

Mitopia[®]

The Definitive Intelligence Platform[™]

Executive Overview

March 2004

Preface:

Mitopia® is a highly integrated information platform supporting the complete intelligence cycle from information collection to analysis to dissemination.

Systems incorporating end-to-end capabilities of Mitopia® mimic a fusion of this country's top intelligence organizations. Due to the breadth and depth of capabilities, only a top-level review will be included in this paper.

For further detailed information or discussions, please contact MitoSystems.

Mitopia®

Mitopia® is a highly integrated environment representing a complete workflow solution for information processing and analysis. It can operate on a single machine, stand-alone basis, or it can be configured to run on thousands of machines as a massive, distributed, horizontally and vertically integrated system of systems.

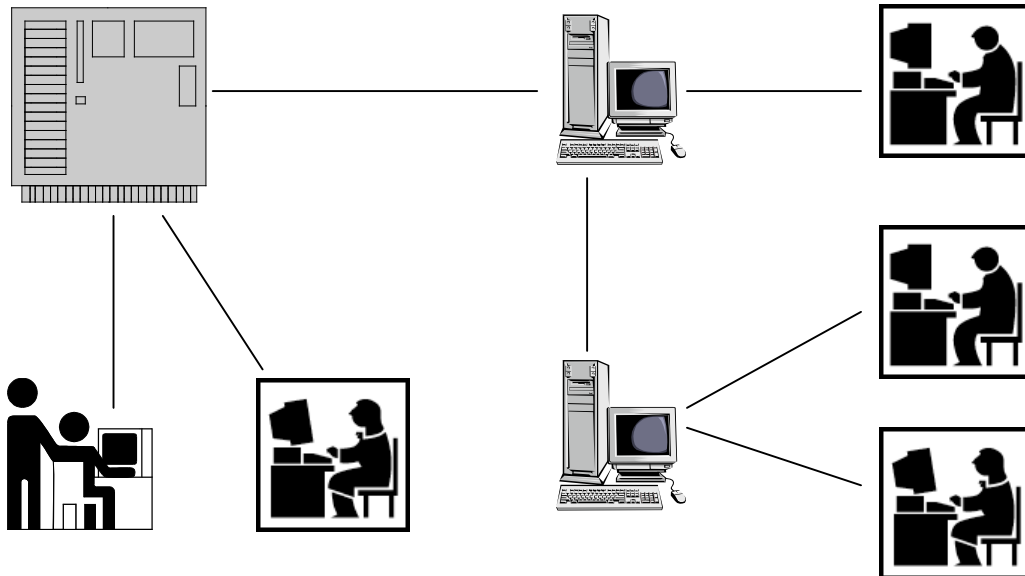
Stand alone

As long as there is sufficient disk space, a number of databases can be integrated into Mitopia® and completely managed from one machine for research and analysis purposes.



Distributed

Mitopia® is a client-server environment, allowing any number of servers and users to be connected, whether in the same facility, or distributed geographically.



Integration Engine

Mitopia® is a powerful software architecture that has been generalized to handle a whole spectrum of information processing tasks. It is transformed into any specific application through a limited set of Configuration Software components. The two major components needed to specify a system are the system **Ontology** and the **MitoMine™** scripts necessary to extract and fuse data into the system.

Ontology

The unifying core of Mitopia® is its ability to richly integrate disparate, heterogeneous information. This is accomplished through a unifying system Ontology. Technically, the Ontology is a formalization of a domain of knowledge into identifiable objects with describable relationships and behaviors with definable attributes. In laymen's terms, it is a means to organize and fuse disparate information and make rich connections within it. The Ontology is also the means through which algorithms are able to compute relationships between items that are not directly related. Changes in the Ontology are reflected throughout the system (searches, user interface, etc.), making Mitopia® highly adaptive via through this important mechanism.

MitoMine™ - Data Extraction / Ingestion

Information is imported into a Mitopia® system through an ingestion technology called MitoMine™. MitoMine™ is an extremely powerful, ontology-based, mining language able to describe any data source format and type (text, image, video, voice, etc.), extract its components, and fuse it into the system ontology. In this way, completely distinct data sources can become uniformly integrated with each other – independent of source format or structure. MitoMine™ scripts can be used to ingest static data sources such as published CD's or relational databases, as well as dynamic data sources such as photo wire, news, or covert information feeds. A complete treatment of this powerful, patent pending, technology is available separately.

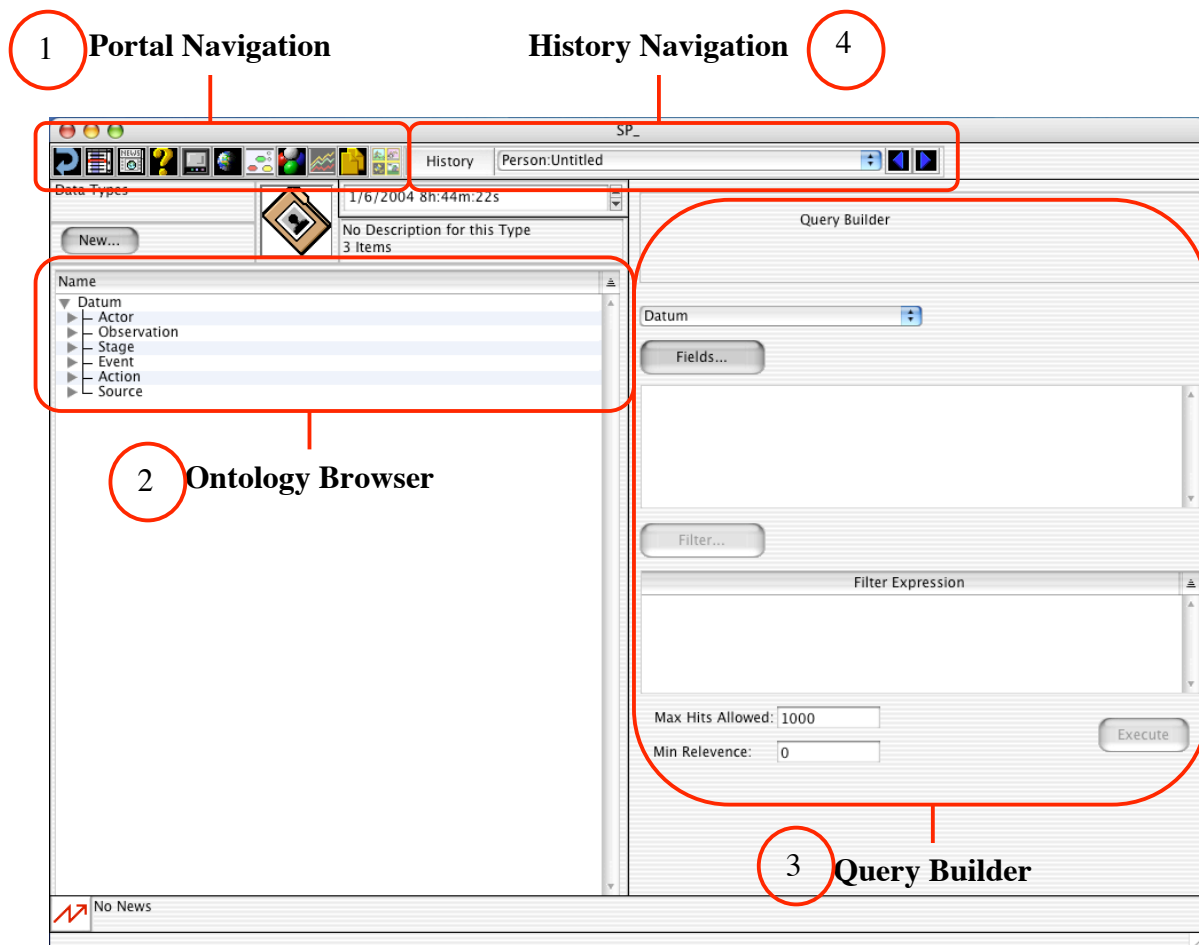
Deriving Connections

One of the more powerful capabilities of Mitopia® is to derive connections between data items. This is done by leveraging all the relationships that can be obtained through the Ontology. For instance, there might be a person in the database whose location you would like to know or plot. But perhaps you don't know their home address. However, through the ontology the system would find that the person has an employer with a known address from which a geographic coordinate can be determined. This is just a simple example of how subtle and indirect connections can be automatically identified and presented through this richly connected information set.

Standard Portal

All the data in Mitopia® is organized according to the system ontology. Below is a typical “portal” view into Mitopia®. It may look like a single screen but actually this represents a number of independent processes and sub-screens, woven into one portal view. This can be customized into many system portal views but we will only focus on the basic components shown below.

Note that the system ontology shown is for example purposes and will differ for each application and data sources.



Mitopia® is a completely integrated environment. Navigation to and from different areas of the system is accomplished through these navigation buttons.



The reader can relate to the idea of having many software applications open on his/her desktop and bouncing between them depending on the task at hand. The same idea applies with Mitopia® except that here, everything is completely integrated and interoperable. We will visit Queries, Lists, GIS, Visualizers and Reports in the paper.



Intra portal return



Lists (from queries)



Alerts



Queries



Video



GIS/Maps



Graphics



Visualizers



Charts

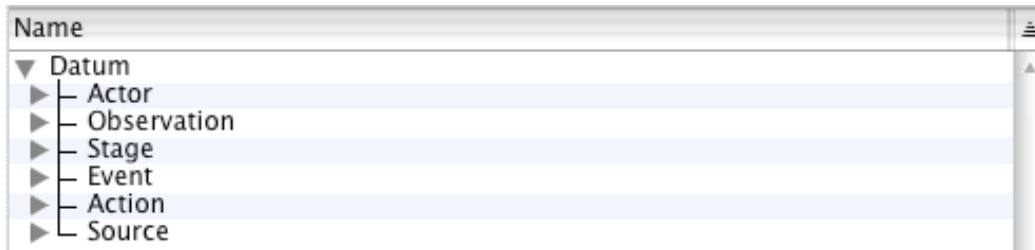


Reports

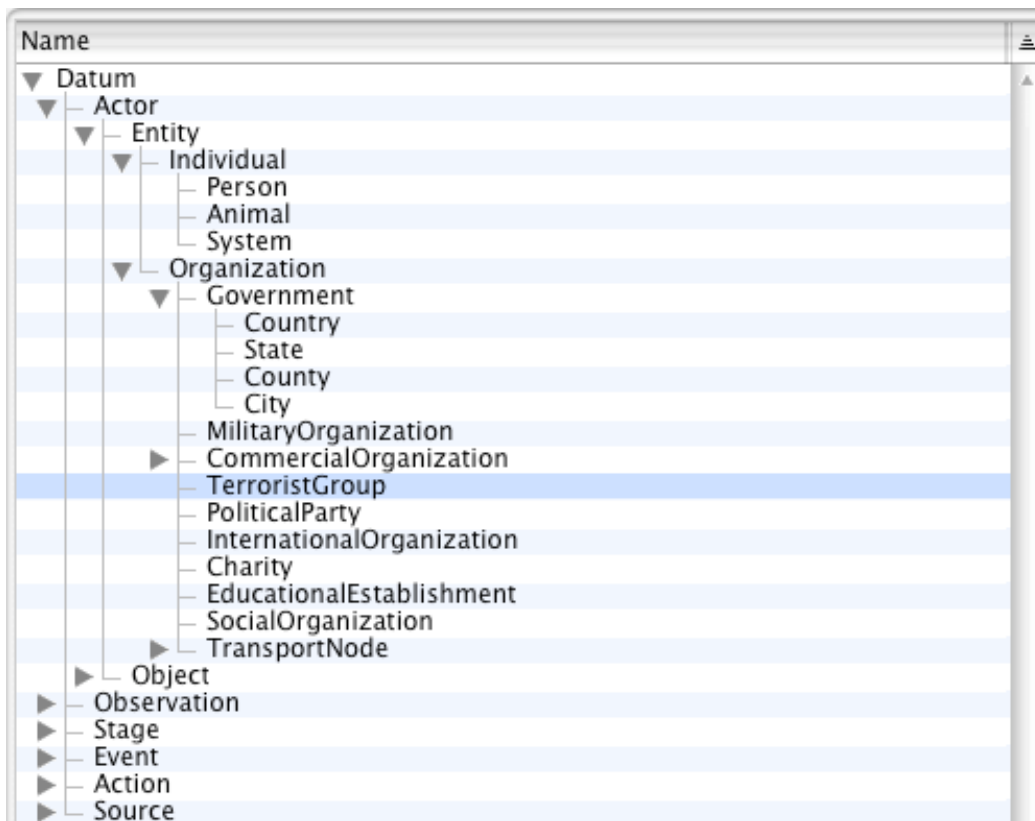


Video Snapshot

The user can quickly browse the data according to the system ontology. We see the top levels of the ontology below:



If you expand Actor, you will see it break down further:



Double clicking an item such as "TerroristGroup" will generate a list from the database. This tool is useful to see a macro view of how the data is organized and how many records of each item are in the system.

Searching for data using the ontology browser is convenient, but that can often return too many hits if you have a large set of data. The query builder allows you to perform much more targeted queries to whittle massive amounts of information down to a more manageable data set for the task at hand.

The screenshot shows the Query Builder interface. At the top, there is a dropdown menu labeled 'Datum' with a blue arrow icon. Below it is a button labeled 'Fields...'. Further down is a button labeled 'Filter...'. Below the 'Filter...' button is a text area labeled 'Filter Expression'. At the bottom, there are two input fields: 'Max Hits Allowed: 1000' and 'Min Relevance: 0'. To the right of these fields is a button labeled 'Execute'.

Data type

The user can select the data type to be searched according to the Ontology:

The screenshot shows the Query Builder interface with a cascading menu open. The menu starts with 'Datum' and branches into 'Actor', 'Observation', 'Stage', 'Event', 'Action', and 'Source'. 'Observation' further branches into 'Image', 'Rendering', 'Story', 'Video', 'Sound', 'Presentation', and 'Document'. 'Image' further branches into 'Report'. The 'Fields...' button is visible below the menu.

Fields

The “Fields” selection then specifies the columns that will show in the list of results. The relevant fields can quickly be viewed and sorted in an effective and condensed manner.

Fields

Select Fields...

Available Fields

- hostID
- datumType
- securityLevel
- aliases
- updatedBy
- dateUpdated
- source
- language
- notes.sourceNotes
- notes.sourceIDref
- symbology
- location.parentLocation
- location.isSpherical
- location.position.longitudeOrDeltaX
- location.position.latitudeOrDeltaY
- location.position.altitudeOrDeltaZ
- location.position.xAngle
- location.position.yAngle

Selected Fields

- id
- name
- dateEntered
- wordCount

Cancel OK

SP_

History Story: Breakthrough court order bans beggars.

Story (10:57 AM) - 100 records -

Name	Id	Date Entered	Word Count
Breakthrough court order bans beggars.	698221	2/6/04 1:25 PM	519
Maurice the pounds 100,000 pie.	698240	2/6/04 1:25 PM	109
Branson's dream collapses as rail plans are shelved.	698241	2/6/04 1:25 PM	552
Spring deadline for military.	698250	2/6/04 1:25 PM	289
Pupils' eye-opener.	698251	2/6/04 1:25 PM	292
Shops praised over selling of fireworks.	698252	2/6/04 1:25 PM	237
Sales executive with baby 'victimised'.	698253	2/6/04 1:25 PM	577
Charity runner's sudden death.	698256	2/6/04 1:25 PM	204
Listed status too late to save many old buildings.	698257	2/6/04 1:25 PM	773
Four die after van hits branch.	698258	2/6/04 1:25 PM	278
Co-ordination key to unlocking bed-blocking.	698259	2/6/04 1:25 PM	398
Former soldier's pounds 30,000 for athletics back injury.	698260	2/6/04 1:25 PM	216
Robinson apologises but insists cash not paid.	698268	2/6/04 1:25 PM	460
Five bailed after drugs ring swoop.	698269	2/6/04 1:25 PM	223
Day-trippers boost city coffers by pounds 1m and give thumbs up to attractions.	698270	2/6/04 1:25 PM	337
Minister back-tracks on forcing mayor referendum.	698277	2/6/04 1:25 PM	408
Hospital gets report after baby's death.	698278	2/6/04 1:25 PM	119
On the beat in crime fighting partnership.	698279	2/6/04 1:25 PM	588
Body in car.	698280	2/6/04 1:25 PM	79
Airlines 'must warn of DVT dangers'.	698281	2/6/04 1:25 PM	373
Jail terms for 'callous swindlers'.	698282	2/6/04 1:25 PM	616
In the flow Pictures to eat by.	698294	2/6/04 1:25 PM	176
MPs bay for fox hunting ban.	698295	2/6/04 1:25 PM	562
Burial for soldier lost in battle 87 years ago; Military honours First World War casualty laid to rest	698296	2/6/04 1:25 PM	618
College students being given raw deal.	698297	2/6/04 1:25 PM	448
Bill allows vets to enter farms to cull animals.	698307	2/6/04 1:25 PM	254
Crackdown on abandoned cars.	698308	2/6/04 1:25 PM	579
Poetic words are lot of plonk.	698309	2/6/04 1:25 PM	425
NHS ombudsman scathing over case of father of six 'sent home to die'.	698310	2/6/04 1:25 PM	407
Cancer facts blitz in bid to lift fears.	698311	2/6/04 1:25 PM	726
MS sufferers' get trial hope.	698312	2/6/04 1:25 PM	181
Sail away University friends hope to smash land wind-powered speed record.	698313	2/6/04 1:25 PM	102
Israeli violence is condemned by MP.	698314	2/6/04 1:25 PM	314
'Flying bedstead' rescue craft set for take-off.	698322	2/6/04 1:25 PM	161
Anthrax death mystifies officials.	698323	2/6/04 1:25 PM	703
Last chance for TV Emmy awards.	698324	2/6/04 1:25 PM	119
Lorryloads of gold and silver found in World Trade Centre rubble.	698325	2/6/04 1:25 PM	548
Bush pitches in to defy the latest threat of terror; Lone star President makes a stand to tell world	698333	2/6/04 1:25 PM	524
Russia still against sanctions change.	698334	2/6/04 1:25 PM	212
Red Cross winds up terror fund.	698335	2/6/04 1:25 PM	162
Bombers target Taliban front lines.	698336	2/6/04 1:25 PM	444
Netanyahu sounds warning to Commons.	698337	2/6/04 1:25 PM	437
Angry Assad raps Blair over civilian casualties.	698353	2/6/04 1:25 PM	817
Bin Laden 'meeting'.	698354	2/6/04 1:25 PM	195

No News

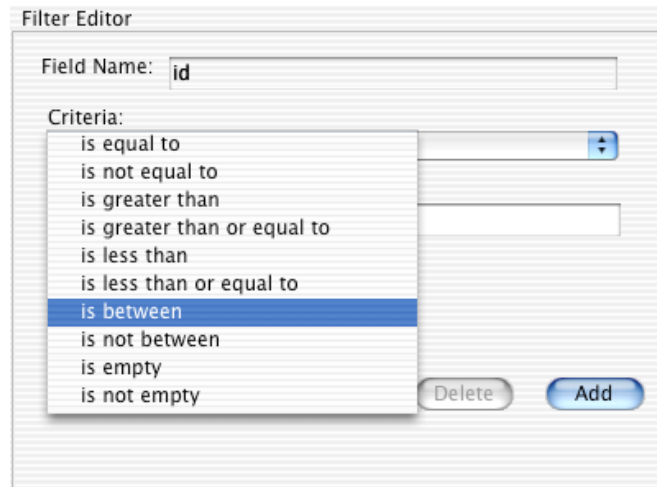
Filter

Filtering is the critical part of the query process. Searching in this highly integrated, multimedia, multilingual system is very powerful. Different query operators exist for dates, numbers, text fields, etc., and can be mixed to any degree of complexity or granularity. Basic handling of text fields is shown below:

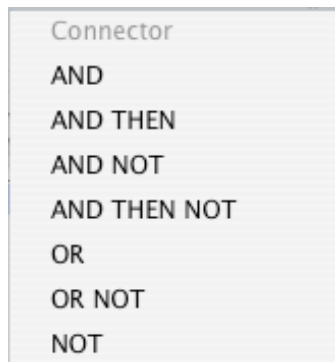


Filter (cont.)

Numbers have unique operators as do dates. Plugin operators for new algorithms such as face recognition, fingerprints, etc., would appear here as well.



Compound queries can be built to any level of nesting using grouping and Booleans:



Stemmed Search

The ability to search according to root concept via stemmed search is inherent. Through this mechanism you can also search for root concepts in English and get hits in foreign languages. You can query in any number of foreign languages such as Arabic (assuming you have the proper keyboard). See multilingual section below.

Hyperlinks

Within a data record, any number of fields may have an explicit hyperlink associated with them. These are created as part of the ontology. These hyperlinks allow you to easily navigate to related items in the database, and allow you to explore the richness of the data interconnectivity. Through these links “relationship chaining” can be exploited to find paths of connections between seemingly totally disconnected items (see visualizer section below).

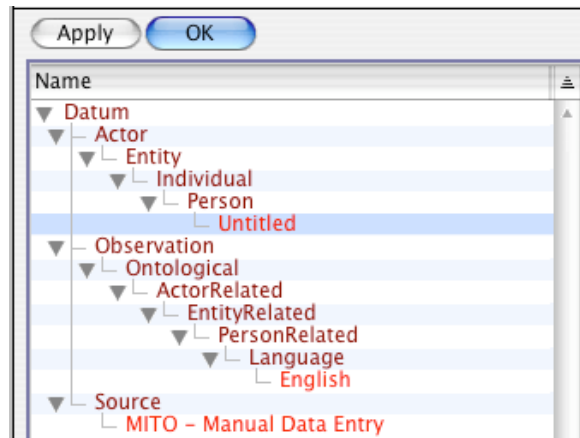
The screenshot shows a web application window titled "SP_" with a "History" tab and a search bar containing "Country: Ethiopia". The main content area is divided into several sections, each containing fields with hyperlinks (indicated by a small red icon with a blue arrow). The sections are:

- Country**: Fields for Host ID (0), Id (205863), Name (Ethiopia), Datum Type (Country), Security Level (1), Aliases, Updated By (John Fairweather), Date Entered (1/12/2004 21h:31m:00s), Date Updated (1/12/2004 21h:15m:00s), Source (InsurgencyAndTerrorism), Language (English), Symbology, and Date Formed.
- Parent Organization**: Fields for Country and Description.
- Map Image**: A placeholder for a map image.
- Flag**: A placeholder for a flag image.
- Chief of State**: A field with a hyperlink.
- Deputy Chief of State**: A field with a hyperlink.
- Head of Government**: A field with a hyperlink.
- Ext Name**: A field with a hyperlink.
- Intro**: A text area containing historical perspective information.
- Divisions**: A field with a hyperlink.
- Members**: A field with a hyperlink.
- Country Code**: A field with a hyperlink.

At the bottom of the window, there is a "No News" message.

Manual Data Augmentation (Editing)

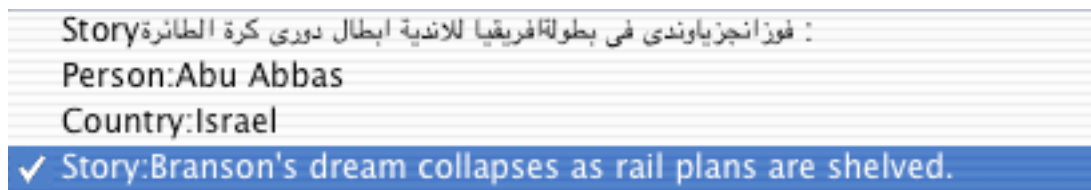
System data is often ingested via automated methods. However, the human analyst or cooperative team may have added information they wish to contribute. There are connections within that record that need to maintain correlations throughout the system. Therefore an “edit” to a record is not as if it is a “flat,” stand-alone record. A feedback system of colors provides the user indication of the state of that data field. A complete process and interface for this is provided. The mechanism ensures that redundant or disconnected items do not appear in the data repository.



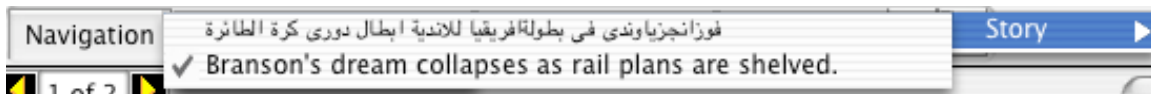
From a list of returns to queries, the user can simply double click any item to view the contents of the record. But after reviewing numerous information records, it is often hard to remember where you've been. Worse yet, if there is a place you wanted to return to, it would be convenient to go back there quickly. The history browser serves this purpose.



It allows records to be listed and revisited **chronologically**:



Otherwise the user may want to visit records **ontologically**. If we navigate to story type (from the chronology above) we would just see:



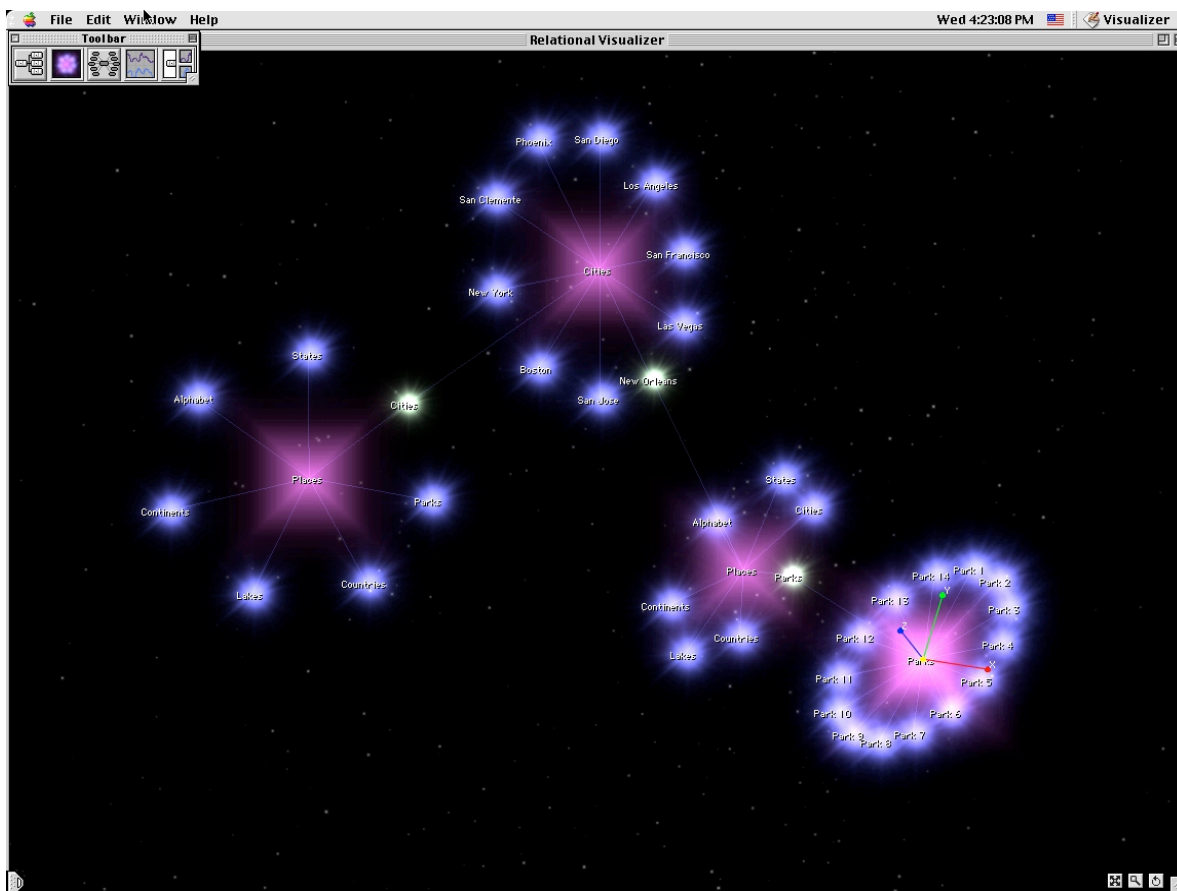
Alerts

Queries of any complexity can be saved and run against incoming dynamic information feeds. These generate alerts to interested customers, and the information can be routed to them directly.

Visualizers

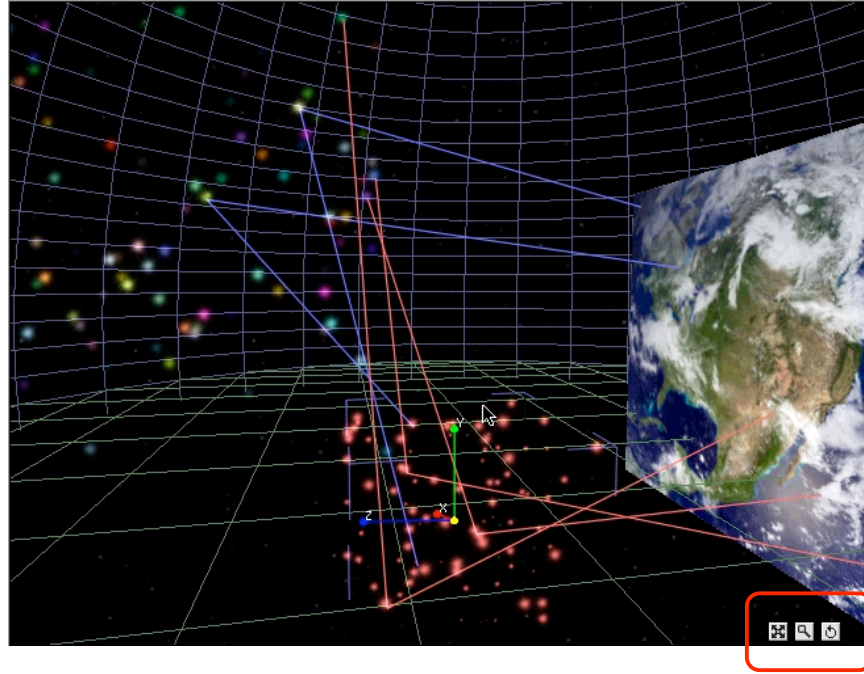
The power of the system is to make connections automatically at the information ingestion stage and/or manually at the user level. Once a tightly and richly integrated data set is obtained, the user may want to explore it for patterns in those connections.

A relationship visualizer shows relationship connections between data items:

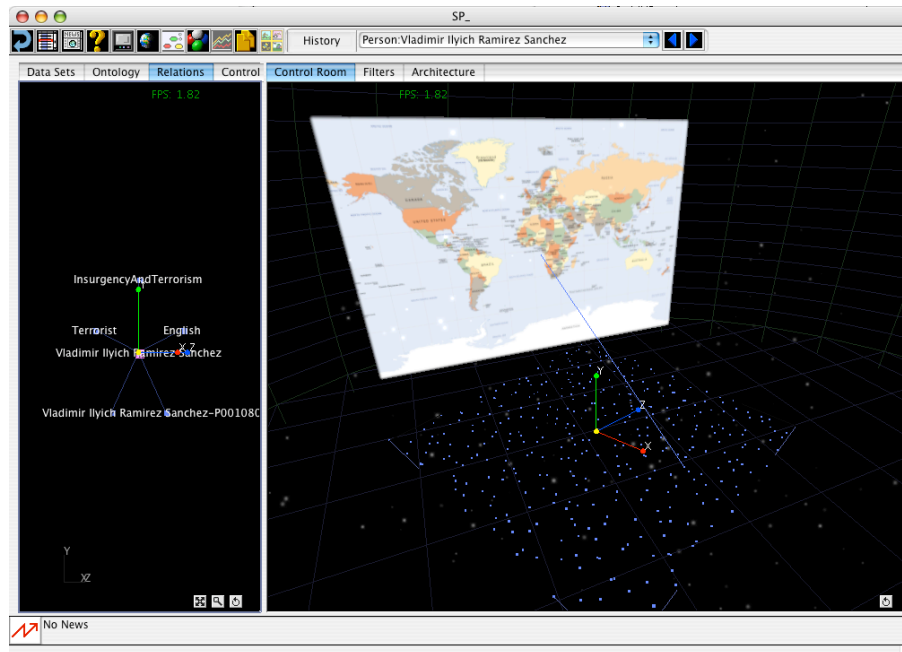


Visualizers (cont.)

A multi-dimensional visualizer allows the user to view the same data set along any number of dimensions simultaneously to find patterns or anomalies that lead to insights:

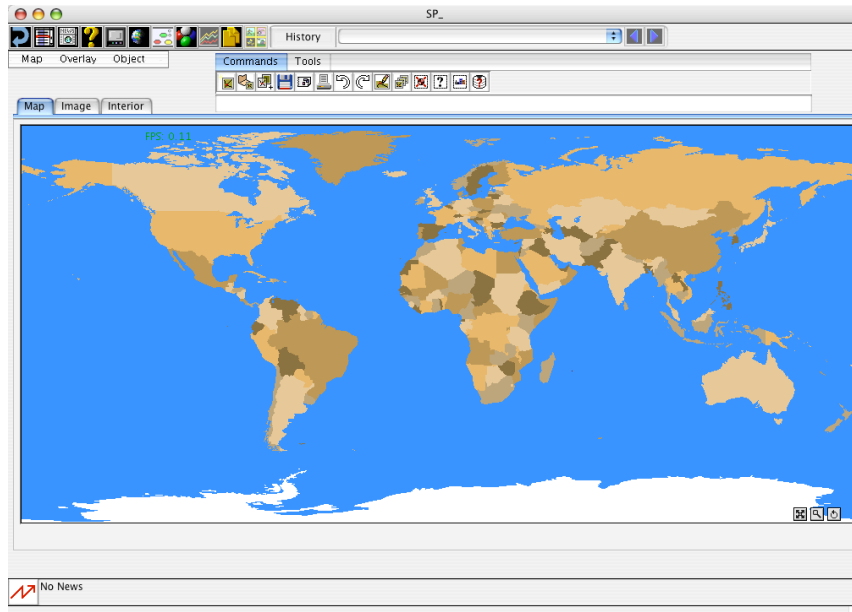


A variety of tools enable three-dimensional manipulation of data sets from first and third person camera perspectives:

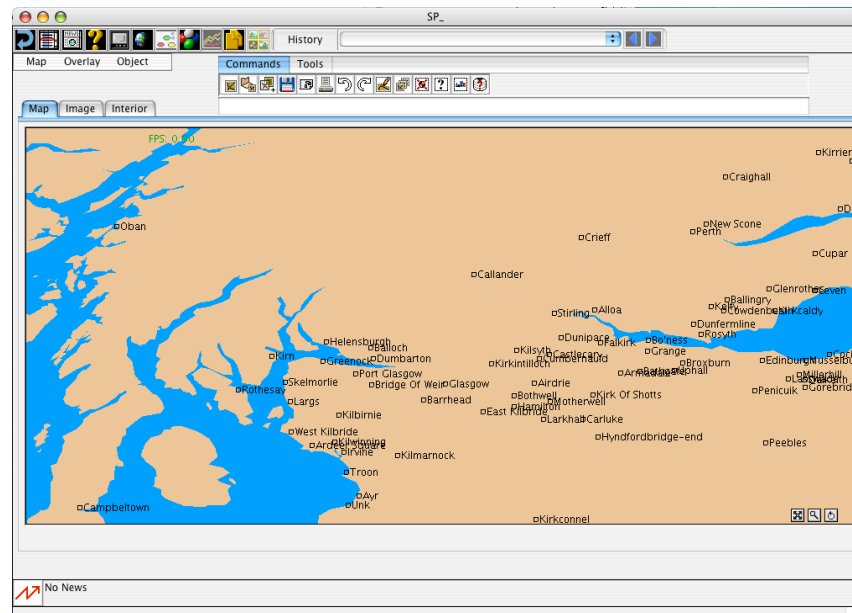


Geographic Information System

Most Geographic Information System (“GIS”) capabilities provide a map-centric view of the world. Mitopia® inverts this by having all geographic representations data-centric. In other words, the GIS should be nothing more than the spatial description of the ontological object being referred to.



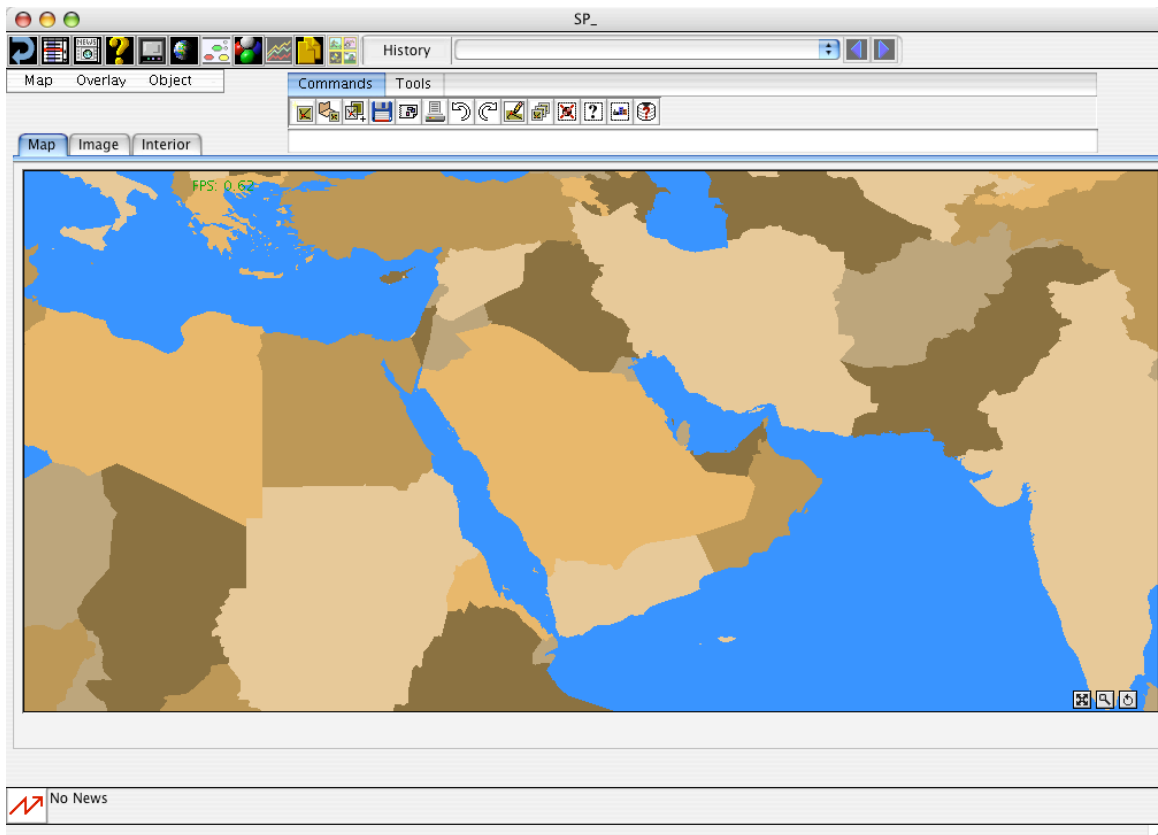
To plot the whereabouts of any number of items, we can perform a query and obtain a hit list, or collection, from the database. From that collection of items, we can push one button to have them plotted on a map.



Geographic Information System (cont.)

From the map we can perform all kinds of GIS functions such as distance between two points, along two paths, range circles, etc. With Mitopia® all transport paths can be fused, so finding the optimal paths and times someone could go from point A to point B could be determined, given the schedules of departures and arrivals to and from all major railways, airports, bus stations, etc., in the system.

In Mitopia® maps are rendered using OpenGL. A layering strategy is implemented to allow zooming in and out as well as panning at any level in real time.



Multilingual

Mitopia® is capable of natively handling a number of foreign languages. A query in English can also deliver hits in foreign languages.

[illegible]

Records can consist of multiple language content within the same record. Below, English and Arabic are shown:

SP...

History
Story/فوزانجیرواندی فی بطولتفریقا لائندی ابطال دوری کره الخاتره

Story
1 of 2
Columns Per Page 1

Host ID	Id
0	197643
Name	
فوزانجیرواندی فی بطولتفریقا لائندی ابطال دوری کره الخاتره	
Datum Type	Security Level
Story	1
Aliases	
Updated By	
Misook Kim	
Date Entered	
1/8/2004 11h:41m:00s	
Date Updated	
1/8/2004 11h:41m:00s	
Source	
NewsStory - MEPA Arabic	
Language	
Arabic	
Symbology	
Media Type	
Newswire	

Key Words

مصر، افریقیا، کره الخاتره

Title

فوزانجیرواندی فی بطولتفریقا لائندی ابطال دوری کره الخاتره

Text

٢٤٢/صلى ٤-١٤٢٤ ١ ش / مصر / افریقیا / کره الخاتره
 فوزانجیرواندی فی بطولتفریقا لائندی ابطال دوری کره الخاتره لتسبب
 الخافرة فی ٢٩ ابریل / ١ ش / غاز نادی انجز یرواندی التکسیرونی علی نادی امداد النج الریاضی الخمری بکاکه
 الشواط مطایل لا تشییء فی اولى مبرایات الخوة الاخیره طاوله الاربعه وه ١٩ لائندی ابطال دوری کره الخاتره لتسبب الخوة
 الخمت بدهما مسا، الخوم بالاطلاق الخفاه لتقادی الخلفی .
 جات المبراره مسره فویه وسهله وسمیترت لاجبات انجز الاکثر تنظیمه وخیره ومبراره و استار الفریق بادهاق الخدی
 ومخاطب الصند والاعداد الخیفریفات السامطه وانهى الاشدات المثلثه لاصحاه ٢٥ / ١٧ و ٢٥ و ١٦ و ١٢ .
 وبذلك یغنی انجز یرواندی التکسیرونی مبرایاته فی البطوله الخافره فی ثلاثه مبرایات وخمساره واربعته واربعته وتتبع
 المبرایات الخیفریفات لتسبب الفریق الخافر بالبطوله . . بیما سخر امداد النج الریاضی الخمری مبرایاته الخافره فی
 البطوله لیست المکرز السادس والاخر .
 ع.ص

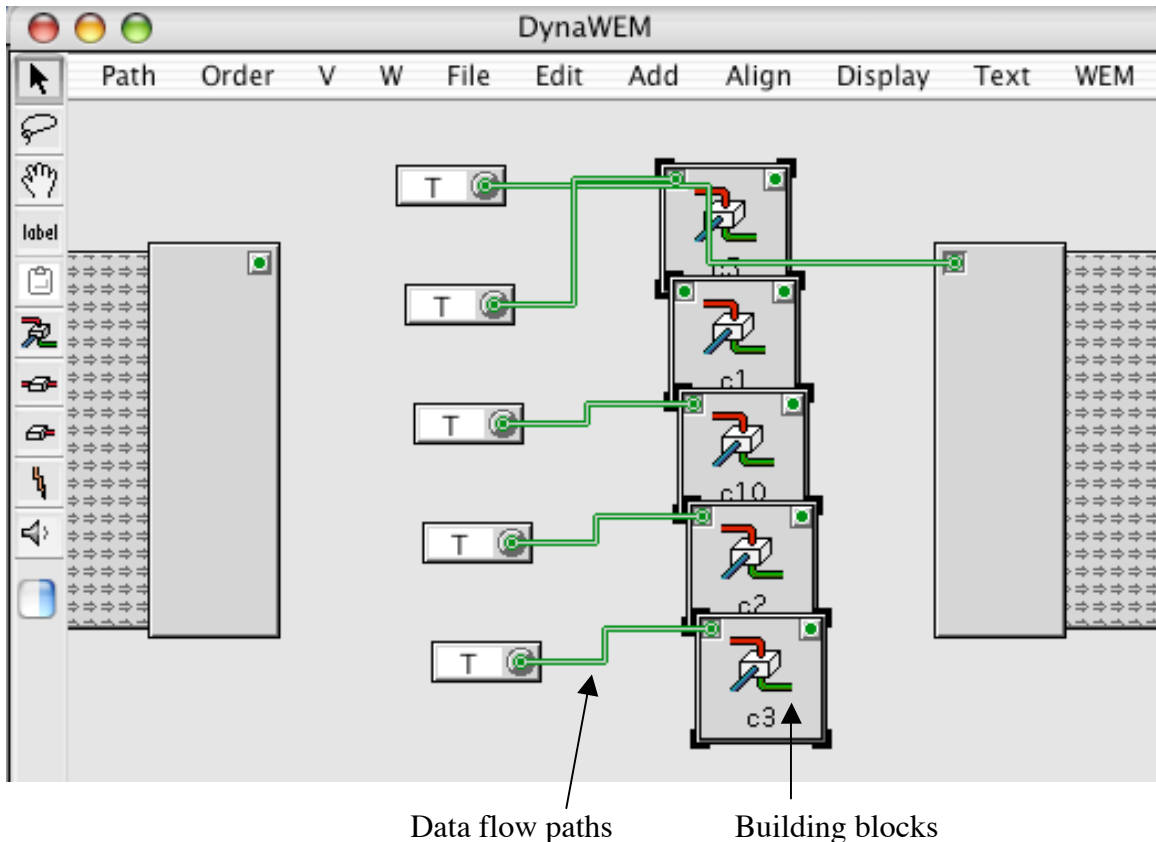
Category

مطلی

Changes

Visual Programming Interface

A visual programming interface is provided within Mitopia®. The purpose of this is to enable automated and semi-automated processes to free up repetitive tasks. These are completely modular and flexible so a large number of possibilities can be created. You can see below that “programming” does not involve writing actual code – it simply requires wiring up a series of logical building blocks.

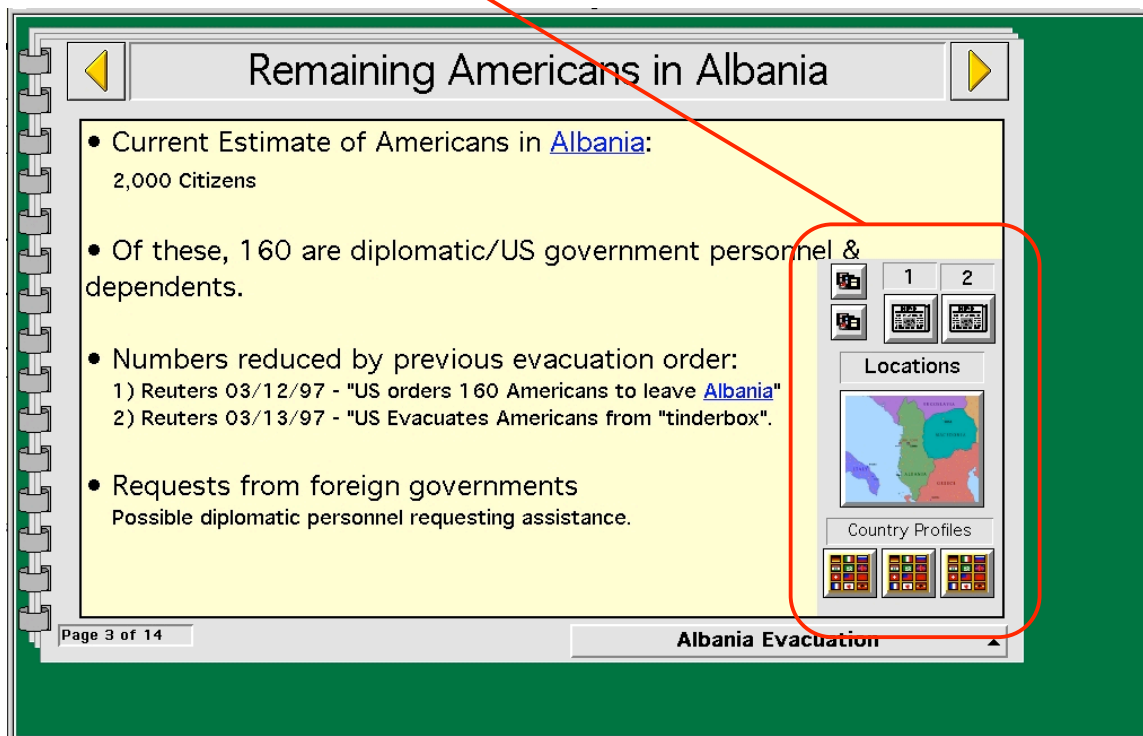


Building blocks perform a number of different functions including, algorithms, functions, user interface, etc. Building blocks can be stand-alone or can be wired together to create compound functionality and greater logical complexity.

Dissemination

Mitopia® provides the ability for the analyst to define custom templates, supply analyses, and attach the sources of his analysis as collateral in reports to decision makers. Templates are customizable through the visual programming interface.

Multimedia collateral can be provided along with an analysis to support the recommendations being made.



Report content goes back into the system (optional) to further enrich and share the corporate knowledge of the analysis organization.

Summary

The key to information intelligence is to be able to rapidly harness enormous amounts of information (in all types and formats), unify and connect them richly, analyze them, and produce intelligence product (reports). All this must come together in a seamless, end-to-end, workflow solution, from collection, ingestion, fusion, and analysis, to intelligence product development and dissemination, and it must all be able to adapt readily to changes in the environment. No other system or capability on the market provides for this complete, integrated, and highly flexible solution. Mitopia® has been in use in production environments for over five years and it is immediately available to deploy in information integration environments today.

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