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Introduction
to Function Points

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Introduction
to
Function Points

Credits:

The International Function Point Users Group (IFPUG) would like to thank the following individuals and companies for their contributions to this presentation:

- **Mary S. Bradley - MSB2 Consulting**
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- **Cindy Woodrow - GEICO**
- **Steven Woodward - Q/P Management Group of Companies**

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Agenda

- Introduction
- Why use Function Points
  - Managing Your Software
  - Managing Your Organization
  - Function Points vs. Lines of Code
- How to Count Function Points
- Questions

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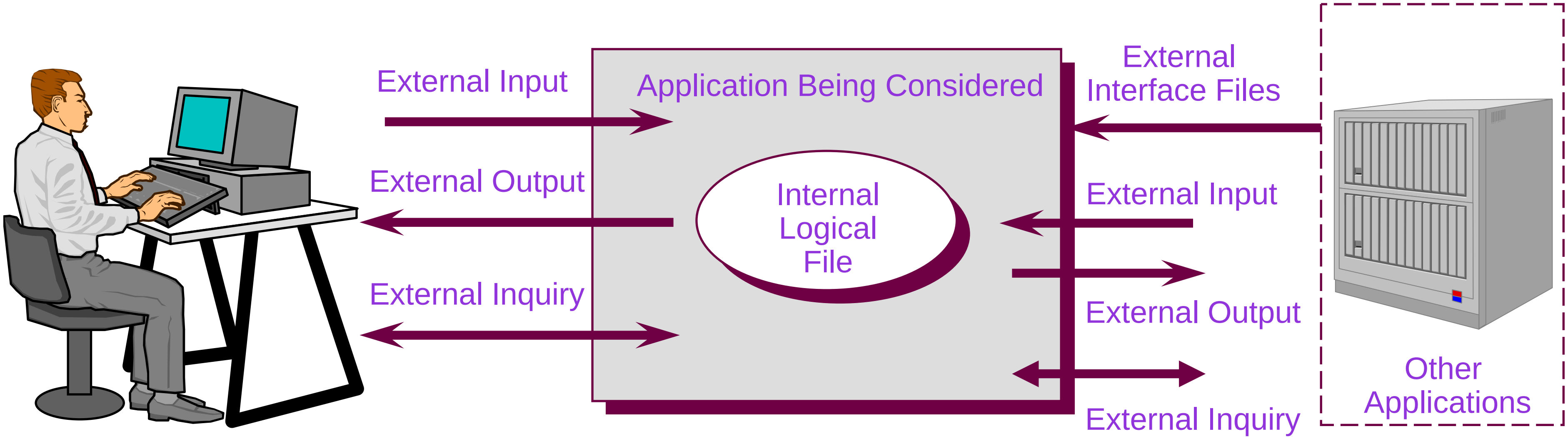
Objectives of Function Point Analysis

- Measures software by quantifying the functionality requested by and provided to the customer based primarily on logical design

- Measures software development and maintenance independently of technology used for implementation

- Measures software development and maintenance consistently across all projects and organizations

Function Points are a Unit of Measure



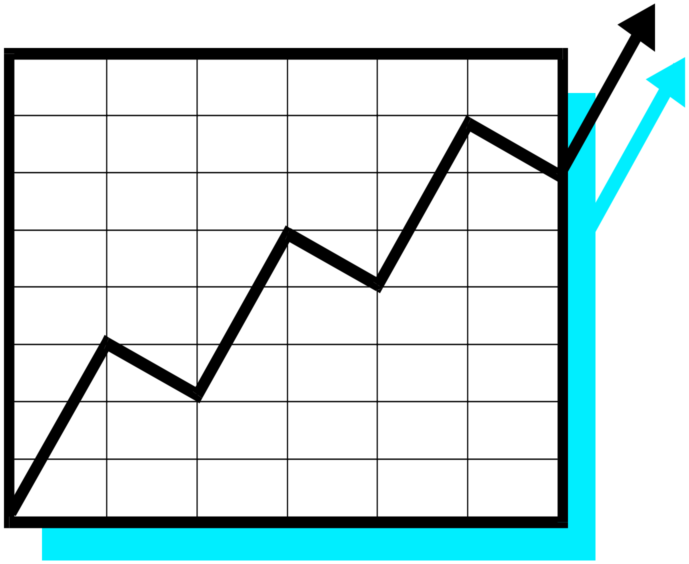
- Functionality as viewed from the user’s perspective

Why Use Function Points

- Managing Your Software

Software Development Challenges

- Size of Requirements
- Changes to Requirements
- Estimation Based on Requirements
- Measuring and Improving Productivity and Quality



Size of Requirements

- Requirements
  - – Complete
  - – Business Terms
  - – Mutual Understanding
  - – Document Assumptions
  - – Size

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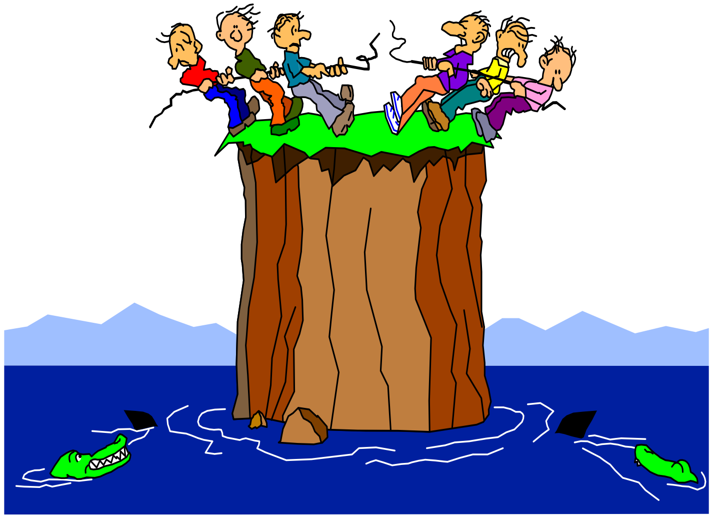
Changes to Requirements

- Changes to Requirements
  - Change Inevitable
  - Trade-offs
  - Customer Definition of Quality
  - Size



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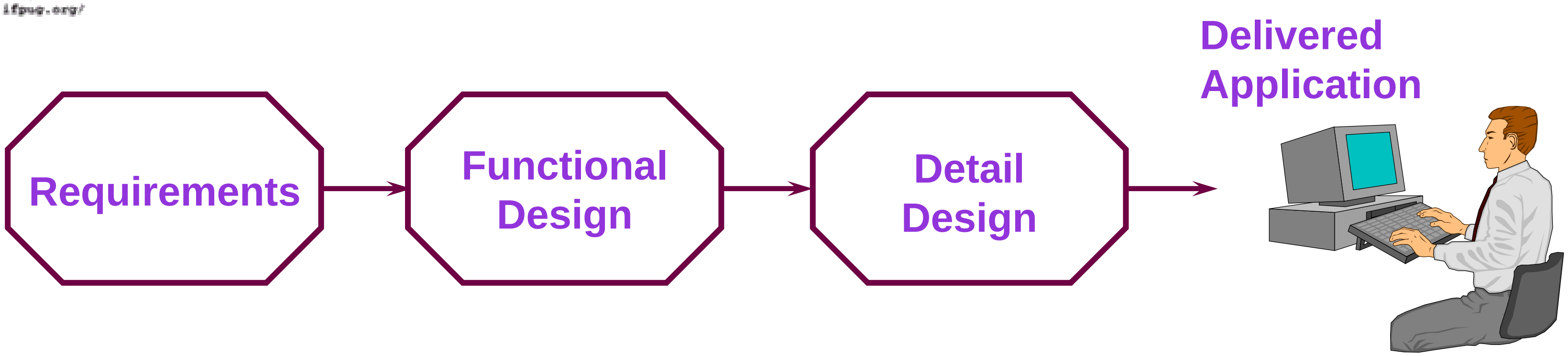
Changes to Requirements

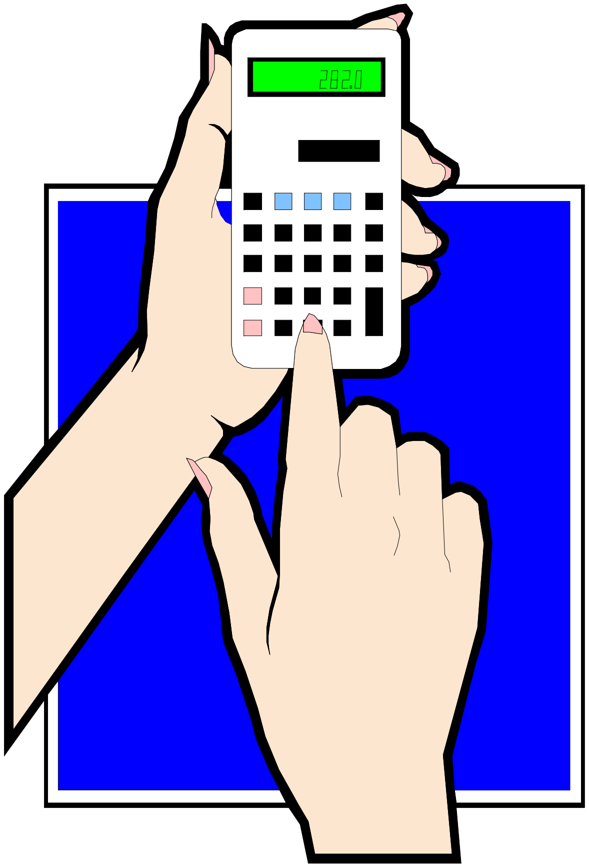


100 FPs	120 FPs	130 FPs	135 FPs
	• State code input screen changed (3 FPs) • Interface to N&A file added (10 FPs) • N&A inquiry and state code inquiry added (7 FPs)	• New regulatory table added (10 FPs)	• Summary report added (5 FPs)

Impact			
Effort	+ 1 month	+ .5 month	+ .25 month
Schedule	+ 2 weeks	+ 1 week	+ 2.5 days
Cost	+ $5 K	+ $2.5 K	+ $1.25 K

Estimation Based on Requirements

- Estimation Based on Requirements
  - Multiple Models
  - Weighted Inputs:
    - Language
    - Skills
    - Methodology
    - Risk Factors
    - Size
  - Historical Base



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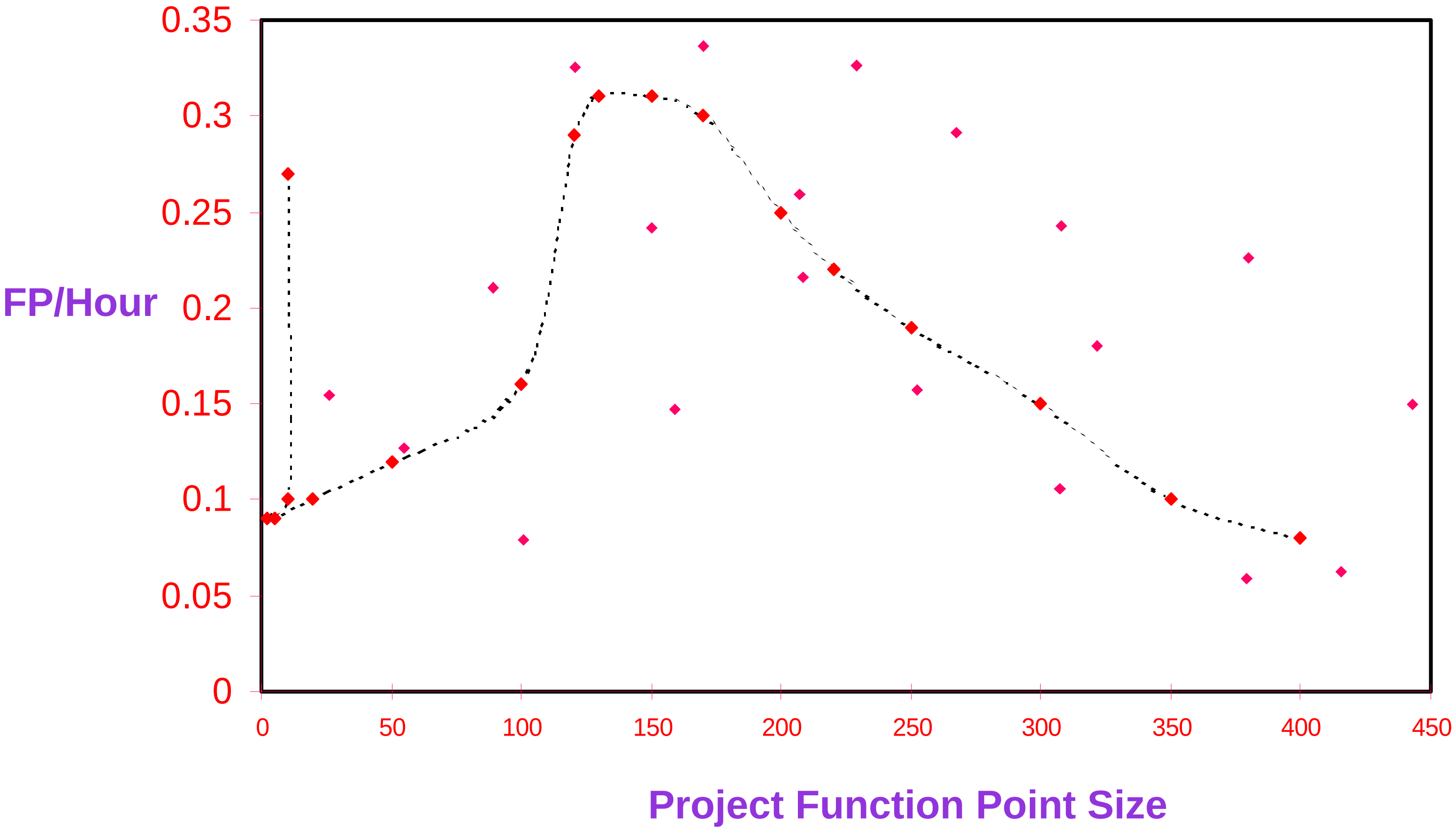
Estimating Examples

Function Point Size	Project Variables	Project Estimate Based on Historical Data and/or Vendor Tool

Project A – 100 FPs	• On-line/database
	• New development
	• C++
	• Highly experienced development staff
		Effort = 5 months
		Schedule = 3 months
		Cost (@ $5K) = $25,000
		KLOC = 6
		Delivered Defects = 25
		Productivity Rate = 20 FP/Month.

Project B – 100 FPs	• Batch
	• Enhancement
	• Cobol
	• Average experienced development staff
		Effort = 20 months
		Schedule = 6 months
		Cost (@ $5K) = $100,000
		KLOC = 10
		Delivered Defects = 100
		Productivity Rate = 5 FP/Month

Measuring and Improving Productivity



- Every organization has an optimum size/productivity range

Why Use Function Points

- Managing Your Organization

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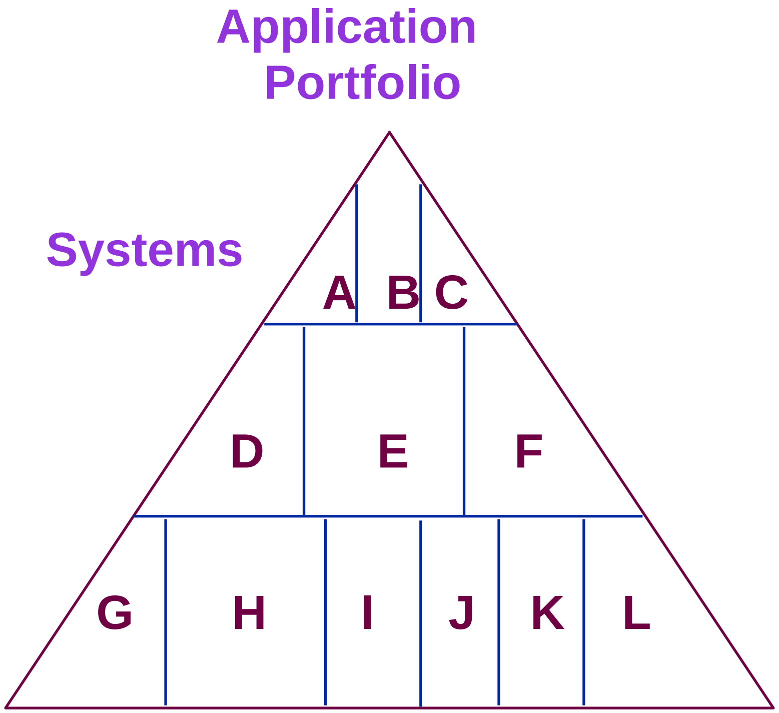
Asset Management



Size = 50,000 Function Points

Replacement Cost = $300,000,000

Growth = 7% per year

Support Cost = $20,000,000 per year

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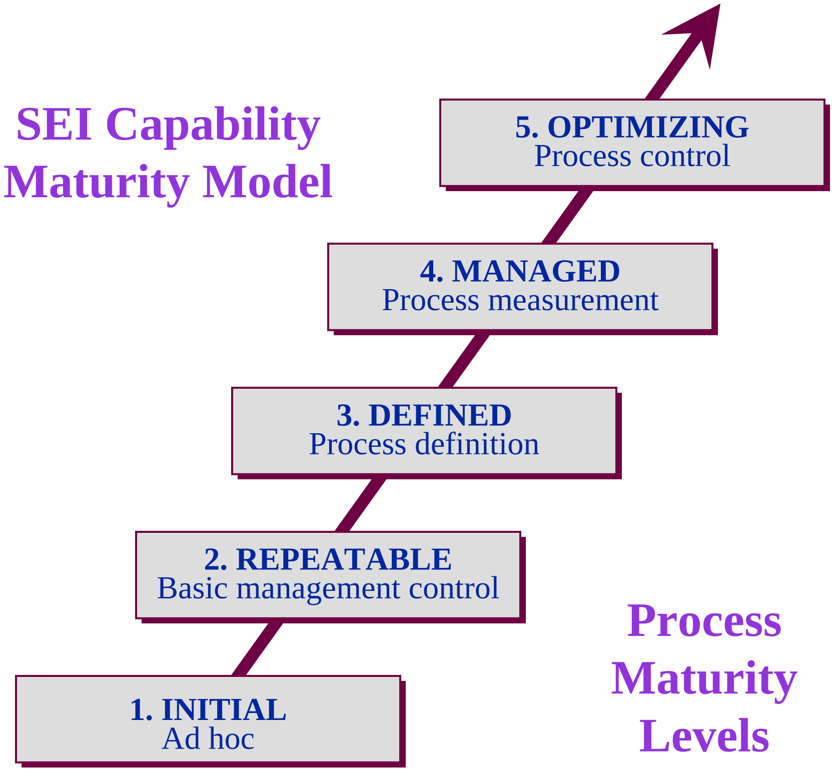
Function Points and the CMM/CMMI

- Function Points are the metric of choice for many of the activities required in the SEI CMM and CMMI Level 2

- With CMMI, metrics becomes a Key Process Area in its own right



SEI Capability Maturity Model

5. OPTIMIZING
Process control

4. MANAGED
Process measurement

3. DEFINED
Process definition

2. REPEATABLE
Basic management control

1. INITIAL
Ad hoc

Process Maturity Levels

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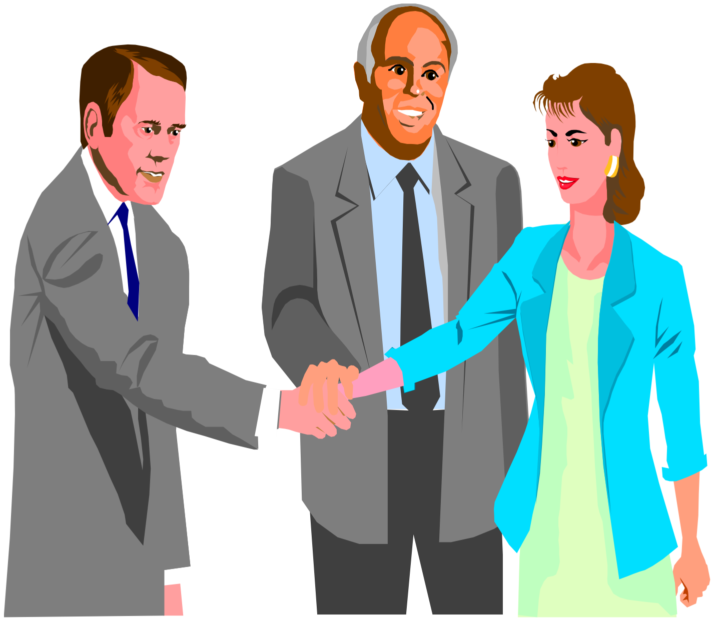
Improving Customer Relations

- Predictable Time scales
- Predictable Costs
- Predictable Functionality



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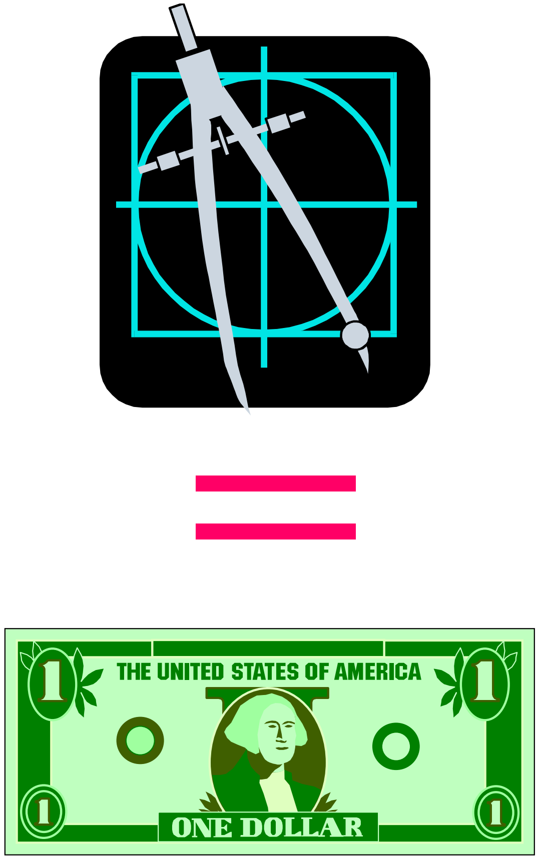
Organizational Improvement

- Process Measurement
- Project Management Metrics
  - Estimates
  - Productivity
  - Defect Densities
  - etc.
- Benchmarking



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Function Points & Metrics Help

- Evaluate current in-house and contractor performance
- Establish quantifiable expectations
- Demonstrate objectives for contract/ outsourcing are met
- Establish realistic commitments
- Determine fair compensation
- Establish “win win” relationships

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Function Points vs. Lines of Code

- Technology and platform independence
- Available from early requirements phase
- Consistent and objective unit of measure throughout the life cycle
- Objectively defines software application from the customer perspective
- Objectively defines a series of software applications from the customer's, not the technician's perspective
- Is expressed in terms that users can readily understand about their software

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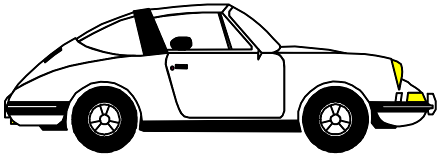
What is Wrong with LOC?

- There is no standard for a line of code
- Lines of Code measure components, not completed products
  - Don't measure the panels produced; measure the number of cars assembled



- Measuring lines of code
  - Rewards profligate design
  - Penalizes tight design
- Positively misleading?

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Classic Productivity Paradox

Lines of Code	10,000	3,000
Function Points	25	25
Total Months effort	25	15
Total Costs	$125,000	$75,000
Cost per Source Line	$12.50	$25.00
Lines per Person month	400	200
FPs per Person month	1.2	2
Cost per FP	$5,000	$3,000

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How to Count Function Points

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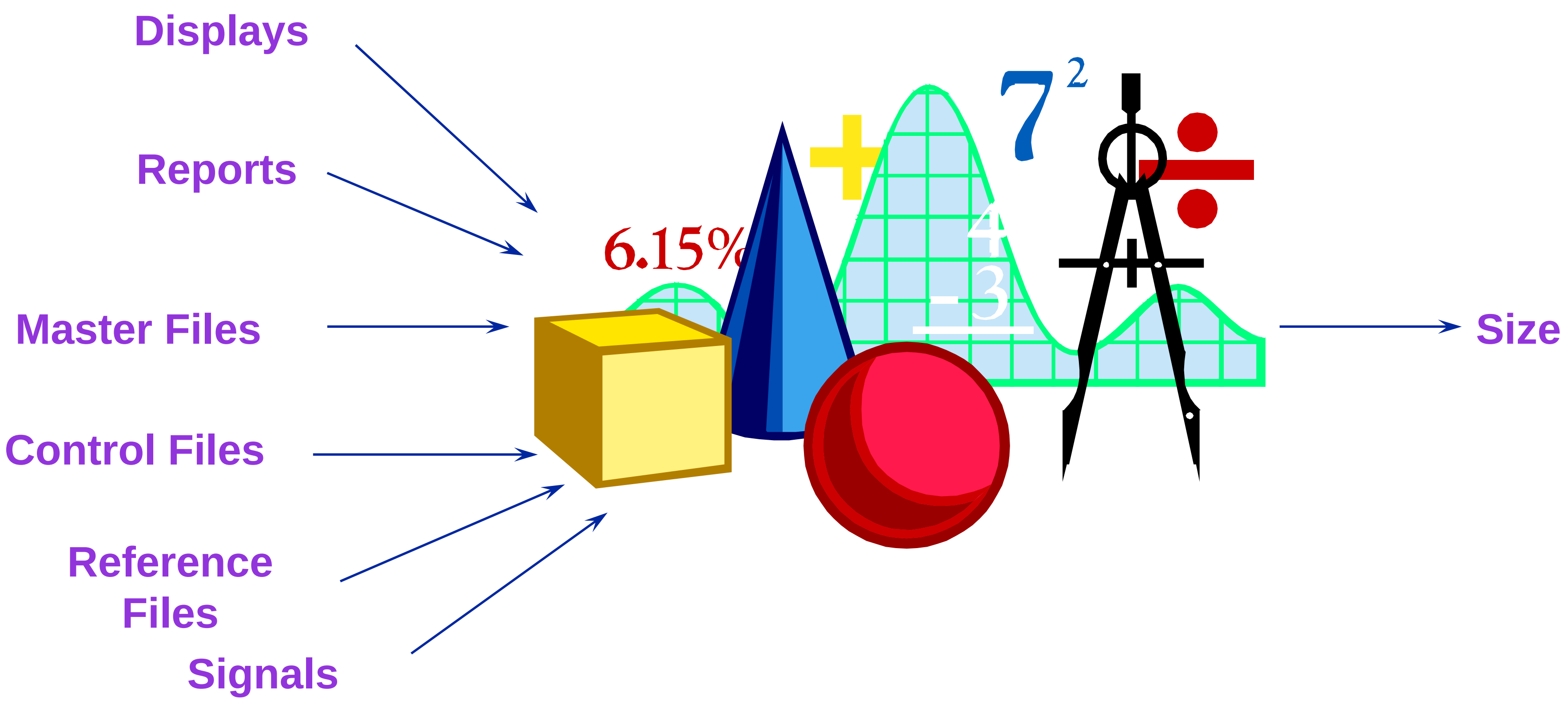
How to Count Function Points



Displays

Reports

Master Files

Control Files

Reference Files

Signals

Size

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Steps in FP Counting

- Determine Type of Count (3 Types)
    - **Enhancement (Project) Function Point Count**
    - **Application Function Point Count**
    - **Development (Project) Function Point Count**
- Identify Counting Scope and Application Boundary
- Count Data Functions
- Count Transactional Functions
- Determine Unadjusted Function Point Count
- Determine Value Adjustment Factor
- Calculate Adjusted Function Point Count

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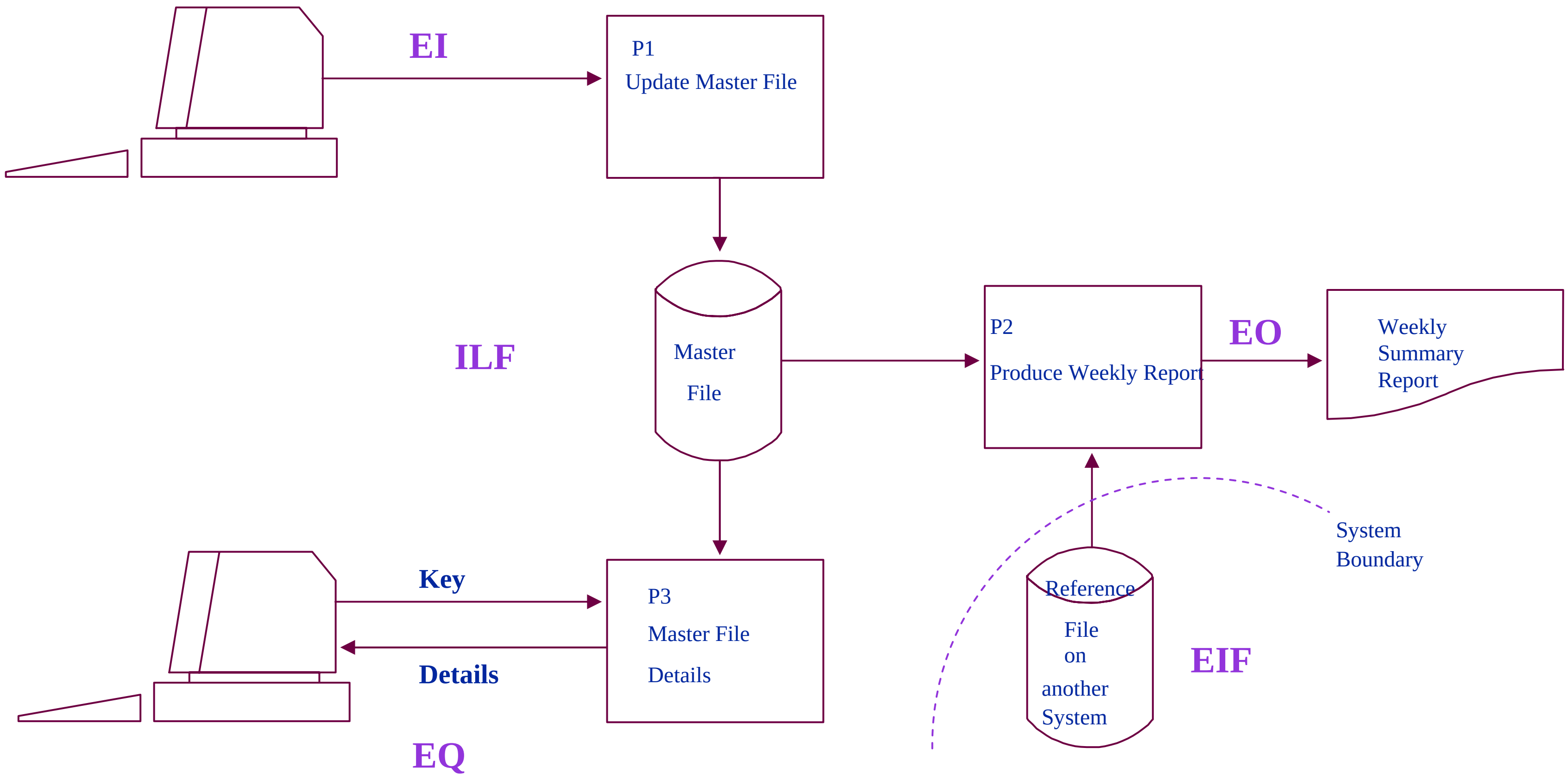
FP Overview: What Is Counted



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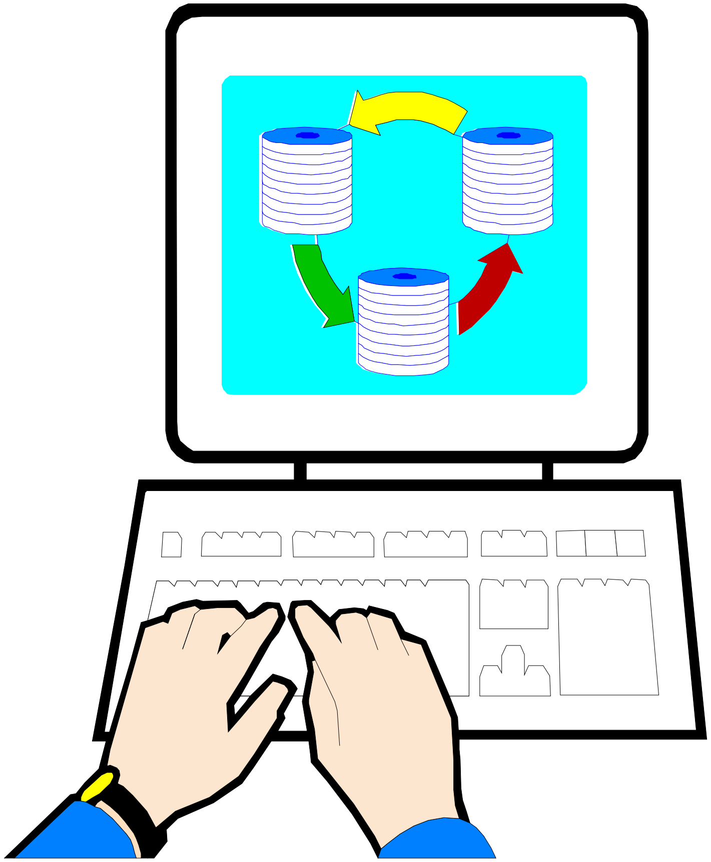
Data Storage

- Internal Logical File (ILF)

  Logical group of data maintained by the application (e.g., Employee file)

- External Interface File (EIF)

  Logical group of data referenced but not maintained (e.g., Global state table)



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Transactions

- External Input (EI)

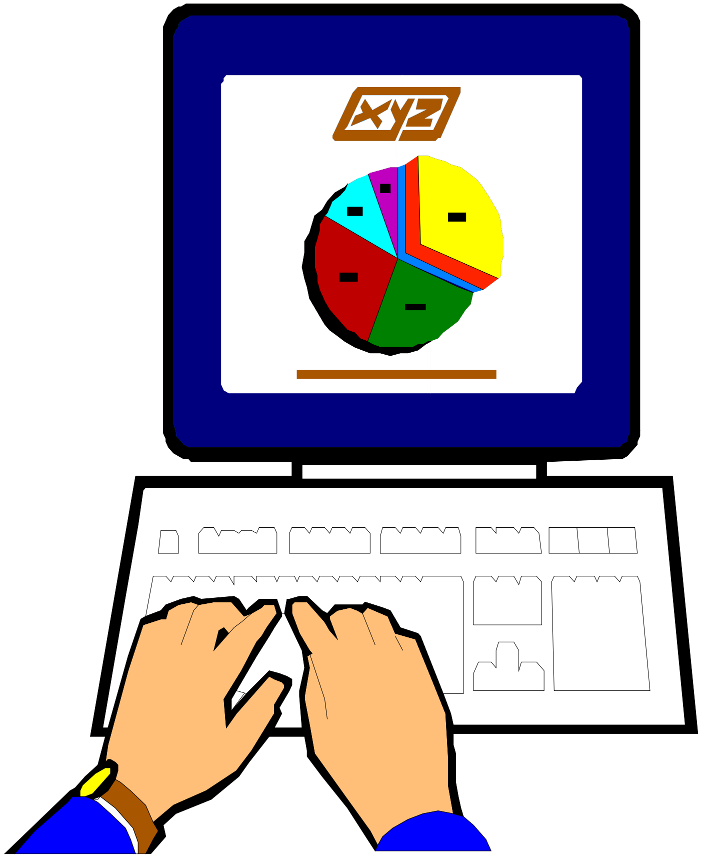
  Maintains ILF or passes control data into the application

- External Output (EO)

  Formatted data sent out of application with added value (e.g., calculated totals)

- External Query (EQ)

  Formatted data sent out of application without added value



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Functions are Weighted Based on Complexity

Data Element Types (DETs)

- Number of user recognizable non-repeated fields
- Applies to data and transactional functions

File Types Referenced (FTRs)

- Number of files referenced, read, created, or updated
- Applies to transactional functions

Record Element Types (RETs)

- Number of data sub-groupings or unique record formats
- Applies to data functions

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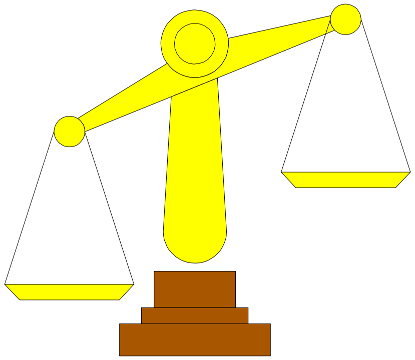
Functional Size
(Unadjusted Function Size)

Function Type	Low	Average	High
EI	x 3	x 4	x 6
EO	x 4	x 5	x 7
EQ	x 3	x 4	x 6
ILF	x 7	x 10	x 15
EIF	x 5	x 7	x 10

Value Adjustment Factor

- Based on 14 General System Characteristics (User Business Constraints Independent of Technology)
  - Examples: data communications, response times, end user efficiency, multiple sites and flexibility



- Adjusts FP count by up to + / - 35%

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Questions ?