Adaptive Finance & Control: Combining Lean, Agile and Beyond Budgeting for Financial and Organizational Flexibility

Rami Sirkiä
Nokia
ramisirkiä@ovi.com

Maarit Laanti
Nitor Delta
maarit.laanti@nitor.fi

Abstract
Enterprises that approach uncertainty and risk in software development based on lean and agile methods [1] often do experience financial planning of projects as a restriction. Traditional budgeting and cost reporting is a system based on rigid frames, and it – along with the process of project cost accounting – burdens the lean and agile enterprise with unnecessary and counterproductive overhead and friction. The traditional system provides, at best, a false sense of cost control to any enterprise.

In this paper we share insights related to how project-based cost accounting can be transformed to a structure based on agile and lean finance and control. Our insights and examples are intended to remove a key impediment to transforming the finance function of your enterprise to something measurably more lean and agile. This work is based both on an actual case completed with our employer and on our knowledge of financial processes at major Finnish companies.

1 Background

Agile SW (software) development and traditional cost accounting don’t match. Firstly, traditional cost center accounting expects a long horizon with detailed cost estimates that must be frequently updated. Simply put, agile SW development avoids this detailed and long horizon planning. [2] Secondly, traditional cost accounting values planning accuracy and executes variance analysis against the original estimate. Agile development instead allows for uncertainty: the final content delivery and total cost may be impacted by the empirical feedback received. Thirdly, traditional budgeting draws attention to budget overruns. In agile development, if the initial feedback proves to be positive we want to allow – and even encourage – further investments. In larger enterprises the division of investment can be controlled via the hierarchy of backlogs – the level of investment is dictated by the changing backlog priorities, which means the teams allocate tasks flexibly. Fourthly, traditional project cost accounting requires a re-approval for any delays that increase the project budget. Rigid approval limits pose an unnecessary control, and thus, in agile development, delays that would traditionally be caused by the budgetary approval process means teams can now take their order of development flexibly from the prioritized backlogs.

We had an opportunity to witness our organization’s (a large global R&D unit in telecommunication’s sector) transition to this lean and agile way of working. What we soon noticed was that the financial function would need to change in response to it, in order to benefit from this adaptive approach. The following changes were implemented in our R&D unit, resulting in demonstrably leaner and more agile finance and control processes:
- Cost center planning was simplified as part of the company wide initiative and we additionally removed project level cost control altogether.
- Instead of planning cost centers we created enhanced visibility for deliverables (projects).
- Instead of focusing on OPEX limitations, we focused on competence limitations.
- Strategically important but longer lead-time investments were mandated a separate allocation.
- People were encouraged to be transparent with regard to the planning uncertainties.

Clear roles and responsibilities for financial planning, content planning and resourcing were defined, following the lean and agile principles.

1.1 The problem

During the transition to lean and agile in our R&D unit there emerged issues with our organization’s structure based planning. While we had organized a...
Experts, i.e. the original estimations were that the team was focusing on his or her own deliverables, even though the key driver in portfolio prioritization was to maximize customer value. If one of the key deliverables was being delayed, there was no automatic resource reallocation method available. The possible delay in deliveries was clearly indicated in our metrics dashboards. The rigid organizational structure, narrow competence profiles and detailed level of projects with dedicated resources prevented prompt and flexible resource reallocation. The idea of allowing more flexible organization structure with empowered teams was born and supported by our R&D management team roughly at the same time when the idea of more flexible investment planning and control was born.

There were also issues detected on the financial planning side. The tradition had been that R&D planners had been asked to provide estimates for the next 18 months. Although estimating such a long period had always been problematic, the argument was that strategic investment allocation was needed – and thus some kind of data had always been provided. Yet now that the R&D became familiar with agile and lean estimating and planning this argumentation was becoming significantly more difficult. Referring to agile principles the R&D planners took the position that they could plan only a few months ahead.

Traditionally, there was also a requirement to state how many person-months were to be spent on which projects, and when. In order to provide this information, a detailed resource profile at the individual level was necessary. That resource profile defined in which project each person would be allocated for next 18 months. Yet an agile R&D planner would refuse to create such a profile, because approval of the idea of content flexibility automatically means that one cannot plan a large-scale implementation plan ahead in such detail, as the content will almost surely change – even on the detailed SW feature level. Thus it is impossible to provide a detailed investment profile per higher level.

The same principle is true for any agile project – thus cost planning being one of the inhibitors in many companies with regard to the adoption of agile methods.

The investment data had been updated on a monthly basis in order to improve the data quality, follow trends more closely and to get quick feedback on any investment reallocations taking place. In the new agile and lean setting these updates were seen as significant and non-value adding overhead.

Naturally, the initial data was changed as a result of these monthly investment data updates. However, only the content experts, i.e. the original contributors, were able to explain why the data had changed. Most typical explanations were that the team had learned more about the topic and the required features had been clarified, or that the architecture was now better understood, or the execution velocity was lower than expected. When more forward-looking information was needed for performance management – to set up the traditional performance targets – we discovered that efficiency was not improved by the use of targets or with the efficiency metrics. People just didn’t know that much about the future – and performance improvement required more than just an ambitious target.

After we took the Scaled Agile Framework model into use with its hierarchy of backlogs – and the decision was made to allow these backlogs to dictate and guide more flexible resourcing, we soon realized that there was no way traditional cost center control practices could scope with the rapid content changes.

We realized that any cost center control or deliverable-based way to approve, track and reapprove resourcing was not adding any value. Instead, we accepted that it is normal to move resources from one project to another and to spend an extra month or two on the project.

This is often case in other companies that have a portfolio of agile projects as well. While agile development has largely been adopted around the globe, traditional management methods need to be changed in response. This is true also for industries in which software is only part of the solution or the product. For the most part, the value of the service or product is dictated by how usable that service or product is for the customers – a factor that we can only measure via customer feedback. The real value of agile portfolio management is to take in this feedback in order to improve the existing product – and then identify the characteristics that actually result in a good product.

This kind of adaptability in how the product is – and how it is built – requires a new type of management that understands the underlying lean and agile principles. Ignoring either the customer feedback or these principles impacts negatively the competitiveness of the product, at least regarding the software side of it. Finance and controlling is a function that is partially driven by rules and regulations (financial accounting), and the part of it that has more

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1 Here we refer ‘epic – feature – story’ as a hierarchical structure of the SW work items.
flexibility (management accounting) is struggling to see the need for the change. [5]

2 An Agile Approach to Financial Planning and Control

Our idea was to comply with lean and agile principles and practices. [3] We were well equipped to cross the chasm of two different functions, Maarit entering from software development angle and Rami from accounting point of view. We didn’t believe that any organization structure, or any finance or planning process should hinder, impede or add an overhead to how software is actually made. We understood that agile and lean principles provide tools and processes to manage content as well as to support performance and efficiency. We trusted that teams would be as efficient as possible. We acknowledged that when you follow the agile way of working, the content must be kept flexible. We knew that total cost is mostly driven by headcount and thus is pretty stable across all of organizations. We accepted that SW developers didn’t know what they were going to do in the mid/long term future. So we removed the control and relied on trust. For many this would seem to be a radical approach, but we knew that our leap of faith would be rewarded by transparency, and any potential errors would be corrected by rapid feedback. What we did is summarized here:

- We created resource pools and more generic competences instead of small cost centers and detailed profiling.
- We simplified the cost center planning by taking it to a higher level of granularity. Cost centers of 30-50 persons no longer provided rolling forecasts for the next 13 months for selected accounts. Forecasts were expected one or two levels up in the organization structure, i.e. cost center for 300-500 persons.
- We downplayed cost center planning and implemented visibility for deliverables. Cost center plans – for cost centers of 300-500 persons – were built after the deliverables had been resourced, based on the deliverable view.
- We promoted a culture of transparency regarding what we know and what we don’t know. We showed unallocated resources after the four to six months. So if teams and planners did not yet know what they were going to do, they marked their resources as unallocated in the capacity planning.
- We highlighted the role of competence management as a constraint instead of OPEX. Portfolio planning focused on bottleneck resources, OPEX planning was secondary.
- We redefined the roles for the capacity management and cost center planning. Cost center planning provided visibility to OPEX run rate on a higher (cost center) level, and deliverable -based capacity management details on an effort profile for each epic.
- Task fluidity. We lifted the project level cost control: content management was done by project office and efficiency metrics was left to the teams themselves. No changes in the epic schedule or resourcing required centralized re-approval. Our project management office had the authority to reallocate tasks between teams.
- We created business plans based on minimum content, and nice-to-have’s were just extra. Additionally we allocated a specific lump sum to support innovation and quality.
- Our company had already earlier separated forecasting from target-setting, which allows for more realistic forecasting and more ambitious target setting.

These changes enabled our finance and planning function to become more agile and lean – in terms of needed resources as well: we were able to remove planning related work worth of 50 man days per month. These changes are also a true enabler of agile and lean development. They don’t just remove the impediments that traditional finance and planning impose on an agile and lean organization, but, together with a flexible organization, also enable deferred decision making when planning the investments. Deferred decision making or real options here means that based on a feedback, an agile and lean organization may balance their investment portfolio based on the field feedback simply by reprioritizing the backlog priorities. A rising priority indicates that more work must be done to the prioritized epic or feature. A company with multiple agile projects may thus flexibly balance the resources and the investments across the projects based on received feedback and needs, as well as estimated payback functions. This is true option thinking.

3 Shorter Planning Horizon and Room for Uncertainty

A requirement to collect long-term estimates for epics comes from a waterfall approach to planning.
Traditionally, it is expected that we would be able to accurately estimate the resource needs, the content (value added to user / consumer) and the completion date for each requirement. The same was now expected for epics, although on the financial planning side.

![Figure 1. Cone of uncertainty [5]](image)

The Cone of Uncertainty (Figure 1) states that the further we try to estimate into the future, the more uncertainty there is in these estimates. The cone of uncertainty states that there are only two ways that the estimates can be more accurate – that we advance in time and gain more information on the project or that we estimate over shorter periods of time. [5]

The agile approach suggests that since change is inevitable, we should try to make estimates across shorter time periods. Some agile teams are thus refusing to give any long-term estimates, claiming this is simply wasted effort. Scaled Agile Framework points toward a two-level lean way of planning: plan roughly for the longer time horizon, and more accurately for the shorter time period.

An additional, complexity-based explanation to planning is also available: the smaller the time-window we use for estimation, the less internal and external coherence is happening. Software development is an art for solving extremely difficult problems – and the solutions themselves cause additional problems, with the system under development thus constantly interacting with itself.

Agile software development is an attempt to solve the problems encountered in traditional development. While traditionally projects fail to deliver on-time or on-budget, and fail to fulfill customer needs for quality within the holistic project timeframe, agile introduces adaptive, self-corrective control mechanisms that are based both on internal and external feedback and on measurements of the intermediate results. In this way the quality promise can be kept.

We decided to abandon the cost center or deliverable-based approach for budget approvals or controlling. We did collect the long-term epic estimates, but centralized this effort to a few experienced planners. We were also very cautious with regard to how this piece of data was used: we acknowledged that the estimates were not accurate, and were not intended to be treated as an agreement on resource availability, consumption, or as a promise of the content.

The estimates from experienced planners were used to calculate the OPEX distribution of the deliverables. This deliverable-based view was valuable to both the R&D management team as well for frequent ad hoc analysis. After all, epics and HW (hardware) deliverables were exactly the content most cared about and talked about, and having an investment number next to a list of items gave insight to investment distribution.

Traditionally, cost center accounting as well as project accounting forms a baseline against which the actual numbers and latest estimates are compared to. The problem with this kind of reactive tracking is that it only reveals problems when the gap between the originally planned baseline and the actuals grow big enough. It’s only then that you need someone to explain whether the changes are acceptable or not. For a traditional company this approach may seem feasible – the more software you develop, and the more you want your content to evolve to satisfy the customer needs, the less you want to prematurely define your investments and opportunities for the future. The more software-driven a company is, the more it wants to adapt to emerging needs, and the more it would like to preserve room for changes. Another way to put this is that the more uncertainty there is, the more real option thinking needs to be allowed to play a role in the future planning.

The agile way of working thus changes how uncertainty is approached. Instead of using historical actuals to forecast the effort estimation error factor, or planning if smaller details, we started using shorter term planning (which is still somewhat accurate) and only rough long-term planning at the project level. Why it is then so hard to estimate accurately? One reason is that the old way of planning with 100% utilization rate leaves no room for unexpected changes. Whenever an error happens, there is no mechanism to make the corrections. Secondly, our portfolio has often consisted of multiple parallel projects, and changing between projects creates extra overhead, and delays all of the ongoing projects. The better way is to sequence the projects one after the other, and to use pull-based scheduling. This way one can optimize the portfolio of projects based on the cost of delay – a good concept for the project prioritization that we didn’t take into practice. Thirdly, when a new project is started, it is never started from an “empty table” – traditionally, we have not given any attention to the projects already started. In agile portfolio management all new projects are planned in smaller batches – from a single project we create 1-3 epics – and all epics are prioritized based on existing work and existing
priorities. A project may also have to prove it is executable. If a project does not show promising progress, it will drop in our priorities hierarchy and in resourcing.

The pull-based scheduling works naturally with queuing principles. Instead of 100% utilization rate we plan for lesser utilization rate. This allows for better tolerance for errors and small changes or surprises along the way. According to DeMarco the slack is also an enabler for all innovations. [6]

4 Delivery Window

Organizations give a range of revenue estimates for the upcoming year. However, traditionally project completion dates are given as specific dates. We wanted to find a way to allow uncertainty be included in completion dates as a range, as is the case with the revenue estimates.

Our solution was to allow ‘delivery windows’ in the product roadmap. Naturally, marketing, hardware deliverables and manufacturing need a target date – and typically they prefer a fixed, committed date. However, if this launch date has been fixed too early – given the inherent uncertainty of SW and HW development – lots of resources are wasted if the launch date is missed, such as already booked marketing campaigns or manufacturing capacity.

Now with the ‘delivery window’ all stakeholders are able to see the level of accuracy in the planning: how long the window was, when did it start and end, and also the documented rational for the related uncertainty. Revenue planning was based on the end date of the window as a safe and conservative estimate. The rest of the portfolio was kept open and only when the maturity increased was the schedule fixed and resources promised for next project in the prioritized backlog.

Another part of our solution was to enable ‘unallocated’ classification in our capacity plans. This new classification was explained to planners so that they would not have reason to hide the uncertainty but rather keep transparency throughout the planning and reporting phases, and align the plans with the reality. Our plans reflected exactly the uncertainty that the management was talking about in their meetings – the range of risks, delays and consequences.

5 Abandon Detailed Cost Center Management as Waste

Our third and fourth issues were about attention to budget overrun and resourcing re-approval upon an unavoidable change in the epic projects. We define epic project here as a group of (Potentially Shippable Increments i.e. PSIs [4] or trains, targeting a single delivery and launch. In traditional projects, the project cost, scope and/or schedule usually fail at some point of time. Sandbagging (i.e. the multiplication of the estimates with concealed numbers) is sometimes used so that problems might be hidden, but sooner or later – usually after a few rounds of cat-and-mouse regarding the target setting – people must come out with a fixed number and approve a budget where no surprises are allowed. That means that when further changes happen, the whole budget needs to be re-done and re-approved.

A company with a portfolio with multiple agile projects may need to keep a few “firemen” in order to be able to rescue a project that has run into a trouble. Our organization allowed the teams to self-organize when needed in order to ship the deliverables that were requested via the prioritized backlogs. We had a hierarchy of product owners to help prioritize the backlogs, and who took part in agile release train (ART) planning [5] to ensure that everyone worked towards the shared vision.

The theory of constraints tells us that any system is capable of delivering at the throughput rate of its weakest link. Hence, the key point is to understand the limiting factor at each business/ level/ function in order to execute proper resource allocation. Any effort to understand details in a non-bottleneck part of the project should be challenged – as the decision would be made based on the bottleneck resources anyway. This approach is adapted from Theory of Constraints [7, 8], in which one should first identify system’s constraints and then make efforts to maximize the output of that limited resource.

R&D costs come mainly from two sources – the headcount driven resource costs (internal or external) and investments on development environment (indirect) or prototypes (direct). The investments are known, and can be planned at the same time when backlog priorities are decided and epic projects started. In our R&D the total cost comes mainly from headcount, and the overall annual cost remains quite steady from period to period.

We abandoned the project-level budgets that needed continuous updating and re-approvals. Thus there were no project overruns, and no variance analysis against to the original plans. We realized that
even if a project’s execution velocity would be slower than expected or the project’s scope would be changed, i.e. the project’s cost would increase significantly; we could keep the project priority high, which would “automatically” allocate more resources onto it. This would need no re-approvals from any controllers. The total cost of the whole organization would not change, only the least prioritized projects would not get any resources and thus would not get done – at least, not now.

The priorities between Epic projects impact how much total value is created on each PSI e.g. 8 week period which targets delivering something shippable). It does not add any real value if the cost of each project is followed separately and re-stamped by management. If a project looked promising, but needed a bit more resourcing, the priority was kept high and resourcing was secured with that priority decision. If the value added from extended work was less than with other projects, priority was dropped and thus other projects were resourced. Release train backlog provides a good control mechanism – having traditional project cost control on top of that does not add any value. Refer to Figure 2.

Even though it is hard to estimate the total cost per project beforehand, it is easy to track the cost once the PSI gets done. You simply need to see from the team backlogs how many days each individual spent on which feature. For us, there typically exists one-to-one mapping between features and projects. But we didn’t have mandatory individual level update requirement, thus we used earlier described resource data collection to create visibility for epic level costs.

Flexible revenue – like flexible output from the outsourced project – is a challenging concept to any business-oriented person. But in real life the revenue typically depends on not just what we do but also on what the overall market situation is. The flexible revenue model raised the question of whether the teams were working as hard as possible if they had not committed to a fixed scope.

We made several attempts to measure the effectiveness of the software development teams. But at the same time there seemed to be so many major architectural and way-of-working changes that we never reached a stable environment for any velocity or cycle-time metrics.

In an environment where velocity is going up all the time the best way to measure completeness of a PSI is to use cumulative flow diagrams on feature / week basis. The shape of the CFD enabled us to estimate when a project would be complete. Alternatively, if the CFD curve was too flat – as was the case in some of our projects – it enabled the management to take the two corners fixed, and the third one is floating, as presented in Figure 3. The resources in our organization were fixed, as we were constrained by competences, and thus unable to increase resources on demand. The schedule is also fixed because we have timeboxed the deliveries into sprints and PSIs. Quality is not scarified, but all Sprint and PSI releases ship with good quality.

The third corner: scope, content, customer value – is floating. The controllers may also label that corner as revenue. This turns around the entire traditional project revenue-cost planning: traditionally, we had fixed content and thus fixed revenue, but upon delay we added resources and thus created additional costs to a project. Traditionally, the revenue estimate has not been changed.

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necessary actions: to raise the project priority or to cut the content or the feature inflow.

We now have a set-up where agility replaces detailed planning and trust replaces the central control. It is far more important to get visibility via information radiators and focus on removing bottlenecks, rather than explaining variances to original effort estimates. Backlogs enable the decentralization of decisions so that decisions happen in timely manner rather than creating situations in which teams are left waiting for permission to proceed.

6 Results and Conclusions

Our R&D has the freedom to manage content according to the pace of execution velocity and latest priorities without excessive reporting or re-approval processes required. The entire solution is powered by tool automation.

Our finance and control process is not an impediment for the journey to agile and lean. Instead, finance and control as a function is pretty lean itself, as it focuses on total R&D level cost and leaves content management to agile ways of working. Resources tied to finance and controlling are now much less than they earlier were, in adherence with the lean principle of value versus waste.

We are observing that many other organizations are becoming aware of the impact of the finance and control on agile software development. The awareness is increasing amongst SW related personnel – yet not with the finance function. We would be thrilled to learn of just how many other companies are facing similar issues, and then see role of finance changed.

Additionally, further work would need to happen in the area of system support. For example having the SAP R/3 finance and control module update to support ranges instead of single value points only – and likewise updating reward and bonus systems to align with the agile way of working.

6.1 Discussion

The paper suggests a new way of doing adaptive finance and control in an agile enterprise. The suggested method requires abandoning detailed cost centre accounting, approaching uncertainty using agile and lean planning and moving to task fluidity, which enables an flexible organization. Our solution is based on lean and agile thinking, scaled agile framework and beyond budgeting ideas. We have proposed a new way of defining fixed delivery dates as more flexible delivery windows. We have also proposed a new interpretation from financial point of view from the traditional project triangle of resources, schedule and content.

Currently, the results are validated in one organization only, but we believe a similar approach would work in other organizations too. The agile concept provides good tools to control SW portfolio and resource allocation in a modern, more rational way. Traditional finance and control methods and tools designed for the industrial age should not be used, as these are largely in contradiction with the lean and agile paradigm.

6.1 Acknowledgements and Related Work

During our journey to lean and agile we learned about the Beyond Budgeting [9, 10] concept. We found the principles matched perfectly with agile software development principles in many ways. [11] We also met smart and kind people both from Handelsbanken and from Statoil, and their insights into modern management accounting were useful and enlightening. We brainstormed all the ideas with our unit Finance & Control directors, and I received key guidance and support from our boss. We got the approval and go ahead from the R&D unit head. Under the corporate policy these persons will remain unnamed.

We would also like to give a big thank to whoever in our large organization initiated Simplified Planning. This approach enabled lots of documented changes.

References


