MAKING TECHNOLOGY DISAPPEAR

BUILDING OMNI-CHANNEL SYSTEMS FOR CAPITAL MARKETS

/ A WHITE PAPER BY GRAHAM ODDS, HEAD OF UX DESIGN
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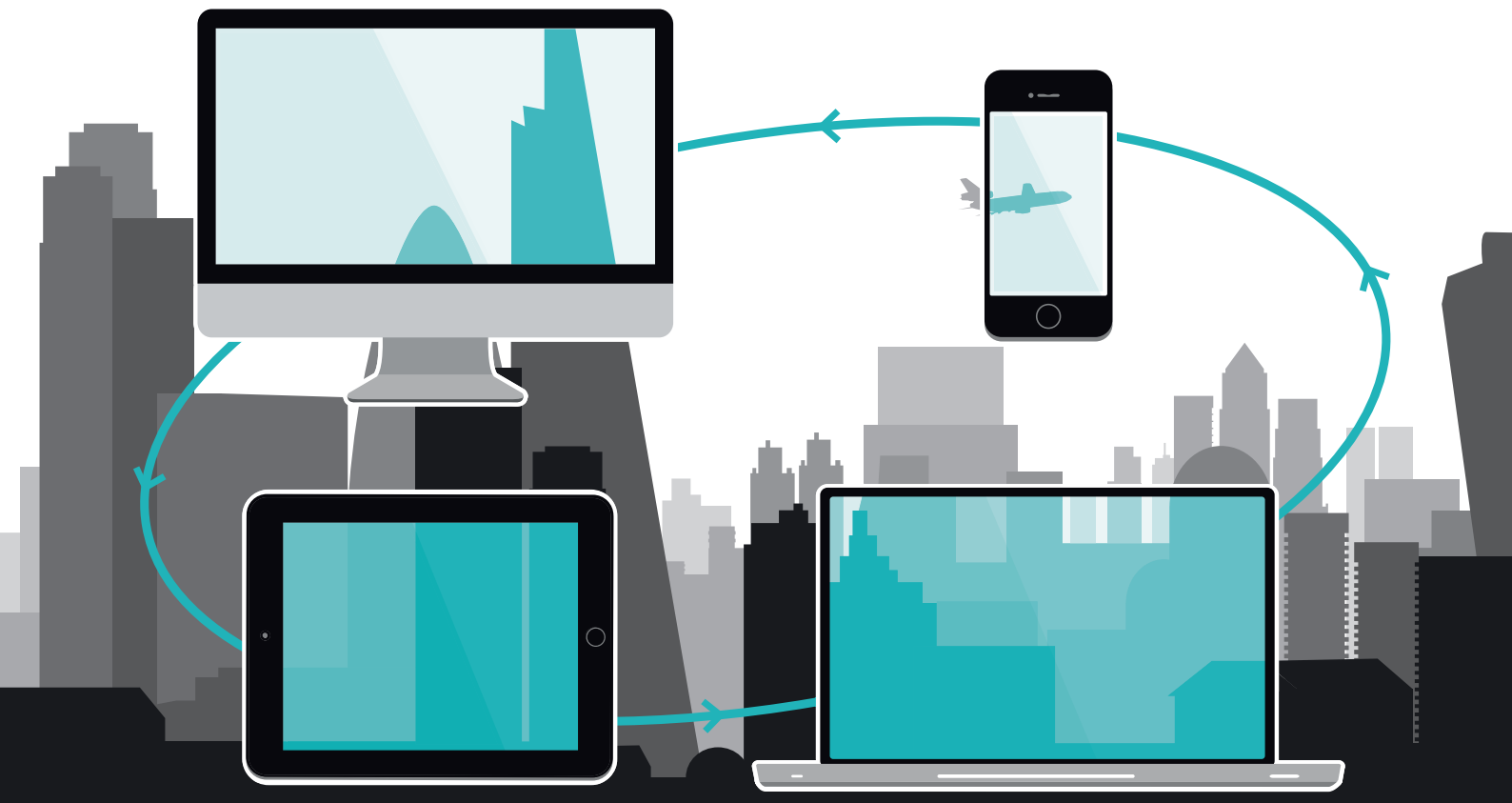

SCOTT LOGIC
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/ EXECUTIVE SUMMARY

The rapid pace of smartphone adoption is revolutionising the way in which businesses operate. Customers increasingly expect an omni-channel system, where they can use a wide range of channels (web, smartphone, tablet) as part of a seamless experience. Companies within capital markets are just waking up to the realities of this new world, and those that currently provide mobile solutions often do so in a fragmented manner.

The current gap between customer expectations and business capabilities presents a competitive opportunity for companies that can provide an omni-channel experience: one that allows people to use systems more effectively and thereby meets and exceeds their expectations.

We believe that now is the time to halt the technology chase, where every feature is delivered on every new device and platform. Now is the time to step back and consider the user experience as a whole. Now is the time for technology to disappear.

In this white paper, we recommend an approach driven by *contexts:* the tasks users want to carry out, and the situations in which they want to carry them out. We show how an understanding of contexts can be used to design a unified customer experience across multiple channels, and outline a technical strategy that supports an omni-channel experience, can adapt rapidly to changes in technology and business requirements, and reduces development costs.

> **"WE BELIEVE TECHNOLOGY IS AT ITS VERY BEST WHEN IT'S INVISIBLE. WHEN YOU'RE CONSCIOUS ONLY OF WHAT YOU'RE DOING, NOT THE DEVICE YOU'RE DOING IT WITH..."**[1]
> - APPLE

''It is critical that we put the interests of our clients first and allow them to choose how they digitally interact with RBS. The interaction should be as technically frictionless as possible so that our clients can perform the tasks that they need to, and want to, without technology getting in the way''
- Nick Barker, Head of Electronic Distribution Products, CIB at RBS

[1] https://robert.accettura.com/blog/2012/05/30/technology-is-at-its-very-best-when-its-invisible/

/ GLOSSARY

Form Factor
the physical size, shape and input/output mechanisms of a device

Device
a computer which has a certain form factor, e.g. mobile, desktop and tablet

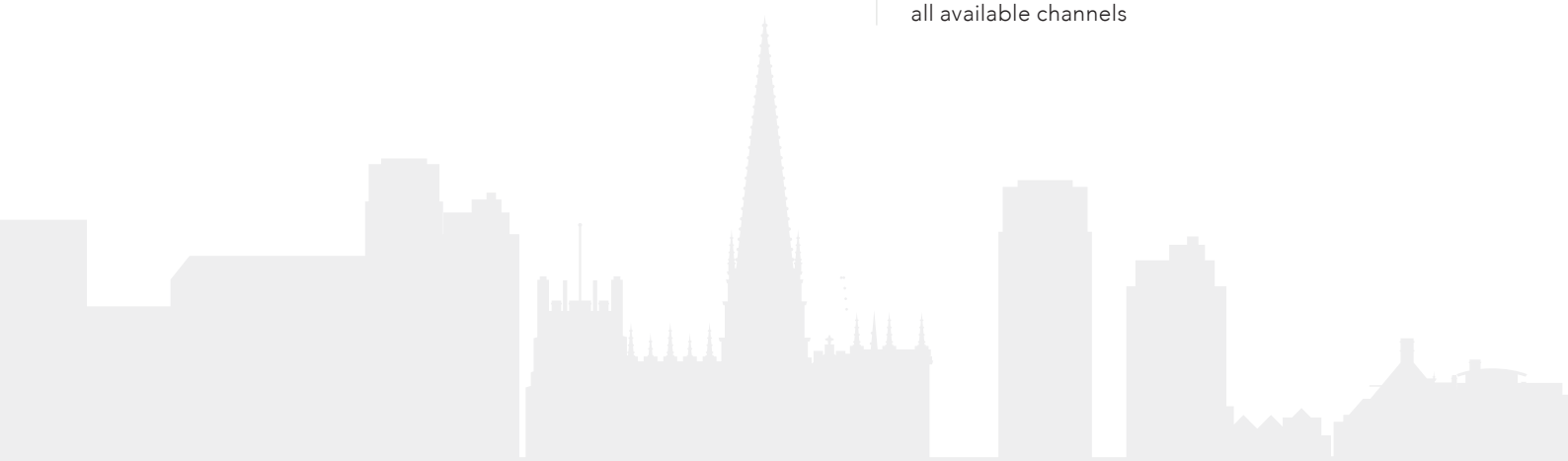
Platform
an operating system or runtime environment, e.g. Android and iOS

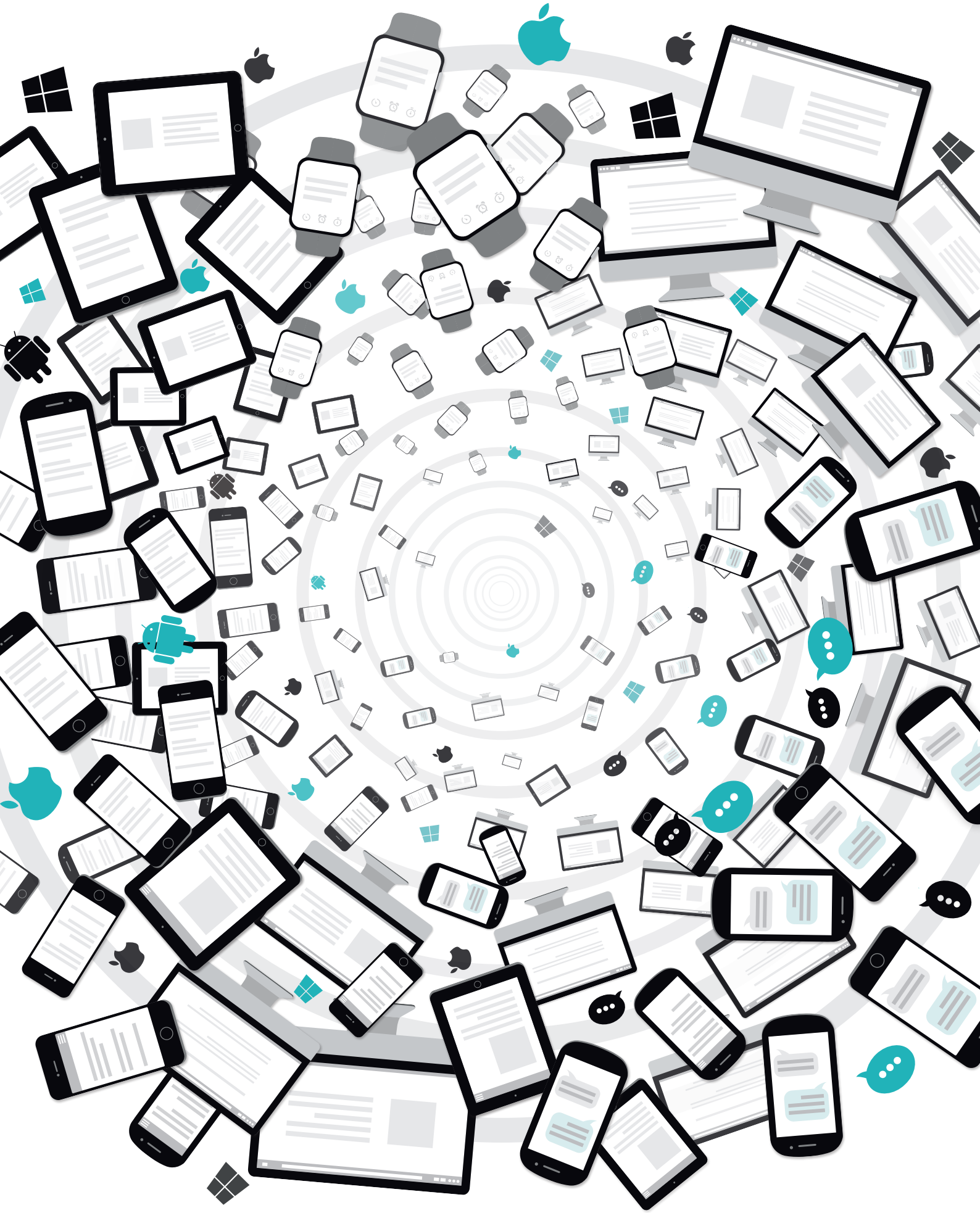
Channel
a communication channel between a client and a business

Multi-Channel
a system which is available on multiple channels

Cross-Channel
a system where interactions can move between multiple channels

Omni-Channel
a system with a seamless experience across all available channels





THE JOURNEY TO OMNI-CHANNEL SYSTEMS

MULTI-CHANNEL, CROSS-CHANNEL, OMNI-CHANNEL: ALL MODERN TERMS THAT ARE USED TO DESCRIBE THE EVOLVING WAY IN WHICH USERS ACCESS SYSTEMS. WITH THE ADVENT OF SMARTPHONES AND TABLETS, COMPANIES ADOPTED A MULTI-CHANNEL STRATEGY WHERE CUSTOMERS COULD ACCESS THE SAME SYSTEM ON A RANGE OF DEVICES AND PLATFORMS. CROSS-CHANNEL SYSTEMS REPRESENTED AN EVOLUTION OF THIS APPROACH, ALLOWING CUSTOMERS TO ENGAGE IN INTERACTIONS THAT MOVED BETWEEN CHANNELS.

Customers now increasingly expect all the channels available to them to act as one seamless service: an omni-channel experience. Within capital markets, however, companies are still battling with the technical complexities of delivering systems across multiple channels, let alone providing an omni-channel experience.

We believe that leapfrogging the multi- and cross-channel evolutionary steps is straightforward because, with careful design and technology choices, an omni-channel system is the easiest to implement. Before diving in to the design of an omni-channel system, we will first look at why the capital markets sector is still struggling with multi-channel systems.

customers have an expectation of a seamless, omni-channel experience

/ PLATFORM PANIC

From a technology perspective, the past decade has been a frenzy. The rapid adoption of smartphones and tablets has resulted in many capital markets businesses reacting rather than strategising. This has resulted in a permanent state of catch-up, with new platforms tackled with an approach somewhat akin to a game of Whac-A-Mole: each platform being dealt with as and when it pops up.

The proliferation of platforms and devices poses a significant challenge for any IT department. Delivering a full suite of services on each device, each requiring different technologies, often results in duplicated business logic and variations in service quality. The complex idiosyncrasies of business logic in capital markets systems compound these issues further. As a result, the cost of development and support means it is no longer practical to deliver the full breadth of business services on each and every device.

The only way to tackle this 'platform explosion' is to move away from considering each platform in isolation, and away from the mindset that all your systems must be available on each and every device. Furthermore, each platform has its own unique capabilities and features that should be exploited and combined.

A more strategic approach to multi-channel delivery requires a more considered approach to design, and ultimately a vision.

STARTING THE JOURNEY

WHILE MANY CAPITAL MARKETS SYSTEMS ARE NOW AVAILABLE ON SMARTPHONES AND THE WEB, AND ARE GENERALLY JOINED UP TO SOME DEGREE, MOST BUSINESSES MISS THE OPPORTUNITY TO CREATE THE GENUINE SINGLE EXPERIENCE THAT DEFINES A TRUE OMNI-CHANNEL SYSTEM.

Your users' understanding of markets and market behaviour should not be encumbered by technology. Removing barriers between intention and action gives people the freedom to act spontaneously; it allows them to work more efficiently by creating 'found time', for example additional potential opportunities for insight or trade execution and management.

remove barriers between intention and action to give people freedom

/ NOT EVERYTHING EVERYWHERE

The first step towards creating a single experience is to stop providing 'everything' via every channel. For example, does it make sense to include all the administrative background tasks associated with order management or reporting on a smartphone? A more strategic approach is required: rather than thinking in terms of target devices, platforms and technology, as Google puts it:

> **"FOCUS ON THE USER AND ALL ELSE WILL FOLLOW"**[2]

The most effective way to instil a user-centric mindset within a team developing a system is to establish *personas*: fictional characters representing aspects of users that lead to different collections of behaviours. These archetypes facilitate communication and decision-making by acting as a common reference point.

Personas should capture details of typical users such as goals, personality characteristics, and when and how your system may fit into their lives. Contrast, for example, an older retail investor interested in establishing a portfolio for pension planning, and an IT-savvy, junior commodity trader focused on speculative activities throughout the day.

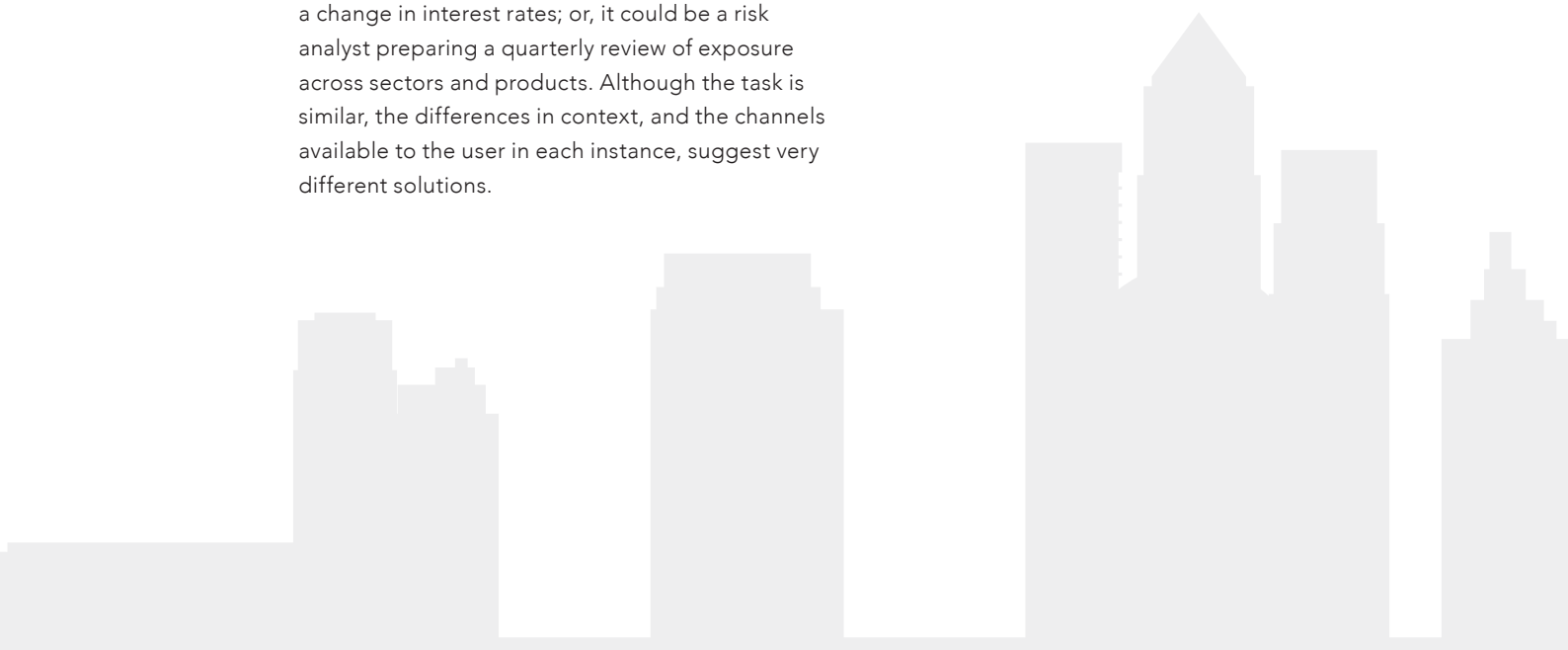
[2] http://www.google.com/about/company/philosophy/

/ FROM CHANNELS TO CONTEXTS

After gaining an understanding of your users by defining personas, you should then consider the contexts in which the system will be used, rather than the channels on which it should be available. The design of the system should centre on the situations that users are in and the tasks they carry out in those situations. As with television, not every channel is for everyone at all times. Contexts provide a clear framework for identifying which channels are available to the user, what functionality should be available, and what form that functionality should take.

A focus on contexts can reveal that what might superficially be considered the same task may involve significantly different workflows when performed in different contexts. Take, for example, the following task: "I want to check my position". The context could be a trader checking their portfolio on the way to work; it could be a fund manager reviewing their asset allocation following a change in interest rates; or, it could be a risk analyst preparing a quarterly review of exposure across sectors and products. Although the task is similar, the differences in context, and the channels available to the user in each instance, suggest very different solutions.

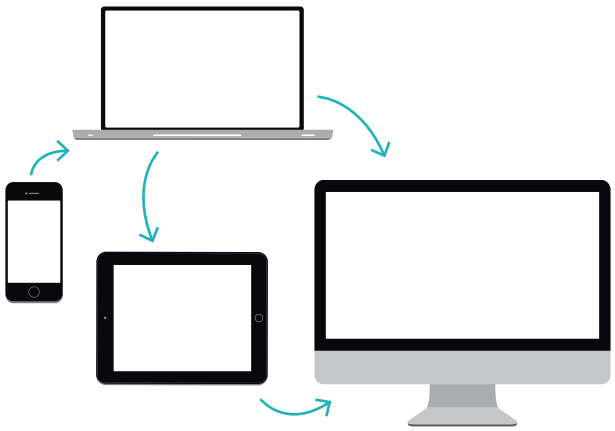
With the contexts of your system established, you can move on to considering potential solutions. This phase is most effective when inspired by a pragmatic design vision and backed by a flexible technical strategy.



A VISION FOR OMNI-CHANNEL SYSTEMS

YOU CAN ESTABLISH A VISION OF WHAT IS POSSIBLE THROUGH AN UNDERSTANDING OF WHICH CHANNELS BEST SUIT DIFFERENT TYPES OF ENGAGEMENT AND WORKFLOWS, AND OF HOW CHANNELS CAN BEST BE COMBINED. THIS VISION FORMS A STARTING POINT FOR DESIGNING EFFECTIVE SOLUTIONS FOR THE CONTEXTS AND TASKS OF YOUR USERS BY PROVIDING CLEAR, PRAGMATIC INSPIRATION.

Consider, for example, the two most common channels, smartphone and desktop, and how differently they suit order entry. The form factor of smartphones, which are always on-hand, results in frequent short interactions. Users expect information quickly, anywhere, at any time. Order entry should be simple and would likely be driven by recommendations or other existing knowledge. This is in sharp contrast to desktops, whose larger screen size, mouse, keyboard and general bulk mean they are most suited to long immersive workflows, such as the entry of complex linked orders based on repeated cross-checking against custom analyses.



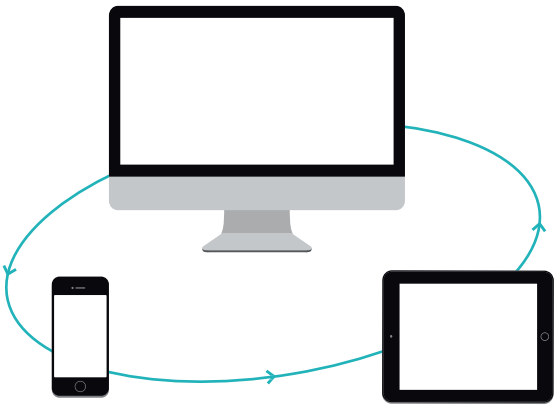
/ CHANNEL HOPPING

The preceding example might suggest that order entry would occur within a single channel. However, by considering contexts rather than channels, the powerful subtleties of how multiple channels can interact become evident. The user entering an order on their smartphone should be able to pick up a half-entered order ticket on their desktop. Not only that, but additional information relevant to the instrument (and any other details entered) should be displayed alongside the ticket, such as the instrument's trade history, related orders or other research and analytics.

This is an example of *channel shifting*, where a task is started on one channel but continued on another. Users' expectations of this type of behaviour are rising because of its presence in the consumer world. Apple's OS X Yosemite and iOS8 offer channel shifting as an operating-system level feature known as Handoff[3], where, for example, calls to iPhones can be answered on MacBooks or iPads, and email composition can similarly shift across devices.

As well as contexts where a user shifts between channels, multiple channels are also frequently used simultaneously. This allows users to perform multiple, possibly unrelated, tasks in parallel, taking advantage of different channels' strengths. For example, while reading this white paper on a desktop or hard-copy, you may have responded to an email received on a tablet or smartphone that you have to hand.

[3] http://www.apple.com/ios/whats-new/continuity/



Technology can drive a stronger omni-channel experience in these contexts by actively maintaining relationships and state between channels. Apple Watch[4], Android Wear[5], Microsoft's Xbox SmartGlass[6] and Nintendo's Wii U[7] are all high-profile consumer examples that are raising and cementing users' expectations for omni-channel experiences. An example of a similar arrangement in capital markets systems would be to take advantage of the proximity afforded by a tablet compared to a desktop. The tablet could be used as a dynamic trading keyboard to allow for rapid trade execution based on instruments pushed to the tablet from a desktop workspace.

/ MAKE TECHNOLOGY DISAPPEAR

THE OVERARCHING THEME OF YOUR VISION SHOULD BE THAT TECHNOLOGY PLAYS A SUPPORTING ROLE TO USERS' TASKS AND CONTEXTS. TECHNOLOGY IS AT ITS VERY BEST, NOT WHEN IT WOWS, OR AMAZES, BUT WHEN IT BECOMES SO NATURAL THAT IT DISAPPEARS: IT JUST WORKS.

"THE INTERNET WILL DISAPPEAR"[8]
- ERIC SCHMIDT, GOOGLE

Google Documents is an excellent example of technology disappearing. When it first emerged many marvelled at the fact you could create a desktop editing experience on the web. Furthermore, it lacked a save button, it was collaborative, real-time. A true technological masterpiece! However, how often do you think about the technology behind Google Docs these days? Its collaborative nature and cloud storage just feel natural. It is no longer a technological showcase, it is the new norm.

4 https://www.apple.com/uk/watch/
5 http://www.android.com/wear/
6 http://www.xbox.com/en-gb/smartglass
7 http://www.nintendo.com/wiiu
8 http://www.forbes.com/sites/timworstall/2015/01/24/eric-schmidts-quite-right-the-internet-will-disappear-all-technologies-do-as-they-mature/

A TECHNOLOGICAL UNDERPINNING FOR OMNI-CHANNEL

WHILST WE WANT TO PRESENT THE ILLUSION THAT TECHNOLOGY HAS DISAPPEARED, IN REALITY THERE ARE TECHNOLOGICAL CHALLENGES THAT NEED TO BE ADDRESSED IN ORDER TO DELIVER AN OMNI-CHANNEL EXPERIENCE.

The technological differences between platforms means that the cost of replicating a complete service offering for each and every channel is prohibitive. For those with a channel-focused mindset, this has been one of the major obstacles that has slowed their move from desktop to web and, more recently, to smartphone.

Fortunately, a move from a channel-focused to a context-focused approach addresses some of the cost issues. The principle of 'not everything everywhere' can result in some channels having a reduced feature set, which lowers development costs.

a context-focused approach lowers development costs

/ TECHNOLOGY REQUIREMENTS

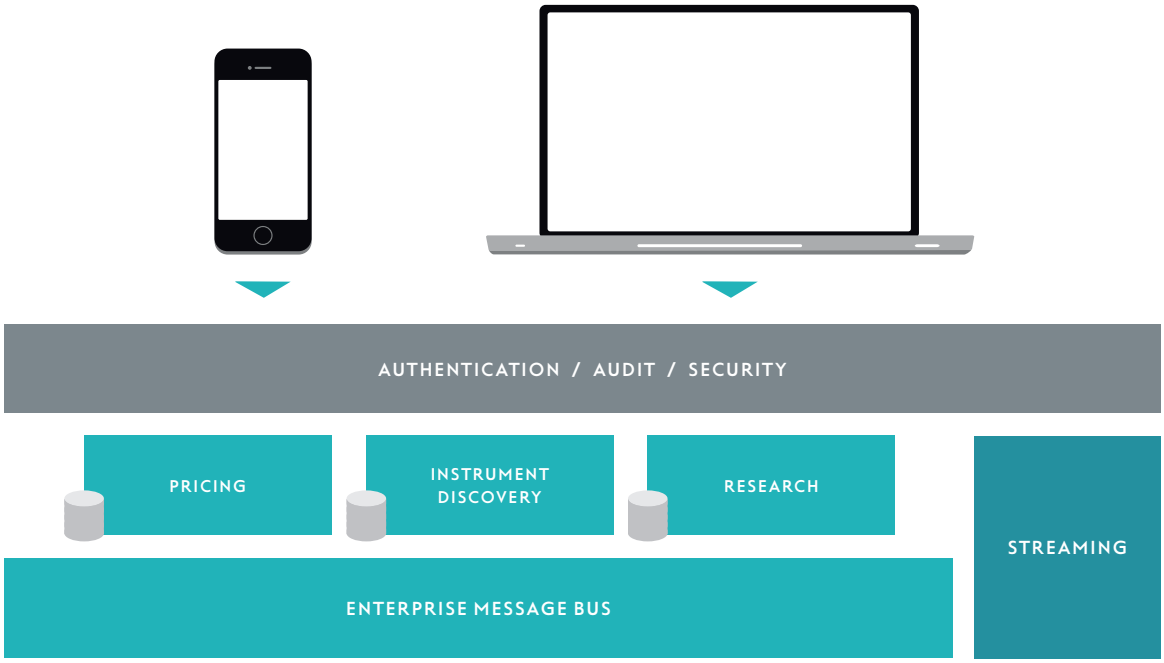
A technical strategy for an omni-channel experience needs to support each individual channel, and also their combined usage. The key objectives of such a strategy and resulting architecture are to:

1. **Provide consistent logic across all channels.** It is imperative that there are no inconsistencies in the data, validation logic and immediacy of pricing between channels. Any inconsistencies, or even a perception that there may be an inconsistency, can cause users to distrust and abandon a channel.

2. **Provide a real-time flow of data across channels.** For each channel to feel part of a single seamless experience, the result of performing an action via one channel must be immediately visible on all other channels.

3. **Support the addition of new channels and channel technologies.** Technologies are in a constant state of flux. The architecture should be able to quickly and easily accommodate changes in technology, and the addition of new channels.

4. **Support a consistent (but not uniform) look and feel across all channels.** Styles, components, assets, fonts and branding should be managed centrally. This ensures consistency and simplifies change.



The most effective way to provide consistent logic across channels is to ensure that all significant business logic is supplied by a shared API layer. By moving away from bespoke service layers to an API-oriented approach, it is possible to entirely decouple the server-side technology from that of the client. This allows disparate teams to work on channels that may require different skills and technologies.

Streaming is an important part of any financial system with real-time delivery of prices and account activities. However, for an effective omni-channel experience it is not just financial data that must be streamed; simultaneous usage models require that all shared application state is immediately synchronised across channels. Outside the financial domain, pushed UI updates are now commonplace on websites such as Facebook, LinkedIn and Twitter. Furthermore, users expect smartphone apps to reflect the same state as their desktop equivalents.

The API layer should support streaming as a first-class concept, and allow subscriptions to any dynamic data. This not only includes data which is inherently dynamic such as pricing, order status and position, but also less obviously dynamic data such as notifications, workspace options, and configuration.

/ CHANNEL TECHNOLOGIES

Possibly the most difficult issue in formulating a technical strategy is the choice of implementation technology for each platform: web, desktop, smartphones, smartwatches and future devices. Regardless of platform, we recommend that the API layer uses a microservice architecture which supplies client-specific data ready for display, rather than raw data that requires extensive client-side manipulation. A significant benefit of this approach is that clients are relatively 'thin', and thus less costly to develop.

Whilst the native technology for many of the channels differ, the one thing they all have in common is their ability to run JavaScript-based HTML5 applications. Sun's old mantra of "Write once, run everywhere" has more recently been used to describe HTML5, with the view that a single codebase can be run on all the various platforms and devices. However, with each channel playing a different role in a given context, this aim is simply not a valid one. HTML5 can more reasonably be described as "Learn once, use everywhere".

With the ubiquity of HTML5, a sensible strategy is to use it as the default implementation technology for all platforms, including desktop. However, the most suitable native, or even hybrid, technology should be employed if a specific platform does not have sufficient support for HTML5 (e.g. old Android phones, Apple Watch), or requires a user experience beyond the capabilities of HTML5. The service-oriented API layer should support native or HTML5 applications equally.

The combination of a streaming API layer, application-specific microservices and thin HTML5 client apps, with some exceptions using native technologies, results in an overall architecture that supports omni-channel usage. Furthermore, it provides an agile platform that can quickly accommodate changes in channel usage and the adoption of new technologies and platforms.

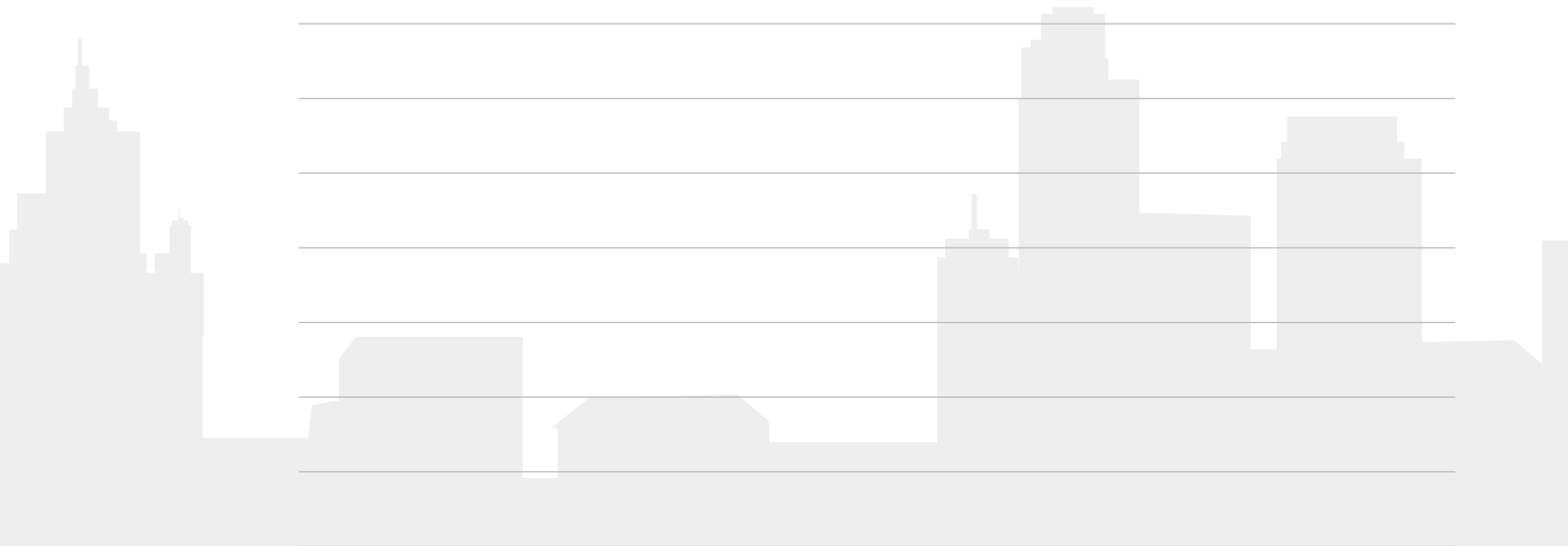
CONCLUSIONS

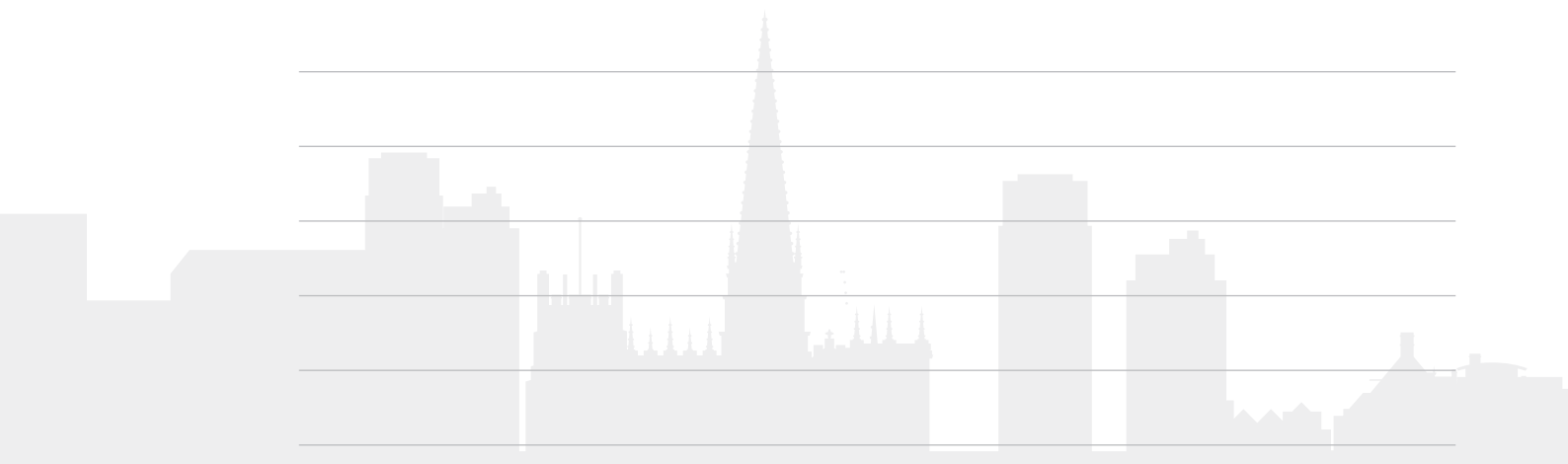
THIS WHITE PAPER HAS OUTLINED HOW OMNI-CHANNEL SYSTEMS CAN BE BUILT BY ADOPTING A DEVELOPMENT STRATEGY THAT FOCUSES ON USERS AND THE CONTEXTS WITHIN WHICH THEY USE THE SYSTEM, RATHER THAN DEVICES. COMPANIES WITHIN CAPITAL MARKETS CAN USE THIS APPROACH TO GAIN A COMPETITIVE ADVANTAGE BY MEETING AND EXCEEDING CUSTOMERS' EXPECTATIONS OF A SINGLE, SEAMLESS SERVICE.

THE KEY RECOMMENDATIONS OF OUR APPROACH ARE:

- **Focus on who your users are. Set aside thoughts of technology, devices and channels.**
- **Identify the contexts in which those users engage with the system, and the tasks they want to carry out.**
- **Design beautiful, effective solutions to provide the appropriate functionality for each task on each channel, and across channels.**
- **Implement decoupled solutions by building on an API-oriented server-side architecture.**

/ NOTES





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