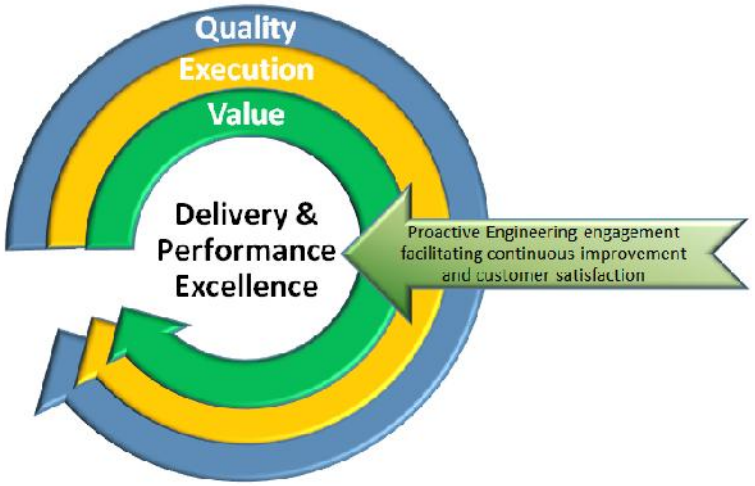


Quality Program Office
Measures, Metrics and KPIs

Determining how well we are doing

The Drive for Quality

- *Quality is not an act, it is a habit.*

  -- Aristotle

- *Almost all quality improvement comes via simplification of design, manufacturing... layout, processes, and procedures.*
  -- Tom Peters

- *Quality management has just become too important to leave to chance.*

  Good things only happen when planned; bad things happen on their own

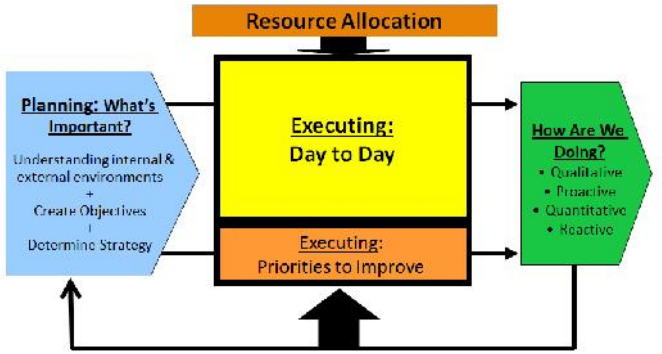
  Why spend all this time finding, fixing and fighting when you could have prevented the problem in the first place?"

  -- Philip Crosby

- Quality comes from internal actions, not external decisions
  -- self

Execution
How Are We Doing?

- Execution Areas – building and supporting the product
  - Day-to-Day
  - Improvement Priorities
- Measures
  - Qualitative
  - Proactive
  - Quantitative
  - Reactive
- Scope:
  - Execution and performance of: organization, development deliverables, processes and tools
  - Ability to assess the team performance not just the team's deliverables
- Objectives:
  - Identify leading indicators for regular assessment of the organization
  - Identify, define and standardize measures and reporting metrics for benchmarking and improving organization, execution and deliverables



Defining a set of Leading Execution Indicators (KPIs)

- Aids leadership by providing insight into potential future states to allow management to take action before problems are realized regarding:
  - Release and project status and risk assessment
  - Assessment of process effectiveness and impacts
  - Necessary interventions and actions to avoid rework and wasted effort
  - Delivering value to customers and end users
- Example Quality Indicators
  - Number of PCOs; new, re-scoped, rescheduled feature projects
  - Requirement trends; growth, rate of change (i.e., from planned), complexity, completeness…
  - Number of internal Etracks discovered; number corrected and deferred
  - Release and Project Fit2test status and trends; Sev1 defects QE identified on feature arrival
  - Resource effectiveness; volatility, skills, availability (dev vs. eeb)…
  - QE Test readiness, completion and retest
  - Number of validated and missed requirements
  - Release and project Decision Gate status and trends
  - External Stakeholder Review Findings and Quality “Escapes”; e.g., customer use case reviews, UI walkthroughs, SE rotations, F24h, ICERs, etc.
  - Type and severity of escalations and need for corrective actions (e.g., eeb)

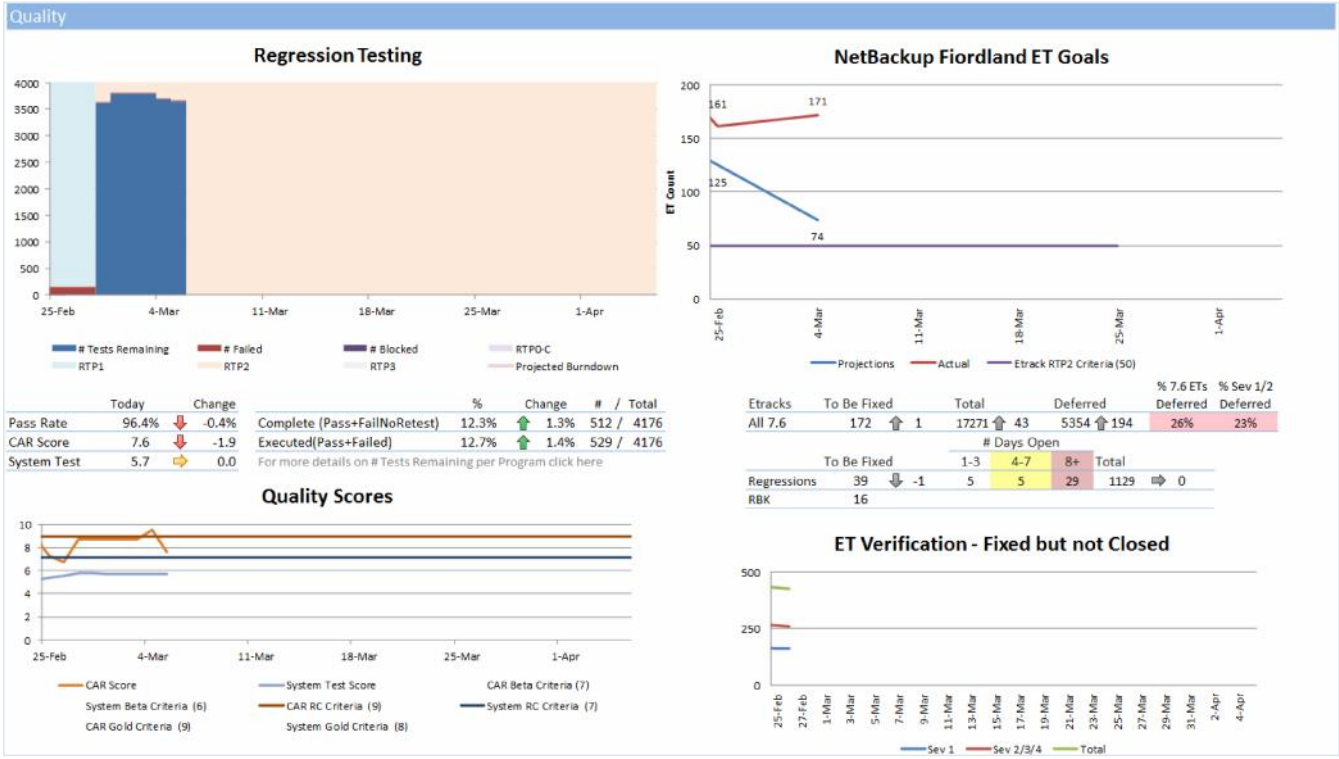
Around the Work Organization Execution

- CP 1 - Building the Product Measures:
  - Quality Objective: First time quality delivery, efficient resource utilization
    - Executive Decision Gate criteria checkpoints
    - Customer use case test driven; data, environment; “end to end” feature usage
    - Technical use case assessment; usage, area alignment, framework
  - Innovation Objective: Increase value-base product/feature differentiation
    - Value-based release tracking and visibility; theme and value focus (vs. FID)
    - Predictable release content and cycles; Itemized feature set / use case
- CP 3 - Supporting the Product Measures:
  - Objective: Reduced Customer raised issues, required interventions
    - Formalized issue/escalation RCA with published actions
    - Stakeholder checkpoints e.g., storyboards (i.e., requirements, use case, usability), beta, Rotations, F24h, ICER
- CP 1 and CP3 - Improvement Priorities
  - Efficiency/Productivity
    - Objective: remove non-value add processes/steps
      - Lean-driven organizational and release process changes
      - Increase skill set, cross-training, awareness; resource fluidity
      - Greater global cross-functional teams

Schedule / Content / Quality KPI Dashboards

Release Dashboards metrics indicate current health of the project to drive decisions

- Internal Release timeline
- Quality, Schedule
- Value metrics
- Risks & Mitigation Plans



Additional KPIs

Area	Metric/KPI/Measure	Total
Quality	# Open Escalations	1
	# Open Etracks Deferred from current release	1
	# Open Etracks Targeted to current release	1
	# RBKs / Open Issues and Delta	1
	% of automated testing in an area/release	1
	% of code changed after merge	1
	Automated Code Coverage	1
	Automation Code Coverage	1
	Average Files Changed per Fix	1
	BPT Code Coverage	1
	CAR Code Coverage	1
	Customer Escalations Over Releases	1
	Engineering Debt	1
	Escalations compared to total support calls	1
	Etrack Open Duration	1
	Files Changed Complexity	1
	Integration testing frequency in a project	1
	Manual testing reduction release over release	1
	Regressions Fixed and Delta	1
	Regressions Opened and Delta	1
	Supportability	1
	Time to Resolve (TTR)	1
	Total Etrack Backlog	1
	Trunk Static Code Status	1
	Unit Test Availability	1
	Unit Test Code Coverage	1
Quality Total		26
Execution	Debt backlog addition	1
	Fix Availability	1
	Hardware setup time	1
	Test Execution Time Difference	1
Execution Total		4
Value	Cost of time spent rerunning tests due to code changes	1
	Customer Release Distribution	1
Value Total		2
Grand Total		**32**

Metrics & KPIs

Selected KPI Details

Dashboard KPIs
Customer Delight – Defect Reduction

CP1 + CP3

- Candidates
  - Customer found defects (alpha, beta, post release)
    - Number of external etracks raised
    - Density of etracks raised from release
  - Customer Escalations
    - Number of escalations by Severity
    - Number of escalations involving executive management
    - Number of escalation requiring “code”/”eeb”
    - Average escalation age (by days)
    - Oldest escalation age (by days
- Measures:
  - Number of escalated complaints received within the measurement period requiring executive management engagement/involvement
  - 12-month rolling average of customer found etracks
- Direction:
  - downward trend by identified n%

Dashboard KPIs
Customer Satisfaction – Proof Points

CP1

- Proof Point Definition
  - Deliverable “Storyboard” walkthroughs with customers
  - Including: Jobs, user stories, functional/non-functional requirements, UI walk-throughs, demonstrations, early access
- Candidates
  - Number of customer proof point interactions
    - Number of unique customers
    - Number of repeat customers
  - Number of Issues Identified/required changes
    - Number of refined/adjusted requirements, user stories, jobs
- Measures:
  - Number of customer interactions within the release
  - Number of changes required based on customer interactions
- Direction:
  - Upward trend in number of customer interactions
  - downward trend of required changes

Dashboard KPIs
BMI – Backlog Management Index

CP3

- Candidates
  - Backlog Management
    - number of problems closed during the month / number of problem arrivals during the month x 100
- Trend: BMI greater than 100
- Indicators:
  - BMI greater than 100, backlog is reducing
  - BMI less than 100, backlog is increasing
- Desired Direction:
  - Reduction in backlog

Dashboard KPIs
Execution –Quality Release

CP1 + CP3

- Candidates
  - Deferred etracks
- Measures
  - Etrack percent originating from current but deferred (not resolved)
  - Etracks percent of Sev1&Sev2 deferred of total originating Sev1 & Sev2
- Desired Direction:
  - Downward trend of deferred etracks from current release
  - E.g., no new debt incurred

Team / Supply Chain Point of View (POV)

Quality metrics
Supply chain POV

- Development Projects
  - Design, code review metrics (red flags)
  - Quality at handoff
  - Monitoring and tracking of release deliverable commitments

Release Metrics
Supply chain POV

- Program management
  - Program metrics (schedule – are we on target)
  - Capacity plan vs. actual
  - Milestones and Criteria Criteria
- Product Management
  - Requirements, user stories and jobs available on time
  - Maturity of Requirements, user stories and jobs
  - Use case validation / acceptance
  - Number of PCOs
- Internal Product Validation
  - Schedule tracking (Test strategy, Test plans, etc.)
  - Test automation
  - Test / code coverage
  - Found issues (new and regression); efficiency and focus on end-to-end use case testing
  - Customer found issues (etracks)
- External Product Validation
  - Customer found issues (etracks)

Release Metrics
Supply chain POV - Improvement Priorities

- Investment areas/megatrends/Domains
  - Reduction in customer escalations/etracks
  - Productivity and Efficiency in the organization
- Build Team
  - Number of Bad builds (requiring rebuild due to process/inclusion)
  - Improvements in component packaging & distribution
  - Tracking turn around time for a build
- Source control management
  - Effectiveness of source
  - Time to make changes
- PMO
  - Consistency in execution
  - Monitoring and tracking of release deliverable commitments

measures/metrics/KPIs by Area

Measure of success for Product

- Measure of success
  - Release and content on schedule
    - Deviation from original plan
  - Customer satisfaction – internal and external
  - Minimize reported defects by customers
  - Minimize engineering effort and maximize output
- Feedback loop for each measure has different timeframes
  - Based on delivery to customer
  - Based on release timelines
  - Based on project timelines
- Long term traceability? From inception thru delivery to customer reaction

Measures and Metrics
Release on Time

Area	Metrics	Quality questions
Development	Projects indicators: MPPs, SRS/ SDD / FFQ indicators	Did I meet my dates? Did you accurately predict the release dates? What is the quality of what I am handing off? Are my deliverables with quality? Did I release with quality? Did we minimize regressions? Did we meet the requirements of the release? Am I planning effectively? Are we getting better over time? Can I do it better the next time?
	Time card data vs. estimates & Earned Value Metrics – e.g., SEA, EEA	
	Test pass rate	
	PR produced per effort applied	
	PRs Pre release - Post release.	
	Measure of architecture goodness? Building it right the first time?	
Product Validation	F2test and test milestones (100% execution)	
	Automation and runs of regression tests	
Program / Release management Build services	Release criteria met on date?	
	Release milestone tracking and deviations {need graphs}	
	Track Turn around for builds	
Product Management?	Issues found verification of requirements	
	% coverage of requirements	
	PCOs against requirements	
	Measure success of front end and back end work	

Measures and Metrics
Customer Satisfaction

Area	Metrics	
Development	Turn around of BU issues	
	Etrack backlog by investment/domain/director?	
	Reduction over time of BU requests	
	Improvement in performance and memory metrics	
Product Validation	Customer etracks not discovered by release QE testing	
Program / Release management Build management		
Product Management	Customer commitments vs. delivery	

Measures and Metrics Schedule

Measures	Metrics	
Schedule Did I meet my dates?	Projects and handoffs QE test milestones (100% execution) – eg., 100/100/0 Release criteria met on date? V2 data vs. MPP estimates	
Release with quality		
Release with quality	etracks/domain or director – Pre release - Post release. Measure of architecture goodness? Building it right the first time? Defects by etrack RCA – requirements, design, code, documentation, user error.	
Release with quality	Project beacon data by domain/director Etrack backlog by domain/director?	
Customer satisfaction	Am I reducing customer escalations (BU) in my area? Counts – plot escalations over time Response time to etracks – average age open, oldest Pre-release Defect (etrack) / KLOC Post release defect (etrack)/KLOC	
Customer satisfaction	Performance - Use P&S lab metrics. Memory – compared to goal. Use P&S lab metrics CPU	

Measures and Metrics
Productivity

Measures	Metrics	
Productivity How efficient are we?	% spend on R&D compared to competition Klocs per hour Tests per hour Business requirements per release Total hours per week on projects More releases, more stuff? Business use cases per year or Business use cases per year or BUC/hour Kloc / hour – kloc / Hour for etrack resolve	
Planning effectivity How good are our release plans?	PCOs quality of the requirements Customer promises per year. Lower is better Measure success of front end and back end work {decision gate metrics}	

Measures and Metrics
Quality

Measures	Metrics	
Schedule Did I meet my dates?	Projects and handoffs QE test milestones (100% execution) Release criteria met on date? V2 data vs. MPP estimates	
Release with quality		
Release with quality	Etracks/domain or director – Pre release / Post release. Measure of architecture goodness? Building it right the first time? Defects by etrack RCA – requirements, design, code, documentation, user error.	
Release with quality	Open and deferred Etrack data by investment/megatrend/domain/director Etrack backlog by domain/director?	
Customer satisfaction	Am I reducing customer escalations(BU) in my area? Counts – plot escalations over time Response time to etracks Post release PRs/KLOC	
Customer satisfaction	Performance - Use P&S lab metrics. Memory – compared to goal. Use P&S lab metrics.	

Measures and Metrics Supportability

Measures	Metrics	
Planning effectivity How good are our release plans, requirements?	Customer ransom/promises per year.	
Customer care	Hot sites (red or yellow) * number of weeks. Total number per month. Should come down.	

Organization

- Quality
  - Objective: First time quality delivery
  - Measures:
    - Executive Decision Gate criteria checkpoints
    - Customer use case test driven; data, environment; “end to end” feature usage
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    - Formalized issue/escalation RCA with published actions
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    - Greater global cross-functional teams
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  - Objective: Increase value-base product/feature differentiation
  - Measures:
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Thank you