

## **Lexical Technology**

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**Project Title:** Knowledge Authority Back-End to Cancer Knowledge Sources

### **Technology Developed**

- Developed an Internet browser for the oncology knowledge sources that allowed rapid exploration and understanding of the structure of the sources by all team members.
- Specified and refined a set of functions with which a variety of client interfaces can request and retrieve pertinent information from the Knowledge Authority.
- Deployed a usable Oncology Knowledge Authority.

### **Cumulative sales/ revenues to date from SBIR-developed technology**

Much of the initial design of the Knowledge Authority carried over into Lexical's Metaphrase® Guide Server API (Application Program Interface) product, which has had cumulative sales of just over \$1 million dollars to date.

The ideas and early prototypes for the Metaphrase Guide Server were all prototyped and evaluated in these SBIR projects. At least 6 personnel positions at Lexical have been created because of the product development work for Metaphrase, that all derived from these SBIRs.

### **Uses of the technology**

The Knowledge Authority indexing technology has been used commercially by Lexical for indexing services provided under contract to the American College of Physicians (ACP), and the American Medical Association (AMA). The notion of uniform access to disparate knowledge sources continues to be a guiding principle of Lexical's commercial product development.

### **How product was commercialized**

The same developers at Lexical who worked on the Knowledge Authority under these SBIRs are still with Lexical, and have become the lead designers for the Metaphrase Server products. The ideas generated during the SBIR contracts were refined, and re-implemented using more modern development environments (Java, Oracle) than were available during the SBIRs.

Lexical hired marketing personnel, and made a successful launch of Metaphrase at the 1998 HIMSS Conference, following up on very successful presentations made at HIMSS about the SBIR work in 1994 and 1995.

### **National Institutes of Health Awards**

N44-CO-33071  
N44-CO-40550  
N44-CO-51031

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**Project Title:** Voice Recognition Front-End to Cancer Knowledge Sources

### **Technology Developed**

- Developed an interface that integrates isolated-word speech for entering a search query and continuous speech for accessing retrieved information. Gained an understanding of conversational interaction between humans and machines and implementing a dialog that incorporates conversational features. Recognized the need for a speech interface to adapt to the user's level of expertise — whether a new or experienced user — and implementing voice prompts that make this adaptation.

### **Cumulative sales/ revenues to date from SBIR-developed technology**

N/A

### **Uses of the technology**

Results of this SBIR contract were presented by project participants to the following organizations and audiences: American Medical Informatics Association (AMIA) symposium (Washington, D.C.); Symposium on Computer Applications in Medical Care (SCAMC); ANSI Healthcare Informatics Standards Planning Panel (Crystal City, Virginia); ARPA Domain Specific Software Architecture Healthcare Meeting (John Silva, M.D., chairman); American College of Physicians (ACP); Lippincott & Co. (medical publisher); NIH Clinical Center; Illustra; Medical Library Association (annual meeting); International Medical Informatics Association (IMIA) Working Group (Geneva, Switzerland); Healthcare Information and Management Systems (HIMSS) conferences (Phoenix, Arizona, and San Antonio, Texas); Medinfo'95 conference (Vancouver, Canada); National Cancer Institute (NCI); and the Artificial Intelligence in Medicine (AIM) spring symposium.

Participants in this SBIR contract authored or co-authored fifteen publications related to SBIR activities. These appeared in journals such as *Methods of Information in Medicine* and in the proceedings of the Annual Symposium on Computer Applications in Medical Care (SCAMC) and of the annual American Medical Informatics Association (AMIA) and Healthcare Information and Management Systems Society (HIMSS) meetings.

### **How product was commercialized**

No direct commercialization resulted from the voice-recognition part of the SBIR. However, the work resulted in receiving another grant from the NAPBC program for our Stanford collaborators.

### **National Institutes of Health Awards**

N44-CO-33071

## **Lexical Technology**

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**Project Title:** Wireless, Pen-Based Front-End to Cancer Knowledge Sources.

### **Technology Developed**

Although considerable effort has been put into creating extensive on-line reference resources for oncology, this compiled knowledge has been underutilized in clinical situations. This SBIR project was designed as a step to remedying this deficiency, basically by combining Lexical's Oncology Knowledge Authority (OKA), a component for retrieving relevant information from machine-readable knowledge sources, with Stanford's Mobile Access to Oncology Knowledge (MATOK), a pen-based interface.

### **Cumulative sales revenues to date from SBIR-developed technology**

N/A

### **Uses of the technology**

Two deployments of MATOK were carried out during Phase II, at the NIH Clinical Center's Pediatric Oncology Clinic (in April 1996) and at the Stanford Oncology Day Care Clinic (in July 1996). The OKA and MATOK were installed and placed into use at the NIH Clinical Center at the end of March 1996, using wireless interfaces. The MATOK client was tested and revised extensively, the OKA Access Protocol was modified and extended to handle the scaled-up database and needs of the clinical environment, and the AllTel TDS 7000 system was integrated with MATOK. The server system was installed in the Clinical Center's machine room, and wireless access points were installed in the Pediatric Oncology Clinic and in the in-patient unit. The four tablet computers were assigned and the initial groups of users were trained on the system. Regular joint meetings between Lexical and Stanford project team members were held to conduct further tests on and to streamline the evaluation of the pen system. Nightly reports testing the OKA showed that both the OKA machine and its Illustra database were stable and continued to work unattended. Very few bugs were reported by users.

During 1994-1996, results of this SBIR were disseminated by project participants to the following organizations and audiences: American Medical Informatics Association (AMIA) symposium (Washington, D.C.); Symposium on Computer Applications in Medical Care (SCAMC); ANSI Healthcare Informatics Standards Planning Panel (Crystal City, Virginia); ARPA Domain Specific Software Architecture Healthcare Meeting (John Silva, M.D., Chairman); American College of Physicians; Lippincott & Co. (medical publisher); NIH Clinical Center; Illustra; Medical Library Association (annual meeting); International Medical Informatics Association Working Group (Geneva, Switzerland); Healthcare Information and Management Systems (HIMSS) conferences (Phoenix, Arizona, and San Antonio, Texas); Medinfo'95 conference (Vancouver, Canada); National Cancer Institute; and the Artificial Intelligence in Medicine spring symposium. Fourteen publications resulted from this work.

### **How product was commercialized**

No direct commercialization has yet occurred.

### **National Institutes of Health Awards**

N44-CO-40550