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Understanding Organisational Engineering

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Abstract: This paper analyses the concept of organisational engineering by stressing the main functions or phases to be developed and linking them with enperprise management but also emphasizing the differences. The paper also states that organisational engineering is well-founded and robust discipline.

Key words: Organisational engineering, Industrial engineering, Enterprise management, Design, Build, Operate, Improve.

1. Introduction

This paper is about organizational engineering (OE). The objectives of the paper are twofold: firstly, to introduce and clarify the concepts of organisational engineering and analysing the differences with enterprise management (EM); secondly, to demonstrate that OE is powerful engineering. This paper attempts to avoid confusion and clarify concepts. Section 2 is devoted to some definitions, Section 3 examines the differences between OE and EM, Section 4 demonstrates that OE is a discipline, and the paper finishes with a conclusions section.

2. Definitions

This section introduces the definitions of the main terms used in the paper. According to Merriam-Webster (2015):

Engineering: the work of designing and creating large structures (such as roads and bridges) or new products or systems by using scientific methods

Management: the act or skill of controlling and making decisions about a business, department, sports team, etc.

Organisation: a company, business, club, etc., that is formed for a particular purpose

Enterprise: a business organisation

These four words have lots of combinations used in natural language and in research (i.e. enterprise engineering, enterprise management, engineering management, organisational engineering, organisational management). The next few paragraphs include some definitions, and some additional ones are found in Section 3:

Enterprise engineering (Vernadat, 1996): the art of understanding, defining, specifying, analysing, and implementing business processes for the entire enterprise life cycle, so that the enterprise can achieve its objectives, be cost-effective, and be more competitive in market environment.

Enterprise management (De Miguel, 2005): the functions of plan, organise, lead and control and enterprise.

Figure 1. Enterprise Management**.**

Engineering management (IEEE, 1990): the discipline that addresses making and implementing decisions for strategic and operational leadership in current and emerging technologies and their impact on interrelated systems.

3. Organisational Engineering: definition and interactions with enterprise management

In this paper organisational engineering is used as being synonymous of the term industrial engineering. Industrial engineering according to Merriam-Webster (2015), is the engineering that deals with the design, improvement, and installation of integrated systems (as of people, materials, and energy) in industry.

Therefore, why do we use organisational engineering instead of industrial engineering?

Because in some countries (including Spain), industrial engineering has a broader sense (it includes subjects which, in other countries, are organised as several branches of engineering, such as mechanical engineering, electrical engineering, and many more. A broad analysis of this topic can be found in (Companys *et al.,* 2016).

Now the use of the term organisational engineering (OE) is clarified, OE is defined herein as:

Organisational engineering is engineering that deals with designing, building, operating and improving organisations (like processes, people, materials, information and money).

Figure 2. Organisational Engineering.

It is interesting to note that enterprise management is developed in the operating phase of OE (Figure 3).

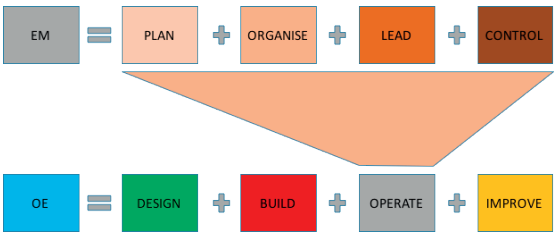

Figure 3. Organisational Engineering *vs*. Enterprise Management**.**

Figure 3 presents some ideas to discuss. The first one is that an organisational engineer addresses every stage (design, build, operate and improve) of OE. This is not obvious in other engineering disciplines. Let me translate the schema to "traditional" engineering, for example, mechanical engineering, and how this life cycle is implemented in a University programme. Normally, a major part of the program focuses on the design phase and how to facilitate the phases below to other actors:

- Build; good designs and specific tasks, such as drawings, constructive instructions, and so on, will facilitate skilled workers the construction of a, e.g., a car
- Operate; a good design, thinking about the human-machine interface and appropriate operative instructions will facilitate the car's operation for users
- Improve; sensors and indicators will provide engineers with information to improve the car.

Sometimes the mechanical engineer can be involved in other phases (i.e. it is usual in Formula 1 that engineers build the car), but it is not usual that such engineers generally participate in the operate phase (i.e. a Formula 1 driver is not usually a mechanical engineer).

This situation differs slightly when analysing this aspect in OE. Normally, OE curriculy strongly emphase knowledge about the operate part of the organisation.

This is important added value for organisational engineers. They are able to execute all the life-cycle phases of OE, but there is also a risk. The risk is to confuse engineering with management in the OE discipline, and to train engineers as managers and not as engineers with the capacity to design, build, operate (manage) and improve organisations. OE universities programmes must balance the time spent on different phases to train good organisational engineers, and it must be accepted that OE is an engineering discipline.

4. Organisational Engineering as a discipline

According to (Liles *et al.* 1995) a discipline has six basic characteristics: (1) a study focal point; (2) a world view or paradigm; (3) a set of reference disciplines used to establish the discipline; (4) principles and practices associated with the discipline; (5) an active research or theory development agenda; (6) the deployment of education and the promotion of professionalism.

The OE definition is found in Section 3. According to the definitions, the study focal point can be the development of architectures, methods and tools for OE (Ortiz *et al.,* 1999). Extensive information about points (2), (3), (4) and (5) on OE can be found in Carrasco *et al.* (2015). OE (also know as industrial engineering in many countries) has a long-standing track record in education and professionalism. Therefore, following the proposal of Liles, OE is also demonstrated as a discipline.

5. Conclusions.

This paper clarifies what OE is. The definition and main phases of the OE life cycle are presented, as well as the link with enterprise management. Additionally, OE has also been demonstrated as a founded discipline.

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