IFPUG
INTERNATIONAL FUNCTION POINT USERS GROUP

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Software Estimating Model using
IFPUG standard sizing method

Christine Green

IFPUG Board of Directors

Hewlett Packard Enterprise

A little bit about me

IFPUG

Danish

▸ IFPUG

- Board of Directors

- Director of Certification

  - Past – Direction of Applied Programs
  - Past - Vice-chair of IT Performance Committee

> **Recognized leader in promoting and encouraging the effective management of application software development and maintenance activities by providing software sizing standards and other software measurement techniques.**

> **Hewlett Packard Enterprise Technology innovation that fosters business transformation.**

▸ Hewlett Packard Enterprise

- Process, Estimating & Measurement

- RCA on Cost Model – Budget and Tracking

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Citation
Valid for both Effort and Cost

**"The single most important task of a project: setting realistic expectations.**

Unrealistic expectations based on inaccurate estimates are the single largest cause of software failure."

Futrell, Shafer and Shafer, "Quality Software Project Management"

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Realistic expectations
- Accurate Estimates – Informed Tracking

Earned Value Analysis

Legend:
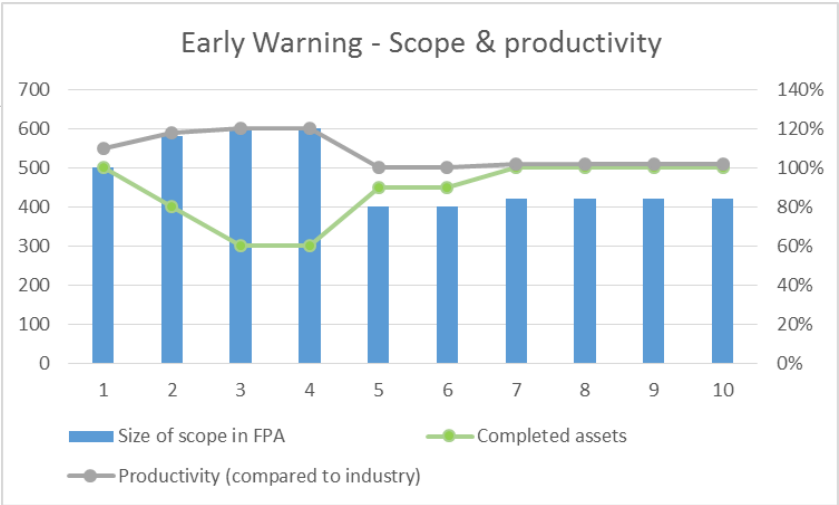- Budget at Completion (BAC)
- Actual Cost (AC)
- Earned Value (EV)
- Planned Value (PV)
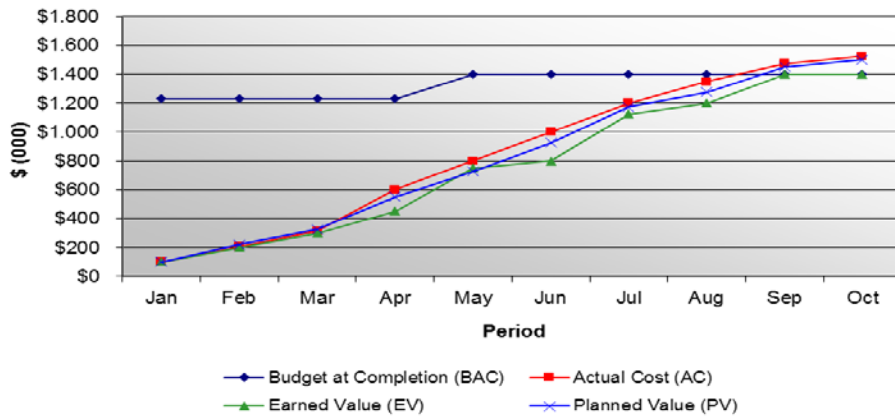
Good project Meeting cost (almost)

Bad project Optimistic from day one Never delivered the Anticipated scope

Early Warning - Scope & productivity

- Size of scope in FPA
- Completed assets
- Productivity (compared to industry)

Root Cause Analysis

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➢ **Little or no perspective of Scope Impact**

➢ **Optimistic Cost Models in initiation**

➢ **Task's blocks in Cost Model to high level**

➢ **Cost based on expected resources (FTE)**

  ➢ Without task breakdown using unit of size

➢ **No assessment of Estimation Risk**

➢ **Un-realistic expectation of Productivity**

➢ **Project Constrains impacting effort & cost**

➢ **Unexpected changes in influencing factors**
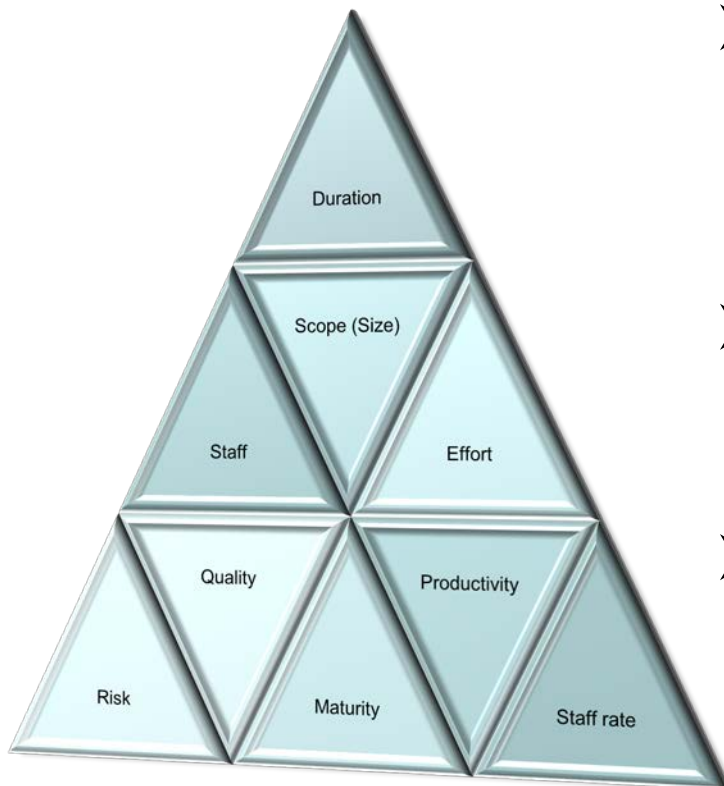
➢ **Estimators with little experience in estimation**

Estimation expert?

Good Estimating – What is that?

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Promote confidence, understanding, acceptance

Balance between many factors

Duration
Scope (Size)
Staff
Effort
Quality
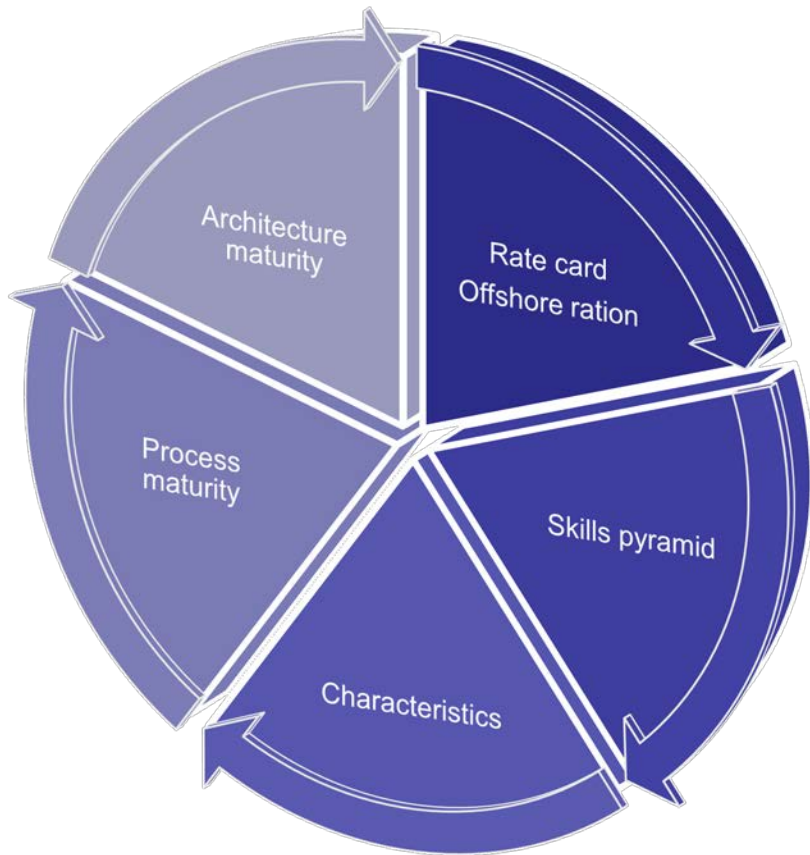Productivity
Risk
Maturity
Staff rate

➢Confidence
  ➢ Accurate
  ➢ Achievable
  ➢ Competitive
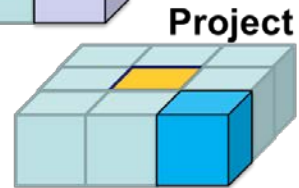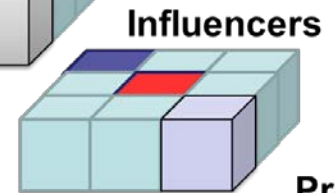➢Understanding
  ➢ Scope
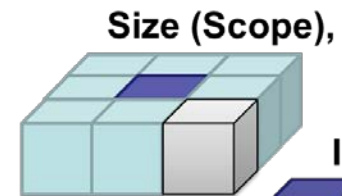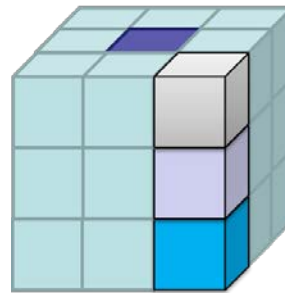 ➢ Constrains etc.
➢Acceptance
  ➢ informed project planning/Cost decisions
  ➢ facilitate effective project tracking & oversight
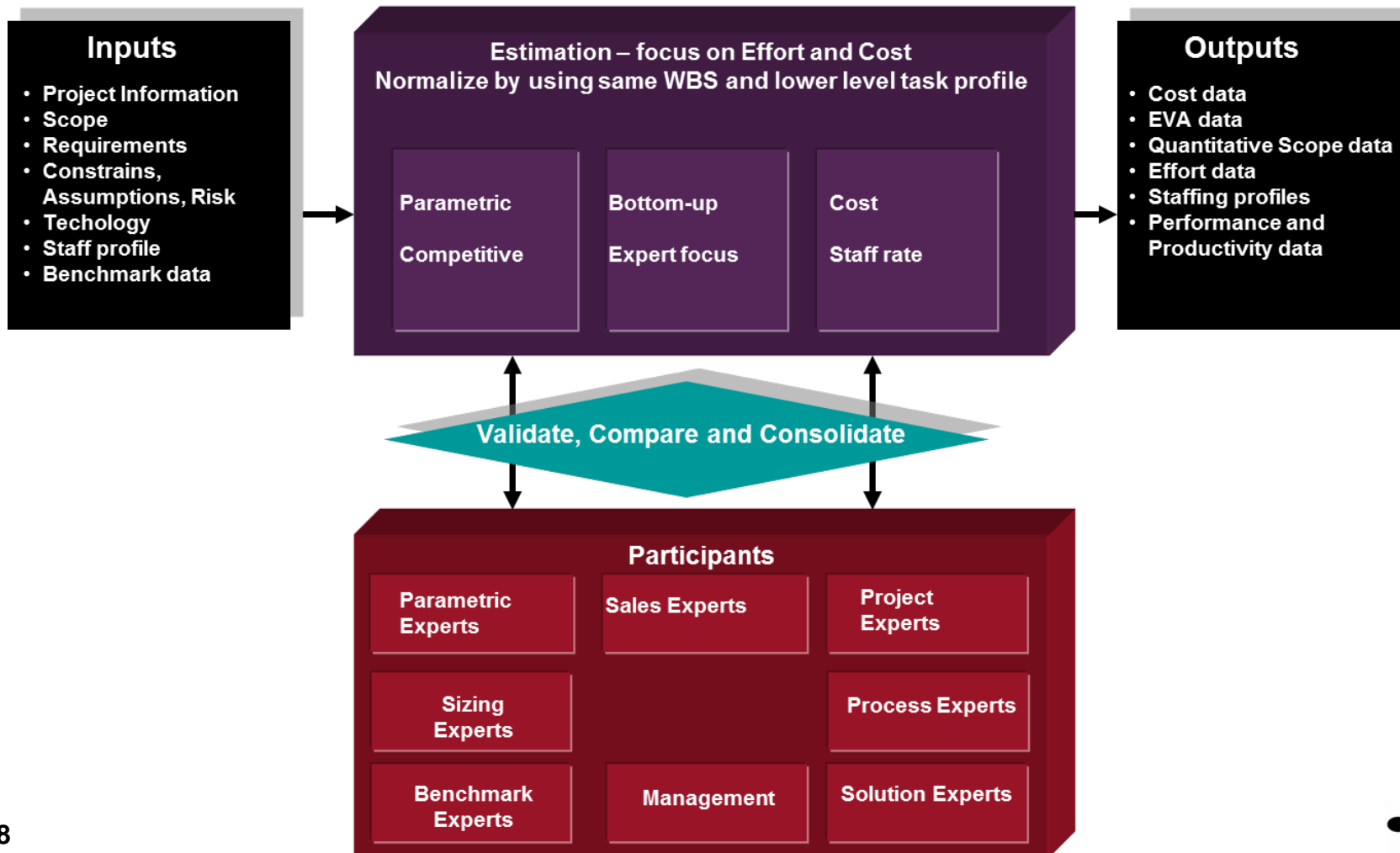 ➢ increase product & Process quality

Influencers

High level Perspective

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Inputs

- Project Information
- Scope
- Requirements
- Constrains, Assumptions, Risk
- Techology
- Staff profile
- Benchmark data

Estimation – focus on Effort and Cost
Normalize by using same WBS and lower level task profile

Parametric	Bottom-up	Cost
Competitive	Expert focus	Staff rate

Outputs

- Cost data
- EVA data
- Quantitative Scope data
- Effort data
- Staffing profiles
- Performance and Productivity data

Validate, Compare and Consolidate

Participants

Parametric Experts	Sales Experts	Project Experts
Sizing Experts		Process Experts
Benchmark Experts	Management	Solution Experts

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Three Point Estimating

Phase	Low	Most likely	High	Expected time	Variance
Refine Scope and Analyze Requirements	10	15	35	16	17
Design (High and low level design)	15	20	66	24	72
Produce (Coding, Code Review)	44	55	66	48	13
Unit & Integration Testing	60	88	130	80	136
Release (QC & Staging)	80	60	40	47	44
Acceptance Testing	10	15	20	13	3
Implement	8	16	32	16	16
Project Management (Start-up, Plan, Manage, Closedown)	20	30	40	27	11
Total	**247**	**299**	**429**	**271**	**920**

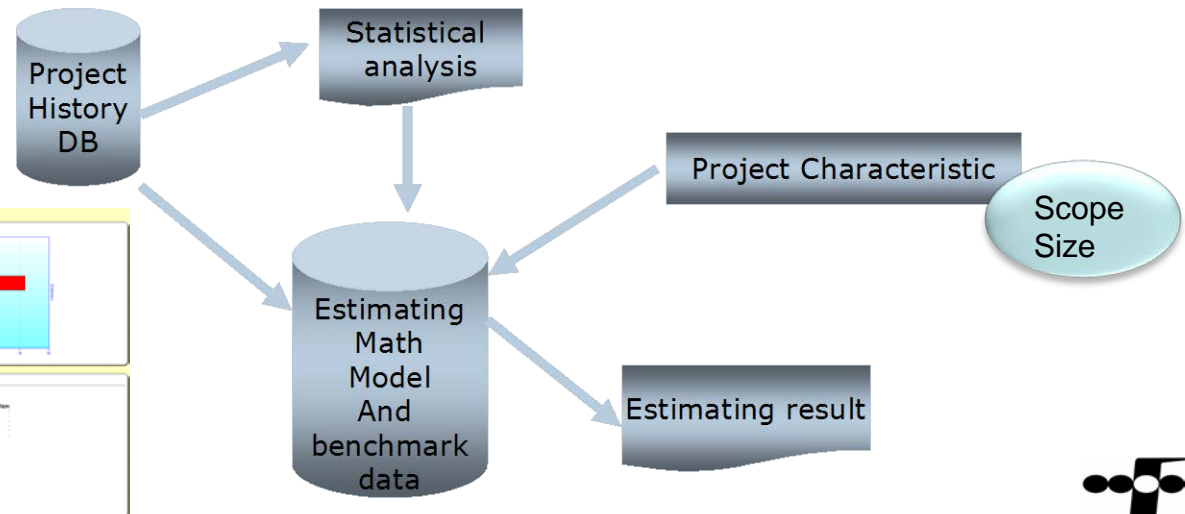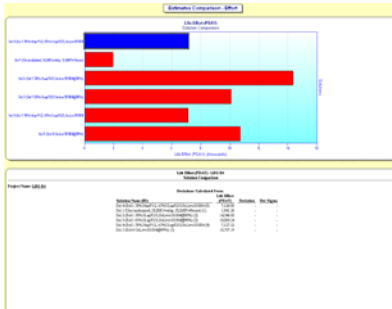**Three Point Estimating is a technique which can be used effectively as part of Bottom-up for Effort (and Cost)**
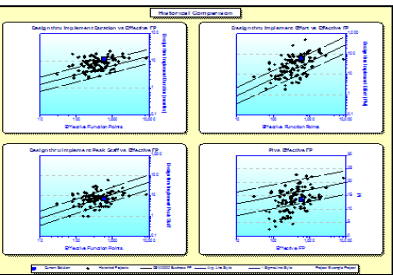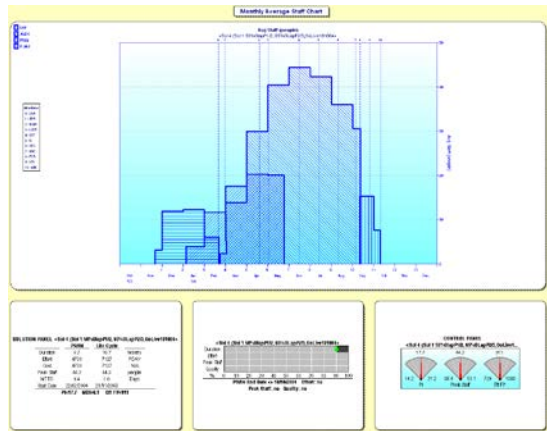
$$\text{Expected time} = \frac{\text{Low} + 4*\text{Most likely} + \text{High}}{6}$$
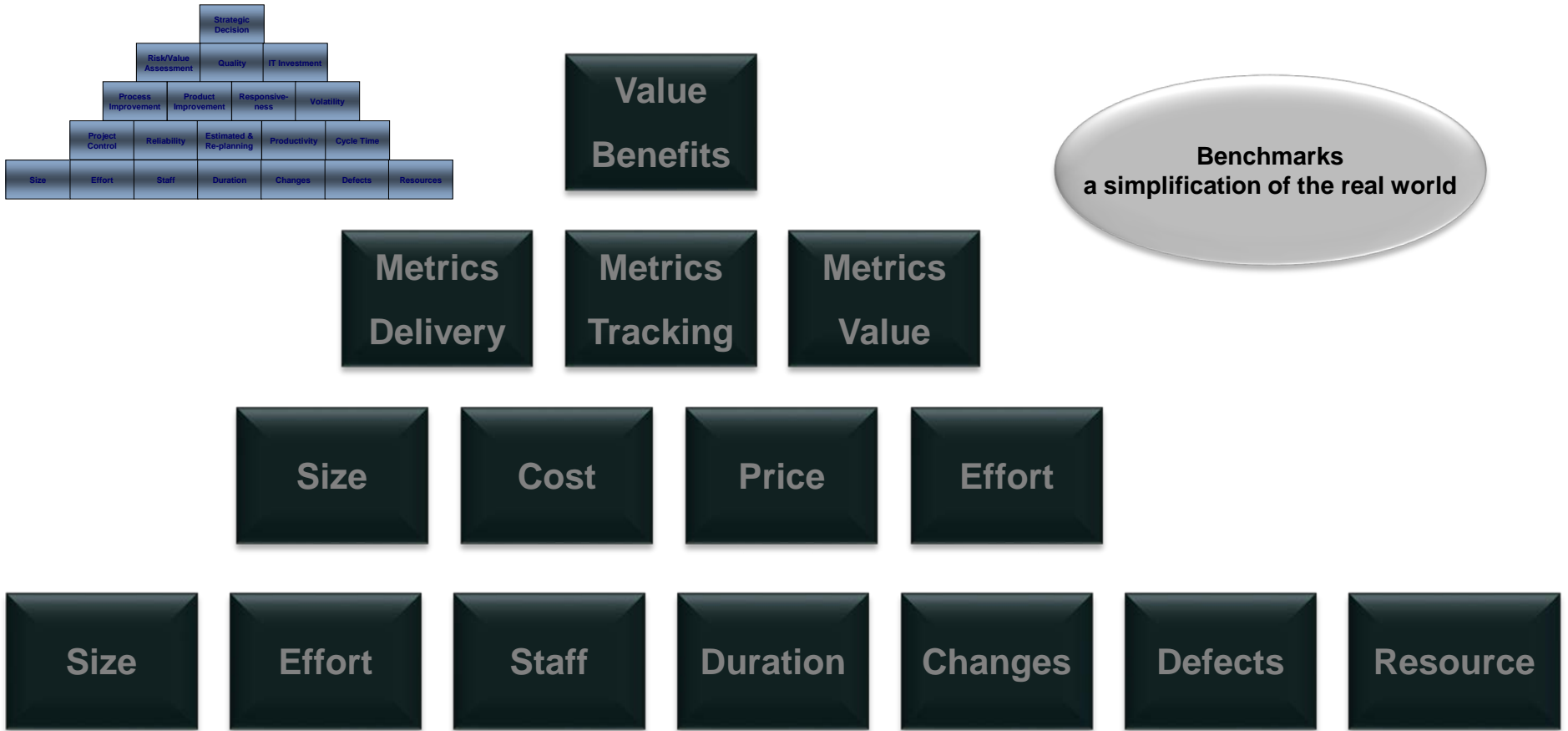
Parametric Effort Estimate
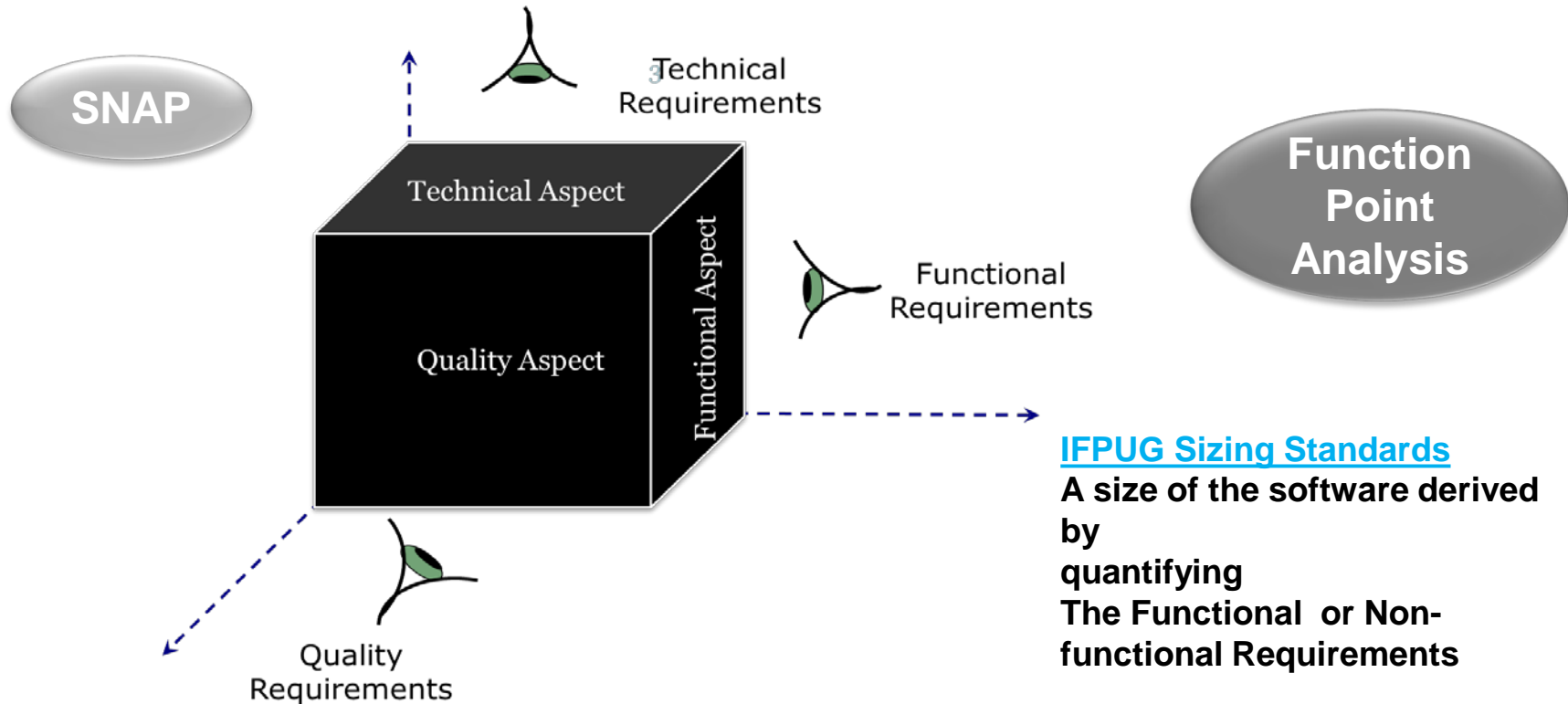
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Gives you the power to…

➢ **Develop realistic, data-driven „cost", effort and duration estimates**

➢ **Sanity check plans against your history and industry trends**

➢ **Scenarios to see impact of constrains and assumptions**

Historical Data Collection
Monitoring, Control, Benchmark

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| Strategic Decision |
Risk/Value Assessment	Quality	IT Investment
Process Improvement	Product Improvement	Responsive-ness	Volatility
Project Control	Reliability	Estimated & Re-planning	Productivity	Cycle Time
Size	Effort	Staff	Duration	Changes	Defects	Resources

Value

Benefits

Benchmarks
a simplification of the real world

Metrics **Delivery**

Metrics **Tracking**

Metrics **Value**

Size

Cost

Price

Effort

Size

Effort

Staff

Duration

Changes

Defects

Resource

Scope – The Black Box
Software Product

SNAP

Technical Aspect

Quality Aspect

Functional Aspect

Technical
Requirements

Functional
Requirements

Quality
Requirements

**Function
Point
Analysis**

IFPUG Sizing Standards
A size of the software derived by
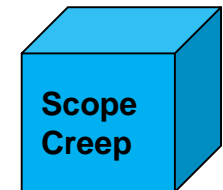**quantifying**
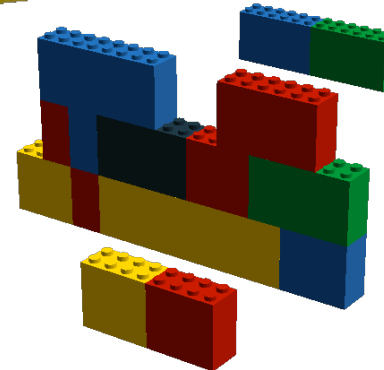**The Functional or Non-functional Requirements**

From Black Box to Quantitative measure Using Sizing Standards
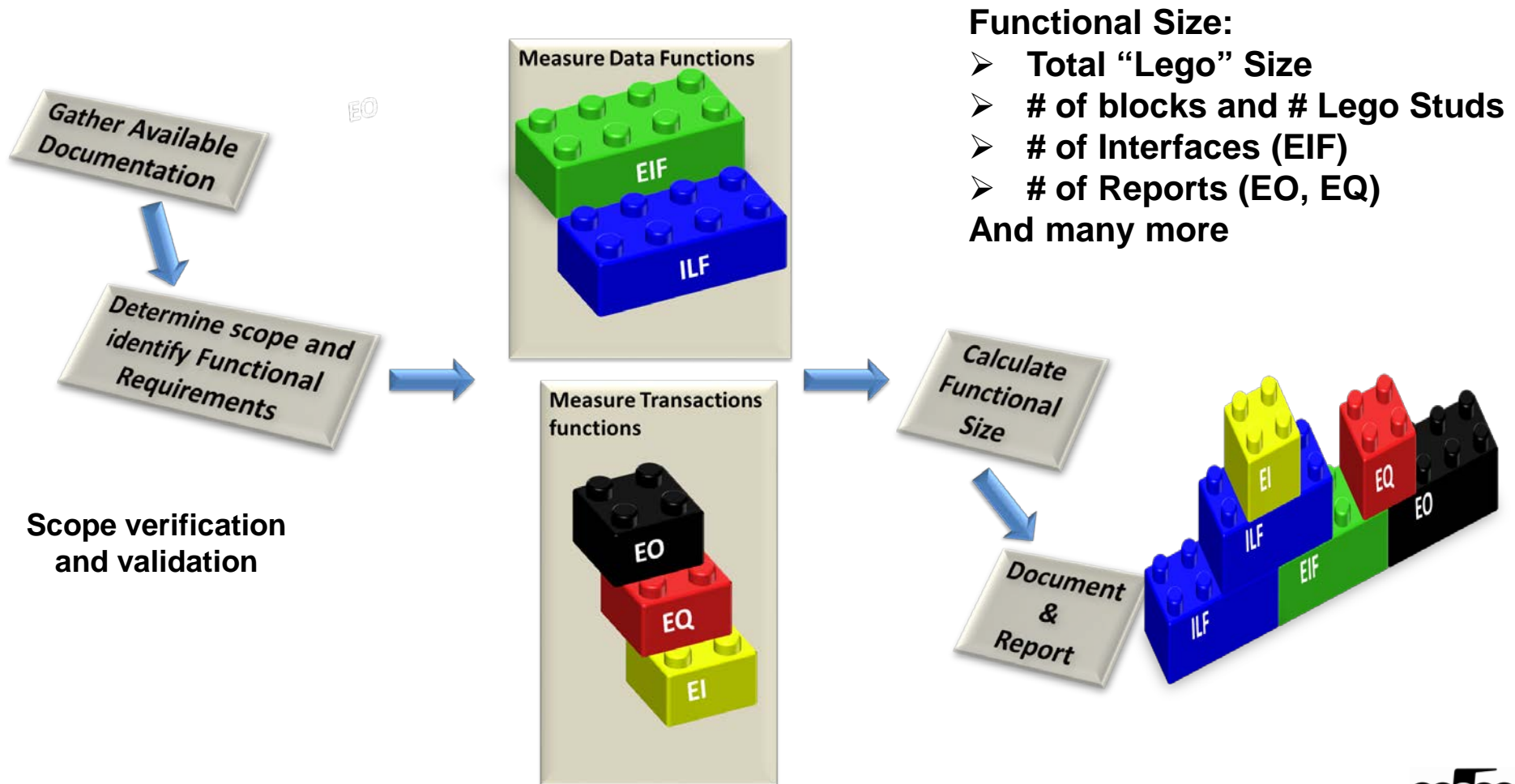
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Quantitative Scope

- ➢ **Scope to # of**
- ➢ **Sizing Standards**
- ➢ **Scope crepe control**
- ➢ **Thresholds acceptable**

Unknown

- ➢ **Quantitative the Black Box**

Before

Scope Creep

After
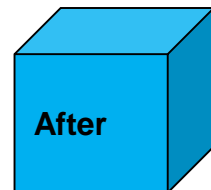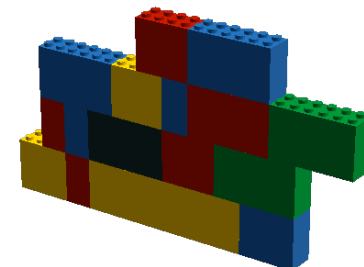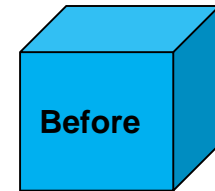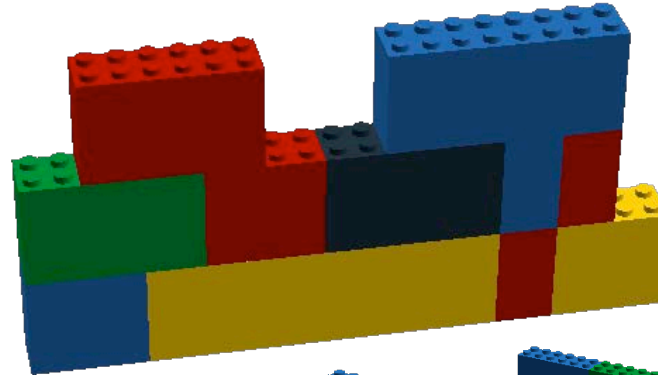
IFPUG Function Point Analysis (FPA) - The Process

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Gather Available Documentation

Determine scope and identify Functional Requirements

Scope verification and validation

Measure Data Functions

EIF

ILF

Measure Transactions functions

EO

EQ

EI

Calculate Functional Size

Document & Report

EI

ILF

EQ

EO

EIF

ILF

Functional Size:
➢ **Total "Lego" Size**
➢ **# of blocks and # Lego Studs**
➢ **# of Interfaces (EIF)**
➢ **# of Reports (EO, EQ)**
And many more

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IFPUG FPA Example

Effort

WBS

Input

Application A – The focus

WBS

Estimate

retrieve

Application B – Interface

Staff Rate

Report

Benefits of using Parametric Effort Estimating Techniques

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- **Peer review of the project documentation by the Function Point Analyst**
  - - an indication of scope quality and accuracy
- **Identification of other critical tracking metrics**
- **Risk identification on Effort, Duration & Staff**
- **Competitive analysis (Industry)**
- **Productivity Analysis (Internal)**
- **More reliable go-live dates (scenarios)**
- **Collection of historical data for future use**

Accuracy of the Effort estimates

Accuracy depends on
- **The reliability of scope definition.**
- **The quality of the documentation.**
- **The assumptions/constraints that will have an impact**
- **The reliability of the historical information**
- **The uniqueness of the project**

Accuracy is important in order to evaluate the level of control of the estimates needed.

Main Indicator
- **Indicator for quality of the estimate**
- **Indicator for Risk associated with Project cost and milestones**
- **Indicator for contingency need**
- **Accuracy assessment to prevent penalties.**

| Chance to deliver	Duration/ Cost etc.
95%	10m
80%	9m
60%	8m
25%	7m
0%	6m
Impossible region	5m
	4m

Reconciliation

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The most important things to consider during reconciliation are

- ➢ **What is the accuracy of the different estimates?**
- ➢ **Why is there a difference in the estimates?**
- ➢ **Why are there a difference between the phase estimates compared to industry data?**
- ➢ **Is something missing or non standard?**
- ➢ **Have all assumptions, constraints and risk been identified during the process for the estimates?**
- ➢ **Can we track the estimates?**
- ➢ **Can we control when a re-estimating is needed?**

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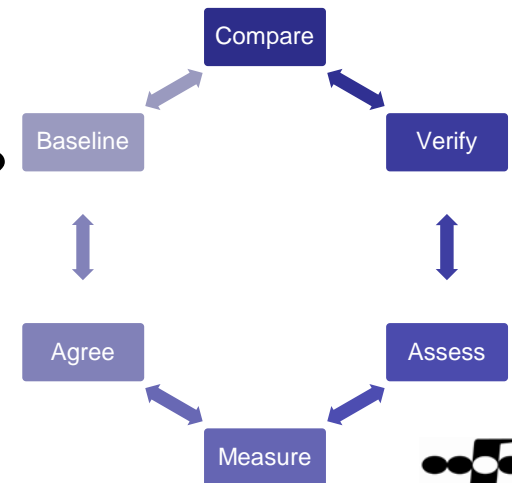
Next Step – After the Effort Estimate

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- **Develop schedule**
  - Including impact of combining the staffing and duration constrains
  - Remember impact on effort of utilizing different staffing experience
- **Cost Estimate**
  - Staffing rate
  - Resource allocation
  - Non-sized cost associated
  - Travel, training etc…

- **Always Take CAR(e)**
  - Constraints, Assumptions, Risks
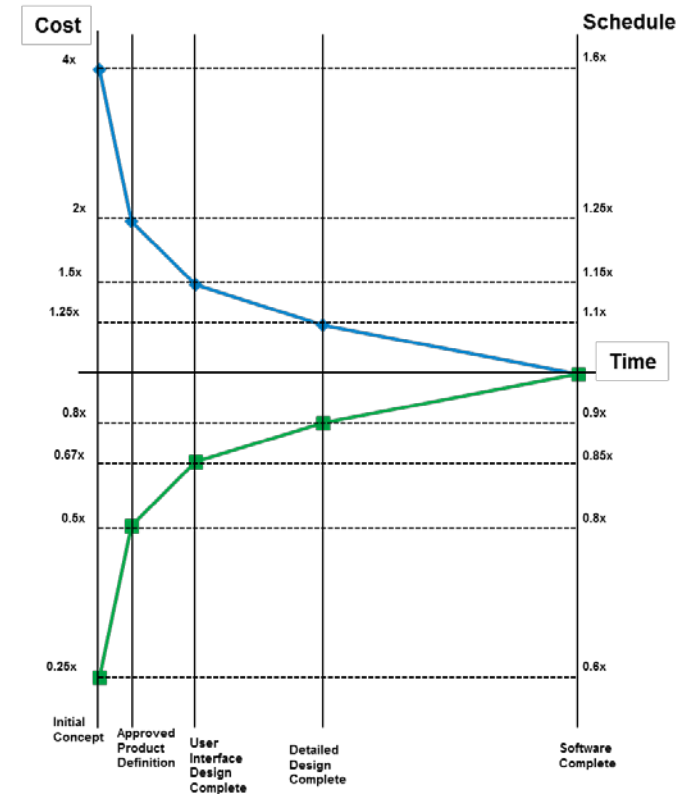
Set the realistic expectations

Maximise it

- **Cost Model - is the end of the path**
  - Scope, Size, Effort, Schedule and Cost
- **Utilise more then one estimating technique**
- **Create a good foundation of information as input**
- **Use Estimating Experts**
- **Assess quality and accuracy**
- **Document constraints, assumptions and risks**
- **Contingency - known-unknowns**
  - Quantitative and identified Risks
- **Track the estimates and progress**
- **Identify thresholds for re-planning**

*Final Statement

Don't treat Estimating as a pain – use it as an opportunity for improvement and Consolidation of information

Well estimated projects are usually those delivered within budget and schedule – and with good Change Management and tracking procedures.
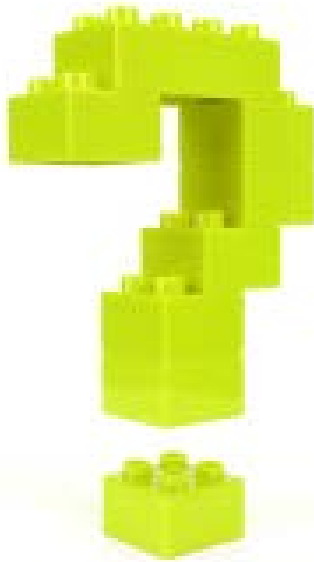
Well estimated projects have no issues with measurement and analysis on cost as well as Scope, effort, staff, changes etc..

Well estimated projects think in # from the beginning

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Thanks for listening

Next – Monitoring and EWI

To create a Budget without Monitoring and EWI is a bit like having a car without the wheels and ability to drive.

The Monitoring and Early Warning Indicators for a software project