

Table 1. Distribution of software maintenance activity.

Study authors	Adaptive (percent)	Corrective (percent)	Perfective (percent)	Comments
Dekleva <sup>7</sup>	46	18	25	Totals 89 percent, with 11 percent “answering questions”
Helms and Weiss <sup>8</sup>	29	19	28	Totals 76 percent, with 24 percent “other”
Glass <sup>9</sup>	42	37	23	Generally small groups
Sneed <sup>10</sup>	52	9	35	Totals 96 percent, with 4 percent “other”
Kemerer and Slaughter <sup>11</sup>	83	12	5	Reported asymptotic defect density of 0.8 per thousand source lines of code in Cobol

products, formally released in April 2002, and 20 percent was expended on the other 12 products. Another 10 percent of maintenance activity went to open source support, and the remaining 30 percent was dedicated to Web site development and utilities including graphics and licensing support.

Each CR included

- A triplet of nonnegative integer numbers  $(a_e, c_e, p_e)$ , where  $a_e + c_e + p_e = 10$ , representing the *estimated* contribution of adaptive, corrective, and perfective components, respectively. For example, (4,5,1) would represent a maintenance contribution estimated to be 40 percent adaptive, 50 percent corrective, and 10 percent perfective.
- A triplet of nonnegative integer numbers  $(a_a, c_a, p_a)$ , where  $a_a + c_a + p_a = 10$ , representing the *actual* contribution of adaptive, corrective, and perfective components, respectively, after completion of the work. The person who supplied this data normally was the same one who provided the estimate, though consistency was not separately assessed.
- Estimated time for completing the request.
- Actual time the request was completed.

Figure 1 shows the distribution of activity by maintenance type in both total time and number of CRs. Compared with the data in Table 1, this distribution—54 percent adaptive, 6 percent corrective, and 40 percent perfective—represents a higher than normal emphasis on perfective maintenance and a lower than normal requirement for corrective maintenance.

The key components of both commercial offerings, which each range from 110,000 to 150,000 source lines of code, have a comparatively low defect density: 0.599 for the GUI client and 0.224 for the server in one product, and 0.269 for the GUI client and 0.184 for the server in the other product (GUI clients are written in Tcl/Tk, the servers in C). These four components contain most of the code the company developed and maintained.

Figure 2 shows the distribution of binned CRs by both number and duration. Approximately 85 percent of CRs

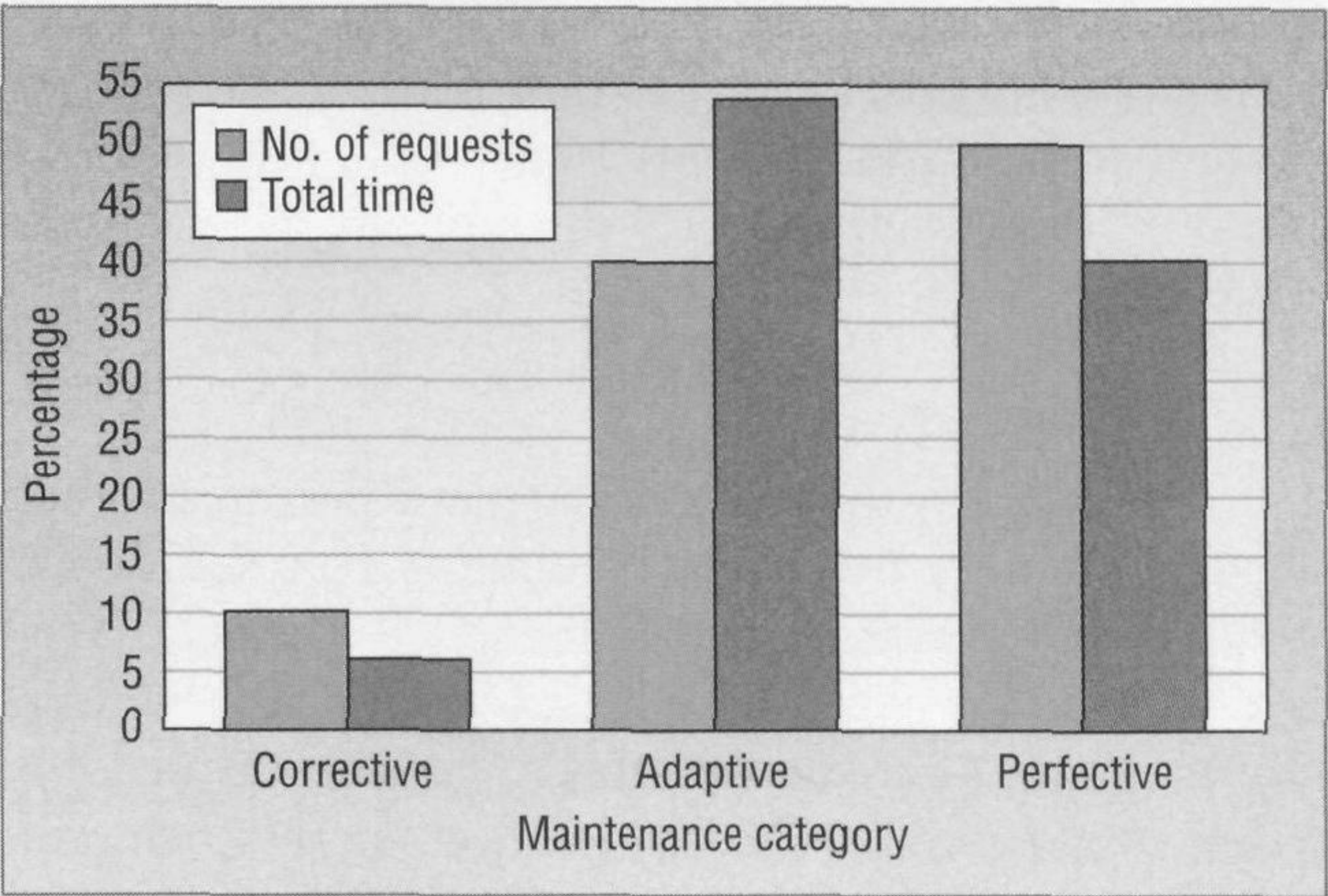


Figure 1. Distribution of maintenance activity by type. The distribution represents a higher than normal emphasis on perfective maintenance and a lower requirement for corrective maintenance.

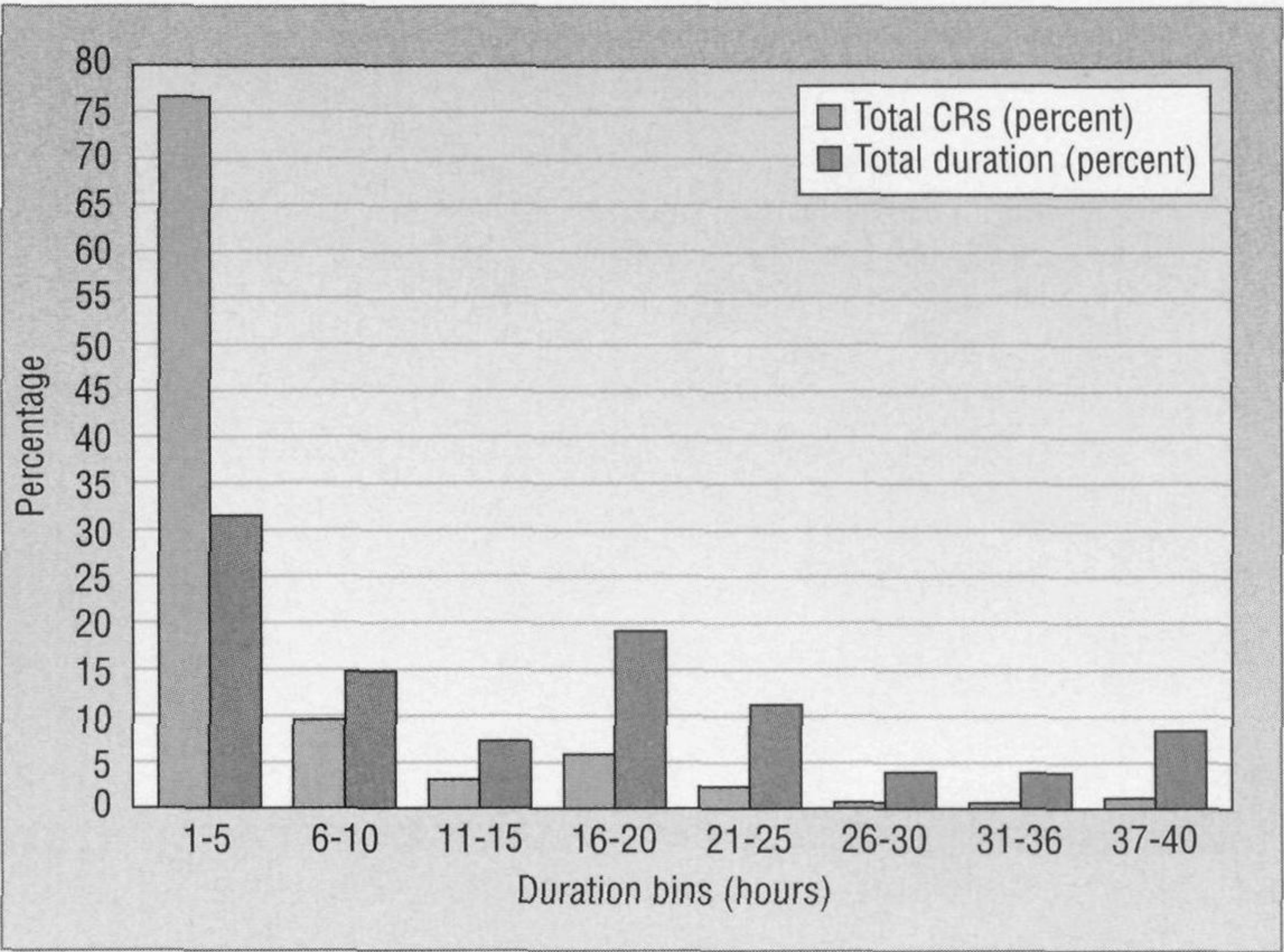


Figure 2. Distribution of change requests by both number and duration. Small changes measured either by number or total time dominate the maintenance activities.