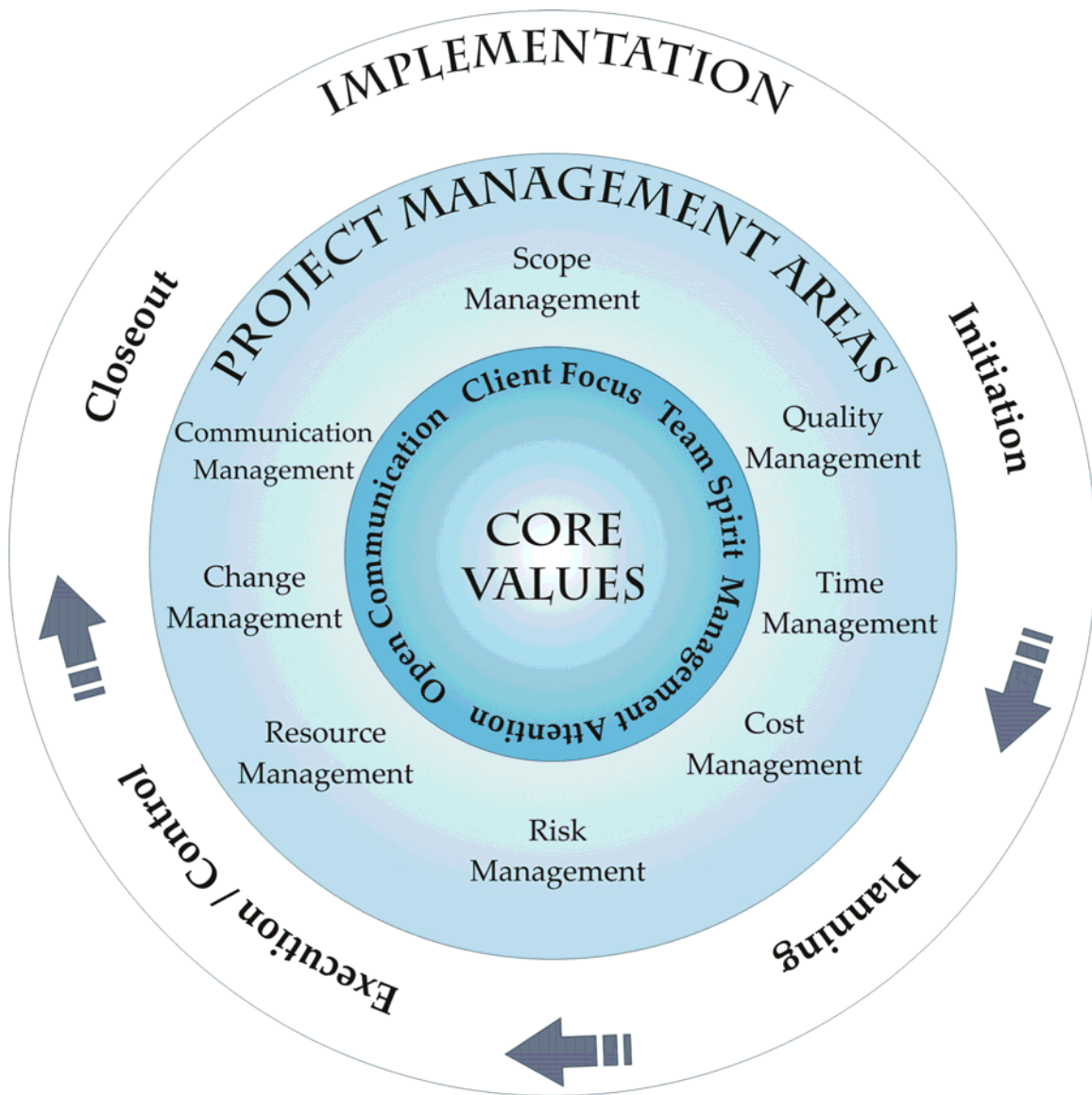# 1 Project Management Methodology

Artech's Project Management Methodology is intended to promote the delivery of quality products that meet customers' needs and results in projects that are completed on time and within budget The objective of the methodology is to provide standard methods and guidelines to ensure that projects are conducted in a disciplined, well-managed, and consistent manner. The methodology recognizes that the correct approach to effective project management is good planning and efficient controls implemented through a well-structured project organization.

Artech's Project Management Methodology has been derived from proven techniques "Best Practices" developed through years of experience and industry standards put forth by the Project Management Institute® (PMI). Driven by our aspiration to adopt Software Engineering Institute management standards, Artech's Project Management Methodology has been designed to comply with software Capability Maturity Model (SW-CMM®) Level 4 goals. Blending the latest technologies with the best industry standards, our Project Management Methodology has been designed with Client and Quality as our primary focus areas.

The methodology is flexible, incorporating the changing needs of the client as well as predicting future changes based on industry trends. Artech believes the key ingredient to its success is customer involvement in the entire project-life cycle. Artech maintains an open-ended approach to its solution while using industry standard tools and methodologies to achieve best results. It is critical that the client is aware of every aspect of the project. To ensure this, Artech proposes a project team, which includes client managers as well as members of the users group.

Artech's internal Software Engineering Process Group (SEPG) is involved in continuous process improvement and process risk management. Along with our Quality Assurance (QA) group our project management process entails developing a knowledge repository and feedback from various projects to enhance understanding of project peculiarities, risks and standards. The SEPG conducts internal knowledge transfer sessions to derive the best practices from various groups and enhance its understanding of the various modules of the project management process. Artech advises its clients on current industry standards and practices enabling revision of existing standards to align with current trends. In order to provide flexibility, Artech will be willing to include client standards and guidelines, as part of the project process. Our risk management process and quality management standards will take these requirements into account in their assessment and reports.

The diagram above represents the main constituents of our project management practice. As illustrated above our project management methodology has three major constituents: (1) Artech's core values, (2) Project management areas, and (3) a four-phased methodology implementation.

Core Values

Our methodology is based on a set of four core values that essentially form the culture of our organization and of our project management approach:

Open Communication

Artech encourages the free flow of information between all project levels. We believe in open communication of problems and solutions in order to reduce the element of "surprise", make realistic estimates and efficiently monitor risks during the entire project life cycle. This implies establishing and keeping open communication lines within the entire project team, including client personnel. Artech's project plan encourages team communication with the client management and the user groups as required by the project. While regular team review and status reports help to measure and predict team performance, Artech's team will always be forthright in answering any project related queries during the entire development lifecycle. Clear role definition in the project ensures effective communication and minimal misunderstandings.

Client Focus

Our motto is to ensure that any project activity should have a client focus. We constantly see to client interest in what ever we do. We sincerely believe that our own interest can best be served only by first serving our clients' interest. This single-minded focus of all project team members ensures that the developed product meets the client objectives. At the beginning of any project, the team undergoes an induction session that emphasizes client objectives, both business and technical. The team keeps these objectives in mind throughout the life cycle of the project.

Management Attention

Artech is a right-sized company – it is not so big that small and medium sized projects will be lost from management attention and yet it is large enough to handle fairly large turnkey projects. Our past experience demonstrates that Artech has a history of successfully executing multiple, parallel, and critical projects. Artech believes in providing top-level management attention to each and every project that we are undertaking. Our SEPG and QA groups work across the organization to ensure cross-project knowledge transfer and institutionalization of 'best practices'. The senior management keeps itself abreast with all project progress through periodic management reviews where important aspects of all projects are reviewed. Additionally there are formal project status reports that are also formally reviewed by senior management. The QA group reports all relevant project metrics to the senior management and works with them and the SEPG to suggests continuous process improvement steps and risk analysis reports. Besides this formal process all project managers

have direct access to top management to be able to resolve any issues or concerns that may come up on a project.

Team Spirit

There is an increasing trend of project teams being distributed across multiple locations - onsite, offsite and offshore. There is also a trend towards forming project teams consisting of client side end users, client side technical people and vendor side project people. Due to this we feel that building a good team spirit is of the utmost importance in ensuring a unified team with a common goal. As a part of our continuous process improvement drive our SEPG group initiates Technical Working Groups (TWG) from various projects in order to enable free and fair dialogue of contentious issues and conflicting ideas. These teams are headed by senior SEPG members who provide guidance and material suggestions in formulating team processes and mitigation steps for team conflicts.

Management Areas

The core values mentioned above are embodied into **eight management areas** that Artech has identified for providing successful delivery of projects. These areas are listed below:
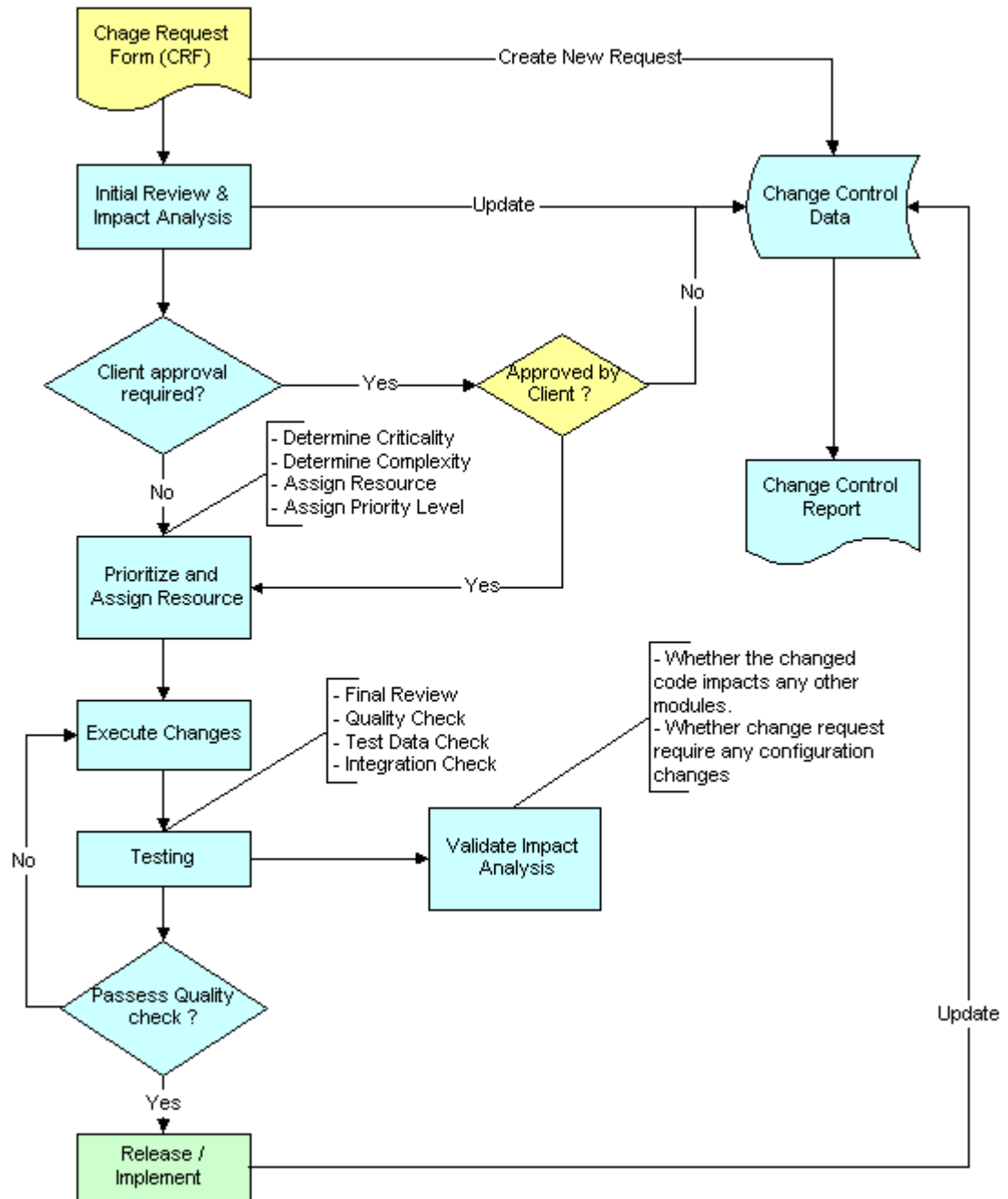
Change Management

Change Management procedure tracks all change requests for individual projects. This includes assigning and prioritizing change request, as well as coordination and review with the client. The impact analysis acts as an input to risk management for mitigation steps if required. The change management process is independent of any other modules of project management. This is a continuous process throughout the project life cycle and is a crucial factor for successful implementation of the project.

All changes are categorized on the basis of the nature of complexity and the projects critical nature. Changes that do not require client intervention are directed to resources for execution. In case client intervention is required, the concerned person is immediately notified and based on the approval/ rejection, the changes are either executed or deferred.

As our standard process, Artech uses a combination of issue handling tool and version control software for tracking, monitoring, reviewing and successfully

executing all change requests. Regular reports are given to the client and Artech management to keep everyone updated of all developments.

The Change process has been represented in the diagram below:

Communication Management

Communication Management describes the process establishing communication protocols and procedures between Artech and our client. As part of our primary focus in project management, Communication Management is given high priority. In keeping with open communication, our clients are encouraged to communicate directly with the Project team whenever required. However, if any issue needs to be highlighted we provide an escalation mechanism that follows a hierarchy that is defined in the escalation hierarchy section of the project management plan.

The communication protocols and procedures are established by the project manager, in consultation with our client, during the project planning stage. Communication planning will include determining the information needs of the stakeholders, the frequency at which they need the information, and the appropriate format of presentation of the information. These are documented in the project management plan and are periodically revisited to ensure that information needs are continually met. It is anticipated that during initial stages the need for communication will be very high, but as the project evolves, communication needs will moderate to that of a regular, steady state need.

Artech assumes client meetings at client decided intervals and provides structured walk-throughs, demonstrations and/or presentations of work proceedings at pre-decided project milestones to ensure that all project stakeholders are kept informed. Other reports like project progress reports,

quality test results, quality trends, bug-fix reports and delivery status reports are reviewed during Management Review or Steering Committee Review. Our technical team and account executive are in constant touch with the client to ensure speedy issue resolution at various levels (e.g. technical, technology, business functions).

We make optimal utilization of technology (email, phone, fax, data dictionary sharing) to set up the best means of information dissemination. Towards this end, we have set up an international private leased line between our development centers in Morristown, New Jersey and New Delhi, India, to provide instantaneous voice and data connectivity, as required. Both of our development centers are equipped with state of the art facilities to support large development projects.

We are always happy to work with our clients to institute any additional communication process that may be mutually beneficial.

Resource Management

The two primary components of this process are **Human Resource Management** and **Material Management**.

Human Resource Management

Artech has a dedicated team of sourcing specialists who specialize in evaluating and recruiting individual resources both from our internal pool of employees as well as best talents in the market. A sourcing specialist is handed a particular account of a project and he/she will be responsible throughout the duration of the project for all human resource requirements. The sourcing specialist will act as an HR representative for the project. If there is any dispute with a particular team member, it will be his/her responsibility to resolve the issue, or to provide an alternative resource of equivalent/better capabilities. The sourcing specialist is given cost guidelines to work with to meet our cost goals. The Project Manager will be responsible for building a cohesive team and a spirit of responsibility and responsiveness to the project goals. Artech's own reward and recognition practices serve as a major benefit to encourage better performance and an extra effort to achieve desired goals.

Material Management

Artech understands the need for project completion to be timely. We use the lead-time before the start of the project to procure and/or assemble all

resources required for successful completion of the project. This includes office space setup, hardware and software setup, communication setup, dedicated link setup, and other office facilities that may be required.

Scope Management

Scope Management ensures that the project includes all work required to achieve the goals of the client. Scope Management activities are mainly centered during the initial stages of the project. While planning and definition are the main activities of this management area, scope control is an integral process of the project and takes place throughout the project lifecycle. Change requests that pertain to addition, modification or removal of features will automatically trigger scope control. Artech will guide the client throughout the project to work within the defined perimeter of the project scope. However, the control and planning process will take care of any changes to project scope. The Scope Management activities can be represented as below.
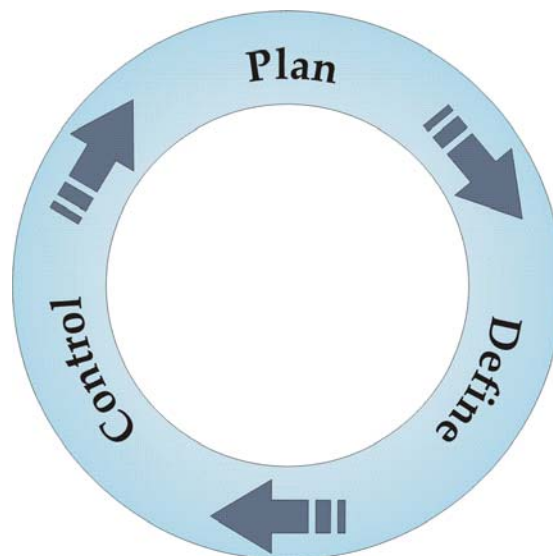
Plan

During this period Artech will initially study the project charter that can be in the form of a contract, proposal, or an agreement and define an overall approach to be taken to identify project scope during the requirement analysis. Artech's team will then internally study all relevant documents and come up with a scope plan consisting of areas to be identified, how best to capture those areas, a structure for defining the scope of the project and control mechanism. Our objective is to define the scope of

work in very clear terms so as to avoid any potential misunderstanding. The planning process starts by gathering inputs, relevant documentation (project charter, contract, agreement, etc.) and inputs from the initiation meeting. This helps us gather requirements data and define scope in a structured way, enabling the client to have a clear idea of the project deliverables. The control process will provide for any scope changes that need to be made to the project.

Define

This activity formally documents the boundaries of work areas. It takes place during the requirements analysis phase. The project manager defines and documents a formal work breakdown structure and identifies all deliverables. This document consolidates the scope statement, the work breakdown structure, and the critical success factors into a formal Scope Definition Document. The project manager and the sponsors need to formally approve and accept the document.

Control
Scope control is an integral part of the project process that is handled during project execution. Change management forms a major input to scope control. All change requests are analyzed for scope impact. Impact on project scope will trigger a revision of the change request by the project management. Any changes in project scope will be reviewed by the project steering committee. The members of the steering committee, that will include senior management from both client and Artech and the project manager, will discuss to decide whether to include the change or not. In case of any time, cost and/or quality implication Artech will advise the client of such impact. Any significant change in scope will require re-evaluation of project effort estimation and revision of the project plan and cost.

Time Management

Time Management is primarily concerned with the process required to ensure timely completion of the project tasks. The process involves defining tasks and sub-tasks to accomplish a goal. The goal in this case is completion of a deliverable within the allotted time and budget. The tasks are defined in terms of activities, scope and constraints. All tasks are detailed to provide clarity. The tasks are arranged in accordance with the development methodology. Based on

the development model, all tasks are arranged to complete the deliverables according to the level of task. Lower-level tasks are an input to the higher level-tasks, which in-turn provides input further up the hierarchy. Activity duration is estimated based on the "Function Point Analysis" model of task effort estimation.

Based on the above input, a schedule of activities is formed to outline starting and ending days. Artech uses Microsoft Project for scheduling tasks and monitoring progress. Critical path analysis is done to quantify project lag/slack time. MS Project is also used for assigning resources, defining milestones, adding tasks constraints, assigning dependencies, etc. Artech further uses MS Project to monitor and level task assignments, managing over-allocation/under-allocation of tasks to specific resources. The schedule at the design stage is an estimated schedule. During the course of the life cycle of the project, the Project Manager adjusts the schedule to reflect the actual timeline, manages changes to work plan, and reports on the effect of these changes on the project's schedule. All changes are based on the basic guidelines provided by the contract. In case of any major changes, the client/stakeholders of the project are notified and the Project Manager will obtain written authorization to proceed.

Cost Management

Artech's cost management procedure ensures that the project is completed within the estimated budget or within the parameters of the approved changes. Artech's cost estimation is based primarily upon "Function Point Analysis". A combination of the number of function points and the function point matrix along with the time schedule, resource, and other overheads contribute to our project costing. Artech is continually striving to provide a best-value product to all our customers. All tasks are initially assigned role description based resources, which further define the profile and level of expertise required to accomplish the task. Artech pools resources from our internal employees and available talent in the market. Utilization of Artech's offshore resources located at our development center in New Delhi, India, gives us a major advantage in providing cost-efficient solutions to the client.

A major part of this process is constant monitoring to control costs. The initial budget is further checked by a mid-term project analysis to identify deviations or potential deviations. Project metrics related to cost and schedules also serve as an input for future projects.

Quality Management

Artech considers quality to be a strong focus area in the entire Project Management process. Artech puts forth a plan and an acceptable checks-and-balances process to assure quality deliverables, subject to client approval. Artech's quality management process has been optimized to provide effective quality control with the least amount of project overhead. Artech's internal quality processes are defined by our SEPG (Software Engineering Process Group) as per SEI-CMM standards. These processes are reviewed and checked by our Quality Manager who ensures that all processes adopted for a project have been adhered to.

The three main components of our quality process are
- Quality Control
- Quality Assurance
- Quality Planning

While Quality Control deals with the day to day activities of quality checks, team review, peer review, structured walk-through, etc. its results are reviewed by the Quality Assuance (QA) to verify adherence to project plan, quality plan, and quality Audit. The quality assurance manager reviews all QA activities, including peer review comments, design review steps, test plan implementation steps, risk mitigation steps at regular intervals and reports to the senior management. The QA manager will work with the client to establish required control activities, and will recommend required quality analysis. Our processes are flexible enough to accommodate specific client requirements. Some of our preliminary planning includes planning for quality assurance and setup of quality control checks. The scope and project objectives along with internal standards defined by the SEPG form a guiding framework for the quality plan. The quality plan consists of standards definition, metrics guidelines and deliverable checklists. The quality plan identifies all quality control mechanisms and desired results.

Over a period of time across several projects Artech has implemented various quality standards, some defined by the client, others defined internally in conjunction with industry standards. We have learnt that there is no one perfect model. The control mechanism is thus kept flexible for review and revision. The process provides feedback information on quality trends to help quality managers and project managers review and revisit the quality planning documents, in case any modifications are required to the quality control process.

A diagrammatic representation of our quality process is shown below:
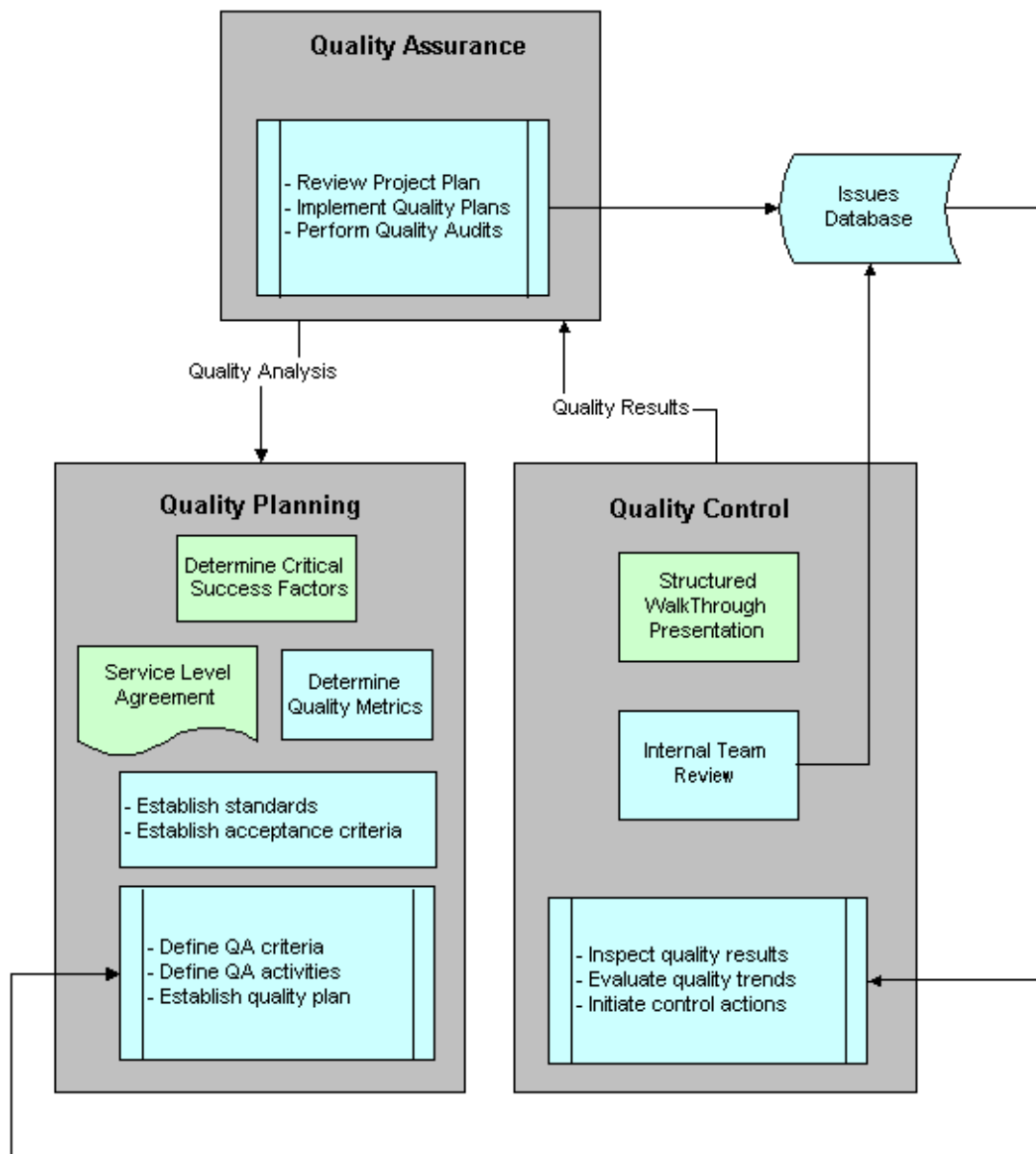
The diagram above reflects the principles mentioned earlier. The quality planning takes into account not only the internal pre-defined quality requirements but also project specific quality requirements that emanate from service level agreements and the critical success factors for the project. The quality metrics, standards and acceptance criteria for various deliverables are defined based on these factors. The quality control steps that are shown ensure that the quality plan is being followed. The quality control process includes peer reviews, team leader/manager reviews, structured walk-through/presentation, quality assurance review and delivery sign-off. Any discrepancies noticed in the quality results will

result in corrective actions in the development process as well as the quality control process.

The quality control process is explained in detail to individual team members who are each responsible for their own deliverable. At the request of the client, Artech provides a totally different team to support testing and the quality process, independent of the development team.

Risk Management

Risk management deals with anticipating and planning for potential problems before they can cause damage to the project. While we can never predict the future with certainty, we can apply structured risk management techniques to take a look over the horizon to anticipate the traps that might be looming and take actions to minimize the likelihood or impact of these potential problems. Formal risk management greatly improves the likelihood of successful project completion and reduces the potential negative consequences of those risks that cannot be avoided. It is important that the risk management process serves as an umbrella to each of the eight areas of project management. Special emphasis is laid on qualification (risk level), and quantification (cost of) of risk.

Risk management is a continuous process. The whole cycle of identification, analysis, planning, tracking, and controlling is repeated continuously and simultaneously as known risks are monitored and new risks get identified. Impact analysis from the change management process serves as one of the inputs to Risk Management.

Through years of experience, Artech has qualified that risk management does not necessarily apply only to the technical or functional aspects of the project. It also applies to areas such as resource management, quality management process, change management process, and others. Thus, Artech provides all generated documentation/results from other areas to risk management to analyze potential risks. Any critical risk factors are immediately communicated to the client to draw-up a plan of action. The internal project management standards at Artech have helped in developing risk tracking techniques and identifying potential risk factors from quality control and project performance reports.
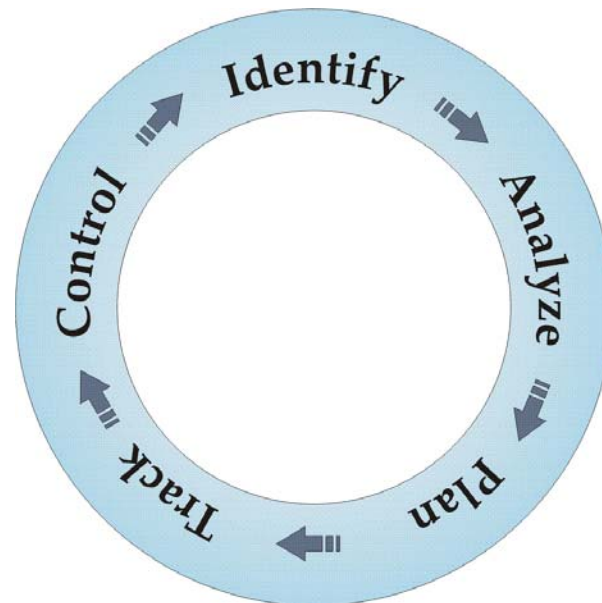
As illustrated above, the risk management process is one of identifying, analyzing, planning, tracking and controlling risk factors of the project. Artech has developed a structured risk management process by identifying potential problem areas, assigning checkpoints and review process, and analyzing any and all changes for risk. During the design stage Artech performs a standard risk analysis exercise against proposed solution, actual deployment environment, and real-life test case scenarios.

Artech places special emphasis on protecting its assets and covering the risk against disasters. Artech has a standard Disaster Recovery Policy. This policy incorporates planned and managed redundancies. The policy dictates the required actions that need to be taken by different personnel, including specific project personnel. For this reason the risk of disaster is not handled separately as a project level risk plan but as an organization level risk plan.

Identify

Risks need to be identified before they become problems. The risk identification process is started as early as possible on each project – sometimes at the proposal stage itself, if there are known risks, else at the project planning stage. Artech follows several methods to identify all

potential risks. One technique that is used is the brainstorming technique where all people who have knowledge of similar projects pool in their thoughts to come out with a list of potential risks. The agreed list is then checked against a standard checklist of risks from our issue database to ensure that a potential risk has not been missed out. This checklist is kept constantly updated with data from ongoing projects. To ensure that risk identification process is a continuous task various project reports like the quality control reports, quality plan, scope change management process, change management request forms, incident reports etc are reviewed in detail as they can flag potential risk factors. The project manager and other members of the team may flag risks while preparing or reviewing these reports (considering issues like, is there a problem that has been recurring, is there a problem that has remained unresolved for a while). Although risk identification is initiated at the beginning of the project, it is an ongoing process and continues through out the life cycle of the project. Each identified risk is stated as a risk statement specifying the condition under which the risk occurs and the consequence on the project.

Analyze

Risk analysis involves examining how project outcomes might change with modification of risk input variables. Risk characteristics are documented, evaluated, classified and prioritized. This is done by evaluating the probability of occurrence of the risk condition along with an assessment of the impact of that risk factor on the project. Taken together, they provide a measure of the risk exposure due to each risk item. This measure can form a basis for prioritizing the risks.

Plan

Based on the risk characteristics identified above, a risk mitigation plan is drawn up. For each identified risk, a person who is responsible for the mitigation plan is assigned. The risk statement is raised as a Problem/Issue/Query and escalated to the appropriate level for tracking and control.

Track

This includes monitoring of risks through collection of risk information. This process helps Artech project management to obtain early signs of potential problems and to take corrective measures. Each risk is tracked

through the periodic project status report. The assigned responsible person and the project manager are primarily responsible for tracking each risk. If required special investigation is carried out to collect relevant information to assist in the decision-making process.

Control

By reviewing the risk tracking data periodically, the project manager can adjust the probability and/or impact of each risk as the project evolves. Additionally, based on tracked risk data and corresponding triggers/thresholds specified in the risk mitigation plan, timely and effective decisions can be made on how to proceed with controlling the impact of the risk. It is ensured that required corrective action is taken for any deviations from the risk mitigation plan.

Communicate

Appropriate and timely communication to concerned stakeholders of all information related to project risks is key to ensuring successful risk management by raising the awareness of conditions that can affect the project. The communication will also ensure that stakeholders are aware of all the risks and the plan to manage them, so that expectations are successfully managed. The risk management plan and the periodic project status reports are the primary means for this communication.

Methodology Implementation

The core values and the management areas listed above that form our methodology are implemented on projects using an integrated four-phased project management approach. The project management methodology should not be confused with system development methodology. The system development phases are used to create a software product. The project management phases are integrated, yet distinct, from the software development phases as shown in the diagram below:
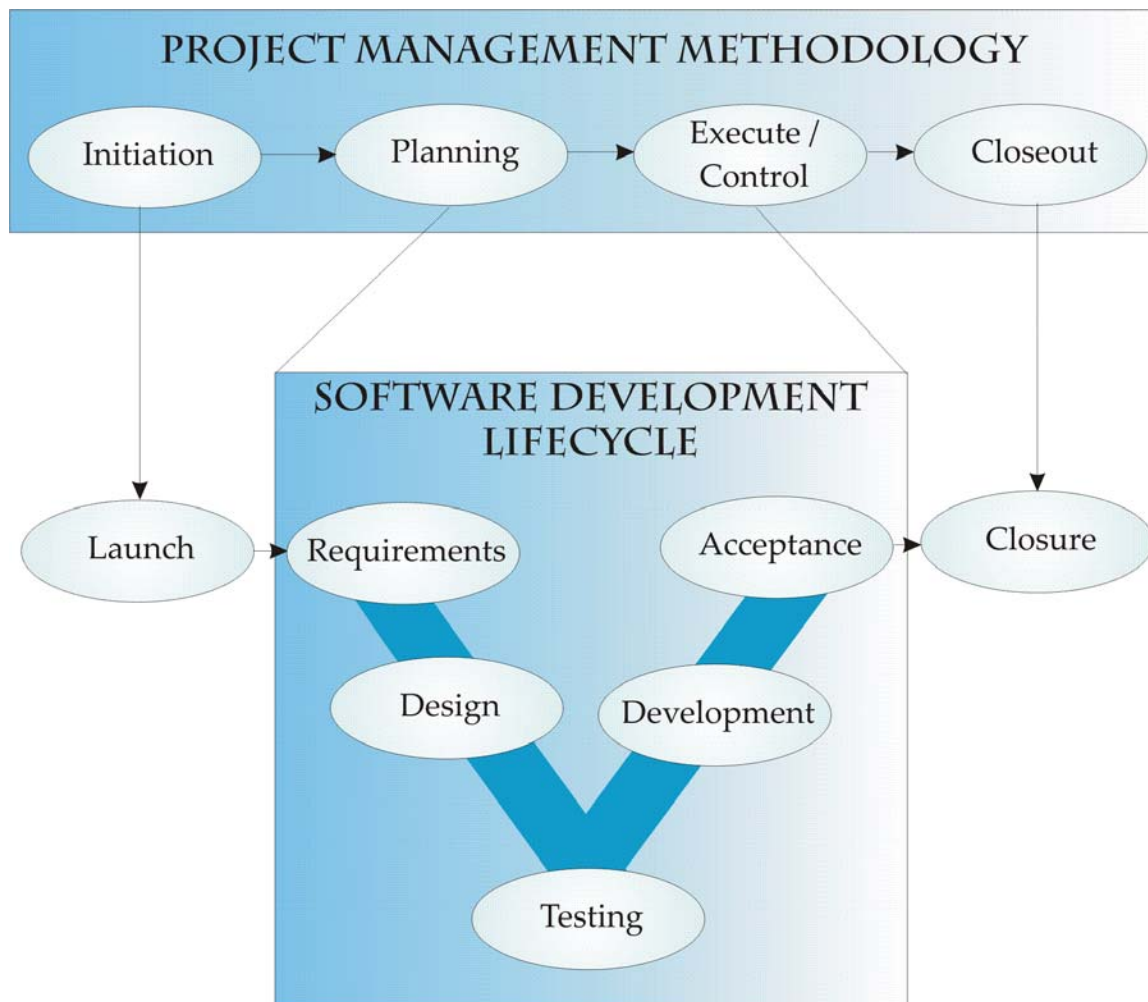
Initiation

This is the initial phase of project management where the initial planning for the project starts. This deals with steps taken to initiate the project, identification of the project resources and project team, outlining the project management structure and control processes, and working out logistics issues. This phase is executed in parallel to the launch of the project.

Planning

This phase of the project management methodology is one of the most important phases where a detailed Project Management Plan is developed. The project management plan, is developed by the project manager at the initiation of the

software project. The project management plan will define the actual implementation of our project management methodology, as it will be followed for the project. This will include all project management issues like the project organization, roles and responsibilities of team members, quality management, risk management, operational process.

Execute/Control

The Execute/Control phase is in tandem with the software development life cycle as the project is executed. The project manager will use the project management plan to ensure that the project proceeds smoothly and that all necessary controls are in place to produce a quality product on budget and on time.

Closeout

This is the final phase of the project management, which is implemented after the project deliverables have been accepted by the client and the project is 'rolled-out'. This phase ensures that all project close out activities like summarizing the project details and metrics collected, documenting the accomplishments and lessons learnt, updating relevant organization databases, closing any open issues, etc have been accomplished as per defined processes.