


How to predicts the maintenance effort of software



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Galorath User Conference
08 December 2011

Agenda

- Introduction
- What do we mean with maintenance
- Aspects that influence maintenance
- Estimating enhancements
- Conclusions





Introduction

Who am I?

- Working at Logica for 12 years
- Responsible for the estimating & metrics approach within Logica NL
- Manager of the Logica E&M Desk
- Involved in standardisation of E&M on a global level

- Member of the board of the NESMA
- Published several papers in literature and on conferences



What is Logica?

- Logica is a business and technology service company
- Employing 41,000 people
- Logica provides
 - business consulting
 - systems integration
 - Outsourcing

More information is available at www.logica.com.



Introduction

- Maintenance separated from development
- Development results will be handed over to maintenance
- Organisations outsource the maintenance of their IT to external IT Suppliers
- How to predict the maintenance effort?
- What aspects will influence this maintenance effort?





Maintenance

What do we mean with maintenance?

- Incident management
 - Helpdesk
 - Solving issues
 - Keep the system up and running
- Enhancements
 - Additional functionality
 - Small enhancements till large enhancements
 - Enhancements can be combined in releases



Aspects that influence the maintenance

- The quality of the documentation
 - Requirements documentation
 - Design documentation
- Knowledge of the application
- Non functional requirements for the application
 - Reliability, availability, security,
- Complexity of the software
 - Transaction mgmt, real time, GUI based, ...
- Development environment
 - Processes, tools, personal capabilities

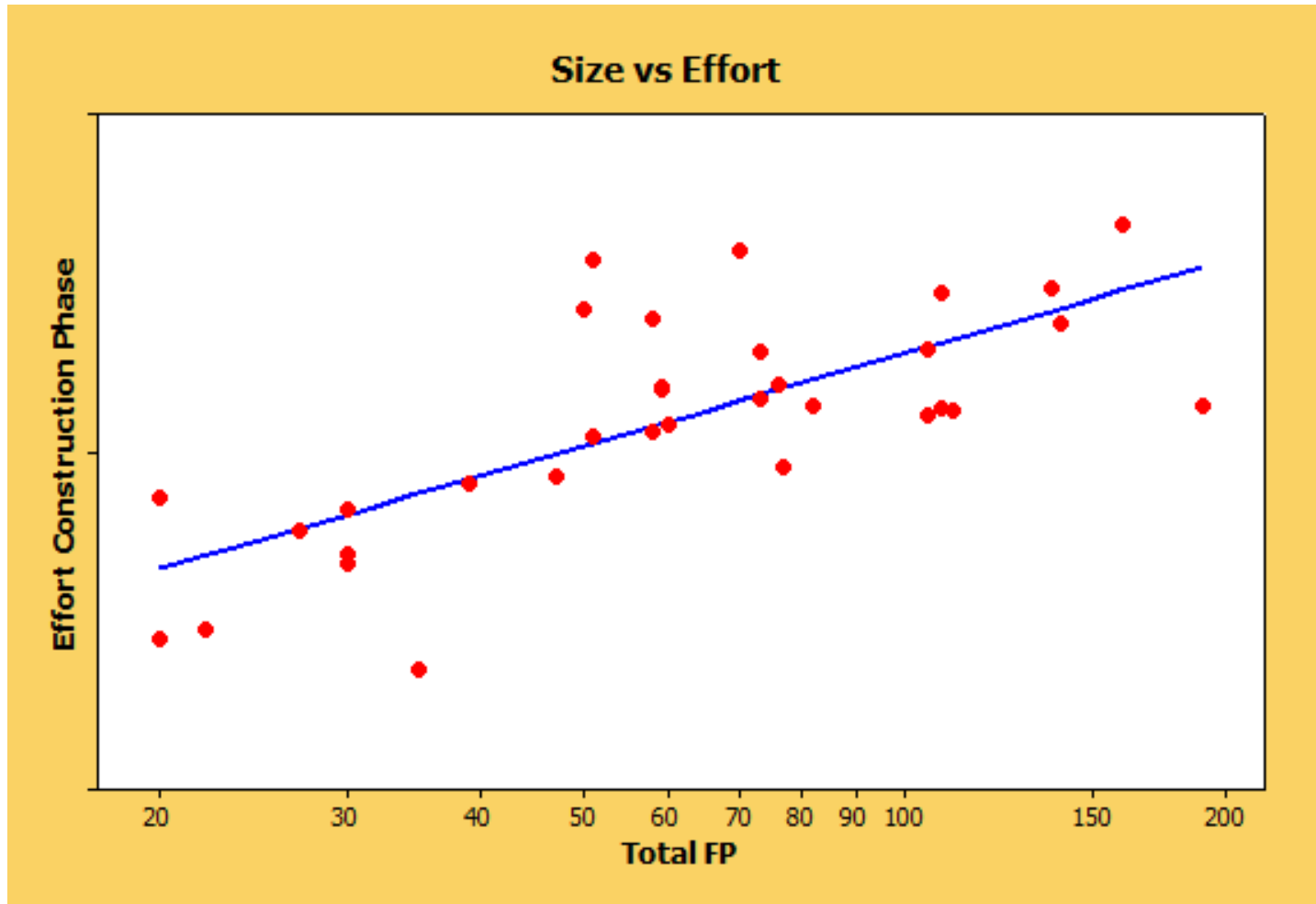


How to estimate the effort for enhancements?

- Expert estimation
 - Estimation based on a WBS
 - Estimation for all activities performed by experts
- Size estimating
 - Determine the size (FP's; Cosmic FP's)
 - Determine the effort based on the productivity
- How to take all influence factors into account?
- Is size an option for estimating enhancements?



Maintenance effort vs Size



Maintenance effort vs Size

- There seems to be some correlation
 - $Rsq = 53\%$
- Correlation between size and maintenance effort not strong enough
 - Variance based on
 - Influence factors
 - Technology
 - Environment
- How to deal with the influence factors in case of outsourcing?



Estimating maintenance in case of outsourcing

- Assumptions need to be made about the influence factors
- Influence factors will change over a period of time
 - Knowledge will increase
 - Quality of software and documentation will improve
 - The team will become more experienced
- How to provide a estimate for the maintenance effort for a longer period of time?
- How to take improvements into account?



Parameter sets in Galorath Seer

- Capabilities & Experience
- Development Support Environment
- Product Development Requirements
- Product Reusability Requirements
- Development Environment Complexity
- Target Environment

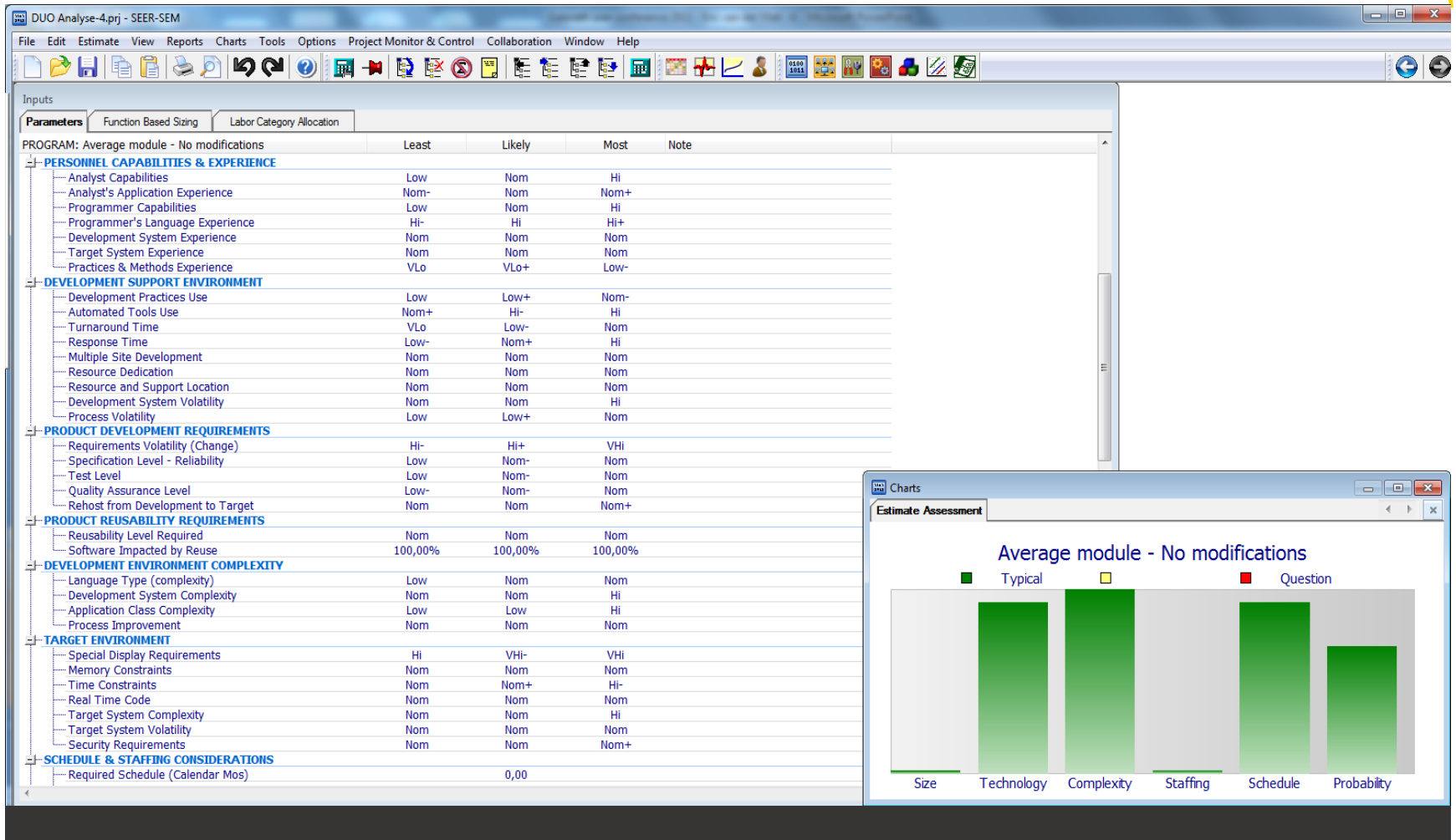


Parameters vs Influence factors

- The parameters take quite some influence factors into account
- Understanding the parameters supports you to determine the impact
- Selection by means of knowledge basis

The screenshot displays the SEER software interface. The main window shows a Project WBS tree on the left with nodes like '1: Enhancement improvement', '1.1: End position', '1.2: Start position', and '1.4: Analyse-2'. The central pane is titled 'Parameters' and lists several factors: 'PERSONNEL CAPABILITIES & EXPERIENCE', 'DEVELOPMENT SUPPORT ENVIRONMENT', 'PRODUCT DEVELOPMENT REQUIREMENTS', 'PRODUCT REUSABILITY REQUIREMENTS', 'DEVELOPMENT ENVIRONMENT COMPLEXITY', and 'TARGET ENVIRONMENT'. A red circle highlights the 'Create/Modify WBS Element' dialog box, which is open over the 'Analyse-1' node. This dialog box contains fields for 'Description', 'Analyst', 'Element Type', 'Indenture', and 'Knowledge Base Selectors'. The 'Knowledge Base Selectors' section includes dropdown menus for 'Platform' (Client-Server), 'Application' (Business Analysis Tool), 'Acquisition Method' (High Level Design thru Test Only), 'Development Method' (Waterfall), 'Development Standard' (Commercial Low), 'Class (Custom)' (No Knowledge), and 'Sizing Method' (Lines, Functions, Unadjusted Function Points). The 'Start Date' is set to 25-05-2011. A red arrow points from the 'Parameters' list to the 'Create/Modify WBS Element' dialog box. In the bottom right corner, a 'Charts' window displays a bar chart titled 'Analyse-1' with six bars representing 'Size', 'Technology', 'Complexity', 'Staffing', 'Schedule', and 'Probability'. The bars are green, and the chart includes a legend with 'Typical' (green square) and 'Question' (red square).

Detailed parameter analysis



Detailed analysis

- Requires detailed understanding of the parameters
- In common circumstances own knowledge bases can be created
- Parameters can be determined based on environmental knowledge
- Parameters can be updated based on change circumstances



Updating the parameter set

DUO Analyse-4.prj - SEER-SEM

File Edit Estimate View Reports Charts Tools Options Project Monitor & Control Collaboration Window Help

Inputs

Parameters Function Based Sizing Labor Category Allocation

PROGRAM: Average module - min effort

	Least	Likely	Most	Note
Pre-exists, designed for reuse				
PERSONNEL CAPABILITIES & EXPERIENCE				
Analyst Capabilities	Nom-	Nom+	Hi	
Analyst's Application Experience	Nom	Nom	Nom	
Programmer Capabilities	Hi	Hi	Hi	
Programmer's Language Experience	Hi	Hi	Hi	
Development System Experience	Nom	Nom	Nom	
Target System Experience	Nom	Nom	Nom	
Practices & Methods Experience	Nom	Nom	Nom	
DEVELOPMENT SUPPORT ENVIRONMENT				
Development Practices Use	Nom	Nom	Nom	
Automated Tools Use	Low	Low	Low	
Turnaround Time	Low+	Low+	Low+	
Response Time	Hi	Hi	Hi	
Multiple Site Development	Hi	Hi	Hi	
Resource Dedication	Nom	Nom	Nom	
Resource and Support Location	Hi	Hi	Hi	
Development System Volatility	Nom	Nom	Nom	
Process Volatility	Low	Low	Low	
PRODUCT DEVELOPMENT REQUIREMENTS				
Requirements Volatility (Change)	Nom+	Nom+	Nom+	
Specification Level - Reliability	Nom	Nom	Nom	
Test Level	Hi	Hi	Hi	
Quality Assurance Level	Hi	Hi	Hi	
Rehost from Development to Target	Nom	Nom	Nom	
PRODUCT REUSABILITY REQUIREMENTS				
Reusability Level Required	Nom+	Nom+	Nom+	
Software Impacted by Reuse	25,00%	25,00%	25,00%	
DEVELOPMENT ENVIRONMENT COMPLEXITY				
Language Type (complexity)	Nom	Nom	Nom	
Development System Complexity	Nom	Nom	Nom	
Application Class Complexity	Low+	Nom-	Nom	
Process Improvement	Hi	Hi	Hi	
TARGET ENVIRONMENT				
Special Display Requirements	Nom	Nom	Nom	
Memory Constraints	Nom	Nom	Nom	
Time Constraints	Hi	Hi	Hi	
Real Time Code	Hi	Hi	Hi	
Target System Complexity	Nom	Nom	Nom	
Target System Volatility	Hi+	Hi+	Hi+	
Security Requirements	Nom	Nom	Nom	
SCHEDULE & STAFFING CONSIDERATIONS				

Charts

Estimate Assessment

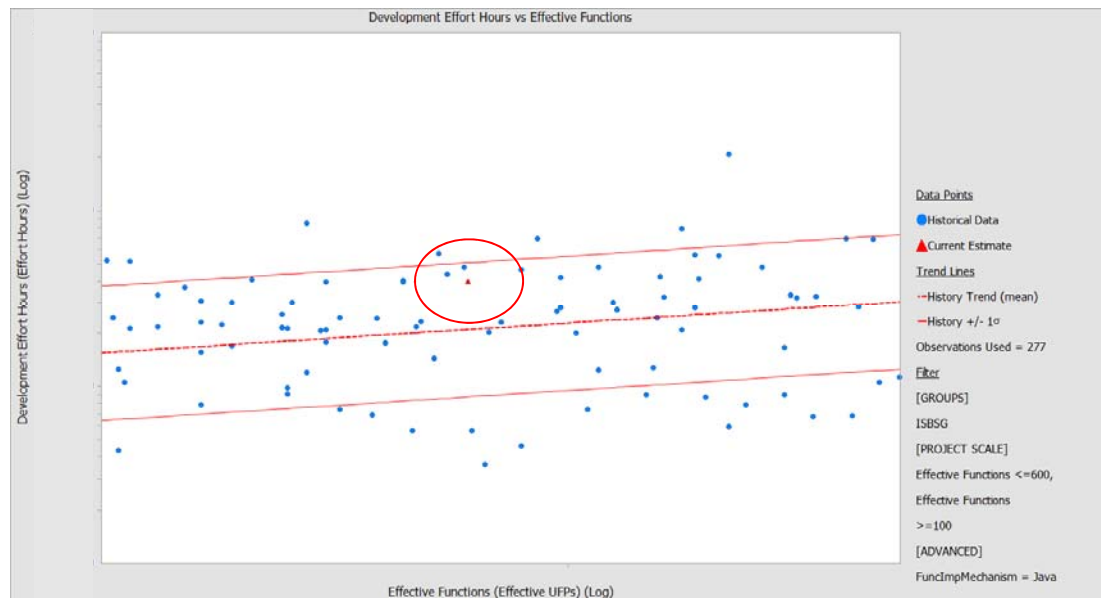
Average module - min effort

■ Typical ■ Question

Category	Typical	Question
Size	Low	High
Technology	Low	High
Complexity	Low	High
Staffing	Low	High
Schedule	Low	High
Probability	Low	High

Estimating approach for enhancements

- Determine the parameters for specific circumstances
 - Improvement stage organisation
 - Experience of the team
 - ...
- Use expert estimates in parallel with a parameter based estimation
- Use historical data to verify the reasonability of the estimate



Benchmark data: www.isbsg.com

Practical example

- Enhancement estimation example
 - Expert estimate
 - Estimate of the effort based on possible improvements of current situation
 - Estimate by means of Galorath Seer
- Variance of the 3 estimates < 5%
- Improvements modelled in Galorath by means of parameter set
 - Improvement possibilities according to expectations

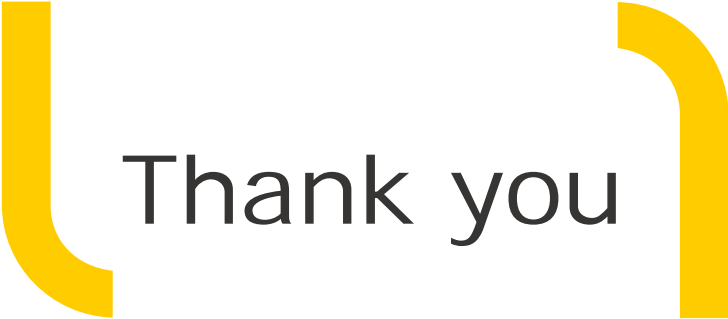
The word "Conclusions" is centered between two large, yellow, stylized brackets that curve inward from the left and right sides.

Conclusions

Conclusions

- For estimating enhancements sizing can be used
 - Use data from corresponding projects
 - Take influence factors into account
- Use of benchmark tooling will support this process
 - Build up your own database to improve the estimates
 - Start with external data (e.g. ISBSG) to verify your estimate against the market
- Keep thinking, tools will only support you





Thank you

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