

A New Approach to Managing Application Development From Aspects of Quality

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Abstract: Objectives and methodologies for application development are derived from the business goals and financial factors, and many include productivity, flexibility and quality goals. According to V-diagram, next steps are identification and modeling for business process, business entities and design of ICT (Information and Communication Technology) infrastructure.

Many of these elements completely or partly already exist in organizations. They depict existing knowledge and usage of methods in organizations, which should be performed in order to achieve effective and efficient managing application development. Long experience of authors in design on information systems and quality systems points that large overlapping exists between these development methodologies.

It was the main reason that motivated authors to develop a new approach of integrated development of information systems, mainly application development, and quality management systems (QMS). This approach is tested in several organizations in the field of production.

In this paper we presented a basic of a new approach for application development based on processes and QMS. Several characteristic solutions of process model and data model are presented

Keywords: application development, QMS

1. INTRODUCTION

Application development process in organization is the result of many previous activities mostly in the field of strategic planning for information systems and usage of existing methods [1,2]. This process is accompanied with risk. Portfolio of application is presented on the figure 1. Application portfolio could be divided in the four groups according to aspects of risk management: strategic, high potential, key operational and support. Authors' experiences are mostly in the field of application development with high risk as well as application development with known

and low risk. The new approach for obtaining the business benefits of applications is presented in this paper. This approach is based on description of processes in QMS. The next step is development of process model and data model, and realization of the most effective and efficient application management. The key activity in this new approach is definition of mutual goals and strategy of integration of ICT/QMS or in the later phase integration of CIM/TQM environment.

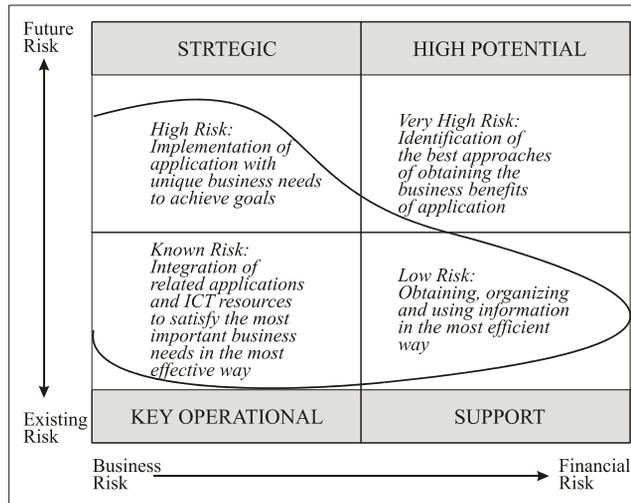


Figure 1. Application portfolio form aspect of risk management

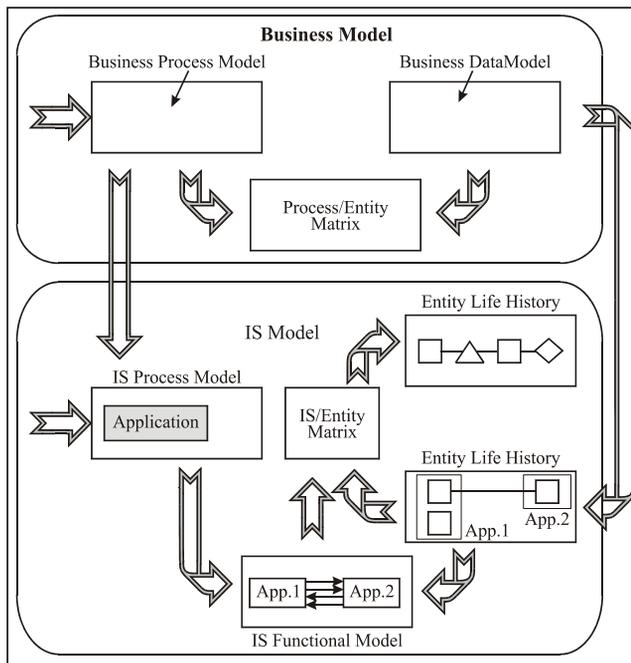


Figure 2. Integration of Business and IS model, based on Cook 1995.

2. THE NEW APPROACH TO MANAGING APPLICATION DEVELOPMENT

Awareness of importance of integration of business systems and information systems

is not new (Cook 1995), or more precisely it could be dated in the last years of 70's, starting for instance with BSP (Business System Planning) method strongly supported by IBM. The model (according to Cook 1995) of architecture

which integrates business and IS model is presented on the figure 2. Methods for modeling of business processes are numerous. ON the other hand, research performed in Serbia (in 100 organizations) points on low implementation of modern methods. (Table 1 and Figure 2).

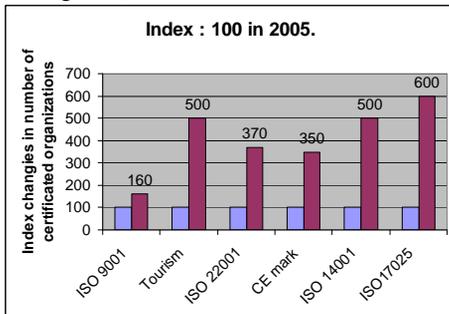


Figure 3. Implementation of modeling method of implementation of QMS on sample of 100 organizations

The basis for implementation of this new approach in the field of application development is implementation of appropriate methods, mostly process oriented ones, such BSP, HIPO, SSA, SADT and IDEF. This is especially important in conditions where developed ICT infrastructure does not exist (absence of IS and appropriate entities and objects make implementation of object – oriented methods very hard). Model of integrated design of IS and QMS based on “V-model” of IS design is presented on figure 4.

In order to implement this model successfully it is necessary to interconnect business goals and IS goals (analysis is presented in table 2).

Evaluation of fulfillment of these goals is performed based on model of quality goals as integrated goal which includes flexibility, productivity, and sub goals of quality in the narrow sense

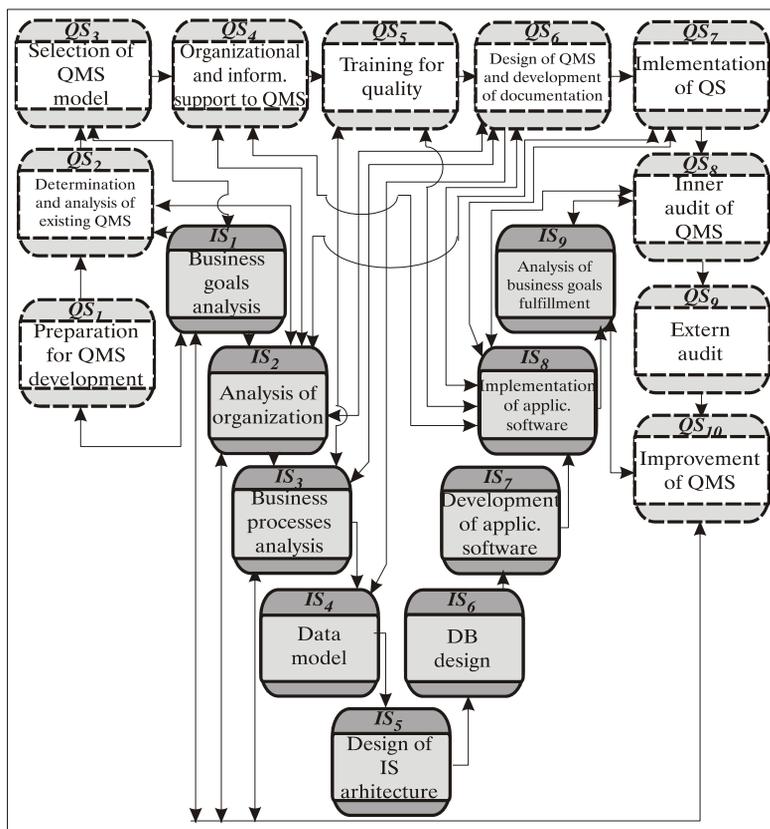


Figure 4. Model of integrated design of IS and QMS

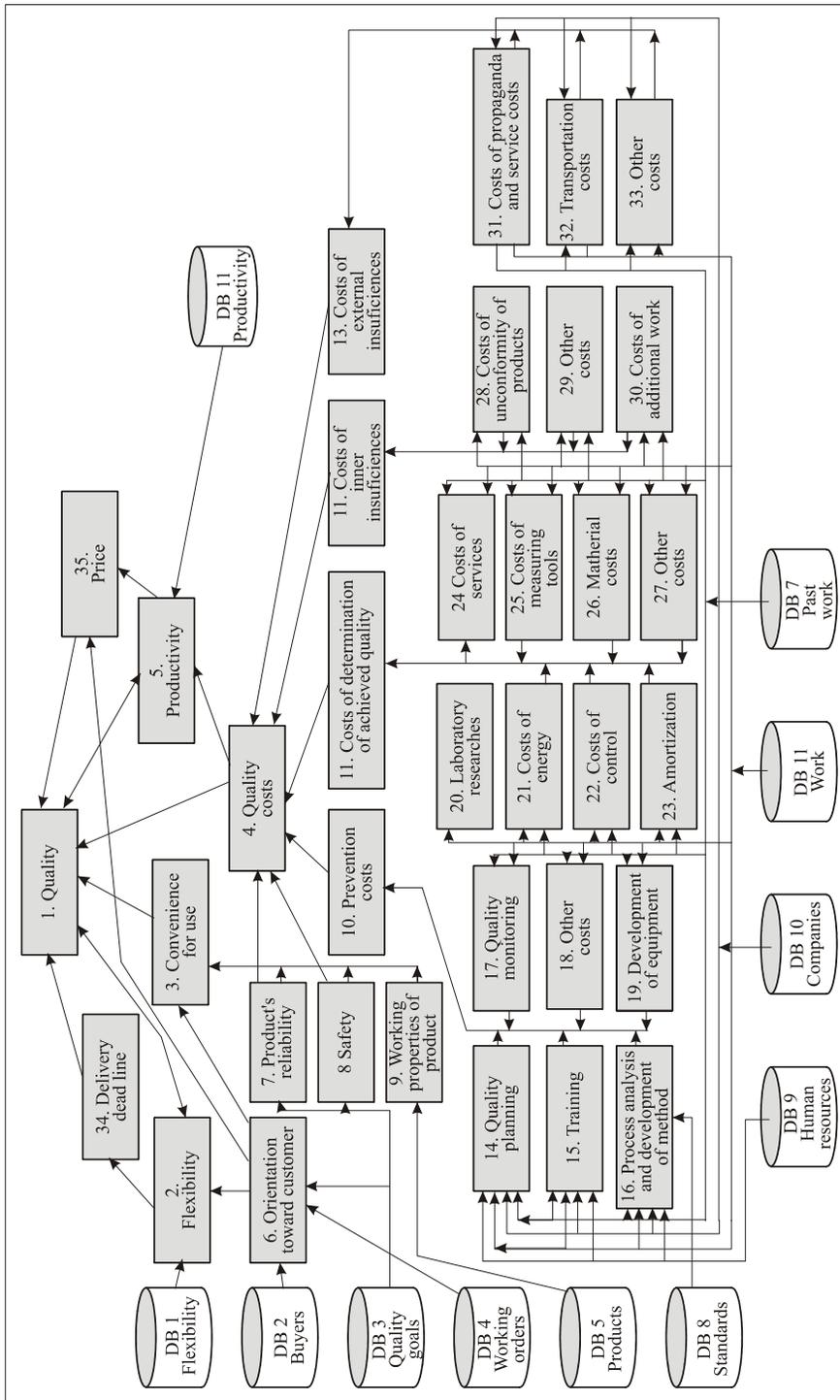


Figure 5. Model of quality goals in organization

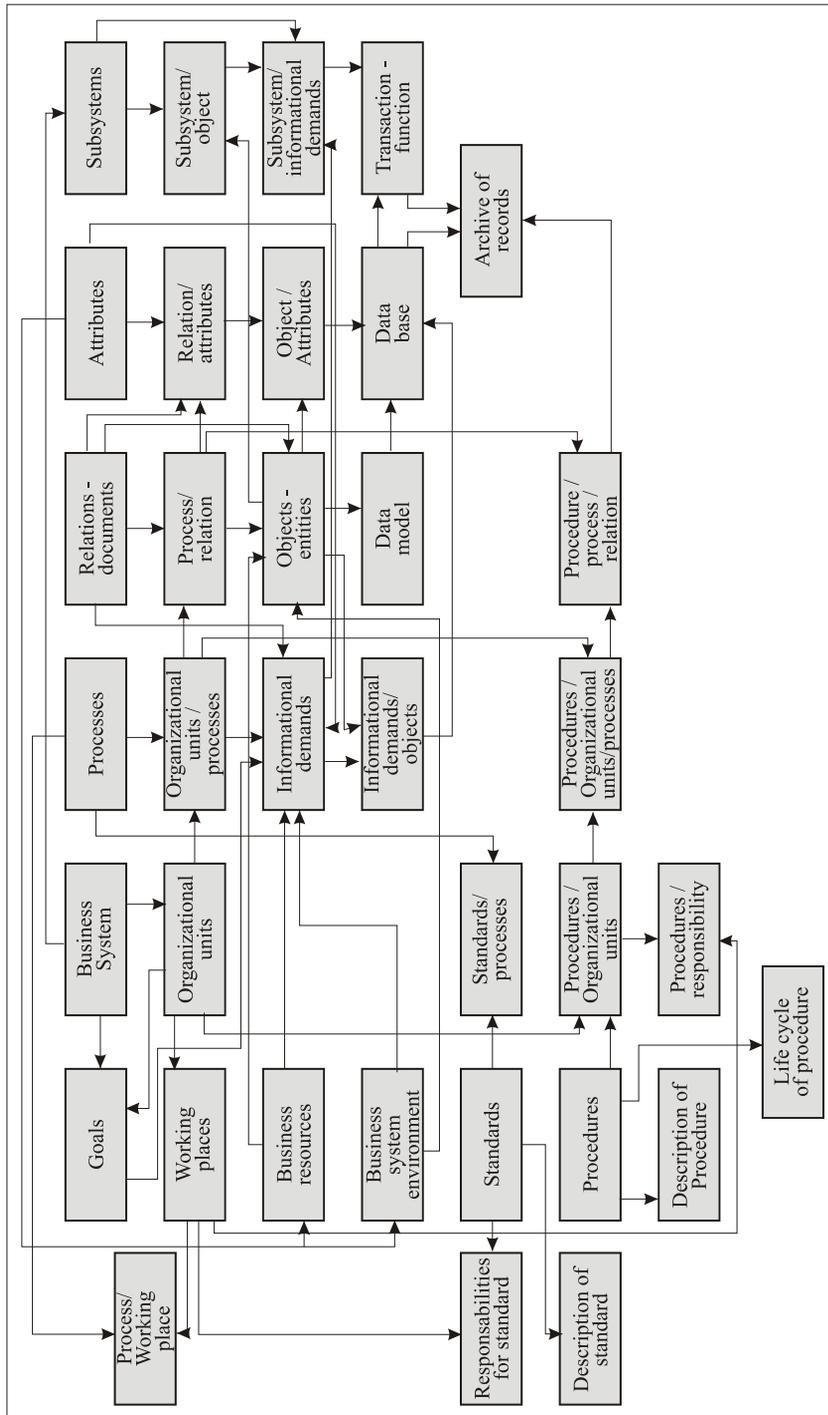


Figure 6. Data model for design of IS using QMS documentation

The general data for calculation of quality goals fulfillment is stored in data base which is a part of integrated IS/QMS system.

Relations between phases of IS (ISi) and QMS (QMSi) are presented by arrows and marked as Rij and Rji. Among presented relations, for purpose of this paper, especially important are following relations:

- Influence of data modeling on design of QMS and vice versa. This relation points that entities and attributes in data model are developed based of QMS demands and vide versa.
R₄₆
- Integration of goals and strategy of IS and QMS.
R₁₁
- Influence of implementation of applicative software on inner audit control and vice versa. This relation points that implementation of application causes changes in working
R₈₈

procedures.

- R₉ Influence of fulfillment of business goals and improvement of QMS. This relation points that analysis of fulfillment of business goals using IS could additionally include in program of QMS improvement.

Application, as one of important parts of IS are important support for integration of processes and resources in QMS. Appropriate communication infrastructure enables integration of business processes and resources.

Based on previous discussion of a new approach, a new methodology is designed for development of IS based on documentation of QMS.

Data model for development of software for development of new and updating of existing objects (entities) in QMS and IS, is presented on figure 6.

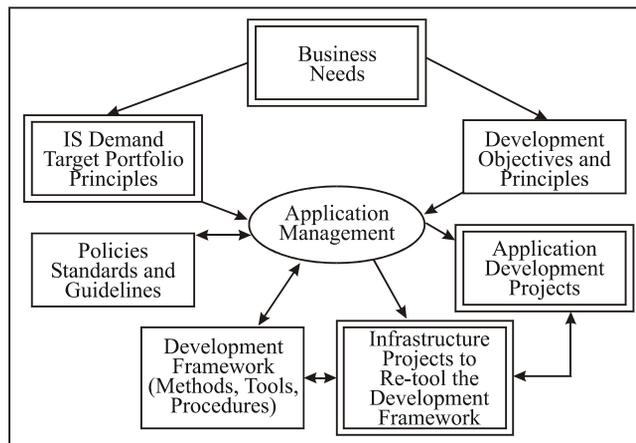


Figure 7. The application management framework

3. SPECIFIC CHARACTERISTICS OF MANAGEMENT APPLICATION DEVELOPMENT USING SUGGESTED APPROACH

Analysis of existing application management framework (figure 7) it is possible to define segments that could be influenced by new approach. These segments are:

- § Business Needs: by documentation of QMS.
- § Development Objectives and Principles: by quality goals and

methodology of integrated QMS/IS approach.

- § IS Demand Target Portfolio Principles: by priorities of information and communication “cover” of key processes in QMS.
- § Application Development Projects: by integrated implementation of QMS and IS.
- § Infrastructure Projects to Re-tool the Development Framework: using new procedures of QMS and new ICT infrastructure.

	No.	Phase	6	12	28	24
QMS	1	Preparation for QMS				
	2	Analysis of organization	█			
	3	Selection of QMS model		█		
	4	Organizational and ICT support	█			
	5	Training for QMS	█	█		
	6	QMS design		█		
	7	QMS implementation		█	█	
	8	Inner audits			█	
	9	Extern audits			█	
	10	QMS improvement			█	█
IS	1	Business goals analysis	█			
	2	Analysis of organization	█			
	3	Business process analysis		█		
	4	Data modeling		█		
	5	IS infrastructure design and implementation	█	█		
	6	DB design		█		
	7	Development of application		█	█	
	8	Implementation of application		█	█	
	9	Analysis of goals achievement			█	█

Figure 8. An example of integrated application development (Factory of automotive parts, Gornji Milanovac Serbia)

Authors' experience in the field of integrated design of IT and QMS are 15 years long. Activities in the case of Factory of automotive parts, Gornji Milanovac Serbia are presented on the figure 8.

On this basis developed IS become strong support for QMS development in following segments:

- § Communication between employees and teams for improvement of quality,
- § Effective and efficient quality management (required by ISO 9001:2000),
- § Process of decision making about strategic quality goals [],
- § Implementation of methods and tools of quality (SPC, QFD, FMEA etc),
- § Development of documentation of QMS,
- § Identification and simulation of quality goals,
- § Integration of business processes and QMS resources,
- § Implementation of QMS, specially in support of:

- Education and training,
- Resource and activities planning,
- Monitoring of QMS implementation,
- Monitoring of corrective actions,
- Monitoring of changes,
- Monitoring of quality costs.

Method for quality economics with specially designer system of quality costs management is developed in Center for Quality and CIM center, Faculty of Mechanical Engineering, University of Kragujevac, Serbia. The results of analysis in many organizations points that starting level of quality costs, as one of the goals, could be decreased using suggested method (figure 9). In the first phase these costs increase due to training costs and investments in infrastructure. With the beginning of implementation of integrated management of IS/QMS< quality costs start to decrease to the level of "natural" quality costs ("natural" costs refer to preventive costs and appraisal costs).

Level and speed of reduction of costs depends on type of organization, level of support to the business processes, and specially key processes and level of implementation of modern ICT. Based on authors' experience after 3rd year we

could expect the return of investment, if we include all aspects of risk (business, economic etc.).

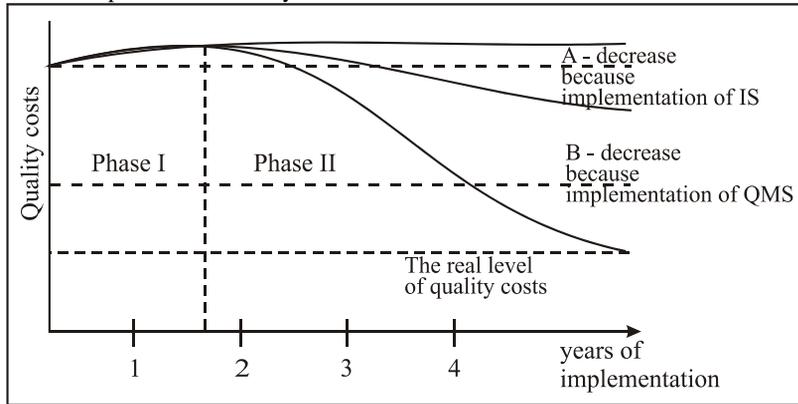


Figure 9. Quality cost decrease as a result of implementation of integrated approach

4. CONCLUSION

Based on previous discussion we can make following conclusion:

- § Managing application development is complex process, connected with risks and strategic decisions,
- § Electivity of this process largely depends on implemented approach for application development and management of this process,
- § The new approach is based on documentation of QMS and enables higher affectivity presented with time for application development, coverage of key

processes and economical effects of IS implementation,

- § Results of implementation of this new approach of managing application development points to decrease of number of non-conformities, e.g. quality costs in organizations.

Special advantage of this new approach is synergic effect of IS and QMS on business performances. On the short term, it is presented by higher customers' satisfaction, customers' loyalty, and better quality of products or services. On the long term it is presented by increase of indicators of economic effectiveness and efficiency.

REFERENCES:

- [1] Porter M., (1985): Competitive Advantage: Creation and Sustaining Superior Performance, Free Press, Simon & Schuster Inc.
- [2] Arsovski S., Arsovski Z., Perovic M., (1995): Development of CIM systems, CIM center, Faculty of Mechanical Engineering, Kragujevac (in Serbian)
- [3] Turban E., McLean E., Wetherbe J., (1996): Information Technology for Management: Improving Quality and Productivity, John Wiley & Sons Inc., New York
- [4] Sommerville I., Sawyer P., (1997): Requirements Engineering, , John Wiley & Sons Inc., New York
- [5] Brown D., (1997): An Introduction to Object Oriented Analysis, , John Wiley & Sons Inc., New York
- [6] Collins B., Huger E., (1993): Management by Policy, ASQC Quality Press, Milwaukee, Wisconsin
- [7] Arsovski S., Arsovski Z., Mirovic Z., (1995): Development of Software for Simulation of Quality Goals, Quality and Standardization, Vol. 1-2, p. 1-5, Belgrade (in Serbian)

- [8] Booch G., (1994): Object – Oriented Analysis and Design, The Benjamin / Cummings Publishing Company Inc., New York
- [9] Rao A., et all (1996): Total Quality Management: A Cross Functional Perspective, , John Wiley & Sons Inc., New York
- [10] Bolwijn, et all (1986): Flexible Manufacturing – Integrated Technological and Social Innovation, Elsevier Press, Amsterdam
- [11] Ward J., Griffiths P., (1996): Strategic Planning for Information Systems, 2nd Edition, John Willey & Sons
- [12] Whitten J., Bentley L., (1998): System Analysis and Design Methods, McGraw Hill
- [13] Valacich J., (2001): Essentials of System Analysis, Prentice Hall
- [14] Applegate L., McFarlan W., McKenney J., (1999): Corporate Information Systems Management, McGraw Hill
- [15] Martin W., et. all. (2002): Managing Information Technology, Prentice Hall
- [16] Wysocki R., DeMichell R., (1997): Managing Information Across the Enterprise, John Willey & Sons
- [17] Brande E., (2001): Software Engineering An Object Oriented Perspective, John Willey & Sons
- [18] Umar A., (1997): Application (Re)Engineering, Prentice Hall
- [19] Kendall K., Kendall J., (2005): System Analysis and Design, Prentice Hall
- [20] Zahedi F., (1995), Quality Information Systems, Boyd & Fraser Publishing Company
- [21] Huges B., Cotterell M., (2002): Software Project Management, McGraw Hill

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