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Engineering Management Model: based on 3-layer Smart Airport Architecture

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Abstract
Achieving airport smartification requires an efficient management Patterns and models in covering airport operation, aeronautical operation and passenger services. The strategic and business objectives of this field require a step-by-step engineering model in organization and execution. Considering that in the field of aviation operations, management with perspective of general Administration does not support all aspects of effectiveness and required performance, sometimes it even causes ambiguity.
In this article, a hierarchy of Corporation, Strategy, Business, Operational, Functional and feedback layers is presented in order to cover planning, implementation and control, in the management engineering program. Also, Smart Airport Management Solution (SAMS) and Smart Airport Management Processing (SAMP) are provided in the field of Operational Experience.

Keywords: Smart Airport, Engineering Management, Operational Experience, SAMS, SAMP

Introduction

Engineering management is very important in any organization that wants to progress towards smartification and use intelligent services effectively.

This goal will be achieved by serving as the interface between strategy, business and technical side. In order for the organization not to reach intellectual maturity, the efficiency of the service is more confused by the users and ultimately contributes to the complexity of the system. The solution to this challenge would be layering method of engineering management in strategy, business and operational levels. In addition, with the overlay of Smart Airport Management Solution (SAMS) and Smart Airport Management Processing (SAMP), operational experience can be facilitated in the smart framework, such as the 3-layer architectural model of the smart airport. [1-3]

With these interpretations, the function of engineering position is how to apply, communicate and select the related attitude type, which should completely cover the lifecycle of planning, design, implementation and testing. The customization of common solutions in the management levels of smartification in the aviation industry will be another point of view of this article; which will result from the necessity of Airport Collaborative Decision Making (ACDM). [4-5]

Proposed Smart Airport Engineering Management Model

The main purpose of the engineering management model in this paper is to define strategy objectives in an applicable engineering perspective. An easy-to-use and structured procedure to choose the appropriate criteria and indicators to monitor and evaluate any kind of planning can lead organizations to their passion and help them prioritize projects.

The proposed engineering management solution layering model clearly discriminates between indicator standards suitable for evaluating the implementation of predominantly smart airport approaches versus standards that focus more on sustainability assessment. Figure.1 shows general schema of proposed model.

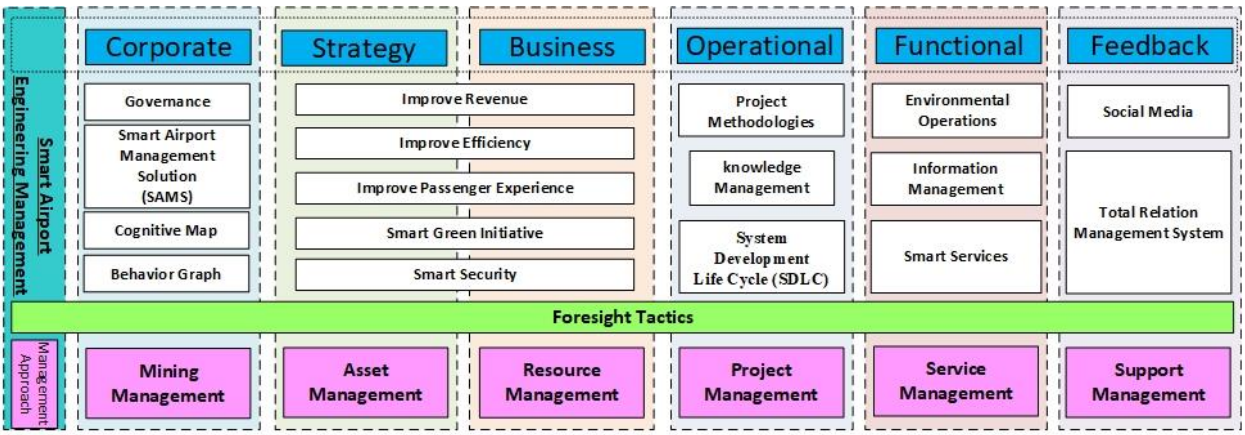

Fig. 1 Smart airport engineering management main schema

In a closer view, the mentioned layers are interpreted as follows:

Corporate

At the highest layer, the organization's strategy and foresight are accomplished from the macro-management perspective. Macro-management objectives are at the level of international governmental/non-governmental organizations and associations (e.g. ICAO & IATA) also, national governmental organizations (e.g. Ministry of road and urban development, CAO & IAC in IRAN). [6-7]

Strategy

This layer would be indicative of strategic management with a foresight perspective in the organization. The organizational semi-macro objectives of airport and its relations with other stakeholders and vendors will be controlled in this layer Obviously, the targeting of this layer is driven by the corporate approach. In addition, the prerequisites for the retail and marketing perspective of the business layer, as well as the design, operation, processing implementation, utilization, and feedback of the other layers below, originate from the strategy layer. [8-10]

Business

Business-based planning will be in line with the goals of smartification and the comprehensive approach of this layer. According to the strategy layer goals, this layer initiates scenario-path and experience lifecycle obligation. It should be noted that the concept of "business" is not the conventional concept of "trade"; In fact refers to the concept of classification, assortment, and the concept of strategy plans. These plans should be structure-based; relying on "input-output", "prerequisite / post-requisite", "priority" and "processing system dependencies". The output of this layer is through providing clear, apprehensible, and responsive programs to each layer. According to requirements and processes, the other output of this layer will be the interpretation and assortment of the business layer issues. [11-13]

Operational

From the fourth layer onwards, service and product management is considered, in which; the operational layer is used to design and frame services. It is necessary to design and implement the mentioned plans in the operational layer in addition to complying with the determination of the plans with the input-output and specific parameters of the business layer. Project Management and application a responsive methodology according to the design style and its process is one of the most significant objectives of this layer. It will also be necessary to research existing similar projects and their solutions before starting any project, which will contribute to the knowledge management perspective. The management of mindware, hardware and software to achieve the desired design(s) along with other integrated and consolidated parameters like security requirements will be seen in project management. [14-18]

Functional

The functional layer extends with the operation layer and supports technical implementation and product development, which is in line with service orientation. System and service integration results from the collaboration of business, operational and functional layers. Considering that the management, implementation, and development of each project requires tools, subservices and components, so this layer assumes this responsibility; and provides all indicators, that determined in the business layer. [14-18]

Feedback

Analysis, feedback, and improvement of each service/system will be done with the aim of improving performance, accuracy, and attitude in Feedback Layer. It guarantees the validity of the desired service/system output. There is no standard engineering process that completes requests without feedback and applying requests and fixing defects. Therefore, this layer is provided by considering all the feedbacks and using the communication and experience management method for all customers, stakeholders and sellers, with the aim of improving the service. Also, the cognitive and behavioral sub-layers of feedback use collaborative decision-making and risk management, which help improve quality of service (QoS) and quality of experience (QoE). With regard to technology foresight, which plays an important role for management models, it makes predictions and defines triggers for leveraging and scenarios for execution. And the use of foresight is necessary to become more relevant in case of organizations working in the development of complex products. [19-20]

Additionally, foresight tactics and management specification approaches will be launched for the model. The following figure (Figure.2) shows the detailed schema of smart airport engineering management model.

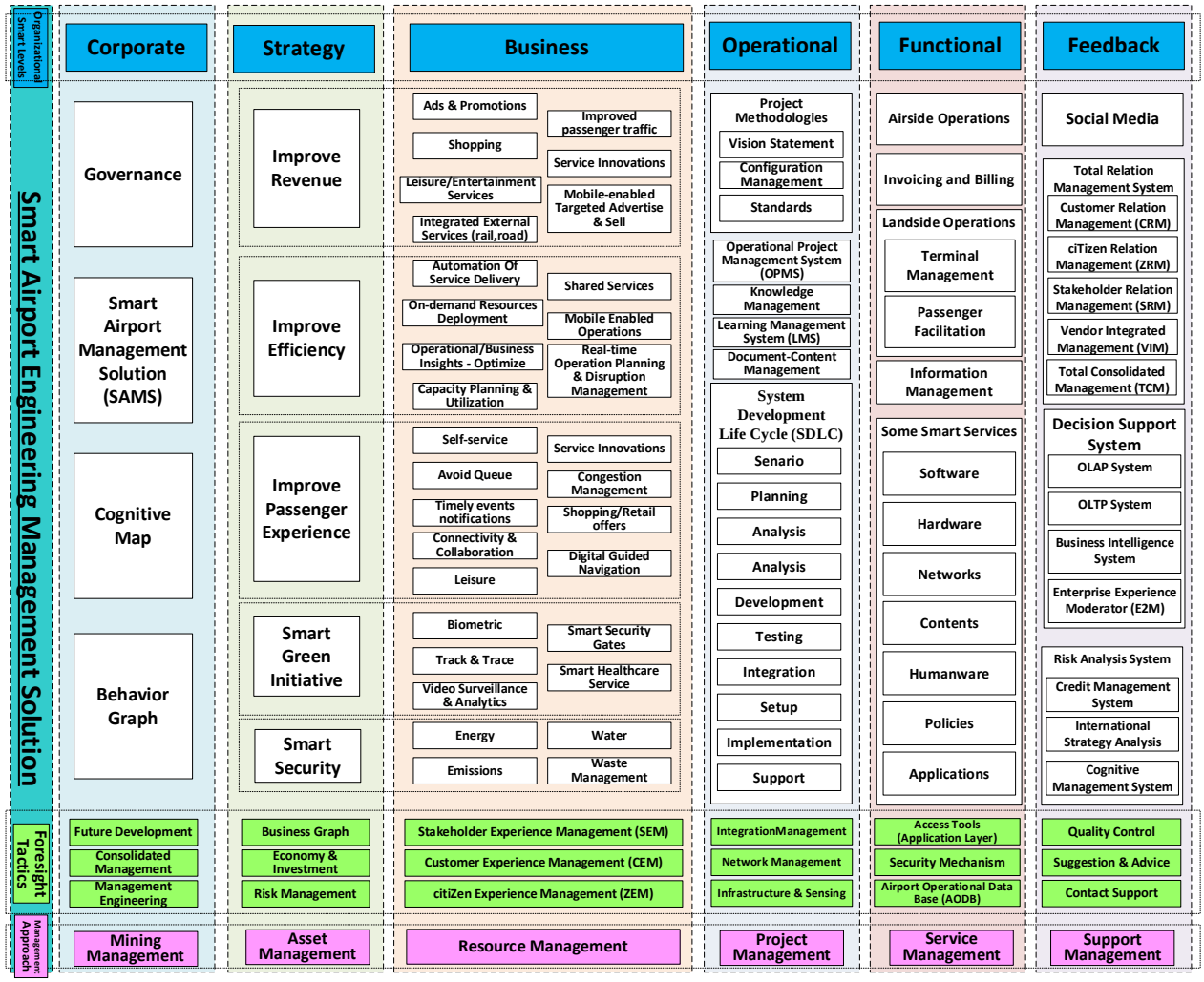

Fig. Ⅱ Smart airport engineering management model

Smart Airport Management Processing (SAMP)

According to the classification of assignments and tasks in each layer of the smart airport management solution, the processing model and work coordination between the layers should be provided. Because in engineering management, without a precise definition in the implementation of tasks at each layer, the conflict in the modeling and applying the actual management architecture will be considered. Hence, a processing method is presented to implement the smart airport architecture based on three layers. Smart airport management processing is the approach of determining and managing each layer. [10-11][16]

In addition, in this task division model (Figure.3), the assignment relationship between the layers is considered. Since the service implementation of each layer derives from the instructions of the previous layer, it manages and produces the affairs of the next layer.

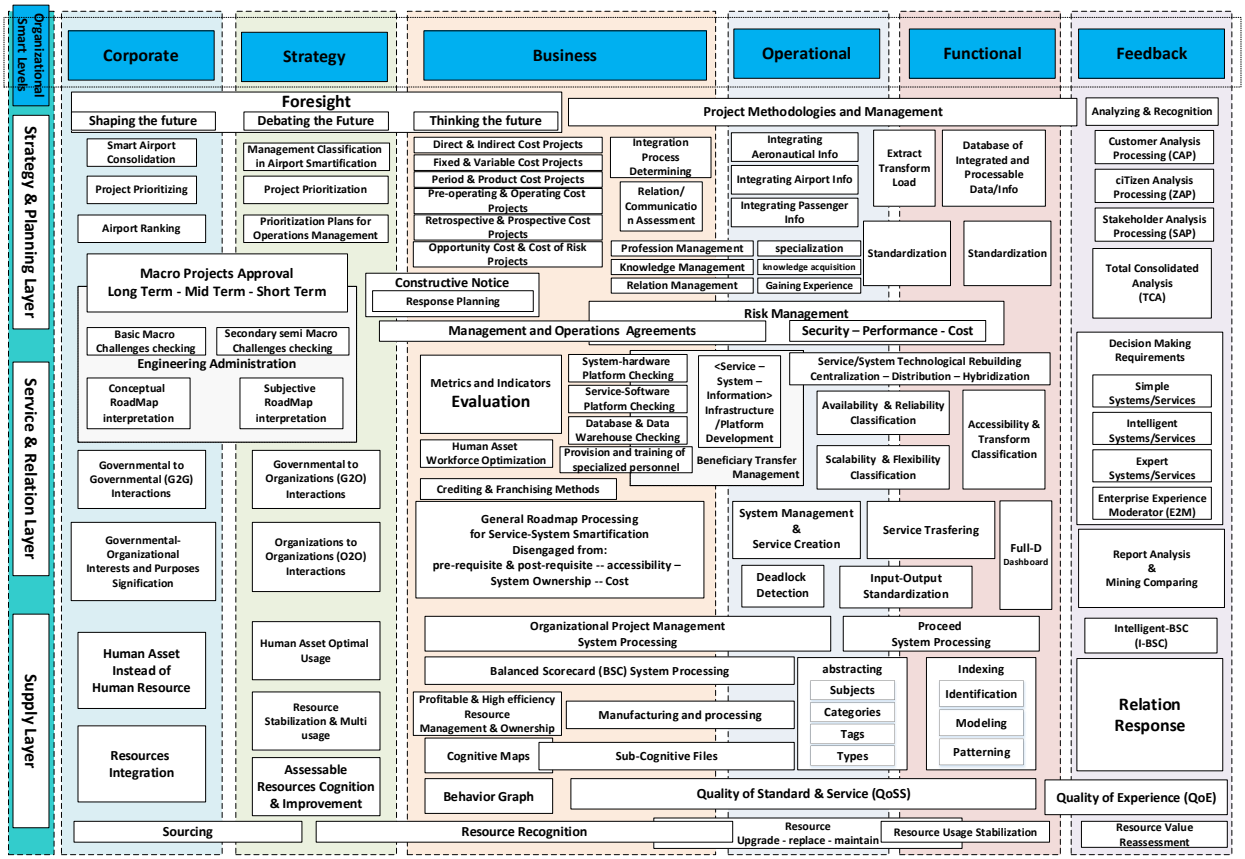

Fig. ⅢSmart airport management processing steps

Conclusion

One of the main challenges of management and its models is the inability to translate solutions into the language of technology and services. As management and models operate in corporate and strategy layers, and finally accomplish the management goals. On the other hand, operational, and service models support engineering and technological tasks. Another challenge, both in management models and in engineering models, is a different look at resources and affairs. At the same time, to solve this problem, the core business must respect the constraints at the management and engineering levels. Providing solutions and independent thinking is also relatively missing.

Thus, this paper presents a customized and applied representation of the management model in airport smartness, which covers all layers of management, business, operational, and experience. The solution is presented in the smart airport management solution and the smart airport management processing sections, and has tried to create a real engineering management.

For future work, integration with other stakeholders and vendor management models is recommended in Airport Collaborative Decision Making (ACDM). It can also be implemented with lifecycle experience in aviation and airport operations, passenger and customer services as well as consolidation management.

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