From Code Reviews to Architecture Decisions: The Daily Life of a Data Scientist Lead

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1. Introduction

In the process of developing software products, the presence of a Technical Lead or a Tech Lead has become particularly crucial [1]. Tech Leads make important technical choices, peer reviews codes [2], and are responsible for architectural integrity of the software product with regard to the long-term vision of the project [3, 4]. Fourthly, excepting technical skills, they guide junior developers and contribute both to the current output and the team's growth in the future [5, 6]. The nature of the position also involves handling these tasks while being conscious of time [7], deadlines, and the expectations of both the development team and the management [8]. This review article is intended to identify the daily scope of working of tech leads and how they manage one of the important day-to-day activities such as code reviews and architecture decisions. As the result of the research of the most recent articles and using the notions of the identified main trends of scientific discussions, the article reveals how Tech Leads participate in enhancing the achievement of the project and impacting the team processes [6, 9]. It also shows the issues they encounter in the process, for example, the conflict of being bothcken the technical specialist and the team leader, and the way they deal with such difficulties [8, 10].

2. Methodology

The systematic review procedure for this investigation was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards [11].

2.1 Data Strategy and keywords

For relevant research publications published between 2010 and 2024, searches were conducted using the databases Springer Link, Elsevier, PubMed, and Google Scholar. Key search terms included: "Code Reviews," "Technical Lead," "leadership," and "Architecture Decisions" were a few of the search terms performed.

2.2 Inclusion and Exclusion Criteria

The review's commitment to accessibility and comprehensiveness was demonstrated by its inclusion criterion, which mandated that papers be published in English. The systematic review included the most recent and pertinent research in the area by considering articles published between 2010 and 2024. In addition, we eliminated articles that were relevant to the topic of the review, but we kept all of the original source material.

2.3 Screening of Articles

When databases containing pertinent articles have been searched. We evaluated the papers using their titles, abstracts, and full text reads. Four articles in total were chosen for additional screening and quality evaluation.

2.4 Quality Appraisal Tools

The internal biases and data dependability of each study should be assessed using the CASP technique [12]. These crucial criteria were used to evaluate the validity and reliability of the selected research.

3. Results

This section presents the main conclusions from the 4 publications that were selected and grouped based on how daily responsibilities of Tech Leads. The methods for the elimination, systematic review, and article selection are depicted in Figure 1.

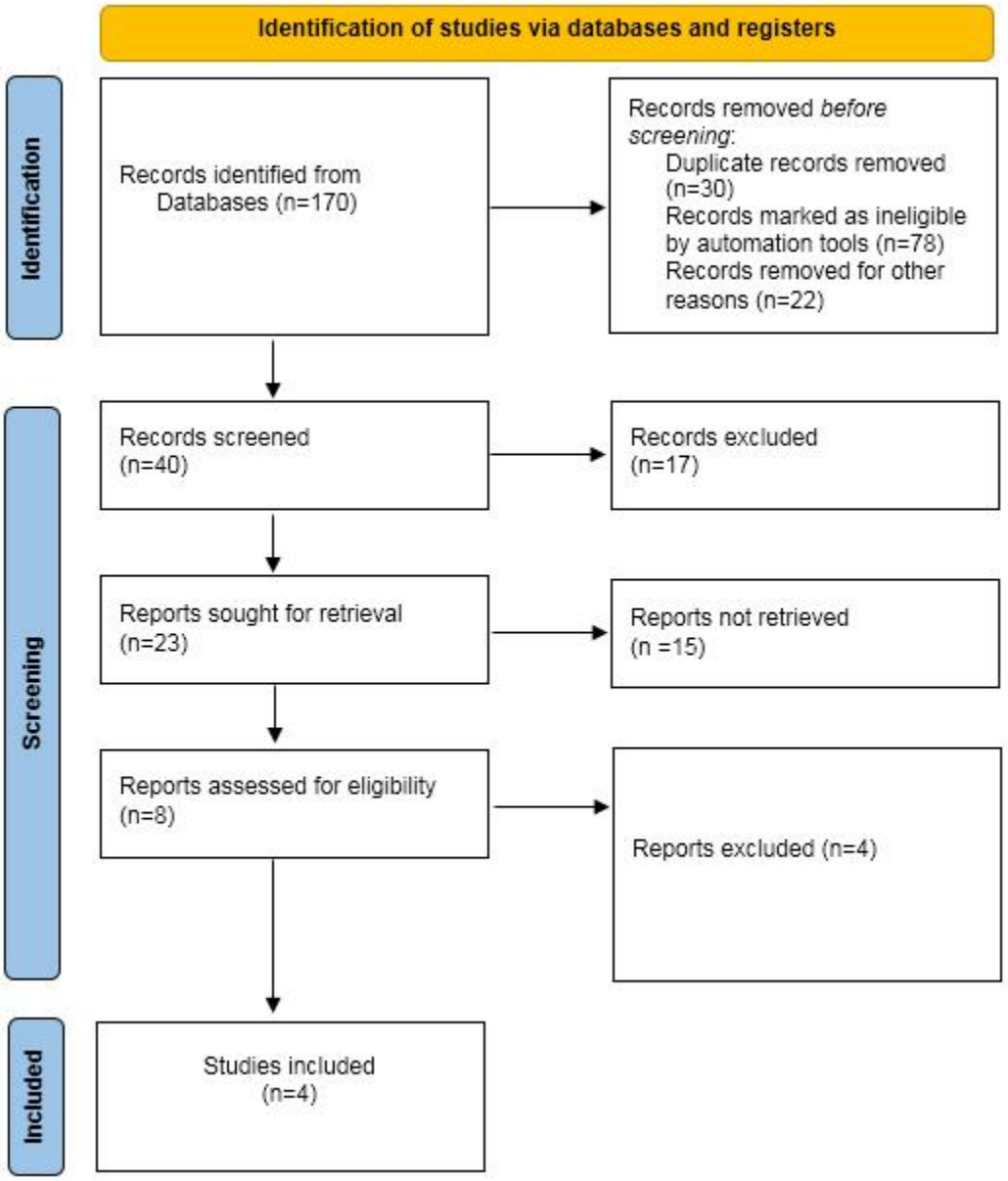

Figure 1: PRISMA Diagram

Table 1: Studies Characteristics

No.	Author and Year	objective	Study Design	Key Findings
1	Gonçalves et al.,	how developers perceive code review	Qualitative	Manually examining, debating, and evaluating

	2022	conflicts		source code by developers other than the code's author constitutes code review.
2	Beller et al., 2014	the useful outcomes of the Modern Code Review process on examined source code.	Case study	Patterns that surfaced in the review data, and the results showed us the technical aspects influencing the quantity of modifications brought about by the MCR procedure.
3	Santana et al., 2017	art in software platforms for Smart Cities	surveys	architecture to direct the creation of cutting-edge software systems for smart cities
4	Drury et al., 2012	obstacles facing decision making in Agile development	mixed method approach	Six choices Unwillingness to commit to decisions, competing priorities, erratic resource availability, and a lack of empowerment, ownership, and implementation are some of the challenges.

3.1 Code Review Responsibilities

Code reviews were identified as a fundamental task for Tech Leads that involved both coding skills and knowledge of coaching [4]. In the presented studies, Tech Leads pointed out that code reviews serve the purpose of ensuring quality of the code as well as the process of knowledge sharing with junior developers [3, 7]. Nevertheless, one of the main concerns that were identified was the ability to meet the requirements of detailed analysis on specific projects and not overstep the timeframe set for other projects [8].

3.2 Architecture Decision-Making

Architecture decisions are a part of the responsibility of a Tech Lead and from this aspect, he or she is held responsible for the decisions that shape the future of a project [4, 7]. Specifically, the studies highlighted the concerns with the project interdependence and managing the short-term requirements while keeping their long-term growth and sustainability in mind [3, 4]. Consequently, decision making sometimes involves the cooperation of other stakeholders from other departments such as the management and other engineering divisions [7, 8].

3.3 Mentorship and Team Leadership

Apart from their technical duties, Tech Leads provide directions to newer team members in the team [4]. It was ascertained that proper and effective training, teaching and coaching of the trainees influenced directly the cohesiveness level within the team and consequently the success rate of the entire project [8]. Research also showed that the Tech Leads experience leadership tensions between their leadership positions and technical responsibilities [3, 8].

3.4 Balancing Technical and Managerial Duties

It is worth to emphasize that the Tech Lead position demands from a person both technical abilities and management skills, and this aspect was met very often in the analyzed studies [3, 8]. This variability in coding, problem-solving and leading people is one of the key attributes of a good Tech Lead [7, 8]. However, this balance indicates that result often comes at the cost of time management and prioritization [4].

4. Conclusion

It is essential to understand the daily interactions of a Technical Lead: code review, architecture discussions, coaching, managing a team. The identified paper demonstrates that, in addition to code, Tech Leads are responsible for technical integrity of the project and for guiding other aspects: team relations, project success, and subsequent architectural solutions. There is potential for subsequent studies that aim at understanding the dynamic roles that Tech Leads play as a result of advancements in technology and changes in the software development processes.

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