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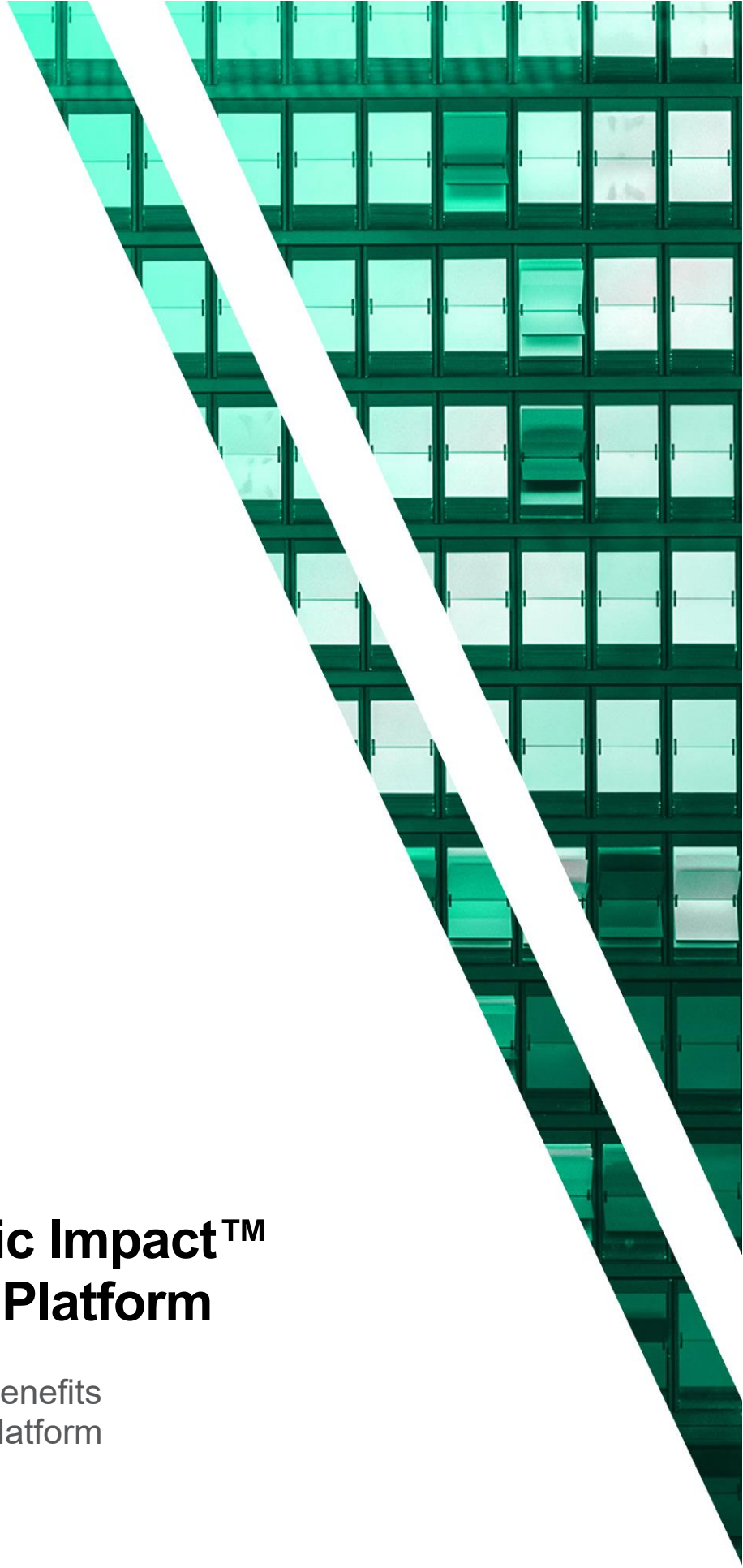

The Total Economic Impact™ Of The DNAnexus Platform

Cost Savings And Business Benefits Enabled By The DNAnexus Platform

MAY 2023

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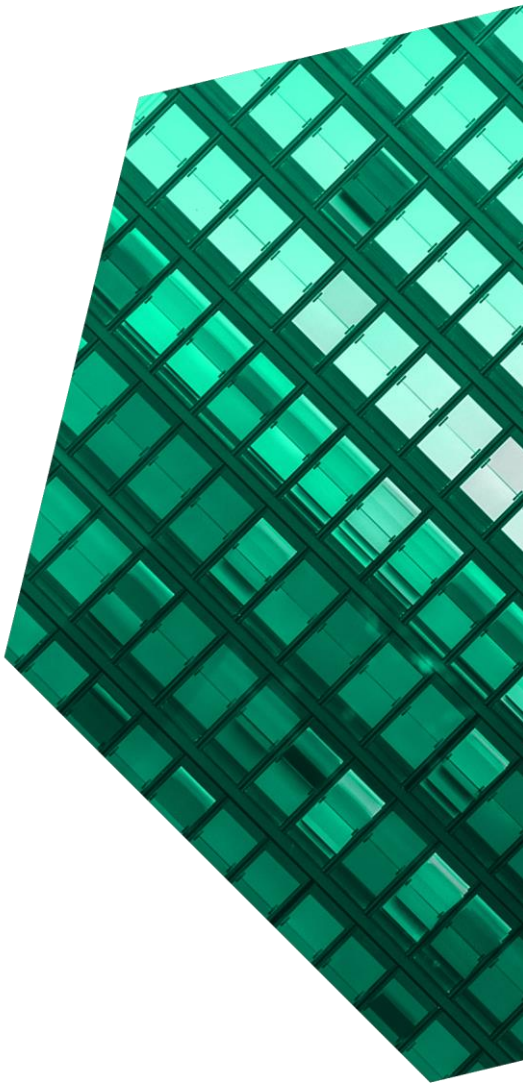


ABOUT FORRESTER CONSULTING

Forrester provides independent and objective research-based consulting to help leaders deliver key transformation outcomes. Fueled by our customer-obsessed research, Forrester's seasoned consultants partner with leaders to execute on their priorities using a unique engagement model that tailors to diverse needs and ensures lasting impact. For more information, visit forrester.com/consulting.

Executive Summary

The market for diagnostic testing, drug discovery, and development is highly competitive, and organizations must scale up their operations rapidly and efficiently to be successful. DNAnexus has developed a specialized cloud platform with flexible computing resources, a secure and compliant production environment, and operational efficiencies. Its solution is supported by a knowledgeable customer care team.

The market for diagnostic testing, drug discovery, and development is dynamic and competitive. Companies require vast computing resources and scientific expertise to accelerate their path to the market and make new drug discoveries. DNAnexus has built a cloud platform that helps pharmaceutical, diagnostic, and biotechnology firms with diagnostic testing, drug research, and development goals.

DNAnexus commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying the DNAnexus platform.[1] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of the DNAnexus platform on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four representatives with experience using the DNAnexus platform. For the purposes of this study,

KEY STATISTICS

Return on investment (ROI)
395%

Net present value (NPV)
$3.1M

Forrester aggregated the interviewees' experiences and combined the results into a single composite organization that is a global pharma/biotech organization with revenue of $5 billion per year.

Prior to using the DNAnexus platform, these interviewees noted how their organizations struggled to scale up operations quickly; their efforts required significant software development. These limitations led to a slower production process and lack of computing resources.

After the investment in the DNAnexus platform, the interviewees had access to a secure and compliant cloud platform with vast computing resources that empowered users to scale up production quickly and efficiently. Key results from the investment include the ability to go to market faster and significant operational efficiencies in terms of time spent by developers and bioinformaticians.

Percentage of time saved by bioinformaticians

40%

KEY FINDINGS

Quantified benefits. Three-year, risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **Faster time to market.** The composite organization generates revenue faster because it can stand up workflows faster and move more quickly through projects using the DNAnexus platform. This benefit accounts for $687,000 over three years.
- **Productivity savings in developers' time.** The composite organization experiences 50% less demand on developers' time since the DNAnexus platform has several built-in features and research users can work with the platform directly without developers' assistance. This benefit accounts for $1.1 million over three years.
- **Productivity savings in bioinformaticians' time.** The composite organization realizes significant productivity savings (a 40% reduction) in bioinformaticians' time because of the availability of vast computing resources and the improved workflow, especially for setting up new pipelines. This saves the composite organization $1.3 million over three years.
- **Increased ability to meet compliance regulations.** The DNAnexus platform has the necessary regulatory certifications and compliance features to ensure that the composite organization stays compliant. This benefit accounts for $42,300 over three years.
- **Increased data security.** The highly secure environment of the DNAnexus platform enables safe data transfer. This benefit accounts for $778,000 over three years.

Unquantified benefits. Benefits that provide value for the composite organization but are not quantified in this study include:

- **Effective customer support speeds up implementation and use of the platform.** Customer support from the DNAnexus team boosts production workflows.
- **Cutting-edge science-based technology drives the best results.** Members of the composite organization note that DNAnexus staff members are knowledgeable, and that the technology is grounded in science and is easy for scientists to use.

Costs. Three-year, risk-adjusted PV costs for the composite organization include:

- **Initial and ongoing costs.** A team of developers deploys the platform with support from the DNAnexus team. Some ongoing maintenance is required. This costs the composite organization $307,000.
- **Fees.** The composite organization pays $195,500 in annual license fees.

The representative interviews and financial analysis found that a composite organization experiences benefits of $3.9 million over three years versus costs of $793,000, adding up to a net present value (NPV) of $3.1 million and an ROI of 395%.

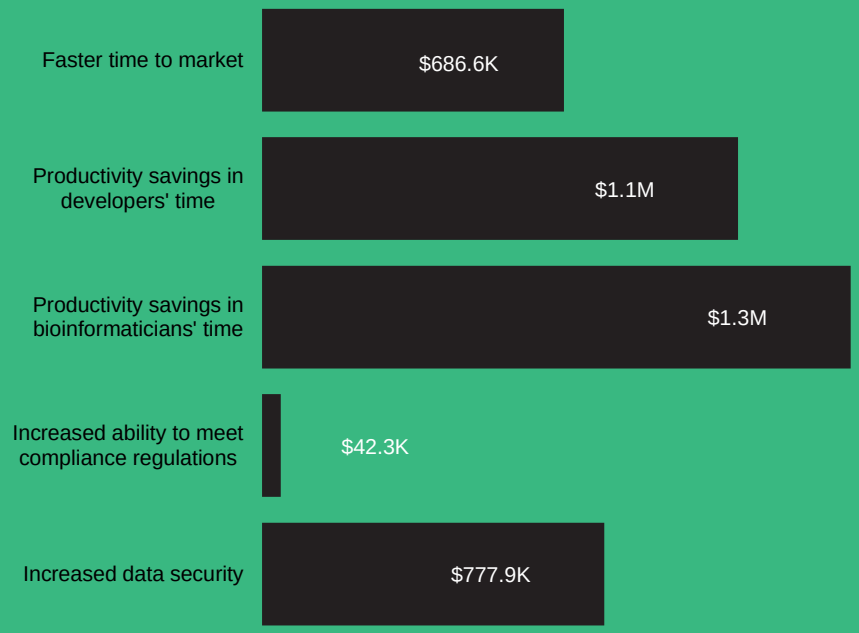
ROI
395%

BENEFITS PV
$3.9M

NPV
$3.1M

PAYBACK
<6 months

Benefits (Three-Year)



“DNAnexus has been a good partner beyond the day-to-day operations that we've been doing with them. DNAnexus is tied in well with various objectives that we have as a company, and I appreciate that.”

— Senior director of R&D, diagnostics industry

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in the DNAnexus 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 DNAnexus platform can have on an organization.

DUE DILIGENCE

Interviewed DNAnexus stakeholders and Forrester analysts to gather data relative to the DNAnexus platform.

INTERVIEWS

Interviewed four representatives at organizations using the DNAnexus platform to obtain data with respect to costs, benefits, and risks.

COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewees' organizations.

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 interviewees.

CASE STUDY

Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

The DNAnexus Platform Customer Journey

Drivers leading to the DNAnexus platform investment

Interviews

Role	Industry	Region	Annual Revenue
Senior director of genomics	Biotechnology	Global	$15 billion to $20 billion USD
Senior director of R&D	Diagnostics	Global	<$1 billion USD
Bioinformatics lead scientist	Diagnostics and drug development	Global	$15 billion to $20 billion USD
Principal scientist	Drug development	Global	$15 billion to $20 billion USD

KEY CHALLENGES

Prior to investment in the DNAnexus platform, interviewees' organizations used in-house processes and on-premises computing resources. Interviewees said that their ability to scale up was hindered by their on-premises system capabilities and required much involvement by software developers.

The interviewees noted how their organizations struggled with common challenges, including:

- **Inability to scale up quickly.** Interviewees mentioned maxing out computer resources and being unable to respond to market demands. A bioinformatics lead scientist said, "We tend to be very sporadic in our resource needs, so I think the thinking and the reality was that a lot of times our on-premises cluster was sitting idle and then would get very busy when running big projects and we would get maxed out."
- **Costly, complicated security and compliance requirements.** Protecting data and ensuring compliance across global regions was challenging for interviewees. A senior director of genomics said: "If we had to build out a secure environment ourselves, that would mean having all of the compliance and security. There is also hosting the data to our partners. That would mean that we would build an internal protected system, that our external users would have to have access to it, suddenly we're engaging in legal privacy, compliance. Even contemplating that question would involve a lot of planning, scoping, and resources."
- **Desire to migrate to cloud computing.** Interviewees discussed their organizations' strategy to move to cloud computing and unwillingness to expand on-premises computing resources. A senior director of genomics said: "The goal of the organization is to continue to scale the number of samples we sequence, and as we hit new scales of data, new problems emerge. So our roadmap is how do we continue to scale on a logarithmic scale."

> **"There is the speed and ease of use, the idea is that in this competitive space we're in, we need to be able to do large scale work quickly, reliably, robustly."**
>
> *Senior director of genomics, biotechnology industry*

INVESTMENT OBJECTIVES

The interviewees' organizations searched for a solution that could:

- Offer dynamically flexible computing resources.
- Provide a robust, secure, compliant environment.
- Provide excellent customer support.
- Empower bioinformaticians and scientists.

"DNAnexus is offering an out-of-the-box solution. They have an extremely secure and robust compliance environment on top of AWS and Azure. They have an extremely mature offering."

Senior director of genomics, biotechnology industry

COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four interviewees, and it is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The global pharmaceutical/biotech organization has $5 billion in annual revenue. The composite organization used an internal on-premises solution for its computing needs in its prior state and is looking for a cloud-based platform to accelerate its drug discovery and development capabilities. The composite organization has a team of eight developers, ten bioinformaticians and ten to twenty research users.

The same business case can be applied to the diagnostics companies.

Deployment characteristics. The composite organization decides to migrate to DNAnexus platform and to set up the necessary workflows so the bioinformaticians and scientists can start using the platform quickly and efficiently.

Key Assumptions

- **$5 billion in annual revenue**
- **Global organization**
- **Pharma/biotech industry**
- **Eight developers**
- **10 bioinformaticians**
- **10 to 20 research users**

Analysis Of Benefits

Quantified benefit data as applied to the composite

Total Benefits						
Ref.	**Benefit**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Atr	Faster time to market	$102,000	$255,000	$510,000	$867,000	$686,642
Btr	Productivity savings in developers' time	$435,200	$435,200	$435,200	$1,305,600	$1,082,278
Ctr	Productivity savings in bioinformaticians' time	$198,769	$496,923	$993,846	$1,689,538	$1,338,071
Dtr	Increased ability to meet compliance regulations	$17,000	$17,000	$17,000	$51,000	$42,276
Etr	Increased data security	$312,800	$312,800	$312,800	$938,400	$777,887
	Total benefits (risk-adjusted)	$1,065,769	$1,516,923	$2,268,846	$4,851,538	$3,927,154

FASTER TIME TO MARKET

Evidence and data. Interviewees spoke of being able to stand up workflows faster and move more quickly through projects with the DNAnexus platform.

- The diagnostics and drug development organization attributed 10% of the observed time to market acceleration to the DNAnexus platform. The bioinformatics lead scientist said, "Every workflow that we've done since then has been much smoother, much quicker now that my folks have more experience on using DNAnexus. So now the turnaround time to put a new pipeline together is much, much shorter."
- The drug development organization attributed 25% of the time-to-market acceleration to the DNAnexus platform. The principal scientist said that the organization experienced an increase in new pipelines installation: "I would say about 50% of the success is from DNAnexus. However, the other 50% should just be that the organization is growing by itself."

Modeling and assumptions. For the composite organization, Forrester assumes:

- The number of new pipelines per year increased from 2 in Year 1 to 5 in Year 2 and 10 in Year 3.
- Revenue generated per pipeline is $3 million.
- Time-to-market acceleration of 20% is attributed to the DNAnexus platform.
- Forrester assumes a 10% operating margin.

Risks. Faster time to market may vary depending on the following:

- Revenue per pipeline.
- Number of new pipelines per year.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $687,000.

Faster Time To Market					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
A1	Number of new pipelines per year	Composite	2	5	10
A2	Revenue per pipeline	Composite	$3,000,000	$3,000,000	$3,000,000
A3	Total revenue	A1*A2	$6,000,000	$15,000,000	$30,000,000
A4	Time to market acceleration attributed to the DNAnexus platform	Interview	20%	20%	20%
A5	Operating margin	TEI standard	10%	10%	10%
At	Faster time to market	A3*A4*A5	$120,000	$300,000	$600,000
	Risk adjustment	↓15%			
Atr	Faster time to market (risk-adjusted)		$102,000	$255,000	$510,000
	Three-year total: $867,000			**Three-year present value: $686,642**	

PRODUCTIVITY SAVINGS IN DEVELOPERS' TIME

Evidence and data. Interviewees said demand for developers' time decreased at their organizations because several of the DNAnexus platform's built-in features allowed research users to work with the platform directly without developers' assistance.

- The senior director of R&D said that their organization observed a 50% reduction in developer time. The senior director of R&D said, "Prior to this, you always had to have a software engineer in the mix to be able to accomplish research tasks."
- The senior director of genomics observed saving about three FTEs due to avoided execution and building infrastructure tasks for the computation.

Modeling and assumptions. For the composite organization, Forrester assumes:

- It employs eight developers.
- The average fully burdened salary of a developer is $160,000.
- The percentage of time spent on development of prior tools is 80%.
- The reduction in development time is 50%.

Risks. Productivity savings in developers' time may vary depending on the following:

- The number of developers involved.
- The salaries of developers.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.1 million.

Productivity Savings In Developers' Time					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Number of developers	Interviews	8	8	8
B2	Average fully burdened salary	Assumption	$160,000	$160,000	$160,000
B3	Percentage of time spent on development of prior tools	Interviews	80%	80%	80%
B4	Reduction in development time	Interviews	50%	50%	50%
Bt	Productivity savings in developers' time	B1*B2*B3*B4	$512,000	$512,000	$512,000
	Risk adjustment	↓15%			
Btr	Productivity savings in developers' time (risk-adjusted)		$435,200	$435,200	$435,200
	Three-year total: $1,305,600			**Three-year present value: $1,082,278**	

PRODUCTIVITY SAVINGS IN BIOINFORMATICIANS' TIME

Evidence and data. Interviewees discussed large productivity savings in bioinformaticians' time after the DNAnexus platform implementation due to the vast computing resources available and improved workflow, especially for setting up new pipelines.

- The bioinformatics lead scientist said the turnaround time for setting up new pipelines improved from eight to ten weeks to four to six weeks. "Every workflow that we've done since then has been much smoother, much quicker."
- The senior director of genomics noted the ease of use of the platform. "So, thinking about transparency of the system, I think that's where DNAnexus really allowed us to build a system where you can trace everything. You can't hide anything on the platform. The core of the platform, the way they've built this database where they track objects and jobs, is just really well thought out, and that drives success."

Modeling and assumptions. For the composite organization Forrester assumes:

- It employs 10 bioinformaticians.

> **"The appeal of the DNAnexus platform for us is that they have a better set of user interfaces and support team than we could build just ourselves."**
>
> *Senior director of R&D, diagnostics*

- The average fully burdened salary of a bioinformatician is $190,000 ($91 per hour).
- The number of new pipelines per year increased from 2 in Year 1 to 5 in Year 2 and 10 in Year 3.
- Time spent before the DNAnexus platform per pipeline per bioinformatician: 320 hours.
- The percentage of time saved: 40%.

Risks. Productivity savings in bioinformaticians' time may vary depending on the following:

- The number of bioinformaticians involved.
- The salaries of bioinformaticians.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.3 million.

Productivity Savings In Bioinformaticians' Time

Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Number of bioinformaticians	Composite	10	10	10
C2	Average fully burdened salary, per hour	Assumption	$91	$91	$91
C3	Number of new pipelines per year	Composite	2	5	10
C4	Time spent before the DNAnexus platform per pipeline	Interview	320	320	320
C5	Percentage of time saved	Interview	40%	40%	40%
Ct	Productivity savings in bioinformaticians' time	C1*C2*C3*C4*C5	$233,846	$584,615	$1,169,231
	Risk adjustment	↓15%			
Ctr	Productivity savings in bioinformaticians' time (risk-adjusted)		$198,769	$496,923	$993,846
	Three-year total: $1,689,538			**Three-year present value: $1,338,071**	

INCREASED ABILITY TO MEET COMPLIANCE REGULATIONS

Evidence and data. Interviewees discussed their organizations' increased ability to meet compliance regulations. They noted that the DNAnexus platform had the necessary regulatory certifications and compliance features, which was an important factor in their decision to start using the platform.

- The senior director of R&D said: "The key driver for our decision was the ability to scale privacy, security, compliance. That was probably the biggest driver for us because DNAnexus had the certifications already."
- The senior director of R&D also noted the improved ability to work in global markets. "Some of the deals that we were trying to do in Europe were made easier because we could just refer people to the DNAnexus compliance team."

Modeling and assumptions. For the composite organization Forrester assumes:

- The average potential regulatory fine of $1 million.[2]
- The probability of a fine is 2%.

Risks. Increased ability to meet compliance regulations may vary depending on the actual cost of a fine.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $42,000.

Increased Ability To Meet Compliance Regulations

Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Average potential regulatory fine	Composite	1,000,000	1,000,000	1,000,000
D2	Probability of fine	Assumption	2%	2%	2%
Dt	Increased ability to meet compliance regulations	D1*D2	$20,000	$20,000	$20,000
	Risk adjustment	↓15%			
Dtr	Increased ability to meet compliance regulations (risk-adjusted)		$17,000	$17,000	$17,000
	Three-year total: $51,000			**Three-year present value: $42,276**	

INCREASED DATA SECURITY

Evidence and data. Interviewees observed increased data security since their organizations started using the DNAnexus platform. They said that because DNAnexus is built on Amazon Web Services (AWS), the data transfer is secure and occurs inside the AWS environment.

- The principal scientist said: "You don't have to go out of AWS. So that's generally a much safer transfer of data. You don't have to use a USB or think about sending the email with the data."
- The senior director of genomics said, "They're offering a sort of out-of-the-box solution; they have an extremely secure, robust security and compliance environment on top of AWS and Azure."

Modeling and assumptions. For the composite organization, Forrester assumes:

- The estimated average cost of a data breach is $9.2 million.[3]
- The probability of a data breach is 4%.

Risks. Increased data security may vary depending on the actual cost of a data breach.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $778,000.

> **"The main takeaway is security and compliance. The reality is that no one else is doing cloud security and compliance the way that DNAnexus is doing it."**
>
> *Senior director of genomics, biotechnology industry*

Increased Data Security

Ref.	Metric	Source	Year 1	Year 2	Year 3
E1	Estimated average cost of data breach	Ponemon Institute	9,200,000	9,200,000	9,200,000
E2	Probability of data breach	Assumption	4%	4%	4%
Et	Increased data security	E1*E2	$368,000	$368,000	$368,000
	Risk adjustment	↓15%			
Etr	Increased data security (risk-adjusted)		$312,800	$312,800	$312,800
	Three-year total: $938,400			**Three-year present value: $777,887**	

UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Excellent customer support speeds up implementation and use of the DNAnexus platform.** Interviewees said they received support from the DNAnexus team, which sped up their learning curve and boosted production workflows. The principal scientist said, “The first thing would be a very good customer service, but also a very customer-oriented training in terms of getting to know what you want and do the last-minute modification to make sure you're 100% satisfied.”
- **Cutting-edge science-based technology drives the best results.** Interviewees noted how knowledgeable the staff were at DNAnexus and how the technology was grounded in science and easy to use by scientists. The senior director of R&D said, “DNAnexus brought to us the ability to have a computational biologist write a workflow that then somebody else (research user) who did not understand any of the complex stuff, could it run themselves.”

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement the DNAnexus platform and later realize additional uses and business opportunities, including a strategic partnership leads to faster results, superior future company strategy. Interviewees discussed the quality and type of business relationship that they have with DNAnexus and the strength of the partnership. The senior director of R&D said: “They've been a good partner beyond the day-to-day stuff that we've been doing with them. DNAnexus is definitely tied in well with various objectives that we have as a company, and I appreciate that.”

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

Analysis Of Costs

Quantified cost data as applied to the composite

Total Costs							
Ref.	**Cost**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Total**	**Present Value**
Ftr	Initial and ongoing costs	$169,846	$55,200	$55,200	$55,200	$335,446	$307,120
Gtr	Fees	$0	$195,500	$195,500	$195,500	$586,500	$486,180
	Total costs (risk-adjusted)	$169,846	$250,700	$250,700	$250,700	$921,946	$793,300

INITIAL AND ONGOING COSTS

Evidence and data. The interviewees described the implementation process as relatively straightforward.

- Implementation periods varied across interviewees due to the complexities of their previous systems and variation in requirements.
- The bioinformatics lead scientist said, “Part of our decision of going to DNAnexus was the additional support that we got: the onboarding, the training, the help in getting us up and running because we didn’t have a group of IT folks that was ready to jump in and help us.”

Modeling and assumptions. For the composite organization, Forrester assumes:

- Four developers work on implementation.
- The initial implementation process takes 480 hours per developer.
- The average annual fully burdened salary of a developer is $160,000 ($77 per hour).
- The ongoing maintenance cost is $48,000 per year.

Risks. The initial and ongoing costs may vary due to the following:

- The complexity of the previous systems and the overall architecture.
- The available capacity and skill set of developers.
- The salaries of the developers.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $307,000.

Initial And Ongoing Costs						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Number of developers	Interview	4			
F2	Average fully burdened salary per hour	Assumption	$77			
F3	Hours spent per developer	Interview	480			
F4	Implementation cost	E1*E2*E3	$147,692	$0	$0	$0
F5	Maintenance cost	Interview	$0	$48,000	$48,000	$48,000
Ft	Initial and ongoing costs	E4+E5	$147,692	$48,000	$48,000	$48,000
	Risk adjustment	↑15%				
Ftr	Initial and ongoing costs (risk-adjusted)		$169,846	$55,200	$55,200	$55,200
	Three-year total: $335,446			**Three-year present value: $307,120**		

FEES

Evidence and data. The interviewees said that their organizations incurred an annual license fee for DNAnexus platform usage.

License fees included a dedicated customer success team and 24/7 customer support.

Modeling and assumptions. For the composite organization, Forrester assumes the composite organization pays $170,000 in annual license fees.

Risks. Pricing may vary depending on the following:

- The number of users.
- The computing resources requirements.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV of $486,000.

"I think their customer support team is excellent. I appreciate that they are accessible and responsive, so we have people that we can work with."

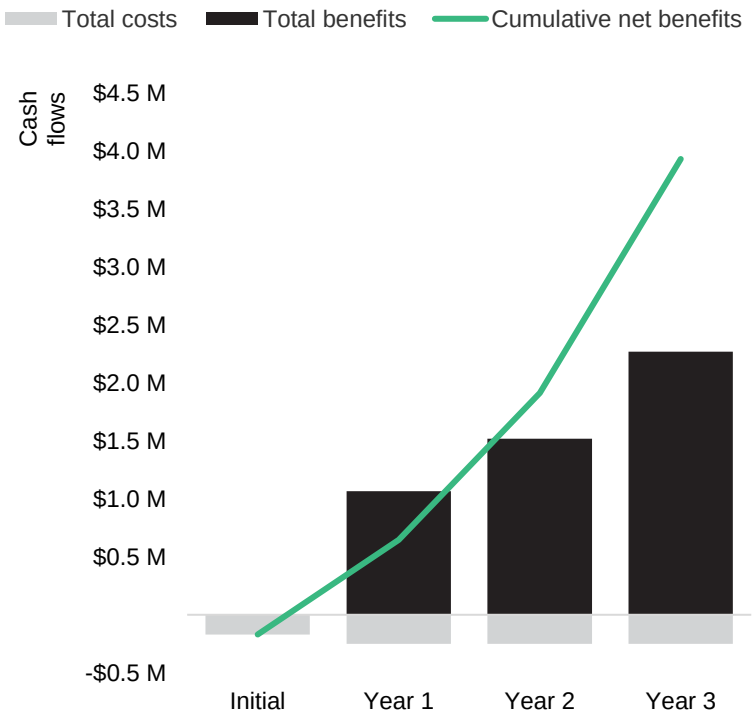
Senior director of R&D, diagnostics industry

Fees						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
G1	License fee	Composite		170,000	170,000	170,000
Gt	Fees	Composite	$0	$170,000	$170,000	$170,000
	Risk adjustment	↑15%				
Gtr	Fees (risk-adjusted)		$0	$195,500	$195,500	$195,500
	Three-year total: $586,500			**Three-year present value: $486,180**		

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 ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

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

Cash Flow Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	($169,846)	($250,700)	($250,700)	($250,700)	($921,946)	($793,300)
Total benefits	$0	$1,065,769	$1,516,923	$2,268,846	$4,851,538	$3,927,154
Net benefits	($169,846)	$815,069	$1,266,223	$2,018,146	$3,929,592	$3,133,854
ROI						395%
Payback period (months)						<6

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.

Appendix B: Endnotes

[1] 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.

[2] Source: Denis G. Arnold, PhD; Oscar Jerome Stewart, PhD; Tammy Beck, PhD, "Financial Penalties Imposed on Large Pharmaceutical Firms for Illegal Activities," JAMA Network, November 2020.

[3] Source: "Cost of a Data Breach Report 2022," Ponemon Institute, July 2022.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