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*Review Article*

# Transitioning from Software Engineer to Engineering Manager (A Journey of Paradigm Shift)

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***Abstract*** *- This paper delves into the journey of a transition from an individual contributor (IC) or a software engineer (SWE) to an engineering manager (EM) in terms of roles, responsibilities, job requirements, and skillsets required. This is a paradigm shift from more technical expertise to management and authoritative responsibilities while managing people and tasks at the workplace. There are many great things about becoming an EM. There are also many obstacles. Yes, an EM can face the same challenges as a manager as an SWE faces being a member. But the general job description is different. EM becomes a mentor and leader of the team [1]. He communicates with stakeholders and top management more often. He must take responsibility for the decisions he makes with his team. He will need to meet deadlines, promote teamwork, facilitate customer service, and achieve the organization's goals. There can be a lot of pressure to do everything perfectly and always well. It can be difficult always to communicate effectively, balance work, manage a team remotely, etc. As a manager and individual participant, it is important to foresee obstacles as setbacks and stepping stones to becoming a better version of yourself. No matter who they are, every person faces different challenges at different positions in their lives. The crux of the study is to emphasize the importance of changing requirements and skillsets while transitioning from the responsibilities of SWE to EM [2]. This work serves as a guide and is beneficial for software engineers, developers, contributors, and those who wish to uplift their career path and transition from individual to managing roles. They want to learn the dynamics of managerial positions while retaining their technical capabilities.*

***Keywords*** *- Software Engineer, SWE, Engineering Manager, EM, Individual Contributor, Individual Participant, Team Lead, Team Member, Transitioning as Engineering Manager, Decision Maker.*

## I. INTRODUCTION

Management is a common development career. This rewarding career allows you to combine your technical skills with project management and people skills to lead and support a team and drive initiatives and results. Even though management is a career that is not for everyone, some developers or software engineers may choose to remain individual contributors (ICs) and advance their careers that way [1]. In this article, the researcher delves into the transition of engineering management to understand and determine how to transition from software engineer to engineering manager.

## II. WHO ARE ENGINEERING MANAGERS (EMs) AND WHAT ARE THEIR RESPONSIBILITIES?

An engineering management position is not the traditional career path for a software engineer (SWE). Being an engineering manager (EM) is quite different than being an SWE. Engineering managers may discover that their time is spent differently in management than during their software engineering days. There are numerous reasons why senior engineers or tech leads seek managerial positions [3]. Many of the finest technical leaders alternate between jobs on the team and as team leaders. An EM can help teams accomplish their best work by understanding the nuances of software development. Human problems and soft skills are replacing their technical abilities and duties. An EM is accountable for the success of the SWEs who report to them. Their ability to lead can make or break the efforts of their engineers.

There are numerous ways to understand the tasks that an EM must assume while still working as a senior engineer or tech lead. Before making a more drastic transfer, you can always advance up the ladder at your current company and take on a different leadership role [8]. What objective metric exists to assess the value of leadership or communication abilities? Engineering managers' responsibilities frequently include larger-scale activities.

## III. ENGINEERING MANAGER (EM) JOB REQUIREMENTS

Managing a software team requires a pragmatic approach to ensure that engineers can thrive. The skillset that propelled you to succeed as an individual contributor or senior engineer does not automatically translate to management. Most EM job postings require a bachelor's degree in computer science or a related field. Aspiring EMs may also have difficulty finding a job posting that requires around 5-7 years of engineering expertise. Advanced degrees such as a Master's or Ph.D. are not required to land a tech job.

## IV. MANAGER VS INDIVIDUAL PARTICIPANT

Each role has its pros and cons. Both EM and SWE careers are profitable. It is a misconception: one should try to become a manager to earn more money. Being a high-performing SWE and a high-performing EM requires different things. Some developers are happy to remain as individual contributors and progress through the ranks rather than move into a leadership role [6]. When an SWE becomes a manager, he is no longer an individual member. As a manager, his decisions and work revolve around the interests of the team and organization, not just for individual tasks and projects.

## V. WHAT CREATES THE DIFFERENCE BETWEEN EMS AND SWES

EMs spend a lot of time helping their teams to manage and solve problems. A leader must know their team well enough to understand strengths and weaknesses to delegate tasks and assign responsibilities effectively. Their team may look for guidance or advice, and they should be prepared to help them through any issues they encounter. On the other hand, SWEs may collaborate with their team or other teams, but they spend a lot of time troubleshooting and solving complex technical problems independently.

EMs will have to switch between contexts constantly. They must manage the team effectively and manage competing responsibilities, priorities, and deadlines and figure out how to proceed. As SWEs, they should generally focus on prioritizing in order (unless the manager tells them otherwise) [3]. There seems to be less context switching in the individual member role than in the management role, but it depends on the organization or team requirements.

In the management domain, EMs are supposed to know when to be a little tougher under different situations or contexts. It is important to be able to read situations effectively and act accordingly. There may be times when they need to have tough conversations with the team, and they need to be able to defend their team and show empathy for others [4].

As far as leadership position is concerned, EMs take responsibility and accountability for the entire team. Whereas SWEs usually take responsibility for decisions on an individual task. In addition, EMs should feel comfortable acting as a leader, mentors, guides, and teachers to a group of people in a leadership position. They need to be able to connect with each member of their team to identify their strengths, unleash their potential, and find the right ways to challenge them and push them to success. They must be level-headed and patient when leading a group of people and must be comfortable giving constant feedback and advice to others.

## VI. QUALITIES OF A GOOD EM

Certain qualities play a key role in managerial success. It is important to understand that these qualities can be developed. Some of these qualities overlap with those of a good software engineer. Some are more important in a leadership position or take on a slightly different meaning while moving into a management position [5].

Let's take a look at some of the qualities of a good EM:

- Trust: Trust in yourself and your team is an important component of relationships and teamwork. A lack of trust in a team can compromise productivity, create a toxic culture, demotivate your team, and cut off communication. Trusting others may not be easy, but it is the key to team harmony.
- Empathy: An EM needs to show empathy so that he can understand how your team feels and respond appropriately to different situations. Empathic management improves interaction, communication, and culture. He can practice empathy by watching for signs of overwhelm or burnout in his team, showing interest in their personal needs and desires, helping them when needed, and showing kindness when a team member reveals personal or professional difficulties.
- Supportive: It is important to be a guide, coach, mentor, and educator for your team to help them in their work. A good manager will be there for his team and help them with the barriers and obstacles that hinder productivity and professional development.
- Motivation: A good manager seeks to motivate his team, unleash hidden talents or potential, and elevate the team to improve morale and performance.
- Collaboration: If he becomes a manager, the days of individual contributions will be a thing of the past. It's critical to be an active leader who collaborates consistently and effectively with your team, other leaders, and stakeholders.
- Clear Communication: To be a good manager, EM needs to know how to get the message across to others and offer simple solutions to guide your team. Good managers can develop a clear vision and communicate it effectively and inspiringly to their team.

- Autonomous and responsible: A good EM can make difficult decisions with his team without outside influence. More importantly, he must be able to take responsibility for these choices, whether they produce good or bad results. The autonomous EM is not afraid of responsibility and takes responsibility for his actions.

## VII. TRANSITIONING FROM SWE TO EM

Leading a team of programmers involves a broad perspective and a long-term outlook [2]. As a manager, it's critical to track overall progress against a year-long roadmap. EM also has to be a chameleon, changing your tone based on the audience. When defects or unexpected occurrences arise, EM can focus on individual fixes without losing sight of the roadmap if the cadence is set correctly. The frequency of one-on-one meetings is also part of a team's rhythm, and it's up to EM to set the tone for meaningful communication. EMs use the technical skills they have developed from their previous or natural degrees to help solve problems and manage efforts at the management level. Generally, because they already have engineering experience, they can review and evaluate the work and recommendations of other engineers on their team [5]. According to the project, they will be responsible on a day-to-day basis for developing talent, developing team members, reviewing times, improving processes, evaluating technology integration in efforts, and reporting to project managers or clients on project status.

SWEs make up the vast majority of Ems's first job. At some time, SWEs have to make a decision. They can continue on the individual contributor path or advance into management and become an EM. As far as EMs are concerned, they are in charge of hiring the proper personnel for their teams and offering direction and mentorship to ensure their success [3]. However, managing people is not the same as engineering. Because of the disparity in required skillsets, the best engineers do not necessarily make the best managers.

## VIII. TRANSITIONING WITHIN THE SAME COMPANY

This process demands SWEs to build rapport with EMs within the working environment and let them know they are interested in management. Many companies may set up a trial run for SWEs. This is the time that reflects that SWEs are best serving personnel during such test runs to maximize their soft skills. This will allow their organization to evaluate the leadership potential of SWEs objectively. While in transitioning phase, EM puts his expertise, particularly in modeling and programming, at the service of his client. In implementing software development projects, he can analyze the client's strategy, objectives, challenges, and constraints to offer him the appropriate software solutions.

He sometimes works within a multidisciplinary team. As a real manager, he supervises, motivates, and leads his team of developers or SWEs and often evolves in an organization in project mode [4]. He is involved in all phases of software development. He analyzes the client's needs and writes the technical and functional specifications and the project specifications. He knows how to show rigor and organization in the projects he leads; he manages project deadlines and costs and is responsible for the project's progress daily. Because engineering management differs from software engineering, it is critical to be prepared for a wide range of difficulties where SWEs should be prepared for a slew of new hurdles when transitioning to EMs.

## IX. TRANSITIONING TO A NEW COMPANY

Some aspiring EMs may find it easier to transfer to the post if they work for another organization first. Remember that the function of an EM can vary greatly based on the size and type of the organization. Prospective EMs should keep their intentions clear to their team and others and develop the skills that will be useful for engineering managers [7]. There's no reason to keep managerial ambitions hidden from the rest of others. Develop abilities linked to the work you may have done as an SWE in the past. Some prefer to work with individual members, while others want to lead and manage a team. Remember that everyone is unique, and everyone has a different path. Beyond his technical expertise, the EM manages a department or a project team transitioning within a new company. He builds his competent project team, capable of responding to technical challenges (internal collaborators or service providers). He supervises this team and defines clear objectives to communicate to the employees concerned. He also communicates with project stakeholders on the progress. Through its management and its communication, it accompanies the changes induced by the projects it carries. In companies, during perpetual technological evolution, the EM manages the digital transition of his activities and his team, like all managers of his time. It develops collaborative and sometimes even remote management by relying on new tools for communication, remote work, sharing of files or projects, etc.

So, the path in software engineering doesn't have to be like anyone else's wants. It is important to stick to what interests you and take the steps necessary to achieve your own goals, not someone else's [8]. More than anybody else, EMs cannot afford to lag. Otherwise, they will be ineffective leaders for their teams.

## X. WHAT SHOULD BE CONSIDERED DURING TRANSITIONING FROM SWE TO EM

A great manager must create an environment where their team can write excellent code. Aspiring EMs should understand how to delegate authority and build trust with their engineers. Transitioning from SWE to EM entails a

significant increase in responsibility and a difficult adjustment. Growth mindsets are also required for leadership and team-building, which should be inspired by the mindset of their leader [1]. The major job of EMs during transition is to supervise their immediate subordinates while also assisting and nurturing their professional development. They should learn to assess personal performance in relation to the success and performance of the team. They will also be responsible for inspiring their team members and creating and maintaining a positive team spirit and work culture. A leader should keep other stakeholders informed about project and assignment updates [7].

When moving into EM, it is important to understand that you are indeed changing career paths. While there is no one-size-fits-all career path for an SWE, career progression includes moving from junior engineer to senior engineer, full-time engineer, chief engineer, etc. While some SWEs believe that management is an integral next step to success in their career, being a manager does not necessarily mean that you are more successful. This career move is more about what you want from your career and what skills you want to use in your career. The career of EM demands:

- Demonstrate ability and passion for designing and building highly available distributed systems at scale.
- Demonstrate problem-solving and debugging skills.
- Demonstrate ability to exercise common sense in ambiguous situations.
- Drive features for projects.
- Work outside the group to build strong relationships with partners and push multiple teams to implement scenarios.
- Engineer highly available systems at scale.
- Implement improvements regardless of ownership, identify bottlenecks in processes and find ways to improve efficiency.

## XI. CONCLUSION

The journey of transitioning from software engineer to engineering manager is a paradigm shift in the context of technical vs. managerial skills. EM appropriates the task's context, objectives, and issues or the project. Not only does he understand the system or project with its architecture and constraints, but he also analyzes and considers needs and, in particular, the necessary steps to take action. He translates the needs into functional requests and proposals and models the task relevance by managing and leading the people. He supervises the project's development work or task assigned while setting up tools for monitoring outcomes. He carries out developments requiring a high level of technical expertise in a collaborative environment with SWEs. In a nutshell, we can conclude that EM is more like a leadership position with less inclined toward technical expertise; however, be intuitive, creative, managing, and authoritative at the same time. While on the other hand, SWE is more like an individual achieving position with more inclination towards technical achievements with creativity, however less authoritative at the same time.

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