The Role of a Corporate Object Technology Center

Report by:

Timothy Korson
Consortium for the Management of Emerging Software Technologies

1.0 Workshop Premise, Goals, and Attendance

1.1 Premise and Goals

Corporations that wish to adopt object-oriented technology on a large scale face a complex set of technical, cultural, organizational, management, and policy issues. To facilitate this adoption, a number of organizations have set up a corporate "object technology center" (OTC).

The primary goal was to share insights, experiences, and approaches amongst organizations who have established a corporate object technology center.

1.2 Attendance

The workshop was organized and run by:

- Tom Guinane,
  IBM Object-Oriented Technology Center
  (guinane@stlvm7.vnet.ibm.com)
- Tim Korson, Consortium for the Management of
  Emerging Technologies (COMSOFT)
  (korson@cs.clemson.edu)
- Tom Kristek,
  IBM Object-Oriented Technology Center
  (scuba@pkedvm9.vnet.ibm.com)
- Gerard Meszaros, Bell Northern Research
  (gerard@bnr.ca)
- Vijay Vaishnavi, Comsoft and Georgia State
  (cisvkv@gsugi2.gsu.edu)

The following people participated in the workshop.

- Ron Adams II, American Airlines
- Andrew Baer, American Management Systems
  (andrew_baer@ mail.amsinc.com)
- Judy Cohen, American Management Systems
- John Cunningham, The Travelers
  (judy_cohen@mail.amsinc.com)
- Jamie Erbes, Wiltel
  (jerbes@wiltel.com)
- Steven Fraser, Bell Northern Research
  (sdfraser@bnr.ca)
- Barry Glicklich, Tellabs
  (barry@tellabs.com)

- Kathryn Grady, Wisconsin Electric Power Company
  (wi.electric@mixcom.com)
- Ray Kruger, Corning, Inc.
  (kruger_rc@corning.com)
- Katherine Lato, AT&T Bell Labs
  (lato@ihlpm.att.com)
- Marco Mulazzani, Alcatel
  (m.mulazzani@rcvie.co.at)
- Robert Marcus, Boeing
  (rmarcus@atc.boeing.com)
- Paul Richards, Electronic Data Systems
  (pricha01@ddex.ets.gmeds.com)
- Kenny Rubin, ParcPlace Systems
  (krubin@parcplace.com)
- Kathy Yglesias,
  IBM Reuse Technology Support Center
  (yglesias@pkedvm9.vnet.ibm.com)
- Bing Yu, Union Switch and Signal, Inc.
  (yubing%atg@switch.com)
- Neil Thomson, Bell Northern Research
  (neilt@bnr.ca)

Position papers describing the approaches and status of 13 different corporate object technology centers were received. Space constraints preclude the summarization of those position papers here, but, the full version of this report, which includes those summaries, can be obtained from Tom Kristek (scuba@pkedvm9.vnet,ibm.com).

2.0 Discussion on Challenges

The workshop began with a discussion of each object technology center, the successes they've achieved, and the challenges they've faced. The challenges were captured and prioritized. The top challenges were then either assigned to a work group for in depth discussion or were discussed briefly amongst the whole group.

The top challenges facing object technology centers were:

- Does object technology solve business problems?
- Metrics for object technology
- Structure and staffing of an Object Technology Center (work group)

- Defining a repeatable process for using object technology
- Does object technology scale to large projects
- Object Technology and Reuse (work group)

All attendees participated in discussion on the following 4 topics.

2.1 Does Object Technology Solve Business Problems?

This discussion was directed toward the question: "How do we justify the investment in object technology to management?"

A key point made was that approaching management purely with the technical aspects of this, or any, new technology is not effective. You have to use the basic motivational tools: Fear and Greed. If you can demonstrate that similar projects are getting improved quality, improved productivity, more products out the door, then management is going to be interested. The technical aspects can argument this argument.

There is plenty of anecdotal evidence of productivity gains that can be used to begin to make the needed business case for adoption of the technology, but, there is still much work needed in the development and use of common sets of metrics for object technology. These metrics are necessary to be able to compare object technology projects consistently and to be able to compare back to business as usual projects.

Thus, there is growing evidence that can be used by the object technology center to demonstrate that object technology, applied correctly, can yield code bulk reductions, maintenance cost reductions, quality improvements, and productivity gains. The challenge to a particular OTC is to cast the technology and those gains into their set of business challenges.

2.2 Metrics for Object Technology

The discussion centered on the fact that metrics are fundamentally different for object technology and are critical for many reasons including the aforementioned determination of the benefits the technology, estimating projects, and tracking projects.

The OTC should be pushing any corporate measurement body for the development, validation, and adoption of unbiased, open metrics. Metrics or data that development groups are sensitive about (e.g.. measurements of failures) are problematic.

The OTCs need to help drive the development of these metrics by working with projects to understand and validate what types of data are important to collect.

If a goal of new technologies is to get to market faster with better quality, then the metrics collected must be able to be analyzed for such results. The key is that the metrics must be beneficial to the providers of the data.

Both internal and external metrics are needed. External metrics would be public and could be used in general to understand the the impacts of object technology on the business. Internal metrics would be private to the project and used for tracking, estimating, and to drive improvements in the development process.

The OTC must try to collect metrics across all projects in order to build a comprehensive set of data. This data can then be used as appropriate in selling the technology, assessing its impact on the business, making changes in the way the technology is used, and refining the set of metrics that should be collected.

2.3 Defining A Repeatable Process for Using Object Technology

The beginning of this conversation centered on whether and how the Software Engineering Institute Maturity Matrix relates to object technology.

IBM has developed an maturity matrix based on the SEI model but for measuring and improving one's understanding and use of the technology. Process is a component of this but is not the only component. Processes need to be flexible but there are certain indicators such as the ability to repeat parts that work effectively, the ability for all participants in a process to understand their roles, and having documentation on hand at some level, that lend themselves well to the SEI model

ParcPlace's experience is that you don't want to get too bogged down on the notion of 'repeatability' since some projects are either first of a kind, or a major variation on a theme and the process must be highly flexible to adapt to these changes.

2.4 Does Object Technology Scale to Large Projects

One problem in addressing this question is that large is relative. Where one participant defined large as a five person project, another viewed it as 500 people. Whereas some groups want to keep projects small in scale in order to avoid huge management problems, others by the sheer size of their legacy systems must have large teams.

The key problems in scaling the technology are similar to scaling any technology. Change management is difficult and a critical issue to address through strict process definitions.

Tools and environments probably are not yet where they need to grow to in order to effectively support such large scale object technology projects. And across large domains, the problems of defining, building, and using reusable parts are compounded. In many ways this is a communication problem.

So, the feeling was that the technology will scale but that the people doing the first mega-projects in the industry will be going through a lot of inventing and a lot of growing pains.

Some comfort is taken in that some big, successful projects have been managed as a traditional development project might be and this approach has worked.

3.0 Work Group Reports

The attendees broke off into one of three work groups to discuss a particular topic in detail. The groups then came back and reported on their discussions and recommendations to the whole group. The work of these groups is summarized below.

3.1 The Structure of an Object Technology Center

This group was to discuss how a Corporate Object Technology Center should be structured, what its mission should be, and what its specific tasks should be.

They took an approach that there are similarities in all technology transfer that would apply to any center of competence. Thus they tried to be generic in their description in order to create an approach that is generic.

Their recommendations to the group, and to other potential OTC's in industry, are presented below in list form:

Some of the goals presented below in this report were actually discussed amongst the full work shop group.

Goals of an Object Technology Center

- Respond to corporate goals in a balanced way
- Technology insertion through documentation, hot lines, consulting, and special events
- Generate interest in a bottom-up pull of the technology
- Get top down support for investment in the technology
- Provide recommendations on process, standards, tools, parts, reuse, etc.
- Provide training
- Ensure methodology promotes "real" software engineering
- Drive a common understanding amongst all technology practitioners
- Manage rapid development so it is used properly
- Put selves out of business as technology becomes business as usual

The following are the roles recommended for an OTC by this work group:

1. Education / knowledge broker

- Book library
- Newsletters seminars
- Education/knowledge services
- Speakers on topics of interest

2. Technology transfer

- Mentoring
- Training the how to
- Pilot projects
- Apprenticeships

3. Technology support/service/adaptation

- OO hot line
- Customizing the technology to the organization
- Getting a pulse on project status

4. Coordination of efforts/communication

- Drive information across projects
- Build infrastructure for cross organization use

5. Change the culture/values

6. Asset management (reuse management)

7. Manage external vendor relationships

- Coordinating training
- Single point of contact for acquisition of tools
- Licensing
- Vendor/tool evaluations
- Suppliers present unified view within the corporation

8. Business strategy synchronization

9. Evaluate for appropriateness for classes of projects

10. Lobby management to get an OCT going

- Meets business needs, provides value

11. Networking consultation to provide common architecture vision

12. Evaluation and Research

- Contribute to the technology state-of-art
- Developing custom methodologies
- Develop reusable frameworks

13. Standards/guidelines

- Production of handbooks
- Design review guidelines
- Reuse process guidelines

14. Promotion/selling/PR

- Presentations to management for OOT
- Promotion of company activities outside
- Lobbying for appropriate support

This group urged all participating companies in the work shop to build a case study of their efforts for sharing with each other and other companies interested in beginning an OTC. The case studies are to take the form of:

- Background and introduction on how the group got started and what was the motivation
- What are the goals and objectives of the OTC?
- What roles and services from the above list (and others) are provided?
- What successes and challenges has the group experienced.

3.2 Affecting Culture and Literacy

This group discussed how an OTC could and should affect the culture and literacy of a group or corporation making a move to object technology. Some of its thoughts are listed below:

- Any approach must be planned in detail
- Expectations must be managed in order to not have people expect more than the technology can deliver
- Education on the technology (including expectations) must be directed in an appropriate way for all levels of people in the company (Executives, management, technical team)
- Publicity for the technology and what is needed to adapt it should be corporate wide
- An OTC should try to be "in the right place at the right time" in terms of being ready to sell the technology at the time the company is ready to listen
- If you sell the respected system architects, eventually others will follow. Peer-to-Peer testimonies are critical in getting an organization to buy into the culture change
- Focus on the points that are important to your organization in both selling and priorities for education
  - Reuse
  - Cycle time reductions
  - Flexibility of the technology
  - The ability to get early results through rapid prototypes and iterations
- Make sure everyone understands the costs up front
- Build a training plan that covers education and pilot projects
- Provide education roadmaps and tips (and of course courses)
- Provide expert mentors particularly on pilot projects
- Provide maturity guides that give hints on where people really stand with their understanding of the technology and what steps they can take to improve
- Build accessible document libraries that tell your developers what they need to know about object technology across the entire life cycle:
  - Process
  - Methodologies
  - Tools
  - Compilers and Libraries
  - Metrics
  - Education
  - Conventions and Standards
  - Etc.
- Maintain a highly visible presence
- Continually assess and upgrade your offerings

3.3 OO and Reuse

This group discussed the implications of realizing the full benefits of reuse when utilizing object technology. Its recommendations to the group are listed below:

Build a strategy for implementation of a reuse program

- Set up a vision for an architecture
  - Based on business goals
  - Bottom up approach—create architecture by raising level of abstraction
  - Incenting people for reuse

Make sure the goals and expectations are realistic

- Know what Granularity of Reuse you are looking for
  - Architecture
  - Frameworks
  - Components
  - Utility
  - Code
  - Reuse is less attractive at the lower levels
- Manage reusable assets
  - Need to track various types of information
- Need the Proper Tools
  - Identification, retrieval, storage, and maintenance of parts
- Transfer pricing
  - May need to determine value of the library assets
- Address Liability Issues
  - Copyright and infringement
  - Certificates of originality

Prevent others from copyright as well

- Leveraging for training and standardization
- Balancing innovation and reuse
  - How to prevent enforcement of reuse from stifling reuse

4.0 Follow-On and Summary

The group agreed that this type of session was useful, and that follow-on sessions could be beneficial if they start to focus more on specific problems and solutions. The organizers will attempt to reconvene the group to continue discussions at some appropriate

Many different approaches for building an effective Object Technology Center were presented. Despite the differences some of the core problems of building experienced staff, affecting culture and literacy, selling the technology, effectively establishing reuse in the corporation, and beginning and completing successful projects are the same.

The workshop began a high level discussion of some of the challenges facing OTCs and provided some insight into possible approaches to address these issues.

Listed Workshop Organizers:

Timothy Korson, Consortium for the Management of Emerging Software Technologies
Tom Kristek, IBM Object Technology Center
Gerard Meszaros, BNR