A Forrester Total Economic Impact™
Study Commissioned By Mendix
June 2020

The Total Economic Impact™ Of The Mendix Low-Code Application Development Platform

Business Benefits And Cost Savings Enabled By The Mendix Low-Code Application Development Platform

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ABOUT FORRESTER CONSULTING

Forrester Consulting provides independent and objective research-based consulting to help leaders succeed in their organizations. Ranging in scope from a short strategy session to custom projects, Forrester's Consulting services connect you directly with research analysts who apply expert insight to your specific business challenges. For more information, visit forrester.com/consulting.

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Selected Key Metrics

Application delivery savings — development team:
$8.075M

Incremental revenue (gross profit) from improved customer engagement:
$3.143M

Accelerated time-to-market for new products and services – incremental revenue (gross profit):
$3.334M

Total quantified benefits:
$20.521M
(risk- and PV-adjusted)

Executive Summary

Today, companies struggle to keep pace with the growing demand for new software solutions to meet the rapidly changing needs of their business. IT is under tremendous pressure to develop differentiating applications to attract and retain customers, improve internal processes, and offer better, more sophisticated employee engagement.

The low unemployment rate for professional developers compounds the issue. Not only does the lack of resources hinder the ability of the enterprise to build up development capacity, but it also widens the ever-increasing gap between business demand and IT's capacity to deliver.

As a result, many companies are turning to low-code as a way to bridge the gap by enabling non-developers to participate in the development of applications to meet business needs.

According to Forrester's research, enterprise development teams are adopting low-code development platforms, and the market's growth prospects appear rosy. In a separate survey of global developers, 45% reported their companies had already adopted or planned to adopt a low-code tool. With demand for applications growing, low-code platforms represent an appealing solution.

Mendix commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and objectively examine the potential benefits that organizations may realize by deploying its Low-Code platform. The purpose of this study is to provide readers and prospects with a framework to evaluate the potential financial impact of the Mendix Low-Code Application Development platform on their organizations.

To better understand the benefits, costs, flexibility, and risks associated with this investment, Forrester conducted in-depth interviews with four customers, averaging almost six years of experience using various components of the Mendix platform. You can read more about the platform in the Mendix Low-Code Application Development Platform Overview section of this study.

Among interviewed customers, key motivations for adopting a low-code platform included lack of IT responsiveness to business demand, unacceptable time-to-market for custom applications, difficulty sourcing professional development talent, and the perception of IT as a cost center, rather than an enabler of change. The adoption of the Mendix platform widened the available talent pool of software developers, accelerated outcomes, fostered better business and IT collaboration, and automated tedious plumbing and infrastructure tasks required in traditional application development. As a result, firms experienced application delivery savings, operational efficiency, and business lift from the introduction of new products and improvements to customer engagement.

Forrester used data from the four interviews to create a composite *Organization* to illustrate the quantifiable benefits and costs of investing in the Mendix platform.

The *Organization* is a multinational company headquartered in North America with operations in Europe and Asia. It serves both B2B and B2C customers. Prior to investing in the Mendix platform, it struggled to keep up with the demands of the business units at a reasonable cost. For more information, see section titled The Composite *Organization*.

Key Findings

Quantified benefits. The composite *Organization* experiences the following risk-adjusted, present-value (PV) quantified benefits, totaling $20,520,796 over a three-year period (see the Analysis Of Benefits section for more details).

- **Application delivery savings:** $8,075,035.
- **Operational efficiencies attributed to Mendix:** $5,969,097.
- **Incremental revenue (gross profit) from improved customer engagement:** $3,142,750.
- **Accelerated time-to-market for new products and services — incremental revenue (gross profit):** $3,333,914.

In addition to the quantified benefits listed above, the interviewed customers discussed several qualitative features or benefits from using the Mendix Low-Code Application Development platform (see the Qualitative Benefits section for more details).

Costs. The *Organization* experiences the following PV costs totaling $696,900 (see the Analysis Of Costs section for more details):

- **Labor to preplan, deploy, and oversee the Mendix cloud platform:** $171,864 (risk- and PV-adjusted).
- **Mendix fees:** $525,036 (PV-adjusted).

Forrester's interviews and subsequent financial analysis found that the *Organization* experienced benefits of $20,520,796 over three years versus costs of $696,900, adding up to a net present value (NPV) of $19,823,896, with a payback period of less than six months.

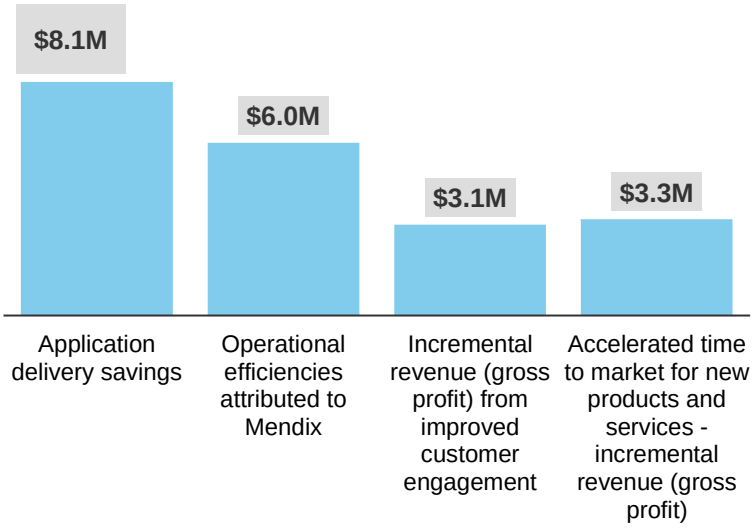
If risk-adjusted costs and benefits still demonstrate a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as realistic expectations, as they represent the expected value considering risk.

Benefits PV $20.521M

NPV $19.824M

Payback Period: Less than 6 months

Benefits (Three-Year)



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TEI Framework And Methodology

From the information provided in the interview, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering investing in the Mendix Low-Code Application Development platform.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that the Mendix platform can have on an *Organization*:

The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

DUE DILIGENCE
Interviewed Mendix stakeholders and Forrester subject matter experts to gather data relative to the Mendix Low-Code platform.

CUSTOMER INTERVIEWS
Interviewed four customers using the Mendix platform to obtain data with respect to costs, benefits, and risks.

FINANCIAL MODEL FRAMEWORK
Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewed customers.

CASE STUDY
Employed four fundamental elements of TEI in modeling the impact of The Mendix platform: benefits, costs, flexibility, and risks. Given the increasing sophistication that enterprises have regarding analyses related to IT investments, Forrester's TEI methodology serves to provide a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Mendix and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential benefits that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the study to determine the appropriateness of an investment in the Mendix platform.

Mendix reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

Mendix provided the customer names for the interviews but did not participate in the interviews.

The Mendix Low-Code Application Development Platform Customer Journey

BEFORE AND AFTER THE MENDIX LOW-CODE APPLICATION DEVELOPMENT PLATFORM INVESTMENT

Interviewed Customers

For this study, Forrester conducted interviews with the four Mendix customers described below, each requesting anonymity:

INDUSTRY — LOCATION	NUMBER OF USERS	INTERVIEWEE	MONTHS USING MENDIX
Insurance — North America	12,000	Chief architect	60 months
Utility — EMEA	4,300	Team manager, rapid product development	48 months
Real estate brokers — North America	26,000	Vice president, software development	102 months
Insurance — EMEA	5,700	Development operations lead	26 months

The Composite *Organization*

Forrester used data from the four customer interviews to create a composite *Organization* to illustrate the quantifiable benefits and cost savings that can be achieved using the Mendix Low-Code platform. This *Organization* is based on a combination of attributes and feedback collected from customers interviewed for this study.

The *Organization* is a multinational company headquartered in North America with operations in Europe and Asia. It serves both B2B and B2C customers and has 15,000 users benefiting from Mendix applications. Prior to investing in the Mendix platform, the organization struggled to keep up with the demands of its business units at a reasonable cost.

> "Prior to our investment in Mendix, we outsourced some application development and experienced very long lead times. It was difficult to change our minds mid-project. It often took multiple years to build an application, and by that time, the business changed its focus, or the products changed, or the market changed, or all of the above changed. It was a very frustrating experience before Mendix."
>
> *Development operations lead, insurance company*

Key Business Goals And Objectives

After an extensive review process evaluating several vendors, the *Organization* selected the Mendix Enterprise edition, as it believed the platform could solve the following challenges:

- Lack of IT responsiveness to growing demand from business counterparts for custom applications due to lack of effective communication, resulting in suboptimal solutions, delays, and rework.
- The need to maximize return on investment in cloud or platform-as-a-service (PaaS), including containerization, automation, and application lifecycle management tools.
- Persistent difficulties recruiting and onboarding skilled traditional developers, resulting in growing backlogs and unmet business needs.
- Long timeframes to create applications, due to inefficient or ineffective development tools and processes, while the backlog of business requests grew.

- Operational inefficiency and organizational rigidity due to difficult-to-change and costly legacy systems and processes.
- Error-prone processes leading to increased cost and risk.
- Uncompetitive customer experiences, reliant on person-to-person processes and out-of-date technology.
- Sluggish time-to-market for new, technology-backed product and service offerings.
- The inability to move from a traditional waterfall *Organization* to an Agile, change-ready *Organization.*
- Lack of close interaction between IT and the business, where problems and solutions are discussed and both IT and business stakeholders share a mutual understanding.
- Lower yield per employee, negatively impacting productivity, retention, recruiting, and morale.

Key Results

The customer interviews revealed beneficial functionality attributed to their investments in the Mendix Low-Code Application Development platform (specific financial benefit details are available in the Analysis Of Benefits section), as listed below:

- Application delivery savings.
- Operational efficiencies attributed to Mendix
- Incremental revenue (gross profit) from improved customer engagement.
- Accelerated time-to-market for new products and services — incremental revenue (gross profit).

In addition to the benefits listed above, the interviewed customers highlighted several qualitative features, functionality, or benefits from using the Mendix platform (see the Qualitative Benefits section for more details).

> "Previously, we released every six weeks, and now we release updates every two to three weeks. With the Mendix platform, we are delivering smaller chunks more often, and we are able to adjust more quickly to the needs of our business users"
>
> *Vice president, software development*

Analysis Of Benefits

QUANTIFIED BENEFIT AND COST DATA

Total Benefits – The *Organization*

REF.	BENEFIT	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Atr	Application delivery savings	$643,200	$3,216,000	$6,432,000	$10,291,200	$8,075,035
Btr	Operational efficiencies attributed to Mendix	$559,104	$2,795,520	$4,193,280	$7,547,904	$5,969,097
Ctr	Incremental revenue (gross profit) from improved customer engagement	$300,000	$1,200,000	$2,500,000	$4,000,000	$3,142,750
Dtr	Accelerated time-to-market for new products and services — incremental revenue (gross profit)	$224,000	$1,344,000	$2,688,000	$4,256,000	$3,333,914
	Total benefits (risk-adjusted)	$1,726,304	$8,555,520	$15,813,280	$26,095,104	$20,520,796

Note: Atr, Btr, Ctr and Dtr refer to benefit totals in the tables below.

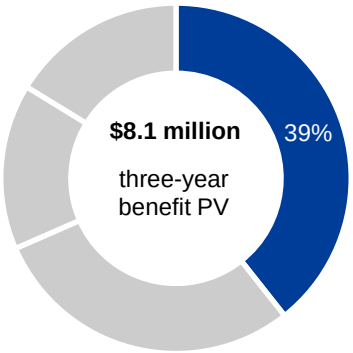
Application Delivery Savings

Prior to its investment in the Mendix platform, the *Organization's* development policies relied on traditional languages, frameworks, and legacy systems and required manual data verification and integration, which resulted in error-laden and poor-quality data entry. This lengthy and costly process was unacceptable to the *Organization's* business units.

Interviewed Mendix customers reported they were able to increase development productivity, decrease personnel costs, and reduce application operations costs using the Mendix platform. This was due to the following Mendix features and functionality:

- Visual modeling across the full application stack reducing reliance on traditional programming languages or frameworks and speeding development by six to 10 times.
- A dual integrated development environment (IDE) toolset, sharing one model, enabling contributions from both technical and nontechnical developers, enlarging the pool of talent able to participate in application development.
- Real-time involvement of business process domain experts, reducing rework due to solutions that more quickly meet business needs.
- Integrated DevOps tooling, expressed through a management console or secure APIs, enabling one-click deployment, automated provisioning, integrated testing, back-ups, and monitoring, which reduces effort spent on deployment and operation.
- Out-of-the-box elastic scaling, failover, and fallback, which are made available using Mendix Cloud, Mendix Cloud Dedicated, or Mendix for Private Cloud, which reduces time and effort spent on operation while aligning with stringent cloud nativity standards.

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the *Organization* expects risk-adjusted total benefits to be a PV of over $20.5 million.



Application delivery savings:
39% of total benefits

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- Custom code extensions packaged into native components in the Mendix modeling environment and saved to private app stores, enable contribution from skilled developers. These extensions can be used by less technical developers to build apps that leverage sophisticated logic and integrations, or new technologies like AI and machine learning.
- Support for many devices and touchpoints, sharing the same underlying model. These include responsive web, native mobile, progressive web applications (PWA), conversational, wearable, edge, and API-driven applications and reduce the need for specialized development resources and costly maintenance of multiple code bases.
- In-platform presence of an AI assistant utilizing machine learning analysis of models to suggest the next step of logic at a high degree of accuracy, easing onboarding for new developers and enabling virtual pair programming.
- The Mendix online learning academy, built-in artificial intelligence guidance, and integrated community support network simplify developer onboarding and support.

Note: Interviewed customers reported that the Mendix platform was easy to understand with a short learning curve.

Modeling and assumptions. The *Organization* develops and maintains five applications using Mendix in Year 1; another 25 applications in Year 2; and another 50 applications in Year 3. Row A2 represents the number of traditional developers needed to develop and maintain the applications in row A1. Row A5 represents the reduced number of developers needed using Mendix; from a cost standpoint, we assumed a hybrid developer staff of 50% traditional and 50% Mendix-trained developers. The industry average fully loaded cost of a traditional developer is $105,000; a Mendix-trained developer is $85,000 for an average fully loaded cost of $95,000.

Impact risk is the risk that the business or technology needs of the Organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

Risks. Forrester has risk-adjusted labor savings downward by 20% in the table below due to interviewed customers having a wide range of applications, labor costs, and their ability to create the 50:50 hybrid developer environment.

This yielded a three-year, risk-adjusted PV of $8,075,035.

Application Delivery Savings: Calculation Table					
REF.	METRIC	CALC./SOURCE	YEAR 1	YEAR 2	YEAR 3
A1	Number of applications completed per year	*Organization*	5	25	50
A2	Number of traditional developers needed before Mendix to develop and maintain these applications	Interviews	12	60	120
A3	Average fully loaded cost of traditional developer	Industry average	$105,000	$105,000	$105,000
A4	Cost to develop and maintain applications with traditional developers	A2*A3	$1,260,000	$6,300,000	$12,600,000
A5	Number of developers needed using Mendix to develop and maintain these applications	Interviews	4.8	24.0	48.0
A6	Average fully loaded cost of developers (hybrid mix of 50% traditional and 50% Mendix trained)	($105K+$85K)/2	$95,000	$95,000	$95,000
A7	Cost to develop and maintain Mendix applications with combined traditional and Mendix developers	A5*A6	$456,000	$2,280,000	$4,560,000
At	Application delivery savings	A4-A7	$804,000	$4,020,000	$8,040,000
	Risk adjustment	↓20%			
Atr	Application delivery savings (risk-adjusted)		$643,200	$3,216,000	$6,432,000

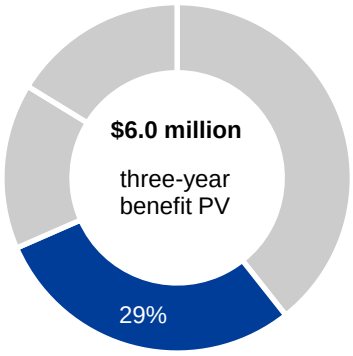
Operational Efficiencies Attributed To Mendix

For the *Organization*, some Mendix applications are designed to automate, streamline, and digitize operational processes. The development and subsequent operational use of Mendix applications results in increased operational efficiencies in the form of higher employee productivity and decreased costs.

Some of the previous operational challenges that were overcome and/or mitigated by these Mendix application include:

- Inefficient, risk-prone, paper-, email-, or spreadsheet-based manual processes.
- Difficulties borne by staff attempting to leverage, rekey, or combine data across multiple, disparate systems.
- Errors resulting from rekeying and manual processes, which led to increased costs and low-quality outputs.
- Decision-making capabilities that were hindered by a lack of transparency and access to accurate data.
- Inflexible legacy systems and processes that were unable to change as improvements were identified or imposed.

Mendix facilitates the automation and streamlining of processes to better utilize existing resources and minimize errors. Staff now have more efficient access to data, improving productivity. Streamlined processes lead to fewer errors, lower operational costs, and greater organizational



Operational efficiencies attributed to Mendix: **29%** of total benefits

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agility.

Modeling and assumptions. Forrester estimates operational labor efficiencies for the *Organization* directly attributed to the Mendix application. Row B1 reflects the number of cumulative Mendix applications at the beginning of each year. Row B2 estimates the average time and effort (hours) that are saved for each enhancement, and Row B3 represents the average hourly cost of an operational process administrator.

Risks. To be conservative, Forrester has risk-adjusted (reduced) the benefits below by 20% to reflect interviewed customers' variations on the number of improved applications and the cost per operational process administrators.

This yielded a three-year, risk-adjusted total PV of $5,969,097.

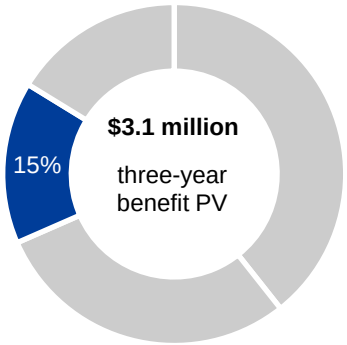
Operational Efficiencies Attributed To Mendix: Calculation Table

REF.	METRIC	CALC./SOURCE	YEAR 1	YEAR 2	YEAR 3
B1	Number of Mendix operational improvement applications per year	Cumulative applications	4	20	30
B2	Average hours saved per application (automating, streamlining, and digitizing operational processes)	Interviews: 3 FTEs	6,240	6,240	6,240
B3	Average hourly cost of positively impacted employees (FTEs)	Industry average	$28	$28	$28
Bt	Operational efficiencies attributed To Mendix	B1*B2*B3	$698,880	$3,494,400	$5,241,600
	Risk adjustment	↓20%			
Btr	Operational efficiencies attributed To Mendix (risk-adjusted)		$559,104	$2,795,520	$4,193,280

Incremental Revenue (Gross Profit) From Improved Customer Engagement

During the interviews, customers agreed that, with Mendix, they could enhance customer experiences that helped win and retain customers, resulting in incremental revenue and gross profits. Contributing factors included:

- The ability to anticipate and act on new business opportunities more quickly than before Mendix.
- Digitized, modern customer experience leading to higher loyalty and retention — and ultimately increased revenue and market share.
- Automation of previously manual processes in favor of person-to-system or system-to-system interactions, delivering streamlined customer interactions across use cases such as price quoting or servicing existing accounts.
- Single view of customers, easing the burden on customer service agents and speeding time-to-resolution, leading to better experiences for each customer.
- A higher frequency of low-cost experiments with emerging technologies like conversational interfaces, AI, or internet of things (IoT), leading to differentiated product and service experiences.



Incremental revenue (gross profit) from improved customer engagement: **15%** of total benefits

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- Improved ability to release customer experience improvements on a biweekly basis across multiple clouds globally.

Modeling and assumptions. The *Organization* experiences incremental and accelerated revenue directly attributed to the ongoing Improved of its customer-facing Mendix applications, calculated as follows:

- Fifty percent of Mendix applications are customer-facing.
- These applications average $4,000,000 in annual revenue.
- Mendix creates a 5% revenue uplift and revenue acceleration of three months attributed to faster time-to-market for that 5% uplift.
- There is a 50% gross profit margin.

Although the *Organization* realizes incremental revenue, the benefit calculated in this case study is the gross profit (minus expenses) associated with the revenue. See the table below for benefit details.

Risks. To be conservative, Forrester has risk-adjusted (reduced) the benefits below by 20% to reflect interviewed customers' variations on the number of customer-facing applications and revenue per application.

This yielded a three-year, risk-adjusted total PV of $3,142,750.

> "The ability to develop new products quickly with Mendix has changed our business. For example, most projects in our organization can take up to two years with traditional development. Now, we got our first iteration done within six months, and the second iteration done within four months. We can get so much out to our customers much faster, and we get quick feedback from them. The speed-to-market has improved our relationship with our customers."
>
> *Vice president, software development*

Incremental Revenue (Gross Profit) From Improved Customer Engagement: Calculation Table

REF.	METRIC	CALC./SOURCE	YEAR 1	YEAR 2	YEAR 3
C1	Customer-facing Mendix applications	*Organization*	3	12	25
C2	Annual revenue associated with customer-facing Mendix applications	C1*$4,000,000 per application	$12,000,000	$48,000,000	$100,000,000
C3	Five percent incremental annual revenue due to better digital customer experiences with Mendix	C2*5%	$600,000	$2,400,000	$5,000,000
C4	Number of months revenue is accelerated due to Mendix	Interviews	3	3	3
C5	Incremental revenue — faster time-to-market by three months	C3/12*3	$150,000	$600,000	$1,250,000
C6	Gross profit margin percent associated with incremental revenue	Industry average	50%	50%	50%
Ct	Incremental revenue (gross profit) from improved customer engagement	(C3+C5)*C6	$375,000	$1,500,000	$3,125,000
	Risk adjustment	↓20%			
Ctr	Incremental revenue (gross profit) from improved customer engagement (risk-adjusted)		$300,000	$1,200,000	$2,500,000

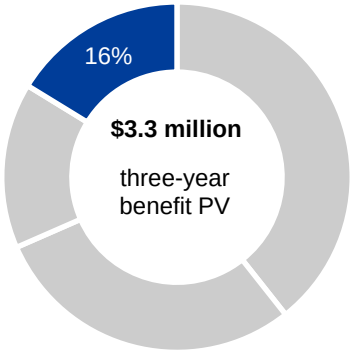
Accelerated Time-To-Market For New Products And Services — Incremental Revenue (Gross Profit)

Interviewed customers agreed that the Mendix platform allows companies to respond faster to changing customer demands and market opportunities. The *Organization* can introduce new products and services seven months faster due to the accelerated time-to-development with Mendix. Factors that contribute to accelerated speed-to-market include:

- Testing and learning on new ideas, using speed-to-market benefits to lower the cost of failure, enabling the *Organization* to "fail fast" and outpace competition with new products, services, and business models.
- A higher frequency of low-cost experiments with emerging technologies like conversational interfaces, AI, and IoT, leading to differentiated product and service experiences.
- Reduction of time and effort expended by skilled development teams needed to achieve goals on time.
- Creating an innovation culture that attracts top talent and moving IT from a cost center to a revenue-driving enabler.

Modeling and assumptions. Accelerating new product and service introductions also accelerates the revenue and profit streams. The *Organization* realizes incremental revenue and gross profits because of the factors listed above. On average, interviewed customers release new products and services seven months earlier using Mendix versus traditional development platforms. Forrester models this by including the seven incremental months of revenue (gross profit) for each product and service introduced. See the table below for benefit details.

Risks. To be conservative, this benefit has been risk-adjusted (reduced) by 20% in the table below to reflect variations in other organizations' gross profit margins. Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $3,333,914.



Accelerated time-to-market for new products and services — incremental revenue (gross profit): **16%** of total benefits

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Accelerated Time-To-Market For New Products And Services — Incremental Revenue (Gross Profit): Calculation Table					
REF.	**METRIC**	**CALC.**	**YEAR 1**	**YEAR 2**	**YEAR 3**
D1	Number of new products and services created by the Mendix platform	*Organization*	1	6	12
D2	Average total monthly revenue per new product or service	Interviews	$80,000	$80,000	$80,000
D3	Number of months accelerated due to Mendix	Interviews	7	7	7
D4	Incremental revenue — faster time-to-market by seven months	D1*D2*D3	$560,000	3,360,000	6,720,000
D5	Incremental gross profit margin	Industry average	50%	50%	50%
Dt	Accelerated time-to-market for new products and services — incremental revenue (gross profit)	D4*D5	$280,000	$1,680,000	$3,360,000
	Risk adjustment	↓20%			
Dtr	Accelerated time-to-market for new products and services — incremental revenue (gross profit) (risk-adjusted)		$224,000	$1,344,000	$2,688,000

Qualitative Benefits

In addition to the quantified benefits listed above, the interviewed customers discussed several qualitative features or benefits from using Mendix Low-Code platform, including:

- Greater ability to respond to the market and customer needs.
- Ability for a company to drive its own improvements.
- Employee access to the right data, at the right time, to make the best decisions.
- Modern systems aligned to business needs and easily adaptable to change.
- Single view of the customer, leading to better customer service, in turn leading to higher customer retention and repeat sales.
- Increased customer satisfaction and value realization (increased wallet share and reduced churn).
- Happier employees, higher productivity, and increased retention.

> "Mendix has proven to be a good fit for our organization. There's excellent collaboration with us on their strategic roadmap. We find our relationship with and our investment in Mendix to be of great value."
>
> *Team manager, rapid product development*

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are scenarios in which a customer might choose to deploy the Mendix platform and later realize additional uses and business opportunities.

Interviewed customers described their initial approach to using Mendix as the following typical chronology:

- Start with a high-impact but small application that can be built quickly to gain broader support internally.

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

- Then evangelize the value of the platform and way of working, celebrating initial successes.
- Thereafter, extend the portfolio of low-code applications and establish a center of excellence.
- Finally, apply the center of excellence to initiatives with large, strategic benefit, extending the value of the platform across functions and geographies.

Other flexibility options include:

- Ability to leverage new technologies to reduce costs and drive efficiencies without needing to hire deep domain specialists, e.g., AI, the internet of things, and augmented reality.
- Multicloud/portability: Applications are containerized by default, utilizing single-click deployment into fully managed, distributed cloud, cloud-opaque, or on-premises environments, providing the ability to leverage multiple clouds at once or move between environments as desired.
- Cloud-native: Mendix applications are cloud-native, are purpose-built to run in containers, automatically scale horizontally and vertically, and fit into diverse architectural patterns such as microservices.
- Mitigated lock-in risk: Model software development kits (SDK) and APIs enable customers to reflect into the models, import and export code, and retain the models into the future, even in the event of termination of an organization's Mendix platform license.
- Openness and extensibility: The platform utilizes open standards and is extensible at each app layer. Applications can be extended with custom code, when necessary, and existing development toolchains can be leveraged by utilizing Platform APIs. Models are open and accessible via the model API and platform SDK.

The concept of flexibility is further described in Appendix A.

> "The training classes are very well done. The initial training is a good way to get comfortable with the platform. After that, it's a combination of the advanced training and the experience of using the platform. The more I used the platform, the easier and more efficient development with Mendix became. I would like to add, the online community is very helpful as well."
>
> *Chief architect, insurance company*

Analysis Of Costs

Total Costs

REF.	BENEFIT	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Etr	Labor to preplan, deploy, and oversee the Mendix Cloud platform	$37,440	$54,054	$54,054	$54,054	$199,602	$171,864
Ftr	Mendix fees	$0	$99,750	$218,750	$337,500	$656,000	$525,036
	Total costs (risk-adjusted)	$37,440	$153,804	$272,804	$391,554	$855,602	$696,900

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the *Organization* expects total risk-adjusted costs to be a PV of $696,900.

Labor To Preplan, Deploy, And Oversee The Mendix Cloud Platform

Based on the interviewed customers' experiences, the *Organization's* internal labor associated with the initial planning and deployment of the Mendix platform was significantly less than deploying the on-premises version. Internal labor included the following job titles that were necessary to the work required: one head of application development and maintenance, one lead architect, and two developers. These individuals spent three weeks full-time working with Mendix to make the best use of a container-based cloud solution, attend training, and start building the first Mendix application. Here were a few of their initial tasks:

- The team created the foundation, operationalized the plan, and formed development teams of IT and business stakeholders.
- They enabled Mendix developers, including the selecting, training, and certifying of staff.
- They ensured the appropriate level of expertise for the following job responsibilities: architects, cloud, user interface/user experience (UI/UX), technical consultants, security, and integrations.
- They sought to embed governance and create synergy across the functional and technical processes.

On an ongoing basis, the head of application development spends 33% of their time overseeing the Mendix environment and the relationship with Mendix and the company. Once again, overseeing solutions built on Mendix Cloud, Kubernetes-based Mendix for Private Cloud, or Mendix Cloud Dedicated takes significantly less time than the on-premises version.

Modeling and assumptions. The table below includes average hourly labor costs associated with the staff listed above.

Risks. Forrester risk-adjusted costs upward by 20% to reflect the variability of each interviewed customer's Mendix implementation and the ongoing management requirements.

The *Organization's* total labor costs to implement, deploy, and oversee the Mendix Low-Code Application Development Cloud platform yielded a risk-adjusted total PV of $171,864.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

Labor To Preplan, Deploy, And Oversee The Mendix Cloud Platform: Calculation Table						
REF.	COST	CALC./SOURCE	INITIAL	YEAR 1	YEAR 2	YEAR 3
E1	Labor hours to preplan and deploy the Mendix platform	Four FTEs for three weeks (hours)	480	-	-	-
E2	Labor hours to oversee Mendix environment and relationship	33% of FTE (hours)	-	693	693	693
E3	Average cost per hour of FTEs	Industry average	$65	$65	$65	$65
Et	Labor to preplan, deploy, and oversee the Mendix Cloud platform	(E1+E2)*E3	$31,200	$45,045	$45,045	$45,045
	Risk adjustment	↑20%				
Etr	Labor to preplan, deploy, and oversee the Mendix Cloud platform (risk-adjusted)		$37,440	$54,054	$54,054	$54,054

Mendix Fees

Mendix fees are based on a three-year commitment using the Enterprise Edition. Readers can learn more about the features and functionality of the Mendix platform by reading the Overview section of this study.

Modeling and assumptions. The table below represents Mendix's fees assessed to the *Organization* over three years. Fees include Mendix Expert Services and workshops, cloud subscription fees, and application container costs.

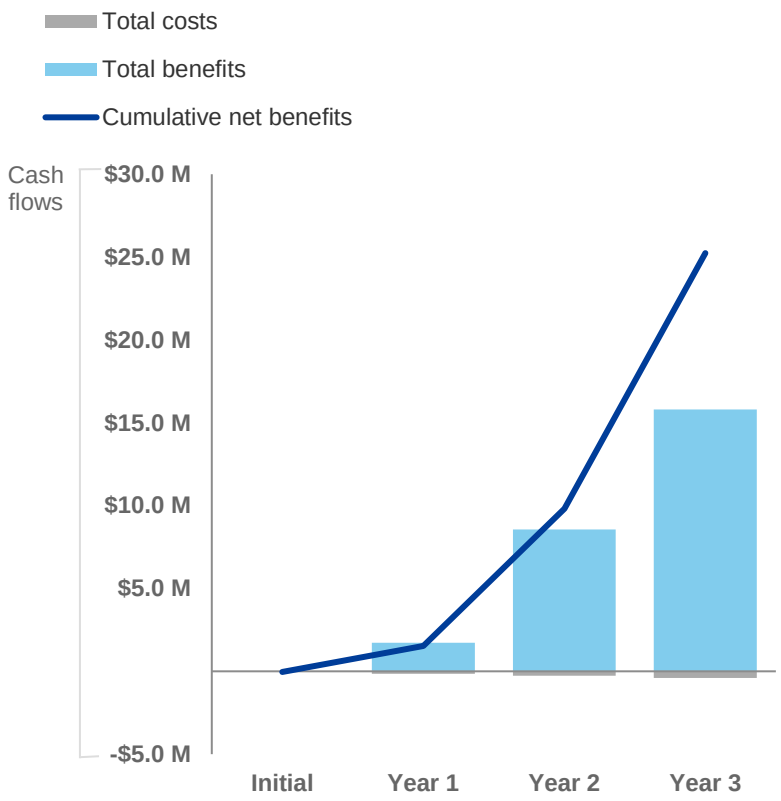
Risks. As with the other leading platforms, predicting what the Mendix platform adoption will cost can be difficult for prospects and customers. Forrester did not risk-adjust this cost category as it represents a fixed-price quote from Mendix. The *Organization's* total fees charged by Mendix are a PV-adjusted $525,036 over three years.

Mendix Fees: Calculation Table						
REF.	COST	CALC./SOURCE	INITIAL	YEAR 1	YEAR 2	YEAR 3
G1	Number of applications using Mendix	*Organization*	-	5	25	50
G2	Subscription fees	Mendix	$0	$90,000	$170,000	$240,000
G3	Container costs — three per application, per year	$650 each container/Mendix	-	$1,950	$1,950	$1,950
G4	Total container costs	G1*G3	$0	$9,750	$48,750	$97,500
Gt	Mendix fees	G2+G4	$0	$99,750	$218,750	$337,500
	Risk adjustment	0%				
Gtr	Mendix fees (risk-adjusted)		$0	$99,750	$218,750	$337,500

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the NPV, and payback period for the interviewed organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	($37,440)	($153,804)	($272,804)	($391,554)	($855,602)	($696,900)
Total benefits	$0	$1,726,304	$8,555,520	$15,813,280	$26,095,104	$20,520,796
Net benefits	($37,440)	$1,572,500	$8,282,716	$15,421,726	$25,239,502	$19,823,896
Payback period						< 6 months

If risk-adjusted costs and benefits still demonstrate a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. Assuming normal success at mitigating risk, the risk-adjusted numbers should more closely reflect the expected outcome of the investment.

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The Mendix Low-Code Application Development Platform: Overview

The following information is provided by Mendix. Forrester has not validated any claims and does not endorse Mendix or its offerings.

MAKE IT WITH MENDIX

Mendix is the platform that empowers anyone to build, integrate, and extend applications 10 times faster with 70% fewer resources, enabling customers to increase operational efficiency, modernize core systems, launch new products, and create digital experiences. The Mendix Platform powers a vibrant developer community with industry-leading low-code capabilities as well as cloud, industrial domain, and business services.

The Mendix platform is designed to accelerate the entire application development lifecycle — from ideation to deployment and operation — while enabling developers and business stakeholders to collaborate throughout the process.

Based around three core principles — speed, collaboration, and control — Mendix offers a complete platform for enterprise application delivery needs. Mendix believes:

- Faster time-to-market comes from tight-knit business-IT collaboration.
- Enabling business stakeholders to innovate faster makes IT more successful.
- Keeping IT in control of the application development process reduces the risk of failure.
- Integrating emerging technologies and core systems quickly leads to insights and innovations that improve business results.
- An open, flexible architecture is vital to future-proof investments.

Leverage your workforce for software development. The Mendix platform accelerates both professional developers and nontechnical domain experts with development environments built to cater to each of their capabilities. Collaboration tools, including integrated feedback loops and story management, foster seamless development across teams. Access to data is simple, reusable, and universal, utilizing industry standard frameworks and protocols.

Develop solutions with uncompromising architecture. Mendix is truly open and extensible at every level: platform, model, and application. Applications built on the platform are cloud-native by default, ensuring portability, scalability, and resilience. The stateless, microservice solution architecture ensures that high-impact changes can be made quickly, safely, and simply. The Mendix platform and application architecture are extensible at every layer of the stack enabling flexibility and interoperability with complex enterprise software landscapes. Built-in lifecycle management and a comprehensive data fabric support visibility and control over application landscapes.

Create engaging experiences for employees and customers. The Mendix platform enables a spectrum of developers to deliver a seamless user experience across touchpoints, including responsive web, progressive web apps, conversational, wearable, and a low-code industry-first native mobile solution powered by React Native.

Proven execution at any scale. Adopted and trusted by the Global 500, Mendix is the only low-code platform built to support the needs of global enterprises. Acquired by Siemens in 2018 to serve at the core of its $4B Digital Industries Division, Mendix claims a thriving community of more than 120,000 developers, is a named leader in each of the four analyst reports it appears in, and is an SAP solution extension partner, serving as the software giant's preferred development platform for future-proof applications.

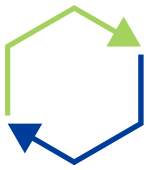
Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

Total Economic Impact Approach

Benefits represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.



Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.