rubin worldwide

An Economic Model for Optimizing Technology Investments

May 2023

Technology Asset Class Optimization: An Essential Discipline to Strengthen Business Performance

Commissioned by BROADCOM MAINFRAME SOFTWARE

The Business Need for Smart Technology Investment Decisions

Global technology spending is approaching $8T annually, with business IT spending reaching peaks of 30% of operating expense for companies across industry sectors. With that much money being poured into technology, it is crucial that technology investments are managed both efficiently and effectively.

But upon what basis should you make technology-oriented decisions? How do you determine where and when to invest in new technologies? How do you weigh the value of your existing technology investments? How do you modernize your IT infrastructure to maximize your business outcomes?

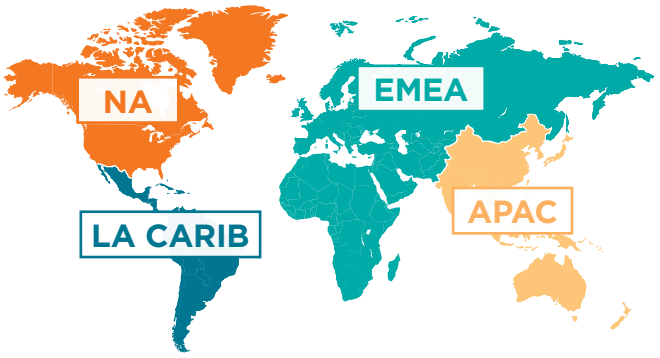
It is all too easy to get caught up in the hype of the latest technologies. However, while the "latest and greatest" may have compelling benefits, it may not be the best or only answer to your organization's specific needs. There is frequently good reason to maintain the proven technologies that are part of your existing tech stack. The better question to ask is, how do you evaluate and leverage the right technologies – both longstanding and more recent – to drive optimal business performance?

Businesses and industries today need a holistic framework to make well-informed technology choices: **a model that gives IT executives a better way to make smart, winning investment decisions for their tech stack.** That framework now exists in the form of Technology Asset Class Optimization.

A New Model: Technology Asset Class Optimization

Seeking to foster deeper understanding of the critical factors that business leaders must evaluate when selecting the technologies that position them for the strongest performance, Broadcom Inc. teamed up with Dr. Howard A. Rubin to conduct an in-depth, data-driven study. The result was the creation of Technology Asset Class Optimization, a clarifying economic construct based upon extensive research and analysis by RubinWorldwide using data from approximately 2,400 organizations across 20+ sectors.

> Technology Asset Class Optimization provides a framework for evaluating and planning technology investments with the same rigor and language used to manage financial investments.



Region	Contries per Region	Data Points per Region
APAC	15	372
EMEA	45	901
LA CARIB	17	158
NA	3	996
Total	80	2427

***Dr. Howard Rubin**, co-founder and CEO of Rubin Worldwide, is a pioneer in the areas of digital and technology economics and has built the world's largest database in the field, consisting of business, national, and technology data captured continuously since 1994. With these insights, he monitors technology-economic trends across companies and organizations that account for roughly 20% of the world's GDP and an equivalent amount of technology spending/investment.*

Dr. Rubin is personally retained as a strategic advisor by many of the world's largest enterprises. He provides competitive calibration via benchmarking and advice on business-technology strategy and trends.

In the world of finance, an asset class is a group of financial instruments that have similar financial characteristics and which behave in the same way in the marketplace. Financial asset classes include equities, bonds, cash, and cryptocurrency. Each asset class has its own profile of returns and risks. People and organizations manage their investments by selecting a balance of asset classes, with specific allocations determined by investment goals ranging from conservative to aggressive growth.

The same concept – that of asset classes – can be applied to technology investments. Infrastructure technology refers to a mixed set of computing, storage, and services made up of on-premises infrastructure (such as mainframe, distributed, and private cloud services) and external public cloud, with orchestration taking place among the various platforms to create a unified "investment portfolio." As in the financial asset class model, each of these technology asset classes has a particular value proposition and can be evaluated in terms of key attributes, risk, business impact, and return on investment (ROI).

Technology Asset Class Optimization provides value to IT executives in two distinct ways. First, it offers **deep insights into the technology asset class distribution used by best-in-class organizations** based on actual business performance against industry competitors and relying on standard measures such as infrastructure efficiency and operating margins. Second, it provides a framework that organizations can use to **arrive at their own optimized technology investment mix** – one designed to meet their unique business performance goals.

Attributes to Guide Investment Decisions

A substantial part of any investment decision is assessing and balancing levels of perceived risk and potential value. In the financial arena, investors carefully weigh variables such as returns, liquidity, and sensitivity to economic cycles. Among technology asset classes, investors should consider the following attributes:

Attribute	Description
Scalability	The ease with which capacity changes can be made due to volume volatility, coupled with the concurrent cost structure response time
DORA Metrics	Performance in terms of key DevOps metrics: Time to Restore Service, Delivery Lead Time, Deployment Frequency, Change Fail Rate
Automation Maturity	The availability of tools to enhance productivity, reliability, and quality
Availability	The operational profile of providing end-to-end business system and data access
Information Security	The degree to which organizational needs are supported in terms of regulatory requirements
Business Operating Margin Impact	How the cost structure impacts the business bottom line though efficiency and engineered elasticity
Software Capabilities	The availability of mature management toolsets in key domains such as AIOps and Automation, DevOps and Application Development, Security Controls and Monitoring, Compliance and Data Protection
Talent Availability	The job market availability of the needed talent for the successful operation of the environment
Environment and Sustainability Impacts	The degree and manner in which the technology affects the environment and environmental resources

The attributes of each technology asset class (public cloud, servers, and mainframe) reveal insights tied to critical performance measures.

	Attributes	Public Cloud	Servers	Mainframe
	Scalability	Moderate - 2x scale growth results in 20% unit cost reduction	Low - 2x scale growth results in 10% unit cost reduction	High – 2x scale growth results in >60% unit cost reduction
DORA Metrics	Time to Restore	~3 hours	~3.5 hours	~2.8 hours
	Delivery Lead Time	~7 days	~9 days	~7.5 days
	Deployment Frequency	4	4.8	3.5
	Change Fail Rate	1.5%	1.75%	1.5%
	Automation Maturity	Moderate	High	High
	Availability	Close to never down	99.9990%	99.99999%
	Information Security	Low – does not meet regulatory requirements for all sectors; low maturity	Moderate – typically meets regulatory requirements	High – most secure and mature of all platforms
	Business Operating Margin Impact	Supports some low-cost IT with margin impact depending on contract factors	None	Highest-margin firms in most sectors use mainframes
Software Capabilities	AIOps & Automation	Moderate	High	Very High
	DevOps & App Development	Moderate	High	Very High
	Security Controls & Monitoring	Moderate	High	Very High
	Compliance & Data Protection	Moderate	High	Very High
	Talent Availability	Low	High	Moderate
	Environment and Sustainability Impacts	High – massive power draw and water usage	Moderate – similar to public cloud at smaller scale	Low – efficient use of power and resources at any scale

Note: Figures in this table are for illustrative purposes only. They are representative of average or typical deployments. Specific metrics and performance measures will vary for different organizations based on factors such as configurations, individual contract agreements, and technology currency posture.

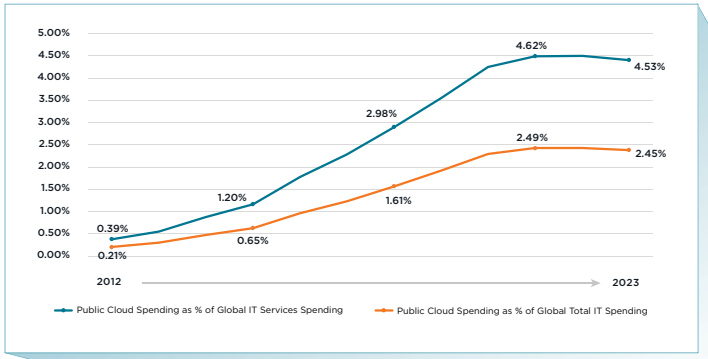
Top Performers Have a Hybrid Mix of Asset Classes

Reviewing the attributes of the various technology asset classes may bring to mind the question: "Is there a single best asset class?" The question is understandable, since it can seem from media headlines and tech articles that "everyone" is moving "everything" to the public cloud. Additionally, new businesses are often cloud native, having never owned a server or given thought to a mainframe. More mature organizations can feel tempted – even pressured – to move away from existing infrastructures for no other reason than that they are not as new as the most recent, trending technology. This approach falls into the trap of basing technology investments on what an asset class isn't – in this case, "new" – rather than by weighing its value for what it is.

The siren song of the "latest and greatest" can be compelling, but may not always be the best course. The truth is in the numbers. Data reveals that cloud is not the only, or even the most prevalent, answer – at least, not to date.

> When you compare the revenue attributed to public cloud at Amazon Web Services, Microsoft Azure, Google Cloud, and IBM against **$8** trillion in worldwide IT spend, it does not even reach **10%**.

Public Cloud Spending as a Percent of Global IT Services and Global Total IT Spending 2012 - 2023



In reality, organizations are relying on a hybrid mix of asset classes. The current thinking is no longer a simple cloud-first approach. The priority is making the right technology investments at the right time on the right platform – including but not limited to cloud – to achieve the greatest total value.

Consider again the analogy to financial investing. It would rarely, if ever, be wise for someone to liquify a robust stock and bond portfolio to invest exclusively in cryptocurrency or non-fungible tokens (NFTs) simply because they are a new financial asset class. Why, then, would that make sense for technology assets? Yet those who fail to view their technology assets from a technology economics standpoint can be lured into going all-in on public cloud or other current headline-grabbing technology without examining asset balance or the direct relationship the new technology may have to their specific business performance.

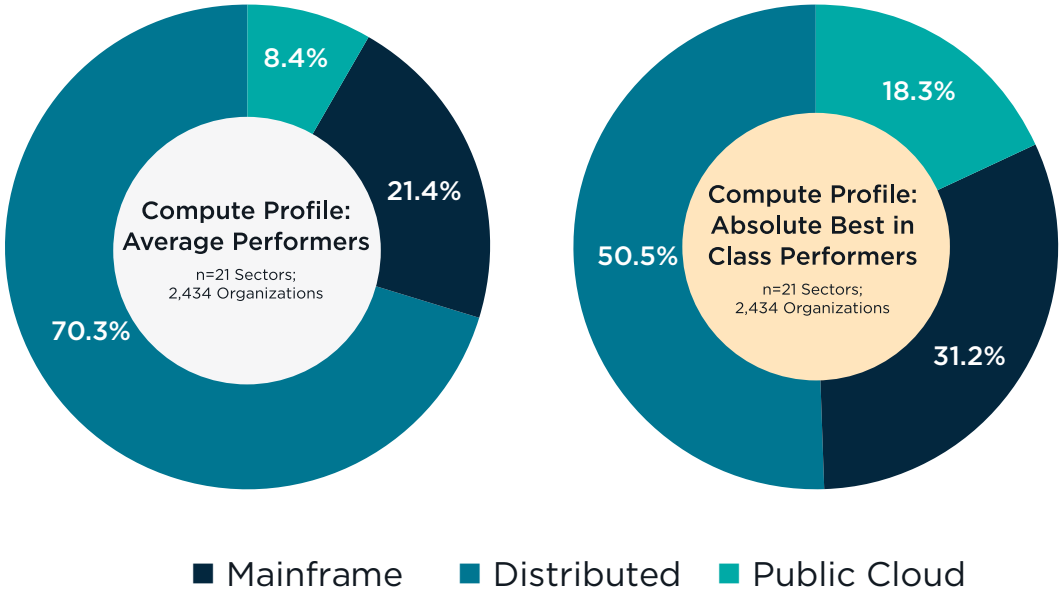
Similar to the world of finance where individuals invest in a portfolio aligned to their particular growth goals and risk tolerance, companies should match their mix of technology asset classes to their specific business objectives.

> The goal is to achieve an optimized balance of technologies that delivers the highest value with the greatest economic efficiency for your organization.

Technology Investment Profiles of Best-In-Class Performers

Virtually all organizations utilize a mix of mainframe, distributed, private cloud, and public cloud assets – a hybrid portfolio tuned to their business needs and risk profile. However, when looking at the technology investment profile of average organizations versus top performers in a given industry, there is a clear distinction.

Average performers use distributed technologies for a heavy majority (70.3%) of their compute power. Mainframe compute makes up 21.4% and public cloud 8.4% of their tech stack. Compare that to the profile of the "absolute best-in-class" organizations – those that demonstrate the strongest business performance, inclusive of topline revenue, operating margin, infrastructure economic efficiency, availability/uptime, and DORA metrics. These best-of-the-best organizations use significantly more public cloud in their overall IT mix than average performers (18.3% vs. 8.4%), but they also use significantly more mainframe compute power (31.2% vs. 21.4%). In the area of distributed compute, the situation is reversed, with top performers using a lower level of distributed resources than the average performer (50.5% vs. 70.3%).



Compared to average performing organizations, the absolute best-in-class organizations use an overall IT mix with **more public cloud, more mainframe,** and **less distributed** compute power.

The following table shows how average performers and absolute best-in-class performers in 21 industries compare in their utilization of technology asset classes.

Performance Profile Based on Operating Margin, Infrastructure Economic Efficiency, Availability/Uptime, and DORA Metrics

	IT Economic Profile				% of Compute Activity by Asset Class					
	IT Spend as % Revenue		IT Spend as % of Operating Expense		Public Cloud		Mainframe		Distributed	
	Absolute Best-in-Class	Average Business Performance	Absolute Best-in-Class	Average Business Performance	Absolute Best-in-Class	Average Business Performance	Absolute Best-in-Class	Average Business Performance	Absolute Best-in-Class	Average Business Performance
Banking/Fin. Services	7.64%	7.88%	16.85%	11.08%	13.4%	5.2%	40.0%	28.0%	46.6%	66.8%
Chemicals	1.25%	1.40%	1.60%	1.64%	18.6%	7.1%	30.0%	19.0%	51.4%	73.9%
Construction/Natural Res.	1.12%	1.16%	1.57%	1.22%	19.0%	6.6%	29.0%	17.0%	52.0%	76.4%
Consumer Products	2.61%	2.31%	2.97%	2.50%	17.8%	8.1%	33.0%	22.0%	49.2%	69.9%
Education	5.68%	5.72%	6.55%	5.64%	18.5%	11.0%	27.0%	16.7%	54.5%	72.3%
Energy	3.04%	1.43%	5.99%	2.04%	16.2%	9.5%	22.0%	12.5%	61.8%	78.0%
Food/Beverage Processing	1.91%	1.51%	2.49%	1.70%	20.5%	7.7%	36.0%	23.4%	43.5%	68.9%
Gov't – National/International			13.40%	11.02%	14.3%	5.5%	41.0%	31.0%	44.7%	63.5%
Gov't – State/Local			7.00%	4.96%	16.7%	5.8%	38.0%	28.0%	45.3%	66.2%
Healthcare Providers	3.94%	4.16%	4.96%	4.57%	16.4%	9.7%	35.0%	26.5%	48.6%	63.8%
Indust. Electronics/Equipment	2.31%	2.46%	3.62%	2.94%	18.6%	7.6%	32.0%	22.5%	49.4%	69.9%
Indust. Manufacturing	2.06%	1.86%	2.53%	2.10%	17.3%	6.7%	35.0%	21.1%	47.7%	72.2%
Insurance	4.25%	3.43%	6.48%	3.87%	17.6%	7.9%	45.0%	32.0%	37.4%	60.1%
Media/Entertainment	8.38%	5.81%	11.13%	6.83%	21.2%	9.1%	26.0%	16.8%	52.8%	74.1%
Pharma./Life Sciences/Med.	3.06%	3.30%	4.46%	4.08%	20.7%	12.4%	32.0%	23.4%	47.3%	64.2%
Professional Services	6.56%	4.57%	9.91%	5.63%	22.4%	13.6%	22.0%	14.2%	55.6%	72.2%
Retail/Wholesale	2.82%	1.61%	3.50%	2.51%	21.8%	9.2%	36.0%	27.1%	42.2%	63.7%
Software/Internet Services	8.16%	8.68%	11.70%	10.49%	24.8%	15.5%	10.0%	6.5%	65.2%	78.0%
Telecommunications	4.48%	4.44%	5.93%	5.24%	16.3%	6.8%	28.0%	19.4%	55.7%	73.8%
Transportation	4.00%	3.18%	6.54%	3.84%	17.9%	6.2%	26.0%	12.2%	56.1%	81.6%
Utilities	4.03%	2.89%	7.17%	3.78%	13.1%	4.5%	33.0%	29.5%	53.9%	66.0%
				Average	**18.3%**	**8.4%**	**31.2%**	**21.4%**	**50.5%**	**70.3%**

The conclusion is clear. Despite all the stories of companies migrating everything to a public cloud, the data tells a different story. Cloud does offer tremendous promise and value. Globally, however, the vast majority of compute power – 85% – is still on-premise. It is the distributed technology asset class that is losing ground to the cloud; the mainframe asset class is steadily growing. At the very top, the absolute best performers are utilizing more cloud compute and more mainframe in their hybrid environment.

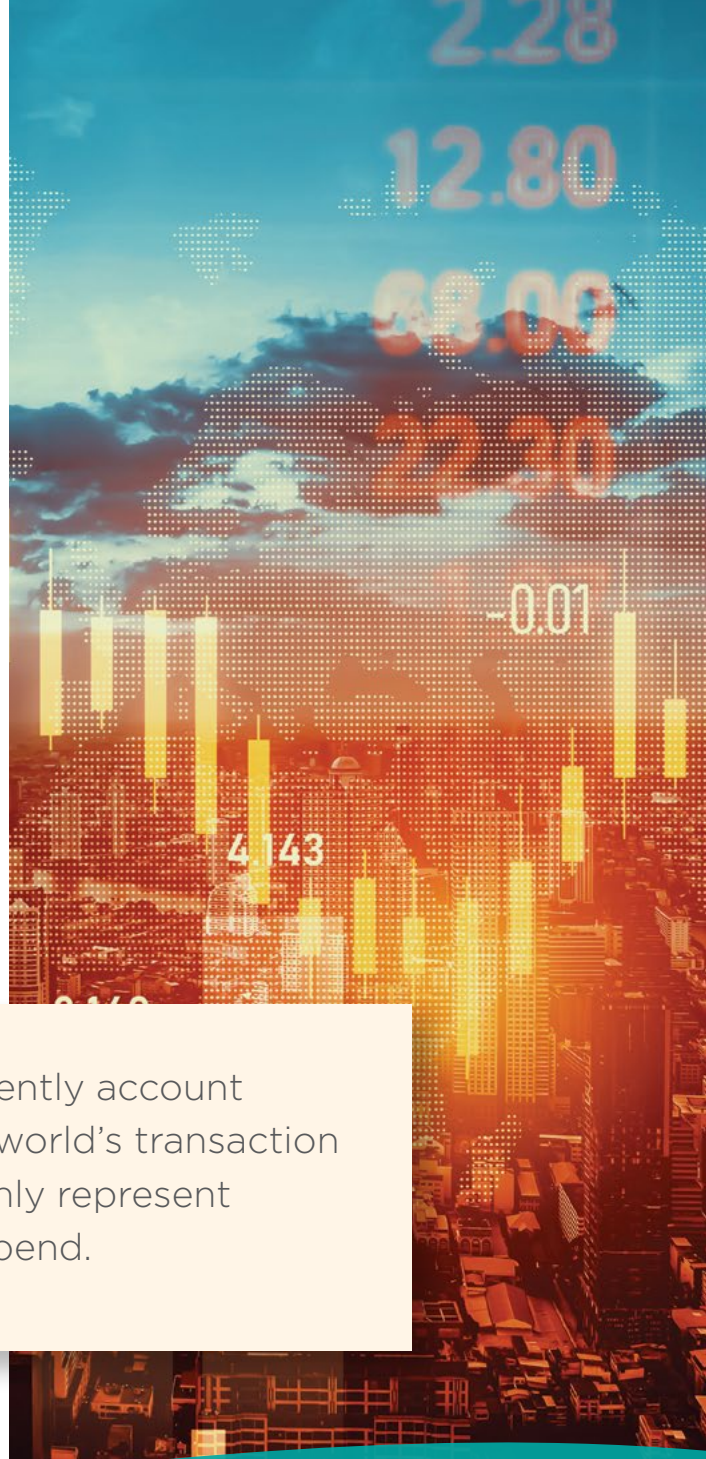
85% of compute power is on-premise

A Global View of Value: Workloads vs. Cost

Mainframes currently account for 72% of the world's transaction workloads yet only represent 8% of total IT spend. This cost efficiency stands out when contrasted with on-premise servers, which handle 13% of the world's transaction workloads yet eat up a staggering 65% of total spend. Public cloud sits in between these two asset classes; it continues to prove its cost efficiencies, having grown to 5% of the world's workloads at 14% of overall spend.

Technology Asset Class	% of Transaction Workloads	% of Total Cost
Public cloud*	5%	14%
On-premise servers	13%	65%
Mainframes	72%	8%
Other	10%	13%

For high-transaction workloads, the mainframe remains the "go-to" platform due to its reliability, efficiency, and security. Most large organizations, including the majority of Fortune 500 companies, have mainframes as part of their IT stacks.



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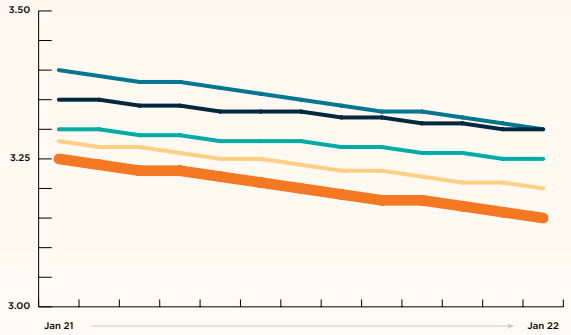
Boost DORA Metrics with Hybrid IT

DORA metrics (named for Google's DevOps Research and Assessment team) are commonly used to measure an organization's DevOps performance. DORA metrics are bellwether measurements that reveal how efficiently an organization can leverage its software capabilities to meet customer, market, and operational demands. **The four DORA metrics are:**

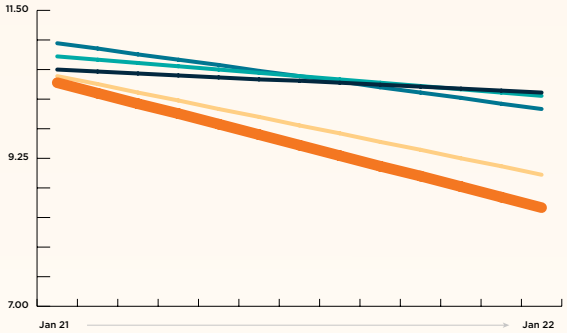
- **Time to Restore Service**
- **Delivery Lead Time**
- **Deployment Frequency**
- **Change Fail Rate**

The Technology Asset Class Optimization model shows that, while each asset class has its own characteristics, **a well-engineered hybrid "mix" of asset classes outperforms any individual asset class in the context of the four DORA metrics.**

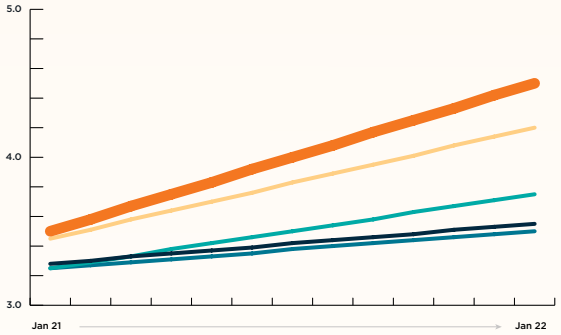
Time to Restore Service



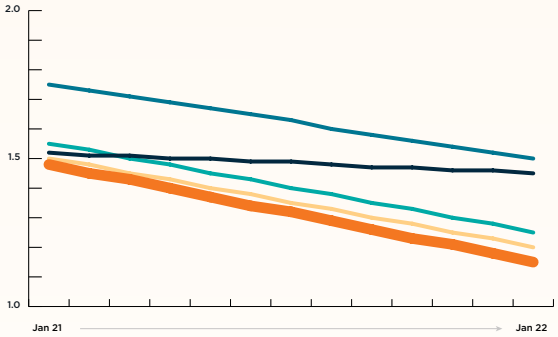
Delivery Lead Time



Deployment Frequency



Change Fail Rate

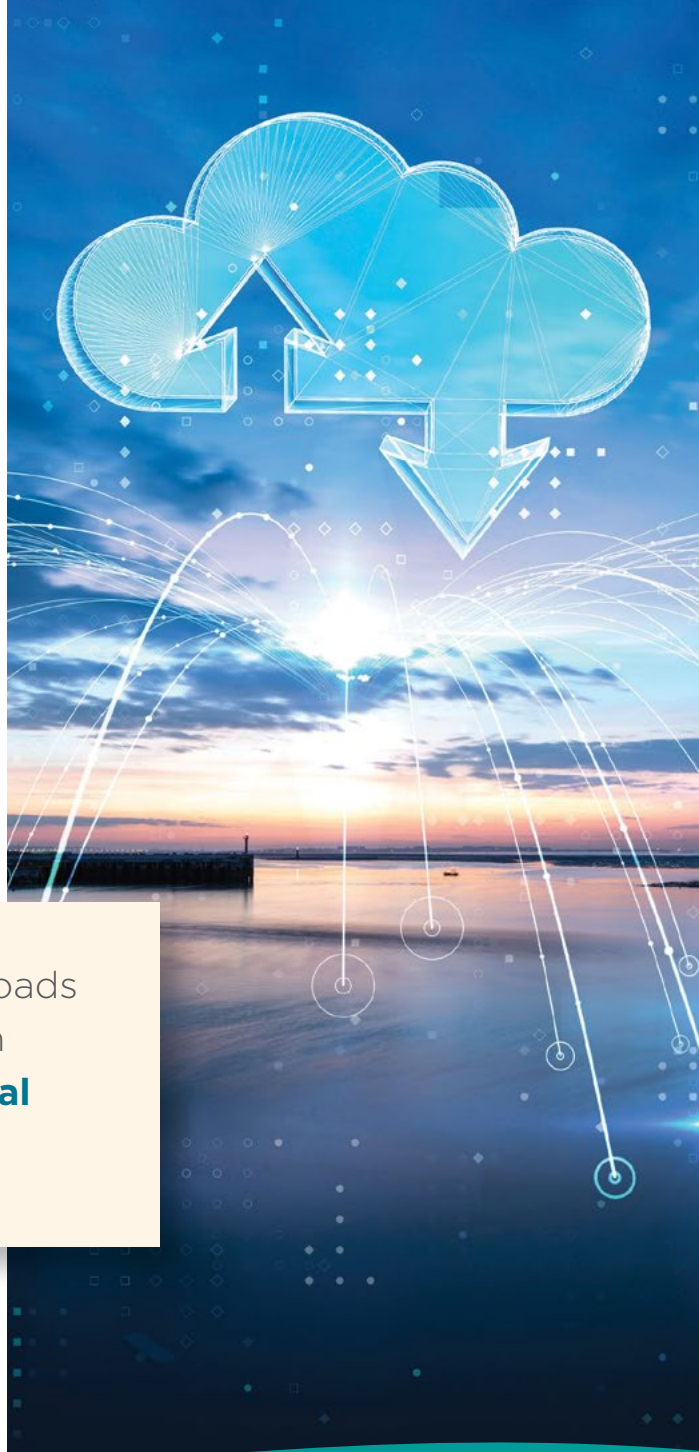


By measuring software capabilities, DORA metrics reflect qualities such as an organization's agility, responsiveness, innovation, and user experience. These qualities are critical across industries for sustainable business success. Businesses should take into account the positive impacts a hybrid technology portfolio produces on DORA metrics when making technology investment decisions.

The Real Cost of Lift and Shift

As already stated, it can be tempting to abandon existing technologies despite the fact that they are tried, tested, and proven. For example, there was a period of time where the trend was to "move off the mainframe" just because it was mainframe. However, **doing a massive lift and shift to new technology frequently places companies at high risk, jeopardizing quality of service (QoS) while at the same time inflicting substantial cost.** In some cases, migration has actually reduced a company's scale and transactional performance and introduced a massive amount of new security problems.

For large mainframe users, moving mainframe workloads to the cloud could cost in excess of 5x more in total cost of ownership (TCO). This dramatic increase in cost does not even include the expense associated with the migration itself. Nor is the added financial cost the only drawback. Migrating off the mainframe also results in a loss of the platform's unique QoS, including reliability, availability, and security. This is why, while utilization of public cloud is growing, it is growing at the expense of distributed compute power, not mainframe compute power.



> Moving mainframe workloads to the cloud could cost in excess of **5x more in total cost of ownership (TCO)**

Striking the Right Balance Is a Question of Value

Organizations are steadily shifting workloads, where appropriate, from distributed servers to the public cloud given cloud's superior cost efficiency, scalability, and sustainability. This is in line with the transition from a blanket cloud-first approach to a more sophisticated approach that prioritizes making technology investments based on the best fit for purpose. As cloud vendors continue to offer superior economics, owning servers and datacenters becomes less and less attractive from a cost, resource, and efficiency standpoint. Other considerations, however, can also come into play.

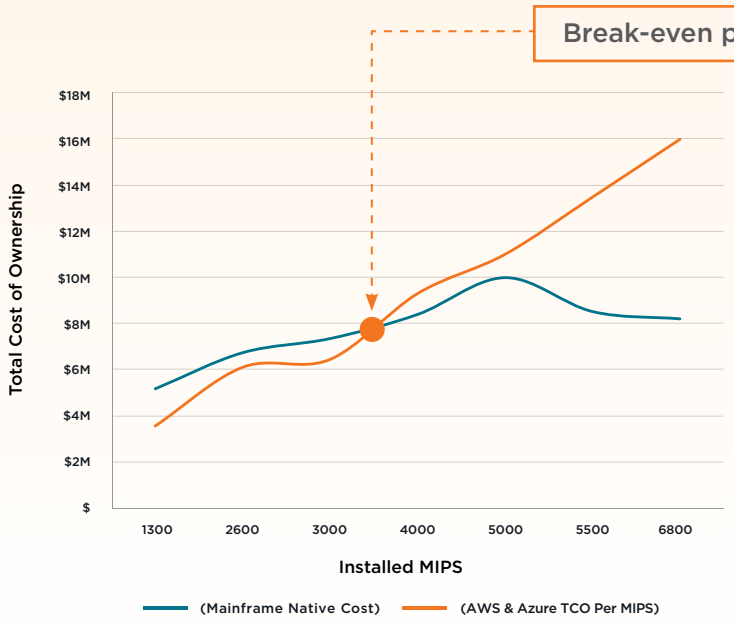
A large financial institution recently did a study on what it would take to move away from the mainframe, which serves as the core of its infrastructure. The study showed that such a move would cost $500M, take approximately 5-7 years, affect 25-57 critical applications, and be accompanied by high risk. The business realized that its greatest needs at the time were to support increasingly rigorous regulatory requirements and deliver new value to their end customers. Switching platforms could negatively impact both those key objectives. Therefore, the institution determined to leverage its existing technology asset classes and build them out in a way that enabled it to gain the desired value without incurring the cost, time, and risk associated with a lift and shift.

This institution's decision is typical of the vast majority of organizations today. The top priority is delivering value to customers. As in this example, the way organizations accomplish that goal is by modernizing in place, specifically in a manner that ensures healthy optimization of all technology assets. Technology Asset Class Optimization provides an economic framework that guides and validates the related technology investment decisions. Top-performing businesses assess the technology they already own, identify what they need to add to provide ongoing value for their customers, and actively rebalance their technology stack accordingly. This enables them to refine their hybrid architecture on an ongoing basis to ensure quality business outcomes.

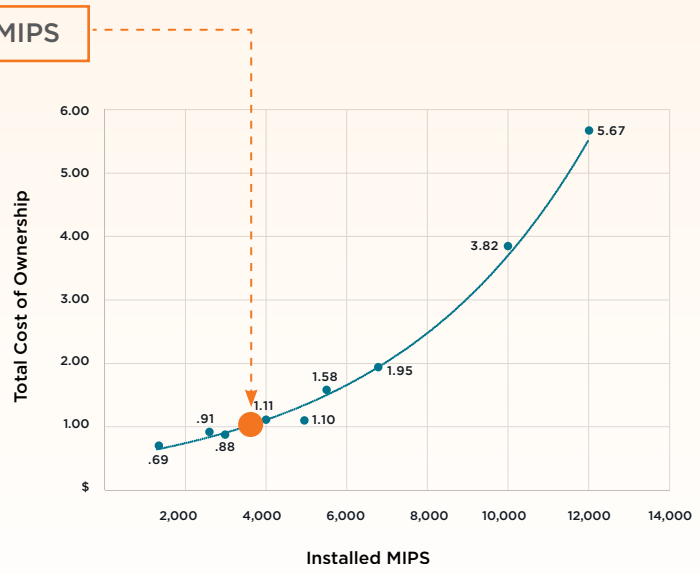
The graphs below show the cost performance and relative cost efficiency of cloud and mainframe.

This data is representative across industries. Each organization's unique metrics could vary depending upon numerous factors.

TCO per Mainframe Native MIPS and TCO per "Cloud"



Ratio of Cloud Cost to Mainframe Native Cost



Three Guidelines to Evaluate Your Technology Costs

Evaluating technology costs and how you pay for assets is another key consideration to take into account when seeking the best balance of your technology investments. Here are three guidelines to keep in mind when considering your IT infrastructure costs:

Understand your contracts and their ramifications.

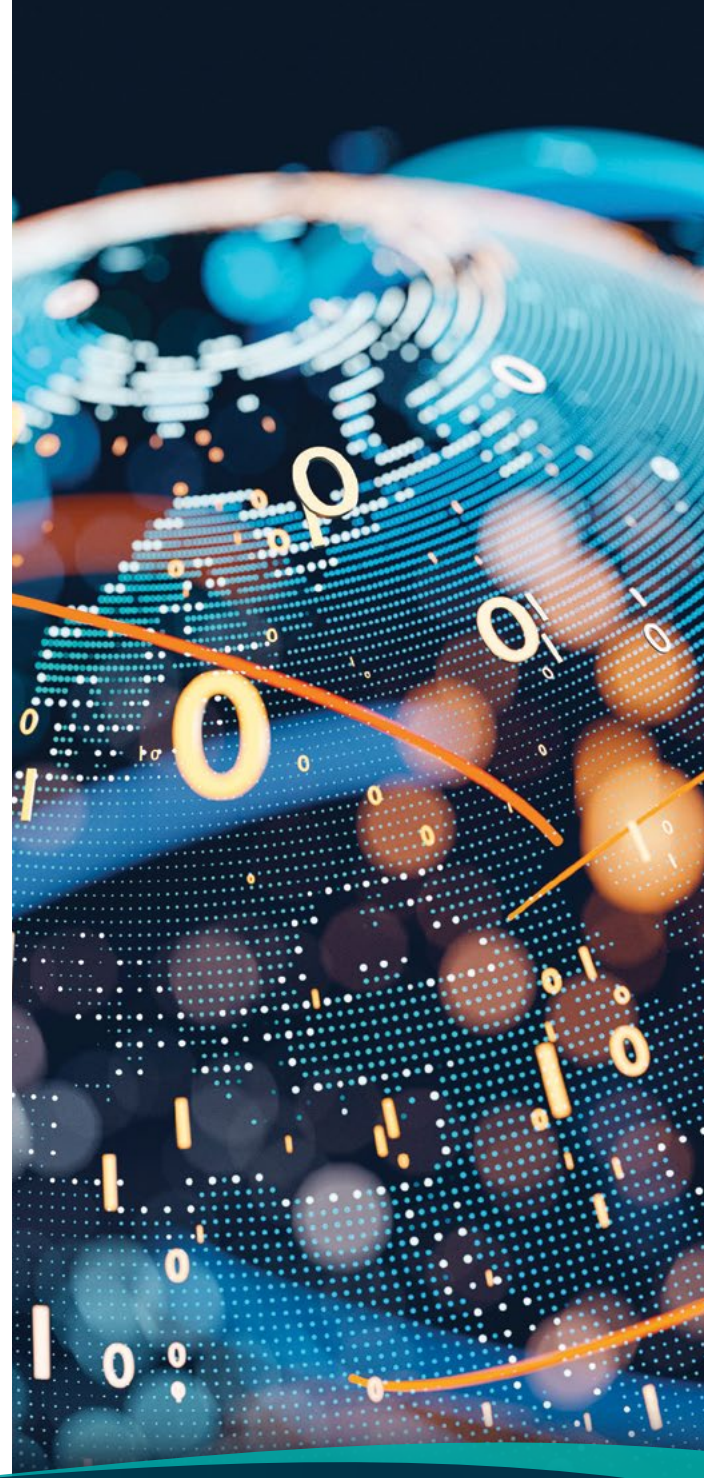
If you pay a provider for services, you need to have a thorough understanding of your contractual arrangements and how those arrangements work out under a variety of scenarios.

Take the public cloud, for example. Think of the payment structure of most cloud provider contracts as an all-you-can-eat buffet. It is $19.95, but only if you can finish everything on your plate. The price goes up to $209.95 if you cannot finish all the food on your plate. This scenario illustrates the economics of cloud: there is a threshold in most contracts and, if you do not meet it, you will pay for it – literally. That risk stands in opposition to the promise of elasticity with cloud.

Plan for business volatility.

It would be ideal if your business continued on a steady upward trajectory with predictable highs and lows in compute power usage. But that is not always the case. Whether due to a global crisis like a pandemic, a national recession, or a purely individual business setback, you cannot know what the future holds. For that reason, you need to plan for the unexpected.

As you review your current technology profile and make decisions about where to invest in technology, play out "worst case scenarios" and evaluate how specific technology asset classes and your technology stack as a whole will fare in terms of cost and value.



Consider the scalability of each asset class.

Each asset class differs in terms of scalability. As you consider your long-term business growth and the short-term variations in your needed compute power (e.g., due to seasonal highs and lows), you will want to be sure that your technology assets scale appropriately and cost-effectively. With that in view:

- Cloud scalability and cost is governed by contract commitments. This is another reason it is important to understand the contract fully. Additionally, bear in mind that clouds are built on servers, which are costly to scale. The cost of cloud compute power is based on the economics of the vendors and how they purchase and manage their servers. If you work with a hyperscaling cloud provider, a 2x scale growth in cloud usage could potentially result in a 20% unit cost reduction.
- Servers offer moderate scalability. You can continue purchasing processing power, but you end up stacking them in racks upon racks. Overall, as contrasted with a hyperscaling cloud scenario, a 2x scale growth in servers results in just a 10% unit cost reduction.
- Mainframe has the highest level of cost-effective scalability. Mainframe scales easily and well since it is designed as an extendable platform. A 2x scale growth results in more than 60% unit cost reduction.

2x scale growth

in public cloud	in servers	in mainframe
20%	**10%**	**60%**
unit cost reduction	unit cost reduction	unit cost reduction

Engineering the Right Mix of Assets for Your Business

The Technology Asset Class Optimization model provides a blueprint for maximizing the value of your technology infrastructure while optimizing its cost. The key is to determine the mix of asset classes that is the right match for your organization's profile and needs. This is the technology equivalent of how an investor will balance risk and return through a distribution of financial asset classes in alignment with their investing objectives.

An organization's evaluation will involve individual factors such as how it weighs operational costs, the ability to deliver products to market, value production, customer-facing performance, information security and privacy, and regulatory and compliance concerns. You can also consider factors from a sector perspective.

Research data reveals that each sector has a unique profile in terms of how intensely it prioritizes technology economics, information security, public cloud penetration, and technology talent. For example, Banking/Financial Services holds technology economics and information security as top priorities but puts public cloud penetration far down the list. In contrast, the Software Publishing/Internet Services and Food & Beverage Processing sectors give precedence to public cloud penetration. Categorizing which of these four areas are greater and lesser priorities for your organization can help inform your technology asset class selection.

Key Insights

Over and above these individual and sector variables, however, **Technology Asset Class Optimization provides a cross-sector framework for engineering and implementing judicious and effective technology strategies.** The model shows that:

- Organizations whose IT investment mix includes about 25% mainframe compute utilization and about 15% public cloud utilization have higher infrastructure efficiency and exhibit operating margins on the order of 75% higher than the average performer.
- The mature security and operational software capabilities of the mainframe computing asset class, along with its superb scalable economics, continue to assure its place as a foundational component of hybrid computing.
- As organizations increase their use of cloud, they should not only keep mainframe in the mix as part of a hybrid approach, but should increase its utilization.
- Cloud usage is still well below that of mainframe for both average and top-performing organizations.
- A hybrid IT stack outperforms any individual asset class in terms of improving the four DORA metrics.
- For top-performing organizations, there is a direct and positive correlation between their mainframe investment and their overall performance relative to others.
- "Cloud first" thinking needs to be replaced by an approach that prioritizes making technology investments based on the best fit for purpose.

The Future of the Technology Asset Class Optimization Model: Emerging Technologies

New technology asset classes will arise. Quantum computing provides a prime example. How will these developments impact Technology Asset Class Optimization? The model provides a blueprint for assessing technologies as they evolve. You can apprise any new technology in terms of its attributes, risks, and cost, and then evaluate the technology based on its potential value. Some of these factors, such as the impact on DORA metrics, only become clear over time as a technology matures and gradually finds its place in the computing paradigm.

The model encourages logic, persistence, and patience. Rather than buying into a new technology as a fashion statement, treat it as a financial investment. Educate yourself, do your research, and ask probing questions. Envision how the new technology might work in both positive and negative business circumstances. Pay attention to early adopters and track their experience and learnings. Listen to all relevant voices, from public opinion to your industry peers to the regulatory authorities.

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For each new technology that emerges, you want to understand how it functions within your business model, how it does or does not support your goals and objectives, and how it interacts with the technologies you already have in place. Only with that data in hand can you decide how the technology may or may not fit into your tech stack. For this reason, **strategically investing in technology scanning, technology labs, and technology prototyping is vital to the continuous optimization of your technology asset class allocation.**

A Critical Competitive Advantage

Engineering a hybrid IT environment with optimized technology asset class allocation positions your organization with a critical competitive advantage. By applying the insights of the model, you can make technology investment decisions with the same rigor that you would apply in financial investing, leading to improved risk management, maximized return, and greater value.

The model provides you with a clear, concise way to talk about technology investments, compare technology asset classes, and discuss technology economics. Plus, the profiles of best-in-class organizations demonstrate that certain technology mixes consistently outperform others as drivers of business success.

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Through the model, it becomes clear that technology asset class optimization is an ongoing process – one that involves a continual assessment of how your current tech stack is supporting your business, how existing technologies are evolving and changing in terms of their capabilities and cost, and how emerging technologies might deliver value for your organization.

While the future cannot be predicted, it can be prepared for. Technology Asset Class Optimization provides you with a framework for making strategic technology investment decisions that deliver the value, economy, and agility you need to succeed both today and for years to come.

Rubin Worldwide

Founded by Dr. Howard Rubin and Mr. Jed Rubin, Rubin Worldwide leverages the world's largest IT and business database to provide a depth of technology economics research that is unmatched in the industry. As an innovator and leader in the field of technology economics, Rubin Worldwide provides the information and insights global leaders need in order to master technology investment strategies and use technology for significant competitive advantage.

Dr. Rubin and Mr. Rubin have served as senior advisors to corporate and political leaders around the globe while at Rubin Systems, META Group, Gartner, and Rubin Worldwide. Their work has helped leading companies and nations use technology to drive measurable change and continuously enhance performance.

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