

eSIM is a critical digital transformation journey for Mobile Network Operators **but they can't do it alone**



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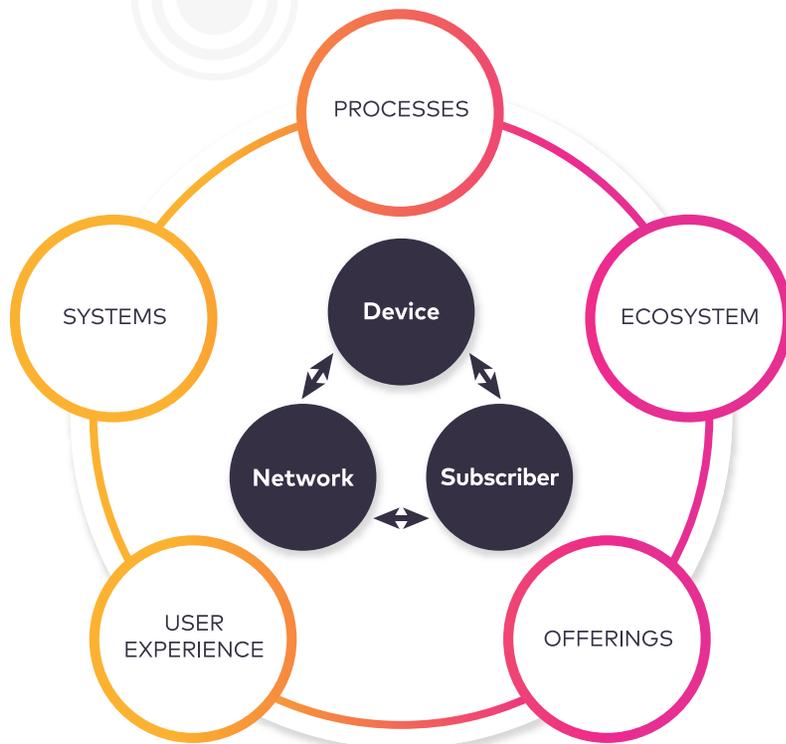




executive summary

This is not just another White Paper about eSIM. You won't find an explanation here of how eSIM works or an in-depth analysis of the use cases that might demand it. This White Paper focuses on the wider implications of deploying eSIM for mobile network operators (MNOs). The teams within MNOs already understand the fundamentals of the eSIM technology and are probably all too familiar with which client sectors will be targeted.

However, we think MNOs have been missing something critical. They have not yet realised the full operational and commercial implications that implementing eSIM might have, if the full opportunity is to be realised.



This White Paper considers eSIM as a Digital Transformation process that MNOs have to navigate. As with other Digital Transformation exercises, the challenge is not in introducing a single new technology. It is in understanding the impact that the technology will have on the wider operations of the organisation. Embracing Digital Transformation, if it is done properly, is about much more than just deploying a shiny new technology. While the technological hurdles are significant, adopters must equally give ample consideration to the commercial and operational implications of deployment, challenges of integration, and how to make the appropriate changes within their organisations. It is as hard to change organisational working practices, processes and business models as it is to adopt new technologies. And so it is with eSIM.

The old plastic SIM will probably be consigned to the dustbin of technology history some time in the next decade. The eSIM is the future, not least because it will end up being cheaper and more customer friendly. Every MNO will need to change to reflect that. To truly realise the opportunities, MNOs should proactively pursue a strategy of overhauling their existing practices to reflect the new market reality.

While it might be hyperbole to say "eSIM changes everything", it's certainly true to say that it can, and will, change a lot; at least if you're doing it right. **Billing and IT systems, customer care, customer lifecycle management, inter-MNO relationships, product offerings and user experience** will all need to adapt to the new reality. These changes are challenging. You need a change management strategy, and you need to make use of the best tools on the market to ensure your approach to optimising all your business processes to take advantage of eSIM is done in the most effective way possible.

These are significant changes that MNOs need to make in a relatively short time-frame. They will need partners. And they will ideally use a proven scalable cloud-based solution to deliver all of the necessary complex interwoven elements of an effective eSIM strategy, across all areas of the business, that will allow them to embrace the opportunity presented by the technology.



the eSIM (r)evolution

The history of the eSIM has been well documented. Introduced to allow simpler device set-up, supply chain streamlining, compliance with permanent roaming regulations and more robust devices, it permits any device to store multiple IMSIs (International Mobile Subscriber Identities) on the associated embedded Universal Integrated Circuit Card (eUICC), rather than on a removable SIM card, and switch between them at any time.

Today it is an increasingly common part of the cellular device landscape. The first, earliest, use of eSIM was in the Internet of Things, where it was seen as a great way to localise devices onto a domestic network and avoid problems with regulations prohibiting permanent roaming and the logistics involved in slotting SIM cards into remote devices. Today it is not uncommon for eSIM to account for 10-20% of the IoT connections supported by mobile network operators (MNOs). This figure will grow rapidly as enterprise customers increasingly demand the functionality.



The first consumer electronics devices to have eSIM were smart watches from the traditional handset vendors including Apple, Huawei and Samsung. Since then, vendors have extended the capability to high-end handsets, tablets and laptops, including iPhone 11 and 12, iPad Pro, Samsung Galaxy S20 and S21, and Microsoft Surface Duo. However, the migration to eSIM is only partial: today those devices also include SIM card slots, which removes the space saving benefit of eSIM. It was inevitable that there would be an intermediate generation of devices supporting both while MNOs went through the process of migrating to eSIM. The first eSIM-only devices are just starting to emerge, including the latest iteration of the Motorola Razr and Rakuten's 'Big' device. Major vendors are likely to take another year or two before they have eSIM-only devices available. However, momentum is clearly with eSIM devices.

These technology developments, of course, are not the most important thing. More critical is how they change market dynamics. Every major technology change is important principally because of the new business models it enables. The arrival of 2G created opportunities such as reversed-billed SMS charging for ringtones and games, the arrival of 3G and 4G gave sufficient bandwidth to support location-based services like turn-by-turn navigation and Uber. The arrival of eSIM will be no different. It removes technology barriers, which facilitates the release of some pent-up demand. Usually that demand revolves around saving money or making life easier. In this case it's likely to focus on avoiding the most inconvenient and costly aspects of having a single SIM tied to a single MSISDN tied to a single device. For instance, customers will be able to manage multiple subscriptions on a single device without the need to visit a store or fumble around with SIM cards.



The more widespread adoption of eSIM will see vendors of connected products and services launch a range of products. Device OEMs, for instance, will be able to more easily add cellular connectivity to smaller devices. Smart watches have tended to take the lead in eSIM discussions because of the relatively limited space available for including a SIM slot. The same must also apply to other Consumer Electronics devices such as headsets, drones or pet trackers. Allowing more consumer devices to be independently connected to cellular networks creates a bigger overall market and creates the opportunity for MNOs to add stickiness to an offering by bundling multiple services together.

Numerous other operators, service providers and application developers will also seek to develop products and services that take advantage of the new market reality. Mobile Virtual Network Operators (MVNOs), for instance, will seek to offer a whole new range of services, for instance new packages aimed at tourists or business models that are based on multiple wholesale agreements, allowing the user to switch between networks based on price differentials. MNOs can also get in on the act, for instance by partnering with overseas MNOs to provide 'super-roaming' services whereby the device is localised onto the domestic network.

There are not only new products and services to be considered. For MNOs, eSIM presents an opportunity to streamline some inefficient operational processes. MNOs stand to gain significantly through savings in manufacturing, logistics, distribution and management of plastic SIM cards. They will also be better able to support the provision of more flexible enterprise mobility and more scalable onboarding of large IoT device fleets, amongst other things.

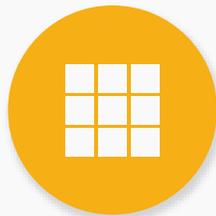


2021

eSIM support grows

MNOs introduce tariffs, packages, processes and support systems to build on the technology capabilities offered by eSIM.

The range of devices supporting eSIM increases dramatically (although devices generally continue to support both).

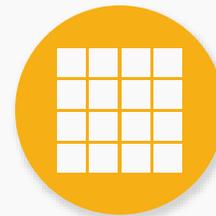


2023

Most new devices use eSIM

Adoption of eSIM by users will be increasingly common, although patterns of use behaviour will not have changed dramatically.

Most device types support eSIM, with an increasing number having no support for plastic SIMs, led by Apple.



2025

eSIM dominates

MNOs will have realised the opportunity for new pricing models and this, together with changing patterns of user behaviour will mark a substantial change.

The eSIM will account for the majority of smartphones. Many operators will, by 2025, have stopped offering plastic SIM cards.

The adoption of eSIM is inevitable. Within the next ten years there is little doubt that the plastic replaceable SIM will become redundant. It is not hard to envisage eSIM adoption growing dramatically to be a mass market phenomenon by 2025. The key point with eSIM is that it is not optional. In future millions of devices will be eSIM only. Eventually all will be eSIM-only and plastic SIM cards will be phased out. **If you, as an MNO, want to support them you're going to need the technical capability and the underlying support systems. Even in the short term, there is a risk of loss of market share from not being proactive about pursuing eSIM.**

MNOs, in recognition of both the inevitability and the opportunities of eSIM, have been increasingly active in rolling out the technology. Today over 200 mobile network operators, including all the major global groups, support eSIM. The technology has also matured dramatically: over the last 5 years eSIM has moved from being based on vendor-specific solutions deployed by individual operators, to being a global compliance framework from the GSM Association[1] which will allow all operators, OEMs and eSIM solutions vendors to deploy interoperable products and services.

However, the story does not end there. The demand might be present, the benefits may be increasingly apparent, and the MNOs may be adopting eSIM technology. But that does not mean they are ready. Far from it. Very few have really recognised the changes that they need to make across a range of their activities to truly take advantage of the opportunities eSIM presents. What is required is a 'Digital Transformation'.

<https://www.gsma.com/esim/resources/sgp-24-compliance-process-2/>

eSIM: a digital transformation

Over the last three or four years the phrase 'Digital Transformation' has dominated the technology conversation. This umbrella term incorporates a lot of very important technology trends, including the idea that for almost all companies IT is becoming increasingly strategically important. As part of that process, legacy OT systems are giving way to IT, or being integrated with them. In effect, this is what is happening with eSIM. An old legacy self-contained system, in the form of SIM authentication, is being stitched into a wider IT environment (e.g. billing systems, website, customer care and more). This change might have some complexity to it, but it inevitably leads to greater innovation and market opportunity.

In a recent Transforma Insights report we explored the concept of 'Separation, Innovation, Explosion'. This is based on the hypothesis that the separation of hardware from software/control layers is a fundamental requirement for a technology area to see true deep-seated innovation. In most technology use-cases there is a deep integration of management software and hardware. However, when these two are separated, as we saw with personal computing decades ago, it stimulates radical innovation. Many different technology sectors are now on this development path, including telecoms. In most cases when we consider this separation in the context of telecommunications, we refer to the network itself. However, there is no doubt that the same thing is also occurring in the humble SIM card. Effectively, by developing the eSIM specification the industry has allowed for the separation of the software element from the associated hardware.

See 'Separation, Innovation, Explosion: how splitting software from hardware is the ultimate tipping point for technology' (July, 2020)

E-SIM: A Digital Transformation for Mobile Network Operators





Integrated

Hardware and software development is handled together and sold as a single product.



Separation

Separate the software and hardware layers of the product into discrete development environments and markets.



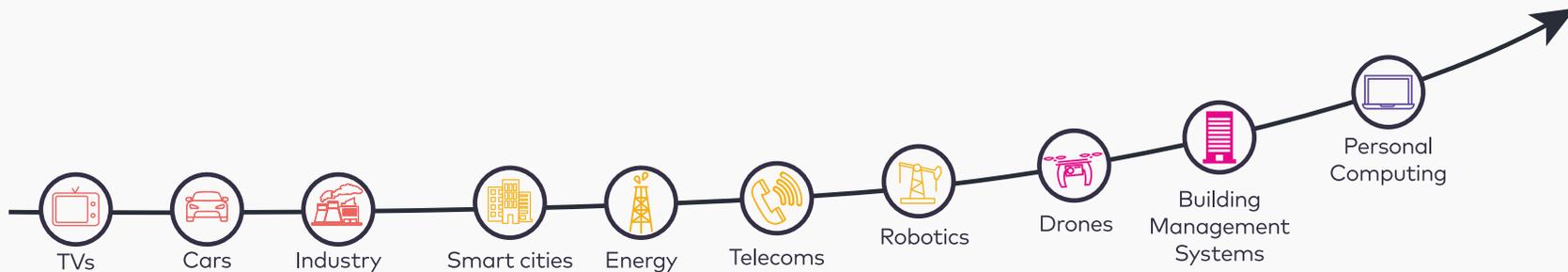
Innovation

Unleash potential for innovative development, particularly in software. Continued challenges of security and integration.



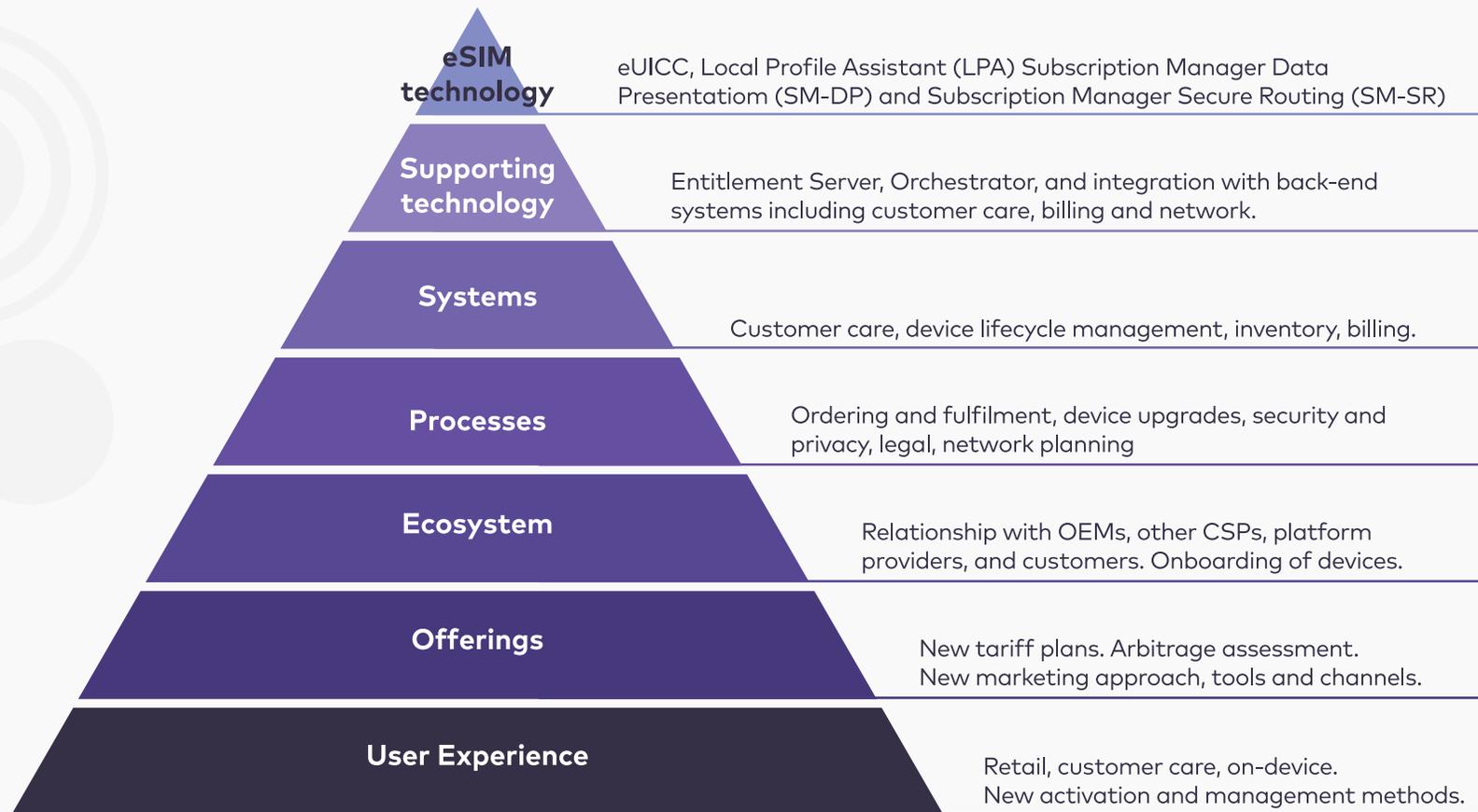
Explosion

Superior products lead to rapid take off in adoption of the services in general or the enhanced functionality.



The arrival of eSIM and the integration of its capabilities into the device, network and user ecosystem is a Digital Transformation in microcosm. As with other Digital Transformations it necessitates a complete overhaul of many of the existing business processes within the organisation, in this case the mobile network operator. The technology change, in this case the implementation of eSIM and subscription management technology, is only the tip of the iceberg. The operational and commercial changes that are facilitated and necessitated by that technology implementation are substantial and far-reaching within the MNO's operations.

The chart below demonstrates each of the major elements of an MNO's operations that will be affected by the arrival of eSIM. Between them these represent a radical transformation in operations.



the iceberg comprises:

eSIM technology the eUICC chip, the Local Profile Assistant (LPA) plus the two Subscription Manager elements, the Data Preparation (SM-DP) and Secure Routing (SM-SR). MNOs don't need to provide these elements themselves, but they do need to integrate with them, ideally using a standards-based approach.

Supporting technology the technology components that the MNOs needs to put in place, as well as the necessary integrations, to make use of eSIM capabilities. This includes the Entitlement Server, the Orchestrator and other elements required to handle the practicalities of managing the eSIM service itself. This also includes the northbound interfaces to, for instance, billing, customer care and core network elements such as the Mobility Management Entity or the Access and Mobility Management Function (and equivalents).

Systems The deployment of eSIM has huge implications for many elements of operator systems. As well as integration with those elements, there will need to be changes made to customer care, device lifecycle management, inventory systems and many more.

Processes eSIM doubtless means changes to many processes within the MNO. Things like lawful intercept, ordering and fulfilment, device upgrade, management of IMSI (and MSISDN) number ranges, security and privacy, for instance, all work differently in the eSIM world. Even something as fundamental as network planning may need to be overhauled. If customers are more footloose it makes it more difficult to plan for what capacity might be needed. If you think that's hard for network planning, consider the possibility that you might be faced with the sudden arrival of a few million new smart meters.



Ecosystem Part of the complexity of eSIM is that it involves many different participants, including MNOs, OEMs, eSIM providers, orchestration platform providers, enterprises and so on. The relationships between these various participants needs to be much more carefully coordinated than it ever was with plastic SIM cards. It works more like mobile number portability, but more complex than that. MNOs, and other players, need a common approach and agreed behaviour on IMSI switching, inter-operator payments and much more. The OEMs in particular have created a significant degree of complexity with their complicated and unique processes which vary not just by OEM, but sometimes by individual product. Staying on top of OEM approaches and their constant change is a definite challenge for MNOs.

Offerings There are many different possibilities of what tariffs and market plans might look like after eSIM comes to dominate. Very few, if any, MNOs have given much serious thought to how they might adapt their offers. Some use cases have few implications for what offerings might look like. In the case of the 'SIM-Swappers' mentioned above, for instance, the provision of multiple virtual SIMs rather than multiple physical SIMs represents a modest change for product offerings. But the creativity of the world's mobile marketers has not yet really been let loose on the opportunity.

User Experience (UX) The UX will change. For instance, there will be new mechanisms for activating a new eSIM profile, such as digital QR code, MNO application, or subscription management discovery service (SM-DS). The procedure for acquiring a SIM identity will need plotting out. The point-of-sale experience will change. Customer care demands will also change. The way in which the MNO app is used may well also change. The new UX demands will evolve over time, requiring continuous development and investment, as MNOs become more comfortable with eSIM and build their dedicated offerings.

For MNOs, implementing the eSIM technology is only the start of the process and the impact will cascade through these other elements, and will continue to do so as MNOs and the ecosystem expand their understanding of how to evolve their products and services to best take advantage of eSIM.

As mentioned before, this looks very much like a very specialised form of Digital Transformation, with new technology adoption necessitating operational and commercial changes throughout the organisation. Transforma Insights has previously identified 7 major areas that are likely to be affected by any Digital Transformation: process, business model, finance, people, partners, systems and culture. MNOs will need to deal with impact in all of these areas. And equally important they will need a change management process that ensures that all of these changes happen smoothly.





Process

Unless you're doing something very wrong, IoT creates new processes of some sort. At the very least it creates a stream (or trickle) of data from remote assets that has to be gathered, stored and used in some way. At the most extreme it necessitates a complete overhaul of how an organisation operates.



Business Model

IoT use cases represent a spectrum of implications for organisations' business models. In some it's a simple streamlining of existing processes, e.g. a port which can make big savings by marginal individual gains in more efficient container handling. In others, it completely transforms the organisation and how it operates.



Finance

New business models often mean new payment formats. Connected car services, for instance, provide a new ongoing revenue stream for manufacturers. In as-a-service models finance is really disrupted, e.g. with implications for the amount of debt on the balance sheet, with the seller no longer receiving a chunk of cash up front.



People

With adoption of new technologies comes additional requirement for internal resources capable of managing them. Suppliers will help with implementation, but there is an underlying requirement for internal capability to be able to work with the new technology. Demand for in-house data scientists, for instance, is booming.



Partners

Most organisations are going through a process to become more IT-centric. "Software is eating the world". Every company is an IT company now. For most organisations this means working with a wide range of partners rather than, create every aspect of their new capabilities in-house. Managing those partners is challenging.



Systems

It almost goes without saying that new IoT capabilities introduce new systems, including device management, data analytics and much more. These new systems need to be implemented, run and integrated with existing systems such as enterprise resource planning (ERP) and customer relationship management (CRM).



Culture

Notwithstanding the practical changes required of systems and skills, there is also the potential need for a change in culture within the organisation. Shifting from selling products to selling services, or harnessing a wide range of additional company data requires a culture shift to become more services - or IT - focused.

There is another way in which the analogy with a 'Digital Transformation' is a good one. Many companies erroneously see it as a finite exercise with a beginning, middle and end. In reality it is an ongoing process of continuous refinement. The same will be true of eSIM for MNOs. They will continually need to refine their approach to addressing the new market opportunity, particularly in the early years. This makes it all the more important to be able to.

things at the top of an MNO's to-do list

There is a lot to consider as an MNO deploying eSIM. What's for certain is that this is not a 'fire and forget' technology. Any implementation needs to include consideration of a wide range of factors that span the entire process.

1 User Experience (UX)

One common approach to Digital Transformation is to take a customer-centric view and work from there. With eSIM it is critical that the MNO thinks through all of the diverse ways in which eSIM will affect the user experience, including in-store service, customer care, website and so forth. Think about the customer journey and how it is affected by eSIM, and therefore all of the process changes and integrations that you might need to make to ensure the UX with eSIM is at least as good as with plastic SIMs. But ambition should not stop there. eSIM provides an opportunity to provide a better user experience, consistent across multiple devices, adding value to the MNO app, allowing better bundling of services, and so forth.

2 Orchestration capabilities and integration

MNOs need to implement a range of technology capabilities to ensure that they can properly exploit eSIM as its use grows. This includes a number of the technology elements discussed in the previous section. It also includes integration with existing systems, including point-of-sale, website, customer care, billing, and network. The approach to these eSIM orchestration and integration capabilities should be the same as for any other technology element: buy, don't build. Taking a ready-built platform that can provide the necessary eSIM functions and integration with other systems.

3 Ecosystem co-ordination

The commercial landscape for mobile services will be disrupted by eSIM. MNOs will need new relationships with providers of Subscription Manager capabilities, there will be new processes for onboarding of OEMs, commercial relationships with other MNOs will need to change, and the nature of wholesale agreements will also evolve. Most of the established relationships between constituents of the mobile ecosystem will need to change. At the same time, there are likely to be new entrants to the ecosystem, spurred on by the arrival of eSIM. For instance, New wholesale markets will open up, with customers interested in exploring selling bundles of content with data. Might I be able to subscribe to Bayern Munich v Real Madrid in the Champions League including the bundled data to watch it. It's possible. Micro-MVNOs might arise. The arrival of eSIM demands an even more coordinated approach between the relevant stakeholders, using a standards-based approach. The GSM Association has some obligations here to ensure that the common framework that it has established for eSIM covers all of these necessary elements. The MNOs have an obligation to conform to a set of universally agreed patterns of behaviour.

4 Marketing plan

While the arrival of eSIM might be relatively gradual, over the course of years, it would be smart to start thinking now about how it will impact the company marketing plan. It rides a coach and horses through the established 5 'P's of the MNO. You need to completely rethink pricing and product as the old models of bundling and selling will need at least a revamp. Promotion and place will also need to be overhauled as there will be new opportunities to reach a new type of customer. Assets as diverse as airline magazines and phone apps will become increasingly important battlegrounds.

5 Prepare for (constant) change

This is a digital transformation, in microcosm. They all involve significant changes in processes and commercial models, as well as technology. They will permeate many aspects of the MNO's activities and the MNO needs to think holistically about how it adapts to take advantage. MNOs need to be prepared for those changes, and put in place a change management process to oversee it. The rewards for doing this right are quite substantial. It means a greater agility to react to the new opportunities as they present themselves. And, on a more mundane but equally important level, it probably means fewer disgruntled customers who are confused by the process, so less churn and fewer customer care calls. MNOs really need to get this right first time or it will put off customers for years to come. With eSIM the change process will be relentless for the first few years, as MNOs, OEMs, customers and other participants in the ecosystem get to grips with how to use eSIM. This is a revolutionary technology but it is still not clear exactly how it will be used. Strategies will change and evolve and MNOs need to change to reflect that.



final thought

What's happening with eSIM is a story that has played out a thousand times before. It's a technology shift. All such technology shifts almost always brings new opportunities and threats. This is a Digital Transformation of the subscriber relationship with the device and the network. Historically it was all based on manual processes: go into a store, get a piece of plastic, put it into a device, phone someone up to activate. All very 20th Century. This needs to change. And in doing so it changes the relationship between device, network and subscriber, i.e. the fundamentals of what a mobile operators does. That change creates challenges and opportunities; it will be the fastest moving and most agile MNOs that are best placed to benefit.

MNOs must also understand that being fast to roll out the technology is not enough. They need to undergo a Digital Transformation process, and it must be pursued proactively. The MNO can't do this alone. The need to make extensive changes, at rapid speed, across many elements of the organisation, makes it essential that the MNO find partners to streamline the process of integrating eSIM into almost every facet of what the MNO does.

Ultimately, the industry wants all the benefits of the SIM card, with none of the drawbacks. The SIM card was simple. There is great potential for confusing people with eSIM and turning them off the benefits. MNOs must iron out as many of the wrinkles as possible from the end-to-end eSIM experience, which includes billing, provisioning, customer care, retail and much more.