C A S T

CAST Appmarq
Benchmark Your Applications To Industry Peers

Anonymous

Anonymous_3 Benchmark Report
20170329-ACTion Core

Executive Summary

This is a customized benchmarking report pulled from the Appmarq database. It highlights the trends in the structural quality of Anonymous's business application Anonymous_3 regarding specific quality characteristics – TQI (Total Quality Index), robustness, efficiency, security, transferability, and changeability.

These structural quality characteristics are computed by analyzing the source code to detect violations of good coding and architectural practice. Compliance scores for each of the characteristics are aggregated from quality rules conformance and defects at the application level and computed on a scale of 0% (high risk) to 100% (low risk).

Anonymous_3 is a .NET application, representing about 1,917 thousand lines of code. In this benchmarking report, it is separately benchmarked against the Appmarq dataset – a total of 1958 applications – in the Financial Services sector and of .NET technology.

What is Appmarq

CAST Appmarq is by far the biggest repository of data about real IT systems. It's built on thousands of analyzed applications, made of 35 different technologies, by over 350 business organizations across major verticals. It provides IT Leaders with factual key analytics to let them know if their applications are on track.

Data is collected via automated analyses with the CAST Application Intelligence Platform (AIP), which performs a thorough structural quality analysis at the code and whole-application level. Metrics from the application-level database are fed into the central Appmarq repository. All data is made anonymous and normalized before entering the central benchmarking database. It is the largest sample of applications ever to be statistically analyzed and measured against a full spectrum of structural quality characteristics across different technologies.

2,000+ APPLICATIONS	300+ ORGANIZATIONS	2B+ LINES OF CODE	1,000+ QUALITY RULES
Core Systems / Cloud & Mobile / ERP, CRM...	Financial Services / Government / Retail...	In-House / Outsourced / Captive...	Security / Efficiency / Robustness...

Java · JSP · COBOL · .NET · SAP ABAP · C · C++ · C# · php · ORACLE PL/SQL · TSQL
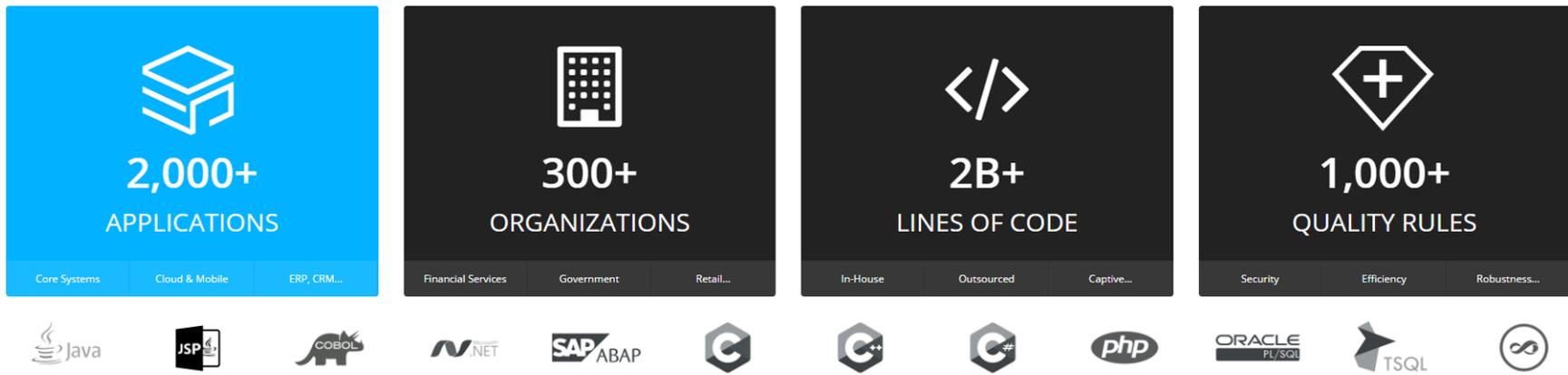
Benchmarking with Appmarq

The unique Appmarq repository provides a basis to benchmark business applications against comparable industry structural quality data. As the number of applications in the Appmarq database grows in the coming years, the breadth and validity of comparable benchmarks will increase.

Appmarq also allows us to detect and track trends in structural quality across industry, and identify the factors that affect them.

Benchmarks should be interpreted thoughtfully since it is difficult to determine how accurately the Appmarq sample represents the population of applications in any particular segment of IT.

CAST Appmarq
Benchmark Your Applications To Industry Peers
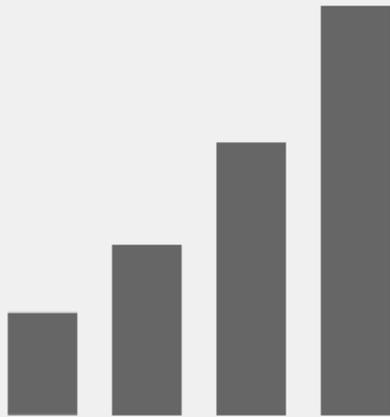
The Benchmarking Dataset

The Appmarq Data

The data in this benchmarking report is drawn from a database made up of 2,897 custom applications, representing 1,573M lines of code distributed across 50 different technologies.

This data has been collected over a period of 9 years and has been submitted by 350+ organizations for static analysis of their structural quality characteristics.

These organizations represent 12 industry segments: Financial Services, Insurance, Telecommunications, Manufacturing, Energy, Government, Utilities, Retail, IT & Business Consulting, Media, Software ISV and other.

The organizations are located primarily in North America, Europe, and India.

Industries

Bar chart values: Financial Services 1495, Insurance 316, Telecommunications 281, Manufacturing 251, Utilities 222, IT & Business Consulting 184, Government 121, Other 127, Energy 109, Retail 104, Software ISV 94, Pharmaceuticals 47, Select from drop-down 43, Media 16

Technologies

Bar chart values: JEE 1184, Cobol 589, .Net 453, PL/SQL 161, ABAP 157, C++ 69, C 54, JSP 53, C# 40, ASP 40, Microsoft T-SQL 40, PHP 38, Visual Basic 32, Forms 25, DB2 Server 23

The Appmarq Data (continued)

In addition of industry and technology data we collect, Appmarq contains valuable application demographics on application types, development methodologies, team size ranges, etc.

Explore live these statistics from your appmarq.com account.

Application Types
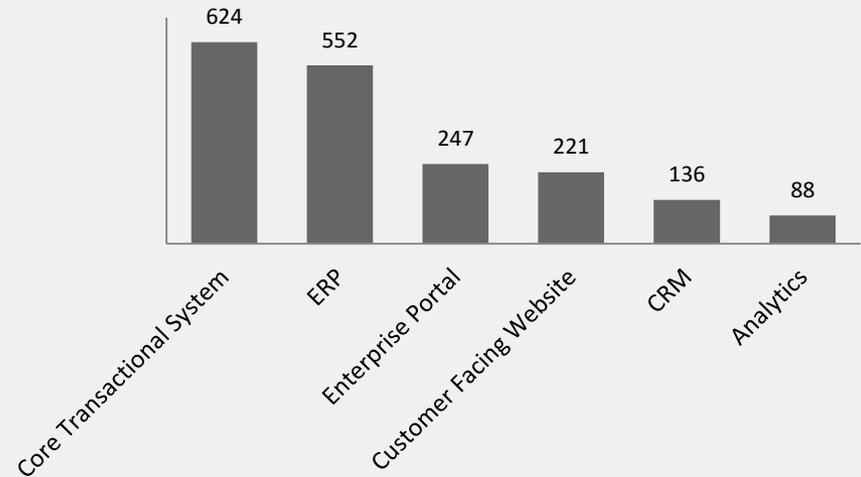
Development Team Sizes
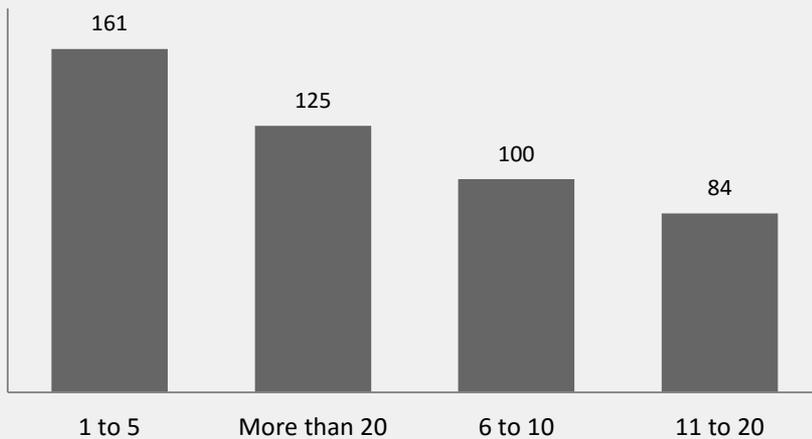
Development Methodologies
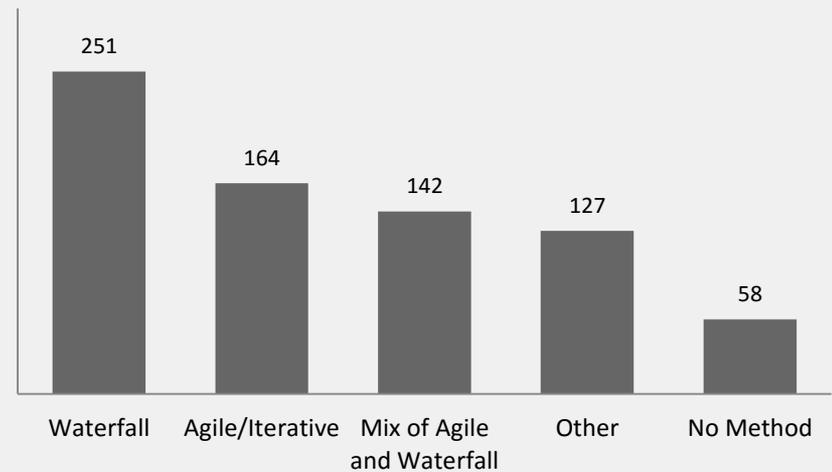
Selected population for this benchmark

This report has been generated from the selected population below. You can modify active demographics of this population from your Appmarq account and build a new benchmarking report.

Active demographics

🏷 Financial Services

Application Distribution by Size (KLOC)

Size Range	Count
< 10 KLOC	47
10 - 50 KLOC	213
50 - 100 KLOC	148
100 - 200 KLOC	149
200 - 500 KLOC	157
500 - 1000 KLOC	80
1000 - 2000 KLOC	56
> 2000 KLOC	40

868 applications

89 organizations

443.91M lines of code

System-Level

Mission critical applications must be analyzed in the context of numerous interconnections among code components, databases, middleware, frameworks and APIs. This results in a holistic analysis of the structural quality of an application. System level analysis makes sense not just for developing high quality code, but it is very important for delivering business value. Research shows that 90% of defects found in production and 60% of defects found in QA are related to cross component or cross technology interactions.

How To Read System-Level Compliance Benchmark Results

System-Level

81.26%

Compliance Score

The System-Level compliance score represents how an application complies to the defined set of System-Level quality rules. The compliance score is the average of compliance scores of all system-level rules. 0% means that your application complies with none of these quality rules, while 100% means that your application complies to System-Level rules.

Quartiles

In descriptive statistics, the quartiles of a ranked set of data values are the three points that divide the data set into four equal groups, each group comprising a quarter of the data. In Appmarq, each quarter is associated with a color which can be green (25% of best scores), yellow, orange or red (25% of the worse scores).

Application Rank

Rank: 811/869

The rank is the precise position of the benchmarked application (the number before the slash), within the application sample you've selected to build this report (the number after the slash).

How To Read System-Level Exposure Benchmark Results

System-Level

6.51%

Exposure

The System-Level Exposure score represents how an application is exposed to System-Level defects compared to all it quality defects, expressed in percentage. 0% means that your application is not exposed to System-Level defects, while 100% means that all your application defects are System-Level.

Quartiles

In descriptive statistics, the quartiles of a ranked set of data values are the three points that divide the data set into four equal groups, each group comprising a quarter of the data. In Appmarq, each quarter is associated with a color which can be green (25% of best scores), yellow, orange or red (25% of the worse scores).

Application Rank

Rank: 774/869

The rank is the precise position of the benchmarked application (the number before the slash), within the application sample you've selected to build this report (the number after the slash).

System-Level Portfolio Benchmark Results
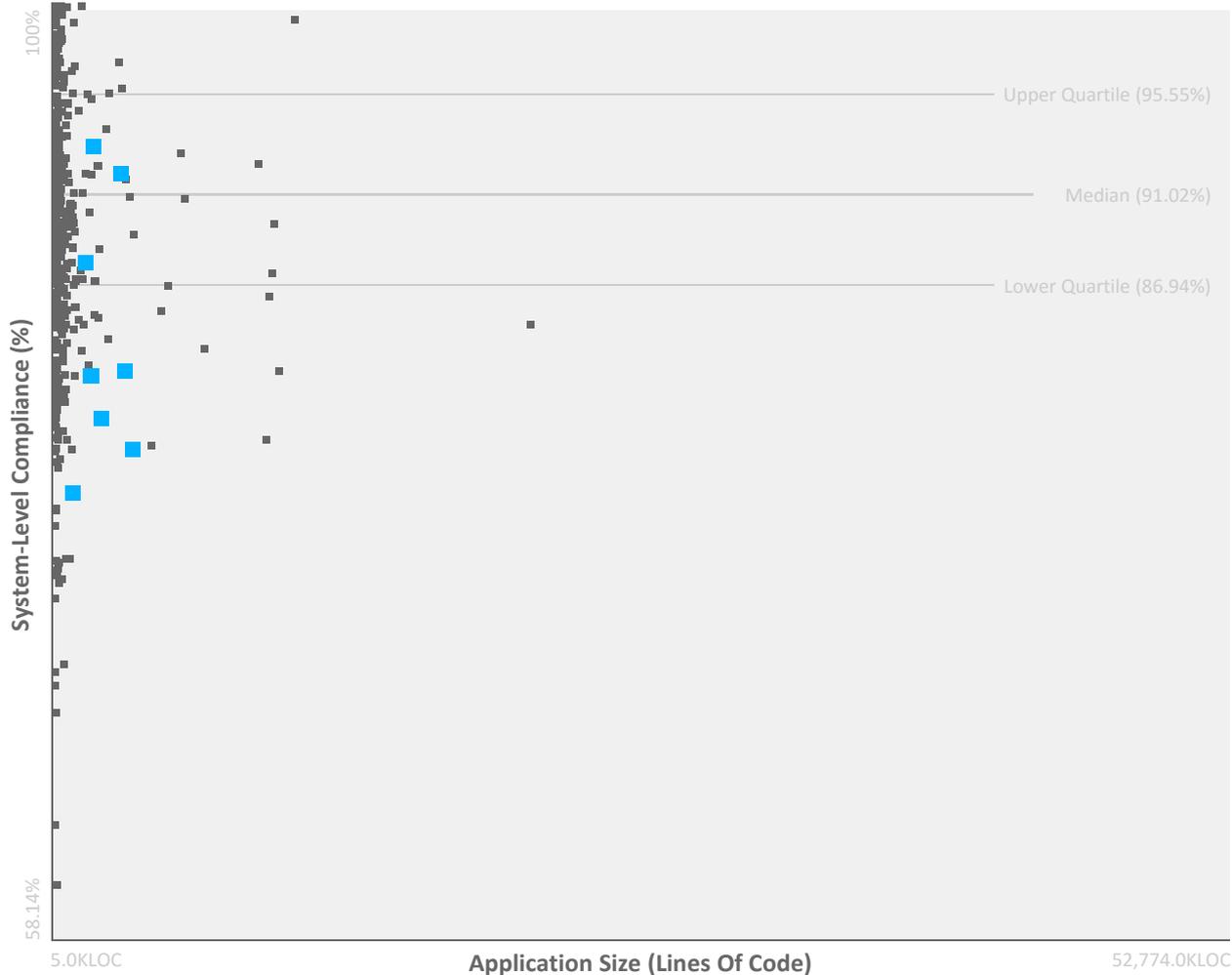
85.47%

4th quartile

Rank: 767/869 apps

Sys. Level	Score
Highest	100.00%
Upper Quartile	95.55%
Median	91.02%
Lower Quartile	86.94%
Lowest	58.14%

■ Anonymous_Portfolio

System-Level Compliance (%)

100%

58.14%

Upper Quartile (95.55%)

Median (91.02%)

Lower Quartile (86.94%)

Application Size (Lines Of Code)

5.0KLOC

52,774.0KLOC

System-Level Benchmark Results
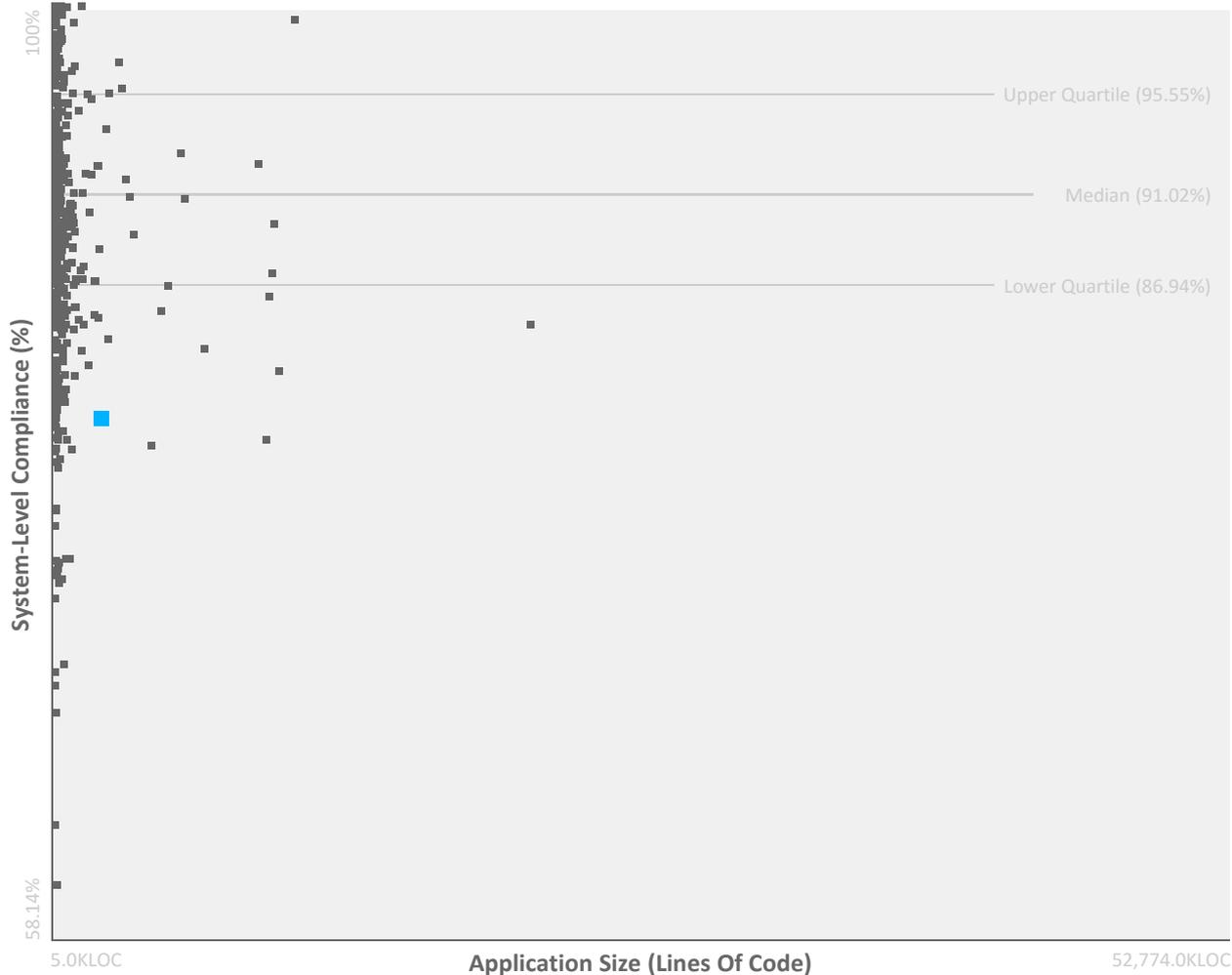
81.26%

4th quartile

Rank: 811/869 apps

Sys. Level	Score
Highest	100.00%
Upper Quartile	95.55%
Median	91.02%
Lower Quartile	86.94%
Lowest	58.14%

■ Anonymous_3

Chart axis labels:

- Y-axis: System-Level Compliance (%), 100%, 58.14%
- X-axis: Application Size (Lines Of Code), 5.0KLOC, 52,774.0KLOC
- Upper Quartile (95.55%)
- Median (91.02%)
- Lower Quartile (86.94%)

⚡ System-Level Violations

The System-Level benchmark is made of 124 quality rules. Below are listed the 20 System-Level rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Data Access must be based on Stored Procedure Calls	.Net	6,078	**7.08%**	33.25%
Avoid direct access to Database Tables	.Net	6,078	**7.08%**	66.62%
Avoid having multiple Artifacts inserting data on the same SQL Table	Microsoft T-SQL	286	**73.22%**	90.65%
Avoid Artifacts with a Complex SELECT Clause	Microsoft T-SQL	299	**74.05%**	80.44%
Avoid SQL queries that no index can support	Microsoft T-SQL	147	**83.97%**	88.14%
Avoid using SQL queries inside a loop	Microsoft T-SQL	91	**92.10%**	95.39%
Avoid "SELECT *" queries	.Net	384	**93.55%**	89.26%
Avoid "SELECT *" queries	Microsoft T-SQL	123	**93.91%**	89.26%
Avoid Artifacts with High RAW SQL Complexity	Microsoft T-SQL	114	**94.36%**	98.17%
Avoid SQL queries with implicit conversions in the WHERE clause	Microsoft T-SQL	41	**95.53%**	86.30%

81.26%

4th quartile

⬜ ⬜ ⬜ 🟥

Rank: 811/869 apps

Sys. Level	Score
Highest	100.00%
Upper Quartile	95.55%
Median	91.02%
Lower Quartile	86.94%
Lowest	58.14%

Technical Criterion Benchmarks

All Quality Rules

⬦ Technical Criteria Benchmark Results

The table below lists the different technical criteria that compose the five main health factors, and the benchmarking results for Anonymous_3 compared to other applications in Appmarq. In red are the technical criteria for which Anonymous_3 is below the industry, in green the one for which it is above the industry.

Technical Criterion	Compliance	Industry	Gap	Total Rules
Architecture - Multi-Layers and Data Access	52.48%	81.49%	**-29.01**	55
Programming Practices - Structuredness	80.50%	92.62%	**-12.12**	38
Documentation - Volume of Comments	66.12%	72.61%	**-6.49**	76
Complexity - OO Inheritance and Polymorphism	90.15%	94.74%	**-4.59**	37
Efficiency - Expensive Calls in Loops	89.49%	92.75%	**-3.26**	27
Programming Practices - Modularity and OO Encapsulation Conformity	77.94%	77.77%	**0.16**	42
Architecture - OS and Platform Independence	97.42%	97.10%	**0.32**	16
Efficiency - SQL and Data Handling Performance	87.94%	87.02%	**0.92**	133
Architecture - Object-level Dependencies	91.63%	90.64%	**0.99**	58
Efficiency - Memory, Network and Disk Space Management	78.39%	75.89%	**2.51**	60

⬦ Technical Criteria Benchmark Results

The table below lists the different technical criteria that compose the five main health factors, and the benchmarking results for Anonymous_3 compared to other applications in Appmarq. In red are the technical criteria for which Anonymous_3 is below the industry, in green the one for which it is above the industry.

Technical Criterion	Compliance	Industry	Gap	Total Rules
Programming Practices - OO Inheritance and Polymorphism	99.90%	95.37%	4.53	33
Dead code (static)	74.94%	69.97%	4.97	47
Complexity - Algorithmic and Control Structure Complexity	98.32%	92.59%	5.73	77
Documentation - Bad Comments	98.13%	90.32%	7.81	2
Programming Practices - Error and Exception Handling	98.59%	88.28%	10.31	56
Programming Practices - Unexpected Behavior	100.00%	86.45%	13.55	58
Secure Coding - Time and State	99.99%	83.96%	16.03	7
Architecture - Reuse	81.11%	58.23%	22.88	11
Documentation - Naming Convention Conformity	82.36%	53.66%	28.71	108

⬦ Technical Criteria Benchmark Results

The table below lists the different technical criteria that compose the five main health factors, and the benchmarking results for Anonymous_3 compared to other applications in Appmarq. In red are the technical criteria for which Anonymous_3 is below the industry, in green the one for which it is above the industry.

Technical Criterion	Compliance	Industry	Gap	Total Rules

Health Factor Benchmarks

Critical Rules

How To Read Benchmark Results

TQI

86.52%

Critical Compliance Score

The critical compliance score represents how an application complies to a set of critical quality rules. At a health factor level, the critical compliance score is the average of compliance scores of all critical quality rules attached to this health factor. 0% means that your application complies with none of the critical quality rules for given health factor, while 100% means that your application complies to all critical quality rules.

Quartiles

In descriptive statistics, the quartiles of a ranked set of data values are the three points that divide the data set into four equal groups, each group comprising a quarter of the data. In Appmarq, each quarter is associated with a color which can be green (25% of best scores), yellow, orange or red (25% of the worse scores).

Application Rank

Rank: 171/869

The rank is the precise position of the benchmarked application (the number before the slash), within the application sample you've selected to build this report (the number after the slash).

TQI (Total Quality Index)

Critical Rules

Total Quality Index measures the general maintainability level of the application based on hundreds of metrics provided by CAST

TQI Benchmark Results

Critical Rules

92.21%

1st quartile

Rank: 171/869 apps

TQI Compliance (%)

Upper Quartile (91.92%)

Median (88.50%)

Lower Quartile (84.72%)

100%

60.32%

5.0KLOC

Application Size (Lines Of Code)

52,774.0KLOC
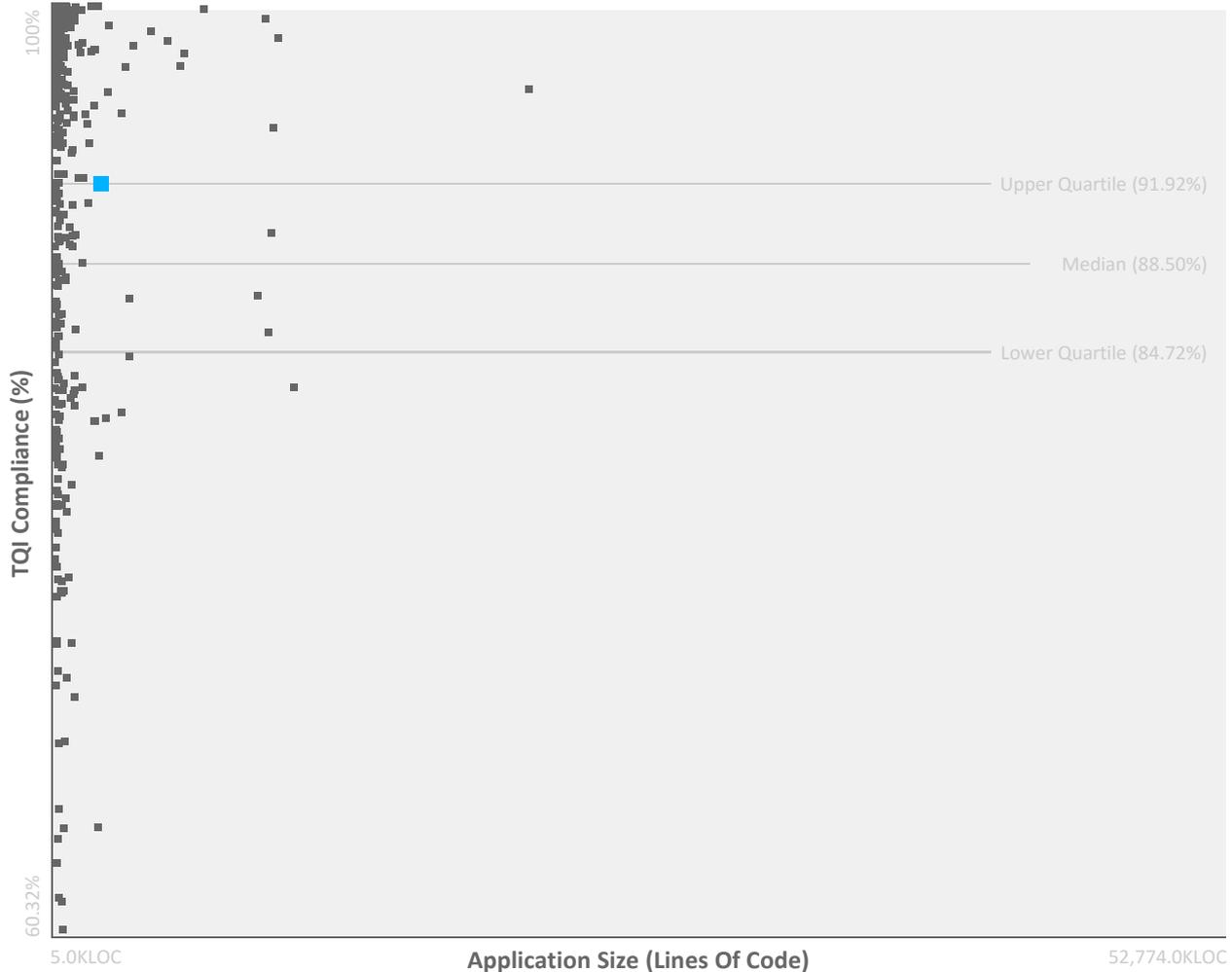
TQI	Score
Highest	100.00%
Upper Quartile	91.92%
Median	88.50%
Lower Quartile	84.72%
Lowest	60.32%

■ Anonymous_3

⚡ TQI Critical Violations

Critical Rules

92.21%

1st quartile

Rank: 171/869 apps

The TQI Health Factor is made of 1792 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid declaring public Fields	.Net	9,102	**66.95%**	84.24%
Avoid declaring public Fields	.Net	9,102	**66.95%**	84.24%
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%
Avoid using SQL queries inside a loop	Microsoft T-SQL	91	**92.10%**	95.39%
Use dedicated stored procedures when multiple data accesses are needed (ASCPEM-PRF-10)	.Net	5	**97.09%**	93.52%
The exception Exception should never been thrown. Always Subclass Exception and throw the subclassed Classes.	.Net	1,016	**98.18%**	99.32%
Avoid String concatenation in loops	.Net	815	**98.54%**	99.30%
Avoid empty catch blocks	.Net	169	**99.70%**	99.46%
Avoid using SQL queries inside a loop	.Net	15	**99.76%**	95.39%
Avoid Cursors inside a loop	Microsoft T-SQL	1	**99.91%**	97.53%
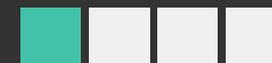
TQI	Score
Highest	100.00%
Upper Quartile	91.92%
Median	88.50%
Lower Quartile	84.72%
Lowest	60.32%

⚡ TQI Critical Violations

Critical Rules

92.21%

1st quartile

Rank: 171/869 apps

The TQI Health Factor is made of 1792 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid using SQL queries inside a loop	Microsoft T-SQL	91	**92.10%**	95.39%
Close SQL connection ASAP	.Net	27	**99.96%**	99.97%
Avoid using SQL queries inside a loop	.Net	15	**99.76%**	95.39%
Use dedicated stored procedures when multiple data accesses are needed (ASCPEM-PRF-10)	.Net	5	**97.09%**	93.52%
Avoid Cursors inside a loop	Microsoft T-SQL	1	**99.91%**	97.53%
Method naming convention - case control	C++	37,891	**2.01%**	73.57%
Avoid undocumented Methods	C++	30,107	**3.80%**	71.92%
Avoid undocumented Methods	.Net	21,976	**64.17%**	71.92%
Avoid Artifacts with High Fan-Out	.Net	15,882	**76.54%**	86.54%
Avoid Functions having a very low Comment/Code ratio	.Net	9,153	**22.59%**	36.93%

TQI	Score
Highest	100.00%
Upper Quartile	91.92%
Median	88.50%
Lower Quartile	84.72%
Lowest	60.32%

Robustness

Critical Rules

Robustness measures the level of risk and the likelihood of having application failures and application defects due to modifications. Robustness measures as well the level of effort necessary to test the application

Robustness Benchmark Results

Critical Rules

87.44%
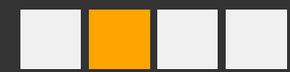
2nd quartile

Rank: 299/869 apps

Robustness Compliance (%)

100%

Upper Quartile (91.87%)

Median (84.58%)

Lower Quartile (73.55%)

49.95%

5.0KLOC   **Application Size (Lines Of Code)**   52,774.0KLOC
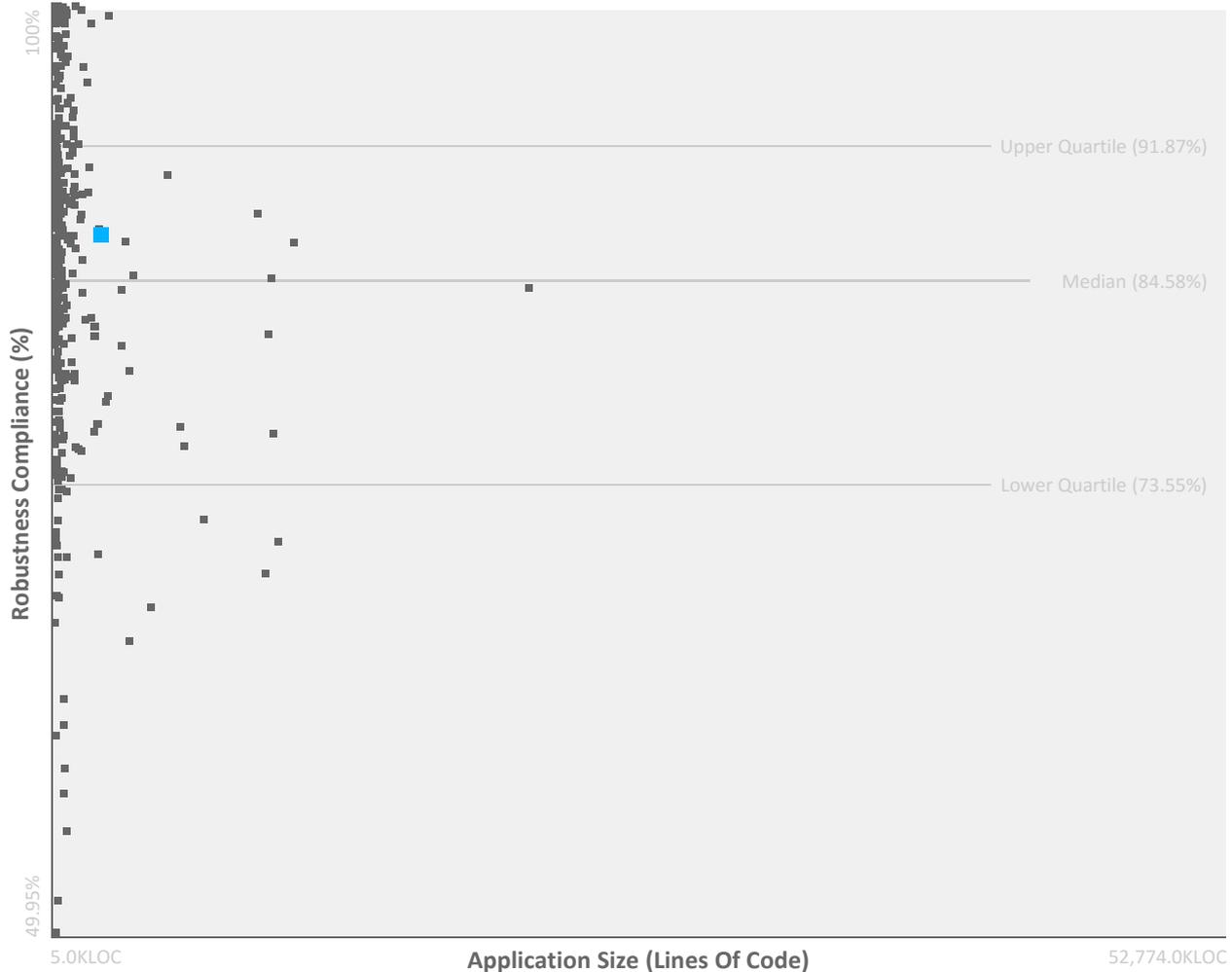
Rob.	Score
Highest	100.00%
Upper Quartile	91.87%
Median	84.58%
Lower Quartile	73.55%
Lowest	49.95%

■ Anonymous_3

⚡ Robustness Critical Violations

Critical Rules

87.44%

2nd quartile

Rank: 299/869 apps

The Robustness Health Factor is made of 936 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%
The exception Exception should never been thrown. Always Subclass Exception and throw the subclassed Classes.	.Net	1,016	**98.18%**	99.32%
Avoid empty catch blocks	.Net	169	**99.70%**	99.46%

Rob.	Score
Highest	100.00%
Upper Quartile	91.87%
Median	84.58%
Lower Quartile	73.55%
Lowest	49.95%

⚡ Robustness Critical Violations

87.44%

2nd quartile

Rank: 299/869 apps

The Robustness Health Factor is made of 936 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry

Rob.	Score
Highest	100.00%
Upper Quartile	91.87%
Median	84.58%
Lower Quartile	73.55%
Lowest	49.95%

Security

Critical Rules

Security measures the likelihood of potential security breaches linked to coding practices and application source code.

Security Benchmark Results

Critical Rules

94.66%

1st quartile

Rank: 120/869 apps
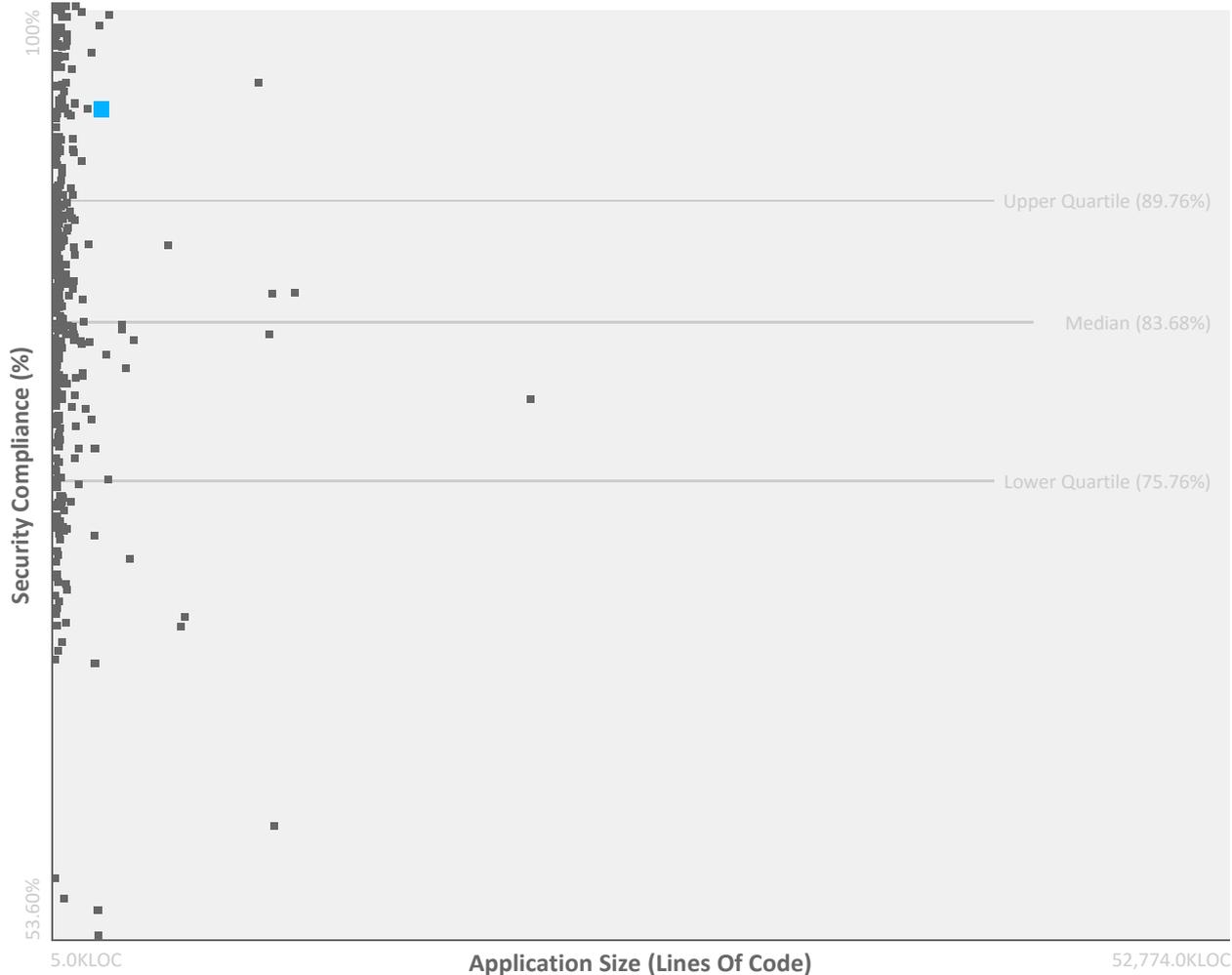
Security	Score
Highest	100.00%
Upper Quartile	89.76%
Median	83.68%
Lower Quartile	75.76%
Lowest	0.31%

■ Anonymous_3

Security Compliance (%)

100%

Upper Quartile (89.76%)

Median (83.68%)

Lower Quartile (75.76%)

53.60%

5.0KLOC   **Application Size (Lines Of Code)**   52,774.0KLOC

⚡ Security Critical Violations

The Security Health Factor is made of 545 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%
The exception Exception should never been thrown. Always Subclass Exception and throw the subclassed Classes.	.Net	1,016	**98.18%**	99.32%
Avoid empty catch blocks	.Net	169	**99.70%**	99.46%
Close SQL connection ASAP	.Net	27	**99.96%**	99.97%

94.66%

1st quartile

Rank: 120/869 apps

Security	Score
Highest	100.00%
Upper Quartile	89.76%
Median	83.68%
Lower Quartile	75.76%
Lowest	0.31%

⚡ Security Critical Violations

Critical Rules

94.66%

1st quartile

Rank: 120/869 apps

The Security Health Factor is made of 545 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry

Security	Score
Highest	100.00%
Upper Quartile	89.76%
Median	83.68%
Lower Quartile	75.76%
Lowest	0.31%

Efficiency

Critical Rules

Efficiency measures the likelihood of potential performance bottlenecks and the potential future scalability issues linked to coding practices.

Efficiency Benchmark Results
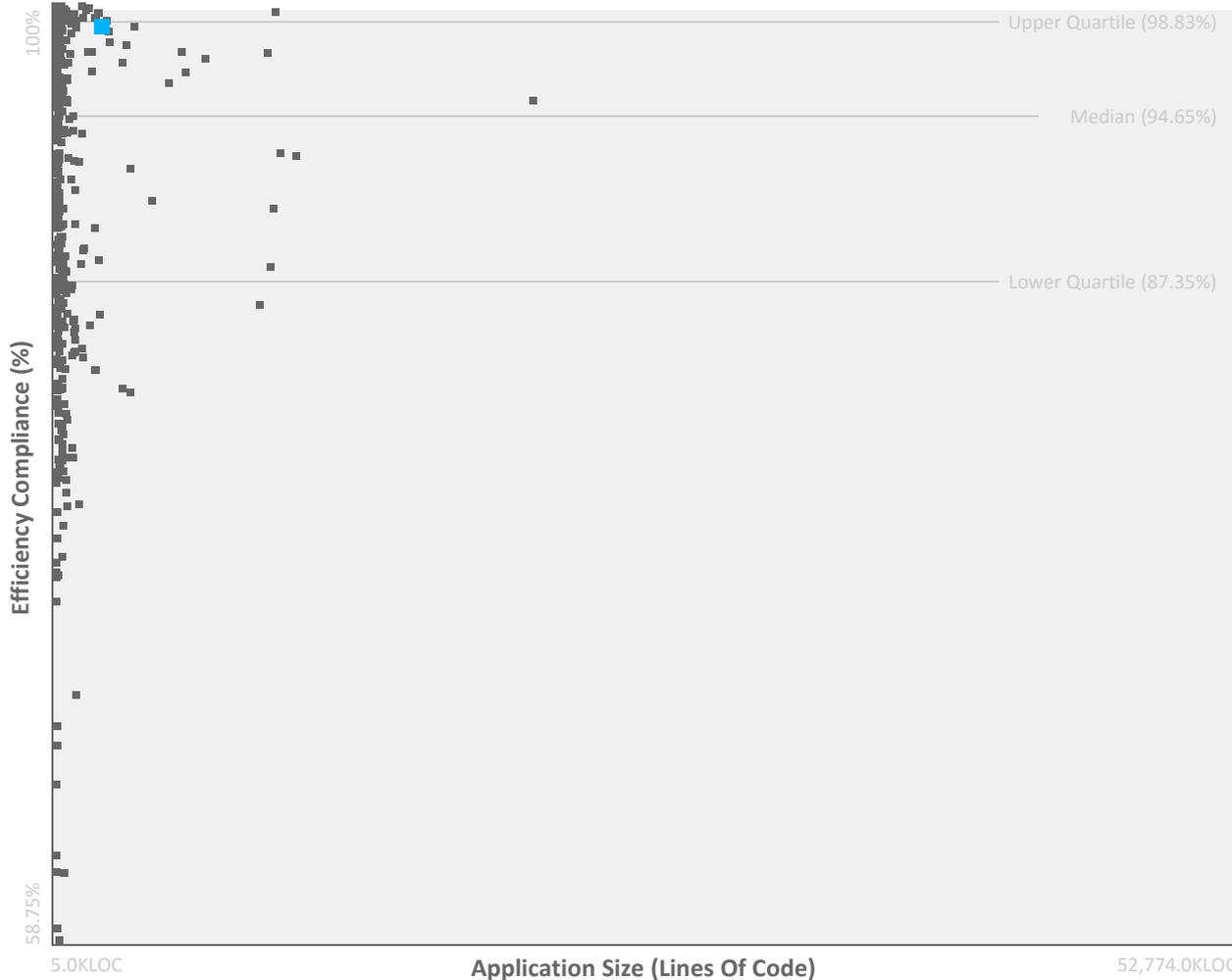
Critical Rules

98.95%

1st quartile

Rank: 168/869 apps

Efficiency	Score
Highest	100.00%
Upper Quartile	98.83%
Median	94.65%
Lower Quartile	87.35%
Lowest	58.75%

■ Anonymous_3

Upper Quartile (98.83%)

Median (94.65%)

Lower Quartile (87.35%)

100%

58.75%

Efficiency Compliance (%)

Application Size (Lines Of Code)

5.0KLOC

52,774.0KLOC

⚡ Efficiency Critical Violations

Critical Rules

98.95%

1st quartile

The Efficiency Health Factor is made of 371 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Rank: 168/869 apps

Quality Rule	Technology	Violations	Compliance	Industry
Use dedicated stored procedures when multiple data accesses are needed (ASCPEM-PRF-10)	.Net	5	**97.09%**	93.52%
Avoid String concatenation in loops	.Net	815	**98.54%**	99.30%
Avoid using SQL queries inside a loop	.Net	15	**99.76%**	95.39%
Avoid Cursors inside a loop	Microsoft T-SQL	1	**99.91%**	97.53%
Close SQL connection ASAP	.Net	27	**99.96%**	99.97%

Efficiency	Score
Highest	100.00%
Upper Quartile	98.83%
Median	94.65%
Lower Quartile	87.35%
Lowest	58.75%

Changeability

Critical Rules

Changeability measures how easily applications can be modified in order to implement new features, correct errors, or change the applications environment.

Changeability Benchmark Results
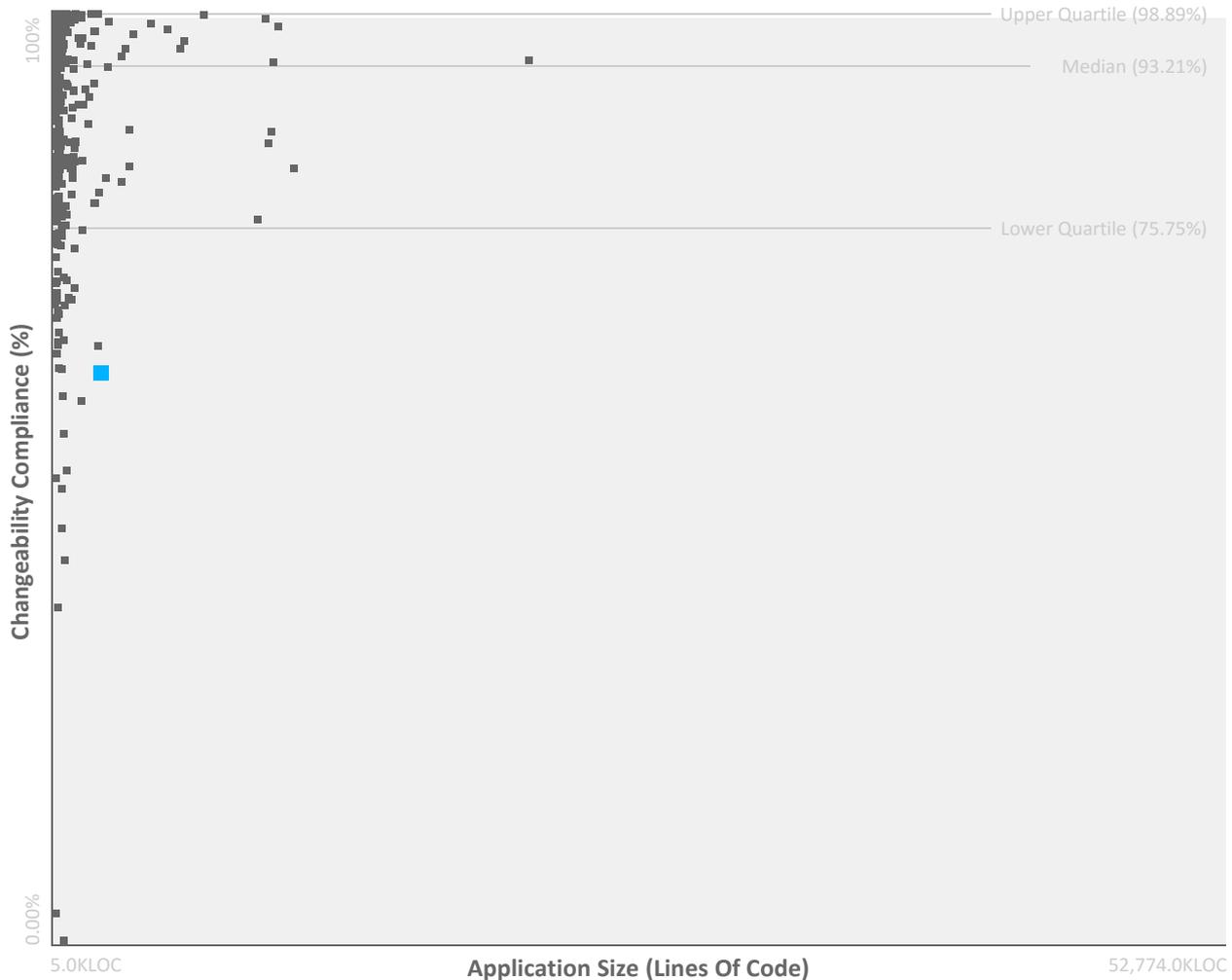
Critical Rules

60.86%

3rd quartile
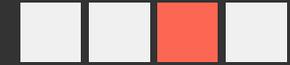
Rank: 648/869 apps

Chang.	Score
Highest	100.00%
Upper Quartile	98.89%
Median	93.21%
Lower Quartile	75.75%
Lowest	0.00%

■ Anonymous_3

Upper Quartile (98.89%)

Median (93.21%)

Lower Quartile (75.75%)

100%

0.00%

Changeability Compliance (%)

Application Size (Lines Of Code)

5.0KLOC

52,774.0KLOC

Changeability Critical Violations

Critical Rules

The Changeability Health Factor is made of 968 quality rules. Below are listed the 20 critical rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid declaring public Fields	.Net	9,102	**66.95%**	84.24%
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%

60.86%

3rd quartile

Rank: 648/869 apps

Changeability	Score
Highest	100.00%
Upper Quartile	98.89%
Median	93.21%
Lower Quartile	75.75%
Lowest	0.00%

Transferability

Critical Rules

Transferability measures how easily applications can be moved across teams or team members including in-house and outsourced development teams.

Transferability Benchmark Results

Critical Rules

66.67%

3rd quartile

Rank: 579/869 apps

Upper Quartile (99.87%)
Median (98.77%)

Lower Quartile (77.82%)

Transferability Compliance (%)

100%

0.00%

5.0KLOC   52,774.0KLOC

Application Size (Lines Of Code)
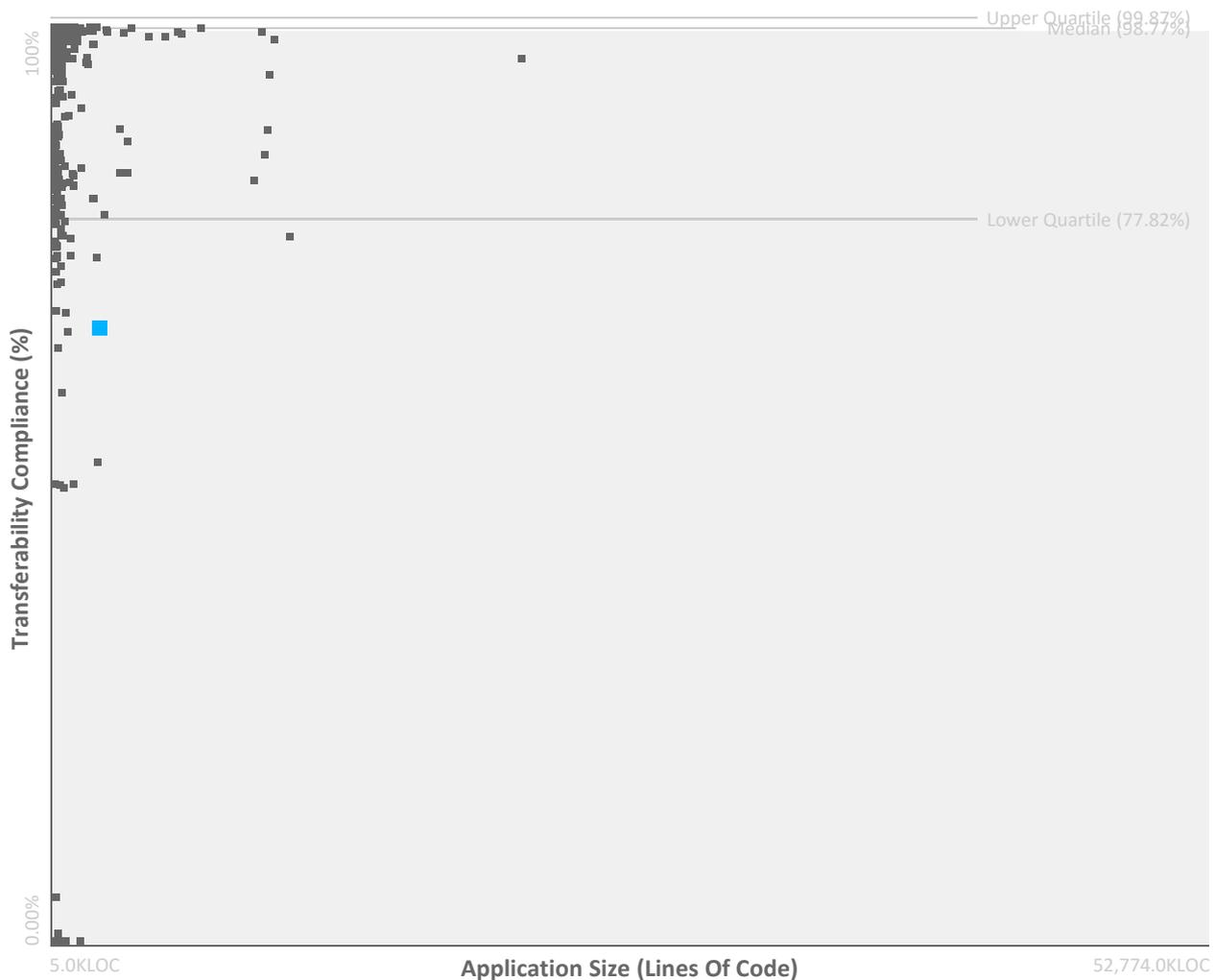
Transf.	Score
Highest	100.00%
Upper Quartile	99.87%
Median	98.77%
Lower Quartile	77.82%
Lowest	0.00%

■ Anonymous_3

Health Factor Benchmarks

All Quality Rules

How To Read Benchmark Results

TQI

86.52%

Compliance Score

The compliance score represents how an application complies to a set of quality rules. At a health factor level, the compliance score is the average of compliance scores of all quality rules attached to this health factor. 0% means that your application complies with none of the quality rules for given health factor, while 100% means that your application complies to all quality rules.

Quartiles

In descriptive statistics, the quartiles of a ranked set of data values are the three points that divide the data set into four equal groups, each group comprising a quarter of the data. In Appmarq, each quarter is associated with a color which can be green (25% of best scores), yellow, orange or red (25% of the worse scores).

Application Rank

Rank: 129/869

The rank is the precise position of the benchmarked application (the number before the slash), within the application sample you've selected to build this report (the number after the slash).

TQI (Total Quality Index)

Total Quality Index measures the general maintainability level of the application based on hundreds of metrics provided by CAST

TQI Benchmark Results
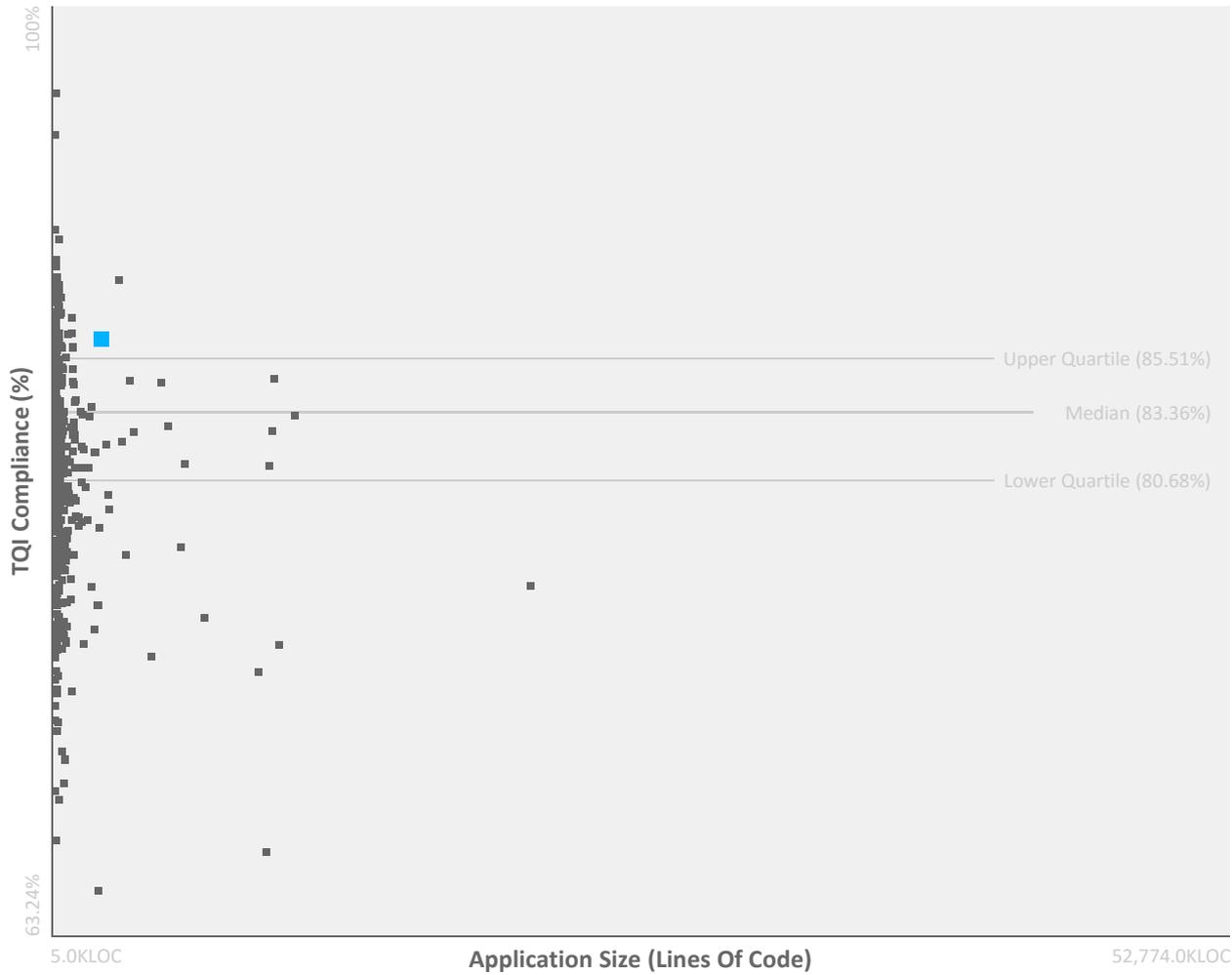
86.52%

1st quartile

Rank: 129/869 apps

TQI	Score
Highest	96.68%
Upper Quartile	85.51%
Median	83.36%
Lower Quartile	80.68%
Lowest	63.24%

■ Anonymous_3

TQI Compliance (%)

100%

Upper Quartile (85.51%)

Median (83.36%)

Lower Quartile (80.68%)

63.24%

5.0KLOC

Application Size (Lines Of Code)

52,774.0KLOC

⚡ TQI Violations

The TQI Health Factor is made of 1792 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

86.52%

1st quartile

Rank: 129/869 apps

Quality Rule	Technology	Violations	Compliance	Industry
DataReader must be called using CommandBehavior.CloseConnection enumeration	.Net	54	**0.00%**	2.54%
Avoid SQL queries not using the first column of a composite index in the WHERE clause	Microsoft T-SQL	52	**0.00%**	73.31%
Prefer UNION ALL to UNION	.Net	1	**0.00%**	38.04%
Interface naming convention - prefix	C++	22	**0.00%**	63.28%
Stored Procedure naming convention - prefix control	Microsoft T-SQL	1,062	**0.00%**	10.25%
Avoid using untyped DataSet	.Net	227	**0.00%**	4.80%
Avoid Classes with a High Lack of Cohesion	C++	749	**1.32%**	43.59%
Method naming convention - case control	C++	37,891	**2.01%**	73.57%
Avoid undocumented Methods	C++	30,107	**3.80%**	71.92%
Avoid Classes with a High Lack of Cohesion - variant	C++	723	**4.74%**	54.99%

TQI	Score
Highest	96.68%
Upper Quartile	85.51%
Median	83.36%
Lower Quartile	80.68%
Lowest	63.24%

⚡ TQI Violations - Continued

The TQI Health Factor is made of 1792 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Data Access must be based on Stored Procedure Calls	.Net	6,078	**7.08%**	33.25%
Avoid direct access to Database Tables	.Net	6,078	**7.08%**	66.62%
Dispose() methods should call GC.SuppressFinalize	.Net	16	**11.11%**	65.86%
Avoid Classes with a High Lack of Cohesion	.Net	4,949	**11.48%**	43.59%
Avoid unreferenced views	Microsoft T-SQL	760	**12.44%**	22.96%
Public Fields naming convention - case and character set control	.Net	7,877	**16.86%**	65.07%
Prefer UNION ALL to UNION	Microsoft T-SQL	46	**20.69%**	38.04%
Avoid Functions having a very low Comment/Code ratio	.Net	9,153	**22.59%**	36.93%
Avoid undocumented Functions	.Net	8,737	**26.11%**	33.73%
Avoid Classes with a High Lack of Cohesion - variant	.Net	4,049	**27.58%**	54.99%

86.52%

1st quartile

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Rank: 129/869 apps

TQI	Score
Highest	96.68%
Upper Quartile	85.51%
Median	83.36%
Lower Quartile	80.68%
Lowest	63.24%

Robustness

Robustness measures the level of risk and the likelihood of having application failures and application defects due to modifications. Robustness measures as well the level of effort necessary to test the application

Robustness Benchmark Results
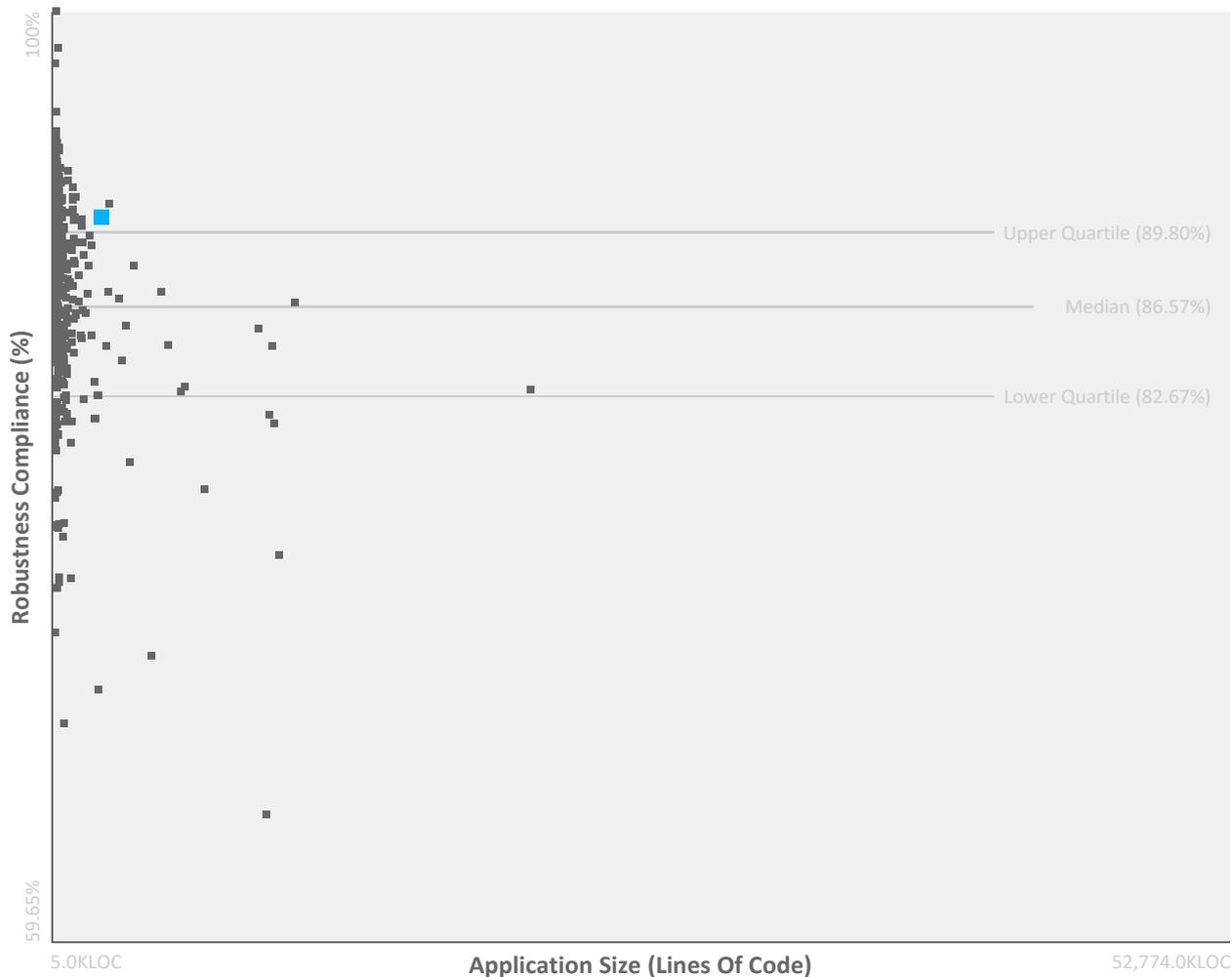
90.74%

1st quartile

Rank: 163/869 apps

Robustness	Score
Highest	99.88%
Upper Quartile	89.80%
Median	86.57%
Lower Quartile	82.67%
Lowest	59.65%

■ Anonymous_3

Robustness Compliance (%)

100%

Upper Quartile (89.80%)

Median (86.57%)

Lower Quartile (82.67%)

59.65%

5.0KLOC   **Application Size (Lines Of Code)**   52,774.0KLOC

⚡ Robustness Violations

The Robustness Health Factor is made of 936 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

90.74%

1st quartile

Rank: 163/869 apps

Quality Rule	Technology	Violations	Compliance	Industry
Data Access must be based on Stored Procedure Calls	.Net	6,078	**7.08%**	33.25%
Avoid direct access to Database Tables	.Net	6,078	**7.08%**	66.62%
Avoid unreferenced views	Microsoft T-SQL	760	**12.44%**	22.96%
Avoid unreferenced Functions	Microsoft T-SQL	705	**38.54%**	40.81%
Avoid unreferenced Functions	.Net	6,913	**41.53%**	40.81%
Avoid large Classes - too many Methods	C++	430	**44.94%**	92.12%
Avoid High Response for Classes	C++	357	**52.96%**	86.22%
Avoid large Classes - too many Constructors	C++	322	**58.77%**	97.40%
Avoid large Interfaces - too many Methods	C++	9	**59.09%**	82.41%
Avoid Too Many Copy Pasted Artifacts	Microsoft T-SQL	159	**62.32%**	67.50%

Robustness	Score
Highest	99.88%
Upper Quartile	89.80%
Median	86.57%
Lower Quartile	82.67%
Lowest	59.65%

⚡ Robustness Violations - Continued

The Robustness Health Factor is made of 936 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid Classes with High Coupling Between Objects	.Net	1,560	**72.10%**	60.57%
Avoid having multiple Artifacts inserting data on the same SQL Table	Microsoft T-SQL	286	**73.22%**	90.65%
Avoid Artifacts with a Complex SELECT Clause	Microsoft T-SQL	299	**74.05%**	80.44%
Avoid Too Many Copy Pasted Artifacts	.Net	889	**74.62%**	67.50%
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%
Avoid Artifacts with High Fan-Out	.Net	15,882	**76.54%**	86.54%
Avoid High Response for Classes	.Net	1,293	**76.87%**	86.22%
Avoid Tables not using referential integrity	Microsoft T-SQL	170	**84.08%**	28.83%
Avoid unreferenced Forms	.Net	2	**88.24%**	96.89%
Avoid Artifacts with too many parameters	Microsoft T-SQL	122	**88.95%**	97.60%

90.74%

1st quartile

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Rank: 163/869 apps

Robustness	Score
Highest	99.88%
Upper Quartile	89.80%
Median	86.57%
Lower Quartile	82.67%
Lowest	59.65%

Security

Security measures the likelihood of potential security breaches linked to coding practices and application source code.

Security Benchmark Results

91.13%

1st quartile

Rank: 168/869 apps

Upper Quartile (90.00%)

Median (86.14%)

Lower Quartile (80.47%)

Security Compliance (%)

100%

53.60%

5.0KLOC

Application Size (Lines Of Code)

52,774.0KLOC
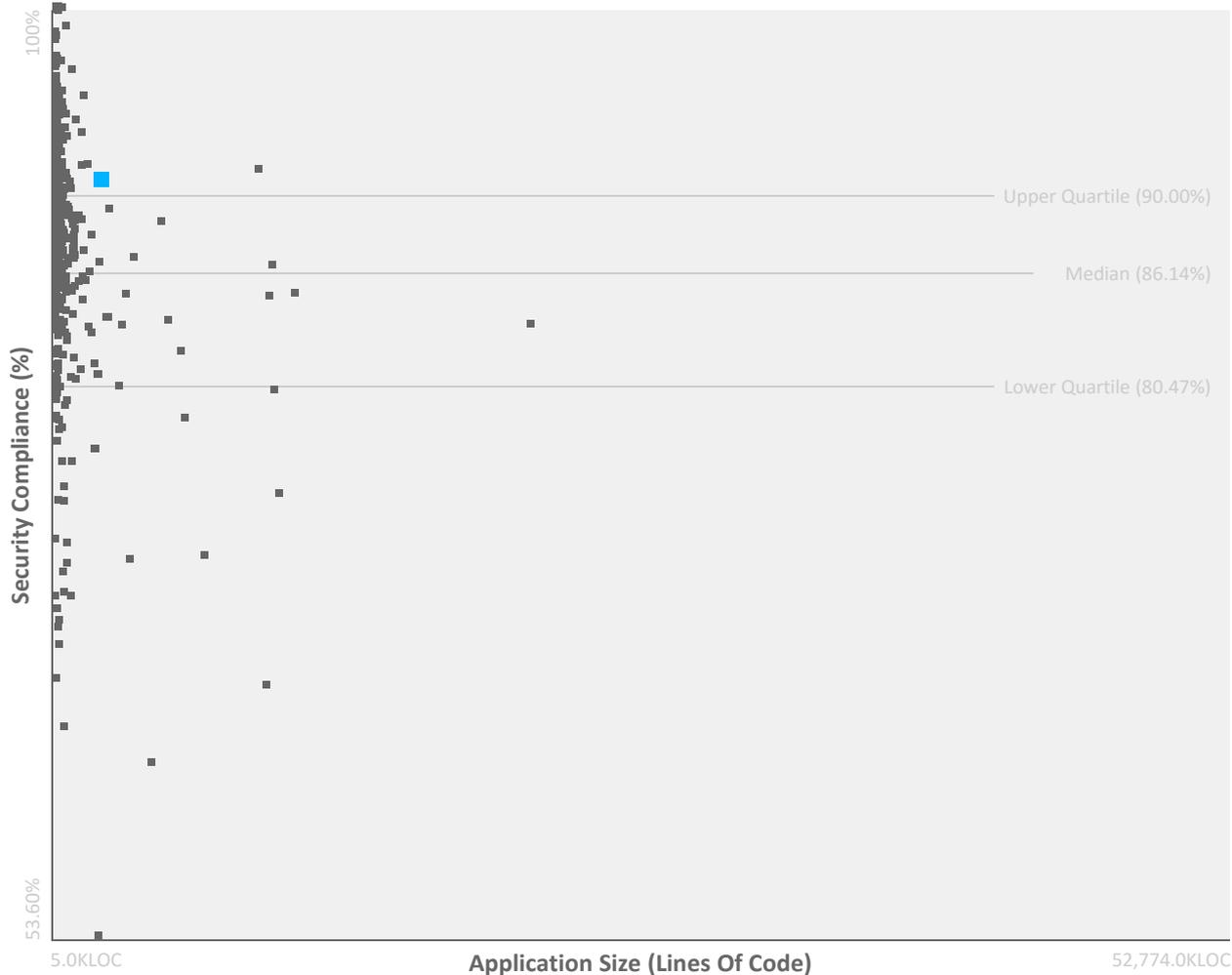
Security	Score
Highest	100.00%
Upper Quartile	90.00%
Median	86.14%
Lower Quartile	80.47%
Lowest	53.60%

■ Anonymous_3

⚡ Security Violations

The Security Health Factor is made of 545 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Data Access must be based on Stored Procedure Calls	.Net	6,078	**7.08%**	33.25%
Avoid direct access to Database Tables	.Net	6,078	**7.08%**	66.62%
Dispose() methods should call GC.SuppressFinalize	.Net	16	**11.11%**	65.86%
Provide a private default Constructor for utility Classes	.Net	79	**40.15%**	14.69%
Avoid declaring public Fields	.Net	9,102	**66.95%**	84.24%
Avoid having multiple Artifacts inserting data on the same SQL Table	Microsoft T-SQL	286	**73.22%**	90.65%
Avoid cyclical calls and inheritances between namespaces content	.Net	155	**76.48%**	92.34%
Avoid Classes with a High Public Data Ratio	.Net	444	**92.06%**	94.92%
Declare as static all Methods not using Instance Fields	.Net	3,848	**93.73%**	86.44%
Avoid catching an exception of type Exception, RuntimeException, or Throwable	.Net	3,042	**94.48%**	95.76%

91.13%

1st quartile

Rank: 168/869 apps

Security	Score
Highest	100.00%
Upper Quartile	90.00%
Median	86.14%
Lower Quartile	80.47%
Lowest	53.60%

The Security Health Factor is made of 545 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid using temporary Objects	Microsoft T-SQL	52	**97.42%**	90.01%
Avoid large number of String concatenation	.Net	1,122	**97.99%**	99.11%
The exception Exception should never been thrown. Always Subclass Exception and throw the subclassed Classes.	.Net	1,016	**98.18%**	99.32%
User Interface elements must not use directly the database	.Net	893	**98.56%**	99.78%
Avoid missing default in switch statements	.Net	668	**98.80%**	99.64%
Avoid types that own disposable fields and are not disposable	.Net	35	**99.41%**	95.07%
Avoid using String.Empty for empty string tests	.Net	144	**99.64%**	98.75%
Avoid empty catch blocks	.Net	169	**99.70%**	99.46%
Close SQL connection ASAP	.Net	27	**99.96%**	99.97%
Avoid empty finally blocks	.Net	20	**99.97%**	99.93%

91.13%

1st quartile

Rank: 168/869 apps

| Security	Score
Highest	100.00%
Upper Quartile	90.00%
Median	86.14%
Lower Quartile	80.47%
Lowest	53.60%

Efficiency

Efficiency measures the likelihood of potential performance bottlenecks and the potential future scalability issues linked to coding practices.

Efficiency Benchmark Results

Efficiency Compliance (%)

Application Size (Lines Of Code)

100%

54.96%

5.0KLOC — 52,774.0KLOC

Upper Quartile (88.42%)
Median (85.53%)
Lower Quartile (82.49%)
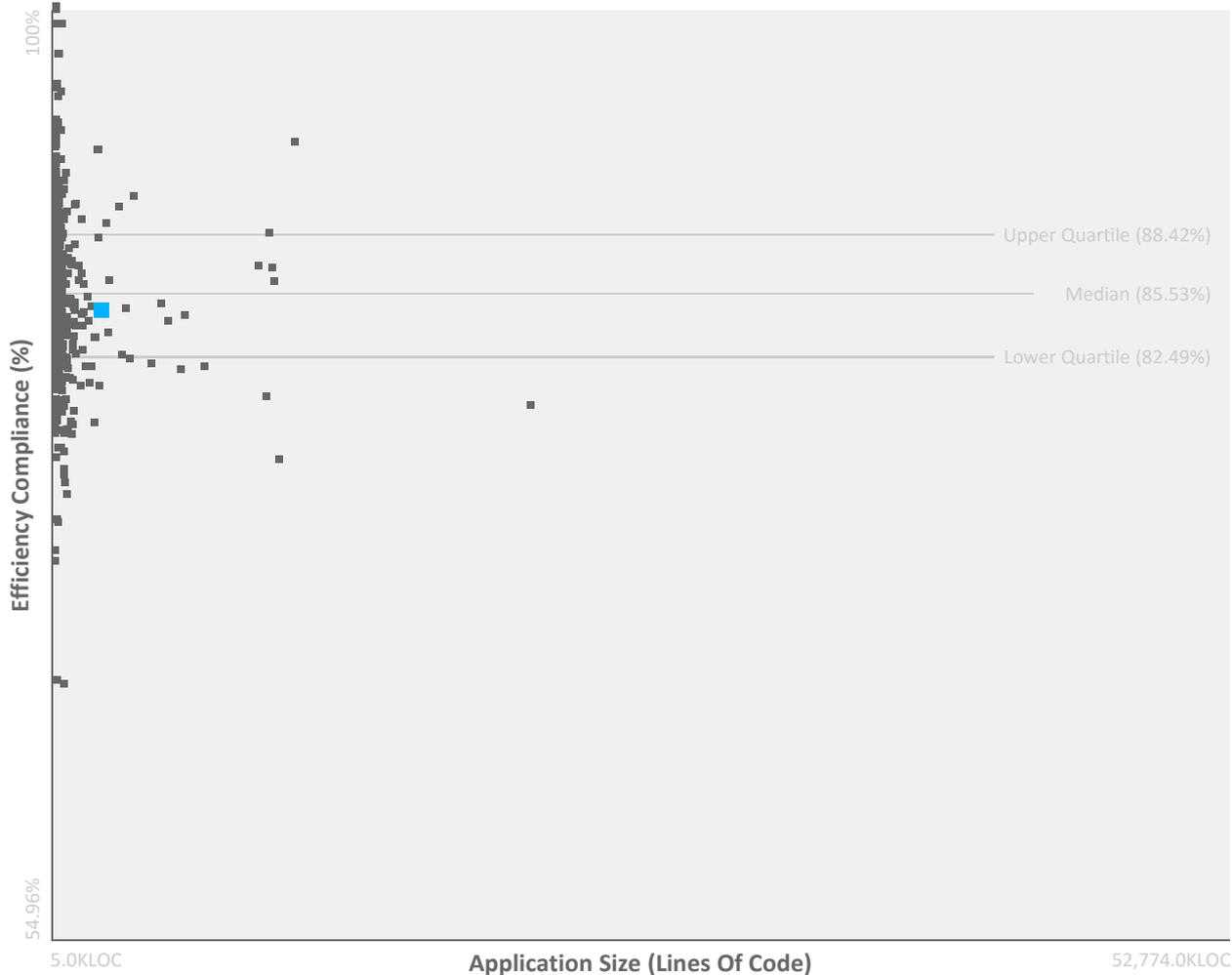
85.08%

3rd quartile

Rank: 470/869 apps

Efficiency	Score
Highest	100.00%
Upper Quartile	88.42%
Median	85.53%
Lower Quartile	82.49%
Lowest	54.96%

■ Anonymous_3

⚡ Efficiency Violations

The Efficiency Health Factor is made of 371 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid SQL queries not using the first column of a composite index in the WHERE clause	Microsoft T-SQL	52	**0.00%**	73.31%
Prefer UNION ALL to UNION	.Net	1	**0.00%**	38.04%
Dispose() methods should call GC.SuppressFinalize	.Net	16	**11.11%**	65.86%
Prefer UNION ALL to UNION	Microsoft T-SQL	46	**20.69%**	38.04%
Use BeginUpdate/EndUpdate when using Items.Add method in loop	.Net	16	**30.43%**	32.87%
Provide a private default Constructor for utility Classes	.Net	79	**40.15%**	14.69%
Avoid Artifacts with a Complex SELECT Clause	Microsoft T-SQL	299	**74.05%**	80.44%
Avoid changing DataSource member before ValueMember/DisplayMember	.Net	5	**80.77%**	43.62%
Avoid SQL queries that no index can support	Microsoft T-SQL	147	**83.97%**	88.14%
Avoid Tables not using referential integrity	Microsoft T-SQL	170	**84.08%**	28.83%

85.08%

3rd quartile

⬜ ⬜ 🟧 ⬜

Rank: 470/869 apps

Efficiency	Score
Highest	100.00%
Upper Quartile	88.42%
Median	85.53%
Lower Quartile	82.49%
Lowest	54.96%

⚡ Efficiency Violations - Continued

The Efficiency Health Factor is made of 371 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid using SQL queries inside a loop	Microsoft T-SQL	91	**92.10%**	95.39%
Avoid "SELECT *" queries	.Net	768	**93.55%**	89.26%
Declare as static all Methods not using Instance Fields	.Net	3,848	**93.73%**	86.44%
Avoid "SELECT *" queries	Microsoft T-SQL	246	**93.91%**	89.26%
Avoid Artifacts with High RAW SQL Complexity	Microsoft T-SQL	114	**94.36%**	98.17%
Avoid SQL queries with implicit conversions in the WHERE clause	Microsoft T-SQL	41	**95.53%**	86.30%
Use dedicated stored procedures when multiple data accesses are needed (ASCPEM-PRF-10)	.Net	5	**97.09%**	93.52%
Avoid redundant indexes	Microsoft T-SQL	27	**97.47%**	97.31%
Avoid large number of String concatenation	.Net	1,122	**97.99%**	99.11%
Avoid queries using old style join convention instead of ANSI-Standard joins	Microsoft T-SQL	35	**98.27%**	89.17%

85.08%

3rd quartile
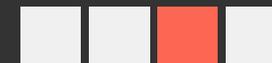
Rank: 470/869 apps

Efficiency	Score
Highest	100.00%
Upper Quartile	88.42%
Median	85.53%
Lower Quartile	82.49%
Lowest	54.96%

Changeability

Changeability measures how easily applications can be modified in order to implement new features, correct errors, or change the applications environment.

Changeability Benchmark Results
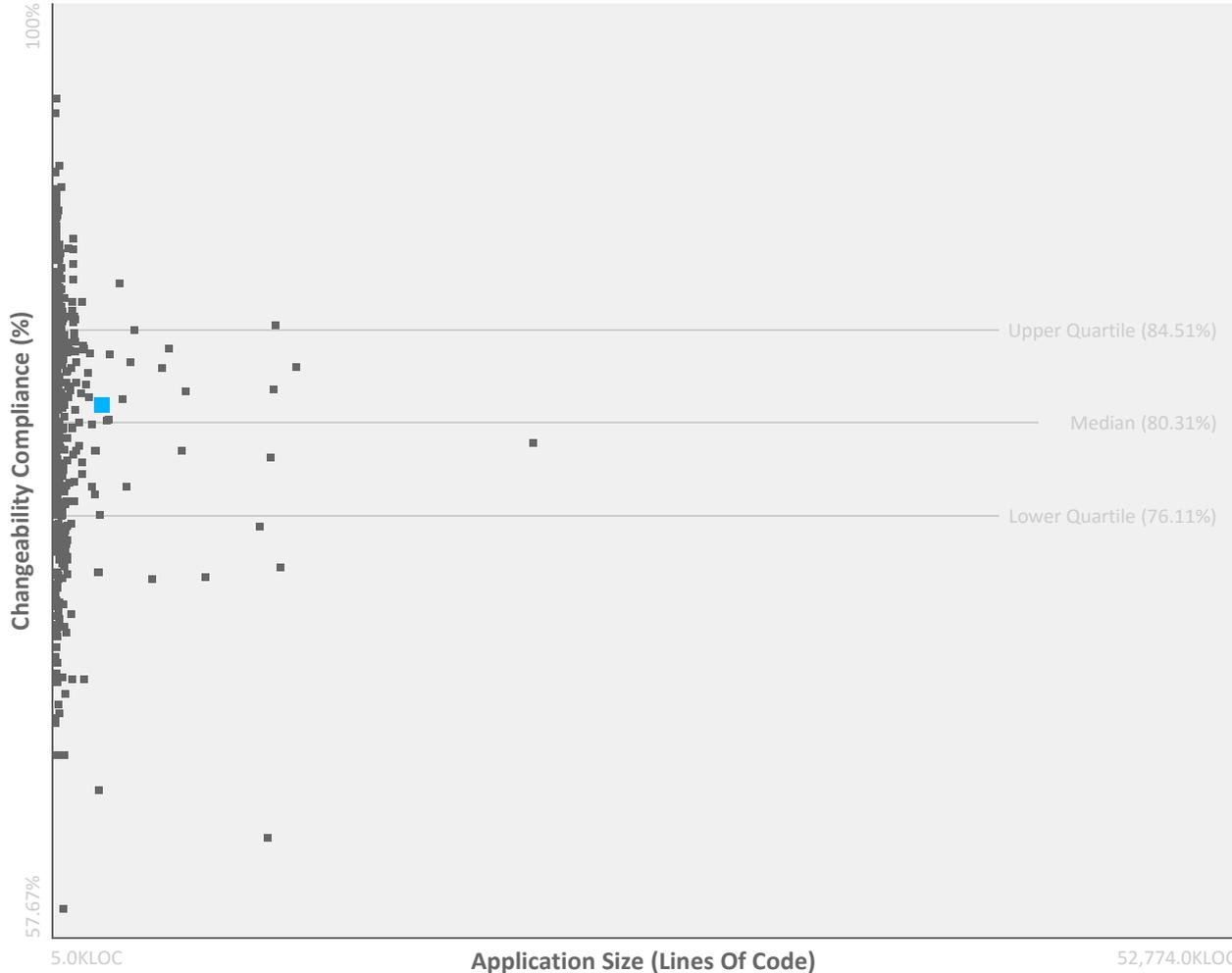
81.44%

2nd quartile

Rank: 385/869 apps

Chang.	Score
Highest	95.88%
Upper Quartile	84.51%
Median	80.31%
Lower Quartile	76.11%
Lowest	57.67%

■ Anonymous_3

Upper Quartile (84.51%)

Median (80.31%)

Lower Quartile (76.11%)

Changeability Compliance (%)

100%

57.67%

Application Size (Lines Of Code)

5.0KLOC

52,774.0KLOC

⚡ Changeability Violations

The Changability Health Factor is made of 968 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Stored Procedure naming convention - prefix control	Microsoft T-SQL	1,062	**0.00%**	10.25%
Avoid using untyped DataSet	.Net	227	**0.00%**	4.80%
Avoid Classes with a High Lack of Cohesion	C++	749	**1.32%**	43.59%
Method naming convention - case control	C++	37,891	**2.01%**	73.57%
Avoid undocumented Methods	C++	30,107	**3.80%**	71.92%
Avoid Classes with a High Lack of Cohesion - variant	C++	723	**4.74%**	54.99%
Data Access must be based on Stored Procedure Calls	.Net	6,078	**7.08%**	33.25%
Avoid direct access to Database Tables	.Net	6,078	**7.08%**	66.62%
Avoid Classes with a High Lack of Cohesion	.Net	4,949	**11.48%**	43.59%
Avoid unreferenced views	Microsoft T-SQL	760	**12.44%**	22.96%

81.44%

2nd quartile

Rank: 385/869 apps

Chang.	Score
Highest	95.88%
Upper Quartile	84.51%
Median	80.31%
Lower Quartile	76.11%
Lowest	57.67%

Changeability Violations - Continued

The Changeability Health Factor is made of 968 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Public Fields naming convention - case and character set control	.Net	7,877	**16.86%**	65.07%
Avoid Functions having a very low Comment/Code ratio	.Net	9,153	**22.59%**	36.93%
Avoid undocumented Functions	.Net	8,737	**26.11%**	33.73%
Avoid Classes with a High Lack of Cohesion - variant	.Net	4,049	**27.58%**	54.99%
Avoid undocumented Functions	C++	193	**36.72%**	33.73%
Avoid unreferenced Functions	Microsoft T-SQL	705	**38.54%**	40.81%
Provide a private default Constructor for utility Classes	.Net	79	**40.15%**	14.69%
Avoid unreferenced Functions	.Net	6,913	**41.53%**	40.81%
Avoid undocumented Forms	.Net	9	**47.06%**	84.46%
Avoid large Classes - too many Constructors	C++	322	**58.77%**	97.40%

81.44%

2nd quartile

Rank: 385/869 apps

| Chang.	Score
Highest	95.88%
Upper Quartile	84.51%
Median	80.31%
Lower Quartile	76.11%
Lowest	57.67%

Transferability

Transferability measures how easily applications can be moved across teams or team members including in-house and outsourced development teams.

Transferability Benchmark Results
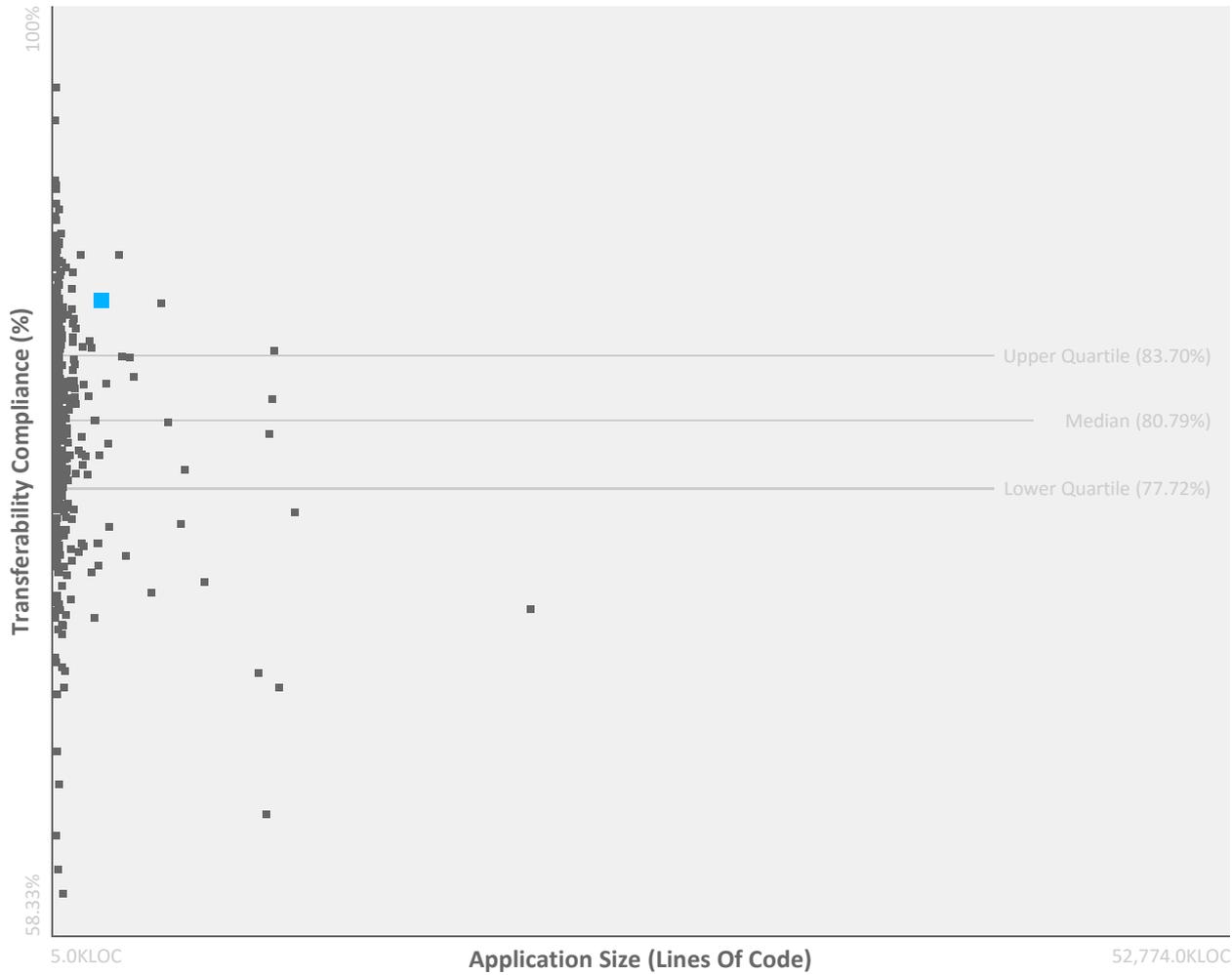
86.44%

1st quartile

Rank: 79/869 apps

Transf.	Score
Highest	99.65%
Upper Quartile	83.70%
Median	80.79%
Lower Quartile	77.72%
Lowest	58.33%

■ Anonymous_3

Transferability Compliance (%)

100%

58.33%

Upper Quartile (83.70%)

Median (80.79%)

Lower Quartile (77.72%)

5.0KLOC

Application Size (Lines Of Code)

52,774.0KLOC

⚡ Transferability Violations

The Transferability Health Factor is made of 960 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Stored Procedure naming convention - prefix control	Microsoft T-SQL	1,062	**0.00%**	10.25%
Avoid using untyped DataSet	.Net	227	**0.00%**	4.80%
Method naming convention - case control	C++	37,891	**2.01%**	73.57%
Avoid undocumented Methods	C++	30,107	**3.80%**	71.92%
Avoid unreferenced views	Microsoft T-SQL	760	**12.44%**	22.96%
Public Fields naming convention - case and character set control	.Net	7,877	**16.86%**	65.07%
Avoid Functions having a very low Comment/Code ratio	.Net	9,153	**22.59%**	36.93%
Avoid undocumented Functions	.Net	8,737	**26.11%**	33.73%
Avoid undocumented Functions	C++	193	**36.72%**	33.73%
Avoid unreferenced Functions	Microsoft T-SQL	705	**38.54%**	40.81%

86.44%

1st quartile

Rank: 79/869 apps

Transf.	Score
Highest	99.65%
Upper Quartile	83.70%
Median	80.79%
Lower Quartile	77.72%
Lowest	58.33%

⚡ Transferability Violations - Continued

The Transferability Health Factor is made of 960 quality rules. Below are listed the 20 quality rules with the lowest compliance ratios for Anonymous_3, compared to other applications in Appmarq.

Quality Rule	Technology	Violations	Compliance	Industry
Avoid unreferenced Functions	.Net	6,913	**41.53%**	40.81%
Avoid large Classes - too many Methods	C++	430	**44.94%**	92.12%
Avoid undocumented Forms	.Net	9	**47.06%**	84.46%
Avoid High Response for Classes	C++	357	**52.96%**	86.22%
Avoid large Classes - too many Constructors	C++	322	**58.77%**	97.40%
Avoid large Interfaces - too many Methods	C++	9	**59.09%**	82.41%
Avoid undocumented Methods	.Net	21,976	**64.17%**	71.92%
Avoid Classes with a very low comment/code ratio	.Net	1,906	**65.91%**	68.57%
Avoid Classes with High Coupling Between Objects	.Net	1,560	**72.10%**	60.57%
Avoid Artifacts with a Complex SELECT Clause	Microsoft T-SQL	299	**74.05%**	80.44%

86.44%

1st quartile

Rank: 79/869 apps

Transf.	Score
Highest	99.65%
Upper Quartile	83.70%
Median	80.79%
Lower Quartile	77.72%
Lowest	58.33%

Contact Information

CAST
321 W. 44th St., Suite 501 - New-York, NY 10036 - USA
Phone: +1 212 759 3845 - Email: contact@appmarq.com

Product Owner:
Michael MULLER (m.muller@castsoftware.com)