

“There are very few people who truly understand both telco and Web and can weave strategic narratives between the two. Paul is one of those guys. His explanation of modern and emergent Web trends and technologies is compulsory reading for all those who take mobile innovation seriously.”

Gregory Gorman, Co-Founder Mobile 2.0 Silicon Valley, Wireless Entrepreneur

“Connected Services is a must-read for telco strategists who need to get up to speed on how the world of software and the web 2.0 works. Paul is a rare breed of strategist, one that can go from writing Android apps to debating future strategies with telco boards – he is the best storyteller when it comes to understanding both telecoms and software worlds.

Andreas Constantinou, Research Director, VisionMobile

“This book is a must read for those charged with leading innovation in a world of connected services where telco and Internet collide. Paul does a great job of articulating the interplay of diverse technologies and systems, creating a cogent narrative on how best to understand modern Web trends and interpret them into great products and service strategies in this challenging and rapidly evolving world.”

Jason Goecke, VP of Innovation, Voxeo Labs

“Paul is one of the rare thought leaders who is trusted by all of his peers. His previous book explained the technology of the mobile apps space. This book is the guide on how to understand and interpret the trends of modern Web technologies and methods, plus insights into how to capitalize on the opportunities in the telco universe. An ironclad must-read for all in mobile.”

Tommi T. Ahonen, Author & Consultant, Hong Kong, latest book: Insider's Guide to Mobile

“Paul is a true architect of innovation being as able to communicate a vision as he is to describing the detail of how to deliver it in practice. This book provides valuable insight to anyone who wishes to first appreciate the potential of pervasive communications and data services and then implement for commercial benefit. Rare insight is provided from hands-on experience with multiple stakeholders in the ecosystem as it has evolved from fixed and mobile to today's system where boundaries between man and machine communications are blurred and the role of historically dominant stakeholders is in a state of flux. Compelling reading for anyone serious about realising the potential of next-generation communications.”

Geoff McGrath, Managing Director, McLaren Applied Technology

CONNECTED SERVICES

CONNECTED SERVICES

A GUIDE TO THE INTERNET TECHNOLOGIES SHAPING THE FUTURE OF MOBILE SERVICES AND OPERATORS

Paul Golding

CEO, Wireless Wanderers



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Biography



Paul is a widely respected and unassuming technologist in mobile and Web with 16 patents and a leading book in mobile applications, now available in Chinese. He has been Chief Architect, CTO and various senior tech roles for companies across the world, from start-ups to multi-nationals. He started one of the first mobile apps companies in Europe. He leads platform initiatives for O2's new "intrapreneurial" business unit and set up the O2 Incubator. His tech activities include big data and cloud telephony. He specializes in far-horizon business and product strategies whilst still being a

hands-on architect and developer. <http://wirelesswanders.com>

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Foreword

In 2005, when the world crossed-over to Web 2.0, business professionals and managers in every industry – from traditional retail to high tech media and telecom – felt the first powerful tremors of the strategic shifts taking place, sweeping away traditional business models and altering competitive landscapes.

Many companies – often leaders in their industry – were faced with more questions than answers, more risks and challenges than opportunities. At that time, Tim O’Reilly, the acknowledged Silicon Valley founder of Web 2.0 asked me for a strategy guidebook published in 2008, to explain in plain language the business implications of Web 2.0. My book’s goal was to make sure that – even if you were unfamiliar with Silicon Valley buzzwords and your company wasn’t started up with Google, Flickr, Facebook, Twitter or Apple DNA – you could use Web 2.0 business thinking to multiply your customers, partners and revenue streams and turn your networks into valuable digital assets.

Mobile 2.0 – smartphone apps combined with viral distribution over vast online social and professional networks – has thoroughly shaken and stirred the business world once again. The year 2011 is a time of great opportunity for those who are agile in orchestrating the right combination of capabilities and putting Web and Mobile 2.0 best practices into place.

Read this book and you’ll benefit from the author’s global, strategic and hands-on experience in the mobile world. He is as comfortable cutting code at a hackday event with start-ups in San Francisco as he is presenting strategic advice to the board of the world’s largest telcos in Europe and across the globe. His first CTO position was in a Hong-Kong start-up designing location-based services for China. His Chief Architect role at Motorola covered the Middle East, Africa and Latin America.

You’ll find out the best practices you need to achieve success in:

1. Creating open platforms and ecosystems that exploit the network effect
2. Embracing “Big Data” – creating value from unthinkably large amounts of data
3. Creating “augmented web” experiences by exploiting the Internet of Things

In exploring the theme of open Web platforms and ecosystems, the author gives a detailed guide of the Twitter ecosystem where over 75 per cent of the traffic (Tweets) flow through open APIs into a rich ecosystem of over 50,000 apps built by a massive community of developers attracted to Twitter’s low-friction programming interfaces (APIs).

In exploring the theme of “Big Data”, the author gives us another example of Web thinking where the “data geeks” of Amazon create value by finding patterns in data sets that are

unthinkably large and can only be processed by inventing a new type of data store, called Dynamo. He argues how Amazon, ostensibly a “retailer”, is actually a software powerhouse whose real business is converting website visitors into customers, a task that is all about data-crunching on an unthinkable scale.

Preparing us for the Internet of Things, the author first lays the groundwork with a discussion of “linked data”, which is how the Web is evolving from a system of links pointing to Web pages readable by humans to a system of links pointing to data about objects, digital and real, readable by machines. He then charts the explosion of intelligent sensors that will provide us with streams of data from real objects, arguing that the nexus between linked data and sensory data will be smartphones.

This is why I’m excited to see the publication of Paul Golding’s book. The Mobile 2.0 revolution has just begun and with this book in hand, you and your company can be part of the wave of innovative business models and success stories to come. This book is a great starting point for anyone who wants the inside scoop on what’s going on, emerging best practices and how to position and think exponentially for success.

Amy Shuen

Best-selling author of *Web 2.0: A Strategy Guide* and a Yale, Harvard, Berkeley-trained strategy consultant, multinational board adviser and award-winning business school professor at Wharton, Berkeley, CEIBS, HKU, Chalmers, Ecole des Ponts and Ecole Polytechnique.

Preface

I wrote this book primarily for a telco industry audience, at all levels, technical and managerial. I wrote it to help stimulate innovation through “Web thinking” inside telcos, knowing that:

1. Many folk inside telcos still don’t get the underpinning principles, patterns and technologies of Web 2.0 and its evolutionary offshoots, like the Internet of Things, which I will explain.
2. Some telcos, though not all, must fight to become platform providers, following the same open innovation patterns as Web platforms, like Facebook, Twitter and Google.
3. Regardless of vision, all telcos can benefit hugely by adopting many of the established and emergent Web patterns, methods and technologies. This does not mean that they should become “Web companies”, but more “Web-enhanced Telcos”, for want of a better description.

I’ve been involved with the digital mobile industry more or less from its start (1990) and I’ve been working with the Web since its beginnings, actively trying to converge the two in all manner of ways, some credible and some incredible. I’ve worked with mobile suppliers, mobile innovators, mobile operators, web companies, start-ups and entrepreneurs across the entire globe. I have worked with technology, sales, marketing and biz dev folk, wearing all of those hats too. I know mobile and the Web pretty well. I’ve programmed for them, built products for them, worked on the science, tried to make money, started companies, advised companies, proposed standards, got my hands dirty in all kinds of ways, had all kinds of successes and failures. Phew! I survived all that and now consult for various clients, big and small, who want to do something that matters with mobile and Web software. I’m saying this so that you will feel confident that I’m the right kind of person to write this book for you.

In working with telcos, I find an industry that has mostly failed to innovate in any meaningful way when it comes to the Web and the digital economy. Operator folk usually think of the issue in the wrong way, as though the Web is just another distribution channel rather than a major infrastructural force in the modern industrial landscape. Many senior folk have always known that they can’t really ignore the Web, but have followed the pattern of “our business has been successful without it, what’s there to learn?”

The answer is: a lot!

What this book attempts to do is to explain, mostly to telco folk and their cohorts, how the modern Web (2.0+) really works and where it’s headed. This is an attempt to explain how the Internet is *the* future of mobile, with “http://” being the dial tone for modern connected services. There really is no such thing as “mobile Internet”. There’s just the Internet. How

it evolves will affect and determine how mobile evolves. The Internet will be at the heart of every way that we communicate, share, interact and conduct our lives. Connected services, in the main, will be Internet ones.

For those of you who have read my previous book *Next Generation Wireless Applications*, the book you find in your hands is kind of what that book would be if I re-wrote it for the current post Web 2.0 age. However, much of the previous book explained the technology of the Web at a detailed level that isn't necessary or useful here. You can still refer back to it, if you want a detailed explanation of Internet and Web protocols relevant to mobile. In the current book, I want to focus much more heavily on the technological principles, rather than the mechanics, taking you on a tour of the big ideas that are shaping our connected lives in dramatic ways.

I wrote this book because my experiences of consulting for mobile operators informed me how far adrift many of the telco folk are in understanding what's really happening with emergent memes on the Web (themes¹), such as "Big Data", "platforms" and "real-time Web".

This book is written for those adventurous spirits who want to be in the innovation race and who don't need to be convinced of why the modern Web is important, but just want to know how it works and what to do about it, or with it. A big obstacle for many in the telco innovation race is that they simply don't understand what's happening in the post Web 2.0 landscape. This book should fix that, or at least get you headed in the right direction.

That said, no one really knows where this innovation race is eventually headed, including me. However, there is one interesting aspect of the connected services evolution that can't be overlooked. It's called the Internet. Ubiquity today has become about access to the Web and its services wherever we go – call it "everyware".

Here's a summary of what I'm going to look at:

Chapter 1: Connected Services: The Collision of Internet with Telco – Here I explore what I mean by a "Connected Service" and how the real backbone of connected services is software, not networks. The dial tone of connected services is "http://" I explore the common architectural pattern for connected services on the Web, which is "open platforms". Successful platforms enable digital ecosystems to flourish.

Chapter 2: The Web 2.0 Services Ecosystem, How It Works and Why – Low-cost and easily programmed software is at the heart of Web 2.0, especially the LAMP stack and its derivatives, which we explore in this chapter. I explore common software patterns using this stack and then outline the ongoing importance of the Web browser. We explore how the Web has evolved from being informational to being social and how the Web has become a highly programmable platform by virtue of open APIs. I conclude by looking at the role of the smartphone as the nexus of modern Web and Mobile software trends. It is the ultimate "connected service" device.

Chapter 3: The Web Operating System, The Future (Mobile) Services Platform – A "Web Operating System" allows the developer of Web and connected services to "hand-off" much of the underlying plumbing to a set of existing services that provide key common functions. In this chapter, I explore the meaning and shape of the Web OS and its strategic implications for telcos.

¹ A "Meme" is a word coined by Richard Dawkins when talking about "the survival of the fittest" in terms of ideas passed on rather than genes. It is used fashionably in the online world.

Chapter 4: Big-Data and Real-Time Web – Big Data is a collection of ideas, trends and technologies that enable Web ventures to exploit the value in massive data sets that exceed the confines of the conventional storage and processing limits of single computers. Big Data is about making value out of unthinkable large amounts of data. In this chapter, we take a tour of the Big Data landscape, decoding some of its components and buzzwords, and also debunking some of its myths. I look at real examples of Big Data technology and think about its application to telcos.

Chapter 5: Real-Time and Right-Time Web – The movement of data on the Web has migrated from an on-demand pull mode to a “just in time” push mode. Data increasingly flows across the Web as it becomes available—in real-time. In this chapter, I explore the real-time nature of the modern Web and how, when combined with real- “Big Data” and smartphone platforms, it enables the right data to be delivered at the right time, leading to the “right-time Web”. I conclude by looking at why telcos need to move quickly to ensure that telco platforms are fully integrated into the right-time Web.

Chapter 6: Modern Device Platforms – In thinking about device platforms, it is sometimes more useful to think of connected devices rather than mobile devices. “Being mobile”, is increasingly about being able to stay connected to a number of key data streams at all times. To stay “connected” at the informational level, smartphones are the key platforms. I explore the dominant platforms of iOS, Android and Mobile Web, each important in their own way. I give a detailed summary of HTML5 and its associated technologies and standards, all of which will deliver a substantial step increase in the power of the mobile Web.

Chapter 7: The Augmented Web – There is no doubt that Augmented Reality (AR) services are going to occupy an important place in our digital lives. We interact regularly with both the digital and the physical world. Using one to augment the other is a natural progression and mobile platforms are the natural intersection points. In this chapter I explore the key components of the emergent “Augmented Web”, including a discussion of how HTML5 and standards will accelerate its adoption. I also explore how sensors are going to become the next frontier of the Web, enabled by convergence with mobile platforms and cloud-computing.

Chapter 8: Cloud Computing, SaaS and PaaS – Cloud computing is one of the key enablers of connected services, underpinning the software paradigms of Software- and Platform-as-a-Service. I explore all of these paradigms in some detail and conclude with a discussion of how telcos must develop meaningful strategies for cloud-computing, PaaS and SaaS, both as providers and consumers of these technologies.

Chapter 9: Operator Platform: Network as a Service – Network as a Service (NaaS) is where a telco exposes existing network enablers via APIs, usually associated with the core capabilities of the network. I describe NaaS patterns and strategies in this chapter, including an important and in-depth discussion of developers, the “customers” of NaaS services. I also include some promising and insightful examples of NaaS.

Chapter 10: Harnessing Web 2.0 Start-Up Methods for Telcos – Although highly successful in their own right, telcos can still benefit from understanding how modern Web ventures work, which I explore in detail in this chapter. I look at what we mean by “Scalable Web start-ups” and how they tend to exhibit a common set of approaches towards exploiting Web 2.0 as a platform for doing business. These approaches span technological, cultural,

organizational and commercial concerns, all of which offer important lessons and opportunities for telcos.

Thank you for reading this book. I hope that you find it useful. Please contact me with any questions and comments.

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Connected Services: The Collision of Internet with Telco

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For coolnames.each do |c|  
  display c.coolword  
  call ubiquity  
End
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- Any digital service that brings people together in a meaningful way – to engage, transact, share, and so on – is a “connected service”. This includes digital communications in telcos and on the Web.
- The real backbone of connected services is software, not networks. The dial tone of connected services is “http://”.
- A common architectural pattern for connected services on the Web is open platforms. Successful platforms enable digital ecosystems to flourish.
- Using standard telco business models to explore the value of a service isn’t congruent with the value of Web platform services.
- When building a platform, user experience remains important.

1.1 Connected What?

An uninformed observer, or visitor from a distant galaxy, would be forgiven for thinking that telcos ought to have been at the heart of the Internet revolution that has swept through much of the developed world these past 10 years, following the tipping point of the Web. After all, telco is all about networks, as is the Web. Telco is all about connecting people, as is. . .

You’ve guessed it – The Web!

Instead of Google, Yahoo, Facebook, Flickr, our alien visitor might expect to see the icons of the Web to be O2, Verizon, Orange. . .

But they won’t. Figure 1.1 shows what they will see (you will probably recognize most of them):



Figure 1.1 Web logos – spot the telco!

Users surfing the “mobile web” often arrive at their digital destination via the on-ramp of Google search. Users finding their way across town often arrive at their physical location via Google Maps. Developers are hacking with Google’s Android. Users finding old friends, and making new ones, are doing so via Facebook. Business folk are connecting and networking via LinkedIn. And on the list goes, dominated by companies that all appear to have one thing in common – they were born on the Web.

But don’t they have something else in common? That’s right. They all appear to be obsessed with *connecting* people, to other people, to data, to places, to whatever – to things? Furthermore, many of these ventures were born in universities, although often not in the labs. They were born in the dorms and sometimes in the coffee houses. This is a key symbol of the Web 2.0’s innovation *culture*. There you go – I did it – I used a dreaded “C” word.¹ And I mean *culture*, not connecting.

Reluctant to use that particular “C” word as I am, as it generally sends corporate minds in a spin (“What is culture?” “How do we change culture?”), I am not going to shy away from talking about “non-tech” stuff in this book wherever it serves to make a valuable point. You see, in my experience, technological enterprise – the art and science of really getting something done, something worth doing with tech – is not done in isolation of people, attitudes and verve. This point, perhaps more than any other, might explain why the Internet is not dominated

¹ Doesn’t every book related to telco have to have a list of words beginning with C? The five Cs? The three Cs? Not sure what the magic number is these days.

by telcos. They are different types of enterprise creature, if you will, or should I say ecosystem (more on that later).

It's not as if telcos didn't have the money to build substantial Web ventures. Well, some of them tried, and failed. It's not as if they didn't have lots of "technical people" either, or, more importantly, lots of paying people who make up those incredibly large customer bases that would be the envy of any Web start-up and most Web ventures. Maybe they didn't have the right cultural conditions. They mostly still don't. And the only reason I mention this now is that Web 2.0 is as much about culture – the way people think and behave *by habit* – as it is about technology and business patterns. If you work in a telco and you still don't get this point, then I recommend reading this book on an airplane, one destined to Silicon Valley where you can hang out with Web ventures and see how they really work.²

Sure, 99 per cent of this book is going to be about tech stuff, but that's almost irrelevant if you don't set up the conditions to make the tech work for you. I know what I'm talking about. My first book – *Next Generation Wireless Applications* – explained much of the Web 1.0 tech, the emergent Web 2.0 stuff, and its mobile offshoots in great detail. That was back in 2004 (and I started writing in late 2002). I wrote the follow up in 2007/8 sprinkled liberally with 2.0-isms.

Both these books were bought mostly by folk in the telco ecosystem – and then mostly ignored. I know, because I held numerous workshops based on the books' themes. I got the feedback firsthand, which was almost always a room full of "Why would we do that?" and other "Why?" questions that added up to a unanimous "We don't get this . . ." message, which is cultural, not technical. Culture is embedded in language and, if you don't speak the lingo, you really won't get the culture, not in any depth.

I set up one of the first mobile ISVs in Europe, back in 1997. I built the first Mobile Portal ever (Zingo) back in 1998, which we (i.e. with my client Lucent Technologies) took to Netscape as their mobile play – imagine that, a telco supplier (Lucent) pushing product to a Web darling. Whilst acting as Motorola's Chief Applications Architect 2005–7, I set up their "Mashing Room" lab to build hacks that would demonstrate the intersection of mobile and Web 2.0 – "Mobile 2.0," if you will. We built a telephony mash-up not too dissimilar to Google Voice (previously Grand Central). I spent much of those two years evangelizing various Mobile 2.0 themes to operators globally. Again, my enthusiasm and ideas were mostly met with blank stares.

Which brings me to the next "C" word – COLLISION!

That's pretty much what's happened. Web 2.0 has hit the telco world, almost taking them by surprise, even though it's been a gradual creeping up, like the vine that slowly grapples a wall (and pulls it down). The overwhelming sentiment is that "these guys" – that is, the Web companies – are slowly eating our lunch, and they're doing it using our networks (bit pipes). What's more, they appear to be doing what we do, don't they? Connecting people!

No need to debate this point. Let's get straight to the killer question:

"What can be done about it?"

This brings me to the final "C" word of the series (noting my dear readers that every seasoned evangelist has to tell a story using 3 or 5 Cs at least once in their career):

"CONNECTED services!"

² This is not a flippant point. I took one senior telco guy on such a trip and he came back "converted."

This phrase happens to be one I've heard used by O2, one of the companies I consulted for when I was writing this book. But they're not unique in their ambition, which is to become something other than just a "mobile company" in order to avoid the inevitable descent to dumb bit-pipe, should they, or any other telco, not want to end up there, which is debatable (see Section 1.3 Six Models for Potential Operator Futures).

The phrase "Connected Services," is supposed to cast a wide net, and one that frees us from the constraints of a telephony network. Any digital service that brings people together in any meaningful way – to engage, transact, share, and so on – is a *connected service*. In that way, Twitter is a connected service. Facebook is a connected service. Even search is a connected service. I don't want to get too prissy about definitions, as experience has taught me that such distractions are exactly that – distractions. A quick skim of the contents page will tell you the sorts of stuff I mean by connected services. The issue for operators is that telephony is a very old technology that hasn't changed much. And, while people will always want to talk, at least for the foreseeable future, we can see that more and more people are finding ways to connect without voice, like the examples just given, which all take place on a giant platform called Web 2.0, quite separate from telco networks, which just carry the traffic to and from these various Web platforms.

So, what can be done about it?

This isn't one of those "get rich quick" books. There's no easy answer. . . .

Actually, there is, which is to do something different from what you've been doing. That's the easy answer, incomplete as it is. Nonetheless, many operators remain in limbo, trying to gain the freedom to innovate that evades them and blesses the innovators at the extreme ends of the "freedom to innovate" spectrum – the cash-rich Googles and VC-funded companies at one end and the cash-starved boot-strapping bedroom start-ups at the other.

As I keep telling my colleagues in the industry: "Think, try, fail, tune, deliver . . ."

You've got to stop pondering about all this stuff, stop thinking about a "them (Web) and us (telco)," and start building stuff, putting it out there and tuning as you go. This is the agile way, the Web way (see How Chapter 10). The battle-hardened roadmap process for deploying and running vast arrays of network infrastructure, supporting millions of customers and running giant marketing campaigns serves very little purpose on the frontiers of the Web. It doesn't matter if you're a 100-year-old company that dug up roads to wire the nation, when it comes to the Web, you're a start-up – it's still a frontier world where more is still unknown than known and where we continue to be surprised by the rampant success of "new" ideas (like Twitter) and emergent categories (like Social Networking). In this regard, most Web ventures are still start-ups, whether launched in a dorm or from the labs of the 100-year-old giant. And in the world of start-ups operating in the unknown, agility is king, as are other memes, as the Web-geeks call them, like platforms, real-time and "Big Data," all of which we shall explore in enough tantalizing detail to get you motivated to try something different.

This book is about the ingredients, patterns and technologies that will enable connected services to work in the Web that's emerging post Web 2.0. Is that Web 3.0? Well, I don't want to mess our heads with yet more conceptual claptrap, but if you think it's time you really got to grips with Web 2.0, then you're a bit late. But don't worry. Whether it's Web 3.0, the Semantic Web, the Internet of Things, the Real-time Web, or all of these things, you'll know which is which by the end of this book. You'll also have enough feel for these ideas to go do something new and interesting, maybe start the next billion Euro industry.