Abstract- The objective of this article is to compare a generic set of project management processes as defined in Project Management Body of Knowledge (PMBOK) with a number of agile project management processes. PMBOK is developed by Project Management Institute and it is structured around five process groups (initiating, planning, execution, controlling and closure) and nine knowledge areas (integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, procurement management). On the other hand, agile software project management is based on the following principles: embrace change, focus on customer value, deliver part of functionality incrementally, collaborate, reflect and learn continuously. The purpose of this comparison is to identify gaps, differences, discrepancies etc. The result is that, agile project management methodologies cannot be considered complete, from the traditional project management point of view, since a number of processes either are missing or not described explicitly.

I. INTRODUCTION

Traditional software development methodologies grew out of a need to control large development projects, and from the difficulties of estimating and managing these efforts to reliably deliver results. These difficulties are inherent in the nature of software and they were identified from the early years of software system development and unfortunately most of them still remain. Most of the skepticism expressed in the legendary book of Frederic Brooks, “The mythical man-month” thirty years ago is still valid [1].

Further, today’s information technology professionals are under tremendous pressure to deliver quality IT products and services, in order to respond to an always dynamic and fast changing market.

As a result, the list of large software projects that have failed is still growing. Robert Charette [2] compiled a list of the most notable fiascoes in the IT industry. Further, he states that “most IT experts agree that such failures occur far more often than they should” and that “the failures are universally unprejudiced”. Literature suggests that project organization, stakeholders’ expectation management, scope creep etc., are always important factors leading to project success, when managed properly [3, 4, 5]. Agile methodologies attempt to overcome these obstacles by changing the approach used to develop software and manage projects. Agile software development attempts to put the software being developed first. Further, agile methods acknowledge that the user requirements change, that we have to respond quickly to the users’ needs, that there is a need to produce frequent and regular, software releases, etc.

The Manifesto for Agile Software Development was released in February 2001 by a group of 17 software process methodologists, who attended a summit meeting to promote a better way of developing software and then formed the Agile Alliance. The Manifesto for Agile Software Development can be found on the Agile Alliance website (http://www.agilemanifesto.org).

Since then, a number of software development methods subscribed to this approach. The list varies depending on different viewpoints and interpretations, but in general the list includes Extreme Programming (XP), Scrum, Feature-Driven Development (FDD), Adaptive Software Development (ASD), Crystal Clear Methodology, etc.

Most agile development methods were created within corporations by software process experts as an attempt to improve existing processes. For example, XP was created by Kent Beck during his work on the Chrysler Comprehensive Compensation System payroll project. Kent Beck refined the development method used and the result was published in his book “Extreme Programming Explained” [6]. Similarly, FDD was initially introduced by Jeff De Luca, in order to meet the specific needs of a 15 month, 50 person software development project at a large Singapore bank in 1997. FDD was influenced by ideas of Peter Coad on object modeling. The description of FDD was first introduced in the book “Java Modeling in Color with UML” by Peter Coad, Eric Lefebvre and Jeff De Luca in 1999 [7]. A more generic description of FDD decoupled from Java can be found in the book “A Practical Guide to Feature-Driven Development” [8].

On the other end more traditional project management methodologies rely heavier on processes, linear development cycles and waterfall like software development life cycles. Along with predictability, they inherited a deterministic, reductionist approach that relied on task breakdown, and was predicated on stability – stable requirements, analysis and
stable design. This rigidity was also marked by a tendency towards slavish process “compliance” as a means of project control [9].

Project Management Body of Knowledge (PMBOK) developed by Project Management Institute is the best representative of this approach [10]. PMBOK formally defines a total of 44 project processes that describe activities throughout a project’s life cycle. These 44 project processes are organized into two axes: into five process groups and into nine knowledge areas that will be described briefly in the following section. Within PMBOK each process is described in terms of inputs (documents, plans, design, other data, etc.), outputs (documents, products) and tools and techniques (mechanisms that are applied to inputs for producing outputs) and without being too specific, it provides guidance to someone that wishes to apply the processes [11].

Similar approaches, process oriented, have been introduced by other international bodies or associations. Among them, worths mentioning International Project Management Association, Competence Baseline (ICB), which describes the necessary competences (technical, behavioral, contextual) for project management [12] and project management body of knowledge as defined by Association for Project Management in UK (APM) (http://www.apm.org.uk) which again describes 40 necessary for project management competencies. These approaches study project management in a multi facet way and therefore somebody can argue about the definition of a process or if a competence is needed but not about their completeness. Further, most of them are widely known and accepted by professionals and organizations.

However, even if agile methods look attractive and their use is achieving promising results there is criticism if they are complete project management methodologies or extended, with some management elements, software lifecycles. Similar studies and discussion can be found to [13, 14].

In the next sections, we will briefly present PMBOK along with some of the most known agile methods. Then we will to compare them having as basis for comparison the processes as defined, per knowledge area, in PMBOK.

II. PROJECT MANAGEMENT INSTITUTE BODY OF KNOWLEDGE

As it was mentioned before, Project Management Body of Knowledge (PMBOK) [10] is defined in terms of process groups and knowledge areas. In this study, we will focus on the knowledge areas, since these areas are offering a more precise idea of what is project management about and at the same time they give the overall picture. The knowledge areas are the following:

1. **Project Integration Management** describes the processes and activities that integrate different aspects of project management. It consists of the following processes:
   a. Develop Project Charter,
   b. Develop Preliminary Project Scope Statement,
   c. Develop Project Management Plan,
   d. Direct and Manage Project Execution,
   e. Monitor and Control Project Work,
   f. Integrated Change Control, and
   g. Project Closure.

2. **Project Scope Management**. It encapsulates processes that are responsible for controlling project scope. It consists of:
   a. Scope Planning,
   b. Scope Definition,
   c. Create Work Breakdown Structure (WBS),
   d. Scope Verification, and
   e. Scope Control.

3. **Project Time Management**, which describes the processes concerning the timely completion of the project. It consists of:
   a. Activity Definition,
   b. Activity Sequencing,
   c. Activity Resource Estimating,
   d. Activity Duration Estimating,
   e. Schedule Development, and
   f. Schedule Control.

4. **Project Cost Management** that includes processes concerning the cost. The processes that are part of this knowledge area are:
   a. Cost Estimating,
   b. Cost Budgeting, and
   c. Cost Control.

5. **Project Quality Management** describes the processes involved in assuring that the project will satisfy the objectives for which it was undertaken. It consists of:
   a. Quality Planning,
   b. Perform Quality Assurance, and
   c. Perform Quality Control.

6. **Project Human Resource Management** includes all necessary processes for organizing and managing the project team. It consists of:
   a. Human Resource Planning,
   b. Acquire Project Team,
   c. Develop Project Team, and
   d. Manage Project Team.

7. **Project Communications Management** describes the processes concerning communication mechanisms of a project, and relate to the timely and appropriate generation, collection, dissemination, storage and ultimate disposition of project information. It consists of the following processes:
   a. Communications Planning,
   b. Information Distribution,
   c. Performance Reporting, and
   d. Manage Stakeholders.

8. **Project Risk Management** describes the processes concerned with project-related risk management. It consists of:
   a. Risk Management Planning,