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## From the Editor's Desk



*MetricViews* provides an excellent avenue for information sharing.

In this issue, Tom Cagley, IFPUG President, discusses his vision for IFPUG. As you will read, one of the areas of focus will be on participation. In support of this, I want to reiterate that *MetricViews*

is put together to benefit the membership of IFPUG. If you have articles or suggestions for inclusion in this or the newsletter, please send those to [ifpug@ifpug.org](mailto:ifpug@ifpug.org).

This edition of *MetricViews* boasts two informative feature articles.

- **“Beyond Defect Removal: Latent Defect Estimation With Capture-Recapture Method”** by Joe Schofield discusses how the use of defect removal and defect prevention techniques can be augmented by a concept titled Capture-Recapture Method (CRM). This article was originally printed in *CrossTalk*, and IFPUG thanks Joe and *CrossTalk* for allowing us to reprint the article.
- **“How to Develop an ILF Model to Reduce the Time and Costs Required for Function Point Sizing”** by Charley Tichenor highlights an approach that can, from time to time, be used to get a quick, scientific function point estimate.

In addition, you will find updates on the CFPS exam automation project, the CSMS body of knowledge, a wrap-up of the 2007 ISMA Conference and Workshops, a teaser about a new project the ITPC is working on, a look ahead to the 2008 ISMA Conference and Workshops, and the interesting “What’s Your (Function) Point?” column. Also included is a communication from the new IFPUG Membership Committee. This group is still in the forming stage and they are eager to receive feedback from you. %

Chris Kohnz

IFPUG Secretary and Director of Communications & Marketing Committee

*MetricViews* Editor

## A Message from the IFPUG Office

Perhaps the most important element of any association is its ability to provide their membership with a proven track record of credibility and informational tools. With that being said, *MetricViews* is here once again to bring you just that! Here at the IFPUG Office we mandate these same intuitive and beneficial practices. Providing the IFPUG membership with knowledge of the Function Point industry continues to be our biggest strength and it is our goal to have this information consistently at your fingertips now and for years to come.

It is very exciting to announce that this year’s annual ISMA Conference

*continued on page 3*

IFPUG Office staff, left to right, Margaret Young, meeting planner; Al Vrancart, executive advisor; Barbara Swanda, association manager; and Christopher Decker, Assistant Association Manager.



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*IFPUG Office, continued from page 1*

will be taking place in beautiful Washington, D.C. After the success of the annual conference in Las Vegas last year, Washington, D.C. promises to follow suit and bring even more to the table. We here at IFPUG headquarters look forward to greeting old friends and meeting fresh new faces at the conference.

New on board to the IFPUG team here at CMA (since the previous *MetricViews* issue) is Christopher Decker, Association Coordinator, and Margaret Young, Meeting Planner, who pledge to provide the utmost amount of attention to IFPUG's day to day activities and give the IFPUG membership a true sense of dependability. We are also pleased to be working with the new Membership Committee which vows to strengthen

IFPUG's membership and add tremendous value to an already established and growing member base.

Function Point Analysis continues to be a crucial aspect of software measurement and IFPUG's continual growth has challenged us to spread this methodology by enhancing its appeal to individuals both domestically and internationally. With a strong work ethic and a conscious effort to provide this for the IFPUG community, we plan on meeting and exceeding expectations!

We at the IFPUG office would like to take this time to wish you the best of luck in 2008! %

Barbara Swanda  
IFPUG Association Manager  
609/ 799-4900  
bswanda@cmasolutions.com

## IFPUG Board of Directors



Front (left to right): Chris Kohnz, Secretary & Director of Communications and Marketing, Nestle Purina Petcare; Márcio Silveira, EDS, Director of International and Organizational Affairs; Mary Bradley, MSB2, Director of Counting Standards; Bruce Rogora, Pershing, Inc., Vice President; "Dana" our very patient Las Vegas Show Girl attending the ISMA Conference Special Event; Tom Cagley, David Consulting Group, President; Mauricio Aguiar, TI Métricas, Immediate Past President; Mary Dale, Q/P Management Group, Treasurer; Ian Brown, Booz Allen Hamilton, (former Board member); Loredana Frallicciardi, CSC Italia, Director of Applied Programs.

And, IFPUG's newest Board member, Joe Schofield . . .

Inset: Joe Schofield, Director of Education and Conference Services (& "Dana")

(For Committee listings, see page 11.)

## MetricViews

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### *MetricViews* Winter 2008

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## From the President

On November 1, 2007, I became the President of IFPUG, an occasion so momentous in the grand scheme of things that the sun actually rose in the east and set in the west on the same day. My personal perspective of the event and the group I serve is far less sanguine. IFPUG is not about a single person or even a very small group called the board of directors. IFPUG is about you, the membership. What the organization focuses on and becomes should be a reflection of the needs and wishes of the community. While the word "community" suggests a majority view, I would rather think of a community as a group that finds a means to meet the needs of all constituencies. The balancing act will ensure the avoidance of the tyranny of the majority (albeit the same for a minority).

In both public and private forums, individuals ask about my vision for IFPUG during my presidency. In short, my view begins with the word "international." IFPUG needs to address the growth in international membership. We need to address how we deliver content and the benefits we deliver. Value for the membership is my by-word. Secondly is a focus encouraging participation within IFPUG. IFPUG is guided by committees and task forces that are staffed by dedicated volunteers. These volunteers make a dramatic difference to both the organization and how we do our jobs. We feel the impact of volunteers every time we count a function point or discuss functional metrics. I would suggest that their participation provides all of us more value than we can ever imagine. Finding a means of getting more people involved will be one of the legacies of my presidency.

The final leg of my vision for my presidency is the need for innovation. We all participate in a profession that continually changes. Driven by continued changes in technology, changes in cultures, and a flattening of the world;

IFPUG is affected by all of these megatrends. I suggest that we must recognize the need to evaluate and determine how to improve all of our processes and products. The automation of the CFPS examination begun by my predecessor, Mauricio Aguiar, is just one of the innovations that will re-write our organization. I intend to challenge the Board to keep the innovation as a top of mind topic; however, I strongly believe each member has a role in finding improvements in our processes. I challenge you to let the Board know when you see a potential improvement in the process, communication vehicle, service, benefit or product.

IFPUG is a great organization with a storied history. I would suggest that in two years, IFPUG will be stronger and there will be more stories because of your passion to grow the organization. I believe that if we all get involved and suggest changes, we will all move IFPUG forward. %

Thomas M. Cagley, Jr.  
President, IFPUG

## Chapter Focus - Korea



KOSMA (Korea Software Measurement Association), the new name of the Korea Chapter of Function Point Users Group that was established in 2004, is the most important organization in Korea to the software measurement professionals.

KOSMA has hosted eight regional CFPS exams from 2004 until the end of 2007 for more than 1,000 people out of several business domains other than the software field. More than 400 CFPSs have passed the exam and KOSMA became the second largest chapter of members who hold the CFPS designation.

KOSMA has been trying to become the leading chapter by making alliances with neighboring chapters of China and Japan. All got together in the name of Software Union Metrics at the Beijing conference last June and exchanged MOU.

CFPSs in KOSMA are actively participating in the extension of using Function Points on estimating projects and on measurement of applications in public, financial, telecommunication, utilities, manufacturing, and education projects.

KOSMA held an annual conference with more than 100 specialists sharing experiences of projects with software productivity and quality improvement using measurements on November 23, 2007. They concentrated on an ITO contract based on the FP size of applications with service level agreement.

KOSMA is planning to develop standards of several useful project and organization management indicators which is useful for benchmarking among organizations to give them the opportunity to improve their competency based on FP measurements and several other basic measures. We are going to help government agencies to develop their policies on SW industry by gathering data from all kinds of projects. %

*Insoo Hwang, Vice President, Korea Software Measurement Association (KOSMA)*

## CURRENT CONTACT INFORMATION?

To ensure you do not miss out on any IFPUG communications, please notify the IFPUG Office immediately of any changes to your email or postal address. You may do so in one of the following ways:

Email to [ifpug@ifpug.org](mailto:ifpug@ifpug.org)

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Fax 609/ 799-7032

Write to: IFPUG

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Princeton Junction, NJ 08550

# What's Your (Function) Point?

## Using Function Points for Pricing

### Question submitted by Ricardo Chávez

I have a simple question. Once an IT organization has provided an estimate for Function Points, how can an organization convert the estimated Function Points into pricing? Is there a benchmark for pricing/cost (e.g. David Consulting, QPMG, ISBSG, SPR, etc.)? Do you know of any successful companies that have implemented this?

### Replies provided:

#### 1. By Pranay Srivastava

You can get the estimated effort based on FPA. Based on your rate you can estimate the cost of executing the project.

In two of my earlier companies, we used FPA for determining the project cost (i.e. basis for the contract).

#### 2. By Luigi Buglione

No, there should not be any actualized cost benchmark (in 1996 some figures were provided by H. Rubin & C. Jones comparing this figure among several countries, from China up to USA). In any case, it can be a dangerous figure if you do not have all the details to determine the final cost (the upper part of the formula, Cost/FP) as the costs are for the whole scope of the "project" to produce a software product while the lower part (number of FPs) is a functional size of the software "product". Therefore, it is not a homogeneous and meaningful value if we look at the initial informative goal for an organization ("how much does it cost a single functional size unit for such system?").

Since FPs should be the expression only of functional requirements (as stated also in ISO/IEC 14143-1:2007 standard) and not also of other non-functional requirements, it would be more correct to separate at least the cost of labor from other costs (infrastructure, software licenses, hardware, etc.) and subdivide again the cost of labor into how much should be referred to the deployment of functional requirements and how much should not.

Again, Function Points were created by A. Albrecht with the aim to allow comparisons about the size of two systems from a functional viewpoint, no matter the technology or methodologies adopted. However, in economical terms, it is not possible to not include into the final calculation other elements such as the expertise of analysts or programmers or other Cost Drivers (in the

COCOMO language) impact on productivity (and therefore also on the final cost of a project). In a global market as the current one where you can outsource huge parts of your Information Systems, probably this number could be quite variable and unstable for any general comparison.

So, my humble suggestion is to deal with this metric with great care. %

Additional input is welcome for this topic via the IFPUG Bulletin Board site:  
<http://www.ifpug.org/webforum/discus/discus.cgi>



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## Conference Committee

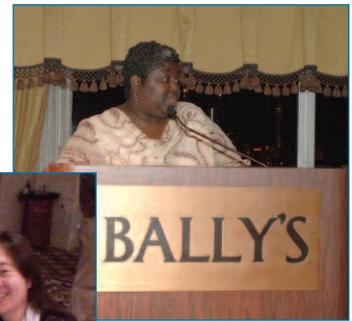
*By Deborah Harris, Chair*

The Conference Committee is gearing up to bring you what is expected to be the most attended conference since ISMA was introduced three years ago, the 3rd Annual International Software Measurement & Analysis (ISMA) Conference, September 14 – 19, 2008, Westin Arlington Gateway Hotel, Washington, DC.

If you received the 2008 ISMA “Save the Date” postcard, you already know that Capers Jones is opening this year’s conference with Wednesday’s keynote address. What you may not know is that Bill Phifer, EDS Fellow and SEI-Authorized CMMI Lead Appraiser has agreed to join us as a featured speaker addressing the eSCM model and its relationship with Function Points. And, that is only the beginning! We have our Special Event scheduled at Washington’s International Spy Museum. This event promises to provide not only a wonderful dining experience; there is also an educational aspect with a private museum tour, as well as the opportunity to network and socialize. We will be adding additional featured speakers to the agenda along with our regular track presentations from people just like you who want to share their experiences.

Take the first step to an amazing experience. Log onto the IFPUG website – [www.ifpug.org](http://www.ifpug.org) – to get more information and to register for this exciting, internationally attended conference.

Are you interested in being a speaker? Our attendees tell us they want to hear “real world” challenges, opportunities and successes from people like them, people from a variety of industries and segments of the user community that are willing to share their stories. For instance, do you have a unique set of applications that challenged your ability to apply the IFPUG counting guidelines? Have you overcome resistance to implementing a measurement program



*Photos of 2007 ISMA Conference and special event.*

in your organization? Do you have a CTO that values and supports your measurement and analysis efforts that can teach others how to gain that same type of support? Has your company strived for and achieved a particular CMMI Level? If so, how did you do it? Have you utilized a method of estimating software projects that has been especially successful?

If you answered “yes” to one or more of these questions, you have a story to tell at the ISMA Conference in D.C.! Check IFPUG’s website – [www.ifpug.org](http://www.ifpug.org) – for the Call for Participation and submit your abstract via the online collection form.

Still undecided? Read what Leah Upshaw, Conference Committee Vice-Chair had to say about the 2007 ISMA Conference in September ...

IFPUG rolled the dice, and hosted the second annual International Software Measurement and Analysis Conference and IFPUG Workshops at the Flamingo Las Vegas, September 9-14, 2007. The Flamingo, with its history as the most expensive Vegas hotel at the time (opened in 1946), was originally built by gangster “Bugsy”

Siegel. The new and improved version housed conference participants with rooms refurbished in streaks of neon pink! This metaphorically describes the conference activities – some historical activities, with a shock of something bright and new!

Conference Committee Chair Deborah Harris welcomed ISMA participants Tuesday evening, September 9 with introductions to several committee chairs with brief presentations. Joe Schofield provided status of the CSMS and its direction. Steve Woodward followed with an update to the New Environments Committee. Finally, Jim McCauley of the Certification Committee presented the results of a study on electronic testing, and how it could be implemented to conduct IFPUG certification. Prometrics representative, Tracy Reynolds, provided an overview of the testing company and its qualifications to implementing testing worldwide. Certification Committee member, Melinda Ayers, conducted a question and answer period following the

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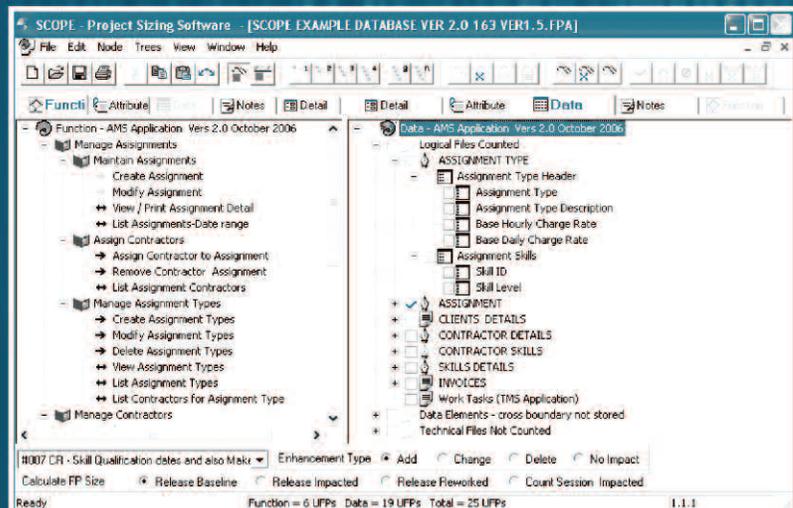
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*Conference Committee, continued from page 6*

preceding presentations, and invited participants to evaluate the prototype during the Vendor Showcase.

During breakfast early Wednesday morning several presentations were delivered. Tom Cagley, IFPUG Vice President provided an orientation for new members. This was followed by a briefing from the Counting Practices Committee by Adri Timp. The conference officially commenced with a Welcome from IFPUG President Mauricio Aguiar. Following this was the much anticipated presentation by Stephen Few of Perceptual Edge. His talk titled "Show Me the Numbers," which was originally scheduled for the 2005 conference in New Orleans, was canceled due to Hurricane Katrina. Then, in 2006, a medical emergency prevented Few from traveling to San Diego, so it was awesome to finally get to hear Mr. Few speak. Attendees concurred that this presentation was well worth the wait! Many were heard to say upon exiting that this was one of the best featured speakers ever hosted by IFPUG. Almost every single feedback form received said, "Well worth waiting for!" Other comments on Stephen's presentation:

- "Great speaker, good topic, valuable information."
- "Very strong performance and message. I will use many of these tips."
- "A well organized, informative and entertaining presentation – one of the best in years!"

ISMA participants were energized as they attended scheduled talks in the Function Point, Metrics, Software

Estimation, and Data Analysis tracks all day on Wednesday, Thursday, and Friday morning. The first day's activities ended with delicious hors d'oeuvres at the Vendor Fair Reception. Sponsors Charismatek Software Metrics Pty, Ltd.; Prometrics; David Consulting Group; Q/P Management Group; and Ti Métricas, Ltda. displayed products from their companies, and participants enjoyed live piano music.

Thursday morning, featured speaker Dr. Rick Hefner, Director of Process Management, Northrop Grumman, spoke on "Measurement Strategies in the CMMI." Rick came highly recommended to IFPUG and surpassed expectations with his interpretation of the CMMI measurement area. Attendees found him to be "very informative and very knowledgeable of important aspects of measurement." Other comments:

- "Excellent overview of measurement and CMMI."
- "Analogies and anecdotes were spot on."

Wrapping up the featured speaker lineup on Thursday afternoon was the fabulous Ms. Sabrina Jackson of Sabrina Jackson Enterprises. We invited Sabrina to ISMA after speaking at the 2004 IFPUG Conference, presenting "True Colors." The conference abstract read "Prepare to laugh and learn a lot!" What an understatement! Sabrina's lively, engaging personality and thought provoking message(s) literally brought the house down. Even though this was her second time with us, it is abundantly clear that she will

always be welcomed back with open arms. This attendee says it best:

- "Beyond excellent. As wonderful the second time as the first. Thank you!"

Thursday evening allowed ISMA participants to let down their hair at Bally's Hotel. The top floor reception provided a bird's eye view of the Las Vegas strip, tasty treats ranging from crab cakes to lobster ravioli, an open bar, and a Vegas showgirl in fully plumed costume. A photographer was there to capture those willing to pose, and let what happens in Vegas escape from Vegas.

In addition to our keynote and featured presenters, we had the privilege of hosting 24 fantastic speakers who covered a variety of topics including function point analysis, metrics, software estimation, process improvement and project management. For those of you who had the misfortune of missing the live event, CDs of the conference proceedings are available through contacting the IFPUG Office, 609/799-4900.

NOW, won't it be more fun to be in Washington THIS September and be part of the excitement than to read what you missed again? Log on; register to attend. Register to attend and submit an abstract with that interesting topic you have been thinking about presenting. Do whatever it takes to get there. See you in D.C.! %

## Upcoming Industry Events



- ◆ March 17-20 **SEPG 2008** Tampa, FL  
[www.sei.cmu.edu/sep/2008](http://www.sei.cmu.edu/sep/2008)
- ◆ March 27 **Software Best Practices Conference** Orlando, FL  
[www.itmpi.org/events](http://www.itmpi.org/events)



- ◆ April 9, 15, 24 **Software Best Practices Conference** Multiple Locations  
[www.itmpi.org/events](http://www.itmpi.org/events)
- ◆ April 29 - May 2 **Systems and Software Technology Conference (SSTC)** Las Vegas, NV  
[www.sstc-online.org](http://www.sstc-online.org)

## Certification Committee

*By Kriste Lawrence, Chair*

Have you ever read the book *Who Moved My Cheese?* by Spencer Johnson, MD? The book's characters see the "Handwriting on the Wall", which tells them that "They Keep Moving the Cheese" (change happens) and that they should "Get Ready for the Cheese to Move" (anticipate change). Well, the "Handwriting on the Wall" certainly applies to the world of CFPS certification – get ready, because change is happening to the CFPS exam!

On October 4, 2007, IFPUG and Prometric officially executed a five-year contract for converting our current paper based CFPS exam to a computer based format readily accessible to members around the world. The IFPUG CFPS designation is recognized worldwide, and Prometric is the global leader in technology based testing services – the perfect match to successfully convert the CFPS exam from paper to electronic.

Our goal is to have the English language exam available to all members by the end of second quarter of 2008. Toward that goal, several activities are already well underway:

IFPUG and Prometric have each established major milestones and tasks. These will be combined and published in January 2008.

The exam design is complete for two of the three major sections.

The exam content has been developed for two sections, with the third underway. Review on the content has already begun.

You, the IFPUG membership, will also be called upon to participate in future activities. We have already identified several volunteers for the exam pilot, and may be reaching out for more. When we begin to schedule translations, we'll be looking for native-speakers to review the translations.

So let's all get ready to "Savor the Adventure and the Taste of the New Cheese" (enjoy change!).

## IT Performance Committee

*By Dan Bradley, Chair*

The goal of the IT Performance Committee is to:

Provide services, based on a collection of software metrics data, that assists IFPUG members to understand, plan, manage, and improve software engineering processes and practices.

The IT Performance Committee (ITPC) met and exceeded our fall agenda at the ISMA Conference in Las Vegas. We not only had productive face to face working sessions, but also presented a well-received course, "MS-222 - Principles of Estimating and Benchmarking Using Industry Data."

This course has evolved over the years into a very hands-on lecture/workshop that emphasizes the use of ISBSG data to improve estimating and IT practices.

Speaking of ISBSG – Dan Bradley is now the official IFPUG representative to ISBSG and attended the annual meeting in Madrid. This highly interactive work meeting produced a variety of results including a significant work effort on a new ISO standard for the Benchmark process. As an active member of ISBSG, IFPUG is obliged to have its members submit projects. Your help in this effort would benefit your organization, the IT community, and IFPUG. Materials and promotions

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*Committee Reports, continued from page 9*

concerning project submissions are available through the IFPUG website ([www.ifpug.org](http://www.ifpug.org)) or at the ISBSG site ([www.isbsg.org](http://www.isbsg.org)).

In other news, the Committee is still working on the classification and clarification of the “top ten” project attributes which most greatly impact project effort. Some of you may have already submitted responses to our survey – thank you! If you haven’t, I’m sure you will see the survey again in the early part of 2008. We are also in the process of getting project charter approval from the IFPUG Board for a new and very exciting project which will address issues surrounding the influence of technology on project effort and estimates.

The ITPC “meets” via conference call on a monthly basis. Our next face to face meeting will be at ISMA in Washington, DC. When you come to the Conference, feel free to stop by and give us your input. If you are interested in volunteering for any of our initiatives, please contact us through the IFPUG Office.

## **Management & Reporting Committee**

*By Heidi Malkiewicz, Chair*

The Management & Reporting Committee (MRC) has two goals in relation to the Certified Software Measurement Specialist (CSMS) program. The first is to sustain the CSMS certification program, the exams and credit packet procedures. This goal requires us to evaluate and update the program, exam and credit packet procedures where improvements are needed. At the September 2007 ISMA Conference in Las Vegas, the MRC solicited feedback from conference attendees regarding the CSMS certification process. Based on this feedback, we will be exploring improvement opportunities. Of which, one initiative the MRC will pursue for the 2008 ISMA Conference is offering a session to assist with CSMS packet preparation.

The MRC has some exciting announcements regarding our second goal which is to transition the CSMS Body of Knowledge (BoK) from the Guidelines to Software Measurement

(GSM) to a compilation of other industry standard bodies including CMMI®, PSM, Six Sigma, and Balanced Scorecard. The first announcement is that the MRC has in fact already transitioned to the new BoK. We have released an electronic syllabus (web page) that points candidates to the BoK sources which include the previously mentioned industry sources. We encourage you to visit the IFPUG website and review the new e-syllabus. The GSM will no longer be the basis for the CSMS.

The second announcement is that the MRC, over the past year, has produced a new CSMS exam based on the new BoK. Our pilot of the new exam occurred throughout the summer of 2007 and concluded in September at the 2007 ISMA Conference in Las Vegas. The exam under the GSM is no longer available. The new exam will first be offered at the 2008 ISMA Conference. This transition does not impact anyone who has a CSMS today, as your CSMS is good for three years from the date of issue. Since the BoK has changed significantly; once your certification has expired you will need take the new version of the exam to become re-certified.

## **The new Membership Committee**

*By Mike Harris, Chair*

At the IFPUG Board meeting in October 2007, it was agreed that a new Membership Committee should be established to be the voice of the membership to the Board. The Board Director responsible for the new committee is Márcio Silveira. I was honored to accept an invitation from Mauricio Aguiar to take on the chairmanship of the committee.

At this writing, we have one other committee member Agnes Nanu. Agnes and I are based in the United States so we are actively seeking to expand the committee membership with members from elsewhere in the world to ensure that the Membership Committee adequately reflects the international nature of the membership. Please contact me via email if you are interested. From a practical

perspective, getting international input to the committee to pass on to the Board is not going to be easy (e.g. time zones and languages) but it is a fundamentally important part of our remit so we plan to make it happen.

The Board established the following Mission Statement for the Committee:

- This committee will be the voice of the membership.
- This committee will be required to provide representatives to attend the annual conference.
- The committee will be charged with enhancing the members’ experience, simplifying membership categories and increasing membership. The committee should consider focusing on high potential areas.

Some ambitious goals have also been established:

- Refine membership categories including recommendations on pricing.
- Define organization sponsorship opportunities.
- Increase total membership by 20% number from baseline (TBD) in two years.
- Recommend alignment of benefits to support membership goals.
- Increase customer satisfaction from baseline (TBD).
- Seek and report on the Member perspective on communications (such as dues, CFPS, translation, expiration, etc.).
- Focus areas should include: Retention, Recruitment (including volunteers), Recognition.
- Consider and tackle membership data automation.

Having started this committee mid-way through a budget year, our budget to tackle some of these goals will be very limited until this new committee can be included in the next budget process. So initially, Márcio, Agnes and I want to concentrate on seeking your input and trying to identify the topics that are most important to you, your ideas for moving those topics forward and how you would be prepared to help. Please write to me at [m.harris@davidconsultinggroup.com](mailto:m.harris@davidconsultinggroup.com). %

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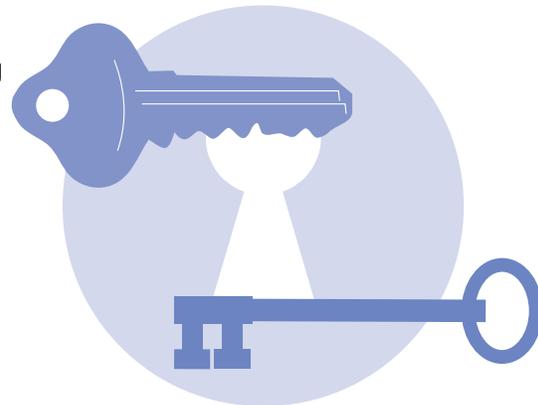
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# Beyond Defect Removal: Latent Defect Estimation with Capture-Recapture Method



**By Joe Schofield,  
Sandia National  
Laboratories; IFPUG  
Board Member**

*Defect removal and defect prevention techniques are no longer good enough to inspire confidence in software products. Techniques that help predict the number of remaining defects in software products can further boost customer confidence. Such techniques are easy to perform and have been used outside the realm of software engineering to produce reliable estimates for decades in the area of animal, bird, fish, and insect counts, and more recently for estimating the prevalence of the Severe Acute Respiratory Syndrome and cancer occurrences. This article describes the business case for removing defects and demonstrates how the usage of the Capture-Recapture Method (CRM) in defect removal activities can predict the number of estimated defects remaining in a product. This estimate can then be used to make quantified, data-driven decisions on how to proceed with a software product.*

In December of 2005, Ford, Marriott, Sam's Club, and the Justice Department were all vilified in a nationally recognized information magazine for having customer data compromised through either theft or their inability to secure sensitive data [1]. Medical staff report that 770,000 medication mistakes occur each year in the U.S.; these errors are more than penmanship issues, transcription, data entry, and other preventable errors [2]. In 2004, interface issues between Hewlett-Packard's order entry system and SAP AG systems triggered \$40 million in lost revenues [3]. Early in 2006, a property in Indiana valued at \$121,900 had its value assessed for tax purposes at \$400 million. The common thread to each of these incidents is software defects.

As recently as 2003, less than one-third of software organizations had a

quality assurance group or processes [4]. Software developers like to use phrases like level of rigor and quality commensurate with risk to avoid or minimize the need for investing time in the quality of their products. Sound familiar? Tell the victims of the defects that it is just a computer problem, a glitch, an issue, a foul-up, a snafu, or a bug. Are they feeling better yet? What do you think is the level of confidence these victims have in the supplier? Will these consumers return and advocate the products and services they purchased?

Driving down the street we notice how credentialed the rest of our world has become. Attorneys, accountants, financial planners, physicians, surgeons, nurses, plumbers, electricians, engineers, and mechanics – they are all certified. But anyone with some level of educational or experiential hacking can write code. Credentials do not eliminate defects; verify this with a certified attorney. Credentials do however offer a measure of confidence to the consumer that the holder of the certification is trained and tested in the use of some body of knowledge, and often, subscribe to some code of ethics.

In lieu of certification credentials, another approach to raising the confidence of software consumers is to embrace defect removal and prediction techniques. The latent defect derivations that result from the prediction techniques are not rocket science. A peer recently taught fifth graders how to perform defect prediction; they became quite familiar with those techniques in merely a few hours.

Defects found during testing reveal as much about the adequacy of the process as they do the quality of the product. Is it not an ominous sign when companies advertise that they are looking for more software testers? Clearly, quality (Q) without defect removal (Dr) is just faking (F) it ( $Q - Dr = F$ ). But is the removal of identifiable defects adequate?

CRM affords a product development team the opportunity to employ statistical approaches to verify the goodness of a product as it is designed, developed, and deployed. Defect removal is woefully late and excessively costly during test (and even more so after release). CRM can be used by product teams to validate requirements and verify design criteria to reduce latent defects by estimating how many defects persist in their products. With this data, teams can make objective choices about proceeding or spending additional time to address unfound but predicted defects in their products. Eventually, practitioners benefit from the assurance of knowing that their products meet the expectations imposed upon them. Management benefits from the increased confidence that latent and hidden costs of post-delivery fixes are predictable, understood, and controlled. Ultimately, estimated latent defect data reduces the risk in risk management.

This article is not just another prognostication about a defect-induced apocalypse, nor is it another article to encourage more thorough testing to remove defects; after all, defect removal by testing is too similar to inspecting quality into a product as it rolls off the production line. This article is not about the effectiveness of inspections and peer reviews to remove defects close to their point of injection. So what, you might patiently ponder, is the purpose of this article? Not so fast.

Recently, a mid-level executive proudly shared that his team had just completed a one million line of code (1 MLOC) project with only 40 issues (notice the euphemism) reported. Ignoring the misunderstanding on his part regarding the significance of the size of the product [5], let us focus on the defects (issues) per MLOC. Forty deaths per million air miles or 40 injuries per million air passengers would not be acceptable to consumer safety groups. Forty deaths per year

from providing wrong prescriptions is not healthy (the actual number is 7,000 per year) [6]. Forty cruise passengers returned to the wrong debarkation port would not float either. So why would 40 issues with a software delivery be hailed as laudable? Does this statement reflect more about the expectations we have for software products or the state of maturity of software development in general?

While possibly more troubling or sensational, the above examples do provide perspective into the serious nature of defects of any kind. Incidentally, the 40-issue-defect-product above was a highly sensitive data collection system.

The lingering question in my mind was how many defects have you and your customer not found, yet? I knew he did not know, and I hardly wanted to ruin his otherwise sunny day.

So what is the purpose of this article? Simply stated, it is to encourage software engineers to use predictive

techniques for determining the quality of products throughout their product development activities. The CRM is one such technique.

## Brief Background

Our organization received a Capability Maturity Model for Software Level 3 certification in 2005. We rely on Personal Software ProcessSM and Team Software ProcessSM (TSP) as enablers of practice improvement. A colleague, Tom Cuyler, recently received his TSP certification. For the past year the organization has been re-engineering its software processes with a CMMI® Maturity Level 4 target. As part of our ongoing process improvement, Cuyler suggested we consider using the CRM which Watts Humphrey advocates in his TSP material [7]. Cuyler and I experimented with the CRM, he in his TSP work and I in our organization training.

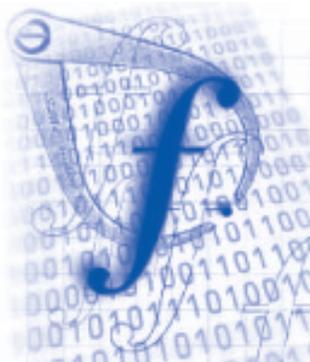
We have collected defect data for the last five years. We know where

our reported defects are injected, where they are detected, the defect type, its severity, the cost to repair, and the cost to discover (this last value is derived at a macro level). We derive and share defect leakage measures with project and management teams. We can estimate defects by function points in development and latent defects in delivered products. (Note: Latent defects can be estimated by defects reported by the customer after delivery using historical data from earlier projects. The defects not yet found by the customer, and perhaps never to be found remain unknown.)

## So What's the Problem

Defect riddled products continue to be released hindering the customer and casting a shadow of suspicion on the credibility of the supplier. Testing has not been effective in eliminating defects. Peer reviews and inspections have been effective in reducing, but

*continued on page 14*



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*Defect Estimation, continued from page 13*

not eliminating defects. Code testing tools cannot identify defects in the elicitation of requirements.

To elaborate briefly, managers and project leaders have false confidence in product quality due to a paucity of the use of estimated latent defects in delivered products. In lieu of an approach like the CRM and statistical latent defect estimating (versus experiential or defect estimation based on reported defects), any claim about the quality of software is no more objective than that assertion from the aforementioned executive who deserved vigorous cross-examination.

### And What's a Solution?

The CRM has been used for decades for sampling and estimating in disciplines unrelated to software engineering [8]. Even exploring the fine print and limitations of the technique, CRM is quite appropriate for peer reviews, for instance, (and even testing [if you must]). Caution: do not limit the use of CRM to peer reviews of code. Peer reviews and stakeholder reviews are useful mechanisms for verification and validation early in requirements capture, through design, as well as later during construction and testing. Here's a simple example of applying the CRM to a product that is being peer reviewed.

In Table 1, three product engineers identified a total of seven defects in a product; these are identified in the Defect Number column. In the next three columns, we associate which defects were found by which engineer in their individual preparation for the peer review. In Column A, the defects by the engineer who found the most unique defects are identified. In this case, Larry found the most unique defects, and Column A duplicates Larry's findings. In Column B, each defect that was found by all of the other participants is identified. In this case, the defects found by Curly and Moe are identified. In Column C, each defect that was found in both Column A and Column B are identified (e.g., the intersection of these

Defect Number	Engineer Larry	Engineer Curly	Engineer Moe	"Column A"	"Column B"	"Column C"
1	✓			✓		
2	✓			✓		
3			✓		✓	
4	✓	✓		✓	✓	✓
5	✓			✓		
6	✓		✓	✓	✓	✓
7		✓			✓	
Totals	5	2	2	5	4	2

two columns). The counts for Columns A, B, and C are totaled in this example, 5, 4, and 2, respectively.

#### Table 1: CRM Example

The CRM indicates that the estimated number of probable defects in the product is:

$$(A * B) / C$$

in the example this value is:

$$(5 * 4) / 2 \text{ or } 10$$

The CRM also indicates that the number of defects found by the participants is:

$$A + B - C$$

In the example this value is calculated as:

$$5 + 4 - 2 \text{ or } 7$$

Finally, the CRM indicates that the estimated number of defects remaining is the difference between the probable number of defects (10) and the found defects (7) or 3. The long hand for this calculation is:

$$((A * B) / C) - (A + B - C)$$

For our example:

$$((5 * 4) / 2) - (5 + 4 - 2), \text{ i.e., } 3$$

Therefore, in this example, the team has estimated that 70 percent of the defects in the product were identified as part of the peer review (and were/or will be removed), and that 30 percent of those defects remain.

Four important points are rendered here (The parenthetical references to CMMI are the most obvious mappings to the model and are not intended to be exhaustive.):

- First, the team has a quantified and objective process for determining

the outcome of the peer review: repeat the review, accept the results of the review, or something else (CMMI Process Areas – Measurement and Analysis and Verification are supported with the CRM).

- Second, the team has an opportunity to establish defect removal thresholds – and manage to them. These thresholds could correspond to quality objectives for the organization and the project (CMMI Process Areas – Organizational Process Performance, Project Monitoring and Control, and Generic Practice 3.2 – Collect Improvement Information).
- Third, the estimated number of latent defects can be used to assess, analyze, and mitigate project risks (CMMI Process Area – Risk Management).
- Fourth, the outcome of any defect analysis can be used for improved training activities (CMMI Generic Practice 2.5 – Train People).

At a recent New Mexico Software Process Improvement Network (SPIN) meeting, Jerry Weinberg (the real Jerry Weinberg) was speaking about writing [9]. He referred to a manuscript which he had distributed to several associates. Weinberg indicated that he used the typos they reported to him to estimate the remaining typos in his document. I asked him if he used the CRM to do this, to which he responded (only slightly surprised by the question)

yes. His writing project, in this case a book, was completed decades ago. Regrettably, the years erode the lessons and wisdom of the past.

## Conclusion

CRM is widely used outside the software engineering world, and I suggest it is desperately needed inside the software engineering practices world. Easy, effective, and economical, we have found the CRM a valuable technique for quantifying confidence in products delivered. Stay tuned.

## Acknowledgements

Thanks to Watts Humphrey for promoting this concept, to Tom Cuyler for introducing CRM in our community, to Jerry Weinberg for confirming its use outside of our initial research, and to Anna Nusbaum for her insightful review and edits of this article. %

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# How to Develop an ILF Model to Reduce the Time and Costs Required for Function Point Sizing



**By Charley Tichenor, Ph.D.**  
*Defense Security Cooperation Agency*

## Introduction

I have measured the size and complexity of numerous software applications and their enhancements using the standard International Function Point Users Group (IFPUG) methodology. Almost all of the time, this approach provides very useful measurements for project management. However, sometimes it is not practical to perform a standard IFPUG software measurement and an estimate is more appropriate.

For example, sometimes the CIO or other decision maker needs a scientific software sizing measurement very quickly. A function point count may require a week (or much longer) to schedule, but an estimate acceptable for this situation might be doable within one day or less.

As another example, function point counts for very large applications can be very time and resource intensive. Consider planning a function point count for an application believed to be at least 10,000 function points in

size and complexity (I have been involved with several). The function point counter must first provide the developers function point training, which may last a few hours, and then meet with one or two developers as a team while counting each of the 10,000 function points. If a counter has good cooperation and good facilitation skills, then up to about 2,000 function points can be counted daily. Conservatively, this can translate into about 15 staff days of work, plus any travel and per diem expenses. Of course, if the counter's speed is slower or cooperation from the development team is less than ideal, then the resource usage can be higher.

Sometimes, an appropriate alternative to conducting a formal IFPUG method count is estimating using the "Internal Logical File Model" (or, "ILF Model," and sometimes called the "One File Model"). The ILF Model method can produce a function point estimate within about 10% of the actual function point count and for a considerably smaller time and cost usage.

The ILF Model was developed in 1994 by the IRS function point team and was presented at the fall 1997 IFPUG Conference with the associated paper. [1] It is based on the statistically significant relationship between the number of ILFs in an application and the application's unadjusted function point count. This works because function point analysis tracks the flow of data into and out of the application, and ILFs are usually recognized for almost all transaction and file types counted. This article will show how

the ILF Model works and how it can be developed locally.

In statistics, it is understood that there can and will be exceptions to the rules suggested. However, if the exceptions are few, then the strength of the relationship can be strong enough to be very useful. The ILF Model is statistical in this sense. Also, the larger the number of applications that have been function point counted by the organization, the better the strength of its potential ILF Model.

## Starting to Build the ILF Model

Start building your ILF Model by listing all of your applications, their unadjusted function point counts, and their countable ILFs. It is good to have at least 30 applications in this list. This article demonstrates using a sample of just five to save space, but in reality five applications will most likely be far too small a data list. My first ILF Model achieved good statistical significance at 27 applications. My current organization's ILF Model has high statistical significance using many more than 30 applications.

For our example, suppose the below are the five applications, their unadjusted function points ("UFP"), and number of ILFs.

Application	UFP	#ILFs
ABC	87	4
DEF	1438	39
GHI	668	13
JKL	822	19
MNO	283	11

## SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.97032441
R Square	0.94152946
Adjusted R Square	0.69152946
Standard Error	126.922625
Observations	5

## ANOVA

	df	SS	MS	F	Significance F
Regression	1	1037611.789	1037611.789	64.41052022	0.004039053
Residual	4	64437.41088	16109.35272		
Total	5	1102049.2			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	38.3203839	2.713409783	14.1225937	0.00014592	30.786735	45.85403283

The next step is to perform the statistical calculations. Below is the regression printout from Excel. The x-axis values are “# ILFs,” and the y-axis values are the corresponding “UFP.” Please notice also that I have assumed that if an application has zero ILFs, it will have a zero function point count. So, I have set the Excel “Constant is 0” in the regression dialog box. This can improve the quality of the model somewhat if that assumption is reasonable. For this example’s data set, below is the Excel regression printout.

In this example, the “Significance F” is .004, which basically means that there is a .4% chance that there is no relationship between ILFs and UFP with these ILFs, or stated another way, there is a 99.6% chance that there is. Also, the “38.32 in the X Variable 1” coefficients cell means that, as a whole, the portfolio is experiencing about 38.32 unadjusted function points per ILF. However, there is a margin of error for this model as represented in the “Lower 95%” and

“Upper 95%” cells. This basically means that although the actual number of unadjusted function points per ILF is probably about 38.32, it could range somewhere between 30.79 and 45.84 function points per ILF (more about this later).

Next, graph the data. This gives a good picture of the statistical significance of the model.

### Incorporate the General Systems Characteristics

Suppose that one wants to estimate the size of an application having 20 ILFs. Using the ILF Model so far, we would multiply the 20 by 38.32 to get an estimate of 766.4 unadjusted function points. We can improve that estimate by incorporating the General Systems Characteristics. These can be well understood even at the earliest stages of a project life cycle. Suppose we conduct a meeting with the project team and determine that the associated Value Adjustment Factor is 1.08. Multiplying 766.4 by 1.08 yields 828

adjusted function points. The associated margin of error range is now from about  $20 * 30.79 * 1.08$ , or 665 at the lower end, to about  $20 * 45.85 * 1.08$ , or 990, at the high end.

### Improving the ILF Model

Here are some ideas that can be considered to improve an ILF Model. These are in no particular order.

The margin of error in this simplistic demonstration seems high because, in part, the sample size of five applications is too small. As the number of applications in the portfolio that is counted increases, the number of available data points increases and the margin of error decreases. As a good rule of thumb, the margin of error may be acceptable at about 30 applications in the data set. So I recommend building ILF Models based on 30 or more applications.

I believe that asking the project team about algorithms is important and counting one ILF per algorithm for this model is appropriate. [2]

*continued on page 18*

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*ILF Model, continued from page 17*

This application might be the only one in the portfolio using a report generator. My limited experience with report generators is that the ILF Model will work better if those report generator function points are not estimated using the ILF Model; I estimate that functionality separately and add it onto the estimate generated by the ILF Model.

The 38.32 unadjusted function points per ILF assumes that this application will have an architecture that is very similar to that of all other architectures in the portfolio. To the degree that this application differs from that assumption, some other adjustments can be made. For this example, suppose that the project team believes that this application will have about 15% more reports than the typical architecture in the portfolio and believes that the estimate of 828 needs to be adjusted further to reflect that. The function point analyst will need to determine the average percentage of function points for reports for a “typical” application in the portfolio, and then adjust the 828 upward to reflect the 15% increase factor.

Please note one more thing. For this simplistic example, the highest data point in the portfolio was an application of 1438 unadjusted function points. We cannot extrapolate this particular model past 1438, as there is no data collected in that range to justify such an extrapolation. So this model in its present state cannot be used to estimate a count believed to be, say, roughly 2000 function points.

## **Conclusion**

I recommend that function point analysts can widen their arsenal of counting and estimating tools by increasing the number of their portfolio counts and building ILF Models that reflect those portfolios. Most of the time I count function points using the IFPUG method, but sometimes a quick, scientific function point estimate is needed where time and resources are at a premium for the purpose needed. The ILF Model can be a very useful tool in these circumstances. %

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# Vendors' World! Vendors' World!

## David Consulting Group

### *Pennsylvania, USA*

Over many years, the process and measurement experts at David Consulting Group have studied, taught, implemented and audited almost all of the IT improvement methodologies and best practices that have come, gone and stayed around. Current examples of these include Function Point Analysis, Six Sigma, GQM, CMI and ITIL.

With such a variety of tools available, how can you ensure continuous improvement, test for effectiveness or, indeed, test for "mission accomplished?" At DCG, we use our Value Visualization Framework<sup>SM</sup> (VVF) to identify and prioritize the two most important aspects of any improvement initiative. It must deliver value and that value must be visible. Evidence-based value modeling is used to test the potential ROI of individual best practices or combinations of best practices.

The VVF is a holistic framework. You start from where you are now. Your next step is the one that is most valuable to you.

## Q/P Management Group, Inc.

### *Massachusetts, USA*

Q/P Management Group, Inc., a SEI Partner, is a well established, innovative consulting firm specializing in software measurement, estimation and quality assurance for high technology and information service organizations. We provide our clients with the methods and techniques to assess quality and productivity needs; implement continuous process improvements; and measure the results.

Our offerings include:

- Benchmarking Software Development & Support
- Software Project Estimating
- Measurement Program Design & Implementation
- Function Point Analysis & Training – IFPUG Certified

- SEI Assessments, Training & Implementation
- Quality Assurance Techniques
- Outsourcing Evaluation & Vendor Management

Q/P Management Group consultants have experience in numerous industries including defense, financial services, transportation, telecommunications, commercial software, insurance and manufacturing.

Q/P Management Group, Inc. also licenses PQMPlus<sup>SM</sup>, a Windows-based tool, featuring an intuitive design with unique project estimating, scheduling, risk assessment, defect analysis and productivity analysis capabilities using function point analysis.

## Quality Plus Technologies, Inc.

### *Florida, USA*

What's new with Quality Plus Technologies, Inc. in 2008:

- We are re-launching our popular IFPUG Function Point Analysis classes due to demand. Visit [www.qualityplustech.com](http://www.qualityplustech.com) for dates and prices: Hands-on Function Point Analysis, FP for enhancement projects, FP for data warehouses, CFPS preparation workshop.
- We offer all our workshops onsite – at your request. Find out how cost-effective and efficient it is to bring Quality Plus to your site. Visit [www.qualityplustech.com](http://www.qualityplustech.com) to download our workshop catalog.
- Watch for the upcoming Springer publishing release of the Software Cost Estimating book by Manfred Bundeschuh and Carol Dekkers. Anticipated release date: June 2008.
- Quality Plus Technologies has entered an agreement with 4SUM Partners of Finland to offer northern SCOPE<sup>SM</sup> training and certification services to North American customers. Visit [www.qualityplustech.com](http://www.qualityplustech.com) or [www.4sumpartners.com](http://www.4sumpartners.com) for details.

- Join the Quality Plus Measurement Forum online by visiting: [www.groups.yahoo.com/groups/QualityPlusMeasurementForum](http://www.groups.yahoo.com/groups/QualityPlusMeasurementForum) to network with measurement practitioners worldwide.

## QuantiMetrics

### *Germany, UK, South Africa*

For over 15 years QuantiMetrics has worked with the most successful users of IT, including global banking, insurance and the largest telecommunication organizations. Our in-depth knowledge of software development, combined with our independence, makes us the ideal partner for functional sizing (IFPUG FPS), estimation and benchmarking services. We provide competitive and professional FPA consultancy support and hands on training.

Our benchmarking services include evaluating applications, assessing the viability of project estimates and benchmarks to strategically manage IT Services. When suppliers promise the world, our analysis will separate guesswork and exaggeration from realistic proposals. Our clients integrate our services into their processes for negotiating contracts and tracking the performance of outsourced service providers.

We have the unique ability to take static benchmarking output and turn it into meaningful and pragmatic recommendations for change. We have helped our clients achieve sustained cost savings. Our assessments are a catalyst for innovation.

URL: [www.quantimetris.net](http://www.quantimetris.net)

## Total Metrics

### *Victoria, Australia*

Total Metrics measurement services help our clients reduce project risk and optimize the cost effectiveness of their software development processes.

Since 1994 we have worked internationally to provide measurement

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consulting, training and tools to:

- Assess the productivity and quality of an organization's software processes and products
  - Identify opportunities for improvements, and
  - Assess industry competitiveness.
- Total Metrics are world thought leaders in the area of software

measurement and Functional Size Measurement. Their consultants have been co-authors, editors, co-developers and/or reviewers of the ISO/IEC 14143 FSM standards, ISBSG Repository, ISO/IEC 19761 COSMIC-FFP FSM Method and the ISO/IEC 20926 IFPUG CPM.

Total Metrics developed the world's

leading tool in IFPUG Functional Size Measurement – SCOPE Project Sizing Software™. It leads the market in its ability to quantitatively track and quantify your software development project so you can objectively negotiate that you are getting what you are paying for! %



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Steve Keim  
David Consulting Group, Inc.

Valerie Marthaler  
David Consulting Group, Inc.

Tammy Preuss  
ATT

Bonnie Vaughan  
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Sistemi Informativi SpA

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Business Integration Partners  
SPA

Paolo Beretta  
Business Integration Partners  
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Department of Employment  
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David Cleary  
Charismatek Software Metrics

Robyn Lawrie  
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Function point analysis is a valuable tool for estimating, managing outsourcing deals, and improving the productivity and quality of software development.

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Q/P will help your organization determine the benefits, establish the contract guidelines, baseline current performance and implement the measures to manage the outsourcing contract.

Our consulting services provide your organization with a comprehensive understanding of outsourcing benefits, issues, and steps for implementation.

### BENCHMARKING

Q/P's benchmarking methodology utilizes proven techniques to statistically assess the productivity, quality, costs and processes of software development and support.

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These measures are then compared to our regularly-refreshed benchmark database of thousands of projects and applications from a broad range of organizations.

### PROCESS IMPROVEMENT

Consistency in the quality of an organization's software products, and control over the cost to develop and maintain the products are significantly driven by process quality.

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### TRAINING, EDUCATION & MENTORING

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