

# CHAPTER 4

## WHEN TO INITIATE THE ADA 95 ADOPTION

This chapter helps the PEO and PM determine *when to initiate the transition* to Ada 95 and pinpoints those times when the adoption will be most likely to succeed. It also discusses the necessity of choosing a transition strategy. Details on the different strategies and their trade-offs can be found in the associated document: *Ada 95 Transition Planning Guide*.

The issues arising from the decision of when to initiate Ada 95 adoption are covered for both contracted development and in-house development (e.g., at a Central Design Activity [CDA] or Software Development Center [SDC]). Contracted development presumes divided responsibilities: the PM will track, monitor and direct, while the contractor will perform the activity. In-house development presumes that all software development activities are the responsibility of the government team; therefore, all adoption and transition responsibility will also be theirs.

*In this chapter, it is assumed that the PEO or PM has addressed the issues described in Chapter 3 (especially the considerations in Table 8) and decided to adopt Ada 95. The next question is, "When?" This chapter advises PEOs and PMs to initiate the adoption at the start of a project or new maintenance upgrade.* The chapter also examines the new actions that PEOs and PMs who contract for software must take during the acquisition process.

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### CONTRACTED DEVELOPMENT

This section focuses on the needs of those PEOs and PMs who manage the contracted development and/or maintenance of software and helps them determine the actions to take at each acquisition phase.

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### The Timing of the Transition

*PEOs and PMs should time their adoption of Ada 95 to minimize disruption to their projects and their organization — transition during periods of maximum stability.* The exact timing of the transition will affect

the likelihood of success of the transition effort. The transition from the use of one programming language to another can impact activities and products beyond just the coding phase of a project. ***Such impacts may be minimized by adopting Ada 95 at times of maximum stability, preferably at the beginning of a project.***

**Table 9** summarizes the effects of initiating an Ada 95 adoption during each of the four major phases of the contracted software acquisition process: (1) Acquisition Strategy Planning and Preparation, (2) Procurement, (3) Contract Performance Monitoring and Evaluation, and (4) Post-Deployment Software Support. The issues associated with the transition increase as a procurement effort proceeds, because earlier decisions and work will have to be re-examined to determine the impact of switching to Ada 95. *The specific issues and impacts of initiating the adoption at different points in the process are summarized in the table and are expanded on in the next subsection.*

#### Actions to Take When Initiating Ada 95 Adoption during Each Procurement Phase

Adopting Ada 95 during *Acquisition Strategy Planning and Preparation*: ***The PEO and PM Offices must tailor the acquisition strategy to clarify whether bidders must have already adopted Ada 95 or whether domain experience is paramount and bidders may propose Ada 95 adoption as part of this project.*** When asking for Ada 95 qualified bidders in the RFP, the PM Office must create selection criteria that reflect the issues to be addressed. The PM Office must tailor the Acquisition Strategy so that there is a large enough supply of potential bidders to ensure competition. Two strategies may be used to do this:

- *Ensure that the pool of bidders has already transitioned to Ada 95* — This reduces the number of issues associated with the project and eliminates the need to fund the transition costs for the bidder. However, if the PM Office has not managed an Ada 95 project before this acquisition, then it must become Ada 95 educated to effectively manage this procurement.
- *Accept contractors with domain experience and Ada 83 experience and support the contractor's Ada 95 adoption* — Naturally, this trades off issues associated with Ada 95 adoption for those associated with domain expertise. The team's background in Ada 83 and its capability (e.g., SEI Capability Maturity Model maturity level) may outweigh the team's (lack of) Ada 95 experience in the early years.

Adopting Ada 95 during *Procurement*: ***The PEO and PM Offices must examine the impact of Ada 95 adoption on proposed project budget and schedule and on the RFP package.*** Assuming that the PM Office did not require Ada 95 usage as a part of the RFP, the bidder may propose to adopt and use Ada 95 in its proposal. The PM's staff and the Source Selection Board (SSB) should consider this during proposal evaluation. The SSB should factor in the issues associated with Ada 95 adoption and the issues addressing actions (discussed in Chapter 3). If the PM's staff and the SSB have not yet managed an Ada 95 procurement, then they must become educated so that they are able to evaluate the proposals. If the RFP does not require Ada 95 but the bidders' proposals respond with its use, then the possible evaluation scenarios are:

- *All bidders have already adopted Ada 95 (i.e., demonstrate Ada 95 capabilities)* — There are few issues in allowing Ada 95 use. The PM Office should examine the Acquisition Strategy and project requirements for any impact due to the use of Ada 95 (little impact should be anticipated).
- *Some bidders have adopted Ada 95 and some have not* — Evaluation criteria should be used to minimize the issues. The PM Office must weigh

Table 9: Issues of Adopting Ada 95 during Different Procurement Phases

| Phase during which Ada 9X Adoption Is Considered                  | Impact           | Required Action   |
|---|------------------|---|
| <b>Acquisition Strategy Planning and Preparation</b>              |                  |   |
| Starting a new software development effort                        | Low              | PM Office must alter its planned acquisition strategy to include Ada 9X   |
| Starting a re-engineering project                                 | Low              | PM Office must alter its planned acquisition strategy to include Ada 9X   |
| Beginning the migration of a legacy system                        | Low              | PM Office must alter its planned acquisition strategy to include Ada 9X   |
| <b>Procurement</b>  |                  |   |
| Completed the procurement package                                 | Medium           | PM Office must alter its planned acquisition strategy to include Ada 9X   |
| Evaluating Proposals  | Medium           | PM Office must alter its planned acquisition strategy plus the proposal evaluation criteria   |
| <b>Contract Performance Monitoring and Evaluation</b>             |                  |   |
| During Requirements Analysis                                      | Medium           | PM Office must alter its planned acquisition strategy, proposal evaluation criteria, <i>plus</i> the current development environment / approach   |
| During Design   | <b>High</b>      | PM Office must alter its planned acquisition strategy, proposal evaluation criteria, current development environment / approach <i>plus</i> design method to be suitable for Ada 9X   |
| During Implementation   | <b>Very High</b> | PM Office must alter its planned acquisition strategy, proposal evaluation criteria, current development environment / approach, design method to be suitable for Ada 9X <i>plus</i> developed software                             |
| During Testing  | <b>Very High</b> | PM Office must alter its planned acquisition strategy, proposal evaluation criteria, current development environment / approach, design method to be suitable for Ada 9X, developed software, <i>plus</i> test plans and test cases |
| <b>Post-Deployment Software Support</b>                           |                  |   |
| Considering the re-engineering of Ada 83 legacy code to Ada 9X    | Low              | Re-examine strategy and environment for maintenance   |
| Considering a major enhancement to the software under maintenance | Low              | Re-examine strategy for maintenance (e.g., how Ada 9X will talk to legacy code)   |

the Ada 95 adoption against the level of domain knowledge. Typically a bidder with extensive Ada 95 experience will outscore those who have not adopted Ada 95, unless they possess other discriminating factors.

- *No bidders have yet adopted Ada 95* — The PM Office must evaluate the risks of allowing the Adoption of Ada 95 as a part of this project. The bidders' proposals should clearly outline these risks and each bidder's mitigation strategy.

Adopting Ada 95 during *Contract Performance Monitoring and Evaluation*: **PEOs and PMs must carefully weigh the impact of attempting to adopt Ada 95 once the project has begun.** Depending on the timing of the contractor's request, three scenarios are possible:

- *Prior to the design phase of Build #1* — If the contractor proposes at this early time, Ada 95 adoption can be accommodated and a successful transition made. However, issues must be managed (see Chapter 3) to ensure success. Some rework of both PM Office and contractor strategies is unavoidable and these may cause cost and schedule impacts.
- *After the design phase of Build #1* — If the contractor proposes at this time, the impact of Ada 95 adoption will be very high. Many programming language-specific decisions have been made and it would be difficult to maintain budget and schedule in the face of such a disruption.
- *During later builds* — As additional increments are built, it becomes less likely that the project can successfully transition to Ada 95. An ongoing project may experience greater success by postponing the transition until after the initial delivery of the software.

Adopting Ada 95 during *Post-Deployment Software Support (PDSS)*: **PEOs and PMs should evaluate an Ada 95 adoption during PDSS in the same way that a new development was evaluated — using the techniques discussed in the previous sections.** If the PDSS is contracted out, then the evaluation will be handled similarly to the approaches described for the three timeframes discussed previously; however, if the PDSS is done in-house, then the adoption impact will be more like that described in the next section.

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## IN-HOUSE DEVELOPMENT

This section focuses on the needs of those PEOs and PMs who directly manage the development of software within their organizations. It helps them determine when to initiate the transition to Ada 95 in their development organization.

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## The Timing of the Transition

**PEOs and PMs should time their adoption of Ada 95 to minimize disruption to their projects and organization — transition during periods of maximum stability.** The exact timing of the transition will affect the impact of adoption and the success of the transition effort. The transition from the use of one programming language to another can affect activities and products beyond just the coding phase of a project. **Such impacts may be minimized by adopting Ada 95 at times of maximum stability, preferably at the beginning of a project.**

**Table 10** summarizes the effects of initiating the transition during each major phase of the software development process: (1) Development Planning, (2) Software Creation (including Analysis, Design, Implementation, and Test) and (3) Post-Deployment Software Support. It is understood that the development process is iterative and these major activities do not reflect a waterfall process. The issues associated with the transition increase as a development effort begins, since decisions that have been made and work that has already been performed will have to be re-examined for implementing the software in a different programming language. *The specific issues and impacts of initiating the transition at different times are summarized in the table and expanded on in the next subsection.*

Table 10: Issues of Adopting Ada 95 during Different Development Phases

| Phase during which Ada 9X Adoption Is Considered                  | Impact           | Required Action   |
|---|------------------|---|
| <b>Development Planning</b>                                       |                  |   |
| Starting a new software development effort                        | Low              | PM Office must alter its planned development strategy to include Ada 9X   |
| Starting a re-engineering project                                 | Low              | PM Office must alter its planned development strategy to include Ada 9X   |
| Beginning the migration of a legacy system                        | Low              | PM Office must alter its planned development strategy to include Ada 9X   |
| <b>Software Creation</b>  |                  |   |
| During Requirements Analysis                                      | Medium           | PM Office must alter its planned development strategy, <i>plus</i> the current development environment / approach   |
| During Design   | <b>High</b>      | PM Office must alter its planned development strategy, current development environment / approach <i>plus</i> design method to be suitable for Ada 9X   |
| During Implementation   | <b>Very High</b> | PM Office must alter its planned development strategy, current development environment / approach, design method to be suitable for Ada 9X <i>plus</i> developed software                             |
| During Testing  | <b>Very High</b> | PM Office must alter its planned development strategy, current development environment / approach, design method to be suitable for Ada 9X, developed software, <i>plus</i> test plans and test cases |
| <b>Post-Deployment Software Support</b>                           |                  |   |
| Considering the re-engineering of Ada 83 legacy code to Ada 9X    | Low              | Re-examine strategy and environment for maintenance   |
| Considering a major enhancement to the software under maintenance | Low              | Re-examine strategy for maintenance (e.g., how Ada 9X will talk to legacy code)   |

Actions to Take When Initiating Ada 95 Adoption during Each Development Phase

Adopting Ada 95 during *Development Planning*: **The PEO and PM must ensure that the development staff tailors the software development plan.** At this point, having made the decision to transition to Ada 95, the PM should:

- Ensure that the development organization examines the issues and manages them as a part of its plan. *Chapter 3 details the different kinds of issues and how to resolve them.*
- Determine the first project (at the PEO level) or the first part of a project (at the PM level) to adopt Ada 95. Ideally, the first Ada 95 project should be one that is *not* on the critical path for the PEO or PM. The pilot should be in a well-understood and well-practiced area, so that it measures only the difference due to the use of a different language.
- Conduct a pilot effort to bound the transition issues. If it is not possible to conduct a completely separate pilot project, the PEO and/or PM should attempt to conduct a pilot effort within the entire project. Take a core

team and have them initially build a small part of the project using the new Ada 95 technology. Lessons learned from this effort can then be fed back into the entire project.

Adopting Ada 95 during *Software Creation*: **PEOs and PMs must carefully weigh the impact of adopting Ada 95 once the project has begun.** Depending on the timing of the proposed adoption request, three scenarios are possible:

- *Prior to the design phase of Build #1* — If the development team proposes Ada 95 adoption to the PM at this stage, Ada 95 adoption can be accommodated and a successful transition made. However, issues must be managed (see Chapter 3) to ensure success. Some rework of strategies is unavoidable and these may cause cost and schedule impacts.
- *After the design phase of Build #1* — If the development team proposes at this time, the impact of Ada 95 adoption will be very high. Many programming language-specific decisions have been made and it would be difficult to maintain budget and schedule in the face of such a disruption.
- *During later builds* — As additional increments are built, it becomes less likely that the project can successfully transition to Ada 95. An ongoing project may experience greater success by postponing the transition until after the initial delivery of the software.

Adopting Ada 95 during *Post-Deployment Software Support (PDSS)*: **PEOs and PMs should evaluate an Ada 95 adoption during PDSS in the same way that a new development was evaluated — using the techniques discussed in the previous sections.** Ada 95 may be incrementally incorporated with the legacy system during maintenance.

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## CHOOSING A TRANSITION STRATEGY

**Choosing a transition strategy is one of the first actions of the PEO or PM who initiates the adoption of Ada 95.** The companion document, the *Ada 95 Transition Planning Guide*, discusses the types of transition strategies commonly used and how to choose among them. Each strategy possesses advantages and disadvantages. PMs must make a detailed comparison of these trade-offs and must tailor the general plan to their specific organizations according to the guidelines given in the document. **The availability of this generic Ada 95 Transition Planning Guide (the companion volume to this document) serves as a significant risk mitigator. Further details are found in that document.**