**Example Measures for Engineering Process Areas - Tables**

Table 17.1 Measurement Plan Outline

|  |  |
| --- | --- |
| Process Areas | Measures to Monitor and Control the PA (GP 2.8) |
| REQM | Requirement volatility (percentage of requirement changes) |
| RD | Cost, schedule, and effort expended for rework  Defect density of requirement specifications |
| TS | Cost, schedule, and effort expended for rework  Percentage of requirements addressed in desing  Size and complexity of product, product-component, interfaces and documentation  Defect density of technical solutions work products |
| PI | Product-component integration profile (e.g., assemblies planned and actual, and number of exceptions found)  Integration evaluation problem report trends (e.g., number written and number closed)  Integration evaluation report aging (i.e., how long each problem report has been open) |
| VAL | Number of activities planned versus actual  Validation problem report trends  Validation problem report aging |
| VER | Verification profile (e.g., number activities planned versus actual, and the defects found)  Number of defects detected  Verification problem report trends  Verification problem report aging |

**The Engineering Process Areas**

The Engineering PAs include:Requirements Management (REQM);Requirements Development *(RD);Technical Solution (TS);Product Integration (PI);Verification (VER);Validation (VAL)*

PLANNING THE METRICS PROCESS

Table 17.1 Measurement Plan Outline

|  |
| --- |
| 1. Introduction (Purpose, Scope) 2. Organizational and Project Issues 3. Overall Measurement Approach 4. Approach for Project Management Metrics 5. Approach for Technical Metrics 6. Approach for Introducing Metrics into the Organization 7. How Metrics Will Be Collected and Used 8. Roles and Responsibilities 9. Communication / Feedback Plan 10. List of Measurements |

Table 19.1 Example Event Level Measures

|  |  |  |
| --- | --- | --- |
| Objective | Event | Measures |
| Productivity | Requirement (defined)  Requirement (designed)  Interface Implemented  Object Coded  Subsystem Integrated  Test Scenario Executed | Hours, Complexity  Hours, Complexity  Hours  Hours  Hours  Hours |
| Product Quality | Desing Review (completed)  Inspection (completed)  Test Scenario Executed | Defects, Pages, Hours  Defects, Lines, Hours  Defects, Hours, Coverage |
| Schedule | Task Completion | Days (no. late or early) |

Table 19.2 Process Performance Baseline (PPB) for New Development Productivity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PPB | Upper Limit | Mean | Lower Limit | Unit of Measure |
| Requirements Definition | 50.8  29.2  13.4 | 35  21  8.6 | 19.2  12.8  3.8 | Hours/Complex Requirement  Hours/Nominal Requirement  Hours/Simple Requirement |
| Desing | 81.4  44.4  18.6 | 49.8  31.7  13.3 | 18.2  19.0  8.0 | Hours/Complex Requirement  Hours/Nominal Requirement  Hours/Simple Requirement |
| Implementation | 13.4  35.4  6.54 | 8.6  21.0  4.3 | 3.8  6.6  2.1 | Hours/Interface  Hours/Desing Page  Hours/Object |
| Integration | 301.5  32.5 | 175.5  23.5 | 49.5  14.5 | Hours/Subsystem  Hours/Component |
| Systems Test | 18.5 | 12.4 | 6.3 | Hours/Test Scenario |

Table 19.3 Process Performance Model (PPM) – Effort for New Development

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Line Number |  | Est´d Number of Elements | Req Phase | Desing Phase | Implement Phase | Integration Phase | System Test Phase | Total Effort |
| 1 | PPB Elements |  | mean | mean | mean | mean | mean |  |
| 2 | Number of Complex Reqs | 75 | 35 | 49.8 |  |  |  |  |
| 3 | Number of Nominal Reqs | 100 | 21 | 31.7 |  |  |  |  |
| 4 | Number of Simple Reqs | 200 | 8.6 | 13.3 |  |  |  |  |
| 5 | Number of Interfaces | TBD |  |  | 8.6 |  |  |  |
| 6 | Number of Desing Pages | TBD |  |  | 21.0 |  |  |  |
| 7 | Number Of Objects | TBD |  |  | 4.3 |  |  |  |
| 8 | Number of Subsystems | TBD |  |  |  | 175.5 |  |  |
| 9 | Number of Components | TBD |  |  |  | 23.5 |  |  |
| 10 | Number of Test Scenarios | TBD |  |  |  |  | 12.4 |  |
| 11 |  |  |  |  |  |  |  |  |
| 12 | Historical effort Distribution |  | 20% | 30% | 20% | 15% | 15% | 100% |
| 13 |  |  |  |  |  |  |  |  |
| 14 | Estimates |  |  |  |  |  |  |  |
| 15 | Based on PPB Elements |  | 6.445 | 9.565 | 0 | 0 | 0 |  |
| 16 | Based on Effort Distribution |  | 6.445 | 9.668 | 6.445 | 4.834 | 4.834 | 32.225 |
| 17 |  |  |  |  |  |  |  |  |
| 18 | Actuals by Phase |  | 6.752 | 0 | 0 | 0 | 0 | 0 |
| 19 |  |  |  |  |  |  |  |  |
| 20 | Prediction Based on Actual When  Available or Best Estimate |  | 6.752 | 9.565 | 6.445 | 4.834 | 4.834 | 32.430 |