# Effective Engineering Philosophy

*(Note: This is a philosophy — a collection of ideas I believe have value. This is not a vision of how things must be. Each enterprise is unique, and even the projects within the enterprise can be unique. The value of this philosophy is to help bring focus to a specific vision for an enterprise.)*

## Introduction

In today's rapidly evolving business landscape, technology is not just a component but the cornerstone of every successful enterprise. Since an enterprise's success is tied to technology, Engineering must adopt an Enterprise Perspective — understanding the enterprise's mission, goals, and initiatives. Additionally, a Customer Perspective is crucial: seeing our products through the customer's eyes and maximizing their value. Combining these, we discover the purpose which drives our efforts. Understanding *Why, What,* and *Who* gives us the wisdom to make better decisions, thus optimizing our time and effort. The increased customer satisfaction and allegiance allows us to continue pursuing our mission.

## Effective Is Better Than Productive

### Definitions

**Productive:** Focuses on the quantity of the output produced (How much was made?)
**Effective:** Focuses on the impact of the output produced (How valuable is what was made?)

### Why Effective Engineering

In a free market economy, all enterprises share a common purpose: to provide goods and services profitably for the enterprise's ownership. Regardless of these owners' passion for the products provided, the enterprise is unsustainable without profitability. A highly productive engineering team will bankrupt an enterprise when what they produce is not what the customer wants or needs. Their excellent efforts have not resulted in meaningful value. Conversely, an engineering team that, in collaboration with Product and Sales, focuses their efforts on building what the customers want ("building the right thing") and building it in a quality-driven way which increases customer satisfaction and dedication ("building the thing right"), will have a measurable impact on the enterprise's goals. Their excellent efforts have resulted in very meaningful value!

Annual studies of engineering teams continue to show that customer-focused teams operating in a paradigm that enables their effectiveness will significantly impact the enterprise's performance and each individual's job satisfaction.

### The Building Blocks Of An Effective Team

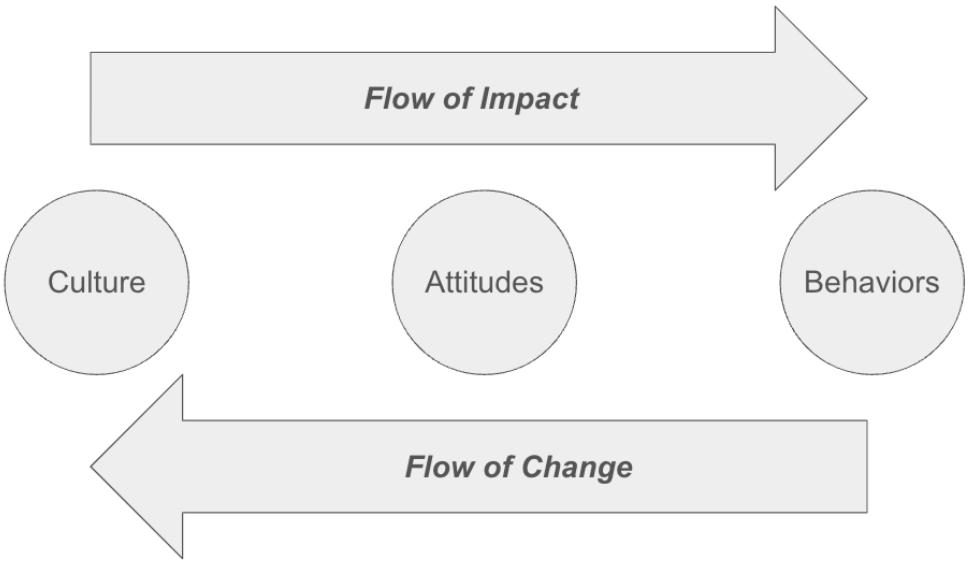
Google has done an internal research study on effective teams. The study showed that the makeup of the team (positions/roles) did not impact their effectiveness. What does impact the team's effectiveness is their culture. They found that these five keys predict the effectiveness of a team:

1. **Psychological Safety (Trust):** Team members feel safe to take risks and be vulnerable in front of each other
2. **Dependability:** Team members get things done on time and meet Google's high bar for excellence
3. **Structure and Clarity:** Team Members have clear roles, plans, and goals
4. **Meaning:** Work is personally important to team members
5. **Impact:** Team members think their work matters and creates change

# Engineering Culture

## Effective Engineering Leadership

Why does team culture have the most impact on team effectiveness? Our culture determines our attitudes, which, in turn, determine our behaviors. How do we change our culture so we can see improvements in attitudes and behaviors? Leadership, specifically *transformational leadership*, is how we drive changes in team culture. It inspires people to willfully modify their behaviors, which alters their attitudes, which then alters the culture.




## Transformational Leadership

Transformational leadership is inspiring! It is empowering! Transformational Leaders:

- Fuel the team with vision:
- The vision of the enterprise
- The impact of the team on the enterprise and its customers
- Champion the team's and team member's growth — intellectually and experientially
- Over-communicate:
- Team and team member performance
- Enterprise goals
- Any information that will inspire the team to be more effective and excited about participating in the mission of the enterprise

Transformational leaders create and maintain a culture of continuous improvement by guiding teams through the cycle of knowledge, understanding, and wisdom:

- They continually provide their staff with knowledge
- They guide them in the application of this knowledge in order to gain understanding
- They then guide them to apply the understandings they have gained in order to gain wisdom

The transformation to a culture of continuous improvement is achieved when the wisdom gained leads the team to seek more knowledge.

## Transforming Team Culture

The desired outcomes for any successful business, *customer satisfaction* and *achieving enterprise performance goals*, are maximized by effective teams. Transformational leaders impact this by continual improvement of the five keys Google identified:

1. **Psychological Safety (Trust)**:
   - Leaders demonstrate this by taking risks, being vulnerable, and showing humility by admitting their mistakes
   - Leaders support the team by recognizing the members who are making the effort to improve in these areas — individually and in front of the team
   - Leaders inspire the team through training and goal setting focused on these characteristics
   - Leaders enable the team by providing opportunities to take risks, encouraging them to do so, and protecting their safety when they do
2. **Dependability**:
   - Leaders empower the team by providing the information and technology to plan and complete their work effectively
   - Leaders enable the team by removing blockers and friction points
   - Leaders demonstrate their personal drive for continual improvement of their own capabilities
   - Leaders inspire the team members through training and goal setting focused on building a similar attitude of continual improvement
   - Leaders encourage the team by recognizing their accomplishments
   - Leaders protect the team by taking responsibility for mistakes and failures while at the same time reporting and crediting the team for their successes
3. **Structure and Clarity**:
   - Leaders purposefully pair team members in order to:
     - Reduce the risk of knowledge loss by sharing the knowledge with each other
     - Broaden each team member's understanding of why the team functions as it does (mentorship)
   - Leaders ensure the best possible decision-making by over-communicating all information about the work, its value, and management expectations (knowledge -> understanding -> wisdom)
4. **Meaning**:
   - Leaders ensure each team member understands the *Why* behind what they are doing
   - Leaders genuinely appreciate the value provided by the team and its members — and they communicate this appreciation clearly and frequently
   - Leaders encourage camaraderie
5. **Impact:**
   - Leaders regularly communicate the impact and value of the team's efforts on customers and the enterprise
   - Leaders promote the successes of the team across the enterprise, demonstrating their value to everyone

# Measuring Engineering Effectiveness

## The Purpose Of Measuring Effectiveness

We are striving for camaraderie and support among the team members so their sum is greater than the parts. A team with this culture will have a strong sense of ownership and responsibility. The other key component is enabling the team to get the most out of their efforts. To accomplish this, the purpose of measuring engineering team performance must be to:

- Identify existing friction points in the team's delivery *(Example: Bottlenecks in the flow of work through the development process)*
- Observe positive and negative trends as they form, guiding the team to capitalize on this knowledge *(Example: Increases/Decreases in the rate of successful deployments)*

This results in a culture of continual improvement of the team's effectiveness.

Conversely, it is crucial that these measurements are never used to track individual team members' effectiveness. Software Engineering is a team sport. Each team member has a role to play. Each team member should learn to compare their performance against their own prior performance, not the performance of other team members. Effective engineering leaders, motivated by their responsibility and commitment to their direct reports, will coach each member on improving their contributions to the team, building in them the character trait of continual improvement. Using the team effectiveness measurements to focus on individual performance will significantly damage the culture we are striving for on the team. Instead of camaraderie and support, we will end up with disdain, animosity, and a lack of ownership.

In the same way, engineering teams should focus on their own continual improvement and not compare themselves to other teams. Engineering teams play on different fields. Differences in factors such as the codebase's age, size, and health, past architectural decisions, and skill set differences among team members make comparisons dubious at best. In addition, it will cause significant damage to the Engineering organization's culture.

### Measurements Of Engineering Effectiveness

Highly effective engineering teams will excel in the following areas:

- **Speed** — measured by:
- The rate at which they complete tasks
- The frequency at which their completed work is deployed
- **Stability** — measured by:
- The amount of time it takes to recover from an issue or outage
- The rate at which changes cause failures
- **Availability** (how teams utilize their time) — measured by the team's success in meeting the commitments they make regarding the work they are assigned

Speed, stability, and availability build on each other to improve a team's effectiveness:

- When tasks are small enough to be completed and deployed at a high rate, it is easier to identify and correct issues or flaws before they are deployed. This improvement in quality results in a more stable system. Additionally, the faster changes can be completed and deployed, the shorter the outage times are. So, stability is improved even more.
- The more stable the system is, the less team members are required to break off from their current tasks to fix an outage, which improves availability.
- When the team is able to work uninterrupted, they are able to complete tasks faster.

These metrics have a significant advantage over traditional, productivity-based engineering performance metrics. They provide a holistic view of a team's software delivery and operational performance. Because these effectiveness-based metrics focus on customer satisfaction, a strong correlation can be drawn between these metrics and the enterprise's organizational performance, like profitability and market share.

## Conclusions

- Effective engineering effort is more critical to the enterprise than productive effort
- Teams focused on effectiveness align their efforts with organizational goals, leading to better performance and improved customer satisfaction
- The two ways to increase a team's effectiveness are:
- Creating a culture that thrives on continual improvement
- Providing the tooling for measuring and monitoring this continual improvement
- It is the responsibility of engineering leadership to improve and sustain the team's culture
- The sole purpose of measuring a team's effectiveness is to provide the team with actionable information to drive their continual improvement

When put into practice, these philosophies will result in increased customer satisfaction and allegiance, enabling the enterprise to continue pursuing its mission.