Blockchain technology in healthcare
KEY FINDINGS

**eHealth business climate:** Business prospects for the eHealth sector continue to be very positive and appear to be unaffected from the slowdown of the wider economies in most countries.

**Blockchain technology in healthcare**
Our survey data from over 360 eHealth professionals from various European countries shows that blockchain technology is in an early stage of development and has not yet gained much traction in healthcare. At the same time the tipping point is coming closer, with healthcare authorities, consulting companies and software vendors exploring and building business cases, services, and products that should advance the sharing of healthcare data in a more secure way, with more stakeholders, based on innovative business models. The survey reveals that critical gaps exist in various areas. Addressing these gaps will be essential to push blockchain adoption and receiving value from this promised and partially hyped technology.

**5 Gaps to address to push blockchain adoption in healthcare**

**Gap 1: Knowledge & Skills**
Blockchain awareness is high, actual knowledge or skills are rare. Most eHealth professionals in Europe have heard about blockchain and claim to be at least somewhat familiar with the term and concept. But there’s only a small amount of professionals with deeper knowledge, and most of these experts work as advisors or project managers in consulting companies or for health authorities, not in health facilities.

**Gap 2: Value & Use Cases**
There is a great deal of uncertainty about how blockchain technology could be applied in healthcare. While most eHealth professionals agree that the healthcare industry can benefit from leveraging blockchain in various ways, especially to improve data sharing between different and new stakeholder groups with an increased level of security, it appears to be difficult to identify clear use cases promising the delivery of tangible value. One of the biggest mistakes to avoid is to view blockchain as just another technology tool instead of being an enabler for new business models and workflows.

**Gap 3: Regulation**
Many eHealth professionals think that blockchain deployments are held back by regulatory and GDPR-related issues. This might be a gap that public health authorities need to address on regional, national or even pan-European levels, but it also is a gap that needs to be addressed at the local level when relevant guidelines, policies or frameworks addressing governance, cybersecurity, reimbursement, and other implications are missing.

**Gap 4: Brand awareness**
A large majority of eHealth stakeholders is not aware of any blockchain vendor. This market is largely unchartered territory from a brand awareness perspective. It provides organizations with a rare opportunity to step into a relatively empty space and associate their brands with an innovative technology and business field that promises to democratize digital transactions. Blockchain consumers need brand awareness in order to have a reference when making decisions to build or buy blockchain-based tools and workflows.

**Gap 5: Time**
Blockchain vendors, consultants and end users need some patience. While momentum to use blockchain-based tools and workflows in healthcare is expected to pick up within the next 3 years, don’t expect a quick gold rush. Most stakeholders are still in their learning phase and even if existing plans will be realized there will still be only a limited amount of early adopters with blockchain products in use or on offer. A real breakthrough of blockchain in healthcare is expected by 2023. So depending on your current position and ambitions it might make sense to shift gears and pick up speed now in order to be part of this leading force, or to at least watch the playing ground closely and develop solid business cases in order to be ready when the horizon has cleared up a bit more. While the hype around blockchain might have faded, there’s no evidence that it will just go away.
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  - Use and provision of blockchain technology and services ............................................. page 11
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HIMSS ANALYTICS – WHO WE ARE

HIMSS Analytics provides healthcare organisations, governments and industry with extensive data resources and services regarding the adoption and use of information and technology. HIMSS Analytics’ offerings include market intelligence, research and IT adoption assessments for topics like Electronic Medical Records (EMR), medical imaging or continuity of care. The portfolio is designed to provide eHealth professionals with insights and guidance on their digital transformation journey.

EHEALTH SURVEY AND TREND BAROMETERS – METHODOLOGY

Objectives
- Continued evaluation of trends and issues in the European eHealth sector: 2 – 4 survey waves per year, with both varying and recurring topics
- Providing insights into current and expected developments of eHealth in Europe
- Initiating discussions within the European eHealth community

Study design
- Structured quantitative online survey
- Fast completion time (< 5 min)
- Survey languages: English, German
- Participation via personal email invitation or a public link on www.himss.eu and other channels

Target audience and participants
Key audience: eHealth professionals from multiple European countries, in particular:
- IT staff, administrative staff and clinicians from health facilities (e.g. CIOs, CEOs, physicians, nurses)
- Professionals from health-IT related software and consulting companies
- Professionals from other eHealth related sectors (e.g. health authorities, research, journalism)
- Number of participants: 300 – 500 per survey wave

Survey period
- Typical field time: 2 months
- Specific field time for the “Blockchain technology in healthcare” January to February 2019

Access all eHealth TREND BAROMETER’s here: www.himss.eu/healthcare-providers/ehealth-trends
SURVEY QUESTIONS

„Blockchain technology in healthcare“

1. What type of organisation are you working for?
2. How familiar are you with blockchain technology?
3. To what extent do you agree with the following statements about blockchain technology in healthcare?
4. Does your organisation already use blockchain technology tools? When will those blockchain technology tools be implemented? Which vendors for blockchain technology in the healthcare ecosystem do you utilise?
5. Do you provide products with regard to blockchain technology for healthcare? When will those products with regard to blockchain technology for healthcare be launched?
6. Do you provide consultative services with regard to blockchain technology for healthcare? When will those consultative services with regard to blockchain technology for healthcare be launched?
7. Which of the following best describes your organisation’s current interest in blockchain? For which purpose do you use blockchain technology currently?
8. Which vendors for blockchain technology in the healthcare ecosystem do you know?
9. What do you see as the top use cases for blockchain in healthcare?
10. When do you expect a breakthrough for blockchain tools in the healthcare space, i.e. when will they become powerful, useful and widespread in your country?
11. In your opinion, which are the biggest challenges for blockchain technology in healthcare?
12. How will the environment for eHealth innovation and investment in your country develop over the next 12 months?
**Geographic distribution**

- Germany: 41%
- Netherlands: 10%
- Nordic Countries: 14%
- Spain: 11%
- Switzerland: 11%
- Other: 10%

**n=361**

Countries or regions with more than 30 respondents are shown individually.

Nordic Countries = Denmark, Finland, Iceland, Norway, Sweden

* “Others” include: Portugal, Poland, Greece, Russia, Malta, Bulgaria, Croatia, Cyprus, Georgia, Romania, Slovakia, Turkey and Ukraine.

** The number of responses can vary slightly by question (if individual questions are skipped)

**Respondents by institution & role**

- **Health facility* (42%)**
  - Medical profession (physician) (21%)
  - Chief information officer (CIO) (18%)
  - IT staff (16%)
  - Chief medical officer (CMO) (8%)
  - Chief executive officer (CEO) (7%)
  - Medical profession (nurse, pharmacist...) (6%)
  - Researcher/Scientist (6%)
  - Organisational & corporate governance (5%)
  - Quality management (5%)
  - Other position (9%)

- **Governmental health authority (13%)**
  - Project manager (25%)
  - CIO (16%)
  - Organisational & corporate governance (16%)
  - IT staff (7%)
  - Clerk (5%)
  - Quality management (2%)
  - Other position (30%)

- **Consulting company (12%)**
  - Adviser/Consultant (57%)
  - CEO (23%)
  - Sales/Marketing (5%)
  - Organisational & corporate governance (2%)
  - Quality management staff (2%)
  - Project manager
  - Other position (9%)

- **Software vendor (13%)**
  - Sales/Marketing (13%)
  - CEO (13%)
  - Organisational & corporate governance (11%)
  - Project manager (11)
  - CIO (9%)
  - Software developer (4%)
  - IT Staff (6%)
  - Quality management staff (4%)
  - Other position (13%)

*Health facility: e.g. hospitals, outpatient practice, social care centres

**Countries or regions with more than 30 respondents**

<table>
<thead>
<tr>
<th>Country</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>59</td>
</tr>
<tr>
<td>Spain</td>
<td>44</td>
</tr>
<tr>
<td>Switzerland</td>
<td>39</td>
</tr>
<tr>
<td>Netherlands</td>
<td>38</td>
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<tr>
<td>Austria</td>
<td>23</td>
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<td>Sweden</td>
<td>19</td>
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<tr>
<td>Italy</td>
<td>18</td>
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<tr>
<td>United Kingdom</td>
<td>16</td>
</tr>
<tr>
<td>Finland</td>
<td>14</td>
</tr>
<tr>
<td>Belgium</td>
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<tr>
<td>Denmark</td>
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<tr>
<td>France</td>
<td>13</td>
</tr>
<tr>
<td>Ireland</td>
<td>13</td>
</tr>
<tr>
<td>Norway</td>
<td>10</td>
</tr>
<tr>
<td>Others*</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>361</td>
</tr>
</tbody>
</table>

**Others (20%)**

- Researcher/Scientist (24%)
- Project manager (16%)
- CEO (7%)
- Organisational & corporate governance (7%)
- Adviser/Consultant (7%)
- CIO (4%)
- Sales/Marketing (3%)
- IT staff (1%)
- Other position (30%)
FAMILIARITY WITH BLOCKCHAIN TECHNOLOGY
BY TYPE OF ORGANISATION

Most eHealth professionals are at least somehow familiar with blockchain technology (total = 71%). But the level of knowledge about the technology differs quite strongly between different stakeholder groups. Consultants and technology providers indicate to be more familiar with blockchain than their potential clients and technology users. This might not come as a surprise considering the low prevalence of such technologies in healthcare facilities so far. Those professionals who claim to be most knowledgeable typically work as advisors or project managers in consulting companies or for health authorities.

How familiar are you with blockchain technology?
[Total also includes “others”; Rounding errors may occur in the chart]
Results by country reveal that eHealth professionals in Germany tend to be less familiar with blockchain technology (Ø 2.5) than their peers in other countries, especially in Spain, the Nordics or the Netherlands. This “knowledge gap” is especially striking since we have weighted the responses according to the distribution of “type of organisation” in the overall sample in order to avoid any obvious sample bias.

How familiar are you with blockchain technology?
[Mean values not including “Don’t know”; Values for countries and regions weighted according to the distribution of “type of organisation” in the sample]
EXPECTATIONS ABOUT BLOCKCHAIN TECHNOLOGY
BY TYPE OF ORGANISATION

Expectations about blockchain technology have arrived in a post-hype age. No one expects this technology to be the magic pill that provides immediate relief to the pains of healthcare systems stuck in various phases of the digital transformation process. At the same time, there’s no disillusionment. The technology is expected to work “under the hood”, meaning it is not primarily associated with creating a more patient-centric health experience, but rather to drive innovation and data-driven decision making. The level of enthusiasm about blockchain’s potential is higher among consultants and lower among governmental stakeholders.

To what extent do you agree with the following statements about blockchain technology in healthcare?
[Total also includes “others”; Mean values not including “Don’t know”]
Spanish and Dutch eHealth professionals expect blockchain technology to be most beneficial to advance data-driven clinical initiatives. Dutch respondents see the biggest value in creating a more patient-centric health experience. Respondents from Germany tend to be less enthusiastic and remain rather neutral. Perhaps the lack of knowledge about the technology and its benefits is a reason for them to restrain themselves from taking a stronger position.

To what extent do you agree with the following statements about blockchain technology in healthcare?

[Mean values not including “Don’t know”; Values for countries and regions weighted according to the distribution of “type of organisation” in the sample]
Blockchain technology tools and products are rarely used and provided in European healthcare at the moment (at least outside of Estonia, which hasn’t been a focus country for this report). At the same time, there appears to be a decent amount of uncertainty about ongoing blockchain activities. The only branch that already has a sizeable active portfolio of services related to blockchain, and has recognised the future potential of the technology, are the consulting companies. This seems plausible, consultants might be able to help to close the existing knowledge gap about this technology, especially at the end user level. According to the results, the natural road forward seems to be that consulting companies accumulate the experts needed to identify beneficial use cases for blockchain, with software vendors starting to provide products in these areas and healthcare providers eventually starting to purchase these tools. If existing plans will be realised a fair share of early adopters of healthcare providers and software vendors should have blockchain products in use or on offer within the next 3 years. But don’t expect a quick gold rush, most stakeholders are still in their learning phase.

**USE AND PROVISION OF BLOCKCHAIN TECHNOLOGY AND SERVICES BY TYPE OF ORGANISATION**

Does your organisation use products, provide products or provide services with regard to blockchain technology?

---

**Healthcare facility**

- **n = 146**

<table>
<thead>
<tr>
<th>Use blockchain technology tools</th>
<th>Yes</th>
<th>No, but plans</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>3%</td>
<td>14%</td>
<td>27%</td>
<td>55%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, until when implemented</th>
<th>Up to 1 year</th>
<th>1 - 3 years</th>
<th>3 - 5 years</th>
<th>Later</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>5%</td>
<td>14%</td>
<td>10%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, current interest in blockchain</th>
<th>Still learning</th>
<th>Proof of concept</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>62%</td>
<td>33%</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Software vendor**

- **n = 95**

<table>
<thead>
<tr>
<th>Provide products with regard to blockchain technology for healthcare</th>
<th>Yes</th>
<th>No, but plans</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>6%</td>
<td>25%</td>
<td>18%</td>
<td>51%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, until when launched</th>
<th>Up to 1 year</th>
<th>1 - 3 years</th>
<th>3 - 5 years</th>
<th>Later</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>13%</td>
<td>17%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, current interest in blockchain</th>
<th>Still learning</th>
<th>Proof of concept</th>
<th>Pilot use case</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>63%</td>
<td>21%</td>
<td>13%</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Consulting company**

- **n = 43**

<table>
<thead>
<tr>
<th>Provide consultative services with regard to blockchain technology for healthcare</th>
<th>Yes</th>
<th>No, but plans</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>62%</td>
<td>14%</td>
<td>23%</td>
<td>40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, until when launched</th>
<th>Up to 1 year</th>
<th>1 - 3 years</th>
<th>3 - 5 years</th>
<th>Later</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>29%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If plans, current interest in blockchain</th>
<th>Still learning</th>
<th>Proof of concept</th>
<th>Request f. proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>57%</td>
<td>36%</td>
<td>7%</td>
</tr>
</tbody>
</table>
A large majority (76%) of eHealth stakeholders is not aware of any blockchain vendor. This market is largely unchartered territory from a brand awareness perspective. Even big vendors, which are heavyweights in other tech product segments, like Microsoft or SAP, haven’t yet managed to associate their brands well with this emerging technology. As a matter of fact, these vendors are currently fighting with smaller, specialized vendors, like MEDICALCHAIN, BLOCKPHARMA, and others about brand awareness shares. The only exception is IBM, which was by far the most often mentioned (n = 21) if eHealth professionals were able to name any vendor.

**Which vendors for blockchain technology in the healthcare ecosystem do you know?**

[Total also includes “others”; all vendors mentioned more than once displayed]
TOP USE CASES FOR BLOCKCHAIN TECHNOLOGY IN HEALTHCARE

BY TYPE OF ORGANISATION

While there’s no single outstanding use case for blockchain if we look across all stakeholder groups, the results reveal some fairly important findings:

First, blockchain technology is not just about resolving an isolated care problem with a new type of technology tool, instead it is something that could potentially be used in many fields and for many purposes, and in combination with already existing workflows and tools. In that sense blockchain in healthcare is less like a new data exchange standard (like FHIR) or a particular storage solution (like a VNA), but more like mobile technology or cloud computing – it supports new and changes traditional business operations.

Second, blockchain in healthcare is likely not to reduce data transaction costs (only 6% of respondents indicated this).

What do you see as the top use cases for blockchain in healthcare?

[Total also includes “others”; Rounding errors may occur; Multiple choice with a maximum of 3 responses; n = number of responses]

- Protect patient data by providing a decentralised framework for digital patient identities: 15%
- Secure data exchange by using cryptographic functions: 13%
- Provide new access points for healthcare data by a decentralised and secured structure: 12%
- Accelerate data transfer between participants by using shared data: 12%
- Increase security among traditional systems by connecting them: 11%
- Enable data exchange for new actors in the healthcare market by a decentralised and secured access: 11%
- Push standardisation among the market by using shared data: 9%
- Reduce data transactions costs by decreasing the number of involved IT systems: 6%
- Other: 3%
- Don’t know: 7%

Consulting company (n = 109): 18% Protect patient data, 13% Secure data exchange, 15% Provide new access points

Governmental health authority (n = 91): 13% Secure data exchange, 11% Provide new access points, 16% Accelerate data transfer

Health facility (n = 318): 15% Protect patient data, 13% Secure data exchange, 10% Increase security among traditional systems

Software vendor (n = 112): 17% Protect patient data, 10% Secure data exchange, 16% Enable data exchange for new actors in the healthcare market

Third, different stakeholder groups see different opportunities regarding the use of blockchain technology. Software vendors appear to focus on security-related aspects that the technology could be able to ease, particularly if it helps to make already existing systems (and potentially their own systems) safer to use. On the other hand, there’s obviously little interest from them to use blockchain as a driver for standardization. Consultants also fancy security aspects, but with a clearer focus on the cryptographic potential of blockchain technology. And from a governmental or public health authority perspective blockchain technology could be most useful to accelerate data transfer between multiple stakeholder groups.
TOP USE CASES FOR BLOCKCHAIN TECHNOLOGY IN HEALTHCARE

BY COUNTRY

When comparing the responses between different countries/regions it is apparent that there are more similarities than differences. Across all countries, blockchain in healthcare is expected to provide better data security, either for patient data, data exchange or healthcare data networks as such. The most remarkable differences come from Spain, where most respondents expect blockchain to enable data exchange for new actors in the healthcare environment, and from Germany, where “don’t know” is among the top 3 answers. This is again in line with the bigger knowledge gap that was identified earlier.

What do you see as the top use cases for blockchain in healthcare?

[Rounding errors may occur; Multiple choice with a maximum of 3 responses; Values for countries and regions weighted according to the distribution of “type of organisation” in the sample; Total values not weighted; Total also includes “others”]

<table>
<thead>
<tr>
<th>Top 3 answers</th>
<th>Germany</th>
<th>Netherlands</th>
<th>Nordic Countries</th>
<th>Spain</th>
<th>Switzerland</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect patient data by providing a decentralised framework for digital patient identities</td>
<td>13%</td>
<td>19%</td>
<td>16%</td>
<td>15%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>Secure data exchange by using cryptographic functions</td>
<td>15%</td>
<td>14%</td>
<td>10%</td>
<td>10%</td>
<td>14%</td>
<td>13%</td>
</tr>
<tr>
<td>Provide new access points for healthcare data by a decentralised and secured structure</td>
<td>10%</td>
<td>9%</td>
<td>13%</td>
<td>15%</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Accelerate data transfer between participants by using shared data</td>
<td>13%</td>
<td>12%</td>
<td>12%</td>
<td>11%</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Increase security among traditional systems by connecting them (e.g. traditional databases in a blockchain environment)</td>
<td>10%</td>
<td>9%</td>
<td>11%</td>
<td>15%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Enable data exchange for new actors in the healthcare market by a decentralised and secured access</td>
<td>9%</td>
<td>8%</td>
<td>11%</td>
<td>18%</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Push standardisation among the market by using shared data</td>
<td>8%</td>
<td>11%</td>
<td>9%</td>
<td>7%</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td>Reduce data transactions costs by decreasing the number of involved IT systems</td>
<td>3%</td>
<td>6%</td>
<td>8%</td>
<td>4%</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>13%</td>
<td>9%</td>
<td>7%</td>
<td>4%</td>
<td>2%</td>
<td>7%</td>
</tr>
<tr>
<td>n (number of responses)</td>
<td>117</td>
<td>81</td>
<td>121</td>
<td>108</td>
<td>89</td>
<td>804</td>
</tr>
</tbody>
</table>

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BREAKTHROUGH AND CHALLENGES FOR BLOCKCHAIN TECHNOLOGY

According to the respondents to this survey, eHealth professionals in Europe will routinely and effectively use blockchain technology by 2023, i.e. in 4 years from now. eHealth professionals from the Nordic countries, Germany and Switzerland are a bit more conservative and expect the breakthrough slightly later (by 2024). In general, this aligns well with the three year planning periods to provide, create or purchase blockchain related products and services as discussed earlier in this report.

When do you expect a breakthrough for blockchain tools in the healthcare space, i.e. when will they become powerful, useful and widespread in your country?

[Total also includes “others”; Bar charts: cumulated percentage of respondents; Blue line: percent of respondents indicating a specific year of blockchain breakthrough; Values for countries/regions weighted according to the distribution of “type of organisation” in the sample]
The challenges for blockchain in healthcare are a bit different than in other industries and might be reflective of the generally more traditional and conservative business models used in this industry. *First*, there’s the lack of in-house skills and knowledge (Total: 20%) that all stakeholder groups point out. *Second*, blockchain deployments are held back by regulatory and GDPR-related issues (Total: 17%). *Third*, currently available products are perceived to be immature and the technology is perceived to be unproven (17%). Also worth mentioning, and specifically relevant in the healthcare domain, are concerns regarding interoperability of blockchain technology with existing soft- and hardware (Total: 10%). While other industries like finance or automobile seem to be over the tipping point regarding the skills and knowledge gap as well as the maturity of certain products, or have less structural issues with interoperability or GDPR compliance, eHealth professionals in Europe still need to find their ways through this. And then they might be more concerned about short-term development costs and ROI which appear to be rather moderate pain points at the moment.

### In your opinion, which are the biggest challenges for blockchain technology in healthcare?

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Total (n = 893)</th>
<th>Consulting company (n = 121)</th>
<th>Governmental health authority (n = 108)</th>
<th>Health facility (n = 350)</th>
<th>Software vendor (n = 129)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of in-house skills &amp; insufficient user knowledge</td>
<td>20%</td>
<td>26%</td>
<td>24%</td>
<td>17%</td>
<td>16%</td>
</tr>
<tr>
<td>Insufficient product maturity &amp; unproven technology</td>
<td>17%</td>
<td>16%</td>
<td>16%</td>
<td>17%</td>
<td>16%</td>
</tr>
<tr>
<td>Regulatory and GDPR-related issues</td>
<td>17%</td>
<td>20%</td>
<td>12%</td>
<td>15%</td>
<td>19%</td>
</tr>
<tr>
<td>Interoperability with other soft-/hardware</td>
<td>10%</td>
<td>11%</td>
<td>4%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Uncertain Return-on-Investment</td>
<td>7%</td>
<td>6%</td>
<td>6%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Lack of trust from medical staff</td>
<td>6%</td>
<td>7%</td>
<td>4%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Potential security threats</td>
<td>5%</td>
<td>2%</td>
<td>5%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Lack of trust from patients</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Implementation of new soft-/hardware</td>
<td>4%</td>
<td>2%</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>High costs</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>2%</td>
<td>4%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>4%</td>
<td>1%</td>
<td>5%</td>
<td>7%</td>
<td>1%</td>
</tr>
</tbody>
</table>

[Total also includes “others”; Rounding errors may occur; Multiple choice with a maximum of 3 responses; n = number of responses]
BREAKTHROUGH AND CHALLENGES FOR BLOCKCHAIN TECHNOLOGY BY COUNTRY

Overall, all surveyed countries and regions face the same top three challenges when considering the use of blockchain technology in healthcare. There are only variations regarding the size of these challenges. For example, Spanish eHealth professionals see bigger challenges in terms of regulatory and GDPR-related issues while their Dutch colleagues are more concerned about the lack of in-house skills and user knowledge. It is noticeable that the Dutch are particularly concerned about receiving a return on investment from using blockchain; if this is related to cultural factors (like their long and successful history as a trading nation and a pragmatic approach to doing business), or because they have more concrete plans to utilize blockchain would need some further investigation.

In your opinion, which are the biggest challenges for blockchain technology in healthcare?

[Total also includes “others”; multiple choice with a maximum of 3 responses; Values for countries and regions weighted according to the distribution of “type of organisation” in the sample]
RESULTS – BUSINESS EXPECTATIONS

Despite somewhat gloomier expectations for the general economies in most surveyed countries, business prospects for the eHealth sector continue to be very positive. Only 6% of all respondents believe the situation will become worse over the next 12 months. While to be interpreted with caution (low response rate) eHealth professionals from Finland are particularly optimistic (86% expect improvement).

From a general perspective: How will the environment for eHealth innovation and investment in your country develop over the next 12 months?

[Score for “Balance of business expectations” = (percentage “improve” – percentage “worse”)*100]

Results by country (2019 – Q1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Worse</th>
<th>Steady</th>
<th>Improve</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>10%</td>
<td>31%</td>
<td>59%</td>
<td>58</td>
</tr>
<tr>
<td>Austria</td>
<td>9%</td>
<td>57%</td>
<td>35%</td>
<td>23</td>
</tr>
<tr>
<td>Switzerland</td>
<td>13%</td>
<td>46%</td>
<td>41%</td>
<td>39</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0%</td>
<td>32%</td>
<td>68%</td>
<td>38</td>
</tr>
<tr>
<td>Denmark</td>
<td>8%</td>
<td>15%</td>
<td>77%</td>
<td>13</td>
</tr>
<tr>
<td>Norway</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>10</td>
</tr>
<tr>
<td>Sweden</td>
<td>0%</td>
<td>17%</td>
<td>83%</td>
<td>18</td>
</tr>
<tr>
<td>Finland</td>
<td>0%</td>
<td>14%</td>
<td>86%</td>
<td>14</td>
</tr>
<tr>
<td>Spain</td>
<td>2%</td>
<td>32%</td>
<td>66%</td>
<td>44</td>
</tr>
<tr>
<td>All countries</td>
<td>6%</td>
<td>34%</td>
<td>60%</td>
<td>358</td>
</tr>
</tbody>
</table>

*UK: expectation not shown in chart due to low response rates during these survey waves
We drive the health IT market in the direction it needs to go

Improved Patient Care and Health IT Insights