The revenue opportunity for mobile connected devices in saturated markets

Northstream White Paper

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At the end of 2009 there were approximately 4.6 billion mobile subscriptions in the world, of which the vast majority were mobile phones and mobile broadband modems.[1] With current growth rates there will be more mobile subscriptions than people on earth well before the end of the decade. The rise of various mobile connected devices (other than phones and broadband modems) can boost the total numbers by a ten-fold if the industry finds a way to harness the potential. Many of the prominent industry players and observers are demonstrating their strong faith in this market through bold predictions about mobile connected devices. (see Figure 1)

Mobile Connected Devices

There is no agreed, industry wide, definition for M2M but most often it refers to "machine-to-machine", although mobile-to-machine or man-to-machine have also been used. M2M communication typically occurs over wireless technologies including cellular networks, WLAN, Bluetooth, and RFID with little or no human interaction. Even the GSM Association (GSMA) has recognized the significance and need for further defining of this area – launching what they call the "Embedded Mobile Programme".[2] In this paper, Northstream uses the term "mobile

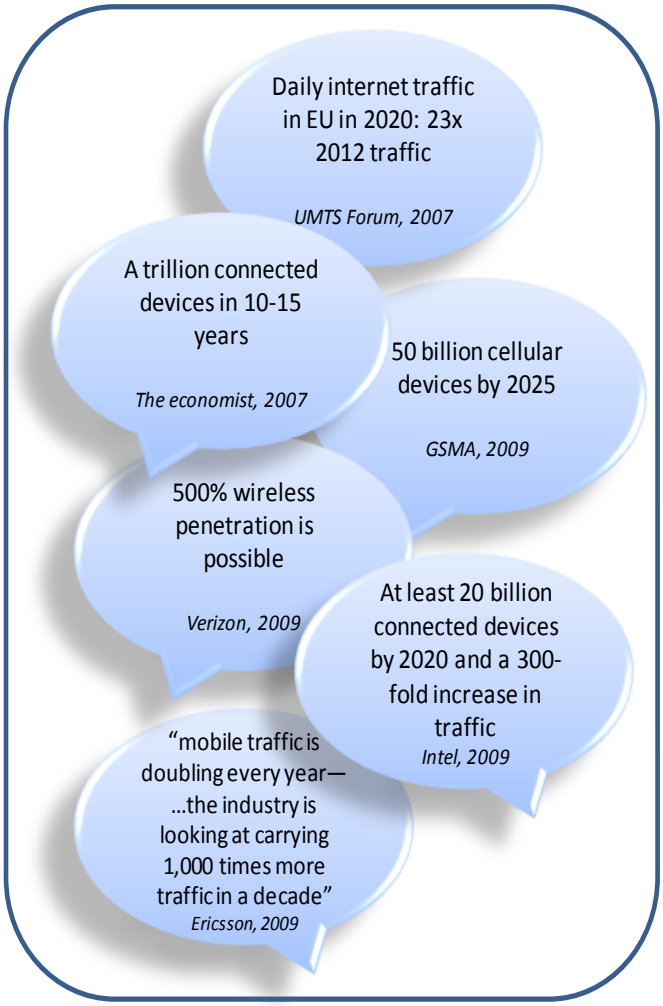

Figure 1. Examples of forecasts and visions of the connected devices market

[1] Source: ITU, The World in 2009: ICT Facts and Figures, October 2009

[2] Source: GSM World, Embedded Mobile Newsletter, August 2009 (The Embedded Mobile initiative was announced at Mobile Asia Congress 2008)

connected devices" to include not only M2M, but also new categories of mobile devices such as the e-book readers, digital picture frames, connected GPS-based tracking devices, and other service specific devices like the TwitterPeek (used for micro blogging). These data centric consumer devices, as well as the more traditional machine-to-machine connections, are expected to experience strong growth in the coming years.

Market overview

Some even believe there will be tens of billions of connected devices by 2020. There are currently around 75 million cellular M2M connections in the world, expected to increase to 225 million by 2014, (see illustration in Figure 2, bearing in mind that the cellular connections only represent a subset of the overall mobile connected devices market). Non-cellular connections are not in the scope of this paper, but they likely have a positive impact on the overall growth of cellular connections by boosting the usage of M2M communications.

The technical solutions for many mobile connected devices applications have been in place for some time, but implementation has been scattered. Telemetry (transmitting data captured by a measuring device) and telematics (automation in automobiles) are by far the two biggest areas driving the growth of mobile connected devices today. Other solutions range from healthcare devices and remote industrial monitoring and control solutions to consumer devices and more solutions will come as the industry matures. The removal of the physical SIM could further drive new applications and technical solutions could be more widely implemented. The GSMA initiative mentioned earlier is a strong sign of the industry's aim for standardized and flexible solutions.

There are several drivers for the growth of mobile connected devices, for example the regulatory requirements such as the European eCall initiative and national/regional utility metering regulation which have driven the number of connected devices in cars and households. In the US federal stimulus funds are used to speed up the "Smart Grid" implementation. Cost efficiencies realized from more accurate control and monitoring of enterprise assets, for example fleet management systems, will also drive the demand for mobile connected devices.

The number of mobile connectivity solutions is increasing all the time as commercially viable solutions are found to bring this technology to the masses. Intel believes the biggest challenge is in creating profitable business models – "*business models capable of monetising the hyper-connected world are not there yet*."[3]

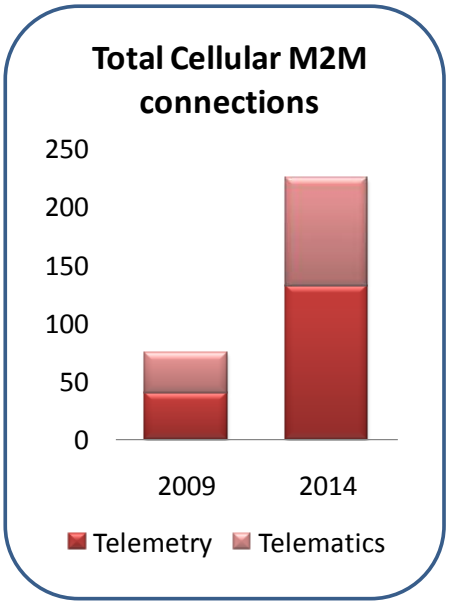

Figure 2. Mobile connected devices market growth forecast[4].

While all industry verticals naturally are of interest to operators, here we discuss areas where growth is observed and where operational efficiency can be achieved by implementing mobile connectivity into devices. Figure 3 illustrates some application examples. Opportunities in many of the following areas have not been fully explored by most operators.

Utility industry is traditionally very risk-averse and hence often not first to implement revolutionary technology, but the introduction of new regulation has made a significant change in a rather short time period, and this industry has indeed installed large numbers of mobile connected devices. According to ABI Research, 49 million smart electricity meters, which automatically relay measurements to the utilities, were installed in 2007. In 2009 it was more than 76 million.[5] It should be noted that some of these meters communicate over fixed networks. Smart metering systems are also referred to as "smart grids" where connectivity is used for more efficient electricity consumption and enabling utility companies to offer better customer service.

Transportation and vehicle telematics: The fleet management solutions communicating data from sources within the vehicle are already widely

[3] Source: Business Week, John Woodget (Intel), June 2009
[4] Source: ABI Research, 2009
[5] Source: ABI Research, 2009

used by companies such as UPS. These are not only related to location, but sensors in engines gathering data on vehicle speeds, oil pressure, and engine temperature are just a few examples. Some leading automakers such as Toyota, GM, and BMW have already launched factory-installed telematics using a built-in box with a cellular module, while others like Ford are using the driver's mobile phone to enable services.

Security industry, which is here referred to as the industry providing home security systems, has traditionally offered fixed line connections for surveillance purposes (for example CCTV), but is now gazing towards possibilities using the wireless GSM/3G networks instead. The new M2M system is activated when an intruder is spotted in the area under surveillance and it instantly starts taking a video footage or images. These kinds of new home security systems have already been implemented in Europe, both as the primary system and as a back-up solution.

Operator revenue potential of mobile connected devices

As communication module prices decrease and mobile connectivity is increasingly becoming cost-efficient to implement on large number of devices, the benefits will spread across industries leading to completely re-designed ways of working. Mobile operators are providing the cellular connectivity that sets them in a key position in the industry to capture shares of the mobile connected devices revenue potential. MVNO's and MMO's (M2M Mobile Operators) are active in the mobile connected devices area, but MNO's are still the only ones operating and owning the actual radio network. Northstream sees that there are three factors defining the revenue opportunity - the market saturation, declining ARPUs, and the state of communication infrastructure in the markets.

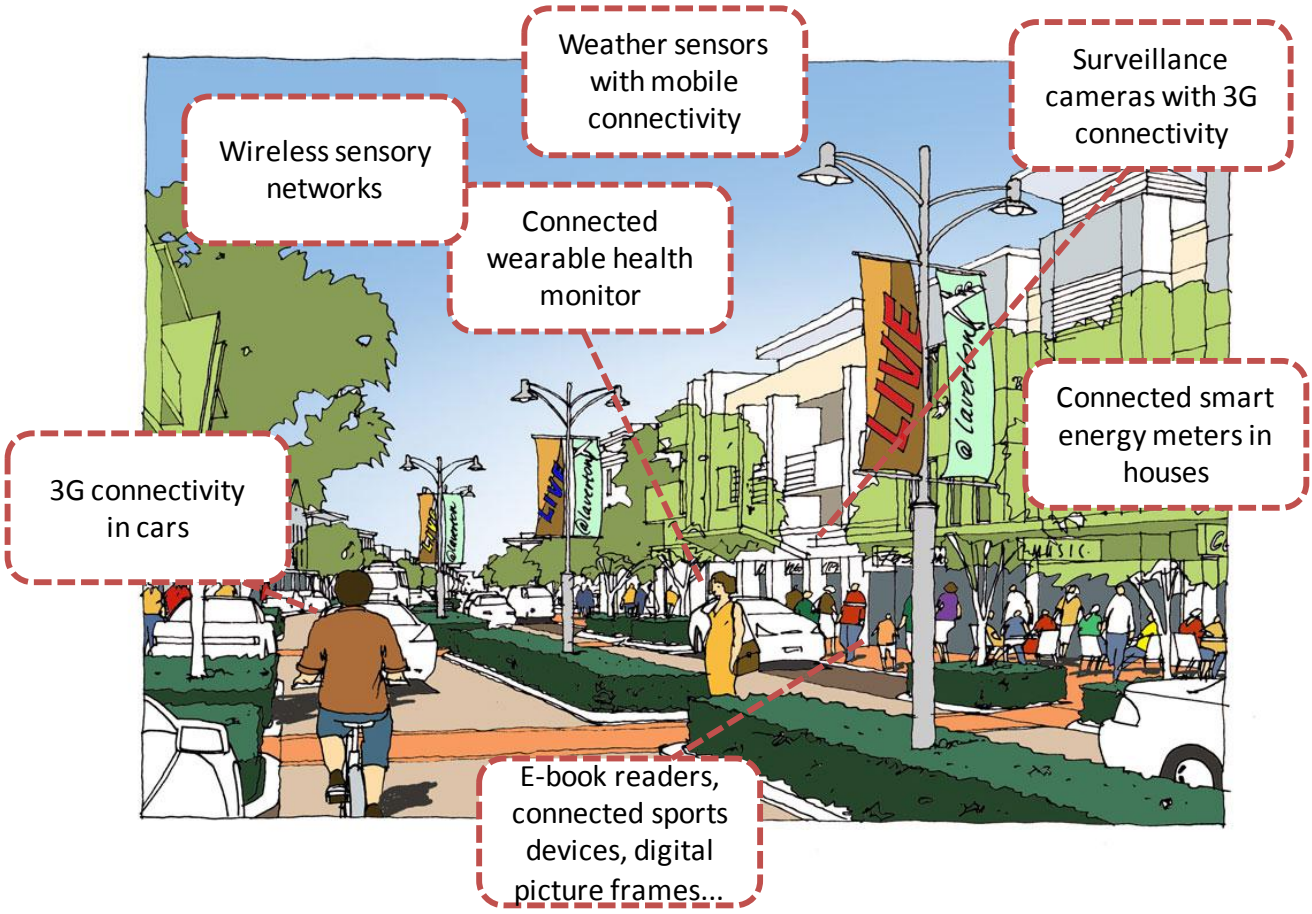

Figure 3. Mobile connected device applications.

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Market saturation

One factor affecting the connected device market potential is the level of mobile phone and laptop penetration in the market. The pick-up of the mobile connected devices market is believed to be stronger in regions or countries where the mobile phone market is saturated or near saturation. In these markets the operators have the strongest needs to look for alternative revenue sources due to declining voice revenues.

Global average level of mobile phone penetration is close to 70%[6] today, and is the lowest in developing countries, where it grows the fastest. In many developed countries there are more than 100 mobile phone subscriptions per 100 inhabitants, whereas the least developed countries had a ratio of 20 to 100 inhabitants in 2008. For mobile broadband there are also substantial differences between regions, as well as *within* regions. The highest penetration levels are in Europe, Asia Pacific, and the Americas - dominated by the US (82.6% of all broadband connections in the Americas), and Japan and the Republic of Korea (comprise 70% of all the broadband connections in the Asia Pacific region).

In developing markets, operators are still strongly focusing on offering basic services, like voice and SMS and therefore these markets are not seen as key for the immediate mobile connected devices growth. As a consequence, the connected devices market is now most relevant in developed countries with high mobile market saturation

Decreasing ARPU

Operators are increasingly finding themselves in a situation where declining ARPUs of traditional voice revenues are challenging their revenue models, and whereas voice revenues are still the main revenue source, this erosion is forcing operators to come up with new ideas and models to compensate. This ARPU trend is illustrated in Figure 4. Traditionally MNO's have tried to reach high ARPU levels, for example by offering diversified services in order to increase profitability. However the connected devices market is all about volume. First a sufficient amount of connections has to be attracted, but more importantly, these connections need to be managed very efficiently due to their low margins. New revenue will be distributed over large numbers of subscriptions making the traditional ARPU measure obsolete. Mobile operators still retain a central position in the value web, and there is revenue potential for them, but they need to be even more efficient in provisioning and operating for these new types of connections to be profitable.

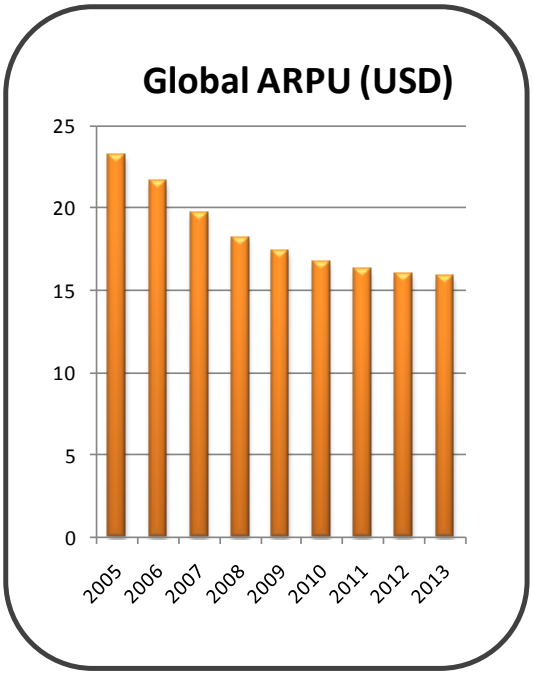

Figure 4. Declining global ARPU levels.[7]

Mobile communication infrastructure

The third factor defining the revenue potential of mobile connected devices is the communication infrastructure within a country or a region, and furthermore the *level of sophistication* of this network plays an important role. In developed markets mobile communication infrastructure is sophisticated and spread widely enough. Extensive coverage is key for successful services to mobile connected devices. With a comprehensive cellular coverage remotely located devices can be connected. Telematics is the most mature segment within mobile connected devices, and is becoming even more popular as the awareness increases among manufacturers, service providers, and end-users.

Widespread availability of 2G and 3G networks including access to wireless packet data connectivity (GPRS, EV-DO, UMTS) encourages the usage and implementation of these new mobile connected devices. "*While currently telematics communication is over a 2G network, the movement to 3G networks will enable the*

[6] Source: UNCTAD Communications and Information Unit, Information Economy Report 2009: Trends and Outlook in Turbulent Times, October 2009

[7] Source: Portio Research, June 2009

potential for communication of rich information between machines – beyond just current messaging, and into more and more complex information capabilities."[8] Although today many of the mobile connected devices do not need the high throughput of HSPA networks, and it could be discussed whether this discourages MNO's to invest in building an expensive network that would be mainly used by a customer group that offers ever decreasing ARPU. Therefore, from a mobile connected devices perspective, it could be more important to have a comprehensive build-out of the 2G network to provide coverage than 3G providing capacity.

In the developed countries where the above discussed factors most often coincide - high mobile phone saturation levels, declining ARPU's, and relatively well evolved mobile network – here the potential for MNO's to gain revenues from this new breed of connected devices is the biggest.

Operator challenges when pursuing revenues from the mobile connected devices markets

Despite new revenue potential for operators in the mobile connected devices market, these opportunities are associated with new types of challenges. The demand and market awareness is not yet on a very high level, as enterprises and end users are not fully aware of how applications or products can benefit from mobile connectivity. The mobility in connected devices can increase operational efficiency, but since the applications can be complex and time-consuming to develop and implement, companies may find it too challenging to attempt to produce an offering on their own. Operators may simply not possess the resources needed to function on such a diverse area. The risks for operators to consider when offering solutions in the connected devices markets include:

1. Fragmentation and complexity of applications

   There is a vast number of mobile solutions and vendors offering different types of applications, and it is difficult for operators to excel in several areas simultaneously without driving up development and integration costs. This might also result in failure to attract large enough volumes if the solution is not easily transferred across companies/industries. Lack of standards in the mobile connected devices markets adds to the complexity.

2. Diversity of solutions available

   Various technologies are competing with the mobile operators' offerings. A strong case needs to be built to support the usage of cellular technology for a certain solution instead of an alternative option. Implementing a cellular connection might often be more expensive than the competing solutions, due to higher module costs. Still, there are often strong advantages for wireless solutions in general as some locations are more conveniently reached with wireless connection, and also wireless solutions tend to be more cost efficient to implement than wired connections.

3. Low revenue per connection

   Network operators are accustomed to relatively high revenues per user and will need to adapt to significantly lower revenues per connection for the mobile connected devices. The average ARPU for mobile connected devices is in the range of 5-10USD per month[9], in some markets this is less than 10% of the voice ARPU.

4. Relatively high SAC/operating costs

   Mobile connected devices often communicate very sporadically, sending messages of which many are not time sensitive. These devices are not believed to create a huge traffic load on the network in the early years, but costs are relatively high for provisioning and servicing a mobile connection (compared to the revenues these connections yield) since the traditional cellular network infrastructure is not optimized for mobile connected devices. For these new revenues to materialize, new ways of working needs to be implemented, solutions need to be found on how to control the SAC levels for the mobile connected devices as they frequently generate very little revenue per connection.

To overcome these challenges and avoid potential pitfalls, operators need to carefully analyze how to best address the mobile connected devices market. Knowledge and experience in this area is still limited, which might result in stumbling-blocks during early implementations. The mobile connected devices market benefits from the R&D, experience and the large scale of the mobile handset industry, but leveraging from that experience alone may not be enough to make the case for millions of low ARPU connections into a commercial success.

[8] Source: Total Telecom, January 2009

[9] Source: ABI Research, Cellular M2M Connectivity Service Providers, 3Q 2009

Operator operating models

The connected devices market, in particular M2M is not a new revenue source, but the discussion on the potential of mobile connected devices markets have gained momentum recently. As mentioned previously, mobile connected devices markets offer relatively low revenues for the operators, but these devices also have very low (or non-existing) churn and can therefore be very lucrative for operators to service. Mobile network operators owned the largest share (85-90%) of the mobile connected devices markets in 2008, nevertheless many operators are looking to partner up with solution providers to learn how to efficiently manage the service. The co-operations are likely to increase specially if the most aggressive growth estimates materialize as operators would likely struggle on their own with such large numbers of diversified connections of which most would be outside of their traditional competence areas. In order to address the challenges discussed earlier, operators need to consider what type of an operating model best suit their purposes. There are different strategies that operators could implement, depending on the operator size, resources, the market they operate on, and availability of potential market partners.

The interdependence among the market players is very high, and many mobile network operators are in fact already showing interest in co-operations with other players. Often a quick entry to this market is to partner up with solution providers or other market players to gain specialist knowledge on how to manage the service. This market place is very fragmented and complex, there are hundreds of small vertical niches and specific types of applications and devices that connectivity can be applied to, and therefore it is very challenging for a traditional mobile network operator to aggressively pursue this market without a partnership of some kind. The following table (Figure 5.) will list some examples of what operators around the world have done in the mobile connected device sphere so far.

One way to get foothold in the mobile connected devices market would be to lease airtime to communication aggregators/specialized MVNO's who then combine services from various operators and add value on the technology side (network services, applications, technology platforms). Communication aggregators have been a source for much of the recent innovations in the mobile connected devices markets.

telenor	New business unit "Telenor Objects" and co-operation with Telit and Volvo for in-car SIM card	Telit, VOLVO
T-Mobile	Echelon and T-Mobile alliance to reduce the cost of a secure smart grid network for utilities; also co-operation with Celevoke to sell wholesale data services to M2M clients	Celevoke, ECHELON
verizon wireless	Co-operation with OnStar/GM, also Verizon Wireless and Qualcomm announce joint venture to provide advanced M2M solutions (nPhase)	QUALCOMM, OnStar by GM
at&t	Emerging devices business unit launched in October 2008; combined platform with Jasper Wireless	Jasper wireless
orange	"Orange M2M Connect"platform; strategic partnerships with Wavecom, Alcatel, and Cinterion. Orange (France and Spain) are co-operating with Securitas Direct to use wireless GSM network for more advanced surveillance solutions	CINTERION WIRELESS MODULES, Securitas Direct
vodafone	New M2M platform July 2009, Vodafone Spain also co-operates with Securitas Direct	Securitas Direct
Telefónica	Telefónica's Smart M2M platform in co-operation with Telit	Telit

Figure 5. Examples of operator co-operations with M2M players.

Another type of model would involve co-operation with the aggregator, so that the communication aggregator would provide the SIM card and enable the services as a white label provider, and the operator would sell the end solution under their brand. This could be a one-stop-shop solution for enterprises that have a strong relationship with the operator and prefer to work directly with them.

Taking the system integrator role where the operator combines components and/or services on behalf of the customer would be one option. This approach though demands significant resources and might not therefore be suitable for the smaller mobile operators. Also the device manufacturers could be considered as valuable partners. Operators are traditionally only used to dealing with phones or laptops, whereas the manufacturers of mobile connected devices could provide the needed device intelligence for a successful co-operation.

Applications for connected devices show great variety as they are used for numerous purposes (from healthcare, agriculture, commercial, industrial, and retail to utility). Providers of these services offer platforms and application solutions to device manufacturers. For operators, application service providers could prove to be valuable partners, as they possess the know-how and experience of a particular niche area, whereas the operator could offer sales and distribution channels.

Whichever strategy operators choose, it is likely to involve some level of co-operation or an acquisition due to the complex nature of this new market space. The development work needed for an operator to effectively attack this market on its own, would simply take too much time and resources. The roles operators take on can also vary depending on the type of device in question. Mass market opportunities for mobile connected devices lie in segments where information can be generated by large population of devices (for example utility, transportation, and security). While technology already allows many of these new types of devices to be connected, *new business models* must be adopted to take full advantage of the unique characteristics of this market opportunity.

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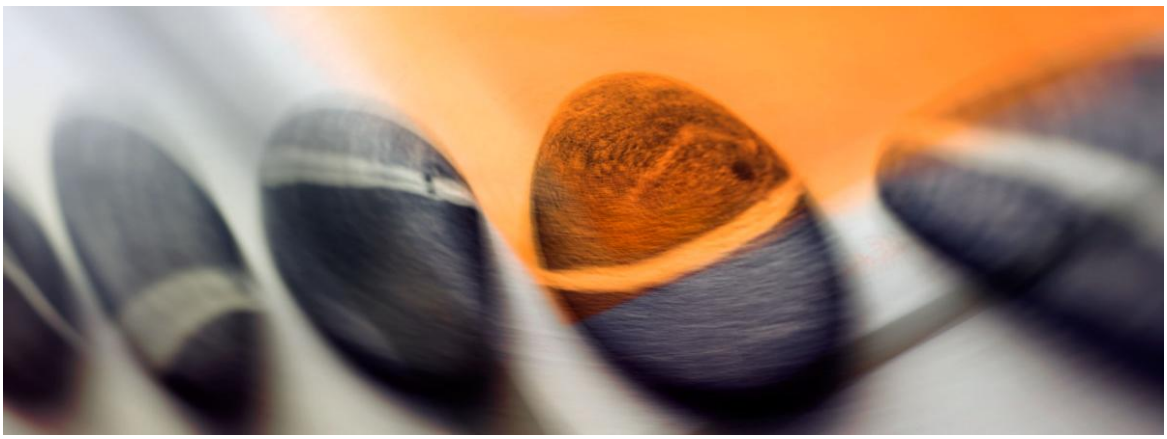

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