

# Early Project Estimation with Early Function Point Prognosis

Presented by

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1ST ANNUAL INTERNATIONAL SOFTWARE MEASUREMENT  
& ANALYSIS (ISMA) CONFERENCE

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# Agenda

- Basics of Estimation
- Metrics from Application FP Counting
- FP Prognosis
- Toolbased Estimation
  - CKWIN
  - Estimation Portfolio
- Benefits of FP Analysis

Estimation has to do with **uncertainty!**

For estimation you need  
**informations about the object**  
of estimation!

Dangerously often  
**estimation is misunderstood as bargaining!**

## Constraints

- Duration
- Effort
- People
- Quality
- Costs

## Drivers

- Size
- Process

## Estimation

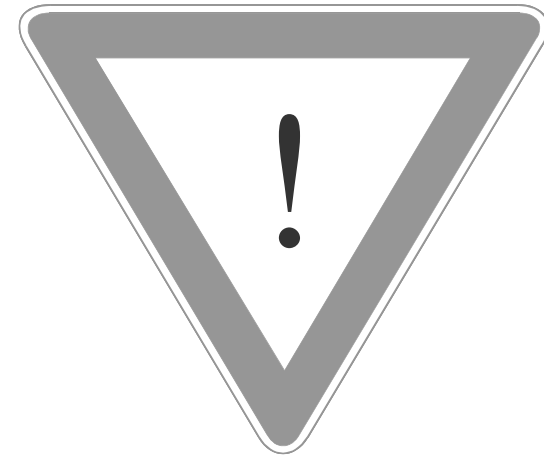
- Duration
- Size
- Effort
- People
- Quality
- Costs

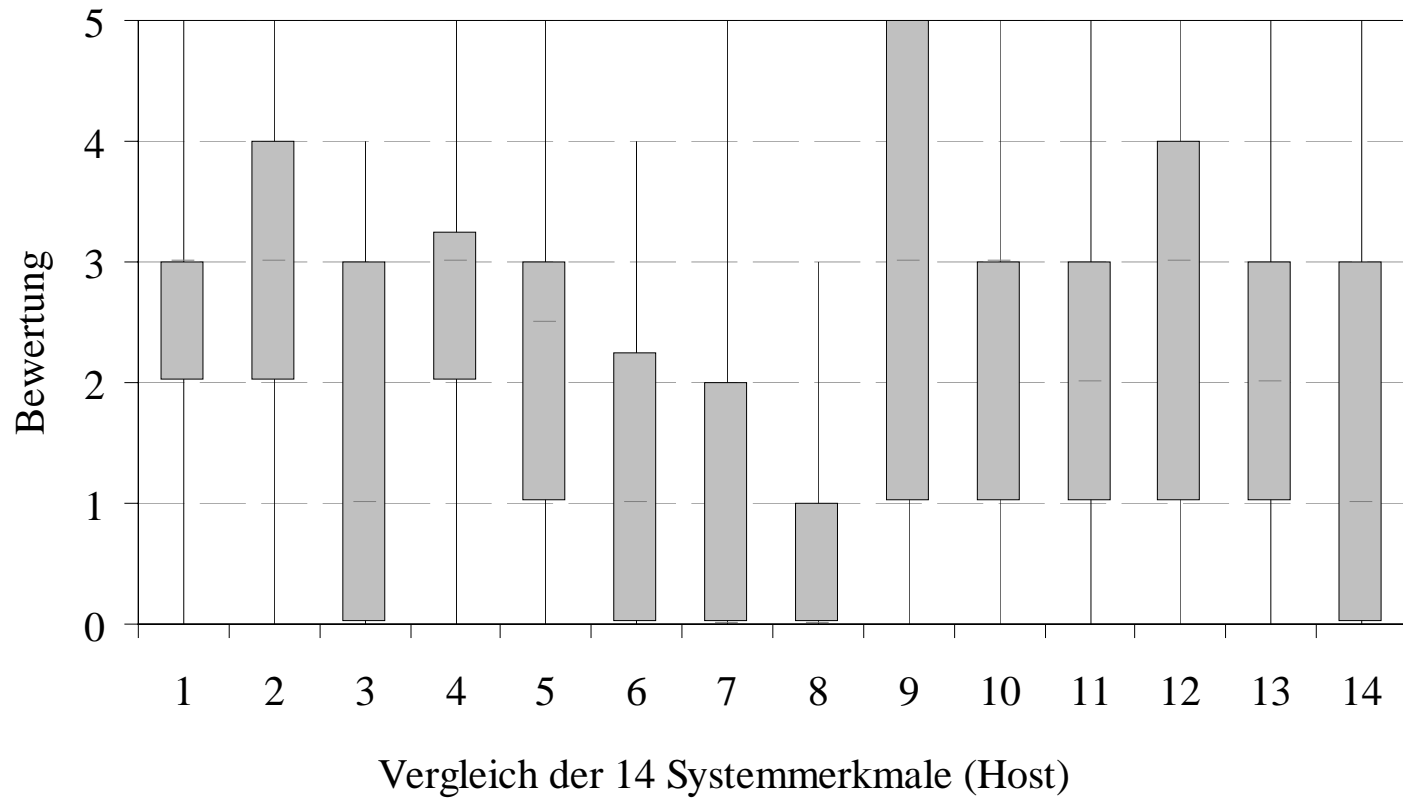
## Degrees of Freedom

- Duration
- Effort
- People
- Quality
- Costs

## *The most important Themes of Estimation*

- ✓ Object of Estimation
- ✓ Time of Estimation
- ✓ Accuracy of Estimation
- ✓ Error Range of Estimation
- ✓ Effort for Estimation
- ✓ Estimation Methods
- ✓ Tracking of Estimations
- ✓ Tools for Estimation
- ✓ Parameters for Estimation
- ✓ Estimation Honesty
- ✓ Estimation Experience
- ✓ Introduction of Estimation
- ✓ Estimation Culture





<b>2001</b>		<b>Percent of Function Points</b>				
<b>Platform</b>	<b>Number of Application Systems</b>	<b>EI</b>	<b>EO</b>	<b>EQ</b>	<b>ILF</b>	<b>EIF</b>
<b>Total</b>	78	22	39	8	16	14
<b>Host</b>	69	21	40	8	16	15
<b>PC</b>	9	28	31	12	19	10
<b>ISBSG Rel. 6</b>	238 New development projects	33.5	23.5	16	22	5
<b>Metricviews [Morr96]</b>		26–39	22–24	12–14	24	4–12
<b>Checkpoint for Windows</b>		20	24	10	43	3
<b>History:</b>						
<b>1998 Total</b>	39	25	39	14	17	6
<b>1996/97 Total</b>	20	27	39	11	18	5
<b>1997 Total</b>	12	18	43	12	18	9
<b>1996 Total</b>	8	34	35	11	18	2

**Table 1:** Function Component Proportions

<b>2001</b>		<b>Average Function Points</b>				
<b>Platform</b>	<b>Number of application systems</b>	<b>EI</b>	<b>EO</b>	<b>EQ</b>	<b>ILF</b>	<b>EIF</b>
<b>Total</b>	78	4.7	5.9	4.4	8.6	6.5
<b>Host</b>	69	4.7	5.9	4.6	8.7	6.5
<b>PC</b>	9	4.3	5.7	3.8	7.6	6.5
<b>IFPUG</b>		4	5	4	10	7
<b>ISBSG</b>	Release 5	4.3	5.4	3.8	7.4	5.5
	Release 5 Europe	4.2	4.9	3.8	7.2	5.3
<b>1998</b>	<b>Number of application systems</b>	<b>EI</b>	<b>EO</b>	<b>EQ</b>	<b>ILF</b>	<b>EIF</b>
<b>Total</b>	39	4.6	5.7	4.3	8.2	6.1
<b>Host</b>	28	4.8	5.7	4.5	8.5	6.2
<b>PC</b>	11	4.0	5.7	3.9	7.3	5.4
<b>1997</b>	<b>Number of application systems</b>	<b>EI</b>	<b>EO</b>	<b>EQ</b>	<b>ILF</b>	<b>EIF</b>
<b>Total</b>	20	4.6	5.5	4.3	8.1	5.7

**Table 2:** Average Function Complexity



<b>Application systems</b>	<b>AXA Service AG</b>			<b>ISBSG Rel. 5</b>	
	<b>2001</b>	<b>1998</b>	<b>1997</b>	<b>Europe</b>	<b>Total</b>
<b>Quantity</b>	78	39	20	32	238
<b>EI per ILF</b>	2.6	2.7	2.7	3.8	2.9
<b>EO per ILF</b>	3.6	3.3	3.7	2.6	1.5
<b>EQ per ILF</b>	0.9	1.4	1.2	1.9	1.1
<b>EIF per ILF</b>	0.6	0.5	0.4	-	-
<b>Ratios per input and ratios per output</b>					
<b>78 Application Systems</b>	<b>2001</b>		<b>78 Application systems</b>		<b>2001</b>
<b>EO per EI</b>	1.3		<b>EI per EO</b>		0.7
<b>EQ per EI</b>	0.3		<b>EQ per EO</b>		0.3
<b>ILF per EI</b>	0.4		<b>ILF per EO</b>		0.3
<b>EIF per EI</b>	0.2		<b>EIF per EO</b>		0.2

**Table 3:** Ratios of Components

<b>78 AS</b>	<b>2001</b>		<b>78 AS</b>	<b>2001</b>		<b>78 AS</b>	<b>2001</b>
<b>EI FPs / ILF</b>	12.2		<b>EO FPs / EI</b>	8.0		<b>EI FPs / EO</b>	3.4
<b>EO FPs / ILF</b>	21.0		<b>EQ FPs / EI</b>	1.5		<b>EQ FPs / EO</b>	1.1
<b>EQ FPs / ILF</b>	4.0		<b>ILF FPs / EI</b>	3.3		<b>ILF FPs / EO</b>	2.4
<b>EIF FPs / ILF</b>	4.2		<b>EIF FPs / EI</b>	1.6		<b>EIF FPs / EO</b>	1.2

**Table 4:** Ratios of Functions Points per Component (AS = application systems)

	<b>R<sup>2</sup></b>									<b>R</b>								
	<b>Quantity</b>			<b>FP's unadjusted</b>			<b>SPR FP's</b>			<b>Quantity</b>			<b>FP's unadjusted</b>			<b>SPR FP's</b>		
	< 1200	> 1800	all	< 1200	> 1800	all	< 1200	> 1800	all	< 1200	> 1800	all	< 1200	> 1800	all	< 1200	> 1800	all
EI's	0,28	0,11	0,77	0,30	0,51	0,86				0,53	0,33	0,88	0,55	0,71	0,93			
EO's			0,84	0,90	0,44	0,85						0,92	0,95	0,66	0,92			
EQ's			0,33	0,01	0,31	0,41						0,57	0,10	0,56	0,64			
EI's + EO's	0,95	0,71	0,95	0,95	0,90	0,97	0,91	0,70	0,93	0,97	0,84	0,97	0,97	0,95	0,98	0,95	0,84	0,96
EI's + EO's + EQ's			0,94			0,96						0,97			0,98			
ILF's	0,86	0,19	0,75	0,14	0,75	0,83				0,93	0,44	0,87	0,37	0,87	0,91			
EIF's			0,05	0,34	0,84	0,05						0,22	0,58	0,92	0,22			
ILF's + EIF's			0,47	0,92	0,47	0,62						0,69	0,96	0,69	0,79			

R<sup>2</sup>: Determination coefficient

R: probability for correlation

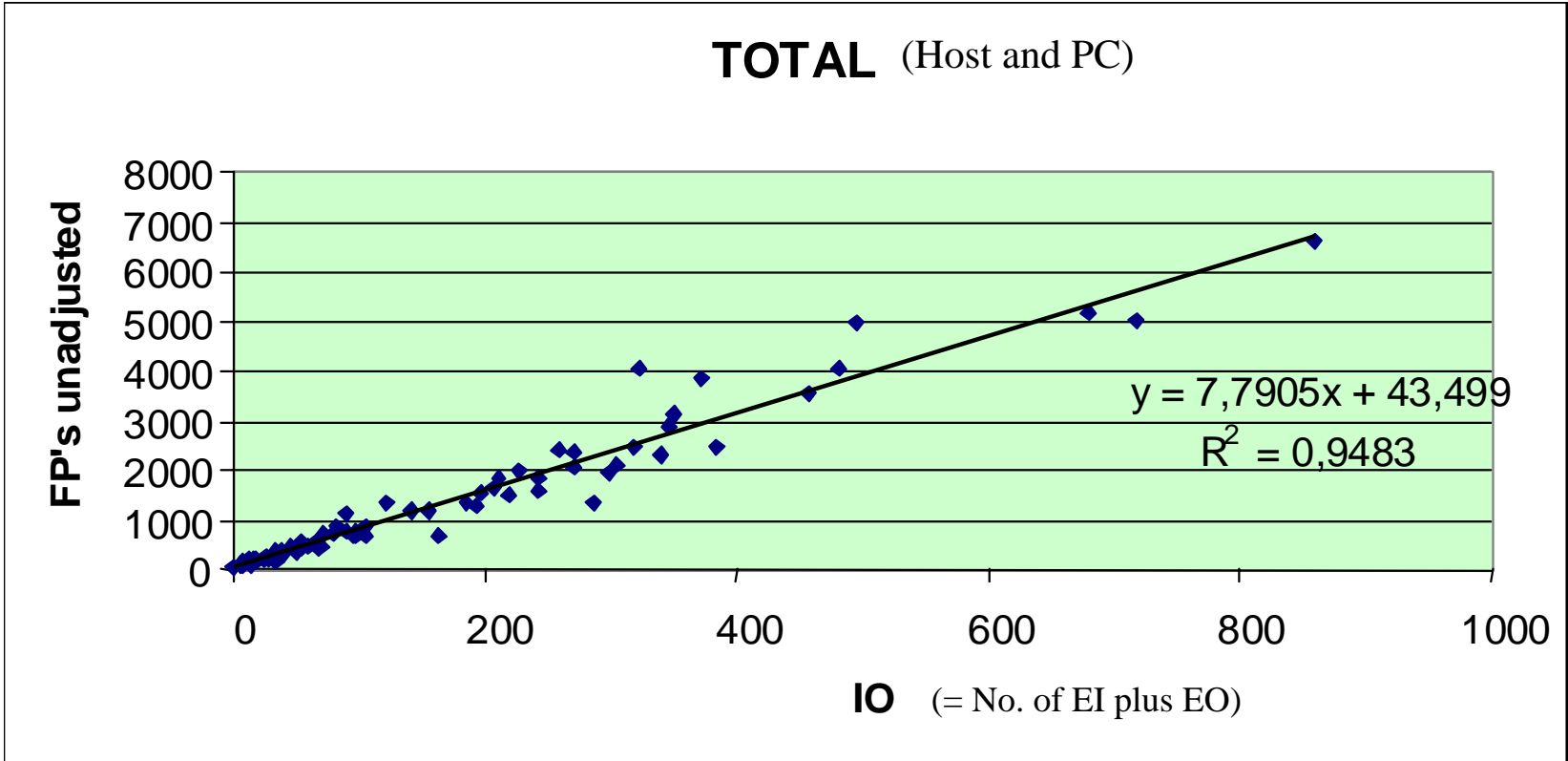
R<sup>2</sup> > 0,90 bold surrounded

**Table 5:** Correlation Coefficients

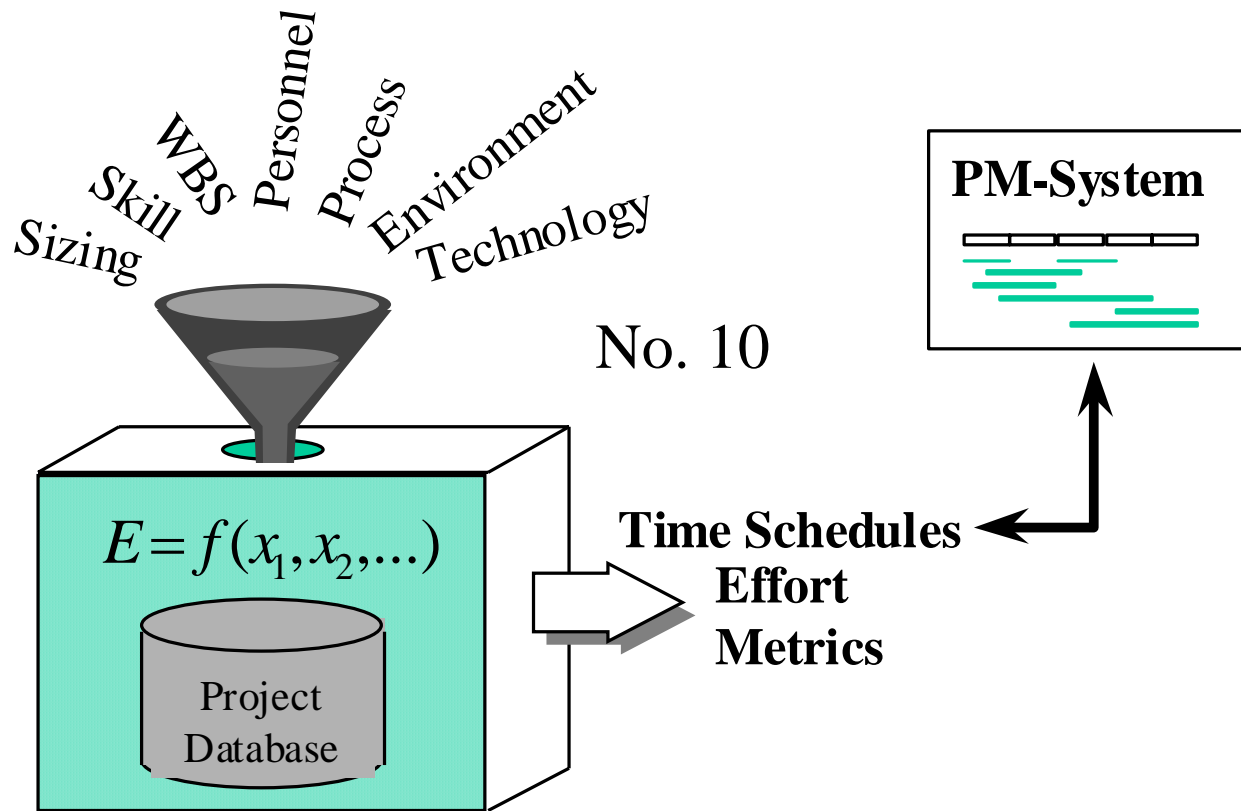
<b>2001</b>	<b>Number of counts</b>	<b>R<sup>2</sup></b>	<b>Error in%</b>	<b>Formula for Prognosis</b>
<b>Total</b>	78	0.9483	13	<b>FP = 7.8 * IO + 43</b>
<b>Host</b>	69	0.9498	12	<b>FP = 7.9 * IO + 40</b>
<b>PC</b>	9	0.9503	21	<b>FP = 6.4 * IO + 172</b>
<b>1998</b>	39	0.9589	20	FP = 7.6 * IO + 50
<b>Host</b>	28	0.9580		FP = 7.9 * IO + 11
<b>PC</b>	11	0.9760		FP = 6.5 * IO + 134
<b>1997</b>	20	0.9525	13 (Median 11)	FP = 7.3 * IO + 56

**Table 6:** Prognosis Formulae (IO = No. of EI plus EO)

# Function Point Prognosis Regression Analysis

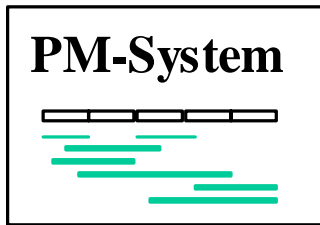


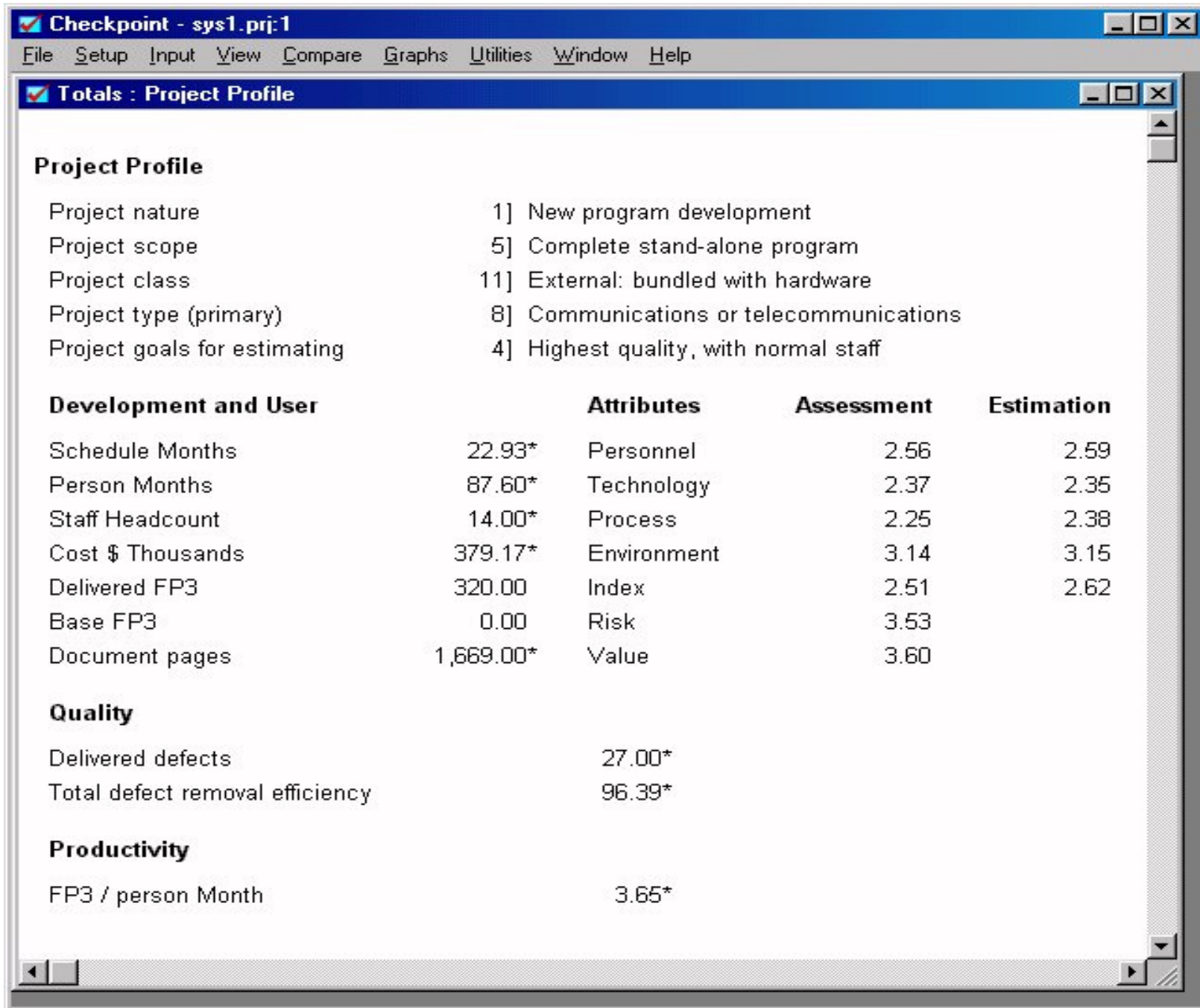
# Toolbased Estimation



No. 10

Time Schedules  
Effort  
Metrics





**START : Formular**

Entwicklungsstand:

Plattform:

Startdatum:

Weitere Kategorien:

**Projekte:**

Alle (mit Nachkalk.)

nur Nachkalkulation

**Templates:**

Alle

Bericht\_Mitarbeiter drucken

Bericht\_Qualität drucken

Bericht\_Produktivität drucken

Bericht\_Assessment drucken

Bericht\_Estimation drucken

OK

Berichtsfelder

Projekt Art	Plattform	Projekt	Startdatum	Personenstunden	Function_Points	Umwelt	Index	Personal	Prozess	Technologie	Nutzen	Risiko
1] New program developr	PC	N_EVS	07.01.1999	703,07	281	2,19	2,39	2,18	2,5	2,28	4	2,77
1] New program developr	PC	N_AVIS	02.01.1997	1497,26	736	2,19	2,39	2,18	2,5	2,28	4	2,77
1] New program developr	PC	N_CONASH	18.11.1996	28583,16	3335	3,33	3,08	2,37	3,34	3,05	3,4	3,33
2] Enhancement	Host	N_DIWA2	05.06.2002	48338,52	3047	2,53	2,28	2,03	2,16	2,28	3,23	3,5
2] Enhancement	Host	N_ECLAIM	01.01.2003	9617,24	1294	1,94	1,93	1,58	2,36	1,75	3,6	1
1] New program developr	PC	N_ELMAR	02.01.1997	1378,45	546	2,19	2,48	2,52	2,5	2,28	4	2,77
1] New program developr	PC	N_GUV	01.01.1999	900,17	395	2,19	2,39	2,18	2,5	2,28	4	2,77
2] Enhancement	C/S	N_KOALAR4	06.01.2002	20465,75	805	2,53	2,62	2,55	2,87	2,23	2,93	2,1
2] Enhancement	Host	N_P-KFZBU2	03.01.2003	8248,79	1464	2,14	2,06	2,06	2,38	1,64	0	0
2] Enhancement	Host	N_RETAIL	07.10.2002	14425,29	712	2,08	2,17	2,23	2,69	1,56	0	0

Anzahl gefundener Projekte : 10

**START : Formular**

Entwicklungsstand:

Plattform:

Startdatum:

Weitere Kategorien:

**Projekte:**

Alle (mit Nachkalk.)

nur Nachkalkulation

**Templates:**


Alle

Bericht\_Mitarbeiter drucken

Bericht\_Qualität drucken

Bericht\_Produktivität drucken

Bericht\_Assessment drucken



Bericht\_Estimation drucken

Berichtsfelder

Projekt Art	Plattform	Projekt	Startdatum	Personenstunden	Function_Points	Produktivität FF	Geschwindig	Aufwand	Programmiersprache
1] New program developr	Host	T_NEWHOLA	21.07.2003	0	0			0	COBOL
1] New program developr	Host	T_NEWHOME	21.07.2003	0	0			0	COBOL
1] New program developr	Host	T_NEWHOSM	21.07.2003	0	0			0	COBOL
1] New program developr	PC	T_NEWPCLAA	21.07.2003	0	0			0	COBOL
1] New program developr	PC	T_NEWPCSMA	21.07.2003	0	0			0	COBOL
2] Enhancement	C/S	T_WECSLAA	21.07.2003	0	0			0	COBOL
2] Enhancement	C/S	T_WECSSMA	21.07.2003	0	0			0	COBOL
1] New program developr	Host	T_WEHOLA	21.07.2003	0	0			0	COBOL
2] Enhancement	Host	T_WEHOLAA	21.07.2003	0	0			0	COBOL
2] Enhancement	Host	T_WEHOME	21.07.2003	0	0			0	COBOL
2] Enhancement	Host	T_WEHOMEA	21.07.2003	0	0			0	COBOL
2] Enhancement	Host	T_WEHOSM	21.07.2003	0	0			0	COBOL
2] Enhancement	Host	T_WEHOSMA	21.07.2003	0	0			0	COBOL

Anzahl gefundener Projekte : 13



Entwicklungsstand:

Plattform:

Startdatum:

Weitere Kategorien:

**Projekte:**

Alle (mit Nachkalk.)

nur Nachkalkulation

**Templates:**


Alle

Bericht\_Mitarbeiter drucken

Bericht\_Qualität drucken

Bericht\_Produktivität drucken

Bericht\_Assessment drucken



Bericht\_Estimation drucken

Berichtsfelder

Projekt Art	Plattform	Projekt	Startdatum	Personenstunden	Function_Points	Produktivität FF	Geschwindigkeit	Aufwand	Programmiersprache
1] New program developr	PC	AVIS	02.01.1997	1497,26	736	3,93	4,41	1336,3	Multiple Languages
1] New program developr	PC	CF_VTZIE	10.01.1997	163,11	80	3,92	6,23	102,79	Multiple Languages
1] New program developr	PC	CONASALT	09.10.1996	8838,16	3335	3,02	419,43	63,61	Multiple Languages
1] New program developr	PC	CONASHT	18.11.1996	28583,16	3335	0,93	5,09	5241,05	Multiple Languages
1] New program developr	PC	ELMAR	02.01.1997	1378,45	546	3,17	3,35	1303,84	Multiple Languages
1] New program developr	PC	EVS	07.01.1999	703,07	281	3,2	4,16	541,01	Multiple Languages
1] New program developr	PC	GUV	01.01.1999	900,17	395	3,51	4,23	746,6	Multiple Languages
1] New program developr	PC	N_EVS	07.01.1999	703,07	281	3,2	4,16	541,01	Multiple Languages
1] New program developr	PC	RBOSS	23.03.1998	2729,77	690	2,02	8,43	654,63	Multiple Languages
1] New program developr	PC	N_AVIS	02.01.1997	1497,26	736	3,93	4,41	1336,3	Multiple Languages
1] New program developr	PC	N_CONASH	18.11.1996	28583,16	3335	0,93	5,09	5241,05	Multiple Languages
1] New program developr	PC	N_ELMAR	02.01.1997	1378,45	546	3,17	3,35	1303,84	Multiple Languages
1] New program developr	PC	N_GUV	01.01.1999	900,17	395	3,51	4,23	746,6	Multiple Languages

Anzahl gefundener Projekte : 13

START : Formular

Entwicklungsstand: 1] New Program Development

Plattform: PC

Startdatum:

Weitere Kategorien: Qualität

**Projekte:**

- Alle (mit Nachkalk.)
- nur Nachkalkulation

**Templates:**

- Alle

Bericht\_Mitarbeiter drucken

Bericht\_Qualität drucken

Bericht\_Produktivität drucken

Bericht\_Assessment drucken

Bericht\_Estimation drucken

OK

Berichtsfelder

Projekt Art	Plattform	Projekt	Startdatum	Personenstunden	Function_Points	Fehler/FP	Fehlerentfer	ausgelieferl		
1] New program developr	PC	AVIS	02.01.1997	1497,26	736	0,48	39,59	354		
1] New program developr	PC	CF_VTZIE	10.01.1997	163,11	80	0,16	23,53	13		
1] New program developr	PC	CONASALT	09.10.1996	8838,16	3335	1,73	52,92	5764		
1] New program developr	PC	CONASHTE	18.11.1996	28583,16	3335	2,55	24,79	8514		
1] New program developr	PC	ELMAR	02.01.1997	1378,45	546	0,49	46,43	270		
1] New program developr	PC	EVS	07.01.1999	703,07	281	0,19	63,12	52		
1] New program developr	PC	GUV	01.01.1999	900,17	395	0,28	52,79	110		
1] New program developr	PC	N_EVS	07.01.1999	703,07	281	0,19	63,12	52		
1] New program developr	PC	RBOSS	23.03.1998	2729,77	690	1,69	3,07	1169		
1] New program developr	PC	N_AVIS	02.01.1997	1497,26	736	0,48	39,59	354		
1] New program developr	PC	N_CONASH	18.11.1996	28583,16	3335	2,55	24,79	8514		
1] New program developr	PC	N_ELMAR	02.01.1997	1378,45	546	0,49	46,43	270		
1] New program developr	PC	N_GUV	01.01.1999	900,17	395	0,28	52,79	110		

Anzahl gefundener Projekte : 13

Microsoft Access

Datei Bearbeiten Ansicht Einfügen Format Datensätze Extras Fenster ?

Ckwin\_Reports : Datenbank

START : Formular

Entwicklungsstand: [2] Enhancement

Plattform: Host

Startdatum:

Weitere Kategorien: Mitarbeiter

**Projekte:**

- Alle (mit Nachkalk.)
- nur Nachkalkulation

**Templates:**

- Alle

Bericht\_Mitarbeiter drucken

Bericht\_Qualität drucken

Bericht\_Produktivität drucken

Bericht\_Assessment drucken

Bericht\_Estimation drucken

Berichtsfelder

OK

Projekt Art	Plattform	Projekt	Startdatum	Personenstunden	Function_Points	IT-Aufwand	FB-MA	Projekt-MA	Produktivität FP/PT	Wartungs-MA	WE-MA
2] Enhancement	Host	CNL-CDSL	09.06.96	85138,54	3348	50	6	56	59,79	49	0
2] Enhancement	Host	CNL-WWU	09.06.96	14241,28	838	12	5	17	49,29	9	2
2] Enhancement	Host	COBRA	17.03.97	50579,76	1713	77	0	77	22,25	0	0
2] Enhancement	Host	DIWA2	05.06.02	48338,52	3047	23	7	30	101,57	0	9,8
2] Enhancement	Host	DUALEPP	07.01.01	19464,11	1000	17	2	19	52,63	0	4,8
2] Enhancement	Host	ECLAIMS	01.01.03	9617,24	1294	25	2	27	47,93	22	3
2] Enhancement	Host	FKGTARIF	07.01.02	5793,05	475	9	3	12	39,58	0	2
2] Enhancement	Host	KOESY-PP	06.01.02	3770,38	274	16	1	17	16,12	0	2
2] Enhancement	Host	LPQOFL	01.01.02	16333,7	302	16	48	64	4,72	5	7
2] Enhancement	Host	P-KFZBU2	03.01.03	8248,79	1464	10	3	13	112,62	0	2
2] Enhancement	Host	PR10163	07.01.01	35004,6	1528	38	2	40	38,2	0	8,2
2] Enhancement	Host	PT0301	14.05.02	1409,03	229	21	1	22	10,41	0	2,8
2] Enhancement	Host	PT0901	14.05.02	3529,25	133	16	1	17	7,82	0	2
2] Enhancement	Host	PÜ0301	14.05.02	2605,26	184	5	0	5	36,8	0	1
2] Enhancement	Host	RETAIL1	07.10.02	14425,29	712	13	1	14	50,86	0	3
2] Enhancement	Host	RIESZUL	07.10.02	16524,19	648	13	1	14	46,29	0	3,8

Anzahl gefundener Projekte : 21

Formularansicht

Start Explorer - Pict... Explorer - Texte Explorer - Ck... Ckwin\_Report... START : For... 14:31

# Function Points are disliked, since ...

## PREJUDICE

- 💣 ... they are developed by theoreticians and not practically usable.
- 💣 ... They produce administrative overhead.
- 💣 ... They are not usable for object oriented application development.

## COUNTER ARGUMENT

- 😊 Originally developed by A. Albrecht in a Project for the development of system software.
- 😊 The effort can be neglected compared to the benefit and the whole project effort.
- 😊 FP's are a Meta-Model, they allow a mapping of the requirements, no matter in which description.

