

Connecting People with Office Machines

WHITE PAPER

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In spite of efforts by manufacturers, many users of office machines and workflows still find it extremely hard to utilise features that are intended to *help* them in their daily tasks. The reasons for this are complex but based on the recognition of the fact that we are all different. We perceive problems and processes differently. We have different physical and cognitive abilities, different social and cultural backgrounds and, at the simplest level, we just like to do things in our own way.

Traditionally, machine manufacturers have chosen to follow the paradigm of building user interaction into the device itself in the form of control panels. Apart from resulting in some disappointing user interfaces, this is fundamentally flawed since the design is targeted at the imaginary 'average user' and therefore fails at any other point in the spectrum.

The world is changing rapidly. There are too many predictions of where we will be in a few years time to repeat them all here. Suffice to say that there are problems looming in the office marketplace as increasing numbers of (less skilled?) users need to utilise more complex functionality. The accompanying evolution of readily available technologies balances this if applied intelligently. It can be utilised to change the way we work with machines and thus 'make the complex simple'.

Machine UI design has traditionally targeted the imaginary average user, this is fundamentally flawed.

Why don't machines deliver?

-  Users have different abilities: physical, cognitive, cultural, etc.
-  The available functionality is inherently complex and getting more complex. It often involves chained jobs involving multiple devices.
-  Generally unsuitable for disabled use
-  Limited by their physicality
-  One size fits all

These points exemplify the basic problems with man-machine interfaces in this environment. The machine cannot identify and understand the user's requirements and therefore cannot interact appropriately. Machines offer functionality. They should not necessarily dictate the usage model also.

Machines offer functionality they should not dictate its usage model also.

Delivering functionality to the user

Any system that seeks to ease these problems must attack the core issue i.e. that a User Interface (UI) is about the user and that machine functionality is about the machine. Until now it has not been particularly practical to present the UI to the user anywhere other than on the device it



A UI is all about the user and machine functionality is all about the machine

One should aspire to bring user interfaces closer to the user

controls. Ubiquitous networking and the ready availability of personal devices now provide the basic technology to allow this.

The aspirations should be: to bring user interfaces *closer* to the user; to create a platform on which a range of Business Solutions and User Experiences can be built; to use open web standards as the means to access that functionality. Additionally, it is important to foster an ease-of-use philosophy, ensuring product functionality is accessible to everyone.

Platform Concept

Once the logic of separating UIs and machines is accepted, it is not difficult to see how to accomplish it in the modern world. Many technologies exist that could achieve this separation. We have made specific choices, the reasons for which are detailed below.

Broadly the concept is that machines require a method to expose their functionality in such a way that User Interfaces, or other machines, can access it.

Machines need a method to expose their functionality in such a way that User Interfaces can access it

There may be a tendency to imagine a PC with a web browser, with the poor user experience this implies, on one side of the planet controlling a machine on the other. While this is easily possible, and undoubtedly ‘cool’, the question would be ‘why?’

In reality it is important for people interacting with the machine to feel connected with it and to take temporary ownership of it. Typically they would achieve this merely by standing in front of it while controlling it from their device. This is quite natural and it is often necessary in any case to insert an original document. So while the UI is technically remote, it is often physically adjacent. This removes the disconnected feeling that is imagined by people who have not used the solution.

History & Intentions

To describe the platform intentions, it seems sensible to explain some of the rationale behind the choices made. As a starting point our design team had to make practical decisions in order to ground these ideals in the real world and to offer some solutions that fulfilled concrete needs. Our background in accessibility, ease-of-use and Multi-Functional Devices MFDs provided some obvious avenues. Also we felt it important to create enabling technologies that would encourage solution developers to utilise them, either to simplify or refine their offerings or to evolve entirely new solutions.

We believe modern, intelligent design can be about working with partners and pre-existing technologies and not necessarily about creating the complete solution yourself.

Machines

While we were looking at various MFD embedded environments, a moment of kismet occurred. Ricoh, our long-term partner, released its own embedded Java SDK called ESA. ESA allowed us to create the architecture for the Machine Interface (MI) on Ricoh MFDs. We used our understanding



of MFDs to abstract their functionality and allow control and monitoring of the device over the network through open standards. Machines of the same genre are effectively made to *look* the same. The scanning functionality of two different MFDs is made to operate the same way as far as the user is concerned to avoid confusion.

Machine Interface in one sense is a misnomer as it applies to any system (mechanical or otherwise) that would benefit from exposing its functionality via a network e.g. a document management system, a cost recovery system, etc. Any networked device enhanced with our platform code can be interacted with.

Connectivity

Networks, it appears, are here to stay. Ubiquitous? No, not yet, but in our target environments they are quite common or can easily be provided. However we fully expect the various technologies to rationalise out to commodity status in the near future.


While it would have been possible to create a proprietary protocol over any network we chose to use HTTP, a high level protocol. Nevertheless, we needed to keep it simple so that basic embedded devices could interact with the system as well as feature-rich ones. HTTP is a stateless protocol and is traditionally bad at providing an underlying transport for dynamic information. It was one of the design challenges to allow the platform to notify the client of information changing in real-time.

We have also made allowances to evolve to a web services model where appropriate.

User Interfaces

At present there are two UI templates, both of which are customisable using standard tools. Both UIs can combine functionality from different sources allowing, for instance, a cost recovery system to manifest a user's balance contemporaneously on the same screen that controls the MFD.

MyUI is a dynamic UI presented in a browser on any connected device

MyUI  MyUI is a personal (or shared) UI viewed in the web browser of connected devices such as Smartphones, PDAs and PCs. It employs state-of-the-art web technologies like AJAX and content streaming to provide a dynamic, responsive remote UI. It simplifies the operation of the MFD by providing quick and easy access to functionality via a "Get From/Send To" concept.

MyUI is completely customisable and, in fact, is only one example of a browser based UI. Anyone with modern web design skills could easily modify the UI for their environment. MyUI's big advantage is that once the MFD functionality is available on the host device, we are able to leverage the facilities of that device e.g. accessibility via screen readers, zooming, colours, etc.



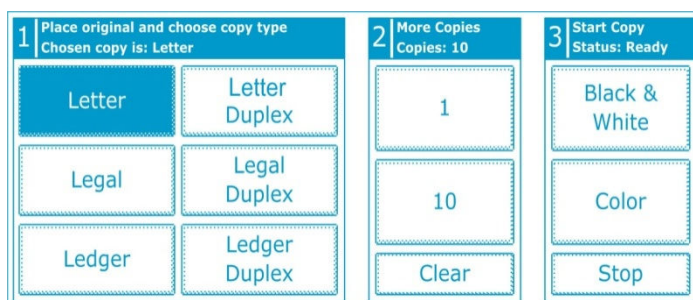


All contribute to hone the user experience.

OurUI, on the other hand, recognises that some interaction is shared or common so a customizable application, hosted in the MFD control panel,

has been developed. OurUI is customisable in terms of layout, looks (this includes higher resolution and colour on newer MFDs), functionality controlled and information sources monitored.

Our UI is a shared UI in the screen of an MFD



OurUI interacts with the MFD via the same HTTP mechanism as MyUI, even though it is physically within the same host. Example usage would be Public Access or Departmental specific use (warehouse may need to scan delivery notes to a folder).

Evolution

With the basic building blocks in place, we are actively working with partners to allow them easy access to the MFD and, optionally, the ability to utilise our UIs as an easy method to manifest information from their systems. It is our hope that in building and evolving this framework we can encourage others to add value at both poles of the platform, to enable more Machine Interfaces and to create new User Interface paradigms.

Having taken care of machine interaction with the MI and user interaction inside and outside of the machine, the next steps include user identification and authentication services. Once a system is in place that connects (an identified, specific) person to machines and other backend services, it can be used to deliver tailored content and services to the user. Importantly, this would be targeted, specific and desirable for them.

Natural Technology Benefits

Another goal is to ride on the back of technology advancements, examples of which would be:

- ✚ Choosing HTTP over agnostic IP networks should ensure the platform is future-proof. The move to IPV6 should make all devices uniquely and directly addressable which would only benefit our platform.
- ✚ Selecting HTML and JavaScript hosted in a browser also helps, even though this was a far harder way to create a dynamic UI than a proprietary interface would have been.
- ✚ In the future, the platform will benefit from the evolution of the cell phone as a viable “personal” platform for a new generation.
- ✚ The advent of currently nascent technologies such as Near Field Communication will enhance the user-to-machine process reducing it to merely gesturing a phone toward the MFD. Via our platform,



NFC, with its similarity to Mifare, offers a transparent user identifier, enabling payment and helping solve the Digital Rights issues that will be a problem in the near term.

Possible Product Concepts

- ✚ MIs can “talk” to each other not just with UIs. A billing unit might monitor the MFD to obtain status information for costing purposes. This would provide much more granular information than is currently available through hard wiring to the machine and would save the cost of the cable and its installation.
- ✚ One intention is to create a natural language “conversational” voice interface to the MFD. It is intended that a bi-directional speech interface will use a speech server to translate a user’s spoken requests into MFD commands sent via the platform. The Module would be operated via a handset or microphone/speaker attached to the MFD or, alternatively, a mobile phone or VoIP phone could be used.
- ✚ A back-end Cost Recovery system might be integrated into the job process such that the user would perceive operating the MFD and billing information as one seamless process.
- ✚ Proactive monitoring: tracking usage of multiple MFDs in real time is easily possible.
- ✚ An experienced user could easily help another when working collaboratively.
- ✚ The platform could easily be used to add scanned documents to a document management system. An interface could be built that would simplify the MFD’s scan-to-folder feature, enhancing it by adding document metadata as part of the scanning process. This process could be further improved by optionally viewing the document on the mobile device either before or after its acceptance by the document management system. Seeing the document on the screen of the device and entering information about it makes this a far more intuitive process.

The selectec Advantage

Recognising that we are all different, and that a new way to interact with machines needs to be found, is a simple but important conceptual shift. Once made, a world of new flexibility and possibilities is unveiled.

The technology is available today to make a fresh start, removing long-standing inequalities, empowering people to just do things their our own way.

