

# Implementing Estimation Competency

Robyn Lawrie  
CHARISMATEK Software Metrics  
175 Dorcas Street  
South Melbourne, VIC 3205  
Australia  
[www.charismatek.com](http://www.charismatek.com)  
[Robyn.Lawrie@charismatek.com](mailto:Robyn.Lawrie@charismatek.com)



# Agenda

- **Part 1**
  - Considerations for implementing Estimation Competency
- **Part 2**
  - Function Point Size as a Work Product Size



# The Need for Estimation Competency



- Know where you are going
- How far it is
- How fast you can go
- What it will cost

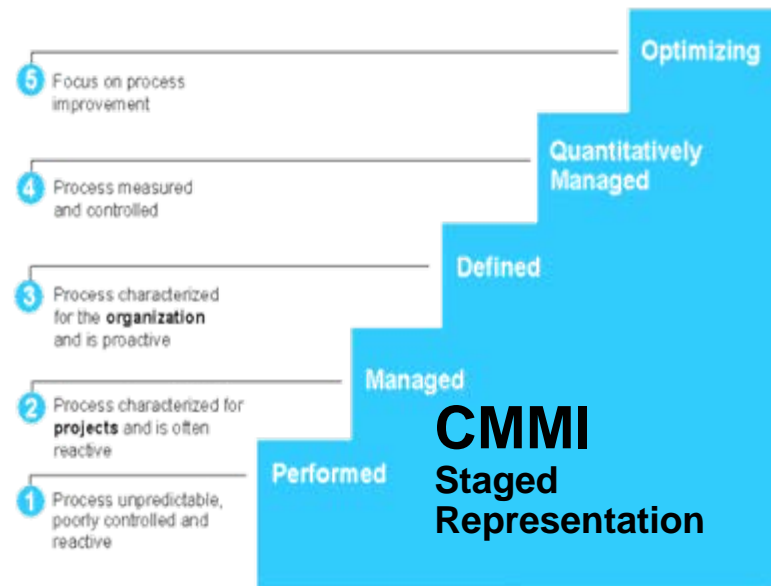
**BEFORE** you start the journey



# Impetus for Estimation Competency



- Sound project management principles
- Move reliance from key individuals to defined, repeatable and objective processes
- Process improvement initiative e.g. CMMI
- Ongoing budget and/or schedule overruns
- Major disaster



# Choices and Decisions



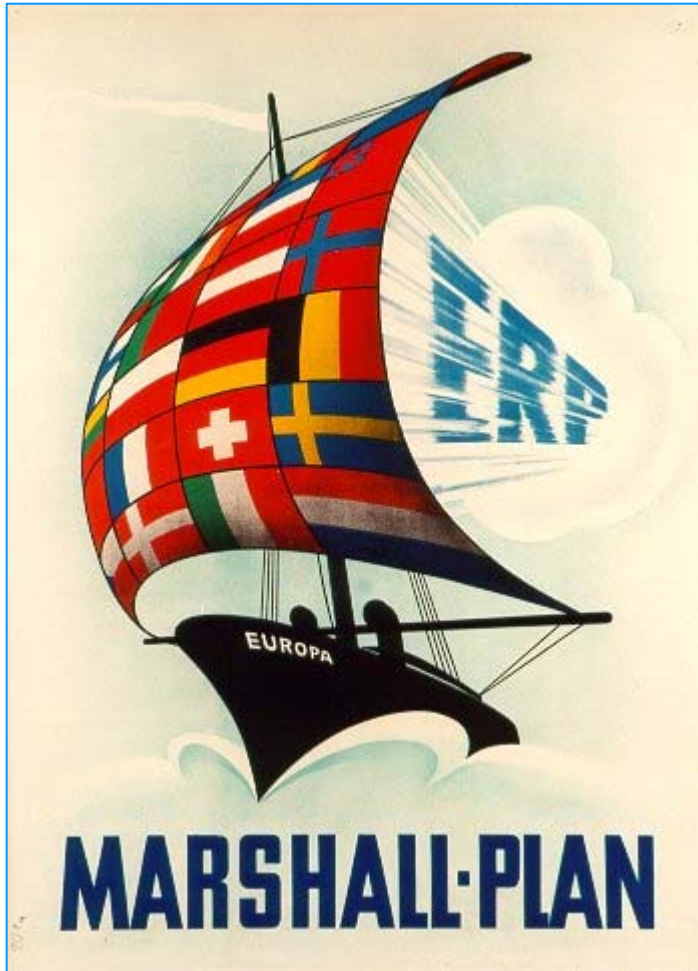
- **Estimation choices and decisions**
  - Top-down versus bottom-up techniques
  - Centralised versus decentralised estimation capability
  - Tools versus manual approaches
  - Outsourced versus in-house delivery
- **Chosen estimation approach**
  - Align with client's needs
  - Complement client's processes and projects
  - ***“One size does not fit all”***



Appropriate estimation choices rely upon careful information gathering to fully understand the client's needs



# Response - Plan



- **Estimation Implementation Plan**
  - Techniques and tools
  - Process:
    - Activities, Phases, Milestones, Schedule, Success Criteria
  - Client responsibilities:
    - Resources, Budget, Business Process Change, High Level Support
  - Outcomes:
    - Deliverables, Benefits, Scope of Applicability, Constraints and Limitations
  - ***“Be careful not to oversell”***

# Implementation – Key Personnel



## The Right People

- Analytical
- Lateral thinkers
- Good interviewing and interpersonal skill
- Interested in estimation
- Understand software development
- Invite respect





# Implementation - Tools

## The Right Tools

- Easy to use
- Effective
- Support chosen techniques, e.g. FPA
- Fit type of projects
- Transparent results

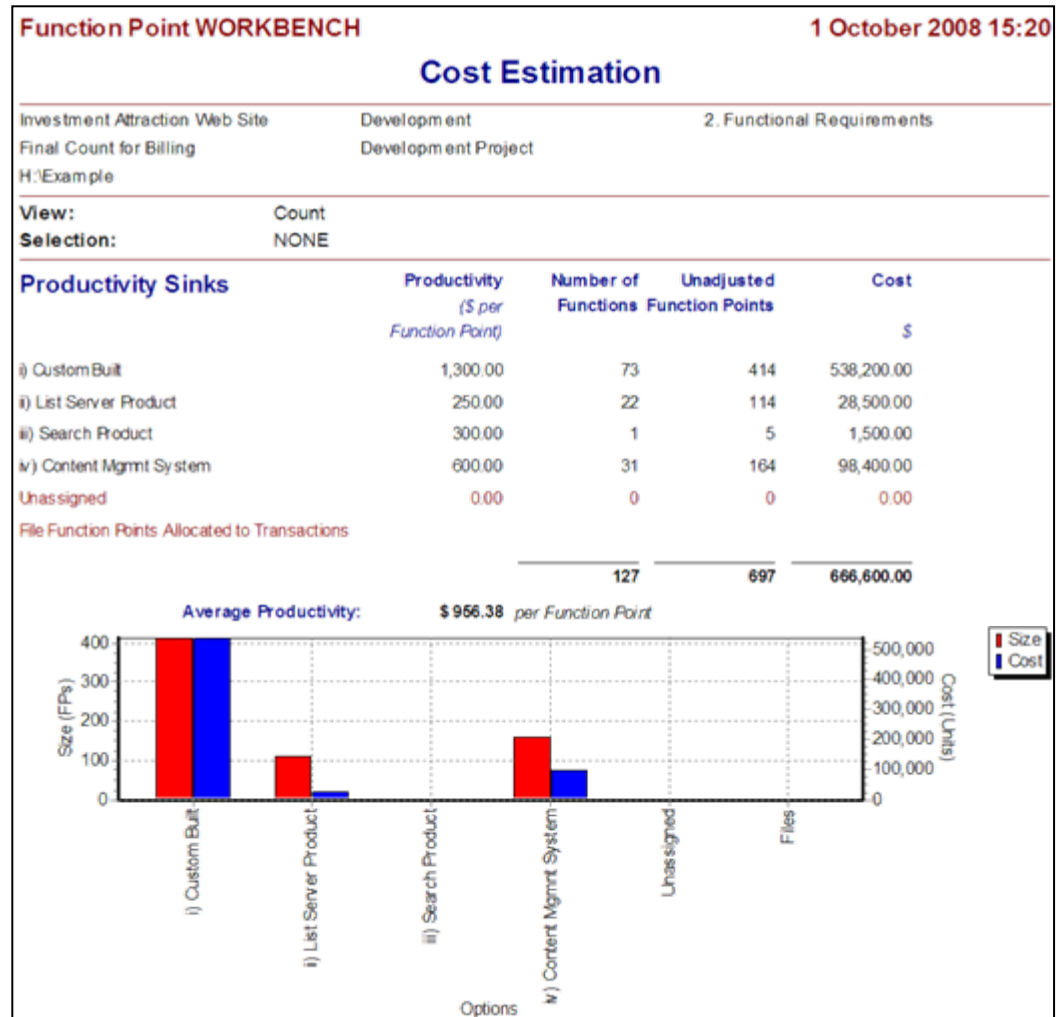




# Implementation - Tools

## The Right Tools

- Rarely the complete solution
- Understanding
- Reference presentation – *“Using Software Tools for Effective Software Estimation or What to Do when the Experts Disagree”* on our website - /Library



# Implementation - Training



## Appropriate Training

- Have a plan
- Target training to roles:
  - Estimators,
  - Project Managers, etc
- Align trainee expectations with training content and outcomes
- Address full scope of required techniques and tools



# Implementation – Knowledge Transfer



## Ongoing Knowledge Transfer

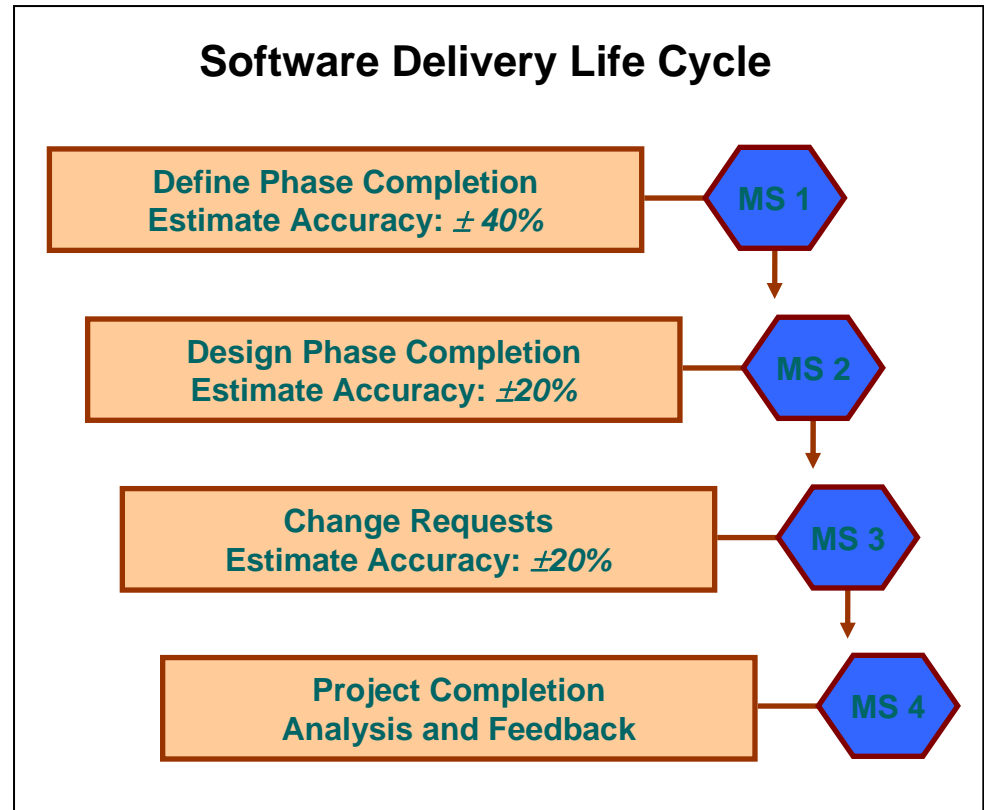
- Initial training alone is usually not adequate
- Provide accessible ongoing mentoring
- Ensure appropriate time lines for results



# Implementation - Process

## Process Integration

- Formalise estimation within standard software life cycles and processes
- Incorporate estimates into standard project deliverables
- Provide adequate resources and budget for estimation activities





## Quality Assurance

- QA steps for estimation activities:
  - Checklists
  - Peer reviews, etc
- Increased confidence:
  - Estimators' Skills
  - Estimate Usefulness

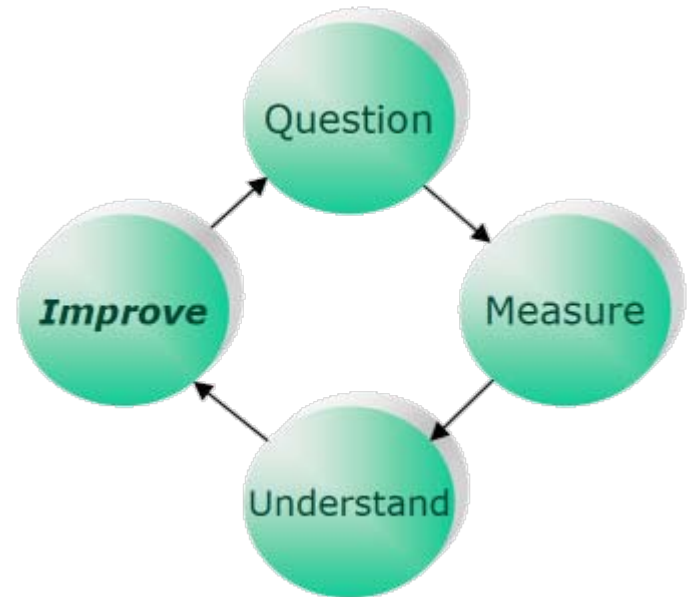


# Implementation - Feedback



## Feedback and Evaluation

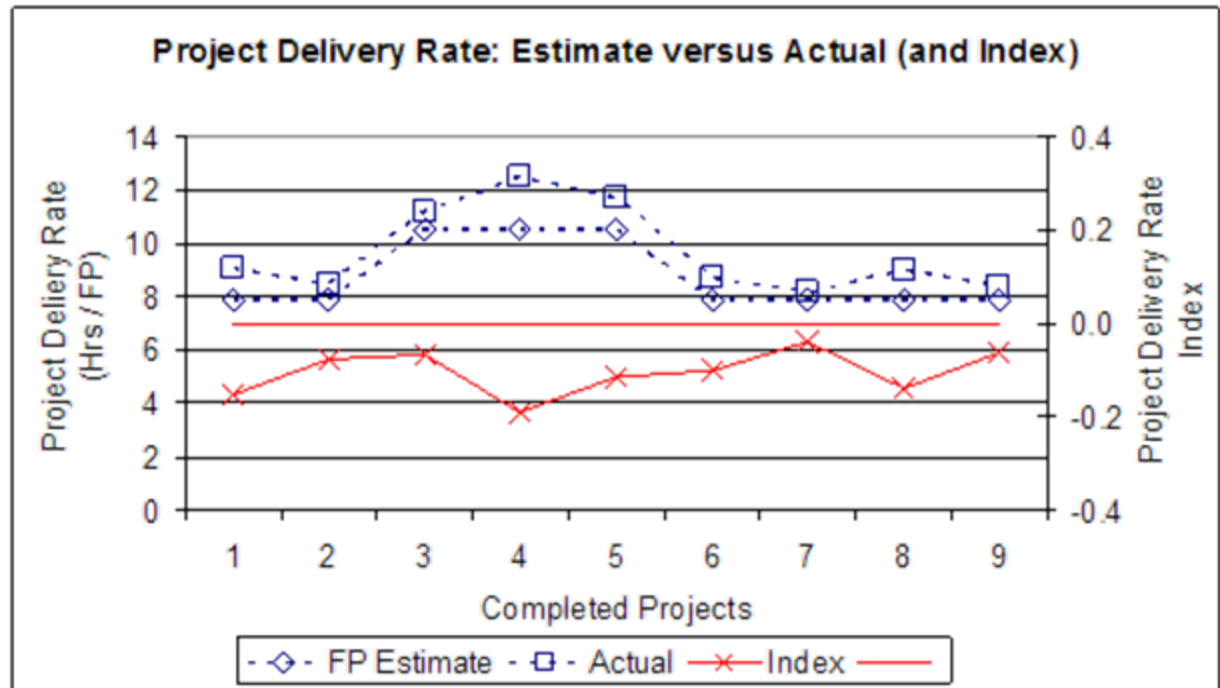
- Track estimation accuracy
- Prove estimation effectiveness
- Continuously tune estimation framework



# Implementation - Analyses

## Ongoing Analyses

- Benchmarking:
  - Productivity, Quality
- Estimate Variation Analysis





# Function Point Analysis and Estimation



- **FPA is not for all projects, or for all parts of a project**
  - **Potentially** all software delivery process activities - specification, design, construction, testing, documentation, QA, project management.
  - There may be parts of the work product **excluded** from the size.
  - There may be project **activities** where FPA cannot be or has not been applied.
- **These projects, or parts of projects, will have to be estimated using another method.**

# Function Point Analysis and Estimation

- FPA delivers a measure of the size of the work product delivered by the project (CPM), as FP Size.
- Project Work Effort =

Work Product FP Size \* Project Delivery Rate

- *It is that easy?*



*Well, actually – not quite.*



# Function Point Analysis and Estimation

---



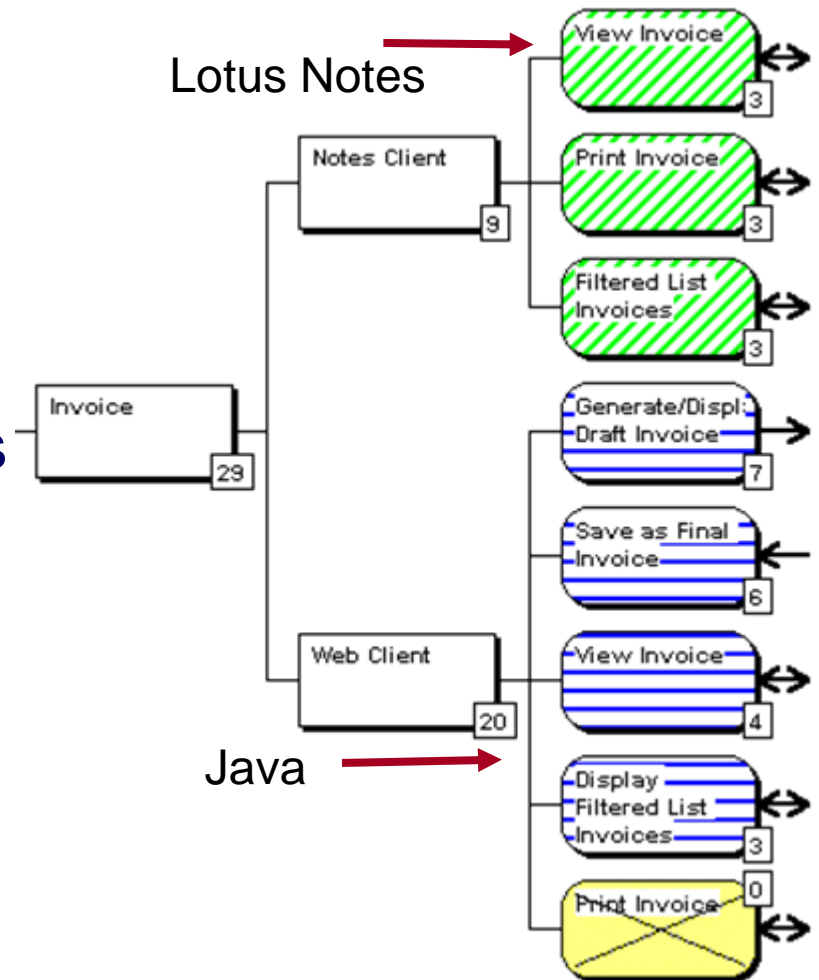
- FPA based estimation has 3 dimensions :
  - **FP Size**
  - **Project Delivery Rate**
  - **SDLC Phase Inclusion / Exclusion**



# Function Point Analysis and Estimation

- **Multiple Work Product FP Sizes of Interest**

- Breakdown total FP size by
    - Technology choices
    - Product characteristics
    - Development strategies
- to form Productivity Groupings for different Delivery Rates



# Work Product Size Breakdown by Expected Productivity



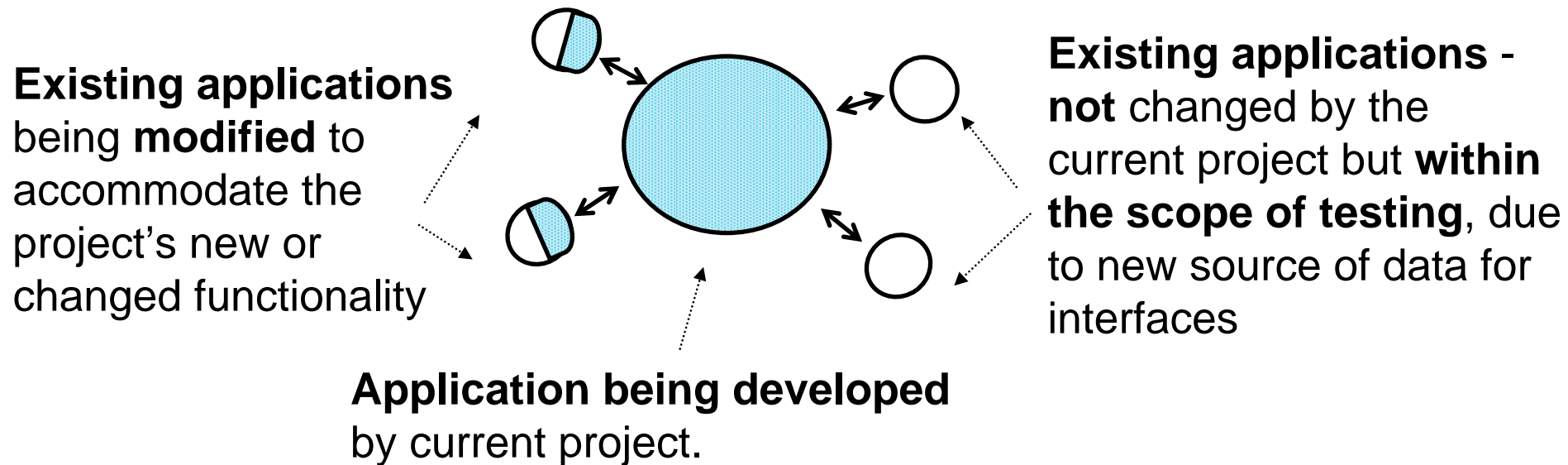
## Phase 1 Summary of Sizing

Phase 1 Components	No of Logical Transactions and Logical Files	Size in Unadjusted Function Points
Data Requirements - Reporting Database	70	512
Load (ETL) of Staging Database	114	504
Load (ETL) of Reporting Database	56	300
Load of Derivation and Aggregation Layer	18	90
Phase 1 Reports (Reporting Database)		
TCS Provided	10	52
VCAA Provided	135	725
Archive	0	0
<b>Total</b>	<b>403</b>	<b>2183</b>

# Function Point Analysis and Estimation



- Identify Work Product FP Size of Interest for each Phase



- In this example, size of interest at **testing** is greater than size of interest at **construction**.
- Does this mean we can size **testing only** projects?





## Simple Estimation Equations

- **Effort PHASE =  $\sum$  (Phase Size \* Delivery Rate \* Phase Contribution)**

where

- **Phase Size** is expressed a Work Product Size expressed in Function Points
  - **Delivery Rate** is expressed in Hours per Function Point
  - **Phase Contribution** is expressed as a decimal fraction of life cycle
- 
- **Effort PROJECT =  $\sum$  Effort PHASE**





# Delivery Rates & Phase Contribution



- The **best way** to obtain delivery rates and phase contribution is to **benchmark** the organisation's own projects.
- If this is not possible, then **use industry data only as a fall-back**.

PHASE	3GL	4GL
PLANNING	0.06	0.11
ANALYSIS	0.08	0.11
DESIGN	0.35	0.44
CONSTRUCTION	0.27	0.09
INTEGRATION AND TEST	0.14	0.12
PROJECT MANAGEMENT	0.10	0.13



# Delivery Rates & Phase Contribution

CHARISMATEK Function Point WORKBENCH™ - Productivity Rate Calculator - May 2009, V18



- Example of simple Productivity Rate Calculator tailored to client's own benchmark data

1. Project Identification:	PROJ3562 - Power Distribution Upgrade				
2. Project Classification:	Java Team - Application Enhancement				
3. Life Cycle Model:	<input type="radio"/> Waterfall <input checked="" type="radio"/> Rapid Application Development (RAD)				
4. Included Project Phases:	<input type="checkbox"/> Define Phase <input checked="" type="checkbox"/> Design Phase - Conceptual Design <input checked="" type="checkbox"/> Design Phase - Detailed Design <input checked="" type="checkbox"/> Build Phase <input checked="" type="checkbox"/> Test Phase <input checked="" type="checkbox"/> All Selected Phases - Project Planning, Control and Management				
5. Project Size:	600	IFPUG	Function Points		
6. Completed Project Phase when Function Point Analysis was performed:	<input type="radio"/> High Level PM Request <input checked="" type="radio"/> Define Phase <input type="radio"/> Design Phase - Conceptual Design <input type="radio"/> Design Phase - Detailed Design				
7. Testing Impact:	Project functionality only				
		Very Positive	Positive	Neutral	Very Negative
8. Reuse Opportunity:		<input type="text" value=""/>			
9. Key Project Drivers:	Client Environment:	<input type="text" value=""/>			
	Team Environment:	<input type="text" value=""/>			
	Product Complexity:	<input type="text" value=""/>			
	Driver Summary:	<input type="text" value=""/>			
10. Project Cost Rate:	\$ 165 / Hr				
11. Other Project Costs:	\$ 125000				
12. Estimates Scope	<input checked="" type="radio"/> ALL included phases <input type="radio"/> Project Planning, Control and Management ONLY				
<b>Project Estimates</b>	<b>Best Case</b>		<b>Most Likely Case</b>		<b>Worst Case</b>
13. Estimated Productivity Rates:	3.6 Hrs / FP	6.0 Hrs / FP	8.4 Hrs / FP		
	\$ 596 / FP	\$ 994 / FP	\$ 1392 / FP		
14. Estimated Effort:	2169 Hrs	3615 Hrs	5060 Hrs		
15. Estimated Cost:	\$ 482837	\$ 721396	\$ 959954		
Generate Estimate Report to HTML ...		Generate Estimate Report to CSV ...			



# Delivery Rates by Productivity Groupings



<b>DELIVERY RATES FOR PRODUCTIVITY GROUPINGS</b>			
<b>Productivity Grouping</b>	<b>Lower Bound Average (Hrs / FP)</b>	<b>Likely Average – Superior (Hrs / FP)</b>	<b>Upper Bound Superior (Hrs / FP)</b>
Business Processes	24.6	17.4	13.0
Simple Reference	8.1	5.7	4.3
Reporting	20.6	14.7	11.2
Reporting with Reuse	10.3	7.4	5.6
Data Integration (ETL)	15.0	11.0	5.6
Database Requirements, New	14.3	11.1	8.7
Database Requirements, Reused	2.1	1.8	1.5

# Delivery Rates - ... by Supplier (1)



Breakdown Approx. Off-Shore / In-House									
Productivity Grouping	Lower Bound Average (Hrs / FP)			Midpoint Average – Superior (Hrs / FP)			Upper Bound Superior (Hrs / FP)		
	Off-S	In-H	Total	Off-S	In-H	Total	Off-S	In-H	Total
Business Processes	22.9	1.7	24.6	15.8	1.6	17.4	11.6	1.4	13.0
	93%	7%		91%	9%		89%	11%	
Simple Reference	7.5	0.6	8.1	5.2	0.5	5.7	3.8	0.5	4.3
	93%	7%		91%	9%		89%	11%	
Reporting In-H Developed	0.0	20.6	20.6	0.0	14.7	14.7	0.0	11.2	11.2
	0%	100%		0%	100%		0%	100%	
Reporting In-H Developed with Reuse	0.0	10.3	10.3	0.0	7.4	7.4	0.0	5.6	5.6
	0%	100%		0%	100%		0%	100%	

# Delivery Rates - ... by Supplier (2)



Breakdown Approx. Off-Shore / In-House									
Productivity Grouping	Lower Bound Average (Hrs / FP)			Midpoint Average – Superior (Hrs / FP)			Upper Bound Superior (Hrs / FP)		
	Off-S	In-H	Total	Off-S	In-H	Total	Off-S	In-H	Total
Reporting Off-S Developed	14.2	6.4	20.6	9.9	4.8	14.7	7.3	3.9	11.2
	69%	31%		67%	33%		65%	35%	
Reporting Off-S Developed With Reuse	7.1	3.2	10.3	5.0	2.4	7.4	3.6	2.0	5.6
	69%	31%		67%	33%		65%	35%	
Data Integration (ETL)	13.8	1.2	15.0	9.9	1.1	11.0	7.3	1.0	8.3
	92%	8%		90%	10%		88%	12%	
Database Modelling, New	12.8	1.5	14.3	9.7	1.4	11.1	7.4	1.3	8.7
	89%	11%		87%	13%		85%	15%	



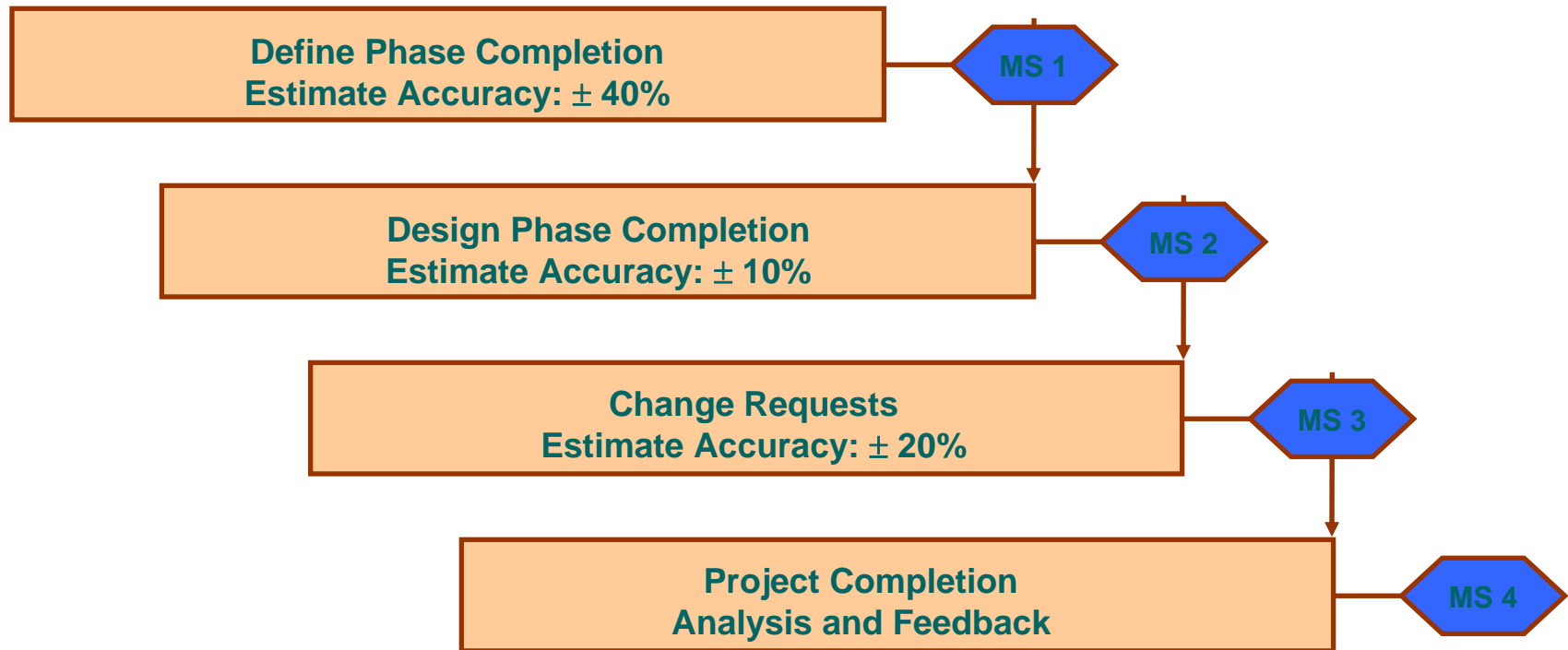
# Precision and Accuracy



- **Precision** - An indication of how finely something is measured
- **Accuracy** - An indication of how close the measure is to reality
  
- For **FP Size**, for example:
  - From early life cycle to software delivery, **accuracy** of FP Size can increase
  - **Precision** is limited by the information sources but is also a **choice** depending upon what the count is to be used for.  
Choice of precision is usually aligned with process.
  
- Each variable will have a margin of error which will flow into the estimate.

# Precision and Accuracy

- For the organisation's process, work with organisation to set "standard" error margin expectations.





# Estimation Competency



- Estimation Competency is a skill which can be **learned** and **refined** through **mentoring** and **feedback**
- **A good estimation process leads to repeatable, verifiable and defensible estimates.**
- Introduction of Estimation Competency should be planned
- **FP Work Product Size is not a single number**
- In any significant project, there will be **multiple Work Product sizes** of interest and different relevant productivity rates.



# Questions

---



[info@charismatek.com](mailto:info@charismatek.com)

