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Evangelos Markopoulos, Javier Bilbao, Eugenio Bravo, Todor Stoilov,
Tanjia E. J. Vos, Carlo Figa Talamanca, Katrin Reschwamm

Project Management Stage Mutations within Agile Methodological Framework Process Transformations

EVANGELOS MARKOPOULOS[1], JAVIER BILBAO[2], EUGENIO BRAVO[2], TODOR STOILOV[3],
TANJIA E.J. VOS[4], CARLO FIGA' TALAMANCA[5], KATRIN RESCHWAMM[6]

[1]Department of Informatics
University of Piraeus
80 Karaoli & Dimitriou Str.,
Piraeus
GREECE
epm@unipi.gr

[2]Applied Mathematics Dept
University of the Basque
Country
Alda. Urkijo s/n., Bilbao
SPAIN
javier.bilbao@ehu.es

[3]Dept Hierarchical Systems, Institute
of Computer and Communication
Systems
Bulgarian Academy of Sciences
Acad. Bonchev str. Sofia
BULGARIA
todor@hsi.iccs.bas.bg

[4]Information Technology
Institute
University of Valencia
Camino de Vera s/n,
Valencia
SPAIN
tanja@iti.upv.es

[5]Technology Division – ICT
Area
Via Giacomo Peroni 386,
Roma
ITALY
c.talamanca@innova-eu.net

[6]The Fraunhofer Institute for Factory
Operation and Automation
Fraunhofer IFF, ICCL
Sandtorstrasse 22, Magdeburg
GERMANY
katrin.reschwamm@iff.fraunhofer.de

Abstract:- Projects are living entities. They are born with the project idea and end with the project termination. The time in between can last for many years, in most of the cases, requiring continuous implementation and management effort.   Over the time project changes on requirements change the implementation process and in turn the management process, the maintenance process and so on. In order to maintain qualitative and quantitative project results both the project implementation and management processes need to be adjusted in the overall project changes and environment. This adjustment can be made by using agile project management methodologies, defining processes based on the identification of the project goals, constraints and expatiations. Unfortunately that is not enough, and projects, especially software projects are still in implementation and management crisis. This paper presents the concept of process mutation on project management methodological frameworks as a supplementary method to the agile models and agility the concept.

Key-Words: - Project Management, Process Mutation, Agility, Process Framework

1   Introduction

Dynamic organizational environments are continuously changed, and the project management processes on theses environments shall be adjusted to theses changes. The adjustment of the project management processes is based on the freedom and capability of the project management methodology used [1]. Today, agile methodologies allow some type of process change based within the logic, objectives and processes of the methodology. The capability to integrate methodologies in order to successfully approach a project goal or objective can be very risky but also necessary. As project management facets and dimensions change over the project implementation period there is also a need for changes in the methods and practices used to manage the implementation process of the project. This need can be viewed as process mutation, where processes are evolved form different methodological approaches into one management model using different processes from different methodologies on different project management phases and stages.

2   The concept of Process Mutation

The notion of mutation was always as a means of interpreting, and sometimes misinterpreting complex information technology problems. The Formal Transformation Model [2], for example, does nothing more than restraining a project's development to a finite set of technical stages, and reapplying them, thus gradually forming the final

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outcome, through a so called transformation.

The Evolutionary Development Model [3] functions similarly; it also breaks a project down to numerous subprojects, the latter being defined by specific development phases, and managing each subprojects individually.

According to the previously mentioned examples, the implementation of a project can be evolved through its implementation stages differently. This project process evolution can be characterized as an implementation process mutation on the project implementation phases and constraints.

3 Appling process mutation on the systems development life cycle

It is commonly used in a project, to define the planning activities for its execution as the first project implementation phase. When a project is in the phase of planning, then several methodologies, such as the SDPP, RDPP, COCOMO, Function Point Analysis, 5 Step and others, which base the management effort primarily on the planning activities, could be possible used alone or in conjunction with other methodologies such as the PROMPT, PRINCE, PRODIGY, SUPRA, etc, which base the management effort primarily on the project organization activities. The combination of such methodological approaches in the project planning phase could be an ideal one, preparing the project to move into more technical phases where other type of methodologies could possible take over the project management support.

A possible project implementation phase following the project planning phase could be the project implementation estimation phase, where the input of the planning phase is used to identify quantitative and qualitative implementation and management goals and targets. Possible methodologies that could be used in this phase could be the SCALABLE, TENSTEP, BPMM, RDPP, SDPP, Ariadne-PM, IPM and other, specialized on project implementation estimation.

After the project planning and implementation estimation phases the project moves in to the more technical and engineering phases which manages the actual realization of the project requirements and development of the project deliverables. Those implementation phases which can be the requirements management, systems analysis, systems design, coding, parameterization, system testing, system integration, system documentation and others can be very well supported by technically

oriented management methodologies such as I.E., LCM-AIS, DoD-STD-2167A, SEFER, WWPMM, DSDM, SDLC, AIM, ITPM, and other.

It is clear that over the years different methodological approaches have been developed in order to solve one part or hopefully the entire management process in the implementation of an information technology project [4]. Unfortunately the crisis in information systems project management, and even more in software project management was, is and seems that will still be [5].

The integration of processes deriving from different methodologies not only in specific project phases, but even in specific activities within a specific project phase can significantly support the management effort. This process selection, per case can be considered as an activity with surgical sensitivity on selected project needs and constraints. On the other hand the determination of the selected processes form specific methodologies for specific project activities can not be predefined since the determination of the way the environment of the project will change or react on different types of changes can not be predicted. The project management processes will be mutated based on the behavior or the project environment and the project progress. This mutation will the one that will realize the needs for specific processes on specific project implementation activities.

4 Systems development and systems acquisition process mutation

An information technology project does not need to be a systems implementation project specifically. Information technology projects can also be the systems acquisition projects, where organizations purchase technologies instead of developing them [6]. The management of the acquisition process can also be supported by many methodologies such as SA-CMM, Ariadne-PM, ITIL, ITPM, WWPMM, and others based on the acquisition phases, goals, and other project constraints [7].

The total project implementation or project acquisition phases could possibly be represented by a mutational information technology project management model, where each stage and even more each stage activity could be supported by a specific management technique, method or approach (Figure 1).

On the other hand it is widely accepted that each project must follow a specific project management method in order to assure consistency on its development management and also maintenance

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effort [8]. Unfortunately no methodology can be considered as the silver bullet or the one that can successfully support all management goals and objectives under all project constraints. It is clear that a methodology besides the need to be readjusted on the environment of each project, and not only to the goals and objectives of each project, must also be readjusted to the needs and objectives of each implementation phase on each project.
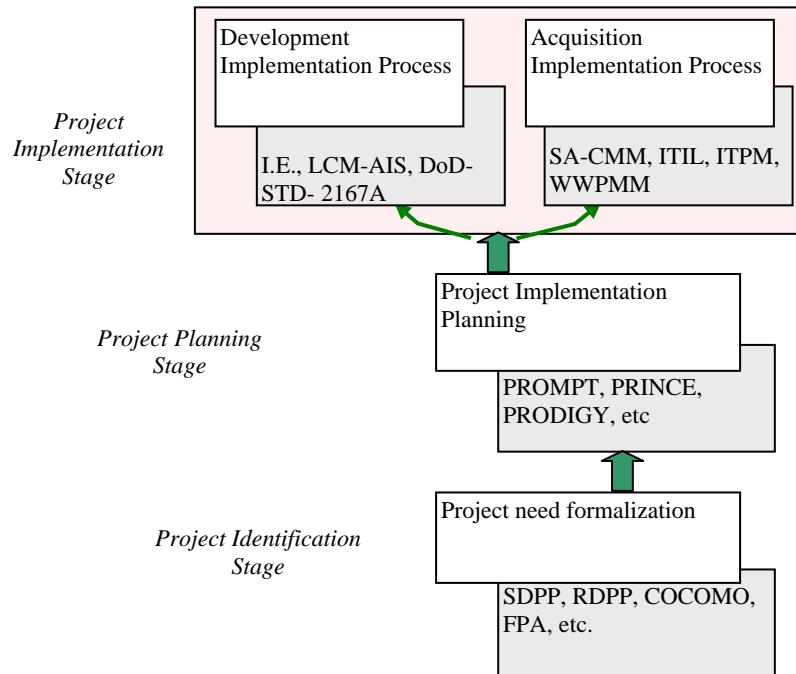

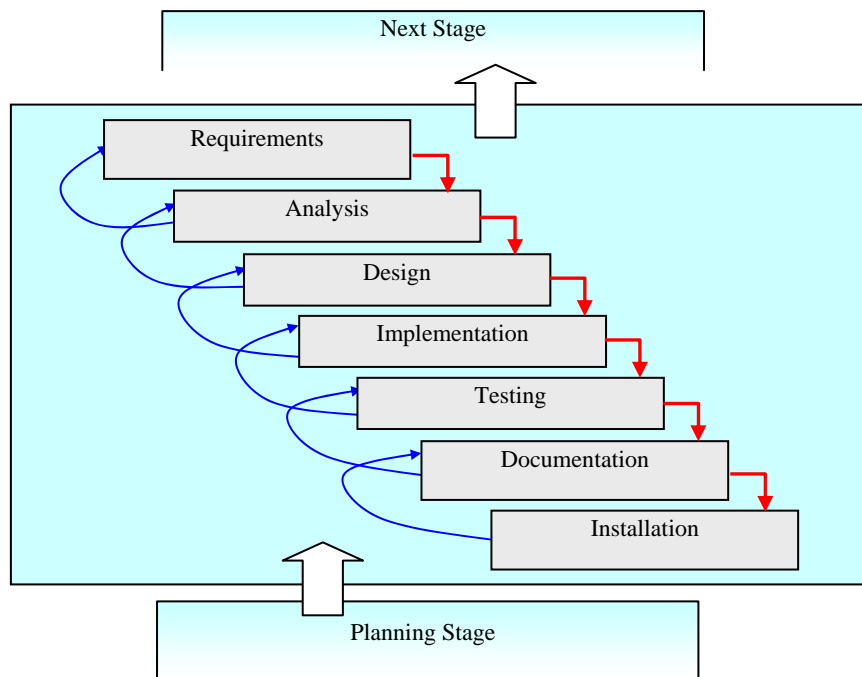Fig. 1. Methodological approaches per project phase

Fig. 2. Indicative Systems Development Framework

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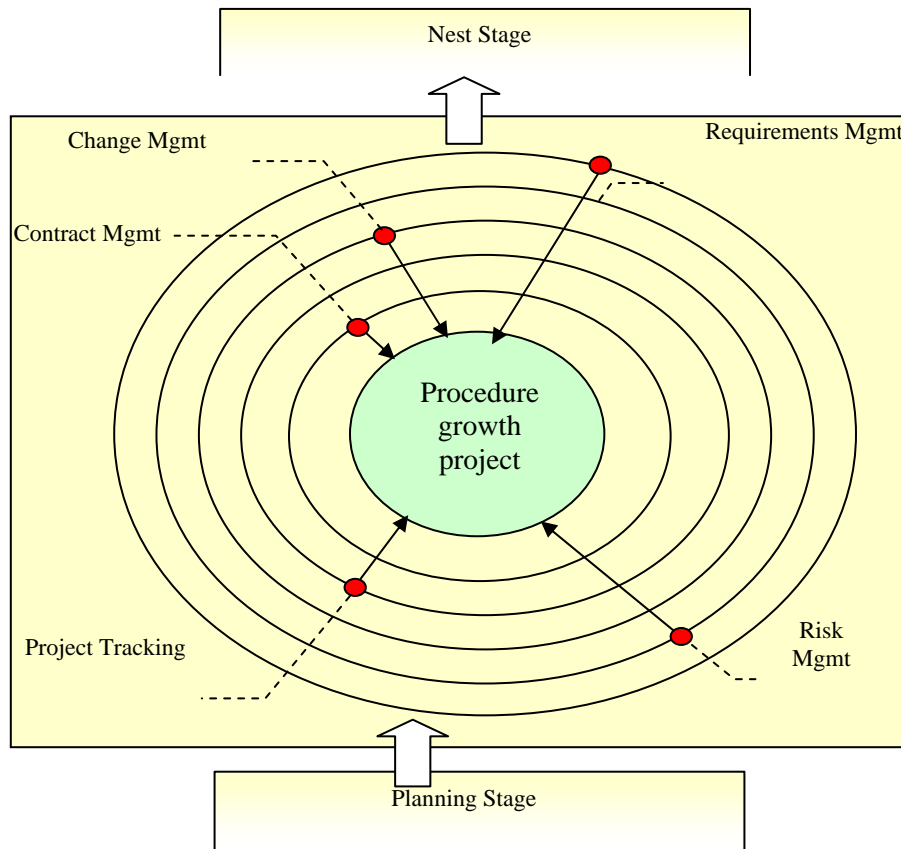Tanjia E. J. Vos, Carlo Figa Talamanca, Katrin Reschwamm

Fig. 3. Indicative Systems Acquisition Framework.

In such project management process transformation need the mutational project management concept can be complementary on the agile project management concept since both are based on the readjustment of the management processes on the project needs affected by the project's environment [9]. The difference between project process transformation and project process mutation is that the agility of the process transformation, which is the adjustment of the processes, is replaced with the agility of the process mutation which is the replacement of the process with other more suitable process in order to meet the specific process goals and objectives per case and per instance.

5 Process Mutation in Project Management Frameworks

A project management framework, unlike a project management methodology has the flexibility to be adjusted to the project needs, goals and constraints [10]. A framework can be consisted from many phases and many processes per phase, where a process transformation takes place every time a new

project is introduced. Process frameworks are characterized by the agility concept. In frameworks there is a method, an approach, a standard, philology, a logic, but no strict rules, specific phases, specific process or process dependencies.

The waterfall model [11] used in figure 2, in order to represent the implementation approach of the development stages in a project management framework is indicative. Other development models such as the spiral [12], or the RAD [13] could be possible used base on the project implementation goals that might be consistency, risk management or fast results delivery.

Under the same approach, the satellite processes [2] selected to support the management of a systems acquisition method, per system acquisition phase are also indicative (Figure 3).

Each framework is supported by all the processes needed per case, functioning like a tailored project management methodology for the needs of the specify project.

In project management frameworks the process mutation moves a level up and becomes stage mutation. A stage in a framework can be composed out of processes whose total can form a sub methodology for the implementation of that specific

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stage. The changes in the methodologies selected to support the goals and objectives of each framework implementation stage can not be restricted since all methodologies derive from the frameworks processes, and are all treated as one methodology which is the overall framework.

A more specific process differentiating on the process transformation is based on the project stage mutation forces makes the project management framework create new methodological approaches form the framework process in order to manage the project mutation stages. On the contrary an agile project management framework incorporates all the project mutations that primarily take place at the project implementation stages, supported with process within the framework and not outside of it from different other methodologies or even frameworks.

6 Project Mutation Stages

The identification and determination of the project management approach is the first project management mutation within a project management framework. If the project is difficult technically to be implemented then emphasis will be given on engineering processes and technical management approaches, instead of a planning and tracking oriented approaches.

The second project management framework mutation is the adaptation of project management framework on the project management approach, which is the identification of the stages that will compose the implementation framework , the stages of the framework and the process in each stage.

The third mutation of the project is based on the way the framework phases and processes are actually applied on the project implementation. Depending on the project scope, objectives, restrictions, management dimension and other project determination elements, the project implementation model is selected. In systems development projects the selection of the project implementation model is more difficult than the selection of the project implementation models in a systems acquisition project. There are many well defined project implementation models today that can guide the implementation process regardless its restrictions constraints and objectives. From the all time classic waterfall model to the also classic spiral development models, to the incremental development, evolutionally development, RAD, and many others. The selection of the development approach and model, based on the project needs, is very critical since the phases of the model itself,

within the framework can pass several mutations.

The fourth project management framework mutation is based on the determination of maturity of organization that will adopt the project management framework and the methodology derived from the framework for the specific project.

This mutation could become also after the first mutation in order to determines the capability of the organization to manage and implement the project in the first place [14].

Organizations with low technological and technocratic maturity rarely achieve project management success. On the other hand, the same framework mutation can be also applied after the completion of the project in order to determine the process requirements for the maintenance of the project. In general this mutation phase is all based on the capability of the people to initially identify their capability to understand the project, then to management it and after that to maintain it. It is a very critical mutation of the project management framework since in can be applied in many stages of the project lifecycle with different objectives and goals on each one.

The fifth and last mutation in the project management framework begins with the completion of the project and the initiation of its maintenance period. A project actually begins after its implementation.

Figure 4 presents the mutations of an agile project management framework towards the management of an information technology systems development project. Respectively figure 5 presents the mutations of an agile project management framework towards the management of an information technology systems acquisition project.

In general a complete information technology project management framework must include both essential sub-frameworks for the management of the development and the management of the acquisition process.

Unfortunately no matter how many attempts have been made or will be made to converge effectively the systems development processes with the systems acquisition processes, the prime constraint which also differentiates the management approaches is and will be the project manager [15] and will always be present. System developers view the project management processes based on the achievement of technical quality and system maintainability, but technology customers performing acquisition management view the management process by the assurance on the return on their investments, usability, availability ad other

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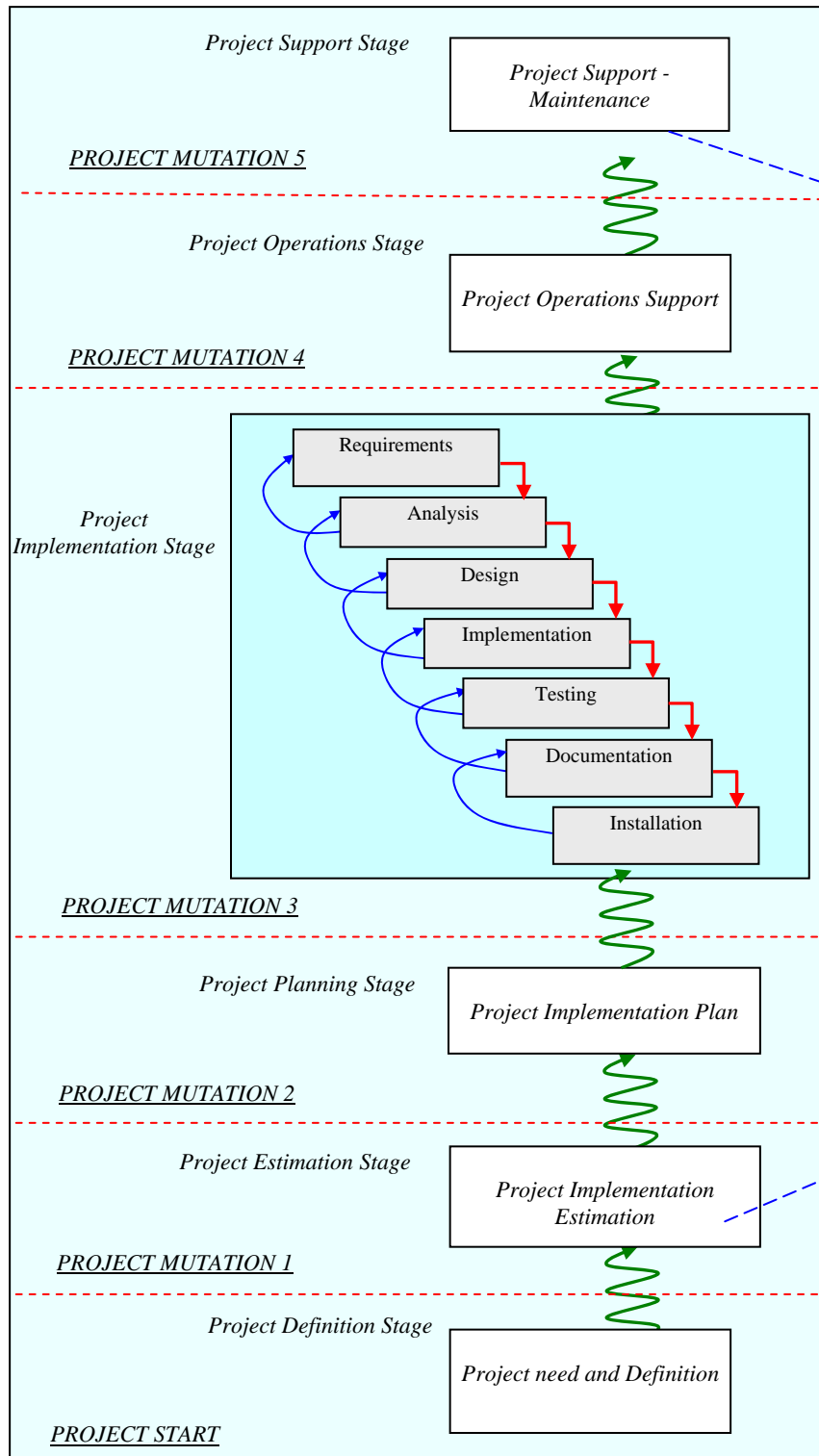Tanjia E. J. Vos, Carlo Figa Talamanca, Katrin Reschwamm

Fig. 4. Project management mutational model for implementation process of information systems.

non functional requirements and qualitative elements.

Figure 6 presents the difficulty of this process convergence. Despite the fact that both type of project managers can adopt the same framework mutations and process transformations, when it comes to the actually project implementation stages, the project is viewed by each one differently.

8 Results

The mutational project management frameworks are

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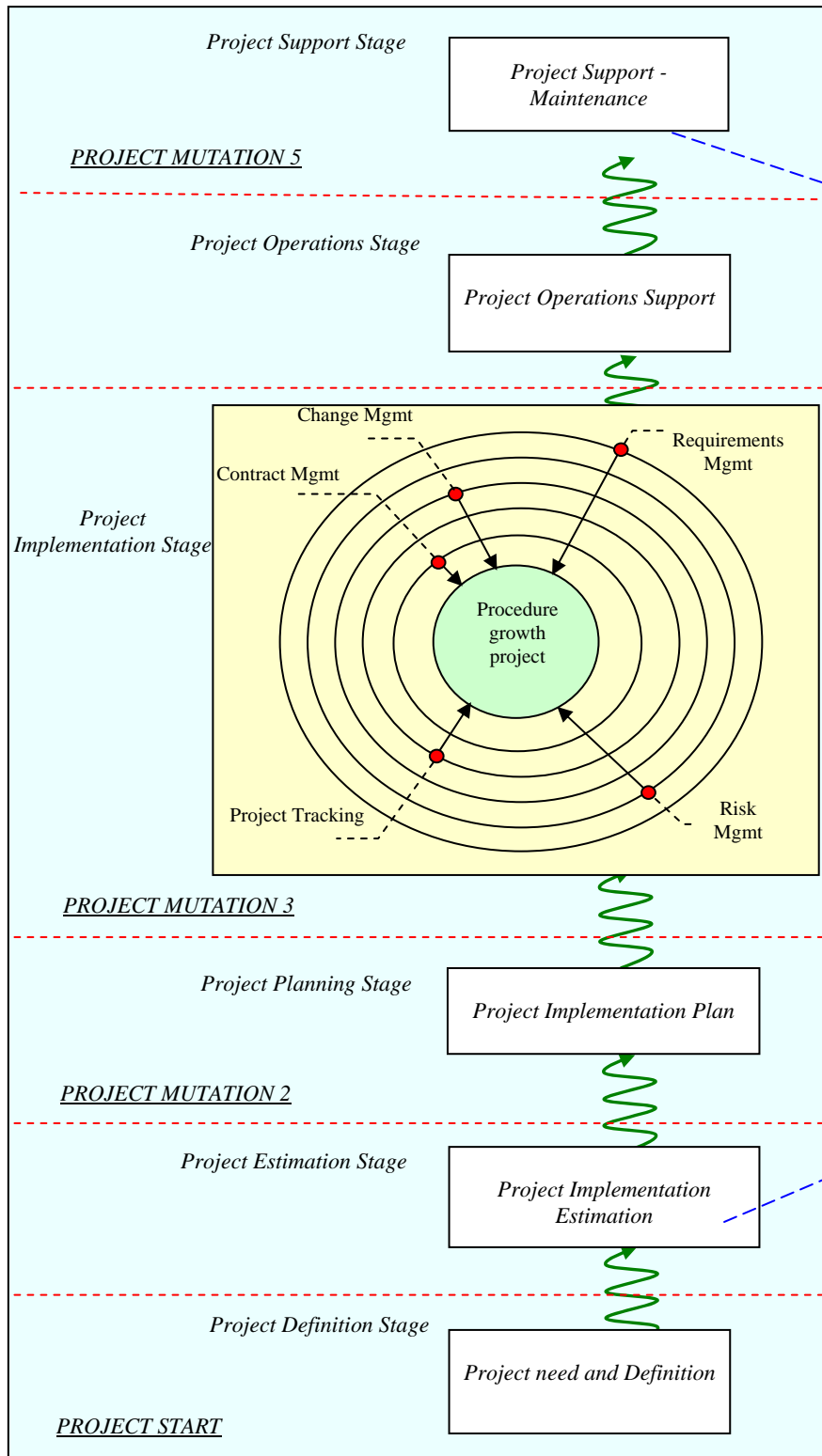Tanjia E. J. Vos, Carlo Figa Talamanca, Katrin Reschwamm

Fig. 5. Project management mutational model for acquisition process of information systems.

quite confusing elements which exist in the real work and need further research for a real and acceptable approach. In order to achieve successful project management on information technology projects and investments hundreds of methodologies have been developed.[16] Unfortunately they all work for specific projects under specific constraints and project goals.

The decomposition of the project management methodologies into project management stages, and then phases and then process, can allow the synthesis of project management models per project

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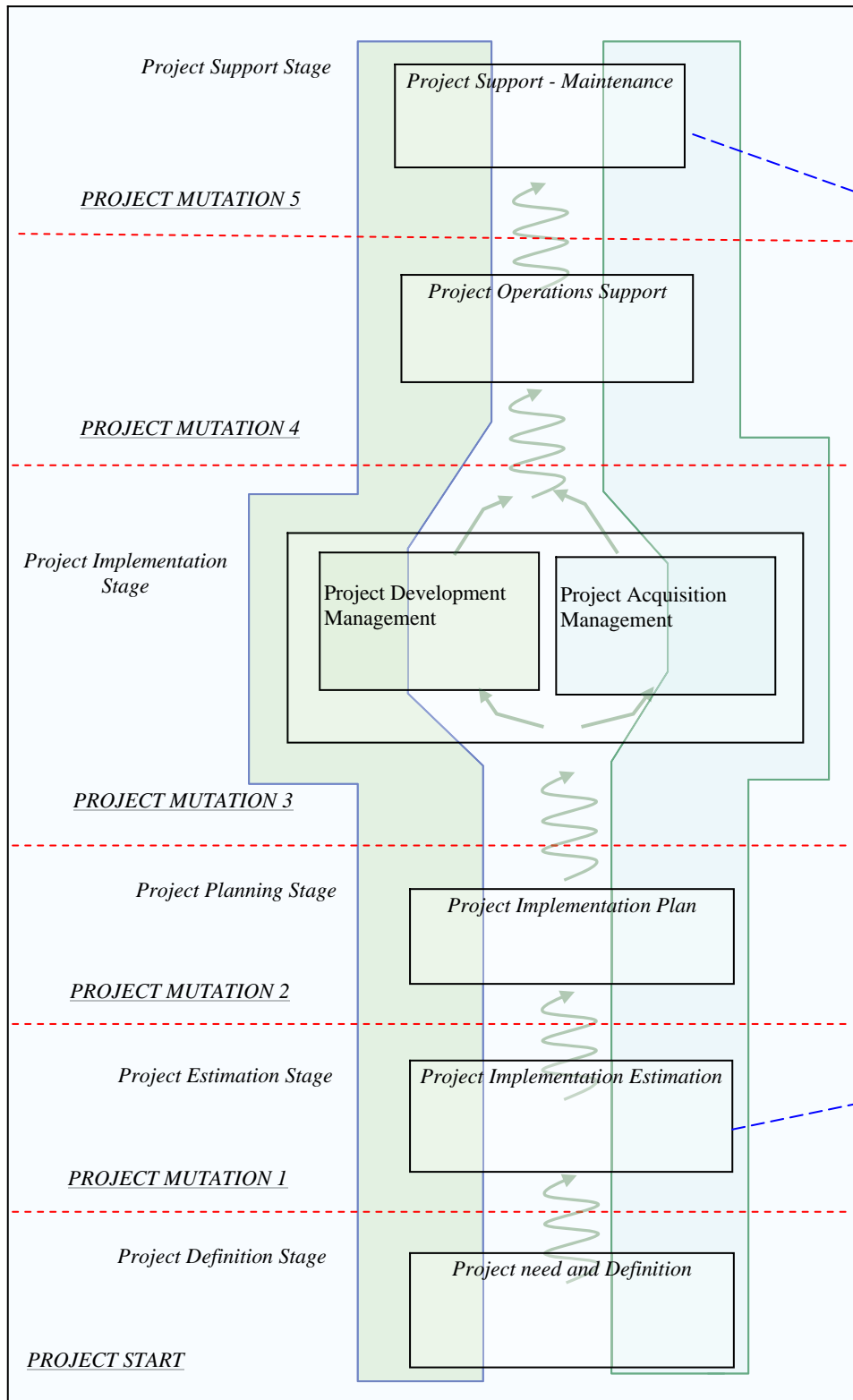Tanjia E. J. Vos, Carlo Figa Talamanca, Katrin Reschwamm

Fig. 6. Information Technology project management mutational model.

management phases. The methodology decomposition and constraint based syntheses is a primitive definition of a project management methodology mutation. If such techniques are considered helpful to the project management effort and initiatives, then the project management crisis is much larger than it seems [17]. Mutational project management and process management models are

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very difficult to be conceived, created and applied. They require process engineering, software engineering and systems acquisition capabilities at the same time, which is difficult to find in a process engineer or a project manager.

On the other hand, no one can go against the progress, and the progress is towards the identification methods and practices that can assure successful project management regardless the capability and maturity required on personal and organizational level.

The agility concept introduced in the late 90s' was a first approach similar to processes and project mutation management. Agile methodologies worked around the processes composing the methodology needed to achieve the desired adjustability on a project. Following the agile methodologies, the concept of the project management frameworks came to move the agility a level higher supporting a project management methodology not only with the adjustability of the process in the methodological stages but also the adjustability on the implementation stages.

The project management mutation models apply the process agility and stage agility concept as well. Mutation is applied in the entire project making each project stage a different project that can possible need not only different processes or stages but different frameworks of methodologies as well.

The concept of process and project mutations comes to incorporate all agile technologies and methods with all methodologies and process developed so far and used successfully per case.

Despite the fact that project mutation models can contribute significantly to project management they do have an Achilles heel and that is the maturity required to determine the processes, stages, frameworks and project decomposition in order to predict and the project mutations [18].

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