

Make What's Counted COUNT

How one company found a way to use measurements to steer the actions of their organization **BY BEN LINDERS**

"Not everything that can be counted counts, and not everything that counts can be counted." —Albert Einstein

ORGANIZATIONS ARE INCREASINGLY RELYING ON MEASUREMENTS, BUT MANY STRUGGLE TO IMPLEMENT them. There are the usual technical problems associated with collecting data, storing it efficiently, and creating usable reports. However, the biggest challenges are often related to using the data to actually make decisions and steer the activities of the organization. Miscommunication,

Info to Go

- Provide raw data.
- Ask for feedback.
- Reduce guesswork.

incomplete analysis, and corrective actions that seem to come from nowhere create resistance to the whole idea of measurements.

To help combat these problems, we at the Ericsson Research and Development Center in the Netherlands have introduced a measurement



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process that is now an essential part of our monthly reporting cycle: feedback. As a result, our control of the R&D work has become stronger, we are able to act on risks earlier, and we have improved our overall performance. Quality engineers are involved in an “Operational Development” role, ensuring that the organization has measurements in place for all goals, that measurements are frequently tracked and analyzed, and that the data leads to actions that meet targets.

Our model may help you use data more effectively (and with less resistance) in your own organization.

WHAT IS FEEDBACK?

In the book *What Did You Say? The Art of Giving and Receiving Feedback*, Charles and Edith Seashore and Gerald Weinberg define feedback this way:

Information about the past delivered in the present, which may influence future behavior.

So how would we define software measurement feedback?

Information about collected data delivered to the people who have been doing the work, in order to support their un-

derstanding of the situation at hand and help them to take needed actions.

Feedback is based on the assumption that you should give the raw data to the people who did the work, and that they should perform the analysis. Why? Because they know the story behind the data. For instance, lead-time and budget precision of a project should be discussed with the project manager, while the rate at which defects are detected should be analyzed with the test team.

Why not report measurements directly to senior management? There are many reasons. What if the data is incor-

Key SUCCESS FACTORS and PITFALLS for FEEDBACK

HOW CAN YOU ENSURE THAT FEEDBACK WILL WORK? HERE ARE SOME KEY SUCCESS FACTORS TO EMPLOY.

Data collected must relate to the organization’s goals. As with any measurement program, the data that is collected must be in line with the goals that the organization has set. Data that provides no insight into performance should not be collected, and plans should be made to collect data that is missing. One advantage of feedback is that because the data is used more heavily, it quickly becomes clear if the right data is being collected. During feedback sessions, quality engineers should monitor the reactions of the people providing and analyzing data. Anything considered irrelevant in relation to the goals should no longer be measured.

Management support is crucial. Upper management will have to ask for conclusions, actions, and predictions that are based on data given by lower management and not by quality engineers. They must insist on lower management understanding the data and having in-

sight into the actual performance; when possible, they should ask that decisions be made using data.

Quality engineers have a central role. Quality engineers must be supportive in providing the data but must also be critical during the analysis. When conclusions do not match the data, they should not give up, but instead ask the manager how he came to that conclusion and to explain why it doesn’t match the available data. Often it is very useful to combine several measurements to explore issues from different views. It makes it possible to dig deeper and to get a better explanation of the situation. Also, a quality engineer can ask more questions, thus making sure that conclusions match the data and are not being brought up without proper analysis just to have a conclusion.

People providing data should be rewarded. Many measurement programs fail because people stop providing data when they get the impression that it is not being used. With feedback, the data is used in a measurement that is shown to the people who have provided the

data, so they see how it helps them to get more insight. After some feedback sessions, I have seen people volunteer to provide additional data as they become convinced that more data helps them to do a better job. There have also been occasions when feedback sessions made clear that certain data was not useful and the decision was made to stop collecting it.

The order of data—analysis, conclusion, actions, predictions—must be preserved. In his book *Getting Things Done When You Are Not in Charge*, Geoffrey M. Bellman suggests that you present the data first (in a way that makes sense to your customer), before you show him the analysis. This can be difficult at times, because as a quality engineer, you would like to tell the customer what you have found after digging through the data. But to get the best analysis and lay a foundation for actions, have the people who did the work investigate the data and form their own conclusions. They may match yours, but they may also be different; the latter would signal that you have to look together carefully to come to good conclusions. So hold your breath, and let them draw their conclusions first.

Communicate, communicate, communicate! As soon as you have data, show it to the people involved, even if you have only a portion of it. If there are conclusions and actions, show them to-

rect and the wrong actions are taken as a result? For example, a project is reported as having a lead-time precision of 83%, well below the goal of 90%. Senior management orders corrective actions based on this data. Later it turns out that a factor was incorrectly reported—the lead-time precision was actually 91%. Besides being a waste of money, corrective actions based on incorrect data can hamper motivation.

Even if the data is correct, the story behind the data is still unknown. If management draws its own conclusions, they may turn out to be wrong. If management orders additional analysis, corrective ac-

tions are delayed. Even if management is able to determine the right causes, and the corrective actions are on target, those actions may meet with resistance from other team members if they are insufficiently understood or if the relationship between the actions and the causes is unclear. In the end, the measurements are not effective, as they do not help the organization to steer the work related to the goals of the organization.

It is much more effective to have the people who will have to correct the problems do their own analysis and decide their own course of action. Of course, they would report to management the

data, their analysis, the causes they determined, and the actions they took. Management is still able to decide if the analysis is sufficient and if the actions that were taken were appropriate.

ERICSSON'S PATH TO FEEDBACK

Over the years, Ericsson has rolled out a very effective feedback process that is now a critical part of our monthly reporting cycle. We have used feedback to increase control of our work, identify and act earlier on risks, and become more efficient. We have also arrived at a “lean and mean” set of measurements, which has decreased the

gether with the data to management. Describe the goals, target levels, actual performance, and the reasons behind performance gaps. Explain when you will provide data and results and what you expect to be the result of the communication. Don't absorb data and then keep it to yourself. The biggest mistake any measurement program can make is to suddenly communicate conclusions “out of the blue.” An organization cannot deal with that; it will only lead to resistance, and nothing will change. Also, you lose a lot of credit and support.

The biggest reason for Ericsson's success has been that the measurement program has shown results every month. Even during holidays or when there were reorganizations, the monthly report was made and discussed. Every month there have been actions based on the data, either from analysis at lower levels (and thus reported in the report), or by the management team after discussing the report. This continuous cycle of benefiting from the report and improving it based on needs has been the main driver in making the report what it is right now and keeping it a useful tool to manage the organization.

People might distrust the data and state that it is wrong. If this happens, ask them to provide the correct data, then check this data until all agree that it is valid before doing the analysis. If they are not able to provide any data, investigate together how it could be obtained. Once you get the data, check it again until they agree that it is valid. Be aware, however, that data will never be perfect; i.e., always keep in mind what it is exactly that you measured, and how limitations in the measurement definition and collection of data will impact the conclusions that can be drawn.

People sometimes do not want to participate in the analysis. This can be either because they are not convinced that it is useful or because priorities prevent them from spending time on it. When this happens, you have to communicate clearly that without proper analysis with the right people, no valid conclusions can be drawn, and thus nothing will change. Reiterate that, as a quality engineer, you are not able to draw any conclusions because you do not know what actually happened. If they disagree, ask them what conclusions they think you could have drawn without their involvement—chances are great that they cannot find any.

People sometimes do not want to take actions. This is often the case if they don't feel responsible for the results that the data show. This pitfall should be

approached in a top-down way, by setting goals and measurements on every level in the organization. If these are accepted, then any outliers on the measurement should be addressed on the level where the goal is defined. Usually when actions are not taken, the goal-setting process has been insufficient and should be redone before measurements and analyses are continued.

People are wary of change. Introducing feedback is a cultural change; it asks people in the organization to look at their performance based on data and to define their own actions. Depending on what is regarded as “normal” in an organization, this can be quite a change. People are asked to be empowered and take more responsibility. Management must support them by being an example and by taking more of a coaching role towards employees.

A first step toward working with feedback would be to take a measurement that is considered important but not currently leading to actions, and start discussing it. Ask questions, and try to figure out the story behind the data with the people who are doing the work. Check how the current performance influence impacts the goals that your company has set. Decide on some early conclusions and actions, implement the actions, and measure again to see if things have changed. Early successes of such feedback loops will be useful to sell more feedback.

ENOUGH ABOUT KEY SUCCESS FACTORS. WHAT ARE THE PITFALLS TO AVOID WHEN YOU START DOING FEEDBACK? HOW CAN YOU DEAL WITH THE CHALLENGES YOU'LL FACE?

amount of time we spend every month in measuring, analyzing, and reporting.

It hasn't always been this way. In the beginning, every development unit within R&D created a monthly report that contained data but provided no mechanism for using it effectively. In these early reports, only some data was reported, mainly from projects that were finished. No analysis was done, and the management team was often unable to interpret the data and draw any conclusions. Generally, no actions were taken as a result of the measurements.

Part of this goal-setting step was to reach agreement on the exact definitions of the measurement, how to collect the data, and who should analyze it and come to conclusions.

We needed a better way to communicate the data to management. Our first step was to have a quality engineer present the data in a monthly unit meeting. For the most part, this data was presented exactly as it was reported. The presentation made management aware of the data and sometimes raised interesting questions. However, there was also much discussion about the purpose and the meaning of the measurements. Resistance increased, and acceptance of the measurements became very low. It was clear that something had to change.

To this end, we aligned the measurements with the goals of R&D. We adjusted our reporting so that we were only measuring things that were related to a goal. Then we made a plan that ensured every goal would have measurements. Monthly reporting of the available measurements tied directly to management goals and kept management involved by enabling them to build up experience with new and existing measurements.

The approach that we took resulted in what Kaplan and Norton call a "balanced scorecard," with goals and measurements for all aspects of software development. A typical balanced scorecard shows goals from four perspectives: Financial, Customer, Internal Business

Processes, and Learning and Growth. Each goal is associated with one or more measurements and a target level that is to be reached. For instance, a measurement of customer satisfaction can be a questionnaire that is sent out quarterly, and the target level can be an average score of 4 on a scale from 1 to 5. (For more on the balanced scorecard, see this issue's StickyNotes at www.stickyminds.com/bettersoftware.)

Part of this goal-setting step was to reach agreement on the exact definitions of the measurement, how to collect the

data, and who should analyze it and come to conclusions. The quality group explained the need for developers and managers to be involved in the analysis. Management agreed, on the condition that it would get sufficient support from the quality group. This was an important culture change and an important step toward effective feedback.

The third step was to introduce analysis. This significantly changed our monthly report. Until now, the quality group had collected and validated the data and made a final report that was sent to all managers. When we introduced analysis, the quality group still collected the data, but the first version of the report with only the raw data was sent to the line managers who were involved with the analysis. In the two days following the circulation of the report, interview sessions were done with the line managers (who had conducted any necessary research prior to the interview with their project managers or technical personnel). During the interview, quality personnel worked with the line managers to analyze the data and come to conclusions. The quality engineer pointed out trends, anomalies, and red flags in the data, and the manager provided an explanation. The knowledge and experi-

ence of the two people in the interview strengthened each other: The quality person knew the measurements and could read the data, while the line manager could relate the data to what had actually happened. Finally, where data analysis showed that the goals of the organization would not be met, the quality person asked what corrective actions (if any) would be taken.

After the interview, the quality engineer added the conclusions and any decided or ongoing actions to the monthly report, and a final revision was sent to both senior management and everyone that participated in the analysis. This report was still discussed in the management meeting, but now the report included much more information along with the data, including the actions that had already been taken. Focusing only on red-flag issues that still needed to be addressed saved valuable time in the meeting.

We didn't stop there. Encouraged by our success, we added performance predictions to our analysis: Would the goals be met, given current performance and planned actions? This process included extrapolating data, looking at trends, and pattern matching. The quality engineer calculated the data and then checked with the line managers to determine their expectations. If there were differences between what the data predicted and what the manager expected, further investigation was done. Conclusions regarding the future performance were again added to the monthly report and discussed in the management meeting.

Recently, we have begun a higher-level analysis of overall results of the measurements with the responsible unit manager. The raw data is fed back, together with information from previous months. The appropriate unit manager and a senior quality engineer look at the data and examine the conclusions, actions, and predictions that have been done on lower levels in the organization. Based on that, the unit manager determines if the targets will be met, evaluates if actions taken were sufficient, and comments on the results. Because all the measurements are already in the balanced scorecard, the resulting management summary is only one page. In fact, the R&D management team ultimately decided to replace an

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existing six-page monthly unit report with this one-page statement, saving reporting time every month. The shortened report is also displayed on message boards in the hallways of the R&D organization, as it provides a clear, comprehensive overview of the current and expected performance of the unit.

BENEFITS OF FEEDBACK IN THE MONTHLY REPORT

The evolution of feedback in the monthly report has brought several benefits to the R&D organization.

By incorporating feedback cycles into the production of the report, management has gained **insight** into performance and other related issues. This insight has spread through all levels in the organization, which also enables lower management to take action within its areas of responsibility, if needed, saving even more senior management time. For instance, projects that will not meet their targets are now discussed at the department level between the lower line manager and the project manager, and actions are taken and reported without involving the unit manager.

that are less complex and easier to maintain. The goals and the balanced scorecards drive the basic set of measurements. Additional data is collected only when analysis of the basic data shows that there is a need, and the amount of data is limited to that necessary for in-depth analysis, nothing more. By having a culture where data and conclusions are openly communicated, the need for “policeman” data has been reduced to zero.

A last benefit is increased **awareness of the goals** and the performance of the organization. Until some years ago, most of the developers and lower-level managers were not aware of the goals. Now, most people in the organization know the goals and can see how their daily work relates to those goals.

GETTING MANAGEMENT BUY-IN

The best way to get management support for feedback is to give *them* feedback. The R&D management of Ericsson was convinced that it should be possible to set quantitative goals and manage the organization based on those goals. Because management wanted continuously visible

ing actions was critical to showing management that feedback works. Support for feedback spread through the organization like an oil slick.

CONCLUSIONS

It has taken several years for Ericsson to implement the process described here. During the implementation, the culture has been changing. Initially, the insight into performance of projects or departments was limited, and people were not willing to share details. Now that they are involved in the feedback sessions, they have become more open. They state possible causes of problems, give their opinions on what could be done, and predict what would result if actions were taken. Usually they decide on the actions that are within their scope of control, thus ensuring that things will be on track sooner and limiting the damage. Management takes these conclusions and actions seriously and interferes only when there are no other options. This empowered culture, with better communication between the people involved, has been a major outcome of the implementation of feedback in the organization.

Feedback enables you to validate collected data, analyze it, and determine effective actions. While an effective feedback process doesn't come easily, the powerful results are well worth the effort: better insight into performance, quicker signaling of risk, informed and empowered employees, improved decision-making, and an organization that is more capable of meeting its goals. **{end}**

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Feedback has made it possible to get earlier warning on goals that will not be met and has improved the speed with which the organization takes action.

Feedback has made it possible to get **earlier warning** on goals that will not be met and has improved the speed with which the organization takes action. These quick actions have limited further target gaps and have also been cheaper than actions taken later. For instance, we now have an early warning system of potential product-quality problems based on inserted and detected defect data. This makes it possible to take corrective actions *during* a project, instead of after the release of the software. The software that is shipped to customers contains fewer defects, plus lead time and budgets have improved because earlier actions also save time and money.

Another advantage of feedback has been a set of **focused measurements**

results from this measurement program, the quality team implemented monthly reporting and quarterly management reviews to steer this organizational change. Hence, they got immediate results.

When the first steps of feedback were implemented, the management review meetings (a full day quarterly) became much more organized; management was able to get insight into the performance of all units using the balanced scorecards and the data that was analyzed. This helped sell all levels of management on the feedback process. Also, the data, the analysis, and the actions showed consistency, which proved to management that things were under control even when targets were not met in the short run. The visibility of the data, analysis, and result-

Sticky Notes

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- Further reading
- Balanced scorecard

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