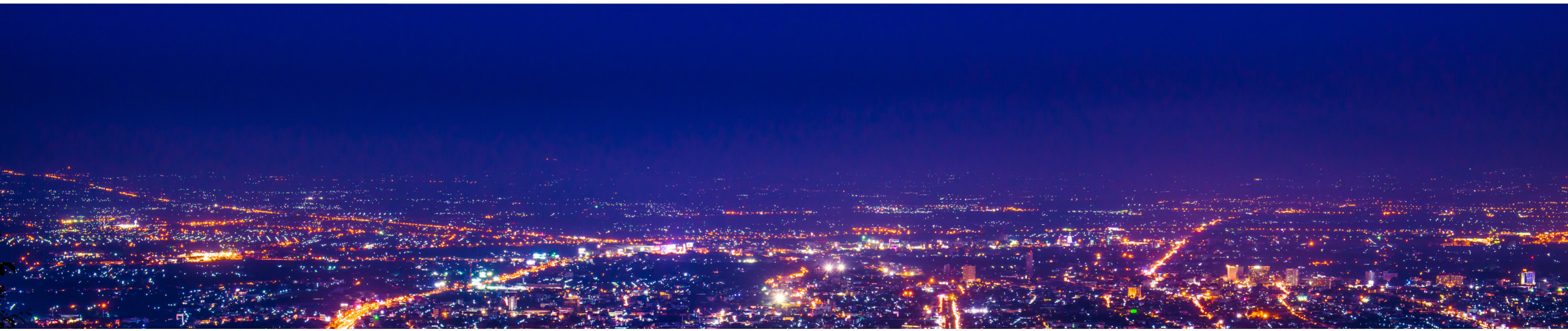
BlueOptima Global Benchmark Report

Key Trends in the Global Software development Industry

April to June 2022



Welcome

Welcome to the BlueOptima Global Benchmark (BGB) Report which provides insights into key trends from across the software development industry.

This quarters key insights are:

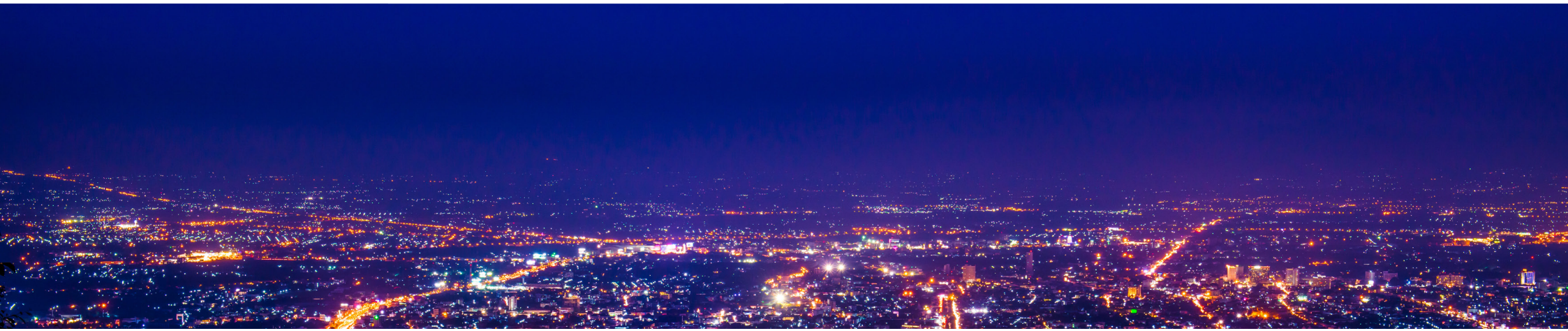
- **The rate of global decline in productivity has started to slow compared to last quarter.**
- **The greatest increase in billable coding effort was GRULAC, which is interesting considering it had almost an 8% drop in productivity for the quarter.**
- **The usage of C# increased across enterprise software development and now sits in the top three most used enterprise languages, accounting for nearly 8.4% of the coding effort delivered globally.**

The report provides a global view of the current trends of software development productivity. By consolidating the insights derived from analysis of source code changes delivered by hundreds of thousands of professional software developers working in enterprises located in more than 30 countries, the report provides a quantitative evaluation of their performance. This Report is published quarterly with each Report containing data from the preceding 12 months. The data is analysed using BlueOptima's Developer Analytics platform to calculate Coding Effort (CE), which sets a global standard for measuring software developer productivity. Coding Effort is a metric derived from objectively measuring a software developer's work outputs, specifically changes in static source code metrics, and the context within which that output was delivered then benchmarking that against all other developers.

Coding Effort is used by large global enterprises to compare the productivity of software engineers across technologies and software development methodologies to deliver actionable insights to optimise the software development lifecycle.

Alongside productivity, the maintainability of source code changes delivered by software developers are measured using BlueOptima's Analysis of Relative Thresholds (ART). Analysis of Relative Thresholds is an objective measure of source code maintainability obtained by using static source code metrics to evaluate how easy it is for a developer unfamiliar with the source code to deliver change into that source code. ART is described as 'quality' in this report. It is the proportion of Billable Coding Effort (BCE) hours spent delivering maintainable source code change.

The analysis within this report deliberately excludes part-time and hobbyist software developers. For example, those contributing to open source projects, as the economic cost and impact of their participation in these projects are indirect



and unclear. The data employed in this analysis represents an approximated 2% sampling of the global enterprise software developer population.

About BlueOptima

BlueOptima's analytics platform empowers software developers and their companies to create better software in the most time and cost-efficient way.

The first solution of its kind, BlueOptima provides insight based on the world's only objective software developer productivity metrics: Coding Effort. It's a breakthrough for software development.

BlueOptima's SaaS platform facilitates analysis of productivity, together with quality, in enterprise software development, in terms of individuals, teams, tasks, projects, divisions, and outsourced suppliers. Understanding variations in performance across an enterprise empowers managers to optimise efficiency. BlueOptima is proven to identify savings of up to 20% for software budgets.

BlueOptima's further offerings around benchmarking and recruiting allow organisations to cost-optimise as early as possible in software initiatives.

Find out more

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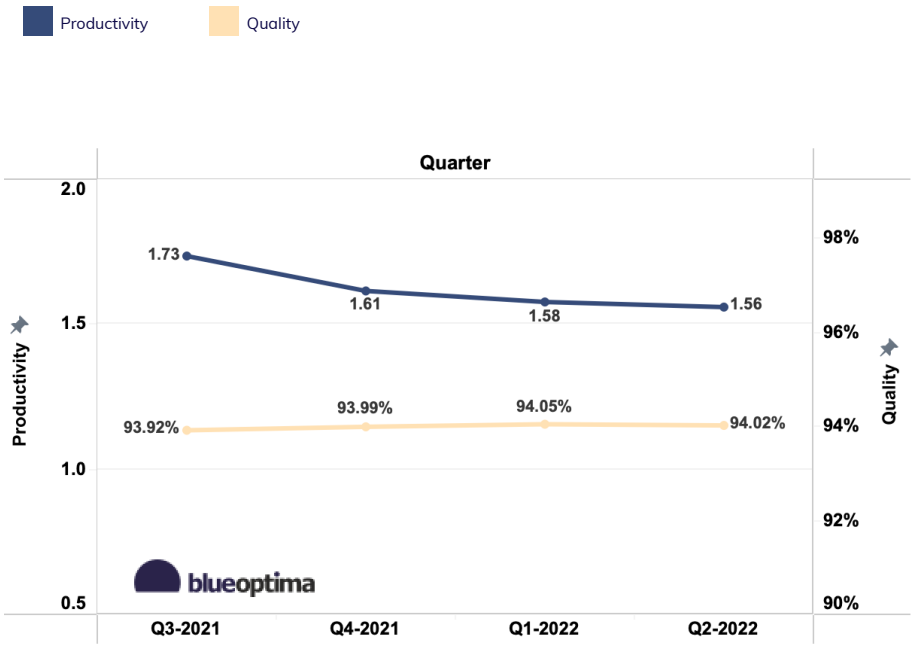
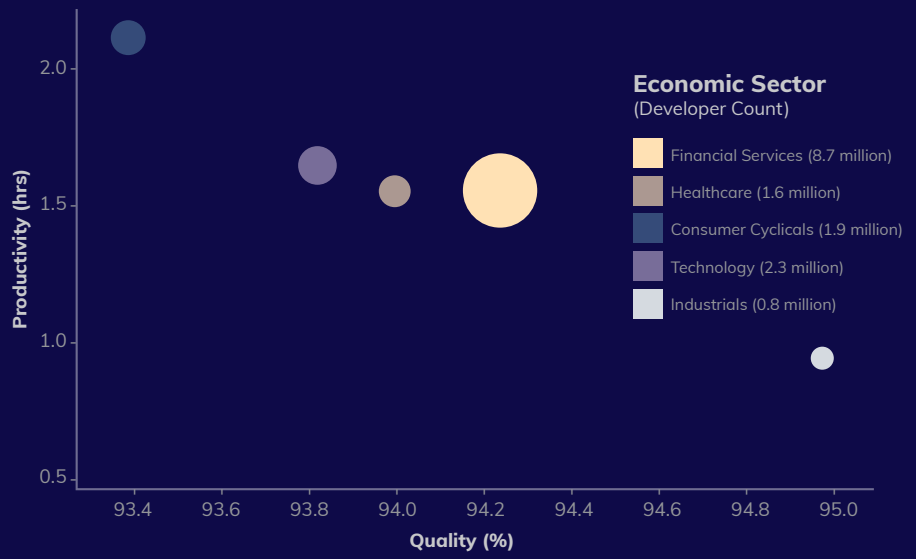
Global Benchmark Trends

Overall, global trends are showing a downward slope in productivity, albeit the rate of decline has markedly slowed this quarter. For this quarter in particular we can see a global drop of 1.1% in productivity between Q2 2022 to Q1 2022. Global quality has remained steady for this quarter with roughly a ~0.03% decline suggesting this is starting to stabilise.





Economic Sector Performance

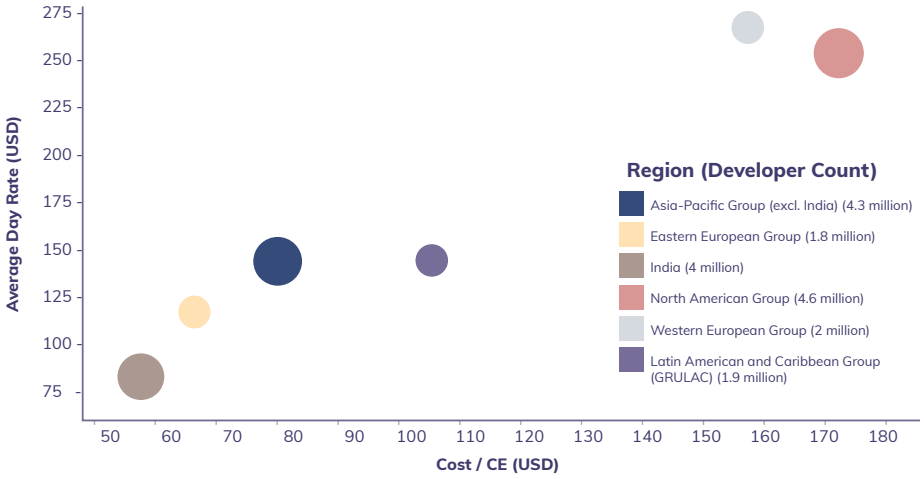
This quarter, almost every sector experienced a drop in productivity compared to the previous quarter. The exception to this trend was Technology where there was negligible change in productivity.

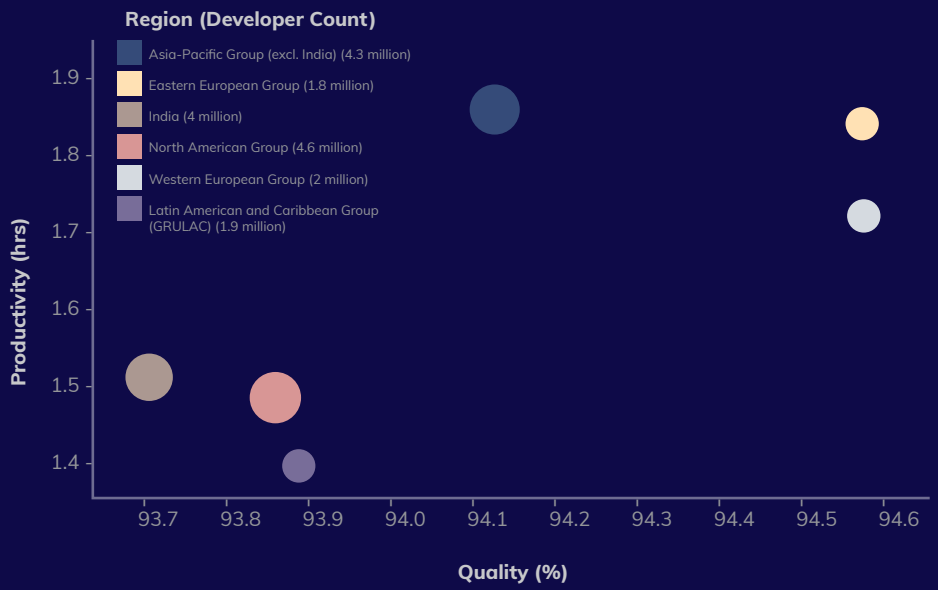
Consumer Cyclicals is the most productive economic sector for the quarter with 2.1 BCE per day. Although Consumer Cyclicals ranked as the most productive area, there was a drop of roughly ~3% compared to the previous quarter. Meanwhile the Financial sector produced the highest quality of code at 94.2%.

Regional Cost Efficiency

The cost per hour of Coding Effort has risen compared to last year. The two regions with the lowest cost to deliver an hour of Coding Effort remain the same, Eastern European developers presented at $63.80 (USD) and Indian developers demonstrated $55.03 (USD) per hour of Billable Coding Effort.

The two most expensive regions remained consistent with previous quarters, which were North America at $170.25 (USD) and Western Europe at $155.08 (USD) per hour of Billable Coding Effort. Even though North America experienced a drop in both productivity and quality, it was the region with the highest average day rate at $170.25 (USD) per hour of Billable Coding Effort in comparison to other geographical regions. Whereas Western Europe saw a slightly greater drop in productivity and an increase in quality from the previous quarter.





Regional Performance

After looking at the averages for the last 12 months, we can see little movement when it comes to the productivity of developers and the quality of code produced based on geographical regions.

However, the one exception is Latin American and Caribbean Group (GRULAC) productivity, which is not following the same trend as other regions and saw the greatest (~8%) downward shift in productivity compared to last quarter (Q1 2022).

Top Enterprise Technologies

Source code language families employed in enterprises move slowly, Java continues to top the charts as the most commonly used language in enterprise software development, as it has for several years. This equates to over a fifth of Coding Effort (CE) delivered globally within our sample at roughly 21%.

The usage of C# has increased across enterprise software development and now sits in the top three most used enterprise languages, accounting for nearly 8.4% of the coding effort delivered globally.

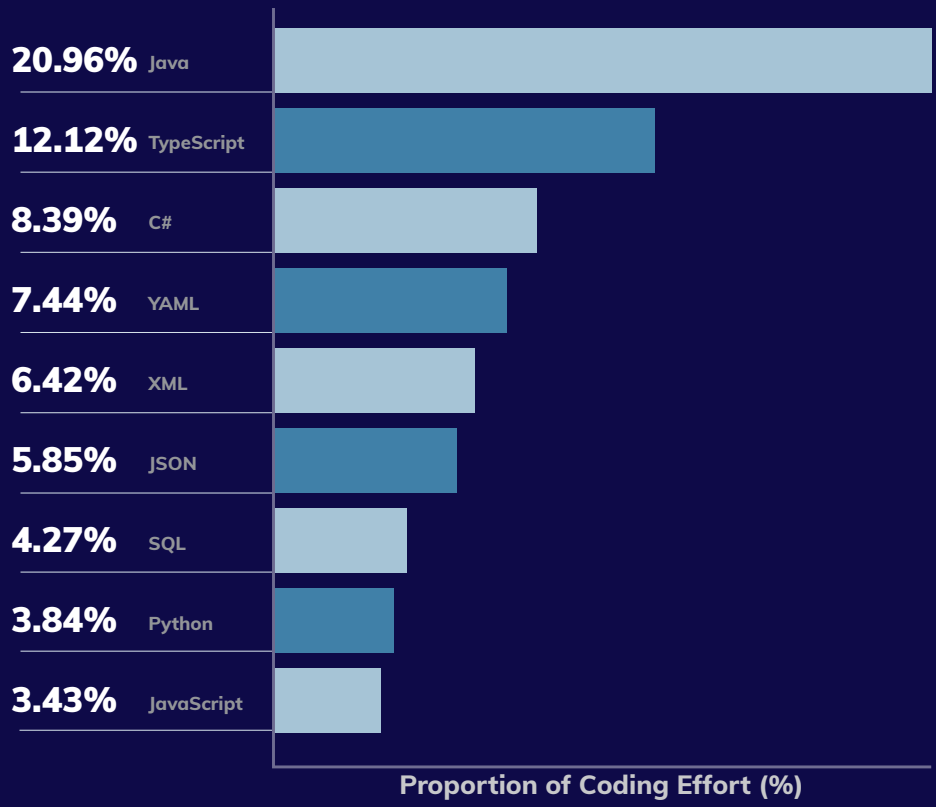
Although there has been no shift in the top three languages over the past 12 months that are utilised by enterprise companies, software configuration mark-up conventions such as YAML are moving. YAML has become the fourth highest investment of Coding Effort across the global sample of enterprises, accounting for approximately 7.4% of the Coding Effort delivered globally. Interestingly YAML has had quite the change in relation to the other extensible markup conventions (e.g. XML). JSON, SQL and Python have also seen upward shifts during the last year of data. Whereas XML has seen a comparable decline potentially an offset due to Typescript.

Top three languages

20.96% development done using **JAVA**

12.12% development done using **TYPESCRIPT**

8.39% development done using **C#**



More about the Report's Data

Proration Methodology Changes

BlueOptima has made significant improvements to our proration logic, particularly when handling infrequent committers or those with an extended break from the code base, this change considerably reduces the instance of underreported productivity due to extended absences from working with a codebase. In order to ensure the comparison between the two quarters is statistically justifiable the previous quarters data has been recalculated in this report so both quarters are using the same proration methodology and hence a comparison on productivity can be made.

Coding Effort

Coding Effort is calculated by statistically evaluating every source code change made by developers in terms of 36 static source code metrics measuring various aspects of Volume, Complexity, and Inter-relatedness while considering the context worked in e.g. a complex legacy software component or a brand new project.

Analysis of Relative Thresholds (ART)

ART is a measure of the quality (specifically: maintainability) of source code. It is calculated by evaluating the proportion of code which is aberrant, relative to the codebase in which it sits. Code is flagged as aberrant when it violates certain internally benchmarked statistical thresholds, across a number of static source code metrics.

BlueOptima Population Sample

This report leverages models and analysis built on the BlueOptima dataset which contains activities of over 400,000 developers and more than 126 Billion static metrics changes. Detailed location, employment, and organisational data is available for more than 32,000 based in India, 10,000 based in North America, 8,000 based in Western Europe, 4000 based in Eastern Europe, 4,000 based in the APAC region (excl. India & China), 3,000 based in China, and 2,000 based in Latin America and the Caribbean. The regions of Africa and the Middle East, which represent an estimated 6.8% of the global developer population, have been omitted from this analysis due to insufficient sample size. All data used is anonymised and aggregated.

Global Software Developer Population

BlueOptima uses a sampling technique in calculating the performance of software engineers across various geographical regions and industries globally. BlueOptima has estimated the global

software developer population using a combination of accredited sources and predictive modelling.

The global population of software engineers across various geographical regions according to the BlueOptima Global Benchmark are 3,966,219 in India, 4,642,058 in North America, 1,834,578 in Eastern Europe, 1,962,108 in Western Europe, 4,317,893 in the APAC region (excl. India), and 1,898,734 in Latin America and the Caribbean. Africa and the Middle East, which represent an estimated 6.8% of the global developer population, have been omitted from this analysis due to insufficient sample size. All data used is anonymised and aggregated.

Estimates of the total number of developers per region are derived from the following sources using a process of harmonising the data sources and arriving at a best-estimate across all sources: IDC Worldwide Developer Census, Evans Data Global Developer Population and Demographic Study, Stack Overflow State of European Tech, Statista, and World Bank Open Data.

Business Classification

The classification of organisations into Economic Sectors, Industry Groups, and Industries is done using The Refinitiv Business Classification. Estimates of the numbers of enterprise software developers in Economic Sectors, Industry Groups, and Industries is done by measuring various proxies of software developers in a firm (e.g. annual revenue, profit, assets, and headcount of each organisation) on a per industry basis and optimising estimation of this against the known developer population in a subset of the those organisations that are known to BlueOptima. Once this industry level estimate is arrived at, constituents of the Global 2000 are evaluated and their developer populations estimated. The relative proportions of developers in Economic Sectors are then applied on a pro rata basis to the global software developer population.

This analysis is provided as a source of information in good faith based on sound underlying data. However, BlueOptima accepts no liability for any actions taken in reliance on this analysis.

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