

A nighttime cityscape with illuminated skyscrapers and a body of water reflecting the lights. A palm tree is visible on the right side of the image.

Delta Technology Handbook Series: Ways to Measure Your Developers Performance

Abstract: Software companies and interactive agencies have become increasingly pressured by external market conditions in leveraging external software development teams, yet few succeed in designing an effective approach to measuring the performance of both in-house and remote developers. This whitepaper will explain how to objectively measure the performance of in-house and remote development teams with the goal to increasing overall team productivity.

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1. Rationale for the Creation of this White Paper

Productivity and efficiency are the most critical factors of any company's success. However, there is no standard recipe for making employees more efficient.

Executives who manage small departments are sure that the performance of each of their subordinates is visible. Normally, we measure someone's work results in accordance with what we see or what we hear from others. For instance, team mates and QA (Quality Assurance) testers are the people who can give appraisals about a programmer. However, when a company grows and begins to have dozens or hundreds of employees, or when face-to-face communication among team members is limited, the method of personal feedback as a means of employee evaluation becomes unreliable. As a result, the achievements of employees may go unnoticed, which could prevent them from being able to work their way up the career ladder.

People with a similar level of expertise and knowledge may also have different earnings. Such issues may cause conflicts, which can result in declining morale and can even lead to employees, including valued specialists, leaving the company.

These issues made our management team at Delta Technology think about devising an effective, consistent methodology for employee assessment and self development. Desktop research and browsing the Internet did not provide us with any process that could be instantly applied to our organization. In the end, we had to develop a system from scratch. With some trial and error and spending hours studying best practice documents, conducting meetings and fostering discussions, we have created a system, which, in addition to the primary purposes already mentioned, has provided us with an effective employee assessment and self development program which we are now using on our staff.

As a result of us introducing this program into the workplace, our staff loyalty level is good and they are highly motivated because they feel that their career and personal development is being considered and that their hard work and achievements don't go un-noticed. Feedback for the system (including client comments) has been extremely positive.

We envisage that this white paper will appeal to a broad range of specialists and managers working in the area of software development.

2. Introduction

Information technology (IT) is widely known as an innovative sphere. For people, who do not work there, it is often associated with the latest models of computers, new types of chips, processors with a number of cores, cutting-edge mobile technologies and ultra-modern buildings and offices.

However, these things are just the tip of the IT iceberg. Insiders know that the work of a modern programmer can be compared to the activities of medieval artisans.

The manual work of potters, carpenters and tailors has been automated: machinery works at a rate of thousands of operations per minute. And although the accuracy and quality of the automated work is much higher than that done manually, eight-cored processors are still

not sophisticated enough to mimic the thought processes that control logic and creativity which humans use to create such things as clay pots and indeed - computer software.

Procedures and process control tools that provide operational consistency, version control, building, designing and automated testing just decrease the number of mistakes and defects. They don't create software.

There is no tool that can increase the speed of how fast a programmer can code. In fact, it's ironic that the software industry that develops automated systems for others cannot come up with a solution that can automate its own. At the moment, there is just one way to significantly increase the speed of software development and that's the hiring and retention of high performance individuals.

3. Definition of Efficiency and Performance

Armstrong and Baron (1998) define performance management as a strategic and integrated method of achieving the success of an organization by increasing the quality of employees' work, as well as the capabilities of both working groups and separate employees.

Performance management is about:

- **Being strategic** because it's connected to a broad range of business issues that determine business efficiency and direction, which are important in order to achieve long-term goals;
- **Inter departmental integration** because every level of the organization eg departments, teams and employees should be managed so they all aim for a common goal;
- **Continuous process improvement** which is probably the most important element of performance management. Without this, it is impossible to increase productivity and quality.

Performance management is a useful tool in helping each employee understand his/her personal contribution /role in achieving the company's objectives. It also provides managers with the ability to manage and improve the performance of both the employee and the organization.

There are a number of factors that influence work efficiency:

- **Personal**—the knowledge, competency, motivation and morale of a person;
- **Leadership**—the group leader's ability to inspire, manage and support the team;
- **Team** —the ability of colleagues to provide support to each other;
- **System** —the tools and operational systems provided by an organization;
- **Situational** —internal and external pressure and changes.

4. Why is Work Efficiency Measurement Needed?

There are two well-known expressions that characterize performance measurement:

“Those tasks are executed, which are measured”

“You cannot manage the process if you do not measure it”.

In order to improve overall performance, one must first begin by establishing the current level of efficiency.

The people being measured must clearly understand the criteria by which they are being assessed, as well as why the measurement process is important.

Oakland (1993) suggests that the appropriate performance measurement does the following:

- Provides customer satisfaction ;
- Provides a basis for comparison;
- Provides a “scale” to employees, which allows them to monitor their efficiency;
- Highlights quality problems and suggests areas that require immediate attention;
- Gives a notion of the costs of low-quality work ;
- Approves resources usage;
- Provides information necessary for further actions that should be taken to increase performance.

If any company is left in any doubt as to why performance management is needed then the results of a survey (Armstrong & Baron, 1998) shown below illustrates the benefits unequivocally.

Managers of 437 widely known US-based companies were interviewed. 205 companies used performance measurement systems; 232 did not. It was pointed out that the 205 companies that used the systems differed from the others in the following ways:

- They had larger margins, a better cash flow, higher stock exchange ratings, and a higher capitalization;
- They provided a considerable gain in financial activity and performance during the previous three years;
- They had a lower specific increase in the number of employees.

5. Performance Measurement Criteria

Armstrong and Baron (1998) point out that the performance measurement must:

- Be connected with the strategic goals of a company or a team;

- Be attributed to the tasks and responsibilities of employees. Measurement is efficient under the condition that personal responsibility is attached to it;
- Be concentrated on measurable results and achievements;
- Be manageable. It must provide information that expectations were justified to a certain extent;
- Correspond to the goals of measurements and data availability as much as possible;
- Provide reliable feedback for further actions;
- Involve all key aspects of work efficiency.

6. Classification of Measures

There are various types of measures, which can be selected in accordance with the criteria described in the previous paragraph. However, we consider the most important factors to be appropriateness, significance, and precision.

Economists suggest that the key measures could be targeted at quality, quantity and profitability.

The metrics can be divided into the following groups:

- **Financial**- income, added value, profitability, expenses;
- **Results**- products sold or services provided, productivity, the number of new clients;
- **Influential**- project completion, service level, innovations;
- **Reactions**- opinions of teammates and clients;
- **Time-Related**- response time, expenditures of labor, delivery time.

7. Numeric Expression of Measurement Results

The measurement results can be expressed in four ways:

- **Calculation**—quantity of units;
- **Ratio**—quantity of the units related to the maximum possible number of them;
- **Percentage**—proportion of real achievements versus possible ones;
- **Financial Results**—gains or losses.

8. Obtaining and Analyzing Measurement Results

8.1. Work Efficiency Data

The data can be obtained from the process automation systems which allow for comparisons between the achieved and expected results as well as alternative/remedial actions that needed to be taken.

8.2. Competency Levels

Competency levels can be measured by analyzing actual against expected behavior. If the criteria for what constitutes as an excellent, good, average or poor performance are defined, the competency levels can be determined relatively easily. Alternatively, rating scales can be used.

8.3. Benchmarking

‘Benchmarking’ is when an organization, group, or individual is compared to the best their industry/sector offers. Benchmarking is a good tool for assessing quality of performance.

9. Efficiency Management and Evolution

A person’s individual capabilities and their ability to work more efficiently improves over time. In most cases, organizations evolve with the personal growth of their employees. In fact, service providers have no other choice apart from this one.

Encouraging personal self development within the company might not directly benefit or increase the knowledge base of the company but what it does do is empower employees to want to learn which at the end of the day will benefit the company. Efficiency management serves as a powerful tool for instilling the culture of learning and self improvement in employees.

Measuring the progress of their personal development is another good method of encouraging learning. Employees should be invited to an interview where they say how they would like to increase their knowledge and experience and how the outcome of their training will benefit the organization. During the interview, personal objectives should be outlined in a personal development plan. The plan must include actions that will help the employees improve on their performance and raise competency levels.

The plan should be set over an agreed period of time and then at the end of that period a review should be organized to discuss the employee’s achievements and how well they performed against the criteria set in their personal development plan.

10. Efficiency Management and Personal Compensation

Various researchers have shown that differentiated compensation still remains an important component of many efficiency management schemes.

The compensation for efficiency and competencies works because:

- It motivates people to work harder and develop their skills and competencies;

- It highlights the importance of being efficient;
- Scalable compensation allows for different reward levels to be issued according to how well each individual has performed with regards to efficiency, competency and input.

Armstrong and Murlis (1994) formulated 'eight golden rules' of compensation paid to groups and individuals for their efficiency:

- 1) Both teams and individuals must clearly understand their goals and assessment standards;
- 2) They must be able to track their movement toward the goals throughout the period during which they will be assessed;
- 3) They must be able to affect their work efficiency;
- 4) They must understand what compensation they will get for achieving the results and there should be a direct correlation between the efforts and the rewards;
- 5) The reward must follow the achievement immediately;
- 6) The reward should be noticeable;
- 7) The results necessary for the reward receipt must be achievable but not too easy;
- 8) The rewarding basis must be positively described and easily understood.

A compensation system based on the performance results has the following advantages:

- It motivates people to achieve better performance;
- It gives correct goals orientation;
- It fairly rewards employees for their performance;
- It provides efficient methods of rewarding and achievements recognition.

However, it also has a number of contingent shortcomings:

- The motivation factor is not guaranteed. It is often difficult-to-impossible to correspond to the rewarding criteria;
- Compensation must be based on a definite form of efficiency metrics. The most usual form is rating. However, creating realistic metrics may appear to be complicated. As a result, the metrics may appear unfair, subjective and inconsistent;
- Such a compensatory system may make salaries grow faster than the benefits of the work improvement results;
- The system may depress teamwork due to its individualistic nature;
- Despite having good metrics, the work may appear to be inefficient and of poor quality;
- The system may make short-term goals more appealing to employees than the long-term ones.

Many researchers have proven that the best results come from those compensation systems that use a competency level for the definition of a base salary and a short-term performance for the bonus calculation. It is even better if a system takes into account not only individual results, but team performance as well.

11. Overcoming Problems Related to Work Efficiency Measurement

The process for managing under performance can be divided into three stages of action:

- 1) Identify the problem;
- 2) Understand the reasons for its origin;
- 3) Make an effort to “cure” it.

Generally there are two factors that affect work efficiency— organizations and individuals.

Organizations can create the environment and processes that will solve the problems of under- performance.

The following should be implemented:

- Create a culture that motivates success. This approach should minimize failures caused by passivity. When failures occurs, it is important that the organization analyses what went wrong and then communicate the findings to individuals so they understand what caused the problem. In addition, a course of action should be put into place that will avoid the problem in the future;
- Elaborate on the performance management processes that set up the definite standards for results comparison and shortcomings correction;
- Train managers to handle inefficiency and disciplinary problems constructively;
- Constantly conduct monitoring of work efficiency and analyze the reasons for failures;
- Encourage self development within the organization.

Employees should also be responsible for their own efficiency at work. They must also pay considerable attention to self-education. The managers must support them by providing coaching and advice and ensuring that personal development plans are filled in and used effectively.

The main challenge that managers and the whole organization will face after the introduction of an efficiency measurement system is how to appropriately respond to the low performers, once they have been identified by the system.

Luthans and Kreitener (1975) defined five steps of improving behavior :

- 1) **Define critical behavior**—what individual processes should be modified?
- 2) **Measure the frequency of the problem**—get clear evidence of the existence of the problem;
- 3) **Conduct functional analysis**—define what stimuli caused the behavior and/or what kind of reward or punishment influenced the behavior;
- 4) **Develop and integrate a correction strategy**—it may include positive or negative consequences on the performer;
- 5) **Assess the results of a correction**—what improvements happened (or did not happen)? What should be done if the correction does not bring results?

Personal performance correction is tightly connected with psychology. Many managers do not like, or are not skilled enough, to criticize their staff constructively. Fletcher and Williams (1992) conclude that the main idea that supervisors should convey to employees is one that

helps them to modify good performance into better performance, rather than turning bad performance into good performance.

They also suggest the following methods of critical discussion:

- Communicate to the person that admitting to his shortcoming is welcome;
- Let the person suggest a remedial solution;
- Provide support and bring to their attention aspects that you think are their strengths as well as the identification of their weaknesses;
- Be persistent, if the under-performer cannot see that there is a problem, provide details and examples;
- Give constructive criticism to the weaknesses that can be corrected and do not make personal attacks in your remarks;
- Do not discuss more than two weaknesses during one meeting. People can only bear a limited amount of criticism.

12. Development of a Performance Management System

The stages of performance management system development can be generally defined as:

- Diagnosis;
- Procedures;
- Design;
- Pilot implementation;
- Introduction.

12.1. Diagnosis

The first stage of developing a successful performance management system must include the following considerations:

General data about:

- the culture, traditions, and style of management in the organization;
- the structure (meaning the extent of delegation and company hierarchy);
- processes and systems;
- strategic plans;
- decision-makers and stake-holders.

Weak and strong agreements about:

- the management, measurement, and assessment of work quality;
- work compensation.;
- improvement of work efficiency; development of skills and competencies;
- integration of personal and team tasks.

Analysis:

- of tasks that should be done;
- of reasons why they should be done;
- of the methods for how they should be done.

Assessment of:

- expenses;
- returns.

12.2. Procedures

The method that is considered to be the best by many researchers of personal performance is to assign a working team consisting of managers and employee's representatives to assess the procedures. This method allows for various opinions and feedback and fosters a feeling of belonging and ownership.

12.3. Design

During the design of the performance assessment system, the following aspects should be taken into account:

- Process model—agreement about work efficiency ;
- Usage of tasks and competencies ;
- The ways in which tasks will be assigned, and which groups and individuals will be able to participate in the formulation of procedures ;
- Connection with the performance reward system;
- Ratings;
- Methods of measurement;
- Ways in which competencies will be assessed;
- The list of necessary documentation and the managers responsible for its handling;
- How flexible the efficiency management system will be.

12.4. Development and Implementation

The following points should be defined as a part of the development and implementation program:

- The participants of the program and what the responsibilities for each participant will be;
- Timelines for development and implementation;
- Employee's notifications about plan details and a structure of the compensation system. It is crucial that these are done thoroughly and in a timely manner;
- Training Plan;
- Pilot schemes;
- Success criteria;
- Monitoring and assessment of the implementation.

13. Assessment of the Performance Management System

In order to assess the efficacy of the management system, attention to the following issues should be paid:

- Processes correspond to the management culture;
- Top management fully back and participate in the process ;
- Linear managers and employees understand the processes;
- The processes should help unite organizational, group, and personal tasks;
- The system is helpful in getting both short-term results and long-term development;
- The processes are integrated with the other HR processes;
- The processes are flexible and robust when applied to special circumstances;
- All stakeholders of the organization participate in designing, developing, and implementing the system. Project team members include top managers, linear managers, team leaders and individuals;
- The processes are transparent and they function fairly and without bias;
- Managers and team leaders undertake measures that help team members to understand the strategy, goals and values of the organization;
- The process places individual needs and company goals in line with each other;
- Employees are able to express their opinions about whether the results expected from them are achievable.
- The primary emphasis is placed on employee development. Financial reward is the second aspect to be considered;
- There are competency models that are developed by all the stakeholders;
- The goals, gains and efficiency of the system are communicated to employees in detail;
- Managers, team leaders and employees are trained to work efficiently.

14. Efficiency Measurement Issues in the Software Development Industry

If your software development company is going to introduce a performance measurement system, be prepared to hear a long list of arguments from developers and even managers about how performance measurement is impossible. Here are some typical examples and our view on them:

“Software developers differ from sales people or factory workers. Their performance cannot be measured by sales volume or by the number of details produced.”

Some will go further and declare that,
“Creative work cannot be measured at all.”

What we say -Each work product creates results, and the results can be measured. There are a number of metrics suggested in paragraph 16, which can be used for assessing the performance of programmers.

“The more the emphasis is put on measuring major metrics, the more likely it is that the small unmeasured elements will be sacrificed.”

What we say -It is impossible to achieve great performance in everything. However, the system of metrics does define a common set of values for all: clients, company and individual developers.

“The quality of work suffers as employees become focused on achieving a grade rather than satisfying clients.”

What we say -Customer satisfaction may be used as one of the metrics.

“Measurement cannot be performed because it cannot take into account the factors that are beyond control.”

What we say -Measurement just points out the changes in work efficiency, it does not explain them.

“Measurement is possible only in a case where the result is measurable.”

What we say -Whenever people are expected to perform some work, the extent of the work completion can be assessed.

15. Efficiency versus Processes

Nowadays many software development companies invest heavily in processes, re-engineering and automating systems.

Their focus appears to be on:

- Improving customer satisfaction;
- Decreasing overheads;
- Acquiring larger margins.

However, polished processes cannot take the place of a highly skilled workforce and the career and personal evolution of programmers.

Process management tools cannot automate the creative work of software developers. Nevertheless, automation systems are extremely important and can be helpful in the performance measurement process by providing the necessary numeric data.

Armstrong and Baron (1998) are cited in the conclusion. They consider the following factors to be the keys to successful implementation and application of performance management systems:

- Clear understanding of 'Performance Management';
- Understanding of the company's values and its desire to establish a 'performance management culture'.
- Laser focus on the individual benefits to employees and their role in the process.

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