



# Migration or Modernisation?

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# The Problems

IBM Notes and Domino has had a number of strengths over the years, from its security, in-built mail routing to support workflow, an in-built web server and replication to support distributed and offline working. But Notes and Domino's backwards compatibility has been both a strength and a weakness. It is not uncommon to see applications that have not had active development for more than five years, or even some that have had no change to look and feel for more than ten years. And applications designed ten years ago will look ten years old. Not surprisingly, that is often one of the main criticisms but the cause is most commonly lack of investment. It's no surprise that a survey by Forrester Consulting found that over the next 5 years, 43% think their applications will be decades behind their evolving business processes.<sup>1</sup>

In that time XPages and server enhancements have provided developers with options to address many criticisms of Domino:

- With XPages, data no longer needs to be "copied" across documents in order to be displayed in views. "Joined" views familiar to relational databases can be done in XPages and, if views display a reasonable number of documents, performance is not an issue.
- With XPages databases can be more modular. For a CMS, for example, there's no reason why companies, locations and contacts couldn't be stored in separate databases, if that improves performance.
- XPages allows de-coupling of data access layer from presentation layer. The criticism that Domino forces tightly-coupled business logic and presentation is no longer valid.
- Attachments, full-text indexes, and (in the up-coming release) view indexes can be abstracted from the NSF to reduce database size.
- Full-text indexing and indexing for individual views can be run on separate threads to improve performance.
- Since Domino 8.5.3 standard web applications built on e.g. Vaadin or AngularJS can be deployed as OSGi applications on the Domino server via the Expeditor Web Container. The Expeditor Web Container is automatically installed and already running on any 8.5.3+ server.
- Since Domino 8.5.3 standard REST servlets can be written and deployed on Domino via the Equinox HTTP Service to provide robust REST access to Domino data. This is also automatically installed and requires no additional configuration. Since 9.0 Domino Access Services allow easy-to-configure REST access to Domino data, though this should really just be used for read only access.
- XPages and community enhancements like OpenNTF Domino API provide threaded processing and open the door to sharding of databases for better performance.
- OpenNTF Domino API has added a graph database implementation on top of Domino's traditional NoSQL database architecture.
- Recent community developments have also enabled native API access to Domino data from standard web applications running on IBM Websphere Liberty Profile, a lightweight JavaEE server free for development and limited production environments.

**However, where applications have not had any investment, those opportunities have not been leveraged.**

**Over the next 5 years, 43% think their applications will be decades behind their evolving business processes**

<sup>1</sup> Application Modernization Is King, And Mobile Is The Heir Apparent, <http://www8.hp.com/h20195/v2/getpdf.aspx/4AA4-6878ENW.pdf?ver=1.0>, May 2013

# The Considerations

## Delivery Platform

Over the last ten years, business applications have changed significantly. More and more desktop-based interfaces have been replaced with browser-based interfaces and, more recently, mobile interfaces. Network connectivity has improved, minimising the need for offline replicas of desktop systems. This has fuelled a desire to move away from the rich client Notes platform.

But pre-existing web-based legacy systems may need addressing before any modernisation of other applications. “Nine out of 10 IT decision-makers claim legacy systems are preventing them from harnessing the digital technologies they need to grow and become more efficient”<sup>2</sup>. Older web-based systems that require Internet Explorer and its “compatibility mode” can cause issues trying to modernise applications with any modern web framework, including XPages. Moreover, Internet Explorer does not provide a way to turn off compatibility mode for a specific application within a domain. The document mode can be changed, but this code results in an incomplete simulation of not being in compatibility mode.

As a result, it’s no wonder that Gartner recommended a two-pronged approach<sup>3</sup>, a legacy browser for legacy applications and a modern browser for modern applications. In the future, it will be interesting to see if two prongs are enough, with an increased number of internal and external, custom or off-the-shelf web applications. To ensure the fewest browser platforms required, operating systems and underlying application platforms will need to be upgraded or replaced more aggressively than for non-browser-based applications.

For some applications, a mobile interface may be appropriate. However, in many cases it’s not appropriate to move a whole application to mobile devices or even deploy all functionality to the mobile device. Mobile application access tends to be “to complete a task in as short an amount of time as possible, using the least amount of effort possible”<sup>4</sup>. Consequently such applications need a more streamlined interface and experience than would be found in a desktop experience. So mobile is likely to be an addition rather than a replacement for desktop usage.

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## Framework Options

Many Domino migration projects start with the single goal of migrating all applications from Domino to a different platform. The choice of which platform and technology comes second. That choice can only be one of personal preference, since the variety of web frameworks is too wide for anyone to claim to offer an independent viewpoint. And experts warn that no single tool works for every project.<sup>5</sup>

The argument of moving away from Domino to a modern web development framework is hard to justify, considering that the most common Java-based frameworks are older than XPages and AngularJS, the most common JavaScript framework, is the same age as XPages. The table below shows ages of some of the more popular frameworks. There are many more, particularly JavaScript frameworks which have a regularly-growing number.

<sup>2</sup> Legacy systems holding back 90% of businesses, <http://www.computerweekly.com/news/4500248467/Legacy-systems-holding-back-90-per-cent-of-businesses>, June 2015

<sup>3</sup> A Two-Pronged Approach to Browser Strategies Allows for Legacy and Modern Browser Strategy, <https://www.gartner.com/doc/2678415>, March 2014

<sup>4</sup> Instructional Overlays and Coach marks for Mobile Apps, <http://www.nngroup.com/articles/mobile-instructional-overlay/>, February 2014

<sup>5</sup> Legacy application modernization projects: Proceed with caution, <http://searchcloudapplications.techtarget.com/news/4500247423/Legacy-application-modernization-takes-careful-thought>, June 2015



## Ages of some of the more popular frameworks

Framework	Language Basis	First Release
Vaadin	Java	2002
Spring MVC	Java	2002
JSF	Java	2004
XPAGES	Java	2009
AngularJS	JavaScript	2009
Backbone.js	JavaScript	2010
Ember	JavaScript	2011
React	JavaScript	2013

Future considerations also need to be borne in mind. AngularJS is a popular option, but the upcoming 2.0 release (announced October 2014 <sup>6</sup>, with no official release date as of November 2015, but estimated at mid 2016 <sup>7</sup>) will make migration to the new release difficult. At the ng-conf in 2015 it was confirmed there will be no backwards compatibility, will focus on browsers that automatically update to the latest version (so not Internet Explorer, a common enterprise browser), and will focus on development of mobile applications. <sup>8</sup>

Other lower-level frameworks like Dojo and Bootstrap have had similar complete redevelopments. In 2014 Gartner wrote "50% of an application's cost across its life cycle is support and maintenance" <sup>9</sup>. Considering the significant redevelopments required by such frameworks and lack of backwards compatibility support from both the frameworks and the browsers, that figure is likely to increase.

## Location

As better networks have become more prevalent and companies have sought to cut costs, cloud solutions have become more prevalent. But this is nothing new. Many companies including Intec Systems have provided hosted solutions for customers for many years. What is new is that companies like Google, Microsoft and IBM have fought for the business with IaaS, PaaS and SaaS offerings covering mail, infrastructure and applications. As a result many customers and partners have taken their on premises Domino servers to the cloud on SoftLayer.

But while the cloud is attractive to many, there are still concerns to be addressed. A recent annual report showed 68% of CxOs consider that, as more systems are connected, IT security is a top risk <sup>10</sup>. Yet Forrester Consulting found 67% of respondents thought there was a greater security risk in the cloud. Considering recent high profile data security issues, that's not a surprise. It's worth bearing in mind Domino's rich history of data security and database encryption.

**50% of an application's cost across its life cycle is support and maintenance**

Gartner

## Integration

Whether servers are on premises, in the cloud or both, one of the growing requirements is integration. It is no longer just a question of integrating one internal application with another. More and more cloud-based services like IBM Watson or data and analytics services are part of a total application solution. Forrester Consulting found 66% of respondents were undertaking application modernisation to offer additional services <sup>11</sup>. This is expected to be so pervasive that "by 2018, more than 50% of the cost of implementing 90% of new large systems will be spent on integration" <sup>12</sup>. When considering modernisation or migration, it's important to bear in mind the types of applications or services that need integrating and the costs involved.

For migrations, pre-existing integration should also be a consideration. If integration is removed from scope or cannot be provided by the new system, it can result in duplicated data entry, increased risk of human error, and unfair increased dissatisfaction with other applications.

<sup>6</sup> What's New in AngularJS 2.0, <http://www.sitepoint.com/whats-new-in-angularjs-2/>, March 2015

<sup>7</sup> Is There Any Estimate for Angular JS 2.0 release date, <https://www.quora.com/Is-there-any-estimate-for-Angular-JS-2-0-release-date>, Nov 2015

<sup>8</sup> What's New in AngularJS 2.0, <http://www.sitepoint.com/whats-new-in-angularjs-2/>, March 2015

<sup>9</sup> 5 Alternative Ideas for the Future of Application Management, HCL and Gartner, [www.hcltech.com/sites/default/files/hcl\\_alt\\_asm\\_issue1\\_0.pdf](http://www.hcltech.com/sites/default/files/hcl_alt_asm_issue1_0.pdf), January 2014

<sup>10</sup> IBM Global C-suite Report 2015, <http://www-935.ibm.com/services/c-suite/study/study/>, November 2015

<sup>11</sup> Cost and Agility Drive Firms' Transformation Agenda, <https://na.atos.net/content/dam/na/documents/we-do/Forrester-paper-Cost-Agility.pdf>, November 2013

<sup>12</sup> Gartner Predictions 2013 for Application Integration: My Take,

[http://www.softwarag.com/blog/reality\\_check/index.php/integration-insights/gartner-predictions-2013-for-application-integration-my-take/](http://www.softwarag.com/blog/reality_check/index.php/integration-insights/gartner-predictions-2013-for-application-integration-my-take/), November 2012

68% of CxOs consider that IT security is a top risk

## Data Importance

One of the critical stages of a migration project from Domino is the extraction of metadata, data and files <sup>13</sup>. Bloor Research found only 62% of data migration projects were brought in on time and on budget <sup>14</sup>. The Bloor Research report also advises that a best practice approach will include data profiling and data cleansing, will treat data migration separately from any application modernisation elements of the wider project and with a separate budget. Where testing of data migration was incorporated into the overall system testing only 47% of projects were brought in on time and on budget.

Before committing to a migration, it is critical to identify what data would need migrating. If data needs to be migrated, a proper assessment of the types of data, inter-relationships and security restrictions on the data should be undertaken. Older applications may not be well documented or may have been incrementally extended, making original documentation obsolete. This can complicate assessment of the database and, without careful assessment, could result in migrating unnecessary information or missing some critical data. As a result costs can significantly impact the project and impact return on investment. And when 69% are undertaking application modernisation to be more agile and launch more quickly <sup>15</sup>, it is not a good start to be blighted by delays because of unexpected data migration or data issues prior to go live.

Migrating to off-the-shelf solutions is likely to make data migration more difficult, because there is no opportunity to plan data schemas accordingly. Additional mandatory data is likely to be needed, which may be hard to introduce into pre-existing data.

## Migration or Modernisation?

Gartner have predicted that modernisation and digital transformation projects will “help fuel a 7.5% growth in enterprise application spending” in 2015 <sup>16</sup>. The analyst also predicts that spending will grow by over a third from 2015 to 2019 <sup>17</sup>. Furthermore they say that “by 2016, more than 50% of application modernization efforts will address business demand for enhanced functionality to legacy applications – not cost reduction” <sup>18</sup>.

But it is important to accept there is a difference between modernisation and migration. Gartner analyst Dale Vecchio defined three primary approaches to application modernisation <sup>19</sup>:

- Non-invasive modernisation, exposing an existing application to be consumed in new ways, for example a web front end.
- Invasive modernisation, replacing existing code in one language with another language via a “modernisation tool”.
- Migration, at essence, rip and replace.

Even where modernisation is espoused as the aim of a project, in the same article John Head stated that 80% of legacy application modernisation projects are just migration. Automated migration tools are often advertised, but these tools will focus on mapping old systems to new systems without addressing changes in processes. They may even produce “hybrid” code that makes further modernisation of the solution harder.

**80% of legacy application modernisation projects are just migration**

<sup>13</sup> Migrating from Lotus Domino to modern web solutions, <https://dzone.com/articles/migrating-lotus-domino-modern-0>, July 2014

<sup>14</sup> Data Migration Report – 2011, <http://www.bloorresearch.com/research/Research-Report/data-migration-report-2011/>, August 2011

<sup>15</sup> Cost and Agility Drive Firms’ Transformation Agenda, <https://na.atos.net/content/dam/na/documents/we-do/Forrester-paper-Cost-Agility.pdf>, November 2013

<sup>16</sup> Application modernisation remains a top CIO priority, <http://www.computerweekly.com/news/4500252396/Application-modernisation-remains-a-top-CIO-priority>, August 2015

<sup>17</sup> Gartner Says Modernization and Digital Transformation projects Are Behind Growth in Enterprise Application Software Market, <http://www.gartner.com/newsroom/id/3119717>, August 2015

<sup>18</sup> Alternative Ideas for the Future of Application Management, HCL and Gartner, [www.hcltech.com/sites/default/files/hcl\\_alt\\_asm\\_issue1\\_0.pdf](http://www.hcltech.com/sites/default/files/hcl_alt_asm_issue1_0.pdf), January 2014

<sup>19</sup> Legacy application modernization projects: Proceed with caution, <http://searchcloudapplications.techtarget.com/news/4500247423/Legacy-application-modernization-takes-careful-thought>, June 2015

66% of respondents were undertaking application modernisation to offer additional services

Some projects may choose switching to an off-the-shelf cloud solution. As discussed, this will rarely attempt data migration because of the prohibitive costs. But this is also application migration rather than modernisation and usually requires a change to business processes to fit the application. Furthermore, because the application is off-the-shelf and used by competitors, the solution “may not offer organisations the speed-to-market or flexibility they need to compete in mission-critical domains”.<sup>20</sup>

For true modernisation, whether it's for web or mobile access, Domino is not a prohibitive factor, even if XPages is not the preferred web / mobile framework. A web application built with, for example, AngularJS or Vaadin can run on a Domino server without any additional server configuration. If an alternative web server is preferable, open source projects allow applications to run on Websphere Liberty Profile but still use native Java APIs to connect to Domino. REST access can be added using Domino Access Services or by coding a standard Java REST servlet. This can provide access into databases for external JavaScript web applications or for integration from native mobile applications. Database architecture can retain stability and pre-existing integration functionality will not need re-writing, both of which will reduce the cost and increase the speed to market of the modernisation. If location is an issue, Domino's in-built replication can make moving to the cloud significantly easier.

If migration is the goal and data does not need keeping or migrating, then Domino has nothing more to offer.

But if migration is the goal and migration of data is still required, why not minimise risk and increase the speed to market by taking a phased approach and splitting the database migration and application modernisation phases? Many older Domino applications will have tightly-coupled business logic and interfaces, which means migrating the data first is not an option. So the approach would be to create a non-Domino user interface, at the same time separating the database access layer into self-contained classes. By removing or minimising the changes to database architecture and integration feeds, the pre-development, development and testing phases will be quicker. Without the complexities of data migration and refactored system integration, post go live support will be cheaper. Migration or additional modernisation phases can follow, as required, once the new application has settled down.

## Summary

Many companies have allowed their Domino applications to languish without development for years because “Notes just works”. Application modernisation expenditure for such applications has been negligible and support costs have been low. But during recent times those same applications have come under greater fire as companies have removed in-house expertise, sought to avoid rich client platforms in preference for browser access and been seduced by the popularity of web frameworks.

Yet at a time when data security is an increasing priority for CxOs, when browsers are increasingly draconian on backwards compatibility for web frameworks, when some popular web frameworks require complete application re-development and the focus in the coming years is expected to be enhancing functionality of legacy applications, Domino still has a lot to offer.

So should you migrate or not? If the indexing features and alternatives to NoSQL data storage aren't enough, there is a third way: Migrate the application without migrating the data. This can be done with a standard web application on Domino or another server like IBM Websphere Liberty Profile, a lightweight JavaEE server free for development / testing and free for up to 2Gb memory in production environments. If still required, data can be migrated separately once the web application has stabilised.

<sup>20</sup> Application modernisation: Why businesses need to ditch the 'off-the-shelf' apps, <http://www.information-age.com/technology/applications-and-development/123460465/application-modernisation-why-businesses-need-ditch-shelf-apps>, November 2015

## About The Author?

Paul Withers has been working with IBM Domino since 1998 and has guest-blogged for Vaadin Ltd. He is one of the founding contributors for OpenNTF Domino API, a Java API that extends functionality for IBM Domino. He is also a contributor to CrossWorlds, an open source project for accessing Domino data from standard web applications running on IBM Websphere Liberty Profile. Paul was co-author for XPages Extension Library, published by IBM Press (2011). He has blogged extensively about using Vaadin to access Domino data and surfacing Domino data through custom REST servlets.

## About Intec?

At Intec, we collaborate with our clients, bringing together business insight, significant experience and technology to provide a distinct advantage in today's rapidly changing business environment. Through our integrated approach to problem solving, solution design and execution we help turn our customers strategies into action. With over 25 years experience we can help customers anticipate change and profit from new opportunities.



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