



University of Southern California
Center for Software Engineering

CORADMO

Constructive Rapid Application Development Model

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Outline

Background

Model Overview

Schedule Drivers, Rating Scales

Background

RAD (Rapid Application Development)

an application of any of a number of techniques or strategies to reduce software development cycle time

Another step

As COCOMO II evolves, it will have a more extensive schedule estimation model, reflecting the different classes of process model a project can use; the effects of reusable and COTS software; and the effects of applications composition capabilities.

COCOMO II Schedule

- Reflects a waterfall process model
- Duration calculation unreasonable for small projects
- Model does not address RAD strategies

Need to Improve Classic Schedule Model

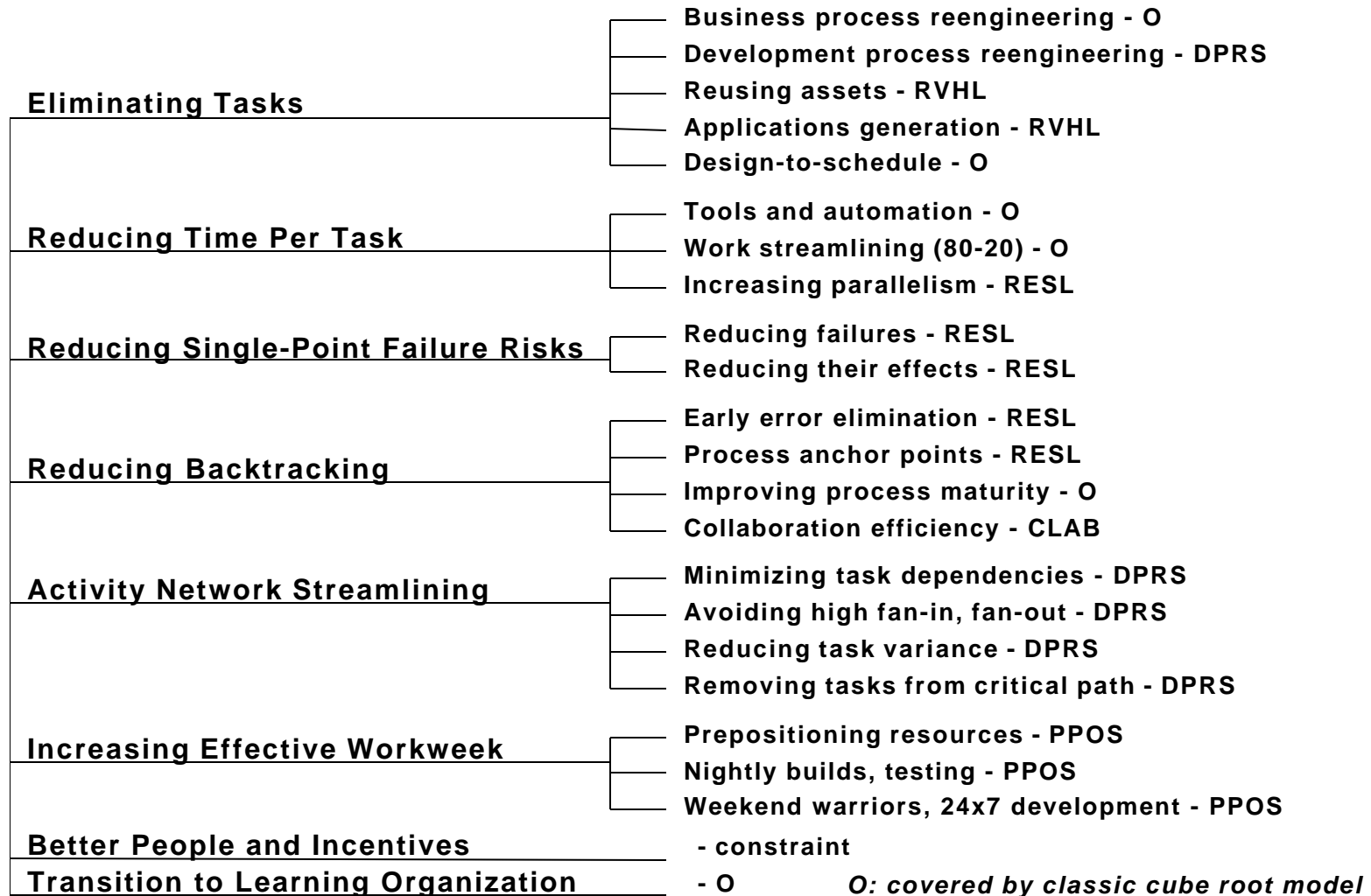
Need stronger capability to reason about RAD Opportunity Tree strategies/tradeoffs

- Reuse, Very High Level Languages (VHLL) (RVHL)
- Development Process Reengineering (DPRS)
- Collaboration Technology (CLAB)
- Architecture, Risk Resolution (RESL)
- Prepositioning Assets (PPOS)

COCOMO II Duration Calculation

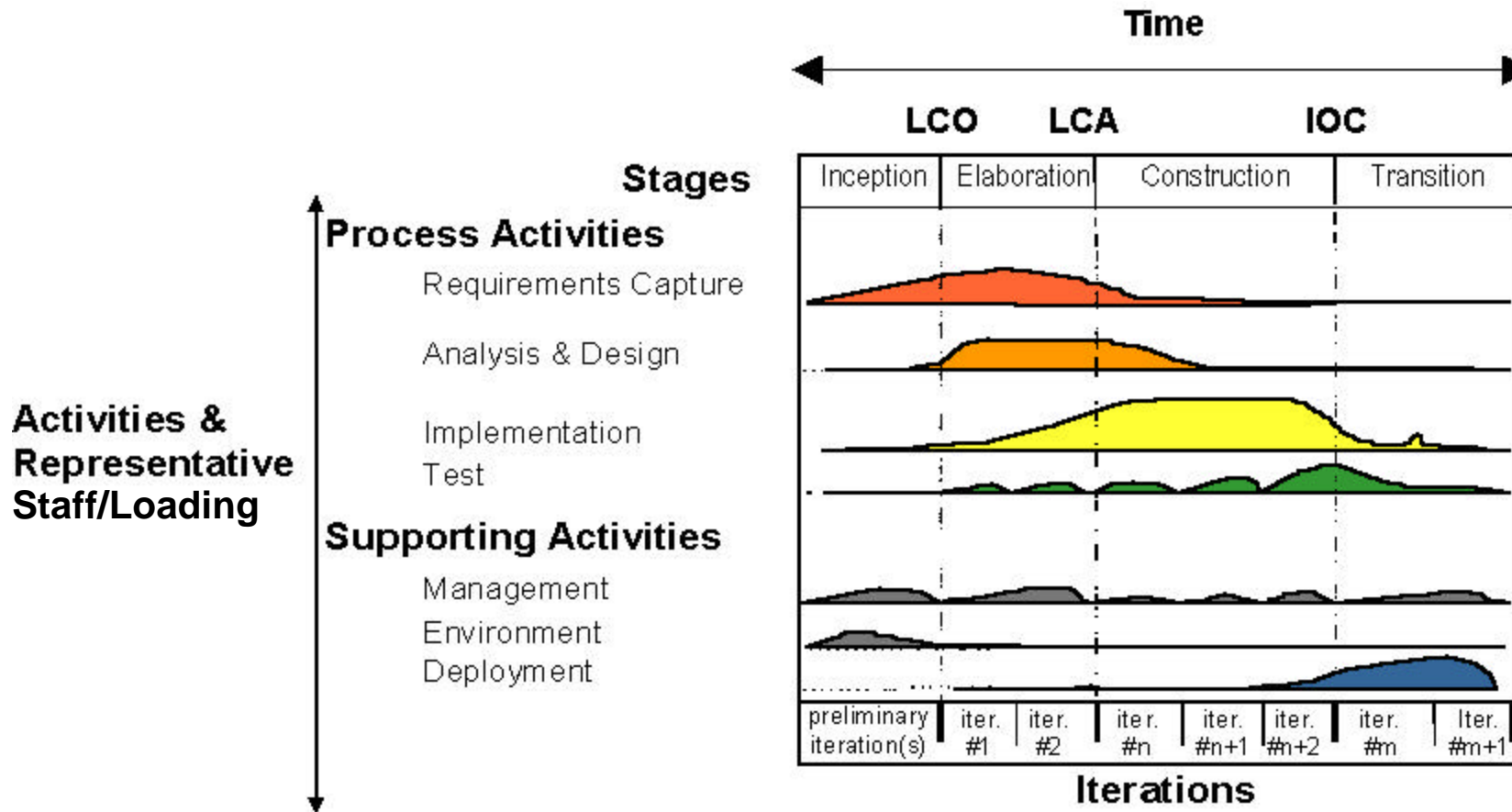
$$\text{Months} \sim 3 \sqrt[3]{\text{Person-Months}}$$

RAD Opportunity Tree



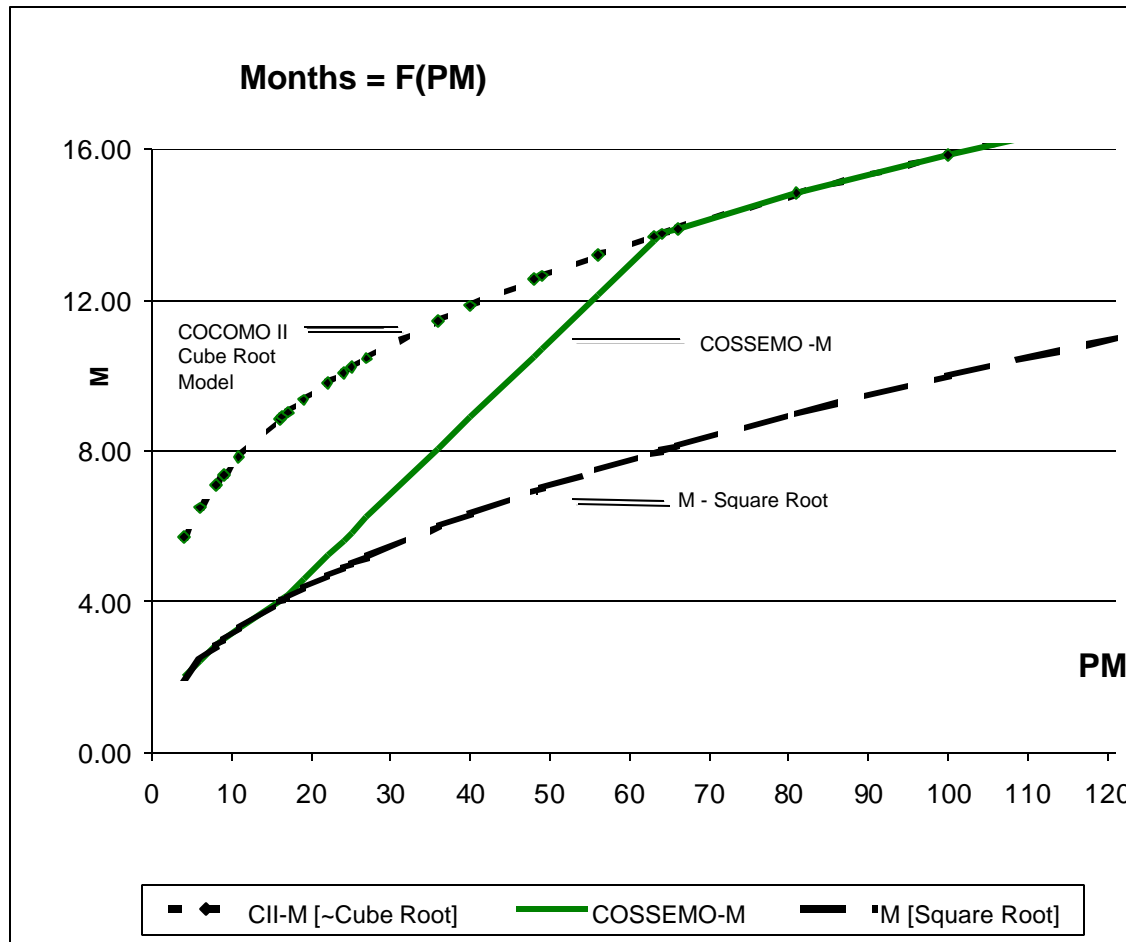
(Source: 1997 CSE Focused Workshop on Rapid Application Development)

Process Model

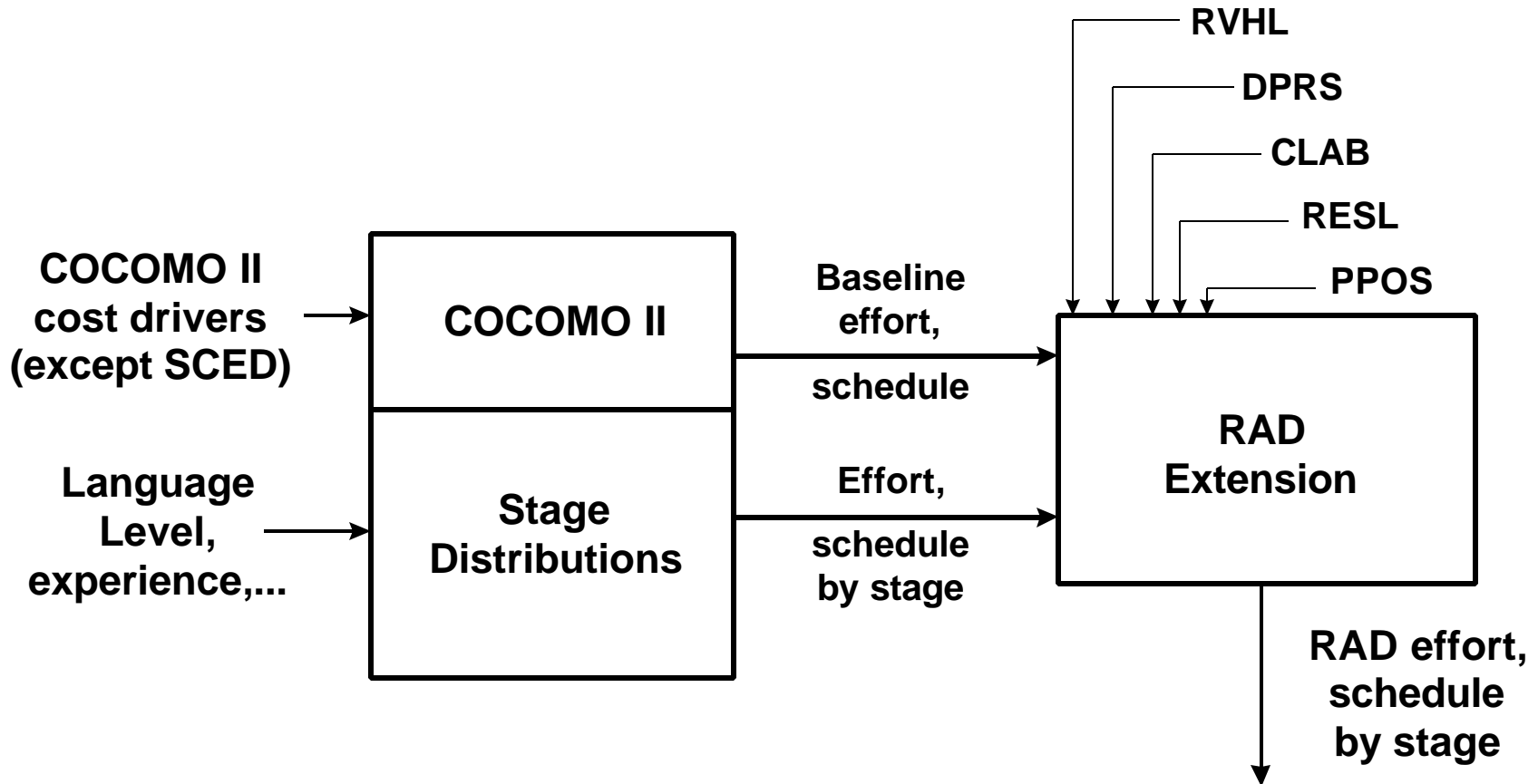


(Source: Rational Software Corporation)

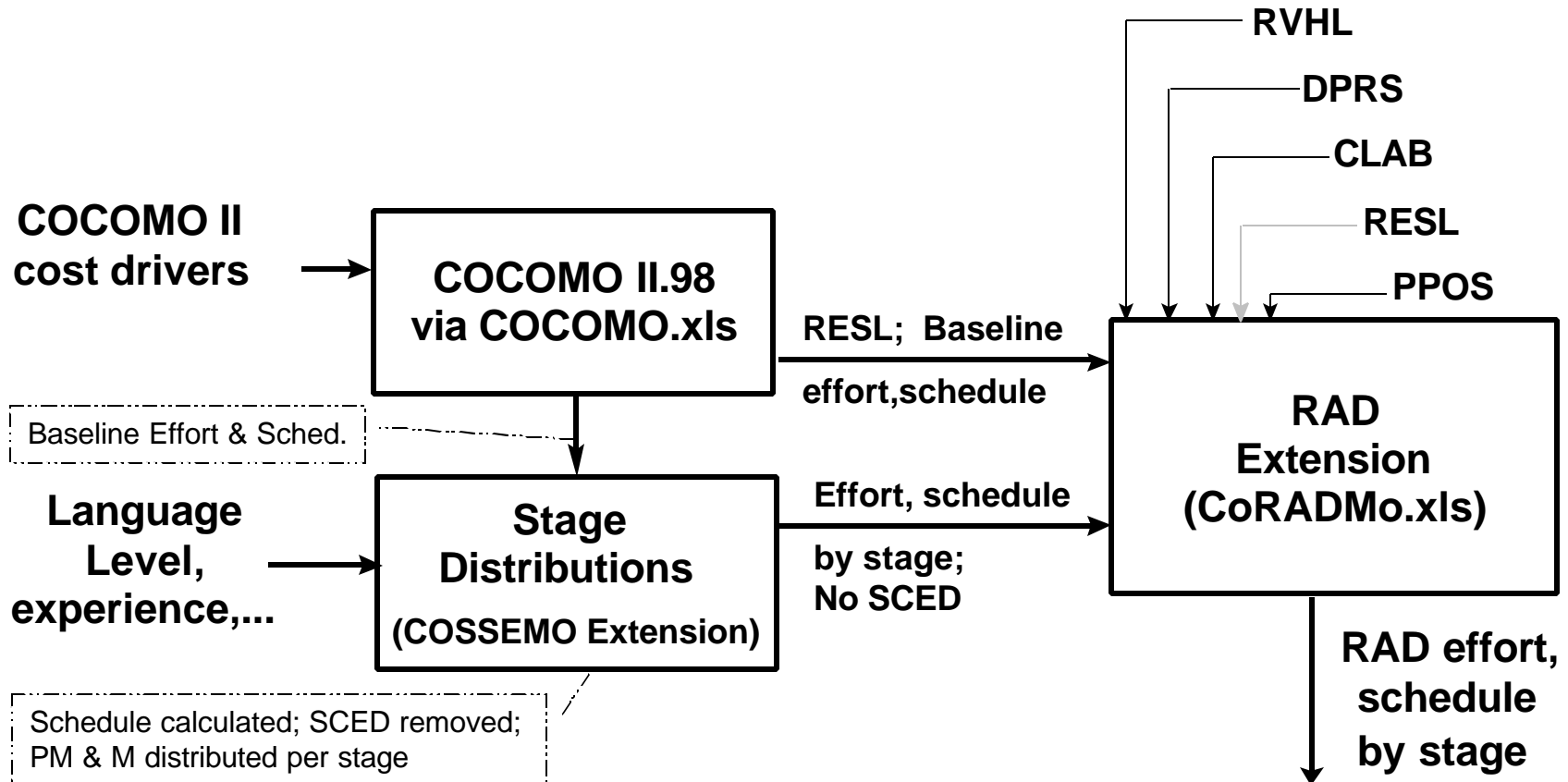
COSSEMO Duration Calculation



Logical COCOMO II RAD Extension



Physical COCOMO II RAD Extension



Reuse and VHLLs (RVHL)

Standard 3GL module reuse: no adjustment

Schedule compression in Inception and Elaboration stages due to faster prototyping, option exploration

- effect depends on level of capability and experience in doing this (similar to Rapid Prototyping experience)
- same effect on effort; staff level held constant

Schedule and Effort Multipliers	Rapid Prototyping Experience Level				
	VL	L	N	H	VH
Inception	1.04	1.0	.98	.94	.90
Elaboration	1.02	1.0	.99	.97	.95
Construction	1.0	1.0	1.0	1.0	1.0

Development Process Reengineering and Streamlining (DPRS)

Detailed rating scale provided

Gains depend on current level of bureaucracy

- **Same effect on effort; staff level held constant**

Schedule and Effort Multipliers	Inception	Elaboration	Construction
VL - Heavily Bureaucratic	1.20	1.15	1.15
L - Bureaucratic	1.08	1.06	1.06
N - Basic good business practices	1.0	1.0	1.0
H - Partly streamlined	.96	.98	.98
VH - Fully streamlined	.90	.95	.95

DPRS Rating Scale

	VL	L	N	H	VH
Number of approvals required per task	Excessive	Occasionally Reduced	Mature	Actively Reduced	Actively Minimized
Time taken per approval	Excessive	Occasionally Reduced	Mature	Actively Reduced	Actively Minimized
Reduced task dependencies, critical path tasks	None	Little	Mature Tech. Adopted	Advanced Tech. Adopted	Pioneering
Followup to expedite task completion	None	Little	Encouraged	Emphasized	Strongly Emphasized
Process measurement & streamlining	None	Little	Mature Tech. Adopted	Advanced Tech. Adopted	Pioneering

Collaboration Efficiency (CLAB)

Detailed rating scale provided

- SITE ratings also include
 - collaboration tool maturity, experience
 - scope effects: domain, negotiation, option-analysis tool support

Same effect on effort; staff level held constant

Schedule & Effort	VL	L	N	H	VH	EH
Multipliers						
Inception	1.21	1.10	1.00	0.93	0.86	0.80
Elaboration	1.15	1.07	1.00	0.95	0.90	0.86
Construction	1.10	1.05	1.00	0.98	0.95	0.93

Architecture / Risk Resolution (RESL)

Same as COCOMO II RESL rating scale

Enables parallel construction

- Assumes higher level of staffing available and used
- Otherwise no schedule compression

Schedule Multipliers (Effort Unchanged)	VL	L	N	H	VH	EH
Inception	1.0	1.0	1.0	1.0	1.0	1.0
Elaboration	1.0	1.0	1.0	1.0	1.0	1.0
Construction	1.0	1.0	1.0	.91	.83	.75

Prepositioning Assets (PPOS)

Degree to which assets are pre-tailored to project and furnished to project for use on demand

- People skills and teambuilding
- Processes and tools
- Architecture and componentry

PM/M=P Multipliers	N	H	VH	EH
Rating	Basic project legacy, no tailoring	Some prepositioning & tailoring	Key items prepositioned & tailored	All items prepositioned & tailored
Inception	1.0/1.0=1.0	1.03/.93=1.11	1.06/.86=1.23	1.1/.80=1.37
Elaboration	1.0/1.0=1.0	1.03/.93=1.11	1.06/.86=1.23	1.1/.80=1.37
Construction	1.0/1.0=1.0	1.03/.93=1.11	1.06/.86=1.23	1.1/.80=1.37