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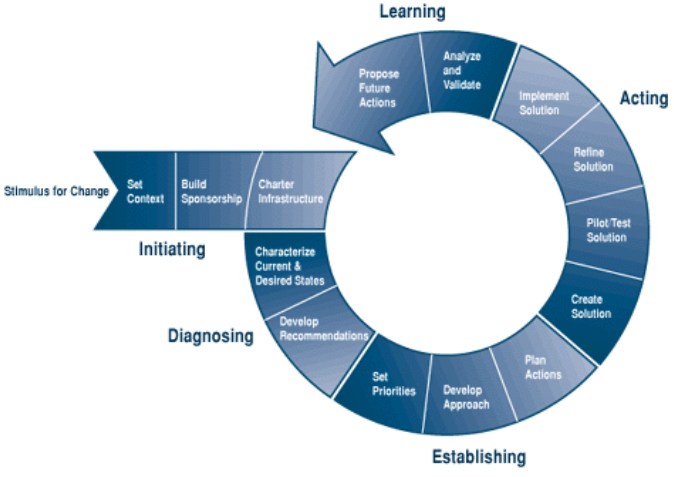
The IDEAL Model

Initiating, Diagnosing, Establishing, Acting & Learning

The IDEAL[SM] model is an organizational improvement model that serves as a roadmap for initiating, planning, and implementing improvement actions. The IDEAL model is named for the five phases it describes: initiating, diagnosing, establishing, acting, and learning.



The IDEAL[SM] Model

The IDEAL model forms an infrastructure to guide organizations in planning and implementing an effective software process improvement program, and is the founding strategy employed in delivering many Software Engineering Institute (SEI) services. Organizations that follow the IDEAL approach to software process improvement (SPI) can effectively integrate SEI technologies, courses, workshops,

and services into a comprehensive method for managing and improving their overall capacity.

INTRo Builds From IDEAL

IDEAL offers a high-level approach to software process improvement (SPI). IDEAL-Based New Technology Rollout (INTRo) takes advantage of the lessons learned from using IDEAL in SPI, and extends and applies those lessons to the domain of information technology (IT) package selection and deployment. INTRo goes further than IDEAL by providing a greater level of detail, content, and support for users. For more information, visit the INTRo on the Web.

Related Information

- Article, The IDEAL Model: A Practical Guide for Improvement
- Presentation, The IDEAL Transition Framework, Speeding Managed Change
- Case Study, The IDEAL Transition Framework: Speeding Managed Change, Book `Em
- Paper, Painting a Building: A Conceptual Reconstruction Based upon the IDEAL℠ Model
- Capability Maturity Model® Integration (CMMI®)
- Handbook, *A User's Guide for Software Process Improvement*
- Course, CMMI-Based Process Improvement Overview
- Graphics, IDEAL Model

For More Information

To learn more about the IDEAL model, contact customer-relations@sei.cmu.edu.

The IDEAL Transition Framework: Speeding Managed Change Book `Em Case Study

Book `Em Case Study

Overview

Note: SG Corporation and Book `Em are fictitious names, created to protect the identity of the corporation and product of the actual case study.

The Book `Em case study was used as part of a tutorial on IDEAL at the 1997 SEI Software Engineering Symposium. The purpose of the case is to apply the IDEAL model as a lens to focus attention on issues related to technology adoption.

Background

About 14 months ago, Don, the manager of Information Technology (IT) at SG Corporation, noted in a management meeting that he'd seen a demo of a scheduling tool called Book `Em. Don had been hearing rumblings from the secretarial staff about how difficult it had become to schedule meetings since the staff had grown to more than 400 people. Book `Em, or a tool like it, seemed like an easy solution.

Book `Em is a groupware tool that provides a wide range of services related to scheduling individual and group activities. It can be used to book group meetings; but it can also be used as a personal calendar. It can be used to keep a current "to-do" list and to maintain an address book. It also has a

handy reminder function. Not only could this tool make scheduling meetings at SG Corporation a snap, it would also allow the employees to keep track of their daily activities, which would make effort reporting easier and more accurate.

Because Book `Em was relatively inexpensive and could run on the existing computing equipment at SG Corporation, the managers said, "Sounds like a no-brainer--go ahead and do it, Don! But check out some other tools that have a similar capability."

Don delegated the evaluation and implementation to Sarah, a member of his IT staff. Sarah had been a member of the staff for about seven years and had worked on several new technology introductions with Don and other members of the staff. Although Sarah had never led an effort like this before, her participation on previous teams made her feel confident that she was capable of handling the job. Sarah scanned the market and talked with a friend of hers at another firm. Then she ordered evaluation copies for 5 products, including Book `Em. Book `Em was more expensive than expected because it had an annual update fee; but it remained the best buy all around. A few weeks later, Sarah placed the Book `Em order and began building a training plan for the corporation.

Sarah created a two-hour training session to introduce all employees to Book `Em. The training would be live for the first two months, then a taped version would be prepared for future use. The IT hotline staff was trained first. They began using Book `Em two months before the tool was rolled out to the rest of the corporation so that they were well prepared to answer hotline calls when they came in.

The announcement was made to the organization at large that the tool would be available shortly. Managers told their staffs to sign up for the training because they would be scheduling all meetings using Book `Em. There was a lot of excitement in many parts of the organization anticipating this improvement.

Unfortunately, there was a delay from the supplier and the software wasn't available until two months after the original ship date. Some of the anticipation and enthusiasm in the organization waned.

The software finally arrived, and training was initiated. There were so many people who wanted to be trained that IT had trouble meeting the demand. Due to availability and schedule conflicts, many employees who wanted to begin using the tool were unable to be trained in a timely manner; some were not trained until 8 months after the tool arrived in the building. Until everyone was using the tool, it was, of course, not 100% effective. No one was given access to the tool until they had completed the training program.

One problem that arose was that in order to use Book `Em, you had to use a mail handler called MailX; so many people had to be trained to use MailX before they could sign up for the Book `Em training. MailX has a graphical user interface, so in some ways it is easier to use than the other mail handlers. However, it offers less functionality. So the more technical types didn't like MailX and resented having to use it.

A second major problem was encountered by the SG Corporation Message Center. The message center staff was responsible for booking conference rooms. One of their responsibilities was to move meetings around if one of the executives required prime meeting space on short notice. Unfortunately, Book `Em only allows the person who originally booked the meeting to make changes to the entry, so the message center was unable to perform this function effectively.

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Part I: Questions and Potential Answers

Q. In terms of IDEAL, characterize what happened here.

A: Stimulus

- Don brought the scheduling tool & related problem to a senior management meeting.
- Awareness of the problem with scheduling meetings was increased.

Initiating

- Other managers endorsed the idea (e.g., "Sounds like a no brainer .. do it!")
- Sarah was assigned to the evaluation and implementation (i.e., infrastructure).

Diagnosing

- The diagnosis was tool-based.
- No one investigated the needs of the range of users.
- No one conducted scenario analysis.
- Sarah evaluated 5 products and talked with a friend.
- No clear selection criteria were defined.

Establishing

- Priorities were identified (also overlaps with Diagnosing phase).
- The approach consisted of: (1) training IT hot line experts first (2) in-house training (1st live then video) (3) hot line support.

Acting

- Training was built in.
- The hotline staff was trained as a pilot.
- The software was 2 months late. It couldn't meet user demand.
- Employees were not trained in a timely manner.
- Sarah discovered the MailX problem.
- Sarah discovered the message center problem.

Learning

- It's not clear that any learning occurred.

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Part II: Questions and Potential Answers

Q. What barriers or risks do you see? Consider possible sequences and overlaps in the phases of IDEAL.

A: Stimulus

- The stimulus was demo driven.
- Scheduling of meetings is perceived to be a problem.

Initiating

- Management assumes that the technology is an appropriate fit for their scheduling problems.

Diagnosing

- There are no clear criteria for selecting the "best" tool.
- There is no reference model, map, or benchmark selected to support transition.
- There is no clear understanding of current vs. desired states.
- There is no investigation of users' needs.

Establishing

- No risk analysis is conducted to identify what they didn't know, including potential inhibitors.
- The approach had only one implementation/transition path.

Acting

- The consequences of risks and barriers listed above surface in the acting phase.
- The software is 2 months late; it couldn't meet user demand.
- Employees were not trained in a timely manner.
- Sarah discovered the MailX problem.
- Sarah discovered the message center problems.

Learning

- Lessons learned were not tracked.

Q. What would you have done differently? Consider the risks you have identified.

A: Stimulus

- Don't leap to a solution based on a demo; identify the root problem.

Initiating

- Understand the problem before determining the solution.

Diagnosing

- Find and use a reference model, map, or benchmark to support transition.
- Identify customer needs and associated constraints.
- Gain a clear understanding of current versus desired states, based on user needs, constraints, and a reference model .
- Develop optional/fall back strategies based on analyzing scenarios.

Establishing

- Conduct risk analysis and mitigation strategy planning.

Acting

- Track and manage risks.
- Include a group of typical users, in addition to the IT group.

Learning

- Build a change history notebook and at least create a "lessons learned" report.

Q. With respect to the transition effort, what are the interests of the sponsor? the IT staff? the practitioner-users? the message center?

A: Sponsor

- Sees a solution to a perceived problem.
- Wants to be successful within reasonable effort.
- May want to look like the "answer man"--hero--to managers and group.

IT Staff/hot line

- Wants to be able to intelligently handle questions from users.
- Wants a smooth introduction of Book `Em.

Practitioners

- Some may not want to change mail handler.
- Want minimum training that doesn't impact their schedule.
- Want hot line available to answer questions.
- Want adequate documentation.
- Want to be able to use the tool immediately after training.

Message Center

- Wants to be able to easily schedule meetings, and move those meetings when necessary.
- Wants to be able to make "prime" space available to "preferred" customers when demanded.

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Part III: Newsflash

Newsflash: Sarah has just received the following NEWSFLASH from Don who received the same information at the senior managers meeting last Monday.

SG Corp. has just acquired a mid sized company called DCR. It turns out that about 40% of DCR employees travel a great deal. Book `Em is not accessible remotely. DCR has offices in the United States, United Kingdom, and Egypt. The users can only update their schedules by calling in changes to their support staff.

Also, DCRs CEO, Patricia, now V.P. of Marketing for SG Corp. hears about some of the difficulties that IT is having with Book `Em and rolling it out in a timely fashion. She has a friend who has a tool, RoomMaster, that is trying to break into this market. Patricia says DCR can get RoomMaster at a one-time cost of Book `Em's annual update fee.

[NOTE: Sarah requested a demonstration copy of RoomMaster earlier, when she was evaluating candidate products. RoomMaster was her third choice.]

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Part III: Questions and Potential Answers

Role: Assume you have Sarah's responsibilities.

Q. What are the implications of the merger for the ongoing introduction of Book `Em, such as

- language differences
- geographically dispersed work force
- interest in RoomMaster
- other critical issues (e.g. political, technical, economic implications)

A: 1. Language: Probably a non-issue. Most users likely use English for business operations. Have to get more details.

Geographic: Raises serious implications for the technical solution. Need to figure out how to schedule

between multiple sites, or do it for SG Corporation only.

Technical: Technical solution is no longer viable if applied across the "new" organization.

Political: Don may be sensitive to these changes, as they will affect the success of the effort and the perceptions of the other managers. How to say "no" to Patricia has political implications, too.

Economic: Cost of RoomMaster vs. Book `Em, if combined with new organization, will be much more expensive.

Q: Should you adjust your strategy and approach? How? What, in terms of applying IDEAL, needs to be adjusted?

A: Original Approach: Treat the two efforts separately; proceed with IDEAL for SG Corporation.

New Adjustments:

- Initiating: Acknowledge potential change in the scope of the transition effort.

Diagnosing:

- Monitor the needs for multi-site scheduling. Consult the message center's, administrative staff and travel data. Look at patterns of information exchange between the sites to better understand the new requirements.
- Scan for a tool that may accommodate the needs identified.
- Check for best practice across organization.
- Seek info from IT for interconnectivity.

Establishing

- Evaluate the alignment of the two efforts: original and projected.
- Decide a direction for the acting phase.

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For More Information

For more information about the IDEAL model, contact customer-relations@sei.cmu.edu

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Painting a Building: A Conceptual Reconstruction Based upon the IDEAL Model

Presentation by Jordan Vause

General

The IDEAL Model v. 1.1, formulated by the Technology Adoption Architectures Team, describes a technology adoption life cycle consisting of five major phases. These phases are further divided into fourteen activities and a "quasi-activity". The purpose of the IDEAL model, as it was originally conceived, was to describe in general terms the stages through which an organization involved in software process improvement would pass. The new model was developed to be applicable not just to software process improvement, but to any improvement effort. This brief case study is an attempt to relate the new IDEAL model to an activity that is not software-related to illustrate how broadly it can be

applied.

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Stimulus for Change

The *Stimulus for Change* is the "quasi-activity" already mentioned. While not technically a part of any activity, it is the condition, event, or direction that indicates that some sort of change is needed. It therefore initiates an IDEAL cycle.

In this case study, the stimulus for action was the condition of the SEI building. The inside walls had not been painted for several years. As a result, they were dirty, smudged, cracked, scratched, and scraped to the point of being obvious to visitors and reflecting badly on the image of the SEI. In addition, the inside fittings -- the carpets, light fixtures, and furniture -- had become dirty, further contributing to this negative image and reinforcing the need for general repairs.

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Establish Context

The obvious response to the stimulus for change was to clean the fittings and paint the walls. However, the SEI occupies a large building in which over 300 people work. The layout of the building resembles a labyrinth, with many hallways, offices, and small administrative spaces. The SEI staff is busy and some part of the staff is in the building at all times.

Individual offices and their contents, especially the computer equipment, are heavily used. Prolonged denial of access to these offices would significantly affect productivity. To clean and paint the building as quickly and economically as possible without disrupting normal SEI operations would be a major challenge.

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Build Sponsorship

The sponsor in this case was the building's landlord, who had to agree to fund the services of the painting contractor. Every other organization involved came under the direct or indirect control of Jo Donatelli, the SEI Building Services Manager. Building sponsorship as we describe it here was the process of convincing the landlord that painting the building was a necessary thing to do.

Jo, as the "champion" of the improvement effort, could have gone about this in several ways. Perhaps the most orthodox way was for her to have persuaded the landlord (using the obvious condition of the building) that painting was needed. She chose, however, to invoke the terms of the original lease agreement, which stated that the building was to have been painted every five years -- by waiting ten years the landlord was in violation of the lease. This is a perfectly valid way to gain adequate sponsorship, though enthusiastic sponsorship may require different means. It all depends upon the nature of the effort.

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Charter Infrastructure

The coordinator of the effort was Jo Donatelli; but she and her staff had to direct the efforts of at least six other organizations. Although each of these organizations existed independent of the painting effort, they formed a single temporary "meta-organization" for the purpose of the cleaning and painting project. This organization formed the infrastructure for the painting effort, with the duties of each component specified in advance.

The painting contractors, who worked for the landlord, were to handle all painting tasks. The cleaning crew, which worked for CMU, was to perform all scrubbing of furniture and carpets and cleaning of light fixtures. The telephone staff was to handle all telephone moves. The Computing Facilities (CF) staff was to ensure that all computer equipment was shut down as required and moved safely out of the

way of painters and cleaners. Building Services (BS) staff was to ensure that all furniture and packed boxes were moved out of rooms and other spaces to be painted. The occupants of the offices were to ensure that all personal and work-related belongings were packed in boxes for moving.

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Characterize Current and Desired State

The building in its current state had not been painted or fully cleaned in ten years. The walls and ceilings were dirty; the walls had cracks and holes in them; the paint was faded and flaking; and the light fixtures were dirty.

The desired state was a building in which all spaces had been scrubbed, all holes and cracks had been repaired, all lights had been cleaned, and all walls and ceilings had been repainted.

These statements may seem very similar to the stimulus for action, but they were in fact based upon a *much more thorough assessment* of the building during which *particular problems* were found and noted. The stimulus statement said simply that the building was dirty and needed painting; the current state of the building, as determined by inspection, showed for example that room 2310 had a deep crack in the far left corner, or that the wall across from the fourth floor mailboxes had a large gouge in it, or that a light cover in room 5514 was particularly filthy. The desired state, therefore, was not "a painted building," but a building in which all of the discrete flaws in the current state had been corrected.

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Develop Recommendations

The recommendations were as follows:

1. The SEI building should be cleaned and painted simultaneously through a collaboration of several groups.
2. This effort be done during normal business operations and without any special time set aside.
3. This effort should be done in cooperation with the occupants of the building rather than against them or in their absence.

Note that the recommendation was not "clean and paint the building." This was an obvious goal of the effort, determined in the "set context" activity and presented to the landlord in the "build sponsorship" activity. The recommendations here refer to the *ways and means employed to get from the current state to the desired state*, of which there were several. The entire staff of the SEI, for example, could have been ejected from the building. The building could have been painted first, then cleaned, or vice versa. A single contractor could have been used rather than the composite infrastructure already assembled.

One recommendation not made in this case, by the way, was to do nothing. Such a decision is always a valid option in the IDEAL model.

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Set Priorities

Money and time were not the first priorities of this effort (although it *will* probably be the first priorities of many such efforts in the real world). The priorities, in order, were as follows:

- Health and convenience of the employees. Several SEI employees were allergic to paint fumes and could not be in the building when the paint was wet. Also, wet oil-based paint tends to damage clothing, so painting had to take place when building traffic was at a minimum.
- Normal SEI operations. Operations were to be disrupted as little as possible, even if this meant that painting had to take place at odd hours and in random room order. Painters would have to work around employee schedules, especially travel and vacation schedules. Computer equipment was to be left undisturbed as much as possible, even if this meant that painters and cleaners would have to work around equipment that was plugged in and running.

- Quality of the work. The quality of both the cleaning and the painting could not be compromised for any reason. However, quality could not take priority over safety and normal operations. It could and would take priority over timely completion.
- Timely completion. The effort had to be completed in four months.

Note that the *priorities are not always derived from the recommendations*. Some do and some don't; the need for timely completion is related directly to this effort, but the health and safety of the staff would be of high priority in any undertaking.

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Develop Approach

The approach in the IDEAL model may seem similar to the recommendations, but this is not the case. The recommendations are based only upon the goals as stated in the "set context" activity and the current and desired states. The approach accounts for recommendations but *expands or alters them as necessary to meet the priorities that have been set for the effort*. For example, one recommendation was that everything take place during normal business hours. This recommendation is in accord with the second priority, but in conflict with the first priority since painting could not take place during normal business hours. An assumption made at the beginning was that computer equipment would be moved out of the rooms with the rest of the furniture. This assumption was changed to leave computer equipment in the rooms, turned on, so that owners would experience as little "down time" as possible.

The approach to be taken, based upon the goals of the effort, the recommendations, and the priorities, evolved to the following:

- All painting was to be done during off hours and all oil-based painting (which required two days drying time) was to be done over the weekends.
- Rooms were to be cleaned and painted over a period of three days each and the rooms were to be scheduled so that six rooms per day could be painted.
- Rooms were to be scheduled for cleaning and painting based as much as possible on employee preference. Employees were to sign up for time slots and were to pack their own belongings before leaving the office.
- Teams of furniture movers, CF staff, telephone staff, cleaners, and painters, were to enter and leave each room at set times over a three day period to perform their duties. This would allow each team to work continuously.
- Furniture and boxed items would be moved into the hallways, but computer equipment would be moved to the center of the room and left on.
- Communication between Jo Donatelli, the various groups she directed, and the staff of the SEI were to be maximized so as to increase synergy and reduce resistance.

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Plan Actions

The plan for an improvement effort differs from both the recommendations and the approach both in degree and in substance. First, it *takes the level of detail down* to the point of "brass tacks." Everyone is told what to do, when to do it, how to do it, and so on. Second, it *translates an approach* that exists outside of time and space into a scheduled event that is tied *to specific days and hours*. The approach calls for each office to be completed in three days; the plan says which three days those are to be. The approach says that six rooms will be painted every night; the plan tells me when *my* room will be painted.

The plan for cleaning and painting the SEI building is too detailed to include here, but it was written to account for the goals as set out in the first IDEAL phase, the recommendations as set out in the second, and the approach as set out in the third. According to the plan, for example, six offices will be cleaned and painted during the three-day period of January 15-17. These offices are 3121, 3215, 3319, 5218, 5401, and 5403. In each case moving and cleaning will take place on January 15, painting on January 16, and moving on January 17. All six offices have been scheduled by their occupants for their own convenience. In one case, that of 3319, the occupant was on a three-day business trip during that time. On Friday, January 17, moving and cleaning will begin for the library. Since the library is a common area, the painting will take place over the weekend. Finally, during this week kitchens and entrance doors will be painted.

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Create Solution

The solution can be described either as the procedure used to paint one room, or as the act of painting one room (painting the entire building is essentially an iterative solution). The IDEAL model allows either interpretation; for purposes of this study we will pursue the first.

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Test/Pilot Solution

The first week of painting can be characterized as the "test/pilot solution" activity of the effort. Since it was based completely on the plan, it did not have the benefit of any previous testing, feedback, or inspection, and changes were made to the plan after the week's painting was complete.

Three major flaws in the painting procedure became clear during the first week:

1. Coordination between SEI Computing Facilities, who had to move the computer equipment in each room, and Building Services, who could not clean the rooms until after this was done, broke down fairly quickly with some recrimination.
2. The availability of boxes became a problem after it was discovered that people were requesting boxes weeks and months in advance of their painting dates and few were unpacking their boxes afterwards to pass them along to someone else.
3. The move of furniture out of rooms and into the hallways became a fire-hazard. This had not been foreseen, but was nevertheless not a problem for most people. One employee did say that the situation was unacceptable for him.

Notice that this activity should be one of "verification" rather than of "validation." That is, the problems with the proposed solution are identified ("Are we painting properly?") but the wider issue of whether or not the solution itself is the right one ("Was painting a good idea?") is not addressed. In practice, the two often blend and one cannot continually ask the first question without also asking the second. The "analyze and validate" activity described below provides a formal opportunity for comparing the solution as implemented against the initial goals.

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Refine Solution

The problems found in the "test/pilot" activity may or may not be corrected; the IDEAL model does not specify. For the SEI painting and cleaning project, the affect of the "test pilot" activity was as follows:

- The coordination problem was solved by having Computing Facilities move its equipment by 9:00 AM each day rather than 12:00 noon, and by eliminating any direct contact between Computing Facilities and Building Services (Jo Donatelli and her staff would serve as liaison if necessary).
- Jo purchased a large number of extra boxes so that anyone who wished could pack their office belongings early. The issue of employees keeping boxes after painting was not directly addressed (many employees have yet to unpack).
- The issue of fire safety was finessed slightly, though in the view of the SEI nobody was placed in increased danger. Any fire safety violation (such as furniture in a hallway) must be corrected within thirty days. Since the contents of any particular room were back in that room within forty-eight hours, the issue of fire safety was deemed not applicable. Egress for the employee who complained was never blocked.

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Install Solution

The "install solution" activity in this case was the painting of the entire SEI building according to the

revised procedure above.

This phase can be repeated more than once; multiple revisions of the solution can occur. But there is a difference between errors in the solution (which were identified and corrected in the last two activities) and errors in implementation. Many minor mistakes were detected during the cleaning and painting procedure. These were found in the course of regular inspections, shown to the workers responsible, and corrected immediately.

It was during this time that the last item listed above in the approach became very important. Since the cleaning and painting of the SEI building affected everyone, and since it was in spite of everything a disruptive operation, Jo Donatelli ensured that updates and status reports were issued continuously in the form of electronic mail, posted notices, and individual notifications for every room. Floor plans, showing each office as complete or incomplete, were maintained and updated continuously. Everyone on the staff knew, or should have known, the progress of the effort at all times. There was no formal feedback mechanism set up for this effort, however informal feedback was easily made through using e-mail, telephone calls, and personal contact.

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Analyze and Validate

The cleaning and painting of the SEI building lasted from Thanksgiving 1996 to the end of March 1997. After the initial weeks, during which the "create solution," the "test/pilot solution," and the "refine solution" activities took place, the entire effort went smoothly.

When the last rooms had been painted, Jo Donatelli went through the building with the painters to inspect. The purpose of this activity in any effort is to compare the results of the improvement effort with its goals. In other words, to determine whether the original point of the exercise had been fulfilled. On the basis of her own inspection and of the feedback she received subsequently from SEI staff members, Jo decided that the goals had been met and that the effort had been a success -- more of a success than anyone had expected.

One purpose of this IDEAL activity is to collect and analyze the lessons learned from the effort; and of these there were several. During the cleaning and painting of the building, a parallel effort involving the move of SEI employees into the building from an outlying location was taking place. The two operations had not been planned with each other in mind, and as a result they tended to conflict rather than complement each other. The entire issue of boxes for packing could have been handled better, as could the issue of the computer equipment.

These lessons, and the analysis that resulted from them, have been documented by the SEI for use in subsequent efforts of a similar nature.

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Propose Future Actions

The next major improvement in the SEI building will be the installation of new carpet. This will be an operation very similar to the cleaning and painting just described. For that reason, the same procedure, modified to take the lessons learned into account, can be used with only minor alterations.

Carpeting does have its own problems. Furniture, including computer equipment, will have to be moved out, but shelves (which do not touch the floor) will not have to be emptied; for this reason disruption to the employees will not be as serious. Night work will again be necessary. Carpet removal is, if anything, a more serious allergy threat than paint (due to dust, fibers, dust mites, etc.). carpeting or rolls of loose carpeting may also cause slips and falls. Finally, old carpet, unlike old paint, cannot be covered up. It will have to be removed from the building and discarded, which represents a significant addition to the process.

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Biography - Jordan Vause

Jordan Vause is a former SEI Resident Affiliate (RA). He came to the SEI in June 1996 from Lockheed

Martin Western Development Laboratories (WDL) in San Jose, California, where he had earlier worked for eleven years as a software engineer, a site support engineer, and a software engineering manager.

While at the SEI, Jordan was assigned to the core development team for the CMM® Integration Project. Jordan has also been working with the Technology Adoption Architectures Team, whose goal is to extend and recast the IDEAL model for process improvement into a tool for general technology transfer activities.

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For More Information

For more information about the IDEAL model, contact customer-relations@sei.cmu.edu.

The IDEAL Model Graphics Files

Guidelines for Using the IDEAL Model Graphics Files

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Please note: To make use of these files, PowerPoint 7.0 for the PC or PowerPoint 4.0 for the Macintosh are REQUIRED.

Overview

The collection of IDEAL[SM] Model graphics can be used in a number of media, including direct display, in HTML files on the World Wide Web, and in print. The collection is divided into two sections.

- One set of files is compatible with the Macintosh.
- One set of files is compatible with the PC.

In each set of files for the Macintosh and the PC, there are three distinct renderings of the IDEAL model. They are

1. **Black and White**: displays the IDEAL model with each phase colored in white
2. **Greyscale**: displays the IDEAL model with each phase colored in greyscale
3. **Color**: displays the IDEAL model with each phase colored in blue

In addition to the three renderings of the IDEAL model, there are two types of files, "full" and the individual parts.

"Full" displays the complete IDEAL model. These files are identified with filenames containing the word "full."

Each of the phases of the IDEAL model is available in a separate file. These files are identified with the words initiating, diagnosing, enabling, acting, and learning in the filenames.

Applications

The IDEAL model graphics can be used for direct display with PowerPoint, Word, or FrameMaker (.ppt files), in print (.eps files), or for use with HTML files on the World Wide Web (.gif files).

- PowerPoint, Word, or FrameMaker - files with the suffix .ppt
- World Wide Web - files with the suffix .gif
- Print - files with the suffix .eps

The PowerPoint graphics files (.ppt) can be used to include an IDEAL graphic in a PowerPoint presentation, in a Word file, or in a FrameMaker file. To use these files, **PowerPoint 7.0 for the PC, and PowerPoint 4.0 for the Macintosh are REQUIRED.**

The .gif files can be used to include an IDEAL graphic in an HTML file for use on the World Wide Web.

The .eps files can be used to include an IDEAL graphic in a high-end, printed publication, such as a newsletter or magazine article.

Using a Graphic in PowerPoint, Word, or FrameMaker

1. Identify the platform being worked on, either Mac or PC.
2. Choose a style, either black and white, greyscale, or color. The filenames contain those words.
3. Decide whether to use the complete IDEAL model graphic or the individual parts. Complete graphics of the IDEAL model have the word "full" in their filenames, such as ideal.full.color.ppt.
4. Select the graphic, and save to a designated location on the computer. Open a PowerPoint file, select the graphic, and copy and paste it into a PowerPoint presentation, Word file, or FrameMaker file.

Using a Graphic in an HTML file on the World Wide Web

The IDEAL model .gif files can be used with HTML files on the World Wide Web, in the same manner as any other .gif files.

1. Identify the platform being worked on, either Mac or PC.
2. Choose a style, either black and white, greyscale, or color.
3. Decide whether to use the complete (full) IDEAL model or the individual parts.
4. Select the graphic, and save to a designated location on the computer.

NOTE: Use the following pixel dimensions for these .gif files in HTML files.

ideal.full.gif	WIDTH = 468 HEIGHT =333
acting.gif	WIDTH = 130 HEIGHT = 236
diagnosing.gif	WIDTH = 157 HEIGHT = 126
initiating.gif	WIDTH = 253 HEIGHT = 86
learning.gif	WIDTH = 158 HEIGHT = 113
establishing.gif	WIDTH = 197 HEIGHT = 115

Using a Graphic in Print

The IDEAL model .eps files can be used for print pieces. Use these .eps files in the same manner as any other .eps files.

1. Identify the platform being worked on, either Mac or PC.
2. Choose a style, either black and white, greyscale, or color.
3. Decide whether to use the complete IDEAL model or the individual parts.
4. Select the graphic, and save to a designated location on the computer.
5. Import the graphic into a file.

Troubleshooting

If you experience difficulty using any of the IDEAL model graphics, please check first with your technical staff for assistance.

If your technical staff is unable to help you, then contact customer-relations@sei.cmu.edu

For More Information

For more information about the IDEAL model, contact customer-relations@sei.cmu.edu

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The IDEAL(SM) Model: A Practical Guide for Improvement

by Jennifer Gremba and Chuck Myers

This article appeared in the Software Engineering Institute (SEI) publication, *Bridge*, issue three, 1997.

Organizations are increasingly recognizing the need for specific implementation guidance when they adopt new software engineering tools, processes, and methods. Many improvement efforts, including software process improvement, continuous risk management, or the introduction of a new development environment, are so complex, and their effects so far reaching, that they require a specialized, systematic approach for managing the technology adoption life cycle. The SEI has developed and refined the IDEAL model to help satisfy this need.

The IDEAL model as originally conceived was a life-cycle model for software process improvement based upon the Capability Maturity Model® (CMM®) for Software, and for this reason the model used process improvement terms. Recognizing that the model had great potential outside of the process arena, the SEI has revised the IDEAL Model for broader application. The new version of the model has been designated as Version 1.1 to emphasize that this is a first step toward the goal of broader applicability.

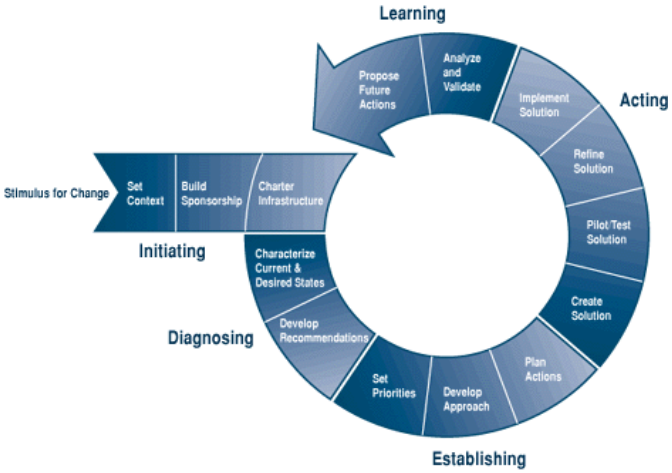
IDEAL 1.1 in Overview

IDEAL provides a usable, understandable approach to continuous improvement by outlining the steps necessary to establish a successful improvement program. Following the phases, activities, and principles of the IDEAL model has proven beneficial in many improvement efforts. The model provides a disciplined engineering approach for improvement, focuses on managing the improvement program, and establishes the foundation for a long-term improvement strategy. The model consists of five

phases:

I - Initiating Laying the groundwork for a successful improvement effort.
D - Diagnosing Determining where you are relative to where you want to be.
E - Establishing Planning the specifics of how you will reach your destination.
A - Acting Doing the work according to the plan.
L - Learning Learning from the experience and improving your ability to adopt new technologies in the future.

Each of the five phases is made up of several activities. The phases and activities are described below.



The IDEAL Model

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The Initiating Phase

Critical groundwork is completed during the initiating phase. The business reasons for undertaking the effort are clearly articulated. The effort's contributions to business goals and objectives are identified, as are its relationships with the organization's other work. The support of critical managers is secured, and resources are allocated on an order-of-magnitude basis. Finally, an infrastructure for managing implementation details is put in place.

Stimulus for change

It is important to recognize the business reasons for changing an organization's practices. The stimulus for change could be unanticipated events or circumstances, an edict from someone higher up in the organization, or the information gained from benchmarking activities as part of a continuous improvement approach. Whatever the stimulus, it can have far-reaching influence on the effort's visibility, conduct, and ultimate success, change for the sake of change rarely results in significant improvement. In general, when the business reasons for change are more evident, there is greater buy-in throughout the organization and there are greater chances for success.

Set Context

Once the reasons for initiating change have been clearly identified, the organization's management can set the context for the work that will be done. "Setting context" means being very clear about where this effort fits within the organization's business strategy. What specific business goals and objectives will be realized or supported by this change? How will it affect other initiatives and ongoing work? What benefits (such as return on investment or improved capabilities and morale) will result? Context and implications often become more evident as the effort proceeds, but it is important to be as clear as possible regarding these issues early in the effort.

Build Sponsorship

Effective sponsorship is one of the most important factors for improvement efforts. It is necessary to maintain sponsorship levels throughout an improvement effort, but because of the uncertainty and chaos facing the organization in the beginning of the effort, it is especially important to build critical management support early in the process. The commitment of essential resources is an important element of sponsorship, but effective sponsors often do much more than this. Sponsors can be most effective if they give personal attention to the effort and stick with it through difficult times.

Charter Infrastructure

Once the reason for the change and the context are understood and key sponsors are committed to the effort, the organization must set up a mechanism for managing the implementation details for the effort. The infrastructure may be temporary or permanent, and its size and complexity may vary substantially depending on the nature of the improvement. For a small effort, the infrastructure may be a single part-time employee; for a large and complex effort, such as software process improvement, it may involve 2-3% of the organization's people across a number of groups. Chartering the infrastructure involves developing explicit written agreements that document and clarify expectations and describe responsibilities.

The activities of the initiating phase are critical. If they are done completely and well, subsequent activities can proceed with minimal disruption. If they are done poorly, incompletely, or haphazardly, then time, effort, and resources will be wasted in subsequent phases.

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The Diagnosing Phase

The diagnosing phase builds upon the initiating phase to develop a more complete understanding of the improvement work. During the diagnosing phase two characterizations of the organization are developed: the current state of the organization and the desired future state. These organizational states are used to develop an approach for improving business practice.

Characterize Current and Desired States

Characterizing the current and desired states is similar to identifying the origin and destination of a journey. Characterizing these two states can be done more easily using a reference standard such as the CMM for Software. Where such a standard is not available, a good starting point is the factors identified as part of the "stimulus for change" activity. This activity should focus on elements critical to the changes being introduced, rather than every aspect of an organization's work.

Develop Recommendations

The recommendations that are developed as a part of this activity suggest a way of proceeding in subsequent activities. The diagnosing phase activities are most often performed by a team with experience and expertise relevant to the task at hand. Their recommendations often weigh heavily in the decisions made by key managers and sponsors.

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The Establishing Phase

The purpose of the establishing phase is to develop a detailed work plan. Priorities are set that reflect the recommendations made during the diagnosing phase as well as the organization's broader operations and the constraints of its operating environment. An approach is then developed that honors and factors in the priorities. Finally, specific actions, milestones, deliverables, and responsibilities are incorporated into an action plan.

Set Priorities

The first activity of this phase is to set priorities for the change effort. These priorities must take many factors into account: resources are limited, dependencies exist between recommended activities, external factors may intervene, and the organization's more global priorities must be honored.

Develop Approach

Combining increased understanding of the scope of work (gained in the diagnosing phase) with a set of priorities leads to the development of a strategy for accomplishing the work and identifying resource availability. Technical factors might include the specifics of installing the new technology and new skills and knowledge required for using a technology. Non-technical factors, including the organization's culture, likely sources of resistance, sponsorship levels, and market forces, also must be considered.

Plan Actions

With the approach defined, a detailed implementation plan can be developed. This plan includes schedule, tasks, milestones, decision points, resources, responsibilities, measurement, tracking mechanisms, risks and mitigation strategies, and any other elements required by the organization.

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The Acting Phase

The activities of the acting phase help an organization implement the work that has been conceptualized and planned in the previous three phases. These activities will typically consume more calendar time and more resources than all of the other phases combined.

Create Solution

The acting phase begins with bringing all available key elements together to create a "best guess" solution to address the previously identified organizational needs. These key elements might include existing tools, processes, knowledge, and skills, as well as new knowledge, information, and outside help. The solution, which may be quite complex and multi-faceted, is often created by a technical working group.

Pilot/Test Solution

Once a solution has been created, it must be tested, as best guess solutions rarely work exactly as planned. This is often accomplished through a pilot test, but other means may be used.

Refine Solution

Once the paper solution has been tested, it should be modified to reflect the knowledge, experience, and lessons that were gained from the test. Several iterations of the test-refine process may be necessary to reach a satisfactory solution. A solution should be workable before it is implemented, but waiting for a "perfect" solution may unnecessarily delay the implementation.

Implement Solution

Once the solution is workable, it can be implemented throughout the organization. Various roll-out approaches may be used for implementation, including top-down (starting at the highest level of the organization and working down) and just-in-time (implementing project-by-project at an appropriate time in its life cycle). No one roll-out approach is universally better than another; the approach should be chosen based on the nature of the improvement and organizational circumstances. For a major change, implementation may require substantial time and resources.

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The Learning Phase

The learning phase completes the improvement cycle. One of the goals of the IDEAL Model is to continuously improve the ability to implement change. In the learning phase, the entire IDEAL experience is reviewed to determine what was accomplished, whether the effort accomplished the intended goals, and how the organization can implement change more effectively and/or efficiently in the future. Records must be kept throughout the IDEAL cycle with this phase in mind.

Analyze and Validate

This activity answers several questions: In what ways did the effort accomplish its intended purpose? What worked well? What could be done more effectively or efficiently? Lessons are collected, analyzed, summarized, and documented. The business needs identified during the initiating phase are reexamined to see if they have been met.

Propose Future Actions

During this activity, recommendations based on analysis and validation are developed and documented. Proposals for improving future change implementations are provided to appropriate levels of management for consideration.

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Future of the IDEAL Model

The explosion of technological development has led organizations to adopt new technologies at an increasing rate. The IDEAL Model provides an effective approach to adopting improved software engineering processes, methods, and tools. In this article, we have described Version 1.1 of the model at a very high level. In the future, the IDEAL model will be developed further and its applicability to additional technical areas will be tested. The IDEAL Model will be documented on the SEI Web site at and the latest developments will be available there.

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Acronyms

CMM : Capability Maturity Model
TAA : Technology Adoption Architecture

For More Information

For more information about the IDEAL model, contact customer-relations@sei.cmu.edu