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Building a Better User Experience for the Digital Worker

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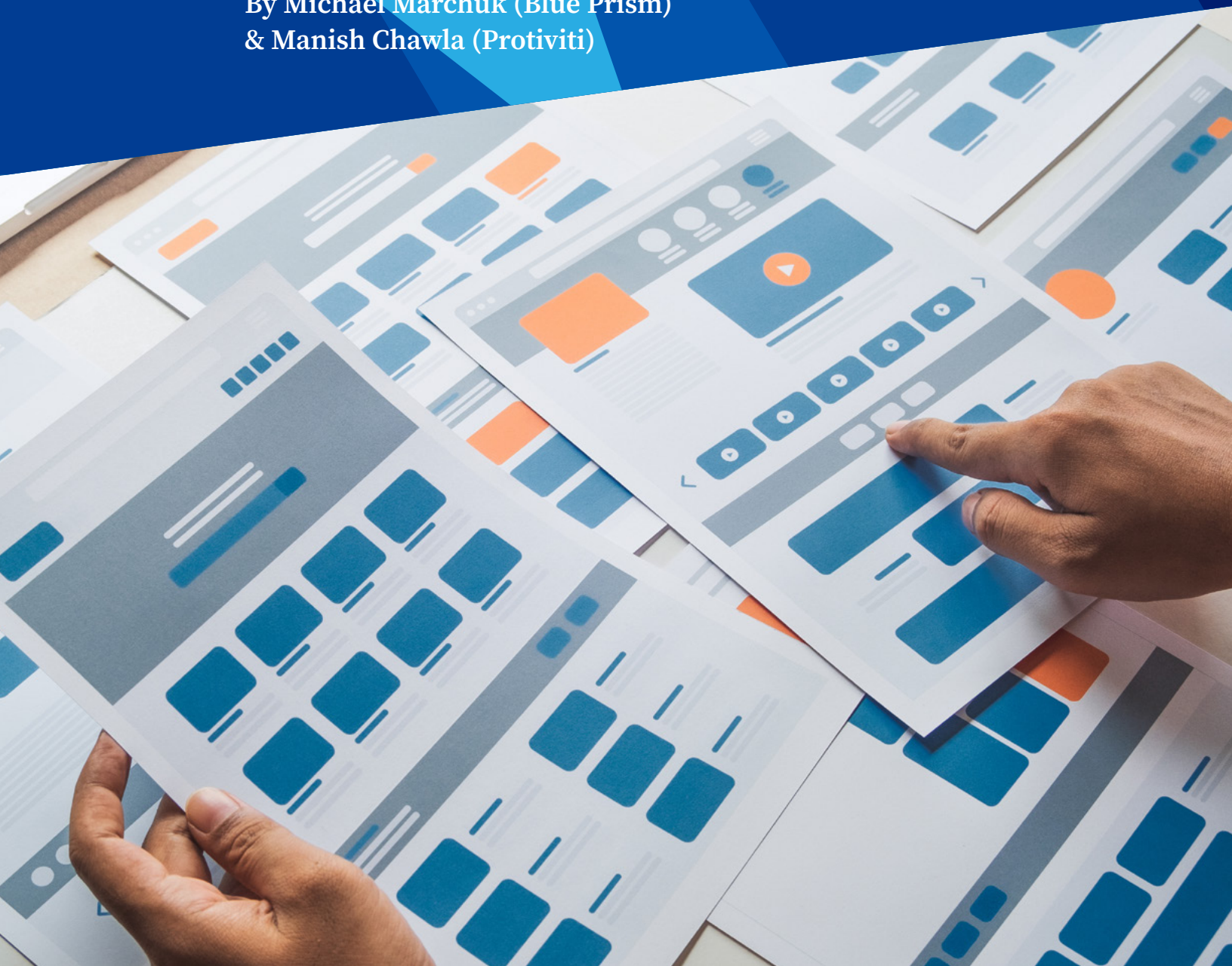


The software landscape has changed.

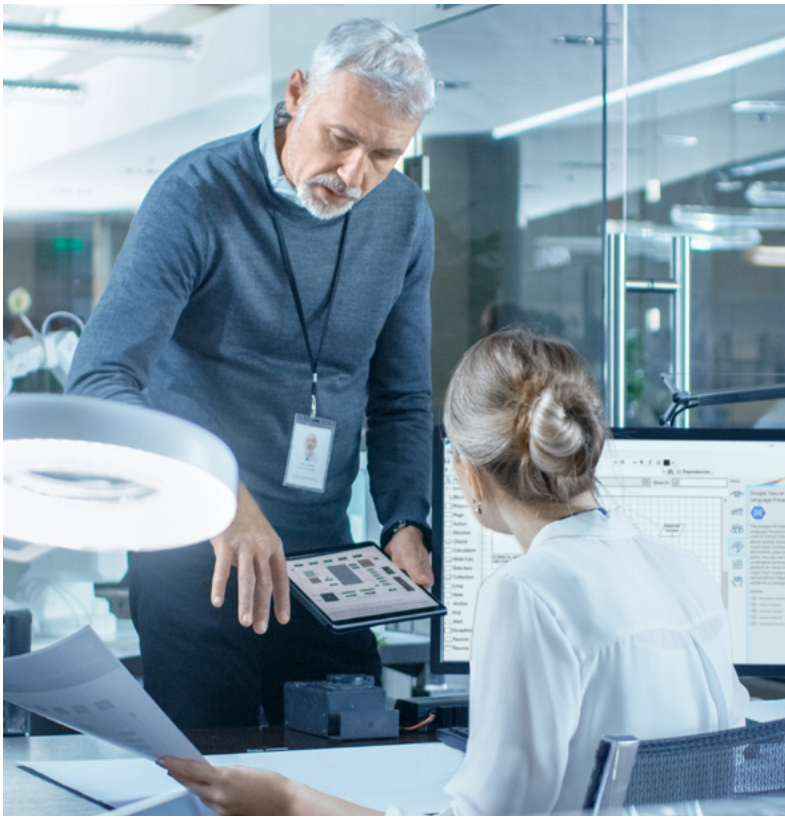
Consumers have broadened their usage from installed applications on desktop operating systems to complex Web-based applications and mobile phone apps. However, with each of these application types, the underlying assumption has been that all users are human. This paper explores the potential for a new automated user base that consumes and engages with software in a different way, by introducing a user interface that is targeted to the new “Digital Worker.”

The Changing Landscape of User Experience (UX)

Software designers have been designing interfaces for humans as the primary user of the software, but as technology has advanced, a new category of worker, the Digital Worker, has emerged.

Application designers have long felt the pain of connecting people with the computer applications that businesses need to operate at large scale. However, these interactions between people and their computers have evolved significantly over time. From hard-wiring to punch cards to green-screen terminals to graphical user interfaces, people fought to interact in more natural ways with their applications.

With each transition, people became more efficient and were able to accomplish more with less time and effort. However, these users were attached to their desks. The gradual transition to a more mobile workforce has led to enhancements in Web-based applications and more recently to applications designed for mobility. Again, people have been afforded increased flexibility and productivity but are still engaged in many activities that require virtual "paper shuffling," as data is moved between applications. Today, productivity for many business users is impacted not just by the individual applications, but by the lack of interaction among various applications within the enterprise. We call this the UX-Gap.



This UX Gap has been discussed as an individual product issue (http://uxmag.com/articles/the-5-ux-gaps-that-can-cripple-your-product) but rarely across the application landscape through which a typical business user must trudge. Depending on the technology debt a company may have, the application estate may include everything from green-screen mainframe applications to mobile apps. This fundamentally impacts and impedes the ability to manage data comprehensively across the enterprise. No matter how ingeniously creative and intuitive any application user's experience is, the reality is that his/her experience across the enterprise will be poor because applications are not designed as part of it.

Managing Data Manually- The Advent of RPA

The UX Gap often leaves employees struggling to forge their own path through the application jungle. These paths typically employ one of the most flexible tools that exists for data management: the spreadsheet. In organizations large and small, the spreadsheet has been leveraged to pull together reports, manage data, and export or import data between applications. However, the flexibility and ease of manipulating data with spreadsheets often masks the missing application capabilities and has firmly embedded the spreadsheet as an inimitable part of the business process.

However, with all the flexibility that spreadsheets offer, they may also enable the introduction of a high margin of human error. In a recent Forbes article, "Why Spreadsheets are Eating Your Business from the Inside Out," Meta Brown reasoned that the biggest issues surrounding the use of spreadsheets are the lack of controls that come with using its free-form power and that most spreadsheet work requires little planning and no quality assurance mechanisms. Unfortunately, spreadsheets introduce more challenges without solving the original problem. Organizations are looking for flexible ways to overcome the inability to complete a process across multiple application systems that were never designed to interact with each other. This is the basis for the development of the Robotic Process Automation (RPA) industry. RPA software allows people to create "Digital Workers" that follow automated processes spanning application systems and are managed easily by the business.

Training Digital Workers

While RPA enables the organization to create Digital Workers, these workers are merely a raw resource. Like all new employees, these workers need to be trained to interact with the applications and understand the processes that they'll be performing. These employees are fast, accurate, and capable of working across the entire estate of applications once they are trained to do so. However, even though Digital Workers offer speed, flexibility, and a near-perfect level of precision and accuracy, they are hindered by the same UX issues that humans face, including inconsistent actions, application navigation issues, and data management.

Scraping Data From the Screen

In earlier iterations of programmatic data gathering, applications known as “screen scrapers” were used to pull data from user interfaces that employees used to interact with the application. Often, these applications were terminal-emulation applications that were using mainframe systems. The text on the screen could be pulled and saved for reporting or other activities that the mainframe application was not designed to do. Programming the screen-scraping activities took quite a bit of effort and was prone to breaking when the mainframe system responses didn’t perfectly match the screen-scraping code.

This approach continues to be refined through various application interpretation engines that Robotic Process Automation (RPA) vendors have designed for their Digital Workers. With RPA, the visual perception and matching algorithms have more sophistication, enabling Digital Workers to find the right data and handle changes in screen positioning much more effectively. Additionally, RPA vendors have built sophisticated application engines to work with many other types of systems that include Java, Windows, Web, and other customized user interfaces. The work done by RPA vendors to support these application frameworks has been impressive, as each of the applications presents another challenge for the Digital Worker to interpret.

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Accessing Systems Using Robots

In order to support data management, humans require an application with visual navigation capabilities. Whether that is on a green-screen terminal or a mobile app, the location of controls and placement of data on the screen must be understood before the application can be used. With an effective UX design, people barely perceive that they are issuing commands and interpreting data. For example, young children can intuitively discover how gesture-based actions control their tablet games. There is little training required to become proficient with the applications in this case. In "poor UX design," users require a manual or "cheat sheet" to support the functions of the application. In either case, manufacturers had to develop tools to support the interaction of the application with its intended audience: people.

With the advent of Digital Workers, there must be a more effective way to access information and complete the processes they've been trained to do. Certainly, one way of doing this is to skip the application altogether and pull data directly from the application's database. The database contains all of the application's raw information, which it stores to manage the specific system for which it was designed. Enterprise resource planning (ERP) databases contain transaction information for invoices, orders, vendors, employees, and inventory. It would seem like an obvious choice to have the Digital Workers dive into this pool of data to get immediate access to the information that is needed.

While it would be expedient to create links to various databases, teaching the Digital Workers how to make sense of the raw data is much more complex. The purpose of the ERP application, in this example, is to support the orderly management of the data through processing rules. Without that overlay, the massive jumble of data inside the database would need to be interpreted through a set of rules. In turn, the Digital Worker would have to learn those rules, while maintaining its role in processing the data.

Teaching a Digital Worker about these rules duplicates what the ERP system is already doing to manage the information, and, the raw data may contain sensitive information that should only be accessed by selected users. Without a user-management system to support this selective access, organizations would risk exposing their data. So, while duplicating the functionality of the ERP rules using Digital Workers is a potential option, there is a much better way to have the ERP system offer data: through the rules it already has in place to provide other systems with a way to communicate. This communication method is the application programming interface (API). The University of California at Berkley describes the reasons for using APIs as the ability to access clean, timely and correct data that is securely managed from the authoritative source of that data.

Application Programming Interfaces (API)

This concept of having applications "communicate" with each other has been around for more than 50 years as documented in the 1968 article by Ira W. Cotton and Frank S. Greatorex, Jr., "Data structures and techniques for remote computer graphics." However, the method these applications use requires some deep technical knowledge of both the application supplying the data & the application using it.

Programmers have long referenced API documentation that provides exposure to functions and data manipulation contained within the software. These API functions are generally accessed using secure, network-based communications and industry protocols like Simple Object Access Protocol (SOAP) and Representational State Transfer (REST), allowing the calling application to connect more easily. In fact, many dedicated applications have been built as connectors between systems for particular functions. For example, Blackline has created software that supports the interconnection of finance and accounting systems, making it easier to manage the transactions and reconcile activities. These types of focused connection applications provide value, but also illustrate the large gaps that most larger organizations experience working within a jungle of disparate systems.

With the potential that APIs provide, is there a way for Digital Workers to support this form of system communication? Certainly, Digital Workers can access APIs and make use of these interfaces to interact with applications, but both the documentation and practical implementation of the APIs require a significant amount of programming knowledge. This, alone, makes training Digital Workers to automate the interactions with these systems much less accessible to business users.

In addition to the challenges that typical business users have with understanding how to implement APIs when automating their work, there may also be additional complications with securing access to the applications offering the APIs. Most people understand that applications use credentials to secure access to various parts of an application and the data contained within. This gives certain users access to read data, while others can modify or add new data. Having this granular control protects the data from prying eyes or inadvertent modification or deletion.

However, when you give programmatic access to an API, the same concepts of granular access may be implemented, but in a different way. For example, rather than a simple username and password combination that unlocks access to the system, there may be additional encryption certificates and other controls that provide safeguards to the data. Such safeguards are required, as it is much easier to make larger, more rapid changes to an application's data using an API than it is to navigate the application's user interface. Security protections generally trump ease of access, especially when it comes to the potential for programs to make significant and rapid changes using automation. Programmers generally require multiple people to check their work as they test code on non-production data before moving a program into production. Empowering average business users to create highly automated workstreams must also engage the same type of controls and governance to ensure the data is protected from the novice users' unintentional mistakes or the nefarious employees' intentional sabotage.

The Future of Software UX

Designing the software UX of the future must include both the user interface (UI) as well as the simplicity of navigating that interface. A simple user interface may be immediately intuitive, such as the touchscreen on a tablet used to flip a page in an online magazine. However, that simplicity could still be confounded by an application where hundreds of finger swipes are required to consume content. This scenario would define a poor user experience even with a simple user interface.

But UX also must address the capabilities of the people using the application. Many countries around the globe have introduced laws to support visually impaired users of computer systems. Operating systems have gone to great lengths to include optional navigational tools to help these users interact more effectively with their applications and satisfy the legal requirements for accessibility. However, application designers still struggle with managing less apparent sight deficiencies related to dyslexia, by selecting artistic fonts that make it challenging to read; or color-blindness, by selecting shades of red or green that make it difficult to distinguish between particular portions of the application. These UX miscues are certainly not intentional but reflect the disconnect between application interface designers and their end-users.

Digital Workers approach information in a more comprehensive way. Not only are these workers uninhibited by vast quantities of data or a spartan interface, they can navigate and manage the interactions with the application more quickly. Additionally, Digital Workers can be trained and can interact in a more fluid way with a simple, yet comprehensive user interface. Rather than requiring complex, and sometimes confusing, navigation to access application functions or data, the Digital Worker can be exposed to much broader contexts that allow single-click access to any function.

A recent Interaction Design Foundation article titled, "Simplicity in Design: 4 Ways to Achieve Simplicity in Your Designs," highlighted how Google and Apple are designed with simplicity in mind and how many companies struggle with the concept of "simplicity." With the evolution of "bots," software end-users are evolving from human to Digital Workers. Some of the best practices for software UX must be updated to capture this transition. Digital Workers don't require lots of graphic design to grab their attention or information to be broken down in multiple screens to avoid having to scroll down. On the contrary, the best systems for Digital Workers would be devoid of graphics, and all the information could be presented on one screen. This would not only benefit the training of the Digital Workers, who could now find information more quickly, but would reduce the bandwidth required to transfer that information so that data can be transferred more quickly. This could mean tailoring the interface for the Digital Workers so that it looks more like a Unix-based system rather than Apple iOS.

Industry Changes

With RPA expected to be a US$12B industry by 2023, according to a recent Forrester report, enterprise software companies will be hard-pressed to come up with ways to integrate RPA capabilities and reduce support costs. By designing a user interface specifically for Digital Workers, software companies could provide a way to accelerate efficiencies. Enterprise software maker, Oracle, announced that it is developing integrated automation capabilities into a cloud-based offering that permits its customers to create "process applications" that are very similar to RPA processes. This partnership is a very strategic initiative, as Oracle can now offer its financial and healthcare customers innovative solutions to their complex business problems.

This symbiotic relationship will drive enterprise software manufacturers to think about how their platform is being used by both human and Digital Workers, leading them to offer out-of-the-box capabilities, not only to provide an intuitive graphical user interface for humans, but also to notify the RPA operations team when changes in one system will impact the Digital Worker. These enhancements will, in turn, help reduce the maintenance or operational costs associated with an RPA platform and provide organizations with a faster return on investment.

Remote Workers and RPA

One of the major challenges with RPA is the technical capabilities required to identify applications and automate processes over Citrix or Virtual desktop. This type of implementation has been popular with organizations that had previously outsourced labor in far-away locations where certain applications were difficult to use or support. In order to overcome the application latency issues, enterprises created a Citrix "farm" of virtual desktop machines. With early versions of RPA, users would have to search for anchor images or text to automate a process in a virtualized environment. The software companies who built these early automations would tell you this method was not stable and was susceptible to application changes (however small they might have been). In the last year or so, RPA has evolved to include a solution that leverages Machine Learning to identify data from the Citrix session. This is a good workaround but still is not as stable or efficient as building automation when screen virtualization is not involved.

If Citrix, VMware, or other software vendors were to build an API or screen interface specifically for Digital Workers that would permit them to interact with the application within the virtualized session the same way as if the application were running locally, this would enable the enterprise to deploy Digital Workers on applications hosted by third parties, opening a whole new set of automation opportunities. This new API or screen interface also would be optimized for Digital Workers that engage over the high-latency virtualized screens that so many firms use. Think of it as a "mobile version of Google Chrome/Firefox" but for Digital Workers.

Conclusion

As companies transition into the digital age, this opens the opportunity to reevaluate both their processes and the aging systems that are in place today. By reviewing how these systems and processes interact, it will become clear that most are not designed for the digital era, much in the same way that a hand-cranked window opener doesn't fit inside an intelligent or driverless car. Companies who understand this will achieve the best results from Digital Workers.

As software providers gain understanding about this new Digital Workforce, the software interfaces will become more suited to both human and Digital Workers. This transition will accelerate the automation capabilities within organizations who will be looking for every opportunity to reduce business friction and enhance customer experiences.

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About Blue Prism

As the Robotic Process Automation (RPA) pioneer, Blue Prism is the trusted, secure Intelligent Automation choice for the Fortune 500 and public sector. Today, Blue Prism's connected-RPA joins operational leaders with accessible, advanced cognitive technologies and a community of experts to bridge the gap between human and Digital Workers, while strengthening the capabilities of the 21st century workforce.

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