Measuring Engineering Productivity

Summary of Key Concepts from the Document

Why Measure Engineering Productivity

- Scaling organizations leads to quadratic growth in communication costs.
- Boosting individual productivity helps expand business scope efficiently.
- Need to identify inefficiencies and implement continuous improvement.

Google’s Approach

- Created a dedicated research team to study engineering productivity.
- Team includes software engineers and social scientists.
- Focus on human factors, motivations, and strategies.

Triage: Is It Worth Measuring?

- Measurement is costly and might influence behavior.
- Ensure a concrete question and decision based on results.
- Key checks: expected result, actions for positive/negative results, decision authority.

GSM Framework

- Goals: Desired outcomes without specific metrics.
- Signals: Indications of achieving goals, may not be measurable.
- Metrics: Measurable proxies for signals.

QUANTS Components

- Quality: Code quality and architecture risk.
- Attention: Engineer focus and distractions.
- Intellectual Complexity: Cognitive load and complexity.
- Tempo & Velocity: Speed of completing tasks.
- Satisfaction: Engineer happiness and burnout.

Validating Metrics

- Use qualitative data to validate quantitative metrics.
- Mixed-methods approach: surveys, logs, interviews.
- Triangulate findings to ensure accuracy.

Outcome and Recommendations

- Readability process found to be worthwhile.
- Engineers reported learning and improved code quality.
- Recommendations to improve tooling and process speed.

Conclusion

- Centralized engineering productivity team brings broad benefits.
- Human factors are complex and require data-driven analysis.
- Focus on eliminating subjective bias.

Goals and Signals (Quality)

- Goal: Engineers write higher quality code due to the readability process.
- Signal: Engineers with readability judge their code to be of higher quality.
- Signal: Readability process positively impacts code quality.

Goals and Signals (Learning & Mentoring)

- Goal: Engineers learn about the Google codebase and best practices.
- Signal: Engineers report learning from the readability process.
- Goal: Engineers receive mentoring during the process.
- Signal: Engineers report positive interactions with experienced reviewers.

Goals and Signals (Productivity & Velocity)

- Goal: Engineers are more productive due to the readability process.
- Signal: Engineers with readability judge themselves more productive.
- Signal: Readability positively affects engineering velocity.
- Signal: Changes are faster to review and easier to shepherd through code review.

Goals and Signals (Satisfaction)

- Goal: Engineers see the benefit and have positive feelings about readability.
- Signal: Engineers view the process as a positive overall experience.
- Signal: Engineers consider the process worthwhile and not frustrating.

Metrics Examples

- Quarterly Survey: Satisfaction with quality of own code.
- Readability Survey: Impact of readability reviews on code quality.
- Logs Data: Median review time for changes from authors with/without readability.
- Logs Data: Median time to submit for CLs from authors with/without readability.

Taking Action

- Study showed readability process is overall worthwhile.
- Engineers satisfied and learned from the process.
- Logs showed code reviewed and submitted faster.
- Recommendations made to improve tooling and transparency.

TL;DR – Measuring Engineering Productivity

- Boost individual engineer productivity to scale business efficiently. Google’s dedicated research team uses a data-driven approach to identify productivity blockers and continuously improve processes.

TL;DR – GSM Framework & QUANTS

- GSM (Goals, Signals, Metrics) ensures metrics align with goals and avoid bias. QUANTS captures key productivity components: Quality, Attention, Intellectual Complexity, Tempo/Velocity, and Satisfaction.

TL;DR – Readability Case Study

- Google's readability process improves code quality, mentoring, and developer velocity. Surveys and logs confirmed benefits, leading to process refinements.

TL;DR – Key Takeaways

- Centralized productivity teams help scale engineering practices. Data-driven, mixed-methods measurement is vital. Human factors are complex—metrics must be carefully designed and validated.