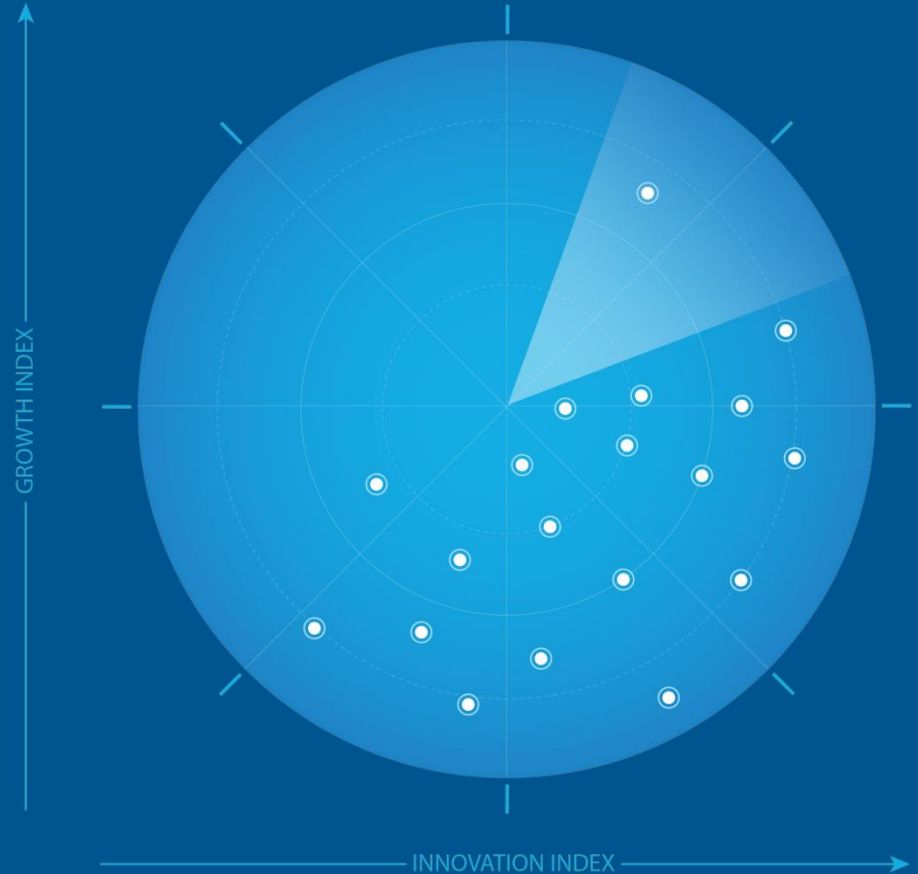# FROST & SULLIVAN

FROST RADAR™: ARTIFICIAL INTELLIGENCE FOR HEALTHCARE IT, GLOBAL, 2020

BENCHMARKING FUTURE GROWTH POTENTIAL

GLOBAL TRANSFORMATIONAL HEALTH RESEARCH TEAM AT FROST & SULLIVAN

GROWTH INDEX

INNOVATION INDEX

K4D8-48
June 2020

STRATEGIC IMPERATIVE AND GROWTH ENVIRONMENT

Strategic Imperative

- Legacy healthcare IT systems are largely unable to deal with the volume, complexity, and growth of medical data across the care continuum. As a result, at a global level, most clinical interventions are not personalized, financial workflows overlook payment fraud, and administrative processes require manual involvement that ultimately results in medical reconciliation.

- Artificial intelligence (AI) technologies are applied on healthcare IT systems to improve the computing capability of front-line clinical, financial, and operational systems amid massive growth of unstructured data that hold the clue for improved outcomes. Adoption had been limited to a few large enterprises that could afford to modernize their IT offerings at an enterprise level, and uses mostly were limited to data management, corporate risk mitigation, administrative automation, and regulatory compliance optimization.

- Over the last 2 to 3 years, however, AI has become an integral part of all healthcare IT systems, and has become more accessible and affordable for patients, providers, and payers. A key contributing factor is the role of pure-play ICT companies that have democratized development, deployment, and commercialization of AI solutions through robust infrastructure support and proactive partnerships via open API programs.

- The global market for AI in healthcare IT is poised for unprecedented growth as all healthcare stakeholders now have the need and the incentive to embrace full-fledged AI to improve clinical efficacy, augment financial performance, and streamline operational agility.

Source: Frost & Sullivan

Strategic Imperative (continued)

- Frost & Sullivan research has identified the core areas in which AI-enabled healthcare IT solutions are most relevant for hospitals, physicians, and payers.

  o Hospitals that have so far invested in AI-based financial solutions to automate patient access management, reimbursement eligibility matching, and computer-assisted coding are now also preferring clinical-grade AI solutions for imaging analytics, genomics profiling, clinical risk stratification, and precision medicine-based diagnosis.

  o Physician practices continue to focus on automated, AI-based healthcare IT solutions that perform practice management, physician scheduling, and workforce attribution. Large group practices are investing in conversational AI solutions that engage and activate patients via chatbot. AI also allows practice management software to merge with a third-party electronic medical record (EMR) or population health management platform for effective referral management and patient tracking in their journey across the care continuum.

  o The payer market, one of the biggest investors in AI-based healthcare IT solutions, is betting big on enterprise-grade AI platforms that predict epidemics (such as COVID-19), forecast patient volume across their member providers, authenticate reimbursement, and drive general well-being of the insured population through medication management and self-care enablement.

- Other stakeholders are emerging, too. Government agencies, patients, incubators, academic medical centers, large healthcare IT vendors, and institutional investors are playing important roles in helping this technology gain traction in global healthcare market.
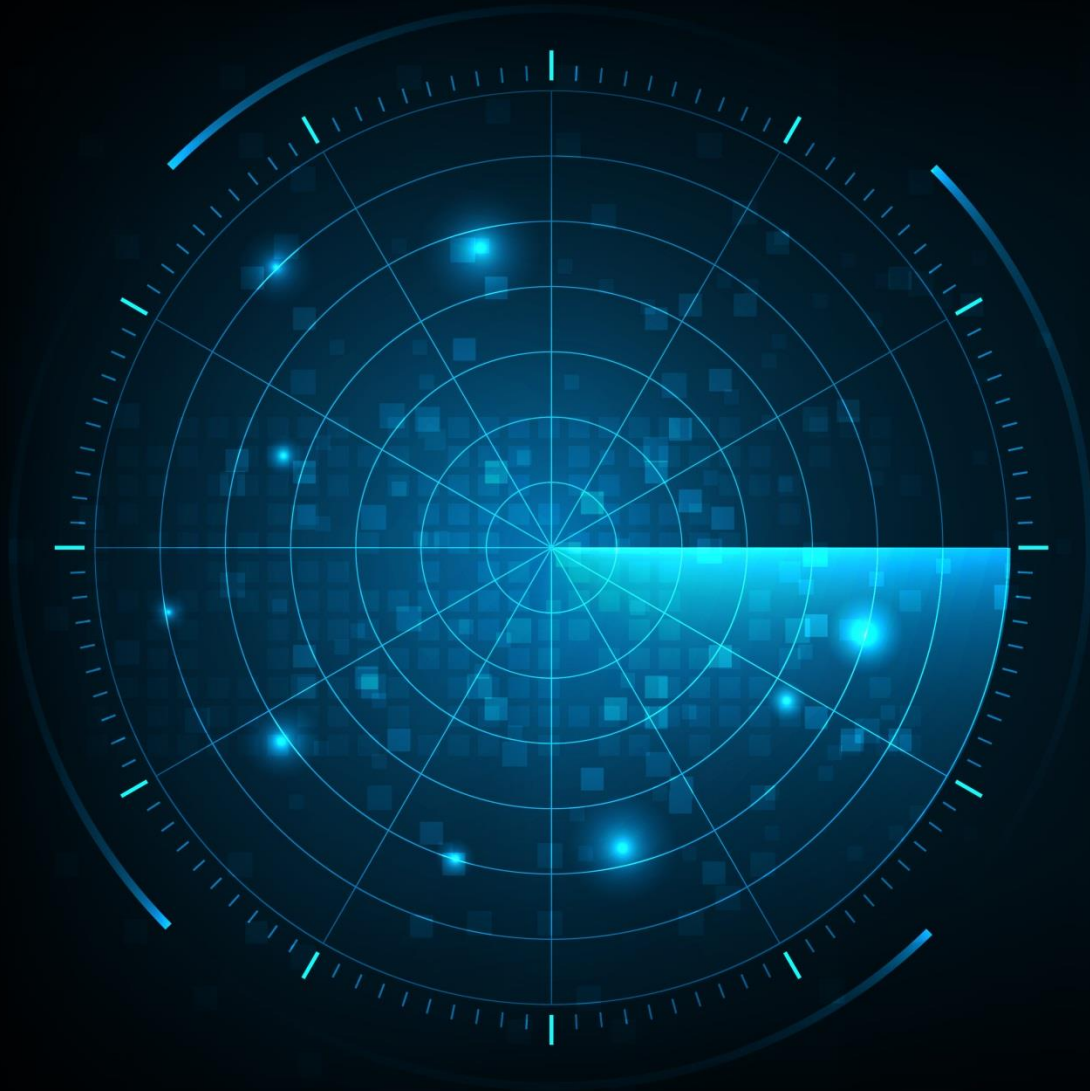
Source: Frost & Sullivan

Growth Environment

- The global market for AI in healthcare IT is on a rapid growth trajectory: Frost & Sullivan expects sales of AI-enabled products to generate more than $34.83 billion globally by 2025. Almost 50.7% of the revenue will come from government agencies (including public payers), followed by hospitals (36.3%), and physician practices (13.0%). Clinical and financial AI solutions each will generate about 40% of the market revenue; the rest will be derived by selling operational AI solutions.

- Next-generation AI solutions that will improve healthcare ecosystem efficiency include

    o **Conversational AI:** Clinical risk stratification and provider referral via chatbot

    o **Pharmaceutical AI:** Clinical trial eligibility assessment via IT

    o **Bioinformatics AI:** Targeted immunotherapy for infectious diseases via IT

    o **Infrastructure AI:** Super computing on cloud to incorporate clinical research outcomes on front-line clinical decision support systems

    o **Remote AI:** Contactless health hygiene via the Internet of Things (IoT), and contactless pain management via face recognition IoT

    o **Hardware-Integrated AI:** Rapid molecular diagnostic testing through wearables

    o **Deep Tech AI:** National data center for infectious diseases

    o **Genomics AI:** Precision medicine IT for infectious or rare diseases (e.g., DNA sequencing through AI to assess the vulnerability of a chronic population to an infectious or rare disease)

    o **Operations AI:** Supply chain analytics of medical products specific to infectious or rare diseases

    o **Research AI:** Real-world evidence IT for complex diseases

    o **Social AI:** National contact tracing application for transmissible diseases
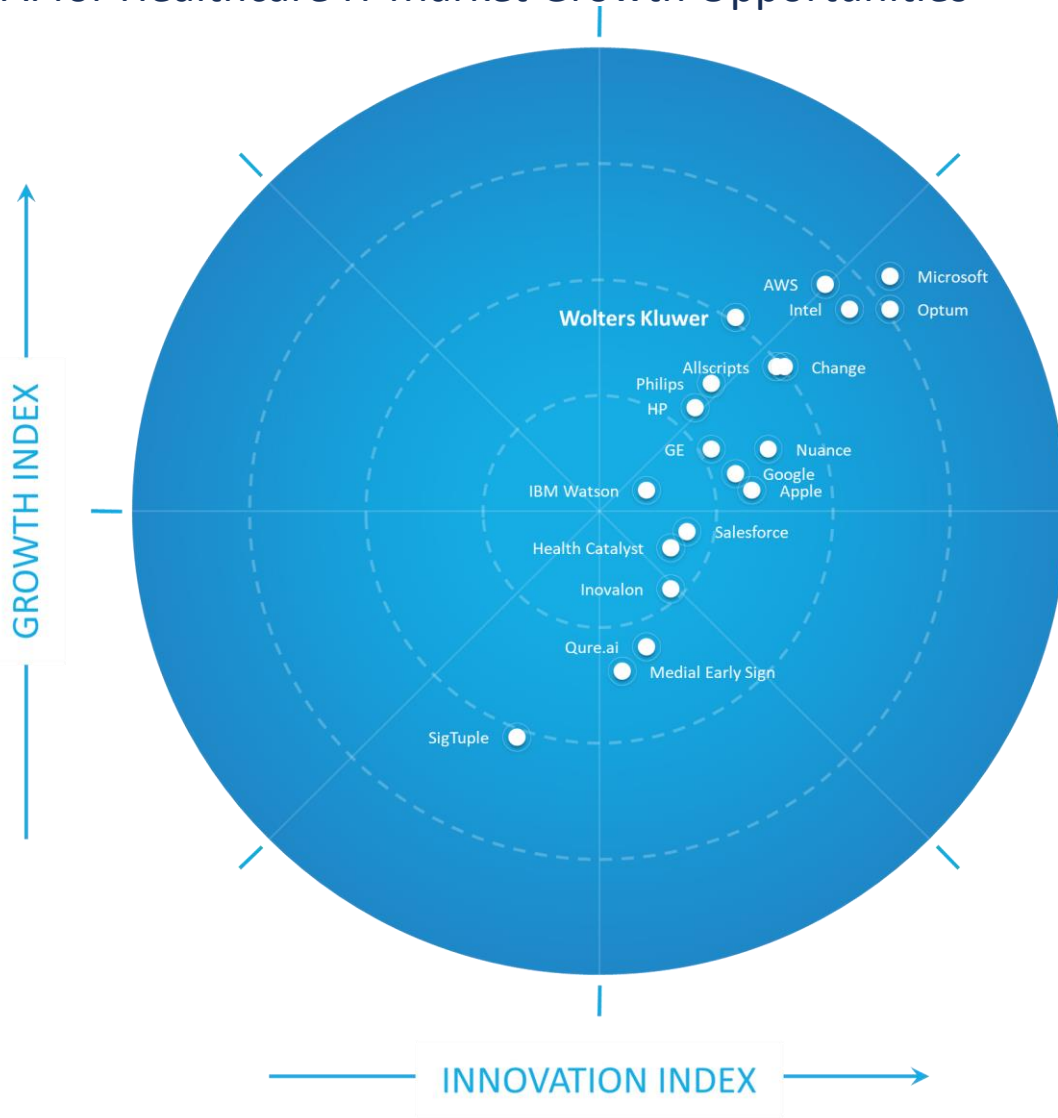
Source: Frost & Sullivan

FROST RADAR™

AI FOR HEALTHCARE IT

Frost Radar™
AI for Healthcare IT Market Growth Opportunities

In a field of more than 200 global industry participants, Frost & Sullivan independently plotted the **top 20** companies in this Frost Radar™ analysis. Parameters assessed in the analysis included:

- Innovation Scalability
- Research and Development
- Product Portfolio
- Mega Trends Leverage
- Customer Alignment
- Revenue Growth
- Market Share Growth
- Growth Pipeline
- Vision and Strategy
- Sales and Marketing

Frost & Sullivan studies related to this independent analysis:
- **K26D:** Artificial Intelligence Market—Key Application Areas for Growth in Healthcare IT, Forecast to 2022
- **K3CE:** Role of AI in the Pharmaceutical Industry, 2018-2022
- **MD1C:** Growth Opportunities in the Global Medical Imaging Artificial Intelligence Market, Forecast to 2022

COMPANIES TO ACTION
COMPANIES TO BE CONSIDERED FIRST FOR INVESTMENT, PARTNERSHIPS, OR BENCHMARKING

Wolters Kluwer

FROST RADAR™ LOCATION

- Wolters-Kluwer (WK) is a global healthcare IT enterprise that has demonstrated superior deep learning, NLP, and predictive clinical surveillance capabilities than most others.
- WK is one of the top Growth performers and is poised to move higher on the Radar in the next 2 years.
- WK has been investing strongly in various AI solutions that effectively consolidate disparate medical data at a provider level, convert unstructured medical notes into standardized clinical documents, and monitor clinical outcomes for regulatory reporting.

GROWTH

- WK is growing rapidly due to recent investment that it has committed to accelerate adoption of AI-enabled healthcare IT for all payer and provider customers.
- Its biggest growth opportunity has remained post-merger IT integration for large providers that are forming accountable care organizations or being acquired by private equity players.
- WK's Health Language platform is embracing various native AI solutions that allow providers to visualize population level health data post-merger and create actionable line items for stakeholders across the care continuum.

INNOVATION

- WK has scored well in Innovation metrics due to its ability to deliver exception results at scale for payers and providers.
- The Health Language platform is able to incorporate AI to automate the process of mapping non standardized lab notes onto LOINC codes.
- The platform further leverages the cNLP solution that allows pattern recognition and easy identification of clinical evidence in EMR, lab, and clinical decision support workflows based on its history of working with more than 300,000 providers for the last 10 years.

NEXT STEPS

- WK is geared for rapid market expansion with proprietary solutions, exceptional domain expertise, and best-in-class operational agility.
- Frost & Sullivan considers WK's decision to invest up to 10% of its revenue on product enhancement to be groundbreaking.
- Frost & Sullivan predicts that WK will gradually expand its AI-enabled healthcare IT footprint beyond North America and will work closely with large health systems, government agencies, and leading start-ups from Europe, the Middle East, and Southeast Asia in the next 2 to 3 years.

Source: Frost & Sullivan

**STRATEGIC
INSIGHTS**

Strategic Insights

1

AI drives the much-needed digital transformation in healthcare. The combination of machine learning, deep learning, NLP, and voice recognition technologies personalize clinical diagnoses, automate administrative processes, and expedite financial decision-making at the patient, population, and enterprise levels.

2

Machine learning and NLP capabilities for clinical review, patient engagement, claims preauthorization, coding, and payment fraud analysis appear to be relatively more mature in terms of adoption and utility across the global healthcare market. However, investment in deep neural network technologies and on-device AI for precision imaging, video analytics, the Internet of Medical Things, digital command center, and integrated remote patient monitoring is growing faster.

3

The COVID-19 crisis is rewriting the future of healthcare AI. Large-scale and enterprise-grade AI platforms that offer foundational infrastructure (hardware and software) and modular toolkits for targeted AI applications in the fields of predictive workflows, preventive intervention, medical research, genomics, and drug discovery will see maximum traction from payers, providers, pharma, and government agencies.

Source: Frost & Sullivan

NEXT STEPS: LEVERAGING THE FROST RADAR™ TO EMPOWER KEY STAKEHOLDERS

Significance of Being on the Frost Radar™

Companies plotted on the Frost Radar™ are the leaders in the industry for growth, innovation, or both. They are instrumental in advancing the industry into the future.

GROWTH POTENTIAL

Your organization has significant future growth potential, which makes it a Company to Action.

BEST PRACTICES

Your organization is well positioned to shape Growth Pipeline™ best practices in your industry.

COMPETITIVE INTENSITY

Your organization is one of the key drivers of competitive intensity in the growth environment.

CUSTOMER VALUE

Your organization has demonstrated the ability to significantly enhance its customer value proposition.

PARTNER POTENTIAL

Your organization is top of mind for customers, investors, value chain partners, and future talent as a significant value provider.

Source: Frost & Sullivan

FROST RADAR™
ANALYTICS

Frost Radar™: Benchmarking Future Growth Potential
2 Major Indices, 10 Analytical Ingredients, 1 Platform

GROWTH INDEX ELEMENTS

VERTICAL AXIS

Growth Index (GI) is a measure of a company's growth performance and track record, along with its ability to develop and execute a fully aligned growth strategy and vision; a robust growth pipeline system; and effective market, competitor, and end-user focused sales and marketing strategies.

- **GI1: MARKET SHARE (PREVIOUS 3 YEARS)**
  This is a comparison of a company's market share relative to its competitors in a given market space for the previous 3 years.

- **GI2: REVENUE GROWTH (PREVIOUS 3 YEARS)**
  This is a look at a company's revenue growth rate for the previous 3 years in the market/industry/category that forms the context for the given Frost Radar™.

- **GI3: GROWTH PIPELINE**
  This is an evaluation of the strength and leverage of a company's growth pipeline system to continuously capture, analyze, and prioritize its universe of growth opportunities.

- **GI4: VISION AND STRATEGY**
  This is an assessment of how well a company's growth strategy is aligned with its vision. Are the investments that a company is making in new products and markets consistent with the stated vision?

- **GI5: SALES AND MARKETING**
  This is a measure of the effectiveness of a company's sales and marketing efforts in helping it drive demand and achieve its growth objectives.

Frost Radar™: Benchmarking Future Growth Potential
2 Major Indices, 10 Analytical Ingredients, 1 Platform

INNOVATION INDEX ELEMENTS

HORIZONTAL AXIS

Innovation Index (II) is a measure of a company's ability to develop products/services/solutions (with a clear understanding of disruptive Mega Trends) that are globally applicable, are able to evolve and expand to serve multiple markets, and are aligned to customers' changing needs.

- **II1: INNOVATION SCALABILITY**
  This determines whether an organization's innovations are globally scalable and applicable in both developing and mature markets, and also in adjacent and non-adjacent industry verticals.

- **II2: RESEARCH AND DEVELOPMENT**
  This is a measure of the efficacy of a company's R&D strategy, as determined by the size of its R&D investment and how it feeds the innovation pipeline.

- **II3: PRODUCT PORTFOLIO**
  This is a measure of a company's product portfolio, focusing on the relative contribution of new products to its annual revenue.

- **II4: MEGA TRENDS LEVERAGE**
  This is an assessment of a company's proactive leverage of evolving, long-term opportunities and new business models, as the foundation of its innovation pipeline. An explanation of Mega Trends can be found here.

- **II5: CUSTOMER ALIGNMENT**
  This evaluates the applicability of a company's products/services/solutions to current and potential customers, as well as how its innovation strategy is influenced by evolving customer needs.

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