

December 1996 Monthly Events Chronology
For details see inside

<u>Event Sponsor</u>	<u>Date of the Event</u>	<u>Location of Event</u>	<u>Web Site: http://</u>
Boston SIGCHI	12/10	Lotus, Cambridge	
BostonSiggraph	12/11	GTE, Waltham	www.v-site.net/siggraph-ne
GBC Monthly Meeting	12/12	BBN, Cambridge	www.acm.org/chapters/gbc
Web Tech	12/17	MIT,1-390	www.acm.org/chapters/webtech
Boston SPIN	12/17	GTE, Needham	www.cs.uml.edu/Boston-SPIN

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The Greater Boston Chapter of the

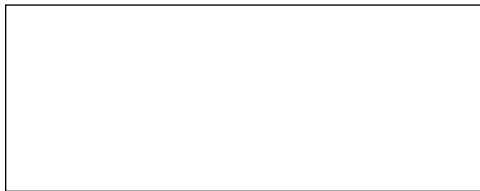


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The Real Times

Vol.35 No.4

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December 1996

Why Surf Alone? Intelligent Agents to Help You Explore the Web

Henry Lieberman MIT Media Lab

Thursday, December 12, 1996

Time Light refreshments and informal discussion from 6:30 to 7:00 PM.

The formal part of the meeting starts at 7:00 PM.

The Newman Auditorium at Bolt Beranek and Newman (BBN), 70 Fawcett Street, Cambridge, MA

Overview

The next major development in the evolution of the Internet will be introduction of "intelligent agents", programs that assist you in using interactive interfaces for information search and other tasks. These agents will be running independently of the user's activities, and will be capable of learning from interacting with the user and providing help or suggestions as to what to do next. I'll illustrate this by showing Letizia, an agent that assists Web browsing by providing a "channel surfing" window that continuously displays recommendations. It learns the user's preferences by recording the user's choices in the browser and searches the "neighborhood" of the current page for other pages of interest. It treats Web browsing as a cooperative search activity between the human user and the computer agent, providing a middle ground between narrowly targeted retrieval such as provided by search engines, and completely unconstrained manual browsing.

are in the intersection of computer graphics, human interface, and artificial intelligence. His current projects involve media interfaces that learn from examples presented by the user. He is a member of the Learning and Common Sense Group, which works on the idea of interface agents, intelligent assistants for interactive media applications. He has also worked with the Visible Language Workshop group, which is concerned with visual design issues. Prior to that, he was a researcher at the MIT Artificial Intelligence Laboratory since 1972, where he worked on parallel object-oriented programming, knowledge representation, programming environments, machine learning, and computer systems for education. He holds a doctoral-equivalent degree from the University of Paris and was a Visiting Professor there in 1989-90. He has published over 40 papers on a wide variety of research topics.

For more information: Prakash Govindarajulu at (617) 588-0861, Prakash_Govindarajulu@braintech.com.

Speaker's Biography:

Henry Lieberman has been a Research Scientist at the MIT Media Laboratory since 1987. His interests

Directions to Bolt Beranek and Newman (BBN)/Recorded directions: (617) 873-4567

From Route 128, Lexington: Take Route 2 inbound. The four-lane highway narrows to two lanes near Route 16. At the traffic light bear right onto Alewife Brook Parkway. Proceed past shopping centers to the Fresh Pond Rotary. Take the first right onto Concord Avenue. Fawcett Street is one block down Concord Avenue, on the right.

From the Mass. Pike: Take the Pike inbound to the Cambridge/Allston exit. Exit onto the Cambridge off-ramp and take Cambridge Street. Turn left onto either Storrow or Memorial Drive. (Storrow Drive is on the Boston side of the Charles River and Memorial Drive.)

From Storrow and Memorial Drives: Take Storrow or Memorial Drive west: follow signs to Route 2,3,16. Remain on 2. The road will become narrow and winding. This is the Fresh Pond Parkway. Several car dealerships and Fresh Pond Seafood will be on the right. At the 1st rotary, take the third right onto Concord Ave. Continue straight at the second rotary. Fawcett is one block further on right. Once on Fawcett St. the Newman Auditorium is about 1/2 block, on the right. Park in the lot on the right side of the street; the lot is adjacent to the auditorium building.

Public Transportation: Take the T to Harvard Square. From Harvard Square take the Concord Ave./Belmont Center bus. Get off at Fawcett St.

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Timely notices of events, meetings, and other activities of interest to the Chapter's Membership should be submitted by the 10th of the month Before the intended issue and sent, with attention to the Managing Editor to:

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The Chapter's mailing list is available to related professional organizations or for commercial use. Please contact the Membership Chair at the address above when requesting mailing lists.

Subscriptions: Annual subscription cost is included in the Chapter Membership dues of \$10.00. See top line on mailing label for membership expiration date. Library subscriptions are free. Please send orders for copies to the Chapter mailing address above.

Postmaster: Address changes should be sent to the mailing address above. Allow eight to ten weeks for changes to address or membership renewal to become effective. Send old label with address modifications.

Top-Down Design

presented by the Boston Chapter, Society of Concurrent Engineering
Thursday, December 5, 1996
6:00 pm to 9:00 pm Moakley Center at Bridgewater State College
Bridgewater, Mass.

Learn about: Using top-down design and who should participate Value of models, virtual prototyping & simulation Role of concurrent engineering
Schedule: 6:00-6:40 pm Sandwiches, soda & networking 6:40-8:25 pm
Presentations by Paul Clemente & Donald Stewart 8:25-8:50 pm Interactive panel discussion, Q&A 8:50 pm Wrap-up

To register: Call Donald Stewart at 617 290-5930 to confirm attendance by Monday, December 2. Early registration is very much appreciated. Cost (payable at door) is \$8 for SOCE members and \$18 for nonmembers Driving instructions will be faxed to you upon registration. Description: A product that performs various functions can be designed from two perspectives: top-down and bottom-up. A top-down approach starts with functional blocks that perform a variety of tasks and proceeds by assigning each function to a separate block. A block is then decomposed into sub-functions and these are assigned to separate sub-blocks. The design continues in this way to a detailed implementation consisting of available components. Bottom-up design is the reverse, starting with available components and creating more complete functions by combining components. The design continues until all functions are included in the final product. There is recent strong interest in top-down design as the complexity of products increases, more choices exist for implementation, and consideration of alternative designs (to meet various time-to-market and cost goals) becomes important. The pay-off using top-down design is large, if you are willing to use concurrent engineering methods and take advantage of the resulting design choices.

THE PROGRAM

1.) At Raytheon Electronics Systems, top-down design starts with system engineers. Paul Clemente, Principal Engineer responsible for system engineering processes, describes how you start a top-down design and who should be involved. With examples from a satellite design project, he will discuss modeling, simulation, standards and use of existing hardware and software components. Paul will show how requirements flow from the customer to become specifications, which are then tracked to the final product.

2.) Donald Stewart, Principal of Concurrency Group, presents three case histories from Boeing, Schlumberger and Polaroid that show the value of system-level models and virtual prototypes. He describes each case and provides data on outcomes for each in five categories: methods for justifying system models and virtual prototypes, measured outcomes (metrics), design methodologies at the tool level, and lessons learned at the tool and organizational levels. Donald analyzes these results and offers his conclusions on the overall results. He will point out the important role of concurrent engineering in the outcomes.

Software Process Improvement Network (SPIN) December Meeting Announcement

Five Minute Madness

Guest Speaker: Audience Participation

John Howland- Moderator

Tuesday, December 17, 1996 at 6:30pm (refreshments), 7:00-8:30pm (meeting)

Boston area Software Process Improvement Network (SPIN)

(Admission Free)

LOCATION: GTE, Building #5, 77 A Street, Needham, MA (Wheelchair accessible) INFO:

Maureen Harris (617) 455-3393, harris.maureen@mail.ndhm.gtegsc.com or

Ken Oasis (617) 563-4197, ken.oasis@fmr.com

UPCOMING MEETINGS: January 1997; Panel- Achieving Higher Level Process Maturity

Meeting Overview

Five Minute Madness promises to be a fun filled evening of open discussion on topics of interest to you. Here is the perfect opportunity for you to float some ideas and get some feedback. Or to sound off on some issue of importance to you. Or listen to what others have to say. We welcome discussion on any topic within the broad field of software (we all know what that is) process and practices affecting the SPIN community.

No preparation required. Just bring an open mind and a willingness to engage in an open, free wheeling discussion. If you want to bring overheads or handouts, that's OK. To assure that we have an opportunity for many to speak, we plan to limit presentations to about 5 minutes each. We will have follow-up Q&A of about five minutes before moving onto the next topic. Those of us who have participated in Five Minute Madness before have found it to be fun and rewarding - just the thing for the holiday season.

Speaker Biography

Dr. John Howland is a Principal Software Engineer at EMC Corporation where he focuses on the capability of EMC to develop quality software products at a predictable cost on schedule. EMC is a multinational supplier of high speed back-up solutions for large, distributed client/server data systems.

Directions:

To get to GTE, Building #5:

From Route 128 in Needham, take exit 19A onto Highland Avenue East. At first traffic light turn RIGHT onto Second Street. Go 1/4 mile (passing hillside Sheraton entrance on right) and turn RIGHT onto A Street. Go 1/5 mile and immediately after GTE HQ building on left (multi story glass facade), turn LEFT into Visitor Parking lot. Go around to the back of the building and you will see the entrance. The security guard will direct you to the cafeteria.

system comes back and gives you another list of topics you can search for and you can continue to narrow it down. With Java you can flatten and enhance this whole process. Now that your client can actually run the program itself, there's no need to do all that work in CGI scripts. Witness the QueSearch program written by MagnaStar for Que Publishing. We will soon be using this program to allow you to search the Javology pages. When we do, you tell me if it's not simply the best search tool you've seen yet on the net.

Is Java Dead?

So what do you think? Hmm? Is Java dead, or just emerging? If you're not completely convinced Java is the way to go, please send me your company name, so I can be sure not to invest in it. Java is here, and it's here to stay.

Author footnote...

Joe Weber is the Vice President of Research and Development for MagnaStar Inc., the world's oldest Java consulting and development company. He has served on numerous Java advisory and expert panels. Mr. Weber's work has been seen in several magazines, and he has written for four books (Special Edition Using Java, Running a Perfect Intranet, A Webmaster's Guide to Plugins and Special Edition Using Java 1.1) all QUE publishing books. An Eagle Scout, Joe has 15 years of programming experience, is a founding member of TeamJava, is a judge for the Java Application Review System, is the moderator for the national Java-SIG, and is the cofounder of Javology magazine. You can reach him at weber@magnastar.com.

DECEMBER GB/SIGCHI MEETING ANNOUNCEMENT

From Chartres to R. Crumb: The artistic heritage of icons

Russ Brami, Brami Design

Tuesday, December 10, 1996

Refreshments at 6:30, meeting at 7:00

Location: Lotus, One Rogers St., Cambridge, MA

(directions & parking info below)

Free and open to the public. Wheelchair accessible. For more info: Please contact Ron Perkins at rperkins@shore.net (email preferred) or (508) 465-6083.

Meeting Overview

Over the last three thousand years, artists of many periods and cultures have worked in very different media that prefigure and offer design solutions to the problems of digital imagery. This talk will present those problems in terms of the diverse solutions found in art history. Examples will include the work of medieval European tapestry weavers and Islamic tile designers who produced images that incorporate attributes known as optical color mixing and anti-aliasing. We will also examine the work of 18th century Japanese wood block artists who had color restrictions similar to those of VGA palettes and yet produced richly textured works of stunning beauty. In addition to works in stained glass, illuminated manuscripts, Byzantine mosaics and the paintings of Georges Seurat, we will look the repertoire of iconic gestures produced by contemporary comic book artists.

Speaker Biography

Russ Brami, Principal of Brami Design in Lexington is a user interface graphic designer. He is a recipient of grants from the National Endowment for the Arts, WBZ-TV and the Massachusetts Arts Council and his interactive sculpture has been well received and shown in many museum and gallery exhibits. His maps have received many design awards and one, of downtown Boston, will be featured in Diagrams 2 from Graphis Press in the Spring of '97. His user interface work may be seen in products by Xerox, Lotus, Cadence Design Systems, KeyFile, and State Street Bank. Russ has a BFA in sculpture and art history from the University of Florida.

Directions

The Lotus building is on the corner of First St. and Rogers St. in Cambridge. (Note that there is another Lotus building on Cambridge Parkway next to the Sonesta hotel. Don't go to that one.) The meeting will be held in Auditorium A, on the first floor.

Directions from the West:

Take the Mass Pike East to Cambridge/Allston (Exit #18). Take Right Lane at the Fork and stay in right lane. Take right on to Storrow Drive. Once on Storrow Drive, stay in left lane to the end. Now follow the signs for Cambridge/Somerville. You will go 2/3 around Rotary. You are now on the McGrath/O'Brien Hwy. (Rte.28). Go past the Museum of Science, which will be on your left. Follow directions from the Museum of Science, below.

Directions from North:

From Rte. 1 & 93 South, take Exit 26, the Storrow Drive Exit. Now follow the signs for Cambridge/Somerville. (Stay to the right — don't go under tunnel). Take a left at the light onto Nashua St. Under the bridge, take right at light onto the McGrath/O'Brien Hwy. (Rte.28) Go past the Museum of Science, which will be on your left. Follow directions from the Museum of Science, below.

Directions from South:

Take Route 3 to 93 North, and go past Airport Exit. Take 2nd exit after Airport (Exit 26 Cambridge/Somerville). Go down the ramp. (Stay to right — don't go under tunnel). Now follow the signs for Cambridge/Somerville. Under the bridge, take right at light onto the McGrath/O'Brien Hwy. (Rte.28) Go past the Museum of Science, which will be on your left. Follow directions from the Museum of Science, below.

From the Museum of Science:

Go thru light and bear left (road will fork, do not go under the bridge). At the next light, take a left onto First Street. Go past the Galleria Shopping Mall on your left, past the traffic lights. The Lotus garage is on your left just before Rogers St. The entrance to the Lotus building is on First St. You go under an archway between two sides of the building and enter the lobby to the left.

PARKING - Drive up to the garage entrance on First St. and tell the guard over the speaker that you are there for the SIGCHI meeting and they will let you park in the Lotus garage.

MBTA Directions:

Ride the Green Line to the Lechmere stop. If you are switching from another line, get off at Haymarket or

before and be sure to catch a Lechmere train (outbound direction). Exit the train at Lechmere station, walk to the right about 100 feet and turn right to walk through the tunnel.

When you exit the tunnel, continue walking straight across through the traffic light and down First street.

Go past the Galleria Shopping Mall on your left and past the traffic lights. The entrance to the Lotus building is on First St. You go under an archway between two sides of the building and enter the lobby to the left.

Design Perspectives: Human Interface Consulting and Evaluation
Ron Perkins

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Newburyport, MA. 01950

508-465-6083 office
508-465-1041 fax

SIGGRAPH/Boston December meeting
Applications of Graphic Systems at the National Weather Service

Mr. James Lee

Wednesday, December 11, 1996

(NOTE: SECOND Wednesday of December not first)

6:30 PM

National Weather Service (NOAA) 445 Myles Standish Blvd. Taunton, MA

Free admission Wheelchair accessible

Contacts WWW: <http://www.v-site.net/siggraph-ne>

Ed Council E-mail: elc@timberfield.com Phone: (508) 872-5522

We have just ended the hurricane season. We are just entering the winter storm season - remember last year! Have you ever wondered how the weather service forecasts what we will be waking up with the next morning? Here is your chance to get these questions answered from a technical point of view. The National Weather Service has been upgrading their computer systems over the past few years. Their multi-platform environment executes 5 different operating systems. They have numerous graphic displays presenting a combination of radar and satellite imagery combined with the graphical results from the mathematical weather models. Attend the meeting to view the Doppler radar images for some of the recent severe storms. See the only weather satellite imagery system in the Boston area that get 15 minute real-time updates at 1 Km resolution. Who knows what we will be seeing that night! The National Weather Service will host our meeting and give us a tour of their facilities.

Special Instructions:

Our host has asked us to estimate the size of our audience so they can have enough guides for a better tour. If you would like to come, please send email to Ed Council at elc@timberfield.com or call him at (508) 872-5522 by MONDAY, DECEMBER 9.

Directions:

The National Weather Service is located off I-495 at Exit 9 in Taunton, MA in the Taunton Industrial Park. From Exit 9 (Bay Street), proceed toward Taunton. About 1/4 mile from the exit, take a right on to Industrial Park Road. This road becomes Myles Standish Blvd. Follow this road for about 1 1/4 to 1 1/2 miles. The National Weather Service will be on your left. Look for a large, lighted blue and white "NOAA" sign. You will need to do a U-turn just after the building to get to their driveway / parking lot. If you drive past a large NYNEX build, you have gone too far.

SIGGRAPH/Boston maintains a mailing list for e-mail announcements of meetings. Send e-mail to siggraphdistrib-request@cs.umb.edu if you want be added or dropped from this list.

Greater Boston Web Tech Chapter

The Greater Boston WebTech Chapter is a special interest group (SIG) for developers of Internet and "Intranet" applications. We focus on emerging tools and technologies, including
 Java language, API's, and IDE's
 Web browser extensions: Java applets and ActiveX controls, plug-ins and ActiveX documents,
 JavaScript and VBScript
 Web server extensions: NSAPI, ISAPI, and servlets
 Distributed objects: RMI, JavaIDL, CORBA

We meet monthly. Each meeting includes be an open exchange of information where you can ask questions and hopefully get answers. We also try to schedule a speaker on a particular topic for each meeting. If you would like to be included on our mailing list, send e-mail to listserv@listserv.acm.org with "subscribe webtech <your name>" in the body of the message (e.g., "subscribe webtech Dennis McCarthy").

The Web Tech Chapter is sponsored by the Association for Computing Machinery, and was formerly sponsored by the Boston Computer Society. For further information, please contact Dennis McCarthy (e-mail: mccarthy@acm.org, phone: 617-894-1964). Meetings

We meet on the third Tuesday of the month at 7pm. Unless otherwise noted, we meet at MIT in Building 1, Room 390. Building 1 is at the corner of Memorial Drive and Massachusetts Avenue. Room 390 (Bechtel Lecture Hall) is on the third floor.

Java is DEAD!!! by Joe Weber

Many hefty accusations have been leveled against Java recently. The language with a cute name seems to have failed to meet the expectations of many people who've never tried to use it. In fact, the people claiming that it's dead, never lived or isn't good for anything are the very same people who, a year or two ago, were telling us all that the Web just wasn't useful. The verdict might still be out on the Web as it currently lives in its Internet form, but Intranets are big, big business. So, despite the title of this article, I am not here to declare Java dead, and I'm certainly not going to claim that it's not useful. I'm about to tell you why it's so much alive, why it's amazingly useful and why it's never going to die.

The Active X is Active argument

Recently I saw an article by one of the dozens of magazines that purport to cover the Internet stating that Java just never lived up to its expectations. (I won't mention this magazine by name, but you can fill in the blanks: N_t Gu_de). This great (*cough*) article claimed that now that Active X is here, Java is just a bump on the information superhighway. The article went on to say that Active X is easier to program in and isn't limited to the Sandbox by which Java is constrained.

Let me respond first to the Sandbox "problem:" Yes, it's true that Java applets are severely limited by the Sandbox. They can't write viruses to your hard drive, and they can't send all that important corporate data on your local network to Big Brother. In fact, they can't even send it to Big Bill G. This is a bad thing for some, but it's just something to work with for others. To me, the Sandbox is no big deal. Just work with it; there's rarely anything that you actually need to do which you can't do in some way other than writing it to the client's hard drive (if you don't think that's true, take five minutes to consider what you're thinking before reading on). I'm not saying that sometimes it wouldn't be easier (though rarely better) to write data to the hard drive. But if you really, really feel compelled to write it to the hard drive, wait about a month or two: signed Java applets are on the way, and individual users will be able to open up objects (like the hard drive) to a particular applet. The "Active X is easier to write" argument I tend to think there might be some small truth to this. No, I don't think an experienced Active X programmer is going to get more done than an experienced Java programmer, but there are thousands of people out there who are probably going to find the transition to Active X from, for instance, Visual Basic easier than the migration to Java. Of course, if you're programming in Visual Basic... well, you can finish that thought. I'm not saying Visual Basic is bad, (no, no, no!) it's great for some things, just not everything. The platform independence argument

The proponents of Active X will tell you (and rightly so) that Active X will be vaguely platform independent. They are referring, of course, to Microsoft's promised plan to make Active X run on the Macintosh as well. (You can run Soft Windows on a Mac too... does that mean Windows programs are platform independent??? I digress...) The real problem with this argument is that you are once again buying into the infamous "vaporware" line from the big Bill on the block. It's just not here yet. It probably will be in 4-6 months. That's fine, but if you're buying

that line, then let's look at where Java is going to be in 4-6 months too. After all, you can write Java NOW and still get the rest of the benefits down the road. If you're investing in Active X because in six months it's going to be better, you had better remember that in 6 months Java is going to be (as Tony the Tiger says) Grrreat! Java is the perfect language for... Too often people ask me, "Sure it's Java and that's great, but what can I really use it for?". I think this is the single most important question for the Java community. What can Java be used for? Why should anyone one to spend thousands of dollars to have a Java application written? If you need specific reasons, here are a few: Sharing data across platforms One of the answers to the above question is: Why invest thousands of dollars into any application? I'm not speaking strictly of Java here, I'm talking about any application. Do you use a contact management system to keep track of your business clients on a day-to-day basis? I do, and it saves me a lot of time. Java is great for this application, because I use 3-4 different types of computers all the time: Solaris, NT, Win95, and Macintosh. If I want to be able to retrieve Jim Wayner's telephone number no matter what computer I'm near, I need a Java-based contact management system.

Drop-and-Drag Web Sites

Are you selling something? Do you use a point-of-sale application? If you've been on the net lately you've seen the thousands of shopping cart programs out there. What makes you think Java can't do that better? Wouldn't it be great if you could walk into a location like a toy store, sit at a kiosk and find that perfect toy for your 2-year-old daughter, even if the store doesn't have it in stock? Java can make this happen. Better yet, Java can give you that shopping cart application with a drop-and-drag interface. Just drive your cart down the aisle, find the picture of the toy you're looking for and DRAG it onto the shopping cart. And remember, this is Java, so the same application can also run on the Internet.

Zero Admin Client

Okay, it's not really here yet. Sun just released the Java Station, which will be a completely zero admin. client. But Java by itself allows you to do something truly fantastic: upgrade everybody as soon as you've made changes. Before Java, you wrote a program once and, on the final ship date, you said, "Well... we don't have features A (a spell checker) and B (a mail tool) yet, but everything else works. Let's cut A and B out of this version and put them in version 3.11 six months later." With Java you don't have to do that. You can add enhancements to the program that everyone will get within hours. If that spell checker is just a week or two from being debugged, release the product. Then in two weeks, add it in. You never lose, because even if you have a million other things you want to put into your program, you can still start using the first set of features right now.

Data Searching

There are few other items of such extreme priority on most web surfers' minds than being able to find the information they need and now. Up until now you needed to use a CGI script, so you enter in some key word, and click send. Eventually, the

Continued on page 7

Gauging the True Work Effort While Eliminating Defects by Paul J. Newcum

In general, we gauge the true work by knowing the quantity and work efforts of fully creating useful individual pieces we need for the project. The individual work efforts must include an amount of time to build the item, to eliminate defects, to handle the people communications, to utilize development tools, and to test each item. A local *quantity* database must record these throughout the project. These individual quantities are fed to a local spreadsheet to calculate the total work effort for everything. These are fed to a local project management package to display meaningful work effort, cost and schedule charts.

Even before calculating those totals, we first begin with just the requirements. We quantify each up front "plain-speak" business requirement statement. These are simple verb statements that capture the business requirements. These are needed to gauge the Amplification of Functionality Factor, which recognizes that for every individual business statement, literally hundreds and sometimes thousands of technical statements are needed to create each one in the system. Using this *factor* with the known simplified business requirements statements produces an answer that can accurately predict up front all true total work, the full time frame, the final cost and even the risks of creating and delivering effective computer-functions. As the project progresses, we can iteratively compute this *factor* and the total amount of project work just from these business requirement statements alone. We can easily see *the quantity of work remaining* and the *time remaining* by counting the number of "plain-speak" business requirement statements and multiplying them with this *factor*.

Next, with the technical design we quantify the number of distinct user screen (including browsing, navigation, inquiry and update plus help and tutorial), algorithm and database functions in the system. Be sure to account for data clean up and data transport work to the new system. Also account for the help, tutorial and production preparation work. Then, we quantify the number of distinct tests to perform and the work for each distinct type, as we have planned them in our testing approach. Finally, for each distinct automated development tool function we will use on the project, quantify the distinct work to create workable functions and then eliminate defects with this tool.

For each of these, a *known* creation work effort, a *known* defect detection and elimination work effort and a *known* people communication and coordination work effort based upon *real world actual experience* is needed. Plug these quantities into a spreadsheet to total up all the creation work, all defect detection and elimination work and all the people communication work per distinct type. This numeric data then goes into your preferred project management package to build a realistic project schedule in Pert and Gantt chart format. As the project proceeds, we quantify the number of defects we find and the work effort to eliminate them, plus any additional functions, tests and automated tools appearing on the project. These quantities "update" our gauge of the true work effort, the costs and the schedule.

Using this data, we can accurately determine how much work there is, the schedule and the complexity of work either based upon the total number of business requirements statements, or based upon the technical design for screens, algorithms and database functions. Thus we have two ways to predict the true work, cost and time frame of the project. Both ways are needed, to help us evaluate the project.

As the work progresses, we want to eliminate defects and errors. Reviews accomplish this. The established requirements and test plan illuminate what the system "should look, act and perform like". We review components to find defects, to eliminate them and to guarantee what we are creating matches the requirements.

The developer verbalizes and explains the created item. During this explanation, defects and errors are *spontaneously* detected and eliminated as they are self-discovered by the developer, and by the team.

Before finishing the review, the developer and the team look again at the requirements to verify that the created components meet them. Once the review is completed, the quantity of defects detected and eliminated are fed into the local quantity databases discussed here.

Therefore, we have a continuous process which accurately gauges the true work, cost and time frame of a project while we are eliminating defects and errors.

The final project should come in on time, for a planned budget, with nearly zero defects. Everyone should be pleased!

The author is a member of GBC/ACM and helps developers get more done in less time, with less burnout and greater satisfaction. People "love" the systems he helps create. He can be reached at 508-699-0455 or e-mail: pncorp@world.std.com.