Crossing the Great Divide

Cloud-powered PowerScribe One revolutionizes radiology reporting with context-aware language understanding, workflow-integrated AI, and decision-support.

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Summary

PowerScribe One leverages a cloud-powered, continuously learning, and context-aware language understanding platform to convert unstructured speech-to-text input into structured data to transform radiology workflows, elevate the clinical value of radiology reporting, and improve patient outcomes.

PowerScribe One integrates access to artificial intelligence (AI) algorithms within the radiologist's familiar workflow, giving users powerful tools to improve efficiency and throughput, increase diagnostic accuracy and specificity, and ensure consistent evidence-based follow-up recommendations. These include AI-driven clinical guidance, assisted diagnosis, quality-checking, and report automation tools that dramatically improve the reporting experience and clinical output.

PowerScribe One's structured data model enables enhanced sharing of concrete and actionable information among care teams all along the care pathway. It puts essential diagnostic data, follow-up recommendations, and other information that was previously confined within unstructured narrative report text directly into the hands of clinical users.

Structured data also opens a path to expanded interoperability and powers a new generation of data-driven applications. It also complements standardization work on Common Data Elements by the ACR, RSNA, and other governing bodies to improve information exchange and advance radiologic practice, research, and performance measurement.

The Great Divide. That's what westbound 19th-century pioneers called the barrier of the Rocky Mountains as they crossed North America in search of new opportunities. The vast mountain range was a formidable challenge that required teamwork, persistence, skill, and ingenuity to overcome. They did succeed, settled the American West—and the rest is history.

As healthcare's technology pioneers, radiologists are like the early trailblazers. They have gained expertise in response to digital imaging modalities, including developing RIS and PACS, and adopting speech recognition for reporting. They too have been facing a Great Divide—in this case, a technological one impeding progress toward a much-needed transformation of healthcare that they know is possible by augmenting current systems and workflows with AI, cloud-connectivity, and other technologies. For example:

- Speech recognition with nearly 100% accuracy is an indispensable tool. But how can radiologists use it to further improve reporting efficiency, quality, and consistency?
- There's a wealth of diagnostic and follow-up information contained in radiology reports. But how can other physicians and healthcare professionals readily access and apply that information for patient care, population health, and other areas?
- Finally, AI models for image characterization, worklist prioritization, and report automation show incredible potential to improve patient outcomes and healthcare costs. But how can radiologists leverage AI-powered tools within proven workflows and without added screens and steps?

Just as they did with past challenges, radiologists are overcoming their technological Great Divide by working with colleagues, healthcare systems, and vendors, including Nuance and its partners. Nuance has earned a privileged position of trust among users of our speech recognition technology and the nearly 80% of radiologists who rely on the PowerScribe workflow and reporting system. We've also launched and nurtured a collaborative community of developers and subscribers in the Nuance AI Marketplace for Diagnostic Imaging. We understand the challenges radiologists face, including the shift from volume- to value-based reimbursements, growing competition, increasing volume, and physician burnout.

Nuance is taking the next step in fulfilling that vision with PowerScribe One and its workflow-integrated AI and language understanding that empower radiologists to transform the profession, patient care, and healthcare overall.

Context-aware language understanding and redefining accuracy

PowerScribe One builds on the accuracy of Nuance's existing speech recognition technology and applies context-aware language understanding. The platform converts previously unstructured text into a layer of structured data that accompanies the narrative. It pairs the words in a report with their meaning in a clinical context as the radiologist speaks without any extra steps or input. It leverages the cloud and real-time input from thousands of Nuance users to continuously train machine-learning algorithms that refine and expand accuracy and specificity. This significantly expands the value of radiology with a wealth of actionable data that can be used throughout the healthcare value chain.

Real-time, context-aware language understanding redefines the meaning and scope of accuracy throughout the radiology workflow with multiple benefits:

- It simplifies consistent adoption of decision-support tools based on the most current and applicable clinical best practices. Evidence-based follow-up recommendations can be automatically generated for review by the radiologist and included in the report without manual re-entry.
- Follow-up recommendations become structured data shared with the EHR and more readily accessible to primary care physicians for ensuring that needed exams are not missed.
- Built-in quality checking ensures report accuracy and consistency and reduces reimbursement delays. For example, it can highlight errors in laterality or gender or prompt for the inclusion of documented communication for critical results.

As more structured narrative data is captured and codified over time, reports and findings can be compared to improve the clarity, accuracy, and effectiveness of findings, diagnoses, and treatments.

> "Artificial intelligence cannot be deployed in a silo—integrating the outputs of AI algorithms into the radiologist's clinical workflow will enable AI to effectively augment the capabilities of the radiologist while preserving as well as enhancing efficiency and quality."
>
> **Warren B. Gefter, MD,** Professor of Radiology, Hospital of the University of Pennsylvania

The what and how of AI integration

The breakthrough in PowerScribe One is in *what* it enables with workflow-integrated AI and *how* it makes its AI-driven features a seamless part of the radiologist's desktop.

The first *what* is the application of image characterization algorithms to detect and measure nodules, lesions, and other notable features. PowerScribe One can receive the results for the radiologist's review without the need for further dictation or added mouse clicks.

The second *what* is the use of the algorithms for worklist prioritization. An algorithm can make an initial read of the images to flag the most urgent or important exams requiring the radiologist's attention. This supports better patient care by identifying and proactively managing potentially life-threatening findings and reduces the risk of missed and delayed diagnoses.

The third *what* is the seamless application of current clinical guidelines and documentation for improved consistency and compliance with evidence-based follow-up recommendations. Because PowerScribe One understands the meaning and context of the radiologist's narrative, it can automatically suggest the inclusion of the applicable follow-up recommendations based on the latest clinical best practices from the American College of Radiology (ACR) and other authorities. Further, those recommendations can be added to the patient's health record as structured data to facilitate searches and tracking, helping ensure a future exam is scheduled, instead of requiring a time-consuming manual review of the radiology report to spot and act on that data.

How PowerScribe One integrates AI into the radiology workflow is one of its most important innovations. This integration includes seamless access to the Nuance AI Marketplace for Diagnostic Imaging and the expanding library of workflow, diagnostic, and other radiology algorithms contributed by commercial vendors, data scientists, and fellow radiologists and clinicians. Images are automatically routed through PowerShare, where algorithms from the AI Marketplace analyze them and send results back into PowerScribe One. The radiologist then reviews, accepts, edits, or rejects each AI finding. If accepted, the results and recommendations are automatically included in the report. This optimizes workflow and supports the radiologist by handling necessary repetitive tasks while helping ensure that key information is not missed.

Structured data capabilities also enable multiple administrative enhancements that make it easier to use and manage PowerScribe One, including:

- Improved multi-site configurations and custom field management.
- Enhanced AutoText/template capabilities for systemwide AutoTexts.
- The ability to create nested AutoTexts with multilevel referencing.
- Improvements to overread workflow and follow-up recommendation management.
- Automatic updates to procedure code tables.

A path to greater value and information sharing

By structuring the radiology narrative data, PowerScribe One opens up new opportunities for intelligent information exchange with EHRs, PACS, modalities, and other systems. This eliminates redundant data entry, minimizes errors, and improves consistency.

For example, PowerScribe One includes real-time integration with imaging partner Siemens/Cerner to allow sharing of extracted data. Key information captured by the PACS can be automatically included in the PowerScribe One report, and updates made within the report are fed back to the PACS.

The longer-term effort toward healthcare data and system interoperability will require standards for consistent language and terms within narrative descriptions. For example, clinical findings and descriptions of a liver lesion or acute intracranial hemorrhage by a radiologist or an algorithm need to be encoded to enable sharing with the EHR and other IT systems. Similarly, systems will need to understand variations in terms used by radiologists for the same condition, such as pulmonary embolism, pulmonary embolus, and PE.

Nuance is working closely with the ACR, RSNA, and other governing bodies to develop structured data terminology and encoding standards for these Common Data Elements.

Crossing the Great Divide and beyond

Cloud-powered PowerScribe One enables radiologists to cross the technological Great Divide with the combination of context-aware language understanding to structure narrative data and the integration of powerful AI tools on the radiologist's desktop. It enables a new expanded definition of accuracy and represents the next generation of radiology reporting. It's also a milestone in the long journey toward fundamentally improving the lives and health of providers and their patients, as well as transforming the economics and delivery of healthcare services.

PowerScribe One in action

- **Radiologists** can leverage the power of machine learning and deep learning through the AI Marketplace to improve the accuracy and efficiency of many common image interpretation and reporting tasks. For example, algorithms can automate the time-consuming process of finding and measuring multiple pulmonary nodules on CT. The radiologist can efficiently validate the AI-produced results and decide what is placed in the report.

  Similarly, when dictating the presence of an adrenal nodule in free text, PowerScribe One extracts the relevant size and characteristics from the report to provide the appropriate clinical guideline and follow-up recommendations. If certain characteristics are missing from the dictation, such as the size or Hounsfield Units value, PowerScribe One will prompt the radiologist to fill in the missing data for a more complete characterization that will lead to evidence-based recommendations.

- **Administrators** can now use field references to streamline AutoText administration. Changes in one AutoText are automatically applied to associated fields. Administrators also can use Picklist references to add structure for abnormal findings for ICD-10 compliance and consistency.

About the author

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Karen joined Nuance in 2014 with more than 15 years of experience in the healthcare industry. Prior to Nuance, she was the vice president and general manager of Global Radiology Workflow at GE Healthcare, where she managed service, implementation, product management, and development for mission-critical healthcare IT software. Karen attended Stevens Institute of Technology where she earned a BS in mechanical engineering.

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