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Allan J. Albrecht Father of Function Points

Allan J. Albrecht passed away recently (November 2010).

The whole of IFPUG and the IT industry will mark his passing. IFPUG itself is formed from his legacy, for it was Allan Albrecht and his team who invented and trialed the initial application of function points.

Allan and his team at IBM back in the late 1960's and through most of the '70's were looking for a way to measure relative productivity and a better way of estimating software projects – one that could be reliably applied BEFORE spending half the money. The critical need for universal application and ability to be applied early in the life cycle were identified as key criteria.

Allan clearly outlined productivity as work product output divided by work effort. However, it was the development of the function point analysis concept as a means of identifying work product that has been his great contribution

He and his team came up with a relatively new and structured technique for quantifying software based primarily on consistent identification of the functional capabilities of that software. The critical intuitive breakthrough was to base this process of identification on a client or user view of capabilities. This lateral thought meant that the quantification or work product 'size' of the software was independent of the technology chosen for implementation. The productivity of different development and delivery platforms could be compared. This technology independence remains today and has meant that function points are directly relevant, practical and useful for all types of modern implementations, architectures and technologies.

Despite the many books and dozens of attempts to describe, define and refine the function point analysis technique since his first publication on function points in 1976, Allan Albrecht's initial definition and measurement process remains clear and practical and one of the best descriptions of the technique available. His intuitive ability to define the essence of function point analysis and apply it to practical business situations set the way forward for thousands around the world.

His work soon inspired others to establish groups and organizations to investigate, support, promote and grow the use of this unique concept. Hence, IFPUG and like associations across the globe were born, research was undertaken all over the world to confirm the relevance and usability of function point analysis, software tools were designed and built to support implementation of function point analysis, international data bases of function point oriented information were created – a snowball was born.

In many ways, it is the mission and responsibility of IFPUG to grow and nourish that snowball, to give it impetus so it can achieve a critical mass to roll faster and further. This is a mission we inherit from Allan Albrecht – may he rest in peace.





Message from the President

ISMA Cinco!: A Wonderful Conference and Experience!

From my vantage point as IFPUG President, I am sure that those who attended the recent ISMA Cinco! Conference would agree that it was an exciting conference and experience. Starting with the keynote speaker and featured speakers, and continuing with the three tracks of general presentations, the conference was wonderful and very insightful. On more than one occasion I had a difficult time choosing which presentation to attend. I would like to extend my special thanks to everyone involved with making ISMA Cinco a truly successful conference. I will not mention everyone by name for fear of missing someone, but one individual I would definitely like to acknowledge is Mauricio Aguiar, who was invaluable and contributed greatly to the success of ISMA Cinco. He was our main link with Option Brasil, the event management firm that organized and administered the on-site logistics. Thanks again to everyone who was involved with and attended ISMA Cinco.

The conference proceeded very smoothly from beginning to the end with everything proceeding as planned. A few things that I felt went extremely well were:

- 1) The presentations were all professionally presented and provided the attendees with information that I am sure they will be able to use once they return to their jobs.*
- 2) The translators did an amazing job. In fact, I feel that some of them spoke English better than I do.*
- 3) The table that was set up on-site at the conference and staffed primarily by Kriste Lawrence to answer questions about the CFPS and CEP programs was of great value.*

When the planning for the conference first started several years ago, there were some reservations about going outside of North America. I was also somewhat hesitant at first, especially knowing that I would be president at the time of the conference. After the wonderful experience from ISMA Cinco, I would not hesitate to plan to take future conferences outside of North America. In fact, as I mentioned in my previous article in *MetricViews* last year, IFPUG needs to be more international and we have made progress in that direction. I believe we must continue in that direction.

One last item about ISMA Cinco, or I should say Brazil, were the dining choices, especially the Churrascarias, which are Brazilian steakhouses, where the Passadores (meat waiters) come to your table with knives and skewers, on which are various kinds of speared meats. The passadores cut off what you want and keep coming back until you turn over the card in front of you that says “no more/I’m done.”

On another note, the Board election was held shortly before the ISMA Cinco Conference and the results were announced at the annual meeting in Brazil. Just in case you haven’t heard the results, they are as follows:

Mauricio Aguiar, Janet Russac and Steve Woodward were elected to the three open Board positions. I would like to extend my congratulations to all three of them. With the election, the Board reorganized and the following will be the Board members effective November 1st along with their Board position:

Bruce Rogora – President

Joe Schofield – Vice President

Mauricio Aguiar – Secretary & Director of Communications and Marketing

Kriste Lawrence – Treasurer

Tom Cagley – Immediate Past President

Chris Kohnz - Director of Counting Standards

Janet Russac – Director of Applied Programs

Márcio Silveira – Director of International & Organizational Affairs

Steve Woodward – Director of Education & Conference

With the election of three new members, there obviously are three Board members who will be “retiring” from the Board. They are Mary Bradley, Mary Dale and Loredana Frallicciardi. I would like to extend my special thanks and also that of the IFPUG Board and IFPUG members to all three for their dedicated and untiring volunteer service to IFPUG over the past 15+ years. I know they will be missed, but not forgotten.

In closing, I would like to encourage each of you to start planning for the 2011 conference. The conference location has not yet been selected, but will be in the several months. In addition, if you have not already volunteered to become a member of an IFPUG committee, visit the IFPUG website and fill out a volunteer form.

Bruce Rogora
IFPUG President

From the Editor's Desk



It's been only a month or so since the ISMA Cinco! Conference in São Paulo, Brazil and I'm already thinking of the next one! Terry Vogt and the IFPUG Conference Committee are discussing many new ideas that will bring ISMA to the next level. ISMA 2011 will be in the United States—several interesting venues are being considered—but that's another story. Read further and you will find more about ISMA 2011 in this issue of *MetricViews*.

Even though I counted myself as one of the “new” Board Members, I am actually coming back to the Board as Secretary and Director of Communications & Marketing. We all hope to keep you well informed on IFPUG initiatives, while bringing more attention to software measurement and function point analysis.

Finally, I invite you to enjoy this issue of *MetricViews* and perhaps consider writing an article for the next.

Mauricio Aguiar
IFPUG Secretary;
Communications & Marketing

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Certification Committee

by Gregory Allen, Chair

CFPS Certification Extension Program Improvements

In the month of September, more than 50 CFPSs earned the certification credits needed for a two year extension of their CFPS designation while attending ISMA Cinco. They earned the credits by attending one of the approved workshops and attending the ISMA conference. The Certification Committee streamlined the application process for all of those CFPS who attended the ISMA Cinco conference and approved workshops in Sao Paulo this year. This allowed for a record number of Certification Extension applications to be approved during the Conference. We will plan to do the same in future for approved conferences and workshops.

Changes in the CFPS Exam

On August 4, 2010, the new version of the CFPS exam was released in English. The work to translate the exam into Brazilian Portuguese is under way. We will also be translating into other languages as their CPM translation is complete. There is a minimum six-month period after the publication of the translated CPM into a specific language before the Certification Committee will start testing on the 4.3 version in that language.

The evolution of the new exam was based on three considerations:

- CPM 4.3
- Feedback from the CFPS Exam candidates
- Analysis of the CFPS Exam results for the last two years

The new exam reflects changes in the terminology, definitions, and acronyms found in CPM 4.3. Feedback from CFPS candidates was taken into account in evaluating question content and purpose. Also, statistical analysis of each of the question and answer combinations was performed to help us in developing clearer combinations.

CFPS Exam Registration Process

You will see some new questions being asked in the registration process for the automated exam. We are now collecting information to better gauge the CFPS Exam candidates FP training and FP counting experience level. We hope to provide future CFPS Exam candidates with the most up to date recommendations regarding FP training and FP counting experience necessary to pass the CFPS Exam. As with exam results, the training and experience information collected on individual candidates will be confidential.

Communications & Marketing Committee

by Linda Hughes, Chair

The CMC had a busy summer leading up to ISMA Cinco in Brazil. We had our hands full coordinating e-blasts for the conference, working on press releases for exciting new IFPUG developments, and putting together issues of your favorite measurement publication, MetricViews. We're also keeping on top of website and bulletin board activities. This coming year we'll be doing more of the same – trying to ensure that you all in the IFPUG community are aware of upcoming events and initiatives. But we also want to encourage your active participation through informed discussions on our bulletin board and contributions of content for our future MetricViews articles.

Also, as members continue to prepare communication requests, we'd like to bring to the attention of all Committees that our Web Update and E-blast Request forms are now available at <http://ifpug.org/about/marketing.htm>. Please help us facilitate your requests by completing these forms in their entirety. Before sending, please remember to check for the following:

- Did I send along all accompanying documentation or downloads?
- Did I double check with my committee team members that all



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documentation to be uploaded to the website is a FINAL, publishable version?

- Did I indicate if the E-blast was dependent on a web update? Did I also send the completed web update request form?
- Did I specify any key dates or deadlines to be highlighted in the E-blast?
- Did I rename the file “Web Update Request Form_Name of Web Update” or “Eblast Request Form_Name of Eblast”?
- Did I submit my form in time to allow for at least two business days to process the request?

These forms have been extremely helpful in streamlining and organizing our Web Update and E-blast requests. Thank you to the committees that have helped adopt this format and for the feedback that we have received to help improve this process. We thank you in advance for your continued cooperation in adhering to this process.

Finally, we'd like to recognize our CMC members that will be leaving us and extend a welcome to those that will be joining. Thank you to Ian Brown for his dedicated support to the CMC over the past three years. He has played a critical role in successfully managing various forms of IFPUG related communications, including coordination and development of the MetricViews publications. Likewise, as a newly elected member of the Board of Directors (congrats Janet!), Janet Russac will also be missed as she transitions off of the CMC committee. We appreciate Janet's passion and commitment to the committee which she helped strengthen over the last three years. In Ian and Janet's place we would like to welcome Andrea Amado of ti MÉTRICAS and Paul Radford of Charismatek. Together Andrea and Paul bring more than 40 years of experience to the committee. We look forward to their fresh ideas and insight. Welcome Andrea and Paul, we look forward to working together!

Counting Practices Committee

by Janet Russac, Committee Member

The Counting Practices Committee's (CPC) mission is two-fold:

- Maintain the currency of the FP Counting Practices Manual
- Continue to serve as a forum for resolving issues in the counting methodology

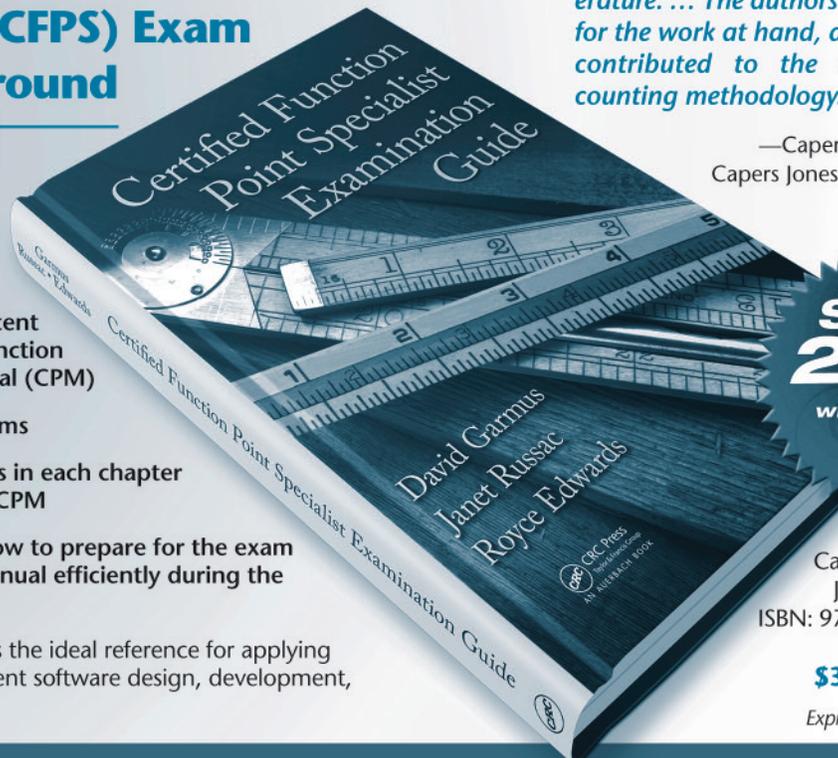
The Counting Practices Manual (CPM) 4.3.1 is available from the IFPUG web-site. CPM 4.3.1 applies several corrections to CPM 4.3 including:

- Adaptation of editorial revisions made by ISO ITTF to Part 1
 - Revision of the Implementation Guide to be consistent with Part 1 and
 - Resolution of printing errors
- Other related references are also available from the IFPUG website, including:

Pass the Certified Function Point Specialist (CFPS) Exam The First Time Around

- ❖ Written by active members of the Counting Practices Committee and a past president of the IFPUG
- ❖ Aligned with the rules and guidelines prescribed in the recent release of version 4.3 of the Function Point Counting Practices Manual (CPM)
- ❖ Includes two CFPS practice exams
- ❖ Provides questions and answers in each chapter with specific references to the CPM
- ❖ Contains time-tested tips on how to prepare for the exam and how to use of the CPM manual efficiently during the exam

Once certification is achieved, this is the ideal reference for applying the IFPUG method for sizing proficient software design, development, and deployment.



“... fills a gap in the function point literature. ... The authors are all qualified for the work at hand, and indeed have contributed to the function point counting methodology.”

—Capers Jones, President, Capers Jones & Associates, LLC

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- CPM 4.3.1 Function Point Quick Reference Card
- GSC Quick Reference Card
- CPM 4.3 Errata

If you previously purchased a copy of CPM 4.3, you may contact the IFPUG office to obtain a copy of CPM 4.3 Errata at no cost.

CPM 4.3.1 has also been translated into several languages including: Portuguese, Chinese, Korean and Spanish. These translations are available for download on the IFPUG web-site from the CPM downloads page. If you would like to purchase one of these translations, reference the Publications and Products section of the IFPUG website. Additional translations are in progress and include: French, Italian and Japanese.

CPC projects currently in progress include:

- CPM 4.3 Update Class
- Control Information and Control EI White Paper
- Shared Data White Paper
- Security White Paper
- Case Study 1 Updates to align with CPM 4.3.1

Suggestions or ideas can be sent to the CPC in an e-mail to cpc@ifpug.org.

Education Committee

by Juan J. Cuadrado-Gallego, Chair

The Education Committee has changed its direction and now the director is Steven Woodward from Woodward Systems Inc., Ontario, Canada. The new chair is Juan J. Cuadrado-Gallego from the University of Alcalá, Madrid, Spain.

The new director thinks that the Education Committee will have significant impact for IFPUG and, in this sense, they are very motivated by improvement and new ideas. Among these new issues that have been considered are:

- Development of a new structure of IFPUG certified courses that allow people to obtain different IFPUG Knowledge certification levels

- Better communication with educational institutions around the world in order to achieve a better position for software measurement and functional sizing
- Evaluate opportunities to network and coordinate with other industry organizations or forums and consortiums to demonstrate applicability and value from IFPUG
- Encourage IFPUG and other functional scoping communities to come together.

IT Performance Committee

by Dan Bradley, Chair

The IT Performance committee's goal is to provide services, based on a collection of software metrics data that assist IFPUG members to understand, plan, manage, and improve software engineering processes and practices.

ISMA Cinco was one for the record books. This was the most successful ISMA conference held outside North America. The IFPUG Internet Performance Committee (ITPC), unfortunately, did not meet in Sao Paulo, but the ITPC and, more importantly, the Software Non-functional Assessment Process (SNAP) Team was represented by the ITPC chair Dan Bradley.

Dan presented an update on the SNAP project and the exciting next steps for this project that is getting close to a final product.

Breaking News!... **SNAP Beta Test of the Assessment Practices Manual (APM) Announced at ISMA CINCO**

The ITPC is working through the Beta testing of the initial version of the Software Non-functional Assessment Process (SNAP) Assessment Practices Manual (APM). This test is critical to proofing the method and calibrating the model. We expect to provide an effective method of sizing the technical requirements associated with software development.

The SNAP Team and a group of dedicated expert reviewers have developed the framework and practices that will allow us to capture the size of the non-functional (technical) requirements surrounding delivery of functionality to our customers. When complete with input from the organizations, the SNAP method will compliment the functional measures and enhance efforts to size, estimate and manage application development. We solicited volunteers from the IFPUG community last month and we appreciate all the interest and volunteer commitments from the numerous organizations! Stay tuned for more on the Beta testing results.

The ITPC wants to thank the project team involved in creating, editing and reviewing the initial Beta Release of the SNAP APM. This accelerated effort has only been possible because of hundreds of hours volunteered by measurement experts around the globe.

For additional information on SNAP see the documents and presentations posted in the ITPC section of www.ifpug.org.

Other ITPC activities include:

- Representing IFPUG at the International Software Benchmarking Standards Group (ISBSG). As part of this group we are currently working on:
 - o An ISO Standard for Benchmarking
 - o Contributing projects to the Benchmark Database
 - o Marketing ISBSG products to IFPUG members at a reduced price
 - o Keeping ISBSG informed of SNAP progress and suggesting the addition of data elements required to benchmark Assessment results
- Responding to Member inquiries:
 - o Posed to the ITPC on the IFPUG bulletin board
 - o Concerning ISBSG Products and Data Demographics
- Updating and presenting the ITPC-created course, MS-222 - Principles of Estimating and Benchmarking Using Industry Data

International Standards Committee (ISO)

by Carol Dekkers, Vice Chair

IFPUG continues to support the development of international standards (ISO standards) related to functional size measurement (FSM), many of which are currently in “maintenance” mode or in new “development.” This *MetricViews* update outlines our current scope of work in the ISO arena.

IFPUG 4.3 attains ISO publication status!

The term “Functional Size Measurement” refers to the size of a piece of software based on an evaluation of the functional user requirements (FUR). The concept of FUR is aligned with the business processes the software performs or supports (“what the software does”)—the very same user-focused requirements counted by our IFPUG function point method. Other non-functional user requirements (such as quality, technical, or other requirements) are considered to be outside of functional size and therefore are not to be included in any method that calls itself functional size measurement.

Our own IFPUG 4.3 Counting Practices Manual (CPM) part 1 was recently published by ISO as ISO/IEC 29026: 2010 IFPUG Functional Size Measurement Method, replacing the previously outdated version. This was a major accomplishment by the ISO committee (Carol Dekkers, Frank Mazzucco and Mary Bradley) and was supported by a significant effort by the Counting Practices Committee (CPC). The new standard is a streamlined and updated set of IFPUG 4.3 rules in ISO official format and it weighs in at less than 50 pages! IFPUG grants ISO a non-exclusive license to distribute and sell the ISO version of this standard. Thank you to all IFPUG members, our ISO Committee and the CPC for their work and support to make this new standard a reality!

Other ISO functional size measurement method standards

In addition to IFPUG 4.3, four functional size measurement methods are ISO standards-based on their conformity with the Functional Size Measurement framework standard ISO/IEC 14143-1 Definitions and Concepts. Each standard must be reviewed and maintained according to the ISO processes in place. Contact your ISO standards body in your country (in the USA, this is the American National Standards Institute (ANSI)) or send me an email (dekkers@qualityplustech.com) for further information about these and other ISO Functional Size Measurement standards.

Ongoing IFPUG involvement in ISO functional size measurement (function point) standards

IFPUG remains committed to the maintenance of the suite of ISO/IEC functional size measurement framework standards known as “ISO/IEC 14143,” which is a family of size related standards. Since the disbanding of Working Group 12 (WG12) at the completion of the development work of these standards, the maintenance work now resides under the supervision of a subgroup of the Quality Metrics working group (ISO/IEC JTC1 SC7 WG6).

New work on IT Performance Benchmarking Standards

IFPUG ISO Committee member, Carol Dekkers, is the project co-editor of the new ISO standard titled ISO/IEC 29155: IT Performance Benchmarking, currently approved to be a two-part standard. Part 1 (Concepts and Definitions) is at the first Committee Draft (CD) stage having its first ISO ballot in early 2010 (comments to be resolved in November 2010 and a new draft issued for comment shortly thereafter. Part 2 (benchmarking process) is at the working draft stage and not yet ready for public comment.

Function points are the preferred software sizing method central to the development of the ISO/IEC 29155 IT Performance Benchmarking suite of standards. This new series was approved as a new work item proposal by ISO in 2008 and was based on a draft document issued by the International Software Benchmarking Standards Group (ISBSG) of which IFPUG is a member—and has included input by the IFPUG IT Performance Committee (Dan Bradley, Chair)—and other metrics organizations. Finland and Japan are also involved in the co-authorship of this standard, and all countries involved in ISO systems and software engineering standards can comment on the draft documents as they are balloted.

IFPUG members who would like to review future drafts of the ISO/IEC 29155 IT Performance Benchmarking standards can contact Carol Dekkers (dekkers@qualityplustech.com) to be added to the list of IFPUG ISO reviewers as drafts become available. The IFPUG ISO Committee thanks the IFPUG Board of Directors and IFPUG members for your ongoing support of this important international standards work.

Management Reporting Committee

by Heidi Malkiewicz, Chair

The Management and Reporting Committee (MRC) is beginning the process of creating another IT Measurement Book. In 2002, IFPUG and the MRC published a book titled *IT Measurement: Practical Advice from the Experts* as part of the Addison Wesley Information Technology Series. The book was a collection of articles on IT Measurement written by experts in various disciplines from across the globe. We are making plans to publish another similar volume to be published by Taylor & Francis. Please watch for our call for authors to participate in this book.

Membership Committee: Growing IFPUG!

by Sheila P. Dennis, former Chair

Growing and retaining IFPUG membership to the benefit of all members is a challenging and exciting environment for the IFPUG Membership Committee. Our Committee is keenly focused on what would entice new global members, what IFPUG can do to service its current membership, and what benefits and activities would contribute to membership satisfaction. It is our goal to monitor membership activity, increase and retain current membership through marketing, offering of benefits or expansion of services.

Currently, we are working on several immediate initiatives to support these goals. In the near future, anyone visiting the IFPUG website will be able to see a video or listen to a voice-over session providing an overview of IFPUG and the benefits of using function points. You will be able to post your opinions about membership on the IFPUG Bulletin Board. Both members and non-members will have access to a direct e-mail address to contact the Membership Committee about membership questions.

Other short and long term goals involve the investigation and realization of discount and fidelity programs, benefits that bring return on investment to both IFPUG and its membership, streamlined processes for membership renewal worldwide and partnering with other metrics organizations.

International initiatives are key to IFPUG expansion. Thanks to the hard work of many of our IFPUG colleagues and the membership, the following recent actions have come to fruition and are providing an excellent base:

- The release of two new translations of the CPM in Chinese and Korean
- The continued production of the CPM in Portuguese
- Poland is becoming increasingly involved with function points
- Japan officially adopted ISO/IEC 20926 as a Functional Size Measurement method

If you are interested in joining the Membership Committee, please contact the IFPUG Office.

New Environments Committee

by Deb Maschino, Chair

Another busy year for the New Environments Committee (NEC)!

The New Environments Committee has been strategizing and reorganizing in an attempt to meet the needs of the IFPUG community for emerging information. Feedback from our Interest Group meetings inspired us to begin offering presentations on topics of interest to a greater IFPUG audience. Look for an announcement in the near future about quarterly webinar presentations that will be given on topics of interest in the application of function points in non-traditional environments.

NEC Interest Groups will continue to meet, evolve and strive to provide a level of comfort and consistency within the groups in the application of function points. Current Interest Groups include: agile, banking/ insurance, UML, SOA and telecommunication. To join, simply e-mail the group in which you are interested: agile@ifpug.org, finance-insurance@ifpug.org, soa@ifpug.org, uml@ifpug.org or telecomm@ifpug.org. The interest groups are being lead by industry NEC Committee members from COBEC Consulting, NASCO, HP, AT&T, Accenture and QinetiQ-North America.

The TM Forum IFPUG relationship has been generating press and visibility. TM Forum events in 2011 include Team Action Week (for TM Forum members only) in Paris, France, January 17 to 21 and Management World in Dublin, Ireland, May 23 to 26. If you plan to attend TM Forum events or have questions regarding participation, please contact Steven Woodward, the TM Forum/IFPUG liaison.

The NEC looks forward to the year ahead with IFPUG industry members to help guide and prioritize our focus for 2011.

ISMA Cinco! Conference in Brazil

By Terry Vogt, Conference Committee Chair

The International Software Measurement and Analysis Conference was held this year in Sao Paulo, Brazil on September 14 and 15 at the American Chamber of Commerce conference facility. Over 150 attendees gathered from around the world from locations including Brazil, the U.S., India, Japan, Italy, Canada, Australia, Germany and Peru. The presentations were provided in roughly equal proportions by presenters speaking in either Portuguese or English. Language barriers were effectively minimized by English-Portuguese bi-directional translation provided by very capable translators in real time through wireless headsets available to all attendees. Conference logistics were handled by Option Brasil, the local conference operating company, which did an excellent job. Workshops were also held on September 13 at the Conference site.

Ricardo Valerdi opened the Conference on Tuesday, September 14 with the keynote presentation entitled Heuristics and Biases in Software Cost Estimation. Carol Dekkers closed Tuesday's Conference with her featured presentation: To Be(nchmark) or not to Be(nchmark) - Shakespeare's Views on Benchmarking. Tom Cagley delivered a feature presentation entitled Counting Today and Tomorrow to open the conference on Wednesday September 15. Dan Bradley of the IT Performance Committee presented a status update on the Software Non-functional Assessment Process and Assessment Practices Manual.

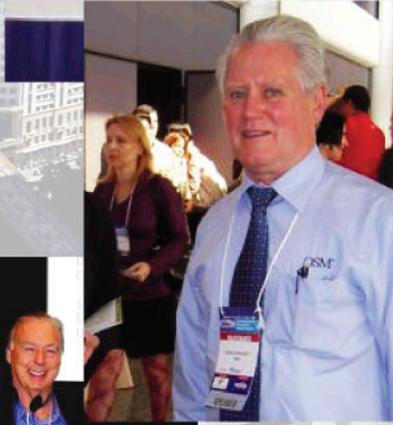
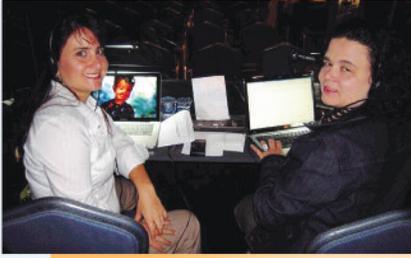
There were a total of 30 track presentations provided on six tracks over the two day Conference. Speakers from Brazil, India, Italy, Australia, Canada, and the U.S. provided presentations on a wide variety of software measurement topics. These included presentations on business, technical and management topics involving measurement of software products and processes, quality and risk. The complete collection of all presentations will be made available to IFPUG members in the future. Notification and directions will be sent to the membership when this material is ready for access.

The IFPUG annual membership meeting concluded the Conference on Wednesday with the announcement of election results for the IFPUG Board of Directors which produced three new Board members: Steve Woodward, Janet Russac and Mauricio Aguiar. Retiring as Board members were Mary Bradley, Mary Dale and Loredana Frallicciardi.

Planning has begun for next year's ISMA Conference. For ISMA 6, the Conference is anticipated to return to North America, but sites on other continents will continue to be evaluated for future conferences based on their attraction as a destination as well as the level of support available from IFPUG members to host the Conference at those candidate locations.

ISMA Cinco will be remembered as a new and successful experience for IFPUG and the many speakers and attendees. Thanks to all who participated. Obrigado, Brasil!





It's Elementary, My Dear CFPS

by *Steve Neuendorf*

One of the biggest challenges still facing FP acceptance and widespread adoption is the observation that considerable inconsistency in how function points (FP - all FP references are to IFPUG 4.x counting practices manual (CPM); currently 4.3, function points) are counted. These observations come from both inside the FP community and from academia and the industry. It is not unusual to find significant differences between even certified counters in the results of counting the same or similar applications or in how to count in general.

For a time, the greatest source of variability in FP counting was in how data was grouped. For those familiar with FP counting, small variations in data grouping would result in big differences in count results. I learned, and would always teach and share, the mnemonic "AUDIO" or that "every file must be heard." The hint is that each file usually had associated add, update, delete, inquire, and output transaction functions. We see this reflected in the CPM's Elementary Process (EP) method for grouping data. Small variations in data grouping were amplified by variation in the associated AUDIO functions. As the notions of data (in)dependence principles for grouping data were forwarded and took hold, data grouping became much more consistent among counters. Most counting practices ended up with fewer data groups. Even though the AUDIO concept still applied, the reduction in data granularity was generally not followed by the logical and correct reduction in transaction granularity.

With the introduction of the 4.x version of the IFPUG counting practices manual, we also were introduced to the concepts of the elementary process as a counting construct. Again, a little history. When FP were developed, the vast majority of software was data strong business software or "MIS" software, primarily characterized by screen-driven applications. Inherently, the user processes had a high congruence with the business processes. That is, if there was a user requirement to add a new employee, there was likely a menu item to add a new employee to launch screen or a series of screens used only for adding employees. As technology advanced, so did the way users interact with software and even the architecture of the systems themselves. The distinctions between physical and logical for FP counting did not change, but the mapping between physical and logical for implementation changed dramatically. Instead of a high likelihood of doing a near correct count by observing physical files and screens, we needed to switch to a better way of counting by looking at requirements and logical data models. We also needed

some sort of discipline for grouping and organizing the components that make up what it is we count.

A quick word about "backwards compatibility." It is important that the practice of FP be able to move forward. As the rules improve and grow to match growing needs and ever expanding technology and adaption of FP, there is a balance that must be attained between the benefits of adopting new and updated standards and the obligation to either update, adapt or maybe even abandon past data. Interestingly though, the updates to the CPM have generally not been because of new and better ways to count FP. The principles and practices are still very similar to what they were originally. Most of the updates are for clarifications because of observation and recognition that the practice of FP counting had deviated from the principles and constructs the rules and guidance had intended to provide. So a legacy count that is wrong, or contains a lot of errors under the current CPM version, was probably just as wrong and contained as many errors under the current version when it was counted. It is just that the then current version was not explicit enough that the errors were as obvious. So while counts done correctly under past versions or the current version are mutually compatible, wrong counts are not, no matter when they were done.

Another important observation is that even though FP is based on the end user view, most FP practitioners come from and/or work largely in the development community. The challenge of counting using an end user view is to only use the end user's view. If items are mixed in which are part of the producer's or implementer's view, the counts quickly become "wrong." For data functions, the "fix" that seems to have worked for correcting counting from a large move towards a count of physical files was the introduction of counting methods relying on Entity Relationship diagrams (ERDs) and a definition of "code data." It is not likely these would be an actual part of end user's view. With that well defined, the data functions for an FP count will be counted correctly, whether done by someone from the development community or the end user community. Then too, ERDs have been around and in widespread use for about as long as have FP and, with only minor variation, are very widely used.

There really is no transaction analysis analogy for EPs like there is for data to the ERD to guide counting transactions. UML's "orthogonal regions" and several finite state machine models could be helpful, but still, they are not in widespread or consistent use. They would also require a clear grasp of the FP principles if one is to rely on them to support transaction counting. So for transaction counting, we must take a direct approach to the CPM EP rules.

It is said there are only two types of scientists: the lumpers and the dividers. There are four concurrent EP rules; the first being a "divider," breaking processes into many steps, and the other three being the "lumpers," combining process steps together into complete transactions. Going directly to the CPM release 4.3 we find the definition for an elementary process (EP) is also the first rule for identifying EPs: "the smallest unit of activity that is

meaningful to the end user.” We also have a definition of “meaningful” as being “user identifiable and satisfying a Functional User Requirement.” We also have a comprehensive definition of Functional User Requirement with several examples offered. Using this guidance, we can identify a large number of activities the software performs that satisfy Functional User Requirements.

Let’s take a closer look at Functional User Requirements. One of the biggest variables in software engineering is if, when and how requirements are specified. From a counting perspective, it also varies widely how a counter will have access to what the requirements for any software are. Even then, we are relying on the assumption that any requirements are written and are clear. Occasionally counts are done from requirements, but more typically a counter is looking at implemented software (or its representation, such as a user manual), and must make the assumption that what the software does is a reflection of a Functional User Requirement. The role of the counter in delivering a correct count is to analyze the requirements or their representation to determine the correct counting result. For any given functionality, wide variations in how the requirements are specified should not affect how those requirements are counted. For example, a requirement to “maintain employee and related information” would result in the same count as a very articulated and

hierarchical description of how each process step related to maintaining each element of the employee record.

The next 3 EP rules are the “lumpers.” Usually, more than one of the elements that meet the test of the first rule are needed to constitute a complete transaction.” Here we have a relationship to the data grouping in counting data functions. One of the methods of grouping data outlined in the CPM is to use the elementary process to identify data groups. It follows that one could also use data groups to identify elementary processes.

The “self contained” rule is also a “lumper.” If we took any identified step, we would look to see the steps that precede that step. If there were none, or if any preceding steps were the last steps in an already identified elementary process, we could say we have identified our initial step. For example, let’s take the add employee example as used in the CPM. If we pick a step, say “add department assignment,” we can see that before we can do that step, the employee identification information must be entered and the department identification information must have been entered. If we look at the add department prerequisite, we would see that is the last step in another EP, so the EP we are evaluating does not need to include the add department step. When we look at the add employee identification, we see it is not the last step in another EP, and

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our EP must include that step as well as the add department step. When we look at the add employee information step, we see it is the first step in our EP. There is nothing that needs be done before a user can start that process.

Now that we have identified the starting step for our candidate EP, we can look at each following step and trace those until there is nothing left to be done. As in our add employee example, there may be many following non-sequential steps. They must be followed to their end, where either nothing is left to be done, or to where any following step is the first step in another EP. For example, after assigning a department, I could change the department assignment. Certainly you cannot change a department if an initial value has not been assigned (or optionally blank). But, we also know that “modify employee” is a separate FUR and will be a separate EP. So we can say the step before modify is to add and that add is a separate EP. For the self-contained rule, the end of the preceding EP is not treated as a prerequisite for the first step of modify. Again, consider the first rule. All of the steps that make up add employee satisfy the meaningful criteria. If we leave any steps out, it will not be meaningful. If we add any steps, it will not be the smallest unit. So if we clarify the meaning of self contained and assure there are no prerequisite steps that are not the part of another EP or follow on steps that are not part of another EP, we can say our step grouping is self contained.

Our final EP test is the EP must “leave the business of the application in a consistent state. The CPM offers the definition as “point at which processing has been fully executed; the Functional User Requirement has been satisfied and there is nothing more to be done.” Clearly that definition corresponds with “meaningful” from our first rule and “complete” from the second rule and with “no subsequent processing steps” from the self-contained rule. I would argue that the definition is right and useful, but that it is not complete. If we look at a dictionary definition for state, we find something like: “the way something is with respect to its main attributes.” Clearly, this is what the CPM describes and illustrates a point in our candidate EP—the point at which everything has been done.

What the CPM definition does not address is “consistent.” Since we are looking at “logical,” let’s look to logic for some insight into the meaning of consistency. Generally we can say consistent means “not contradictory.” Using just the CPM definition, if we picked a step other than the last step, it would contradict the state at the last step. It would be clear that our selected step was not last, but that is redundant with the conclusions we could also arrive at with the other 3 rules. So the question we must examine is if there is a possible EP candidate that would pass the other three tests but fail this test. If the answer is no, then we would say (logically), this rule is a tautology (same result under all conditions of passing the other three tests) and just discard or ignore it without consequence.

So, since I propose there are conditions where this rule would be false where the other three rules would at least reasonably appear to be true, we need to look at how we will interpret this rule in order to assure it operates as intended. Actually the solution is simple. Instead of evaluating the state at the end of the

step being examined, we must additionally evaluate the state at the beginning of the set of steps that is our candidate EP and compare that with the end state, and not just compare it with a processing definition of last step.

A special note about what I will call “bifurcated EPs.” A bifurcated EP is one where there is a mutually exclusive option for some of the data within the EP. The CPM add employee example has two types of employee: hourly and salaried; each with its own unique DETs. We can see how separate RETs are counted for each unique data subgroup, but that separate EPs are not counted for each employee type. We should say that both types are mandatory. When we populate one RET, the valid values for the other RET become blanks.

And what about the uniqueness rules? The uniqueness rules—same set of File Type Referenced (FTR), Data Element Types (DET) and Processing Logic (PL)—are not applied until after the EPs have been correctly identified. Once an EP is identified, the uniqueness rules should be used to determine its uniqueness from all previously identified EP. The purpose of this article is not to examine the uniqueness rules, but suffice it to say the uniqueness rules cannot be used to divide an EP into smaller groupings. As an example, it could be argued that an hourly employee record has a “different set of DETs” than does a salaried employee record, due to the mutually exclusive values. But actually, each record has the same DETs, where only the valid values for some of them are determined by the values in other fields.

One reliable test of a set of rules is that the rules are “orthogonal.” That is, can we create examples where the result of the test turns solely on the result of just one of the rules? The following four analyses each pass all but one of the rules:

Example 1: fails rule 1 only.

EP Name: Modify Employee (Including Delete)

Primary Intent: Maintain ILF

Elementary Process Identification Rules	Does the Rule Apply?
1. Compose and/or decompose the Functional User Requirements into the smallest unit of activity, which satisfies all of the following:	
• is meaningful to the user;	No - This can be divided into two smaller activities, each of which satisfy the two separate transactions identified in the analysis of the requirement.
• constitutes a complete transaction;	Yes - This starts with accessing an existing record and ends with saving changes, be they modifications or deletion of the key data.
• is self-contained; and	Yes - Nothing needs to be done before (starts after end of add EP) or after, ending with the changes being maintained on the ILF.
• leaves the business of the application in a consistent state.	Yes - Nothing is left to be done afterwards. Starts and ends with all employee records being up to date.
2. Identify an elementary process for each unit of activity identified that meets all of the above criteria.	No

Example 2: fails rule 2 only.

EP Name: Add an hourly employee and all mandatory information, where an employee can be hourly or salaried

Primary Intent: Maintain ILF

Elementary Process Identification Rules	Does the Rule Apply?
1. Compose and/or decompose the Functional User Requirements into the smallest unit of activity, which satisfies all of the following:	
• is meaningful to the user;	Yes - Meets FUR to add hourly employees and cannot be further divided.
• constitutes a complete transaction;	No - The complete transaction must consider all options, so both add hourly and add salaried must be considered together in one transaction.
• is self-contained; and	Yes - Nothing needs to be done before (starts after end of add EP) or after, ending with the changes being maintained on the ILF.
• leaves the business of the application in a consistent state.	Yes - Nothing is left to be done afterwards. Starts and ends with all employee records being up to date.
2. Identify an elementary process for each unit of activity identified that meets all of the above criteria.	No

Example 3: fails rule 3 only.

EP Name: Make a catalog purchase on our on-line store account.

Primary Intent: Maintain ILF

Elementary Process Identification Rules	Does the Rule Apply?
1. Compose and/or decompose the Functional User Requirements into the smallest unit of activity, which satisfies all of the following:	
• is meaningful to the user;	Yes - Meets FUR to make purchase and cannot be divided into smaller pieces.
• constitutes a complete transaction;	Yes - This starts with selecting items for purchase and completing the purchase.
• is self-contained; and	No - Items cannot be purchased unless the user has first registered.
• leaves the business of the application in a consistent state.	Yes - Nothing is left to be done afterwards. Starts and ends with the customer having made all desired purchases.
2. Identify an elementary process for each unit of activity identified that meets all of the above criteria.	No

Comment on this example. You have to consider the user who can specify requirements for this example is not the customer, but rather the vendor, (or consider them collectively). Registration of a user is not meaningful to the vendor—only purchases are—so the user must make at least one purchase before the registration and customer record is complete from the vendor-user perspective. Making subsequent purchases is just another instance of add customer. I would count a separate EP for the ability to modify the customer registration data and include the possibility that purchases could also be made for the modify EP (for FTR and DET counting purposes). But the case could be made that the modify registration is just another instance of purchase and the recall of a past registration data and the ability to edit it is just a usability feature.

Conclusion: Correct counting depends on getting each part of the counting right. The data guidance has made a considerable difference in the overall practice of accurately identifying data functions, and the clarified EP rules are working to do the same for the identification of EP. As I like to say when offering advice: I hope this helps.

Steve Neuendorf is an independent consultant with over 30 years experience working in the areas of software measurement and management, project management, benchmarking, business management and quality improvement. Steve has been using Function Points since 1982. Steve has authored two books, Project Measurement and Six Sigma for Project Managers and numerous articles on a variety of measurement related subjects. Steve has business related bachelors, masters and doctorate degrees.

Example 4: fails rule 4 only.

EP Name: Update an employee's salary status associated with promotions.

Primary Intent: Maintain ILF

Elementary Process Identification Rules	Does the Rule Apply?
1. Compose and/or decompose the Functional User Requirements into the smallest unit of activity, which satisfies all of the following:	
• is meaningful to the user;	Yes - Meets that FUR and cannot be further divided.
• constitutes a complete transaction;	Yes - Starts with the initial salary information and ends with the updated information.
• is self-contained; and	Yes - Nothing needs to be done before with regard to the salary information (starts after end of add or last modify EP) or after (again regarding the FUR under analysis), ending with the changes being maintained on the ILF.
• leaves the business of the application in a consistent state.	No - There are potentially other changes, such as changing job description or tax changes. The initial state is the employee record is up to date, and it is potentially not up to date if only the salary information is modified.
2. Identify an elementary process for each unit of activity identified that meets all of the above criteria.	No

Reflections on the IFPUG Internet Bulletin Board, or are Function Points “Discovered” or “Invented”

by Charles B. Tichenor

There is an interesting unsolved dichotomy, is mathematics fundamentally something which is “discovered,” or is it fundamentally something which is “invented.” To the best of my knowledge, this is a matter unresolved within both the mathematics and philosophy scholarly communities.

A person who believes that mathematics is fundamentally something that is “discovered” might argue the following (assuming an argument series using the real numbers). Suppose that long before humans existed, two trees dropped their fruit. From the seeds of the first tree, 3 new trees grew. Then, from the seeds of the second tree, 5 new trees grew. Therefore, a total of 8 new trees grew, as $3 + 5 = 8$. Also, it really does not matter whether the 3 new trees were the first to grow, or the 5 new trees were the first to grow a total of 8 trees grew because $3 + 5 = 5 + 3$. This person argues that the existence of the real numbers, the operation of addition and the commutative law are all part of nature and exist whether humans are around or not. By extension, they also believe that subtraction, multiplication, the associative law, the distributive law, etc., are discovered. Many more mathematical laws probably remain unbound.

The person who believes mathematics is invented points out that we can define the real numbers, the operation of addition and the commutative law. Based on that, we will conclude that $3 + 5 = 8$ and $5 + 3 = 8$. Addition and the commutative law always seem to work, as do subtraction, multiplication, the associative law, the distributive law, etc. As long as the definitions and rules are logical and don't result in contradictions, then the resulting mathematics is sound. Probably many more new such definitions can be generated and the mathematical system can grow even whether or not the new mathematics corresponds to something in the real world.

Well, since function point analysis is largely mathematical, I am led to wonder whether unadjusted function points fundamentally are “discovered” or “invented.” We all agree that a low EI is valued at 3 unadjusted function points. But why 3? Is it because of some natural law of software? This implies that researchers have studied software and learned that functionality appears in many forms. Research has discovered that low EIs statistically average 3 unadjusted function points and this is due to the nature of software functionality itself. There may be some additional

currently unbound places that functionality exists. It is for us to discover those places and find the functional value of them.

Alternatively, does a low EI value at 3 unadjusted function points exist because we define it that way? We also recognize a high ILF at 15 unadjusted function points, etc. and have produced a large number of other definitions and rules. These are collected and published, have withstood the test of time (at least so far) in terms of logic and being without contradictions and are accepted as an international standard. Should technology improve, then we are free to improve the definitions and rules to ensure they remain logical and without contradictions.

I am in the mathematics/function points are “discovered” camp. It just makes the most sense to me that mathematical relationships and principles exist independently of whether people exist or not and that a certain amount of functionality exists in a software application independently of whether we have discovered it all or not. When the tree falls in the woods, it makes a sound whether people are there or not. On the other hand, the senior professor who oversaw several of my math classes in college wrote a successful text in which he often explained new concepts using the “define” approach, though I'm pretty sure he was of the “invented” camp. As his student, I found this approach sometimes difficult to follow and often frustrating. That being said, I'm sure that others have found my approaches sometimes to be likewise.

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Having followed the posts on the IFPUG Bulletin Board since its inception, I wonder if the reasons for the sometimes widely differing solution approaches are to some degree really based on whether a responder is philosophically from the “discovered” camp or the “invented” camp. Sometimes responses explore solutions representing fresh ways of viewing functionality, or even suggest the discovery of new kinds of functionality that are not (at least yet) universally recognized, with proposals for how to count them. Other responses go into great detail explaining the current definitions and rules, emphasizing strict

adherence to them at least in part because these definitions and rules are an international standard and have withstood the test of time.

Would the scholarly mathematicians and philosophers disagree as to which approach to function points is “correct?” In my opinion, probably. So I take no formal position until they decide. It’s OK to be in either camp. For the time being, however, I informally remain in the “discovered” camp.



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Controlling Software Acquisition Costs With Function Points and Estimation Tools

By Ian Brown

Too often, organizations that contract for software development services are at the mercy of vendors for cost and schedule estimates. Once a program office releases a request for proposal (RFP) for software development, it must somehow evaluate the validity of cost and schedule estimates that come back with the proposals. Or, a program might have a limited budget or schedule but not a clear understanding of what amount of development is actually feasible within these limitations. This article proposes an approach that can help buyers of software take control of this situation by providing the ability to objectively evaluate software development proposals, select the best value for their needs, and effectively manage acquisition costs from kickoff to product delivery.

Just a few years ago, purchasing a new car was often a lopsided affair. A buyer might know what kind of car he wanted to buy and how much he could afford, but the sellers held all the cards because they controlled the situation with information. They knew cost details—sticker price, invoice, incentives, kickback numbers—all of which provided them tremendous advantage in the transaction. They had information on how specific features were priced and which ones generated the most profit. A buyer might ask for power seats and windows, a CD player, antilock brakes, and passenger side air bags, and

the salesperson might give a price of \$5,000. How was the buyer to know whether or not that price was too high or if it was a great deal? And what if the seller offered to throw in the special undercoating and super-absorbent floor mats—which the buyer does not need—for free? It was very difficult for a buyer to understand if he was getting the features for which he asked and needed at a fair price. He might be able to shop around, but in the end, not having good information as a point of reference, it was difficult to assess if the transaction was fair. These days, however, information is more readily available for car buyers. Car pricing Internet sites have become valuable sources of information for consumers. Car buyers can now prepare more effectively for the acquisition process by arming themselves with independent, comparative cost information before the assessment and negotiation activities begin. Overall, consumers are much more likely to be able to buy the car of their choice—with the features wanted and needed—at a fair price.

In many ways, acquiring software or software development services compares to the old way of buying cars. Access to information is rarely equal, and it typically does not favor the buyer. Once an RFP for software development is released, a program office can become completely dependent upon vendors' estimates of cost and schedule. Or, a program might have a limited budget or schedule but not a clear understanding of what amount of development is actually feasible within these limitations. When assessing proposals from vendors,

programs are faced with several of the following questions:

- Have we been offered a reasonable price?
- Has this project been deliberately underbid?
- Is the proposed schedule realistic?
- How do we know we are getting the functionality we have asked for and need?

With these kinds of uncertainties, how can a program make informed decisions when purchasing software or software development services? A program must take control of the situation to more effectively assess whether submitted proposals are realistic while having a clear understanding of what functionality should be included in the delivery. The purpose of this article is to provide an approach that can help buyers of software objectively evaluate software development proposals, select the best value for their needs, and effectively manage acquisition costs from kickoff to product delivery. The foundation of this methodology is the ability to objectively size the developed software and to understand the potential ranges of cost and schedule that could result. This article proposes a particular methodology to estimating software development cost and schedule in the context of independent evaluation of vendor proposals. It is not the only valid software estimation methodology available to organizations, but experience has shown that this specific methodology is very well-suited for this particular situation, for reasons that are discussed later.



Methodology

The following five-step approach (Figure 1) is designed to be as objective as possible:

- **Step 1:** Define Functional Requirements.
- **Step 2:** Conduct Function Point Analysis (FPA).
- **Step 3:** Assess Key Project Parameters.
- **Step 4:** Develop and Refine Estimation Model.
- **Step 5:** Evaluate Proposals in Context of Estimates.

Generating cost and schedule estimates without intimate knowledge of a development organization’s historical performance can be extremely challenging. This methodology combines standardized software measurement

Step 1 – Define Functional Requirements

Although this article focuses on software estimation for acquisition, requirements definition must be included as a critical step. Functional software requirements have to be defined, documented, and baselined. This is an essential foundation of the acquisition process. Requirements fidelity is key to ensuring that vendors understand what must be delivered. Requirements documentation should be provided to all potential bidders along with time for review and clarification. Requirements definition should happen before anything else. The importance of this step cannot be over-emphasized, as requirements are an integral part of nearly every aspect of delivery of the project, and they are necessary to conduct an initial FPA.

Step 2 – Conduct FPA

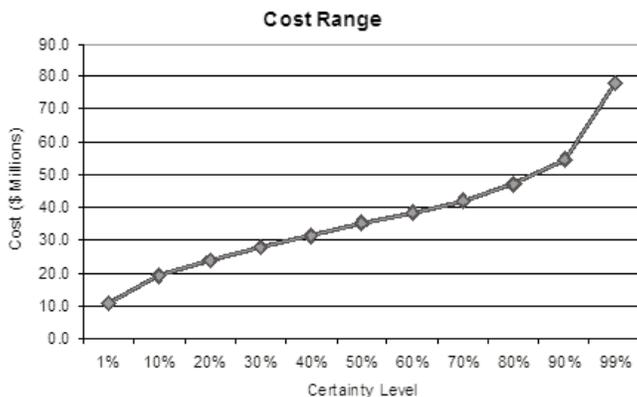
In order to estimate the cost and schedule of a development effort, one has to know the size of the intended software. Software size, too frequently overlooked in estimation exercises, is often expressed in source lines of code (SLOC). Many organizations have success with this size measure as a

basis of estimate, but this measure has some inherent difficulties associated with it, especially in the context of the methodology proposed here [1]. Different organizations count SLOC differently—there are no industry-defined standards that identify what should be counted and what should not. This makes an accurate, independent assessment of SLOC size difficult to produce. So, although it is a valid measure of software size, SLOC does not lend itself

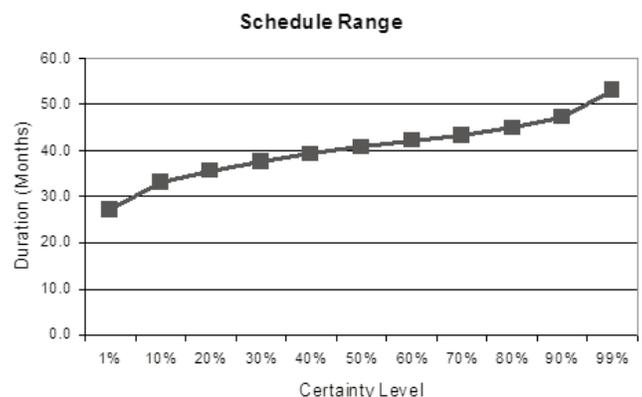
to the nature of this particular type of estimate and independent analysis. Function points, on the other hand, are a standardized unit of measure as recognized by the International Organization for Standardization 20926:2003. The function point standard is maintained by the International Function Point Users Group (IFPUG) in a voluminous counting practices manual; IFPUG offers a certification program that recognizes experts in the field as certified function point specialists. Function points measure software size independently of technology, platform, or programming language. In short, function points objectively define the size of an application that is to be developed based on defined functional requirements. They can also help identify gaps in requirements analysis, avoiding early introduction of defects [2]. To take this a step further, if an FPA is conducted prior to releasing the RFP, the results can be provided to all interested vendors to provide a common assumption of size so that all bidders can work from consistent information in developing their responses.

Step 3 – Assess Key Project Parameters

Key project parameters define characteristics of important cost and schedule drivers for the development effort. These parameters include high-level assumptions, such as the platform, programming languages, application type, reuse, development standards, commercial off-the shelf (COTS) use, and staffing approach. If known, more



techniques with structured, well-documented estimation tools to enable true independent estimation. The goal is not to produce the right answers in terms of cost and schedule, but rather to understand what a reasonable range of answers might be and how vendor responses to a RFP (typically submitted as point estimates) fit within that range. Additionally, this methodology can help a program understand the relative cost and schedule risk it accepts by selecting one proposal over another.

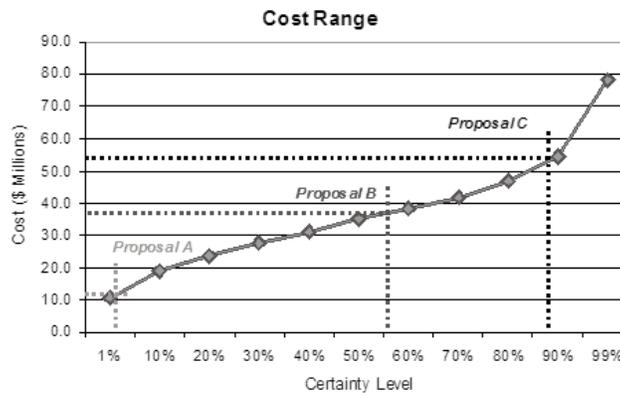


precise parameter values for specific product and performance attributes can be identified in order to tailor the estimate to more specific project characteristics, such as development environment, personnel skills, organizational process maturity, security requirements, and system volatility. These inputs should be expressed as ranges (low, middle, high) to account for uncertainty and potential variation among bidding organizations. The less that is known about these more specific factors, the wider the range of assumptions should be.

Step 4 – Develop and Refine Estimation Model

The outputs of steps 1 through 3 are relatively meaningless on their own. Only when they are combined as inputs to an estimation tool do they produce relevant, useful information. In this type of estimation exercise, leveraging a parametric tool to generate cost and schedule estimates is particularly important. Other estimation methodologies (analogy, wideband Delphi, cost estimating relationships, etc.) do not provide the flexibility needed to establish this proposal assessment framework. An estimation tool provides the flexibility to apply generalized assumptions where necessary and specific assumptions where appropriate. A trained, experienced user should be involved to make sure that the tool is used properly and the results are interpreted correctly. This methodology does not lend itself strictly to COTS acquisition, as most estimation tools are best suited for estimating effort on projects with custom development. The model should be constructed with a work breakdown structure (WBS) that reflects the components of the software. For example, if the application will have a user interface with an Oracle back-end, then these two components should be modeled as separate WBS elements in the

parametric tool. The WBS should also reflect any expected modular or incremental development strategies that might be proposed. Function points should then be allocated to the appropriate WBS elements or increments as accurately as possible. Step 3 identified ranges of key project parameters. Applying these inputs to the estimation



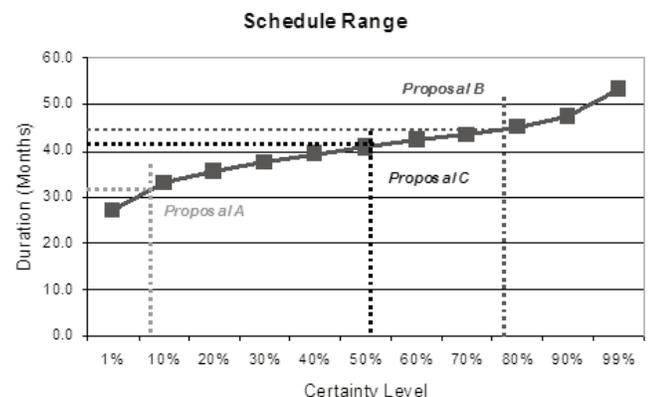
model will generate cost and schedule ranges with corresponding probabilities. Estimates in this form can be expressed as S graphs and are the linchpin of this evaluation structure. Using ranges in this way, as illustrated in Figures 2 and 3, provide the context and framework for evaluation of different bids from different vendors. The estimates produced by the tool, however, should not just be accepted without consideration. Analysts should apply cross-checks, known analogies, or expert opinions to test the outputs for reasonability. The estimates should also be compared to the expected or known budget or schedule for the project. Ideally, those numbers will fall somewhere within the estimated ranges, preferably in the higher certainty levels. However, if the budget or schedule falls outside of the relevant range, the program office should review the model and key project parameters. Oftentimes this exercise can highlight some assumptions that might be incorrect. For example, the

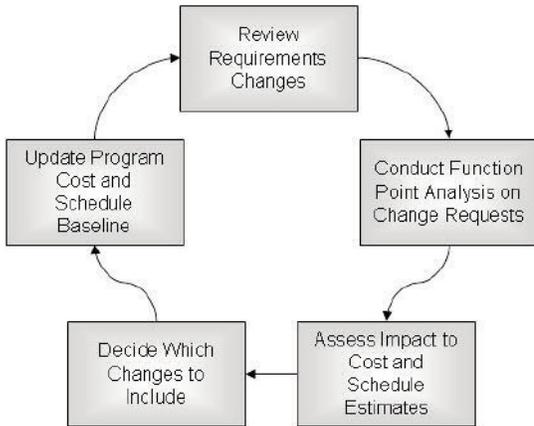
initial model may have assumed the project would be staffed to minimize the development schedule. This staffing approach generally increases effort and cost (as well as the associated risk), so if the estimated range is too high for the known project budget, perhaps the project should be modeled to optimize the effort (resulting in fewer staff, lower cost, and longer schedule). If this review still results in an estimated range that does not include the necessary budget or schedule, then the project scope must be evaluated. Too often, a program office will set a project up for failure by demanding that the full set of software requirements be developed within a budget or period of performance that is simply unrealistic and unattainable. This methodology can help to avoid these situations

by raising a red flag early in the process. Requirements should be evaluated and prioritized, and then the overall scope of the proposal should be reduced or phased in such a way to more likely fit the required budget and schedule. The powerful combination of function points (linked directly to requirements) and a parametric estimation tool make these what if scenarios possible.

Step 5 – Evaluate Proposals in Context of Estimates

This is the payoff step. Steps 1 through 4 prepare a program office for proposal evaluation. The cost and schedule estimates represented by the





S curve charts provide the framework against which actual proposals can be compared. When vendor responses are received, the cost and schedule proposed by each vendor can be mapped to a point on the independent cost and schedule curves (see Figures 4 and 5, page 17). Comparing certainty levels across the estimate continuum provides a more informed understanding of the relative value or risk of any given proposal. Any given certainty level is interpreted as the likelihood that the project can be completed at or below that cost or schedule. The higher the certainty level, the more likely the project can be completed within that estimated cost and schedule. This comparative analysis can provide a tremendous amount of information to a program office. It can help identify price to win proposals that are overly optimistic as well as more conservative proposals that might be overpriced. This framework allows the program to control the amount of cost and schedule risk it accepts when awarding the work by providing a context to the winning bid that is based on robust quantitative analysis.

Other Critical Considerations

When evaluating the submitted proposals within this framework, there are several items that absolutely must be kept in mind. These critical considerations can significantly impact the value of the analysis and the quality of the information that results.

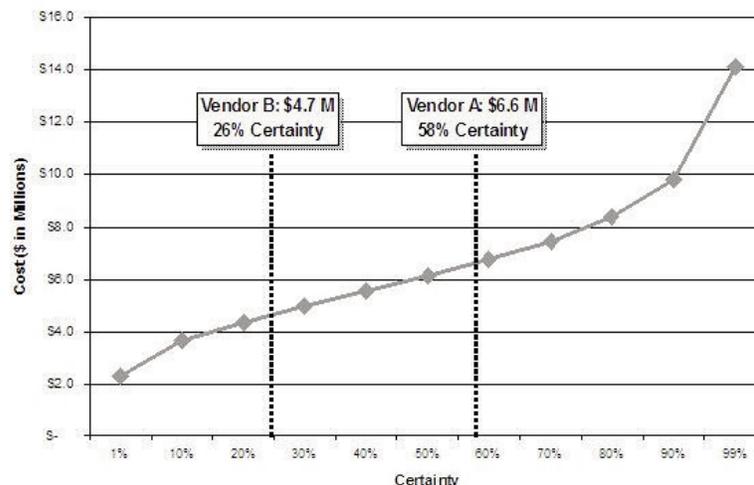
- **Width of Cost and Schedule Ranges.** These should increase with more uncertainty in an acquisition. How much is really known about the project should be carefully evaluated at any given point.
- **Contract Type.** The nature of the contract type may influence the proposals received in response to the RFP. Time and materials or cost plus award fee contracts are more likely to be priced aggressively (lower certainty levels) than fixed price proposals.
- **Cost Versus Effort.** Parametric tools actually calculate effort and then multiply effort by labor rates to arrive at cost estimates. Evaluating proposals based on effort estimates normalizes for differences in labor rates and highlights which vendor is actually proposing the most efficient solution. Note, however, that highly skilled and experienced vendors will likely have higher hourly rates.
- **COTS Usage/Software Reuse.** Some proposals may have assumed more software reuse or COTS applications than

others. In this situation, the program office may want to run multiple scenarios with varying levels of COTS components or other software reuse assumptions. This produces multiple evaluation frameworks but allows for more appropriate apples-to-apples comparisons.

Post-Contract Award

The main purpose of this methodology is to enable more informed decisions when evaluating and awarding the initial development contract. The benefits, however, do not have to end there. The same estimation methodology can be applied in an iterative fashion throughout the entire contract life cycle to manage the project with quantitative data. The baseline FPA can serve as the basis of the initial contract, establishing threshold delivery rates or other relevant performance metrics. The contract could also implement a progressive fee structure for functionality added or changed in later development phases. As part of a change control process, recurring FPA, coupled with updates to the estimation model, can evaluate the potential impact of proposed changes to functional or technical requirements on the project cost and schedule. The estimation process at this point should become cyclical in nature, reviewing change request, and revising size, cost, and schedule estimates based on the methodology (see Figure 6). Go/no go decisions regarding these changes can

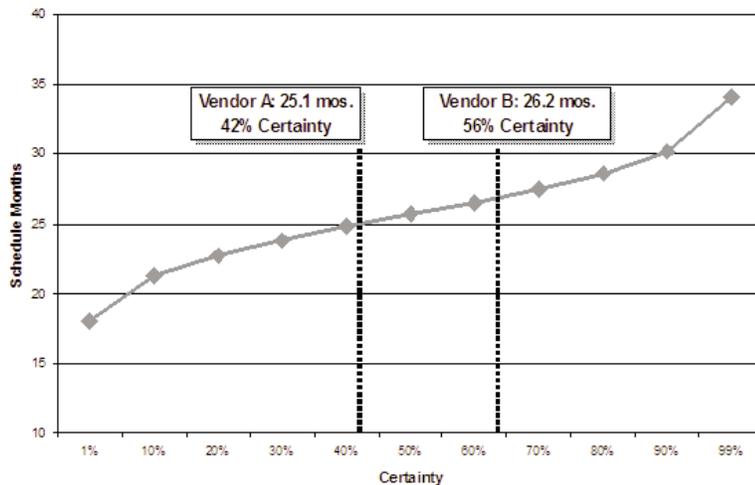
be based on quantitative analysis instead of guesswork. This approach is one way to help keep requirements volatility and scope creep under control. Finally, function



points and a robust estimation model can provide the data essential to earn value management by establishing well-documented baseline cost and schedule plans, providing the ability to update these plans when requirements change, and effectively assessing percent complete or the value that has been delivered at any point in time.

suspected, Vendor B did offer a rather aggressive price bid, driven lower by an assumption that significant legacy reuse would be possible (see Figures 7 and 8). The probability of delivery for the bid amount was lower than desired (~26 percent certainty). Vendor B's schedule estimate was actually more conservative, but the client identified the lower cost

price will be known, thanks to the context provided by the independent estimate. Proposals that are intentionally low-bid in order to win the contract can be identified and filtered prior to award. Conducting an FPA will help ensure completeness of requirements to improve the probability of delivery of full functionality. The methodology also allows a program office to conduct a self-examination to make sure that the planned budget and duration are reasonable and do not doom the project for cost and schedule overruns before it even starts. This methodology enables the contracting program office to more effectively control the balance of information and, in turn, produce acquisition results that benefit all stakeholders—program office, user community, and vendor alike.



Example

A client organization desired to merge multiple financial management systems with overlapping functionality into a single, consolidated system. The business owners developed a master set of requirements that any solution would have to meet, then released an RFP for open bids. Two vendors responded, both of whom assumed they would be able to leverage some amount of functionality from existing proprietary systems. Vendor A bid a significantly higher price than Vendor B, but the contracting organization was unsure which would provide the best value and was wary of the risk of focusing on the low bid. Consultants completed an FPA of the master requirements to establish the baseline size, then conducted an independent gap analysis of each vendor's existing systems. Then, following the methodology set forth in this article, the consultants set up the RFP analysis framework that enabled the client to put each bid into context. As the client

estimate and the high reuse assumption as a potential risk for the project. Vendor A provided an estimate that fit into the evaluation framework at a more conservative level (~58 percent). Vendor A's schedule estimate was more aggressive than Vendor B's, but it was still within a reasonable range in the framework. Cost risk was more critical to the client organization than schedule risk. This approach allowed the client to make an informed decision to award the contract to Vendor A based on quantitative analysis. The client could justify the higher price bid while understanding where critical risk areas were in the acquisition strategy.

Summary

The more information a program office has during the software acquisition process, the better the chances are for having the answers to the questions that the beginning of this article laid out. The reasonableness of the proposed

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Improving Customer Experience Using Functional Analysis

By Steve Woodward

The ISO/IEC 14143-1:2007 functional analysis scoping standard was originally developed to model functionality, helping to improve communication between technical teams and non-technical or business user teams. Therefore, functional analysis encompasses part of the user experience as it relates to the identification of unique functional processes. The resulting deliverable is a list of recognized and documented functions using specific definitions regarding uniqueness tests. This list can then be used as a checklist to evaluate the user experience by function.

The functional analysis focus is around what the user perceives and can describe.

The information can be analyzed to help identify the most critical functions with the lowest evaluated user experiences. These functional areas require the most immediate focus and corrective actions.

The same functional analysis can even be leveraged to help assess non software functionality or even manual

processes, if desired. For example “file signed customer agreement in filing cabinet”. The functional analysis method is an ISO standard that helps identify and categorize functionality. For larger, more complex analysis the functional size can be quantified, summarized and categorized multiple ways enabling meaningful, actionable analysis to improve customer experiences by category.

There are of course additional aspects of user experience that are non-software functionality related such as telephone support, number of outages and availability of service.

The ISO functional analysis framework provides one perspective to help evaluate and quantify customer experience.

If user experience is important for your organization, then the IFPUG method is a great framework to classify functionality and highlight opportunities for improvement!



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IFPUG Board of Directors Update

IFPUG extends a special thanks and appreciation to the following out-going IFPUG Board of Directors for the dedication and support during their many years of service!

Mary Bradley

An IFPUG member with a track record of involvement, Mary was one of the first Certified Function Point Specialists. She served on the Counting Practices Committee from 1994 to 2001 and as its chair from 1998 to 2000. She has been a member of the International Organization for Standardization (ISO) Committee since its inception in 1994, serving as the chair of that committee from 1995 until 1998. She also served as U.S. representative to the ISO software engineering work group on functional size measurement. Mary has been a member of the IFPUG Board of Directors since 1999, serving as Director of Education and Conference Services; Vice President; President; Immediate Past President; and, most recently as Director of Counting Standards.

Mary Dale

Mary has been active in IFPUG since 1987, serving on the IFPUG Board of Directors as Treasurer and Chair of the Finance Committee. As Treasurer, Mary initiated many innovative financial procedures ensuring that IFPUG operates as a viable business. These procedures helped IFPUG survive the economic impact of the September 11th tragedy, as well as the current economic downturn, and have allowed IFPUG to remain fiscally solvent. In fact, under Mary's guidance, IFPUG has successfully rebuilt equity reserves despite these hurdles. She also served on the Certification Committee from 1994-2004 and attended numerous IFPUG and software conferences throughout the years.

Loredana Frallicciardi

Loredana has volunteered with IFPUG since 1993, and served as the IFPUG Director of Applied Programs. Her committees provided services to IFPUG members based on a collection of software benchmarking data; assisted IFPUG members to understand, plan, manage and improve software engineering processes and practices; created the Guidelines of Software Measurement and the IFPUG CSMS Certification; and developed the new Assessment Practice Manual (APM), containing guidelines and rules for sizing the non-functional aspects of software development, as well as technical and quality aspects.

Welcome to our newly elected Board members!

Mauricio Aguiar

A software measurement practitioner and businessman with a solid background in software development, statistics and the behavioral sciences. He is a member of IFPUG, PMI, INCOSE, IEEE and a senior member of ASQ. He is also a Qualified Practical Software Measurement Instructor licensed by the U.S. Army. Mauricio served on the IFPUG Board of Directors from 2000 to 2009, including his IFPUG Presidency from 2005 to 2007. He has been instrumental in the growth of IFPUG function points in Brazil.

Janet Russac

An active member and strong supporter of IFPUG for 15 years, Janet has served as Chair of the Management and Reporting Committee during which time she spearheaded the creation of the CSMS program. She served on the Counting Practices Committee and Communications and Marketing Committee for the past several years. Serving on these various committees has given Janet a unique insight into all areas of IFPUG and their interrelations.

Steven Woodward

Steve has served as Chair of the New Environments Committee (NEC) and led the Multiple Media Task Force to a realistic resolution. He is responsible for fostering the formal collaborative relationship between TM (Telecommunication Management) Forum and IFPUG; and is now the liaison between these organizations. He also initiated the NEC Interest Groups to promote IFPUG member participation and networking.

In Loving Memory

William J. Hufschmidt – December 15, 2010

We are all sad to lose our dear Bill. Bill was a true believer in Function Points and IFPUG from the very beginning. He served as IFPUG's first president in 1987. He was a tireless volunteer, a friend and mentor to everyone he came in contact with.

The friendly smiling "button man" was always willing to help and volunteered thousands of hours on multiple committees over the many years. IFPUG conferences will not be the same without our "button man".



Vendors World!

CHARISMATEK Software Metrics *Victoria, Australia*

CHARISMATEK Software Metrics announces Function Point WORKBENCH 7.0h. Here are a couple of our new features.

WORKBENCH 7.0 includes a powerful module called the Approximator. This delivers an approximation of the Function Point size of an application or project which is stored as a Summary Count.

For many business purposes needing the assessment of the entire application portfolio, the degree of FP size accuracy provided by this approximation technique is all that is required. This approach is obviously much faster and more cost effective than performing detailed counts.

The approximated size is derived from counts of user observable, physical application software artefacts. These can then be stored as summary counts within the WORKBENCH for Portfolio Reporting. And an organization may have hundreds of applications in its portfolio.

WORKBENCH Release 7.0h equips you with all you need to complete this task painlessly. Adobe Forms, supplied with the WORKBENCH, facilitate the electronic collection of data for each application. Data is then electronically stripped from these forms and imported directly into the WORKBENCH.

A user can now open a count directly from a Recent Counts shortcut or from an object embedded in a document or other repository. Can't remember where the count was that you were working on yesterday? No problem. Want to open a count directly from your metrics repository? Just click on the object or icon.

WORKBENCH Publisher reports are now also available in Spanish.

And, of course, Release 7.0h is fully Windows 7 compliant.

Q/P Management Group, Inc. *Massachusetts, USA*

2010 is a milestone year for Q/P Management Group, Inc. Q/P celebrates 20 years in business and our reputation as a leading provider of software measurement, benchmarking, quality and productivity consulting services. We implement the best, most innovative methods, techniques and tools available to assess quality and productivity, implement continuous process improvements and measure the results.

We are proud to announce the latest version of our Software Measurement and Reporting tool, SMRe. SMRe users can now generate software development estimates using historical or industry benchmark data. The SMRe estimating model is based on Q/P's proven software estimating methodology which incorporates an innovative risk assessment to help identify potential project pitfalls. SMRe users continue to have the ability to capture, report and compare project performance against historical or industry benchmark data. Our strategic tool alliance with CHARISMATEK Software Metrics provides a direct link between SMRe and CHARISMATEK's Function Point WORKBENCH™ giving clients licensed to use both products a fully integrated, seamless measurement and reporting solution. Q/P has added Function Point WORKBENCH to our product offerings.

Visit our website, www.QPMG.com for details about our services and product offerings, including online product demonstrations, or to request an evaluation download.

Total Metrics *Victoria, Australia*

Established in 1994, Total Metrics is a world thought leader in software measurement and provides metrics related consulting, training and software tools to the international market. Total Metrics' IFPUG certified function point counting experts are the developers of SCOPE Project Sizing Software™, the first product to bring software functional sizing into the domain of project governance and software portfolio asset management.

SCOPE 3.0 is fully multi-lingual in English, Spanish, Portuguese, Korean, Japanese, French, German, Italian, Dutch and Chinese. Project managers use SCOPE to model and quantify their software projects, for input into project estimates, productivity assessments and client/supplier scope negotiations.

SCOPE is the only IFPUG 4.3 compliant measurement software to provide a fully multi-user FP count repository and a quantified audit trail of requirement's changes. It enables tracking of which counter has made what change to the count and when. SCOPE imports all data from your old and current FPW and EXCEL counts, so you can start using SCOPE tomorrow and lose none of your data.

Total Metrics provides online web based training in all aspects of:

- IFPUG and COSMIC FSM Methods
- implementing measurement programs
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- using SCOPE software
- IFPUG exam preparation

We have certified measurement consultants based around the world to assist you in your software metrics implementation. See www.totalmetrics.com or contact us at admin@totalmetrics.com.

Congratulations to these NEW and Extended Certified Function Point Specialists!

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and wishes you a happy New Year!**