

Agile Teams Performance Measurement

**IT STARTS
WITH THE
FACTS.**

— **How to measure and benchmark team value creation**

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ISBSG IT Confidence 2021

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Introducing me

2 Drs. Harold van Heeringen

Graduated in Business economics at the University of Groningen in 1997

>20 years experience in IT, **>15 years in software measurement and metrics**

Married, 3 kids, living in Veendam (North of the Netherlands)

Hobbies – Chess, soccer and software metrics:

Metri – Principal Consultant Estimation & Performance Measurement

Nesma – Board member International cooperation and partnerships

ISBSG – Immediate Past President (2011-2019)

COSMIC – Dutch representative in the International Advisory Council (IAC)

ICEAA – Trainer of CEBoK chapter 12: Software Cost Estimation

SCEBoK – initiator and module presenter



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Nesma:

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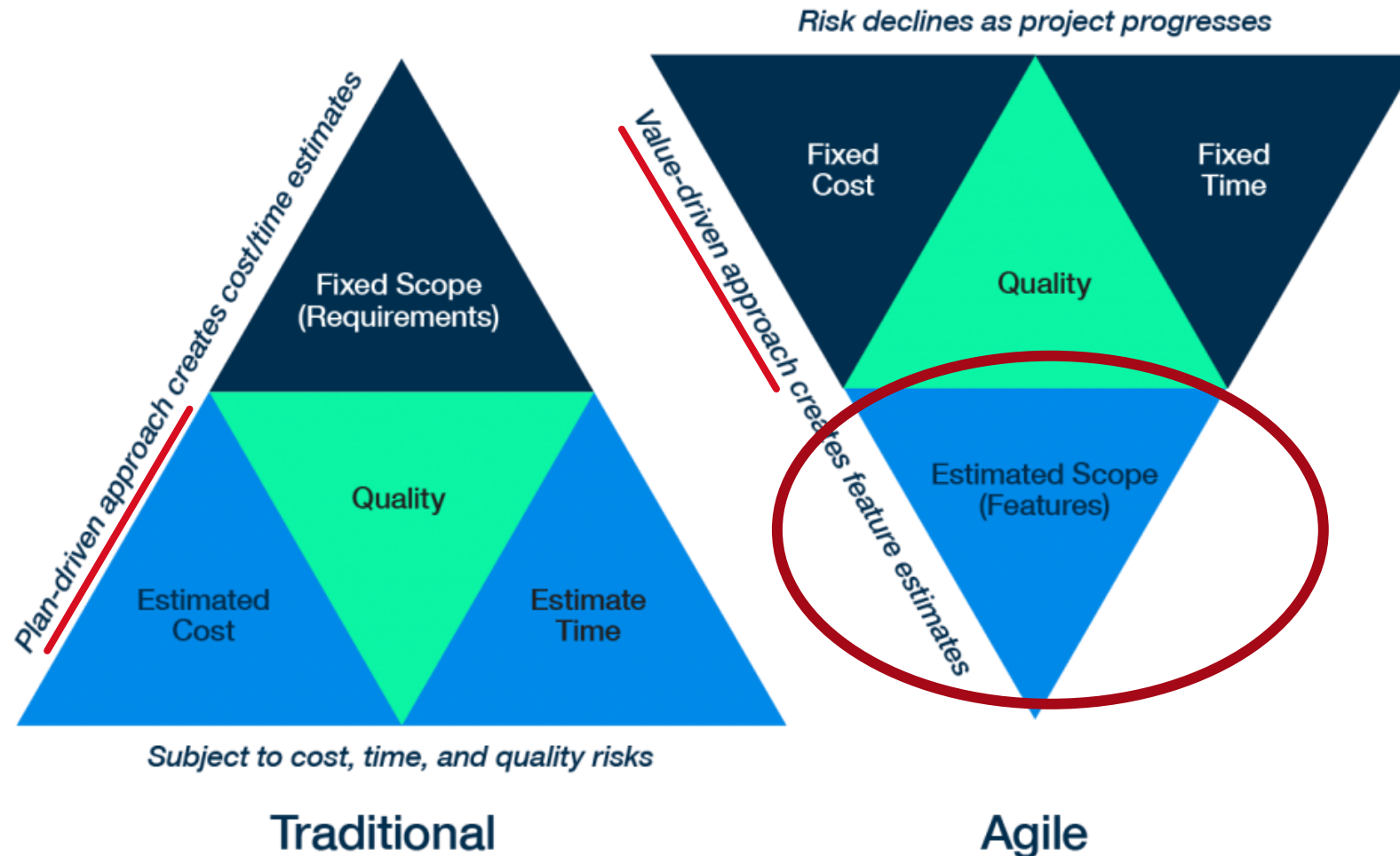
Basic Performance Measurement

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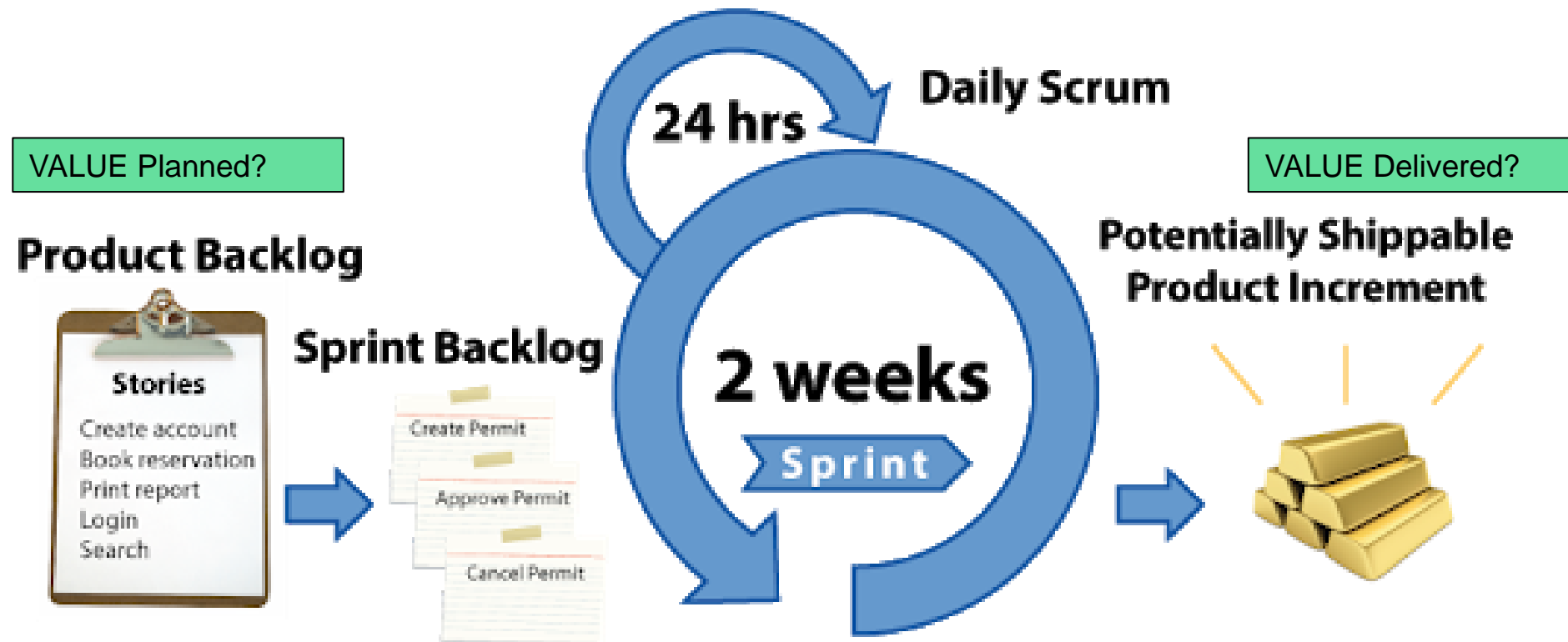
Agile vs. Traditional development

Iron Triangle Paradigm Shift

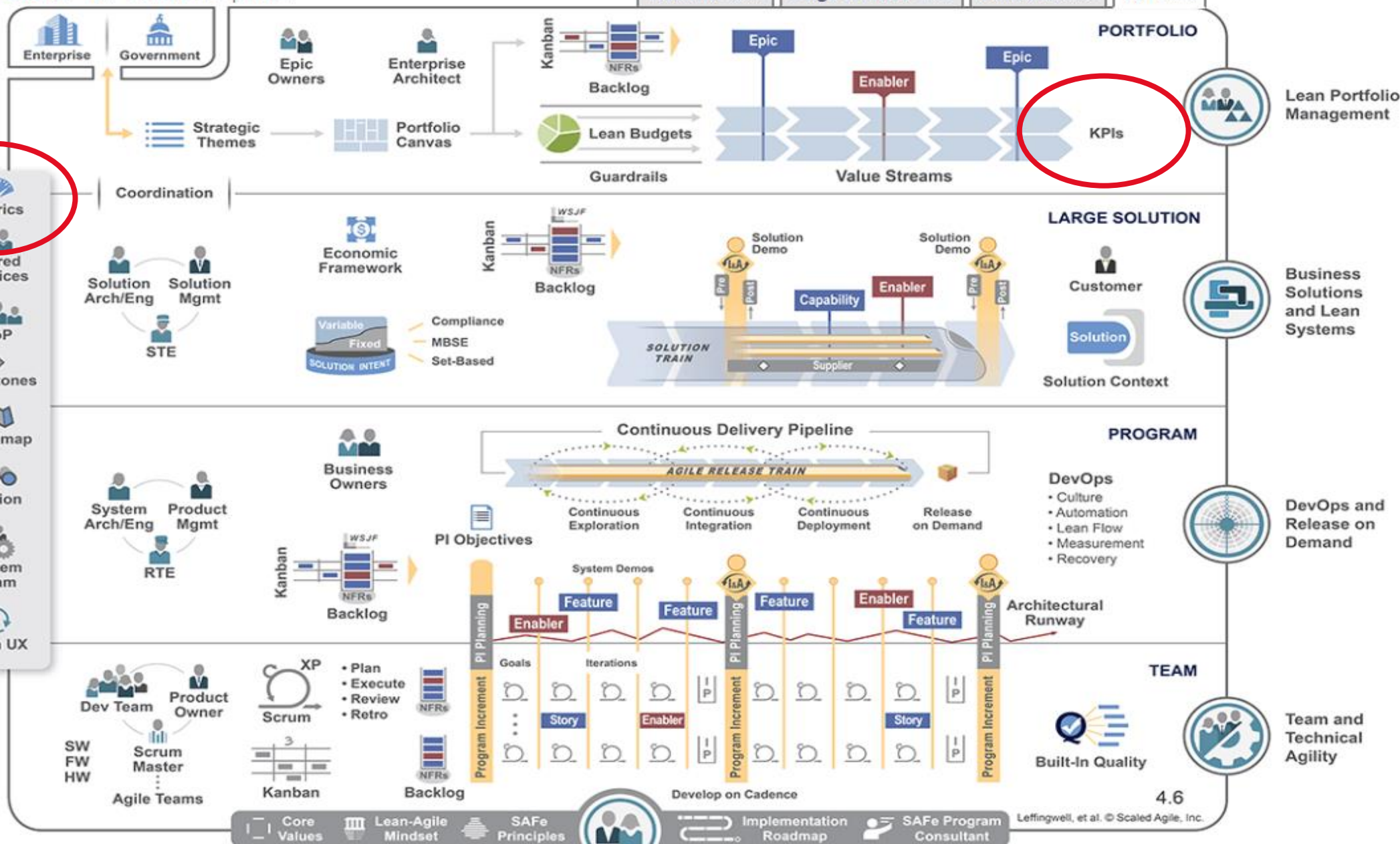


Agile/Scrum

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Team: 6 FTE
Sprint Effort: $6 * 2 \text{ weeks} * 40 \text{ hours} = 480 \text{ hours}$
Average rate = € 100
Sprint Cost = € 48000



SAFe metrics

Benefit	Expected Result	Metric Used
Employee engagement	Improved employee satisfaction; lower turnover	Employee survey; HR statistics
Customer satisfaction	Improved Net Promoter Score	Net promoter score survey
Productivity	Reduced average feature cycle time	Feature cycle time
Agility	Continuous improvement in team and program measures	Team, program, large solution and portfolio self-assessments; Release predictability measure
Time-to-market	More frequent releases	Number of releases per year
Quality	Reduced defect counts and support call volume	Defect data and support call volume
Partner health	Improved ecosystem relationships	Partner and vendor surveys

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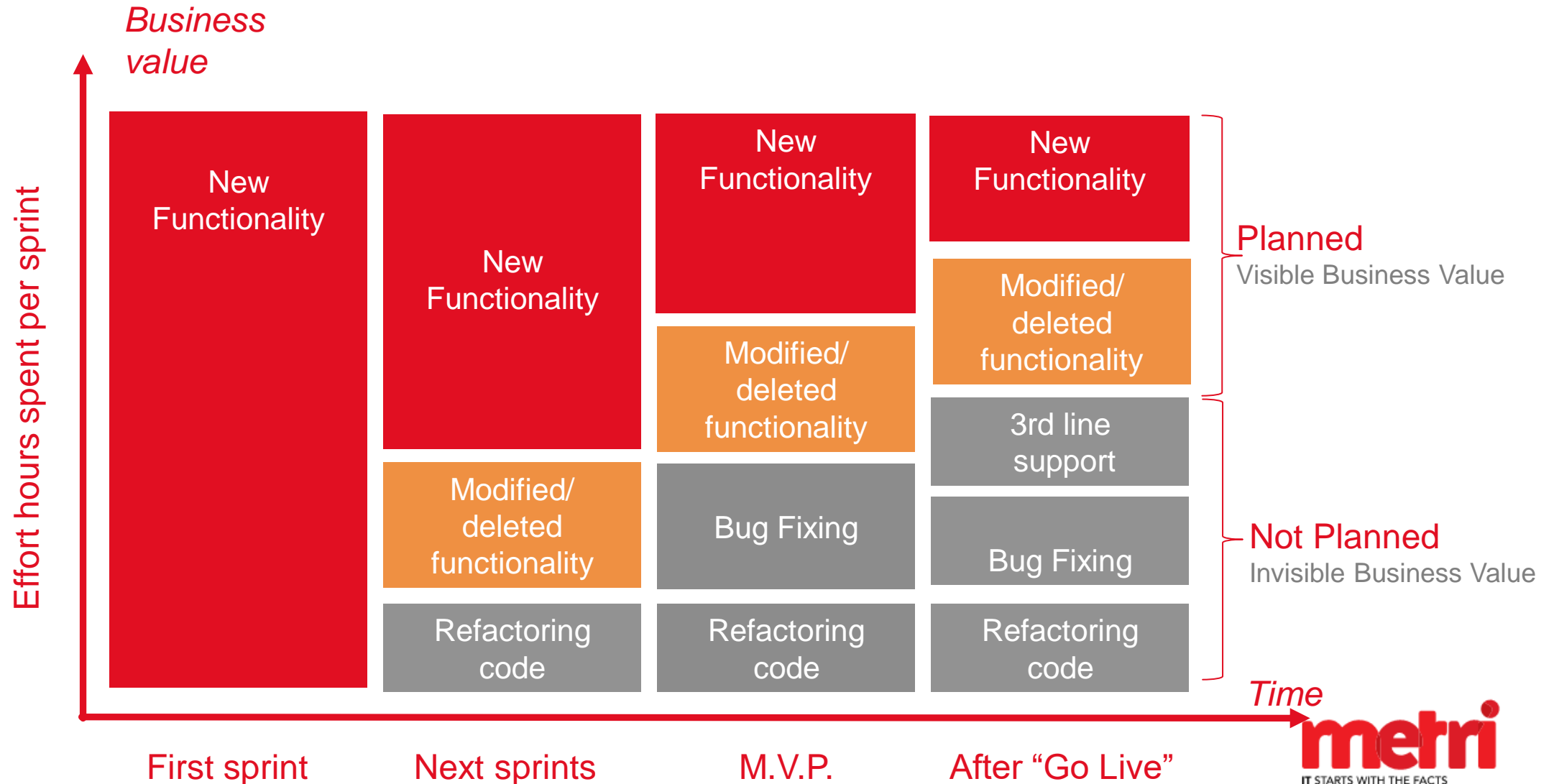
Functionality	Iteration 1	Iteration 2	Iteration 2
Velocity planned			
Velocity actual			
# Stories planned			
# Stories accepted			
% Stories accepted			
Quality			
Unit test coverage %			
# Defects			
# New test cases			
# New test cases automated			
Total tests			
Total % tests automated			
# Refactors			

Efficiency Sample Measures: - Contribution margin - Organizational stability - Team velocity vs. capacity	Value delivery Sample Measures: - Number of releases - Value feature points delivered - Release date percentage - Architectural refactors
Quality Sample Measures: - Defects - Support calls - Support satisfaction - Product satisfaction - Escalation rate percentage	Agility Sample Measures: - Product ownership - Release planning and tracking - IP planning and tracking - Teamwork - Testing and dev practices

Observations:

- Proposed metrics are not standardized
- Value Feature Points?
- What about code quality/maintainability/security etc.?

New Functionality vs. Other activities



Measure Functional Size

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ISO/IEC 14143 - Functional Size Measurement

- Objective (person independent)
- Repeatable, Comparable, Verifiable
- Technology independent
- Applicable in early stage
- Easy to use
- Future proof
- Measure of value
- Easy and fast measurement of user stories
- ISO/IEC certified
- Defensible – estimation, performance measurement, benchmarking, contracting**



nesma



C O S M I C

INTERNATIONAL
FUNCTION POINT
USERS GROUP



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metri
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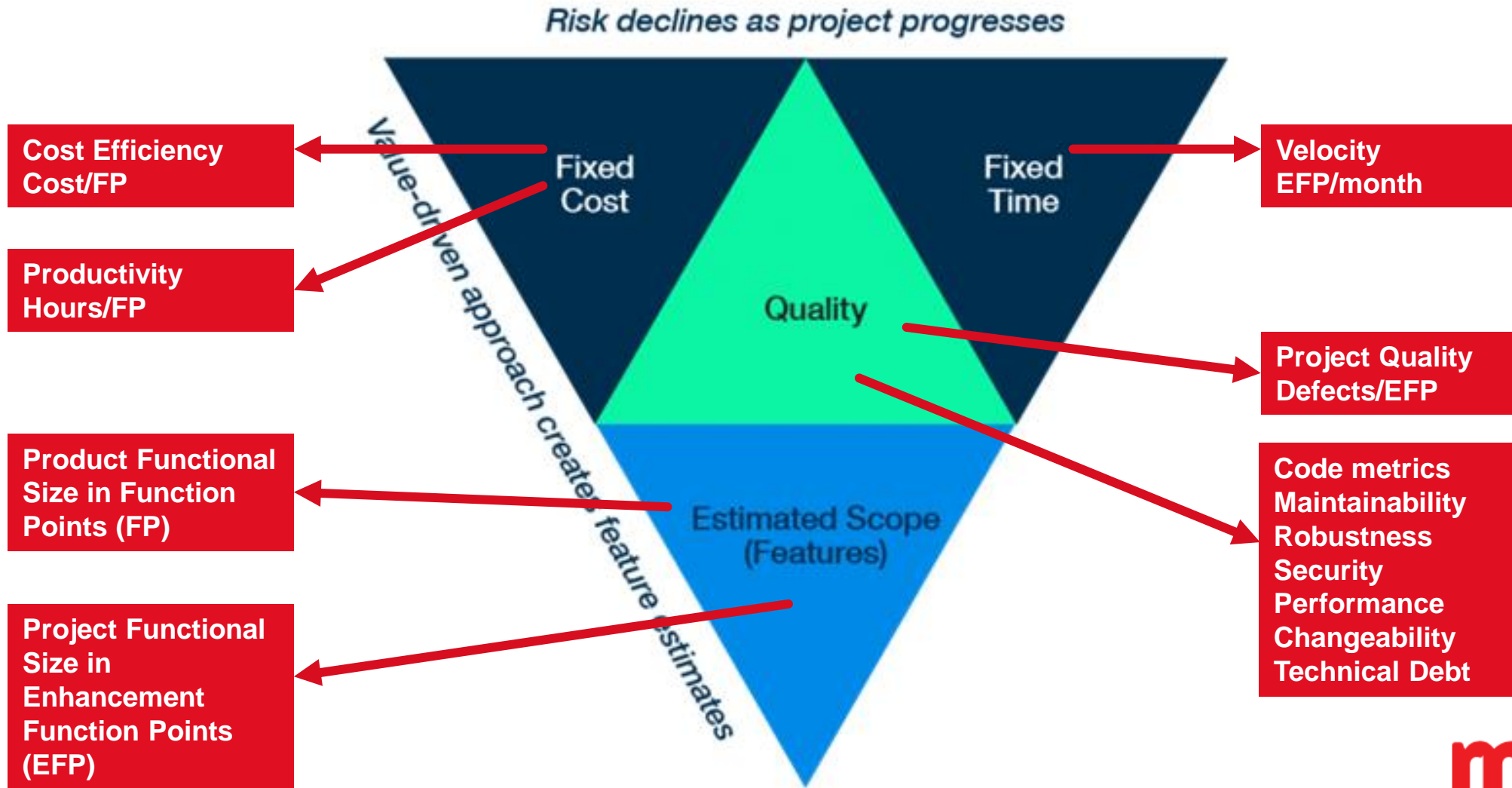
Key performance metrics for agile teams

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- **Productivity** Effort hours spent / **Size of the value delivered (FP)**
- **Cost Efficiency** Team cost / **Size of the value delivered (FP)**
- **Delivery Speed** **Size of the value delivered (FP)** / Duration (months)
- **Product Quality** Defects Delivered / **Size of the value delivered (FP)**
- **Code Quality Metrics**
 - Maintainability**
 - Robustness**
 - Performance**
 - Changeability**
 - Security**
 - Technical Debt**

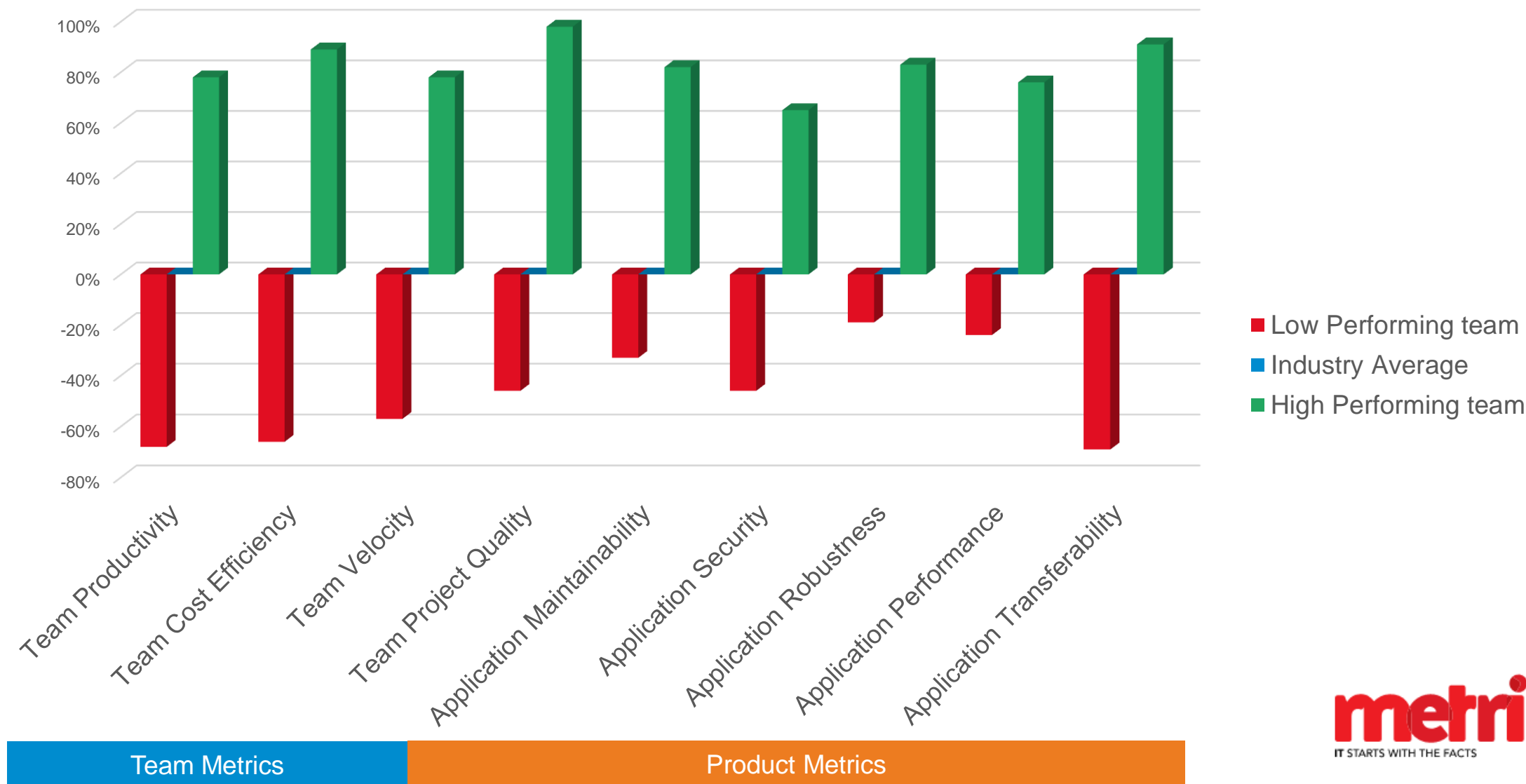
Standard metrics cover the pyramid

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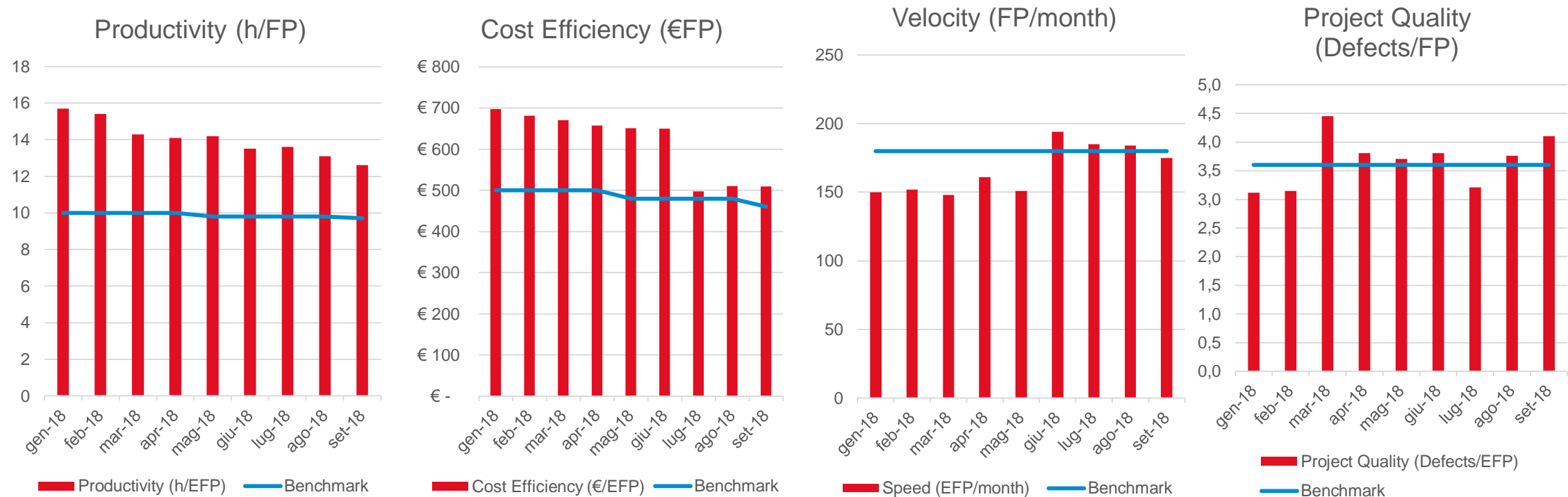
The market

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Performance Measurement / Benchmark

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- Agile Team Performance Measurement, based on standards
- Trends through time
- High performance teams vs. Low performance teams – learn and improve!
- Benchmark! Metri Data engine or ISBSG D&E data repository

• But how to determine the benchmark?

ISBSG Development & Enhancements

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- The D&E repository is available as Microsoft .xls file.
- Every row (over 10000 rows in 2021) is a new development or enhancement (release) data point.
- Every column (>250 columns) is a data attribute of that data point.
- The data source is anonymous, but data attributes like industry sector, application type and others can be used to filter the data set.

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
	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
10109	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	New Development	PC	4GL	.Net	NESMA
10193	B	A	2017	Government	Government;			Enhancement		3GL	Java	COSMIC
10293	B	B	2016	Utilities	General;	Business Application		Enhancement		4GL	.Net	NESMA
10313	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	3GL	COBOL	NESMA
10317	B	B	2015	Government	Government;	Business Application	Business Application;	Enhancement		4GL	.Net	NESMA
10473	B	B	2015	Insurance	Insurance;	Business Application	Workflow support & management;	Enhancement	PC	3GL	COBOL	NESMA
10540	B	A	2016	Insurance	Insurance;	Business Application	Financial transaction process/accounting;Cus	Enhancement	PC	3GL	Java	COSMIC
10551	B	A	2016	Insurance	Insurance;	Business Application	Financial transaction process/accounting;Cus	Enhancement	PC	3GL	Java	COSMIC
10565	B	B	2016	Insurance	Insurance;	Business Application		Enhancement		3GL	PL/SQL	IFPUG 4+
10695	B	A	2017	Insurance	Insurance;	Business Application	Financial transaction process/accounting;Cus	Enhancement	PC	3GL	Java	COSMIC
10776	A	B	2015	Government	Other;	Business Application		Enhancement		3GL	Java	NESMA
10834	A	B	2016	Government	General;	Business Application		Migration		3GL	Java	NESMA

Some screenshots

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- Functional Size is an important data attribute for analysis.
- ISBSG provides size categories to facilitate the analysis as well.

ISBSG Project ID	Sizing		Sizing		Effort
	Functional Size	Relative Size	Adjusted Function Points	Value Adjustment Factor	
10109	317	M2	317		3735
10193	308	M2	308	1	4167
10293	32	S			1318
10313	402	M2	402		1073
10317	8	XXXS	8		816
10473	56	S	56		295

- Effort is also an important attribute. Level 1 is Development Team only.
- Metrics are calculated.

Productivity		Productivity		Other Metrics	
Normalised Level 1 PDR (ufp)	Normalised PDR (ufp)	Pre 2002 PDR	Defect Density	Speed of Delivery	Manpower Delivery Rate
11,8	11,8	11,8	81,3	47,3	6,8
8,1	8,1		72,9	34,2	
41,2	41,2		53,2	10,3	
2,7	2,7	2,7	112,5	62,8	62,8

Benchmarking the metrics

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Schedule and effort are recorded.

Schedule	Schedule	Schedule	Schedule	Schedule	Schedule	Schedule	Schedule	Schedule	Schedule	Schedule
Project Elapsed Time	Project Inactive Time	Implementation Date	Project Activity Scope	Effort Plan	Effort Specify	Effort Design	Effort Build	Effort Test	Effort Implement	Effort Unrecorded
1,1		19-1-2015	Planning;Specification;Design;Build	3	3	262	274	219	55	0
5		30-11-2015	Design;Build;Test;Implement;Proj M			898	1181	945	236	
1		9-2-2015	Planning;Specification;Design;Build	0	0	295	210	168	42	
5		1-3-2016	Planning;Specification;Build;Test;Im	11	11		206	165	41	
6		30-11-2015	Design;Build;Test;Implement;Proj M			1080	728	582	146	

With this information, more detailed analysis can be done to calculate metrics:

- Project Delivery Rate (PDR) – Hours spent (Scope) per Function Point (Sizing method)
- Cost Efficiency – Cost of the effort hours (Scope) per Function Point (Sizing method)
- Delivery Speed – Function Point (Sizing method) per calendar month
- Defect Density – Defects found in tests (and 1st month production) per 1000 Function Points (Sizing method)

Create an analysis model

Create an Analysis tab and set up a table with metrics to analyze.

[illegible]

Enhance the dataset if necessary

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- In this case: the Cost/FP metric is added:
- Select the data and paste the values in the analysis tab.
- There seem to be some outliers but for the analysis we take the P30 – Median – P70 values

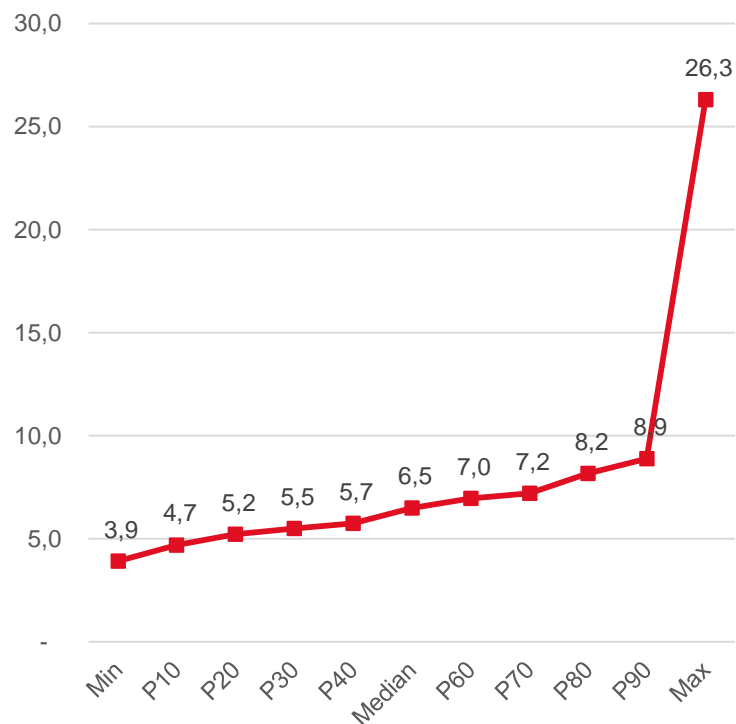
Costs	Costs	Costs
Total project cost	Cost/FP	Cost currency
€ 592.598	€ 447,92	European, euro
€ 944.460	€ 530,00	European, euro
€ 4.612.300	€ 2.431,37	European, euro
€ 969.883	€ 475,20	European, euro
€ 570.650	€ 447,92	European, euro
€ 743.673	€ 737,04	European, euro
€ 1.006.607	€ 481,40	European, euro
€ 734.189	€ 410,85	European, euro
€ 715.816	€ 474,05	European, euro
€ 508.260	€ 482,22	European, euro

Metric	PDR (h/FP)	Cost Efficiency	Delivery Speed	Defect Density
N	92	88	92	18
Min	3,9	€ 340	66,2	272,0
P10	4,7	€ 388	93,1	283,9
P20	5,2	€ 431	102,0	295,7
P30	5,5	€ 448	121,3	307,6
P40	5,7	€ 475	136,5	319,4
Median	6,5	€ 497	153,0	331,3
P60	7,0	€ 529	164,6	418,8
P70	7,2	€ 549	184,4	506,3
P80	8,2	€ 604	194,8	593,9
P90	8,9	€ 679	199,8	681,4
Max	26,3	€ 2.431	461,2	768,9
Avg	7,0	€ 555	155,0	457,4

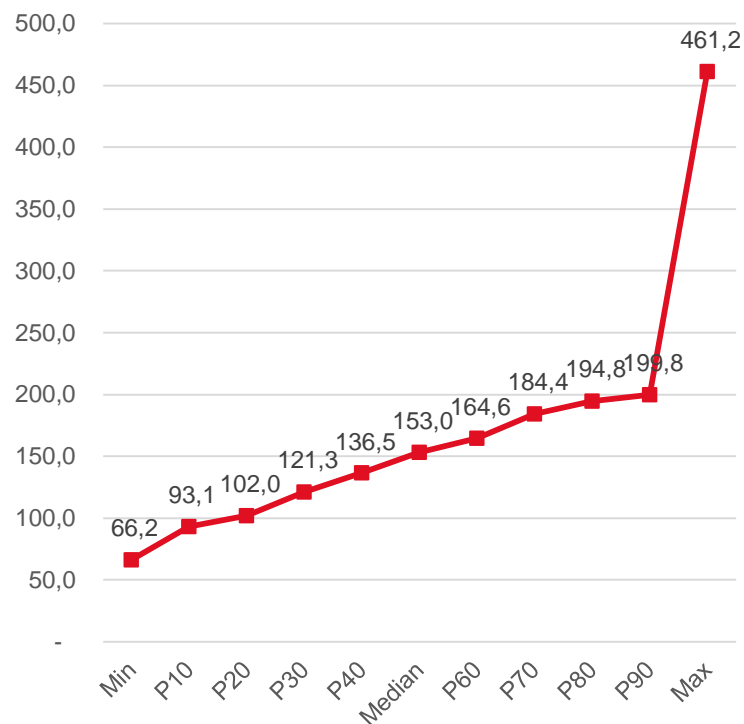
Benchmark P30 – Median – P70

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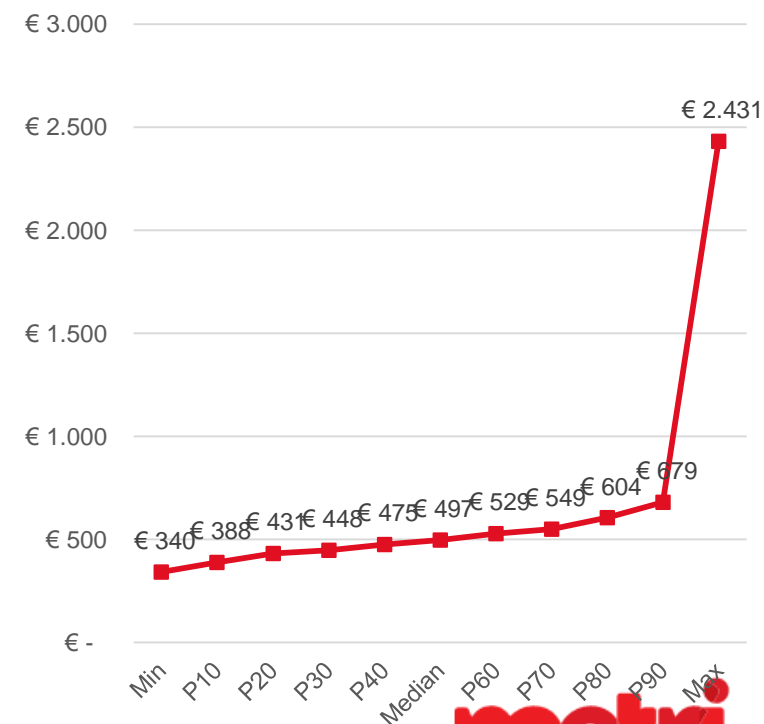
PDR (h/FP)



Delivery Speed (FP/Month)



Cost Efficiency (€/FP)



Same for estimation

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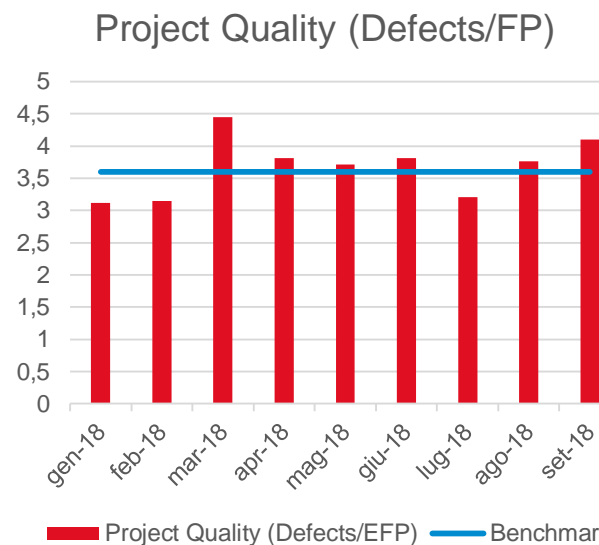
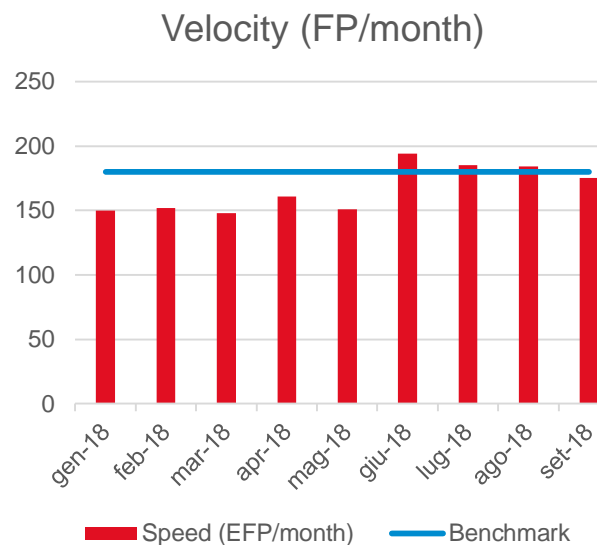
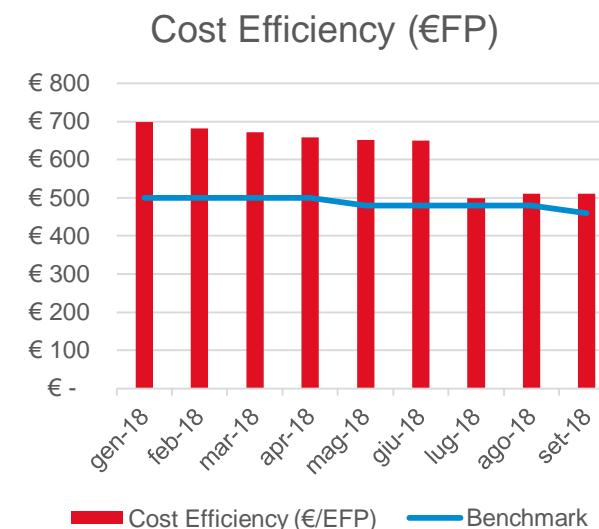
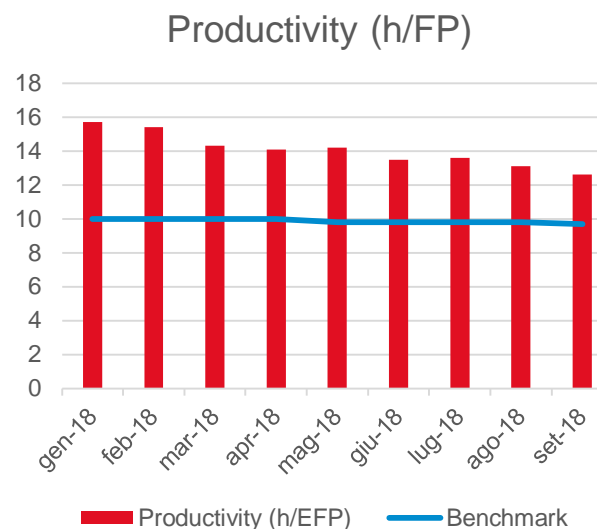
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Project	Functional Size		
	Low	Likely	High
Effort hours	22.000	32.500	57.600
Project Cost	€ 1.791.680	€ 2.483.950	€ 4.394.323
Duration	33,0	32,7	43,4
Defects	1.230	1.656	4.051
Low	4000	FP	
Likely	5000	FP	
High	8000	FP	

Conclusions

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- The Agile way of working has many advantages, however uses subjective metrics to control.
- Standardized metrics based on functional size are necessary to implement robust Performance Measurement and metrics on Portfolio level (SAFe).
- Performance measurement is extremely useful, especially when combined with benchmarking.
- For benchmarking, the ISBSG D&E repository provides invaluable data which can easily be analysed.



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Software Cost Estimation Summit 2021

**Physical and Online event
09 – 10 November
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