

# Creating a Metrics Program

## Step 4: Identify Data To Collect

Step 4 is to identify the data that needs to be collected for each metric selected in the preceding step.

By now you have a list of metrics for the metrics program. In this step, each of the metrics is expanded into a set of raw data to collect.

### Data To Be Collected for the Program Goals

The following tables, organized by goal and metric, itemize the data to collect for each metric presented in Step 3. Consult the tables to identify the specific data you require for the metrics selected. If you have included other metrics, decide what additional data must be collected. If the tables contain unfamiliar terms or acronyms, refer to the Glossary.

#### Data To Collect for Goal 1: Improve Development Process

Figure 3.12 :  
Data for  
process  
improvement  
metrics.

Process Improvement Metrics	Data Required
Average elapsed time between defect identification and correction	Average elapsed time between defect identification and correction
Number of person hours (effort) to complete each activity	For each activity: <ul style="list-style-type: none"><li>• actual number of person hours to complete</li></ul>
Elapsed time for each activity	Project start date For each activity: <ul style="list-style-type: none"><li>• date activity started</li><li>• date activity completed</li></ul>
Number of defects detected in each activity	Number of defects detected in each activity
Number of deviations from the software development process	Number of process exception reports
Number of requirements added or changed during development	Number of requirements added or changed during development

## Data To Collect for Goal 2: Improve Software Estimation

Figure 3.13 :  
Data for  
software  
estimation  
metrics.

<b>Software Estimation Metrics</b>	<b>Data Required</b>
Initial estimate versus actual effort (person hours) for each activity	For each activity: <ul style="list-style-type: none"> <li>• estimated number of person hours to complete</li> <li>• actual number of person hours to complete</li> </ul>
Initial estimate versus actual project schedule for each activity	For each activity: <ul style="list-style-type: none"> <li>• estimated start date</li> <li>• estimated completion date</li> <li>• date activity started</li> <li>• date activity completed</li> </ul>
Initial estimate versus actual size of the software (new and reused)	Estimated SLOC of new code Estimated SLOC of reused code Total SLOC produced (new) Total SLOC produced (reused)
Initial estimate of staff required versus actual staff levels (for each activity)	For each activity: <ul style="list-style-type: none"> <li>• estimated number of staff required</li> <li>• number of people on staff</li> </ul>
Total overtime hours	Total number of overtime hours worked
Labor rate (PH/SLOC) for each activity	Total SLOC produced For each activity: <ul style="list-style-type: none"> <li>• actual number of person hours to complete</li> </ul>
Requirements changed for each activity	Initial number of requirements For each activity: <ul style="list-style-type: none"> <li>• number of requirements deleted</li> <li>• number of requirements added</li> <li>• number of requirements changed</li> </ul>
Software product complexity	Category of the software product

### Data To Collect for Goal 3: Improve Project Tracking

Figure 3.14 :  
Data for project  
tracking  
metrics.

<b>Project Tracking Metrics</b>	<b>Data Required</b>
Earned value of each activity	Estimated SLOC required Current SLOC completed For each activity: <ul style="list-style-type: none"> <li>• estimated number of person hours to complete</li> <li>• labor rate in PH/SLOC</li> <li>• number of units required</li> <li>• number of units completed</li> </ul>
SLOC completed	Total SLOC completed to date
Initial estimate for SLOC	Estimated SLOC required
Overall percent of work complete	Estimated SLOC required Current SLOC completed For each activity: <ul style="list-style-type: none"> <li>• estimated number of person hours to complete</li> <li>• labor rate in PH/SLOC</li> <li>• number of units required</li> <li>• number of units completed</li> </ul>
Percent of work complete for each activity	For each activity: <ul style="list-style-type: none"> <li>• number of units required</li> <li>• number of units completed</li> </ul>
Percent of budget spent to date	Current total budget Total dollars spent to date
Percent of schedule elapsed	Project start date Estimated project completion date Current date
Proportion of tests executed	Total number of tests Number of tests executed to date
Proportion of tests passed	Total number of tests Number of tests executed successfully to date

### Data To Collect for Goal 4: Minimize Schedule

Figure 3.15 :  
Data for  
development  
schedule  
metrics.

<b>Development Schedule Metrics</b>	<b>Data Required</b>
Elapsed time between project milestones or activities	Project start date For each activity: <ul style="list-style-type: none"> <li>• estimated completion date</li> <li>• actual completion date</li> </ul>
Initial estimate versus actual effort for each activity	For each activity: <ul style="list-style-type: none"> <li>• estimated number of person hours to complete</li> <li>• actual number of person hours to complete</li> </ul>
Initial project schedule versus actual schedule	For each activity: <ul style="list-style-type: none"> <li>• estimated start date</li> <li>• estimated completion date</li> <li>• date activity started</li> <li>• date activity completed</li> </ul>
Initial estimate versus actual staffing levels	For each activity: <ul style="list-style-type: none"> <li>• estimated number of staff required</li> <li>• number of people on staff</li> </ul>
Person hours spent on rework	Total number of person hours required to fix defects
Total overtime hours in each activity	For each activity: <ul style="list-style-type: none"> <li>• number of overtime hours worked</li> </ul>

### Data To Collect for Goal 5: Minimize Development Cost

Figure 3.16 :  
Data for  
development  
cost metrics.

Development Cost Metrics	Data Required
Actual cost for each activity	For each activity: <ul style="list-style-type: none"> <li>total cost in dollars</li> </ul>
Amount spent fixing defects in each activity	For each activity: <ul style="list-style-type: none"> <li>person hours spent fixing defects</li> </ul>
Cost for each SLOC	Total SLOC produced Total dollars spent to date (and at end of the project)
Initial cost estimate for each activity	For each activity: <ul style="list-style-type: none"> <li>initial cost estimate in dollars</li> </ul>
Budget for each activity	For each activity: <ul style="list-style-type: none"> <li>funds allocated</li> </ul>
Initial estimate versus actual effort for each activity	For each activity: <ul style="list-style-type: none"> <li>estimated number of person hours to complete</li> <li>actual number of person hours to complete</li> </ul>
Labor rate (PH/SLOC) for each activity	Total SLOC produced For each activity: <ul style="list-style-type: none"> <li>actual number of person hours to complete</li> </ul>
Percent of budget spent on development tasks	Current total budget in dollars Total dollars spent on development tasks
Percent of budget spent on management tasks	Current total budget in dollars Total dollars spent on management tasks
Percent of budget spent on support tasks	Current total budget in dollars Total dollars spent on support tasks

### Data To Collect for Goal 6: Improve Software Quality

Figure 3.17 :  
Data for  
software quality  
metrics.

Product Quality Metrics	Data Required
Average person hours to fix a defect	Average PH to fix a defect
Mean time between failures (if appropriate)	Mean time between failures
Number of defects detected of each type	Number of defects of each type or priority
Number of defects/SLOC	Total number of defects detected Total SLOC produced
Total lines of documentation	Total LOD
Percent of code inspected	Number of units coded (new) Number of units inspected

### Data To Collect for Goal 7: Improve Software

### Performance

Figure 3.18 :  
Data for  
software  
performance  
metrics.

Software Performance Metrics	Data Required
Average CPU utilization	Average CPU utilization
Average memory utilization	Average memory utilization
Mean time between failures (if appropriate)	Mean time between failures
Number of I/O transactions per unit of time (actual versus required)	Required I/O transactions rate Measured I/O transactions rate
Number of lines of code (SLOC)	Total SLOC produced
Software product complexity	Category of the software product

## Data To Collect for Goal 8: Improve Productivity

Figure 3.19 :  
Data for  
productivity  
improvement  
metrics.

Productivity Metrics	Data Required
Average number of person hours spent on rework per development staff member	Total number of development staff Total number of hours spent fixing defects
SLOC/person hours for each activity	Total SLOC produced For each activity: <ul style="list-style-type: none"> <li>• actual number of person hours to complete</li> </ul>
Number of staff at each experience level	Number of staff members at each experience level
Percent of budget available for software development tools	Current total budget in dollars Total dollars allocated to tools
Percent of budget available for support staff	Current total budget in dollars Total dollars allocated to support staff
Proportion of person hours spent on managerial or support tasks for each activity	For each activity: <ul style="list-style-type: none"> <li>• actual number of person hours to complete</li> <li>• number of person hours worked on support tasks</li> <li>• number of person hours worked on management tasks</li> </ul>
Ratio of development staff per manager	For each activity: <ul style="list-style-type: none"> <li>• number of managers</li> <li>• number of development staff</li> </ul>

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### Actions Required for Step 4

1. Consult the above tables and determine the data required for the metrics you selected in step 3. If you are using metrics and goals that are not defined by SPC's Metricate , you can use the above tables to help determine which data you need to collect.
  2. Update the metrics program documentation with the information extracted from these tables.
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## Step 4 Example

### Data

In Step 3, you identified 19 metrics to use in Buddicorp's metrics program. Now you look up each of these metrics in the Step 4 tables to determine what data needs to be collected.

You summarize the data that Buddicorp needs to collect (Figure 3.20) and add the information to your Metrics Program Description document.

Figure 3.20 :  
Data and  
metrics to be  
collected at  
Buddicorp.

<b>Buddicorp's Metrics</b>	<b>Data Required</b>
1. Earned value of each activity	Estimated SLOC required Current SLOC completed For each activity: <ul style="list-style-type: none"><li>• estimated number of person hours to complete</li><li>• labor rate in PH/SLOC</li><li>• number of units required</li><li>• number of units completed</li></ul>
2. Initial estimate of staff required versus actual staff levels (for each activity)	For each activity: <ul style="list-style-type: none"><li>• estimated number of staff required</li><li>• number of people on staff</li></ul>
3. Initial estimate versus actual effort (person hours) for each activity	For each activity: <ul style="list-style-type: none"><li>• estimated number of person hours to complete</li><li>• actual number of person hours to complete</li></ul>
4. Initial estimate versus actual project schedule for each activity	For each activity: <ul style="list-style-type: none"><li>• estimated start date</li><li>• estimated completion date</li><li>• date activity started</li><li>• date activity completed</li></ul>

Figure 3.20 :  
Data and  
metrics to be  
collected at  
Buddicorp  
(cont'd).

<b>Buddicorp's Metrics</b>	<b>Data Required</b>
5. Initial estimate versus actual size of the software (new and reused)	Estimated SLOC of new code Estimated SLOC of reused code Total SLOC produced (new) Total SLOC produced (reused)
6. SLOC completed	Total SLOC completed to date
7. Labor rate (PH/SLOC) for each activity	Total SLOC produced For each activity: <ul style="list-style-type: none"> <li>• actual number of person hours to complete</li> </ul>
9. Number of defects detected of each type	Number of defects of each type or priority
10. Original estimated SLOC	Estimated SLOC required
11. Overall percent of work complete	Estimated SLOC required Current SLOC completed For each activity: <ul style="list-style-type: none"> <li>• estimated number of person hours to complete</li> <li>• labor rate in PH/SLOC</li> <li>• number of units required</li> <li>• number of units completed</li> </ul>
12. Percent of budget spent to date	Current total budget Total dollars spent to date
13. Percent of schedule elapsed	Project start date Estimated project completion date Current date
14. Percent of work complete for each activity	For each activity: <ul style="list-style-type: none"> <li>• number of units required</li> <li>• number of units completed</li> </ul>
15. Proportion of tests executed	Total number of tests Number of tests executed to date

Figure 3.20 :  
Data and  
metrics to be  
collected at  
Buddicorp  
(cont'd).

<b>Buddicorp's Metrics</b>	<b>Data Required</b>
16. Proportion of tests passed	Total number of tests Number of tests executed successfully to date
17. Requirements changes for each activity	Initial number of requirements For each activity: <ul style="list-style-type: none"> <li>• number of requirements deleted</li> <li>• number of requirements added</li> <li>• number of requirements changed</li> </ul>
18. Software product complexity	Category of the software product
19. Total overtime hours	For each activity: <ul style="list-style-type: none"> <li>• number of overtime hours worked</li> </ul>