

# **Interscambio di formati e modelli di dati**

Giornata di Studio

Progetto di informatizzazione dei PR

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# Interscambio di dati

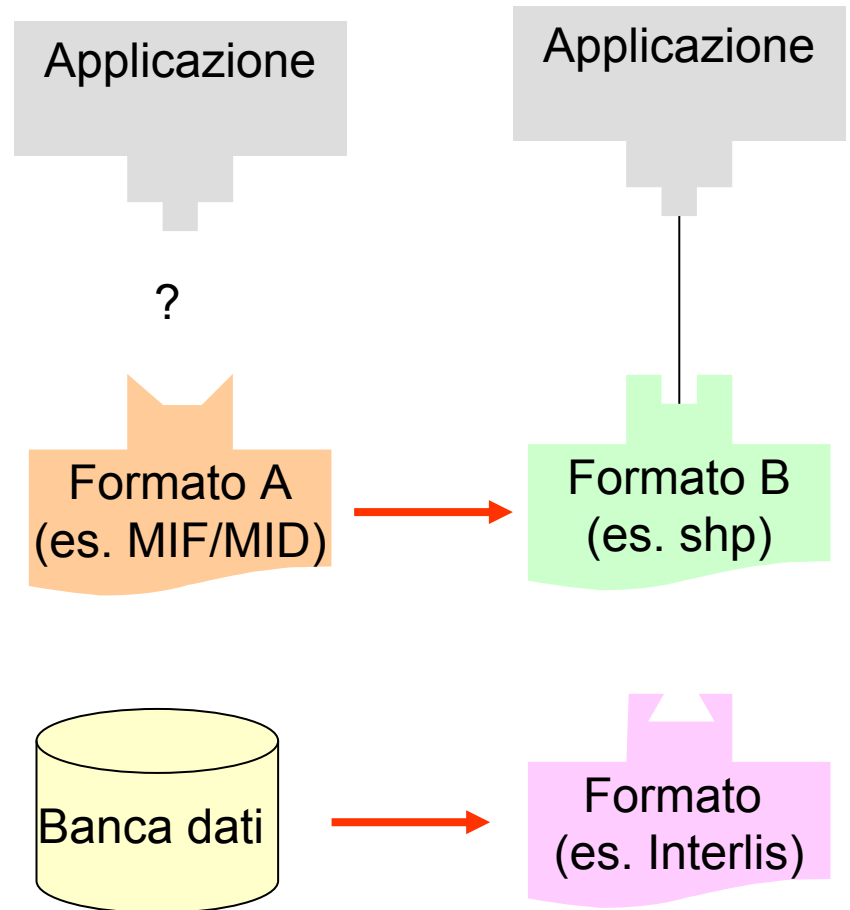
- Disponibilità sempre maggiore di dati in formato numerico
- Integrazione di dati in scala locale e regionale
- Moltiplicazione degli strumenti / applicazioni GIS
- Adozione di standard per l'accesso e per i formati di dati
- Interoperabilità: connessione tra applicazioni
- Trasferimento di dati tra software e versioni di software
- Pubblicazione di dati su Internet
- Diffusione dei dati

# Terminologia

- **Formato di dati:** è una strutturazione dell'informazione numerica destinata ad essere interpretata da un specifico sistema informatico
- **Modello dati:** è un insieme di meccanismi di astrazione per definire una base di dati, con associato un insieme predefinito di operatori e di vincoli di integrità.

# Problematica (1)

- Ricevo un file nel formato vettoriale GIS A (p.es. MIF/MID) ma non riesco a leggerlo con il mio software che accetta solo il formato vettoriale GIS B (p.es. shp)
- Devo fornire al cantone i dati in un formato C ma attualmente i miei dati si trovano in una banca dati



⇒ **PROBLEMA DI CONVERSIONE DI FORMATI**

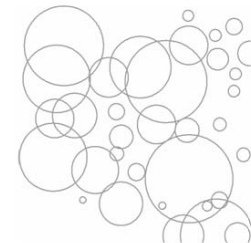
# Problematica (2)

- Da modello A a modello B
- Costruire poligoni a partire da linee
- Creare aree d'interesse a partire da dati tabellari



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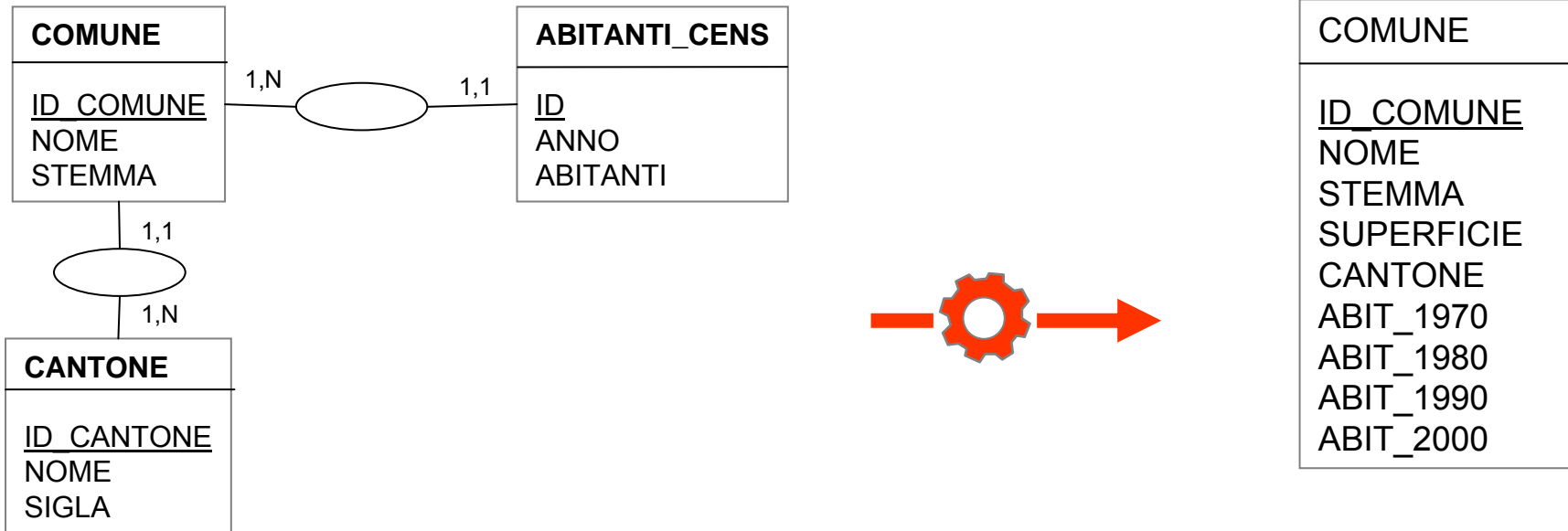


⇒ **PROBLEMA DI TRASFORMAZIONE DI DATI**

# Problematica (2.1): Da modello A a modello B

- I miei dati sono strutturati secondo un modello di dati A ma devo fornirli secondo un modello di dati B

Modello concettuale



Modello logico

**COMUNE**

ID_COMUNE	NOME	STEMMA	ID_CANTONE
1001	Bellinzona	bellinzona.jpg	21
1043	Lugano	lugano.jpg	21
...			

**CANTONE**

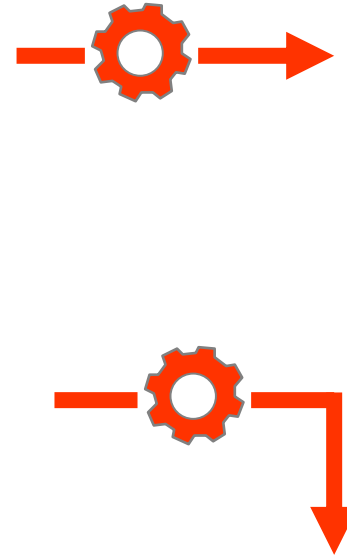
ID_CANTONE	NOME	SIGLA
21	Ticino	TI
...		

**ABITANTI\_CENS**

ID	ANNO	ABITANTI	ID_COMUNE
100	1970	16.979	1001
101	1980	16.743	1001
102	1990	16.849	1001
103	2000	16.463	1001
104	1970	41.331	1043
105	1980	45.422	1043
106	1990	46.113	1043
107	2000	50.857	1043
...			

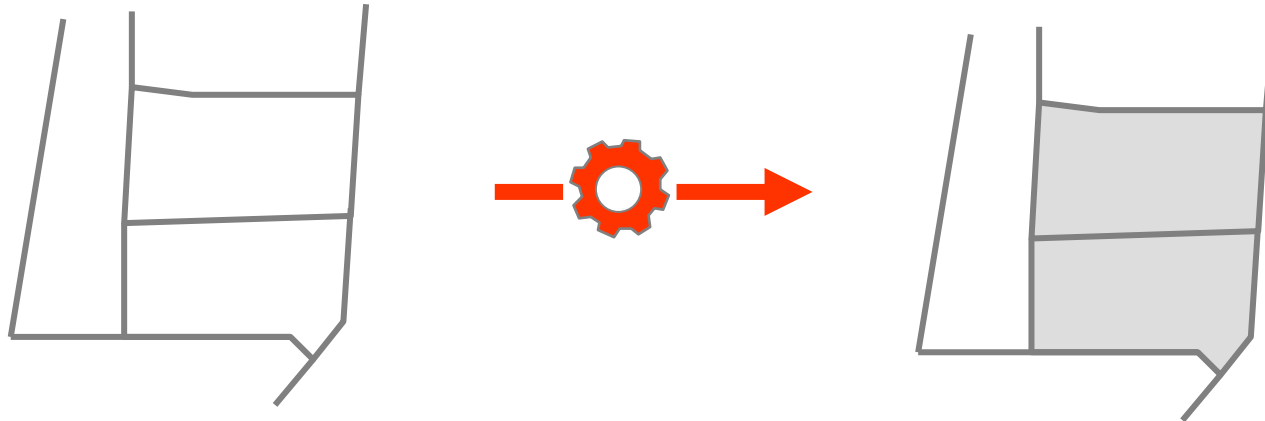
**COMUNE**

ID_COMUNE	NOME	STEMMA	CANTONE	SUPERFICIE	ABIT_1970	ABIT_1980	ABIT_1990	ABIT_2000
1001	Bellinzona	bellinzona.jpg	Ticino	19.13	16.979	16.743	16.849	16.463
1043	Lugano	lugano.jpg	Ticino	32.08	41.331	45.422	46.113	50.857
...								



# Problematica (2.2): Costruire poligoni da linee

- Un collega mi fornisce dei dati su delle zone digitalizzate sotto forma di linee mentre io devo fornire dei poligoni



# Problematica (2.3): Creare aree d'interesse

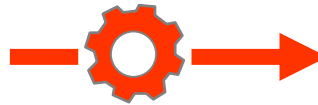
- Devo creare un file GML in coordinate WGS84 contenente le aree attorno alle stazioni di misura (file ascii con coordinate CH1903) il cui raggio è uguale alla misura effettuata sulla stazione (file csv).

ID	EST	NORD
29	716633.994715	716633.994715
33	715956.842005	715956.842005
37	712364.575995	712364.575995
38	714613.7339	714613.7339
40	716567.016141	716567.016141
42	716724.12523	716724.12523
45	712529.722045	712529.722045
46	715762.85203	715762.85203
51	715943.217494	715943.217494
52	713475.136612	713475.136612
961	716594.790721	716594.790721

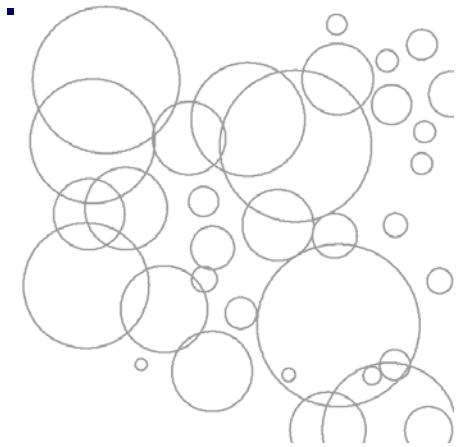
Tabella con  
coordinate  
stazioni di misura

ID	MISURA	ID_PUNTO
1	751103	26
2	829315	32
3	1101926	36
4	2484207	37
5	742205	39
6	1658367	41
7	3963095	44
8	752879	45
9	1063946	60
10	458185	51
11	881687	84

Tabella con  
misure e  
indicazione della  
stazione



- Creazione geometria punti
- Trasformazione CH1903→WGS84
- Collegamento (join) stazioni misure con tabella misure
- Creazione buffer (area)

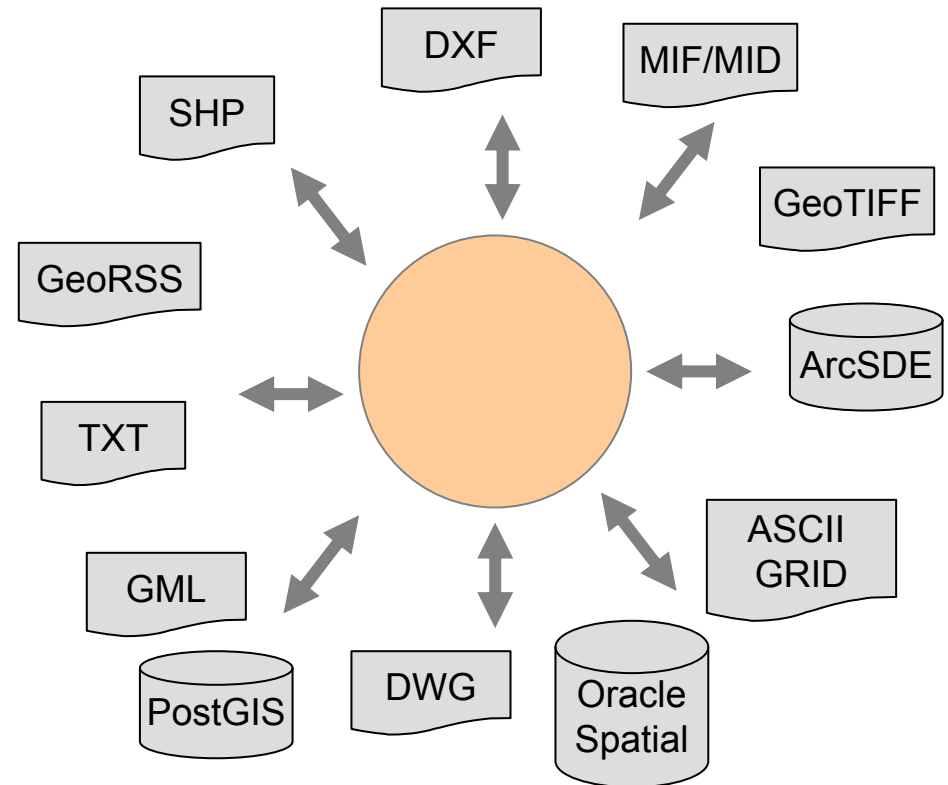


Aree centrate sulle stazioni di  
misura e con raggio uguale alla  
misura rilevata



# Problematica (3)

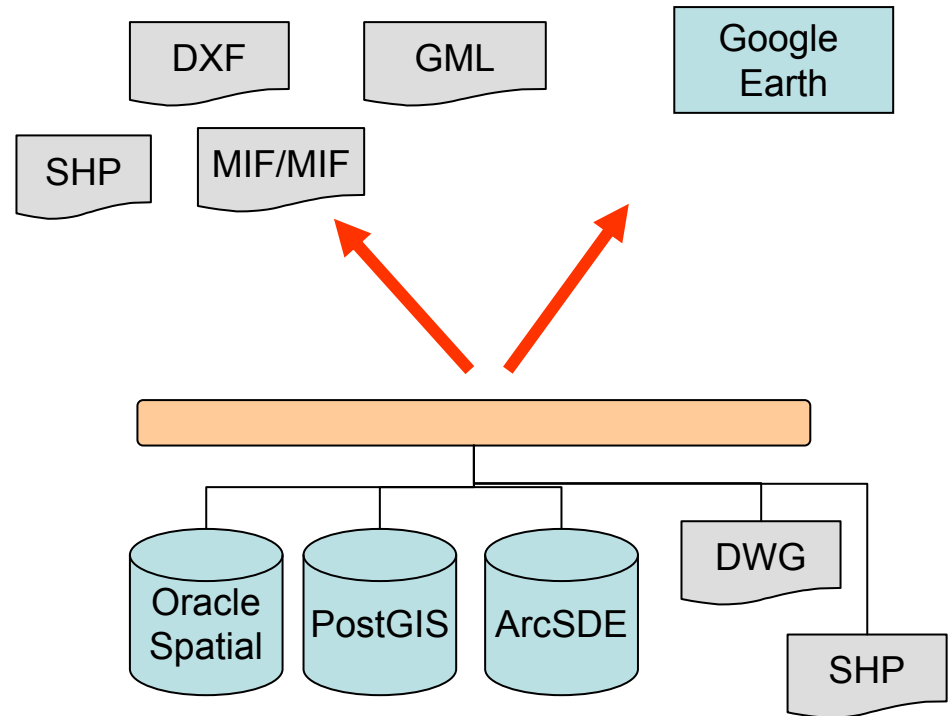
- Durante un progetto devo lavorare con diversi tipi di dati spaziali e non, in formati diversi e modelli diversi.
- Devo integrare diversi tipi di dati provenienti da diverse fonti per creare un modello di dati unificato adattato al mio progetto.



⇒ **PROBLEMA DI INTEGRAZIONE DI DATI**

# Problematica (4)

- Nella mia organizzazione lavoro su diversi tipi di banche dati e con diversi formati ma spesso devo fornire ai clienti gli stessi dati in formati diversi



⇒ **PROBLEMA DI DISTRIBUZIONE DATI**

# SOLUZIONI

- Tradizionalmente le applicazioni GIS hanno la capacità di leggere, importare o esportare un limitato numero di formati di dati geografici (conversione di dati)
- Molte di queste problematiche possono essere risolte singolarmente con le diverse applicazioni GIS tradizionali eseguendo operazioni manuali (query, ecc.) o sviluppando script ad-hoc
- Oppure utilizzando i cosiddetti Spatial ETL tools
- ...sempre più spesso alcune „funzionalità“ dei Spatial ETL tools vengono integrate dalle applicazioni GIS nei loro prodotti

# Spatial ETL Tools

- Spatial ETL Tools (o strumenti ETL Spaziali):
  - E = Extract = Estrae
  - T = Transform = Trasforma
  - L = Load = Carica
- Sono strumenti utilizzati per manipolare e trasformare i dati spaziali e non.
- Possono sia ristrutturare modelli e geometrie di dati che convertire dati in un nuovo formato output.
- Per esempio è possibile eliminare o rinominare attributi, calcolare o assegnare dei valori ad attributi nuovi o esistenti.
- Questi strumenti permettono di integrare modelli di dati complessi ristrutturati in un ambiente di geoprocessamento.
- Gli strumenti ETL spaziali forniscono capacità di trasformazione di dati all'interno di ambienti di geoprocessamento e possono essere usati per importare, esportare e trasformare dati.

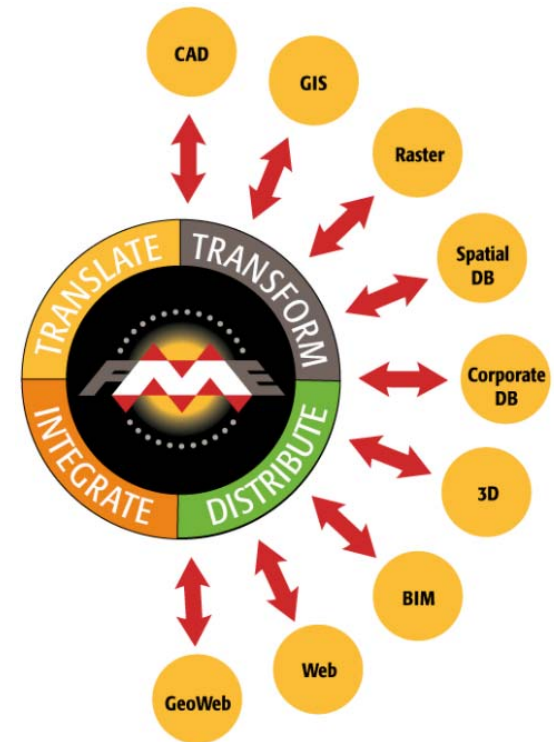
# FME: esempio di software Spatial ETL

- Feature Manipulation Engine (FME) è una soluzione sviluppata dalla società Safe Inc.
- I prodotti FME permettono la:
  - CONVERSIONE di dati in numerosi formati
  - TRASFORMAZIONE di modelli di dati
  - INTEGRAZIONE di numerosi tipi di dati
  - DISTRIBUZIONE di dati spaziali



# Funzionalità

- Conversione di dati fra più di 100 formati diversi
- Pacchetto di strumenti per il trattamento di dati
- Modifica del modello di dati
- Caricamento di dati in Oracle Spaziale, ArcSDE, ecc.
- Realizzazione di analisi spaziali
- Migrazione da un sistema di coordinate ad un altro
- Controllo della qualità dei lavori di acquisizione
- Correzione delle geometrie incoerenti
- Generazione di DTM o di TIN a partire da dati vettoriali
- Sovrapposizione di dati 2D su un DTM
- Trasformazione di dati 2D in 3D in funzione di attributi
- Generazione di curve di livello a partire da un DTM
- Conversione e trattamento d'immagini raster (tiff, ecw, ecc.)
- ...



# Formati supportati

- Più di 100 formati supportati
- Per ogni formato informazioni sulle sue caratteristiche
- Esempio: formato ESRI Shape

Geometry Support			
Geometry	Supported?	Geometry	Supported?
aggregate	yes	point	yes
circles	no	polygon	yes
circular arc	no	raster	no
donut polygon	yes	solid	no
elliptical arc	no	surface	yes
ellipses	no	text	no
line	yes	z values	yes
none	yes		

File Name Extension	Contents
.shp	Geometric data
.shx	Index to the geometric data
.dbf	Attributes for the geometric data
.sbn and .sbx	Spatial index for the geometric data. These two files will not exist unless you generate them with an ESRI product.

## BIM/3D

- Adobe PDF
- CityGML
- Industry Foundation Class STEP Files (IFC)
- LandXML

## GIS/CAD/Database

- 1Spatial Gothic\*
- 1Spatial Internal Feature Format (IFF)
- APT
- ASPRS Lidar Data Exchange Format (LAS)
- Additional Military Layers (AML)
- Adobe Flash (SWF)
- Adobe Illustrator EPS
- Aeronautical Information Exchange Model (AIXM)\*
- Autodesk AutoCAD DWG
- Autodesk AutoCAD DWG/DXF
- Autodesk AutoCAD Map 3D Object Data
- Autodesk MapGuide SDF
- Autodesk VISION GINA
- B.C. MOEP
- BC MoF Electronic Submission Framework - ABR, FSP, FTA and RESULTS
- Bentley MicroStation Design
- Bentley MicroStation GeoGraphics
- CITS Data Transfer Format (QLF)
- Canadian Council on Geomatics Interchange Format (CCOGIF)\*
- Caris NTX
- ComGraphix Data Exchange Format (CGDEF)
- DES
- Danish DSFL
- Danish UFO
- Digital Line Graph (DLG)
- Dutch TOP10 GML
- EDIGeo
- ESRI ArcGIS Layer
- ESRI ArcGIS Map (.mxd)
- ESRI ArcInfo Coverage
- ESRI ArcInfo Export (E00)
- ESRI ArcInfo Generate
- ESRI ArcSDE
- ESRI Geodatabase (ArcSDE)\*\*
- ESRI Geodatabase (File-based)\*\*

- ESRI Geodatabase (MDB)
- ESRI Geodatabase (XML)
- ESRI PC ArcInfo Coverage
- ESRI Shape\*\*
- Encapsulated PostScript (EPS)
- FDO Providers (AutoCAD Map 3D 2008)
- FDO Providers (FME)
- FME Feature Store (FFS)
- Facet XDR
- FalconView File
- GEODESYS StruMap
- GML (Geography Markup Language)
- GML SF-0 (Geography Markup Language Simple Features Level SF-0 Profile)
- GPS eXchange Format
- Genasys GeoMap
- GeoConcept Map
- GeoTask Server
- Geographic Data Files (GDF)\*
- Geographic Data Management System (GDMS)
- German AAA GML Exchange Format (NAS)
- German EDBS EDB\*
- German GTI/Restore\*
- German Geogrid OVL/ASC\* (GTI) GTViewer
- Halliburton GeoGraphix CDF
- IBM DB2 Spatial
- IDRISI Vector Format
- III Open Geospatial Datastore Interface (OGDI)
- ISO8211
- Informatica\*
- Intergraph FRAMME Standard Exchange Format (SEF)\*
- Intergraph GeoMedia Access Warehouse
- Intergraph GeoMedia SQL Server Warehouse
- Intergraph MGE
- Japanese Profile for Geographic Information Standards (JPGIS)
- KLT Atlas ASCII\*
- Land Victoria Incremental Update Format (IUF)
- Landmark Zycor Graphics File (ZGF)
- Landonline
- Leica Independent Data Exchange Format (IDEX)
- MapGuide SDL
- MapInfo MIF/MID
- MapInfo SpatialWare\*
- MapInfo TAB (MFAL)
- MapInfo TAB (MITAB)
- Mehrzweckkarte Wien (MZK)\*
- Metria AutoKa FF
- Microsoft MapPoint Web XML
- Microsoft SQL Server Spatial
- MultiGen-Paradigm Digital Feature Data (DFD)
- MySQL Spatial
- NEN 3610 (GML)
- NULL (Nothing)
- National Geospatial-Intelligence Agency (NGA) Digital Feature Analysis Data (DFAD)
- NGA GEOnet Names Server
- OS (GB) MasterMap
- OS (GB) NTF
- OeNORM A2260\*
- Oracle SQL Loader
- Oracle Spatial Object\*\*
- Oracle Spatial Relational
- Osmose FastGate (SMSF)\*
- PHOCUS PHODAT
- PenMetrics GRD
- PostGIS
- Regional Geographic Information System (REGIS)
- S-57 (ENC) Hydrographic Data\*
- SEG-Pt
- SEG-Y\*
- SICAD
- SPANS VEH/VEC/TBA\*
- STAR-APIC Mercator MCF
- Scalable Vector Graphics (SVG)
- Smallworld 3 and 4
- Spatial Archive and Interchange Format (SAIF)
- Spatial Data Transfer Standard (SDTS)
- Standard Linear Format (SLF)
- Summary Report
- Swedish I2K (Interface 2000)
- Swedish KF85
- Swedish MASIK
- Swiss INTERLIS\*
- Tele Atlas MultiNet Interchange format
- Tobin TDRBM II Data Distribution Format
- Trimble JobXML

- U.S. Census Bureau TIGER/ GML and TIGER/Line
- U.S. Environmental Protection Agency (EPA) Geospatial Data
- VALIS/ASC\*
- Vector Markup Language (VML)
- Vector Product Format (VPF) Coverage
- Vector Product Format Database (VPF\_DB)\*
- Virtual Reality Modeling Language (VRML)\*\*
- VoxeGeo OpenInventor (VOIV)
- XML (Extensible Markup Language)\*\*
- Z-Map (ASCII)
- rmdATA MXF

## Non-Spatial

- Comma Separated Value (CSV)
- OBASE (DBF)
- Directory and File Pathnames
- IBM DB2
- Microsoft Access
- Microsoft Excel
- Microsoft SQL Server
- MySQL
- ODBC 2.x/3.x
- Oracle
- Pervasive PSQL
- PostgreSQL
- SQLite
- Tabular Data
- Text File

## Raster

- Aircom ENTERPRISE Map Data/ASSET Data\*
- ARC Digitized Raster Graphics (ADRG)
- ARC Standard Raster Product (ASRP)
- Canadian Digital Elevation Data (CDED)
- Color Raw Raster
- Compressed ARC Digitized Raster Graphics (CADRG)\*
- Digital Map Data Format (DMDF)
- Digital Terrain Elevation Data (DTEd)
- ER Mapper ECW
- ERDAS IMAGINE
- ERDAS RAW
- ESRI .hdr RAW Raster

- ESRI ASCII Grid
- ESRI ArcGIS Binary Grid (AIG)
- ESRI ArcSDE Raster
- ESRI ArcSDE Raster Catalog
- ESRI ArcSDE Raster Map
- GIF (Graphics Interchange Format)
- GIF Rasterizer
- GeoTIFF (Geo-referenced Tagged Image File Format)
- Golden Software Surfer 6 Binary Grid
- Hierarchical Data Format 4 (HDF4) ASTER and Hyperion
- ITT ENVI .hdr RAW Raster
- JPEG
- Landmark Z-MAP
- LizardTech MrSID
- Marconi Planet\*
- Microsoft BMP
- NITF (National Imagery Transmission Format)
- Network Common Data Form (netCDF)
- Numeric Raw Raster
- Oracle Spatial GeoRaster
- PCI Geomatics Database File (PCIDSK)
- PNG (Portable Network Graphics)
- PNG Rasterizer
- RADARSAT-2 XML
- TIFF (Tagged Image File Format)
- Text File
- U.S. Geological Survey Digital Elevation Model (USCDEM)
- Vertical Mapper Grid (NGrid)
- X11 Pixmap (XPM)

## Web

- GeoJSON (Geographic JavaScript Object Notation)
- GeoRSS/RSS Feed
- Google Earth KML (Keyhole Markup Language)
- JSON (JavaScript Object Notation)
- WFS (Web Feature Service)
- WMS (Web Map Service)

[2008]

# Categorie di trasformazioni

- FME offre una flessibilità completa nel trasformare i propri dati nel modello di dati necessario
- Più di 300 trasformazioni disponibili permettono di ristrutturare i propri dati

CATEGORY	DESCRIPTION	EXAMPLE OPERATIONS
3D	Create and modify three-dimensional surface and solid geometries	<ul style="list-style-type: none"> <li>■ supporting CSG (Constructive Solid Geometry) Boolean operations between solids</li> <li>■ converting the face, donut, or polygon of a feature to extrusion geometry</li> </ul>
Calculators	Calculate a value and supply it to a new attribute on a feature	<ul style="list-style-type: none"> <li>■ calculating areas and lengths</li> <li>■ counting features</li> <li>■ adding counts as attributes</li> <li>■ reformatting date or time strings</li> <li>■ adding results of arithmetic expressions</li> <li>■ generating points inside areas</li> <li>■ calculating statistics from attributes</li> <li>■ determining topological relationships</li> </ul>
Collectors	Operate on collections of features to merge their attributes or geometries, have their orders altered, or replace the collection of features with new features	<ul style="list-style-type: none"> <li>■ aggregating features</li> <li>■ decomposing aggregates</li> <li>■ combining attributes</li> <li>■ finding the closest neighbor</li> <li>■ creating bounding boxes or convex hulls for multiple features</li> <li>■ testing for common segments</li> <li>■ aggregating neighboring features</li> </ul>
Database	Extract data from external spatial databases and merge it onto query features; extract attributes from non-spatial databases and join to features	<ul style="list-style-type: none"> <li>■ querying spatial and non-spatial data in ESRI ArcSDE® and Oracle Spatial</li> <li>■ joining attributes from non-spatial databases such as Microsoft® Access, Microsoft® Excel®, Microsoft® SQL Server™, MySQL®, PostGIS and SQLite to a feature</li> <li>■ executing arbitrary SQL statements</li> </ul>
Filters	Perform tests on feature geometry and/or attributes and allow the feature to be routed to different destinations, depending on the outcome of the test	<ul style="list-style-type: none"> <li>■ segregating aggregates from single features</li> <li>■ routing data based on attribute values or geometry</li> <li>■ detecting changes in features</li> <li>■ removing duplicate features</li> <li>■ detecting matching features</li> <li>■ sampling to create subsets of input features</li> </ul>
Geometric Operators	Operate on the geometry of individual features or groups of features	<ul style="list-style-type: none"> <li>■ building area features</li> <li>■ snapping</li> <li>■ clipping</li> <li>■ dissolving features</li> <li>■ connecting points in order</li> <li>■ line labeling</li> <li>■ line joining</li> <li>■ intersecting</li> <li>■ rubbersheeting</li> <li>■ tiling features</li> <li>■ computing topology</li> </ul>
Infrastructure	Enable interaction with the underlying FME translation engine facilities	<ul style="list-style-type: none"> <li>■ adding attributes</li> <li>■ logging features</li> <li>■ retrieving URLs</li> <li>■ setting feature colors</li> <li>■ calling Python or TCL functionality to create features and assign values to attributes</li> <li>■ retrieving and setting variables</li> <li>■ invoking the FME Universal Viewer to view data sets</li> </ul>
Linear Referencing	Use linear referencing data structures on FME features to create and apply measure-related information held in attributes onto the geometry of FME features	<ul style="list-style-type: none"> <li>■ calculating measures</li> <li>■ setting measures on features</li> <li>■ shortening line features</li> <li>■ snipping vertices</li> </ul>
Lists	Use a list structure to handle multiple values for each attribute	<ul style="list-style-type: none"> <li>■ creating, exploding and searching attribute lists</li> <li>■ extracting information from attribute lists</li> </ul>
Manipulators	Modify (or manipulate) the geometry or attributes of individual features	<ul style="list-style-type: none"> <li>■ generalizing area feature boundaries</li> <li>■ creating buffers around features</li> <li>■ creating centerlines</li> <li>■ rounding off coordinate values</li> <li>■ curvefitting to smooth lines</li> <li>■ constructing GML documents</li> <li>■ reprojecting between coordinate systems</li> </ul>
Rasters	Create, use or output raster data	<ul style="list-style-type: none"> <li>■ georeferencing rasters</li> <li>■ converting vector features to rasters</li> <li>■ mosaicking multiple rasters into a single raster feature</li> <li>■ decomposing rasters into point features</li> </ul>
Strings	Operate on character strings held in FME attributes	<ul style="list-style-type: none"> <li>■ searching</li> <li>■ replacing</li> <li>■ splitting</li> <li>■ concatenating</li> <li>■ changing case</li> <li>■ extracting character encodings</li> </ul>
Surfaces	Operate on data which defines a 2.5D surface	<ul style="list-style-type: none"> <li>■ generating contours or Digital Elevation Models (DEMs)</li> <li>■ draping features</li> <li>■ generating Triangulated Irregular Networks (TINs)</li> <li>■ modeling surfaces</li> <li>■ generating Voronoi diagrams</li> </ul>
Web Services	Access web services via the HTTP protocol	<ul style="list-style-type: none"> <li>■ sending requests to web services and making results available to the FME infrastructure</li> <li>■ creating or consuming GeoRSS/RSY/GeoJSON/JSON documents</li> </ul>
Workflow	Run FME workspaces either locally or on an FME Server	<ul style="list-style-type: none"> <li>■ submitting or running jobs on FME Server</li> <li>■ running FME workspaces locally</li> </ul>
XML	Work with XML data	<ul style="list-style-type: none"> <li>■ mapping XML elements into features</li> <li>■ using stylesheets to convert XML documents</li> <li>■ querying collections of XML data</li> </ul>

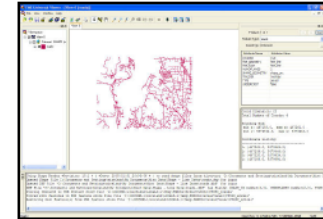
[2009]



# Componenti di FME Desktop

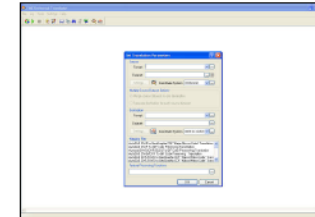
- **FME Universal Viewer**

Visualizzazione di formati diversi di dati spaziali, prima, durante e dopo conversione



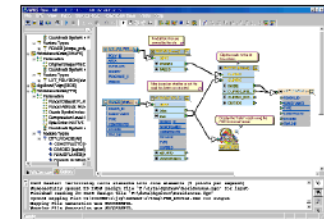
- **FME Universal Translation**

Conversione rapida da un formato predefinito ad un altro, o per utenti avanzati, realizzazione di processi più complessi a partire da scripts



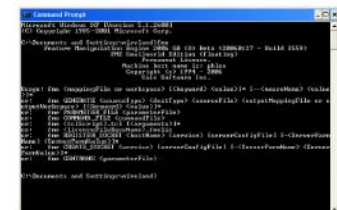
- **FME Workbench**

Controllo della conversione e trasformazione grazie a un'interfaccia grafica del flusso dei dati (dalla fonte all'arrivo)



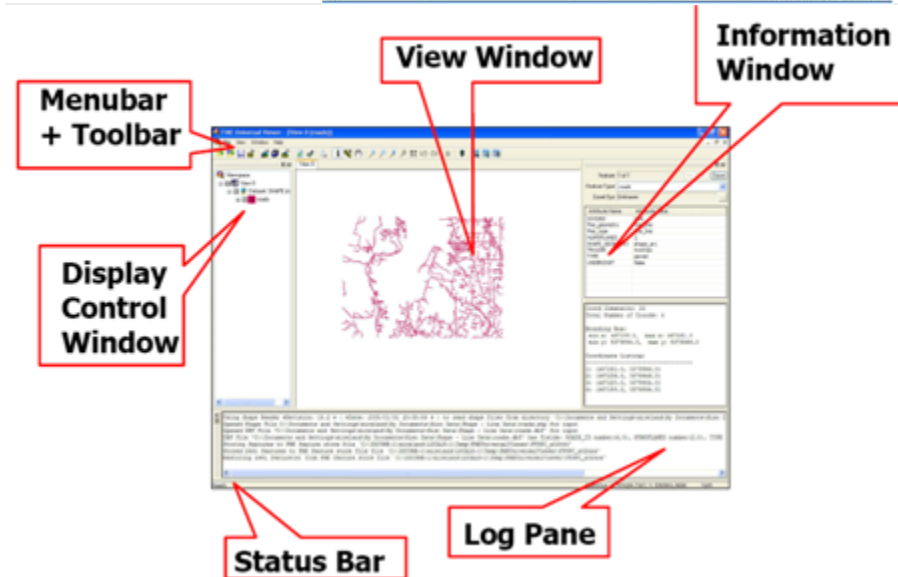
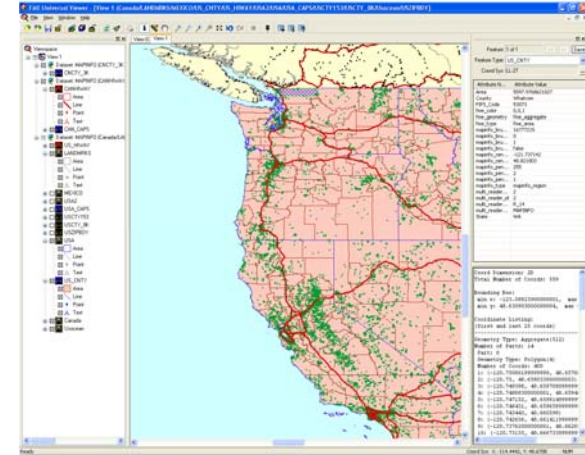
- **FME Command Line Engine**

Comandi in linea



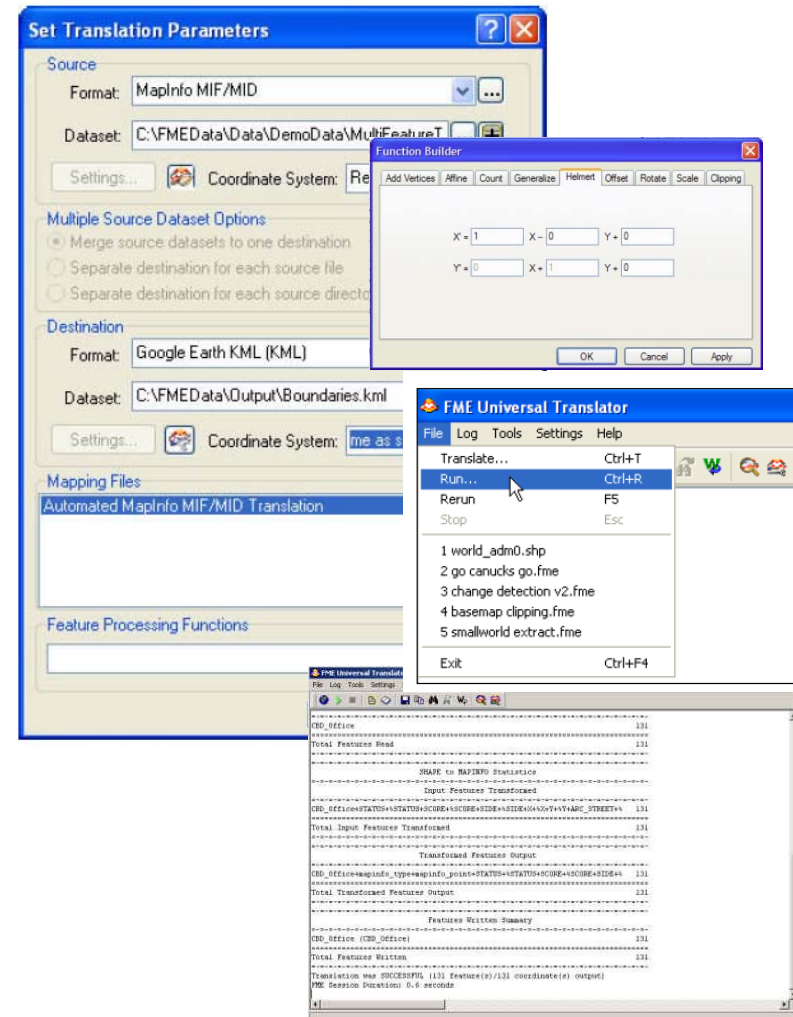
# FME Universal Viewer

- Permette di visualizzare i dati ed „ispezionarli“
  - geometria
  - simbologia
  - attributi
  - formato dati
  - modello dati
  - quantità dati
  - risultato processo



# FME Universal Translator

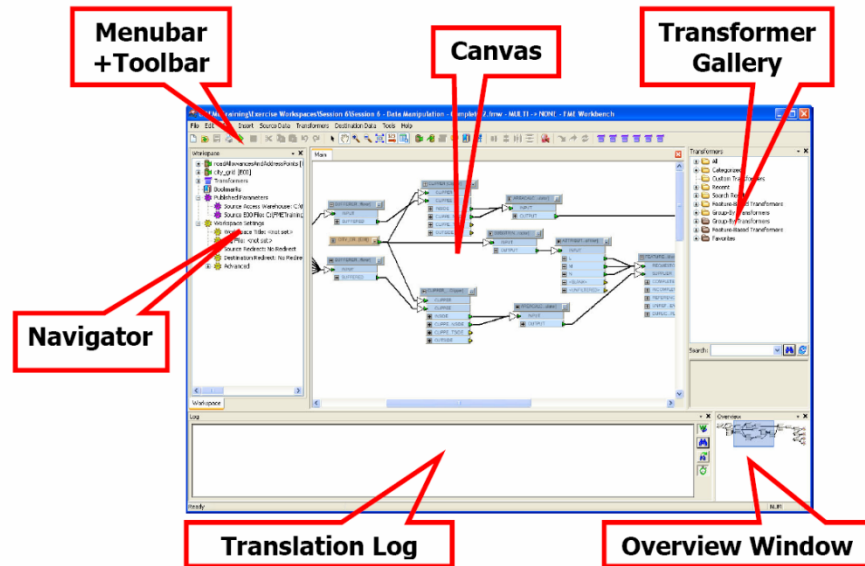
- È lo strumento per traduzioni / conversioni
  - formati
  - coordinate
  - ...trasformazioni semplici
  - sistemi di coordinate



Translation log

# FME Workbench

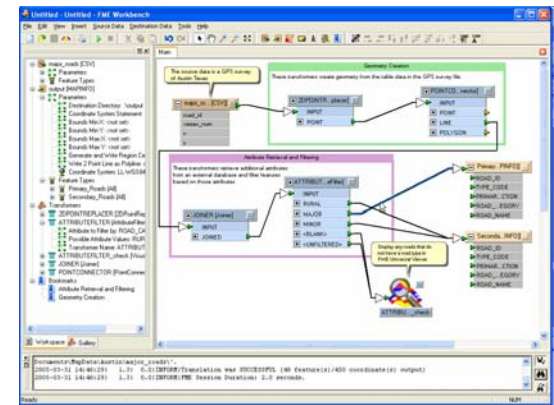
- Permette di creare delle trasformazioni avanzate
- Esistono più di 300 funzioni (factories) per trasformare i dati (geometria, attributi, proiezione, ecc.)



```

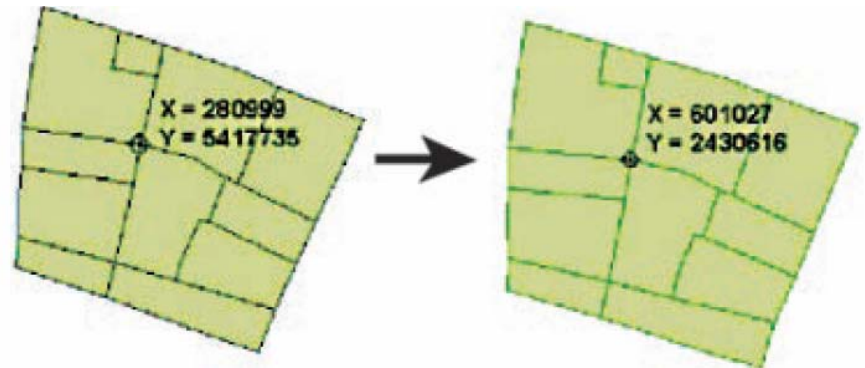
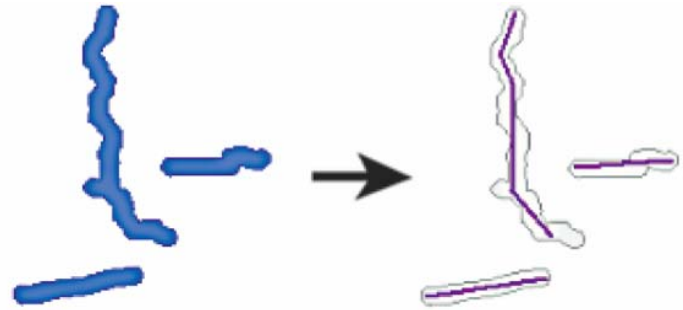
-----
Features Read Summary
-----
Level1 4
Total Features Read 4
-----
Features Written Summary
-----
Level1 4
Total Features Written 4
-----
SESSION READER: Closing DGN V8 file.
ACAD Writer: Successfully closed writer.
Feature output statistics for 'ACAD2004' writer using keyword 'ACAD_1':
-----
Features Written
-----
Level1 4
Total Features Written 4
-----
Translation was SUCCESSFUL (4 feature(s)/33 coordinate(s) output)
FME Session Duration: 1.9 seconds.
    
```

Translation log



# Esempi di trasformazioni (factory)

- CenterLineReplacer
- Reprojector
- Concatenator



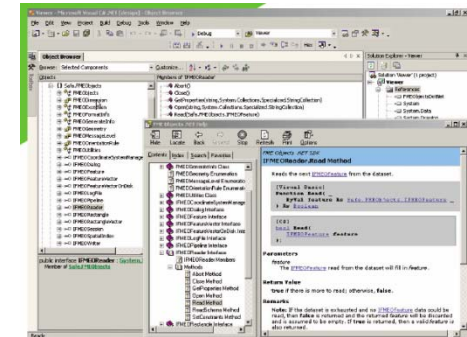
7445 132<sup>nd</sup> Street  
Surrey  
BC

→ 7445 132<sup>nd</sup> Street, Surrey, BC

# Altri componenti e altri prodotti

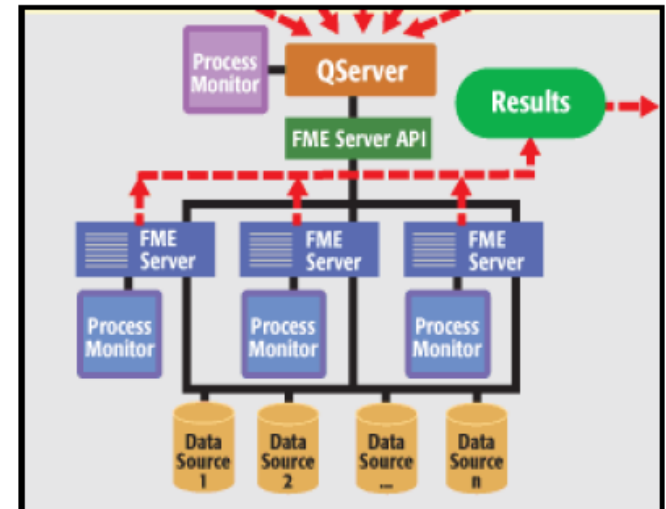
Altre componenti:

- FME Objects
- FME Application Extenders
- FME Plug-In SDK



Altri prodotti:

- FME Server
- FME Data Server
- FME Plugins



# FME Application Extenders

<i>Application</i>	<i>Extender</i>	<i>Package</i>	<i>Functionality</i>	<i>Contact</i>
ArcGIS	<a href="#">Data Interoperability Extension</a>	Add On	LOTS!	ESRI or Safe
ArcGIS	<a href="#">FME Extension for ArcGIS</a>	with FME	Import FME supported formats, export to ESRI formats	Safe
ArcIMS	<a href="#">FME SpatialDirect for ArcIMS</a>	Add On	Extends ArcIMS Data Delivery to support over 30 additional formats	Safe
ArcView	<a href="#">FME Themes for ArcView</a>	with FME	Read FME supported formats in ArcView	Safe
AutoDesk Map 3D 2005	<a href="#">AutoDesk Map 3D 2005 FME Integration</a>	with FME	Access to 100+ extra formats	Safe
AutoDesk MapGuide	<a href="#">FME Provider for AutoDesk MapGuide</a>	with FME	Publish FME supported formats directly	Safe
AutoDesk MapGuide	<a href="#">FME SpatialDirect for AutoDesk MapGuide</a>	Add On	Web mapping and data download of FME supported formats	Safe
GeoMedia	<a href="#">FME Data Server for GeoMedia</a>	with FME	Access spatial data with an FME GDO	Safe
GeoMedia	<a href="#">FME ArcSDE Editing for GeoMedia</a>	with FME	Edit ArcSDE data directly from within GeoMedia	Safe
GeoMedia WebMap	<a href="#">FME Data Server for GeoMedia WebMap</a>	with FME	Read-Only access of FME supported formats	Safe
GeoMedia WebMap	<a href="#">FME SpatialDirect for GeoMedia WebMap</a>	with FME	Web Mapping and Data Download of FME supported formats	Safe
MapInfo	<a href="#">MapInfo Universal Translator</a>	with MapInfo	Convert to/from MapInfo and other common GIS formats	MapInfo
MapPoint	<a href="#">FME Extension for MapPoint</a>	with FME	Import FME supported formats to MapPoint	Safe
Smallworld	<a href="#">Spatial Objects Manager (SOM) for FME</a>	Add On	Access to various formats within Smallworld	GE/Smallworld



# FME Server

- distribuire i dati geografici attraverso il Web .
- trasformare dei grandi volumi di dati.
- ripartire e condividere operazioni spaziali all'interno di un'organizzazione.





# Ulteriori informazioni



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