

# **Mitopia® Global Information Intelligence Platform**

## **Overview** November 2003

MitoSystems, Inc., with its **Mitopia®** platform, develops high-end data management decision support systems for international government and multinational corporate clients. Mitopia® is an end-to-end, data-flow, “***Ontology-based***,” intelligence workflow software platform designed to support the complete intelligence cycle, from data collection, mining, fusion, storage and retrieval, to analysis, visualization, and dissemination. Its architecture was specifically designed for rapidly changing, real-time, massive, distributed, multimedia, multilingual, unstructured, information environments. Mitopia® has been under development for over ten years, with large installations operating for over five years.

### **Mitopia® System Workflow:**

**Information Extraction** – Mitopia® employs a powerful real-time parsing and mining engine called MitoMine™. MitoMine™ uses Backus–Naur Form (“BNF”) scripts written for each data feed to automatically identify and extract entities and ontological objects with all relevant links. MitoMine™ acts to fuse data to the Ontology and hence to other source feed data. This capability integrates multimedia information (video, audio, imagery etc.) via the unifying system Ontology. Ingestion servers support user-specified alerts (“interest profiles”) with automatic user notification.

**Intelligent Agents** – The system supports the ability to define user-specific interest profiles (or active agents) that automatically run on the user’s behalf on all incoming information. These profiles can incorporate abstract processes defined via a visual programming language and include the ability to create new custom building blocks via compiled code. An application programming interface (“API”), containing thousands of calls, is provided to support the creation of such custom building blocks, which may incorporate any technology area or analytical techniques. Providing the inputs and outputs conform to the laws of “data-flow,” such blocks may be integrated anywhere in the system and will operate on the user’s behalf after being inserted.

**Link & Relationship Analysis** – Incoming data is mined and fused via MitoMine™. The Ontology and the underlying architecture supports automated (or manual via drag-and-drop) creation of rich, arbitrary information links (including automated user-centric hyperlinking). Visualization tools allow trends and anomalies to be uncovered via abstract vector spaces whose axes are user definable and which, by themselves, can be used for querying or automated alerts and profiles. The system Ontology is designed to allow automatic extraction of entities, events, actions, and the examination of these events for matches to known entity motives; such as terrorist actions. Scenario modeling can be used as an analysis tool simply by introducing artificial data into the normal data stream.

**Search & Retrieval** – Mitopia® has a complete client-server architecture at its core. Any kind of server can be specified without a single line of compiled code. Servers can be clustered logically and distributed geographically and scale to any number of machines. A mass storage architecture is provided to facilitate integration with mass storage robotic devices (in petabytes and beyond). A complete search infrastructure called MitoPlex™ acts as a federated search infrastructure between all servers and to all containers within a server (including multimedia). Search and querying is multilingual and language independent. Automated Ontology-based hyperlinking of incoming data is built-in. All information and the user interface (“UI”) is auto-generated from the system Ontology and customizable on a per-user basis according to security clearances and user preferences.

**Geospatial Analysis** – A fully integrated geographic information system (“GIS”), topology, and mapping engine is provided within Mitopia®. GIS-based query and data refinement is fully-integrated with all other analytical techniques including link and other visualizers.

**Data Visualization** – a complete 3-dimensional OpenGL visualization framework is in place to view data along multiple axes either derived from real data values or inferred via user-specified ‘vector’ algorithms. Any data type may have a symbology associated with it – selection of such item will initiate view of a record (text), image, playback of video, audio, etc. A complete, immersive 3-D environment including spatial data (maps), satellite images and flyovers, and building “walk-throughs” is provided and fully integrated with all abstract visualization tools provided. Video capture and streaming (multiple formats) is fully integrated and can be incorporated anywhere in the environment including briefings and reports.

**Production of Analysis** – A complete, multimedia report architecture is available with any number of customizable templates. Multimedia reports can be created through use of customizable templates, or manual entry, and dragging & dropping collateral information and source documents to support analyses. Reports are available online in the system and can be published and distributed to select users on the system. Custom live reports can be created through the built-in visual data-flow programming language. As with all UI, reports and the data within them can be customized based on user privileges. Arbitrary markups can be attached by any of the multiple users and each has separate security tags. Reports and all data at a client workstation can be collaboratively shared with others. All data in the system is permanently tagged with its source. This information can be used to establish reliability. Support for tracking changes over time is inherent to the underlying model on which the system is built.

### **Mitopia® Architecture:**

Mitopia® is not just an application – it is a complete, data-flow, architecture, readily customized and extended by the technical user. An extensive discussion of its capabilities is available separately.

**Ontology-based** – Mitopia® is a completely Ontology-based system. The system Ontology is the unifying model into which all data is fused to determine explicit and computational connections, relationships, and patterns. A complete Ontology definition language is provided. The Ontology can be modified. It is reflected automatically throughout the system.

**Cognitive Date Model™** – Mitopia® employs its own data handling paradigm that completely breaks from the inherent limitations of the traditional relational database models. The “database” uses an inverted file structure, which can be distributed across any number of machines in a system, arbitrarily scalable to any size, and handle any number of foreign languages and multimedia types. It can be readily extended by federated containers for additional data types. A plug-in query architecture is provided. The storage of data is completely driven by the system Ontology so changes in the Ontology are instantly reflected in the appropriate storage fields and data types to be ingested.

**Multimedia** – Servers can be set up for any multimedia type. Accordingly, Mitopia® is already able to serve up images, videos, maps, text, audio, and stream them all to any client machine or integrate them in any analytical process. Custom querying engines for these types (e.g., face recognizer) can be plugged into the MitoPlex™ architecture. Video conferencing can be supported, as can plug-in encryption and biometric user authentication devices.

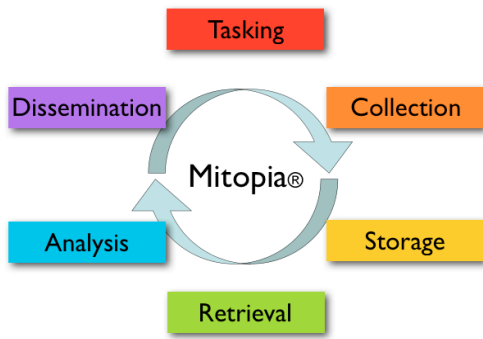
**Dynamic User Interface (UI)** – All user interface windows are generated and laid out automatically from the system Ontology. Changes to a system simply require the appropriate change to the system Ontology and no further coding is required to generate the appropriate user interface(s).

**Information Sharing** – Users of the system are treated as specialized “feeds” and thus their input is shareable (and can be queried or monitored) in a homogeneous manner with all system data. “Interest profile” support provides automated ‘push’ capability (live feeds), while ‘pull’ (query) capability is inherent. User-definable workflows (via visual data-flow language) can be integrated into the process allowing arbitrarily complex behaviors, including modification of distributed content.

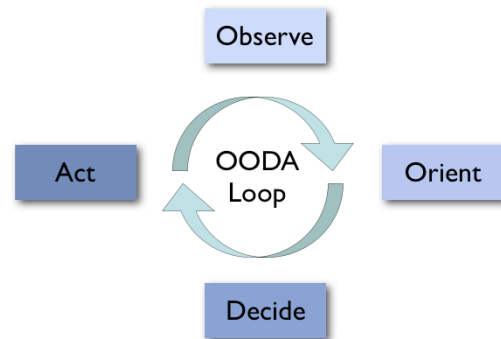
**Collaboration** – The system supports both data-level and UI level sharing between arbitrary numbers of users on the system. A publish and subscribe collaboration model is built into the system data and UI architecture at the lowest levels. All system communication is handled via standard IP packets and thus will operate over any IP network.

## Mitopia® Summary

Mitopia® supports the *entire* intelligence cycle. The fact that it is fully integrated and designed for flexibility, means the classic problem of information “stovepipes” goes away. Mitopia® represents a complete, streamlined, scalable, workflow platform for analysis and sharing *within* intelligence organizations and *across* them.

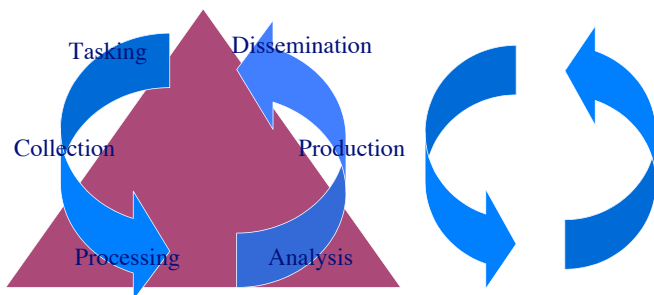


The classic rapid response cycle “OODA Loop” is shown below. The advantage goes to the entity which can adapt to changes in the environment faster than his opponent(s). Mitopia® is designed for rapid adaptability at all levels.



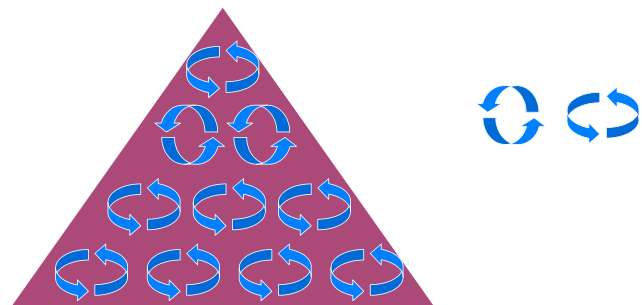
During the Cold War, it was acceptable to have slow response to change in the environment because, generally, the main adversary was equally slow to change.

**Intelligence Apparatus OODA loop      Adversary's OODA loop**

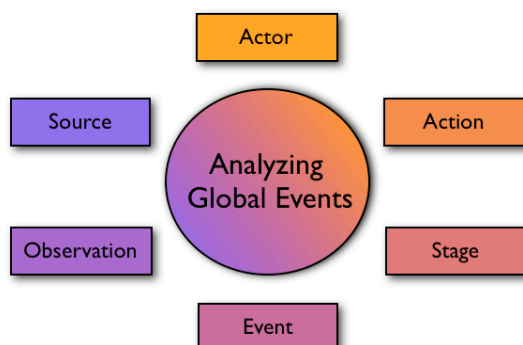


Today, however, we are confronted with a rapidly changing foe. Our systems and organizations must be able to rapidly adjust and communicate from end-to-end and top to bottom. Mitopia® is expressly designed with this in mind.

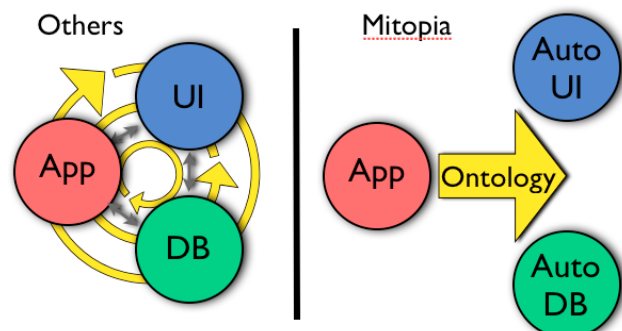
**Rapid response organization      Terrorist OODA Loop**



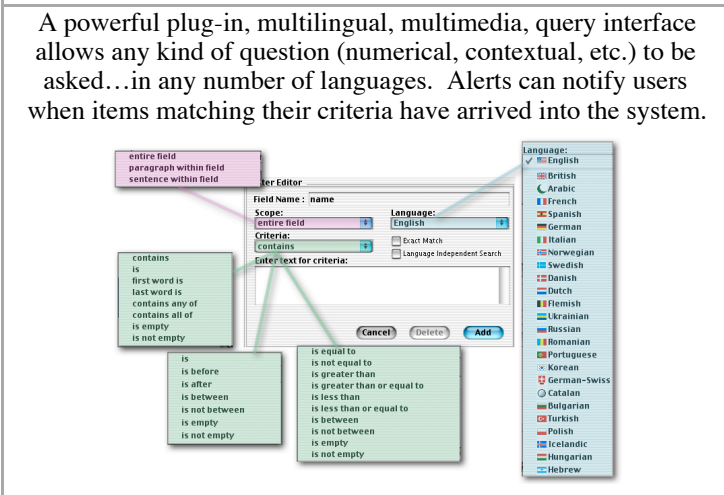
The system “ontology” provides a framework where all unstructured, disconnected information can be unified. It seamlessly integrates every step of information workflow. The ontology is flexible and can be changed over time. It is essential in determining connections and patterns in global event space.



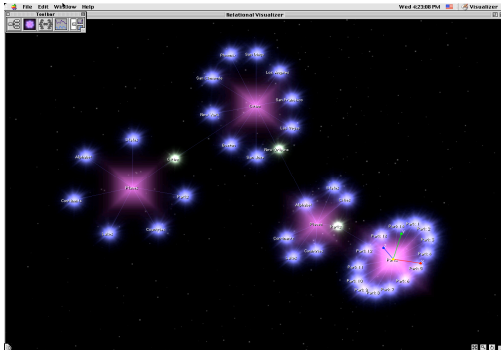
Traditional information systems require heavy coordination between user interface (UI), database (DB) and application (App) groups – represented below left. Mitopia® provides unprecedented system adaptability by automatically generating all database storage and user interface from the system ontology.



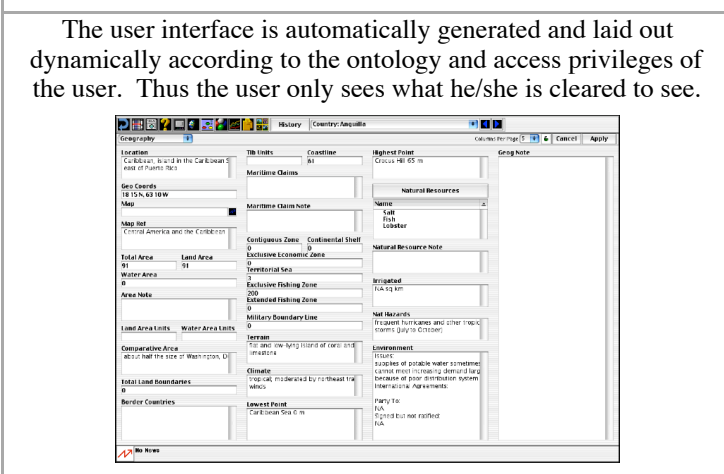
Sources can be tasked through Mitopia® to collect, convert, mine, and fuse information in virtually any format.



Relationship visualizers allow users to view data and see results of mined relationships and interconnections within.



The screenshot displays the 'Relational Visualizer' application window. The interface includes a menu bar (File, Edit, Window, Help), a toolbar with icons for loading, saving, and zooming, and a title bar indicating the file 'Web-G2-EMM-PA'. The main visualization area shows a complex network graph with numerous nodes and edges. The nodes are represented by glowing blue and purple spheres, while the edges are thin, light-colored lines connecting them. The graph is set against a black background with a subtle starfield pattern. The window also features a status bar at the bottom with various icons.

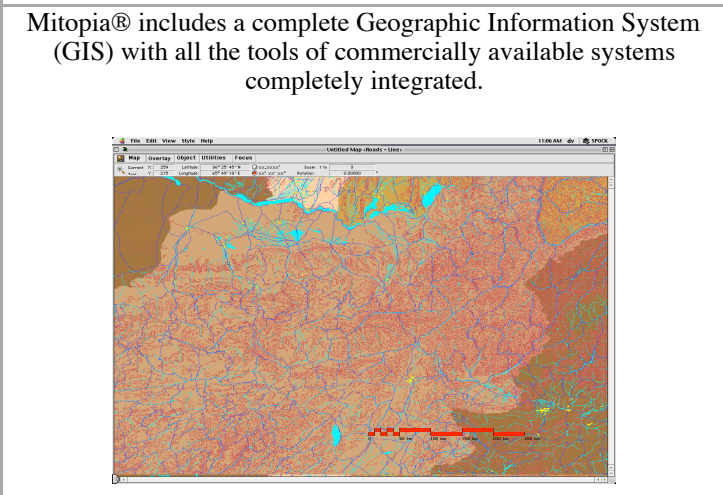


For more information, please contact Ted Whetstone, Business Development

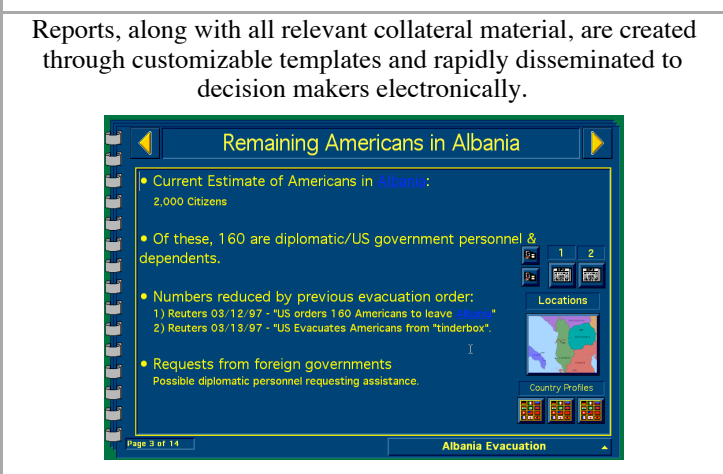
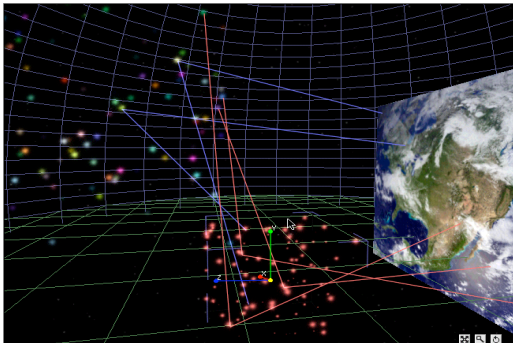
Multimedia data types are readily supported (e.g., video below). Any server type can be readily configured through Mitopia®.

The screenshot displays a window titled "Video Snapshots" containing a 5x6 grid of 30 video thumbnails. Each thumbnail is numbered and labeled with its source. The thumbnails show a variety of content, including news broadcasts, entertainment programs, sports, and educational material. The window has a standard Mac OS interface with a title bar, menu bar, and scroll bars.

Thumbnail Number	Source Label
2	KCBS
3	Discovery
4	KHBC
6	ETLA
6	KCET
7	KABC
8	ESPN
9	KCAL
10	Adaptive/California
11	KTVU
12	Nickelodeon
12	KSCP
14	FOX Sports Net
16	Santa Monica
19	KSCI
19	Fox Family
21	ABC
22	KIMY
23	VH1
24	USA Network
25	Fox News
26	E!
27	MTV
28	IMCC



Multidimensional visualizers allow users to view data in time, space, context, and/or any other arbitrary analysis vector.



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