Speech Understanding™
The Intelligent Speech Alternative

mModal™

M*Modal delivers innovative solutions that capture the complete patient story by facilitating clinical workflows, enabling collaboration and providing insight for improved delivery of care. M*Modal is the leading provider of interactive clinical documentation and Speech and Natural Language Understanding technology, as well as medical transcription, narrative capture and support services.

Our flexible, cloud-based technology and services convert the physician narrative into a high quality and customized electronic record to enable hospitals, clinics and physician practices to improve the quality of clinical data, as well as accelerate and automate the documentation process. Our solutions address the critical issues for the future of the healthcare industry — from EHR adoption to accurate ICD-10 coding to enhanced business analytics.

It's Not Just Speech Recognition. It's Speech Understanding.

Every patient has a unique story. Even similar patient cases are not exactly alike. Dictated narrative reports have long been the preferred approach. As one doctor put it, "One of the most helpful lessons I've learned about being a physician is that we're story tellers. We're trying to capture the patient's full story."

Yet we have created a crisis of capture around clinical narrative in the move to EHRs and other electronic clinical systems. Pursuing the legitimate need for structured data, we have pushed a paradigm of template-based data entry at the expense of rich narrative documentation. This point-and-click model works for some information, but clearly demands a shift in physician behavior because it can be cumbersome to use and very limited in its ability to capture the detail physicians prefer. Plus, it frequently encourages undesirable behaviors, such as improper use of cut-and-paste and including lengthy standard text blocks that render the electronic record unusable by other physicians.

By contrast, speech-based narrative documentation is workflow-friendly and enables providers to tell the full story, including the causes, opinions and rationale for conclusions that match the way doctors think and collaborate.

Consider how valuable the following content is to collaborating physicians — and how difficult it is to create via templates:

"The decision is supported by the fact that the probability of deep vein thrombosis with no prophylaxis is greater than with IPC prophylaxis."

"Looking at other aspects of the proposed plan, for a patient with chronic renal failure, Curare is a reasonable selection since it is reliably metabolized by the liver, and Halothane is a good choice since it has no nephrotoxicity."

The industry's long-running "Solution 1.0" to the dilemma has been to deploy speech recognition within or outside of EHR systems for dictation of patient histories or text "snippets". Speech recognition is a vital and efficient tool to create electronic text. But it remains text that is still not easily useable data.

Valuable as it is, conventional speech recognition is yesterday's solution. It is necessary but not sufficient for today's big strategic challenges.

The pressure is on. Healthcare faces a set of related demands that contributes to the overall drive to achieve higher care quality and substantially reduced cost.

COST
- Reduce costs
- Integrate imaging fully into the complete electronic health records equation
- Optimize the revenue cycle

QUALITY
- Provide higher quality of care at the point of care
- Accelerate EHR adoption and achieve Meaningful Use
- Manage change
- Meet rapidly escalating demands for reporting quality metrics
- Deliver better care through analytics

Quality clinical documentation is one of the linchpins for addressing these major initiatives. That's too big a task to leave to just templates or just speech recognition.

Which is exactly why M*Modal created Speech Understanding™ as an alternative more than a decade ago and has refined it through steady technological advancement and the accumulated experience of 200,000 physicians. More than automating voice-to-text, and more than just a widget for the EHR, M*Modal's Speech Understanding allows physicians to:

- capture their narrative via "natural language"

- have it instantly processed into a standardized structured document

- ...and then have this narrative actually impact the physician's workflow.

The document's rich data can then be readily shared and used. We refer to this as Collaborative Intelligence.

The Requirements for Speech Understanding

On a single platform Speech Understanding combines two native technologies delivered in the Cloud: speech recognition and Natural Language Understanding (NLU). Speech Understanding exploits synergies between those two technologies working in tandem on the voice file. In one unified process. In real-time.

We recognize the meaning and syntax of the dictation, not just the individual words or word strings as in conventional speech. With the speech engine having the benefit of a contextual understanding of a document's meaning, physicians can dictate in a normal, "conversational" mode without needing to follow particular speech structures or provide verbal cues to the engine. We call this *Conversational Documentation Services*. Accurate recognition results because the system, running in the Cloud, can recognize the physician's intent and adapt to virtually all dialects, accents, speaking styles, dictation habits and sub-specialty terminology.

The physician's experience is exemplary and satisfying.

Caveat Emptor: There are several crucial requirements that distinguish M*Modal Speech Understanding from basic speech or other "wannabees" that use similar Speech Understanding terminology in the market.

1. A True Cloud-Based Solution

Speech Understanding is not only physician-friendly; it's IT-friendly as well. The M*Modal platform is hosted in a robust and secure M*Modal data center. It is a true cloud-based solution providing major benefits to each organization and its users.

- Anywhere, anytime access on any workstation becomes a reality because each user's profile is available in the Cloud, not just on the computer they had to "teach".

- Each user instantly taps into the accumulated understanding garnered from a decade of capturing 200,000 other physician voices.

- Sub-specialty terminology resides in the Cloud for enhanced understanding and accuracy.

- Costs and efforts by IT are minimized and deployment is dramatically simplified.

- Routine software updates are automatic and centralized. No waiting for the next major release.

2. Conversational Speech with the Highest Accuracy

Speech Understanding delivers "110% Accuracy".

That means we get beyond the traditional speech recognition headline "accuracy rates", which have become somewhat artificial at this point and often used to hype marginal product enhancements. Speech Understanding models natural, conversational speech and aims for the whole context of what is spoken, in addition to accurate word recognition. From this richer context we can glean medical concepts and detect the report type or sections referenced in the dialogue. We don't need to have doctors call out specific terms to alert the speech engine. For example, we can easily distinguish between "allergies" as a word versus a command to go to the Allergies section of the report.

What does that mean for the doctors? They can dictate naturally and have the technology adapt to them and achieve accurate results. Consistent with their workflow. Adding to, not subtracting from, their personal productivity.

As a leading physician at Pinnacle Health System in Pennsylvania noted: "I have found that M*Modal is very precise regarding physician language. It's geared towards the way physicians think and the way physicians speak. Even if it were to cut off a word, I find that it still creates a phrase that is understandable to other physicians, that makes sense when you read it in terms of how we construct our thoughts. You don't have to worry too much about putting in homonyms or other words that don't make sense in the patient record."

3. Out-of-the-Box Effectiveness from Day One

Many speech recognition products take weeks of "training" to work with consistent reliability. And they require this training to be done on each individual workstation to be used if the author profile is not stored centrally.

Physicians can begin using M*Modal Speech Understanding immediately, with little or no enrollment, and rapidly ramp to effectiveness. Hundreds of thousands of doctors' voices, profiles and speech patterns have collectively performed the training in advance during the past decade, and our contextual technology adapts quickly to the new user. As one physician said: "The quality of the draft report was high from the beginning and the system quickly improved the department's productivity." And not just with the easy speakers, as another relates, "A lot of the residents I work with have heavy, very thick accents. And they, within an hour, for the most part, were able to get used to using the system, and the system used to their personal speech patterns."

The upshot is tremendous speed to value, an absolutely critical requirement in today's healthcare IT world.

4. Automatic and Continuous Learning System

Medicine is constantly changing. Users vary their habits and needs. Any clinical system worth its salt <u>must</u> be a learning system.

Speech Understanding technology provides continuous learning on steroids. Our platform improves as it is used. It gets feedback from all the corrected, structured and encoded documents we process, whereas conventional speech systems rely on verbatim transcripts. So each new user adds to the richness of our knowledge built in the Cloud from the hundreds of thousands of physicians. Which is how we are able to detect, interpret and fully understand clinicians' speech — and adjust on-the-fly to differences in each individual's unique cadence, accent, dialect and sub-specialty terminology.

This continuous learning also extends to our Natural Language Understanding. Most "natural language processing" systems in the market use human-created rules to help the engine adapt and incorporate new information. While some rules are always part of the equation to ensure flexibility and scalability for the complex and changing healthcare environment, "machine learning" models such as M*Modal's are much more appropriate. The system processes feedback statistically for continuous improvement.

Systems that learn like this are essential for true collaboration.

5. Creating Structure from the Narrative

We've established that Speech Understanding delivers more than "typing with your tongue". We create meaningful documents that are structured and encoded, derived from the original unstructured data. In this way we generate actionable intelligence, the kind of information that can be used by many systems and that promotes collaborative care.

To get there we do something crucial and unique. Documents are output not only as text, but also in HL7 Clinical Document Architecture (CDA) format, a leading industry standard for structured document types. CDA promotes two major goals: information reuse and interoperability with EHR and clinical systems. M*Modal has been deeply committed to open, standards-based deployments since its inception and has built interoperability into its platform from the outset.

In fact, given our CDA foundation and extensive report processing over many years, you could say that M*Modal is the world's most significant clinical document interoperability company!

Reaching far beyond technology that merely tags medical terms in transcripts, M*Modal deploys sophisticated technology to "read" and understand unstructured clinical narrative. We provide unique annotation of the meaningful information contained in the narrative content — codified to standardized medical ontologies and lexicons such as SNOMED®-CT, ICD, RadLex®, LOINC and others. So we preserve context-aware data from the original narrative while transforming it into actionable information — Collaborative Intelligence — to be coupled with structured EHR data. That enables clinical decision support and significantly improves the quality of care.

6. Information-Driven Workflows

Clinical technology should fit with existing workflows and enhance them productively. That is a guiding principle for M*Modal's technology and solution development.

Whether providers self-complete recognized documents or delegate to a medical language specialist, the Speech Understanding-based workflow is extremely user-friendly and matches physician preferences. Our solutions include intelligent editing tools which support greatly improved productivity no matter what work style is selected. We also offer solutions that benefit imaging, transcription and coding.

Second, the M*Modal platform has its own workflow orchestration features that resolve issues, such as the need to boost radiologist productivity by unifying worklists and bringing together images and patient data from multiple systems.

But it is not only about matching workflows. The power of Speech Understanding is crystal clear when it triggers workflow steps automatically and dynamically based on the dictation. For example, when a critical finding is detected during radiology reporting, the radiologist will be automatically prompted to provide the required communication protocol to the referring physician. Another example: the Physician Quality Reporting System (PQRS) mandates that certain information be documented in given types of cases. M*Modal Speech Understanding can recognize absence of such required information in the dictation and provide a real-time alert to rectify the problem immediately before signature. Now that is true clinical documentation improvement.

7. Unstructured Data Analytics

Because it produces much more than "tagged" data elements, M*Modal's Speech Understanding technology lets you move beyond the simplistic resolution offered by most speech and language systems: "We'll help you populate your EHR data repository." Most organizations are awash in "data"; they want to *understand* their data and *answer* significant clinical and business questions. Preserving context while producing structured data makes our output not just database-ready but analysis-ready as well. High quality analysis, since the data contained inside narrative is richer than plain discrete structured data elements. In a later section of this white paper we will outline integrated offerings available from M*Modal to put this analytical power directly in your hands.

M*Modal: The Unstructured Information Resource Company

Unstructured, narrative data represents an untapped healthcare "natural resource." As we have described throughout this paper, Speech Understanding technology captures, manages, codes and uses the clinical facts and data contained in free text (unstructured) narrative reports. At M*Modal we process billions of lines of transcription and millions of documents annually, creating structure from the unstructured with the complete patient story intact. The information becomes a valuable resource to be shared, mined and reused for many purposes. It becomes Collaborative Intelligence, and its value is multiplied dramatically through our expanding ecosystem.

M*Modal is not a speech recognition company; it is an Unstructured Information Resource company that is vital to your electronic health records strategy.

Quick Benefit Summary of Speech Understanding

M*Modal's platform is not about technology at the end of the day. It's about delivering the benefits you are working hard to realize:

- Higher quality documentation
- Improvements in clinical documentation initiatives
- Transcription cost savings
- Increased physician satisfaction and productivity
- Promotes EHR adoption
- Meet the Meaningful Use criteria
- Improved communication with referring physicians
- Enhanced evidence-based decision making
- Drive greater collaboration

Simply put, Speech Understanding is not a single point solution; it gives you a comprehensive set of benefits that are central to your strategy.

M*Modal brings the experience, the technology and the vision to open up the meaning, the use and the revelations that are embedded in each physician's narrative.

- **A leading developer of advanced technology.** Our Speech Understanding platform is developed by a stellar team of world-class scientists, linguists, health information experts and engineers. It has been built from the ground up as a unified platform, not one stitched together from acquired parts or independent elements.

- **A demonstrated record of technology development leadership and innovation.** First and only company in our sector to offer Conversational Speech. First and only to produce native CDA documents from speech. The list goes on. The healthcare industry has recognized M*Modal as a technology leader throughout its history.

AN ECOSYSTEM FOR COLLABORATIVE INTELLIGENCE

Collaborative Intelligence presumes and requires a network of people, processes and technologies that work together. That's why M*Modal also continues to build out an ecosystem of partners to leverage its technology and foster collaborative use of the information it helps generate. Such an ecosystem creates a real network effect that increases knowledge and further bolsters our learning system. Speech Understanding is especially well suited to integration with other systems, and M*Modal is committed to a robust partnering strategy.

- **A strategic thought leader in this area.** M*Modal was one of the founding members and major supporters of the Health Story project to promote the value of narrative documentation. We have created pioneering partnerships. We have produced many articles on groundbreaking technology developments for the healthcare industry. Our roadmap reflects this thought leadership.

- **A deep commitment to quality narrative documentation.** M*Modal is exclusively focused on healthcare. We are the nation's largest clinical transcription services provider. We are focused on helping produce the highest quality patient information and using it to drive valuable clinical actions. This laser-focus means we bring all of our resources to bear on using and improving Speech Understanding and related technologies for these ends.

Speech Understanding offers incredible opportunities to align IT initiatives with caregivers on the frontlines. And it offers impressive opportunities to tap into a source of data that has been extremely difficult to leverage in any meaningful way. Until now.

Speech Understanding Spawns a Rich Solutions Portfolio

M*Modal's technology forms the foundation for a solutions portfolio that represents the most scalable set of clinical documentation technology and services available today. We deliver a rich array of choices. Front-end and background Speech Understanding in a SaaS "cloud-based" workflow. The industry's largest domestic and global workforce for cost-effective transcription and editing outsourcing services. Computer-assisted coding. Solutions to mine and manage clinical content. Integration with major EHR systems. We partner with you to analyze and understand your specific needs, challenges and requirements to meet you at your state of readiness.

These options come together within the **M*Modal Fluency**™ product family, our real-time interactive suite of workflow-friendly speech and natural language offerings built on M*Modal's cloud-based enterprise documentation platform. Additional information is available on each of these:
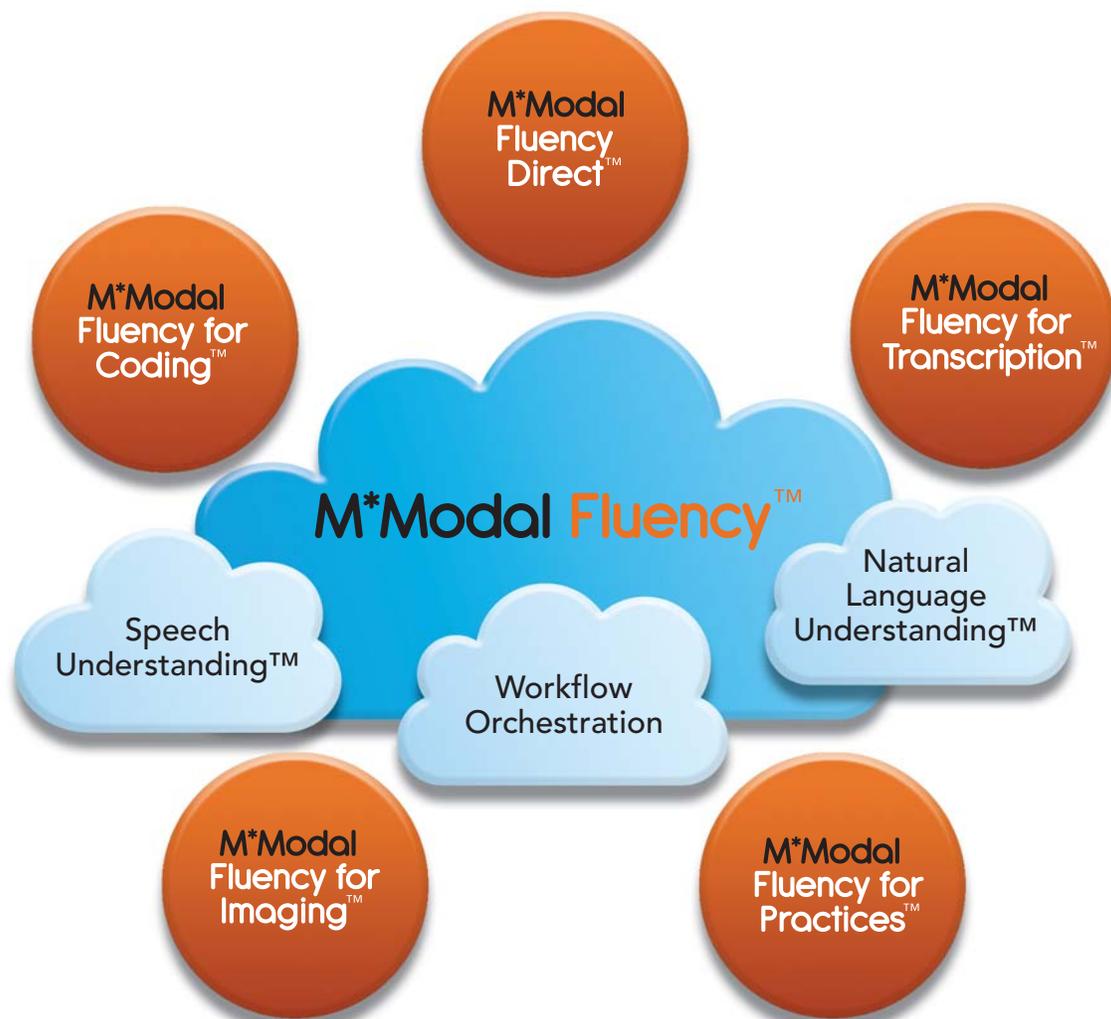
M*Modal Fluency Direct™

M*Modal Fluency Direct speech-enables existing health information systems such as EMR/EHR, clinical documentation systems, RIS and PACS. Caregivers use voice to navigate their clinical applications and dictate narrative reports directly within those systems. By capturing spoken dictation and turning it into both text and structured data, M*Modal Fluency Direct offers high-accuracy, "once and done" speech, so physicians can dictate, review and electronically sign their reports in a single pass. Providers improve documentation efficiency and avoid difficulties associated with template-based point-and-click systems, augmenting discretely captured data with a narrative of the patient's story.

M*Modal Fluency for Imaging™

M*Modal Fluency for Imaging offers real-time interactive speech with Workflow Orchestration features tuned to the needs of radiologists, including support for voice-driven insertion of normal text and completion of templates. M*Modal Fluency for Imaging provides interoperability between disparate systems and supports a unified work list for the radiologist. Radiology groups can thus scale across multi-site, multi-vendor environments with the authoring, productivity and communication tools that enable subspecialty, high quality care.

M*Modal Fluency for Coding™

M*Modal Fluency for Coding helps automate the coding process. Based on an industry-leading, patented technology, M*Modals' software delivers high-efficiency, high-accuracy Computer-Assisted Coding. This Web-based product marries strong coding workflow management with accurate ICD (9 & 10), CPT and E&M code assignments automatically generated from analysis of the medical reports. The system presents these recommendations along with the link to the text used to make the determination for rapid coder review and assessment. Coder productivity gains of 25 - 75% or more are achieved.

M*Modal Fluency for Transcription™

M*Modal Fluency for Transcription is our platform for optimizing your clinical information workflows when transcription is deployed — whether your preferred model calls for in-house, outsourced or combination of resources. Dictation is captured through M*Modal Fluency Voice Capture™, a cloud-based, digital voice capture and transport solution deployed at the customers' location. The embedded M*Modal Speech Understanding™ technology quickly converts audio to text and then our rich workflow management routines automatically route it to the right editor. M*Modal Fluency for Transcription supports M*Modals' industry-leading outsourced transcription services, as well as in-house transcription at hospitals and clinics.

M*Modal Fluency for Practices™

M*Modal Fluency for Practices helps physicians in small to medium-sized practices capture patient narrative using a smart phone, traditional phone or digital recorder. Using our HIPAA-compliant, Web-based document management platform, all staff members have expedient access to transcripts and other related practice documents as well as full workflow support. Fluency for Practices contains many productivity and compliance features including e-signature, fax/auto fax, print and audit trail functions.

Bringing Unstructured Data to the Next Level

One of the essential characteristics of Speech Understanding is the ability to empower analytics. An important opportunity for the entire healthcare industry lies in the ability to query large volumes of narrative unstructured documents in search of answers to significant questions — from the patient to the population level.

At best, today's EHRs have limited query capabilities, and you need more than a simple medical search engine. M*Modal has responded with our companion **M*Modal Catalyst Platform**. We provide customizable tools and interfaces that permit interrogation of the data we generate across millions of narrative documents, or through drill-down on the relevant information about one patient in a given context. The benefits are more than substantial — they are game-changing.

We invite you to investigate the only unstructured information resource company for healthcare: M*Modal.

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