



Axon Consulting

Commercialising Emerging Technologies

Technological developments, the need to diversify mature ICT businesses and the prospect of significant returns drive global attention to emerging technologies. In this article, we focus on current perceptions, challenges and recommendations for the commercialisation of emerging technology.

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1. Introduction

Similar to other popular and fashionable concepts, emerging technologies are regularly evoked in connection with 'seizing opportunities', 'standing out from competition', 'expanding the value proposition' and simply expanding a business as a whole. Clichés apart, these technologies' potential for adding whole new territories to the space occupied by saturated ICT markets, with potentially huge returns for the successful newcomers, helps explain their appeal despite any associated, and often underestimated, risks of failure.

It is a plain fact that businesses in today's mature ICT service markets must grapple with formidable competition, and margins that tend to shrink by the day. It is therefore vital for them to keep an eye on the tricky and uncertain paths of emerging technologies, and successfully monetize the right candidates among them to survive and thrive.

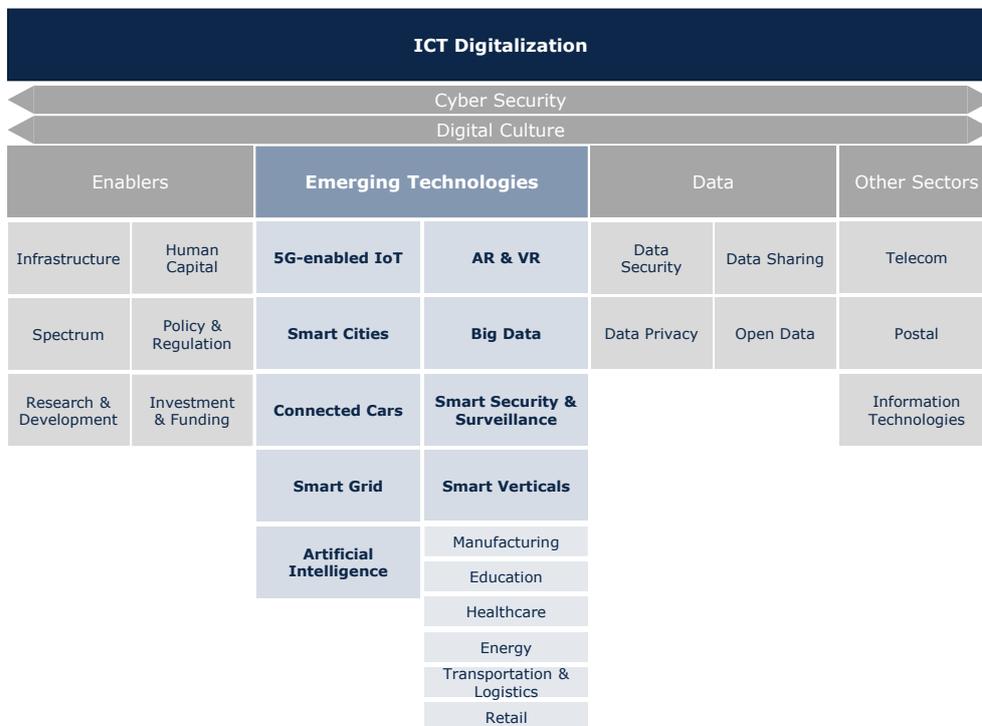
In this article, we aim to elaborate on how businesses perceive such technologies and associated commercial opportunities, the challenges they meet on the road to success or failure, and recommended ways to commercialise emerging technologies, without unrealistic expectations.

Emerging technologies' potential for adding whole new territories to the space occupied by saturated ICT markets, with potentially huge returns, helps explain their appeal despite any associated, and often underestimated, risks of failure.

2. Scope of 'emerging tech'

Emerging technologies are one of the most important topics under the large umbrella concept of ICT digitalization, together with other themes such as various types of digitalization enablers or data, and 'cross topics', such as cyber security and digital culture.

We can define emerging technologies as ICT technologies that are not yet fully developed and seized but are set to be launched within a time frame of up to ten years, once enabled by ICT enablers (i.e., infrastructure, demand, human capital, policy & regulation, research and development, investment and funding).



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Exhibit 2.1: Illustrative Scope of ICT Digitalization and the Position of Emerging Technologies [Source: Axon]

Depending on the role of enablers and various security and cultural aspects, the boundaries of emerging technologies are constantly shifting, and their impact is expanding. Prominent current examples include the Internet-of-Things with an emphasis on services enabled by 5G, Smart Cities, Smart Verticals and Smart Grid Services, Connected Cars, Augmented and Virtual Reality, Big Data, Artificial Intelligence, Smart Security and Smart Sectors (i.e., Verticals). Yet, it is important to note that topics under the concept of digitalization are quite often interlinked,

diluting boundaries. This is why the role of such other, distinct but interlinked, topics should also be understood when bringing emerging technologies to life. In addition, some emerging technologies, such as IoT, have cast a net that is large enough to include distinct sub-categories of emerging technology. For an example, one can think of Augmented Reality (AR) and Virtual Reality (VR), which both form part of the larger 5G-enabled IoT category.

Keeping these shifting boundaries in mind, this article substantially draws on our first-hand experience with 5G-enabled IoT, Smart Cities and Verticals, Augmented & Virtual Reality, Connected Cars, Smart Security & Surveillance, Smart Verticals and related infrastructure network aspects (e.g., Edge Computing).

3. Perception of emerging tech

There are regular attempts at quantifying emerging technologies' potential through studies of market size and future growth estimates, complemented through more qualitative predictions about their impact on our daily lives. Quite often, these expectations turn out to be exaggerated and must be shifted forward as the deadline for their supposed realization comes closer.

When it comes to the reasons behind such unrealized expectations, some businesses will invoke unpredictable obstacles, which were particular to their journey, but will still keep their faith in an overall rosier picture; others will tend to suspect that emerging technology studies do not reflect market reality. Our work on the field and our numerous studies over the years lend support to both of these views, depending on the circumstances.

The world's expectations for the future emerging technologies market observe a logic that can be broadly summarized as follows:

- ▶ *Technological developments will create services that are fresh and appealing, thanks to the plug-and-play nature of underlying technologies.*
- ▶ *These services will be supplied readily to the market, given ICT service providers' motivation to expand their businesses.*
- ▶ *Similarly, there will be substantial and quick demand, as customers are also willing to welcome and pay for innovative services that can boost their businesses or improve comfort in their daily life.*
- ▶ *All in all, the total value created will be captured in monetary terms.*

Although this thinking process is not necessarily wrong, it disregards some important variables along the road.

Before getting into details, we should remember that the emerging technologies business is no different to any other ICT business in that it is ultimately a function of two aspects: the commercial and the technological. Our experience suggests that, despite variations across emerging technologies, the main problem lies in the commercial side's significant lagging behind the technology side, with negative implications for emerging technologies' ability to generate monetary value within the desired timeframe.

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4. Challenges on the road to commercialisation

Typically, the contrast between optimistic expectations about the opportunities offered through emerging technologies and the reality encountered during actual implementation is less due to the real merits of the services concerned than to the business and commercial models deployed.

So, what are the key factors leading to such a challenging gap between expectations and reality?

4.1. Low visibility of market potential

A first challenge pops up in the early market-sizing and business planning phases, through the difficulty of understanding an immature market's characteristics.

Whether free or paid, most of the market research studies dealing with emerging technologies share a common feature: they apply a top-down approach, based on relatively indirect metrics. It is also very common for their figures, estimates and trends to be populated through extrapolation from overbroad or mixed geographic areas with no consideration of particular country dynamics. Another problem is that such studies are not always relying on up-to-date data, a critical problem when dealing with such volatile and dynamic markets.

By contrast, decision makers need to be able to rely on detailed, direct and fresh facts and figures, together with particular and pertinent characteristics of the specific region concerned. All this requires substantial preparatory efforts for customized market research, prior to the actual business launch. It is difficult for service providers to engage themselves fully in such preliminary research, planning and insight extraction activities, as these are not part of their core business, and can be perceived by their shareholders as a wasteful and speculative distraction. Realizing what is actually required here and the insufficiency of internal resources to deal with it can often discourage market players from pursuing emerging technology opportunities at an early enough stage.

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4.2. The integration challenge

As broadly acknowledged, the emerging technologies' business ecosystem is highly fragmented, with individual entities mostly focusing on very specific tasks within large value chains. As the name suggests, emerging technologies tend to be developed by start-ups and other new companies that are relatively young, small but uncoordinated – the flipside of agility. Even larger organisations, with the potential to cover multiple steps of the value chain, may still present a scattered picture due to internal conflicts of interest, lack of coordination or their disregard for the critical, although less visible, role of third parties or sub-contractors.

In a situation of multiple parties bringing in multiple technologies and systems, integration becomes critical for a feasible service provisioning process. This sounds like an easier task than it really is. Practical requirements for resources (e.g., time, money, human capital) are often unveiled only at the very end of business planning activities. Moreover, many of the integration steps required may not even be revealed before technical teams are confronted by them in the implementation period. As such requirements are unexpected and tend to grow exponentially, they may cause delays or even failures of roll-out plans. Just like an iceberg, the reality of integration tasks and the budget, time and effort they engender may only become fully visible when it is too late for one or multiple parties in the value chain.

Contrary to more stable and traditional ICT services such as voice telephony or the Internet, the service design of emerging technologies cannot be squeezed into one-size-fits-all mass products, but often necessitates significant customization, due to very different and sophisticated customer needs. This may require initial commercial and technical plans to be continuously re-developed for different sets of stakeholders, with some of them being rejected or abandoned half-way.

Existing telecom or other ICT companies with deep pockets and the necessary scale may find it difficult to integrate such flexible and customized products into their product portfolio and internal organisation. Agility and large scale do not mix well.

Integration efforts potentially carry an iceberg characteristic and they often cause to higher budgetary requirements compared to initial commercial plans.

4.3. Difficulty of choosing the right technology partners

Although related to the previous challenge, choosing the right technology partners deserves special attention. Our experience suggests that partner selection is generally not considered difficult, given the plethora of technology companies 'out there' with decent expertise in different business layers. However, it is crucial to clearly understand the value proposition of different technology vendors and how these match an emerging technology's business requirements. This is more difficult than it seems, because of the knowledge asymmetry of the parties involved. In other words, even if each stakeholder is very knowledgeable within its core business, it is much less capable of judging potential business partners active outside its comfort zone. Reciprocal compromises to reach a deal with technology partners can weaken the design of a successful service model.

In addition to this challenge, selecting the right technical partner and working together needs to overcome a list of other sensitive topics, which should not be overlooked, such as:

- ▶ *Protection of industrial property/knowhow through the necessary early filings, confidentiality, non-disclosure and cooperation agreements*
- ▶ *Data security and data storage*
- ▶ *Data privacy*
- ▶ *Regulatory compliance*
- ▶ *Crisis management*
- ▶ *Ability to develop from-scratch solutions / customize*
- ▶ *Ability to offer / comply with high SLA standards*
- ▶ *Common grounds experience, i.e., the ability of mid-layer units from different parties to work in a compatible way, as emerging tech services tend to be developed jointly rather than be offered off-the-shelf.*

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4.4. Customers left in the dark

It is important to remember that emerging technologies do not typically respond to strong pre-existing consumer demand. Yet, once emerging

technology products or services become possible through technological enabling developments and innovation, they often create potentially whole new business areas and revenue streams. Consumer response cannot be taken for granted, however: there is a requirement for a marketing process which can be roughly described as 'inventing the need'.

To second-guess consumer's response to new types of ICT services and products, emerging technology service providers rely on various tools:

- ▶ *Periodic research through reliable and up-to-date market analysis studies, which may also focus on broader, indirectly related or adjacent market areas – as the optimal focus of new products is not necessarily clear from the outset;*
- ▶ *Monitoring competitors' marketing, R&D, M&A strategy and new partnership activities;*
- ▶ *Paying for primary, targeted, research via surveys, interviews, focus groups or other traditional avenues;*
- ▶ *Drawing conclusions from success stories and advice from technology providers.*

Most of the time, such efforts do end up extracting relevant information. However, such information is still based on a theoretical process, as the real potential of emerging technologies is still a matter of – at best - informed speculation rather than actual experience. Almost by definition, emerging technology markets are not there yet, but are waiting to be built through actual commercial transactions between market operators and customers.

Consequently, the fact that customers (the public, businesses or government entities) are much less exposed to emerging technologies than the service providers bringing them on the market creates a critical imbalance. When potential customers are asked about what they need, very often the answer is a counter-question about what they can get. This implies that some, if not most, customers are in the dark, with no clarity on their actual emerging technology needs. Henry Ford's famous words "if I had asked people what they wanted, they would have said faster horses" may or may not have actually been said, but they are, in any case, as applicable today as they were a century ago.

The upshot is that, when emerging technology products or services are introduced in a sloppy or otherwise unappealing manner, most consumers will prefer not to take the plunge of buying them, especially as new

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products, which normally still lack economies of scale, can be expensive or not yet flawlessly integrated into the consumers' ecosystem of other products.

Consumers' concerns about new ICT products can find expression in a number of ways:

- ▶ *Suspensions that the delivery of such new products or services will be late and problematic;*
- ▶ *Requests for reference projects or case studies;*
- ▶ *Repeated customization requests;*
- ▶ *Requests for alternative solutions that cause a lot of re-work;*
- ▶ *Asking for Proof-of-Concept (PoC) deployments before purchasing;*
- ▶ *Concerns about hidden bugs;*
- ▶ *Suspensions that prices are too high, given the lack of market visibility for such new services or products;*
- ▶ *Requests for commercial plans with a guaranteed service success prior to payment.*

All in all, when excluded from pre-sales stages, customers are likely to be suspicious and prone to repetitive loops of information or customization requests, which can undermine commercial feasibility and appeal up to the point that the parties involved become seriously frustrated and lose their interest.

4.5. Lack of a holistic approach

As stated earlier, provision of emerging technologies' services usually requires multiple parties to collaborate on different service layers (e.g., connectivity, data and solution management platforms, equipment, data storage, data analytics etc.).

Even if each party carries a responsibility to maintain end customers' satisfaction in order to sustain the business, customer ownership is perceived as belonging to one single party, typically the one interfacing with the end-customer. Consequently, parties with only partial roles in specific layers of the value chain may put the highest priority on ensuring their short-term financial return, with less attention to the successful

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ultimate provision to the end-customer of the services they are involved in.

Such external parties within the value chain are usually small or medium sized technology companies and start-ups. Dedicating a significant share of their resources into PoCs or pilot studies, where actual opportunity is unknown, can be too risky for them.

This aspect is especially important considering that customers of emerging technology tend to reject payments in advance prior to service success. In the interim period, this can lead to substantial frictions within the value chain, as the 'customer owner' party may be unable to convince its smaller partners to accept such deferred payments for their contribution, pending feedback from an end-customer they do not interface with.

Larger companies, able to dedicate significant own resources to new projects and eyeing longer term returns, can face a different type of holistic-view problem: a lower appetite for any new business that may ultimately deviate resources from, or even cannibalize, the group's 'safe' core business. Where new opportunities are not attractive enough, such larger companies may prefer sticking to off-the-shelf solutions, with minimum engagement, without the extra effort and risk necessary to ensure new technological solutions' success on the market.

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5. Concluding recommendations

To a certain degree, challenges such as those discussed above can sort themselves out over time. Nevertheless, it should be preferable to accelerate this process and hopefully even bypass it right from the start. In this section, we provide certain recommendations to that effect.

5.1. Do not wait until the market is settled

Service providers aspiring to commercialise emerging technologies do not always have the necessary stamina for risk taking, but may be inclined to wait and see what other companies introduce in the market or how reference projects are successfully deployed elsewhere. Such a mindset points to a 'follower' approach, and a supposedly safer corporate strategy of following into the steps of pioneering companies, while the new market is being settled. But even if waiting for the market launch of new services can offer some visibility and clarity on their commercial prospects, it can also lead to missed opportunities. In the ICT field, an early mover advantage and resulting network effects can be the key to success, to the exclusion of more wary competitors.

Service providers in the broader ICT space are well-advised to keep an eye on early-stage efforts within the competitive landscape. Monitoring competitor activities through project-based service deployments (e.g., tenders), pilot studies and fairs or expositions becomes critical in order not to lose an early-mover advantage.

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Competition Status					
	Competitors in the Addressable Market				
	Competitor 1	Competitor 2	Competitor 3	Competitor 4	Competitor 5
5G-enabled IoT	☑ ★	☑ ★			☑ ★
Smart Cities	☑ ★	☑ ★		☑ ★	
Connected Cars	☑ ★	☑		☑ ★	☑
Smart Healthcare	☑ ★				
Smart Education				☑	
Artificial Intelligence				☑ ★	
Smart Grid				☑ ★	
AR & VR		☑ ★		☑	☑
Smart Security & Surveillance				☑ ★	☑
Smart Transportation & Logistics			☑ ★		☑
Smart Retail		☑ ★		☑ ★	☑

★ Project Evidence
 ★ MoU or Trial Evidence
 Prioritised
 ☑ Competitor Solutions

Exhibit 5.1: Illustrative Competition Status Overview [Source: Axon]

All in all, even if market players understandably prefer operating within their comfort zone, emerging new markets are up for grabs, first and foremost, by those risking to step out and take the lead.

5.2. Adopt a start-up spirit

Attracted by the financial return prospects of emerging technologies, ICT and other service providers are eager to exploit it as extensively as possible. Yet their steps to that end may be self-defeating, because of organizational (and sometimes bureaucratic) internal structures or the operational workload of their existing services.

As a result, service providers that are already too busy with their existing operations and frustrated by the complexity of emerging technologies may end up limiting themselves to offerings with incremental value propositions and complementary add-ons to their existing services. This causes them to overlook opportunities with unique value propositions.

It is important for companies to focus on their emerging technology operations separately, without allowing them to slow down or be pushed aside by the company's existing businesses. A key step to that effect includes the acceptance of risk-taking and a start-up spirit within dedicated units, shorter product development cycles, and readiness to deviate from established corporate routines, without rejecting potential synergies with centralized and shared services.

Accepting to take risks and adopting a start-up approach within dedicated units, shorter product development cycles and ability to change are crucial.

5.3. Build collaborative relationships

Arguably the most important aspect for the successful commercialisation of emerging technologies is building collaborative relationships with relevant stakeholders, and especially technology partners and commercial partners (i.e., customers). This mindset should be in action through all stages, starting from business ideation to the very end of customer lifecycles. The Exhibit below shows a recommended approach for a healthy emerging technology business, with an emphasis on the involvement of technology partners and customers.

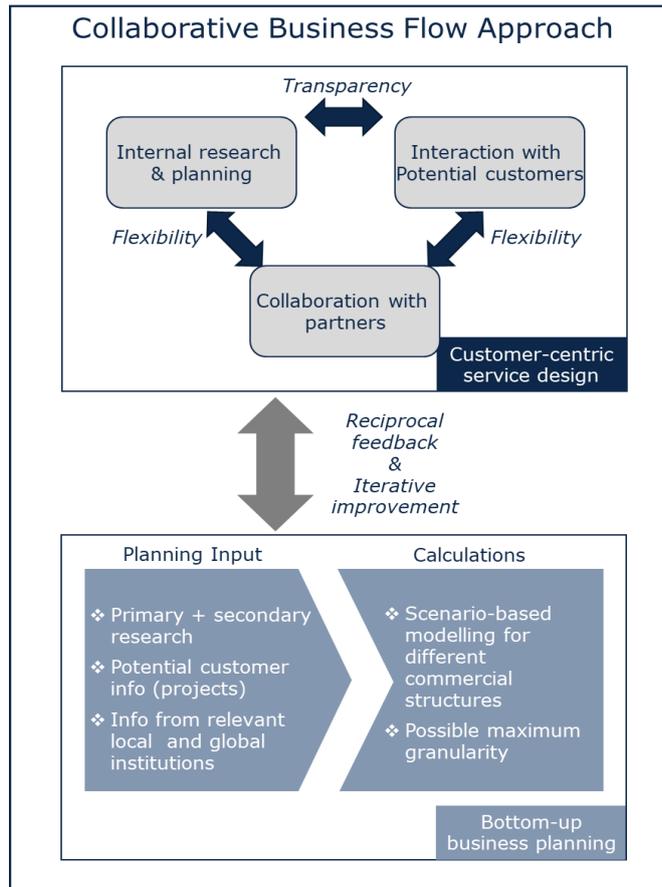


Exhibit 5.2: Collaborative Emerging Tech Business Flow [Source: Axon]

In the following sub-sections, we shall elaborate further on the importance of collaboration with both partners and customers.

5.3.1. Working closer with partners

The fact that emerging technology value chains are fragmented is true in all stages of establishing a running business, starting from the initial survey of the market and business planning. Still, what we often see are business plans prepared in a purely theoretical manner, without any interaction with any of the actual partners expected to be involved at later stages. Unsurprisingly, such theoretical business plans lose their credibility as soon as the partners involved step in, with their own agendas, experience and counter arguments, which often run contrary to the business plan's theoretical assumptions. Therefore, early planning efforts must aim to be more practical through:

- ▶ *engaging with partners early on to discuss relevant procedures, potential opportunities and barriers;*

Theoretical business plans lose their credibility as soon as the partners involved step in, with their own agendas, experience and counter arguments, which often run contrary to the business plan's theoretical assumptions.

- ▶ *updating plans with practical insights as early as possible, in both service design and business planning activities.*

Based on our experience in similar engagements, we recommend starting from a more theoretical lay of the land, with market research and plans, but switching to practical terms as early as possible, with the help of other key stakeholders and potential partners.

Admittedly, background operations and processes for emerging technology service provisioning are neither straightforward nor sequential. Business requirements are quite dynamic and usually require the continuous involvement of relevant parties within the value chain. Simply building a relationship in which other stakeholders are limited to delivering their products and services, invoicing and disappearing until further notice is simply not enough when it comes to emerging technologies.

All stakeholders, starting from, but not limited to, customer owner parties that carry the responsibility of end-to-end services, should have a mind-set and ability to engage not only on a transactional level but also on business development and customer satisfaction levels. By doing so, they can familiarise themselves with other areas of the value chain and become a more coordinated force for the successful service provisioning to the end-customer.

To achieve such a collaborative state, our experience in various markets reveals some helpful tools including but not limited to:

- ▶ *Early identification of requirements to be provided via partners;*
- ▶ *Detailed and comprehensive research of potential partners;*
- ▶ *Adequate criteria for partners' evaluation (e.g., flexible commercial plans or ability to work side-by-side);*
- ▶ *Interest in business development and service design;*
- ▶ *Technology and knowledge transfer capability;*
- ▶ *Competence in data and information security.*

In essence, we can only emphasize the importance of sharing responsibilities with partners in the value chain, throughout all stages of service provisioning, from business development to customer success.

Stakeholders, should have a mind-set and ability to engage not only in transactional levels but also in business development and customer satisfaction levels.

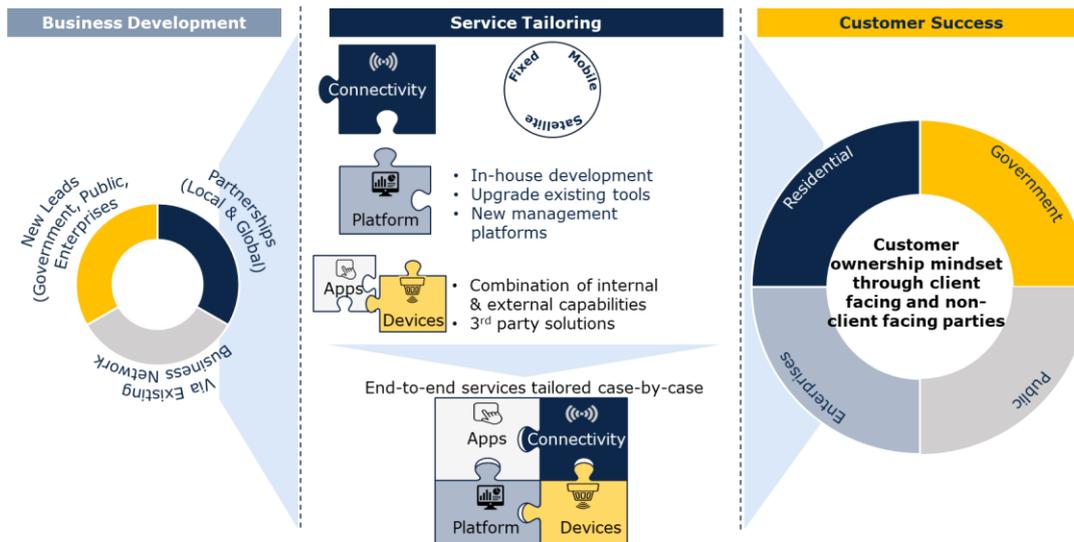


Exhibit 5.3: Illustrative Service Provisioning Approach [Source: Axon]

5.3.2. Involve customers into earlier stages

As stated earlier, emerging technology services require customization on a case-by-case basis, as service design is subject to particular and evolving customer requirements: one size does not fit all. This underlines that the merits of a collaborative attitude and actually working closer with partners also extend to the relationship with customers.

Nonetheless, in our experience, many ICT service providers tend to approach customers only after finalizing a complete emerging technology service portfolio. Sadly, such a 'service-centric' approach is very risky as it is almost blind-guessing specific customer needs without any previous interaction with them. Consequently, involving customers into early service design stages of emerging technologies is almost a must-have. In other words, we recommend a shift towards a more 'customer-centric' approach by putting customer needs at the forefront of the venture's priorities and trying to fulfil them collaboratively with the relevant partners.

Involvement of customers from early service design stages has nearly become a must-have.

6. About Axon Consulting

Axon, through its consulting arm, is an international investment and consulting firm offering world-class consulting and corporate finance services to a broad client base in the ICT industries.

In the last 10 years, Axon has executed +500 projects in +60 countries in the ICT domain for major private companies, institutional bodies, and technology companies worldwide.

Axon is at the forefront of ICT digitalization, having advised market players across the globe in a wide range of issues, including the definition strategies in the new digital ecosystem and development of business and go to market plans for emerging technologies.

Analysts Team at Axon Partners Group¹

¹ The views and opinions expressed in this article are those of the authors and do not necessarily reflect those of Axon Partners Group.