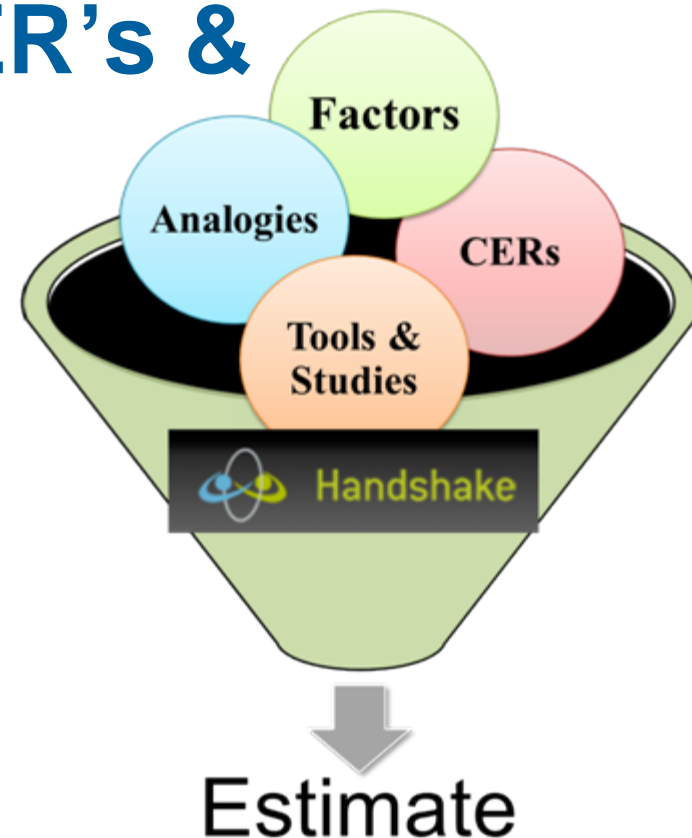


# Getting (and Sharing!) the FACTS: Factors, Analogies, CER's & Tools/Studies

Ruth Dorr and Daniel Harper

Special thanks to colleagues Valerie  
Reinert, Chris Dalton, P.N. "Jai" Jairam

Approved for Public Release; Distribution Unlimited. 13-1495



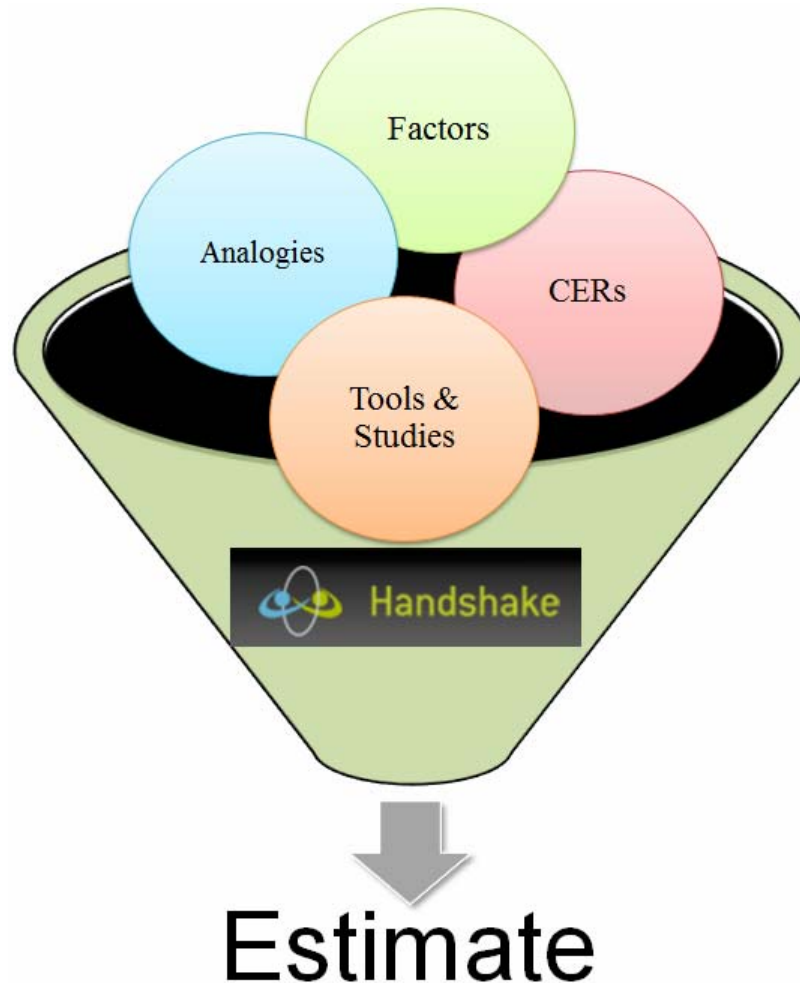
# Prologue

---

- **Huge challenge when it comes to sharing or finding useful cost Factors, Analogies, CER's & Techniques/Studies (FACTS)**
- **FACTS is an internal research project designed to overcome this challenge**
  - Throughout the cost community (not just MITRE)



# A Picture is Worth a Thousand FACTS



# FACTS- Factors & CERs

- Estimating Factors & CERs usually lend themselves well to a spreadsheet or database:

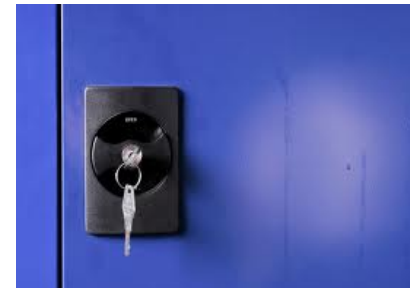
Title of input, variable, or parameter	Most Likely	Unit	Year of Data	Source
<b>Operations and support</b>				
PC Refresh	3.0	years	2009	<a href="#">October 2009 Policy Bulletin 18:"OSD Lifecycle Standards for OSD IT Equipment"</a>
Laptops Refresh	3.0	years	2009	<a href="#">October 2009 Policy Bulletin 18:"OSD Lifecycle Standards for OSD IT Equipment"</a>
Monitors Refresh	6.0	years	2009	<a href="#">October 2009 Policy Bulletin 18:"OSD Lifecycle Standards for OSD IT Equipment"</a>
Printers Refresh	4.0	years	2009	<a href="#">October 2009 Policy Bulletin 18:"OSD Lifecycle Standards for OSD IT Equipment"</a>
<b>Software</b>				
SLOC per Function point "back-firing" ratio	80.0	SLOC/FP		<a href="http://www.davidconsultinggroup.com/indata.htm">David Consulting Group (http://www.davidconsultinggroup.com/indata.htm)</a>
SW growth per month	1%-3%	%/Month		Capers Jones

# FACTS-Analogies

---

## ■ Analogies

- Analogies can refer to entire systems or just some elements of systems.
  - E.g., system to do Identity Credential and Access Management
  - Find an analogous *system* for cost comparison.
- A “Sub-element” analogy might be the cost of Testing
- E.g., for a particular DHS program an Operational Testing Agent was required
- GAO report on a similar program for the same agency reported \$1.8M to do OTA testing



# FACTS- Analogies, cont'd

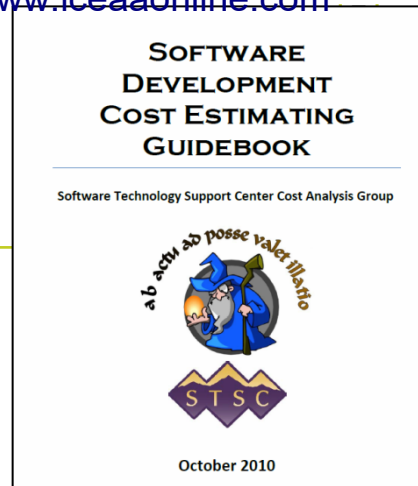
- **Analogies require more context than factors, but also can be expressed in a spreadsheet or database:**
  - Note that referencing the agency may get more buy-in from client

System or Element	Agency	Value	Unit	Year of		Definition & Comments	Source	Sensitivity
				Data				
Operational Testing Agent	DHS	\$1.8 M	TY\$M	FY12		This includes test consulting services provided by the U.S. Navy Space and Naval Warfare Systems Command (SPAWAR) in support of testing. The OTA provides a number of personnel to monitor and observe testing activities and contribute suggestions drawing from the SPAWAR knowledge data base.	According to the GAO Nov 2011 Report on the DHS Transformation program, "Cost of an operational testing agent, who would be responsible for planning, conducting and reporting independent OT&E for Release A, was not included in the acquisition planning process. USCIS officials from TPO and OIT agreed that an OTA appeared to be a duplicative effort because TPO had already planned to conduct independent testing. However, DHS denied TPO's request for a waiver of the OTA. As a result, USCIS contracted with an independent OTA by Oct 2010, and as of June 2011, TPO has awarded approximately \$1.8M towards this contract."	Public

**...”an analogy requires little data and can be used as a good cross-check to validate an estimate.”**

**- GAO Cost Estimating and Assessment Guide,  
Ch. 11, p. 108**

# FACTS-Tools and Studies



- Software Development Cost Estimating Guidebook
- At 200+ pages, this tome *is not easily codified in spreadsheet form*
- The manual touches on *numerous factors* impacting cost, including the impact of physical space for development teams, team experience, etc.
- Too much context required to simply put into a database!



# The Case for Change in 3 Acts





# Act 1: The Wisdom of Crowds



# Metcalfe's Law

---

- Metcalfe's law states that the value of a network is proportional to the square of the number of connected users of the system

**N<sup>2</sup>**

**Obligatory ICCEA  
Formula Slide**



# Crowdsourcing\*

- The crowdsourcing model [taps] the collective knowledge of the community to harness the crowd to directly produce goods and services.
- [...] the crowdsourcing model *actively involves the community in the process of online production activity.* [emp. mine]



\*"Rules of Crowdsourcing: Models, Issues, and Systems of Control," Author: Gregory D. Saxton, Onook Oh, Rajiv Kishore,

Source: Information Systems Management 2011

# Act 2: Open Government and Open Source



# The Open Government Initiative and the Open Source Movement

- In 2009 President Obama's signed the Memorandum on Transparency and Open Government
  - Government should be transparent, participatory, Government should be collaborative
- Open Source:
  - “Open source refers to a program in which the source code is available to the general public for use and/or modification from its original design.”
  - “Open source code is typically created as a collaborative effort in which programmers improve upon the code and share the changes within the community. “ -*Wikipedia*



# Open Source Successes



- Amazon's [Mechanical Turk](#)
- Other well-known examples include Red Hat, TopCoder, Wikipedia
- Not just private industry but NASA and Center for Medicaid Services

## IT DASHBOARD

The screenshot shows the TopCoder website's IT Dashboard. At the top, there is a navigation bar with the TopCoder logo (a red 'C' in a square) and the tagline "a place to create". Navigation links include "Community", "Platform", "About Us", and "Contact Us". Below the navigation bar is a section titled "CLIENT SUCCESS STORIES" with a red book icon. The main content area displays three client success stories in a grid:

Client Logo	Client Name	Industry	Client Name
	NASA	Government	NASA
	Humana	Healthcare	Humana
	Harvard Medical School	Bio-Technology	Harvard Medical School



# Act 3: Social Networking vs. Traditional Knowledge Management



# 1995 vs 2013 Technology

- E-mail lists: so 1995



- Social Networking and KM tools: so 2013!!!





# Enterprise Social Networking vs. Traditional KM

- Much simpler, 90% of functionality, minimal training
- Bottoms up, employing wisdom-of-crowds vs. top-down “SharePoint” approach
- No license required-just a web browser
- “SharePoint lite” allowing for collaboration and file sharing *without the need for a SharePoint administrator!*
  - Ease of use: If you can upload or find a video on YouTube, you can use Handshake
- Provide feedback on artifacts via comment or simply “Like” it
- Not only for the “under 40” set-at least at MITRE most users (70%) are more senior (mid-level manager to principal)



# “Market” Survey of Cost KM sites

- **Defense Acquisition University Knowledge Sharing Portal**
  - Registration is required
  - Restricted to members of the Department of Defense (DoD), Government, or those supporting the Defense Industry.
  - Site contains a lot of great administrator-posted content such as DoD Directives on all aspects of Acquisition, but there does not appear to be a lot of user-generated content.
- **Army Cost and Performance Portal** <https://cpp.army.mil>
  - CAC card required (or AKO e-mail account)
- **Many organizations struggle with Knowledge Management (KM) implementation**
- **Some vendor dialogue on LinkedIn via groups, mostly thinly-veiled marketing**

Assistant Secretary of the Army  
Financial Management & Comptroller  
**Cost & Performance Portal**

The screenshot shows the homepage of the Defense Acquisition University Knowledge Sharing Portal. The header features the DAU logo and the text "DEFENSE ACQUISITION UNIVERSITY Learn Perform Succeed". Below the header is a navigation menu with links for Home, About DAU, Student Information, Publications, Locations, Careers at DAU, Catalog, and Defense Acquisition Portal. The main content area is titled "Knowledge Sharing" and includes a search bar, a "DAU TOP 5" list, a "SITE MENU" with links to Acquisition Workforce, DAU/ACQ/ACQ/ACQ, Alumni Information, DAU iTunesU, DAU Media Kit, Acquisition Conferences, and FAQs, and a "DAU CALENDAR" for February 2013. The main content area also features a "Knowledge Sharing" section with a description of the portal's purpose and a grid of icons for various resources: DAP (Defense Acquisition Portal), ACC (Acquisition Community Connection), Media (Video clips from senior leaders), ILC (Integrated Defense AT&L Life Cycle Management Chart), P&T (Your one stop shop for Program Management), Ask-a-Professor (Got an acquisition question? Go to the experts!), and SAM (Service Acquisition Mail).

# “Market” Survey of Cost KM sites

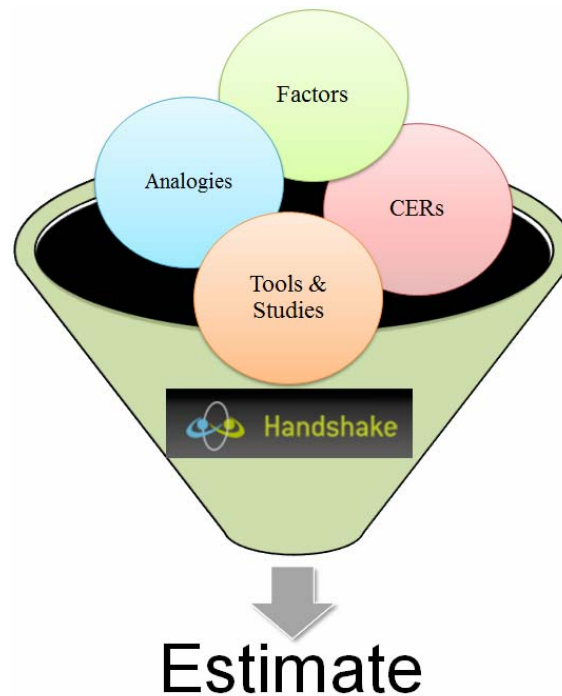
- Even the International Cost Estimating and Analysis Association (the International Cost Estimating and Analysis Association ) has made a valiant KM attempt
- Limited networks to draw from: Many companies have fairly small cost groups of 40 or so estimators
- These are valuable and worthwhile endeavors, but rely on a “top-down” model with dedicated administrators

## **Tools & Applications** (for ICEAA Members)

### *EVM Trend Tool*

- [EVM Trend Tool Instructions Draft4](#) (docx)
- [EVM Tool Presentation](#) (pptx)
- [Roy Smoker Paper On EVM](#) (pdf)
- [EV Trend Analysis Tool 120522 Rev1](#) (xlsm)

# The Solution: The Cost FACTS Handshake Group



# The Handshake Solution

- E-mail dialogue preserved for future members (versus sitting in e-mail inboxes, inaccessible to new employees)
- Can easily be opened up to partners!
- Interface w/ variety of SMEs (vs. only cost SMEs sign up for cost-focused e-mail list serves, (i.e., e-mail discussion lists))
- 80 members across MITRE, 72 artifacts, 183 discussions/comments (only administrators know SharePoint stats)
- 48% of members contribute
- Offers a simple Calendar feature
- See site [here](#) (MITRE Fast Jump “FACTS”) or contact [djharper@mitre.org](mailto:djharper@mitre.org)



Group metrics					
	TOTAL		PAST 7 DAYS		TREND
Discussions	16	42	1	14	↑
Files	67	124	2	40	↑
Pages	6	15	-	-	—
Blog posts	-	-	-	-	—
Albums	1	-	-	-	—


Contributing members: 48%


# The Handshake Solution

- Users can provide value-adding "color commentary"
  - Discussion is available for others (vs. traditional e-mail discussion)

## Software Cost Estimating Relationships

Download this file





**Software Cost Estimating Relationships** 

By Daniel Harper Oct 12, 2012 Comments (2)


932 KB


Software Cost Estimating, CERs, SLOC

Edit  

Software cost overruns are a common problem for the majority of software development projects. With the ever increasing amount of software present in current Department of Defense (DOD) programs, it is extremely important to generate an accurate software cost estimates. There are many complex models that estimate software development productivity and costs. This paper builds upon the principles of these models to look for a simple regression model that can be used to generate accurate and defensible cost estimates for software development programs.

### Comments



**Gareth Embrey** Oct 12, 2012 

Unfortunately, this paper does little to alleviate any challenges inherent in the development of software cost estimates. Even the CERs that show potential utility are discounted by additional analysis. The paper does state that the use of any CERs developed in this model (and as a rule, all other non-parametric models) should be limited to the development of ROM estimates. A good software cost estimate that is not built upon a direct analogy (which is always preferable, if available!) is heavily reliant upon a good size estimate, the use of a justified and applicable factor to estimate code growth, and a reasonably good understanding of the most impactful environmental/complexity factors that will determine the productivity of the development team.

It seems like most of the current research being done is on more effective ways to estimate size using better sizing measures rather than how better to churn out estimates using a given software size. This paper focuses exclusively on ESLOC, which is not always (and some would argue rarely) the best metric to use in measuring size given the current state of software development techniques. Today's parametric models allow for the input of many different metrics because of this, even though SLOC (or ESLOC) is still the predominant choice because of its ease of understanding.

Gareth Embrey, CCE/A

# The Handshake Solution

- Users can even see how many members viewed a given document or discussion
  - Typically when something is posted to SharePoint other users have no idea how useful the item is or what other users think of the artifact

« Previous 1 2 3 4 5 6 ... End Next » 76 total

 **DISA Defense Working Capital Fund (DWCF) Telecommunications Services Billing Prices For FY 2013**  Viewed by 1 member   

By Daniel Harper 22 hours ago

◆ Telecommunications cost, DISA, Catalogue, DISN Subscription Services

[Hat tip: Laurette Sullivan]. She recommends "checking internally with Joe Young. He is the ADH for Networking, Video and Telecom and is a real genius when it comes to this stuff." "DISA Defense Working Capital Fund (DWCF)..."

---

 **Excel Travel Calculator**  viewed by 10 members   

By Daniel Harper Mar 19, 2013


◆ Travel cost, travel calculator

Use this handy Excel travel calculator to build up a travel estimate.

# The Handshake Solution

- Integrates with Outlook e-mail for those w/firewall issues
  - dialogue will be synchronously posted to the group site for others to view

**[The Cost FACTS:...]** File: DISA Defense Working Capital Fund (DWCF) Telecommunications Services Billing Prices For FY 2013

 Daniel Harper [Handshake] <no-reply@handshake.mitre.org>

Sent: Wed 3/20/2013 12:37 PM

To:  Harper, Dan

[Daniel Harper](#) has uploaded a new file to the group "[The Cost FACTS: Factors, Analogies, CER's & Tools/Studies](#)":

[DISA Defense Working Capital Fund \(DWCF\) Telecommunications Services Billing Prices For FY 2013](#)

[Hat tip: Laurette Sullivan]. She recommends "checking internally with Joe Young. He is the ADH for Networking, Video and Telecom and is a real genius when it comes to this stuff. "

DISA Defense Working Capital Fund (DWCF) Telecommunications Services Billing Prices For FY 2013.

[email a reply](#) (one time use, before Apr 4, 2013)

[email a status update](#) (one time use, before Apr 4, 2013)

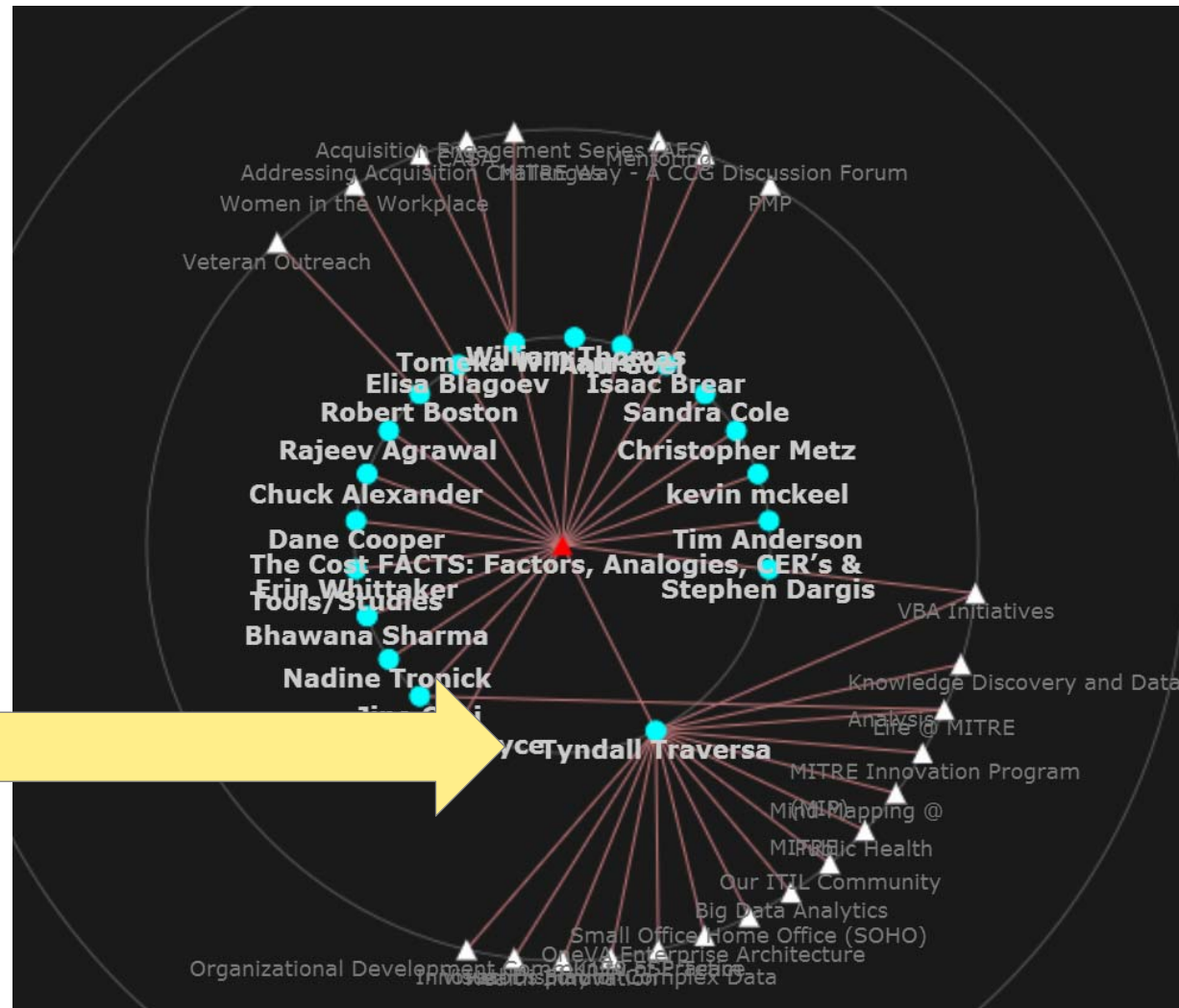
[email a file to this group](#) (one time use, before Apr 4, 2013)

You can [adjust your notification options](#): choose between instant alerts or a daily digest - or opt out by group.



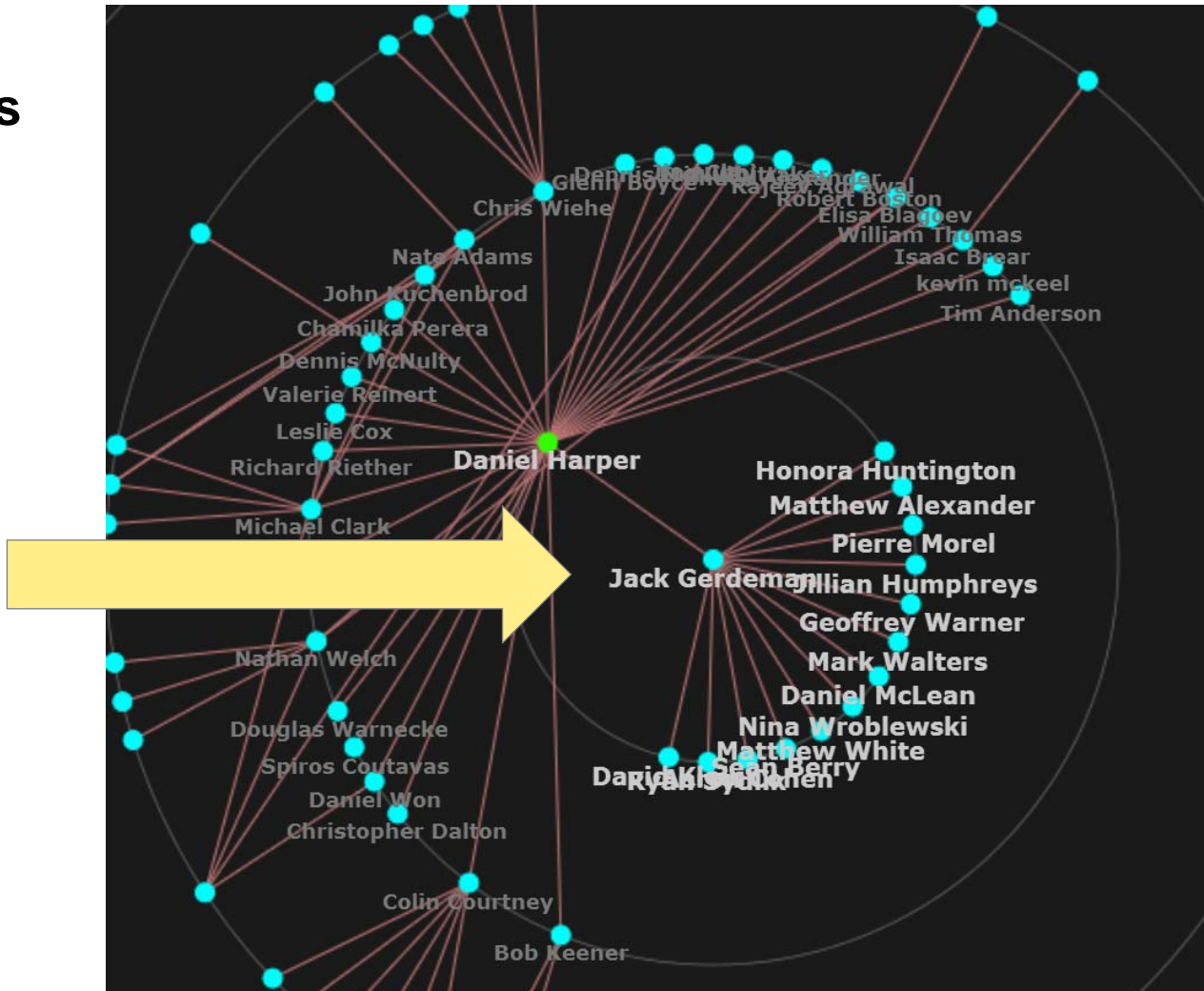
# Visualization Tools-Explore Group Membership

- See what other groups your group members are connected to
- Find “nodes” or “hubs”, e.g., Tyndall Traversa connected to multiple groups of interest



# Visualization Tools-Explore Relationships

- See to whom group members are connected



# What's in it For Me?

- Why should I “give it away” for free?
- Technology has changed many industries’ business models. Think of these examples:
  - Developers gives away apps and charge for additional features
  - MP3s have changed the music industry-Some bands give away the album and charge for concerts
  - A cheeky upstart “someecards”
- It’ll help you (you scratch my back...). The customer or colleague you help today could become your employer if you demonstrate value!
- The Golden Rule (do unto others...)
- Customer recognition
- For more see Harvard Business Review [article](#) “Get Your Team to Work Across Organizational Boundaries”



# User Guide and Best Practices

- Handshake User Guide [here](#)
- Don't simply think of it as a marketing channel
- Do not post anything marked FOUO (For Official Use Only), Proprietary or Sensitive
  - E.g., no Gartner Studies without permission (They frown on posting those to SharePoint OR Handshake)
- **Hyperlinks** to public proprietary sources okay (e.g. RAND studies)
- If you are unsure, simply ask
- If you make a mistake, it's okay, we'll fix it. No hand-slaps!



I thought you loved me-How could you post proprietary data?

# Handshake 101

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- Click [here](#) for a four-minute handshake primer (accessible to non-MITRE Partners)
- Everything you need to know about Handshake you can learn watching [this video](#) during lunch (accessible to non-MITRE Partners, but you must be a Handshake member)



\*"Rules of Crowdsourcing: Models, Issues, and Systems of Control," Author: Gregory D. Saxton, Onook Oh, Rajiv Kishore,

Source: Information Systems Management 2011

# What is a group?

- A space created for collaborating and communicating around a project, a community of practice, an event, an organization, a social group, and more.

The screenshot shows the 'Handshake User Support' group page. Annotations include:

- Group Home Page** pointing to the top header area.
- Groups contain different tools for collaborating and communicating:** pointing to a list of tools: Discussion forum, Files, Blogs, Pages (group-editable), Albums.
- The Activity River displays the most recent group activity.** pointing to the activity feed.
- How healthy is your group? Is everyone contributing?** pointing to the group metrics table.
- The tag cloud provides an overview of tagged content and is a quick way to find content - just click on the tag.** pointing to the tag cloud.
- All group members** pointing to the group members list.

**Handshake User Support**

The Handshake User Support Group was created as a space for Handshake users to ask questions, make suggestions, report bugs, and get help.

Feel free to browse our [User Guide](#). If you cannot find the answer to your question or would like to make a recommendation, create a new [discussion topic](#). Use the [message board](#) to post comments.

You may also contact us by [email](#).

user support, user guide, help, feedback, hand, help, feedback, handshake, support, handsh

Group type: Application Support

**Discussion** add a topic | view all

**Activity**

**Single page view option?**  
Started by Patti Butler Feb 13, 2012 Comments (2) Last reply by Fred Robinson Feb 13, 2012  
Is there a way to change to some of the long discussion/b threads rather than clicking t

**Handshake at the Science Fair**  
Started by Stan Drozdetski Feb 8, 2012  
Want to take a sneak peek at the upcoming version of Handshake? Meet the Handshake team? Come to the Science Fair today at the MITRE Center (Bedford) or the Tie corridor (McLean)!

**Handshake's wild Monday**  
Started by Stan Drozdetski Feb 8, 2012  
Not the best day in Handshake land - first, we found ourselves running low on disk space; then, we had to take some downtime while the space allocations were being increased by the outage. The

**Group metrics**

	TOTAL	PAST 7 DAYS	TREND
Discussions	101 257	2 5	↕
Files	113 6	1	↕
Pages	47 593	- 2	↕
Blog posts	31 57	-	—
Albums	-	-	—

Contributing members: 33%

**Tag cloud**

handshake, user guide, help, user manual, help pages, feedback, Metrics, groups, data, group, tools, blog, profile, notifications, video, release, help, user guide, help, user manual, help pages, feedback, Metrics, groups, data, group, tools, blog, profile, notifications, video, release,

**Search in this group**

Go

**Subgroups**

No subgroups found

**Group owners**

Laurie Damianos (primary)  
Lysa Olimpo  
Jessica Honecker  
Michele Smith  
Jon Maul  
Donna Cuomo  
Stan Dro

**Group members**

All group members

# The Cost FACTS Handshake Group (Demo)

## The Cost FACTS: Factors, Analogies, CER's & Tools/Studies

Edit group



This group is to serve as a supplemental forum to using e-mail (think SharePoint light) for MITRE and partners across the cost community (both Gov't and industry).

Handshake is useful for posting files, briefs, studies, etc. and hosting discussions related to IT cost.

microsoft excel, k461, cost estimate, cost estimating, igce, lce, FACTS, Factors, CERs

<http://communityshare.mitre.org/sites/V400/V460/V461/Workspace/Ice%20Chest.aspx>

Group type: Community of Practice - created Dec 20, 2010

### Discussion

add a topic | view all



#### CHAOS Manifesto 2013: Think Big, Act Small, published by the Standish Group

By Daniel Harper Feb 26, 2013

Standish, CHAOS Manifesto

The Standish Group has just published their annual CHAOS Report, CHAOS Manifesto 2013: Think Big, Act Small. This year, the focus of the 48-page report is on:

- Comparing small project...



#### Branding: Changing ICE CHEST Handshake Group to FACTS:

By Daniel Harper Feb 12, 2013

I've re-branded the ICE CHEST handshake group as the "Sharing Cost FACTS: Factors, Analogies, CER's & Tools/Studies" handshake group to 1) distinguish it from the ICE CHEST SharePoint site and 2) reflect a

### Activity

view all



#### Daniel Harper uploaded the file IEEE Buy vs Lease for Government Contracts 1995

IEEE Buy vs Lease for Government Contracts 1995

yesterday

add a comment



#### Daniel Harper added a new discussion topic CHAOS Manifesto 2013: Think Big, Act Small, published by the Standish Group

The Standish Group has just published their annual CHAOS Report, CHAOS... more

Feb 26, 2013

add a comment

# Recruitment Strategies: Getting Others Engaged

- **“Shameless” promotion: In Top 100 of over 800 groups on Handshake**
- **Publicly unveiled to MITRE cost community via June Cost newsletter, “brownbag” brief**
- **Pointing others to the site (vs. e-mailing files to them)**
- **Created Fast Jump (MITRE Internet keyword search term)-”FACTS”**
- **Created personal intro e-mail, short orientation brief sent to new members; calling new employees to encourage them to join**
- **Promote the idea that “benefits members receive outweigh the ‘costs’”\***
- **Increased awareness via Association for the Advancement of Cost Engineering International, ICEAA conferences**

Subject: FW: [IT Cost Estimat...] File: GAO: Size and Scope of Modernization Investment Merit Increased Oversight, GAO-13-179, Jan 10, 2013

CATT~

This was posted to/shared with the ICE CHEST Handshake group, so I thought I'd pass it on. If you are not a member of this Handshake group, you can access the report via the link below, or, you might want to consider joining the ICE CHEST group to receive other information/tools/articles such as this ([fastjump: handshake](#)).

Happy weekend!

Laurette M. Sullivan  
Lead Economic/Business Analyst

**\*\*Leveraging Social Science to Boost Adoption of SMAC Technologies - Higgins and Clark, The Journal of Information Technology Management, Feb 2013**



# Recruitment Strategies: Getting Others Engaged

- Inviting influential internal colleagues as well as outside experts (i.e., DHS, President of the ICEAA Washington chapter, former colleague)
- We aren't trying to create a *new* community out of whole cloth: it exists informally already

**From:** Timothy Anderson [mailto:[timothy.anderson@iparametrics.com](mailto:timothy.anderson@iparametrics.com)]  
**Sent:** Wednesday, March 06, 2013 11:10 AM  
**To:** Harper, Dan  
**Subject:** RE: Invitation to the Cost FACTS Handshake Group!

Hi Dan,

This will make an excellent briefing to the Washington Chapter! And, I plan to sign up for the Handshake group ASAP!

---

**From:** Kevin McKeel [mailto:[mckeel@logapps.com](mailto:mckeel@logapps.com)]  
**Sent:** Wednesday, February 20, 2013 2:13 PM  
**To:** Harper, Dan  
**Subject:** RE: Cost FACTS Group

Dan,

Things are well, or as well as they can be in the age of sequestration. Just registered, excellent concept. I've had a lot of discussions with various cost people about the lack of open source data for anything to do with estimation. I think all of us in the industry have our own sources, and it makes sense to bring all of our ideas together. Will post some artifacts and comments

# Epilogue

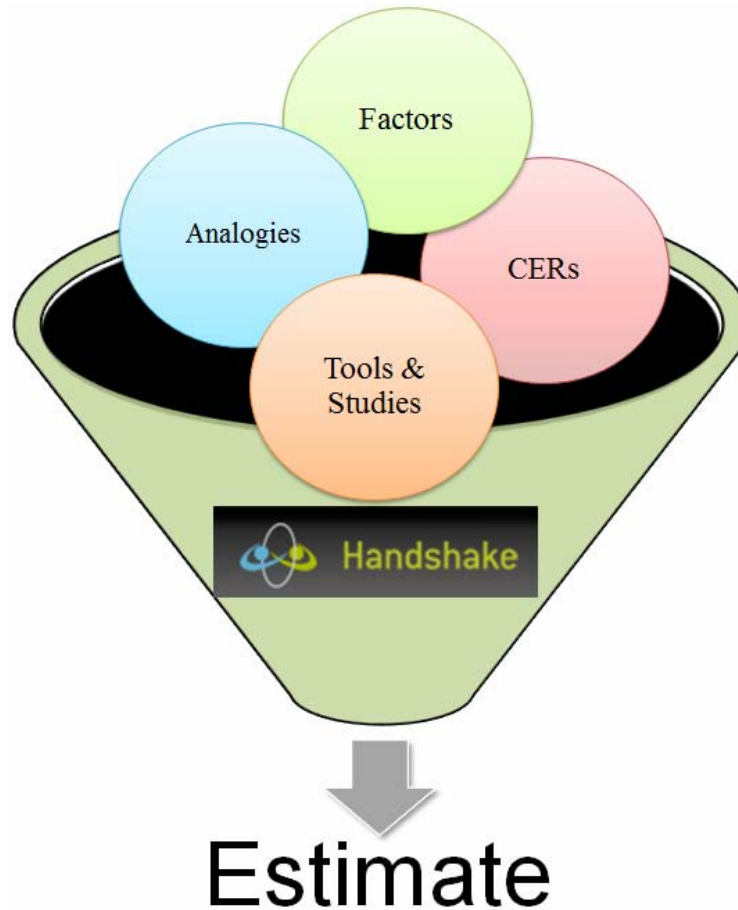
---

- **This presentation has provided in detail the FACTS project, including challenges overcome and remaining hurdles**
- **Organization should engage enterprise social media as a platform to help lower our natural instinct to “close-hold” data**
- **Ultimately the sharing across organizational boundaries will benefit everyone**



# Appendices

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# Tagging 101



- A tag is user-defined metadata; that is, it is a term you can add to any object you create within Handshake.
- Use the Tags field when you create blog posts, discussion topics, pages (and subpages), files, bookmarks, albums, and pictures
- This use of user-defined tags is common in social media. It has the advantage that people can use terms that are familiar to them.
- It also means the tags that individual users assign to objects might not always match up. For example, one user might tag topics related to Enterprise 2.0 as “E20” and another might use the tag “E2.0.”
- A search on one of these strings will not find content that is tagged with the other.

## Tag cloud

cost estimating, LCCE, DHS, software cost, cost estimate, Cost Element Structure, Labor rates, template, K461, CES, software cost estimating, GAO, AoA, SCEA, Agile Cost Estimating, excel, CEBD, WBS, Data center, soa, Cost, IGCE, lessons learned, ERP Cost, Analysis of Alternatives, healthcare IT, ICE CHEST, CERs, SLOC, DMSMS

# Tagging 101

---



- A rule of thumb in tagging is to tag anything that you want to be able to find again quickly and that you want other people to discover.
- Tags are a great way to build a collective knowledge base and share an ongoing conversation about a topic that is interesting to you and others.
- Tags ensure that when a person in Handshake is looking for material in a particular area, they will be able to find materials which have already been created or shared on the topic.
- When tagging use both acronyms and the actual word, e.g., “IGCE” and “Independent Government Cost Estimate” (note searchers are not case sensitive)
- Note that a search for anything tagged “cost estimate” would also return results for anything tagged “Independent Government Cost Estimate”

# Tagging 101



- Recommend using between four and ten tags. The more the merrier.
- Good tagging likely means that more site visitors will see your content, and the contributor herself will find the content more readily in the future

## Tag cloud

cost estimating, LCCE, DHS, software cost, cost estimate, Cost Element Structure, Labor rates, template, K461, CES, software cost estimating, GAO, AoA, SCEA, Agile Cost Estimating, excel, CEBD, WBS, Data center, soa, Cost, IGCE, lessons learned, ERP Cost, Analysis of Alternatives, healthcare IT, ICE CHEST, CERs, SLOC, DMSMS