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Agile Contracts: Designing an Agile Team Selection Guideline

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Abstract. When you have stable and non-ambiguous requirements then a classic contract for IS between a supplier and a public sector institution based on a requirements specification may be well suited. However, if you have to accept many changes or have ambiguous requirements then you may end up with “endless” re-negotiation of the requirements; you need a more flexible way to develop IS. A new way of coping with many changes is to use an agile development approach and a fixed budget and resources contract. This paper presents an example case. We analyse the case and design a guideline for how to implement a fixed budget and resources contract in the public sector. The guideline includes elements to cope with challenges in a tender process such as transparency, criteria for supplier selection, and live assessment of resource skills and capabilities, as well as achieving the flexibility for change needed.

Key words: Design science research, public sector, agile resource contract, tender process.

1 Introduction

It is not the core purpose of public sector institutions to develop Information Systems (IS). Hence a supplier from outside is often brought in when there is a need for new IS. In European Union countries it is required to have a public tender process if the engagement between the public institution and the supplier is going to be over a certain threshold value (Bovis, 2007). In short a public institution has to publish annually how much they are going to procure in the coming year. They have to formally invite suppliers to tender offers. At a certain date they receive bids. The incoming bids are then opened and assessed, and the most economically advantageous tender or simply the lowest cost bid is chosen. Finally the award of the contract to the chosen supplier is published. This very formal process has been created to ensure transparency and fair competition (Sanchez Graells, 2011).

Until recently the common way for public institutions in Europe to procure IS has been through an open bidding process based on an invitation that included a requirements specification. This specification defined very precisely the scope of work and the IS functionality to be delivered within the contract. The competing bidders could then estimate time and resources for developing the required IS functionality and thereby calculate the cost, i.e. this many resources for this long time at this cost per hour.

This common way of procuring IT can be described using the project management triangle or “iron triangle” (Atkinson, 1999) as shown to the left in Figure 1. The iron triangle is based on the understanding that all projects will have to be performed with scope, time and cost as constraints. Scope refers to the goal or goals of the project specified as wished-for functionality, typically written down as a requirements specification. Time refers to the planning of the project and how much time is set aside to the different activities and how

much calendar time the project is to stretch over. Cost refers to the amount of resources spent which in most cases would be man hours and can usually be converted to a monetary value. Often these three constraints are drawn as a triangle, where each side represents a constraint. The relationship between the constraints is then that one side of the triangle cannot be changed without influencing the others.

Some public institutions have been looking for a different approach, and lately agile software development methods have been tried out as an alternative. Agile approaches are known to be good at dealing with (Conboy, 2009) frequent changes in requirements. Or as Coram & Bohner (2005, p. 1) express it: “Agile Methods have advantages, especially in accommodating change due to volatile requirements”. So if you are in such situation the Scope corner of the Iron Triangle is difficult to fix and freeze.

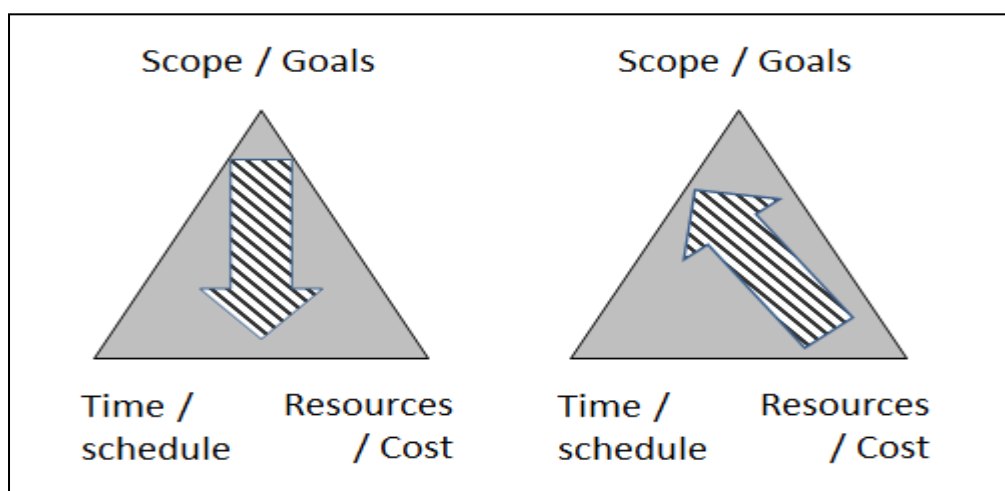


Figure 1: To the left the iron triangle for classic IS development where you first fix the scope (requirements) and derive resources and time. To the right the alternative agile approach where you start out from fixed resources.

When comparing plan-driven and agile methods Ceschi et al. (2005) found that agile approaches are especially good at improving the management of the development process and improving customer relationships. Agile approaches are also known to deliver results fast (Ågerfalk, Fitzgerald, & Slaughter, 2009), and to do it in an iterative way, piece by piece (Austin & Devin, 2009). Prominent examples of agile methods are eXtreme Programming (XP) (Beck, 2000) and Scrum (Rising & Janoff, 2000; Schwaber & Beedle, 2002).

The classic waterfall-style procurement may be “incompatible with an agile elaboration of requirements and development of functionality” (Jamieson, Vinsen, & Callender, 2005, p. 1). If customers require frequent changes and, at the same time, frequent releases are needed, one option would be to shift from buying a software product on a fixed-price scope and requirements oriented contract to buying agile development resources with certain capabilities (e.g. a team skilled at working in an agile way). Hence writing a *resources* contract instead of a scope-oriented contract. This will change the order of doing things as illustrated to the right in Figure 1.

Furthermore a public sector institution within EU still need to include the cost or at least be able to argue that the chosen supplier is the “most economically advantageous” (Bovis, 2007; Sanchez Graells, 2011). But when changing from starting in the Scope corner of the iron

triangle (Figure 1, left) to starting in the Resource corner (Figure 1, right) it changes from being a fixed price to being a fixed budget. Thus when using agile to cope with many changes we are looking at *fixed budget & resources contract*

Changing to that type of contract may result in significant changes to the bidding process: one is moving away from focusing on fulfilling requirements for an IS product toward fulfilling requirements for agile development resources. This means that the public sector customer organization has to define the properties of the resource (agile capabilities) they are buying.

The above reflections lead to the research question we aim at answering in this paper: *How to implement a fixed budget and resources contract?*

The remainder of the paper is organized as follows. First we give an overview of existing literature. We present our research method. Next, we present a public sector case organization where fixed price and resources contracts were signed. We then analyse the case and derive a framework that can be used for a fixed budget and resources contract thereby providing an answer to our research question. Finally we discuss the implications of the resulting framework for theory and practice.

2 Agile contracts, teams and Scrum

Poppendieck and Poppendieck (2007) identifies two different purposes of a contract. First, to protect each party from opportunistic behavior of the other party. Second, to set up appropriate incentives for companies to cooperate. The contract tender process typically starts with an announcement, a call for proposals. Competing suppliers then send in their proposals. They are opened, assessed by the customer and negotiated, finally a contract is signed, typically a contract seeing to that both the above mentioned purposes (Poppendieck & Poppendieck, 2007) are fulfilled. Hence competition is understood to provide an open and transparent process for both vendors and customers, thereby preventing favouritism.

We have searched the literature for papers on agile contracting. First, we found a book on “Agile Contracts” (Opelt, Gloger, Pfarl, & Mittermayr, 2013). Although they emphasize the need for a setup where scope is re-negotiated during the project (keeping cost and time constant) they still suggest a fixed-price contract based on scope; project vision, topics and epics. We also found three papers from conferences (Franklin, 2008; Jamieson, et al., 2005; Thorup & Jensen, 2009) reporting from cases experimenting with alternative contract formats. Jamieson et al. (2005) reports an alternative way of doing agile procurement focusing on resources and not scope. They report from a case; a collaboration between the Australian Department of Defence and the company ADI limited, where at the end of each iteration the supplier make an estimate (a fixed price) for the next iteration. This allow the public institution to “negotiate the elements that provide the highest value at that time” (Jamieson, et al., 2005, p. 7).

Franklin (2008) reports from the company InfoTech in USA reports some “Adventures in Agile Contracting”. InfoTech works with government customers and they have moved from Time and Material contracts to a “fixed price, fixed scope, fixed schedule contract that support Agile development” (Franklin, 2008, p. 269). Hence in the iron triangle (Figure 1) they nearly fix all three corners since Cost is derived from resources and time. The way they make this fixed setting work with agile is by very close cooperation “with members of the user community” thereby ensuring “enough user story awareness” (Franklin, 2008, p. 273).

Furthermore they systematically manage expectations so that the requirements discovery process “is seen as a positive and welcomed part of the project” (Franklin, 2008, p. 273).

Finally, Thorup and Jensen (2009) reports from two Danish projects where they have used what they call Collaborative Agile Contracts. They work with “scope described loosely in a few paragraphs as a kind of vision statement” (Thorup & Jensen, 2009, p. 196). So there is no detailed requirements specification. Instead they postpone customer payment until certain criteria at certain milestones have been fulfilled. But they do not have a fixed deadline. So in relation to the iron triangle these projects are starting out from the resource corner. Thorup and Jensen (2009, p. 196) says that the contract “establishes a space in which an agile project can take place and collaborative behaviour be cultivated”. The means they use, however, are different from what working with resources in that they work with two prices: The price per hour and the completion price. The idea is to negotiate a low hourly price and give the supplier an incentive to finish by having a high completion price.

With commodities, one can only use price as the criteria for choosing the vendor. But when an IS with considerable more complexity is added we may see a need to have more compounded criteria. Kreiner (2010) studied architectural competitions and found that “A complex design task can justify the compound character of the competition.” Kreiner (2010) concludes “... that the rationale of architectural competitions relies as much upon the enactment of the competition as it does on its design.” Further, Kreiner et al. (K. Kreiner, Jacobsen, & Jensen, 2011) report from a study where dialogues were allowed between contestants. Thus, for the implementation of a fixed budget and resources contract it is probably necessary to look at things other than price.

So when focusing at the resource corner (team and technical infrastructure) it is necessary to consider capabilities in relation to price. To do so you need to assess the capabilities of the individual team members, team capabilities (the composition of the team and the team member’s ability to work as a team) and the technical infrastructure and its ability to support the team performance.

Boehm et al. (2000)’s research shows that the most important factor contributing towards productivity of software organizations is team-oriented capability. Studies by MacBryde and Mendibil (2003) show that organizations are left without a systematic approach to measure team ability and performance. According to Zigon (1995), there are three reasons for this difficulty of measuring performance: 1. Knowing what to measure, 2. determining how to measure, and 3. carrying out measurement both at individual and team levels, thus making the task of measuring twice as complicated. In addition, Castka et al. (2004) found that performance measurement is not implemented generally according to the complexity of team-work; rather, “teamwork development is seen as a multidimensional construct (individual, team, organization), and it is recognized that the conditions in one dimension critically affect the conditions in other dimensions (i.e., poor performance of individuals in a team results in poor team performance).” Hence, measuring team ability is complex and difficult.

Performance should not only be measured at project completion to assess whether the task is achieved as set out whether the output meets the customer standards, but also throughout the project in terms of how the team is doing.

Finally we need to introduce the agile method Scrum. Basically it is an iterative approach where a 2-4 week repetitive iteration is called a Sprint. The customer plays a key part in Scrum IS development through having the Product Owner role. The Product Owner decides the wished-for functionality of a new IS and records the User Stories that are prioritized in a

Product Backlog. The functionality with the highest priority is broken down to tasks by the Scrum Team on the first day of a Sprint-iteration in the Sprint Planning Meeting. The Sprint begins after the Sprint Planning meeting. Every day the project team meets in a Daily Stand-up Meeting that is designed to take no more than 15 minutes. After two to four weeks, the Sprint iteration produces a deliverable of value to the customer. In general, the produced functionality is then demonstrated to the Product Owner in a Sprint Review Meeting.

3 Research Method

The genesis of Design Science Research (DSR) was Herbert Simon's Sciences of the Artificial (1996), that promotes the creation of things for both scientific rigor and practical relevance. DSR has gained an increasing presence in the IT field (Purao et al., 2008), capturing the field's increasing attention on relevance to practice (Winter, 2008).

Design science frameworks can add further scientific structure to the design process in design science. For example, Hevner (2007) observes a three-cycle view of DSR that relates the design activities (including a build-and-justify design cycle) both to the environment and to knowledge with a *relevance* cycle and a *rigor* cycle, respectively.

As our overall research method, we undertook the three-cycle design science research as described in Hevner (2007). Based on the notions of structure, rigor and creativity in DSR set out above, we aimed to design a solution to the research question phrased: "How to implement a fixed budget and resources contract?"

The relevance cycle took its starting point in a problem experienced in the case of the National Labour Market Authority in Denmark, namely, that an existing contract involved too much contract mudslinging when changes were needed. To solve the problem they experienced they had decided to change to agile contracting instead and were organising a tender process for doing so. We came in contact with the Authority during this tender process and we have followed them since.

In relation to the rigor cycle there was not much consideration of applicable knowledge at the beginning. There was a lot of experience within the Authority from numerous bidding processes, and there was also a solid base of knowledge on procurement rules. A consultant was brought in with deep knowledge on Scrum. But the knowledge base did not come together as a whole before we started writing this paper.

In the final design cycle of build and justify two iterations have taken place before arriving at the contribution of this paper; a guideline for implementing a fixed budget and resources contract in a public organization – which is also the answer to our research question..

For data collection we have carried out 25 semi-structured interviews over 2 years. We had a full day group interview organised as a project retrospective (Kerth, 2001). And we have had access to all the call for tender documents from the Authority. The interviews were transcribed and analysed focusing on the tender process and the contract issues (interviews were broader than just looking at the whole Scrum development process and how it developed over two years).

We decided to use the iron triangle (Atkinson, 1999) as our theoretical lens. We coded data with this lens using analytical induction techniques (Miles & Huberman, 1984). This led to the identification of a number of categories. Finally, the categories came together in the design of a guideline. In doing that we applied *ET generalization* (Lee & Baskerville, 2003) from empirical statements to theoretical statements to design a guideline. ET generalization means

that you generalize from the empirical data (our case at the Authority) to a more generic theory that be used across many organisations. This theory in our case is the guideline for a fixed budget and resources contract.

4 Case

The Danish National Labor Market Authority is a part of the Ministry of Employment. The scope of the Authority is to ensure that Denmark has a flexible, dynamic and efficient labor market. The main goal is to increase the supply of labor by getting people into jobs and out of unemployment. The Authority is responsible for maintaining a large number of information systems, and relies on external suppliers for development and maintenance of the systems. As an institution they have extensive experience with open tender processes using a traditional fixed-price contract based on a requirements specification.

We have, however, looked at two tender processes where the Authority applied a new approach buying agile capabilities on a fixed budget & resource contract. In Denmark where this case takes place this way of contracting with a supplier is relatively unique.

The first tender process is related to a web portal called *jobnet.dk*. Each month this portal has more than three million visits, of which 800,000 are unique users. The portal is open to all job seekers and employers, but is mandatory to use for all job seekers receiving benefits from the Danish government. Hence, *Jobnet* is the largest job portal in Denmark: used by most job seekers, most searches and most visitors; it also features a lot of political attention and discussions held in Parliament.

The development organization should thus be geared for rapid implementation of politically adopted amendments and changes. These changes also need to be implemented without compromising quality or usability. Especially intuitive ease-of-use has great importance because of the many new users and because it is mandatory to use *Jobnet.dk*, even for people with poor IT skills.

The first tender process took place in 2010/2011 when a contract renewal for the web portal *Jobnet.dk* was coming up. The Authority decided to initiate an agile tender process, contracting an agile team instead of buying a software product based on a set of requirements. For some time The Authority had been frustrated about the way IT projects were performed and the conditions for collaboration with suppliers. Slowly they realized that the classic waterfall model and fixed-price contracts did not fit their reality. Thus they decided to try agile instead. The main reason they opted for an agile development model was to ensure value for money and to avoid all the contract mudslinging that plagued the old set-up. The project manager reported: “We believe that the agile development method is well suited to address our needs in close collaboration with the supplier. It is the model that meets most of the concerns we have identified for flexible and solution-oriented processes with a focus on fast results.”

The first contract award process was part of an overall public framework contract thus a number of potential suppliers had already been decided on, and the new supplier had to be found among them. A tender process warning was send out 1 October 2010. A timeline for the process can be found in Figure 2. The normal tender procedure with information meetings and offer presentations was followed. However a new element, a *Scrum Camp*, was introduced as part of the process.

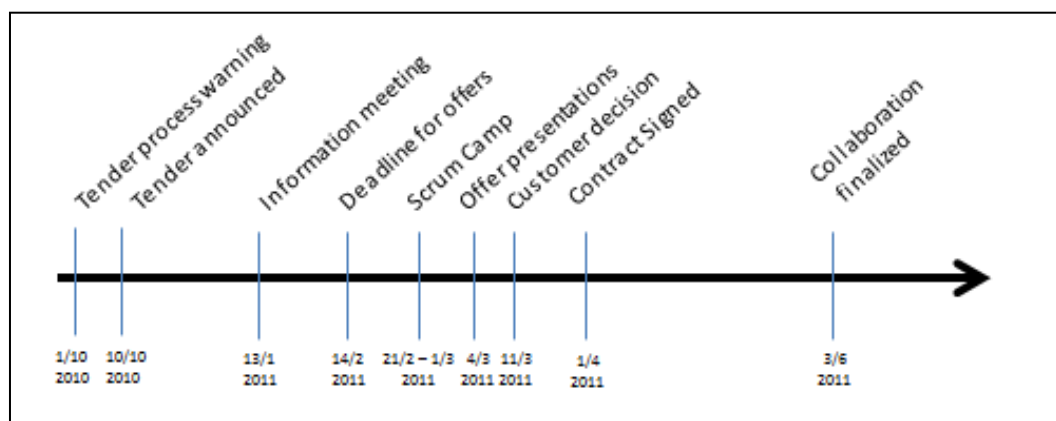


Figure 2: First tender process – Contract award

The Authority was very satisfied with the format of the tender process and the collaboration with the supplier following. Thus in the spring of 2012 the Authority decided to use it a second time.

The second tender process was for an information system called DFDG (an abbreviation for the Basic Data shared by many information systems). DFDG is vital for the Authority; it is a cornerstone in most business critical systems at the Authority. Basically, it is a means by which all communication - via web services – is sent to the local case management systems, to unemployment insurance funds and to *Jobnet.dk*. An error in DFDG could have implications for all systems used by all stakeholders involved in employment activities in Denmark. An error could also have as a consequence that unemployment benefits would not be paid out.

Inspired by the success of the agile contract and the Scrum Camp in relation to *Jobnet.dk*, the Authority decided in the spring of 2012 to aim for an agile team contract, instead of a traditional contract. In the call for tender, the criteria for assessing the team being offered and the performance in the Scrum Camp was stated as follows: “That the management of processes in the offer submitted creates an effective and creative problem solving, including the employees of the two teams, individually and collectively ... shows good understanding of the work and demonstrate that they can work team oriented. With regard to the DFDG team there will be placed great emphasis on the ability to collaborate on creative problem solving, supported by an agile process and less emphasis on the final result in the form of a running system”.

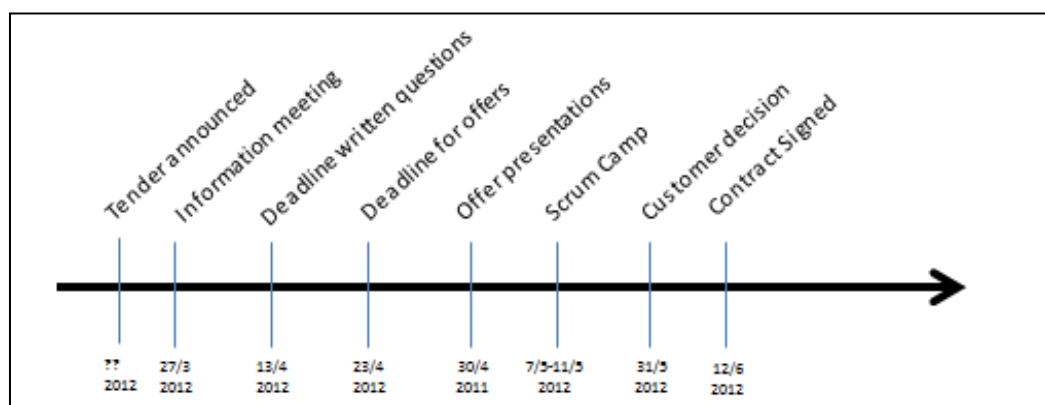


Figure 3: Second tender process

A slightly different set-up was used for the DFDG Scrum Camp compared to the first one, that is, both a Scrum team and a System Management team were part of the Scrum Camp. The two teams were expected to work in parallel, but a few activities were included to allow interaction between the two teams. There were the same activities concerning the introduction, performing two sprints, a question-session at the end, as well as the same number of observers. This time the tender process was open to all suppliers interested in tender, and all suppliers approved in the pre-evaluation round were invited for a one-day Scrum Camp.

In Figure 3 a timeline for the contract award process is given.

5 Analysis

In this section the customer's requirements regarding the tender content for the two instances of an agile fixed-budget and resource contract is analyzed using the iron triangle to focus the analysis on the traditional three elements interacting in IS projects: Scope/goals, time/schedule and resources/cost.

5.1 The first tender process

The scope/goal element: As a consequence of the Authority's desire (intention) to keep the scope open and flexible; allowing constant re-prioritization of the product backlog, no functional requirements are included in the invitation to tender. Non-functional requirements such as Service goals for the application are included and the supplier is asked for suggestions how to implement KPIs for them. The final level for the goals is to be agreed on by the supplier and customer in common during the startup phase. It is also stated explicit in the tender invitation that no penalty will be tied to achieving the goal, however if the agreed level is not achieved for a specific month the supplier is expected to provide a statement and suggestions how to ensure the agreed level in the future. Other non-functional requirements covered by the invitation to tender are the quality of the code, standards and principles for system architecture and design, test coverage and finally scope and quality of the documentation. A number of other elements are included focusing on the development method to be used (e.g. Scrum or an agile approach inspired by Scrum) and governance of the project; emphasizing reporting requirements and common forums to decide on Release and Sprint planning as well as actions to improve the performance of the delivery organization (including both customer and supplier roles). The elements are not states as mandatory requirements however, but as the customer's expectations. The supplier is asked to provide a solution how to fulfill the customer's expectations and if the supplier finds it necessary to suggest different elements in order to fulfill the overall goal.

The Time/schedule element: Duration of the contract is two years, with the possibility to extend twice to a max of total five years. A two month trial period applies allowing the customer to withdraw if a satisfying collaboration cannot be established.

The resource/cost element: Three types of resources are explicitly asked for: (1) A development team having specific roles and competences; (2) Physical premises fulfilling specific requirements, and (3) An IT-infrastructure including an IT development and test environment.

Scope/goals	<ul style="list-style-type: none"> Goals (the supplier is asked to suggest KPIs): stable in operation, user friendly, short response time, fast and efficient troubleshooting, fast and efficient development and implementation, continuous improvement of the system architecture and code quality
Functional requirements	<ul style="list-style-type: none"> No functional requirements (history of the application and a short description of the future direction of development provided)
Non-functional requirements	<ul style="list-style-type: none"> Service goals for the application (e.g. system accessibility, response time, bug fixes) Quality of the code Standards and principles for architecture and design Testing coverage Documentation of the developed application
Other requirements	<ul style="list-style-type: none"> Development method (agile development process e.g. following Scrum) Organization and governance structure Reporting (e.g. transparency, current, online, simple, natural part of development process) Danish language mastered by all participants
Time/schedule	<ul style="list-style-type: none"> Two month chance of withdrawing from the contract (trial establishing collaboration) 2 year contract with the possibility of extending it to a max of 5 years
Resource/cost	<ul style="list-style-type: none"> Team size, roles and competences <ul style="list-style-type: none"> Allocation, replacement, back-up and scalability Premises (e.g. location, dedicated project room, dedicated meeting facilities) IT-infrastructure and developing and test environment

Table 1: First tender process – Elements in tender

As the customer's intention is to source agile capabilities the resource element is very important and therefore the supplier is asked to provide many details about the resources they offer. In order for the customer to control the nature of information provided by the supplier a CV-template is provided as part of the tender invitation. The supplier also has to guarantee that the employees offered in the proposal will be the actual team working for the customer the next two years. A penalty applies for replacing employees before the collaboration starts and throughout the contract period. A penalty is also defined in relation to premises. Thus the customer wants easy access for their product owners to sit together with the team and work. Therefore an algorithm is defined calculating the penalty for (distance between supplier and customer) travel time.

A summary for the first tender process is provided in the Table 1.

5.2 The second tender process

The scope/goal element: The vision included in the invitation to tender address the need to provide high quality user experience, develop a stable delivery organization with great sense of responsibility, commitment and low staff turnover and finally to improve and develop the system to be a better foundation for IS support of employment (all the other systems using the services) and create a basis for relaxing the release process in the future.

Scope/goals	<p>Goals:</p> <ul style="list-style-type: none"> • User-friendly, efficient and stable system with a high level of service to users • A stable delivery organization (team) with great sense of responsibility, commitment and low staff turnover • Improve and develop the system to be a better foundation for IS support of employment and create a basis for relaxing the release process in the future (frequent releases, decoupled from receivers' releases).
Functional requirements	<ul style="list-style-type: none"> • No functional requirements specified (history of the application and a short description of the future direction of development provided)
Non-functional requirements	<ul style="list-style-type: none"> • Service goals for the application (e.g. system accessibility, response time, bug fixes) • Quality of the code • Standards and principles for architecture and design • Testing coverage • Documentation of the developed application
Other requirements	<ul style="list-style-type: none"> • Agile development process following Scrum • Organization and governance structure • Transparent development process (e.g. sharing code) collaborating with other IS-suppliers who rely on the web-services provided • Compliance with time estimates for sprints • Danish language mastered by all participants • Use of common coach to support development team as well as the collaboration between supplier and customer
Time/schedule	<ul style="list-style-type: none"> • Two month set-up phase • 22 Month contract with the possibility to extend it one year, two times (total max of 4 years)
Resource/cost	<ul style="list-style-type: none"> • Team size, roles and competences <ul style="list-style-type: none"> ◦ Allocation, replacement, back-up and scalability • Premises (e.g. location, dedicated project room, dedicated meeting facilities) • IS-infrastructure and developing and test environment

Table 2: Second tender process – Elements in tender

No functional requirements are included, but like the first tender process non-functional requirements including service goals for the application, quality of the code, use of standards and, principles for architecture and design and test coverage and documentation of the developed application. Also in this tender a number of other requirements are included

focusing on the development method to be used (e.g. Scrum or an agile approach inspired by Scrum) and governance of the project; emphasizing reporting requirements and common forums to decide on release and sprint planning as well as actions to improve the performance of the delivery organization (including both customer and supplier roles).

The Time/schedule element: Duration of the contract is two years, with the possibility to extend twice to a max of total four years. The customer is allowed to withdraw if a satisfying collaboration cannot be established; in that case the customer will have to pay compensation to the supplier.

The resource/cost element: The same three types of resources as in the first tender process are explicitly asked for: a developing team fulfilling specific roles and competences, premises fulfilling specific requirements, and IS-infrastructure including developing and test environment. And again penalties apply for replacing employees before the collaboration starts and throughout the contract period and travel time (distance between supplier and customer). This time a penalty apply if team members are working on tasks external to the customers sprint without approval from the customer.

A summary is provided in the Table 2.

5.3 Evaluating the proposals focusing on resource capabilities

The evaluation of the proposal focused on assessing capabilities offered in relation to the prize, as only the resource corner of the iron triangle was the most important; no functional requirements were stated, service goals were to be agreed on by the contracting parties as part of the starting up, and the duration of the contract was fixed without any ties to the scope or delivery. The award criteria used for each of the contract award procedures are slightly different (see Table 3 for details).

The price element was relatively simple to evaluate as the main components related to an hourly fee for different categories of resources offered. The two other elements were much more challenging to assess individually but also due to the fact that they to some extent interact and rely on each other. Hence the offered Agile process can on paper look very appealing but if the people performing it lack personal skills or professional skills it may not provide the desired result or vice versa.

The primary component assessing the delivery organization is the CVs for the team members, the Scrum Master and the Project Manager offered. In order to provide the customer relevant information and make comparison easy a CV template was provided as part of the invitation to tender.

A new component in the tender process a Scrum Camp was invented to supplement the written proposal from the supplier in order to assess the teams' competences. In short all bidding suppliers perform a one day workshop in the offered location, with the offered team, demonstrating how they perform a complete sprint. A schedule was included in the invitation to tender thus the prequalified suppliers knew on beforehand when to perform the Scrum Camp. Two weeks prior to the actual Scrum Camp a letter was sent to the supplier with a script for the Scrum Camp and the required technical infrastructure the supplier should prepare.

A detailed script or plan for the day was developed for each of the two Scrum Camps. For the Scrum Camp, the customer organization had defined which roles should be filled on the customer side as well as on supplier side. In both tender processes, five people from the

customer organization participated. The Scrum Camps were to be held at the supplier's premises in the actual room the future development team was supposed to work in, and the suppliers were asked to provide their own technical infrastructure for the Scrum Camp.

Award criteria		First tender	Second tender
1	Price	20%	30%
2	Delivery/solution; the suppliers suggestion how to perform agile development (process, toolbox and governance principles)	20%	30%
	Time and activity plan	10%	
	Quality in the supply stages throughout the delivery process	15%	
3	Delivery organization (in practice the capabilities of the team members)	30%	40%
	Deviations and/or clarifications	5%	NA

Table 3: Award criteria for the two tender processes

During the Scrum Camps participants from the Authority observed the work performed by the supplier team. In both tender processes, the Authority's participants had a short meeting after each Scrum Camp, where they shared notes and impressions about the day and agreed on the rating. The final rating was based on a common table with positive and negative observations within the different categories, e.g., "the team demonstrates that they can work as a team," and "the team demonstrates ability to perform an agile development process." The customer organization made sure that the way they assessed the team was in accordance with the general requirements of assessing tender material from a supplier.

Finally, all assessment criteria were summarized into one grade for each team. The grades used were 1 and 5, where 1 is the poorest and 5 the best. An individual assessment document for each supplier was formulated, very carefully safeguarding that it fulfilled the requirements of a legal document that could be used in a court.

The Authority found that the Scrum Camps provided the basis for assessing the team's agile (scrum) abilities in a consistent and transparent way, and, at the same time, it gave invaluable insights into how the offered team worked and the extent to which the performing team had implemented and internalized the principles of agile software development. The insights that the participants from the Authority reported were such that could not have been gained from written material submitted by suppliers.

The workshop participants found that simply observing a team perform relevant agile software development in one day allowed them to understand how a team works. As one of the participants described it, "You get a possibility to look right into the engine and see how it works."

5.4 Summing up case findings

Summing up our case findings we found the following.

Time/schedule element: Not used in the traditional way; instead fixed period with no considerations to the scope, however with the possibility extending or aborting the collaboration.

Scope/goal element: No functional requirements in any of the tenders. However, some service requirements (but with no penalty attached) and many other requirements e.g. on the development process. Invitation to tender included many statements expressing the customer's vision; direction of development and intention of the collaboration.

Resource element: Here we found a number of requirements. Especially it was important to describe the actual skills and composition of the agile team and their ability to work as an agile team. Resource requirements included the size/capacity of the team, different roles the team should cover, the time period for the contract, and skills the team should provide.

Simply asking suppliers to provide CVs for team members could provide a distorted assessment of the team's skills and agile capabilities. Some bidders simply may be very good at presenting things on paper that will not really materialize or work out in practice. Hence, the Authority needed something to supplement CVs; something that allowed them to view the potential suppliers work in "real life"; The Authority decided to use a *Scrum Camp* for that.

The Authority found that the Scrum Camp worked well as a supplement to the written proposal. It provided a face to the CV and added context to the CVs that made deeper interpretations possible. Plus it made the customer understand the suggested (by the bidder) agile process better and see how their agile toolbox supported the team and the process.

Penalties specified in the contract were related to replacing resources or using resources on tasks outside the contract. No penalties related to time or scope.

As a natural consequence of abandoning the functional requirements and focusing on resources the change management process moves from scope to resources.

6 Analysis

We have now analysed the case. Based on the analysis and the categories identified we design a guideline for how to implement a fixed budget and resources contract in a public sector institution. For reasons of traceability back to the categories we have left the same things underlined as in the previous section.

Pre-requisites

You are a public sector institution that has to adhere to public rules for contracting

You have a number of existing IS; large and old legacy systems that needs to be updated

Time / Schedule

You do not need milestones and deadlines in the contract. But you have to consider the length of the contract, that is how long you will engage the resources

Scope / Goal

You can avoid describing precisely what you want as functional requirements. This is especially useful in a situation where you have changing and unforeseen requirements.

Even if you do not put up any functional requirements you should still consider including non-functional requirements for things such as usability, operational stability, and maintainability

Resources

You have to specify resource requirements: What resources? With what competence(s)? What roles are they to play? What cooperation do you expect e.g. shall they be able to work as a team?

You have to consider how you will measure the requirements fulfilment e.g. whether the competencies are available at the wished-for level.

You need a high level of knowledge and insight to be able to write resource requirements.

This is not something new; public institutions often hire outside consultants to help them write functional requirements. But here the knowledge needed is about the resources and the process. E.g. if you require a Scrum team you need a high level of knowledge on Scrum to write the requirements relating to the process and the technical infrastructure.

Scrum Camp

It is very difficult – maybe impossible – to evaluate the ability of a team and a process on paper. You have to plan to see it being played out. As a minimum you should plan the input, the process (of the test) and the expected result.

Penalties

You need a new form of penalties written into the contract. Traditionally penalties have been linked to missed deliveries at milestones and deadlines. Now penalties should be linked to resources instead. E.g. not being able to deliver a competent project manager at a given time.

Change management

You need to be able to handle changes in resources not in requirements. The supplier needs to know how to bring in or take out a person from the project. There needs to be a resource change management process described.

7 Discussion and Conclusion

The guideline design presents a skeletal structure of elements to cope with challenges in a tender process such as transparency, criteria for supplier selection, and live assessment of resource skills and capabilities, as well as achieving the flexibility for change needed.

By ‘skeletal’ we refer to the fact that the guideline is not complete or final. It is based on a generalization from a case with two instances of a fixed budget and resources contract. In that sense the guideline answers our research question on how to implement a fixed budget and resources contract.

In relation to literature we have not been able to find similar design work in the academic literature. A number of people have looked at agile contracting (Franklin, 2008; Opelt, et al., 2013) but without moving the starting point to the resource corner in the iron triangle. Cellary and Picard (Cellary & Picard, 2010) have used an agile approach for virtual teams and cooperation but without fixing the resource corner as we do. Brown et al. (Brown, Conrade, & Callender, 2009) are quite critical to whether an agile approach is helpful at all? And a few (Jamieson, et al., 2005; Jamieson, Vinsen, & Guy Callender, 2006; Thorup & Jensen, 2009) are thinking along the same lines, namely changing the focus to the resource corner, but focus on pricing and flexible negotiations of price instead of focusing on the ability of people and the team. Hence we believe that no prior research has been published about a fixed budget and resources contract for a public sector institution buying IS. Hence this work provides novel insights into this new form of tender process and contract form.

In relation to practice we believe it could have enormous impact. There are many public institutions with a legacy of IS that could benefit from considering a new way of contracting. Our skeletal framework can provide a valuable starting point for these institutions.

We are not saying that our design of a guideline apply in all situations. In many cases, e.g. when buying something completely new with a relatively clear scope, a fixed-price contract may still be the best way to govern a cooperation between a public customer and a supplier. Hence, an important limitation to the utility of our guideline is that the organisation using the guideline should be in the process of procuring maintenance and further development to an already existing information system. But based on our case study we claim that the fixed budget & resource contract can complement the classic scope- and requirements-oriented contract in the public sector.

References

- Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*, 17(6), 337-342.
- Austin, R. D., & Devin, L. (2009). Research Commentary--Weighing the Benefits and Costs of Flexibility in Making Software: Toward a Contingency Theory of the Determinants of Development Process Design. *Information Systems Research*, 20(3), 462-a-477.
- Beck, K. (2000). *Extreme Programming Explained: Embrace Change*: Addison-Wesley.
- Boehm, B. W., & al., e. (2000). *Software Cost Estimation with Cocomo II*: Prentice Hall PTR.
- Bovis, C. H. (2007). *EU Public Procurement Law*: Edward Elgar Publishing.
- Brown, J., Conrade, L., & Callender, G. (2009). Managing IT: Does agile software development solve buyer needs? *Journal of Contemporary Issues in Business and Government*, 15(1), 79-91.
- Castka, P., Bamber, C. J., & Sharp J. M. (2004). Benchmarking intangible assets: enhancing teamwork performance using self-assessment. *Benchmarking: An International Journal*, 11(6), 571-583.
- Cellary, W., & Picard, W. (2010). *Agile and Pro-Active Public Administration as a Collaborative Networked Organization*. Paper presented at the 4th International Conference on Theory and Practice of Electronic Governance (ICEGOV'10), Beijing, China
- Ceschi, M., Sillitti, A., Succi, G., & De Panfilis, S. (2005). Project Management in Plan-Based and Agile Companies. *IEEE Software*, May/June 2005, 21-27.
- Conboy, K. (2009). Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development. *Information Systems Research*, 20(3), 329-354.
- Coram, M., & Bohner, S. (2005). *The Impact of Agile Methods on Software Project Management*. Paper presented at the Proceedings of the 12th IEEE International Conference and Workshops on the Engineering of Computer-Based Systems (ECBS'05).
- Franklin, T. (2008). *Adventures in Agile Contracting: Evolving from Time and Materials to Fixed Price, Fixed Scope Contracts*. Paper presented at the Agile 2008 Conference.
- Hevner, A. R. (2007). A Three Cycle View of Design Science Research. *Scandinavian Journal of Information Systems*, 19(2), 87-92.
- Jamieson, D., Vinsen, K., & Callender, G. (2005). *Agile Procurement: New Acquisition Approach to Agile Software Development*. Paper presented at the Proceedings of the 2005 31st EUROMICRO Conference on Software Engineering and Advanced Applications (EUROMICRO-SEAA'05).

- Jamieson, D., Vinsen, K., & Guy Callender. (2006). *Agile Procurement and Dynamic Value for Money to Facilitate Agile Software Projects*. Paper presented at the 32nd EUROMICRO Conference on Software Engineering and Advanced Applications (EUROMICRO'06).
- Kerth, N. L. (2001). *Project Retrospectives: A Handbook for Team Reviews*: Dorset House.
- Kreiner, K. (2010). Designing architectural competitions: Balancing multiple matters of concern. *Conditions – Independent Scandinavian Magazine on Architecture and Urbanism*(December 28, 2010).
- Kreiner, K., Jacobsen, P. H., & Jensen, D. T. (2011). Dialogues and the Problems of Knowing. Reinventing the Architectural Competition. *Scandinavian Journal of Management*, 27, 160-166.
- Lee, A. S., & Baskerville, R. L. (2003). Generalizing Generalizability in Information Systems Research. *Information Systems Research*, 14(3), 221-243.
- MacBryde, J., & Mendibil, K. (2003). Designing performance measurement systems for teams: theory and practice. *Management Decision*, 41(8), 722-733.
- Miles, M. B., & Huberman, A. M. (1984). *Qualitative Data Analysis: A Sourcebook of New Methods*. Newbury Park, CA: Sage.
- Opelt, A., Gloger, B., Pfarl, W., & Mittermayr, R. (2013). *Agile Contracts. Creating and managing succesful projects with Scrum*: Wiley.
- Poppendieck, T., & Poppendieck, M. (2007). *Implementing Lean Software Development: From Concept To Cash*: Addison-Wesley.
- Purao, S., Baldwin, C., Hevner, A., Storey, V. C., Jan, P.-H., Smith, B., et al. (2008). The Sciences of Design: Observations on an Emerging Field. *Communications of the Association for Information Systems*, 23, 1.
- Rising, L., & Janoff, N. S. (2000). The Scrum Software Development Process for Small Teams. *IEEE Software*(July/Aug), 26-32.
- Sanchez Graells, A. (2011). *Public Procurement and the EU Competition Rules*: Hart Publishing.
- Schwaber, K., & Beedle, M. (2002). *Agile Software Developemnet with Scrum* (Pearson International Edition ed.). Upper Saddle River, NJ, USA: Prentice Hall.
- Simon, H. A. (1996). *The Sciences of the Artificial* (3rd ed.). Cambridge, Mass.: MIT Press.
- Thorup, L., & Jensen, B. (2009). *Collaborative Agile Contracts*. Paper presented at the 2009 Agile Conference.
- Winter, R. (2008). Design science research in Europe. *European Journal of Information Systems*, 17(5), 470-475.
- Zigon, J. (1995). Team Performance Measurement: A Process for Creating Team Performance Standards *How to Measure the Results of Work Teams*: Zigon Performance Group.
- Ågerfalk, P. J., Fitzgerald, B., & Slaughter, S. (2009). State of the Art and Research Challenges. *Information Systems Research*, 20(3), 317-318.