



# **Top 10 Function Point Uses in Mature Software Organizations**

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# AGENDA

- Basic Function Point concepts
- Agile and FP
- Top 10 FP uses by mature organizations
- Steps to a sustainable measurement program
- Q & A

# Quality Plus Technologies, Inc.

## List of Clients



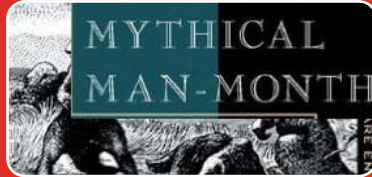




# BASIC CONCEPTS

# HISTORY LESSON

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1970's: Fred Brooks Mythical Man Month (1975); Alan Albrecht 1<sup>st</sup> FP method (1979); Putnam parametric estimation; COBOL / Fortran; 1<sup>st</sup> Software Development Life Cycle (SDLC) models



1980's: Barry Boehm: S/W Engineering Economics (1981); International FP User Group – IFPUG (1986) & other metrics groups formed; Methods published: IFPUG FP, Mark II, Feature Points; parametric estimating models: COCOMO II, etc.



1990's: ISO/IEC 14143 Functional Size Standards (1998+); Italy (1<sup>st</sup>), then Brazil & Korea governments → FP; Certification (CFPS); national metrics groups → Growth; ISBSG; Capers publishes in Scientific American (1998); Watt Humphrey: Managing the Software Process;



2000's: IFPUG & other FSM Methods → ISO/IEC FSM Methods; IFPUG publishes textbook IT Measurement, Advice from the Experts; Southern Scope; IFPUG releases (1-4.2); IFPUG releases SNAP: Software Non-functional Assessment Process (2009)



2010's: IFPUG 4.3.1 (2010), Malaysia adopts FP; IEEE PAR for SNAP (2017); IFPUG celebrates 30<sup>th</sup> anniversary with ISMA14 (Sept 13-15, Cleveland) and International Year of Software Measurement #IYSM (2017)

# BASIC TERMINOLOGY

**Functional Size Measurement (FSM)\*:**  
the process of measuring Functional Size

**Functional Size\*:** a size of the software derived  
by quantifying the Functional User Requirements

**Functional User Requirements\*:**  
a sub-set of the user requirements.

The Functional User Requirements represent the user practices and procedures that the software must perform to fulfill the users' needs. They exclude Quality Requirements and any Technical Requirements

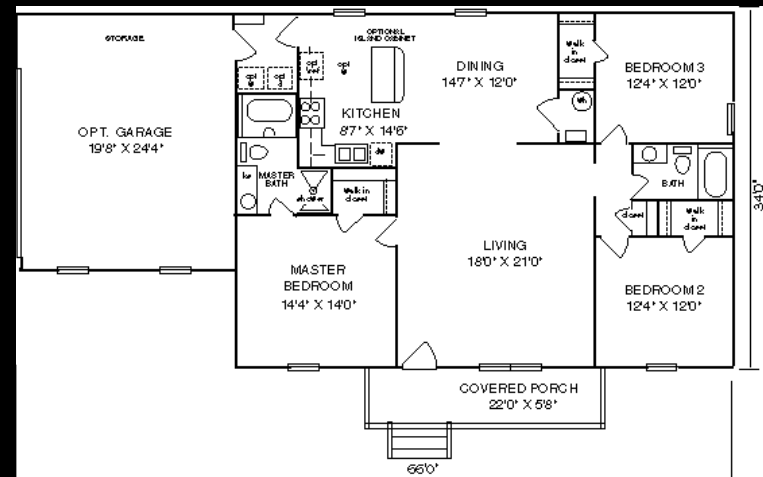
**Function Points:** unit of measure for Functional Size when using  
The International Function Point Users Group (IFPUG) FSM Method

*\* Source: ISO/IEC 14143-1 Functional Size Measurement:  
Definition of Concepts*

"Function Points (FP) are similar to square feet (or square meters) for software.

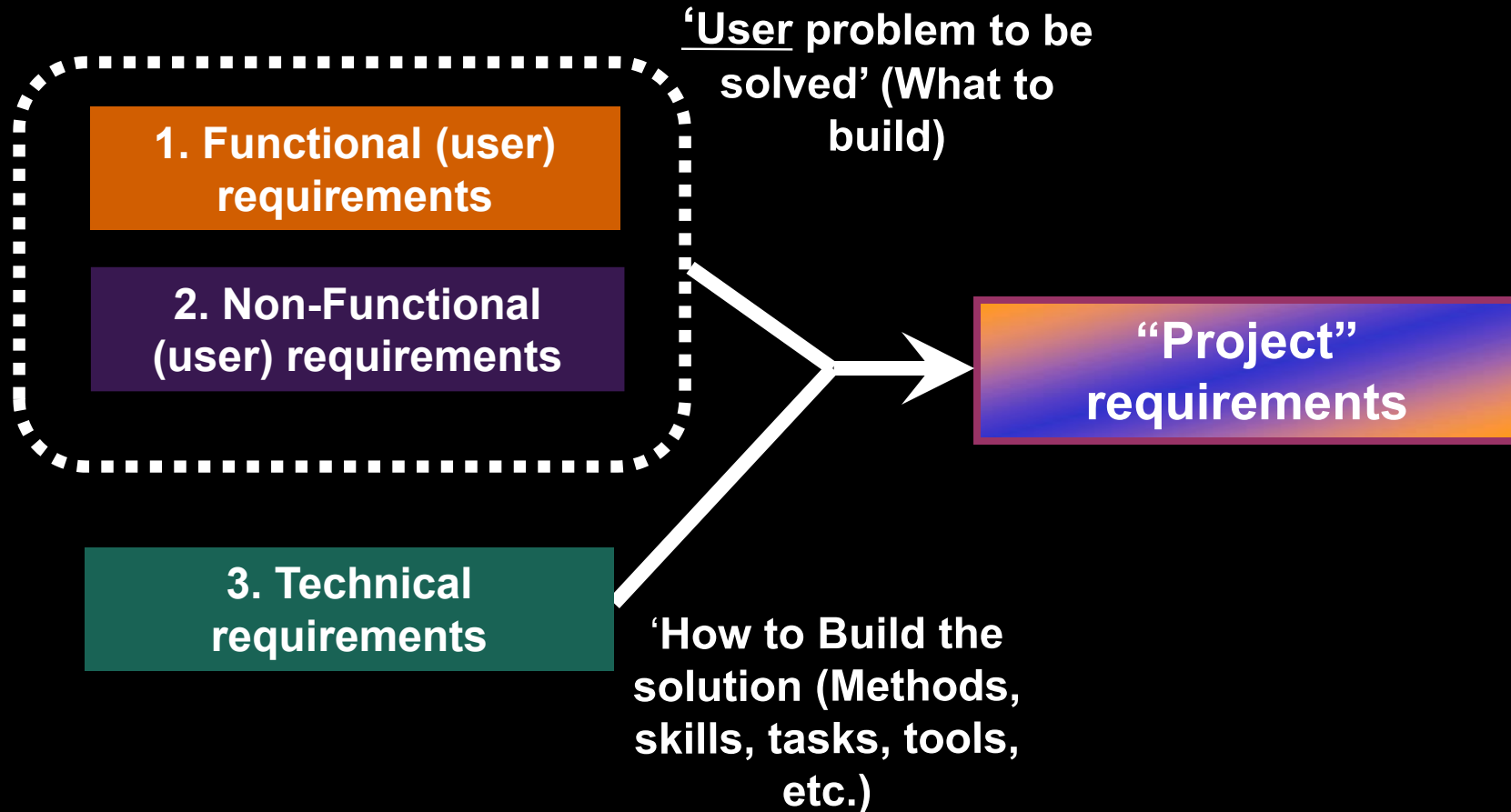
FP quantify 'WHAT' the software must do."

*Carol Dekkers*





# WHERE DO FP FIT?



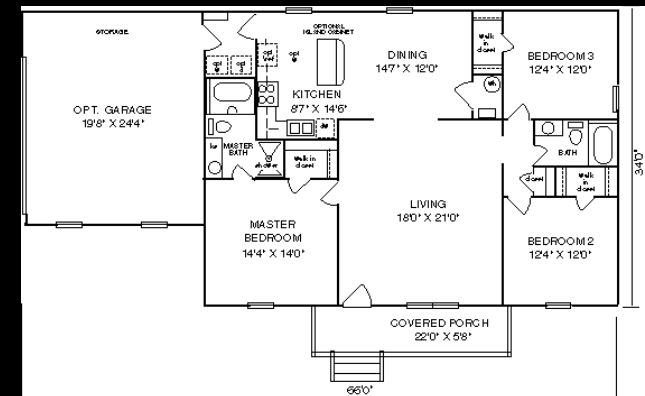


# 1. FUNCTIONAL USER REQUIREMENTS

What the software must do

Assess functionality:

inputs, outputs, queries,  
data stores (maintained,  
referenced)



**Size = functional size (units = FP)**

## 2. NON-FUNCTIONAL USER REQUIREMENTS

**How** software must perform  
(Quality: ISO 9126/SQUARE,  
performance, +ilities)

Formerly VAF, now SNAP Points, (or  
parameters)

**Non-functional size = VAF,  
SNAP points (or parameters)**



### 3. TECHNICAL REQUIREMENTS

How software will be built

Includes: Architecture,  
environment,  
programming language,  
skills, resources,  
methodology...



SDLC methods: Agile vs waterfall vs spiral

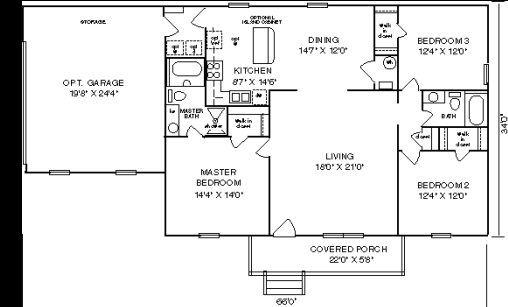
Not part of s/w product size (parameters)



# ISO/IEC STANDARDS

## Functional Size Measurement

- Functional size measurement framework  
ISO/IEC 14143-1 through -6
- IFPUG 4.3.1 unadjusted – ISO/IEC 20926
- COSMIC – ISO/IEC 19761
- NESMA – ISO/IEC 24570
- Mark II – ISO/IEC 20968
- FiSMA 1.1 - ISO/IEC 29881



## Quality Measurement

- SQUARE – ISO/IEC 25000 series, (replacing ISO/IEC 9126 series)

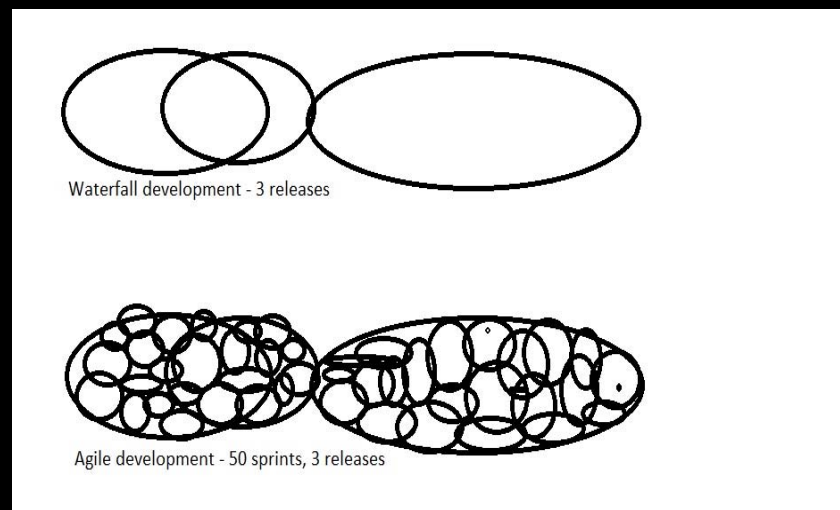
## Process Standards

- Software (& systems) life cycle processes –ISO/IEC 12207
- Software Engineering body of Knowledge (SWEBOK)
- Software measurement framework – ISO/IEC 15939



# ABOUT AGILE: FP ARE INDEPENDENT OF METHODS, TECHNOLOGY, NFR, ETC.

- Software product size → independent of SDLC
- Agile FP delivery delivered in releases (not sprints)
- Consistent measurement → IMPORTANT !





# TOP TEN FUNCTION POINT USES BY MATURE ORGANIZATIONS

# 2015 STATISTICS BY CAPERS JONES<sup>15</sup>

GLOBAL SOFTWARE PROJECTS	10,000 + FP Projects Started	1,000 + FP Projects Started	Troubled %	Outsource %	Using FP %	Using Parametric Estimates %
Large European	2,000	30,000	37%	20%	65%	15%
Large Asia/Pacific	4,000	60,000	44%	15%	35%	20%
Large Central/ South American	1,700	25,500	52%	25%	70%	9%
Large Russian	1,650	24,750	64%	20%	5%	5%
Large Arab/middle east	500	7,500	55%	55%	4%	5%
Large African	250	3,750	58%	55%	30%	20%
Subtotal	10,100	151,500	48%	21%	43%	14%
U.S. Subtotal	4,050	60,750	38%	56%	46%	23%
GLOBAL TOTAL	14,150	212,250	11%	31%	42%	17%

Troubled projects = cancelled, delayed, overrun or poor quality.

Function Points mandated by governments in Brazil, Italy, Malaysia, Japan, S. Korea

# 1. SOFTWARE CONTRACTING

## Based on unit pricing (currency/ FP)

- Balances risk (fixed price favors customer, T&M favors supplier)
- Highly flexible to change

## Government directives: Brazil, Italy, Malaysia, Japan, Korea

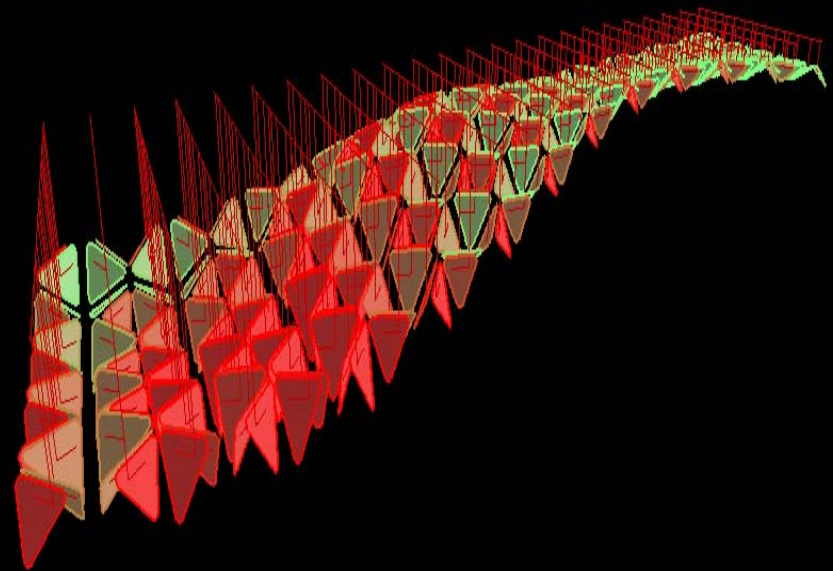
## Mandated / optional implementations

- Proposal evaluation: # of Certified Function Point Specialists (CFPS)
- Legislation may govern
- Pricing vs costing models



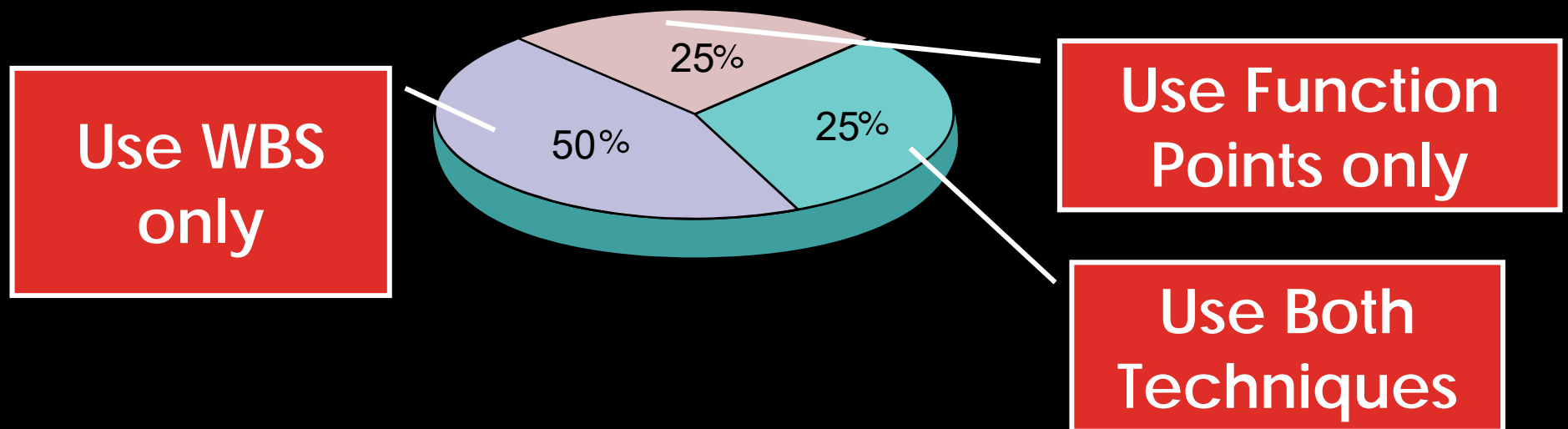
## 2. PARAMETRIC COST ESTIMATION

Commercial products:  
COCOMO II,  
CostXpert,  
Excelerplan,  
Knowledge Plan,  
SEER,  
SLIM,  
Software Risk Master,  
True Price,  
Others



# ESTIMATION ACCURACY

Estimates based on Function Point sizing are producing the most accurate estimates



# 3. OUTSOURCING MANAGEMENT

Supplier payment  
based on FP  
delivered

Negotiation /  
pricing based on  
(past) performance

May include reward  
/ penalty  
mechanism

May include unit  
pricing

Offshore or other  
(US/India,  
Germany/Latvia,  
Europe/China, etc.)

Basis for insourcing  
(U.S.)



## 4. FORMAL SCOPE MANAGEMENT

### Based on formal methodology

- Southern Scope (Australia)
- northernSCOPE (Finland, Sweden, Denmark, Germany)

### Training curriculum and certification (northernSCOPE)

### Customer driven with supplier collaboration

- Early estimates in FP
- Contracting based on unit pricing
- Flexible to change (change orders)
- Scope manager role as customer and supplier advocate



# TOP 10 REASONS FOR PROJECT FAILURE

**60% SCOPE  
related !**

- Lack of top management commitment
- **Misunderstanding the requirements**
- **Not managing change properly**
- **Failure to gain user commitment**
- Lack of effective project management skills
- Lack of adequate user involvement
- **Failure to manage end user expectations**
- Lack of effective PM methodology
- **Unclear/ misunderstood scope/ objectives**
- **Changing scope/ objectives**

# 5. MATURITY ASSESSMENT AND PROCESS IMPROVEMENT

Level 2/3 of CMMI® outlines measurement criteria

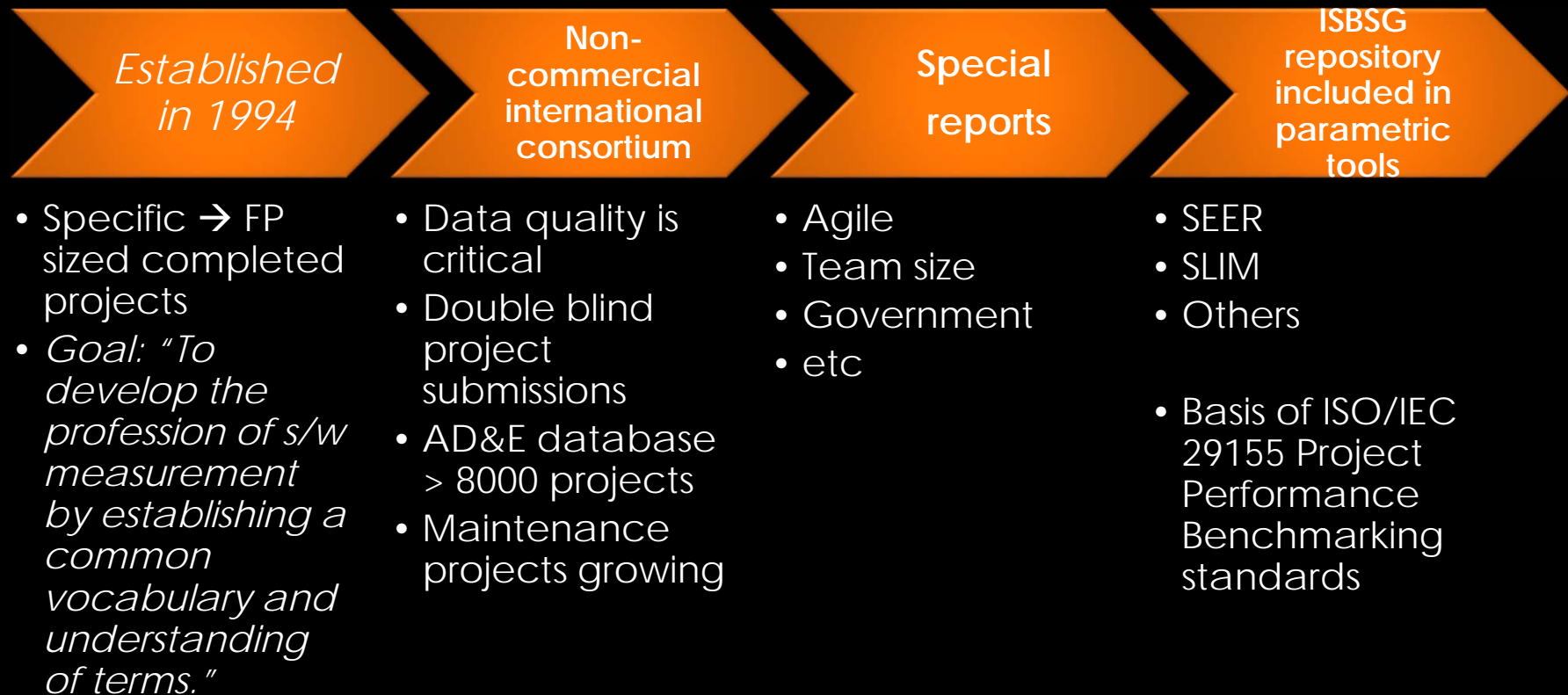
- Software product size (requirements, scope, s/w product)
- Practical software and systems measurement (PSM)
- Goal Question Metric (GQM)

SPICE (Software Process Improvement Capability dEtermination)

FP is common denominator for measurement programs

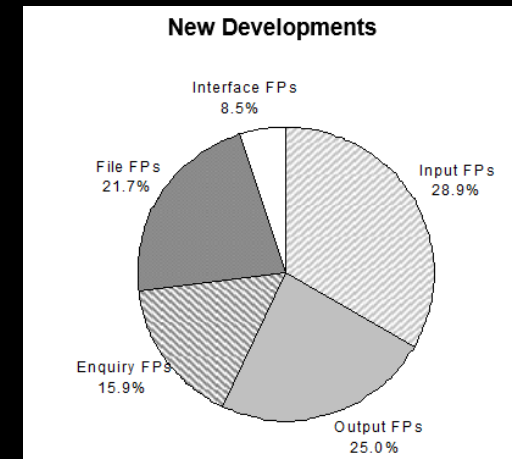
- Defect density (defects / FP)
- Team productivity (FP / person month)
- Product delivery rate PDR (hours / FP)
- Maintenance and support rates (FTE / 1000 FP)

# 6. INTERNATIONAL SOFTWARE BENCHMARKING STANDARDS GROUP (ISBSG)



# 7. EVALUATE S/W PRODUCT SIZE

- Gauge requirements completeness (% FP component)
- Sizing by analogy (t-shirt sizing)
- UAT coverage
- Evaluation of alternatives (functional fit)
- Replacement system size
- “Good” requirements = FP countable
- Shortcut methods (rule of 31, patterns, all average, E&Q)
- With SNAP points = complete sizing





# 8. PROPOSAL EVALUATION

## Compare Supplier Bids

- Compare bids: pricing and product size
- Evaluate pricing (customer runs own parametric simulations)
- Gauge requirements completeness

## Request for Proposal (RFP) → FP provisions

- Response must be sized in FP
- Team requirements (similar to CMMI® level)
- Common understanding of scope

## 9. INSURANCE VALUATION AND LITIGATION

- U.S. Internal Revenue Service (IRS) → FP-based valuations of software assets
- Expert witness cases:
  - Infringement
  - Non-delivery
  - Malicious behavior
  - Cancellation / contract termination
  - other



# 10. PRICE-TO-WIN AND OTHER ESTIMATES

Price-to-win:  
engineering  
design +  
software  
(FP) +  
hardware +  
other



Micro and  
macro  
based  
estimating  
models  
(ISBSG)



“Fog test”  
estimates →  
work effort,  
defects,  
pricing,  
WBS



History is  
better  
predictor  
than  
theoretical  
models



# TOP 10 MEASUREMENT BEST PRACTICES WITH FP

1. Software contracting
2. Parametric estimating
3. Outsourcing management
4. Formal scope management
5. Process improvement and maturity assessment
6. ISBSG / benchmarking
7. Objective S/W product sizing
8. Proposal evaluation
9. Insurance valuation and litigation
10. Price-to-win / other estimates





# STEPS TO A SUSTAINABLE MEASUREMENT PROGRAM



# SUSTAINABLE CHANGE NEEDS P.O.W.E.R.

Predisposition → we see success

Outlook → we will do it

Wherewithal → we can do it

Evaluation → we will measure it

Resources → we commit to it



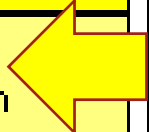
*Source: C.Dekkers  
2000*

" Motivation moves  
mountains...  
Motivation is  
everything! "



*Principle 6 of Tom Gilb's Ten Most Powerful Principles for Quality in (Software and) Software Organizations, 2<sup>nd</sup> World Congress on Software Quality, Tokyo, September 2000*

# CRITICAL SUCCESS FACTORS

Pressure for change	Leadership and vision	Capable people	Actionable first steps	Effective rewards	Results
+	+	+	+	+	Successful implementation 
	+	+	+	+	Disinterest
+	+	+	+		Evaporation
+	+	+		+	Frustration
+	+		+	+	Disengagement
+		+	+	+	Dissolution

Source: P. Willman

**Thank  
You**

*Mahalo*

Kiitos

*Tack*

Toda

Grazie

Obrigado

Thanks

Takk

Gracias

Merci



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