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Innovative Cartography Standards for Web-GIS Portals: Case Study of the 'Survey of Israel's' Web-GIS Portal

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Project Goals

- examine and discuss the challenges and opportunities of innovative cartography methods for web-based GIS platforms.
- introduce a recently developed cartographic methodology, which is based on a web-based GIS portal by the Survey of Israel (SOI).
- Discuss the prospects and constraints of such methods in improving web-GIS interfaces and usability for the end user.
- Demonstrate the preliminary findings of the initial implementation of the web-based GIS cartographic method within the portal of the Survey of Israel.

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Background

- The debate regarding the future of printed maps versus digital maps.
- New challenges for the Cartography in the digital mapping age.
- Web-based cartography methods and the implications of adopting such methods by the SOI (Survey of Israel).

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GIS and Mapping

- Analysing and mapping data from applications is becoming increasingly important in all levels.
- The use of GIS increases efficiency by providing timely and rapid assessment information for decision-making.
- One of the ways to expand the use of GIS is by web-based GIS platforms.

Web-based GIS

- Web-based GIS should be based on three main components; usability, accurate data, and interactivity.
- It is essential that the data included must be clear to both professional and non-professional users.
- Increased usability increases interactivity, which in turn leads to more empowered users.
- Enabling the service on the internet provides access to a broad audience and resolves operational issues such as data accuracy.
- The growing interest in web-based applications encourages a rapid expansion of research, especially in online decision-making and planning systems.
- Implementation of such applications in a variety of sectors provides new insights and increases public involvement and community empowerment.

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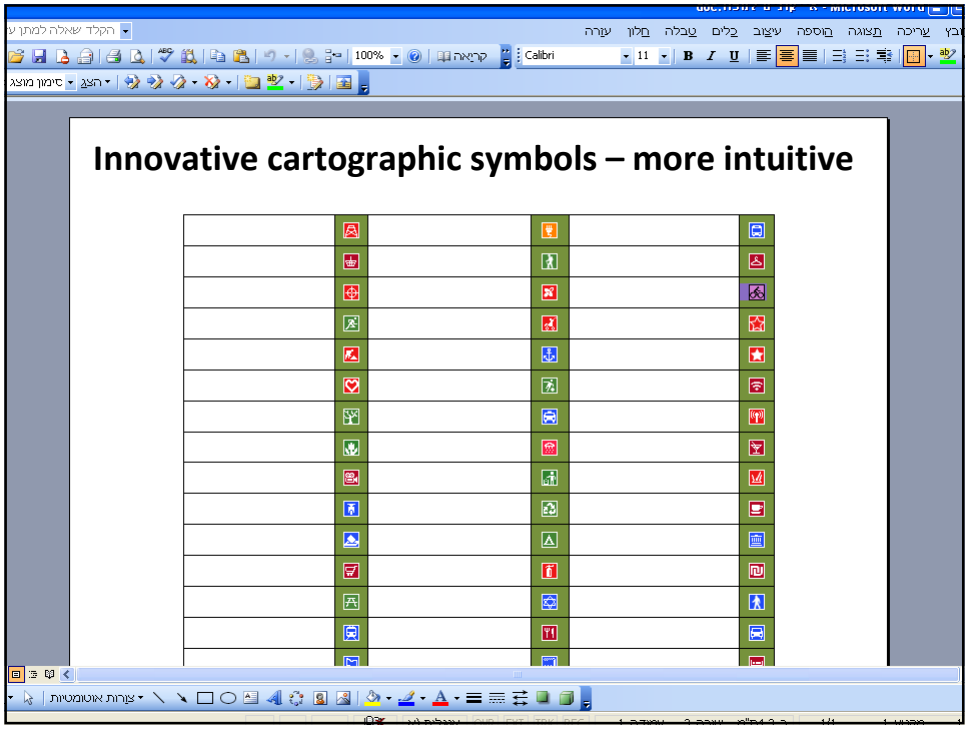
Web-based Cartography and Implications

- Cartography, that was once a paper-based field, has encountered problems as mapmaking has moved to a web-based medium.
- A large proportion of the new web mapping applications ignore important cartographic principles.
- Most GIS products contain a range of functionality for the creation of high quality maps and cartographic products.
- The conclusion is that new cartographic methods suitable for today's demands are essential.



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Case Study: the portal of the Survey of Israel

Background

- The portal of the SOI was launched in 2007, and was developed and managed by the SOI, in coordination with the Inter-Agency Committee for Geographic Information (IACFGI), with the long-term vision to serve as the initial platform for the NSDI.
- The establishment of the portal was part of a new strategy to move services and products to a web environment.
- The portal is a part of the Israel E-Government project aimed at improving the connection between the citizens and the government of Israel.

Case Study: the portal of the Survey of Israel

Objectives

- Reducing the costs and pricing of geographic data.
- Extending the availability of geographic information (GI) to the public, government and public agencies.
- Reducing government expenses and overall national expenditure.
- Enhancing the inter-government cooperation by introducing mutual geospatial standards.
- Expanding the use of geographic data.

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Case Study: the portal of the Survey of Israel

Guiding principles

Guiding Principle	Description
Usability	Intuitive operation of the user interface for presentation of geospatial data and for Meta-Data queries
Attractiveness	Clear and convenient user interface and an attractive cartographic design
Solidity	Focusing on applications
Internal Standardization	The user will feel familiar in any future environment which will be based on the maps portal
Privileges	Following Windows and Internet standards as well as governmental standards

(Srebro et. All 2006)

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The Portal Database

- The maps portal includes about 120 layers of national geospatial data that have been collected since its early stage of operation.
- The data includes basic mapping: Roads, buildings, addresses, orthophoto, contours, hydrology, institutes, various scales of raster topographic layers, etc.
- Cadastral and planning layers: Blocks, plots, town plans, master plans, land reserves, etc.
- Tourist information layers: National resorts, national parks, hiking trails, forests, parking areas, etc.
- The portal also includes information on administrative boundaries, transportation, infrastructure, security and national emergencies.

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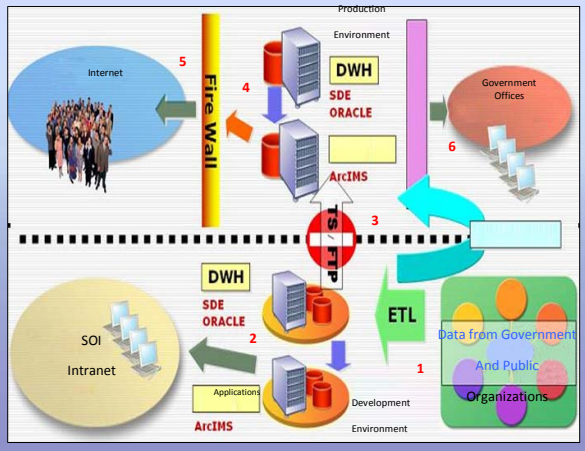
The Portal Architecture



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Web-Based Cartography in the Maps Portal

- Current technology of the maps portal is based on the ESRI ArcIMS engine and the portal's cartography is based on its capabilities. (ArcIMS Author)

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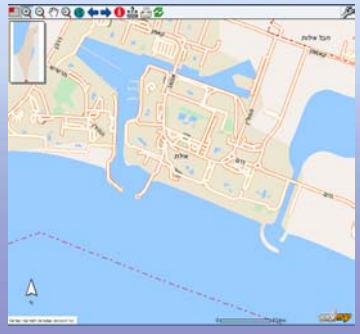
Web-Based Cartography in the Maps Portal

The difference between a web-based map of Eilat (area of hotels) and a printed map:



After months of development it was clear that more research efforts, cartographical design and investment are vital for improving the map outputs in terms of harmony and quality for the end users.

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Implementing Innovative Cartography Approaches

- The SOI is in advanced stages of migration to ESRI ArcGIS server technology.
- One of the main concerns during the innovative design was of the usability and the end-user experience, specifically the response and refresh times.
- Taking advantages of the new system capabilities to utilize the basic tools and features of the ESRI ArcGIS and to design the cartography based on a MXD template.

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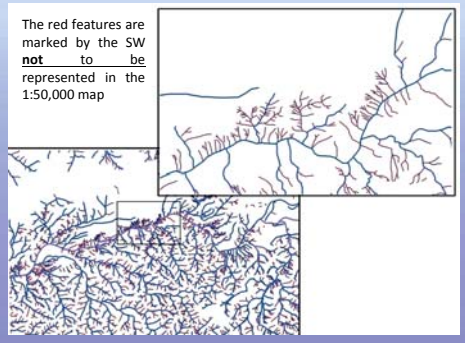
Implementing Innovative Cartography Approaches

- Utilizing the generalized layers developed earlier for the 'GIS Based Cartography' project.

DLM data pre automatic generalization



The same data post automatic generalization

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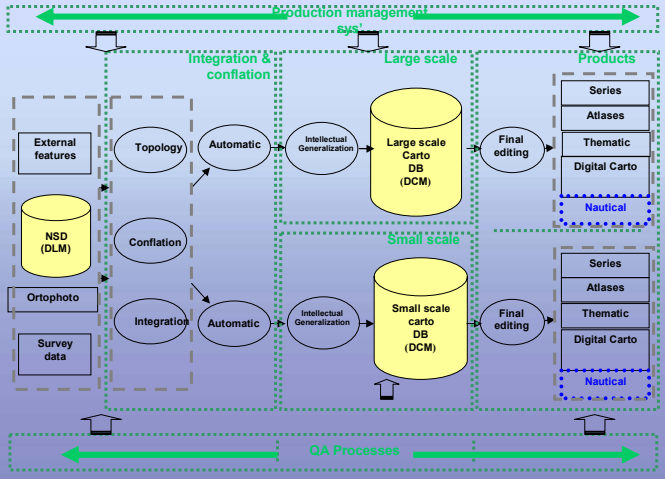
Implementing Innovative Cartography Approaches



The GIS based cartographical generalization process workflow

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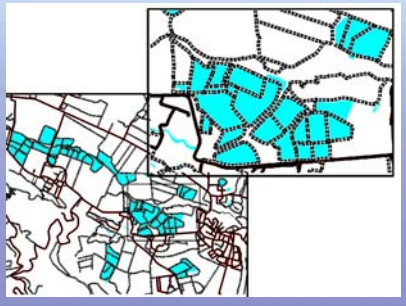
Implementing Innovative Cartography Approaches

Polygonal hydrology post automatic generalization scale 1:50,000



Transportation layer post automatic generalization to 1:50,000 scale

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Caching Mechanism

- The challenge:
  - To efficiently distribute datasets composed of large graphics, such as raster, ortophotos, and aerial imageries.
- The Implementation:
  - The use a caching mechanism.

The caching feature, implemented on top of the geographic data layers, is designed to enable the system immediate enhanced response to data pulling queries.

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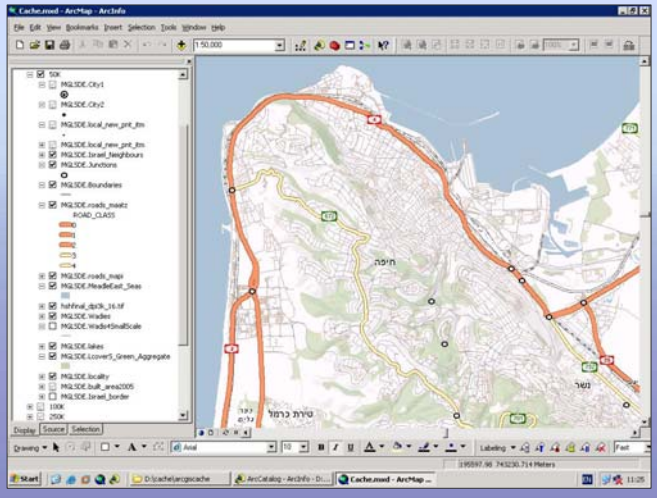
Caching Mechanism



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Caching Mechanism

- The process of preparing the caching includes:
  - Producing background maps based on template MXD's, designed based on the National GIS layers.
  - Utilizing the cartographic generalization process.
  - Integrating the appropriate symbology
  - The maps are automatically transformed to raster format (GIF), where the raster files are then preloaded to the maps portal cache storage.

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Caching Mechanism

- The SOI designs the caching maps for different scales and for various types of layers variations:
  - Eleven group scales: 1:1,000, 1:2,500, 1:5,000, 1:10,000, 1:25,000, 1:50,000, 1:100,000, 1:250,00, 1:300,000, and 1:500,00.
  - five types of caching: orthophoto; orthophoto + Hebrew maps; orthophoto + English maps; Hebrew maps; and English maps.
  - Each map is divided into 256x256 pixel tiles.

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Caching Mechanism

Cache Tiles

256x256 pixel tiles

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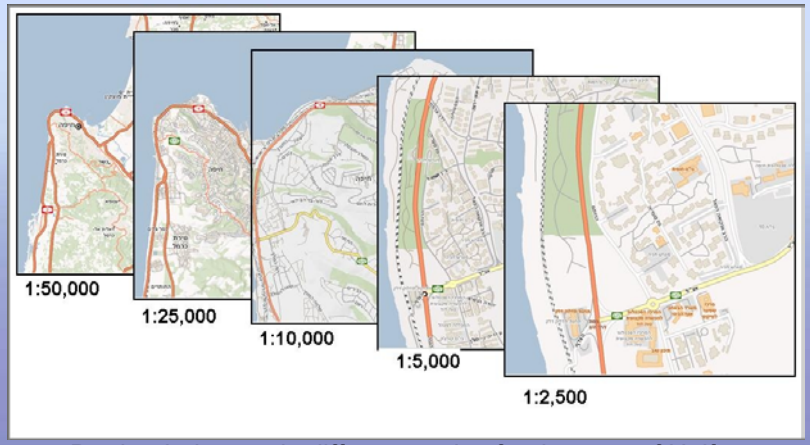
Caching Mechanism



Pre-loaded maps in different scales for the area of Haifa

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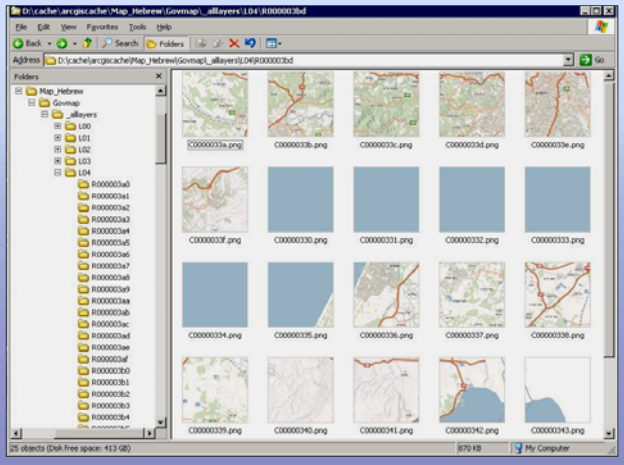
Caching Mechanism

The tiles are stored in a defined storage. 15 million predefined tiles



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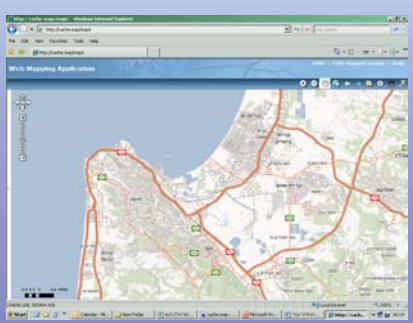
Caching Mechanism

- In order to shorten the response time, the system is pulling the tiles from the storage as a direct response to the end - user panning on the map.
- The vector data is seamless, and are utilized only for spatial analysis.



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- Cartographical generalizations and caching mechanisms are innovative tools to address several of the modern cartographical challenges.
- However, studies indicates that a large proportion of the new web mapping application ignores important cartographic principles.
- Cooperation between stakeholders, cartographers, universities and professional organizations are vital for creating standards for the next generation of cartography.

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Thank You

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