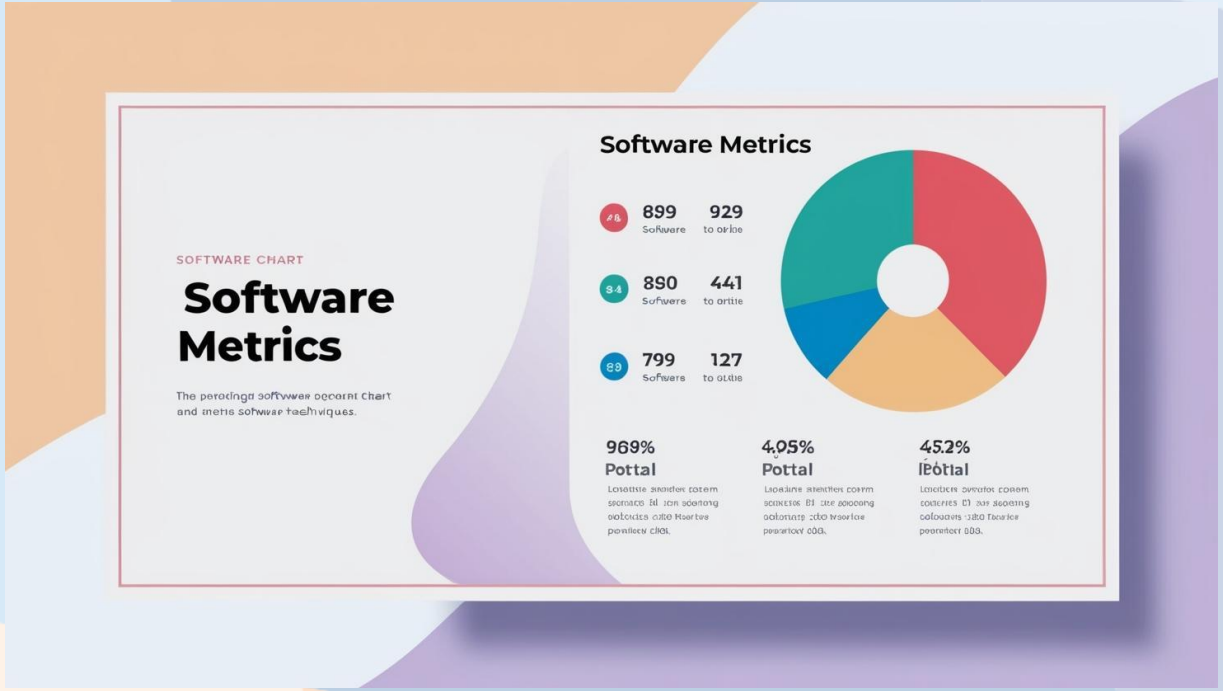
Real-world Usecases where Software Metrics were used to support important business decisions.



ISBSG/Nesma webinar
May 9, 2025
Harold van Heeringen

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Nesma: Metrics and more

In a world that is becoming more and more agile, metrics are an indispensible 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

Unlock the Power of Nesma – Where Software Measurement Excellence Begins

At Nesma, we believe in the transformative power of software measurement. Our mission is to empower organizations worldwide with the tools, knowledge, and community support they need to excel in software measurement and improve their software development processes.

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Nesma - Software Measurement Standards and Improvement

Nesma is a non-profit international software measurement organization, founded in 1989, focused on:

- Governing the **Nesma standard** for functional size measurement.
- Promoting measurement and metrics based on functional size, which is the best **proxy for business value**.
- Spreading knowledge about **software measurement** and **software metrics**.
- Act as a **Body of Knowledge** for the industry regarding the use of software metrics in all business areas.
- Remain independent, objective, and **not-for-profit**.
- Research the applicability of software metrics in **all business areas**.
- **Connect relevant organizations in the industry** that are expert in the areas where software measurement and metrics are important.
- Produce **relevant guidelines, reports and other information products** that are useful for the software industry.
- Produce a platform where experts can discuss issues, they experience with software measurement and metrics or where they can **exchange ideas and/or knowledge**.

Nesma is Gold Partner of **International Software Benchmarking Standards Group**, partner in the **International Cost Estimation and Analysis Association (ICEAA) Software** Special Interest Group and partner with the **China Software Process Improvement** group.

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Introducing me

Harold van Heeringen

- >25 years experience in IT, >**20 years in software measurement and metrics.**
- **Ex-Sogeti –** 17 years – Metrics desk: FPA, metrics, estimation, benchmarking.
- **IDC Metri** – 9 years – Principal Consultant and Practice Lead IT Intelligence services.
- **ISBSG** – Immediate Past President, data collection.
- **NESMA** – President.
- **SIG ICEAA Software** – Board member.

51 years young.

Living in Veendam, the Netherlands.

Married, 3 children.

Passions: playing blitz chess, skiing, travelling, zwifting, mountain biking, playing padel

and software metrics!

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Topics for today

- Typical metrics based on functional size.
- Key benefits of functional size measurement.
- Case Study I: Cost Estimation of a CotS redevelopment project.
- Case study II: Procurement based on FP at ESMA.
- Q&A

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Introducing Functional Size Measurement (FSM)

Functional Size Measurement: A consistent method to quantify the amount of requested **functionality** that an information system offers to its users. **Functionality is a good proxy for business value**. Therefore, it is important to track!

Main advantages

- Objective (ISO/IEC standard), repeatable, verifiable and therefore defensible measurement of **functionality**.
- Basis for objective metrics, independent of the technical and non-functional requirements.
- Therefore, it is possible to use functional size in **software project estimation, project control, productivity measurement, benchmarking, pricing and contracting.**
- **Functionality is a good proxy for (business) value!**

Current ISO standards for Functional Size Measurement:

- **Nesma** **ISO/IEC 24570**
- IFPUG ISO/IEC 20926
- COSMIC ISO/IEC 19761
- MK II ISO/IEC 20968
- FiSMA ISO/IEC 29881

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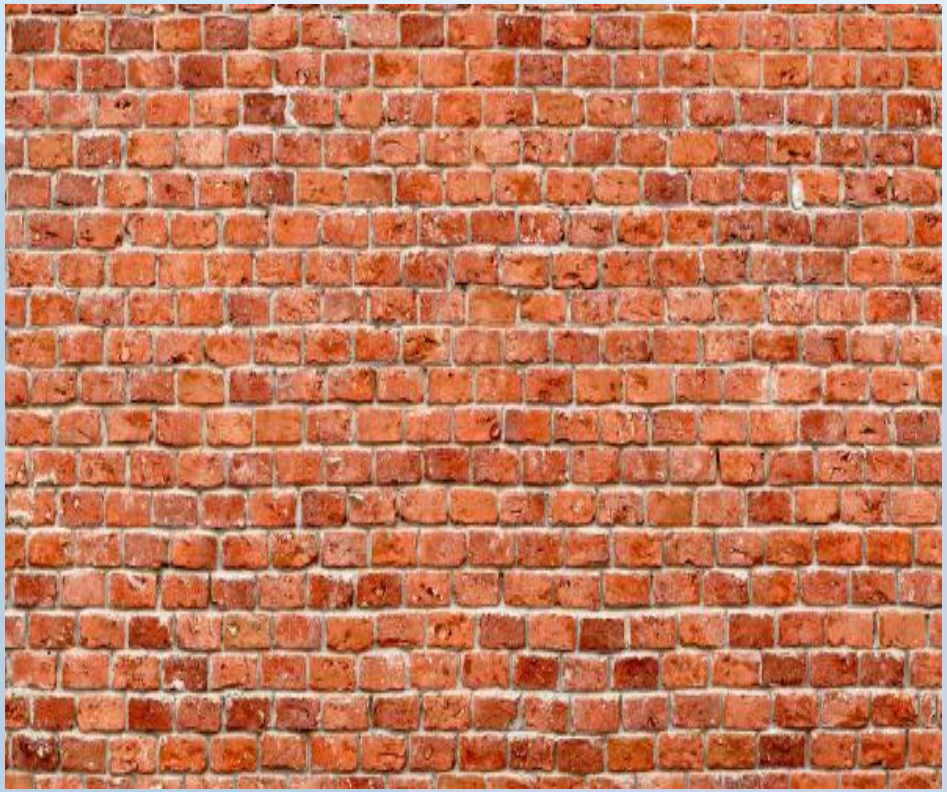
Wall analogy

20 m^3



20 m^3

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Key benefits of Functional Size Measurement

Objective size → **objective metrics!**

- **Project Delivery Rate (PDR)** = effort hours spent per FP, e.g., 12,3 hours/FP.
- **Cost Efficiency** = $ per FP, e.g., 792 $/FP.
- **Delivery Speed** = FP per month, e.g., 98 FP per month.
- **Process Quality** = Defects/1000 FP, e.g., 154 defects per 1000 FP.
- **Value for Money** = FP per $1000 spent, e.g., 3,5 FP/$1000

What to do with **objective metrics**:

- **Software Cost Estimation** using parametric models and historical data.
- **Project Management:** track process improvement over time.
- **Performance measurement and benchmarking:** compare teams, projects or contracts.
- **Procurement:** use as KPIs in contracting external agile teams.
  - Price per FP contracts are a win-win for both parties.
- **Objective management information** – to understand and to manage the value creation function!

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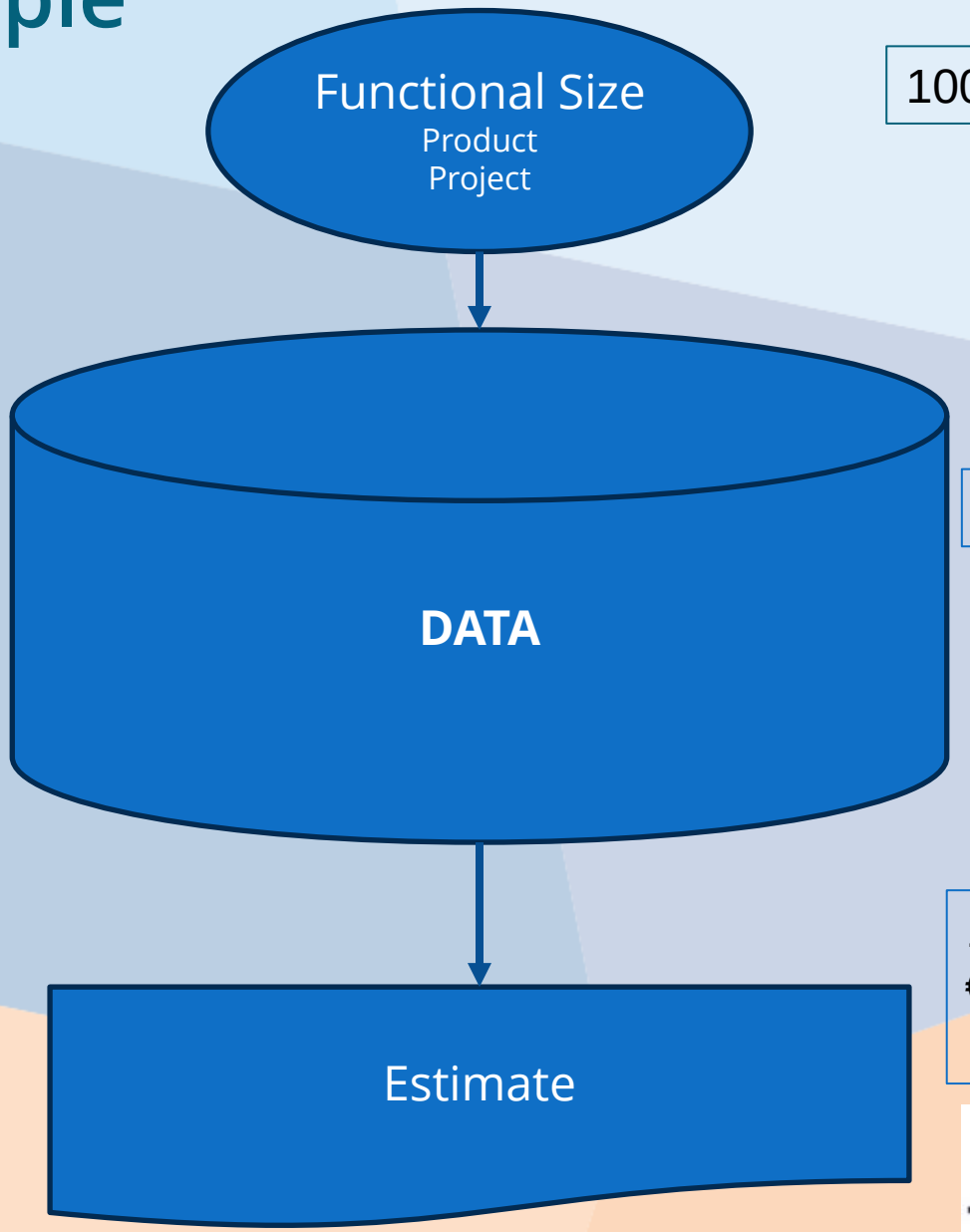
Estimation – simple example

- Software Cost Estimation
- Project Planning
- Staffing Plan
- Benchmark Agile Teams
- Output-based contracts
- Price per FP contracts
- Performance management
- Process improvement
- QA Planning
- Risk Assessment
- ....



1000 FP project size

10 hours/FP

10.000 hours
€1.000.000

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Data: The Gold Standard in Software Benchmarking

The International Software Benchmarking Standards Group (ISBSG), founded in 1997, is a non-profit organization dedicated to establishing and promoting **industry standards for software development and maintenance benchmarking**. They provide a comprehensive data repository of real-world project metrics from leading organizations worldwide.

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"

Nesma has been a Gold Partner of ISBSG since its establishment in 1997. This long-standing partnership signifies our deep commitment to:

- **Reliable Benchmarking Data**: Nesma leverage ISBSG data to allow our members to use the most up-to-date and reliable industry data for benchmarking, estimation, outsourcing, performance measurement, research and analysis, etc. Nesma members are encouraged to submit data and receive large discounts on ISBSG data.
- **Advanced Benchmarking Expertise**: Nesma shares extensive knowledge of ISBSG data and methodologies, allowing our members to deliver insightful analyses and actionable recommendations.
- **Continuous Improvement**: Nesma actively collaborates with ISBSG to contribute to the evolution of software benchmarking standards and best practices.

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ISBSG data - example

ISBSG Delivering IT Confidence

D&E Corporate Release July 2023 V1

11848 rows

PDR = hours per FP (inverse of universal concept of Productivity)

ISBSG Project ID	Rating	Rating	Software Age	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Sizing	Sizing	Effort	Productivity	Productiv
	Data Quality Rating	UFP rating	Year of Project	Industry Sector	Organisation Type	Application Type	Development Type	Language Type	Primary Programming Languag	Count Approach	Functional Size	Relative Size	Normalised Work Effort Level 1	Normalised Level 1 PDR (ufp)	Normalis PDR (uf
10001	D	A	1998	Service Industry	Recreation & Personnel Services;	Transaction/Production System;	New Development	4GL	Oracle	NESMA	237	M1	1850	7,8	
10007	B	B	2016	Communication	Telecommunications;	Customer relationship management;	Enhancement	3GL	Java	IFPUG 4+	51	S	314	6,2	
10011	B	A	1996	Construction	Construction;	Stock control & order processing;	New Development	4GL	Access	IFPUG 4+	443	M2	856	1,9	
10012	B	A	2002	Wholesale & Retail	Billing;	Billing;	Enhancement	3GL	COBOL	IFPUG 4+	76	S	1100	14,5	
10016	B	B	2019	Construction		Customer relationship management;	Enhancement	4GL	Oracle	NESMA	745	M2	4582,5	6,2	
10019	B	B	2014	Communication	Telecommunications;	Data Warehouse;	Enhancement	3GL	Shell	IFPUG 4+	98	S	324	3,3	
10026	B	A	2000	Insurance	Insurance;	Sales contact management;	New Development	3GL	Java	IFPUG 4+	620	M2	18160	29,3	
10028	B	B	2015	Communication	Telecommunications;	Customer relationship management;	Enhancement	4GL	Siebel	IFPUG 4+	138	M1	2954	21,4	
10029	B		2004	Banking	Banking;	Financial transaction process/accounting;	New Development	3GL	COBOL	COSMIC	297	M1	8186	27,6	
10032	D	A						3GL	Visual Basic	IFPUG 4+	113	M1	596	5,3	
10046	B	B	2015	Communication	Telecommunications;	Customer relationship management;	Enhancement	3GL	Java	IFPUG 4+	63	S	888	14,1	
10047	B	A	2002	Wholesale & Retail	Ordering;	Stock control & order processing;	Enhancement	3GL	C	IFPUG 4+	730	M2	20975	28,7	
10048	B	A	2018	Construction		Financial Transactions;	Enhancement	3GL	Java	NESMA	1.323	L	7316	5,5	
10051	B	A	2021	Communication	Telecommunications;	Stock control & Order processing;	Enhancement	3GL	C	IFPUG 4+	103	M1	564	5,5	
10052	B	A	2002	Professional Service	Sales & Marketing;	Trading;	Enhancement	4GL	ColdFusion	IFPUG 4+	179	M1	789	4,4	
10054	C	B	1998	Manufacturing	Manufacturing;	Management Information System;	Enhancement	4GL	Oracle	IFPUG 4+	198	M1	2753	13,9	
10056	B	A	2002	Communication	Voice Provisioning;	Voice Provisioning;	Enhancement	3GL	C	IFPUG 4+	114	M1	7290	63,9	

12500+ data points of new development and enhancement projects, releases and sprints.
253 columns with project data attributes.

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Case Study I – Software Estimation

- A pharmaceutical company uses a Commercial of the Shelf (CotS) package Oracle Clinical at the heart of its critical processes. It runs in many locations worldwide to keep track of clinical trials.
- There are many integrations between the CotS and other (custom-made) applications in the landscape.
- The supplier of the CotS (Oracle) stops the support 3 years from now.
- This is considered a risk and Company wishes to investigate 2 options:
  1. Replace the CotS by a similar CotS and integrate that into the landscape.
  2. Develop the CotS functionality inhouse in C# .NET technology.

- For the 1st option, a supplier selection project was started to investigate the available solutions on the market and create a short list of suppliers to talk to.
- For the 2nd option, a **Software Cost Estimation** study was carried out of the redevelopment project.

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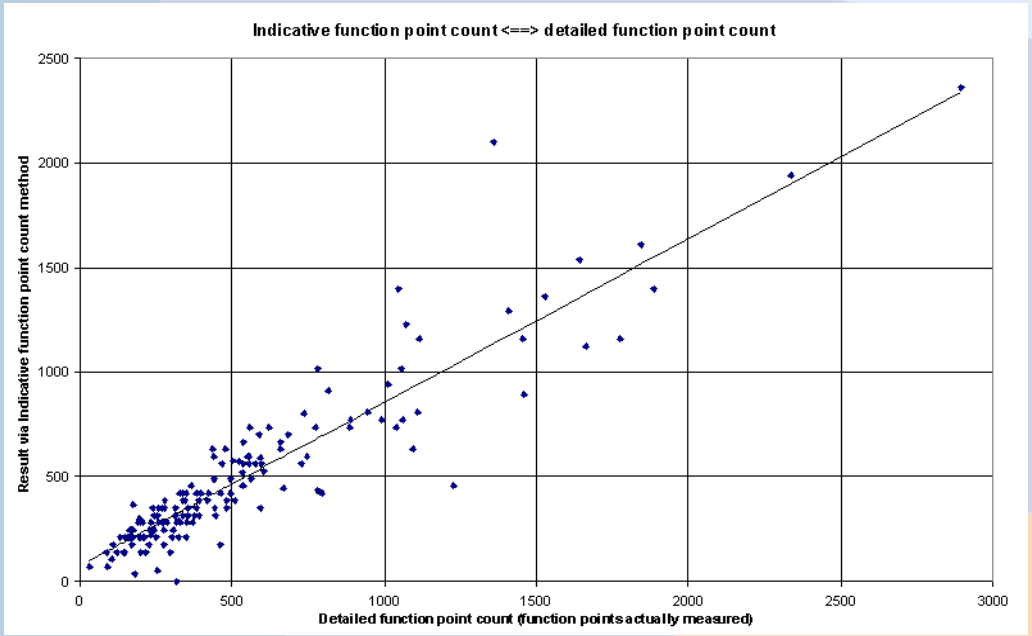
Functional Size Measurement

- A CFPA measured the available functional documentation using indicative FPA.
- All entities that are maintained in the application are considered an ILF.
- All entities that are used in the application but maintained in a different application (inside or outside of the company) are considered ELF.
- Indicative Nesma FPA:
  - The number of ILF's is multiplied by 35 FP.
  - The number of ELF's is multiplied by 15 FP.
- The total nr. of function points is approximately **3000 FP.**
- For a 3- point estimate, the following size is used:
  - Minimum: 2400 FP
  - Likely: 3000 FP
  - Maximum: 4000 FP

BFC-type	Conceptual Data model	Normalized Data model
ILF	35 FP	25 FP
ELF	15 FP	10 FP



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Historical Data – select relevant data

The ISBSG repository (2023) was used to select the historical data to use:

- Data Quality Rating: A or B.
- Size Range: 2000 – 5000 FP.
- Count Approach = Nesma FP.
- Project Year > 2021.
- Project Type = New Development.
- Not include XS, S or M1 projects.

This results in **13 data points**.

ISBSG Delivering IT Confidence

D&E Corporate Release July 2023 V1

11848 rows

ISBSG Project ID	Rating	Rating	Software Age	Software Age	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Major Grouping	Sizing	Sizing	
	Data Quality Rating	UFP rating	Year of Project	Year Range	Industry Sector	Application Group	Application Type	Application Type Grouping	Development Type	Primary Programming Language	Count Approach	Functional Size	Relative Size	Fu
15920	B	A	2022	2021-2025	Finance	Business Application	Workflow;	Workflow support & management	New Development	.Net	NESMA	1676	L	
19346	B	A	2022	2021-2025	Finance	Business Application	Business Analysis Tool;	Business Application	New Development	.Net	NESMA	576	M2	
24850	B	A	2021	2021-2025	Wholesale	Business application	Command/Control;	Command/Control	New Development	.Net	Nesma	594	M2	
27799	B	A	2021	2021-2025	Retail	Business application	Catalog/Inventory Management;	Catalog/Inventory Management	New Development	.Net	Nesma	530	M2	
30848	B	A	2022	2021-2025	Wholesale	Business Application	Financial Transactions;	Financial transaction process/acco	New Development	.Net	NESMA	1353	L	
31577	B	A	2022	2021-2025	Services	Business Application	Customer Relationship Management;	CRM	New Development	.Net	NESMA	1395	L	
36469	B	A	2022	2021-2025	Wholesale	Business Application	Communications;	Communications	New Development	.Net	NESMA	1418	L	
42197	B	A	2022	2021-2025	Agriculture, Forestı	Business Application	Decision Support System;	Decision Support System	New Development	.Net	NESMA	725	M2	
42442	B	A	2022	2021-2025	Finance	Business Application	Computer Aided Design;	Computer aided design	New Development	.Net	NESMA	1760	L	
48894	B	A	2022	2021-2025	Finance	Business Application	Database System;	Data Management	New Development	.Net	NESMA	2270	L	
49720	B	A	2022	2021-2025	Services	Business Application	Logistics;	Logistics Management	New Development	.Net	NESMA	1145	L	
51717	B	A	2022	2021-2025	Construction	Business Application	Computer Aided Design;	Computer aided design	New Development	.Net	NESMA	854	M2	
52708	B	A	2022	2021-2025	Utilities	Business Application	Data Warehousing;	Unknown	New Development	.Net	NESMA	943	M2	

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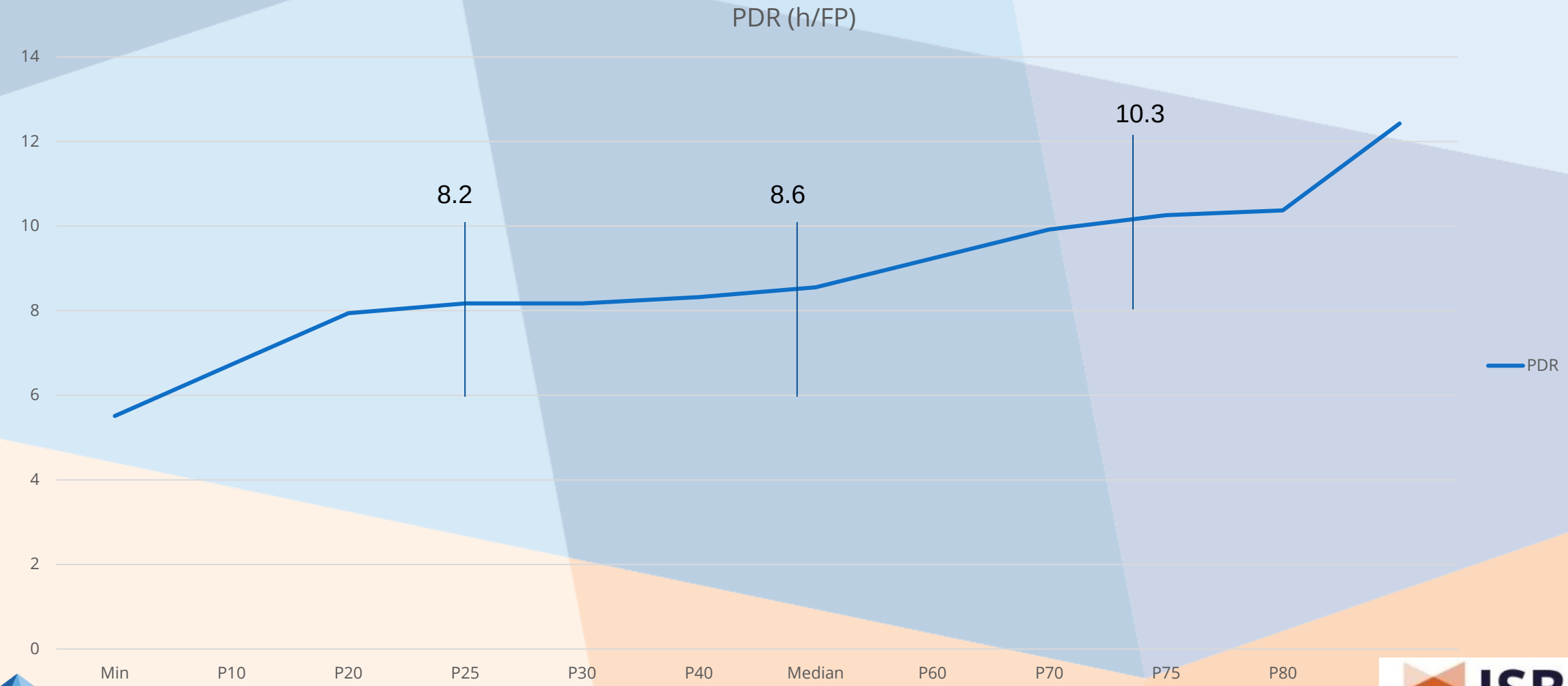
Distribution PDR (h/FP)



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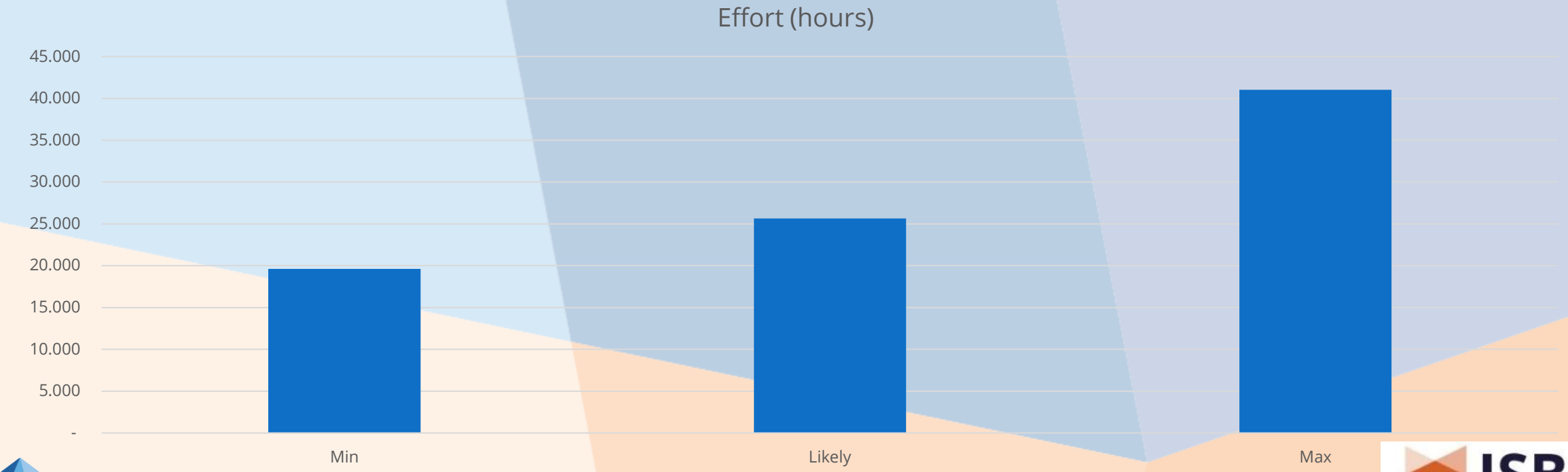
Estimate using ISBSG PDR

Scenario	Nesma FP	PDR (h/FP)	Effort (hours)
Min	2400	8.2	19,608
Likely	3000	8.6	25,650
Max	4000	10.3	41,040



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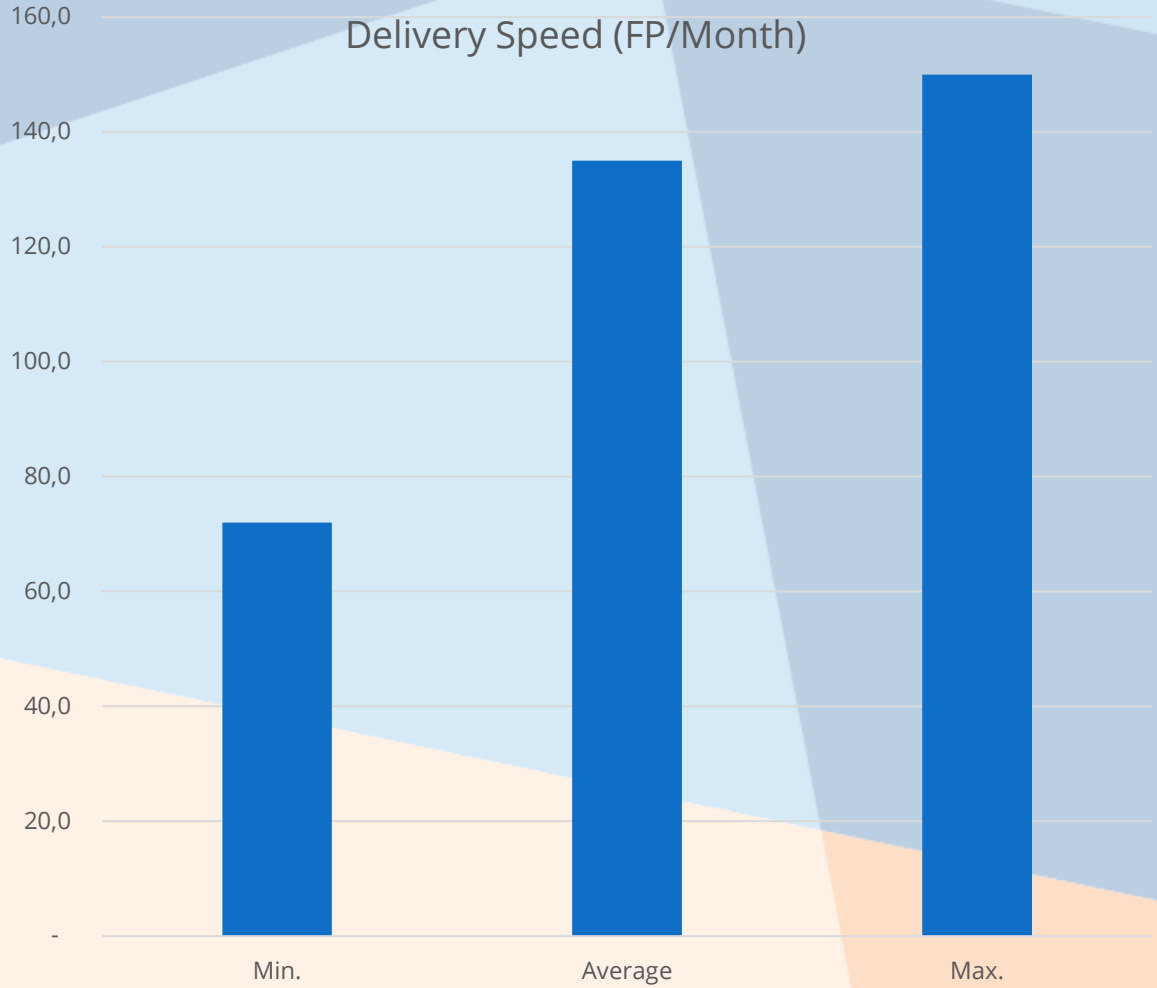
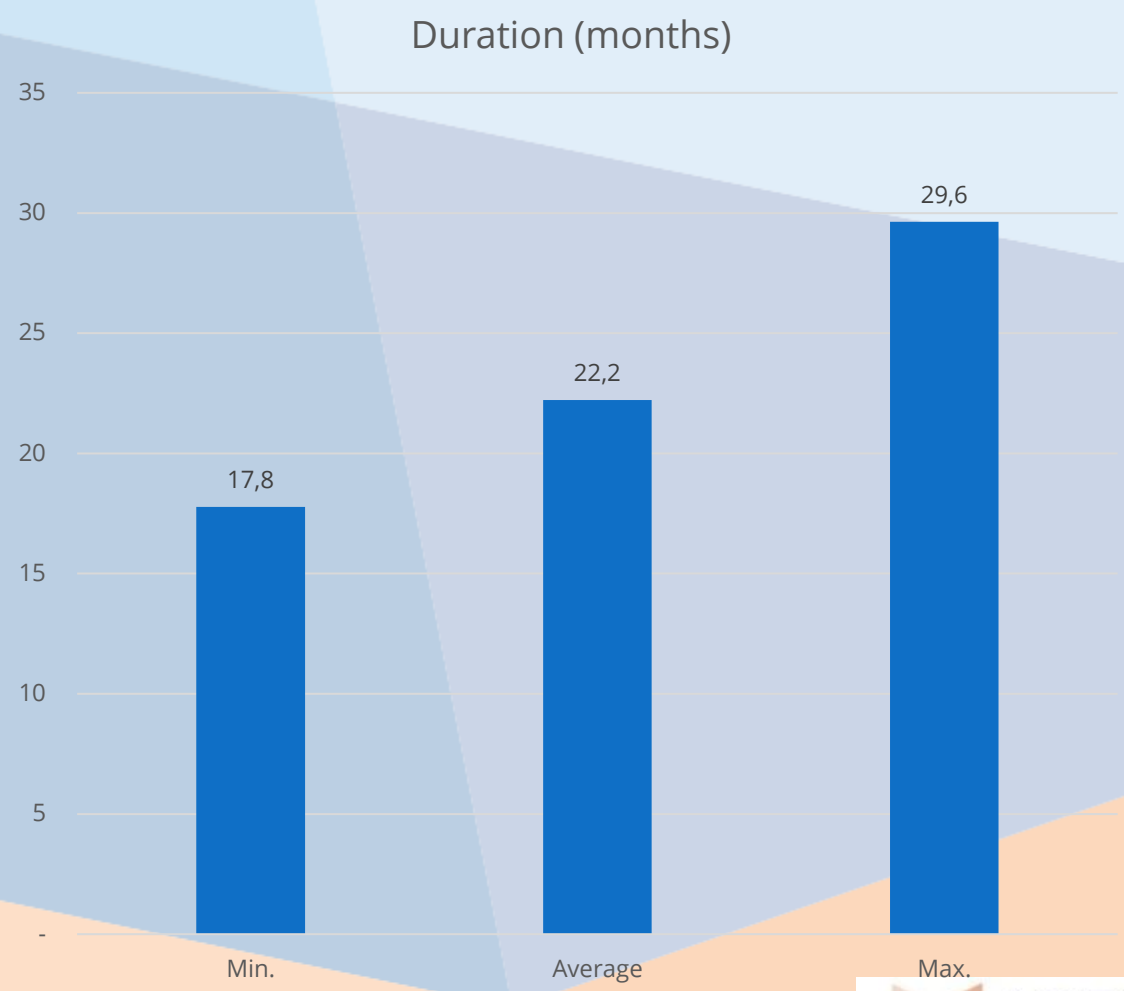
Delivery Speed → Duration (avg speed)





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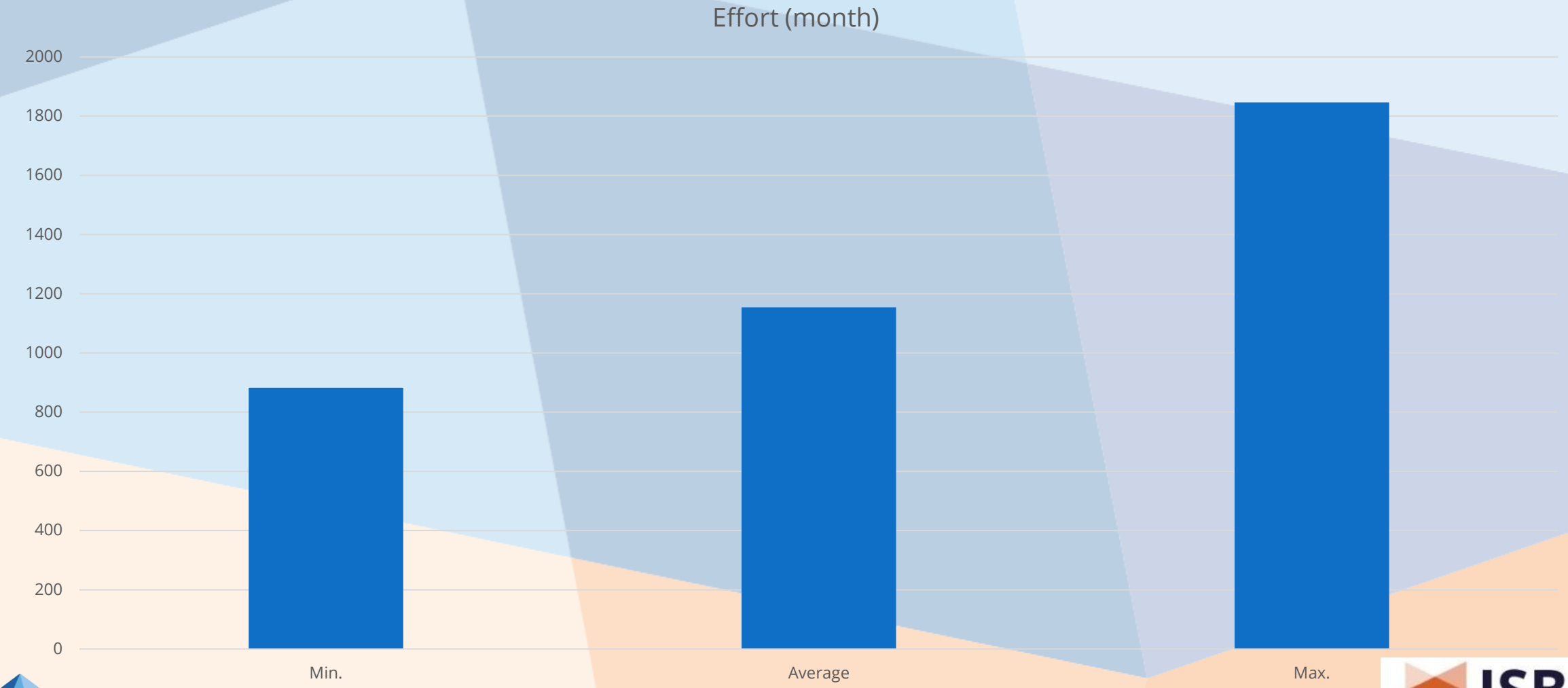
Effort per month (based on likely duration)



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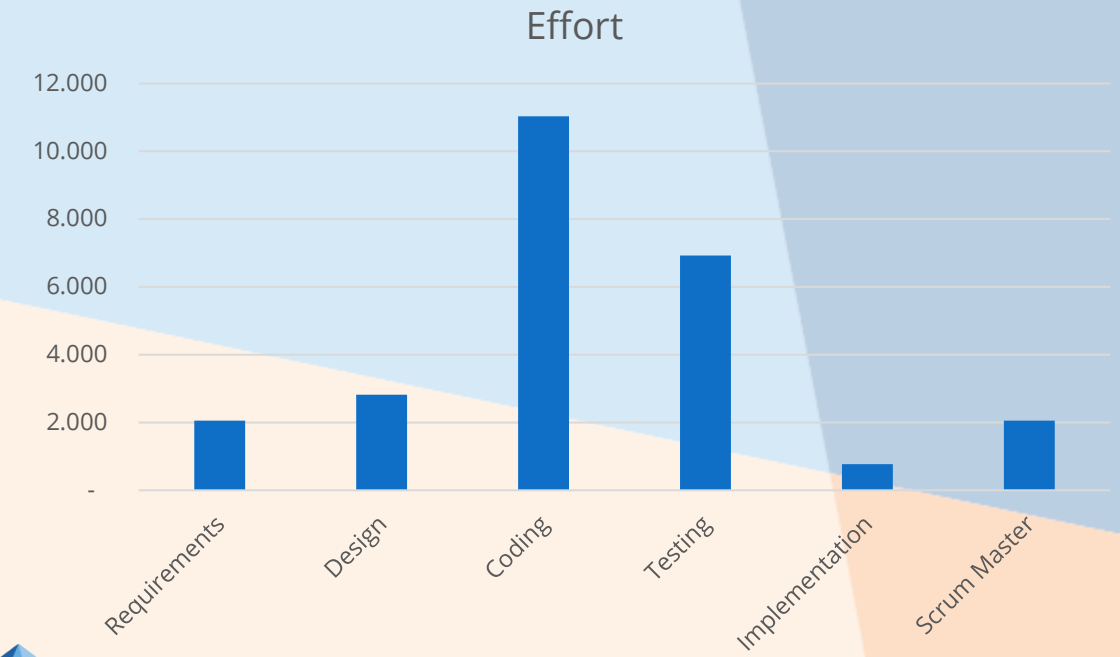
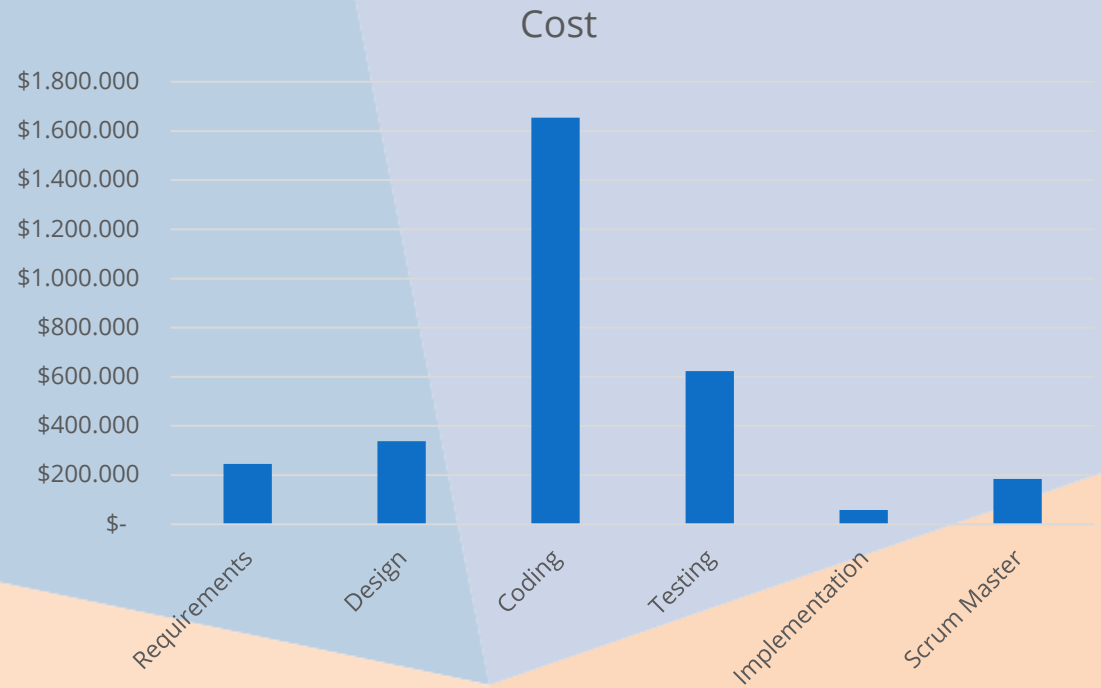
Effort/Cost Most Likely scenario

Activity	%	Rate	Effort	Cost
Requirements	8%	$ 120	2.052	$ 246.240
Design	11%	$ 120	2.822	$ 338.580
Coding	43%	$ 150	11.030	$ 1.654.425
Testing	27%	$ 90	6.926	$ 623.295
Implementation	3%	$ 75	770	$ 57.713
Scrum Master	8%	$ 90	2.052	$ 184.680
Totals	**100%**		**25.650**	**$ 3.104.933**





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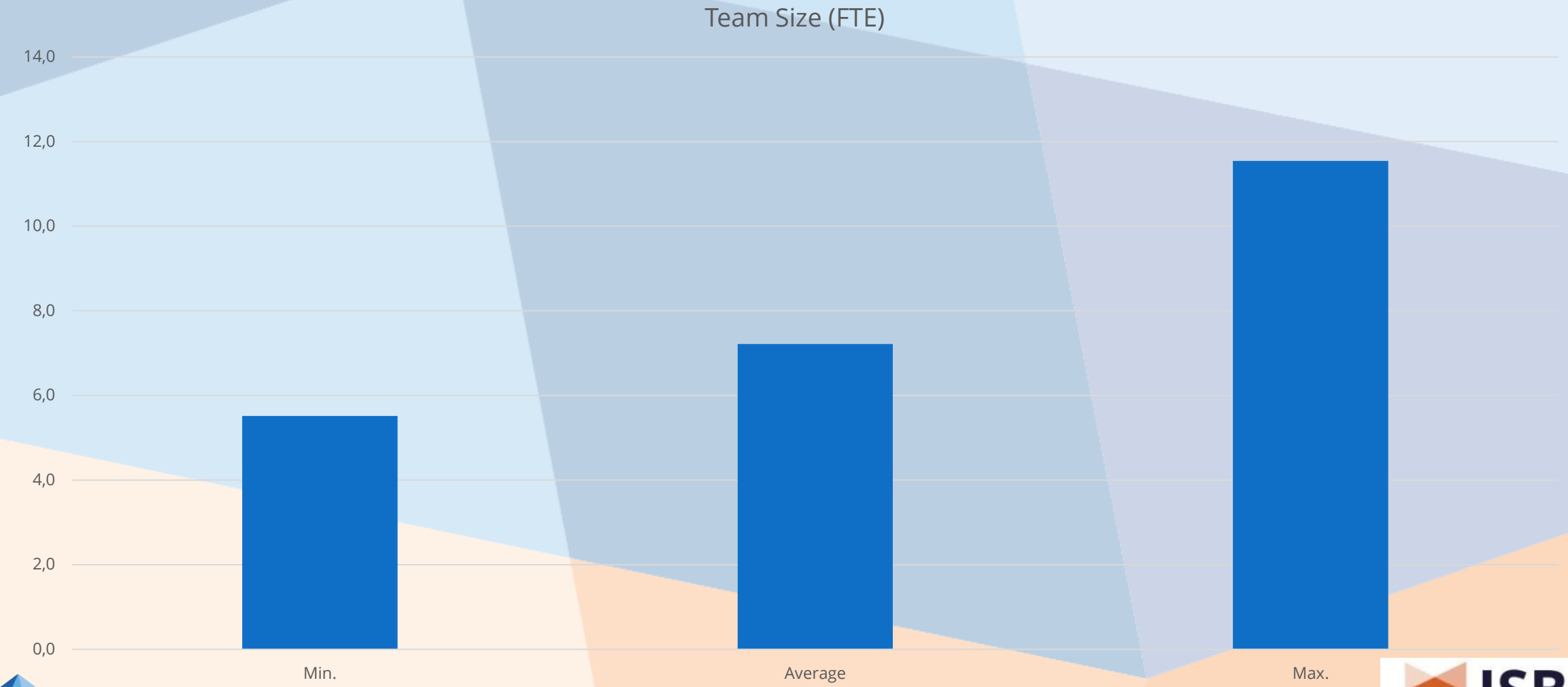
Team Size needed



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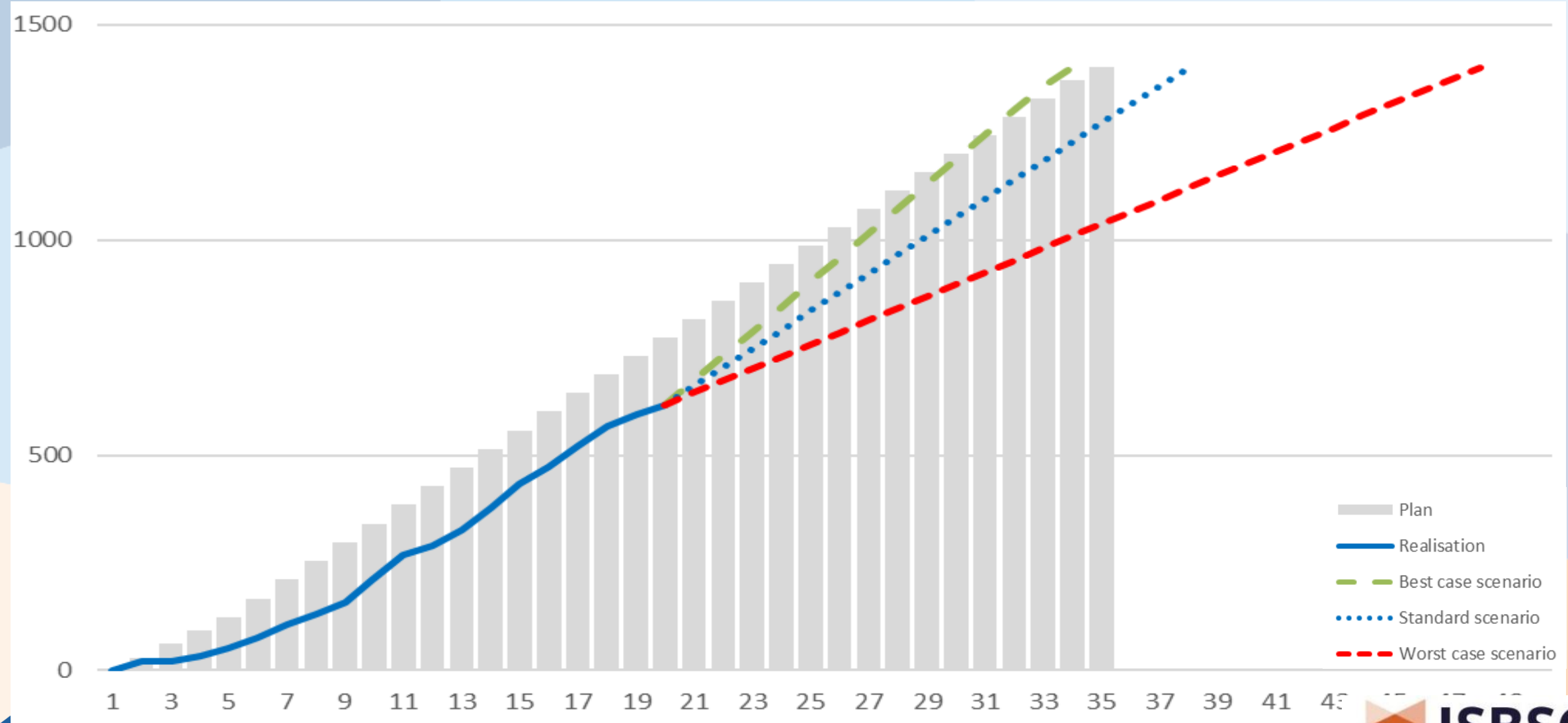
Monitoring the project



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Case Study II – ESMA (ITCE 2022 – Haarlem)

- ESMA – European Securities and Markets Authority
- 400 staff.
- Needs to procure through open tenders.
- Was procuring a supplier to develop a large BI/ big data platform.
- Sent out an RFP for terms & conditions for at least a 4-year period.

- Main question: *How to fix the price for any development or maintenance for the duration of the agreement, whilst maintaining the same process and the same deliverables and quality?*

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Request for Proposal

Clearly in the statement of work what is required for Development and Maintenance for any Generic System.

Type	PDR (h/FP)	Hourly Rate (€)
Development	0.5	€ 70
Maintenance	0.4	€ 50

Example: new system 10.000 FP:

10.000 FP x 0,5 x €70 = € 350.000.

Maintenance of the system:

10.000 x 0,4 x €50 = € 200.000 per year.

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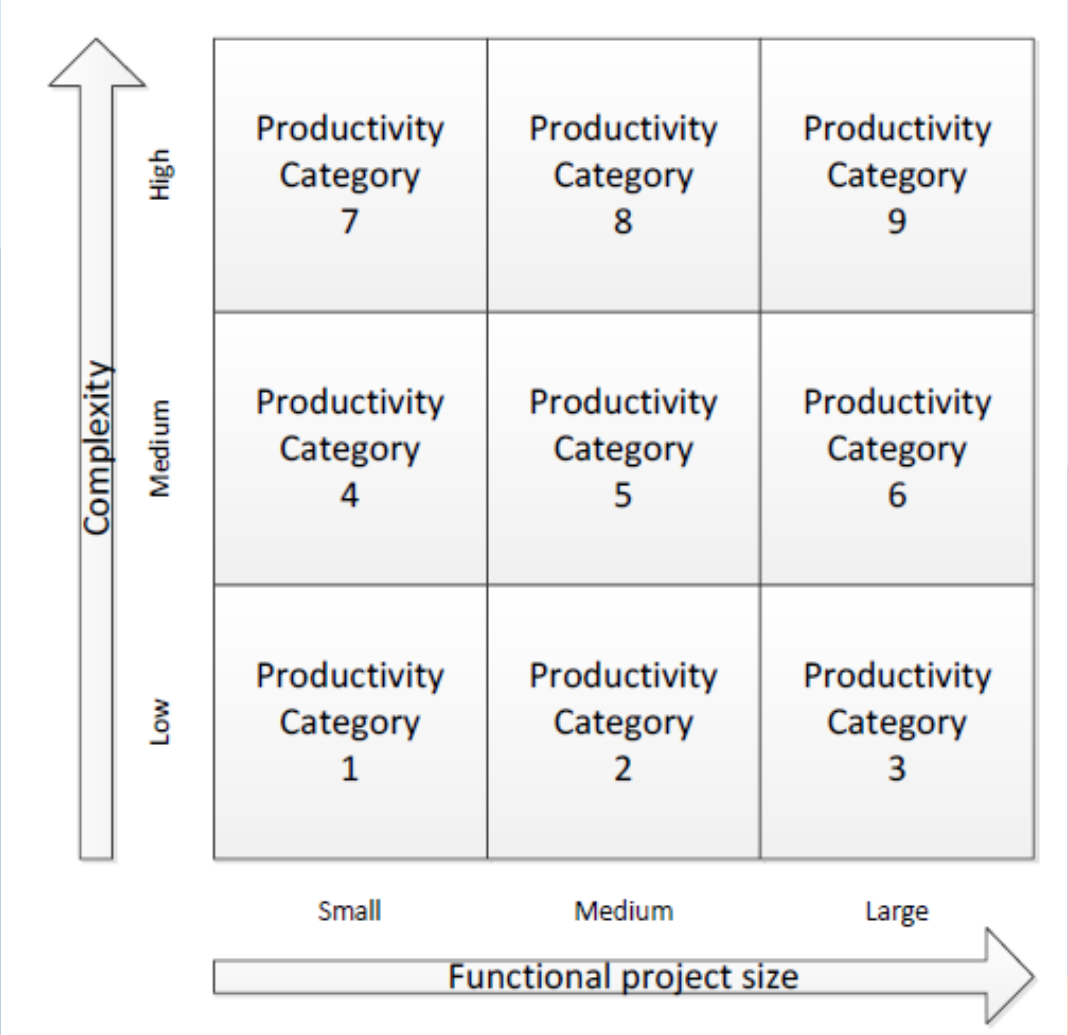
Complexity and Project Size

To accommodate for differences in complexity and size, different categories are defined:

Complexity: low, medium, high.

Functional size: Small (<500 FP), Medium (500-1000FP), Large 2000+ FP).



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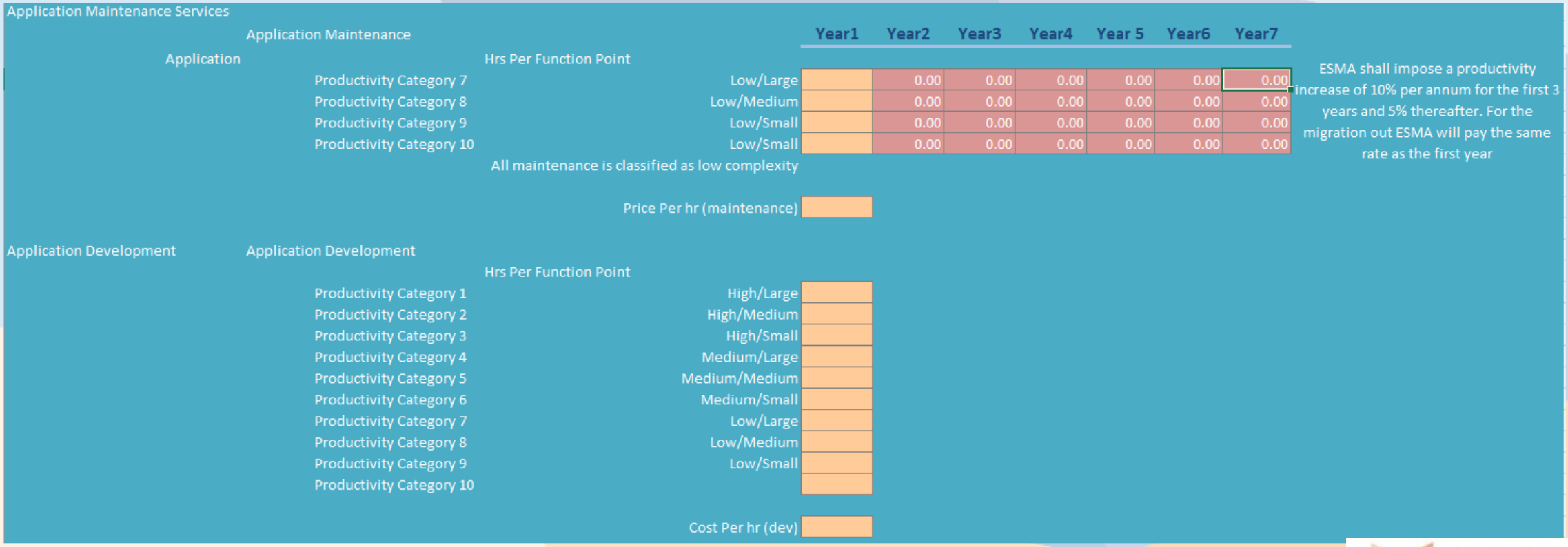
RFP pricing sheet

When the demand of the number of projects and their size/complexity is known for the coming years, this way of procuring software development and maintenance services enables an organization to easily select the best vendor solution.



Application Maintenance Services

			Year1	Year2	Year3	Year4	Year 5	Year6	Year7
Application Maintenance									
Application	Hrs Per Function Point								
Productivity Category 7		Low/Large		0.00	0.00	0.00	0.00	0.00	0.00
Productivity Category 8		Low/Medium		0.00	0.00	0.00	0.00	0.00	0.00
Productivity Category 9		Low/Small		0.00	0.00	0.00	0.00	0.00	0.00
Productivity Category 10		Low/Small		0.00	0.00	0.00	0.00	0.00	0.00
	All maintenance is classified as low complexity								
		Price Per hr (maintenance)							

ESMA shall impose a productivity increase of 10% per annum for the first 3 years and 5% thereafter. For the migration out ESMA will pay the same rate as the first year

Application Development	Application Development	
	Hrs Per Function Point	
Productivity Category 1	High/Large	
Productivity Category 2	High/Medium	
Productivity Category 3	High/Small	
Productivity Category 4	Medium/Large	
Productivity Category 5	Medium/Medium	
Productivity Category 6	Medium/Small	
Productivity Category 7	Low/Large	
Productivity Category 8	Low/Medium	
Productivity Category 9	Low/Small	
Productivity Category 10		
	Cost Per hr (dev)	

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Results

Cost Predictability

- Aligns costs with measurable functionality delivered.
- Reduces risk of budget overruns.
- Enables accurate forecasting for sourcing budgets.

Quality Focus

- Encourages vendors to prioritize functional requirements.
- Improves accountability for deliverables.
- Facilitates objective performance evaluation.

Flexibility & Scalability

- Adapts to changing project scopes seamlessly.
- Supports iterative development and agile sourcing.
- Enhances vendor-client collaboration.

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Key Take Aways

- Functional Size Measurement is an ISO/IEC standard that measures **functionality**, a good proxy for **business value**, in an objective, repeatable and standardized way.
- This allows the **use of objective metrics** for estimation, benchmarking, team measurement, contracting, etc.
- Functional Size Measurement already is possible once the high-level **functional user requirements** are known, very early in the project lifecycle.
- The **Nesma standard** allows the use of **indicative and high-level FPA** with very high accuracy. **Easy Functional Sizing** has recently been published as well.
- ISBSG offers **historical data** of over 12.500 completed projects, releases and sprints.
- The 1st case study shows a **Software Cost Estimate** for a redevelopment project based on functional size combined with relevant historical data.
- Monitoring the project is important: Agile teams may spin out of control fast, but agile also brings **new data every sprint, which can be used to manage the project.**
- The Second case study shows procurement at ESMA based **on price per FP for different productivity categories.**

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Q&A

New Nesma Guide: Easy Functional Sizing (EFS)

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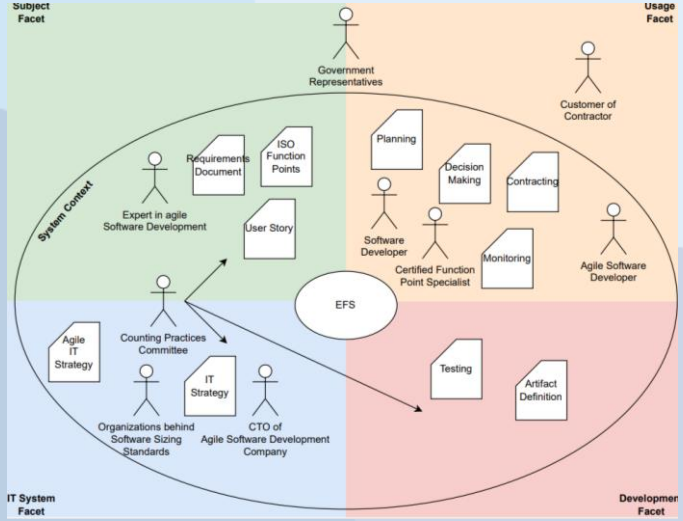
- Especially for **Agile working teams** (but others can use it as well!)
- Only Logical Files, External input and External outputs are measured!
  - Logical File: 7 FP
  - External input: 4 FP
  - External output: 5 FP
- Positioned at the heart of the Organization!
- Download available on www.nesma.org
- Free for members, small fee for non-members.



Your starting point for successful software projects

Now Available: Official EFS Documentation

The official Easy Functional Sizing (EFS) documentation is now available on this site! This essential guide helps you apply functional size measurement in a clear and practical way.

Free for Nesma members
Are you a Nesma member? Then you can request the full documentation completely free of charge by sending an email to office@nesma.org.

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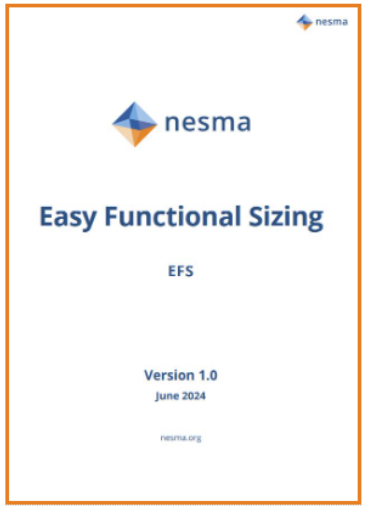

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Thank you for attending this webinar!

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