

STUDENT PAPER
Estimating and Tracking Agile Projects

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Abstract:

Agile methods are approaches to manage the development of Internet products and services based on principals of early customer involvement, iterative development, self organizing teams and flexibility. These methods are more and more spread as an integrated way of managing IT projects for many companies; moreover it marks a break with traditional Project Management paradigm. Indeed there are several characteristics that make agile project approaches slightly different as they require Project Managers to change their way of estimating cost and tracking project performance.

There is a fundamental problem applying accurate estimation and tracking due to the quality of baseline plan and unclear project scope for Agile project. It doesn't mean that tools and techniques used in traditional plan driven project management are not applicable by the project manager. Nevertheless, the specificities introduced by Agile concept need to be managed and adaptations on the approaches to estimating and tracking are required. Project managers will be managing projects in a highly unstable environment where project performance still need to be well managed.

This paper is focusing on estimating and tracking issues faced by an Agile Project Manager and it identifies which tools and techniques taken from AACE (American Association for Cost Engineering) and PM Bok can help to overcome those difficulties.

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1 Introduction

Agile software development methodologies such as eXtrem Programming, Scrum, Crystals, DSDM, etc are becoming important in some industries. The movement of Agile is now spread around the world; it has been introduced in every type of industries with a high popularity among team players. Adopting agile methods means incorporating new dynamic approaches in terms of roles, management style, project monitoring and controlling. Some changes are fairly radical compared to plan-driven project management. It brings us to wonder how tools and techniques such as Earned value Management or cost estimating, used in traditional projects, can be applied to Agile project?

Companies are moving to agile methods because the market is demanding more flexibility, faster reactivity with high quality expectations. Agile methods promise a quicker delivery, less expenses for operations to companies in their software development. For example, XP uses rapid iterative planning and development cycles in order to force trade-offs and deliver the highest value features as early as possible. In addition, the constant, systemic testing that is part of XP ensures high quality via early defect detection and resolution. "Agile processes can provide a larger return on investment by decreasing the investment in inventory, decreasing operating expenses, and increasing throughput"¹.

There is definitely a lack of alignment between the methodologies/tools used by traditional Project Management and those introduced by Agile techniques. The role of the Project Manager remains very critical in the adoption and application of Agility in projects. He still needs to keep control on different tasks, focus on value to get paid for what the team has accomplished.

2 Agility in projects

2.1 Definition

Agile methods are approaches to managing the development of Internet products and services based on principles of early customer involvement, iterative development, self organizing teams, and flexibility".

- Early customer involvement is the solicitation of market feedback by including end users in the product development process to achieve higher satisfaction². During latter half of the 1960s early user involvement was cited as a success factor for information system development³.
- Iterative development is the act of creating a skeletal computer program followed by the gradual enhancement of successive software implementations. Iterative

¹ Mufazzal Badani, "Mapping Agile development practices to Traditional PMBOK", June, 4th 2001, www.pmi-issig.org/pds/DOCS/BadaniBioandAbstractMappingAgileDevelopmentPractices.doc, accessed 29 Feb 07.

² David F. Rico, "Agile Methods and the Links to Customer Satisfaction and Firm Performance", September 18 2006. P11

³ Orlicky, "*The Successful Computer System: Its Planning, Development, and Management in a Business Enterprise*", McGraw-Hill, New York, 1969

development was rediscovered and applied to software development in the 1970s⁴. A high number of frequent iterations are credited with project success.

- Self organizing teams are non-hierarchical groups with different and complementary skills, who are responsible and accountable for organizational outcomes⁵. An early study of self organizing teams shows responsibility without authority or inability to affect resources may be fruitless⁶.
- Flexibility is a development process that is tolerant to design changes, late product changes, or change altogether due to flexible designs. And, Scholars realized very early that flexibility was a key to successful software projects⁷.

Computer programmers, computer scientists, software engineers, and management scientists have been trying to solve computer programming problems such as productivity, quality, reliability, customer satisfaction, cost effectiveness, and time-to-market for more than five decades. The concept has been introduced in the 1960's and now, the transition to agile processes is a growing trend that will have lasting effects on the industry and the people involved.

2.2 Plan driven project management vs. Agile

Traditional software development lifecycle emerged from the need to have control and to overcome difficulties to estimate and manage the delivery of expected benefits. Project management traditionally comes from the engineering industries such as construction where planning is one of the most critical aspects. Indeed, when you are building a bridge, you have at least to design, plan and estimate every single part of the final product. The very well known saying in Project management community: "If you fail to plan then plan to fail" finds there all his essence. Most of Project Management methodologies have inherited this necessity to predict and use a deterministic approach on their work breakdown. This brings out certain rigidity because the development lifecycle becomes then linear which is inadequate model for a project running in a stable environment.

"Regardless of the particular methodology, the traditional project manager is often seen as a *taskmaster* who develops and controls the master plan that documents (often in excruciating detail) the tasks, dependencies, and resources required to deliver the end product"⁸.

Even though those methodologies have proven their effectiveness for lots of organizations, when it comes to integrate them in fast moving industries they have showed their limits, especially in software development. Traditionally, plan driven project methodologies

⁴ Basili and Turner, "Iterative enhancement: A practical technique for software development. *IEEE Transactions on Software Engineering* ",1975, Pages 390-396

⁵ Zarraga and Bonache, "The impact of team atmosphere on knowledge outcomes in self managed teams ". *Organization Studies*, 26(5), Pages 661-681, 2005

⁶ Babchuk, N., & Goode, W. J. (1951). "Work incentives in a self determined group". *American sociological Review*, 16(5), Pages 679-687, 1951

⁷ Ahituv, Hadass, & Neumann, "A flexible approach to information system development ", *MIS Quarterly*, 8(2), Pages 69-78 ,1984

⁸ Sanjiv Augustine and Susan Woodcock, "Agile Project Management Pace Systems", CC Pace, www.ccppace.com, par. 2, page 5- 2003 , Accessed 12 Dec 2006.

assume that:

- Rigid procedures are needed to regulate change
- Hierarchical organizational structures are means of establishing order
- Increased control results in increased order
- Organizations must be rigid, static hierarchies
- Employees are interchangeable “parts” in the organizational “machine”
- Problems are solved primarily through reductionist task breakdown and allocation
- Projects and risks are adequately predictable to be managed through complex up-front planning.

Agile methodologies are solutions to the rigidity of traditional projects on the organizations needs of reactivity to the market in terms of change approach, project control, organization, people interactions.

3 Managing constraints, scope and quality

3.1 Constraints

Managing changes and constraints are one of the essences of Agile management. The way the project is managed will allow the customer to minimize cost of change while taking into account constraints. In Agile environment we can identify two types of constraints:

→ External constraints

The role of the project manager is to handle the external constraints that are imposed by the project environment and the customer through contractual terms. The project manager is still guarantying those constraints imposed on time, budget quality and scope.

→ Internal constraints

The Project Manager should rely on the self organized team to handle the internal constraints which are very often more technical. “Agile projects engage people with profound knowledge of the system; agile team is typically diverse of generalizing specialist⁹”. By the way, there is system philosophy that views the system as a chain. And the weakest link is the constraint that keeps the system (project) from achieving the expected goal. In other terms, the project manager should not bother with internal constraints but has to keep an eye on the weakest link of the chain.

3.2 Scope

In agile world project, frozen specifications of the final product and abominable snowman are alike: they are both myth and don't exist in organization dynamics. Rather than defining during the initiation phase the entire project (scope, work breakdown structure, assumptions, etc), the project manager will focus on planning for the horizon.

Typically, when the project manager is defining the project scope with the sponsor and other stakeholders, the project charter, very often, consists of several white paper boards with color-coded markings and post-its. In traditional project management, before proceeding to the initiation phase, the scope has to be well defined and understood by the

⁹ Naresh Jain, “*Overview of agile*”, thoughtwork presentation , Page 10, 2005

project manager, whereas agile methodology is demanding more than just understanding the scope. The project manager has to be a visionary leader; he will be able to manage the scope of the project through changes and continuous adaptation:

“One thing is sure: the future will not be simply an extension of the past, but rather a series of discontinuities which, paradoxically, will become new opportunities”¹⁰.

3.3 Quality

In agile methodology such as DSDM, quality is planned at the beginning of the project and is continuously present throughout the project lifecycle. The customer is deeply involved in the product development, consequently, that requires from the project manager a focus on quality expectations.

Agile software development put the Quality Assurance in the center of the project management methodology. Because of iterative development and continuous improvement, quality assurance will be involved into the analysis, design and review processes. It will also be used to help for decision making throughout the entire project lifecycle with prototyping and testing.

“Because incremental code is being developed for each iteration, Quality Assurance(QA) is now testing at the very beginning of the project instead of waiting for something to be “thrown over the wall” at the end. And because throughput is increased, QA is finding itself with a need to become more technical as they must automate testing at all levels, and not just via macros run on the GUI.”¹¹

4 Estimating an Agile project

4.1 Cost Estimation

Estimating in Agile project seems to be a difficult exercise to lot of people. In essence, Agile projects doesn't focus (at least at the beginning) on defining a clear scope for the project. Larry R. Desert defined cost estimation as “a predictive process used to quantify, cost, and price the resources required by the scope of an investment option, activity, or project”. He then added that “understand the scope of the activity to quantify the resources required”¹² was the first step of estimating process.

We can easily understand that some project managers are wondering how they can perform an accurate cost and resource estimation while they don't know exactly what the final asset is going to look like. Indeed, the level of *project definition* is in general low for an Agile project and correspond to the level of definition of a class 3 or 4 (see figure 1, Generic Cost Estimate Classification Matrix).

¹⁰ Jaime Herrera S, “*Participatory management team work and leadership*”, www.itu.int/itudoc/itu-d/hrdqpub/hrdq/hrdq86/part_ww7.doc, Page 24, San José, Costa Rica – October 2001, Accessed 20 Dec 06.

¹¹ Michel Slioger, “*Survival guide to going Agile*”, Rally Software Development Corporation, page 8 – 2006.

¹² Larry R. Desert, “*Skills and knowledge of cost engineering 5th edition*”, chapter 9 – 2004

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic			
	LEVEL OF PROJECT DEFINITION Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical +/- range relative to best index of 1 [a]	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Screening or Feasibility	Stochastic or Judgment	4 to 20	1
Class 4	1% to 15%	Concept Study or Feasibility	Primarily Stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Mixed, but Primarily Stochastic	2 to 6	3 to 10
Class 2	30% to 70%	Control or Bid/Tender	Primarily Deterministic	1 to 3	5 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Deterministic	1	10 to 100

Figure 1: Generic Cost Estimate Classification Matrix ¹³

In fact, Agile methodologies are using the notion of features to perform estimation rather than using the work or product approach. Most plan driven project methodologies are using Work breakdown Structure (PMI, AACE) or Product Breakdown Structure (Prince2) as an approach to estimating and planning. Both are assuming that the scope is well defined at a certain extent.

What is a feature?

"In agile development, a feature is a chunk of functionality that delivers business value. Features can include additions or changes to existing functionality"¹⁴. Feature will be the main unit for planning and estimating work items. The feature should have the following criteria:

- It should provide business value
- It should be estimable - it must have enough definition for the development team to provide an estimate of the work involved in implementing it
- It should be small enough to fit within an iteration - therefore, if it is too big, it should be broken down further
- It should be testable - you should understand which automated or manual test a feature should pass in order to be acceptable to the customer

¹³ "Skills and knowledge of cost engineering 5th edition", Education board of AACE International, Table 9.1 – 2004

¹⁴ T. Sulaiman "Earned value management the Agile way", <http://www.agilejournal.com/content/view/210/76/>, Agile journal – January 2007, Accessed 2 Mar 07.

The different Agile methodologies use different terminologies to refer to features. Extreme Programming (XP) uses the terms User Stories or Stories to represent features; Scrum uses Product Backlog to describe a feature list; Feature-Driven Development uses Feature; and DSDM uses Requirement.

For time and cost estimation, agile project manager are using Feature Breakdown Structure (FBS) approach. He has to draw up all potential features that the team has to build then starting the planning process or iterative planning process.

When the feature is well defined, the project manager has to involve all keys stakeholders to estimate it (i.e.: the customer and software developers). First estimations should be high level, just to make possible to release the first planning iterations. Many agile project base organizations have developed useful process that help a group of people to quickly provide first estimations. The project manager can rely on cost estimation tools like:

- Cost estimating techniques Analogous (DELPHI, PERT), using expert judgment done by team members.
- Cost estimating techniques parametric.

Estimation unit definition¹⁵:

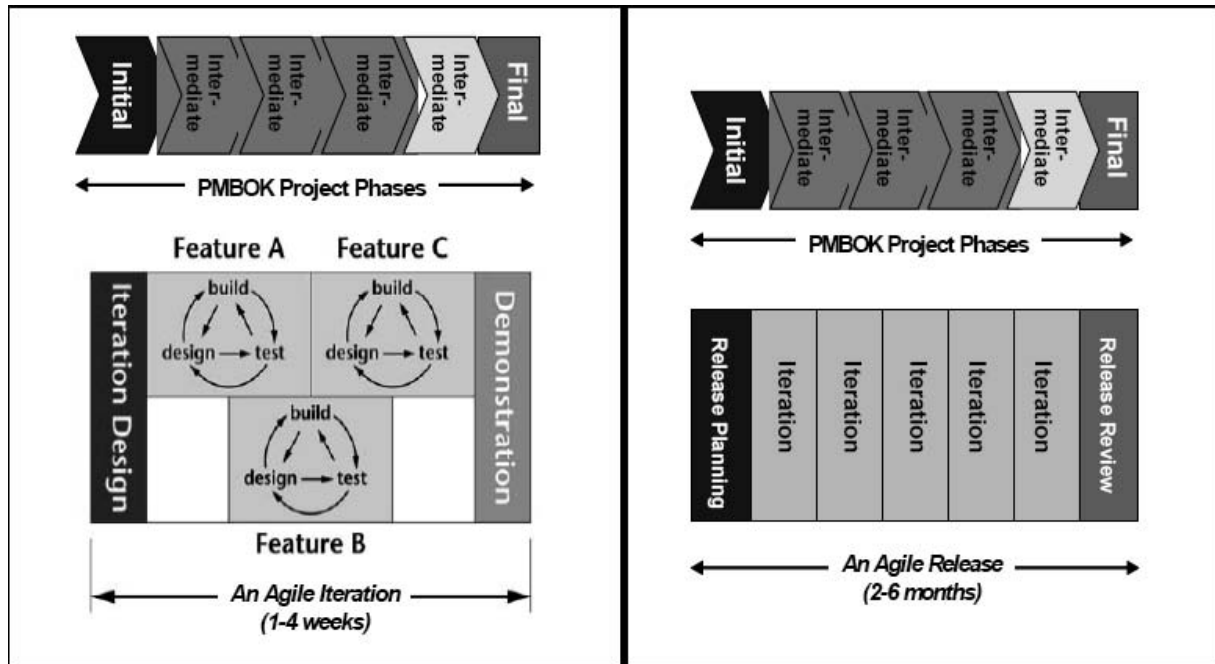
- Ideal Time: how long a task takes if there were no interruptions.
- Story Point: relative measurement among User Stories.
 - User requirements
 - Feature list
 - Use case scenarios
- Velocity: how many estimation units get completed by a team in a single iteration

Estimates are by nature inaccurate. Managers working in IT field know that developers have difficulties in providing good estimates and have tend to overestimate team capabilities in delivering quickly work packages. Very often, non-programming time is not taken into account, i.e. in going through testing and validating process or documentation (even if the later, by principal is has less importance in agile methodologies).

4.2 Time management

The notion of time in Agile environment has radically changed compared to what it represents to a Project Manager in a plan-driven model. The Agile project lifecycle is not linear this makes time management slightly different.

¹⁵ Rob Morris, “Agile estimation and Planning”, CDL Systems presentation – October 12, 2006



PMBOK Project Phases mapped to an Agile Iteration Release

PMBOK Project Phases mapped to an Agile Release

Figure 2: Comparison with PM Bok ¹⁶

The three principles associated with iterative development are “(a) working software is the primary measure of progress, (b) at regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly, and (c) deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale” ¹⁷.

The project Manager has to deal with the excessive time requirements associated with early customer involvement in agile projects. He has complex relation with time: being able to manage time constraints based on an iterative plan and very few specifications or even uncompleted. He will then have to be able to use historical data, and master estimation techniques. Typically, PERT estimation technique is very commonly used by Agile Project Managers to forecast duration. The estimation will rely on information given by the team members as expert judgment.

The question that the Project Manager ask very often: “what I would I tell to my boss or my customer when he asks me, when the project will be done»? This question seems to be in contradiction with iterative planning. In fact, traditional estimation tools will help the project manager but not completely answer this question. Ron Jeffries, one of the founders of the agile movement and co-creator of Extreme Programming, has scripted the best way a project manager can respond to that question:

“Right now, this appears to be a 200-point project. Based on our performance on other projects (or a random guess), with N programmers on it, and your intimate involvement in

¹⁶ Michel Sliger, “Survival guide to going Agile”, Rally Software Development Corporation, page 6 – 2006

¹⁷ Agile Manifesto, “Principles behind the Agile Manifesto”, <http://agilemanifesto.org/principles.html> – 2001, Accessed 20 Dec 07.

the project, a project of this size will take between 4 and 6 months. However, we will be shipping software to you every two weeks, and we'll be ticking off these feature stories to your satisfaction. The good news is that if you're not satisfied, you can stop. The better news is that if you become satisfied before all the features are done, you can stop. The bad news is that you need to work with us to make it clear just what your satisfaction means. The best news is that whenever there are enough features working to make the program useful, you can ask us to prepare it for deployment, and we'll do that. As we go forward, we'll all see how fast we're progressing, and our estimate of the time needed will improve. In every case, you'll see what is going on, you'll see concrete evidence of useful software running the tests that you specify, and you'll know everything as soon as I know it."¹⁸

5 Earned Value Management in Agility

5.1 Difficulties to transfer EVM in Agile world

As an Agile project manager or customer, I want to know where exactly the project is against what has been planned. Agile methodologies are also more and more used in the governmental contracts, where using specific tools and techniques to track project performance is often mandatory. So what better way to track a project than Earn Value Management (EVM)?

An excellent reference to Earned Value reporting is "Earned Value Project Management, Second Edition" by Quentin Fleming, Joel M. Koppelman. The author has identified 3 critical success factors in implementing EVM¹⁹:

1. Quality of the project's baseline plan. Earned Value is compared against the baseline plan, whether the plan is accurate or not. Therefore, cost 'overruns' will occur if the project costs are under-budgeted, and scope creep will occur if the initial project scope hasn't been adequately defined.
2. Actual Performance against the Approved Baseline Plan. i.e. whether the actual performance tracks to the baseline plan.
3. Management's Determination to Influence the final results. Final results for a project based on earned value projections can be modified based on management's commitment to take action as soon as deviations from the plan are observed.

At a quick glance, EVM seems to be hardly applicable to Agile projects because the different methodologies fail at meeting the 2 first criteria. Since EVM requires quantification of a project plan, it is often perceived to be inapplicable to discovery-driven or Agile software development projects. Agile detractors have claimed EVM should not be used on Agile projects due partly to the belief that for EVM to be applied, the entire project scope must be planned in advance, and in detail using a Work Break Down structure. Another belief is that the EVM technique is too "heavy weight" for Agile projects. Thus, the challenge is to create agile or discovery-driven implementations of the EVM principle and

¹⁸ Ron Jeffries, as quoted in Mike Cohn's book "Agile Estimating and Planning", Upper Saddle River, N.J.: Prentice Hall PTR – 2006

¹⁹ Quentin Fleming, Joel M. Koppelman, "Earned Value Project Management 2nd edition", – 2000

not simply to reject the notion of measuring technical performance objectively²⁰.

If some people are still wondering if EVM is applicable to Agile methodology, the answer is definitely yes. But we need to translate EVM definitions into Agile terms. Tracking agile project can integrate the areas of technical performance, schedule, and actual cost to provide metrics for work actually accomplished. By comparing the earned value (EV) with the planned value (PV), the efficiency of accomplishing work can be accurately measured.

The metrics used to track the project performance are CPI, SPI, BAC, EAC, etc... Because of the difficulty related to baseline plan quality, those metrics should be computed against the number of features to produce and how they are planned to be produced. Tamara Sulaiman has defined the data to establish the first baseline²¹:

- Budget at Complete - what's your targeted budget for the release? This can be expressed in either dollars or hours.
- Iteration Length - How long are each of your iterations or Sprints? AgileEVM assumes that your planned iterations are of the same length.
- Planned Iterations - How many iterations are you planning to include for this release?
- Planned Release Story Points - How many Story points have you estimated to be included in the release?
- Start Date - What date are you starting the first sprint? While this data point is not required to generate the Earned Value and Planned Value data, by including it the Agile EVM worksheet will automatically calculate your baseline schedule, in much the same way as a traditional Work Breakdown Structure.

5.2 Using Earned Value for Quantity Adjusted Budget

Dr. Joseph J. Orczyk in "Skills and knowledge of cost engineering" has treated the subject of earned value for variable budgets. This tool provide a method to calculate earned value metrics for project on which the budget is baselined with a high uncertainty, and consequently it has a great probability to be readjusted through the project life span. Even though this kind project is not concerning only Agile projects, the methods to produce project tracking metrics will be fully applicable.

What is Quantity Adjusted Budget (QAB)?

Initially, the notion of QAB has been developed for construction industries. Indeed, some building construction projects have to start before the design phase is completed. The QAB

²⁰ T. Sulaiman "Earned value management the Agile way", <http://www.agilejournal.com/content/view/210/76/>, Agile journal – January 2007, Accessed 20 Dec 07

²¹ T. Sulaiman "Earned value management the Agile way", <http://www.agilejournal.com/content/view/210/76/>, Agile journal – January 2007, Accessed 20 Dec 07

has to be forecasted and baselined when the bid is prepared. After the effective start of the project, the QAB is updated while the engineering office is refining the design of the project. The project manager still has to keep tracking project performance, taking into account successive budget readjustments.

The analogy with agile world can be considered with the kind of projects discussed above. When the project has been estimated, the quantitative adjusted budget will be gradually and smoothly reevaluated while project plan is updated through iterations.

The new budget is obtained by multiplying the new estimated quantity with the budget unit rate:

$$QAB = (\text{Adjusted quantity}) \times (\text{Budgeted Unit Rate})$$

The earned value will be obtained by multiplying the physical percent complete by the adjusted budget. Quantities can be number of hardware material (server, hard drive, etc), software licensing (database engine, reporting tools, society application, etc) or features. The number of features to realize will determine the amount of work hours required by the developers crew. In order to quantify the effort necessary to complete features, each of them will be weighted by certain number of Function Points. Organizations maintain historical data that gives the unit rate in Dollars or Work Hours per Function Point. This unit rate is updated annually by the account department.

Work(feature) Item	Unit	Initial Quantity	Initial budget	Budgeted unit rate	Adjusted quantity	QAB
databases Setup	U	3	9,000\$	3,000\$	2	6,000\$
Web pages coding	Function point	40	12,000\$	300\$	50	15,000\$
Application deployment	Each Web Server	5	10,000\$	2,000\$	4	8,000\$
Total			31,000\$			29,000\$

Table 1: Quantity Adjusted Budget calculation

Work(feature) Item	Unit	Budgeted unit rate	Initial budget	QAB	Quantity completed	Earned Value
databases Setup	U	3,000\$	9,000\$	6,000\$	1	3,000\$
Web pages coding	U	300\$	12,000\$	15,000\$	20	6,000\$
Application deployment	U	2,000\$	10,000\$	8,000\$	2	4,000\$
Total			31,000\$	29,000\$		13,000\$

The percentage of completion = $\text{Earned Value} / \text{QAB} = 44.8\%$

Table 2: Earned value calculation for BAQ

The method to calculate percent complete, SPI (Schedule Performance Index), CPI (Cost

Performance Index), and PI (Performance Index) used for traditional fixed budget will be fully applicable.

Depending on the type of contract the project manager is dealing with, you may compute these indicators differently (see skills and knowledge 5th edition):

- Fixed Budget Approach for Fixed Price Contract
- Variable Budget Approach for Fixed Price Contract
- Variable Approach With Variable Budget

Measuring the work completed

As discussed earlier in the paper, in agile project the scope is defined by the features list that the team has to produce. The most accurate way to measure the amount of work accomplished is to see how many features have been created. The feature produced by the team should meet the following requirements²²:

- The work (feature) must have been physically completed.
- The work (feature) must substantially conform to the specifications;
- The work (Feature) must fulfil all of the contractual terms and conditions.

There is several ways to several ways to measure the physical percentage completed:

- Units completed
- Incremental milestones
- Start/Finish
- Supervisor opinion
- Cost Ratio
- Weighted units

In agile project, the weighted units, Incremental Milestone, Start/Finish, Units completed methods are applicable depending on the situation.

Units completed or weighted units methods are mainly used when, during the initiation phase, the team is able to estimate the weight of each feature to be produced. In some organizations, the number of iterations are defined and included in the project plan. The milestones have to correspond to feature completions time or iteration cycle. This method can be problematic when the features are developed in parallel and is more adapted if they are developed sequentially.

There is also another aspect that confuses people in when using earned value in variable budget. Due to rework effort and work hours adjustment, the percent complete can decrease from one week to another. But the client has still to pay for what have been accomplished. To come around, J. Orczyk gave us the following solution "it is necessary to purge such hours from the accounts as rework occurs. Quantity adjusted budgets and actual hours wasted as a result of rework should be transferred to separate accounts outside the basic control structure so that they may later show the extent and cost of rework"²³.

²² "Skills and knowledge of cost engineering 5th edition", Education board of AACE International – 2004

²³ J. Orczyk , "Skills and knowledge of cost engineering 5th edition", Education board of AACE

6 Conclusion

The project manager in Agile world is not only taskmaster, or a professional of planning and scheduling but a leader who will be able to envision and to see the horizon. He is managing scope through changes. Meanwhile, this Project manager still needs to follow processes usually used by traditional projects, i.e. initiating the project, building a plan and executing it, managing the scope, estimating cost, etc.

Projects with extremely short release cycles will not find as much utility from the tracking techniques (like EVM) as projects with longer release cycles involving multiple sprints or iterations. The good news is that technics and tools introduced by traditional project management can be fully applicable in Agile world when the requisites are known. We can add that the use of those technics is even more required for a project where the initial plan is going to change radically, where the power is not in the hands of a unique person (the project manager) but controlled by team players.

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Discussion groups

<http://finance.groups.yahoo.com/group/agileprojectmanagement/>

<http://groups.yahoo.com/group/scrumdevelopment/>

<http://groups.yahoo.com/group/extremeprogramming/>



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Bachir KANE is based in Paris and currently works for Steria as a consultant in telephony and Contact Centre solutions. He has a Masters Degree in telecommunications from Institut Galille (Paris 13) and has pursued a specialised Masters Degree in Project and Program Management at ESC Lille since 2006. He is an accredited PRINCE2 Practitioner and is a member of APM (Association for Project Management), PMI® (Project Management Institute) and AACE (Association for the Advancement of Cost Engineering). Bachir has participated on several projects in call centre and telephony system implementations either as a consultant or a project manager. He also has a strong consultancy background in CRM (Customer Relationship Management) and Identity Management for large companies. He has written several articles on Agile project management methodologies. Bachir Kane can be contacted at bkane80@yahoo.fr.