

# *Digital accelerators for a new innovation era*

*PwC  
Health Research Institute  
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# Introduction

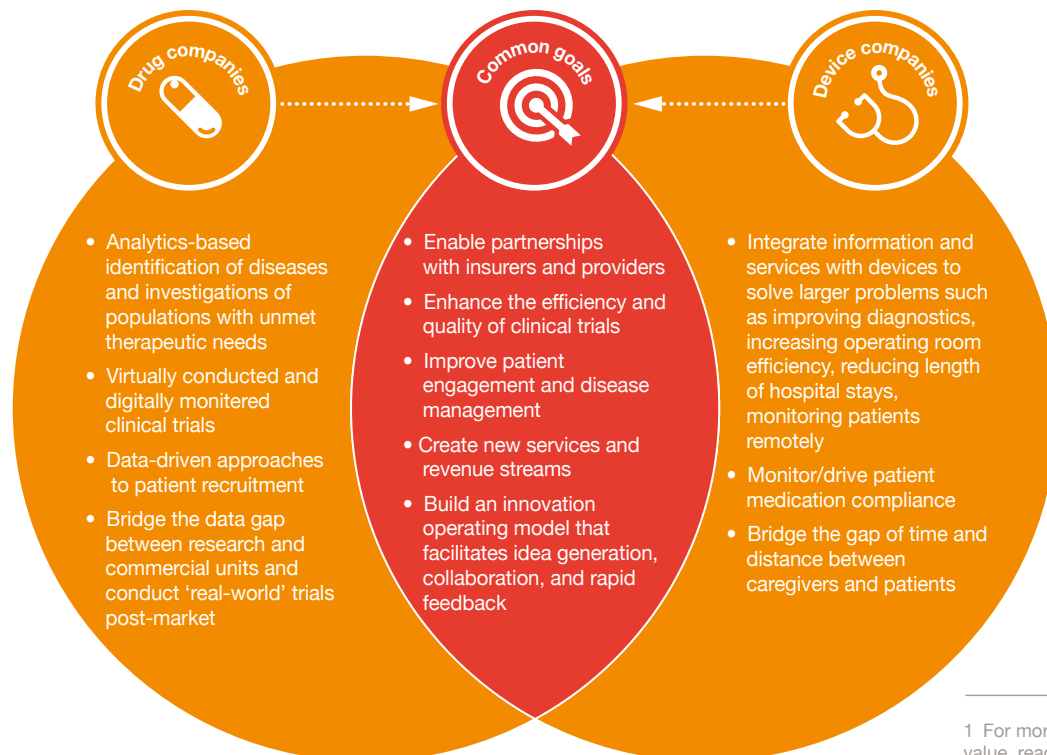
Drug and device companies need the right mix of digital tools and processes to accelerate innovation, or they risk displacement and missed growth opportunities in a New Health Economy that is demanding technologies to support measurable, value-driven care.

Digital technologies are changing how companies innovate, interact, and do business. Consumer industries such as retail, electronics, and telecommunications already use digital technologies to more closely connect to customers, better understand their needs, and be more responsive. As patients transition from passive care recipients to active value-seeking consumers, it is healthcare's turn to master

these tools as new competitors chip away at the market. (See sidebar on page 2).

According to the 2013 PwC Global Innovation Survey, drug and device companies are placing bigger bets on innovation than other industries are. But nearly half are focusing on traditional product innovation as the top priority over the coming year, rather than on service and business model innovations that could help them prove their value beyond the efficacy and safety of their drugs and devices.<sup>1</sup> Leading companies are now investing in digital tools to create new revenue streams from data, optimize outcomes, and create tighter patient engagement. (See Figure 1).

**Figure 1: How leading drug and device companies prove value beyond product development**



<sup>1</sup> For more information on expectations for value, read HRI's *Medtech companies prepare for an innovation makeover* and *Unleashing value: The changing payment landscape for the US biopharmaceutical industry*.

## How digital new entrants are putting on the pressure

According to HRI's recent report on new health industry entrants, nine Fortune 50 companies have entered the digital health space. According to PwC's Global Innovation Survey, new digital entrants are more likely to:

- Regard themselves as true innovation pioneers
- Have derived a greater percentage of annual revenue from major new products and services launched during the past year
- Implement business model innovation to create new services rather than a single product
- Tap social media to support innovation and collaborate with competitors to deliver innovative products and services

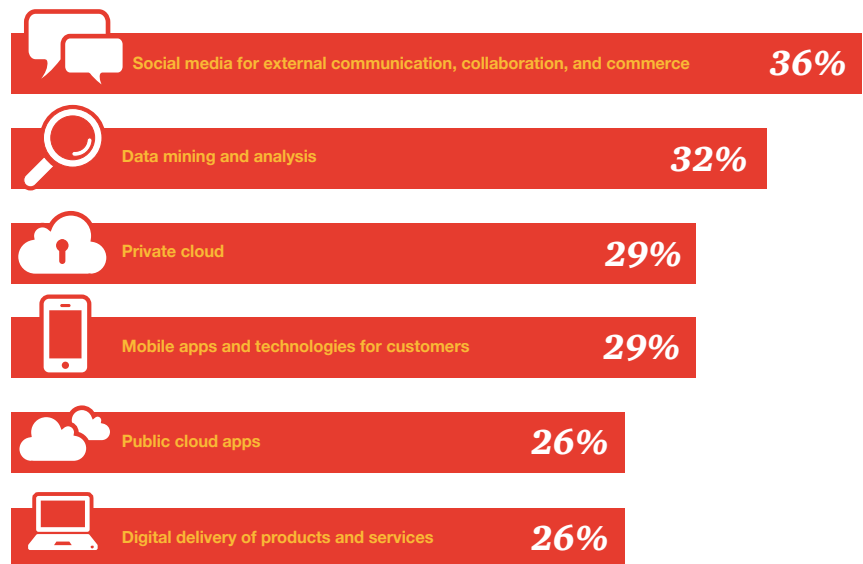
One-quarter of drug and device executives say new entrants are influencing their strategic agendas.

Some new entrants that have engaged in a health platform war for the consumer:

- The new **Amazon** Fire phone includes an array of sensors to enable new digital health applications.
- **Samsung** software integrates with mobile devices that allows users to track nutrition, exercise, and weight.
- **Apple** HealthKit and app allows health and fitness apps to share their data.
- **Qualcomm Life** wireless health technology that aggregates and integrates patient data.
- **Google** Fit platform to manage the data from health and wellness apps, sensors and wearable devices.
- **Intel** home health gateway sold by the Intel-GE Care Innovations joint venture.
- **Salesforce.com** has partnered with **Philips** to build a connective digital healthcare site in the cloud.

Eighty-nine percent of drug and device CEOs surveyed by PwC view technological advances as the global trend that will transform their business the most during the next five years.<sup>2</sup> (See Figure 2). But many traditional companies lag behind, with three-quarters of industry executives citing inability to quickly understand and adopt new information technologies as their biggest barrier.<sup>3</sup>

**Figure 2: Top 5 digital technologies of highest strategic importance to drug and device companies during next 3-5 years**



Source: PwC Digital IQ Survey, 2014

<sup>2</sup> PwC Global CEO Survey 2014.

<sup>3</sup> PwC Digital IQ Survey 2014.

# Key research findings

1. Companies may be missing digital opportunities to widen the innovation funnel, generate rapid feedback, and apply learnings.

Drug companies name open innovation as the approach that will generate the most growth for their companies—more so than incubators, design thinking, and individual freedom for employees to explore innovative ideas.<sup>4</sup> Device companies rank it a close second. But on average executives say they only co-create on 21-30% of their products and services today.

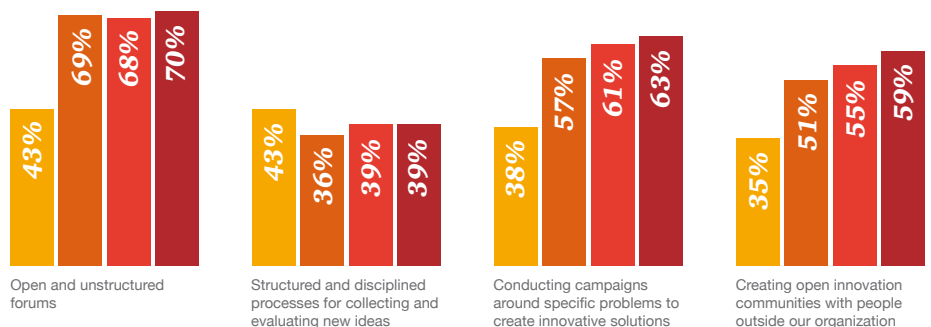
Many companies say they value social media as an important accelerator of innovation—nearly half of the executives surveyed say they regard it as strategically important to their companies. In 2012, investment in social media for internal communication and collaboration rounded out the top five areas of digital technology investment for drug and device companies. But, according to interviews, how effectively companies are connecting their employees across traditional silos— from R&D to commercial business units—is debatable.

Culture is an issue: half of drug and 57% of device companies cited creating an innovative culture as a barrier to implementing fresh ideas.<sup>5</sup> “To succeed, it will be important as an organization steeped in a manufacturing culture, to adopt new techniques and capabilities to allow for meaningful innovation to happen either internally or externally,” said David Feygin, vice president of corporate strategic innovation at Becton Dickinson.

Forty-three percent of device companies and 69% of drug companies say they use social media to support open and unstructured collaboration forums, but fewer are putting discipline around collecting and evaluating new ideas, conducting innovation campaigns, or opening doors to input from the outside. (See Figure 3).

**Figure 3: How drug and device companies are using social media for innovation**

Does your company leverage social media to support innovation efforts in any of the following ways?



4 PwC Global Innovation Survey, 2013.

5 PwC Global Innovation Survey, 2013.

Source: PwC Global Innovation Survey, 2013

Med tech Pharmaceuticals Retail Technology

Retailers and technology companies have traditionally been more aggressive in merging social media data with other sources, such as sales data, for the purpose of innovation. Firms that master this will capitalize on a newly engaged consumer and transition more easily from a “hard” drug and product based culture to one that produces highly valued services grounded in information.

Nevertheless, drug and device executives name external social media as having the highest strategic importance during the next three to five years.<sup>6</sup> Some companies have already invested in open innovation platforms such as InnoCentive, Kaggle, and Salesforce.com to share elements of research and development data that would otherwise be confined to individual organizations and researchers.

While drug and device companies are looking to make their interactions with consumers via social media more meaningful, they are also treading lightly. While social media was among the top digital investments in 2012 and 2013, it appears drug and device companies have slowed their spending, possibly awaiting further guidance from the FDA on what is acceptable conduct for “socializing” with consumers.

### Considerations:

- **Connect and collaborate to innovate:** Companies need organization-wide structures and practices that enable collaboration to increase the probability of producing the results they desire. They should invest in integrated, virtual networks of data repositories and environments that allow access to new sources of data and analytics and offer an entirely new way to interact and innovate.

Many companies are participating in industry initiatives rather than building their own collaboration platforms. Through Project Data Sphere, competitor drug makers such as AstraZeneca, Pfizer, and Sanofi work with research organizations to collect and share anonymized patient-level data from oncology studies.<sup>7</sup> RockHealth and HealthBox bring together multiple industry stakeholders to share data and invest in promising entrepreneurs.

- **Invest in a “pilot and prove” approach:** Proofs of concept will help prove value, develop foundational components, secure leadership endorsement, test the ability to scale, and mitigate risk.

Companies can use simulation technology to design and test business models that rely on digital health technologies and applications to deliver a better consumer experience, and build consistent capabilities to identify and scale promising concepts. One of the top digital investments drug and device companies will make in 2014 is in simulation and scenario modeling.<sup>8</sup>

- **Increase social presence with consumers:** The FDA released draft guidance this spring outlining rules for interactive promotional media, including blogs, social networking sites, online patient forums, and podcasts.<sup>9</sup> Some companies, such as Qu Biologics, already use a Twitter handle to enhance trial recruitment. Medtronic operates active blogs and live chatting for its patients. Companies should also scan social media for information about adverse events related to their products. A recent study showed that Twitter had three times more adverse-event reports for 23 commonly used prescription medications than the FDA did during the same time period.<sup>10</sup>

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6 PwC Digital IQ Survey, 2014.

7 Pogorelc, Deanna, “To spark cancer discoveries, several Big Pharma companies are sharing idle clinical trial data,” April 8, 2014; <http://medcitynews.com/2014/04/sanofi-pfizer-jj-astrazeneca-share-clinical-trial-data/>

8 PwC Digital IQ Survey, 2014.

9 Tyler, Dominic, “Biopharma looks to social media to assist patient recruitment in trials,” July 4, 2013; [http://www.pmlive.com/blogs/digital\\_intelligence/archive/2013/july/biopharma\\_looks\\_to\\_social\\_media\\_to\\_assist\\_patient\\_recruitment\\_in\\_trials](http://www.pmlive.com/blogs/digital_intelligence/archive/2013/july/biopharma_looks_to_social_media_to_assist_patient_recruitment_in_trials)

10 Frefield CC, Brownstein JS, Menone CM, et al, “Digital drug safety surveillance: Monitoring pharmaceutical products in Twitter,” *Drug Safety*. 37 (2014): 343-350.

*2. Investments in mobile strategies that bring drug and device companies closer to patients are most valuable.*

*“Owning a disease from a pharmaceutical standpoint is only part of the story. Owning the care process is another big part.”*

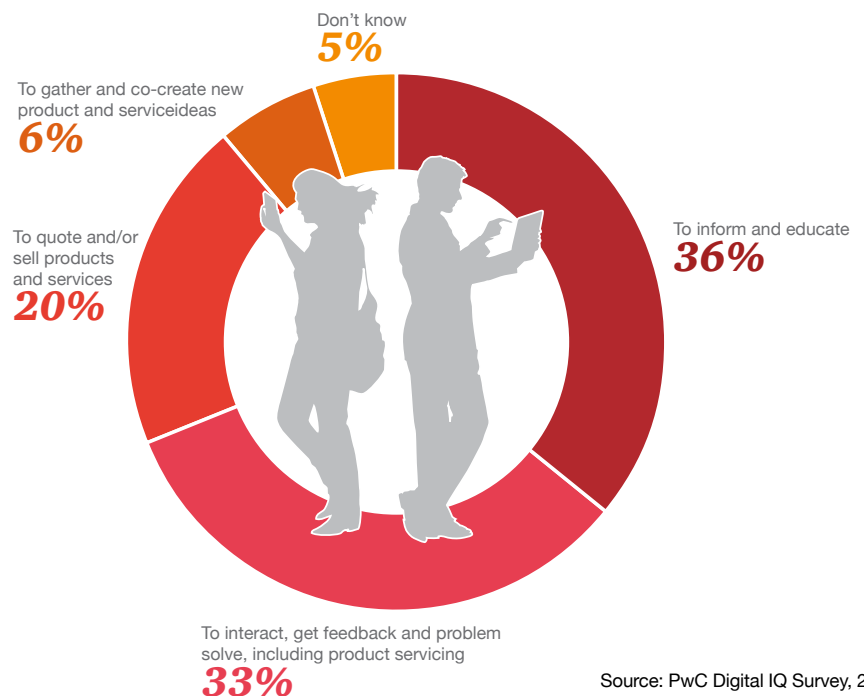
– David Feygin  
Becton Dickinson

Consumer education has been the focus of most drug and device companies’ mobile strategies, but companies may be missing opportunities to use mobile technology in other ways that bring greater return. While 36% of drug and device companies say they mainly use mobile technology to inform and educate customers, only 6% say they use it to gather and co-create new product and service ideas.<sup>11</sup> (See Figure 4).

This appears to be changing as companies work to expand their mobile reach. In 2012, drug and device executives said their top digital technology investment area was mobile apps and technologies for employees. Last year, apps and technologies for customers made the top five list. In 2014, companies expect the biggest play to be in mobile—more than 60% of companies are investing more on consumer mobility, cloud, and sensing technologies.<sup>12</sup>

Leading companies generally develop deeper, more direct mobile-based relationships with patients, not just with their internal employees or physician customers. Some drug and device companies are implementing consumer mobile apps that enable patients to better manage their care. New Zealand-based Nexus6 recently received FDA approval for its SmartTouch inhaler system, which records time of use and transmits that data to the patient’s mobile device, promoting medication adherence.<sup>13</sup> GlaxoSmithKline’s Diabetes HealthMate app tracks blood sugar readings and visualizes the relationship between physiological measures and lifestyle factors such as mood, medication intake, activity levels, and diet.<sup>14</sup> Other major companies are investing in gaming technologies

**Figure 4: Drug and device companies use mobile technology more for educational purposes than co-creation**



<sup>11</sup> PwC Digital IQ Survey, 2014.

<sup>12</sup> PwC Digital IQ Survey, 2014.

<sup>13</sup> Dolan, Brian, “Nexus6 gets FDA clearance for smartphone-connected inhaler, SmartTouch,” June 2, 2014; <http://mobihealthnews.com/33703/nexus6-gets-fda-clearance-for-smartphone-connected-inhaler-smarttouch/>

<sup>14</sup> GlaxoSmithKline PLC, “Diabetes HealthMate,” January 5, 2014; <https://itunes.apple.com/us/app/diabetes-healthmate/id704434084?mt=8>

Source: PwC Digital IQ Survey, 2014

### Considerations:

- **Provider and insurer needs should drive mobile investments:** Often the quickest digital path to the patient will be through the care provider. Devices like Merck Serono S.A.'s EasyPod™ and Medtronic's Carelink app automatically monitor patient devices and send data to clinicians so they can intervene before an acute episode occurs. These are also popular among insurers looking for better value.

One leading drug company uses technology originally built for the retail industry to enhance the patient experience upon an initial cancer diagnosis. Doctors enter patient demographic data into the company's digital app, which connects patients to ancillary support, such as the location of wig-makers in their areas.

- **Understand what customers are ready for:** Before investing heavily in new services they think will work for providers, drug and device companies should understand how far along providers are in

adopting innovative methods of care delivery. "If we're disjointed from a service perspective, we're going to be disjointed from a technology perspective, too," said Mike Plaia, chief executive officer of PharmaPoint, a pharmacy management and technology company focused on helping providers improve medication adherence and reduce hospital readmissions.

Similarly, drug and device companies should be prepared to round out a mobile product with additional services. "Owning a disease from a pharmaceutical standpoint is only part of the story," said Becton Dickinson's Feygin. "Owning the care process is another big part, especially for device companies which need to be prepared for that." Companies should first address the most acute "pain points" with their digital solutions, and then expand to add-on offerings.

*"We used to be a federated company. But because our patients have co-morbidities, we're looking at how to connect information across the organization."*

– Zeeshan Tariq  
Medtronic



3. After investing in analytics, drug and device companies are still uncertain about managing data and gaining quality insights.

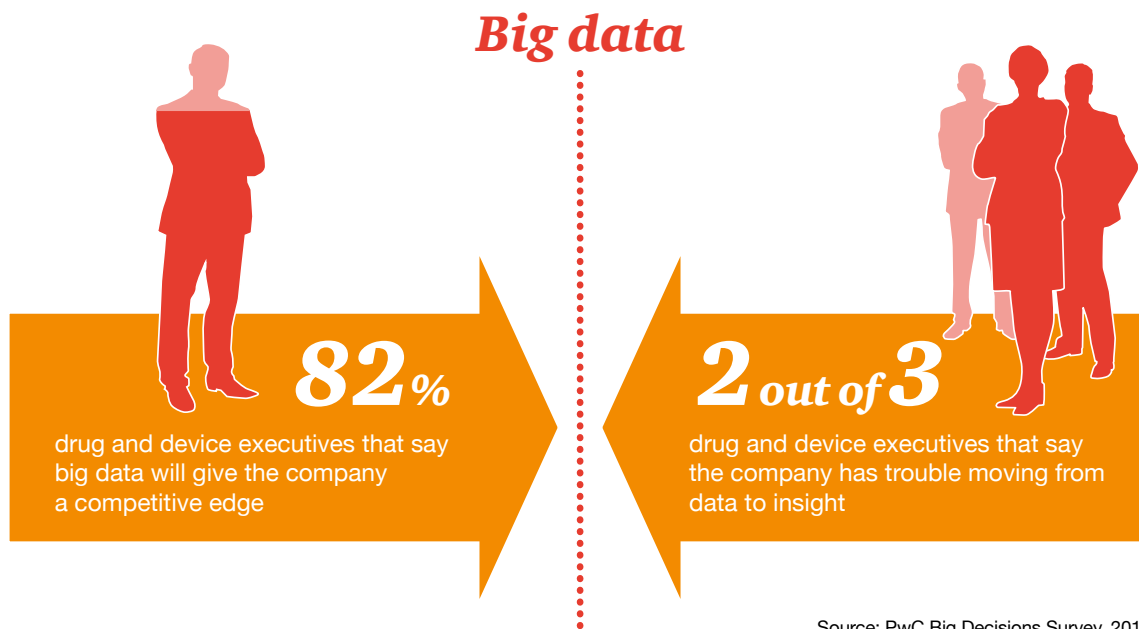
Data mining and analysis technologies topped the list of digital investments among drug and device companies in 2013.<sup>15</sup> Some companies appear to have made strides in building infrastructure to align capabilities that are scattered across the organization. “We used to be a federated company,” said Zeeshan Tariq, vice president for information technology at Medtronic. “But because our patients have co-morbidities, we’re looking at how to connect information across the organization.” Philips, Becton Dickinson, Pfizer, Eli Lilly, and others have built health informatics divisions or spin-off companies focused on looking for ways to develop new services for providers and insurers.

While 82% of the executives PwC surveyed agreed that big data would give their organization a competitive edge, two-thirds acknowledged that their companies have trouble moving

from data to insight.<sup>16</sup> One issue is that companies often question the accuracy or completeness of the data they mine. And just over one-third of drug and device companies rated the timeliness of the data they receive as “poor,” compared to 23% of companies in other industries.<sup>17</sup>

Historically, drug and device companies have not considered data to be a competitive advantage or a source of value. Nearly one-third of drug and device executives believe their senior leaders lack the expertise necessary to fully make use of data.<sup>18</sup> To address this, many companies are sending their senior executives to data interpretation training.

Figure 5: For drug and device companies, hopes for big data are met with concerns about achieving insight



Source: PwC Big Decisions Survey, 2014

15 PwC Digital IQ Survey, 2014.

16 PwC Digital IQ Survey, 2014.

17 PwC Big Decisions Survey, 2014.

18 PwC Big Decisions Survey, 2014.



### Considerations:

- **Expand data sources and data-sharing relationships, but own the insights:** Companies are beginning to build a broader picture of customers and patients—of executives who said their company has changed how it approaches major decisions as a result of big data or enhanced data analysis over the top years, 55% said they are using new, richer data sets from outside sources, compared to 45% of executives from other industries.<sup>19</sup> They should identify partners with which to share mutually useful data while also taking care to protect their intellectual property.

The evolution of pharmacies to retail clinics will likely force drug companies to rethink relationships with new prescribers. Pharmacies have deep relationships with millions of customers and rich databases of information about them. For example, Walgreen's Balance Rewards program has customer and patient preference data on 74 million active members.<sup>20</sup> These insights can be valuable as companies develop personalized medicine.

Atherotech Diagnostics Lab, a specialty lab and disease management company and provider of proprietary, comprehensive cholesterol testing, has built a large lipid data library. The company is enhancing this data set by using advanced patient matching technology and algorithms to link patients' history and records. Using its Our Healthy Heart<sup>®</sup> program,

Atherotech can also tie other important clinical information to the record—such as the patient's risk factors—for a more robust view of the patient.

- **Consider “weak data signals”:** Data quality concerns should not stall organizations. Companies such as Optum are capturing new but often incomplete data from sources such as EMRs, cohort studies, and registries. They are starting to derive what might be considered weak signals from them to inform decision making and guide investments in complete data sets through randomized clinical trials. Enlisting patient participation may also help form a more complete picture—patients may be willing to share their health data if they believe it could benefit them in the long run.
- **Visualize the outcome:** Leading firms will develop sophisticated capabilities that allow teams to ask meaningful questions of data sets and subsequently generate actionable insights. One-third of drug and device companies will invest more in data visualization technology in 2014.<sup>21</sup>
- **Make real-time adjustments:** Adaptive trials that allow researchers to make modifications as data becomes available account for 20% of clinical trials today and are expected to grow in number.<sup>22</sup> These trials hold the promise of speeding up results, uncovering more information, allowing for “fast failure,”<sup>23</sup> and reducing trial costs.
- **Predict to reduce risk:** Just as Walmart tracks things such as weather patterns to predict when and which stores will need more snow shovels, drug and device companies could develop products that help predict disease outbreaks and signal demand. They could also protect revenue from their drug investments by predicting which treatment a patient will respond to—of the \$25 billion spent on the top three drugs each year, an estimated \$15 billion is wasted on the 60% of patients who are “non-responders.”<sup>24</sup>

Soluble Therapeutics, which provides drug formulation instrumentation and services, has invested in technologies that allow scientists to predict the combination of additives that will lead to the best outcome. “Formulation is a bottleneck in the R&D process for many pharmaceutical companies,” said Joseph Garner, the company's chief executive officer. “Our technology can help us predict the best formulations in three to four months versus 18 months.”

- **Manage the data:** As they strive for more robust analytics, drug and device companies need capabilities for ensuring due diligence in data management, processes, and policies. They need a team that governs data management initiatives based on formal processes for monitoring data quality and compliance, communicating policies, and managing data definitions and standards.

19 PwC Big Decisions Survey, 2014.

20 Gregory Wasson speech, JP Morgan Healthcare Conference, Jan. 15, 2014. Transcript courtesy of Thomson Reuters.

21 PwC Digital IQ Survey, 2014.

22 PwC Health Research Institute, “Top health industry issues of 2014,” December 2013; <http://pwchealth.com/cgi-local/hregister.cgi/reg/pwc-hri-top-healthcare-issues.pdf>

23 See “A new mantra for health innovation: Fail fast, frequently, and frugally” in HRI's *Top health industry issues of 2014* report.

24 Pharmacogenomics in clinical practice and drug development. Andrew R Harper 1, 2 and Eric J Topol, Nature Biotechnology.

*4. Drug and device companies should combine modern technologies with existing systems for the greatest return.*

A 2013 West Health Institute study estimated that by connecting medical devices to EMRs the health system could save \$30 billion per year through reducing clinician time spent manually entering information, adverse events, redundant testing, and length of stay due to information delays.<sup>25</sup> Even though many device manufacturers have created smartphone apps for patients to monitor themselves and send data to clinicians, a recent HRI survey found that only 18% of those companies are maximizing the use of new technologies and integrating the patient data into clinician workflows and EMRs. Just 12% of device companies believe they are doing a good job of integrating this data with their R&D systems to drive innovation.<sup>26</sup>

**Considerations:**

- **Go flexible to stay agile:** Companies need flexible tools that can be layered and accommodate evolving data sources—such as EHRs, social media, and patient themselves. “Healthcare organizations’ usual approach is to seek a one-off solution for each specific problem. What they should do instead is build adaptable infrastructure with broadly scalable and generic capability that not only solves the problem in question but can also be used to address others that inevitably come down the pike,” said Mark Smith, director of the MedStar Institute for Innovation in Washington, DC. “Implementing solutions with a low change cost that are easy to configure and deploy is key.”

- **Connect modern technologies with major information systems used to run the business:** Two major device companies are creating these links. In June, Philips and Salesforce.com announced that they will build a one-stop-shop technology for caregivers by compiling patient health information from clinical machines, core data systems, and wellness apps. Once mined, this extensive pool of data should reveal ways to treat patients more personally and effectively, providing doctors and nurses valuable information at the bedside and allowing Philips to conduct research and development programs.

Last summer, Medtronic acquired digital health company Cardiocom, which offers remote monitoring for heart patients. “We are now able to reach the 90% of cardiology patients who do not need one of our pacemakers but still have a need for monitoring and managing their disease,” said Frédéric Noel, vice president of hospital solutions for Europe, the Middle East, Africa and Canada. Medtronic uses cloud platform CareLink to connect its devices and link them to provider EMRs. CareLink also brings together critical information from insulin pumps and glucose monitors that diabetes patients and their physicians can both view. The software prepares reports that reveal patterns and trends to help inform therapy adjustments.

*“Healthcare organizations’ usual approach is to seek a one-off solution for each specific problem. What they should do instead is build adaptable infrastructure with broadly scalable and generic capability that not only solves the problem in question but can also be used to address others that inevitably come down the pike.”*

– **Mark Smith, MD**  
*Director, MedStar  
Institute for  
Innovation*

<sup>25</sup> The value of medical device interoperability: Improving patient care with more than \$30 billion in annual health care savings. West Health Institute, March 2013.

<sup>26</sup> PwC Health Research Institute, “Medtech companies prepare for an innovation makeover,” October 2013; <http://pwchealth.com/cgi-local/hregister.cgi/reg/pwc-medical-technology-innovation-report-2013.pdf>

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# Conclusion

With outdated and unresponsive information technologies, traditional drug and device companies will have difficulty meeting the needs and demands of the next generation of consumers. If companies fail to embrace a digital strategy that fuels its innovation machine, they risk displacement from new competitors that will create more valued offerings,

and they may miss opportunities to create new revenue sources. Conversely, businesses that invest in adaptable technology platforms; social, mobile and cloud technologies; sophisticated analytics; new skill sets; and data-sharing relationships will be more likely to achieve breakthrough innovations faster.

## Health Research Institute

PwC's Health Research Institute (HRI) provides new intelligence, perspectives, and analysis on trends affecting all health related industries. The Health Research Institute helps executive decision makers navigate change through primary research and collaborative exchange. Our views are shaped by a network of professionals with executive and day-to-day experience in the health industry. HRI research is independent and not sponsored by businesses, government or other institutions.

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