Show me the money...

18th Practical Software and Systems
Measurement Users' Group Meeting and Workshops

"Measurement in a Complex Environment"

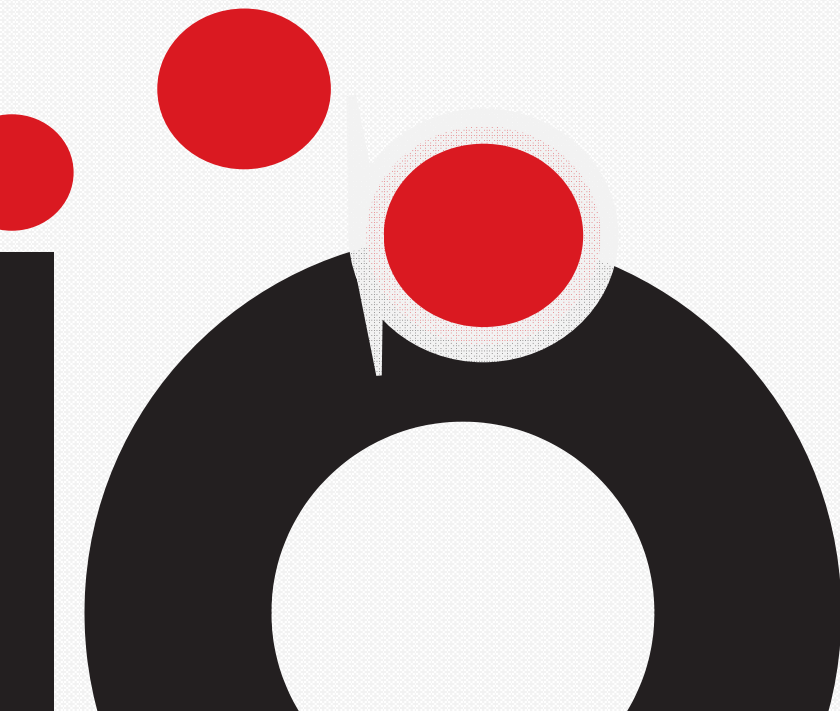June 12-16, 2107
Arlington, Virginia

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Show me the Money

From software sizing to productivity measurement across your software lifecycle

"What value is your software spend getting for you?"

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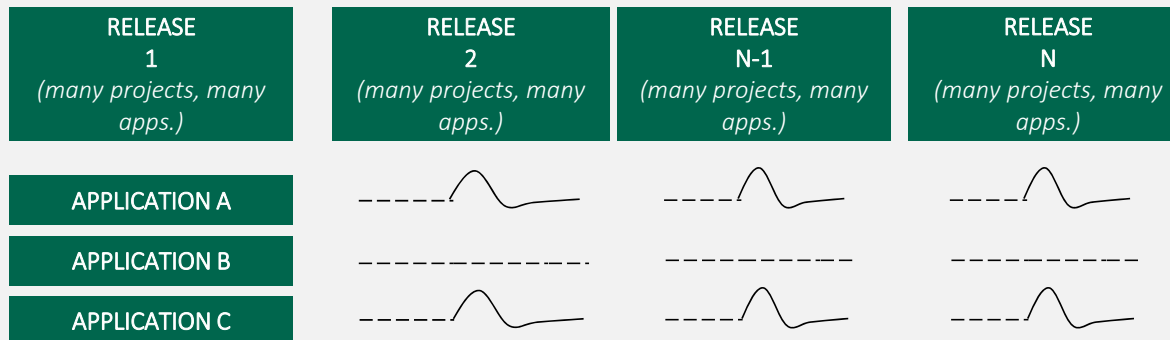**Inspired Software Services. Measurable Results.**

Objectives

- Construct a Software Value Measurement Process that:
  - Reduces IT cost and improves developer productivity and software quality.
  - Provides consistent "sizing" of work delivered by teams and vendors.
  - Improves estimation and budgeting by aligning with work delivered.
  - Is sustainable and scalable.
- This approach combines automated functional sizing with software risk and maintenance factors (this is for large app dev portfolios---scale matters)
  - Consistent, fast, neutral, Quantitative (Objective) Measure
  - Based on global Industry Standards
  - Expectations (Perceived Customer Value) can be managed
  - Software Process Improvements can be evaluated

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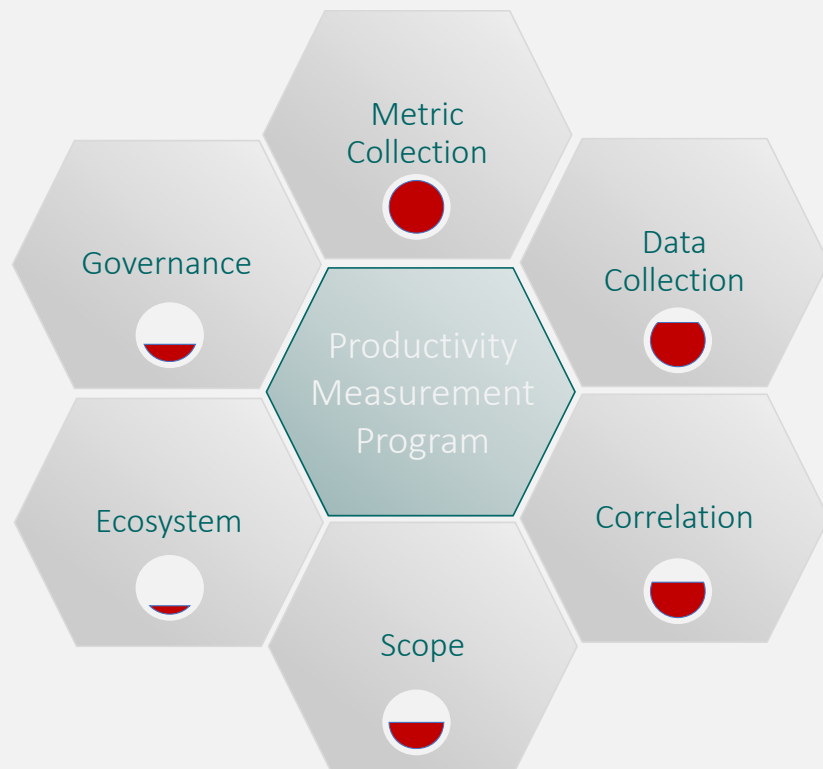Inspired Software Services. Measurable Results.

What Effective Sizing Enables: VALUE economics

- Helps organizations that are focused on managing costs and improving IT performance reliably measure outcome of software projects and thus quantify <u>ECONOMIC value</u> along with engineering efficiency.

- Accurate evaluation of cost, time to market and quality. Without size, a relative value cannot be established.
  - Standardized & Benchmarking
  - IT focus: Productivity Measurement & Improvement
  - Business focus: Quantify Effectiveness of Transformation Initiative
  - ADM Supplier Outcome Measurement
  - Program plan and Estimation

Your software life cycle cost MONEY– meter it for Value…

Size / Work Estimate	Development PROJECT 1	
Size / Work Estimate	Development PROJECT 2	Integration PROJECT 1 to N

RELEASE 1 *(many projects, many apps.)*	RELEASE 2 *(many projects, many apps.)*	RELEASE N-1 *(many projects, many apps.)*	RELEASE N *(many projects, many apps.)*

APPLICATION A

APPLICATION B

APPLICATION C

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Measurement Maturity

Metric Collection

Governance

Data Collection

Productivity Measurement Program

Ecosystem

Correlation

Scope
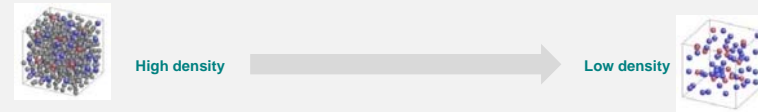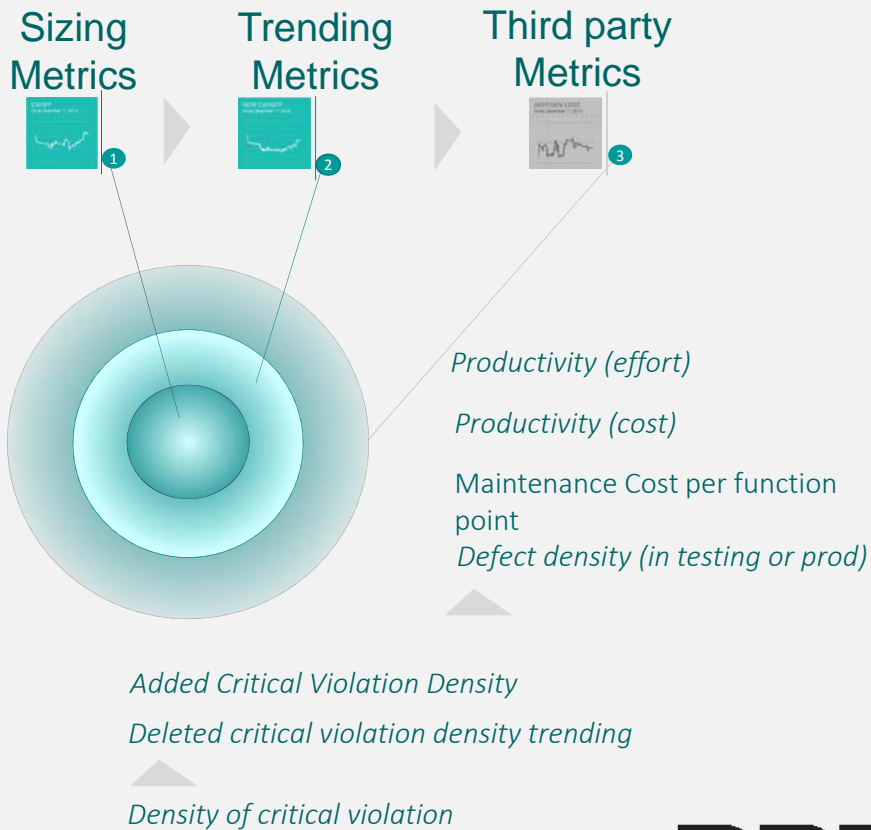
You can start with different level of maturity on each characteristics of the program

HIGH
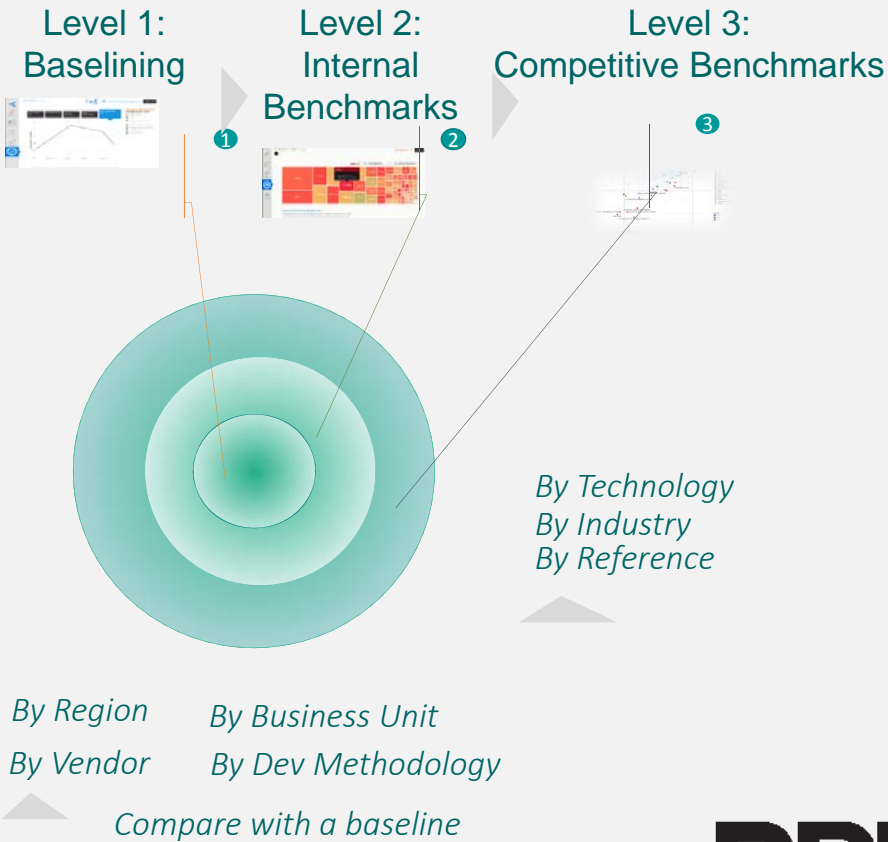
MATURITY

LOW

| Holistic |
| Integrated |
| Formalized |
| Ad-hoc |

Characteristics of Effective Sizing Metric

Sizing Metrics ① → **Trending Metrics** ② → **Third party Metrics** ③

High density → Low density

Productivity (effort)

Productivity (cost)

Maintenance Cost per function point

Defect density (in testing or prod)

Added Critical Violation Density

Deleted critical violation density trending
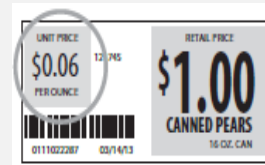
Density of critical violation

- Meaningful to developer and user/customer
- Defined (industry recognized)
- Consistent (methodology)
- Easy to learn and apply
- Accurate, statistically based
- Available when needed (early)
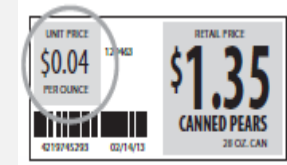- Addresses project level information needs

Dev Cost/aefp Score Evolution

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Model Performance

Canned reports, 16 units, costs $1.00

Canned reports, 28 units, costs $1.35

Level 1: Baselining

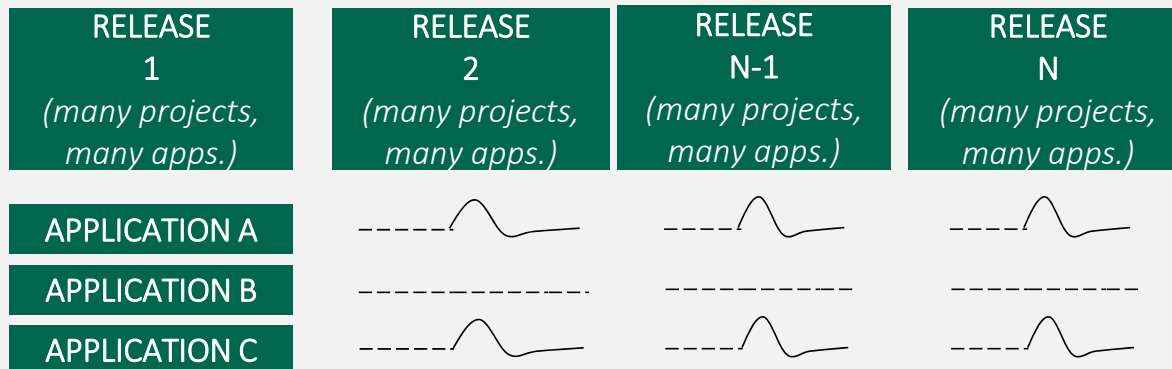Level 2: Internal Benchmarks

Level 3: Competitive Benchmarks

- Develop parametric models that utilize historical data to analyze the impact of selected process improvements

- Provide a knowledge base for improved decision making

- Identify areas of high impact (e.g., productivity and quality)

- Create an atmosphere of measuring performance

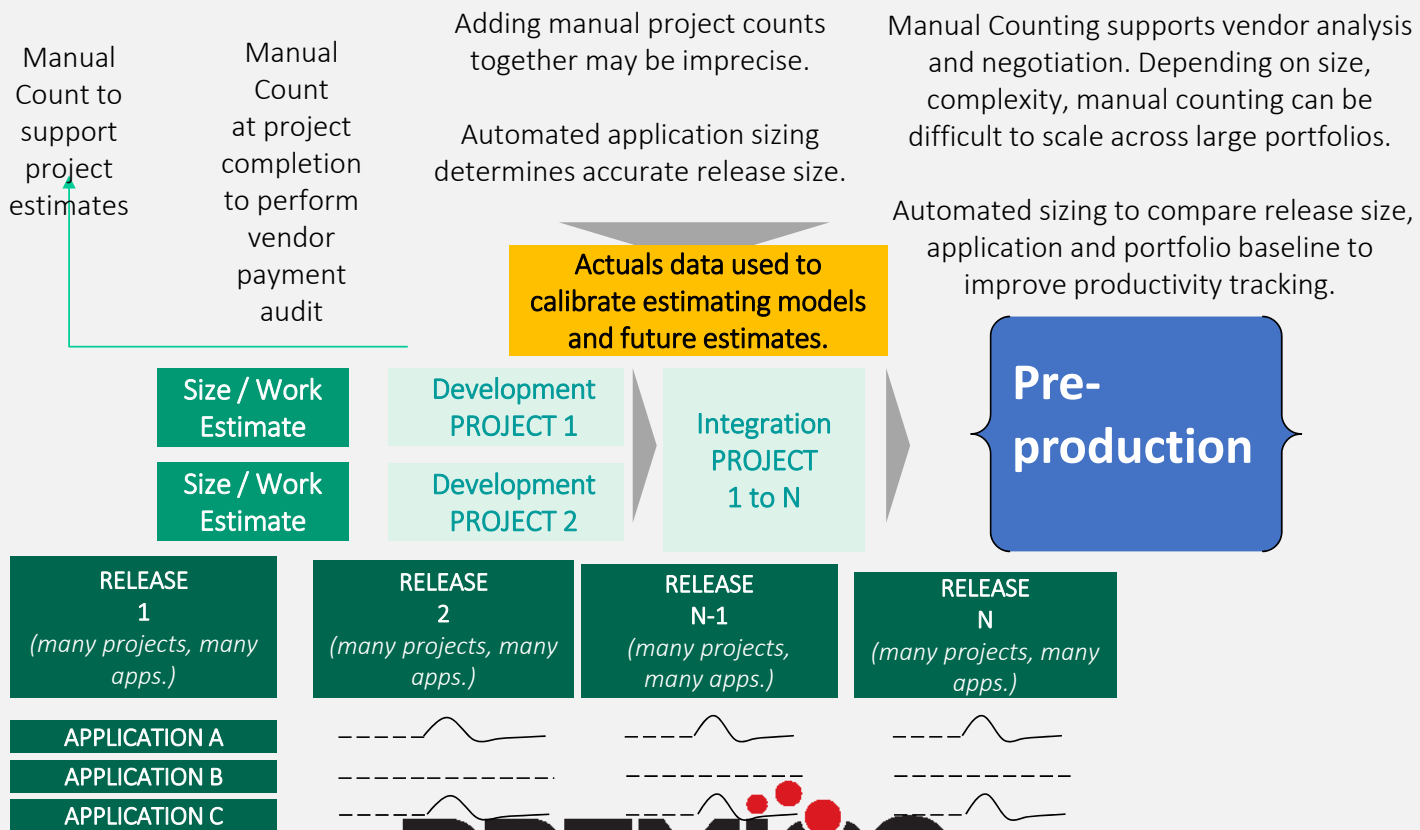- Opportunity for comparison to industry best practices

By Technology
By Industry
By Reference

By Region   *By Business Unit*

By Vendor   *By Dev Methodology*

Compare with a baseline

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Your software life cycle cost MONEY– meter it for Value… (I say it again…)

Size / Work Estimate	Development PROJECT 1	Integration PROJECT 1 to N
Size / Work Estimate	Development PROJECT 2	

RELEASE 1 (many projects, many apps.)	RELEASE 2 (many projects, many apps.)	RELEASE N-1 (many projects, many apps.)	RELEASE N (many projects, many apps.)
APPLICATION A			
APPLICATION B			
APPLICATION C			

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Meter your software life cycle (pre-production)

Manual and Automated FUNCTIONAL SIZING

Manual Count to support project estimates

Manual Count at project completion to perform vendor payment audit

Adding manual project counts together may be imprecise.

Automated application sizing determines accurate release size.

Manual Counting supports vendor analysis and negotiation. Depending on size, complexity, manual counting can be difficult to scale across large portfolios.

Automated sizing to compare release size, application and portfolio baseline to improve productivity tracking.

Actuals data used to calibrate estimating models and future estimates.

Size / Work Estimate	Development PROJECT 1		
Size / Work Estimate	Development PROJECT 2	Integration PROJECT 1 to N	**Pre-production**

RELEASE 1 *(many projects, many apps.)*	RELEASE 2 *(many projects, many apps.)*	RELEASE N-1 *(many projects, many apps.)*	RELEASE N *(many projects, many apps.)*

APPLICATION A
APPLICATION B
APPLICATION C

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Meter your software life cycle (post-production)

| RELEASE 1 (many projects, many apps.) | RELEASE 2 (many projects, many apps.) | RELEASE N-1 (many projects, many apps.) | RELEASE N (many projects, many apps.) | Post-production |

APPLICATION A

APPLICATION B
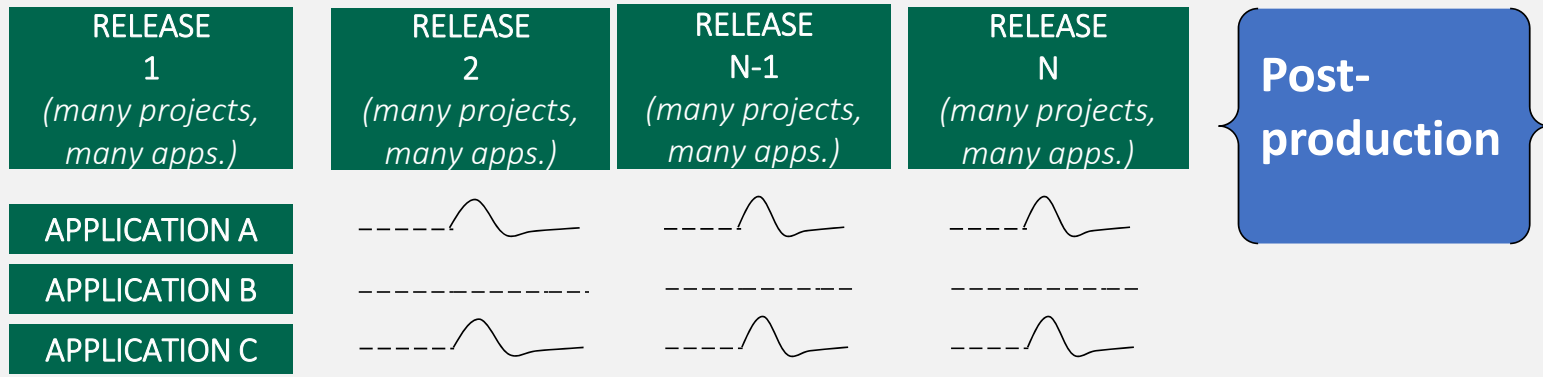
APPLICATION C

AUTOMATED FUNCTIONAL SIZING AND STRUCTURAL ANALYSIS

- Monitor code & application health during development
- Identifies critical flaws
- Educates developers
- Monitors architectural and engineering standards compliance

- Enforce minimal quality / risk thresholds.

Release Quality Gate:
- Verifies quality and security standards met
- Calculates Software metrics: complexity, non-functional requirements
- Calculates team / vendor productivity

Release Quality Gate:
- Consistent comparison of releases to support Continuous Improvement

Application Assessment:
- Identifies vulnerabilities, excessive complexity, production risks, productivity obstacle.
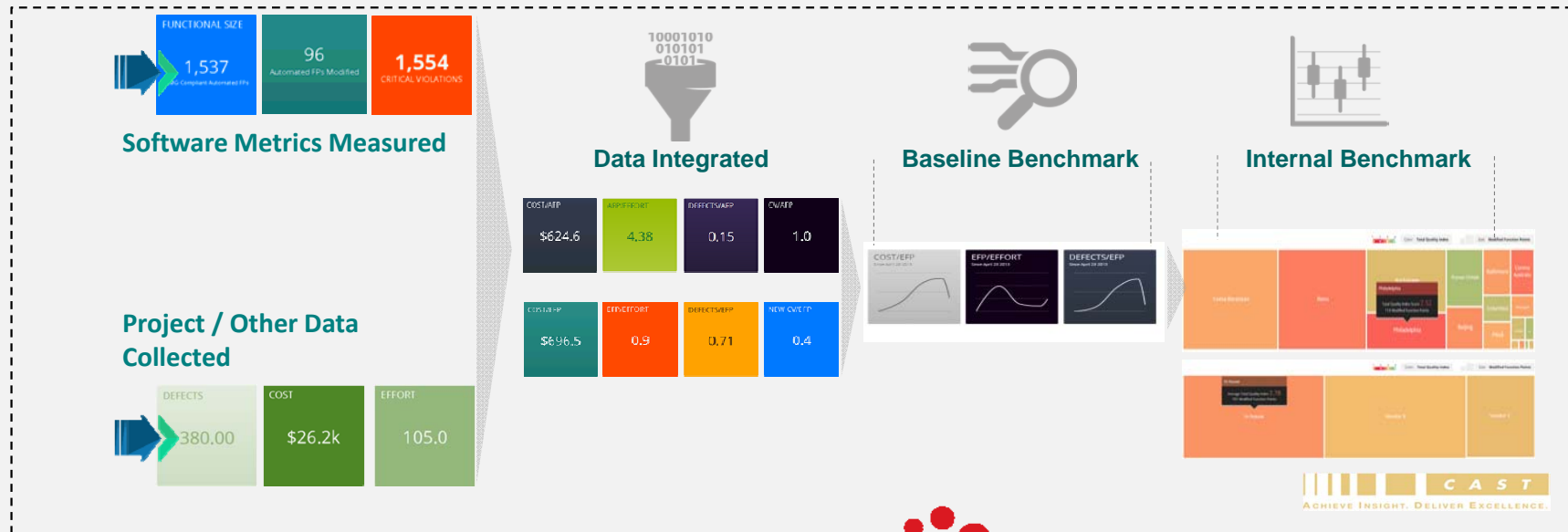
Portfolio Analysis
- Identifies high risk applications that represent production or maintainability risk
- Find potential consolidation or rationalization opportunities.

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Data Aggregation Process
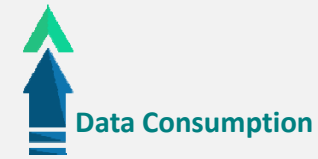
Software Value Management Process:
What is important? What is not?
Measure to goals to MAKE DECISIONS!

Data Consumption

Software Metrics Measured

FUNCTIONAL SIZE	96	1,554
1,537	Automated FPs Modified	CRITICAL VIOLATIONS

Project / Other Data Collected

DEFECTS	COST	EFFORT
380.00	$26.2k	105.0

Data Integrated

COST/AFP	AFP/EFFORT	DEFECTS/AEFP	CV/AFP
$624.6	4.38	0.15	1.0

COST/EFP	EFP/EFFORT	DEFECTS/EFP	NEW CV/EFP
$696.5	0.9	0.71	0.4

Baseline Benchmark

Internal Benchmark

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Benchmark Sample

Enhancement Defect Density

Number of defects introduced in the Latest Release

Number of Enhancement Function Points in the Latest Release

1) Evaluation of the latest software release or CAST analysis

2) Apples-to-apples benchmarking between releases

3) Tracked over time as a measure of progress

4) Used as a release gate

5) Apples-to-apples benchmarking between categories
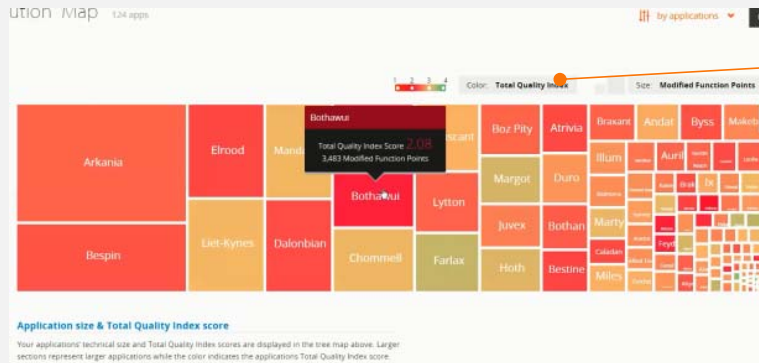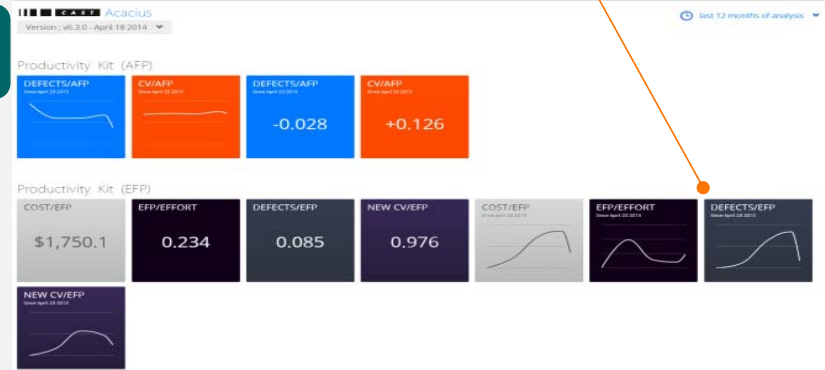
Risk area: Heat map (Quality and Enhancement)

Total Quality Index of the Applications

Enhancement Function Points of the Applications

1) Identification of the application which evolved the most

2) Identification of the worst applications terms of quality

3) Apples-to-apples benchmarking between applications

4) he size of the box indicates the number of enhancements the application has

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Manual Estimation & Automated Function points Process

Baseline Analysis ⇨ Estimation ⇨ Development ⇨ Analysis ⇨ Measure FP Delivered

Re-calibrate estimating and/or AFP count
- Re-define boundaries
- Re-calibrate transactions
- Refine complexity ratings and adjustment ratios
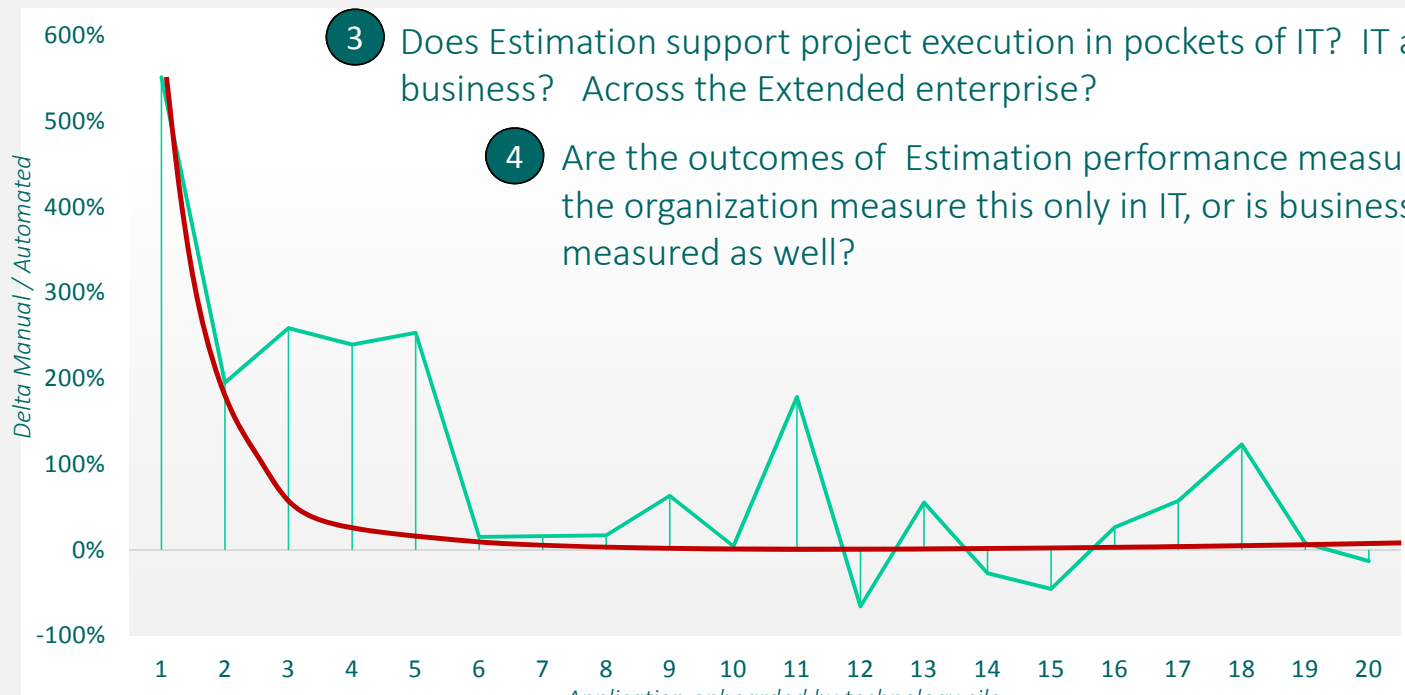- Additional training requirements

Investigate delta if threshold triggered
- Start at 20% variance
- Narrow to 10% during burn-in
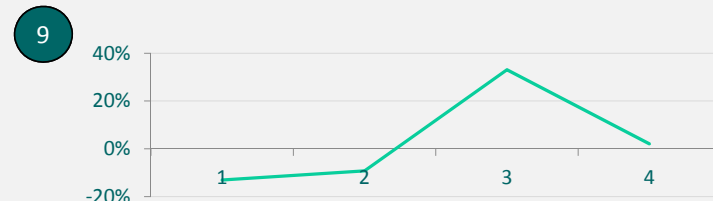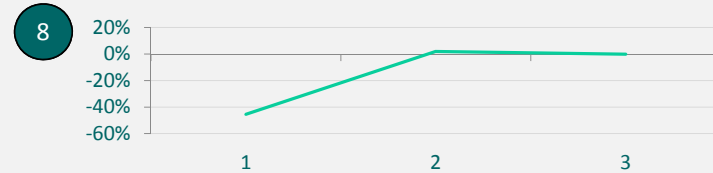- Exceptions can be defined
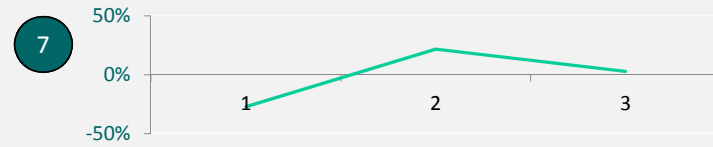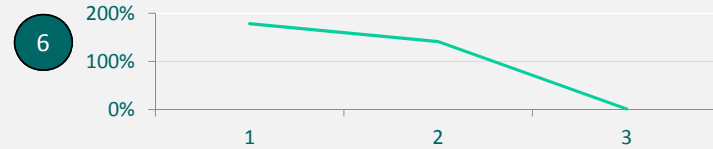- E.g. variance of xx FPs are always investigated

"Bedding in" period – improving estimation and closer calibration over an average of 6 months
Consistent, Automated "As-Delivered" Function Points, aligned with Contract

Baseline

Bedding In — Steady State

Outside expected threshold

Within expected threshold

Aggregated Reconciliation Monitoring

Axis: 130%, 120%, 110%, 100%, 90%, 80%, 70%, 60%
M1, M2, M3, M4, M5, M5, M6, M7, Contract Life

— Top — Bottom

Re-calibrate estimating

Axis: 500, 480, 460, 440, 420, 400, 380, 360, 340, 320, 300
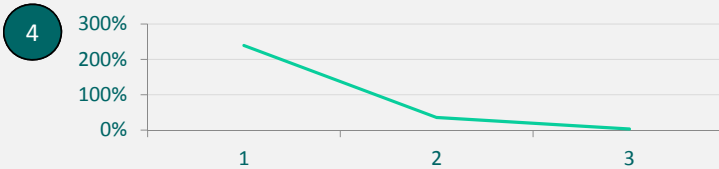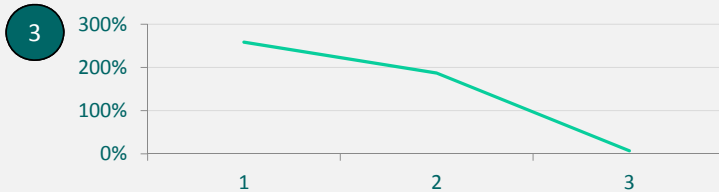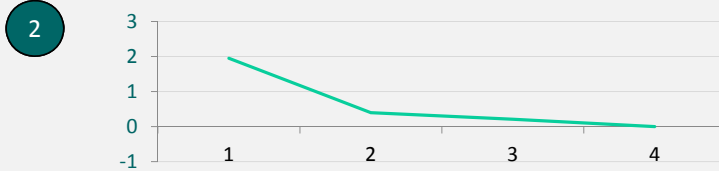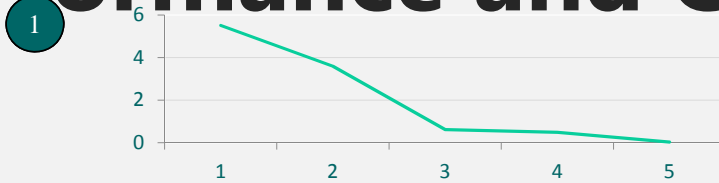0, 2, 4, 6, 8, 10, 12, 14

● Estimated ● Actual

Performance and Calibration I

1 How well defined is the estimation process that will be used to support project execution?

2 Is the process partially or wholly automated? Is it integrated with other processes?

3 Does Estimation support project execution in pockets of IT? IT and business? Across the Extended enterprise?

4 Are the outcomes of Estimation performance measured? Does the organization measure this only in IT, or is business outcome measured as well?

Application onboarded by technology silo

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Performance and Calibration II

Principles of a Stabilization Period

- Analytics should be based on **actual work delivered** – related to actual Function Points delivered at the required quality standards.
- Recommended "Bedding In" period to become familiar with the process and achieve success for parties
  - Bedding In estimates should be +/- 20%
  - Steady State Accuracy within +/- 10%

- **Continuously improve** the process of Estimation & AFP via calibration and reconciliation phase.
- Development team will be allowed flexibility to develop as they see fit, when the code is delivered, a scan will be performed to measure the function points and quality scores.

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Work wisdom: Do this… don't do the opposite…

- **Executive Sponsorship** - Introducing productivity and performance measurement requires C-level sponsorship and personal involvement.

- **Leverage Industry Standards** – Using a standards based product for the quality & productivity measurement will improve client & supplier relationship management.

- **Preparation** - As a prerequisite to any measurement initiative, the organization must be capable of delivering all codes and scripts that comprise their multi-technology applications. Have a project code for supplier SMEs to book their time to avoids delays.

- **Change Management** - Expect resistance to change and limited spontaneous demand from development teams for productivity and quality analysis & measurement. A successful measurement program starts from a 'Baseline' agreed by all parties.

- **The First Step is the Hardest** - On boarding applications require some manual effort. Automation comes over time once the process gets embedded.

- **Know The Limits** - Not everything can be measured through automated analysis.

- **Calibration & Collaboration**

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Conclusions

- A software value measurement program is key to track the progress of a transformation initiative, new development or steady-state program performance to inform on the value received from the spend

- A software value measurement program should include a stabilization phase to get a complete adoption from stakeholders

- Sizing measures should be interpreted and correlated with risk and quality indicators in order to ensure fair team performance measurement

- Sizing measures should result in economic value discussions not just engineering efficiency

- Implement Best Practices including estimation, automated measurement, consumption activities to ensure success of any software value measurement program

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Questions?

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