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Progressive Acquisition and the RUP Part II: Contracts That Work

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In Part I of this series, we identified the gap between the expectations of traditional procurement specialists and the realistic needs of the software development community. We acknowledged that there is currently a fundamental disconnect between the legal practices concerning contracting and effective software development practices, but that a new approach called "progressive acquisition" can help bridge that gap.

To prepare for a detailed discussion of progressive acquisition, in Part I we also developed a simplified acquisition scenario for discussion purposes and defined key terms. And finally, we looked at both the variables involved in contracting and the range of conventional contract types defined by the Project Management Institute.

Now, in Part II, we will describe how to modify the traditional contracting process to fit a progressive acquisition model that meets the needs of both acquirers and suppliers. Like the material in Part I, this material is based partly on the work of Mike Barnard, a Rational Unified Process® expert in Rational's Vancouver office, and partly on what I have learned through years of experience on many projects.

A Simplified Overview of Traditional Contracting

In Part I we noted that those professionals normally responsible for formulating and administering service contracts follow a process based on a long history of tradition and practice, and governed by well-established contract law. A simplified workflow of this process is shown in Figure 1. More often than not, the objective of the "Negotiate Contract" stage is to arrive at a fixed price for a fixed amount of work. This is especially true for government or large corporation contracts.

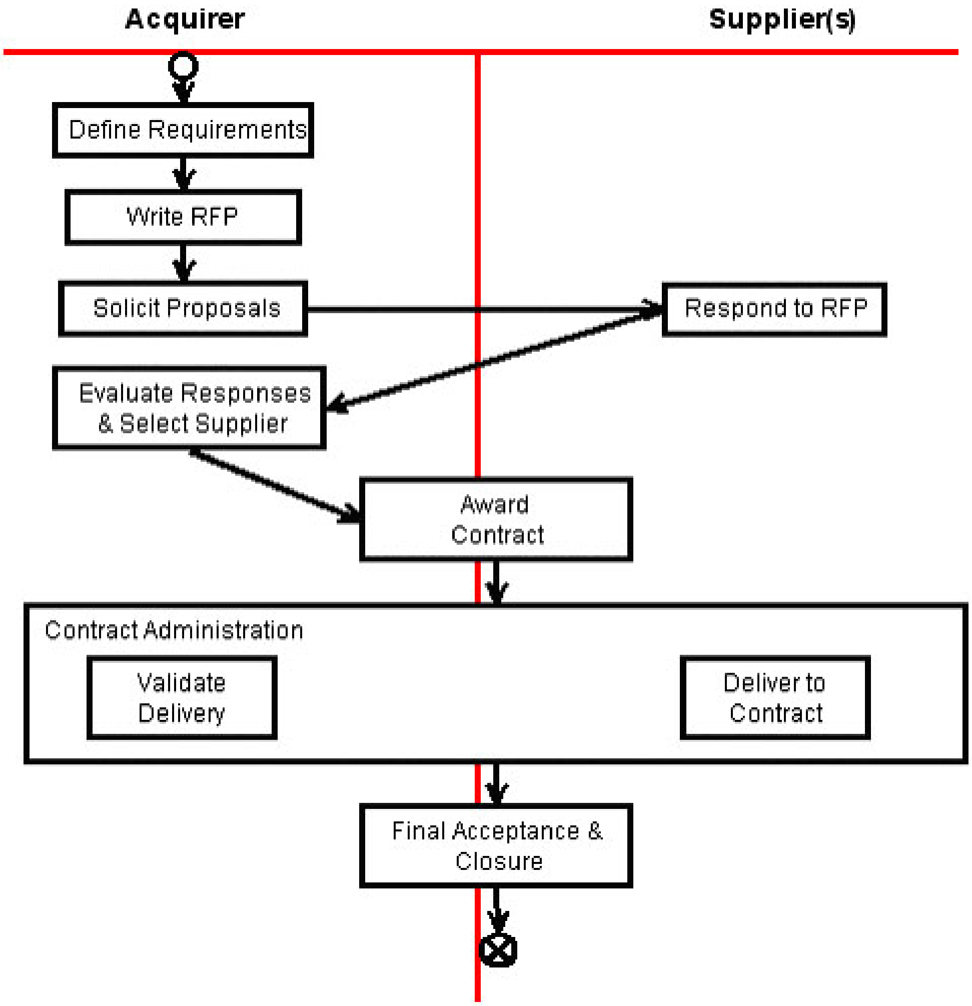

Figure 1: Overview of a Typical Contract Process

In such cases, it is up to the acquirer to define requirements well enough for potential suppliers to estimate the amount of work involved with a reasonable level of confidence. Unfortunately, acquirers do not always recognize this necessity. This leaves the supplier with three options: asking the acquirer to reconsider; building in a high level of contingency; or accepting an unreasonably high level of risk. If the acquirer cannot do the "Define Requirements" work in-house, they can either hire an outside party to do it, or refer back to earlier contracts for which they did do definition work.

For example, suppose you want to negotiate a contract to construct a public building. If you do not have qualified staff on your payroll, you can hire an architect. This architect would go through a sequence of steps to ascertain your requirements, determine the constraints of the chosen site, propose alternatives for the size and appearance of the building's shell, and then move on to develop functional layouts -- all with your progressive concurrence as the client. Note that it is the shell of the structure that will largely determine the eventual cost of the physical construction, and enable the various specialists that follow to be reasonably confident of their costs.

Once hired, the architect would expect to stay on board with the project if you decided to go ahead with construction. It would be unusual for the architect not to do so, although there is no actual guarantee you will engage him. Chances are you would also negotiate the rates for his prospective work before the contract is awarded.

The Acquisition Process with RUP

Although the typical contract process we have just described works reasonably well in the construction arena as well as many others, practices in the software development world are different. First, few acquirers hire an architect to define the system before issuing a Request For Proposal (RFP). And they typically expect to negotiate a fixed price for the entire development project right at the outset. Unfortunately, as we noted in Part I, such practices and objectives run counter to best practices that lead to successful software development.

If the acquiring organization is a RUP user, it will have guidance for applying some of these best practices to the acquisition process. There are standard RUP processes for arriving at, capturing, and managing requirements. Artifacts in which requirements are embedded include Stakeholder Requests, the Vision document, the Software Architecture document, and use cases and supplementary specifications.

The acquirer would first analyze the market, decide upon the set of potential vendors to receive solicitations, establish the selection process and criteria, and decide which contract type to employ. Then, the acquirer would prepare a Request for Proposal (RFP) that articulates the organization's needs as clearly as possible, based on requirements contained in the artifacts we mentioned above. The RFP is typically a highly standardized document that contains much "boilerplate" language specific to the organization, and it is usually under the purchasing department's control. Before distribution, the draft RFP would be reviewed by the organization's legal department or service. It would then be distributed to potential vendors, and the acquiring organization would supply clarification if necessary.

The vendors would review the RFP and decide if they want to respond by creating a proposal that describes their approach and pricing options for meeting the requirements. The acquirer would then review the responses and select a particular supplier to work with, possibly through progressive eliminations or pilot implementations.

A Progressive Acquisition Solution for Contracting

For the acquisition process to be compatible with RUP -- and, more important, adhere to the spirit of RUP -- a new approach to contracting is required. Specifically, that would be an iterative, or "progressive," approach to the entire process.

The Activity Diagram shown in Figure 2 introduces a new key element into the acquisition process: multiple smaller contracts, each resulting in delivery of value to the acquirer, rather than one "big bang" contract (as Gilles Pitette might describe it).

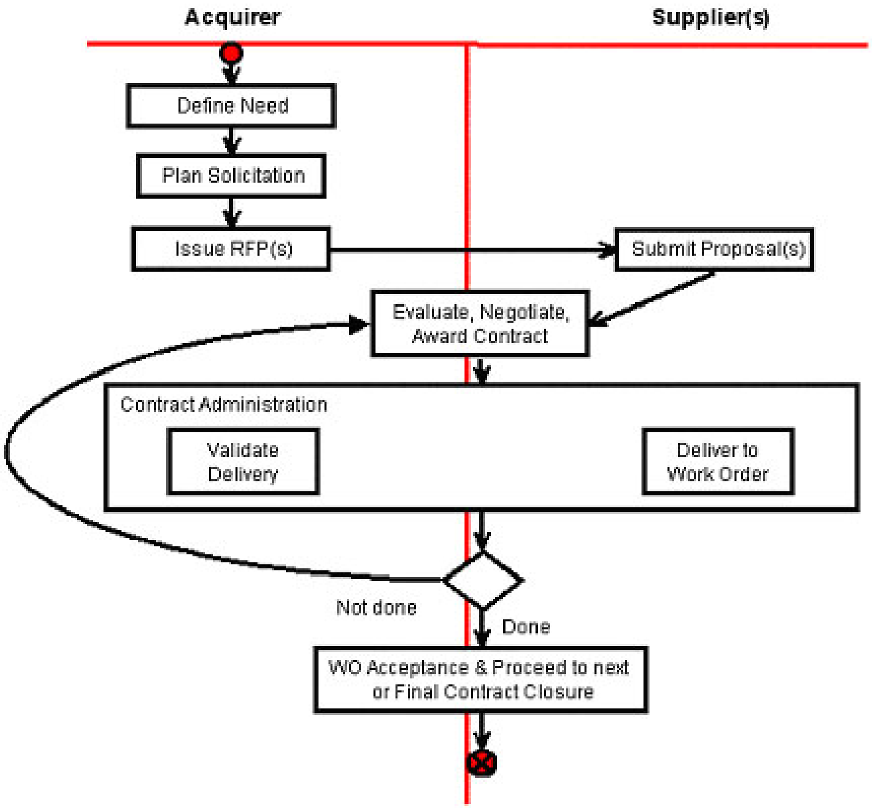

Figure 2: Overview of a Progressive Acquisition Approach

Two-Level Contracting

As we observed in Part I, contracts are very flexible, and this is especially true for software development projects. So a contract agreement really should consist of two levels:

- A "Head Contract" that sets out terms and conditions for an anticipated long-term relationship.
- A system of "Contract Work Orders" (CWOs) that progressively enable the work.

The Head Contract should include most of the required standard boilerplate: administrative and technical provisions such as hourly or unit rates, change management procedures, payment cycles, testing processes, and so on. If the acquiring organization has done its homework, this part can also include a target budget figure based on reasonably accurate conceptual-level estimates. This document spells out a broad framework for an ongoing relationship; it provides the acquirer with the necessary financial control and the supplier with a reasonable expectation on which to base its competitive pricing.

The second level of the contract defines specific deliverables associated with a shorter period of time, and the actual technical work is released as a sequence of CWOs. These CWOs are prepared and awarded to the supplier for each stage of the work, based on the latest information and/or development of the solution, and as a result of technical negotiations between the parties. The initial set of deliverables will be recorded in the first CWO. The earliest CWO or CWOS will be cost reimbursable, just like the architect in our public building example. Then, as successive elements of work are accomplished, the requirements should become sufficiently firm, at least for the next iteration, that a firm price can be agreed upon for the next CWO.

Acquirers who need more convincing about the wisdom of this approach should consider Murray Cantor's observation:[1]

> Computer science shows there is no way to get precise answers to many questions you might want to ask. There is no rigorous formula for determining the size of the code required to carry out a given task. There is no practical way to prove whether a piece of code is correct, that is, whether it does what it is supposed to do, or even whether the code will stop in a finite length of time. Although there are useful methods for estimating the effort required to develop code, the formulas are based on imprecise parameters and human judgment. Finally, there is no widely accepted formula for code quality, only indicators.

As the contract proceeds, the supplier delivers, the acquirer validates delivery, and both sides perform a variety of administrative functions, including change management and payment.

As the conditions related to the first CWO are met, the parties negotiate deliverables for the next phase and record the agreement in another CWO. If the documentation for the next iteration is extensive and/or subject to further negotiation, it may be preferable for the acquirer to initiate the process by issuing a Contemplated Contract Work Order. This represents best practice for delivering value iteratively. This cycle is then repeated under the conditions of the Head Contract until the entire acquisition is complete.

Once the objectives of the full acquisition project have been met, both parties move into final acceptance and closure activities, including final payments and archiving.

Progressive Acquisition and the RUP Lifecycle

If the foregoing description seems like a linear or waterfall approach, it is important to understand how it relates to the RUP. Figure 3 shows how the first delivery maps into the RUP from the perspective of the acquirer.

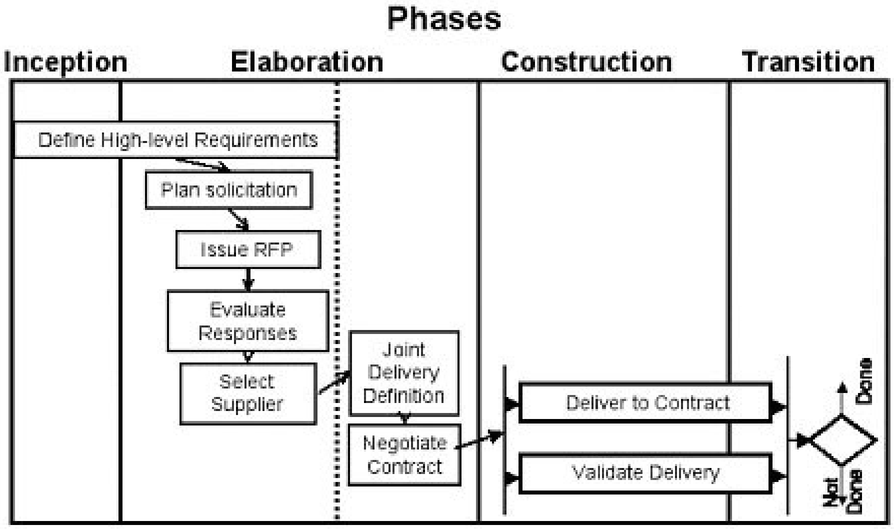

Figure 3: Acquisition Lifecycle Leading to First Delivery

Note that the acquirer and supplier negotiate the first set of deliverables as part of the initial overall contract determination. These are recorded in the first one or more CWOs.

If the chosen supplier proves to be unsuitable in the "first round," or if the specific value they bring becomes exhausted, then the acquirer can terminate the Head Contract with minimal losses in terms of time, cost, and progress. Otherwise, the parties can initiate each subsequent increment with a new CWO that focuses on the latest known technical requirements, without having to invoke a full traditional and legal RFP process. Instead, they can invoke a simplified and more efficient version of the first stage process that maps to the RUP, as shown in Figure 4.

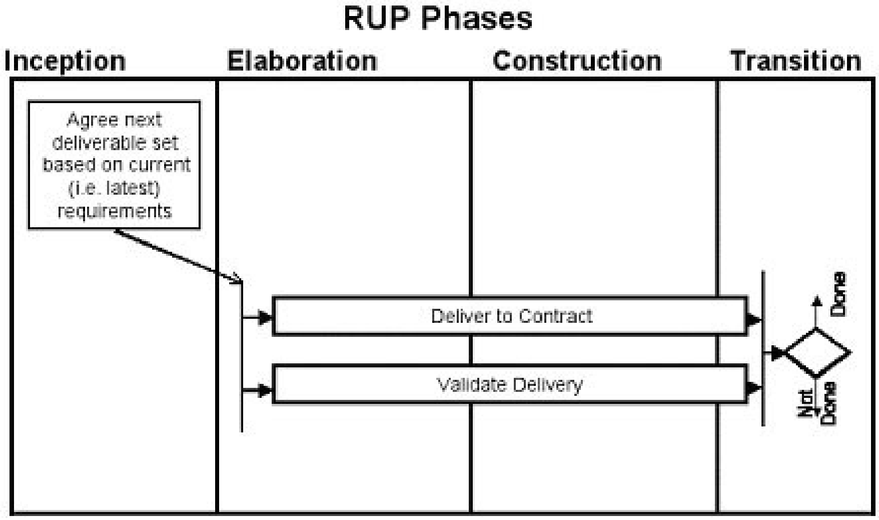

Figure 4: Acquisition Lifecycle for Subsequent Deliveries

The timing of each subsequent CWO negotiation is critical to the efficient conduct of work for both acquirer and supplier. The trick is for the supplier to avoid loss of momentum and the consequent additional effort that can result from gaps between CWOs. The Inception phase of the next delivery should overlap with the Transition phase of the current delivery, as shown in Figure 5.

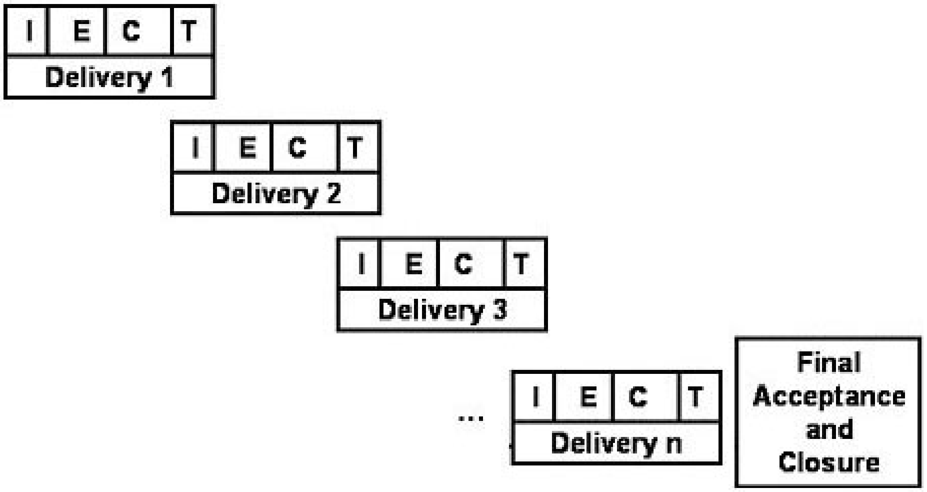

Figure 5: Product Delivery Lifecycle for Progressive Acquisition

The Contractual Perspective

From a contractual standpoint, the whole process would generally follow the pattern shown in Figure 6. Note that a first small contract might be issued to help define the first delivery -- part of the Elaboration phase for the first increment. As we said earlier, this would be on a cost reimbursable basis. The second CWO would cover completion of the Delivery 1 and include the technical discussion necessary for setting up Delivery 2 -- in other words, the Inception phase of the second increment. Depending on the confidence level of the parties regarding the extent or effort required for this second CWO, the payment arrangement could be either cost reimbursable or fixed price.

By the time we get to Delivery 2 (i.e., the third CWO), both the relationship between the parties and their understanding of the work should be solid enough to let them arrive at a satisfactory fixed price for the scope of work in this CWO. Specifications should include not only the amount, but also a payment schedule and end date. The acquirer should avoid imposing unreasonable time constraints so that the work can be done properly. Also, as Murray Cantor says,[2] "Sometimes the surest way to kill a [software] project is to add more workers."

Note that in the event of a breakdown in the relationship between the acquirer and supplier, the acquirer has an option to terminate further development. If they choose to exercise it, the supplier, of course, would lose the work and the revenue. But the acquirer would also sacrifice the intrinsic knowledge the supplier has built up about the project. So both parties have an incentive to keep the relationship alive and well oiled.

As shown in Figure 6, the fourth CWO encompasses Elaboration for Delivery 3 through Inception for Delivery 4; this gives the supplier the necessary resources to work jointly with the acquirer to define the scope of Delivery 4. The final CWO covers the remaining work, including supplier obligations specified for Final Acceptance and Closure.

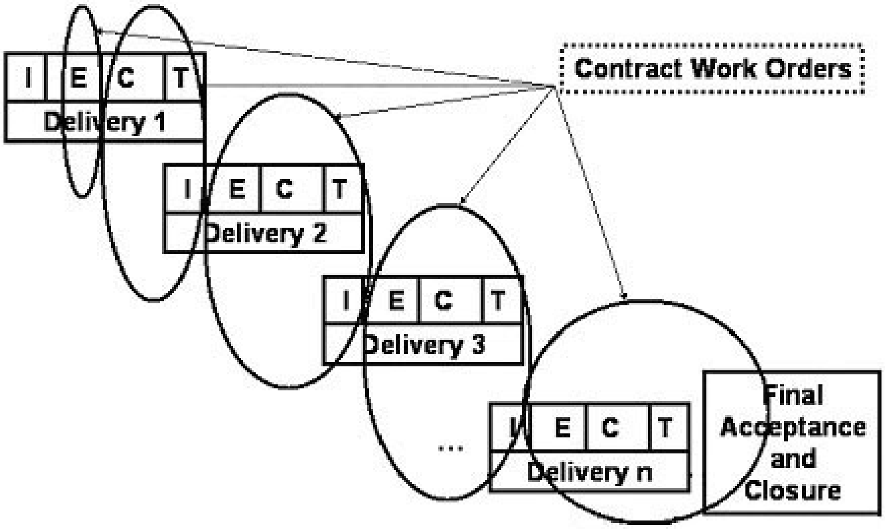

Figure 6: Contracting Cycle for Progressive Acquisition

Advantages for Both Parties

What we have described is a very simplified version of what managers actually encounter in the real world, especially on large, complex systems projects. But our main objective is to demonstrate how to translate a realistic contractual philosophy into a practical arrangement that satisfies the essential needs of both acquirer and supplier.

As we have described, the precise relationship between these two parties is determined by the manner of compensation. In turn, you can best determine the most appropriate form of compensation by the extent to which you can define and estimate in advance the work involved. For this reason, it is wise to make the first one or two CWOs cost reimbursable contracts. The scope, architecture, and specifications for the product are in the greatest flux during this period, and more flexibility is required on the part of both suppliers and acquirers. Subsequent CWOs related to specific deliverables can be fixed cost as the product specifications become more solid.

The progressive approach to contracting that we have described has enormous benefits from both a managerial and a technical perspective.

Project Management Benefits

When it comes to project management, the multiple contract approach for progressive acquisition:

- Dovetails neatly with RUP methodology, which offers technical processes and workflows with well-defined goals and milestones.
- Provides for cost-effective rigor and quality.
- Allows both parties to enjoy a productive partnership at the working level.
- Gives acquirers a mandate to stay involved at the right level and time.

- In contrast to single, fixed-price "big-bang" contracts, facilitates flexible responses to inevitable changes in requirements, market conditions, and technology.
- Does not demand that the acquirer maintain an "open checkbook" in exchange for flexibility.
- Meets the needs of the acquirer's senior management by establishing financial control and potential for competitively priced work.
- Satisfies supplier needs by providing some assurance of a long-term relationship.
- Provides for equitable risk sharing; the acquirer is assured of a controlled cost, and the supplier is assured of a reasonable profit.
- Can help establish time-to-market with reasonable assurance, provided that both parties work effectively.

Technical Management Benefits

In the technical area, the multiple contract approach for progressive acquisition:

- Encourages a development lifecycle that is product driven rather than document driven.
- Is applicable to both whole-system and separate component development.
- Allows requirements to evolve consistently with build chronology.
- Breaks down the work structure in an evolutionary way rather than "freezing" a structure at the outset of the contract.
- Encourages real teamwork between the supplier and the acquirer at the technical level.
- Allows managers to apply objective metrics at a level consistent with overall project progress.
- Positions reviews as part of the partnership rather than as independent exercises.
- Ties reviews to supplier performance; movement to the next increment is not sanctioned until the current review is satisfactory.
- Provides the supplier with performance-based payments; the supplier avoids absorbing the cost of unanticipated risk events out of a fixed profit margin, which inevitably leads to short-cutting toward the end of a contract.
- Minimizes the acquirer's costs across the product lifecycle rather than minimizing only short-term development costs.

Be sure to come back next month for Part III of this series. We will present a "Beginner's Guide to Contracting" that takes a look at ways to actually formulate head contracts and CWOs for progressive acquisition.

Notes

[1] Murray Cantor, *Software Leadership: A Guide to Successful Software Development*. Addison-Wesley, 2002, p.170.

[2] *Ibid*. p.161.

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