

A Forrester Total Economic
Impact™ Study
Commissioned By
Wolters Kluwer Health

Project Director:
Sebastian Selhorst

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The Total Economic Impact™ Of UpToDate

A Case Study Based On The
Experience Of A Public And A Private
Hospital In Brazil

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Executive Summary

Not only in Brazil but all over the world, hospitals are working to improve the quality of care while also controlling their costs.

Wolters Kluwer Health commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential financial impact medical institutions in Brazil may realize by deploying UpToDate.

UpToDate is an evidence-based clinical decision support tool used at the point of care. For a more detailed description of UpToDate, please refer to page 18.

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of UpToDate on their organizations. To better understand the potential benefits, costs, and risks associated with the use of UpToDate, Forrester interviewed representatives from a public, Hospital de Clínicas de Porto Alegre, and a private (nonprofit) hospital, Hospital São Rafael, in Brazil, both with multiple years of experience using UpToDate.

Both hospitals provide all medical staff with access to the tool via any hospital terminal or their staff's personal fixed or mobile devices. Hospital de Clínicas de Porto Alegre also embedded UpToDate into its electronic health record system (EHR);

Hospital São Rafael plans to do so in the near future. These hospitals installed UpToDate with the stated goals of improving the quality of service care, providing better evidence-based medicine and education, and ensuring rational use of drugs and treatments.

“We’re shaping the culture of the hospital for the next eight to 10 years. This change comprehends hospital accreditation and knowledge enhancement of the clinical and academic staff of the hospital. We can already see the achievements, and I think that UpToDate is a part of this.”

~ Nephrologist and education coordinator at Hospital São Rafael

UPTODATE HAS POTENTIAL TO IMPROVE THE QUALITY OF CARE WHILE REDUCING COSTS

All interviewed physicians felt that the widespread use of UpToDate improved the quality of care. They noted several potential impact areas, including physician productivity gains, avoidance of unnecessary referrals, reduced length of stay, avoidance of unnecessary diagnostic tests, and increased physician satisfaction. For this analysis and together with the interviewees, we were able to conservatively estimate the impact for the first two of these benefit areas for a composite hospital, which could represent either a private or a public hospital.¹ The analysis points to quantifiable benefits of R\$1.1 million versus total costs of R\$270,000, adding up to a net present value (NPV) of approximately R\$816,000 over the three years of the analysis (see Figure 1).

FIGURE 1

Financial Summary Showing Three-Year Risk-Adjusted Results For The Composite Hospital Described In This Case Study

ROI:
302%

NPV:
R\$816,000

Payback:
within 6 months

Source: Forrester Research, Inc.

› **Benefits.** The organization used in this analysis is a composite based on interviews that Forrester conducted with a public, Hospital de Clínicas de Porto Alegre, and a private hospital, Hospital São Rafael, in Brazil. The composite organization represents a larger-than-average hospital in Brazil with 500 beds. The hospital employs about 4,000 people, including 800 physicians, and has an annual budget of approximately R\$800 million. The institution counts about 24,000 admissions and 570,000 outpatient visits per year. UpToDate is made available to the medical staff from anywhere and on any device, and the tool has been integrated with the hospital's EHR system. For this sample hospital, we estimated the following benefits:

- **Increased physician productivity.** Users report that the service saves them time in finding and verifying important information for medical decision-making, such as diagnosis and treatment pathways. Furthermore, it also saves doctors time when they are teaching students and junior doctors. In this analysis, we conservatively estimate that each physician saves an average of 10 minutes per topic review. These productivity gains have value to the hospital, as the saved time will result — to some extent — in redistribution of labor. Specialists can work on the more complex tasks, and generally people are pushed to work at the top of their license. The incremental productivity has an estimated three-year risk-adjusted PV of approximately R\$930,000 for the composite hospital.
- **Avoidance of unnecessary referrals.** Interviewees reported that UpToDate improves the dissemination of knowledge to clinicians. It provides them access to the latest, evidence-based information about their own and other specialties. One potential impact is that a number of unnecessary referrals might be avoided, saving the hospital money. For our composite organization, we conservatively assume that 0.5% of the referrals can be avoided in Year 1, and 1% in years 2 and 3 due to increasing adoption of the tool. For the composite hospital, the cost savings have an estimated three-year risk-adjusted PV of approximately R\$150,000.
- **Improved quality of care.** Interviewed physicians generally agreed that quick and easy access to the latest, evidence-based medical information resulted in improved quality of care. They believe that if UpToDate is correctly and consistently used, it could improve key hospital performance metrics such as average length of stay, adverse event frequency, waiting times, and readmission rates. One of the interviewees noted:

“Yes, I think that UpToDate has an impact on our quality of care. Anecdotally, for example, we change what we are doing based on the information we get from UpToDate.”

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

However, at the time of the interviews, no metrics were available to estimate these impacts in financial terms. Therefore, they are not included in the return on investment calculations in this analysis. Readers, however, should evaluate the possible impact of these potential improvements on their organizations and decide how they are applicable to their own business case.

› **Costs.** The composite organization experienced the following risk-adjusted costs:

- **Annual UpToDate subscription fees.** The service is charged on an annual basis, and the costs mainly depend on the number of hospital beds. For this large, composite hospital with 500 beds, these costs are estimated at R\$103,000 per year and represent about 99% of the total costs of the investment.
- **EHR-related costs.** The costs for embedding a link to UpToDate and the hospital's electronic health record system have been estimated at R\$1,000.
- **Change management costs.** These costs take into account the initial efforts in defining and executing the communications strategy in order to inform the hospital staff about the introduction of UpToDate and have been estimated at approximately R\$1,000.
- **Ongoing governance costs.** The efforts with regards to ongoing governance have been estimated at 2 hours per month, or approximately R\$1,200 per year.

Disclosures

The reader should be aware of the following:

- › The study is commissioned by Wolters Kluwer Health and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.
- › Forrester makes no assumptions as to the potential financial or medical impact that other institutions will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the report to determine the appropriateness of an investment in UpToDate.
- › Wolters Kluwer Health 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.
- › Wolters Kluwer Health provided the customer names for the interviews but did not participate in the interviews.

TEI Framework And Methodology

INTRODUCTION

From the information provided in the interviews, Forrester has constructed a Total Economic Impact (TEI) framework for those organizations considering implementing UpToDate. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision.

APPROACH AND METHODOLOGY

Forrester took a multistep approach to evaluate the impact that UpToDate can have on an institution (see Figure 2). Specifically, we:

- › Interviewed Wolters Kluwer Health marketing and sales personnel, along with Forrester analysts, to gather data relative to UpToDate and the marketplace for clinical decision support solutions.
- › Interviewed a total of four physicians from a public and a private hospital in Brazil currently using UpToDate, to obtain data with respect to costs, benefits, and risks.
- › Designed a composite medical institution based on characteristics of the interviewed hospitals.
- › Constructed a financial model representative of the interviews using the TEI methodology. The financial model is populated with the cost and benefit data obtained from the interviews as applied to the composite institution.
- › Risk-adjusted the financial model based on issues and concerns the interviewed organizations highlighted in interviews. Risk adjustment is a key part of the TEI methodology. While interviewees provided estimates, some categories included a broad range of responses or had a number of outside forces that might have affected the results. For that reason, some cost and benefit totals have been risk-adjusted and are detailed in each relevant section.

Forrester employed four fundamental elements of TEI in modeling UpToDate's solution: benefits, costs, flexibility, and risks.

Given the increasing sophistication that organizations have regarding financial 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 B for additional information on the TEI methodology.

FIGURE 2
TEI Approach



Source: Forrester Research, Inc.

Analysis

COMPOSITE ORGANIZATION

For this study, Forrester conducted interviews with four physicians working in the following two hospitals in Brazil:

- › **Hospital de Clínicas de Porto Alegre.** This public hospital is a major university hospital in Brazil with approximately 850 beds, 1,000 physicians, 500 residents, and more than 1,000 students. In total, the hospital employs about 6,100 people and has an annual budget of approximately R\$1.5 billion. The institution counts about 33,000 admissions and 600,000 outpatient visits per year. UpToDate was first rolled out to the entire hospital in 2006 and has now been integrated with the hospital's electronic health record system. On average, the hospital staff carry out 30,000 topic reviews per month in UpToDate.
- › **Hospital São Rafael.** This private, nonprofit hospital is a large medical institution in Brazil that is dedicated to tertiary and quaternary care. It has a structure of approximately 340 beds, 700 physicians, 100 residents, and 280 medical students. In total, the hospital employs 3,000 people and has an annual budget of approximately R\$500 million. On average, the hospital records about 20,000 hospitalizations and 530,000 outpatient visits per year. UpToDate was first rolled out to the entire hospital in 2008. In the near future, the hospital plans to integrate UpToDate with its electronic health record system. On average, the hospital staff carry out 4,000 topic reviews per month in UpToDate.

The interviewees shared the hospital's main drivers for introducing and using UpToDate. In particular, the two hospitals were looking to:

- › Improve the quality of service care.
- › Provide better evidence-based medicine.
- › Provide better education and development.
- › Ensure rational use of drugs and treatments.

Based on the interviews, Forrester constructed a TEI framework, a composite organization, and an associated financial analysis that estimates the financial impact on potential benefit areas. The composite organization that Forrester synthesized from these results represents a medical institution with the following characteristics:

- › A large hospital in Brazil.
- › Five hundred beds.
- › An annual budget of approximately R\$800 million.
- › Four thousand employees, including 800 physicians.
- › Twenty-four thousand hospitalizations and 570,000 outpatient visits per year.

For more detailed assumptions regarding the composite organization, please refer to Appendix A.

“For us, the most important driver for introducing UpToDate was to improve quality of care. The reduction of costs and increase in efficiency are highly desirable byproducts of the first one.”

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

INTERVIEW HIGHLIGHTS

The interviews were conducted in August and September 2016 and revealed that:

- › **UpToDate is highly regarded by all interviewed physicians.** The interviewees told us that UpToDate has been broadly adopted by the medical staff and imbedded in their day-to-day activities. They consider it a trusted and reliable source of information. They consult UpToDate if they have doubt in a diagnosis, drug, or medical interaction. They find the search engine robust and easy to use. The hospitals noticed an increase in usage when UpToDate is deployed via mobile devices. One of the hospitals also reported that the integration of UpToDate with the hospital's EHR further boosted adoption.

"UpToDate has become part of life for our physicians. It is a trusted source of information."

~ Nephrologist and education coordinator, Hospital São Rafael

- › **Language does not seem to represent a barrier — at least not for physicians.** While UpToDate's search, navigation, and auto-complete functions are available in multiple languages, including Portuguese, the topic content itself remains in English. The interviewees do not think that this represents any barrier for adoption by the physicians. Nevertheless, one interviewee noted that this might be one of the reasons that the tool is less used by nurses and other categories of medical staff in the hospital.

"I do not think that language is a barrier for the heavy users, like physicians, residents, and medical students.

They are all very proficient in English. But maybe it is an obstacle for other professions within the hospital."

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

- › **Interviewed physicians believe that UpToDate improves the quality of care — but proving it on the hospital level would require a long-term study.** Physicians reported that UpToDate helps them to practice a better, evidence-based medicine and that, anecdotally, they have adjusted their diagnosis or prescriptions based on the information they received from UpToDate. They use the tool to improve their skills and make better decisions for their patients.

"For us, the primary goal of using UpToDate is to provide information that leads to better quality of care. It helps us to improve our decisions, realize what the best treatment is for a given patient."

~ Cardiologist, researcher and research coordinator, Hospital São Rafael

- › **UpToDate saves physicians' time.** All of the interviewed physicians agree that UpToDate makes their work in the hospital more efficient and saves them a lot of time. They stated that without UpToDate, they would have to spend considerably more time and effort to get a similar quality of information; they can now dedicate this time and effort to their patients and other important tasks at the hospital.

"UpToDate definitely saves me time. It abbreviates my work from searching the original articles, selecting the ones that are key to answer these questions, reading the abstract of the articles, [and] parsing through the methodology to verify that it is okay."

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

- › **In some cases, UpToDate may result in a reduction of diagnostic tests.** One interviewee reported that, in specific situations, UpToDate might help with a diagnosis in a way that avoids executing unnecessary diagnostic tests. On the other side, however, another interviewee noted that UpToDate might lead to the opposite, i.e., ordering additional examinations that the physician might not have thought about in the first place.

"When you do not know what to do for a particular disease, you might order unnecessary exams. With UpToDate, when you have a direct answer, you can go in a specific direction of the diagnosis and it therefore can reduce the quantity of diagnostic exams."

~ Cardiologist, Hospital São Rafael

- › **In certain situations, UpToDate might avoid unnecessary referrals.** Interviewees report that, anecdotally, they were able to avoid unnecessary referrals based on the information they received from the tool.

“I think that UpToDate helped us to improve the dissemination of knowledge to clinicians. Now everybody has access to information about other specialties. I think that we do not need to have five specialists anymore to see one patient. This used to be very common here. We probably have less consultations now.”

~ Nephrologist and education coordinator, Hospital São Rafael

- › **UpToDate contributes to the job satisfaction of physicians.** All of the interviewed physicians appreciate having access to UpToDate from anywhere and with any device. The tool has become part of their standard work environment and adds to their job satisfaction.

“UpToDate is one of the factors — surely not the only one — but one of the factors that might motivate physicians to work or stay in a given hospital. It makes them feel empowered.”

~ Cardiologist, researcher and research coordinator, Hospital São Rafael

- › **Education is also a key element of the service’s benefits.** Both interviewed hospitals are very heavily involved in medical education. They noted that UpToDate improves the students’ training, as students find it a useful resource for completing projects and reading about different conditions and treatments.

“I’m aware of a study that showed that those students who had more access to UpToDate had higher scores in tests.”

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

- › **UpToDate is part of a longer, cultural journey.** People do not change the way they work from one day to another. Adopting a tool like UpToDate takes time, but the interviewed physicians were sure that over time, the tool has helped them to improve their practice and the hospital to improve its benchmarks.

“For us, the long-term impact of UpToDate is that we can provide our physicians with quality information, and they use this information every day discussing patients in meetings, in rounds. I think it is changing our culture and it’s taking our benchmark to higher levels.”

~ Endocrinologist and advisor to the VP of medical affairs, Hospital de Clínicas de Porto Alegre

BENEFITS

All interviewed physicians believe that, if correctly used, UpToDate can improve the quality of care. They noted a number of potential outcomes, including increased physician efficiency, avoidance of unnecessary referrals, reduction in the length of stay, reduced number of diagnostic tests, and increased physician satisfaction. While it has not been possible to financially quantify all of these benefits, we have estimated the value of the benefits delivered through productivity gains and avoided unnecessary referrals.



Increased Physician Efficiency

Clinical staff saves time by having quick and easy access to the latest information about conditions, diagnoses, symptoms, drugs, and medical interactions. All of the interviewed physicians concur that UpToDate makes their work in the hospital more efficient and saves them a lot of time. Anecdotally, interviewees estimated that they might have saved between 1 and 4 hours for a given topic review.

These productivity gains have a value to the hospital, as the saved time will result — to some extent — in redistribution of labor. Specialists can work on the more complex tasks, and generally people are pushed to work at the top of their license.

For our composite organization, we conservatively assume that, on average, a physician saves 10 minutes per topic review and that each of the 800 physicians reviews one topic per week in Year 1, increasing to two topics per week in years 2 and 3. The average hourly salary rate of a physician is set to R\$85. To be conservative in our estimates of productivity gains, Forrester further assumes that only 50% of the time saved is allocated to other productive tasks.

Finally, we risk-adjusted this benefit down by 10% in order to account for uncertainties in our assumptions. For the composite hospital, the risk-adjusted productivity gains have a present value of approximately R\$930,000 over the three years of the analysis.

TABLE 1

Increased Physician Efficiency

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
A1	Number of physicians			800	800	800
A2	Assumed average number of topic reviews per physician per week			1	2	2
A3	Assumed average number of minutes saved per topic review			10	10	10
A4	Number of weeks worked per year			45	45	45
A5	Average number of hours saved per year	$A1 \cdot A2 \cdot (A3/60) \cdot A4$		6,000	12,000	12,000
A6	Average fully loaded hourly salary rate (physician)	Assume R\$165,000 per year		R\$85	R\$85	R\$85
A7	Assumed productivity captured			50%	50%	50%
At	Increased physician efficiency	$A5 \cdot A6 \cdot A7$	R\$0	R\$255,000	R\$510,000	R\$510,000
	Risk adjustment	↓10%				
Atr	Increased physician efficiency (risk-adjusted)		R\$0	R\$229,500	R\$459,000	R\$459,000

Source: Forrester Research, Inc.



Reduction In Referrals

Interviewees reported that UpToDate improves the dissemination of knowledge to clinicians. It provides them access to the latest, evidence-based information about their own and other specialties. One potential impact is that a number of unnecessary referrals might be avoided, saving the hospital money. Anecdotally, one of the interviewees estimated that in cardiology, approximately 20% of the referrals are not absolutely necessary and could theoretically be avoided with the help of a reliable, evidence-based tool such as UpToDate.

For our composite organization, we assume the number of referrals to be 12,000 per year and the average cost of a referral to be R\$700. We further assume that 60 unnecessary referrals (i.e., 0.5% of the total number of referrals) have been avoided in Year 1. Due to increasing adoption of the service, we assume that this percentage grows to 1% (i.e., 120 avoided unnecessary referrals) for year 2 and 3.

Finally, we risk-adjusted this benefit down by 10% in order to account for uncertainties in our assumptions. The risk-adjusted cost savings over the three years have a present value of approximately R\$154,000 for the composite hospital.

TABLE 2

Reduction In Referrals

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
B1	Assumed number of referrals			12,000	12,000	12,000
B2	Assumed reduction in referrals due to UpToDate			0.5%	1.0%	1.0%
B3	Number of unnecessary referrals avoided due to UpToDate	B1*B2 (rounded)		60	120	120
B4	Assumed cost of a referral			R\$700	R\$700	R\$700
Bt	Reduction in referrals	B3*B4	R\$0	R\$42,000	R\$84,000	R\$84,000
	Risk adjustment	↓10%				
Btr	Reduction in referrals (risk-adjusted)		R\$0	R\$37,800	R\$75,600	R\$75,600

Source: Forrester Research, Inc.

Total Benefits

Table 3 shows the total of all quantified benefits across the two areas listed above, as well as present values (PVs) discounted at 10%. Over three years, the composite hospital expects risk-adjusted total benefits to be a PV of approximately R\$1.1 million.

TABLE 3

Total Benefits (Risk-Adjusted)

Ref.	Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
Atr	Increased physician efficiency	R\$0	R\$229,500	R\$459,000	R\$459,000	R\$1,147,500	R\$932,829
Btr	Reduction in referrals	R\$0	R\$37,800	R\$75,600	R\$75,600	R\$189,000	R\$153,642
	Total benefits	R\$0	R\$267,300	R\$534,600	R\$534,600	R\$1,336,500	R\$1,086,471

Source: Forrester Research, Inc.

COSTS

The composite organization experienced the following costs related to the UpToDate solution:

- › UpToDate subscription fees.
- › IT labor costs for the integration with the electronic health record system.
- › Change management costs.
- › Ongoing governance costs.



UpToDate Subscription Costs

UpToDate's annual service costs are mainly based on the number of beds in the hospital. In the case of the composite organization, with 500 beds and mobile access to the tool, the annual fees were estimated at R\$103,000. This represents approximately 99% of the total costs.

As these costs were directly provided by Wolters Kluwer, no risk adjustment was applied.



EHR-Related Costs

The composite organization chose to embed UpToDate into the hospital's electronic health record system. The corresponding IT efforts have been estimated at 20 man-hours. For the sake of this business case, we assume an average fully loaded IT salary rate of R\$45 per hour.

To take into account the uncertainty of the above assumptions, the integration costs were risk-adjusted up by 10%. The risk-adjusted EHR integration costs were estimated at approximately R\$1,000.



Change Management Costs

The change management costs take into account the efforts for defining and executing the communications strategy in order to inform the hospital staff about the introduction of UpToDate. These efforts have been estimated at 20 hours for the composite organization. We further assume an average fully loaded admin salary rate of R\$45 per hour.

As these costs are based on estimations, the change management costs were risk-adjusted up by 10%. The risk-adjusted change management costs were estimated at approximately R\$1,000.



Ongoing Governance Costs

The efforts with regards to the ongoing governance were estimated at 2 hours per month, or 24 hours per year. Again, we assume an average fully loaded admin salary rate of R\$45 per hour.

To take into account the uncertainty of the assumptions made, the governance costs were risk-adjusted up by 10%. The annual, risk-adjusted ongoing governance costs have a value of approximately R\$1,200.

Total Costs

Table 4 shows the total of all costs as well as associated present values (PVs), discounted at 10%. The total three-year costs of the investment in UpToDate have a PV of R\$270,444 for the composite organization.

TABLE 4
Total Costs (Risk-Adjusted)

Ref.	Cost Category	Initial	Year 1	Year 2	Year 3	Total	Present Value
Ctr	UpToDate subscription fees	R\$103,000	R\$0	R\$103,000	R\$103,000	R\$309,000	R\$265,509
Dtr	EHR integration costs	R\$990	R\$0	R\$0	R\$0	R\$990	R\$990
Etr	Change management costs	R\$990	R\$0	R\$0	R\$0	R\$990	R\$990
Ftr	Ongoing governance	R\$0	R\$1,188	R\$1,188	R\$1,188	R\$3,564	R\$2,954
	Total costs (risk-adjusted)	R\$104,980	R\$1,188	R\$104,188	R\$104,188	R\$314,544	R\$270,444

Source: Forrester Research, Inc.

FLEXIBILITY

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some 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. There are multiple scenarios in which a customer might choose to implement UpToDate and later realize additional uses and business opportunities. Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix B).

For example, one of the interviewees noted that further integrations between UpToDate and other third-party medication databases result in additional benefits.

RISKS

Forrester defines two types of risk associated with this analysis: “implementation risk” and “impact risk.” Implementation risk is the risk that a proposed investment in UpToDate may deviate from the original or expected requirements, resulting in higher costs than anticipated. Impact risk refers to the risk that the business or technology needs of the organization may not be met by the investment in UpToDate, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates.

TABLE 5

Benefit And Cost Risk Adjustments

Benefits	Adjustment
Increased physician efficiency	↓ 10%
Reduction in referrals	↓ 10%
Costs	Adjustment
EHR integration costs	↑ 10%
Change management costs	↑ 10%
Ongoing governance costs	↑ 10%

Source: Forrester Research, Inc.

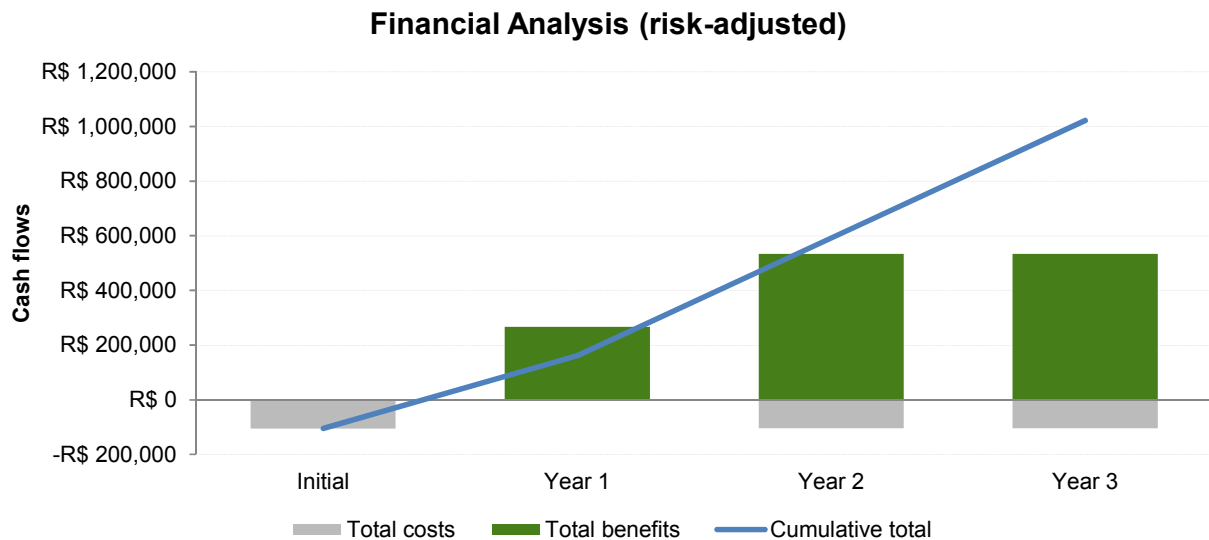
Quantitatively capturing implementation risk and impact risk by directly adjusting the financial estimates results provides more meaningful and accurate estimates and a more accurate projection of the financial impacts. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates. The risk-adjusted numbers should be taken as “realistic” expectations since they represent the expected values considering risk.

Table 5 shows the values used to adjust for risk and uncertainty in the cost and benefit estimates for the composite organization. Readers are urged to apply their own risk ranges based on their own degree of confidence in the cost and benefit estimates.

Financial Summary

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 in UpToDate (see Table 6). For the composite Brazilian hospital described in this case study, the total investment costs and benefits related to the UpToDate service have a three-year present value of approximately R\$816,000.

FIGURE 3
Cash Flow Chart (Risk-Adjusted)



Source: Forrester Research, Inc.

TABLE 6
Cash Flow (Risk-Adjusted)

	Initial	Year 1	Year 2	Year 3	Total	Present Value
Costs	(R\$104,980)	(R\$1,188)	(R\$104,188)	(R\$104,188)	(R\$314,544)	(R\$270,444)
Benefits	R\$0	R\$267,300	R\$534,600	R\$534,600	R\$1,336,500	R\$1,086,471
Total	(R\$104,980)	R\$266,112	R\$430,412	R\$430,412	R\$1,021,956	R\$816,027
ROI						302%
Payback period						Within 6 months

Source: Forrester Research, Inc.

UpToDate: Overview

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

UpToDate® is an evidence-based, physician-authored clinical decision support resource at the point of care. More than 6,300 physician authors, editors, and peer reviewers use a rigorous editorial process to synthesize the most recent medical information into trusted, evidence-based recommendations that are proven to improve patient care and quality. More than 1.1 million clinicians in 180 countries and almost 90% of academic medical centers in the United States rely on UpToDate. Wolters Kluwer guarantees the integrity of recommendations by never accepting funding from pharmaceutical companies, medical device manufacturers, or other commercial entities.

UpToDate includes:

- › Evidence-based medical content that is researched, created, and continually updated by over 6,300 leading physicians.
- › Summaries and treatment recommendations for over 10,500 topics in 24 specialties.
- › “Practice Changing UpDates” highlighting critical research that changes how you treat patients today.
- › “What’s New” summaries of important new findings by specialty.
- › Over 425,000 references, with links to PubMed and the full-text articles where subscriptions permit.
- › Medical calculators.
- › Patient information covering over 1,500 topics.
- › A select drug database of more than 5,600 unique drug entries (in partnership with Lexicomp®), including adult, pediatric, and international drugs and a drug interactions tool that provides graded adverse reaction information between drug-to-drug and drug-to-herb interactions.

UpToDate is part of Wolters Kluwer Health, a global provider of information, business intelligence, and point-of-care solutions for the healthcare industry. Wolters Kluwer Health is part of Wolters Kluwer, a global information services company with 2014 annual revenues of €3.7 billion.

Appendix A: Composite Organization Description

For this TEI study, Forrester has created a composite organization to illustrate the potential quantifiable benefits and costs of introducing and using UpToDate. The composite organization is intended to represent a large hospital based in Brazil.

The hospital has 500 beds and employs 4,000 people, including 800 physicians. It has an annual budget of approximately R\$800 million. The institution counts about 24,000 admissions and 570,000 outpatient visits per year.

In purchasing UpToDate, the hospital had the following objectives:

- › Improve the quality of care.
- › Provide better evidence-based medicine.
- › Create efficiencies.
- › Reduce costs.

FRAMEWORK ASSUMPTIONS

Table 7 provides the model assumptions that Forrester used in this analysis. The discount rate used in the PV and NPV calculations is 10%, and the time horizon used for the financial modeling is three years.²

TABLE 7
Model Assumptions

Ref.	Metric	Value
G1	Total annual budget	R\$800 million
G2	Total number of beds	500
G3	Total number of physicians (part-time)	800
G4	Average fully loaded annual salary (physician)	R\$165,000 (R\$85 per hour)
G5	Average number of admissions per year	24,000
G6	Assumed average number of referrals per year	12,000
G7	Assumed average cost of a referral	R\$700

Source: Forrester Research, Inc.

Appendix B: Total Economic Impact™ Overview

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.

The TEI methodology consists of four components to evaluate investment value: benefits, costs, flexibility, and risks.

BENEFITS

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often, product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place 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. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

COSTS

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the form of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

FLEXIBILITY

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point. However, having the ability to capture that benefit has a PV that can be estimated. The flexibility component of TEI captures that value.

RISKS

Risks measure the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: 1) the likelihood that the cost and benefit estimates will meet the original projections and 2) the likelihood that the estimates will be measured and tracked over time. TEI risk factors are based on a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the risk factor around each cost and benefit.

Appendix C: Glossary

Discount rate: The interest rate used in cash flow analysis to take into account the time value of money. Companies set their own discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their respective organizations to determine the most appropriate discount rate to use in their own environment.

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.

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.

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.

Return on investment (ROI): A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

A NOTE ON CASH FLOW TABLES

The following is a note on the cash flow tables used in this study (see the example table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows (here year 1) are using the discount rate (shown in the Framework Assumptions section) at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations are not calculated until 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.

TABLE [EXAMPLE]					
Example Table					
Ref.	Metric	Calculation	Year 1	Year 2	Year 3

Source: Forrester Research, Inc.

Appendix D: Endnotes

¹ See Appendix A for a description of the composite organization.

² Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult with their respective company's finance department to determine the most appropriate discount rate to use within their own organizations.