Institutionalizing Software
Tools and Methods

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Abstract

Achieving success depends on an incremental process supported by the appropriate people, straight-forward methods, and management support. This paper describes a three-pronged approach to building and supporting a reuse program at FSC-Owego. Although the fundamental issues in technology insertion remain the same across technologies, the individual experiences and techniques to address those issues depend on the organization.

Keywords: Technology Insertion, reuse organization, metrics-based process improvement.

1.0 Position

The fundamental problems in changing technology remain the same independent of the new technology or tool [11]. Achieving success depends on an incremental process supported by the appropriate people, straight-forward methods, and management support. The incremental approach applies not only to the speed of which you can expect to adopt a new tool or idea, but also the speed at which you can expect it to grow. You can not expect dramatic changes in organizational process maturity any more than you can expect instantaneous adoption of a complex technology, so expectations and progress will depend on existing practices within the target organization [8]. Not only must business needs motivate the change, the organization must have programs in the right phase to implement the change.

2.0 Role

Marilyn Gaska serves as the coordinator of the Owego site reuse program and directs the activities of the three reuse working groups at Owego. She currently serves as the Open Systems Environment (OSE) profile and compliance lead for SBIS, a contract which has moving to OSE technology as a major objective.

Jeffrey Poulin worked for 1.5 years on the IBM Reuse Technology Support Center, a group responsible for inserting software reuse into IBM's development organizations. As part of a four-person team, he organized a 2-day technology insertion workshop in 1992 for IBM's tools and process managers. He currently chairs the Owego Tactical reuse sub-group, and wrote the reuse insertion strategy for the Army Sustaining Base Information Services (SBIS) contract, where he acts as a change agent in direct support of the SBIS program.

3.0 Discussion

Our basic technology insertion approach incrementally phases the organization into the new technology by way of series of demonstration projects. This plan uses lessons presented in other successful technology insertion programs [5] and includes the following major steps [7]:

1. *Determine Objective.* State the major problem to address (quality, productivity, business strategy) and the target technology or tool to address the problem.
2. *Commit to Feasibility Pilot.* Obtain management commitment and resources. Identify and train the pilot participants, design and conduct the pilot, and monitor and evaluate the results. Use demonstrated success as a basis for step 3.
3. *Commit to Implementation Pilot.* As with the Feasibility Pilot, obtain management commitment and resources. Identify and train the key participants, design and conduct the pilot, and monitor and evaluate the results.
4. *Commit to Migration.* Using the success of step 4, develop and commit to a plan to moving the entire organization to the new technology. Continue to monitor and evaluate the results.

The above template plan, however, does not reveal several key factors required for the successful adoption of the technology. We believe in the pilot project approach, but also recognize the need to assign individual responsibilities. We also assert that the chances of success depend heavily on the degree with which you expect change; you can achieve large paradigm shifts but you have a better chance if you work within a system that the organization already feels comfortable. Motivators also contribute heavily. One prime motivator comes from our metrics program, which fits in well with the corporate emphasis on software metrics and reporting. Finally, the entire process depends on continual attention by the change agents involved. We will address each of these factors in turn:

Provide an organization and assign responsibility: Assigning responsibility to individuals generates the structure and personal stake to enable action. In the case of reuse at the Owego site we have an organization led by the site reuse coordinator that has three levels of responsible sub-groups. The *Strategic* sub-group defines business objec-

tives and methods. It also interfaces with external organizations and other applicable site groups, such as the Software Engineering Process Group (SEPG) [4] and the site quality council. The *Tactical* sub-group coordinates the activities of the different programs on the site by providing a forum for program reuse representatives. Finally, the *Technology Infusion* sub-group works technical issues for the programs, such as providing tools support and education on technical topics to promote culture change/reuse awareness. A similar organizational approach started in 4Q93 on the Army Sustaining Base Information Services program [10].

Work within the environment: Incremental change has a much better rate of success than attempts at major paradigm shifts. All aspects of technology insertion must leverage off the existing business practices as much as possible. For example, the Tactical sub-group disseminates general information using an internal bulletin board mechanism which most Owego employees routinely use and know. The Technology Infusion sub-group does not push the use of complicated external products but rather encourages the use of methods and tools (when necessary) that already exist within the developer's environment. They make use of related efforts, such as horizontal reuse opportunities provided by Application Programming Interfaces (APIs) we provide to commercial products [3].

Track progress with quantifiable measures: Most people respond and adapt their behavior based on how we measure and rate their actions. Metrics that reflect upon the level of involvement (and commitment) to the new technology will draw attention to the new technology and ease its adoption [2], [9]. Furthermore, most people remain skeptical of advertised benefits unless they see examples of where a new technology actually worked. For example, adopting new quality programs in our labs depends on defect analysis metric models developed at the Watson Research Laboratory; by showing quantifiable quality improvements through the use of this these models, we have successfully modified the actions of our developers in ways that lead to higher quality software [1]. At Owego, the Strategic sub-group defines the current metric baseline and future goals, the Tactical sub-group collects and reports progress to the goals, and the Technology Infusion sub-group ensures the collection tools and project database support/automate the process as much as possible [6].

Provide continued emphasis at all levels: Any new technology needs nurturing until it has a chance to catch on. The responsible organization and people must provide constant training, consulting, monitoring, and attention. Above all, management must support the effort through demonstrated interest, commitment, and funding. The Owego site executives have made reuse a key part of our business strategy and have appointed a high-level executive to serve as the program Sponsor for all reuse efforts. Basic marketing concepts apply; to meet the requirements of users we must act as salespeople to provide the right education, metrics, and successful pilots to motivate people to use the technology and recognize that we need it to win new programs [11].

4.0 Biography

Marilyn T. Gaska (mtgaska@vnet.ibm.com) *MD 0124, Loral Federal Systems - Owego, Owego, New York, 13827,* joined IBM Owego, formally part of the IBM Federal Systems Company, in 1987. She currently is a Staff Programmer in SBIS Engineering and Technology, but has also worked in other fields to include healthcare prior to joining IBM. Currently she is a candidate for a Ph.D. in Advanced Technology, Systems Science, at Binghamton University, where she is working with Professor Donald C. Gause in the area of design. These part-time studies follow her second Master of Science is in Advanced Technology, Computer Science, from State University of New York at Binghamton in 1985. However, she received her first Master of Science on a Cornell Fellowship in 1979 following completion of a Bachelor of Science degree at Cornell in 1978. She is also a member of the IEEE.

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