

# Software Metrics Based on Developer's Activity and Context of Software Development

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Software development is extensive process which needs to be monitored and evaluated. It is important to evaluate it from the perspective of software product development as well as from the perspective of project management. The goal behind the monitoring of software project is to assess reaching desired qualities and attributes of the process and resulting product. The process of software development is very complex. It consists of various activities difficult to monitor resulting in ineffectiveness of the project management. Therefore, special metrics were developed to evaluate software project and to identify the problems easily [1].

We may take various points of view for monitoring the project, varying from planning to resource management, or mostly the work done by the developers. It is the quality of development which affects external product attributes like fault-proneness, maintainability, security, reusability or other external attributes of resulting software product [1]. The success in reaching the desired values of these attributes are affected by the quality of the source code produced in development process.

Software product is changing during its development process. Changes in source code bring not only new functionality or bug fixes but are also source of new bugs. Software fault-proneness is mostly caused by faults of human factor. By studying the periodicity of changes in source code we may predict which modules are fault-prone, even using primitive metrics (the higher the number of changes, the higher the chance of fault-proneness) can be effective in this matter.

Another approach is to evaluate software project with internal product metrics [1], namely the size, structure and resources. Even though these product metrics evaluate software product on its lowest level, they suffer from the ambiguity in interpretation exclusively for every project. It is up to managers to find out what values of these metrics they want to observe and how they relate to the product attributes. High number of source code lines or high coupling between objects may be required for one project but for other it may be viewed as bad approach.

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Because of these problems with existing software metrics we intend to take into consideration developer's activity performed during the development process and the context of software development to find the connection with attributes of created product. Developer performs various activities during the development process:

- Activities associated with development directly, e.g., programming or modelling of components,
- Activities associated with development indirectly, e.g., searching for information, studying documentation or communicating with team members,
- Activities not related to development and context of the developer, e.g., emotional state or state of the environment.

Our project is part of the research project PerConIK (Personalized Conveying of Information and Knowledge, [perconik.fiit.stuba.sk](http://perconik.fiit.stuba.sk)) [2]. In PerConIK project we log these activities during the software development and allow developers and managers to tag the source code with information tags. We intend to use these logs and tags to evaluate how they relate to the attributes of the created software product. Activities like frequent browsing of the Web during the development process, copy-pasting code instead of sharing it between components, developing during night hours and other activities and context falling into mentioned categories may have impact on the resulting attributes of the software product. Our prediction may be anchored to the source code with newly created information tags and used by the developers and managers, e.g., to locate problems in the source code.

We plan to take results of existing product metrics based on the source code and manual reviews of the source code for evaluation of our approach of evaluating software product.

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## References

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