

SOFTWARE COST ESTIMATION

FINALLY BECOMING A REAL PROFESSION !



IT Confidence 2019
Beijing, 7 August 2019

Harold van Heeringen

INTRODUCING ME

Drs. Harold van Heeringen, (Groningen, the Netherlands)

- >20 years experience in IT, **>15 years in software measurement and metrics**
- **ISBSG** – Immediate Past President
- **METRI** – Senior Consultant ADM Benchmarking
- **NESMA** – board member International cooperation and partnerships
- **COSMIC** - Dutch representative in the International Advisory Council (IAC)
- **ICEAA** trainer of CEBok chapter 12: Software Cost Estimation
- **sCEBoK** initiator and module developer



haroldvanheeringen



@haroldveendam



haroldveendam

ISBSG: www.isbsg.org
Nesma: www.nesma.org
METRI: www.metrigroup.com

SOME FUN

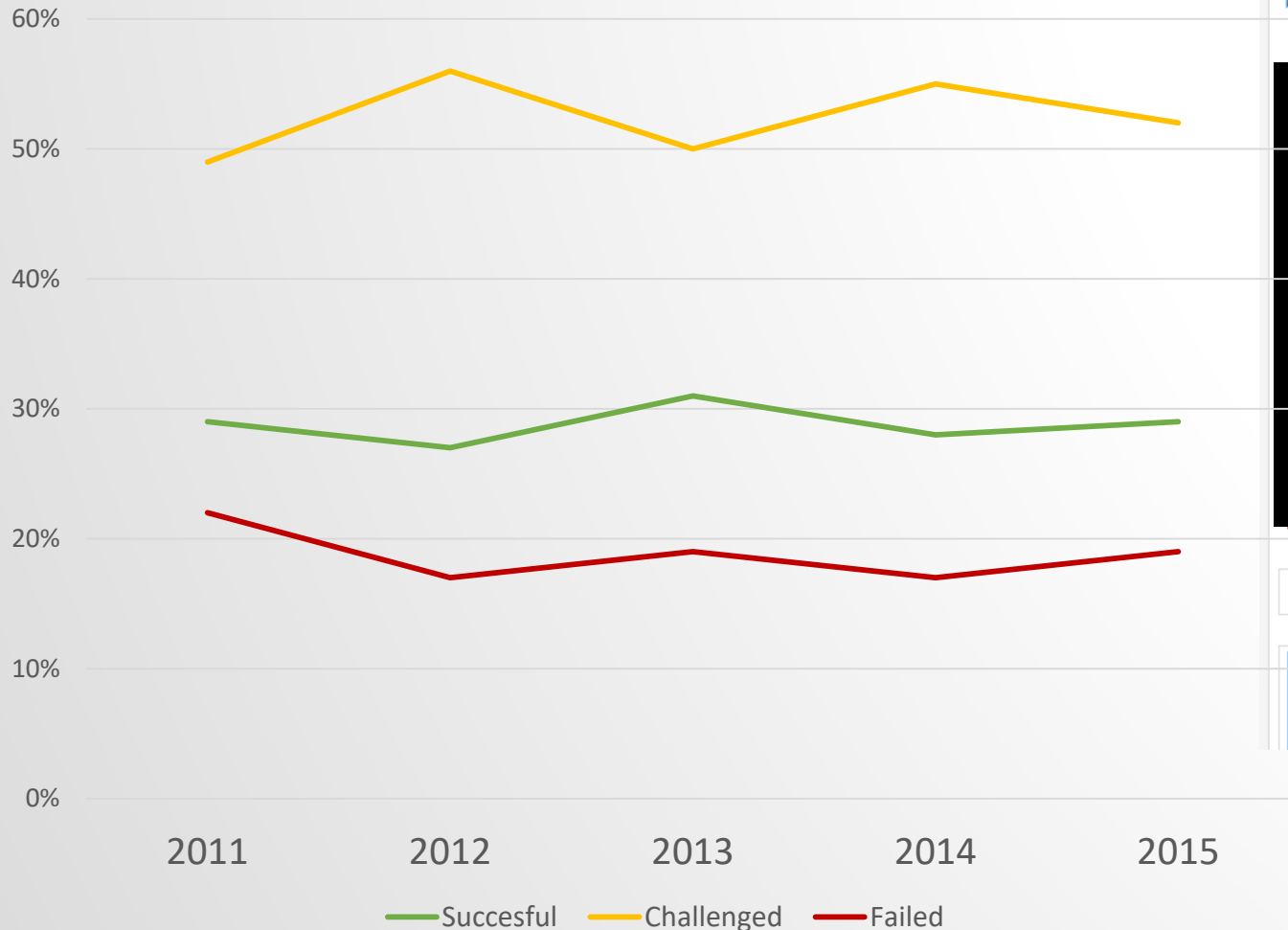
The first 90 percent of the code accounts for the first 90 percent of the development time. The remaining 10 percent of the code accounts for the other 90 percent of the development time. — *Tom Cargill, [Bell Labs](#)*

Hofstadter's Law: It always takes longer than you expect, even when you take into account Hofstadter's Law.
— *[Douglas Hofstadter, Gödel, Escher, Bach: An Eternal Golden Braid](#)*

What one programmer can do in one month, two programmers can do in two months.
— *[Fred Brooks](#)*

NOT SO MUCH FUN!

Project Success Rate



'Falende ICT kost overheid miljarden'

25-04-2014 11:42 | Door [Pim van der Beek](#) | Er zijn [41 reacties](#) op dit artikel | [Permalink](#)



'De Nederlandse overheid raakt elk jaar vier tot vijf miljard euro kwijt aan ict-projecten die mislukken. Vooral met de grote technologieprojecten gaat het mis. Van die projecten - vanaf een budget van 7,5 miljoen euro - slaagt maar 7 procent. Van alle projecten bij elkaar is 30 procent succesvol.' Dat zei hoogleraar beleidsinformatica en directeur van Venture Informatisering Adviesgroep nv (VIAgroep) Hans Mulder tijdens de eerste bijeenkomst van de tijdelijke ICT-Commissie van de Tweede Kamer die onderzoek doet naar ict-projecten binnen de overheid.

Failing IT projects cost the Dutch government 7 billion USD per year

Projects > 10 million USD only 7% succeeds.

In total, only 30% of IT projects are successful.

These are tax dollars and one of the reasons the whole country was in recession for years.



[bekijk reacties \(41\)](#) [print](#) [stuur door](#)



Dé cloud bestaat niet.

Sogeti geniet het vertrouwen van top 500 organisaties, waaronder PostNL. Sogeti helpt ook u graag met concrete cloudoplossingen. Van een stapsgewijze aanpak tot de meest vergaande cloud-only strategie. Ontdek dat dé cloud niet bestaat. [Bezoek de Sogeti Cloud Cases.](#)

Advertorial

NEW SOFTWARE HORROR STORIES EVERY DAY!

Nieuw ict-tientallen

 Michaël Niewold • 14
@michaelniewold



Opnieuw een ict-project van de dienst die de veiligheidsgegevens van Nederland moet beschermen, maar nu al 100 miljoen euro duurder uit dan gepland.

Hoe de overheid uitgaf aan drie mislukkingen

Het landelijk persoonsregister van Nederlanders, moest moderniseren. Nu, een jaar later is er 100 miljoen uit betaald.

✂ Liza van Lonkhuyzen & Derk Stokmans
🕒 Leestijd 17 minuten

Opnieuw relevant (16 april 2019)

Het vernieuwen van de ICT-systemen bij de overheid is tot zoveel problemen en kostenoverschreden, dat het niet de eerste stukgelopen digitale vernieuwing is.

In de kleine kantine van het beschaaft kabinet, het najaar van 2007 een koude oorlog uitbrak. De ene hoek. De ict'ers, die ze hebben gebouwd, zitten in een andere hoek. Tu

De ambtenaren, van de Rijksdienst voor Identiteitsgegevens, zijn de poortbewakers van de persoonsgegevens van alle mensen in Nederland. De ict'ers zijn er om een nieuw systeem te bouwen voor al die gegevens. Het project staat op het punt te mislukken.

Binnenland

Nieuwe ict-flater in de maak: overheidsproject miljoenen duurder en vertraagd



Michaël Niewold • 07 december 2018 06:17
@michaelniewold



Minister Cora van Nieuwenhuizen van Infrastructuur en Waterstaat. Beeld © Archiefphoto ANP

Er dreigt een nieuw fiasco voor de overheid bij het bouwen van een ict-systeem. Een project, bedoeld om het inhuren van externen door overheidsdiensten te regelen, is 'in gevaar'. Er moet daarom snel iets veranderen, waarschuwt Bureau ICT-toetsing (BIT).

PERFORMANCE MEASUREMENT

Manufacturing and Production Analytics

Availability Analysis



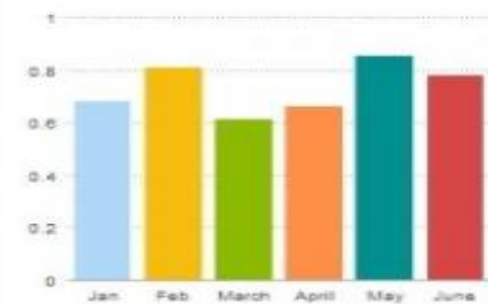
Performance Analysis



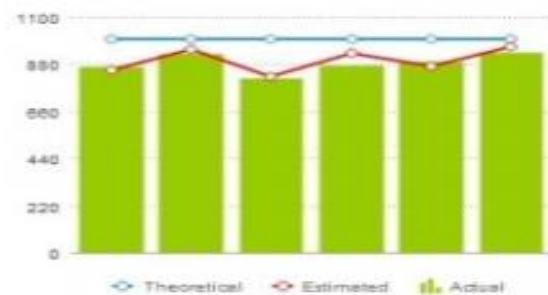
Quality Analysis



OEE Analysis



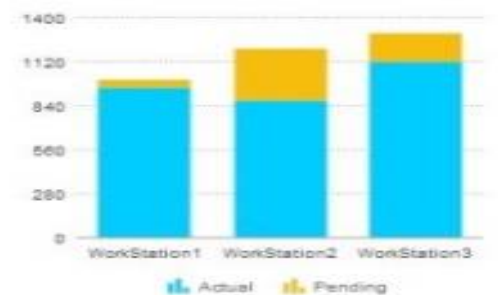
Production Yield Analysis



Cost Analysis



Production Analysis



KEY METRICS FOR ANY (AGILE) TEAM

- **Productivity**

Effort Hours

Size of the delivered Software Product
- **Cost Efficiency**

Cost

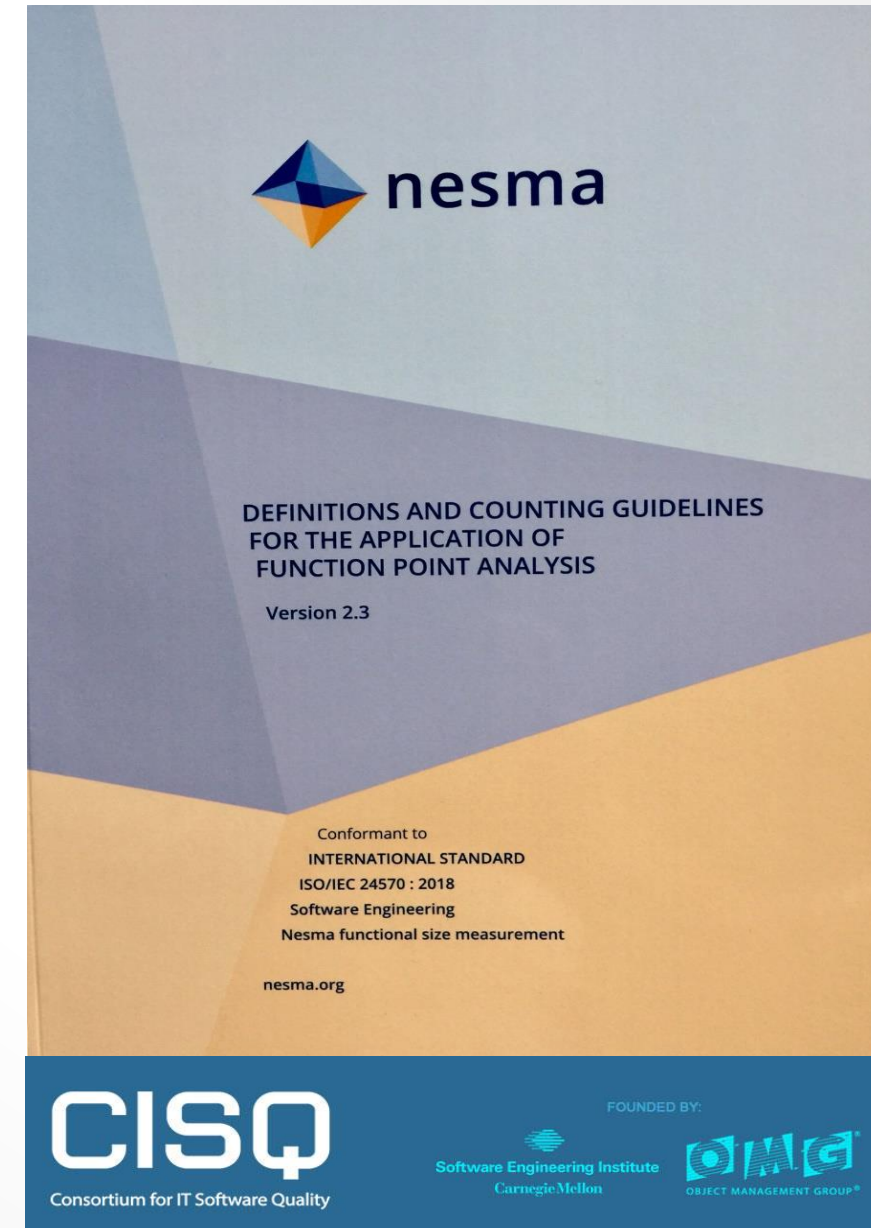
Size of the delivered Software Product
- **Velocity**

Duration (months)

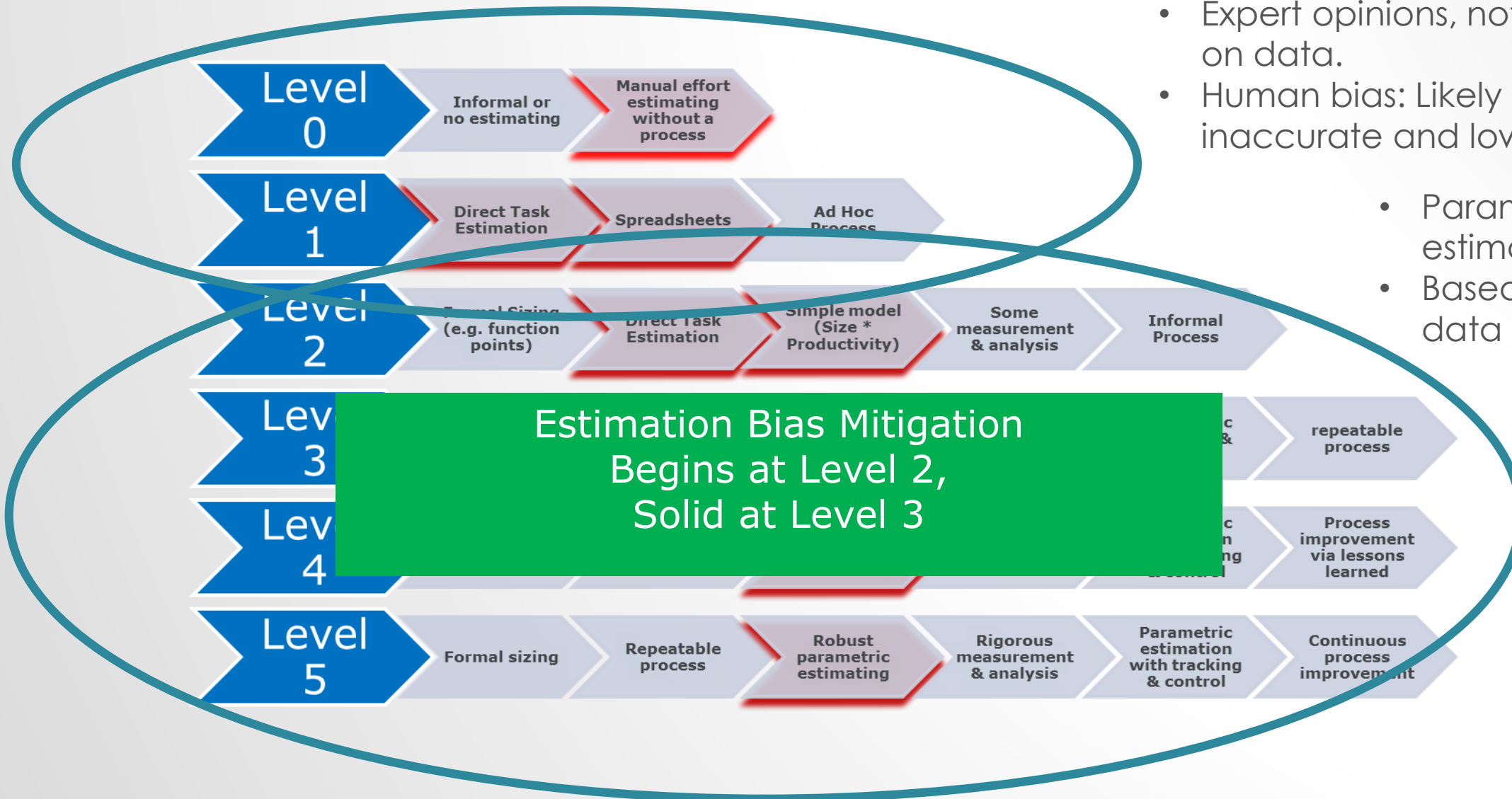
Size of the delivered Software Product
- **Product Quality**

Defects Delivered

Size of the delivered Software Product
- **Code Quality Metrics**
Maintainability
Reliability
Performance
Security
Technical Debt

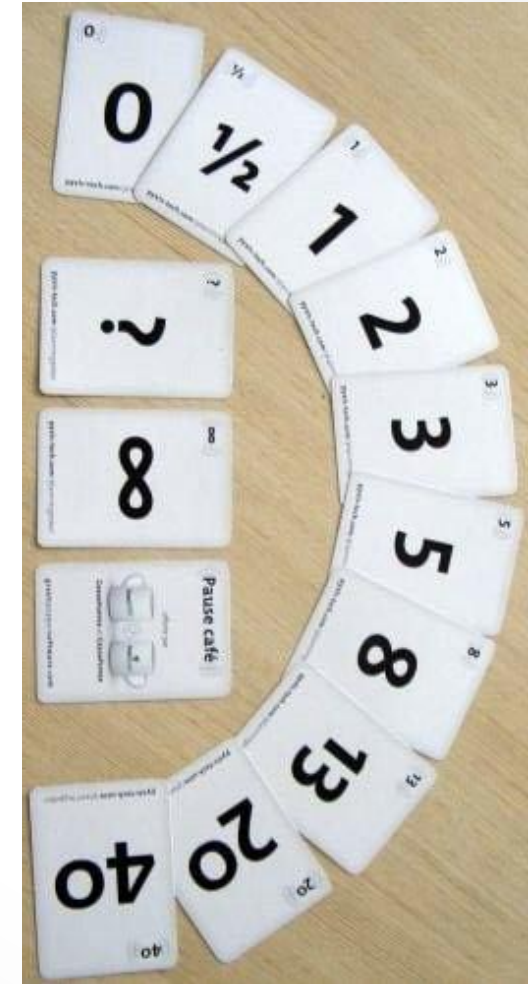


ESTIMATION MATURITY MODEL



- Expert opinions, not based on data.
- Human bias: Likely to be inaccurate and low
- Parametric estimates
- Based on size, data and models

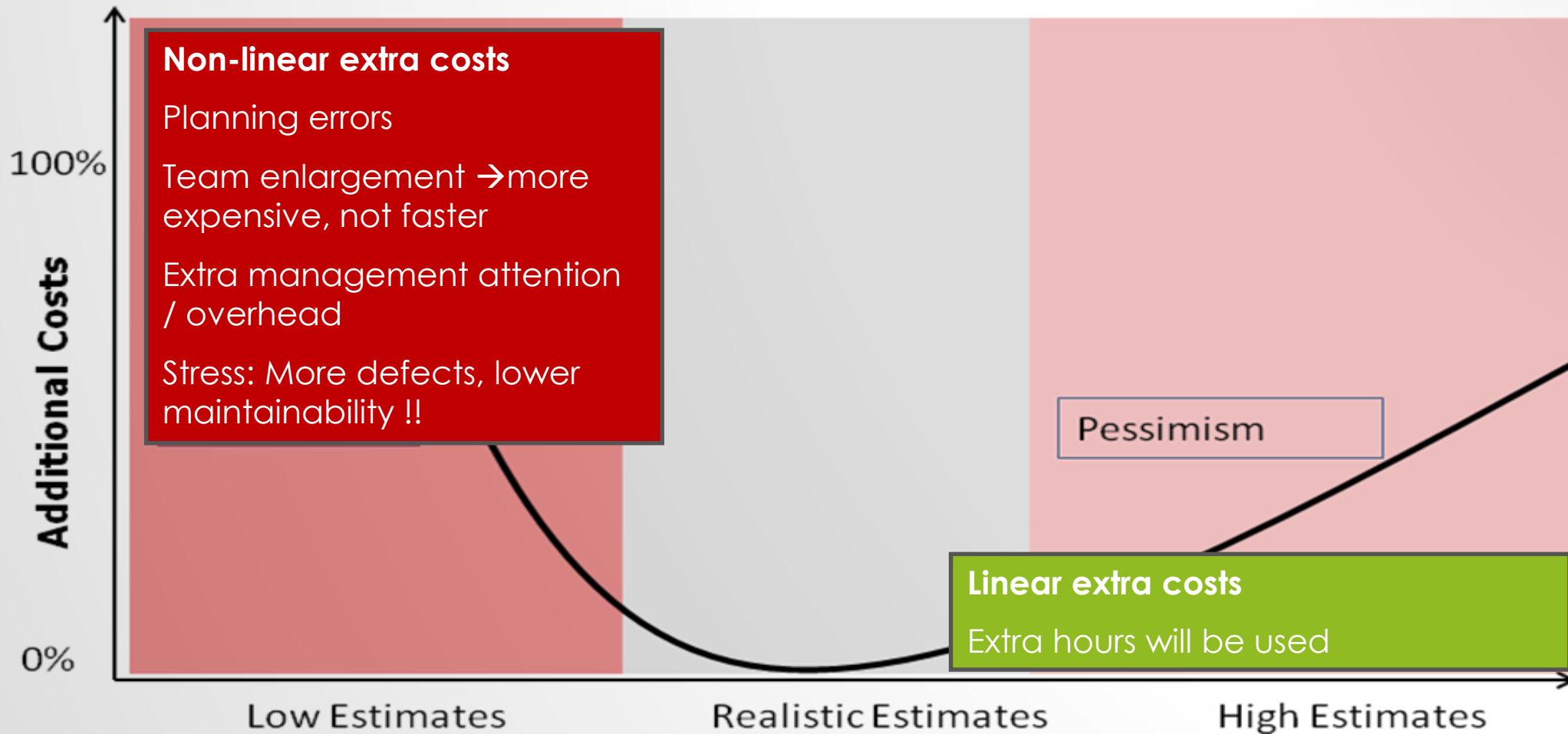
THE INDUSTRY PRACTICE



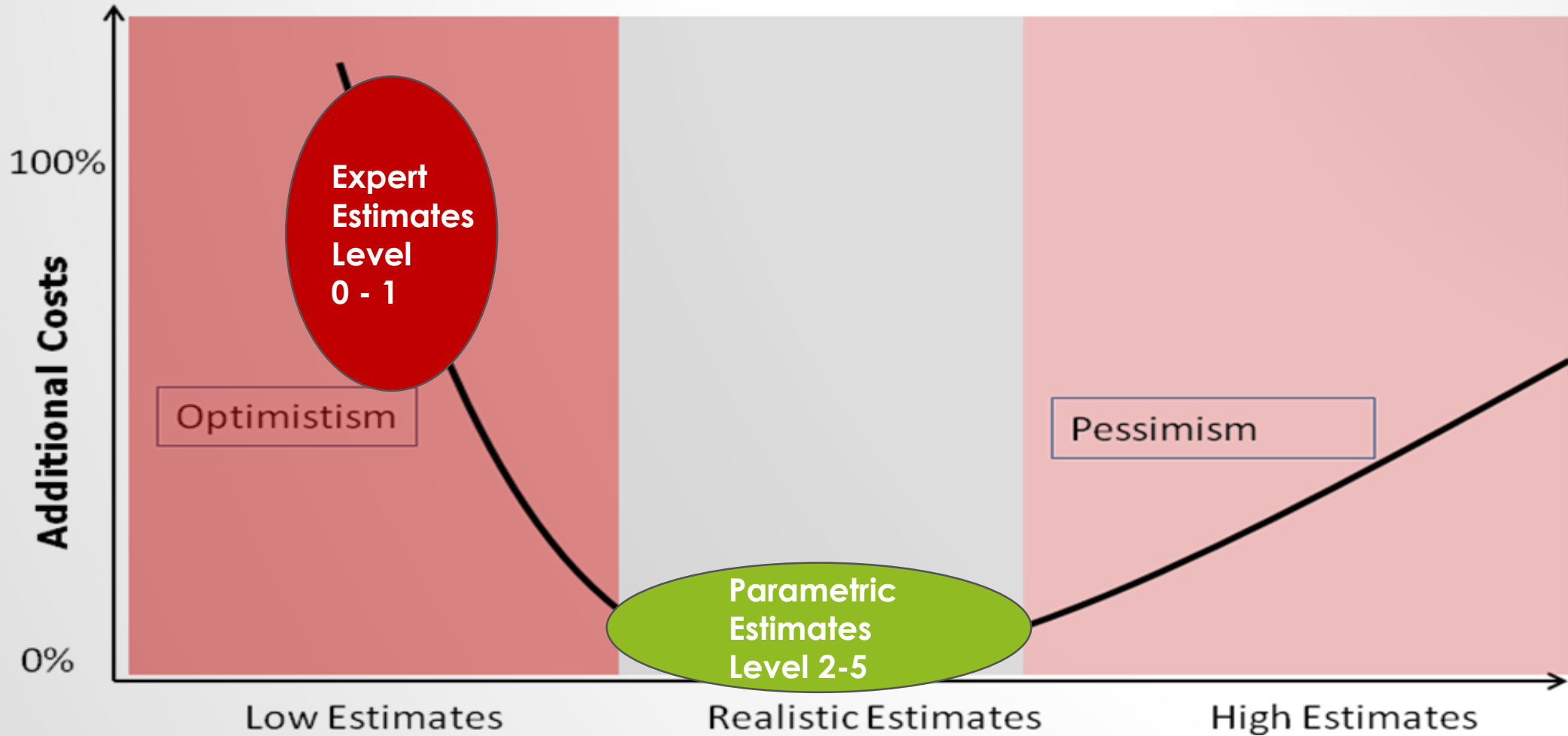
HUMAN 'EXPERT' ESTIMATION



OPTIMISM VS PESSIMISM



LOW MATURITY RESULTS IN DISASTERS



COST ESTIMATORS DO EXIST!

Overview



Cost estimators use standard estimating techniques to calculate the cost of a construction or manufacturing project. They help contractors, owners, and project planners determine how much a project or product will cost to decide if it is economically viable. There are approximately 216,270 cost estimators employed in the United States.

Quick Facts

Alternate Title(s)	None
Duties	Plan and troubleshoot projects with owners, architects, engineers, and contractors; identify all cost items (e.g., site preparation; labor, materials); gather information and measurements; prepare estimates using job notes, blueprints, and supporting documentation; calculate estimates using software programs
Salary Range	\$25,000 to \$100,000+
Work Environment	Indoors/Outdoors
Best Geographical Location(s)	Nationwide, with particular focus on government and large commercial areas
Minimum Education Level	<ul style="list-style-type: none">• Bachelor's Degree
School Subjects	<ul style="list-style-type: none">• Business• Economics• Mathematics
Experience	Internship or co-op
Personality Traits	<ul style="list-style-type: none">• Organized• Realistic• Technical

SOFTWARE COST ESTIMATOR

Overview



Software

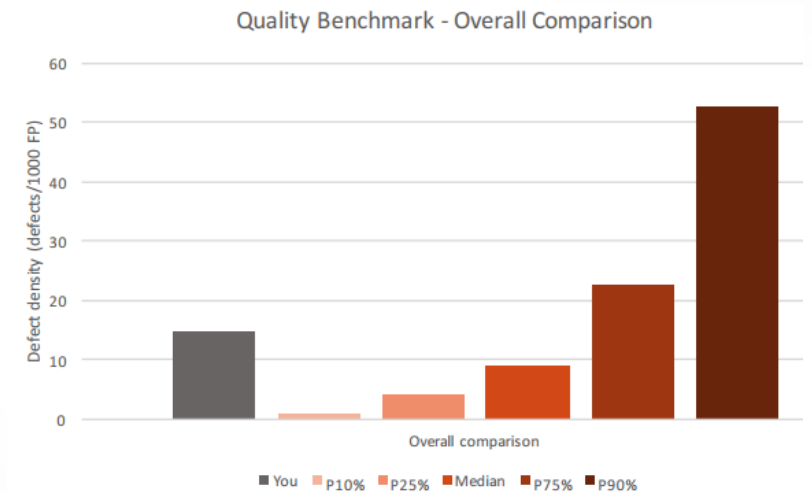
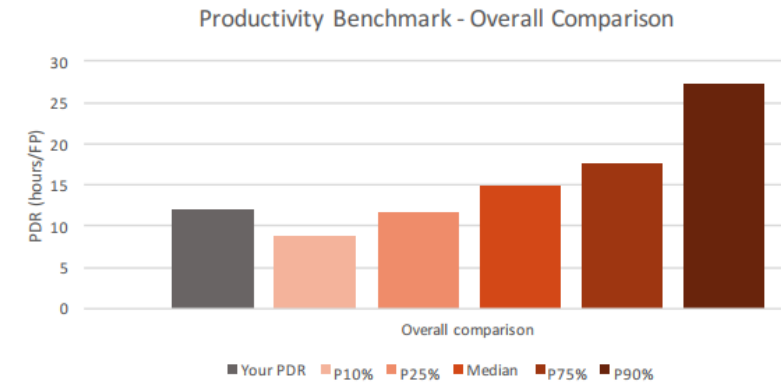
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INTERNATIONAL SOFTWARE BENCHMARKING STANDARDS GROUP (ISBSG)


- **Independent** and **not-for-profit** organization based in Australia
- Full Members are non-profit organizations, like **China SPI**, AMMS, Nesma, IFPUG, FiSMA, GUFPI-ISMA, JFPUG and commercial organizations Galorath, Kexin Science, Leda-MC
- Bronze member: COSMIC
- Grows and exploits two repositories of software data:
 - New development projects and enhancements (**> 9150 projects, releases and sprints**)
 - Maintenance and support (**> 1100 applications**)
- Everybody can **submit** project data
 - Questionnaires on the site, online or Excel data files
 - Anonymous
 - **Free benchmark report in return**



ISBSG MISSION

- Mission: “**To improve the management of IT resources** by both business and government, through the provision and exploitation **of public repositories of software engineering knowledge** that are standardized, verified, recent and representative of current technologies”
- All ISBSG data is
 - validated and rated in accordance with its quality guidelines
 - representative of the industry
 - independent and trusted
 - captured from a range of organization sizes and industries

ISBSG DATA

																	
D&E Corporate Release April 2019	9178 rows																
ISBSG Project ID	Rating	Rating	Software Age	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Sizing	Effort	Productivity	Productivity	
	Data Quality Rating	UFP rating	Year of Project	Industry Sector	Organisation Type	Application Group	Application Type	Development Type	Development Platform	Language Type	Primary Programming Language	Count Approach	Functional Size	Normalised Work Effort Level 1	Normalised Level 1 PDR (ufp)	Normalised PDR (ufp)	
10007	B	B	2016	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement			Java	IFPUG 4+	51	314	6.2	6.2	
10046	B	B	2015	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement	Multi	3GL	Java	IFPUG 4+	63	888	14.1	14.1	
10109	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	New Development	PC	4GL	.Net	NESMA	317	3735	11.8	11.8	
10169	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	4GL	Oracle	NESMA	168	137	0.8	0.8	
10293	B	B	2016	Utilities	General;	Business Application		Enhancement		4GL	.Net	NESMA	32	1318	41.2	41.2	
10305	B	B	2015	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement	Multi	3GL	Java	IFPUG 4+	110	1037	9.4	9.4	
10313	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	3GL	COBOL	NESMA	402	1073	2.7	2.7	
10317	B	B	2015	Government	Government;	Business Application	Business Application;	Enhancement		4GL	.Net	NESMA	8	816	102	102	
10392	B	B	2016	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement			Java	IFPUG 4+	132	1037	7.9	7.9	
10421	B	B	2016	Communication	Telecommunications;	Business Application	Other;	Enhancement		4GL	.Net	IFPUG 4+	74	1229	16.6	16.6	
10469	B	B	2015	Communication	Telecommunications;	Business Application	Stock control & order processing;	Enhancement	Multi	3GL	Java	IFPUG 4+	85	357	4.2	4.2	
10473	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	3GL	COBOL	NESMA	56	295	5.3	5.3	
10521	B	B	2014	Communication	Telecommunications;	Business Application	Stock control & order processing;	Enhancement	Multi	3GL	Java	IFPUG 4+	135	2424	18	18	
10546	B	B	2016	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement			Java	IFPUG 4+	86	523	6.1	6.1	
10565	B	B	2016	Insurance	Insurance;	Business Application		Enhancement		3GL	PL/SQL	IFPUG 4+	87	251	2.9	2.9	
10572	B	B	2014	Government	Government;	Business Application	Business Application;	Enhancement		4GL	Oracle	NESMA	85	774	9.1	9.1	
10600	B	B	2015	Government	Government;	Onshore		Enhancement		4GL	Oracle	NESMA	54	608	11.3	11.3	
10655	A	B	2014	Government	Government;	Onshore		Enhancement		4GL	.Net	NESMA	16	706	44.1	44.1	
10658	B	B	2014	Insurance	Insurance;	Business Application	Unknown;	Enhancement		3GL	PL/SQL	IFPUG 4+	71	117	1.6	1.6	
10665	B	B	2015	Communication	Telecommunications;	Business Application	Stock control & order processing;	Enhancement	Multi	3GL	Java	IFPUG 4+	96	1599	16.7	16.7	
10707	B	B	2014	Communication	Telecommunications;	Business Application	Stock control & order processing;	Enhancement	Multi	3GL	Java	IFPUG 4+	56	1298	23.2	23.2	
10762	B	B	2015	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement	Multi	3GL	Java	IFPUG 4+	231	224	1	1	
10776	A	B	2015	Government	Other;	Business Application		Enhancement		3GL	Java	NESMA	706	8276	11.7	11.7	
10834	A	B	2016	Government	General;	Business Application		Migration		3GL	Java	NESMA	167	2643	15.8	15.8	
10909	C	C	2015					New Development		3GL	Java	Garner FFP	209	1438	6.9	6.9	
10940	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	3GL	Java	NESMA	246	5147	20.9	20.9	
11014	B	B	2016	Communication	Telecommunications;	Business Application	Customer relationship management;	Enhancement		3GL	Java	IFPUG 4+	66	967	14.7	14.7	
11118	B	B	2015	Communication	Telecommunications;	Business Application	Logistic or supply planning & control;	Enhancement	Multi	3GL	Java	IFPUG 4+	96	920	9.6	9.6	
11182	B	B	2014	Insurance	Insurance;	Business Application	Unknown;	Enhancement		4GL	Oracle	IFPUG 4+	58	55	0.9	0.9	
11195	B	B	2014	Manufacturing				New Development		3GL	Java	IFPUG 4+	51	818	16	16	

EXAMPLE

Selection:

Data Quality: A or B

Year of Project > 2012

Project Type: Enhancement

Primary Programming language: Java

Count approach: Nesma or IFPUG

...

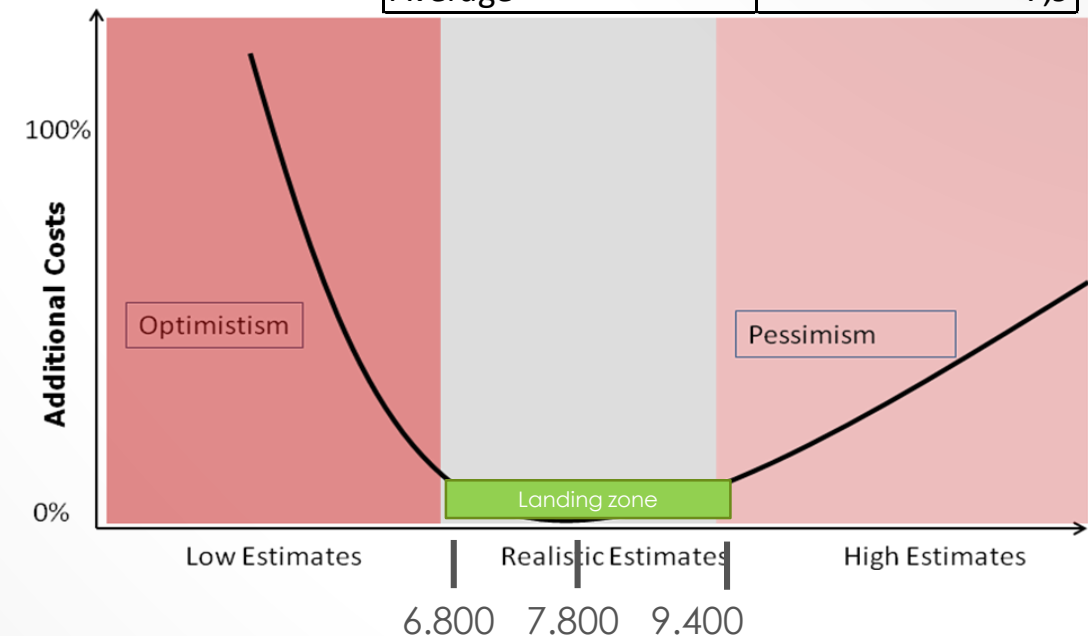
Example: 1000 FP

Min: $6,8 * 1000 = 6.800$ hours

Likely: $7,8 * 1000 = 7.800$ hours

Max: $9,4 * 1000 = 9.400$ hours

	PDR (hours/FP)
Number of projects	166
Minimum	4,2
Percentile 10%	5,3
Percentile 25%	6,8
Median	7,8
Percentile 75%	9,4
Percentile 90%	10,2
Maximum	15,3
Average	7,9



ICEAA AND NESMA



International Cost Estimating and Analysis Association

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Welcome to ICEAA


The International Cost Estimating and Analysis Association is a nonprofit organization that strives to promote and to enhance the profession of cost estimating and analysis with the primary goal of fostering the professional growth of our members in cost estimating, cost analysis, and allied fields. ICEAA is represented locally by more than 20 chapters nationwide and international affiliates in Australia, Canada, Japan and the United Kingdom.

Member Benefits

Membership is open to all interested individuals from all levels of expertise from the government, private sector and academia. ICEAA members enjoy a valuable suite of member benefits, including:

- Discounted registration to the annual Professional Development & Training Workshop, an annual training event that brings together industry experts for a dynamic four-day informational environment
- Local and regional seminars designed to address specific topics of special interest and networking events to expand your circle of colleagues
- Subscription to *ICEAA World*, a magazine filled with important association news, book reviews, feature articles and chapter updates
- Subscription to the *Journal of Cost Estimating & Analysis*, ICEAA's scholarly journal dedicated to providing the most current and innovative research and analysis in the cost community
- Eligibility to submit articles and papers for publication in both *ICEAA World* and the *Journal of Cost Estimating & Analysis*





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NEDERLANDS

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Nesma: Metrics and more

In a world that is becoming more and more agile, metrics are an indispensable base for managing the essentials of your software project: quality, cost and time. Nesma provides you with valuable information about software metrics and measurements, and the way metrics support your road to successful and cost-effective software projects.

[LEARN MORE](#)

Your starting point for successful software projects

Sizing and more

Nesma has its origin in measuring the size of software. Today, size and other metrics form the base for many activities that play a role in successful and cost-effective software projects.

[Learn more](#)

SW Cost Estimating

Estimating cost and managing budgets is very important in software projects. Together with ICEAA and with support of international organizations, Nesma is involved in establishing a Software Cost Estimating Body of Knowledge (sCEBoK).

[Learn more](#)

Publications

Nesma offers a combination of both free and paid publications that are helpful for you as a metrics professional. Take a look at these publications and raise your level of knowledge!

[Learn more](#)

In the spotlight

SOFTWARE COST ESTIMATION BODY OF KNOWLEDGE (SCEBOK)

	Topic Area	No. of Ques.	(sCEBoK) Training Module Title	Track No.	CEBoK Title (Module No.)
Topics considered essential and worthy of examination	Software Engineering	6-10	Introduction - Software Engineering	SWT15	Software Cost Estimating (12)
		6-10	Estimation in the Software Lifecycle	SWT01	
	Cost Estimation Basics	6-10	Estimation Principles	SWT02	Cost Estimating Basics (1)
	Cost Estimation Processes	6-10	Solution-Based Estimation	SWT03	
	Estimation Methods & Techniques	6-10	Software Cost Estimation Methods	SWT08	Costing Techniques (2)
			Basis of Estimate (BOE)	SWT04	
	Sizing (FP's, Cosmic, Story Points, Proxies)	6-10	Estimation Methods – Size-Based Methods	SWT09	
	Data Collection and Basic Data Analysis	6-10	Basis of Measurement (BOM)	SWT05	Data Collection (4) Data Analysis (6)
		6-10	Metrics Collection and Basic Analysis	SWT10	
	Parametrics	6-10			Parametrics (3)
	Budget and Pricing	6-10	Budget and Pricing	SWT06	Contract Pricing (14)
	Cost Drivers	6-10	Cost Drivers	SWT07	Regression (8)
	Statistics	6-10	Statistics to Support Basic Metric Analysis	SWT11	Prob. & Stats. (10)
	Benchmarking	6-10	Benchmarking	SWT12	
	Scheduling	6-10	Scheduling	SWT16	
	Monitoring and Control	6-10			Cost Mgmt. (16)
	Risk Management	6-10			Cost Risk (9)
	Validation	6-10	Estimation Maturity	SWT14	
	Application Maintenance	6-10	Introduction – Application Maintenance	SWT13	
	Total	100-150			



Haarlem 7-9 October 2019

WHERE ACADEMIC IDEAS MEET INDUSTRY PRACTICE ON MEASURING, CONTROLLING AND PREDICTING DIGITIZATION

VENUE DETAILS

<https://www.iwsm-mensura.org/>

The future of IT Cost Estimation

Trends for the new Decade

On October 7-9, 2019 the IWSM Mensura conference will be held in Haarlem, the Netherlands. In this last conference before we enter a new decade, we want to look forward to discover the trends for the next decade. [Register NOW](#).

2030 LOOKING BACK

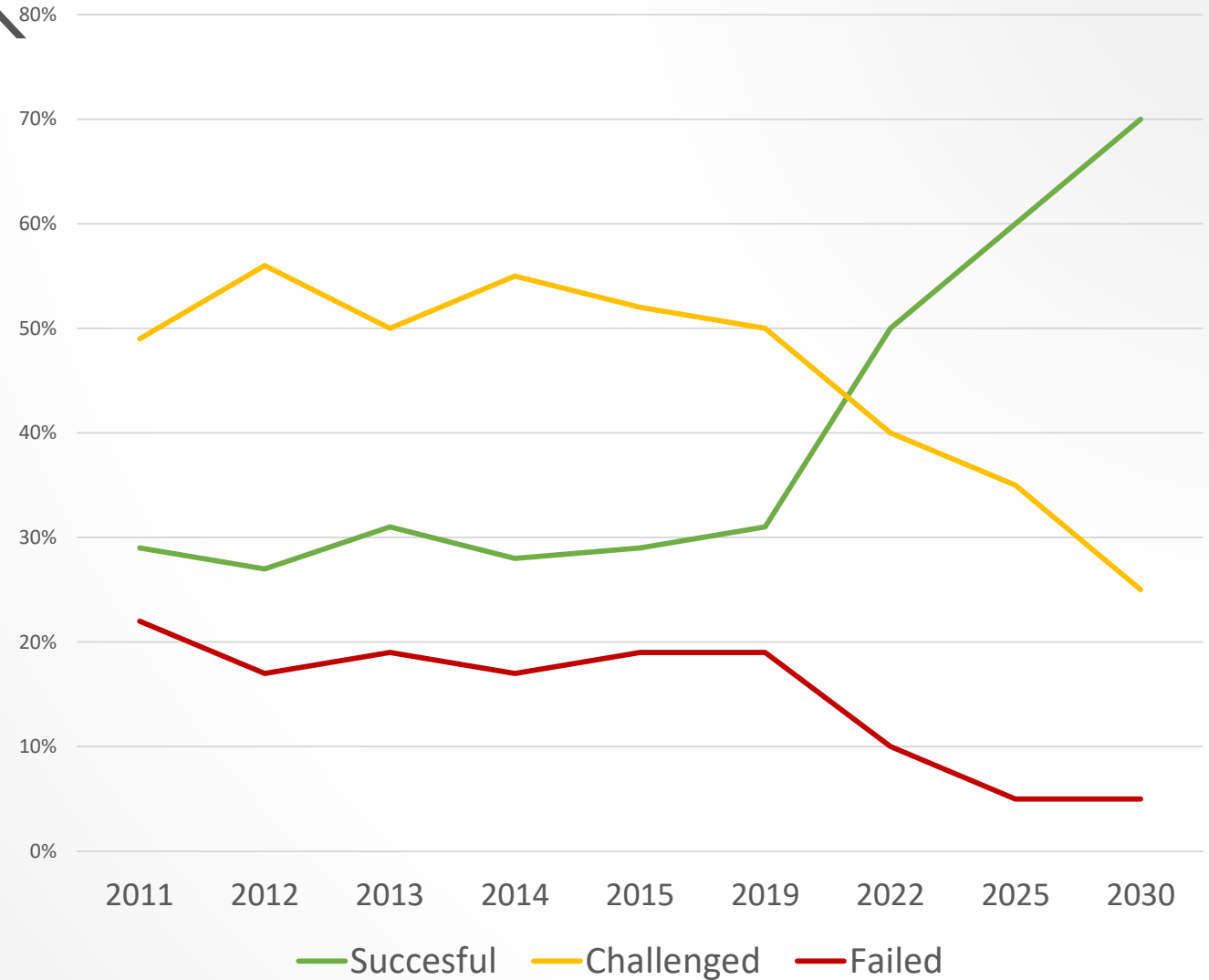
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Project Success Rate



THANK YOU!



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METRI: www.metrigroup.com

