Technology Fabrication Projects Guide

Construct needed technology solutions - building anew, repairing the old, or migrating IT assets to a more capable platform - integrating the old with the new.

This guide defines the key activities, artifacts, and roles that are necessary to prepare integrated technical solutions that meet HS Agency and TANF program requirements. These solutions are the result of individual IT fabrication projects. The projects are coordinated by the IT Evolution Plan. Together, these projects produce the developmental configuration.

Adjunct technical requirements are allocated to the projects from the A-TARS. These technical requirements guide the design and production of each project's products, as well as the engineering and technical management practices performed on the project.

The term fabrication is used rather than the more widely occurring term development. Fabrication stresses a preference for a compositional approach to combining or assembling individual applications or complete Automated Information Systems (AIS's) by buying or adapting existing parts. Maintenance actions, as well as creating one-of-a-kind solutions (or parts), are considered a special case of the overall fabrication approach.

Applications, platforms, or complete AIS's can be derived from preexisting components or packaged solutions. Technology elements can be obtained in several ways, such as commercially (purchased), contractually (built to spec), reusing existing Agency-wide IT resources, or transferring systems from other States. Integration across legacy application systems is considered a part of the fabrication approach. The legacy application system is reengineered to provide services, hidden behind interfaces, in accordance with the Technical Architecture, thereby preserving the investment in existing applications and data.

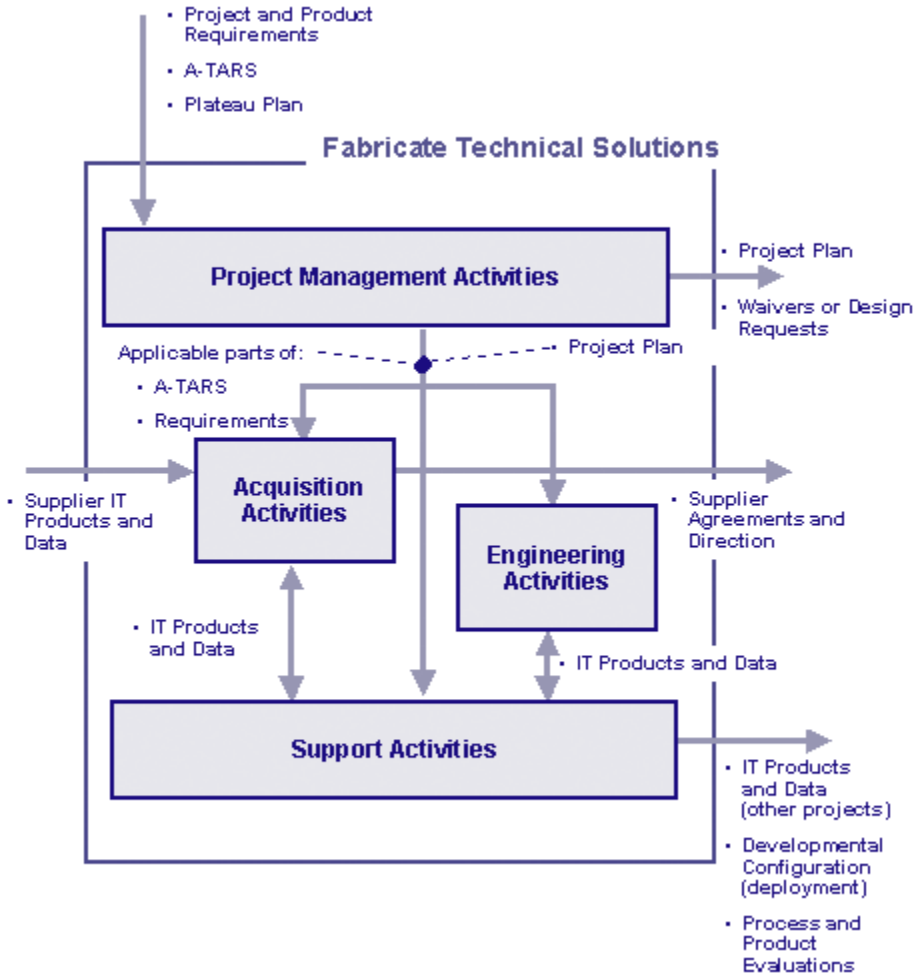
IT fabrication projects are assumed to be relatively small and execute over a proportionally short timeframe, contributing to one or more goals for a plateau. Each project produces a well-defined technology product that may be used by another project or integrated into the developmental configuration. The possible set of IT products is broad and may include new or updated applications (or portions), databases and files, integrated server, or client platforms, information appliances, networking infrastructure, or other equipment (e.g., UPS network monitors). Life-cycle documentation, such as user, operator or engineering documentation, and training materials, is also considered a technology product.

See the Organization of the IT Planning and Management Guides for the relationship of the processes described in this guide to those of the other guides. Background is provided on the fundamental concepts and principles that apply across the guides. For information on how to customize this guidance, view the Application of the IT Planning and Management Guides pages.

Processes

Circumstances for each project determine the specific mix of activities that must be performed. This includes consideration for the type of product being delivered, the technology being used to produce it, or the approach taken to acquire it. The

fundamental types of activities common across the projects are illustrated in the figure and described in the following text.

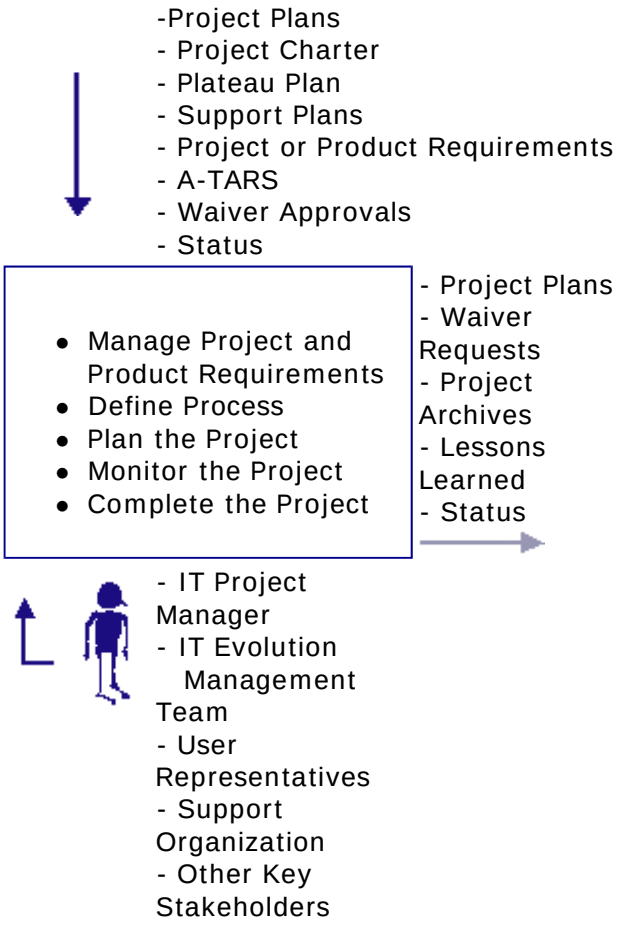


- **Project Management Activities** - This set of activities includes practices necessary to plan, monitor, and control an IT project throughout its lifetime.
- **Engineering Activities** - This set of activities includes technical, life-cycle practices needed to create, modify, or adapt a technology element and its associated documentation to prepare them for use.
- **Acquisition Activities** - This set of activities includes those life-cycle practices needed to establish, monitor, and terminate a buyer-supplier relationship to acquire an IT product or service.
- **Support Activities** - This set of activities includes all those life-cycle practices needed to establish a project environment to support the other three sets of activities. This includes configuration management and quality assurance practices.

Technology Fabrication Projects Resources - A consolidated set of items that can be used to implement the activities defined in this guide are listed in the consolidated resources.

Project Management Activities

Form the IT project; manage its tasks, and coordinate with other IT projects, as needed.



Introduction

These activities are responsible for the life-cycle management of fabrication projects. Fabrication projects are the fundamental organizational building blocks by which the HS Agency provides IT products and data to achieve a plateau's goals. The products produced by the projects are integrated into the developmental configuration, which is then released for deployment.

Fabrication projects may implement many approaches to provide these products. These approaches include developing from scratch within the HS Agency, purchasing and adapting existing Agency or commercially available off-the-shelf items, transferring a system from another State, or contracting with an external developer. Maintenance actions are also managed as fabrication projects. The management techniques are specialized to accommodate each approach. The use of the term project implies any form of these fabrication projects.

The lifetime of a project is assumed to be relatively short, as noted in the Technology Fabrication Projects Guide main page. A project may produce products to be used by another project or have those products placed within the developmental configuration, ready for deployment. Fabrication projects are considered complete once their products

are accepted and placed under configuration management (see the support activities).

The set of projects, their products, and interproject relationships are documented in the IT Evolution Plan. Project-level plans detail the project's tasks within that context. Projects may be separately managed or managed as a set. The need to organize projects into commonly managed sets can be based on coordination and personnel efficiencies or other aspects, such as:

- Assembling cohesive projects into sets based on the unique skills of developers. This approach may include aggregating Web content development, presentation, business logic, database, networking, security, platform configuration, testing, or acquisition specialties. Individuals on these projects work across many applications in their specialized area.
- Organizing projects into sets based on functional capabilities, such as implementing all parts of an application for an HS Agency program.
- Organizing projects to align with a funding source.
- Implementing shared functionality, where the resultant product's costs are shared across many programs (e.g., a project for a common front end or portal.
- Organizing high-risk tasks as a set that can receive focused attention, especially if they are on the IT Evolution Plan's critical path. This approach could include developing an operational prototype that is used as a basis for other projects.
- Organizing projects to reduce competition for shared resources. This approach may include individuals that work across many projects (specialists or advisory roles) or projects where limited resources must be maintained (developmental testing environments).

  TANF Example: In many States there are limited resources available to manage projects. A few individuals may have responsibility to manage and oversee many TANF technology integration projects.

  While new projects are underway, business requirements for existing systems continue to evolve and need rapid resolution. TANF IT managers cannot put everything on hold to execute new projects. They must balance existing support requirements with additional resource constraints to successfully complete new technology integration projects, within the time-frame they are needed. Technical resources must be carefully balanced to provide technical support to the new project, while maintaining existing systems.

  Critical to the successful development and deployment of a TANF system is the ability to thoroughly test it and confidently demonstrate that it satisfies program requirements. The creation, use, and maintenance of a credible user testing and acceptance environment and databases can be a significant undertaking. Resources to establish and maintain these environments must be carefully considered in any project's plan.

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Activities

The basic planning and management activities described in the Planning and Managing the Technical Evolution Guide also apply to the fabrication projects. You may refer to those activities for additional detail. Some management activities applicable to the fabrication projects are described below:

1. **Manage Project and Product Requirements.** The overall scope of a project is established in the IT Evolution Plan. This scope includes expectations and constraints on the project's product and processes, as well as dependencies between projects. These expectations and constraints form the technical and nontechnical requirements. These requirements are the basis of the detailed planning for the project.

   Example technical (product) requirements include, among others:

   - Functional capabilities
   - Performance, size, reliability, quality, and other intrinsic product attributes
   - Life-cycle maintenance costs
   - Product design and fabrication rules (from the A-TARS)

   Example nontechnical (project) requirements include, among others:

   - Project deadlines (expected or required start and delivery dates)
   - Budget and spending rates
   - Staff availability
   - Coordination with other projects, such as cross-project working groups
   - Methodologies, practices, or tools to be used (e.g., process constraints, including acquisition rules or engineering practices from the A-TARS)

   You must document and review all requirements allocated to a project. Requirements can be communicated in any convenient form that satisfies the project's need to ensure communication between it and the stakeholders. For example, you can provide a complete and concise requirements document or use a simple list of note cards with capabilities (Beck 1999; Newkirk and Martin 2001) to communicate requirements. For maintenance activities, a problem report or a change directive may suffice. You can prepare waivers for relief from A-TARS requirements and forward them to the Technical Architecture Team for negotiation and approval.

   Address issues with the requirements' feasibility, clarity, consistency, or verifiability before commitments are made to satisfy them. Manage and control changes to the requirements to ensure that project plans remain consistent with the requirements. Because projects are generally of short duration, once the requirements are accepted, they are generally unchanging until the project completes. New or changed requirements can be applied to projects later in the plateau. One exception is a make-work modification. A make-work modification is a change to the requirements to accept the product when full compliance will cause significant delay or cost. You may define additional projects to rectify the loosening of requirements later during the plateau or on later plateaus. You can manage requirements individually on each project or as a set that is allocated across the projects.

2. **Define the Process.** These activities complement and further elaborate the plans produced by the Develop the IT Evolution Plan activities. Integrate the management, engineering, acquisition, and support practices for the project into a coherent project process. This includes the methodologies and tools to be used. Identify the appropriate staff skills and training needs to select and prepare staff to competently execute the process. The project practices must conform with the guidelines from the A-TARS. The project's defined process also must be consistent with the project and product requirements allocated to the project.

3. **Plan the Project.** Detailed plans for the project are based on the project requirements and the processes to be enacted. The project plans must conform to the deadlines and resources allocated to the project, within a reasonable probability of success (cost, schedule, quality). In the IT Evolution Plan, maintain a reserve for

managing risks, such as a late deliverable from another project. If reasonable plans cannot be made, you can renegotiate the project or product requirements. Project planning generally involves three major components:

- **Define the project work.** Define the final and intermediate work products of the project and the activities to be performed in the project's WBS. The WBS spans the management, engineering, acquisition, and support activities. Products include all life-cycle documentation, as needed to create, maintain, and use the products (e.g., design documentation; program code; test procedures and results; and training, user, and operation manuals, among others). For acquisition-focused projects, the work products reflect the exchange and management of technical and management information with the contractor or vendor.
- **Estimate project costs.** Define all cost categories and make estimates for each category. This includes all costs that are project responsibilities (e.g., tools, travel, facilities, consulting, interproject coordination, or labor). For labor-related costs, use one or a combination of the following methods:
    - **Analogy.** When a similar product has been built or procured, use its costs as a benchmark for comparison with the current project (or set of projects). Use the differences between the benchmark and the new product to establish a cost range. Actual results for completed internal projects should provide the best basis for comparison, although comparison outside the HS Agency may be useful (another State's experiences).
    - **Simple estimation relationships.** This technique relies on a reasonable estimate of the size of the products, such as expected number of entities from a data model. You can use staff productivity factors to estimate the labor involved. This approach assumes that productivity data is available, and historical information is maintained across the IT Division.
    - **Activity-based models.** This bottom-up technique combines the estimates for each separate activity performed on the project. This approach works well when experts in each of the activities are available and have expertise in the project domain (the application or technology to be used).
    - **Parametric models.** These tool-based models consider several parameters, such as expected size of the product (SLOC), staff experience, use of tools, and overall maturity of the development organization. You need to calibrate these tools to the characteristics of the development organization in order to provide accurate estimates.
- **Schedule tasks.** Create the network of project activities. This involves:
    - Identifying internal project task dependencies as well a dependencies, on other projects. This activity will help with sequencing projects within the IT Evolution Plan.
    - Identifying organizational or other global constraints, such as the number and type of skilled staff or other resources available (testing facilities). Task schedules may need to be adjusted to allow for sharing resources. Staffing plans may need to be to integrated across projects. Responsibilities, especially for inter-project interfaces should be explicitly assigned.
    - Structuring tasks to allow for two measures per individual per month.

This approach provides adequate visibility into project schedule status and allows project management to determine progress within a 2-week window (e.g., task duration of 1 to 3 weeks, 1 to 2 individuals per task). Define and objectively state the criteria to indicate task initiation and completion (e.g., event-influenced, not schedule-driven).

The plan, when completed, will be reviewed and approved by the Project Manager and members of the IT Evolution Team. Record the plan and any assumptions upon which it is based and place them under CM.

4. **Monitor the Project.** The Project Manager tracks activities against the documented project plan, making adjustments to the plan or the project performance, when necessary. Effort, cost, schedule, technical achievements, and other measures are tracked against estimates. Periodic status reports should be furnished to the IT Evolution Team, the HS Agency's Chief Architect, or other project stakeholders. Reports will communicate status against planned activities, technical or management issues, and expectations for the next reporting period. This may include results of formal reviews with contractors when acquiring products from outside the Agency.

   For these short duration projects (3 to 6 months), management in-process reviews can be performed rather than formal, large-scale reviews. These in-process reviews can be scheduled for roughly 1/3 and 2/3 of the project's elapsed time (or every 2 to 3 months). The reviews should offer timely insight for management to allow midcourse project corrections or adjustment of other dependent projects. Some measures that can be taken and reported are:

   - Task planned/actual start/completion performance
   - Critical path performance
   - Effort planned vs. actual
   - Earned value
   - Technical or management issues requiring higher-level decision making (cross-project dependencies)

   Hold informal project reviews, involving internal project personnel, on a more frequent basis, such as every other week. These reviews make sure that the intraproject dependencies are being met and facilitate making minor midcourse corrections that affect only the project team.

   A formal review, generally near the end-time for the project, authorizes the release of the project's products. These products can then flow formally to other projects through the CM activities or be incorporated into the developmental configuration.

5. **Complete the Project.** Projects exist until they are cancelled or their products are accepted. Before a project is closed, archive major work products and by-products for later analysis, if needed (e.g., project plans and periodic status). Also, conduct a formal lessons-learned session. You can feedback items from this session into the planning and management of current and future projects. Some areas to explore include:

   - Accounting for differences between actual and estimated values for effort, cost, or schedule. This determination may result in improvements to the planning or other management processes.
   - Accounting for differences between actual and expected product qualities. This determination may result in improvements to the engineering or acquisition processes.
   - Risks that were difficult to mitigate. This determination may result in identifying mitigation strategies that worked well and those that did not.

Share a report communicating the lessons learned across the projects. This report serves as a basis for improving the IT Division's processes. Incorporate guidance into the A-TARS, as appropriate.

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Roles and Responsibilities

The key roles and their responsibilities are as follows:

- IT Project Manager. This individual has primary responsibility for these activities, assisted by the IT Project Team or staff, such an Estimation Analyst or Contract Manager. An IT Project Manager may manage one or more projects simultaneously.
- IT Evolution Management Team. These individuals, specifically the IT Evolution Manager, have oversight responsibility for all projects. The IT Project Team will coordinate with the IT Evolution Management Team when planning and controlling the project.
- User Representatives. These individuals collaborate with the IT Project Team to provide user perspectives, helping to establish product requirements and providing user insight while the product evolves.
- Chief Architect. The Chief Architect represents the Technical Architecture Team when reviewing waivers or the project's technical achievements.
- Support Organization. Individuals with expertise in the QA or CM disciplines provide assistance to the management staff. They participate in the early project planning activities and provide oversight of the project practices and developing products.
- Other Key Stakeholders. These stakeholders may include any group or individual with a vested interest in a project's products (e.g., representatives of IT Project Teams from other interdependent projects). Coordination may take place during cross-project working groups or by other means.

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Artifacts

The following information is used or produced by these activities. Templates, examples, and checklists for identifying and documenting items are available through the Additional Resources section at the end of this page.

- IT Project Plans. These work-level plans are the main product of these activities, updating the previous version, if it exists. They are used to guide the execution of all project activities and to report progress.
- Project Charter. The Project Charter sets the scope and authorities of the project management and is the foundation for the management approach.
- Plateau Plan. The appropriate portion of the IT Evolution Plan identifies constraints and expectations for the project with regard to other projects. Project plans must be consistent with it.
- Support Plans. These plans are integrated into the overall project plans.
- Project or Product Requirements. This consolidates all the requirements imposed on the project from all sources: IT Evolution Plan, the HS Program Staff, HS IT Division, the Project Charter (constraints), and others. These requirements are used as a basis of defining and planning the project. Project success is defined by how well the requirements are satisfied.
- A-TARS. The appropriate part of the A-TARS is used to guide technical management decisions for the project, such as the technical practices that can be used or how products are structured.

- Waiver or Design Requests. Projects file waivers to be relieved from mandatory A-TARS requirements.
- Waiver or Design Approvals. Projects receive formal approval when they deviate from the A-TARS.
- Status. Task progress and issues from engineering, acquisition, or support activities is used to manage project tasks. Project status is summarized and provided to the IT Evolution Manager and other oversight authorities on a periodic and event-driven basis.
- Project Archives. Technical and Management data from a project is archived for later analysis.
- Lessons Learned. These are formally captured and disseminated at project completion.

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Additional Resources

Resources applicable to this activity are cataloged below. Some items in the Planning and Managing the Technical Evolution resources may also be used to perform the fabrication project management activities. Lists of all available resources may be found in the Resources portion of the IT Planning and Management Guides.

Template: Project Charters
Template for developing the charters for projects covered by the IT Evolution Plan. 02-01-02

Example: Risk Management Plan
Example of a Risk Management Plan that defines a specific risk analysis and management process. 02-01-02

The Federal Perspective: Requirements for IT Planning
A brief overview of Federal requirements related to planning, developing, modifying, or replacing an information system. 02-01-02

Template: Estimate of the Situation (EoS)
Template for an Estimate of the Situation. 02-01-02

Guidelines: Development of a Work Breakdown Structure (WBS)
Lists the steps in the development of either an activity-based WBS or a work-product-based WBS. 02-01-02

Sample: Software Estimation Procedure
A sample procedure for the estimation of the labor and cost of new software. 02-01-02

Template: Outline of a Measurement Plan
Outline for a measurement plan that could be used for either the IT Evolution Plan, a specific Plateau Plan, or a Project Plan. 02-01-02

Consolidated Guidance: Earned Value Methods
Overview of the techniques for computing earned value, with strengths and weaknesses of each method. 02-01-02

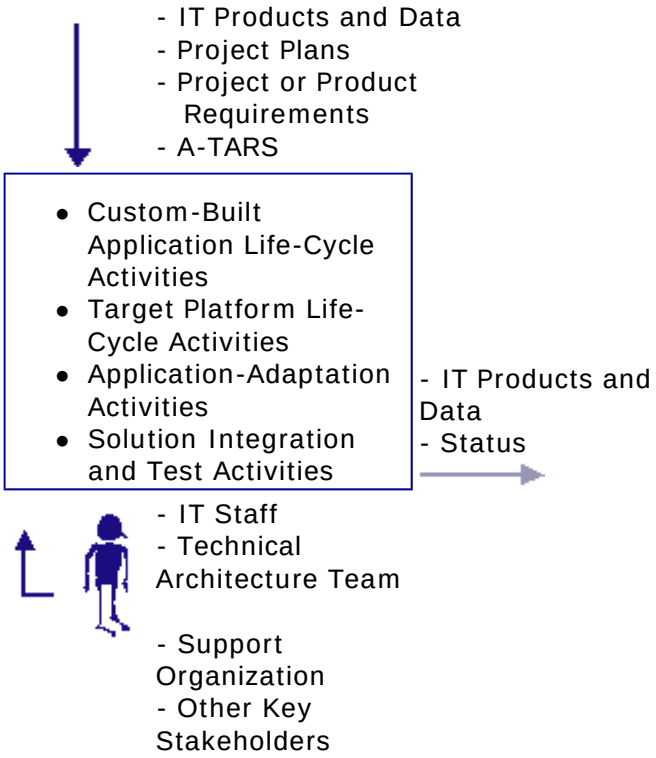
Consolidated Links: Advance Planning Documents for State Systems
Links to information about the APD process consolidated in the **Planning and Management Resources** document. 02-01-02

Consolidated Links: Cost/Benefit Analysis of State Systems

Links to information about the Cost/Benefit analysis consolidated in the **Planning and Management Resources** document. 02-01-02

Engineering Activities

Apply effective engineering methods to construct technology products ready for deployment.



Introduction

These technical activities are performed in a development environment for one or more technology fabrication projects. These activities produce IT products and associated by-products that have the following characteristics:

- Are used by other projects as a part of their products (interproject dependencies are described in the IT Evolution Plan
- Are used by the acquisition activities as technical criteria to guide a commercial purchase or procurement contact. Fabrication projects also may adapt products purchased for HS Agency use.
- Are ready to integrate into the developmental configuration and directly deploy into the business, development, or technical operations environments.

IT products take many forms, from individual components, to complete integrated applications adapted from packaged solutions, commercial platforms, and information appliances, or systems transferred from another State - configured for use within the HS Agency environment. The background for the Technical Architecture Guide describes basic types of technology-related entities that may be produced. Documentation necessary to maintain and use these items is considered a product of the engineering activities. This documentation can include user, maintenance, installation, or operation manuals, as well as associated technical training materials.

IT by-products include engineering data and documentation that are generated and used

to support the engineering process. These by-products may include process-related documentation, tools, scripts, and scaffolding, such as test generators, emulators, and databases.

The IT products may be unique to an HS program or can be shared across them, such as implementing a common application front end or portal. IT products are placed under formal change management by the support activities when delivered by the project.

Engineering practices, as well as overall adjunct technical requirements, are derived from the A-TARS. Unique product requirements are elicited from the HS program staff (e.g., TANF functional requirements). All product and process requirements are levied through each project's plans.

> **TANF Example:** Many of the current TANF application systems were built with technologies that are 15 to 20 years old. Migrating existing applications systems to new and significantly different technology or distributed platforms in a fabrication project is a challenge. These legacy applications execute on older mainframe platforms and are written using older technologies, such as COBOL and CICS, with database management systems like ADABAS.
>
> Compounding the development of the new system is the fact that the legacy system must be maintained and kept fully operational, while the new application system and platform are built. Technical staff must be sufficiently skilled and knowledgeable to develop with technologies for the new platform, yet retain essential skills for maintenance of the existing platform(s), until cutover is complete. Several States also utilize rapid development techniques such as Rapid Application Development or Joint Application Development (RAD/JAD). This offers the ability to expedite projects, yet requires developers to work closely with users, further complicating the assignment of staff between new and maintenance projects.
>
> Introducing new platforms and technologies into the TANF world gives rise to new toolsets. These changes will ripple through the support practices for new platforms. For example, tools and skills acquired over many years of building and debugging CICS-based application systems would not directly translate to distributed, EJB-based applications. While Pan Valet was used to handle "mainframe" object sets, new executables or components will require new configuration and deployment packaging tools and technologies.

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Activities

Key software-oriented activities performed on one or more fabrication projects are described below:

1. **Custom-Built Application Life-Cycle Activities.** A fabrication project may create or maintain unique applications that address specific HS program business needs. The size and complexity of an application product and uncertainty in a project's outcome (i.e., risks) influence how the engineering activities are partitioned across projects. For example, a conceptual prototype could be developed by one project to establish design goals and functional requirements for another project. The second project would implement those requirements and may reuse portions of the prototype's source code, delivering a robust application. Identifying the projects and their (input/output) dependencies is part of the Technical Evolution Planning and Management activities. The types of applications and their constituent parts are categorized in the TRM in the A-TARS (see the Technical Architecture Guide).

The following activities assume that the target application platform is defined and available to the development staff. Key activities are:

- **Problem analysis and application requirements specification.** These activities establish the engineering design and implementation goals for an application. This involves eliciting needs, expectations, and constraints from the stakeholders and translating them into product design and implementation criteria. Applicable portions of the A-TARS set the overarching technical requirements. Any program or application-unique requirements must be consistent with the A-TARS, or waivers must be granted. Key portions of the A-TARS are the:
    - Boundary descriptions (identifying external entities, settings, and usage expectations)
    - Application or system architectures (application partitioning and allocation across processing nodes)
    - Service descriptions (identifying the appropriate software interface constraints)
    - Overarching principles (quality criteria and guidelines for target platform design)

Engineering methods to be employed include business process modeling, usage scenarios, prototypes, demonstrations, brainstorming, market surveys, QFD, and others. The result of these activities is agreement on a product specification and any supporting documentation, such as a concept of operations or use cases.

- **Application design and composition.** The fabrication project activities assume a compositional approach based on component reuse, as noted in the overarching principles. A significant portion of an application's top-level design should have been addressed before a specific application product is built. An application's design is based on the application architecture(s) defined in the A-TARS, as implemented on the target application platforms. This includes the use of shared components, application templates, or use of an integrated development environment. You also could develop helper applications or data to aid testing or emulating the operational environment (e.g., cell phone presentation emulators and test databases). you should generate design notes or documentation to aid maintenance of the application (or part). Also you could produce technical user documentation or technical training materials, such as user or operator manuals.

- **Application verification.** Examine individual parts of the application separately to establish that they meet technical requirements. For verification, you can use any method, including unit-level testing, peer reviews, or demonstration, as noted in the project's plan. The engineering practices and product characteristics must conform to the A-TARS. When the application is determined to meets its design goals, then place it and accompanying data under formal CM (see support activities).

- **Application maintenance.** Maintenance is considered a special case of the application life-cycle activities, where the scope of change is usually small in reaction to a latent defect or usage/requirement change. Perform the appropriate analysis, design, composition, and verification activities. Perform

regression testing to ensure that changes did not affect existing functionality or performance characteristics negatively (e.g., replacing a shared component with a newer version and maintaining backward-compatible interfaces or transaction performance). You may update and use helper applications or test data for application verification. The most recent version of the A-TARS may not be applicable because the technology in the maintained entity may no longer be part of the Technical Architecture (e.g., coding guidelines for a COBOL-based application where the A-TARS recommends Java). In this case, reference and use the previous version of the A-TARS unless the application is intended to migrate to the current A-TARS.

- **Migration-oriented activities.** Migration of an application or part of an application is achieved through the actions of the other application engineering activities. Automated tools and procedures may be used heavily, scaffolding (e.g., adaptors) to bridge heterogeneous environments may be needed. This could include scripts or procedures to migrate data from one storage system to another. You should test these scripts and procedures within the development environment and execute them during deployment to migrate operational data in concert with the newly deployed applications.

- **Application retirement.** Projects make the end-of-life decision for a technology during the strategic IT planning process. The relevant applications and all dependent items are removed from the IT inventory. This process may include uninstalling and removing of any application and its associated pieces (directories, registry settings, data files, or user documentation). You may want to archive application data. It may be necessary to retire equipment (removal of legacy devices or platforms). Retirement may have security/privacy considerations, especially if the items will be resold or transferred to another usage environment. This may require actions to purge data from magnetic media or other destruction procedures. Software subscriptions and licensing also may need to be cancelled, as coordinated with the acquisition activities.

2. **Target Platform Life-Cycle Activities.** A Target Architecture is developed in accordance with the system and application architectures defined in the A-TARS. It is designed to satisfy the unique needs of the hosted applications and to meet specific product requirements (e.g., processing performance, disk size, and memory size requirements). Generally, the Target Architecture is based on commercial products. These products are acquired, adapted, and configured to form the Target Application Platform. That physical platform is the basis upon which the applications are designed, built, acquired, and executed.

   The design of the Target Architecture's technology-related entities must conform to the A-TARS to minimize the risk of becoming overly dependent on a vendor's unique capabilities. Members of the Technical Architecture Team will advise, review, and approve the Target Architecture before products are purchased. When a vendor-provided product conforms to the Technical Architecture descriptions, it can be used directly to build applications (e.g., a conforming implementation of a service API. Otherwise, programming guidelines, wrappers, or other adapters may be needed to maintain a degree of application-vendor independence, as required by the A-TARS. For example, the target platform design may wrap a vendor component within another, exposing an A-TARS, compliant service interface to the applications while hiding the vendor's version. This limits application programmer access to vendor

extensions, which can be verified during code peer reviews. The vendor component can be replaced later with another vendor's product with little or no direct application changes; only the wrapper implementation would change. When cost, performance, or other design considerations are justified, exceptions to parts of the A-TARS can be negotiated with the architects and waivers granted on a case-by-case basis.

Not only is the target for the operational environment defined and assembled, the development environment also could be impacted. This may occur when a new type of computer platform is introduced into the HS Agency (e.g., moving from mainframe-based to distributed application server-based solutions). You may create guidelines on application development and use of tools and integrate them into the development environment, in accordance with A-TARS process-oriented guidelines. In some cases, you may want to feed the lessons learned from pioneering projects back into the A-TARS.

These activities coordinate with the acquisition activities to acquire products meeting Target Architecture criteria. The support activities will maintain the configurations. All products are tested and verified against the Target Architecture before hosting applications (e.g., performance, security, or other essential properties).

3. **Application-Adaptation Activities.** Applications may be constructed using commercially available components, such as custom controls or business objects; prepackaged solutions; other applications (e.g., office suite automation objects); or complete integrated systems (e.g., specialized servers, such as data store or business gateways). These items are subject to the same disciplines as those for defining and building the target application platform. The goal is to establish and control how applications will be built on top of these products to limit the impact of vendor lock-in, while taking advantage of the product's unique features (most likely the reason it was selected in the first place). Products will be tested before building applications on them (e.g., maximum transaction rates, security, availability) and guidelines provided to the application builders.

4. **Solution Integration and Test Activities.** Each fabrication project may build a portion of the overall AIS. Even though each project verifies that its part is complete and meets allocated requirements, you must integrate the set of parts and test them as a whole. A fabrication project is created to receive each part and construct the developmental configuration, preparing it for deployment. Each release undergoes development testing and evaluation to ensure that it meets the technical goals for the plateau. This testing is highly repeatable and may rely on simulated workloads, data, or emulation of devices or platforms.

   Focus a significant portion of integration and testing on external system interfaces (e.g., Medicaid, SACWIS, Child Support Enforcement, Courts, Social Security Administration). Confidence should be high in the application's ability to maintain the accuracy and integrity of any exchanged data. You need to use test data, test cases, and detailed manual or automated test procedures to monitor and verify external system interfaces. You may need to use emulators and test scripts to exercise interfaces for nominal and exception conditions, and to allow for cost-effective regression testing.

   The result of this testing is a major factor in the decision to release for deployment. In essence, the engineering requirements that were allocated to the products that project's produced have been satisfied adequately. The IT decision makers for the plateau make this determination.

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Roles and Responsibilities

The key roles and their responsibilities are as follows:

- IT Staff. These individuals perform the technical activities. They may perform analysis, programming, network design and implementation, database design and implementation, testing, user interface development, Web content development, technical documentation, and many more types of activities. They may be organized on interdisciplinary or specialty teams, sharing expertise across projects in accordance with the project's staffing profiles.
- Technical Architecture Team. These individuals provide assistance and review of the technical practices and products to ensure consistency with the appropriate part of the A-TARS. They may participate in peer reviews or other formal design reviews.
- Support Organization. Individuals with expertise in the QA or CM disciplines provide assistance to the IT staff. These individuals may help establish and review practices to ensure proper accounting of all product elements and quality oversight of technical processes and products.
- Other Key Stakeholders. This includes any group or individual with a vested interest in the project's products (e.g., the customer). This may include staff from other projects that will build on the project's products or business user representatives (e.g., participating in sessions to establish technical requirements and review designs). The IT Project Manager and other management groups may review technical progress. State procurement personnel also may participate (e.g., when the project defines specifications that will be used to acquire conforming products).

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Artifacts

The following information is used or produced by these activities. Templates, examples, and checklists for identifying and documenting items are available through the Additional Resources section at the end of this page.

- IT Products and Data. This is the main result of these activities. The output products and data may be new or may build upon other products and data. When maintenance activities are performed, the previous version of the product and data will be updated.
- IT Project Plans. Each engineering task is formally managed in accordance with the project's plan.
- Project or Product Requirements. These are allocated to the engineering tasks to ensure that both the engineering practices employed and the resultant IT products and data conform to the HS Agency and HS programs' needs.
- A-TARS. The appropriate part of the A-TARS is used to guide technical decisions for the project. Any IT products and data produced by the project must be verified against the A-TARS.
- Status. Technical progress and issues are forwarded to the project management activities. Status is against the tasks in the Project Plan.

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Additional Resources

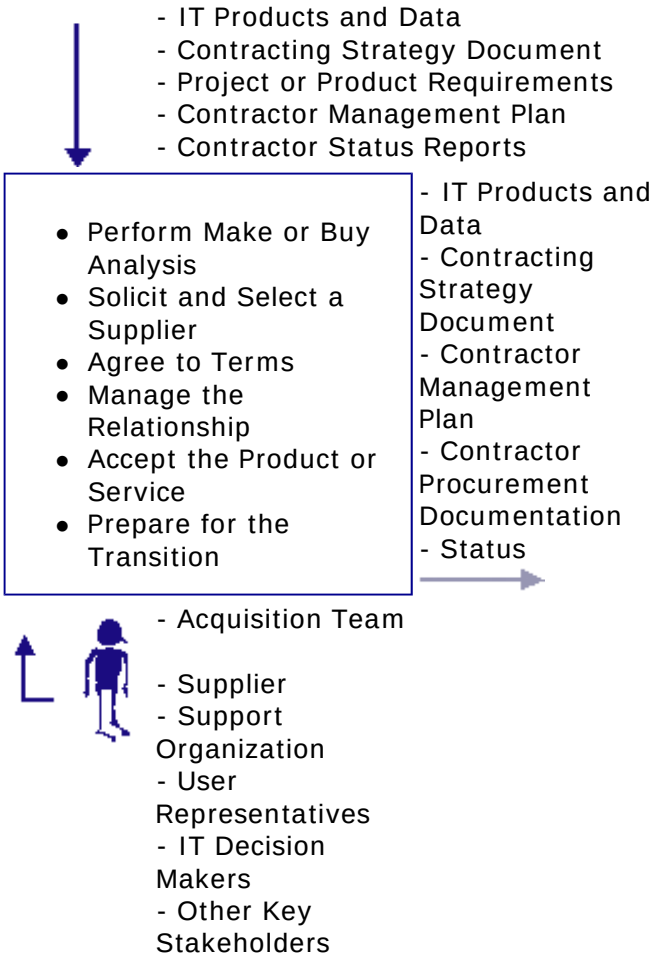
Resources applicable to this activity are cataloged below. Lists of all available resources

may be found in the Resources portion of the IT Planning and Management Guides.

Consolidated List - Software Engineering Resources
Contains links to sites that further list software engineering practices and related topics.
03-3-02

Acquisition Activities

Manage the acquisition of custom or commercially available products or services that will be added to the HS Agency's technical inventory.



Introduction

These acquisition activities can be performed within the context of each project, or as a single project serving many other projects. These activities establish and manage a formal agreement to obtain IT products (and services) from suppliers external to the HS Agency. Any type of technology element can be obtained, such as (but not limited to):

- Complete software applications or parts (office automation products, user interface controls, or business components)
- Packaged solutions (including a system transferred from another State)
- Information appliances (PDA or cell phone)
- Complete, integrated platforms (a server or client workstation)
- Network equipment and infrastructure (routers, switches, firewalls)
- Data stores and content (databases and Web pages)

- Development or technical operations tools or environments (IDEs, systems management)
- Documentation necessary to install, operate, and maintain the product
- Specialized consulting services (on-site support, maintenance support, including products withdrawn from the market).
- Application services from an ASP

Many types of agreements may be used to obtain the items, depending on the nature of the supplier relationship, such as:

- Contracts (commercial suppliers build to specification)
- Licenses (users within and external to the HS Agency)
- Memorandums of Understanding (other State or local Government entities)

The acquisition activities focus on the management aspects of the supplier relationship. They interface with the other project activities, as needed:

- Engineering activities for technical support, such as producing specifications used as a basis for contracting, testing received products before acceptance, or adapting the products for use within the HS Agency.
- Support activities for managing the configuration of the received products and oversight of the provider quality through product and process reviews.
- Project management activities for oversight of acquisition activities.

TANF Example: Many State IT organizations need to augment their support staff with contractor and vendor provided resources. Typically, States are not adding technical support staff through employment, but are using the contractor community to support applications. A key to success is a strong contractor management capability. A State-contractor partnership should consider the impact on the existing TANF organization, and clearly delineate roles and responsibilities. Clearly identified organizational structures and decision making should allow a composite TANF IT support organization to respond quickly to technical emergencies and changing operational needs.

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Activities

Key activities performed on one or more fabrication projects are described below:

1. **Perform Make or Buy Analysis.** Generally, analysis to make or buy an IT product or service is performed early in the planning for a plateau (see the Develop the IT Evolution Plan activities). Projects may be defined and executed to perform this analysis when it involves significant effort or time. Some items to consider during the analysis:
    - Include how the product will be adapted to meet the needs of the HS Agency. For example, a transfer from another State requires analysis of changes to incorporate specific laws and regulations that apply to the HS Agency. The analysis also addresses how the transferred technology fits within the HS Agency's Technical Architecture.
    - Use a contracting scorecard to identify all the relevant business objectives and issues.

- Collect some general information about the availability and capability of potential suppliers (see the Solicit and Select a Supplier activities). Establish the feasibility of acquiring the items with reasonable competition to assure best value for the State.
- Determine the essential criteria needed to meet the business objectives by performing a trade study of the possible alternatives and deciding which alternatives are acceptable.

The outputs of this activity include the trade study results, a documented make or buy decision, a list of those products and services to be purchased, and the procurement strategy.

2. **Solicit and Select a Supplier.** Perform a systematic evaluation of qualified suppliers to determine their ability to meet technical requirements and other selection criteria as part of a solicitation package. If a list of qualified suppliers does not exist use an RFI to identify potential suppliers. Information about the suppliers may be part of the make or buy analysis.

   In the course of generating the solicitation package and evaluating the suppliers' responses to the solicitation, you may generate the following:

   - Supplier evaluation criteria. An adaptation of essential criteria from a contracting scorecard, modified to address relevant suppliers' capabilities as determined from their proposals.
   - Solicitation package. An RFP, including the product or service requirements, type of contract (fixed price, cost plus), SOW, terms and conditions, proposal evaluation criteria, and proposal process instructions.
   - List of solicited suppliers and their proposals.
   - Evaluations of each supplier's ability to satisfy the essential criteria.
   - Technical and nontechnical risks associated with each supplier, such as conformance to the HS Agency's Technical Architecture, cost, or delivery schedule.

   This activity concludes when you identify a first-choice supplier and, if possible, alternative suppliers. Failure to find a qualified supplier necessitates reconsideration of the make or buy decision and possibly replanning the plateau.

3. **Agree to Terms.** Establish a formal agreement (contract) between the HS Agency and the supplier. Create a CMP during negotiations with the supplier. This plan is the basis upon which the HS Agency tracks and controls the supplier's performance in accordance with the agreement. Base the supplier agreement and the CMP on the high-level requirements and risks identified during the selection activities.

   The work products resulting from this activity include the following:

   - A signed supplier agreement including, explicitly or by reference, an SOW, product specifications, Service Level Agreements, a top-level project plan, change request and approval procedures, acceptance criteria and responsibilities, process and product quality requirements, and legal terms and conditions. This agreement could be in the form of a purchase order, contract, Memorandum of Understanding (MOU), or partnership agreement.
   - A CMP, which includes all the activities, schedules, roles and responsibilities, measurements to be collected and analyzed, interface mechanisms, review procedures, and support functions that your organization performs in dealing with the supplier during the contract.

- Updates of other projects' plans that have been impacted by the supplier agreement and CMP for the current plateau.

If acceptable terms cannot be established, you may select the next-choice suppliers.

4. **Manage the Relationship.** Monitor and evaluate the supplier's progress and performance against the supplier agreement or SOW. Perform these functions in accordance with the CMP. Include periodic tracking of cost, schedule, risks, quality, and technical performance. Conduct periodic in-process and formal reviews of both management and technical achievements in accordance with the CMP.

   This activity begins once a supplier agreement is executed. Use supplier-developed plans for tracking purposes. Keep the CMP and other affected project plans consistent with any changes in the supplier plans. Record corrective actions or risk mitigation activities and track them to closure.

   Periodic outputs from this activity include the following:

   - Reports on the progress, risks, and status of the supplier
   - QA reports from reviewing the supplier's process and work products
   - Reports from technical and management review meetings
   - Action items list
   - Documentation of work product and document deliveries

   The most important output from the supplier is the delivery of the contracted end product or service. Continue this management activity until the end product is successfully delivered, all contracted services have been rendered in accordance with the SOW, and all corrective actions have been closed.

5. **Accept the Product or Service.** Formal acceptance tests, reviews, and configuration audits are performed before the HS Agency accepts the purchased products. Tests are conducted in accordance with approved test plans. The supplier may perform the tests and submit results (with HS Agency oversight), or HS Agency project engineering activities may perform the tests. Tests must verify objectively that the established requirements are met and any deviations are noted. Produce a report noting the acceptance conditions (deviation from criteria, criticality, and any corrective actions to be taken). Once accepted, place the product and any associated by-products (test plans and results) under CM (see the support activities).

6. **Prepare for the Transition.** Acquired products can be deployed in several ways. The product may be fielded by itself (a packaged solution), or it may be incorporated into another product and deployed along with it (e.g., a Web server as part of a larger distributed system or a set of components to be used in an application). Planning and managing the introduction and retirement of products into the operational environments is a part of the technology deployment processes. The acquisition activities should identify the following to help prepare for deployment:

   - Identify when the contract is scheduled to terminate and the supplier's obligations to support the deployment. Issues that do not surface during acceptance testing may appear only during deployment. Note any risks associated with supplier support during deployment.
   - Identify any special skills or knowledge needed to maintain or operate the acquired products.
   - If multiple units will be received over a long period of time (e.g., workstation

upgrades), identify the timetables for receipt; how each unit will be verified (manufacturer changes in components, such as video cards); and any storage of spare parts or specialized equipment needed before deployment (testing or system management).

- Identify licensing issues or other agreements that may affect deployment cost and timetables.
- Initiate life-cycle maintenance or service contracts.
- When outsourcing, the transition may involve planning for and executing the transfer of data, facilities, equipment, and personnel to the control of the supplier before they perform the service.

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Roles and Responsibilities

The key roles and their responsibilities are as follows:

- Acquisition Team. The Contracting Officer and the Project Officer have primary responsibility for the acquisition activities.
- Supplier. These individuals, from outside the HS Agency, provide the IT products and data. This may include contractors; Vendors; or other State Agencies or organizations, as necessary.
- Support Organization. These individuals participate by providing oversight of the processes used by the supplier and managing the configuration and quality of the delivered products.
- User Representatives. These individuals help establish requirements and provide feedback on the delivered products as they develop. These individuals may be direct users of the product (i.e., business users) or other IT staff that will incorporate the product into another product (e.g., components placed into an application).
- IT Decision Makers. These individuals have authority to select and enter into agreements with the suppliers. This may include members of the IT Evolution Management Team, the HS IT Division, or other executives (CIO).
- Other Key Stakeholders. These individuals support the acquisition activities by providing subject matter expertise, as needed. This may include IT staff, Technical Architecture Team members, and IT project staff, among others.

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Artifacts

The following information is used or produced by these activities. Templates, examples, and checklists for identifying and documenting items are available through the Additional Resources section at the end of this page.

- IT Products and Data. This is the main result of these activities. Products are received from the suppliers and placed under CM.
- Contracting Strategy Document. This document is prepared as the result of a make or buy analysis and used to guide the solicitation, selection, and management of the suppliers.
- Project or Product Requirements. These are allocated to the acquisition tasks to guide the technical and nontechnical criteria for the acquired products. These are allocated through the IT Project Plan. This includes the appropriate parts of the A-TARS.

- Contractor Management Plan. This document is produced and used as the basis of managing the supplier relationship.
- Contractor and Procurement Documentation. This represents the supplier agreements and obligations including the contract, legal terms and conditions, the SOW, licenses, and other formal agreements.
- Contractor Status Reports. This information is furnished by the supplier, indicating progress and issues against the supplier's plans.
- Status. Status against the CMP and any supplier issues are analyzed, consolidated, and forwarded to the project management activities for review.

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Additional Resources

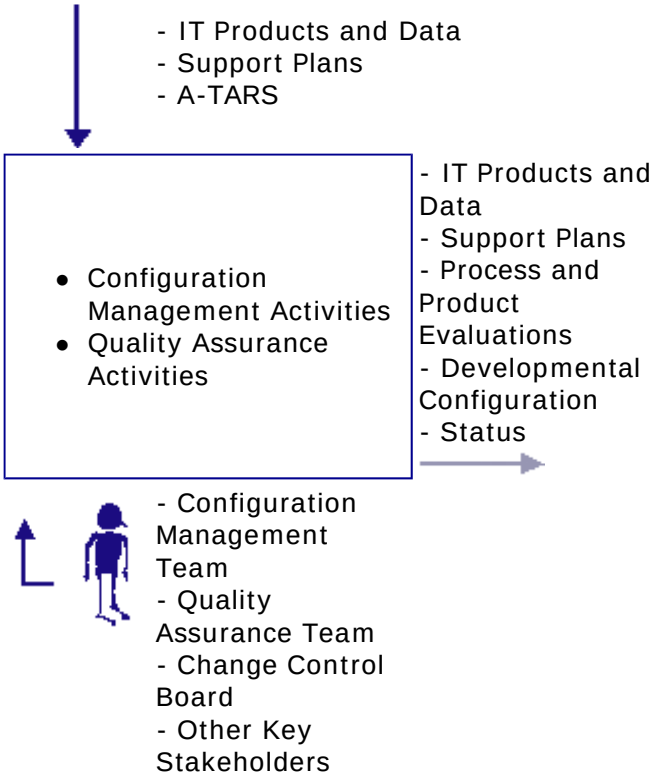
Resources applicable to this activity are cataloged below. Lists of all available resources may be found in the Resources portion of the IT Planning and Management Guides.

Template: Project Charters
Template for developing the charters for projects covered by the IT Evolution Plan. 02-01-02

Template: Contracting Scorecard
Describes background of the contracting scorecard approach and identifies a tailorable list of common factors applied to the contracting scorecard. 02-01-02

Support Activities

Provide technical support to the project's processes and products to help manage the product configuration and quality.



Introduction

These support activities can be performed within the context of each project or as a single project serving many other projects. These activities provide technical support to the management, engineering, and acquisition activities by:

- Establishing and managing the product integrity
- Objectively reviewing and auditing the project's processes and products to establish expectations on product quality

The CM activities establish and maintain the integrity of the project's baselines. This facilitates the flow of products between projects as they each contribute to a portion of the plateau goals. Each project is generally small and of short duration; hence, the baseline contents will generally conform to each project's product. The items to be controlled include any technology-related entities and associated life-cycle documentation. These items can be created in the engineering activities or provided by the acquisition activities. Management products, such as plans and project or product requirements also can be placed under formal control.

The QA activities provide project, plateau, and executive management insight into the activities and work products created and used on the project. The project's planned work activities and their results are evaluated against the project's established procedures,

standards, and guidelines. Noncompliance issues are identified and addressed to ensure that project's practices and products conform to those noted in the project and support plans.

> **TANF Example:** As States migrate TANF systems to newer technologies, effective Configuration Management practices will be crucial. It may take several years to do away with the old technology and completely switch over to the newer products. During that time it will be necessary to maintain individual baselines for both the old and new applications, as well as account for similarities and differences between them. Commitment to CM tools, procedures and staffing with qualified individuals is key to maintaining the old applications and making sure appropriate changes are propagated to the new, at the right time.
>
> Many States are utilizing Quality Assurance contractors for their development projects. Individuals with the State IT Division should have oversight over these contractors. The contractor's Quality Assurance Plan should clearly identify and describe explicit activities that provide the State with sufficient insight into the quality of the delivered systems. Actions may include quality reviews and audits of contractor processes and products, as needed.

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Activities

Key support activities performed on one or more fabrication projects are described below:

1. **Configuration Management Activities.** Key activities are:
   - **CM planning.** These activities establish formal plans for performing the CM activities on one or more projects. Prepare a Configuration Management Plan (CMP) during the early project definition and planning stage. Some items to address in this plan are as follows:
     - Explicitly define the CM activities, schedules, and resources. Establish dependencies to engineering and acquisition activities.
     - Identify items to be placed under CM and establish the criteria and permissions needed to make changes. Items may include engineering work products and items acquired or transferred from outside the HS Agency. You should control and manage development tools and platform software configurations.
     - Establish the CM repositories and implement the tools and infrastructure. For software, include storing and retrieving individual products or parts, creating a configuration and managing its integrity, archiving items, and reporting change actions and configuration audits.
     - Document procedures for CM activities, including: changing repository contents, handling change requests, making and releasing items between projects and to deployment, and configuration status accounting.
   - **Configuration identification and baseline management.** These activities uniquely identify the items placed under control and ensure their integrity and distribution. This includes the following practices:
     - Identifying baselines and the items they contain. This may include a baseline for contractor received products, a system transferred from

another State, or a set of applications developed in house and ready for deployment.

- Establishing the identification method for each item, keeping item relationships consistent when they change (e.g., design documentation, code modules, module test scripts, test databases, test results, and user documentation kept consistent with one another).
- Establishing and executing a Change Control Board (CCB) with approval of change requests and oversight of baseline changes. This board oversees the configuration of products when released from a project and approves release of the developmental configuration to deployment.
- Generating and distributing reports on the contents of the baselines and CM actions.
- Conducting audits of a baseline to assess the consistency and integrity of the items in it.

2. **Quality Assurance Activities.** Key activities are:

- **QA planning.** These activities establish formal plans for performing QA activities on one or more projects. Prepare a Quality Assurance Plan early during the project definition and planning stage. Some items to address in this plan include the following:
  - Assign explicit responsibility and authority for the QA tasks to the QA team. The assignment should ensure independence from others associated with the project, as necessary to maintain objectivity and limit influences. Provide orientation for the QA Team on the project practices, such as technical, management, CM, and acquisition practices. Provide orientation for other members of the project team on the role and responsibility of the QA team in accordance with the QA Plan.
  - The QA Plan reflects the project goals and is realistic within project constraints. Identify processes and intermediate or final products to be evaluated in the QA Plan. Activities provide for evaluation of internal and acquired products. Include activities for contractor process reviews in the plans, as applicable.
  - The QA Team participates during the early project definition stage to establish the appropriate processes and standards to be used on the project. These processes and standards should conform to the project and product requirements and the applicable portions of the A-TARS.
  - Create procedures, checklists, and tools to objectively evaluate the adherence of processes and products to those established on the project. These may be common across projects.
- **Quality reviews and audits.** The QA Team formally reviews and audits project work processes and products to identify any noncompliance. This includes the following practices:
  - Reviews may be performed using a variety of methods, including observations of processes execution, use of checklists, or automated tools (for example, something as simple as a spell-checker with tailored dictionaries).
  - Audits are generally more thorough than reviews and require physical evidence to substantiate that the work was performed in accordance with the project's defined processes.
  - A noncompliance is first addressed with those that performed the work, and if not resolved, is escalated to an appropriate level of management.

The escalation chain may include the IT Project Manger, the IT Evolution Team Management, or the IT Division and other executive management.
- All reviews and audits must be objective, relying on published criteria documented in the project Quality Assurance Plan and checklists, done in accordance with written procedures and guidelines.
- Because the QA Team has firsthand insight into project quality issues, they may periodically generate and disseminate lessons learned across projects. These lessons learned can be the basis of improving all project practices.

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Roles and Responsibilities

The key roles and their responsibilities are as follows:

- Configuration Management Team. These individuals have primary responsibility for performing the CM activities for one or more projects.
- Quality Assurance Team. These individuals have responsibility for performing the QA activities for one or more projects.
- Change Control Board. The IT Project Manager, the IT Evolution Manager, the HS Program Manager, or other interested parties may be on the board. They approve release of the developmental configuration, as well as changes to a product once it is released from a project.
- Other Key Stakeholders This includes any group or individual with a vested interest in the performance or status of the support activities. This may include the IT staff, State procurement personnel, Contract Manager, or others who interact with the support personnel. The IT Project Manager, the IT Evolution Management Team, and other senior managers (the CIO) and technical persons (Chief Architect) also will have insight into the status of these activities as necessary to understand the developing configuration and its qualities.

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Artifacts

The following information is used or produced by these activities. Templates, examples, and checklists for identifying and documenting items are available through the Additional Resources section at the end of this page.

- Developmental Configuration. This is the major output of these activities, an integrated set of IT products or data that is formally controlled, of known quality, and ready for release to deployment.
- IT Products and Data. These items are placed under configuration change control as needed. These products and related process data are subject to QA review and auditing actions as noted in the Quality Assurance Plan.
- Project or Product Requirements. This consolidates all the requirements imposed on the project from all sources: IT Evolution Plan, the HS Program Staff, HS IT Division, the Project Charter (constraints), and others. These requirements are used as a basis of defining and planning the project. Project success is defined by how well the requirements are satisfied.
- Support Plans. All support tasks are managed formally according to their appropriate specialty plans, such as the Configuration Management Plan or the Quality Assurance Plan. These specialty plans augment the overall IT Project Plans. Project or product requirements allocated to the support tasks are delegated through the

support plans.

- A-TARS. Applicable parts of the A-TARS will influence the Support activities. Beside the technical design requirements, the A-TARS: Technology Guidelines may include process-specific requirements that QA activities will review or audit against.
- Process and Product Evaluations. The result of QA reviews and audits are distributed to the appropriate individuals. Issues that cannot be resolved at the working level are elevated to project and IT Division or other executive management, as necessary.
- Status. Technical progress and issues are forwarded to the project management activities. Status is against the tasks in the appropriate Support Plan.

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Additional Resources

Resources applicable to this activity are cataloged below. Lists of all available resources may be found in the Resources portion of the IT Planning and Management Guides.

Consolidated List: Support Resources
A list of Web links, publications, and standards relating to configuration management (CM) and quality assurance (QA) support activities. 03-03-02

Template: Quality Assurance Plan Outline
An abbreviated Table of Contents for a Quality Assurance Plan. 03-03-02

Guidelines: Quality Assurance Reporting
A set of guidelines for preparing quality assurance reports. 03-03-02