A New Hybrid Approach for Selecting a Project Management Methodology: Handout

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Each of the fourteen project attributes represents a different aspect of the project. A three-level scale is used to rate a project on each attribute. The attributes, and their associated scales, are described below and in Exhibit 1. Note that the attributes are ordered alphabetically and not necessarily in order of importance.

1. *Budget* is the sum of funds authorized for project execution. It includes the direct and indirect costs, as well as the project management reserves (PMI, 2013). Project budget is developed within constraints, which can be more or less 'soft'. "The budget constraints may be 'soft', in the sense that it is meaningful to adjust the budget depending on what benefits can be secured at different levels of resource expenditure" (Liesiö et al., 2008; p. 679). Therefore, project budget can be *fixed*, *variable*, or *flexible*.

2. *Commitment* is a feeling of duty that people, in teams and organizations, have to achieve the project goals and objectives, and which is translated into actions that support project success (McDonough, 2000). Project overall commitment represents a *high*, *medium*, or *low* sense of duty by the project's team members to focus on contributing to the overall project goals (Hoegl et al., 2004).

3. *Contract Type* is defined within the project procurement management processes and it involves the terms and conditions for administrating the business relations placed on the project team (PMI, 2013). The contractual relationships can be *fixed-price*, *cost plus*, or a *hybrid* type that integrates both (von Branconia and Loch 2004).

4. *Customer Type* refers to the customer focus in the project planning and implementation, and to the targeted product or service user (Pinto and Rouhiainen, 2002). The project customer can be a *single internal*, a *single external*, or the commercial *market*, where many single end users will buy the product.

5. *Duration* is defined by the PMBOK® as "the total number of work periods (not including holidays or other nonworking periods) required to complete a schedule activity or work breakdown structure component" (PMI, 2013; p. 537). Classifying project duration as *long*, *medium*, or *short*, is based on a subjective evaluation, relative to the overall activities executed by the organization.

6. *Goals* are defined within the broader environment of the organization and refer to the desired achievements, outputs and outcomes (PMI, 2013). Based on the specific business case analysis, the project goals and objectives can be *well defined, estimated*, or *unclear*.

7. *Pace* refers to the question: how critical is the time frame? While understanding the temporal nature of projects with a definite start and end (Shenhar and Dvir, 2007). Project pace can be *time critical* when the project duration impacts the achievement of competitive advantage and the need to get to market as soon as possible. In such cases, missing the deadline would result in project failure. The pace can be *fast*, when constrains on deadlines impose quicker than initially planned turnaround and it can be *regular* when the project aims to achieve long term goals and time is not critical to success.

8. *Procedures and Regulations* refer to the organizational or regulatory infrastructure within which the project is operated. A consistent approach to project strategy and implementation, including planning, executing and reporting, can be required for specific types of projects (Payne and Turner, 1999). In different organizations and programs, we can find different levels of standardized procedures and regulations, ranging from *none specific*, through *standard*, to *highly structured and specific regulations* for instance, in the case of drug development.

9. **Resources,** including human resources, equipment, commodities, and material, are required to carry out the project activities. Project resources can be *versatile*, i.e., one resource can be easily replaced by another; they can be standard, i.e., each resource has its specialty; or they identified as *high expertise and unique*, i.e., scarce resources – specialized, qualified, certified, professionals - should be carefully assigned to tasks (PMI, 2013; p. 269).

10. **Scope** is defined by the PMBOK as "the work performed to deliver a product, service, or result with the specified features and functions" (PMI, 2013; p.554). A *rigid* project scope implies an inflexible and none divisible set of features and functions. *Multiple delivery units* implies that the scope is composed of several independent parts that are integrated into a unified deliverable. A *modular* scope implies that the final product or service is composed of independents segments, or parts, which can be delivered independently or as a unified product (Chen and Liu, 2005).

11. **Team Availability** refers to the degree to which the project team members are able to start a task when it is called for, whether it is on a planned schedule or at an unexpected time. The number and complexity of external project tasks that the team members are expected to execute usually impact the degree of team's availability. The project team can be *fully* available, *partially* available, or *very limited*.

12. **Team Distribution** is expressed in actual spatial and temporal distance, and many times represents cultural difference (Hogan, 2006). The increasing geographical distribution of work is mainly relevant for information technology projects although in recent years, it is also evident in other fields (Hinds, P2002). Project teams can work in a *single location*, in *multiple locations*, or be distributed *globally*.

13. **Team Size** is usually studied with regard to productivity (for example, Pinto and Pinto, 1990; Gorla and Lam, 2004; Rodriguez et al, 2012) and yields the understanding that bigger is not always better. The number of team members determines the project team size, classified as *small*, *medium*, or *large*, and is based on a subjective evaluation, relative to the overall activities executed by the organization.

14. **Uncertainty** relates to situations where the established facts are questioned and the impact of strategic planning on the project performance is raised (Loch et al, 2006; Perminova et al., 2008). The degree of uncertainty in the project environment can range from *ambiguous*, through *predictable*, to *highly predictable*.

Attribute	Levels
Budget	*flexible, variable, fixed*
Commitment	*high, medium, low*
Contract Type	*fixed-price, cost plus*, or a *hybrid*
Customer Type	*Market, single external, single internal*
Duration	*long, medium, short*
Goals	*well defined, estimated, unclear*
Pace	*time critical, fast, regular*
Procedures & Regulations	*None, standard procedures, highly structured*
Resources	*versatile, standard, unique expertise*
Scope	*modular, multiple delivery units, rigid*
Team Availability	*fully, partially, limited*
Team Distribution	*single-location, multi-location, global*
Team Size	*small, medium, large*
Uncertainty	*ambiguous, predictable, highly predictable*

Exhibit 1: Attributes in the Attributes-Approaches Framework

We identified the main processes and techniques in three well-established project management methodologies: waterfall, agile, and TOC.

1. ***Critical Path Analysis*** ("CPA") is a project management tool that uses network analysis to handle complex and time-sensitive operations. The CPA analysis calculates the longest path of planned activities to the end of the project, and the earliest and latest dates that each activity can start and finish without making the project longer. This process determines which activities are "critical" (i.e., on the longest path) and which have "total float" (i.e. can be delayed without making the project longer).
2. ***Presenting the whole picture end to end*** refers to the ability to plan ahead the entire project and present the roadmap for the entire project end to end, before committing to it.
3. ***Focus on Project stages*** Projects are typically broken down into stages (phases). Each phase outlines the work that needs to be done and who is involved in it. Generally, in order for a phase to be considered complete, specific deliverables need to have been completed and handed off.
4. ***Sequential Process***, e.g. progressing one stage at a time (no overlap) refers to completing each project phase before starting to work on the next phase, without any overlap.
5. ***Emphasis on documentation*** means that the project's documentation is substantiated by the essential two functions of documentation i.e. to make sure that the project requirements are fulfilled and to establish traceability with regard to what has been done, who has done it and when it was done. Thus, documentation must make up the foundation for quality, traceability and history both for the individual document and for the entire project documentation.
6. ***Detailed requirements specification*** refers to a set of documents that describe what a project is supposed to accomplish and how the project is supposed to be created and implemented. Project requirements provide a tool for evaluating the quality of a project, since a final review would examine whether each requirement has been met.
7. ***Progress control by earned value management*** refers to a project management technique for measuring project status, progress, and forecast its likely future performance. EVM measures work progress as "earned value" and answers two principle questions: How much of the budget "should have been" spent at this point in the project? How much "value" has the work on the project "earned" so far?
8. ***Hierarchical organizational structure*** follows the layout of a pyramid where every team member in a project (except the project manager) is subordinate to someone else within the project. The layout consists of multiple entities that descend into the base of team level employees, who sit at the bottom of the pyramid. An organizational structure indicates the method that an organization employs to delineate lines of communication, policies, authority and responsibilities. It determines the extent and nature of how leadership is disseminated throughout the organization as well as the method by which information flows.
9. ***Formal communication*** refers to interchange of information officially. The flow of communication is controlled and is a deliberate effort. This makes it possible for the information to reach the desired place without any hindrance and in a proper way.
10. ***High level planning*** refers to a more abstracted description of a project, describing its overall goals and systemic features, and is typically more concerned with the system as a whole, or larger components of it.
11. ***Sprint Retrospective*** is a meeting facilitated by the Scrum Master at which the team discusses the just-concluded sprint and determines what could be changed that might make the next sprint more productive.
12. ***Daily stand up meetings*** are very short meetings held every day, in which all team members attend and report three things: what they did yesterday? what they'll do today? and if there are any impediments in their way. The purpose of this meeting is to gain good understanding of what work has been done and what work remains, and to commit to each other.
13. ***Working system from day one*** refers to delivering useful products to the customer as early as possible in the project lifecycle, thus achieving customer satisfaction and flexibility to change.

14. ***Co-management: Customer and supplier c***ooperation is a technique of close management of a project with full cooperation and decision making of both the customer and the project team. This technique helps with alignment between the parties, and ensures better communication and decision making processes for the project.
15. ***Multidisciplinary teams*** are heterogeneous groups composed of members with varied but complimentary experience, qualifications, and skills that contribute to the achievement of the project's specific objectives.
16. ***Self-organizing teams*** mean that once the team is formed, and given a problem to solve, and a set of constraints to operate within, the team gets to decide how the work is done, as well as to monitor and manage progress. Team members of a self-organized team choose how best to accomplish their work, rather than being directed by others outside the team. Each team member has to self-organize as well to figure out what to do and how to do it. Every day, everyone on the team has to coordinate his or her self-organization with the rest of the team.
17. ***Progress control by burndown chart*** refers to a graphical representation of work left to do versus time. This technique is useful for predicting when all of the work will be completed.
18. ***Rapid and flexible response*** to change refers to the iterative and incremental development, for which requirements and solutions evolve through the project lifecycle, supporting and encouraging rapid and flexible response to change.
19. ***Informal communication*** refers to interchange of information unofficially. This communication is based on informal relations (like friendship, membership of the same club, the same place of work or team, etc.) and, therefore, is free from all the organizational formalities.
20. ***Buffer management i***s a technique for calculating additional time to be set aside, to absorb unforeseen problems in the project. The buffer is a safety instrument that is constantly monitored. It protects the project from disruptions that might happen when the activities on the Critical Chain are performed.
21. ***Throughput analysis*** is a concept looking at investment decisions in terms of their impact on the entire system, rather than on the specific area in which an investment is contemplated.
22. ***Focus on critical resources*** Focus on critical resources is based on the assumption that resources are limited and some might also be a bottleneck therefore, the project schedule is planned based on these critical resources availability and dependencies.
23. ***Don't start things without finishing others*** refers to individuals working sequentially on tasks rather than working multi-tasking on several tasks at the same time?
24. ***Progress control by buffer consumption*** rate is a technique to control the progress of the project by monitoring the work done in relation to how much time has been set aside (the buffer) to absorb unforeseen problems. Buffer consumption rate is the rate at which the project buffer is being consumed. The rate is calculated as the ratio of the percent of penetration into the project buffer and percent of completion of the critical chain, the buffer burn ratio tells us when a project is in danger of not being completed on time. By identifying which tasks are creating the highest buffer burn ratio, the project manager knows which tasks to focus on right now.

Waterfall	Agile	Theory of Constraints
1. Critical Path Analysis	1. Sprint Retrospective	1. Buffer Management
2. Presenting the whole picture	2. Daily stand-up meetings	2. Throughput analysis
3. Focus on Project stages	3. Working system from day one	3. Focus on critical chain on critical resources
4. Sequential Process, e.g. progressing one stage at a time (no overlap)	4. Co-management: Customer and supplier cooperation	4. Don't start things without finishing others
5. Emphasis on documentation	5. Multi-disciplinary teams	5. Progress control by buffer consumption rate
6. Detailed requirements specification	6. Self-organizing teams	
7. Progress control by earned value management	7. Progress control by burn down chart	
8. Hierarchical organizational structure	8. Rapid and flexible response to change	
9. Formal communication	9. Informal communication	
10. High level planning		

Exhibit 2: Approaches in the Attributes-Approaches Framework

Participate in our survey
here: **http://virginia.qualtrics.com/SE/?SID=SV_804h8oFH0rTqhmd**