

## Introducing the Technology Thrivability Index

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Initiatives: [Technology Innovation and Strategy](#)

CTOs lack a systematic approach to predict a technology's potential to thrive, impeding their ability to make strategic investment decisions. Gartner's Technology Thrivability Index is a self-assessment tool that measures the potential of technologies to thrive based on 30 leading indicators.

### Additional Perspectives

- [Summary Translation: Introducing the Technology Thrivability Index](#)  
(27 February 2024)

## Overview

### Key Findings

- CTOs are often tasked with making strategic technology investment decisions. They seek a structured method and a tool to make informed decisions about a technology's potential to thrive rather than only relying on gut instincts, public opinion or ad hoc recommendations.
- While there are instruments to evaluate vendors for a given technology, CTOs find it difficult to assess the future potential of the technologies themselves (for example, the potential of open-source software).
- Technologies evolve and thrive in clusters that comprise the incumbent emerging technology, its predecessors and successors and the underlying dependencies. Without understanding this evolution, CTOs will struggle to know when to replace the old with the new.

### Recommendations

CTOs making strategic technology investment decisions should:

- Make smarter technology choices by adopting Gartner's Technology Thrivability Index and incorporating it into their technology evaluation and trendspotting processes.
- Adopt a structured approach to estimating future potential by using the Thrivability Index in conjunction with other tools in the toolbox for technology analysis (such as Magic Quadrants, Hype Cycles, Technology Attractiveness Indexes or Technology Adoption Roadmaps).
- Map out the succession plan for technologies within the technology portfolio by evaluating their thrivability index taking the necessary preconditions into account.

## Strategic Planning Assumption

By 2028, 30% of global companies will invest in early-stage, innovative technologies to generate new revenue streams and outperform the competition.

## Introduction

CTOs regularly make strategic decisions on whether to adopt early-stage technologies and continue investment in those that are mainstream or on the verge of obsolescence. When making these decisions, they face the challenge of justifying business investments in unproven technologies. Given the absence of historical data, CTOs do not have the benefit of hindsight about newer, alternative technologies, making it nearly impossible to make data-driven decisions about them.

Therefore, CTOs rely on informal techniques such as community buzz, internal technology radars, or proofs of concept to confirm or invalidate their hunches about emerging technologies. These sources are undoubtedly very useful since they give a pulse on the technology and an idea of what it might make possible. However, these approaches present a gap — they don't represent a structured method to arrive at consistent, quantifiable and repeatable conclusions about a technology's future potential.

As a result, organizations incur huge monetary losses by betting on the wrong emerging technologies. In the 2022 Gartner Technology Viability and Thrivability Survey, respondents reported an average loss of \$9.1 million due to incorrect strategic technology investments.<sup>1</sup> Further, without exercising due diligence, CTOs may miss out on emerging technologies that pay large dividends in the future.

Gartner defines technology thrivability as a quantifiable measure of a technology's potential to gain mainstream adoption and sustain healthy adoption levels for an extended period.

To help CTOs make smarter investments in emerging technologies, this research introduces Gartner's Technology Thrivability Index. The index uses a set of 30 leading indicators that are grouped across six dimensions to predict the likelihood that a technology will thrive in the future. The six dimensions are:

- Adaptability
- Community
- Criticality
- Differentiation
- Ease of adoption
- Societal impact

CTOs should view Gartner's Technology Thrivability Index as an important tool in their toolbox to evaluate and compare emerging technologies.

*This research is part of a three-part series, we recommend reading it first to understand the context of this research. In addition, we recommend reading [Leading Indicators That Cause Technologies to Thrive \(Survey Insights\)](#) and using the companion [Tool to Assess Whether a Technology will Thrive](#).*

## Analysis

### Adopt Gartner's Technology Thrivability Index to Make Smarter Technology Choices

The Technology Thrivability Index provides a formulaic approach to help CTOs make technology decisions. It uses a deterministic, predictable and consistently testable proxy metric — technology thrivability — to predict a technology's future potential. We vetted the model through qualitative primary research methods and quantitative surveys and tested it against technologies that either thrived or prematurely perished.

Figure 1 uses the metaphor of a flower that blossoms to describe technologies that thrive. Much like the petals have to unfold for a flower to blossom, the six factors have to unravel for a technology to thrive.

**Figure 1: Six Dimensions of Technology Thrivability**

## Six Dimensions of Technology Thrivability



Source: Gartner  
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## Six Dimensions of Technology Thrivability

The Technology Thrivability Index captures 30 leading indicators across six dimensions:

### Adaptability

This dimension measures a technology's ability to adapt to new environments and use cases through interoperability, compatibility, composability and modularity. The ability to adapt to changing user needs requires technologies to have a steady release cadence with an active roadmap. The technology must also lend itself to efficient production and distribution, enabling users to benefit from economies of scale.

### Community

This dimension measures the strength of the technology's supporting community and ecosystem, which makes it more likely to build a perception of trust. A strong community can result in vendors using the technology to provide services and build solutions, making it commercially viable.

A vibrant community offers two advantages. First, the community ensures that the underlying dependencies remain viable while providing feedback on the technology to address privacy, security and transparency concerns adequately. Second, it provides a support system with community members helping each other via user forums and advisory groups. This category of indicators includes open innovation through open source and open standards.

## **Differentiation**

This dimension measures the ease of finding alternatives to a given technology. If alternatives are easier to adopt and provide greater value with less risk and cost, it reduces the thrivability of the current technology. This group also includes "technical differentiation," ranked as the most impactful indicator of technology thrivability in our survey.

## **Criticality**

This dimension measures how closely a technology integrates with business workflows or whether it is indispensable to "get the job done." Think of criticality as the equivalent of a page rank that scores webpages in ranking search results based on how many other pages link back to it.

This group includes indicators that make the technology foundational and critical to other technologies. The more foundational the technology, the greater its criticality. Other criticality factors include "intellectual property that is difficult to replicate" and "high market penetration." Together with other factors, these can be healthy signposts of a technology's direction.

## **Ease of Adoption**

This dimension measures the ease of adopting the technology at scale. The ease of adoption considers implementation efforts, supply chain disruptions, a lack of requisite skills, the need for infrastructure modernization and a higher total cost of ownership.

Minimizing user friction by lowering the total cost of ownership, providing a path to bridge skills gaps and making the technology easier to use helps gain initial momentum and eventually achieve widespread adoption. Our survey shows that users ranked not having an easy path to migrate to alternatives as the least impactful indicator of thriving. These results validate the idea that users are willing to adopt new technologies if they provide sufficient differentiation and adequately meet user needs.

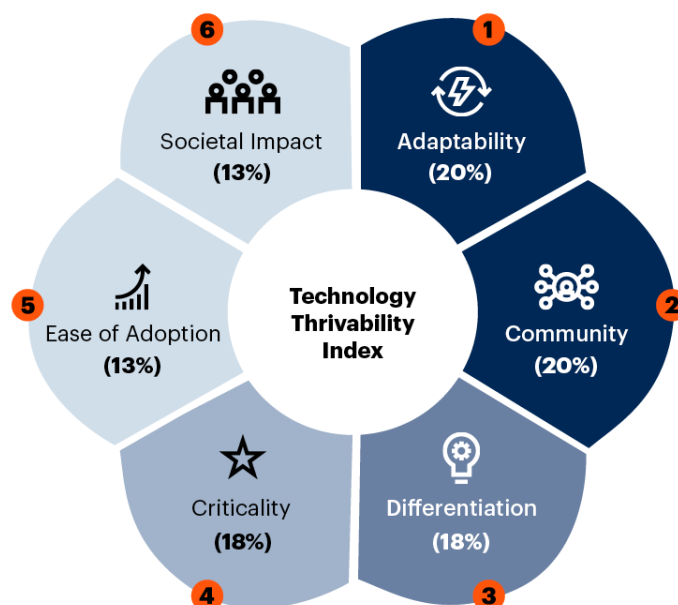
### Societal Impact

This dimension measures the technology's alignment with an organization's societal values, morals, ethics and environmental sustainability commitments. Societal impact indicators also factor in aspects of accessibility to all kinds of users and the cultural context — that is, whether the technology is inclusive of multiple cultures. For technologies that have far-reaching social consequences, this dimension serves as a lighthouse that guides the advancement of other dimensions.

Not all dimensions hold equal weight in determining the thriving of a given technology. The 2022 Gartner Technology Viability and Thrivability Survey found that adaptability and community are the most impactful in predicting the thriving of a technology. Figure 2 shows the relative weighting of each dimension.

**Figure 2: Relative Weighting of the Six Dimensions of Technology Thrivability**

#### Relative Weighting of the Six Dimensions of Technology Thrivability



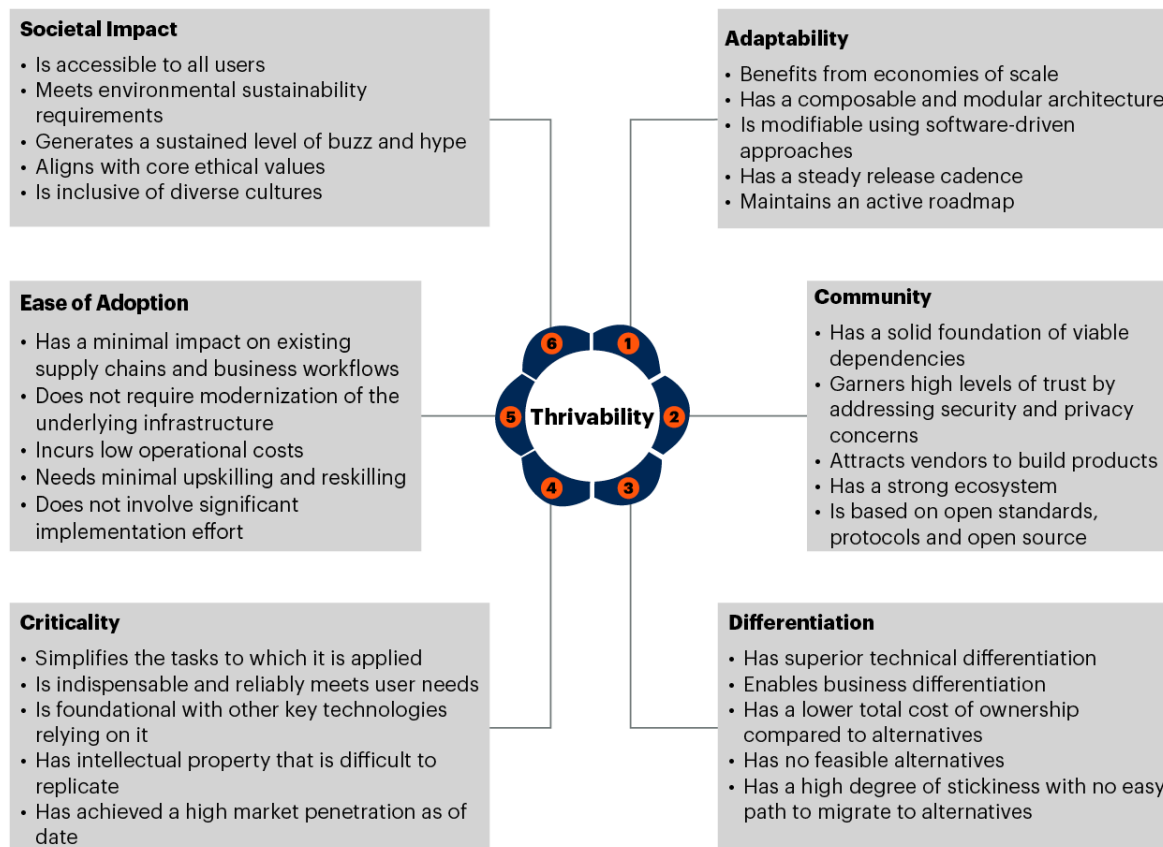
Source: Gartner  
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## 30 Leading Indicators Impact Technology Thrivability

As we drill into the six dimensions, we find 30 forward-looking leading indicators for thrivability (see Figure 3).

**Figure 3: Leading Indicators Impacting Technology Thrivability**

### Leading Indicators Impacting Technology Thrivability



Source: Gartner  
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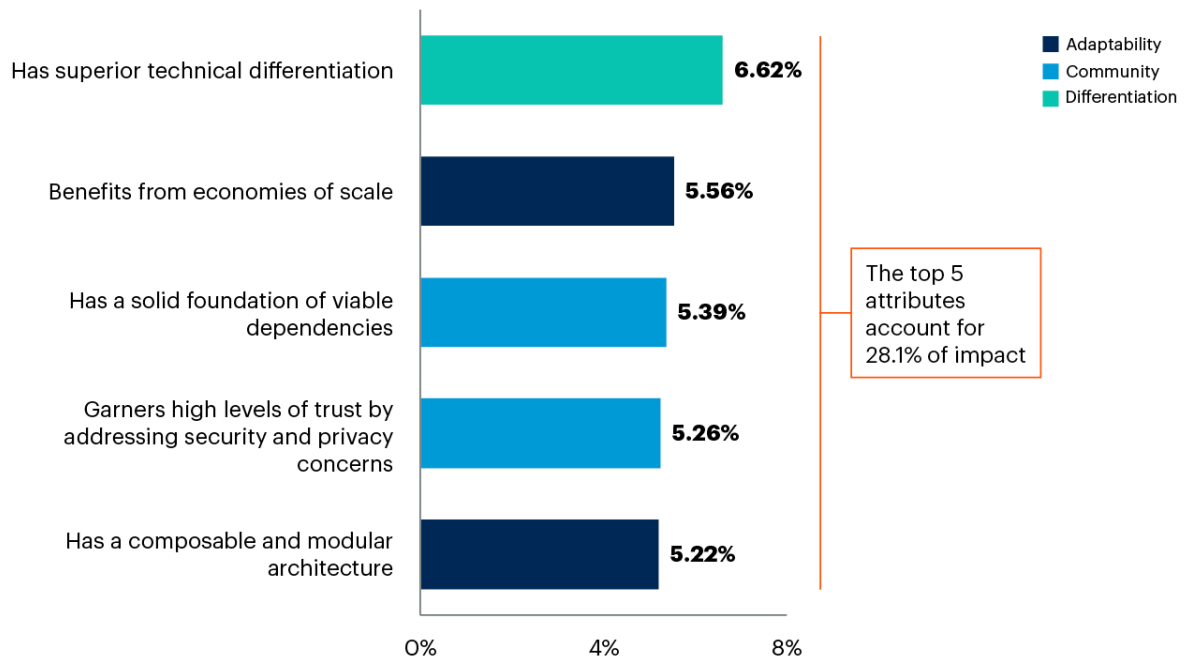
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The 30 leading indicators vary in terms of their impact on technology thrivability. Of the 30 indicators, technical differentiation is perceived as the greatest predictor of thrivability — accounting for 6.6% of the impact. The top five leading indicators represent more than a quarter of the total share of impact toward technology thrivability (see Figure 4).

Figure 4: Top 5 Leading Indicators of Technology Thrivability

**Top 5 Leading Indicators of Technology Thrivability**

Share of Indicator Impact — Maxdiff Method



n = 504 Total respondents

Q: Thinking about emerging or early-stage technology, which of the following do you find to be the most important predictor of thrivability, and which do you find to be the least important predictor of thrivability?

Source: Gartner Technology Viability and Thrivability Survey

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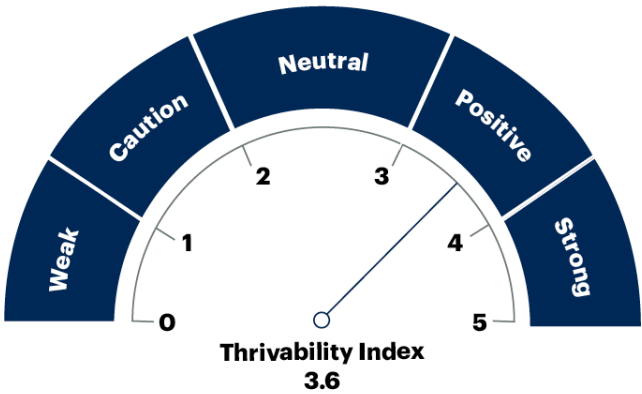
**Self-Service Assessment Tool For Calculating the Thrivability Index**

CTOs should use the companion [Tool to Assess Whether a Technology Will Thrive](#) to assess the thrivability of specific emerging technologies. As an example, a small team of Gartner analysts used the tool to calculate the Technology Thrivability Index of a highly hyped technology — Meta's Llama 2 model. Llama 2 received a cumulative Technology Thrivability Index score of 3.6 out of 5.0 (see Figure 5).



Figure 5: Technology Thrivability Index Score for Meta’s Llama 2 (December 2023)

Technology Thrivability Index Score for Meta’s Llama 2 (December 2023)



Dimensions	Weak	Caution	Neutral	Positive	Strong
Adaptability					4.5
Community				4.3	
Criticality			3.0		
Differentiation			3.2		
Ease of Adoption			2.6		
Societal Impact			3.4		

Source: Gartner  
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In theory, the Thrivability Index is similar to the consumer price index (CPI) as a measure of inflation. The CPI is calculated by taking the average weighted cost of a basket of goods and services. Likewise, the Thrivability Index is calculated by taking the average weighted cost of a basket of indicators shaping the growth and adoption of a technology. However, the similarities end there.

Unlike the CPI, which is a lagging indicator of inflation, the Technology Thrivability Index is a leading indicator of a technology’s future potential. Lagging indicators provide a snapshot of what’s already happened after an event has taken place whereas leading indicators paint a picture of what might come.

Another example of a similar model is the S&P 500, a stock market index that tracks the stock performance of 500 of the largest companies listed on stock exchanges in the United States. Like the Thrivability Index, the S&P 500 index is a leading indicator of the economy and is often used to predict the economy's direction. It is a market-value-weighted index whose components are weighted according to the total market value of their outstanding shares. These are opinionated indexes, and while not perfect, they serve as quantitative and objective indicators by establishing a common definition and allowing comparing apples with apples between the things they benchmark.

## Use the Thrivability Index With Other Tools in Your Technology Evaluation Toolbox

To reap the most benefits from the Thrivability Index and avoid common pitfalls, CTOs must know the nuances of this framework. Like any tool, the Technology Thrivability Index is designed for a specific use, and it is only useful when applied for the right purpose and as a complement to other instruments. CTOs should use the following Q&A guidance to ensure they are properly using the framework.

**"Prediction is very difficult, especially about the future."**

*— Attributed to Niels Bohr, physicist*

### Can I Use the Thrivability Index for Classes of Technologies or Trends?

It may be tempting to use the Thrivability Index for technology trends rather than specific technologies. Consider the difference between generative AI and the Llama model or between observability and OpenTelemetry. While the former are trends, the latter are technologies manifesting the trend.

The Thrivability Index is designed to predict the thrivability of specific technologies that organizations can implement and use — like generative AI models (such as Meta Llama 2 or OpenAI GPT), Kubernetes, Apache Kafka or OpenTelemetry. It does not cover technology trends or categories (such as AI, cloud-native or edge computing).

A specific technology does not necessarily mean a commercial product. However, the Thrivability Index could be used to determine the thrivability of specific vendor implementations. For example, it is possible to assess the thrivability of both Apache Kafka and Confluent's managed Kafka offering.

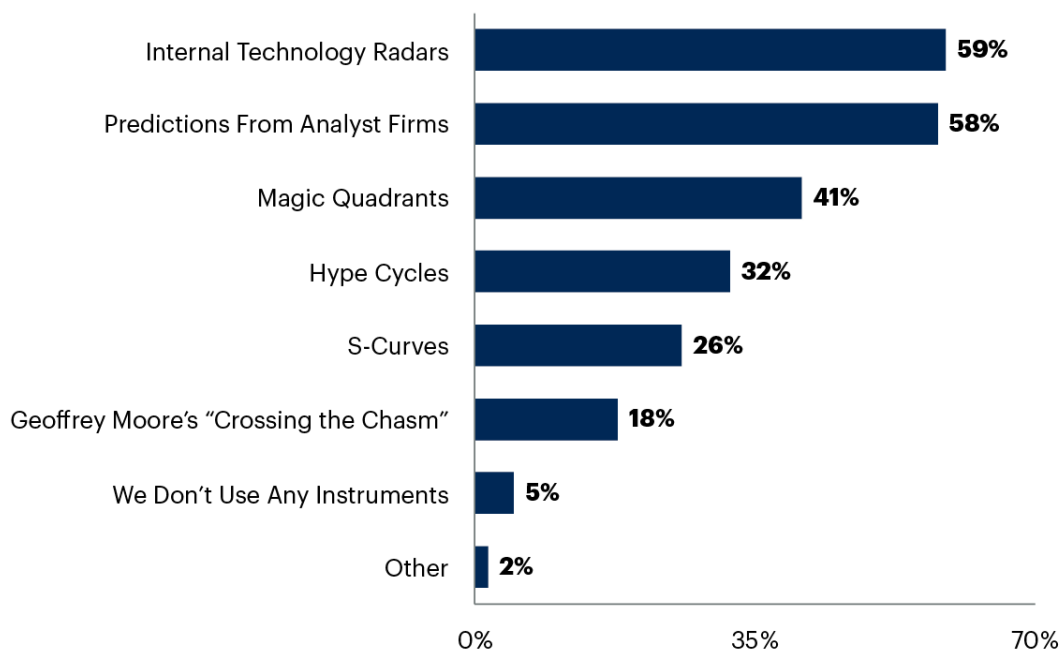
## How Does the Thrivability Index Relate to Other Tools Used to Analyze Emerging Technologies?

In the 2022 Gartner Technology Viability and Thrivability Survey, we asked technology decision makers which instruments they currently use to analyze early-stage, emerging technologies for future investments. More than half of respondents said they used internal technology radars and predictions from analyst firms. Hype Cycles and Magic Quadrants were also popular among respondents (see Figure 6).

**Figure 6: Instruments Used to Analyze Emerging Technologies**

### Instruments Used to Analyze Emerging Technologies

Percentage of Respondents, Multiple Responses Allowed



n = 504 Total respondents

Q: Which instruments, if any, does your organization currently use to analyze early-stage, emerging technologies for future investments?

Source: Gartner Technology Viability and Thrivability Survey

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The Thrivability Index complements these instruments and fills gaps in the decision-making process. Much like the Magic Quadrant and the Hype Cycle, the Thrivability Index is a point-in-time tool. However, unlike the Magic Quadrant and Hype Cycle, the Thrivability Index is a self-assessment tool. The index score is bound to change due to new inventions or discoveries, evolving market dynamics or other changes over time. CTOs must use the Thrivability Index as a key input in formulating their technology roadmap (see Table 1).

## How Various Technology Assessment Tools Compare

Viewing partial table. [Click here to view full table](#)

Instrument	Typical Usage	How to Use it With the Technology Thrivability Index
Hype Cycle	Provides a snapshot of the market penetration, maturity and benefit of technology innovations.	Use the Thrivability Index to determine whether the technology may reach the Plateau of Productivity and gain mainstream adoption.
Magic Quadrant	Compares vendors that support a specific technology based on a market definition.	Use the Thrivability Index first to determine whether the technology will thrive. Then, compare how well each vendor in the market can support the technology. For example, calculate the Thrivability Index for Open Telemetry and then use the <a href="#">Magic Quadrant for Application Performance Monitoring and Observability</a> to assess vendors that use Open Telemetry.
Enterprise Technology Adoption Profile	Captures an enterprise's attitudes and preferences that influence technology decision making across three dimensions: planning, control and pace of change.	Use the Thrivability Index to build confidence in your technology decisions. Knowing a technology's thrivability helps fast followers justify their investment in early-stage technologies. Enterprise technology adoption profiles also help bring clarity and reassurance to reluctant followers.
Technology Attractiveness Index	Compares the attractiveness of technology options for a given use case. For example, private 4G, 5G midband and Wi-Fi 6E can all enable a private mobile network. However, their capabilities vary by needs (such as capacity, latency and ecosystem needs).	Use the Thrivability Index to estimate the likelihood of a technology thriving. For example, if you are currently using private 4G, and you have determined that Wi-Fi 6E is better suited for your needs, the index will give you clarity on the thrivability of Wi-Fi 6E.

Source: Gartner (December 2023)

## Where Does the Thrivability Index Fit in Relation to Trendspotting?

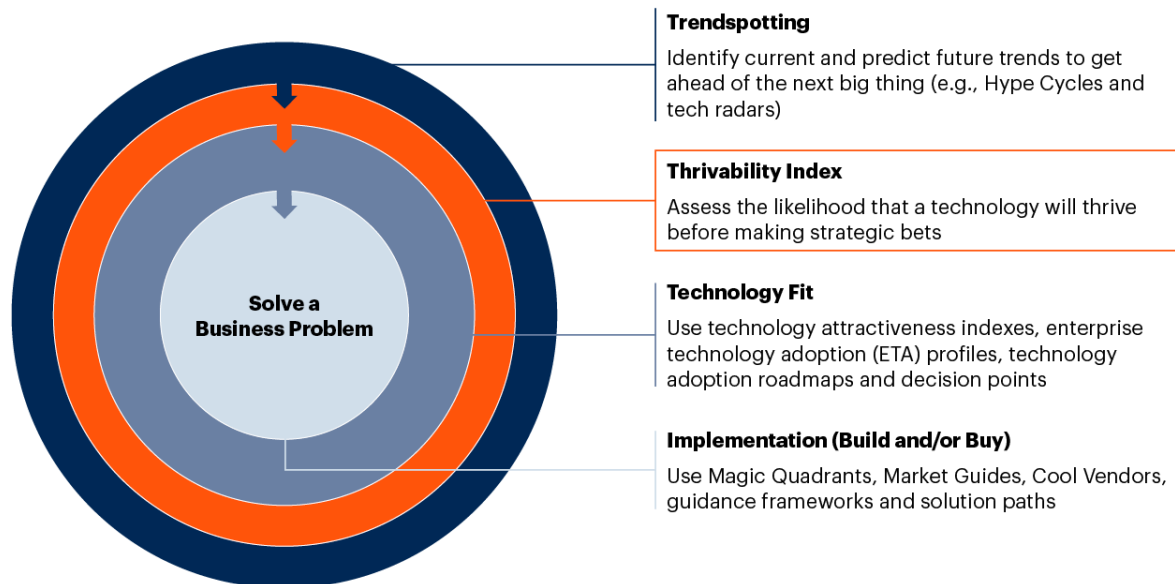
Trendspotting is a purposeful and targeted approach to exploring uncertainties and future changes that may impact the enterprise, creating both disruptions and opportunities. A key goal of trendspotting is to identify current and predict future trends so that you can monitor them and respond to them to get ahead of the next big thing (see [Use Trendspotting to Identify the Trends That Matter and the Impact on Technology Adoption](#)).

We recommend CTOs to use a thrivability analysis as the next step after analyzing technology trends with trendspotting techniques or analyzing innovations in the Hype Cycle. Once you determine which trends are relevant to your specific industry and applicable to your organizational context, you can use a thrivability analysis to assess whether the relevant technologies will likely thrive.

Follow this analysis with instruments such as Magic Quadrants, technology attractiveness indexes and guidance frameworks to help adopt the technology (see Figure 7).

**Figure 7: Where the Thrivability Index Fits in Your Technology Assessment Toolbox**

## Where the Thrivability Index Fits in Your Technology Assessment Toolbox



Source: Gartner  
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## Is the Thrivability Index Designed for Technology Producers or Technology Consumers?

The Thrivability Index applies to organizations of all sizes, regardless of whether you are a technology provider or a technology consumer. The framework is highly versatile because it focuses on the technology and the leading indicators of thrivability.

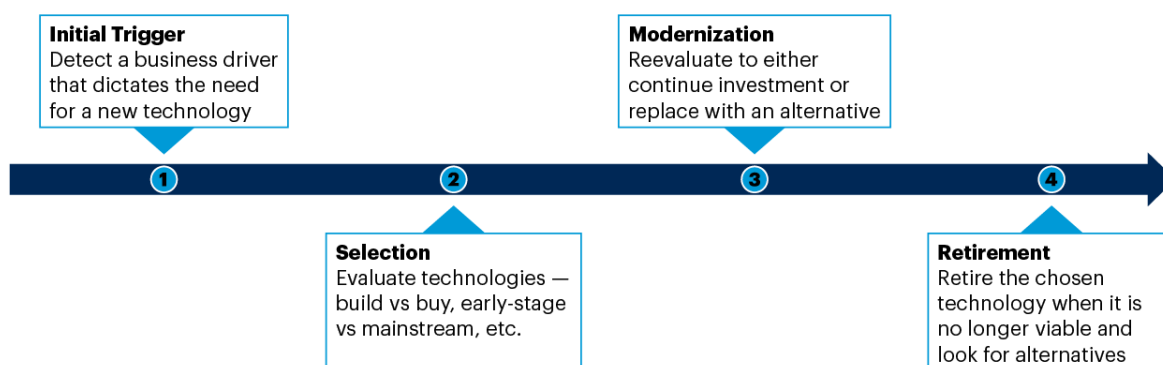
The decision to adopt the technology is a separate exercise that includes factors beyond thrivability. As Gartner's research on enterprise technology adoption indicates, an organization's attitudes toward planning, control and pace of change determine how it approaches technology decisions (see [Enterprise Technology Adoption Profile Self-Assessment](#)).

## Can I Use the Thrivability Index to Assess Mature Technologies?

Thrivability is not only a concern when choosing emerging technologies but also when working with mature technologies. The main difference between the two is the availability of ample empirical data for mature technologies. Technologies that are relatively stable and have a seemingly positive outlook are prone to existential threats from radical, disruptive innovations. The Thrivability Index is a valuable tool to identify potential alternatives when technologies are close to becoming obsolete (see Figure 8).

**Figure 8: Assess Thrivability at Different Stages of Technology Adoption**

### Assess Thrivability at Different Stages of Technology Adoption



Source: Gartner  
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The Thrivability Index accounts for potential disruptions to established technologies by including a key pillar called “differentiation.” This pillar indicates looming threats on currently thriving technologies to help CTOs decide whether to continue investment or look for competing alternatives. CTOs must pay attention to the indicators that comprise differentiation and assess the impact of such technology disruptions and upheavals.

### Does Open Source Guarantee Higher Thrivability for Technologies?

The open-source movement, characterized by open ecosystems, open roadmaps and community contributions, has been pivotal for the success of many popular technologies. Key examples include Linux, Android, Kubernetes, OpenSSL and OpenTelemetry.

Contrary to the popular belief that open-source technologies with low barriers to adoption will invariably thrive, the 2022 Gartner Technology Viability and Thrivability Survey found that technology decision makers do not consider open source as a top leading indicator for thrivability.

When asked, “Which of the following do you find to be the most important and the least important predictor of thrivability?” the indicator “based on open standards, protocols and open source” was weighted 22nd among the 30 indicators.

The degree to which open source impacts thrivability will depend on the strength of the community that supports the technology. Our survey shows that “community” ranks as one of the two most impactful thrivability dimensions. In addition, respondents indicate that open-source technologies are more likely to thrive if they have viable dependencies, garner high levels of trust and attract vendors to build products.

## Map Out the Succession Plan for Existing Technologies

Succession planning for technologies requires understanding the notions of “preconditions” and a “technology cluster.”

### Preconditions

For a technology to thrive, certain preconditions must already be well-established. For example, the success of the iPhone depended on several preconditions: cellular technology, touch interfaces, GPS technology, mobile internet, mobile cameras and the tools to quickly build mobile applications.

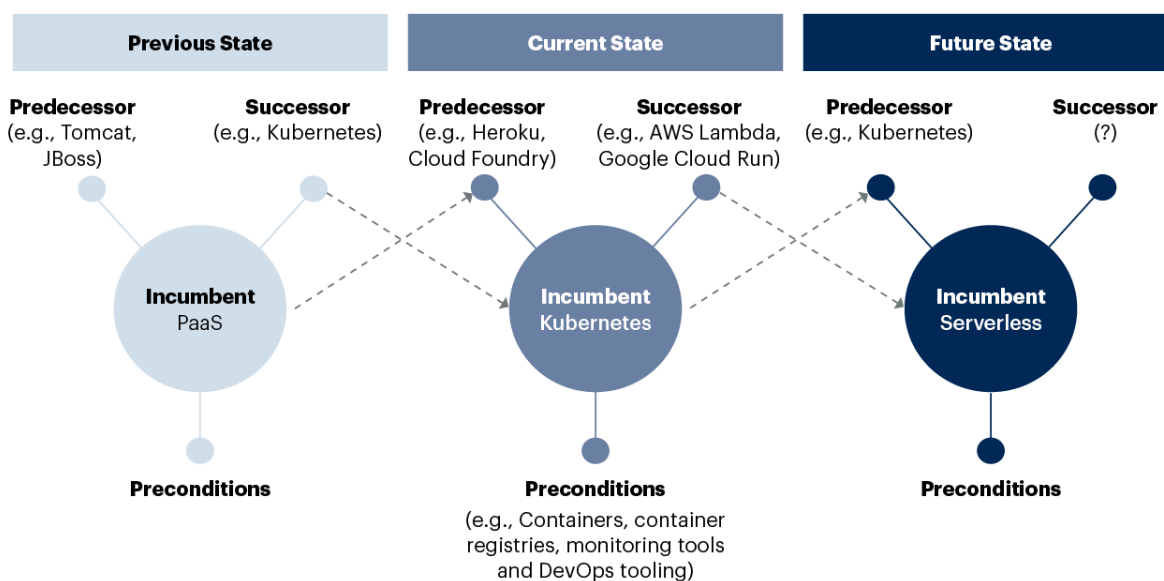
The existence of a healthy ecosystem can be a precondition. Think of Android — its precondition is the Linux operating system. The Linux operating system not only provides a solid set of underlying dependencies but also serves as a thriving ecosystem for Android.

### Technology Cluster

The technology cluster comprises predecessors, the incumbent technology and the potential successor. The preconditions are the prerequisites that advance technologies from an incumbent to its successor. For an example technology cluster from the cloud-native realm, see Figure 9.

Figure 9: Technologies Evolve in Clusters of Predecessors, Successors and Preconditions

### Technologies Evolve in Clusters of Predecessors, Successors and Preconditions



Source: Gartner  
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CTOs should analyze the thrivability of technologies — and their clusters — as part of succession planning. They should combine the Thrivability Index with an analysis of technical fit, skills fit and a migration or transition path. Through this analysis, they can optimize their succession planning by accounting for the strength of the community, the interdependencies and supply chains. The potential successors might have a huge thrivability advantage. However, they might only do 80% of what you need, or require a substantial reskilling of the workforce and retooling of related capabilities (for example, going from Kubernetes to serverless technologies).

CTOs can also use the thrivability criteria as a filter to eliminate successor technologies that have a weak Thrivability Index score or prioritize further evaluation of those with a positive score. Note that the Thrivability Index score of the incumbent technology benefits from hindsight, while the score of the successor technology provides foresight to justify future investment.



## Evidence

**2022 Gartner Technology Viability and Thrivability Survey:** This study was conducted to identify and understand the key indicators that impact the viability and thrivability of technologies.

The research was conducted online in December 2022 among 504 respondents across multiple industry sectors (including retail, information technology, energy, manufacturing, banking and financial services) and company sizes. Responses were from the following countries or regions:

- The U.S.A. (42%)
- The U.K. (20%)
- Other European countries (14%) — including France, Germany, Italy and Netherlands
- India (9%)
- Canada (7%)
- Singapore (5%)
- Australia and New Zealand (3%)

Respondents had to be involved in vendor selection, strategic technology decision making, setting strategic direction and leading digital transformation initiatives. Their role had to be no more than two reporting layers away from the most senior person in the department.

*Disclaimer: Results of this study do not represent global findings or the market as a whole but reflect the sentiment of the respondents and companies surveyed.*

## Note 1: Guidance on the Scope and Use of the Thrivability Index as a Tool

1. The scope of “technologies” covered by the Thrivability Index is limited to digital technologies that CTOs use in an IT context to enable digital business and drive digital innovation.
  1. Specifically, the Thrivability Index is aimed at assessing technologies or technology products that generate data for enterprise use.
  2. “IT” is the common term for the entire spectrum of technologies for information processing, including software, hardware, communications technologies and related services. Technologies in non-IT use cases, such as space exploration, agriculture, solar energy and plastics, are excluded.
  3. For this research, “technology” refers to technology products and the underlying software, hardware and firmware layers that underpin those products. The technology must be directly consumable by end users or builders to build new solutions.
  4. Technologies that meet this definition include cloud services, edge devices, mobile devices, AI models, digital infrastructure, software libraries, operating systems, and security tools and appliances.
2. The Index must not be seen as an absolute value of thrivability but as a probabilistic score on a scale of 1 to 5. For example, based on our analysis, the Thrivability Index of Meta’s Llama 2 model as of December 2023 is 3.6 out of 5. The survey results helped establish the weights used to calculate the index. Gartner may revisit weights as we learn more about the tool’s usage and adoption.
3. Treat the Thrivability Index as a complementary tool that fills gaps in your existing technology evaluation toolbox.
4. Thrivability calculation provides a mechanism to assess and not discover emerging technologies.
5. A high thrivability score alone does not make the technology a good fit for all organizations and use cases.

## Recommended by the Authors

Some documents may not be available as part of your current Gartner subscription.

[Use Trendspotting to Identify the Trends That Matter and the Impact on Technology Adoption](#)

[Leading Indicators That Cause Technologies to Thrive \(Survey Insights\)](#)

[Tool to Assess Whether a Technology Will Thrive](#)

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Technology Attractiveness Index	Compares the attractiveness of technology options for a given use case. For example,	Use the Thrivability Index to estimate the likelihood of a technology thriving. For

	private 4G, 5G midband and Wi-Fi 6E can all enable a private mobile network. However, their capabilities vary by needs (such as capacity, latency and ecosystem needs).	example, if you are currently using private 4G, and you have determined that Wi-Fi 6E is better suited for your needs, the index will give you clarity on the thriving ability of Wi-Fi 6E.
Technology Adoption Roadmap	Assesses technologies based on their perceived value, deployment risk and adoption timelines across organizations.	Use the Technology Thrivability Index to estimate the thriving ability of key technologies that are in the piloting phase or planned for deployment.

Source: Gartner (December 2023)

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