Gauging internal efficiency and effectiveness with leading and lagging indicators

Leading indicators help to ensure that employees perform proactively, while lagging indicators identify issues with adherence.

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While one robust formula is helpful to understand engineering productivity, there are a number of additional leading and lagging indicators that help companies to delve deeper, so that they can measure both efficiency and effectiveness within the product development organization and process (Exhibit 1).

Leading indicators are forward looking and critical to ensure that employees perform proactively, for example, identifying risks early on and initiating countermeasures instead of reacting after the risk has materialized. Lagging indicators represent metrics to assess the development work that has already been conducted. Development metrics fall into two categories: functional (tied to product development budgets) and project based (tied to project profits and losses directly). Both are important for measuring performance but take different cuts of the data. Exhibits 2 and 3 present a set

Exhibit 1

R&D efficiency and effectiveness is measured in a number of ways, which then can be benchmarked to industry-specific best in class.

				Client example		
			Best in class	Current state	Increase or decrease	Gap %
Value creation	Engineering efficiency	Return on sales	5.3%	2.0%	↑	-165
		R&D/sales	4%	3%	↑	-33
		Sales/engineering FTE ('000)	$100	$80	↓	-25
		Cost/engineering FTE ('000)	$70	$90	↓	-22
		Outsourcing	35%	15%	→	-133
		Time to market (months)	10	16	↑	-38
	Engineering effective-ness	Project distribution (innovation, cost, etc.) vs. plan	95%	80%	↑	-19
		Adherence to gate deliverables	90%	70%	↓	-29
		Average margin/project	14%	8%	↓	-75
		Warranty cost/unit or product	$0.8	$1.5	↓	-45
		IP[1] filed (quarterly, annual)	4	1	→	-300

1 Intellectual property

Exhibit 2

Example set of metrics for efficiency, shown here with leading and lagging indicators.

NOT EXHAUSTIVE

Efficiency

Bucket of metric	Lagging	Leading
Launch management	▪ Time to market ▪ Project cost overruns ▪ % project on time ▪ Adherence to product quality ▪ Project NPV/IRR[1] ▪ Project margin ▪ Project payback	▪ Adherence to deliverables for a gate ▪ Unit cost vs. planned (monthly) ▪ % gates late ▪ Revenues vs. planned ▪ Supplier risk ▪ Supplier delivery ▪ Supplier quality
Lean product development	▪ Budget overruns ▪ Projects/FTE ▪ Sales/R&D spend ▪ Sales/engineering FTE ▪ Avg. cost/FTE ▪ % design work-out: sourced vs. plan	▪ Adherence to process ▪ No. of design changes per project ▪ % rework ▪ Individual productivity vs. design unit
Complexity	▪ % standard on a program or system ▪ % reuse overall ▪ No. of variants for a commodity	▪ % adherence to product shelf or plan prior to concept sign-off ▪ Product shelf growth (size or no.) ▪ % products or subsystems which have product shelves
Demand and resource management	▪ Engineering hours spent vs. planned	▪ % projects prioritized ▪ Adherence to prioritization ▪ % engineering hours spent on technical (value add)

1 Net present value/internal rate of return

Exhibit 3

Example set of metrics for effectiveness, shown here with leading and lagging indicators.

NOT EXHAUSTIVE

Effectiveness

Bucket of metric	Lagging	Leading
Customer voice	▪ Adherence to customer top priority characteristics ▪ Brand/product value perception	▪ % time customer voice deliverables met ▪ % NPI[1] products with teardown complete
Innovation	▪ Revenue from innovation ▪ Average margin from innovation ▪ % resources on innovation vs. planned	▪ IP filed ▪ Supplier innovation partnerships
Quality	▪ % validation first time ▪ % parts approval	▪ FMEA[2] risk ▪ Drawing rejection rate ▪ DVPR[3] quality
Talent management	▪ Regrettable attrition ▪ $ m delayed due to capability gap	▪ Employee sentiment ▪ Career development ▪ Avg. training hours per year ▪ Avg. onboarding time
Strategic alignment	▪ Adherence to strategic plan ▪ Adherence to product/tech road map	▪ % resources assigned vs. plan
Knowledge and systems	▪ Change management lead time vs. benchmark ▪ % repeat failures or quality issues	▪ Knowledge generation volume ▪ Knowledge system usage ▪ Nonvalue-added time spent aligning PLM[4] or other tech databases ▪ % lessons learned reviewed at project start

1 New product introduction 2 Failure modes and effects analysis 3 Design validation plan and report 4 Performance level modeling

of sample metrics for leading and lagging indicators for efficiency and effectiveness. Although these metrics are neither exhaustive nor universally accepted, they help to illustrate the types of leading and lagging indicators available.

There are several best practices for selecting metrics and setting targets. First, companies need to avoid the common trap of selecting too many or redundant metrics. At any given level, three to eight metrics (key performance indicators) should be used for performance management. Deep-dive submetrics (internal performance indicators) can be used, as needed, to reveal the causes of issues. Metrics should be SMART: simple, measurable, actionable, relevant, and timely. Common pitfalls include promoting a reactive culture by using too many lagging indicators or establishing metrics that do not align with the responsibilities or controls within a group or that fall outside of the company's core strategic objectives. It is also important to consider data availability when choosing metrics. Data reliability and ease of capture will determine the cost of monitoring and effectiveness. Mapping the sources and process for data capture (for example, method, frequency, or communication) will provide insight into feasibility.

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