

# Software Measurement Programs in SMEs – Defining Software Indicators: A Methodological Framework

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**Abstract.** Implementing a measurement program is not an easy task. It requires effort, resources, budget, experts in the field, etc. The challenges to successfully implement a measurement program in small settings are considerable and greater than in large companies. Small and medium-sized enterprises (SMEs) have an additional handicap: the existing methods and frameworks that support measurement programs such as Goal Question Metric (GQM), Goal-Driven Software Measurement, GQ(IM), PSM and ISO/IEC 15939 do not fully satisfy the needs of such companies. We propose MIS-PyME, a methodological framework which supports small and medium enterprises (SMEs) in establishing software measurement programs, especially as regards the definition of software indicators. MIS-PyME is based on GQ(IM) and aims at supporting SMEs measurement activities related to software process improvement tasks. This framework has been applied in STL, where the main benefit derived from the use of MIS-PyME has been an effortless, more accurate program definition integrated into software process improvement practices.

**Keywords:** Methodological framework, measurement programs definition, GQ(IM), MIS-PyME.

## 1 Introduction

Measurement is a key technology for supporting the basic tasks of an improvement program. Collecting and interpreting well-defined data provides organizations with the necessary information to make well-founded decisions about process improvement[1]. Process improvement results in increased productivity, better quality, and reduced cycle time, all of which make a company competitive in the software business[2].

Small organizational units are just as likely to be confronted with demands for credible evidence about their ability to deliver quality products on time and on budget

as large, multinational organizations. Similarly, managers in small settings are equally or even more likely than their counterparts in larger organizational units to have to make well-founded business decisions about process improvement and technology adoption, and must have the wisdom of taking new business opportunities. Therefore, implementing serious measurement programs is even more important in small organizational settings [3].

Although measurement is applied in various areas, it has proved to be a complex and difficult undertaking in the field of software and especially in the context of SMEs [4]. The existing obstacles include limited resources and a limited budget, a need for training, tight schedules, poor software measurement knowledge, a low cash flow, a restricted mentality as regards software measurement, etc. [5]. [6]. [7].

**Table 1.** Requirements for measurement program models suited to SMEs

SMEs Restrictions	Measurement program model for SMEs Requirements	Benefits
Limited resources, schedule and budget	<ul style="list-style-type: none"> <li>- Easy to Understand and Manage (EUM)</li> <li>- Effortless (EFL): It should guide users and help them define measurement programs in an effortless way</li> <li>- Complete. (COM): It should cover their process improvement needs</li> </ul>	<ul style="list-style-type: none"> <li>- prevents users from spending too much time defining measurement programs.</li> <li>- does away with the need to contract measurement experts to develop measurement programs.</li> </ul>
Limited training , poor software measurement knowledge	<ul style="list-style-type: none"> <li>- Informative (INF): It should contain full information about the measurement possibilities, the benefits of using measurement and its potential use in technical and organizational management.</li> </ul>	<ul style="list-style-type: none"> <li>- makes users learn about measurement.</li> <li>- makes users learn about the benefits deriving from its use.</li> <li>- makes the measurement program more accurate.</li> </ul>
	<ul style="list-style-type: none"> <li>- Integration into the Processes (INTP): It should contain full information about its practical integration into the organization's software processes</li> </ul>	<ul style="list-style-type: none"> <li>- help measurements activities implemented for different aims be coherent.</li> <li>- measurement usefulness can be better understood since its potential use is clearly shown when the measurement goal is derived from the software process practices.</li> <li>- measurement activities are better integrated into software processes.</li> </ul>
	Measurement Maturity Model (MMM): It integrates a measurement maturity model	<ul style="list-style-type: none"> <li>- make the organization progress across software measurement.</li> <li>- advise the user to implement those measurement goals which suit its measurement maturity and prevent the user from defining measurement goals which cannot be successfully reached.</li> </ul>