands of workers team up consisting of senior engineers and project managers. Project success rates depends upon some critical factors mentioned in [VI-VII] that require precise monitoring and measurement. With valuation of engineering work setup defining as well executed, managers judge, and endeavor to function in the direction of own plan. This however is foiled by the fact that engineering operations and projects are completed with variety, where the context of each describes an discrete set of objectives for success.
and circumstances of operation [IX]. Within the engineering field alone, subjects of work varies between design, modeling, planning, production, and maintenance tasks within electronics, automotive, aeronautic, and construction systems and include design and maintenance engineers to coordinate, with thousands [X] of workers. The intensive care of the project engineering development and its success are multifaceted and delicate job precisely covering the three stages of Success, cost and time which are monitored through multiple variables set by managers [XI-XII] in order to judge their project outputs. Company stake holders should be well aware internally and externally of such variables/key indicators in order to have strong and intellectual understanding with technical staff and managers. As project success and failure rates in construction project to software houses are describe in literature [XIII] [XIV] each with its own key variables performance, it can easily by concluded that project success and failure rates are hugely dependable on work type and nature and requires careful approach. IVHM process is motivated on the implication of higher empathetic analysis of the machine performance given with lower functioning data. Aiming for autonomy in machine diagnosis and prognosis, IVHM uses high levels of embedded sensor capability and knowledge of underlying operational principles to predict specific mechanical issues from early warning signs. Analyzing multifaceted and exclusive machine structures for their problems and operations, IVHM is focused in dealing issues same as engineering management by analyzing large variables using lower data. Adaptation of the IVHM methodology to the context of engineering work offers an innovative method in providing new levels of work-specific and context-specific managerial understanding.

This paper presents data analysis using IVHM method of project coordination and engineering activity. IVHM creates identifies and predicts existing with upcoming system performance automatically, for action by system engineers and also uses project monitoring on larger scales. The methodology offered within this paper aids such administrative power over automatic generation of case-based scenarios comprising direct, real-time, data-driven studies of engineering commotion, in support of monitoring, and verdict making progressions.

II. IVHM Setup:

IVHM once embedded with machine structural behavior, operates and control its functions through sensors and proposes alternative ways to improve and control quality and life of machine. Where IVHM takes responsibility of outputs behavior to control, engineering project health management (EPHM) delivers a systematic frame work on managerial level for better outputs and project success. Measurement through sensors, analysis of outputs and established structure are key factors for implementing IVHM to engineering management.

A machine systematic behavior, all responses under specific conditions are monitored by IVHM and it proposes a better solution for its operation which is a complex task as of all outputs under given conditions to which IVHM interferes with personalized composition for each case [XV]. Engineering management is just a like IVHM protocol where all activities are performed by an individual skills although highly complex yet effectively. As in IVHM, this relationship between situation distinctive and action makes a path among direct analysis and higher level system health. While
implementing IVHM in management, all the factors, situations and scenarios encrypted in from of digital operation with tools should be mentioned only then the output of the program can be effective as these input data sheets will provide basis for comprehensive analysis.

III. Framework:

The difficulty of engineering management demands noteworthy deviations in application of an IVHM approach to the engineering management domain. IVHM has ability to adapt an analytical arrangement, as compared to EPHM where its sole purpose is to support and increment current management developments. It is therefore a need for variation of the OSA-CBM outline for EPHM (see Fig. 1).

Figure 1: OSA-CBM outline

Similar to first stage of IVHM, EPHM first layer L1 consists of acquiring data traffic through digital assets and is responsible for communicating among team members, representing in charts and CAD forms and recording it in data bases etc. The second stage L2 use these digital inputs from L1 and transform it into required input which is use for analysis in L3. EPHM sets accountability on the clarification of manager, delivering a proof for their examination and successive action. It is therefore vigorous for data presentation and is measured prudently. L4 stage presents data and it should be convenient and easy to understand because presenting data through a noticeable connection to the engineering situation may comfort explanation for the manager. A noteworthy point on EPHM is that it isn’t projected as a spare for managerial tools and methodologies presently accessible, but rather as an additional suggestion base for context-specific cross-examination and judgment creation. As of their own consideration of the work, timeline and agenda, necessities, budget, etc., a manager may use detailed accepting of the actual activity to evaluate the state in contrast to their expectancy of the high performance.
IV. Implementing IVHM in case studies:

There are three cases/scenarios taken to analyze the IVHM approached study in order to facilitate management. They are covered in Table 1.

Table 1: Case Scenarios Analysis

| Scenario | Name                  | Decision | Explanation                                                                 |
|----------|-----------------------|----------|------------------------------------------------------------------------------|
| 1        | Email Communication   | L1       | Input data was email                                                         |
|          |                       | L2       | Input given on basis of emails priority                                     |
|          |                       | L3       | Discussion included lifespan of project                                       |
|          |                       | L4       | high debate areas were focused                                               |
|          |                       | L5       | judgment is through progress, work motivation of engineers                   |
| 2        | Project Difficulty    | L1       | Project Papers                                                               |
|          |                       | L2       | Information regarding project requests                                       |
|          |                       | L3       | Project intricacy conditional from ratio of internal/external information requests |
|          |                       | L4       | Numerically presented                                                        |
|          |                       | L5       | Manger suggested to hire experience staff and to focus resource management    |
| 3        | Design Accomplishment | L1       | CAD files in Design development                                              |
|          |                       | L2       | Engineers Design manipulation                                                |
|          |                       | L3       | Design development rate, and time-to-complete resolute over modeling of data against S-curve. |
|          |                       | L4       | Graphical Presentation                                                       |
|          |                       | L5       | Work should be completed according to resource settlements                    |
V. Conclusion

This article delivers a methodology for development of facts-base analogy for engineering managers, used for verdict provision and intrusion grounded directly with specific situation context. The method is termed as engineering project health monitoring (EPHM), and therefore is proposed not to deduce routine work, nor to unswervingly propose actions, involvements, or arrangements that may be functional to project, but relatively to deliver evidence in provision of the results and procedures now pretentious, condense managerial analytical exertion, and allow comprehensive consideration of the current engineering state. As such, its competences sustenance and enhance current managerial information and procedures through noteworthy allowance to situation specific administrative understanding information on which conclusions are made. EPHM draw from the well-known Integrated Vehicle Health Monitoring (IVHM) method for valuation and practical upkeep of mechanical systems. Facing comparable issues in variety of the entity of study and complexity in analysis, IVHM delivers strong evidence of the capability of such a system in generation of detailed understanding and prevention of future issues. While significant version has been required, the EPHM approach affords similar possible assistances, allowing monitoring and assessment with compassion to the effect of context and located difference in position of separate elements upon operational performance.

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