“The iDoctor Will See You Now”
Challenges and Implications Facing Future Healthcare AI

NOVATIO SOLUTIONS
August 2017
SUMMARY

Current machine-assisted solutions in healthcare include:

- Medical Records and Other Data
- Taking Over Repetitive Jobs
- Treatment Design
- Digital Consultation
- Virtual Nurses
- Medication Management
- Drug Creation
- Precision Medicine
- Health Monitoring
- Healthcare System Analysis

The reason for shifting towards artificial intelligence are clear benefits, in the form of cost savings, to patients and providers. This will allow speed, accuracy, productivity increases, ability to eliminate mundane work, deeper data analysis and broader healthcare access.

However, challenges lie ahead for wholesale adoption of AI technology. Risk aversion is embedded deep within the industry, and many believe systems and processes that use digital workers to be risky. Many specific questions will need to be addressed and key obstacles overcome to realize a future where humans work side-by-side with robot counterparts.

Needs include:

- Investment in data support
- Universal regulation of private information
- Convincing the industry to embrace change
- Avoid technology over-reliance
- Realize the human touch is still needed
- Build AI as part of a larger strategy
- Trust the right providers and partners

About 86% of healthcare providers, companies, and technology vendors use some form of artificial intelligence. As high as that number is, it will only grow as technology continues to evolve.

If these, and more, challenges are faced, the potential for a new, optimized healthcare industry could be realized. One that balances and leverages the strengths of both human providers and machines.
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INTRODUCTION: EMERGING AI IN HEALTHCARE

Many industries have been disrupted by the influx of new technologies in the Information Age. Healthcare is no different. Particularly in the case of automation, machine learning, artificial intelligence (AI), doctors, hospitals, insurance companies, and industries with ties to healthcare have all been impacted – in many cases in more positive, substantial ways than other industries.

According to a 2016 report from CB Insights, about 86% of healthcare provider organizations, life science companies, and technology vendors for healthcare are using artificial intelligence technology. By 2020, these organizations will spend an average of $54 million on artificial intelligence projects.¹

Investment and contracts from AI startup companies are another way to gauge this growth. Completed deals from healthcare startups are beating out companies in every other industry. (See Figure 1)

FIGURE 1


“Deals to healthcare-related AI companies have been increasing year-over-year since 2011, with deals more than doubling in 2014,” the report says. “Funding jumped by nearly 460% in 2014, to $358M, from $64M in 2013.”²

Currently, much of the AI investment in healthcare goes toward improving business processes. But recent advances in technology are widening the scope of digital automation to more client-centric (and ultimately impactful) tasks.
“AI systems are poised to transform how we think about disease diagnosis and treatment,” said Health Industry Analyst Harpreet Singh Buttar. “Augmenting the expertise of trained clinicians, AI systems will provide an added layer of decision support capable of helping mitigate oversights or errors in care administration.”

The capacity of robots to pull information from various and different sources, translate data, and process language allow them to take on challenges that previously had no easy solution. Additional advances will allow AI systems to be used in both clinical decision-making support and fine-tuning of business and logistical workflows, including: medical imaging and diagnostics, remote patient monitoring, and risk prediction, among other tasks.

“By 2025, AI systems could be involved in everything from population health management, to digital avatars capable of answering specific patient queries,” added Buttar.

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Even with clear benefits and quickly evolving technology, hospitals staffed by robots in lab coats is far from a reality.

“Like any technological transition, the path toward a seamless digital-human partnership in healthcare is faced with many challenges,” says Gokul Solai, MD, technology firm Novatio Solutions’ co-founder. “But I think the end result will help so many people, it will be well worth us tackling those challenges.”

In this paper, we will explore the benefits of a future AI-supported healthcare system, as well as the questions we must answer to actualize that vision.
HOW AI IS CHANGING HEALTHCARE

Digital automation, machine learning, and artificial intelligence can play a key role in the revolution of healthcare. Novatio Solution’s Gokul Solai, MD, helps break down common solutions and key benefits they offer providers and patients.

10 COMMON AI SOLUTIONS (NOW AND FOR THE FUTURE)

Medical Records and Other Data
Since the first step in health care is compiling and analyzing information (like medical records and other past history), data management is the most widely used application of artificial intelligence and digital automation. Robots collect, store, reformat, and trace data to provide faster, more consistent access.

“Insights gained from faster analysis of more data also helps patient education,” explains Solai. “We can say ‘This is what happened, and this is how you can help yourself with treatments and preventative measures.’”

Treatment Design
Artificial intelligence systems have been created to analyze data – notes and reports from a patient’s file, external research, and clinical expertise – to help select the correct, individually customized treatment path.

AI can help us simulate scenarios to compare treatment options,” says Solai. “For example, we can analyze the results of surgery for a patient’s heart blockage versus different medications, to custom tailor treatment plans.”

Repetitive Jobs
“While it may not be the most glamorous, the shifting claims processing, billing, and other back-end tasks away from people will have the biggest, most important, and most immediate impact,” says Solai.

“Why? Because AI technology will enable nurses and doctors to spend more time with patients,” he adds.

In addition, it allows doctors to give specialized attention to sicker people. Analyzing tests, X-rays, CT scans, data entry, and other mundane tasks can all be done faster and more accurately by robots. For example, cardiology and radiology are two disciplines where the amount of data to analyze can be overwhelming and time consuming. Cardiologists and radiologists in the future should only look at the most complicated cases where human supervision is useful.
Drug Creation

Developing pharmaceuticals through clinical trials can take more than a decade and cost billions of dollars. Making this process faster and cheaper could change the world.

Amidst the recent Ebola virus scare, a program powered by AI was used to scan existing medicines that could be redesigned to fight the disease. The program found two medications that may reduce Ebola infectivity in one day, when analysis of this type generally takes months or years – a difference that could mean saving thousands of lives.4

Medication Management

“One of the biggest reasons for patient readmittance is medication non-compliance or wrong medication or dosage was prescribed,” explains Solai. “There is tech now we can use to proactively monitor patients — if they taking their meds or experiencing side effects — without having to travel or physically visit them.”

The National Institutes of Health have created the AiCure app to monitor the use of medication by patients in this way. A smartphone’s webcam is partnered with AI to autonomously confirm that patients are taking their prescriptions and helps them manage their conditions. Most common users could be people with serious ailments, patients who tend to go against doctor advice, and participants in clinical trials.4

Virtual Nurses

The startup Sense.ly has developed Molly, a digital nurse to help people monitor patient’s condition and follow up with treatments, between doctor visits. The program uses machine learning to support patients, specializing in chronic illnesses.

In 2016, Boston Children’s Hospital developed an app for Amazon Alexa that gives basic health information and advice for parents of ill children. The app answers asked questions about medications and whether symptoms require a doctor visit.2
Healthcare System Analysis

In the Netherlands, 97% of healthcare invoices are digital. A Dutch company uses AI to sift through the data to highlight mistakes in treatments, workflow inefficiencies, and helps area healthcare systems avoid unnecessary patient hospitalizations.4

“AI can also help identify abuse of benefits and duplication of patient therapy,” adds Solai. “Things that usually fall through the cracks now, would get caught with the help of machine-aided data analysis.”

(For additional examples of AI applications, see Figure 2)

Health Monitoring

Wearable health trackers – like those from FitBit, Apple, Garmin and others – monitors heart rate and activity levels. They can send alerts to the user to get more exercise and can share this information with doctors (and AI systems) for additional data points on the needs and habits of patients.

Precision Medicine

Genetics and genomics look for mutations and links to disease from the information in DNA. With the help of AI, body scans can spot cancer and vascular diseases early and predict the health issues people might face based on their genetics.

Digital Consultation

Apps like Babylon in the UK use AI to give medical consultation based on personal medical history and common medical knowledge. Users report their symptoms into the app, which uses speech recognition to compare against a database of illnesses. Babylon then offers a recommended action, taking into account the user’s medical history.4
Since the first step in health care is compiling and analyzing information (like medical records and other past patients within five years based on CT scans.

“Boosting the humanistic element in healthcare is the change the healthcare needs, ” says Solai.

More one-on-one time with patients allows human clinicians to better care for patients’ mental facility where they can get help. 

Solai. “Basic diagnosis and early intervention can be made remotely, or expedite transfer to a

Even in the U.S. in rural, remote areas, they don’t have access to high-quality healthcare, “ says

The combination of data availability and AI will give future healthcare access to those who may not previously had access – either because of proximity or affordability.

To human diagnosticians). With more data points and learning, the robots could be trained to partnered with deep learning algorithms, the AI system predicts with 69% accuracy (similar rates results of surgery for a patient’s heart blockage versus different medications, to custom tailor treatment plans. 

Cardiologists and radiologists are two disciplines where the amount of data to analyze can be overwhelming and cardiology and radiology are two disciplines where the amount of data to analyze can be overwhelming and external research, and clinical expertise – to help select the correct, individually customized treatment path.

In addition, it allows doctors to give specialized attention to sicker people. Analyzing tests, X-rays, CT scans, away from people will have the biggest, most important, and most immediate impact, “ says Solai.

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BENEFITS OF AI AND DIGITAL AUTOMATION IN HEALTHCARE

Cost Savings (Patients)

Diabetes is near epidemic levels in the U.S. (in 2014 an estimated 9% of the population had the disease), and it is spreading throughout the world. Those who suffer from the disease spend $5,000 to $10,000 a year just on medication. Diabetics who have complications can spend in the hundreds of thousands of dollars on care. Combined with lost wages, Diabetes cost the U.S. more than $245 billion a year. Digital solutions could be instrumental in battling this costly disease.

Virta, a smartphone app uses AI and machine learning to help diabetics manage their symptoms. Users regularly enter glucose levels, weight, blood pressure, activity, energy levels, hunger, and mood. The app monitors and looks for warning signs in all this patient data, with help from offline doctors and pattern recognition.

“Any clinical decision is always made by a doctor,” Virta Health co-founder Sami Inkinen said. “But the software increases productivity by 10-X.” Combined with proper diet other medical controls, around 87% of patients reduced or eliminated the use of their costly medications, in clinical trials. Imagine the cost savings if this method is replicated at scale and for other diseases.

FIGURE 2

Care Management: applications for robotics

Care management presents plans with challenges typical to data overload: clinicians and others must aggregate information from multiple source

<table>
<thead>
<tr>
<th>Process</th>
<th>Typical Challenges</th>
<th>Source: HfS Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data intake</td>
<td>Inputs received from multiple data sources in formats incompatible with CM systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time wasted by highly-skilled resources focusing rote data entry</td>
<td></td>
</tr>
<tr>
<td>Care coordination decision support</td>
<td>Typical payers keep claim experience, care management, PBM, and other data separate systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Care managers cannot readily see the full picture without visiting each system unless payers invest in costly, slow, and issue-ridden integration</td>
<td></td>
</tr>
<tr>
<td>Decision management for quality outcomes</td>
<td>Decision workflows can be triggered by robotics scripts, presenting clinicians with the necessary information when needed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>As with care coordination, clinicians cannot readily see the full picture without visiting multiple systems separately</td>
<td></td>
</tr>
<tr>
<td>Notifications of process engagement</td>
<td>Member and provider notification letters can take as much as 5 minutes to generate automatically</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notification triggers can cause robots to generate letters and log appropriately system unless payers invest in costly, slow, and issue-ridden integration</td>
<td></td>
</tr>
<tr>
<td>Case management</td>
<td>Progress notes for rote activities can be automated by robots</td>
<td></td>
</tr>
</tbody>
</table>
**Cost Savings (Providers)**

Healthcare administration processing consumes a significant amount of time, effort, and manpower across markets worldwide. With a centralized, enterprise-wide, rule-based process-oriented system already established, Robotic Process Automation can drive down operational costs and lower fraud and litigation risk by up to 50%. (See Figure 3.)

**FIGURE 3**

Areas where RPA can offer benefit going forward in healthcare industry and specific functional areas

<table>
<thead>
<tr>
<th>Area</th>
<th>From 1 year ago</th>
<th>Expected 1-2 years</th>
<th>Expected 5-7 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrolling and billing services</td>
<td>20%</td>
<td>37%</td>
<td>50%</td>
</tr>
<tr>
<td>Claims coding and processing</td>
<td>28%</td>
<td>34%</td>
<td>41%</td>
</tr>
<tr>
<td>Overpayment recovery services</td>
<td>11%</td>
<td>22%</td>
<td>39%</td>
</tr>
<tr>
<td>Fraud and abuse services</td>
<td>11%</td>
<td>28%</td>
<td>39%</td>
</tr>
<tr>
<td>Medical management</td>
<td>20%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>Member/provider customer support</td>
<td>17%</td>
<td>30%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Source: HfS Research

“Not only does RPA remove system inefficiencies, it also lowers costs by reducing repeat patient procedures,” explains Solai.

**Speed, Accuracy, and Productivity Increases**

Digital health assistants can cover a large part of the clinical process – checking vital signs, answering basic questions, and providing prescriptions, all in less time than their human counterparts. With the help of AI and algorithms, workflow inefficiencies can be pinpointed and addressed. Human staffing can be adjusted constantly to meet patient needs.

Novatio Solutions predicts a 100% productivity increase over human workers in some areas of healthcare, especially operational tasks. (See Figure 4.)
Medical diagnosis will benefit from increased speed and accuracy with the help of AI solutions. Overall, AI has the potential to improve outcomes by 30-40%.⁶

At Purdue University Indianapolis, machine learning correctly predicted relapse rates for patients with leukemia with 90% accuracy. And identified those who would experience remission with 100% accuracy.²

**Shift From Mundane**
Leveraging the strengths of robots (like repetitive tasks) frees up humans to play to their own strengths (like complex, nuanced problem solving and personal care).

“Doctors are spending time on things that really are incredibly redundant, and if a machine can do it, let them do it,” said Zen Chu, faculty director of Massachusetts Institute of Technology. “If there’s an easier way to enter all that data, do it so doctors can spend more time with that patient.”⁹

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**Boosting the humanistic element in healthcare is the change the healthcare needs**

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### OPERATIONAL SAVINGS

<table>
<thead>
<tr>
<th></th>
<th>With Robot &amp; BPM</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 mins/case</strong></td>
<td>Request for authorization</td>
<td>3-5 mins/case</td>
</tr>
<tr>
<td><strong>3 mins/case</strong></td>
<td>Care coordination and decision support</td>
<td>8 mins/case</td>
</tr>
</tbody>
</table>

**Observations**
- Eliminates re-keying and manual errors
- Quality is 100%
- BPM automatically routes exceptions, overtime data makes robot more efficient
- Useful for environment reconciliation when traditional data migration is infeasible
- Very useful for intensive data entry processes that can not or will not be modernized

Over 100% productivity increase
More one-on-one time with patients allows human clinicians to better care for patients’ mental and emotional needs – an area where robots are ill equipped.

“Boosting the humanistic element in healthcare is the change the healthcare needs,” says Solai. “While AI can’t do that directly, it frees us up to do it.”

**Deeper Data Analysis**
The University of Adelaide in Australia has been working on an AI system to predict the death of patients within five years based on CT scans. Trained to analyze over 16,000 signs of disease and partnered with deep learning algorithms, the AI system predicts with 69% accuracy (similar rates to human diagnosticians). With more data points and learning, the robots could be trained to measure overall health rather than a single disease.

**Broader Access to Healthcare**
The combination of data availability and AI will give future healthcare access to those who may not previously had access – either because of proximity or affordability.

Small clinics will be able to pull the same medical records and log into the same disease treatment databases of large hospitals. Symptoms and wearable tracking data will be uploaded to virtual nurses and AI systems that will recommend treatment. Apps and AI will support mobile nurse practitioners to give them the same recourses as brick-and-mortar facilities.

“Even in the U.S. in rural, remote areas, they don’t have access to high-quality healthcare,” says Solai. “Basic diagnosis and early intervention can be made remotely, or expedite transfer to a facility where they can get help.”
CHALLENGES FACING AI IN HEALTHCARE

The biggest obstacle for technology adoption in healthcare has and will be the nature of the industry itself. Tech startups and solution companies face an uphill battle convincing providers to change their processes and rely more on automation and artificial intelligence. Much of this battle is the mindset of the industry: risk aversion is understandable when human lives are at stake.

David Torchiana, CEO of Partners HealthCare explains, “[Healthcare] generally has a problem in being incredibly labor-intensive and having shown relatively less gains in productivity than the rest of the economy.”

“Healthcare as a system advocates ‘do no harm’ first and foremost. Not ‘do good’, but ‘do no harm,’” cautions Kapila Ratnam, Ph.D., a scientist turned partner at NewSpring Capital. “Every application of A.I. in healthcare is regulated by that fundamental philosophy.”

Additionally, Lisa Suennen, Managing Director at GE Ventures highlights that “the single biggest contribution to excess cost and error in healthcare is inertia.” The attitude of “this is how it’s always been done” is figuratively killing people, she says.

“There will be some pushback from insurance companies because they thrive on inefficiencies,” adds Solai. “Not everyone is excited about fixing those inefficiencies.”

Keeping this paradigm in mind, big answers and issues need to be tackled before more progress is made.

DATA SUPPORT INVESTMENT

Dr. Joseph Reger, CTO, Fujitsu EMEIA, recently stressed that machine learning and AI in healthcare will only be successful if data is the “lifeblood of the system.”

"Data will enable AI machines to learn and understand new medical functions, and then critically provide humans with the necessary information to diagnose problems," Reger said.

"The potential application of AI in healthcare could even grow to possibly predict future illnesses even before they manifest, improving the quality of services for patients.” Reger adds. “All of this will not be achieved without vast swathes of data, an acceptance that AI will supplement jobs, not replace them, and the overall investment in the technology itself.”

UNIVERSAL REGULATION OF PRIVATE INFORMATION

Although transparency of medical records and data between institutions would create massive benefits, it is weighed against the security of that data.

“In the wrong hands, access to all this private data could lead negative consequences,” warns Solai. “Insurance companies knowing about a patient’s preexisting condition and then rejecting them for coverage, for instance.”
It’s a challenge to dynamically regulate this space, but we should universally agree what we need to protect. Individual privacy security should be standardized throughout the world. Data is everywhere, it’s circulating everywhere, so it has to be regulated everywhere.

“We don’t want to prevent innovation, but we also have to recognize that we need to protect information. Especially personal information,” Solai says.

### Data is everywhere, it’s circulating everywhere, so it has to be regulated everywhere

#### EARN TRUST, EMBRACE CHANGE
While many people are ready to trust AI-assisted healthcare providers, not everyone is there yet. Studies by Price Waterhouse Cooper found 55% of people are willing to use robots and AI to get health-related answers, tests, and diagnosis. However, 38% were not.13

Convincing doctors, clinicians, nurses, and other stakeholders to place their trust in machines will also not be easy, said Steve Leonard, chief executive at innovation company SGInnovate.

"Healthcare is a very tricky area," Leonard said. "Doctors and clinicians are not so excited sometimes about new models or new processes – and I don’t mean that disrespectfully. It’s just that’s a reality."

However, momentum is moving toward a positive overall feeling toward what AI has to offer. According to one study, around 55% of healthcare organizations feel AI is important to competitiveness.14

Success, said respondents, will be dependent on culture – getting managers and employees to trust the advice that robots offers. The hope is that this internal majority can help move the industry further toward mass adoption.

#### AVOID TECHNOLOGY OVER-RELIANCE
“Our society is heading toward embracing AI technology,” said Solai. “We want to make sure we don’t over-embrace this technology to the point of reliance.”

Having the ability for doctors to have recommendations written for them and treatment plans catered for them, could have a downside. It may make it too easy to just defer to machine-generated recommendations. Doctors could begin to relax, which is not the best mindset to be in when a patient’s best interest is at risk.

“When we had PDAs come in with predicted medication dosages, a lot of times we’d just defer to that,” explains Solai. “We weren’t necessarily asking ourselves for ‘How could this potentially be wrong?’”
“Taking away the human judgment element from medicine is definitely one thing we have to watch as technology evolves,” he says.

**HUMAN TOUCH IS STILL NEEDED**

Like other industries impacted by digital workforces, human workers will need to recognize more opportunities will come from the technology, not less. Robots in healthcare are not replacing but enhancing human efforts. Demonstrating this concept will be key.

A survey shows new jobs from healthcare AI will increase an estimated 13% by 2025. For these new jobs, respondents guessed companies would fill 58% with current staff and 42% with new hires.14

Human staff will also need to understand that no algorithm is able to emulate both the social and professional functions of a doctor or nurse. Bedside manner will be even more important as the redundant, repetitive tasks of diagnosis and treatment are given to robots. Healthcare will lean even more heavily on humans for complex problem solving and personal care. (See Figure 5, “A Day in the Life of an AI-Aided Doctor.”

**FIGURE 5**

<table>
<thead>
<tr>
<th>DAILY TASK</th>
<th>WITHOUT AI</th>
<th>WITH AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Call Overnight</td>
<td>Field triage calls--medication dosing, drug combinations--at all hours</td>
<td>AI simulations field triage questions, freeing doctors to get more overnight rest</td>
</tr>
<tr>
<td>Patient monitoring</td>
<td>Vitals reviewed every shift or every 4 hours</td>
<td>Vitals analysis at shorter intervals; concerning trends spotted faster</td>
</tr>
<tr>
<td>Morning patient review</td>
<td>Review patient charts from previous night; compile notes from specialists and other sources</td>
<td>Charts are aggregated with other data sources, streamlined, and present consolidated treatment plans</td>
</tr>
<tr>
<td>Treatment planning</td>
<td>Manually comb through data from various charts, doctor recommendations, and other sources; react to data</td>
<td>Consolidated charts allow for end-to-end treatment of patient instead of treatment of data; increased ability to compare patient data against other patients, treatments, and their own history</td>
</tr>
<tr>
<td>Patient visit rotations</td>
<td>In-person check-ins to explain treatments and answer questions</td>
<td>More time with patients for personalized, thorough, transparent care</td>
</tr>
<tr>
<td></td>
<td>Notes are taken, medication prescribed, calls to pharmacies to ensure on-time fulfillment</td>
<td>Medication prescriptions prioritized, informing patients in real-time; patient visit notes aided by AI</td>
</tr>
<tr>
<td>End of day patient handoff</td>
<td>Doctor hands off patients to next doctor on rotation</td>
<td>Standardized, seamless process with no lost information or miscommunication</td>
</tr>
</tbody>
</table>
AI IS PART OF LARGER STRATEGY
While robotics offers the benefit of bolting onto existing processes, maximum efficiency gains are only possible when integrated with a wider transformation strategy.

Partnering RPA with strong leadership, data integration and analytics, and business process management is the true path to digital business innovation. (See Figure 6)

FIGURE 6
Integrating RPA as part of digital transformation

While robotics offers the benefit of bolting on to existing processes, maximum efficiency gains are possible only when integrated with a wider transformation strategy.

OTHER QUESTIONS THAT NEED ANSWERS
In addition to the previous key issues, the following unknowns will need addressed for continued AI adoption and to avoid possible pitfalls that come with it.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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</thead>
<tbody>
<tr>
<td>What are the global ethical standards for healthcare AI?</td>
<td>Who will develop and govern these standards?</td>
</tr>
<tr>
<td>What are the possible downsides for mass AI adoption in healthcare?</td>
<td></td>
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<tr>
<td>How will medical professionals gain basic knowledge on how AI works?</td>
<td>Can they be convinced of its everyday benefits?</td>
</tr>
<tr>
<td>Are patients ready to trust AI-supported diagnosis and treatment plans?</td>
<td>What will it take to earn that trust?</td>
</tr>
<tr>
<td>How will health-related data and privacy be protected if made more</td>
<td></td>
</tr>
<tr>
<td>available for providers?</td>
<td></td>
</tr>
<tr>
<td>How will healthcare institutions measure success and effectiveness?</td>
<td></td>
</tr>
<tr>
<td>What are the liability implications of AI-supported diagnosis and</td>
<td></td>
</tr>
<tr>
<td>treatment?</td>
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</tbody>
</table>
CHOOSING THE RIGHT PARTNER

When selecting the right digital workforce solution, you need a flexible, knowledgeable leader. Trust a partner who can give experience-based guidance on how to accommodate for a digital workforce implementation and transformational leadership to help the transition.

For 25 years, Novatio Solutions has provided this leadership in managed business process (BPO) outsourcing for Fortune 100 clients. They have returned more than 500,000 hours back to their partners, so that those organizations’ employees can focus on higher-value work. They have helped free managers from micromanaging. And they have helped empower people to harness the cognitive skills that make them human.

The Novatio team understands automation and what it takes to transform business operations

"The Novatio team understands automation and what it takes to transform business operations," says Gokul N. Solai, head of products and alliances for Novatio. "Our goal is to use digital workforce solutions to make everyone’s life easier, from the CEO to the person answering the phones."

Medical Experience
Because of the medical background of co-founder, Solai, a certified MD, Novatio understands how technology and medicine intertwine to benefit each other.

Novatio has partnered with many of the U.S.’s major hospital systems to streamline their processes. And because there are commonalities in most large companies and healthcare groups, lessons and solutions can be delivered quickly. Solutions that are tested, optimized, proven, and ready to adapt to other providers.

Humanistic Mindset
When evaluating technology solutions in healthcare, the “what” and “why” — helping people live better, longer, more healthy lives — should be prioritized over the how.

“The most efficient solution might be what you want from technology,” says Solai, “But is it the safest most helpful solution?”

Their focus on the people impacted by the technology, instead of the technology separates Novatio from other firms.

More Than “Traditional” Automation
“Traditional” automation solutions usually fall short in their rigidity. They are limited in scope and benefits and too expensive to update or change. There’s a long change process that is highly
We are able to combine our emerging technology with our industry-leading expertise to deliver an unrivaled experience to our customers.

In many cases, companies rely on legacy applications or systems that are no longer supported. When changes or integrations are needed, technical support resources are difficult to find. Novatio Solutions harmonizes multiple and previously disconnected robotic process automation (RPA) tools and combines them with next-generation technology to create a customized digital workforce. Robotic process automation with digital workers gives agility and flexibility to accommodate change; decreases time to value; and is less expensive to set up and maintain.

The Novatio online portal offers advanced business intelligence tools, an online marketplace and service catalog and visibility into usage and billing. Simulator tools provide real-time input on cost-savings, which prioritizes time and cost efficiency. The portal also provides insight into forecasting and demand prediction, which allow for data-driven staffing and a more proactive decision-making.

**Novatio Digital Workforce**

<table>
<thead>
<tr>
<th>noninvasive, technology-agnostic workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% compliance</td>
</tr>
<tr>
<td>Zero errors</td>
</tr>
<tr>
<td>3-5 times greater productivity</td>
</tr>
<tr>
<td>1/10 price of traditional workforces</td>
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<tr>
<td>2-3 times faster implementation than other solutions</td>
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**The Novatio Solutions Difference**

1. We are experts on automation, technology and innovation.
2. We futureproof your digital workforce by keeping you ahead of the game.
3. We can streamline your practices in a fraction of time.
4. We provide solutions that are highly efficient, cost-effective, reliable and scalable.
5. We integrate across multiple platforms and industries.

“We are able to combine our emerging technology with our industry-leading expertise to deliver an unrivaled experience to our customers.”

“Novatio allows your organization to accelerate the convergence of intelligence automation and artificial intelligence,” says Solai. “We are able to combine our emerging technology with our industry-leading expertise to deliver an unrivaled experience to our customers.”
CONCLUSION

CRAWLING COMES BEFORE RUNNING
As we look forward to a future of streamlined hospital systems, accelerated drug development, curated and personalized treatment plans, and universal healthcare access, perspective is needed. It will take time – for technology to improve and for people to trust the technology – before this future is a reality.

“Everyone wants to get to robust artificial intelligence tomorrow, but it’s an evolution,” explains Novatio’s Gokul Solai. “People and machines both learn through experiences. Babies evolve from sitting up to crawling to standing up to walking to running.”

The safest, most effective route is to start with simple solutions and work toward more advanced application of AI.

“When you’re implementing the first part of a strategy, you’re going to aim for continual improvement,” says Solai. “Technology is going to iteratively get better. Understanding that RPA is the first step and that it could be a long journey to AI is important.”

The long journey, as we have shown, could impact millions of lives.
SOURCES AND ADDITIONAL RESOURCES

1 “AI Heatmap: Healthcare Emerges As Hottest Area For Deals To Artificial Intelligence Startups,” CB Insights, June 18, 2016.
https://www.cbinsights.com/blog/artificial-intelligence-investment-heatmap/

2 Jennifer Bresnick, “How Do Artificial Intelligence, Machine Learning Differ in Healthcare?” Health IT Analytics

3 “From $600 M to $6 Billion, Artificial Intelligence Systems Poised for Dramatic Market Expansion in Healthcare,”
Frost & Sullivan, January 5, 2016
expansion-healthcare

4 “Artificial Intelligence Will Redesign Healthcare,” The Medical Futurist
http://medicalfuturist.com/artificial-intelligence-will-redesign-healthcare/

5 Kevin Maney, “How Artificial Intelligence Will Cure America’s Sick Health Care System,” Newsweek, May 24, 2017

6 “2014 National Diabetes Statistics Report,” Center for Disease Control and Prevention,

7 Ben Pallant, Abigail Dove, and Adam Brown, “Virta Health: Reversing Type 2 Diabetes with Low-Carb Diets &
Coaching,” DiaTribe, March 10, 2017

8 Dr. Jon Warner “10 Roles Artificial Intelligence Can Play in Healthcare,” RX4 Group


10 “The Future of Radiology and AI,” The Medical Futurist
http://medicalfuturist.com/the-future-of-radiology-and-ai/


12 Jennifer Kite-Powell, “See How Artificial Intelligence Can Improve Medical Diagnosis And Healthcare,” Forbes
Magazine, May 16, 2017
https://www.forbes.com/sites/jenniferhicks/2017/05/16/see-how-artificial-intelligence-can-improve-medical-diagno-
sis-and-healthcare/

13 Saheli Roy Choudhury, “A.I. can be a game-changer for health care but convincing doctors, clinicians can be
‘tricky,’” CNBC, May 5, 2017
http://www.cnbc.com/2017/05/05/artificial-intelligence-can-transform-healthcare.html

14 Bill Siwicki, “86% of healthcare companies use some form of AI,” Healthcare IT News, May 19, 2017
ABOUT NOVATIO

Novatio is a Digital Workforce solutions provider from the founders of Solai & Cameron Technologies. The company capitalizes on Solai & Cameron's 25 years of experience developing best practices in operational transformation.

Novatio harmonizes multiple robotic process automation (RPA) tools along with next generation technology to create a customized digital workforce. Consequently, Novatio's clients benefit from added capacity, scalability and efficiency.

Novatio has streamlined business processes for clients across a variety of industries, including IT, healthcare, finance, insurance and government. For more information, visit NovatioSolutions.com.

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