Copyright 2018 Carnegie Mellon University. All rights reserved.  
  
This material is based upon work funded and supported by the Department of Defense under Contract No. FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.  
  
Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Department of Defense.  
  
NO WARRANTY. THIS MATERIAL IS FURNISHED ON AN “AS-IS” BASIS WITH NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PURPOSE OR MERCHANTABILITY, ANY WARRANTY WITH RESPECT TO FREEDOM FROM PATENT, TRADEMARK, OR COPYRIGHT INFRINGEMENT, OR THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.  
  
[Distribution Statement A] This material has been approved for public release and unlimited distribution. The United States Government has Unlimited Rights in this material as defined by DFARS 252.227-7013.

The text and illustrations in this material are licensed by Carnegie Mellon University under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

The Creative Commons license does not extend to logos, trade marks, or service marks of Carnegie Mellon University.



Managing Quality

Exercise

Leading a Development Team  
Software Engineering Institute

© 2012 Carnegie Mellon University

Managing Quality

|  |  |
| --- | --- |
| **Overview** | This document presents some proposed answers to the questions addressed in the *Managing Quality* exercise. |

|  |  |
| --- | --- |
| **Questions #1** | *How effective were the code reviews?*  **Solution** |

|  |  |
| --- | --- |
| Part | Observations |
| A | Part A is slightly smaller than planned. The team spent more time than planned in code and code review, but less time than planned in code inspection. The number of defects found in code reviews and inspections, as a whole, is slightly less than planned. |
| B | The part is two-thirds larger than estimated. The team spent about the planned time in reviews and inspections. The team found about the planned number of defects (an actual total of 89 versus a plan of 87.1). So it looks as though the code reviews and inspections were okay. |
| C | Part C is three times larger than planned. However, the actual number of defects found is lower than the number planned for reviews and inspections. There is some concern about the effectiveness of the reviews and inspections.  The part is three times its estimated size but defects found are near plan in compile and code inspection and CR was half of planned. |

|  |  |
| --- | --- |
| **Questions #2** | ***Does there appear to be any quality problem?***  **Solution** |

|  |  |
| --- | --- |
| Part | Observations |
| A | Part A was smaller than planned and from our analysis of design review and inspections, there is a risk that there are latent design defects. |
| B | The yield chart looks fine except that the DLDR yield is half of planned. Many design defects were found in code review and code inspection. The size and DLDR yield suggest that a risk of higher defects than planned will be found in testing. |
| C | The defect density charts show actual defects is well below plan but the actual densities are similar to the second component. So this part is also at risk for higher defects in test. Also, a large number of design defects are being found in code review and inspections. |

|  |  |
| --- | --- |
| **Questions #3** | ***What data did you use and why?***  **Solution**  The key data that you want to be looking at is planned versus actual for   * Size * Time * Defects removed * Defects removed (normalized) * The phase yield charts   Keep in mind that the phase yield charts represent a lagging indicator of quality. You will never really know the true phase yield until the product has completed system test and has been used for some time in the field. Depending where you are within the development cycle, the calculated yield will always be 100% for the last defect removal phase that you executed. When additional defect removal phases have completed (e.g., unit test), the phase yield for earlier defect removal phases (e.g., code review) must be recalculated.  The tables below display the key data that can be used to assess quality of the components. The data was extracted from the plan data that you were presented with in the exercise handout.  The ratios are calculated here and displayed to provide a quick picture of actual vs. planned. While these values were not provided directly by the tool output, they can be easily calculated using a spreadsheet program. |

*Question #3 continues on the next page*

Component A

Size

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Size | 2235 | 1908 | 0.85 |

Time

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Requirements (Req) | 19.5 | 16.1 | 0.83 |
| Detailed-Level Design Review (DLD) | 70.7 | 55.7 | 0.78 |
| Detailed-Level Design Review (DLDR) | 33.5 | 7.5 | 0.22 |
| Detailed-Level Design Inspection (DLDINSP) | 34.5 | 18.7 | 0.54 |
| Code | 38.0 | 53.2 | 1.40 |
| Code Review (CR) | 19.0 | 30.4 | 1.60 |
| Code Inspection (CODEINSP) | 19.5 | 16.0 | 0.82 |

Defects Removed

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Detailed-Level Design Review (DLDR) | 27.7 | 8 | 0.29 |
| Detailed-Level Design Inspection (DLDINSP) | 13.9 | 0 | 0.00 |
| Code Review (CR) | 44.9 | 27 | 0.60 |
| Compile | 23.0 | 26 | 1.13 |
| Code Inspection (CODEINSP) | 11.5 | 18 | 1.57 |

Defects Removed – Normalized (Defects/KLOC)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Code Review (CR) | 20.11 | 14.15 | 0.70 |
| Compile | 10.30 | 13.63 | 1.32 |
| Code Inspection (CODEINSP) | 5.15 | 9.43 | 1.83 |

Component B

Size

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Size | 2112 | 3554 | 1.68 |

Time

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Requirements (Req) | 0.0 | 0.0 | 0.00 |
| Detailed-Level Design Review (DLD) | 57.3 | 69.5 | 1.21 |
| Detailed-Level Design Review (DLDR) | 29.6 | 28.4 | 0.96 |
| Detailed-Level Design Inspection (DLDINSP) | 34.1 | 34.2 | 1.00 |
| Code | 43.5 | 37.1 | 0.85 |
| Code Review (CR) | 21.8 | 20.5 | 0.94 |
| Code Inspection (CODEINSP) | 28.3 | 42.4 | 1.50 |

Defects Removed

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Detailed-Level Design Review (DLDR) | 21.5 | 13 | 0.60 |
| Detailed-Level Design Inspection (DLDINSP) | 10.7 | 19 | 1.78 |
| Code Review (CR) | 48.8 | 43 | 0.88 |
| Compile | 25.5 | 29 | 1.13 |
| Code Inspection (CODEINSP) | 12.8 | 17 | 1.33 |

Defects Removed – Normalized (Defects/KLOC)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Code Review (CR) | 23.12 | 12.10 | 0.52 |
| Compile | 12.08 | 8.16 | 0.68 |
| Code Inspection (CODEINSP) | 6.04 | 4.78 | 0.79 |

Component C

Size

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Size | 565 | 1729 | 3.06 |

Time

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Requirements (Req) | 11 | 18.1 | 1.65 |
| Detailed-Level Design Review (DLD) | 29.7 | 62.8 | 2.1 |
| Detailed-Level Design Review (DLDR) | 14.9 | 12.9 | 0.87 |
| Detailed-Level Design Inspection (DLDINSP) | 18.6 | 15.7 | 0.84 |
| Code | 28.6 | 34.7 | 1.21 |
| Code Review (CR) | 14.3 | 18.3 | 1.28 |
| Code Inspection (CODEINSP) | 9.8 | 12.4 | 1.27 |

Defects Removed

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Detailed-Level Design Review (DLDR) | 11.8 | 10 | 0.85 |
| Detailed-Level Design Inspection (DLDINSP) | 5.9 | 8 | 1.36 |
| Code Review (CR) | 31.5 | 16 | 0.51 |
| Compile | 16.4 | 15 | 0.91 |
| Code Inspection (CODEINSP) | 8.2 | 7 | 0.85 |

Defects Removed – Normalized (Defects/KLOC)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Plan | Actual | Actual/Plan |
| Code Review (CR) | 55.80 | 9.25 | 0.17 |
| Compile | 29.03 | 8.68 | 0.30 |
| Code Inspection (CODEINSP) | 14.52 | 4.05 | 0.28 |