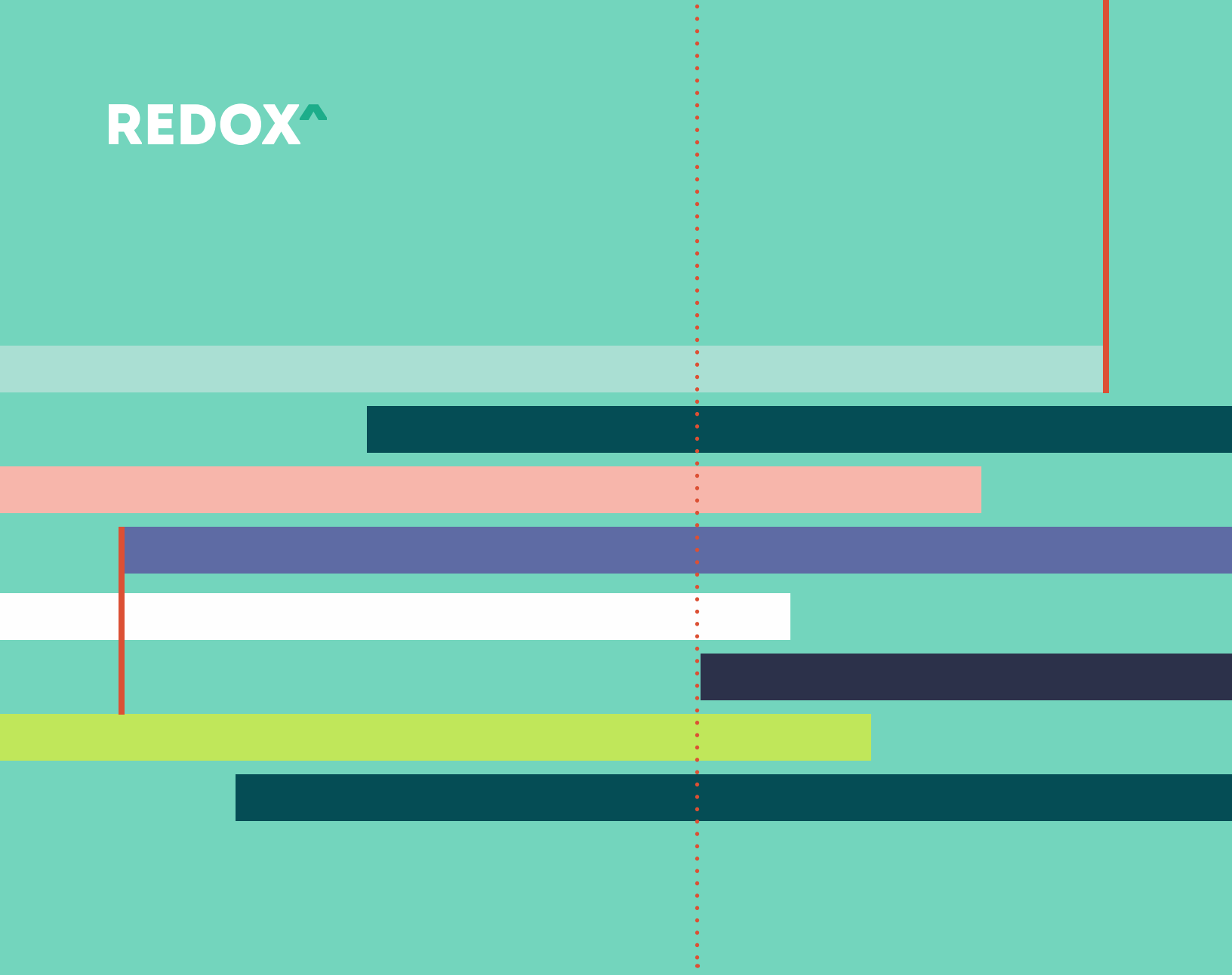
REDOX



How to Assess your EHR Integration Strategy

Understand total cost of ownership and identify areas for optimization.

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EHR integration is fundamental to the delivery of many products and services targeting patients, providers, and administrators. The ability to not only integrate, but to do so in an optimized way, is important because of the impact it has on users and an organization's bottom line.

Users, when discussing healthcare integration, are the patients, providers, administrators, etc. who interact with (and rely on) the tool/software/device/service in question. From the perspective of the user, the goal of integration is fairly straightforward—the tool/software/device/service must work as advertised.

The user does not care about how the solution is integrated. All that matters is that it serves the intended purpose. A user's integration key performance indicators (KPIs) can be summarized as:

- **% Uptime (availability)**
- **Ease of Access (login/authentication process)**
- **Functions as Designed (latency, etc.)**
- **Accuracy (data integrity: right data, right place)**

While users don't care how two systems are integrated, only that they are available, accurate, and function as advertised, your organization should because your integration strategy directly influences not only your ability to deliver on these KPIs, but your bottom line.

In this whitepaper we outline key metrics that can be used to assess the health of your integration strategy. The goal is to introduce a way of thinking that ensures integration is thought of holistically and opportunities for optimization are acted on. The end result should be happy patients, providers, and lower costs for everyone.

Meeting (and Exceeding) User KPIs

Healthcare technology is held to the highest of standards. Due to its use in settings where patients lives may literally be at stake, the acceptable margin for error is razor thin. In order to deliver technology that is an asset, not a burden, it must meet the following criteria.

Uptime (Availability)

The more dependent a caregiver or patient becomes on technology the less tolerant they are to it not being available. The result is that in healthcare, downtimes are essentially unacceptable. Your integration strategy must deliver extremely high level of availability. For reference, Redox's standard SLA is 99.95% which guarantees less than 43 seconds a day of unavailability.

Ease of Access (Login/Authentication Process)

Everyone is drowning in login credentials. Noone wants to create a new username and password to login to an additional tool as part of their normal workflow. An essential component of any integration strategy is the ability to power some form of "single-sign-on" functionality that allows the user to interact with your system with existing credentials.

Functions as Designed (Latency, etc.)

Many healthcare technologies are used at the point of care and depend on real-time requests of information to inform next steps. An integration strategy that takes 5-minutes to return a requested piece of information is worthless if the workflow is user generated. In order to deliver a tool that is valuable to users an integration strategy must be capable of delivering data in near real time.

Accuracy (Data Integrity: Right Data, Right Place)

Finally, but arguably most importantly, your integration strategy must power the accurate exchange of data. Once again, patient safety is at stake. You can't accidentally file medications with the wrong patient or pull up the wrong medical history before a patient is seen by a remote caregiver.

These user KPIs are the absolute essentials to any healthcare integration solution. If you can't meet any of them, you need to find a different solution. After demonstrating an ability to meet user KPIs, it is time to look at opportunities for optimization.

Understanding Costs

Your integration strategy directly impacts your bottom line. In this section we overview the tangible, direct costs as well as the harder to calculate but very real, opportunity costs.

DIRECT COSTS

Direct are the things that show up on your balance sheet. They are fairly easy to understand and calculate but are still important to review. We categorize direct integration costs as follows.

Labor (Initial)

There will be at least the following roles and corresponding labor costs (rate **x** hours):

- **Developer**
- **Project manager**
- **Support* (defined below)**

Labor (Support)

Integrations are basically living things. They require ongoing monitoring, maintenance, and support. The direct labor costs associated with this kind of work can be broken into two categories for assessment.

Support: Expected

Run of the mill maintenance (e.g. accommodating a source system update) that is fairly easy to predict and necessary to ensure uptime and meet SLAs.

Support: Emergency

Response to an error or unexpected issue. This most likely is a premium rate as it could be off-hours support or require highly skilled personnel to triage/resolve.

Licenses (Solution Price)

Licenses refer to all of the software/systems you purchase and leverage to make integration possible. This could be a traditional interface engine you have purchased or a platform you leverage (e.g. Redox). If you directly license interfaces, those should also be calculated here as a direct cost of integration.

Services

Every organization has a limit to what they do internally. As such, almost all organizations pay service fees to a solution provider or consulting company in order to fill gaps/offload work. These vary depending on the integration strategy you choose to employ but need to be accounted for.

EHR Vendor Costs

EHRs have different monetization programs. Some have revenue sharing agreements with integrating third parties. Other charge by volume of calls/data exchanged. Costs will vary by vendor (and won't always be present) but should be defined as direct and accounted for.

OPPORTUNITY COSTS

While difficult to calculate, it is important to address opportunity costs. Let's say your team is wildly competent and capable of building integrations that meet users needs and perform well when it comes to growth rate. At this point, it seems like your integration strategy is totally under control–but at what cost?

If 40% of your development resources are dedicated to integration, even though you are performing highly in that area, at what rate are you optimizing your core product? What new functionality are you making available? Are you continuing to innovate at a rate that will differentiate you from competitors and maintain your position as the preferred solution?

At Redox, we've seen groups come to the conclusion that the opportunity cost of integration, or the company resources required, was prohibitive at different stages.

Our partner Breg found themselves rolling out a new product that required extensive development resources to ensure feedback was incorporated and the new product was a success. Even though they had already successfully integrated with hundreds of partners, they decided it was the right time to bring Redox in to handle integration and free up their team to focus on other tasks.

> "For us to connect to an Epic health system so quickly was amazing. Being able to focus on our product during that time and not worry about handling the integration was crucial to this project's success."
>
> – Shari Matkin, Senior Product Manager

Healthwise began leveraging Redox to power integrations after determining the amount of customization per client required by their traditional integration engine was too high. This was after successfully integrating at scale and meeting the user KPIs mentioned above.

> "The biggest reasons we switched to Redox from Mirth was the ongoing costs of customizing messages for each client. We had to invest in a lot of specialized knowledge and dedicated developers just to handle Mirth. We already do REST APIs so switching to Redox was a win-win."
>
> – Glen Colby, Developer Lead at Healthwise

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Finally, Stryker embarked on a very extensive solution assessment exercise that lead to the creation of the following EHR Integration Key Business Considerations table and Solution Matrix.

Stryker came to the conclusion that that the amount of company resources required over time would be too high if they selected a traditional integration solution. Direct costs certainly factored in but opportunity costs were just as important.

There are many different costs associated with EHR integration. Some are very obvious while others require careful thought and assessment. What's most important is that you understand all of the different costs so that you can assess your integration comprehensively and make decisions that are appropriate for your organization.

Category	Considerations
Upfront Costs	Product/Development, Deployment, Testing
Ongoing Costs	Monitoring, Technical Support, Troubleshooting
Expertise	Data access expertise, Implementation, etc.
Security	Level of risk, Audits, Certifications, etc.
Release Timing	Market launch, Customer Use (Go-Live)
Project Prioritization by Customer	Many IT projects, New interfaces have unknown effort/risk

Consideration	**Open Source Integration Engine** (Mirth, etc.)	**Commercial Integration Engine** (Cloverleaf, CorePoint, eTransX, Iguana, etc.)	**Software as a Service** (Redox)
Solution Price	~$100 per Facility	~$2-5k per Facility	~$4-10k per Facility
Solution Services	Minimal to No Services	Limited (and Expensive) Services	All-in Pricing Including Full Services
Company Resources	Maximum	Significant	Minimal
Total Cost of Ownership	Maximum	Significant	Minimal

How to Assess your Integration Strategy

Calculate Growth Rate

Costs are obviously very important but what is the most valuable resource in the world? Time. Assessing an integration strategy would not be effective if speed or the rate at which you can integrate and grow isn't taken into account. Your growth rate is a function of three things:

- **The time and resources required to integrate with a partner for the first time**
- **The time and resources required to integrate with an existing partner (i.e. integrate a second product line)**
- **The number of concurrent integrations you can execute (MCI)**

The way you choose to integrate directly informs all three. Is your process highly labor intensive increasing the time it takes to integrate? Do you build siloed connections that can't be leverage for delivering future products? Do you have limited resources drastically reducing the number of concurrent integrations you can execute? Understanding and optimizing for these metrics is the only way to ensure your solution reaches maximum distribution.

Calculate Mean Time to Integration (MTTI)

Simply record the number of days from integration project kickoff to go-live for your past five integrations. This will provide you a mean time to integration benchmark you can track over time.

Project	Days to Complete
1	100
2	90
3	110
4	100
5	95
MTTI	99

Calculate Turnkey Score (TKS)

Ideally, after you integrate with a partner once, subsequent integrations would require dramatically fewer resources. You want an integration strategy that makes introducing additional product lines simple. We call this a Turnkey Score and it can be calculated by taking:

$$\frac{\text{\# hours required to execute an initial integration}}{\text{\# hours required to execute a subsequent integration}}$$

TKS	What it Means
<1	Something is very wrong
1–3	Standard
3–5	Very Good
5+	Phenomenal

Calculate Maximum Concurrent Integrations (MCI)

Your growth rate is really a function of three things:

- **The time and resources required to integrate with a partner for the first time**
- **The time and resources required to integrate with an existing partner (i.e. integrate a second product line)**
- **The number of concurrent integrations you can execute (MCI)**

The way you choose to integrate directly informs all three. Is your process highly labor intensive increasing the time it takes to integrate? Do you build siloed connections that can't be leverage for delivering future products? Do you have limited resources drastically reducing the number of concurrent integrations you can execute? Understanding and optimizing for these metrics is the only way to ensure your solution reaches maximum distribution.

To calculate maximum concurrent integrations (MCI) simply calculate how many available labor hours you have per week in critical roles (developer, project manager, etc.). Compare those totals with your baseline requirements per integration and calculate the maximum number of integrations you could execute at one time with your current available resources. In every scenario there will be one labor role that acts as the rate limiting factor and effectively sets your maximum concurrent integrations.

Estimate Total Direct Cost of Integration (TDCI)

When it comes to calculating your total cost of integration you need to start with identifying how many new integrations you plan to execute, a few labor costs, and average hours required by developers, project managers, and support personnel per integration. For the sake of this calculation, we will only consider projects that are anticipated over the next 24 months.

We've actually built a calculator that allows you to compare your current costs with what a Redox powered integration strategy would require. For a free, customized report simply fill out this form and our solutions team will return your results. We will outline your current total cost of integration and compare with those of a Redox powered integration strategy.

This simple exercise can help you predict costs and plan accordingly. It can also reveal whether your cost of integration is too high and if you should start seeking alternative solutions.

redoxengine.com/**calculate**

Assessing Your Assessment

The health of your integration strategy is directly tied to your goals. If you plan on executing 1,000 integration projects in 24 months, reducing MTTI and increasing your MCI score might be your primary area of focus. If you're strapped for cash you may focus totally on your TDCI. What's important is that you identify weak points (i.e. a single labor role that is throttling your growth rate) you can plan to address if needed and benchmarks you can review over time to track progress.

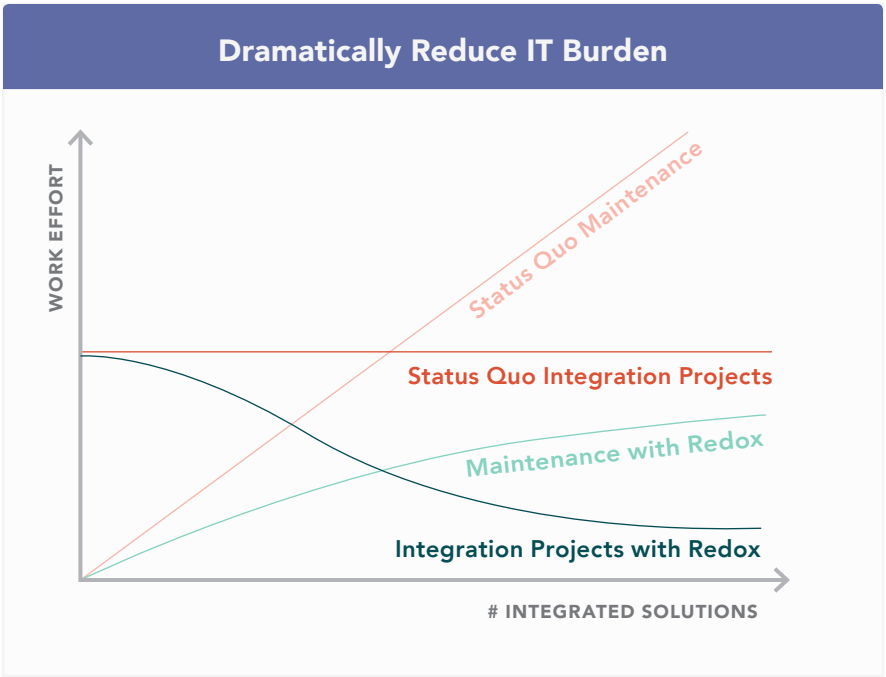
Conclusion

Healthcare integration at scale requires work. Connecting with hundreds, maybe thousands of different systems and executing healthcare specific workflows will require a strong development team in addition to strong subject matter experts.

At Redox, we tend to focus on whether you are achieving benefits of scale or executing a linear integration strategy. In our view, integration should require less resources as you increase volume until finally, executing a new integration is a nearly turnkey process.

Our approach aims to deliver the following:

- **Reduced total cost of integration**
- **Reduced integration time (faster customer go-lives)**
- **Increased maximum concurrent integrations due to decrease in resources required**



We do this by providing a cloud optimized platform capable of delivering integrations as lightly configurable services instead of complex labor intensive projects. Our network design creates an environment where subsequent integrations require minimal additional work and our platform is designed to eliminate much of the customer specific development required by traditional integration methods.

Whether you leverage Redox to power your integration strategy, or some alternative solution, this framework can be leveraged to identify optimization opportunities. We hope it helps!