The TRIP MAP™ Industry Evaluation Framework

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The TRIP MAP™ Framework

The **TRIP MAP™** industry evaluation framework is a two-dimensional strategy framework for evaluating the maturity and economic potential of technologies throughout their lifecycle, with critical diagnostic utility for business planning including R&D allocation; corporate strategy, organization, and talent management; and venture capital, investing, and M&A analysis. **This document provides a brief overview of the framework, which combines TRIP™ Technology Readiness Inflection Points™ with the MAP™ Market Adoption Profile.**

TRIP™ Technology Readiness Inflection Points™ pinpoint the maturity of a technology across 10 stages:

1) **recognition** of a need or opportunity
2) **research** via discovery, experiment, theory
3) **invention**, including ideation and architecture
4) **realization**, via reduction to practice, prototyping, and refinement
5) **commercialization** via a business model and value propositions
6) **scaling** infrastructure and supply chains
7) **diffusion** beyond early adopters to the mass market
8) **maturity**, with slowed growth, new entrants, and standardization
9) **decline** due to market saturation, shifting trends, disruptive alternatives, etc.
10) **redirection**, e.g., discontinuation, relegation to a niche, renewal, etc.

The **MAP™** Market Adoption Profile helps compare different market opportunity sizes and then real market results, which variously can be measured on wallet share, market share, unit sales, annual revenue, etc., and optionally analyzed in greater granularity, e.g., in terms of segments. In early TRIP stages, the MAP level is *projected*; in later ones, it is *actual*. Forecasts may not materialize, but they are important in representing relative opportunity sizes and allocating innovation investments.

When taken together as orthogonal measures, the **TRIP™** and **MAP™** scales form the **TRIP MAP™** industry evaluation framework: a *map* to the *trip* that technologies take from cradle to grave or rebirth.

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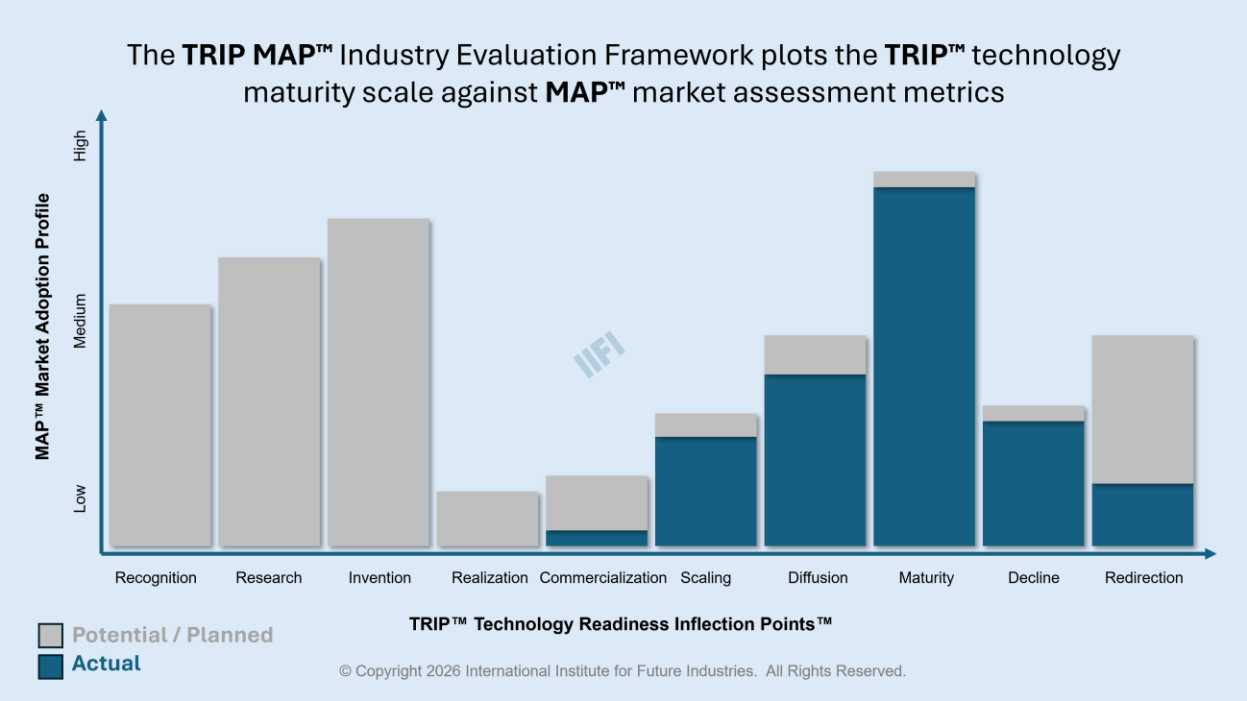

To be sure, the research and commercialization of innovations is an uncertain process. Shifts in competition, evolving customer needs and trends, varying technology applications and product positioning, or technology practicalities may impact MAP levels as a technology moves through its TRIP cycle. Moreover, as shown in the diagram, the MAP profile begins as a *potential* market opportunity, and then unit sales, revenues, or share become more *actual*. Even in later stages, though, there is some uncertainty based on orders, subscriptions, long-term contracts, cancellations, and the like.

A new technology may have a promising future that never pans out, as with Sony®'s Betamax®, 3D televisions, or the Segway® personal transportation device. The Segway was projected to be "a product that would sweep the world and change people's lives forever." Steve Jobs famously said that it was "going to be as big as the Personal Computer." Instead, it was widely considered to be a flop, and retired after only selling roughly as many units in two decades as were predicted for its first year.

Conversely, Sony executives heavily criticized the plan for and prototype of the Sony Walkman®, because it couldn't record audio tapes, only play them back. They projected that no one would buy such a device. It went on to sell 385 million units.

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The **TRIP MAP** framework differs from other models in the sphere of technology innovation, which all have their uses but areas that they don't address. For example, Disruptive Innovation focuses primarily on the dilemma that incumbents face due to technological innovations and asymmetric financial incentives between the high end and low end of the market, but doesn't address the end-to-end lifecycle including research and invention through strategic redirection, nor does it account for technologies that arrive on the market with substantial advantages over the incumbent. The Technology Adoption Lifecycle model addresses *adoption* dynamics from a customer or market viewpoint, but doesn't address stages prior to market introduction nor the realities of commercialization, such as learning curve effects or supply chain optimization. Conversely, Design Thinking and the Stage-Gate Innovation® process address pre-commercialization phases only, without regard to scaling, diffusion, maturity, or strategic redirection. The Gartner® Hype Cycle® famously addresses market perception of technologies but doesn't address market sizes or innovation stages. Moreover, it isn't clear that every technology must pass through stages such as a "Peak of Inflated Expectations®" or a "Trough of Disillusionment®."

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TRIP™ Stage 1: Recognition

Sometimes, innovation begins with an unexplained discovery, such as the famous case of Alexander Fleming, who observed that a stray mold had contaminated a Petri dish, killing bacteria, and thus discovered penicillin. Sometimes an invention fails but then fits a different market need, as with YouTube®, which started as a dating site but gained traction sharing videos. However, the vast majority of commercial innovation begins with problem-solving: the recognition of an unsolved problem or grand challenge, a market gap, customer need or job-to-be-done, a technical bottleneck, shifting macroeconomic or consumer trends, an emerging opportunity, or an external shock.



Apple® realized that physical keyboards used too much footprint in mobile devices and couldn't adapt to changing application needs, leading to the touch screen, capable of handling taps, pinches, and other multi-touch gestures, and the iPhone®, one of the most iconic products in history.

Researchers have long sought a cure for cancer and recognized the toxicity of traditional chemotherapy. This has led to genetically engineered T-cell and mRNA targeted therapies.

Fred van der Weij recognized that consumers love fried food, but they consider deep frying to be messy and potentially unhealthful. This led him to invent the air fryer.

The systemic shock of a pandemic and the need for remote collaboration led to the invention of new vaccines and videoconferencing applications and infrastructure.

Sustainability trends have led to renewable power from solar and wind energy, but their intermittent nature has driven research and solutions for energy storage at utility scale.

Whether by using design thinking and empathy to identify user inconvenience or inefficiencies, identifying grand challenges, rapidly reacting to a short-term crisis or developing strategies to address predictable long-term trends or long-standing problems, or looking at old problems in new ways, recognition is often the critical first step in innovation.

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TRIP™ Stage 2: Research

Technology-based innovation typically requires research in chemistry, physics, biology, materials science, computer science, and/or mathematics, often in an inter-related fashion. For example, today's artificial intelligence systems such as Large Language Models run on chips using exotic materials such as cobalt/ruthenium for local interconnects and hafnium for gate dielectrics (materials science), designed with an understanding of quantum tunneling (physics), attempting to mirror neural network learning and thinking mechanisms (biology), using at their core algorithms such as the Google®-invented Transformer model (applied math), running on complex systems architectures (computer science) using optimization algorithms such as gradient descent (pure mathematics). They are built on extreme ultraviolet lithography machines that involve reactions that create tin tetrahydride or engineered into systems such as superconducting quantum computers that need rare substances such as Helium 3 (chemistry) for refrigeration.



Key steps in research include: discovery, observation, anomaly detection, hypothesis, experimentation, analysis, and theory formulation. It has been said that "chance favors the prepared mind," so even serendipitous discovery—e.g., penicillin—happens not just due to an anomalous result, but when a scientist ponders its cause rather than ignoring it.

Sometimes the results of research lead to an invention; sometimes the needs to make an invention work drive research efforts.

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TRIP™ Stage 3: Invention

An invention based on new or existing science arrives through a creative design and engineering process, brute force analysis, or happy accident. An example of creative design and engineering would be the electric light bulb. A century before Edison, Ebenezer Kinnersley determined that electricity could make a wire glow. It then took brute force—trying many different types of filaments—and design and engineering—realizing that filaments would last longer in a vacuum—to build a working, cost-effective light bulb. An example of a happy accident could be the microwave oven: Percy Spencer was working near an active radar magnetron when he noticed a candy bar melt in his pocket.



The invention stage typically has several steps: consider the recognized need (TRIP Stage 1, e.g., overcome nighttime darkness), consider the research (TRIP stage 2, e.g., electric wires glow), conceive a possible approach (use electric wires to generate light), architect a solution (build a bulb that encases a filament in a vacuum, with electrical connections outside the vacuum), and then iterate to refine the solution (titanium, too expensive, maybe carbon?). Additional steps include formulating various alternatives (inert gas instead of a vacuum? Two filaments?).

An invention doesn't require a working model or prototype, merely a reasonably well-thought-out idea or concept—called a "constructive reduction to practice"—of a novel system, assembly or architecture, a process or algorithm, or a functional mechanism or an article of manufacture that is useful for some purpose, and is not an improvement or variation that would be obvious to someone in the field.

Multiple commercial benefits can arise from an invention, as well as ways to de-risk or protect those benefits. The invention can be patented, it can be suppressed (as Kodak® did when it invented the digital camera), it can remain a trade secret (e.g., the formula for Coca-Cola®), or it can be released to the public, for reputational value or because an organization gains commercial value via a complementary product or service.

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TRIP™ Stage 4: Realization

Invention and realization are fundamentally different: invention is a workable idea; realization is its embodiment in the real world. Invention requires a *constructive* reduction to practice, i.e., a way in which the parts work together to enable a meaningful application or benefit. Realization involves an *actual* reduction to practice: building a prototype of the product or service; testing it to surface unforeseen characteristics, behaviors, or problems and prospective customer reactions; refining the prototype to solve edge cases and issues identified during testing; and engineering the solution architecture or components to optimize cost, safety, durability, manufacturability, etc. Sometimes realization will feed back improvements to invention; require further research; or even find an unanticipated use, restarting recognition.



The interval between research or an invention and a working prototype and commercialization can be decades or longer. In 1971, Leon Chua conceived the idea of a memristor. It took until 2008 for the first prototype to be built, when HP® built a prototype out of titanium dioxide (by accident…they were trying to build something else), and then another five years before the technology became embedded in a commercial product.

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TRIP™ Stage 5: Commercialization

Now that a functioning product or service has been built and shown to be suitable for its intended purpose and ideally, have compelling advantages in meeting opportunities or needs, it's time to move it from being a sink for financial resources into a profit generator.



There is a wide gap, though, between a working technology and a viable, self-sustaining business with offers that will be purchased by customers. Therefore, a critical need is for an appropriate business model that addresses the "marketing mix," a profit formula, a competitive strategy, and a value proposition. These last two combine into a differential value proposition: not only *how* does a customer benefit, but how can it benefit *more than* by using a competitor. Pets.com famously gained exponential revenue growth with a powerful value proposition: the best prices and online ordering. Unfortunately, they sold products for 1/3 their cost, so the business was not sustainable. Conversely, a company may have a great business model and competitive strategy, but no value proposition.

In any event, this stage includes identifying and closing on early adopters who are willing to tolerate imperfections and incompleteness in the offer; constructing operations and service delivery infrastructure; validating and documenting performance against relevant benchmarks; ensuring legal and regulatory compliance and approvals; setting prices; setting up initial supply chains and distribution networks; initiating marketing, sales, advertising, public relations, and advertising; launching; and, in most cases, iterating and pivoting.

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TRIP™ Stage 6: Scaling

When a business scales from a small, entrepreneurial team to high volume, major operational, physical, financial, and organizational changes become essential.

A business can't grow without a manufacturing, operations, service delivery, sales, distribution and/or support infrastructure behind it. Even virtual businesses, such as social media, require physical infrastructure such as servers and networks.

To accomplish this requires financial resources and partnership agreements. Initial funding from departmental budgets, grants, angel investors, private equity and venture capitalists evolves to working capital for operations, infrastructure CapEx, and partner commitments.



Organizational growth requires new organizational structures, delegation, and the formalization of culture, policies and procedures. Formerly part-time founder tasks become functions and departments, like human resources, legal, and accounting.

Scaling also requires the evolution of processes from *ad hoc* to fully standardized, managed, measured, and optimized workflows. This in turn requires training, certification, and reporting. If may also drive process redesign, such as cross-docking or virtual inventory pools.

Some economics will improve due to *economies* of scale and learning curve effects, others, such as organizational communications and decision-making time, will worsen due to *diseconomies*.

As custom, manual processes become standardized, automation may become necessary. Often this requires not just the purchase of new machinery or software, but the invention of new machinery, processes, algorithms, or architectures, like continuous rolling for steel, distributed databases for social media, or ISP caching for video streaming.

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TRIP™ Stage 7: Diffusion

With growing infrastructure capacity, initial adoption can grow to widespread diffusion. The Technology Adoption Lifecycle model created by Everett Rogers captures the behavioral differences between innovators, those risk-tolerant visionaries that are willing to try half-baked products during realization; the early adopters, who begin purchase and use during commercialization; and the early and late majority of the mass market who are risk-averse, and thus less interested in innovation *per se* than in convenience and practical benefit.



Product or service advantages and positioning can drive behavior change and accelerate adoption. For example, by increasing convenience, enhancing personalization, and offering a near-infinite catalog, streaming has increased the time spent listening to music greatly over records, CDs, or broadcast stations. Even active vinyl enthusiasts spend roughly twice as much time listening via streaming services as they do playing physical records.

Besides a clear differential value proposition, architectural compatibility, cultural and workflow alignment, low switching or onboarding costs, and risk-free trials can all facilitate "crossing the chasm" to rapid mass market adoption. Additional influences such as virality and network effects can accelerate adoption. Social proof, via word-of-mouth, whether face-to-face, via social media, or via reviews, has been shown to often be more effective at accelerating adoption and behavior change than financial incentives or appeals to values.

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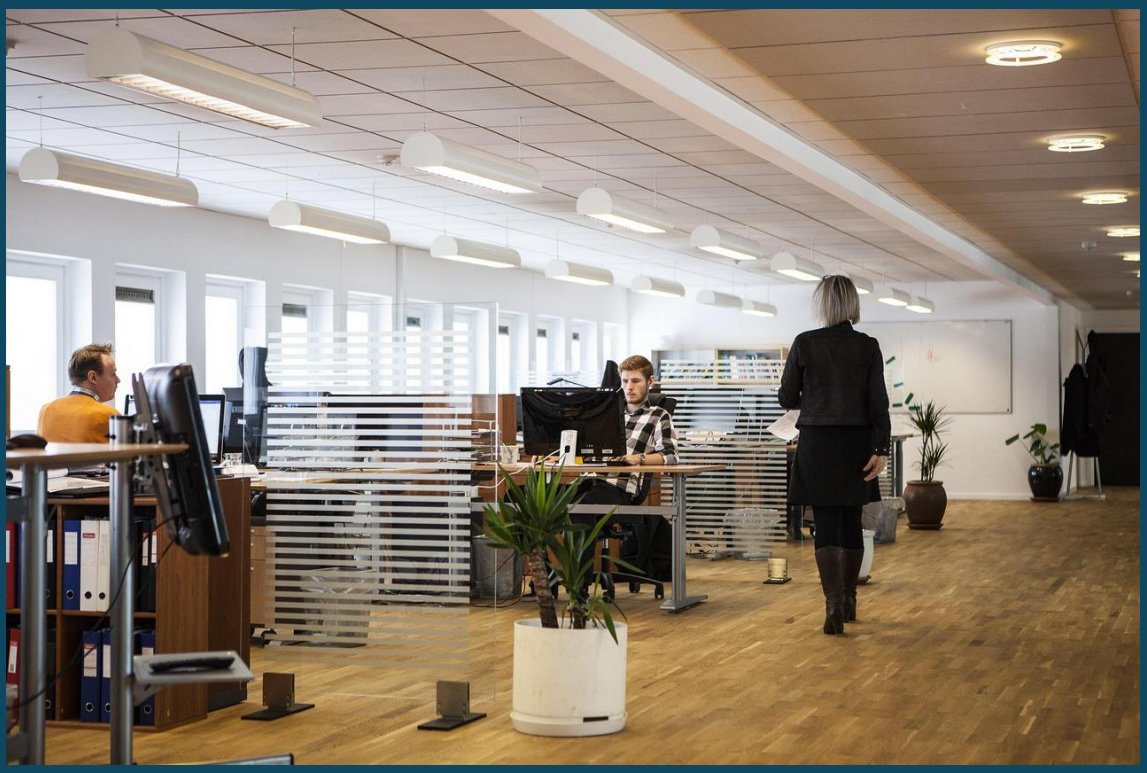
TRIP™ Stage 8: Maturity

After a time, industries become mature. Revenue growth has flattened, and the only real changes are due to incremental variations in market share or macroeconomic factors such as inflation or recessions. Consumer and enterprise behaviors have stabilized. Novelty and awe has transformed to ubiquity, which has become invisibility: the way television viewers no longer marvel over the fact that images appear in color, or shoppers marvel over web or mobile ordering with same-day delivery. New entrants have entered the market, offering comparable features and functions, modularly interchangeable, depressing profit margins. Rather than investing in new production operations or distribution facilities, funds are applied to maintenance or incremental upgrades. Products and services undergo sustaining, incremental innovations rather than radical reinvention: new sizes, new colors, new flavors, or substitutions of materials or ingredients. Advertising no longer focuses on explaining value or use, but rather maintaining customer loyalty or attempting to change brand positioning. Processes have become standardized and well accepted.



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TRIP™ Stage 9: Decline

Some industries remain in a maturity phase for decades or centuries, with little change in products, services, processes, or technology. One example might be the French wine industry, which still picks grapes, ferments them, ages them in oak casks, and bottles them about the same way as in the 1800s. Cultural heritage and artisanal positioning help here.

Most industries, however, experience decline sooner or later: industry revenues drop, and rivalry increases among remaining participants, causing profits to drop and firms to exit. This can be due to shifting customer tastes and public opinion (e.g., fur coats), awareness, values, behaviors, and perceptions, shifting demographics, macroeconomic factors, regulatory changes (e.g., thalidomide being taken off the market), disruptive innovations (e.g., online services vs. newspapers and malls), functional substitutes (e.g., digital photography vs. film), or share of wallet or time substitutes (e.g., baking bread vs. going to the gym during a pandemic).

Companies are often unable or unwilling to forecast the decline of their products or industries. Blockbuster Video®, at the height of their dominance, with thousands of video rental stores spanning virtually every community, apparently didn't foresee the advent of subscription-based services nor video streaming, famously turning down an offer to buy Netflix®, which now has a market cap of billions of US dollars.



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TRIP™ Stage 10: Redirection



Whether after experiencing a period of decline, in anticipation of such a period, or when proactively searching for continued growth, technologies, firms, and industries face a number of non-exclusive options for strategic redirection to an earlier TRIP phase:

- Retirement: sunsetting, end-of-life termination, asset liquidation
- Repression: suppression or throttling of supply, e.g., Kodak surpressing digital photography, Disney® toggling Princess DVD availability, seasonal pumpkin spice lattes
- Reset: the entire basis of industry structure and value propositions is transformed
- Rehoming: divestiture, spin-offs, joint ventures, or selling off business units
- Revival: capitalizing on nostalgia or authenticity, e.g., bell-bottom jeans, vinyl records, mid-century furniture
- Remixing: merging legacy models with new tech, e.g., digital-physical fusion
- Re-ecosysteming: expanding into adjacent / complementary offers, e.g., home delivery
- Relegation: to a niche or subsegment
- Renovation: via sustaining / continuous / incremental innovation
- Rebranding: altering market perception, value proposition, or category definition
- Repurposing: finding a new use, e.g., baking soda to eliminate refrigerator odors
- Relocation: migration or expansion to new geographies + localization
- Retargeting: to a new demographic, e.g., Pabst Blue Ribbon® beer transitioning to urban hipster culture

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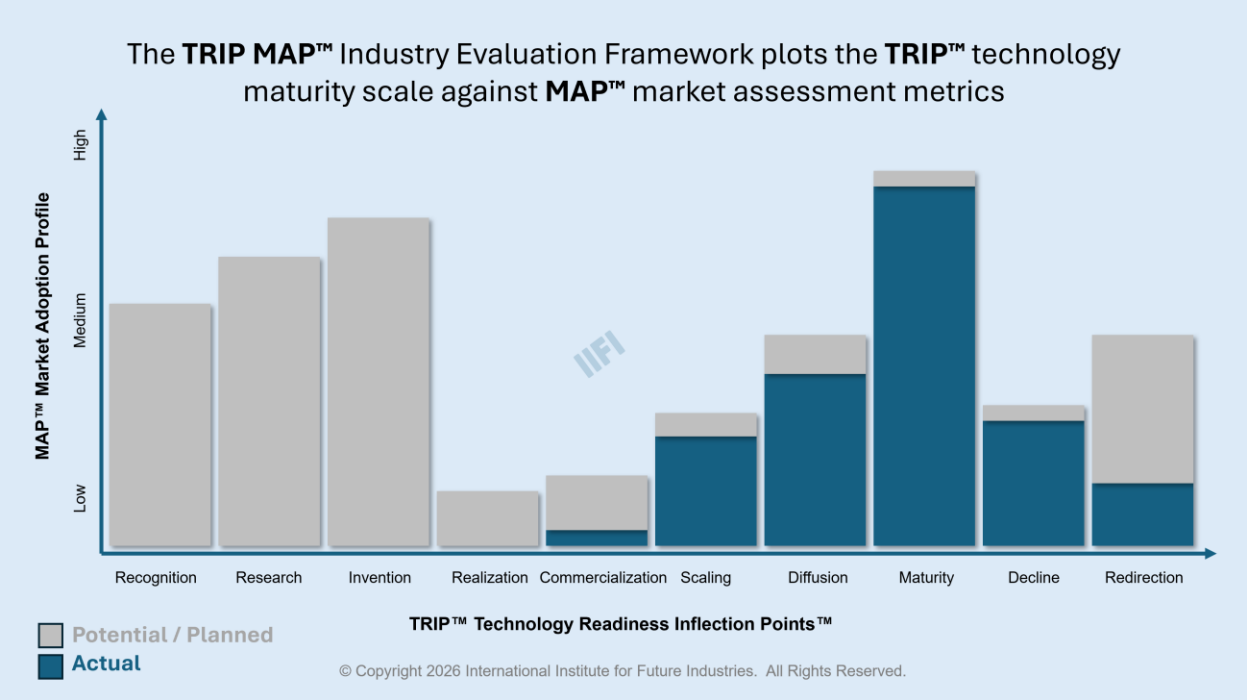
MAP™ Market Adoption Profile

At any given TRIP stage, business strategists, financial planners, accountants, and industry analysts will either have a projection, plan, or forecast regarding the market, actual data on sales, or both. Knowing the TRIP stage can help inform the validity of the market opportunity, and having market data can inform the TRIP stage, e.g., when Maturity shifts to Decline.

A companion IIFI case study details the TRIP MAP journey for 3M® Post-it® Notes—their "serendipitous failure" followed a torturous journey through the TRIP process, with MAP levels jumping back and forth between high and zero, and target and actual segments varying in early stages in the search for a good product-market fit, and then due to the strategic evolution of the product line.

This simplified view doesn't show all of the complexities of interactions and overlaps between phases. However, this case study shows how a technology-based product can go from a recognition of market opportunity to a stable, mature market continuing to evolve through strategic redirection.



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The MAP assessment scale is extremely flexible, and is intended to examine the evolution of the attractiveness and focus of the market across Technology Readiness Inflection Points. As such, a variety of metrics can be used individually or in combination.

FINANCIAL

- Total Addressable Market
- Serviceable Addressable Market
- Serviceable Obtainable Market
- Revenues
- Profit Share
- Unit Volume
- Conversion Rate

VALUE EXTRACTION

- Share of Wallet
- Average Revenue Per User / Account
- Customer Lifetime Value vs. Acquisition Cost
- Pricing Power
- Premium Capture

SEGMENTATION

- Firmographic / Demographic
- Psychographic
- Technographic
- Geographic
- Regulatory
- Behavioral
- Needs
- Relationship

MIND SHARE

- Share of Attention / Voice
- Influencer / Key Opinion Leader Mentions
- Advertising & Brand Recall
- SEO/GEO/Agentic Commerce Impact

ECOSYSTEM

- Direct vs. Indirect Channels
- Supplier Power
- Buyer Power
- Network Effects / Vitality

LOYALTY

- Customer Satisfaction
- Net Promoter Score
- Engagement / Active Users
- Retention Rate
- Switching Costs

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