

Cyc[®] Medical Analysis Environment™ (MAE)

Sophisticated Medical Research, Analysis, and Reporting

Answering the Tough Questions

Medical researchers require efficient means to identify, access, and integrate data from a variety of sources. However, they are often unaware of where to find the data, how to interpret it, or even the very existence of information that may be beneficial to their research. The Cyc Medical Analysis Environment enables medical researchers and analysts to clearly state their information objectives and have the system access and appropriately integrate the necessary underlying data.

- Unlike traditional medical records data bases, the MAE lets researchers pose queries in English rather than SQL, carrying out a clarifying dialogue if needed.
- Unlike search engines, the MAE returns *answers* and *lines of reasoning* behind each answer – not just possibly relevant documents – by drawing on federated data sources and human-like common sense reasoning.

Solutions to Your Analysis Challenges

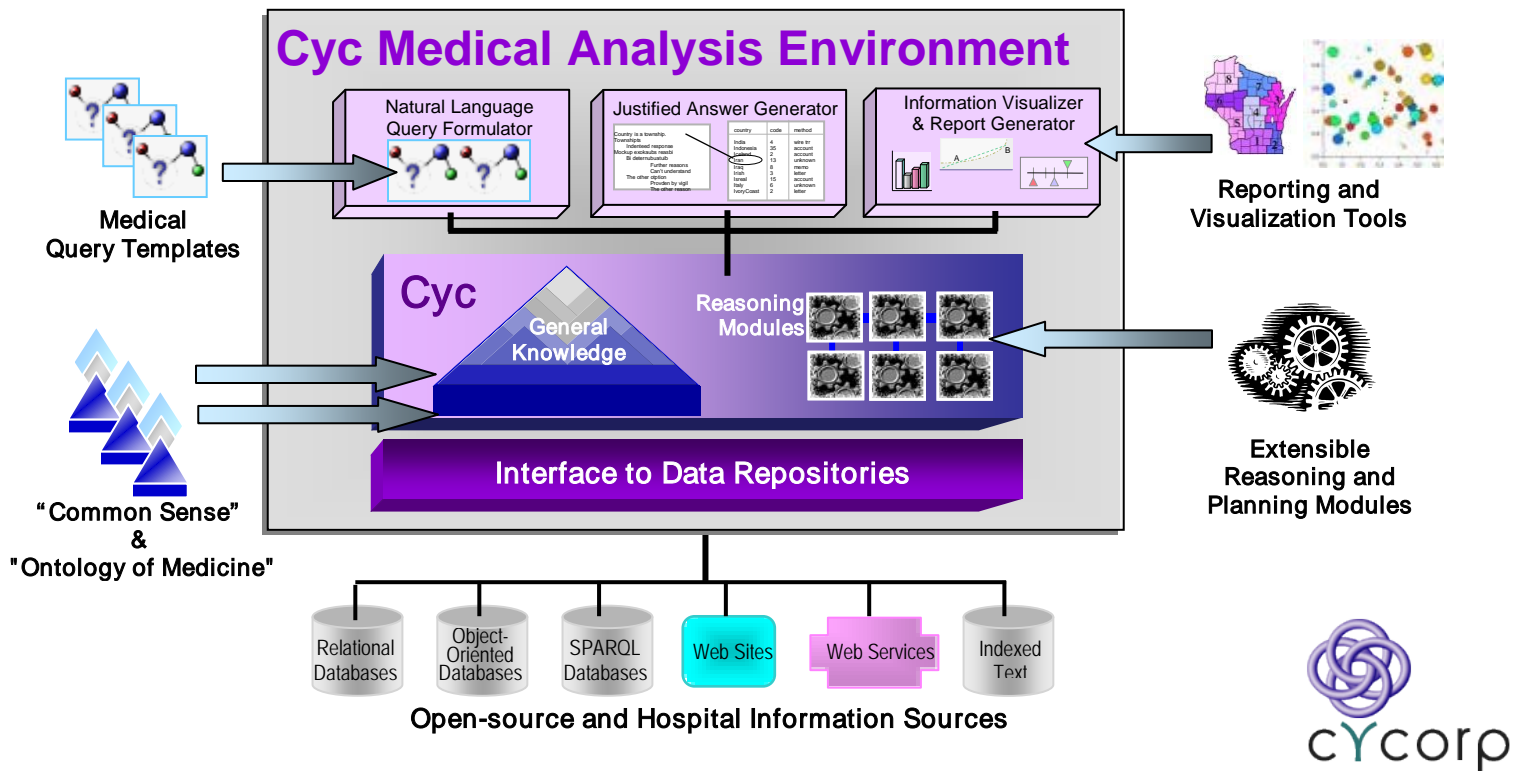
Building on the powerful Cyc Analysis Platform, the MAE provides tools specifically designed to support complex knowledge-fusion tasks. The MAE is tailored to querying, integrating, presenting, and reporting on medical data using an enhanced medical ontology and lexicon, business rules, and reporting interfaces. Cycorp's Semantic Knowledge Source Integration and question-answering API's permit powerful integration with a variety of open-source and hospital-specific data sources.

A Sampling of Medical Questions

1. Which patients had a heart attack less than 2 weeks prior to a coronary artery bypass graft (CABG) between 2000 and 2005?
2. What were the post-operative morbidity and mortality rates for patients who had septicemia or bacteremia within one month following a pericardial window?
3. What percentage of aortic valve replacement (AVR) patients in 2006 received a premarket aortic prosthesis?
4. What is the percentage of patients that had a mitral valve prosthesis that was manufactured by an EU company implanted between 2000 and 2005 and later explanted?
5. For patients over 65 years old, what was the average time between successive stent surgeries?

Answers, Justifications, Visualizations, and Reports

The MAE provides a variety of information querying, display, and report generation capabilities, including event diagrams, relationship networks, and on-the-fly fact sheets about medical conditions, treatments, physicians, and facilities. Each answer is accompanied by a detailed, dynamically-generated, narrative-style justification, with citation links to all sources that support (or argue against) that conclusion.



Guided query formulation

- Intuitively pose queries via natural language and drag-and-drop query construction
- Be guided by dynamic, context-based query recommendations and concept suggestions

Fully justified, dynamically generated answers

- View explanations and the underlying rationale and source information
- Exclude facts, rules, or sources you deem unreliable or irrelevant
- Perform *what-if* (hypothetical) reasoning, and confirm or deny system-made suppositions

Rich connectivity to enterprise and domain data

- Semantic mapping to existing databases
- Guided entry, including disambiguation, of domain- and enterprise-specific business

Intelligent data reporting

- Flexible semantic specification of data reporting needs for standard and *ad hoc* reports
- Dynamic inclusion of hospital and clinical data into customized, patient-specific views of web pages

Simple Yet Sophisticated Semantic Reasoning Power

The MAE delivers unmatched reasoning power in a simple-to-use tool by building on the **Cyc Analytical Platform's** rich set of knowledge representation and reasoning capabilities:

- A **cross-domain knowledge-base** of over 300,000 general real-world concepts, 20,000 types of relations among them, and 3 million facts and rules about these concepts, all in a richly-represented formal logic enabling machine reasoning
- An **integrated library of industry-specific knowledge**, including concepts, relationships, and rules, plus easy **form-based natural-language entry** of new information
- An extensible suite of **powerful inference engines** that answer questions requiring complex chains of reasoning and planning
- A **library of query templates and query components**, represented in both natural language and formal logic, supporting easy construction of precise, complex queries
- Cross-domain **visualization tools** to display textual, spatial, and temporal information using expandable outlines, graphs, timelines and maps
- Flexible **reporting and information exporting** facilities to produce structured textual reports, SQL databases, RDF triple graphs, XML data files, or OWL ontologies
- Semantic integration with external data, providing transparent access to databases, spreadsheets, websites, web services, or other structured and semi-structured information

To find out how a Cyc Analysis tool can help you, contact Cycorp at:

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