Misurare il software

Modelli per la misura del software. Parte 2/3.
Produzione e Manutenzione.

Basato su

Giovanni Cantone, Paolo Donzelli: Production and Maintenance of Goal-oriented Software Measurement. Models. Intl. Journal of Software Engineering and Knowledge Engineering, World Scientific, submitted 1999, published 2000.

http://www.worldscientific.com/doi/abs/10.1142/S0218194000000328

http://www.worldscientific.com/doi/abs/10.1142/S0218194000000328?journalCode=ijseke

Giovanni Cantone, Paolo Donzelli, Gianfranco Pesce; Misure software: teoria, modelli e ciclo di vita. F. Angeli editore, Collana "Informatica & Organizzazioni“ , volume per GUFPI , Cod. 724.36, 512 pp. ISBN 88-464-7139-3, luglio 2008.

Processi di misura

Vari approcci

- Practical Software Measurement (PSM)

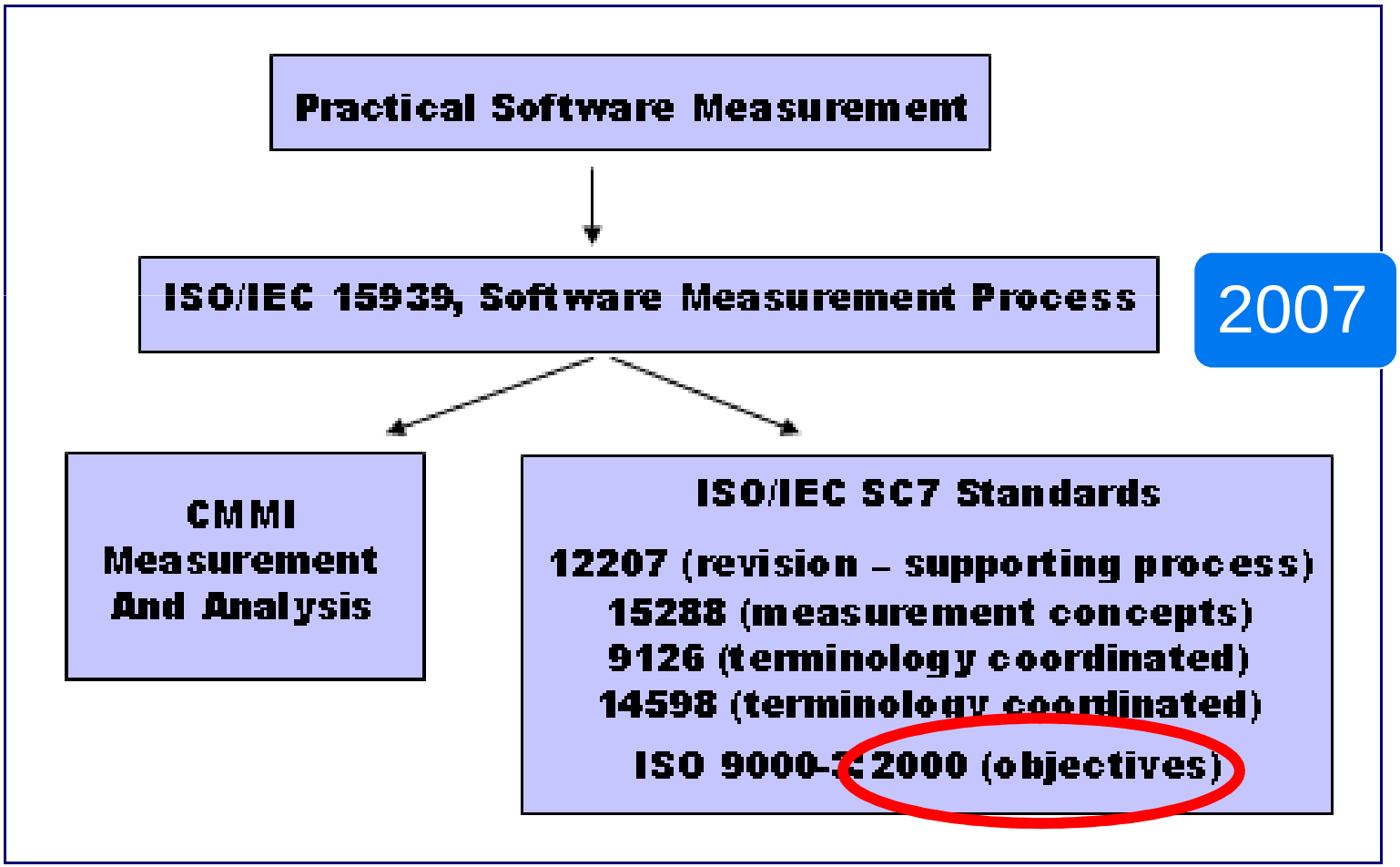
Standardizzazioni

- ISO/IEC 15939: 2007 2007 e succ.

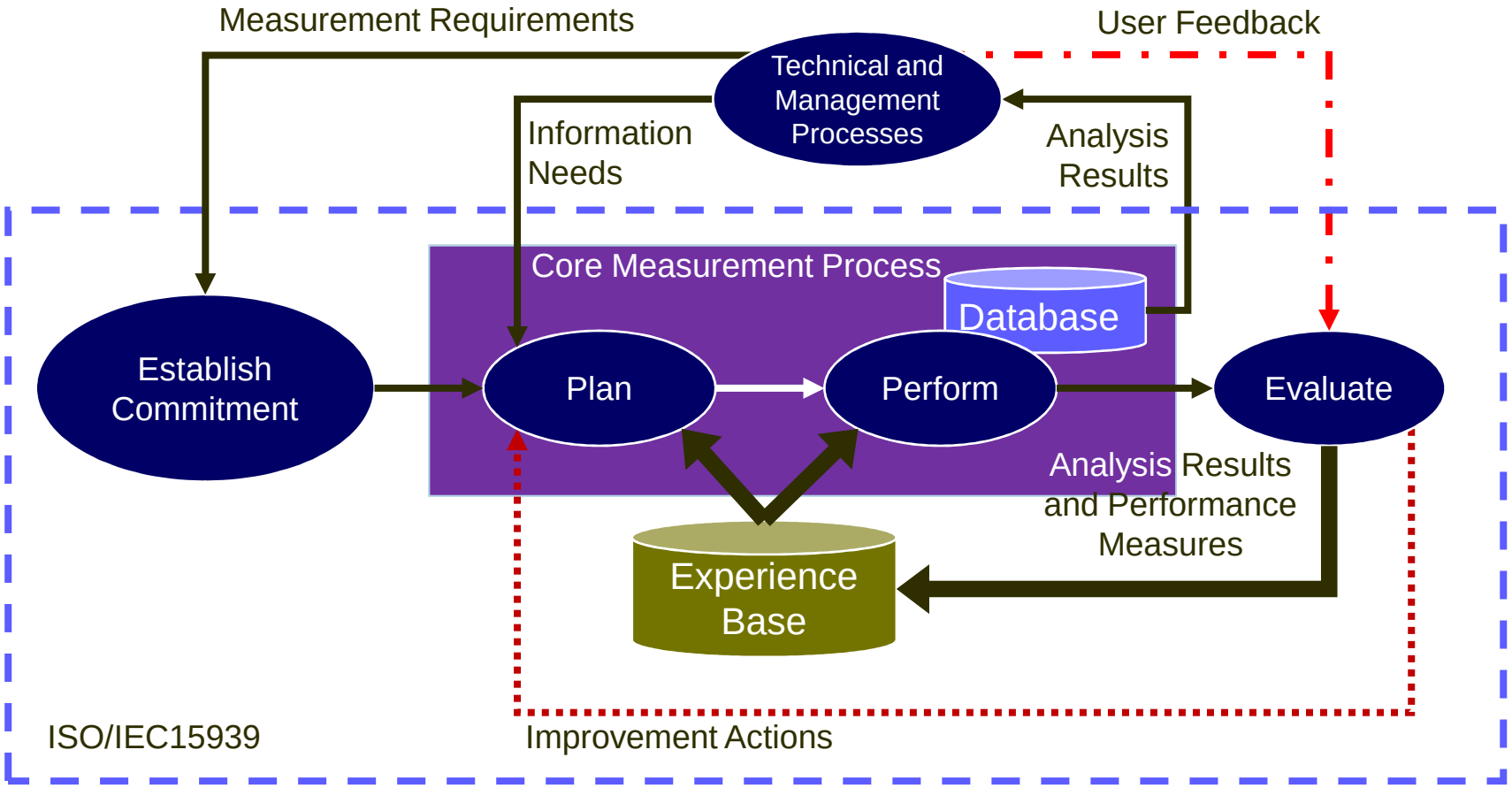
  Systems and software engineering -- Measurement process.

PSM

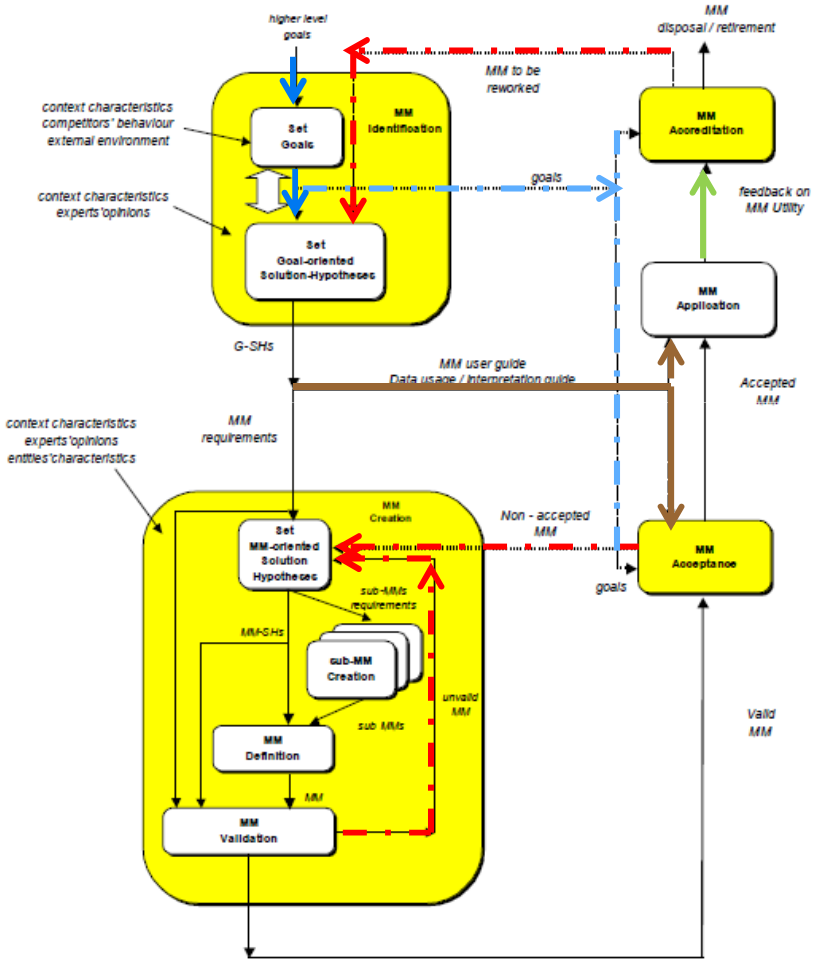
Practical Software Measurement (PSM) vs. ISO/IEC 15939



Measurement Process – ISO/IEC 15939



SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

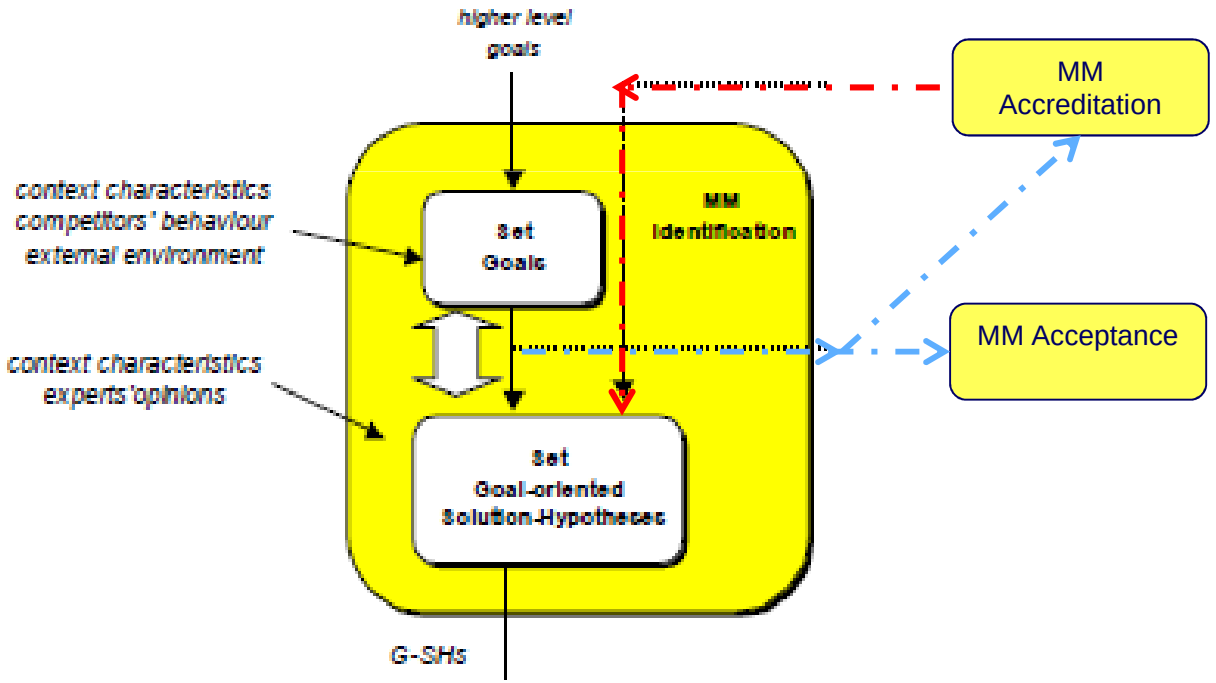


1999-2000

See the next section “Measurement plan” for details

SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

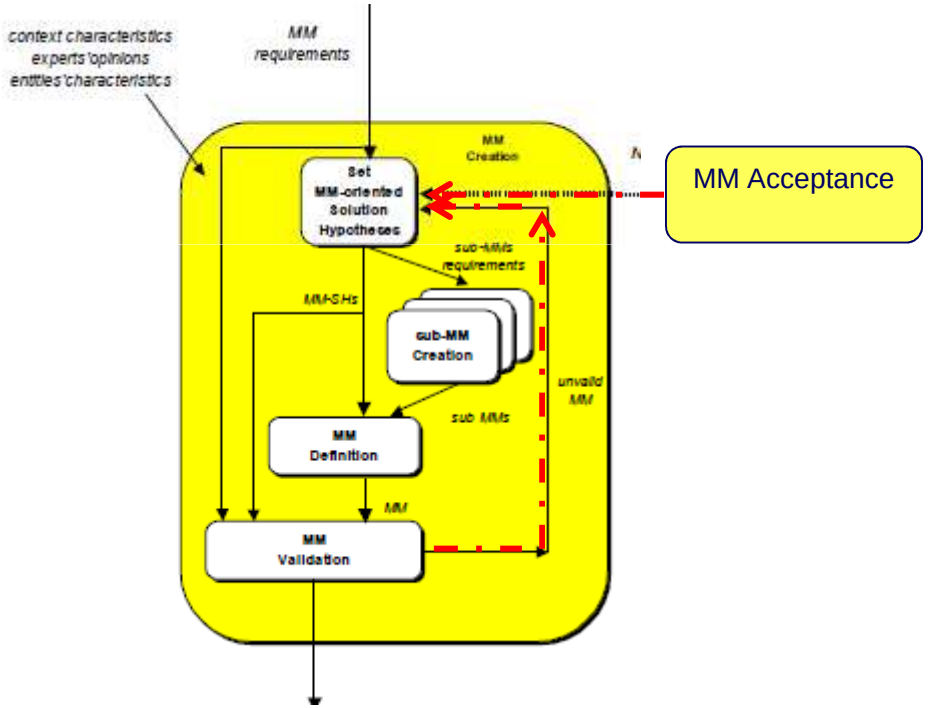
IDENTIFICATION.



See the next section “Measurement plan” for details

SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

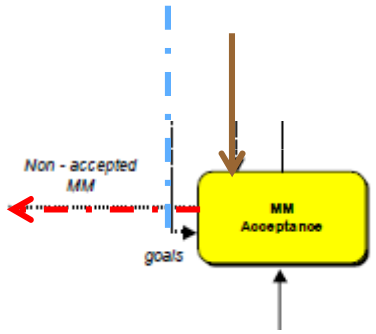
CREATION



See the next section “Measurement plan” for details

SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

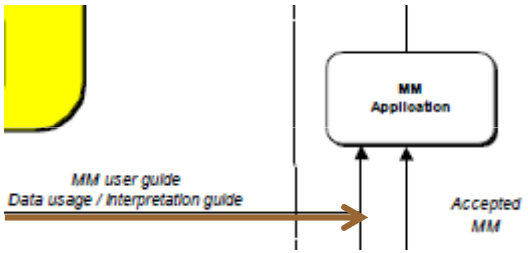
ACCEPTANCE



See the next section “Measurement plan” for details

SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

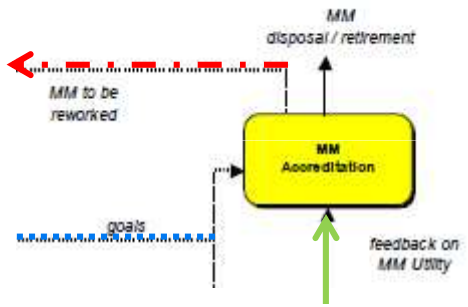
APPLICATION.



See the next section “Measurement plan” for details

SMMLC by G. Cantone, P. Donzelli, IJSEKE 2000.

ACCREDITATION



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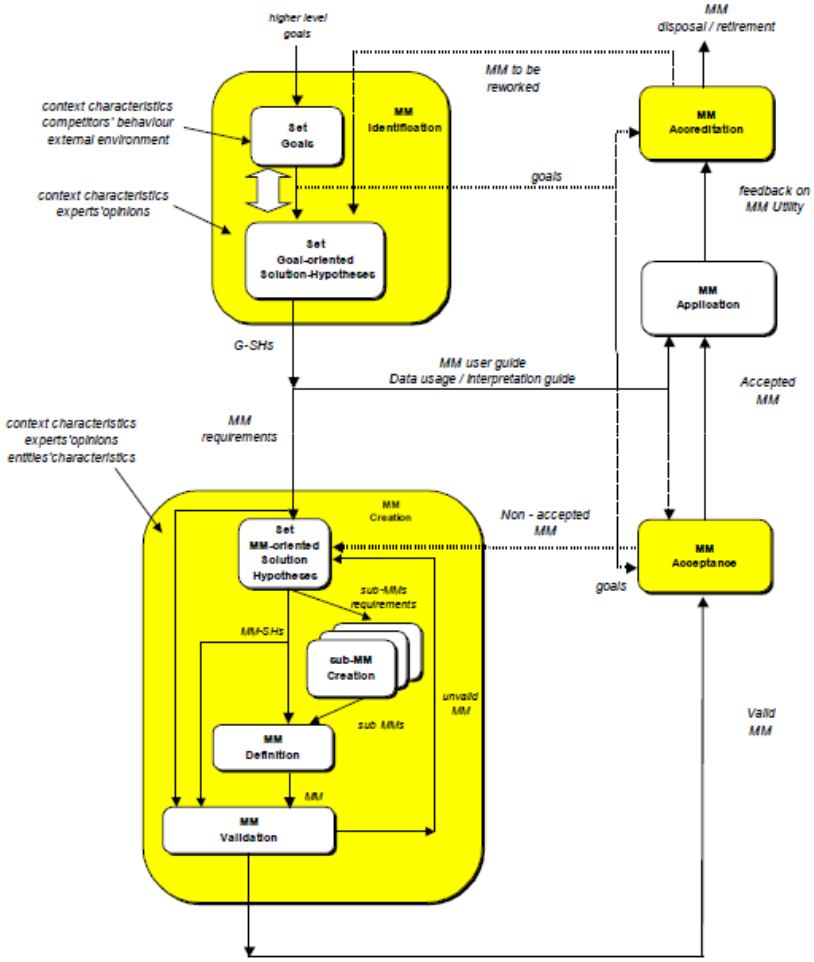

See the next section “Measurement plan” for details

COMPONENTS OF A SMM

A MM package is expected to include (but is not limited to) the *descriptive* | *predictive* | *prescriptive* MM's ***basic components*** (see Part I), which the next tables summarize.

BASIC COMPONENTS OF A DESCRIPTIVE SMM PACKAGE

MM Nature	Components	Description
Descriptive MM	Attribute Properties	Set of the properties of the attribute of the entity that the MM is meant to capture.

BASIC COMPONENTS OF A DESCRIPTIVE SMM PACKAGE

MM Nature	Components	Description
Descriptive MM	Attribute Properties	Set of the properties of the attribute of the entity that the MM is meant to capture.
	Entity Model	A model of the entity showing the characteristics that are relevant for the attribute.
	Mapping Function (Scale and Unit)	The measure function linking the empirical world (empirical relational system) to a formal one (formal relational system).

BASIC COMPONENTS OF A PRESCRIPTIVE SMM PACKAGE

They are similar to components of a descriptive SMM package.

BASIC COMPONENTS OF A PREDICTIVE SMM PACKAGE

MM Nature	Components	Description
Predictive MM	Sub-MMs	Definition of the included sub-MMs.
	Statistical Relational System	The statistical relationship between the measured attributes and the estimated one.

Preliminary examples of Predictive relationships: **Basic CoCoMo**

Effort Applied (E) = $\mathbf{a_b(KLOC)^{b}_{b}}$ [man-months]

Development Time (D) = $\mathbf{c_b(Effort\ Applied)^{d}_{b}}$ [months]

People required (P) = **Effort Applied / Development Time** [count]

Software project	a_b	b_b	c_b	d_b
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Organic projects - "small" teams with "good" experience working with "less than rigid" requirements

Semi-detached projects - "medium" teams with mixed experience working with a mix of rigid and less than rigid requirements

Embedded projects - developed within a set of "tight" constraints. It is also combination of organic and semi-detached projects.(hardware, software, operational, ...)

FURTHER COMPONENTS OF A SMM

A MM package is also expected to include *any kind of information useful for* the MM *assessment*, *reuse*, and refinement.

Preliminary examples of Predictive relationships: **Intermediate** CoCoMo

Effort Applied (E) = $\mathbf{a_b(KLOC)^b}_{\mathbf{b}}$ (EAF) [man-months]

Cost Drivers	Ratings					
	Very Low	Low	Nominal	High	Very High	Extra High
Product attributes						
Required software reliability	0.75	0.88	1.00	1.15	1.40	
Size of application database		0.94	1.00	1.08	1.16	
Complexity of the product	0.70	0.85	1.00	1.15	1.30	1.65
Hardware attributes						
Run-time performance constraints			1.00	1.11	1.30	1.66
Memory constraints			1.00	1.06	1.21	1.56
Volatility of the virtual machine environment		0.87	1.00	1.15	1.30	
Required turnabout time		0.87	1.00	1.07	1.15	
Personnel attributes						
Analyst capability	1.46	1.19	1.00	0.86	0.71	
Applications experience	1.29	1.13	1.00	0.91	0.82	
Software engineer capability	1.42	1.17	1.00	0.86	0.70	
Virtual machine experience	1.21	1.10	1.00	0.90		
Programming language experience	1.14	1.07	1.00	0.95		
Project attributes						
Application of software engineering methods	1.24	1.10	1.00	0.91	0.82	
Use of software tools	1.24	1.10	1.00	0.91	0.83	
Required development schedule	1.23	1.08	1.00	1.04	1.10	

Effort Multipliers

MEASUREMENT PLAN

To be successfully applied within a development environment, the development of a measurement plan is expected.

This includes a set of MM Packages, where the MMs are designed to achieve a given goal.

MEASUREMENT PLAN SPECIFICATION

A measurement plan is also expected to specify:

- the "**why**" (the underlying reasons)
- the "**what**" (attributes to measure)
- The means (**by** "**what**" tools and/or automats) and in case the "**who**" (the involved personnel), and the "**how**" (the data collection procedures)
- the "**when**" and "**where**" (in the process), of the corresponding measurement activities.

But, rarely all of these aspects are equally taken into consideration by the adopted approaches.

COMPONENTS OF A MEASUREMENT PLAN

Item	Description
Set of MMs	The measurement models to be used (as ad-hoc tools) for achieving a given goal.
MM characteristics	The MM characteristics include: • The MM nature (descriptive, predictive). • The scale type and unit. • The relevant user oriented MM attributes, such as precision, usability, complexity, robustness, scope, etc.
MM application guide	This guide describes the MM related data collection procedures, that is both how/when to apply the given MM within the operational context and, the involved personnel.
MM data interpretation/usage guide	This guide describes how to employ the data provided by the MM.