Technological Advancements in Mapping and Tracking Logistical Operations Using GIS and Remote Sensing

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Source www.esri.com

Outline

- Foundations of GIS Technology
- Different Geospatial Integrated Products
- Visualization and Simulation
- Foundations of Remote Sensing Technology
- Importance of Satellite Imagery
- Radio Frequency Identification (RFID)
- Common Operating Picture
- Integrated Location-based Logistical Tracking
- Strengths of Location-based Logistical Tracking
- Trends in Lactation-based Logistical Tracking
- Conclusions

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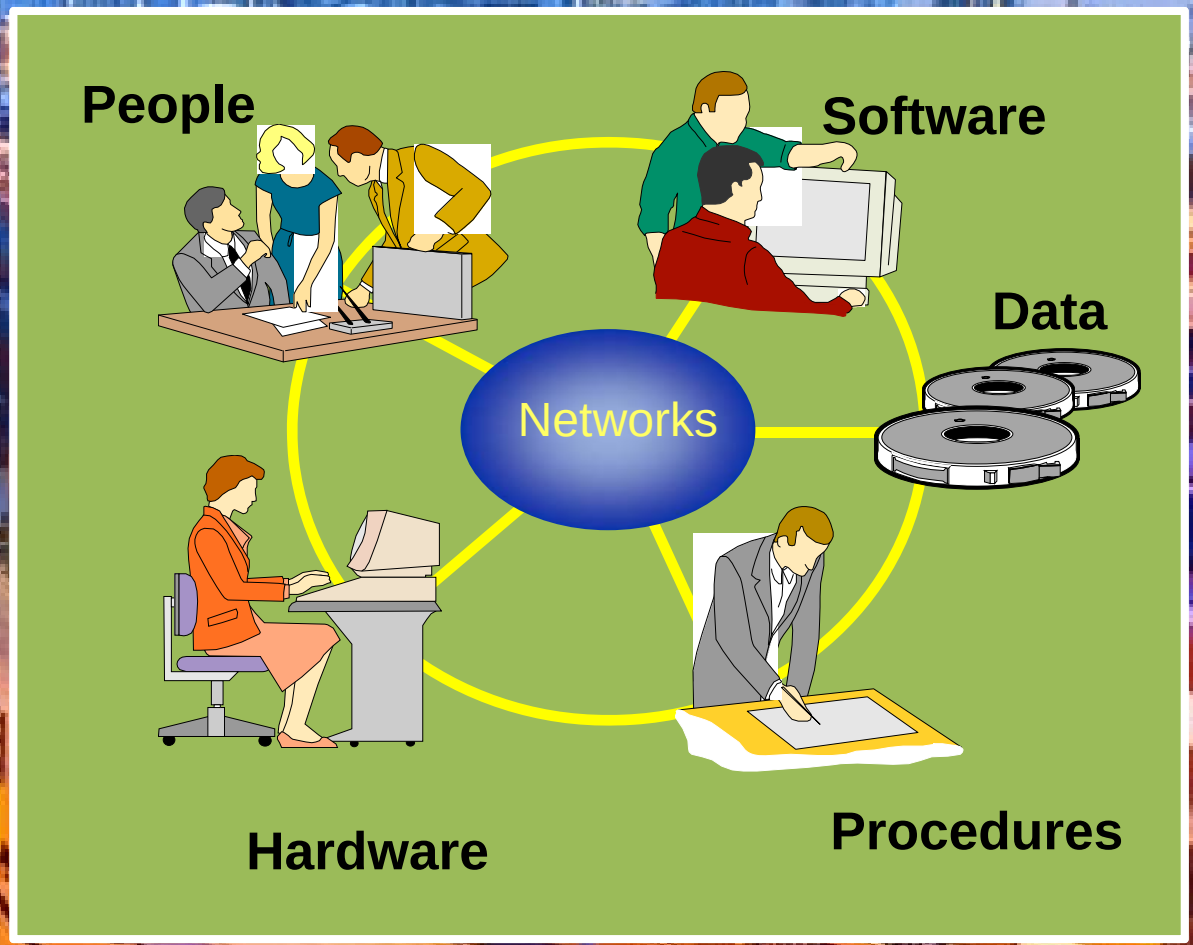
Foundations of GIS Technology



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Different Geospatial Integrated Products

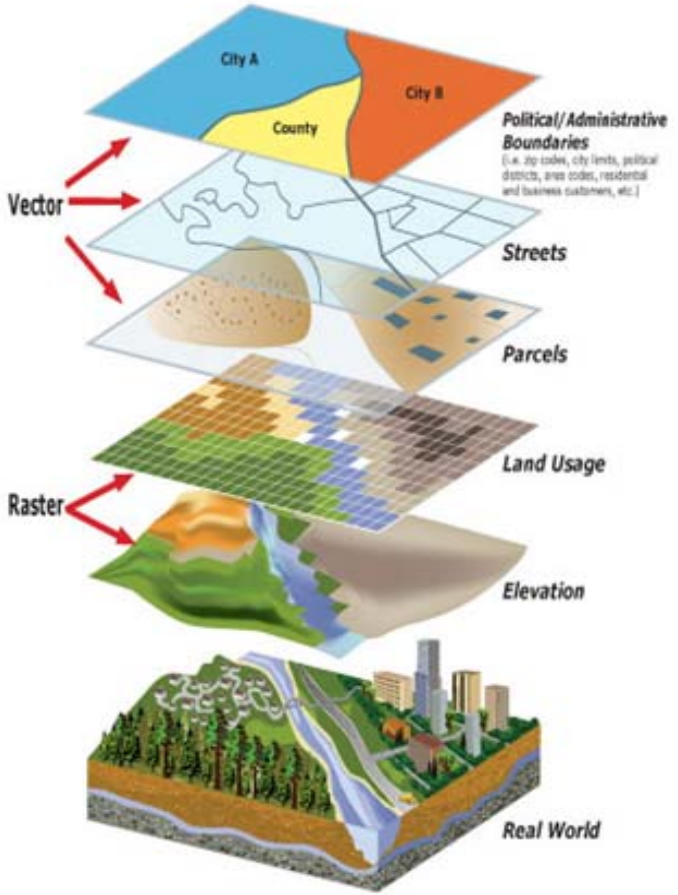

Figure 2: An example of map layers used together in GIS
San Berardino County GIS Dept, 2012. Used for educational purposes only. http://gis.sbcounty.gov/

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Visualization and Simulation

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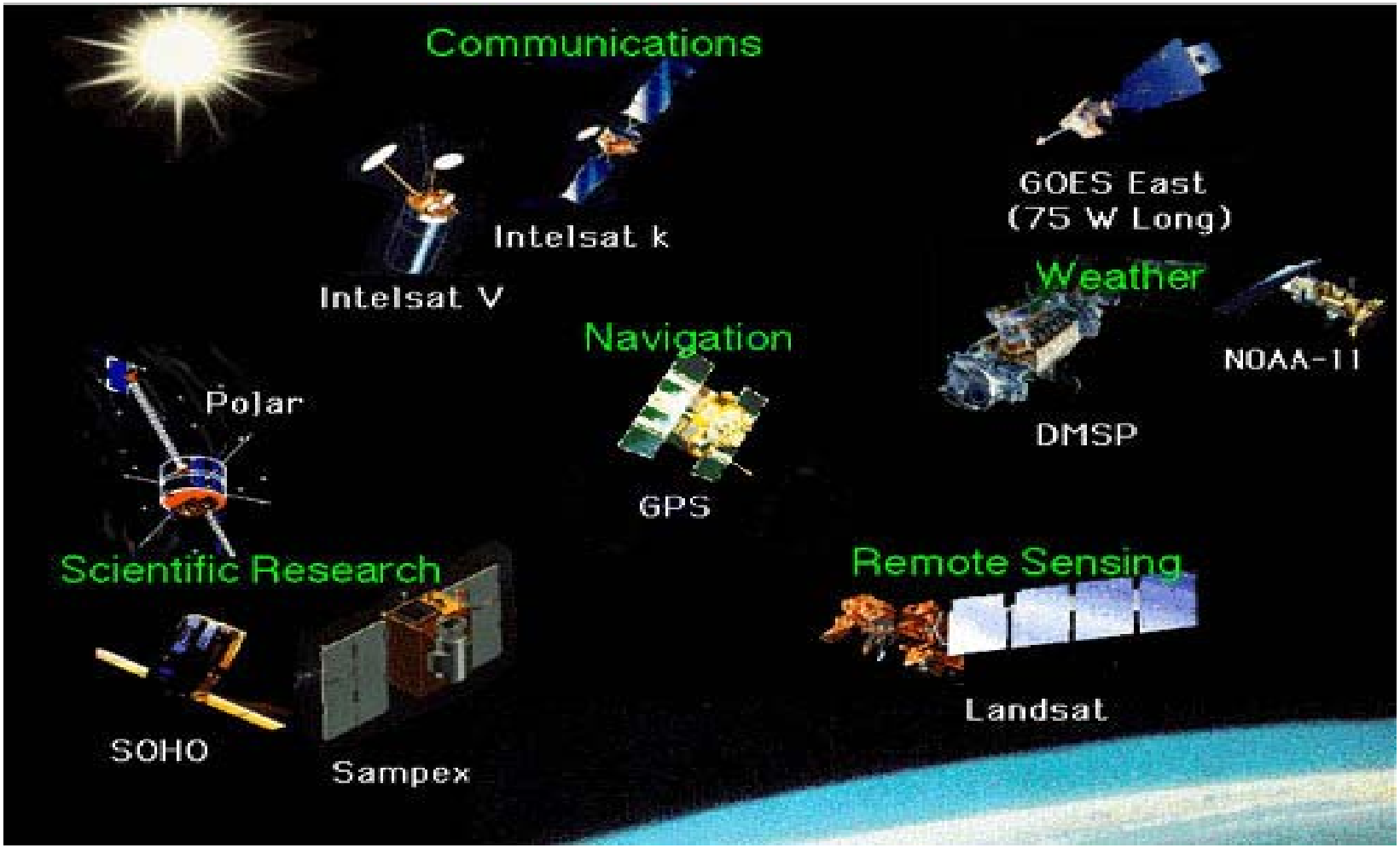
Foundations of Remote Sensing Technology



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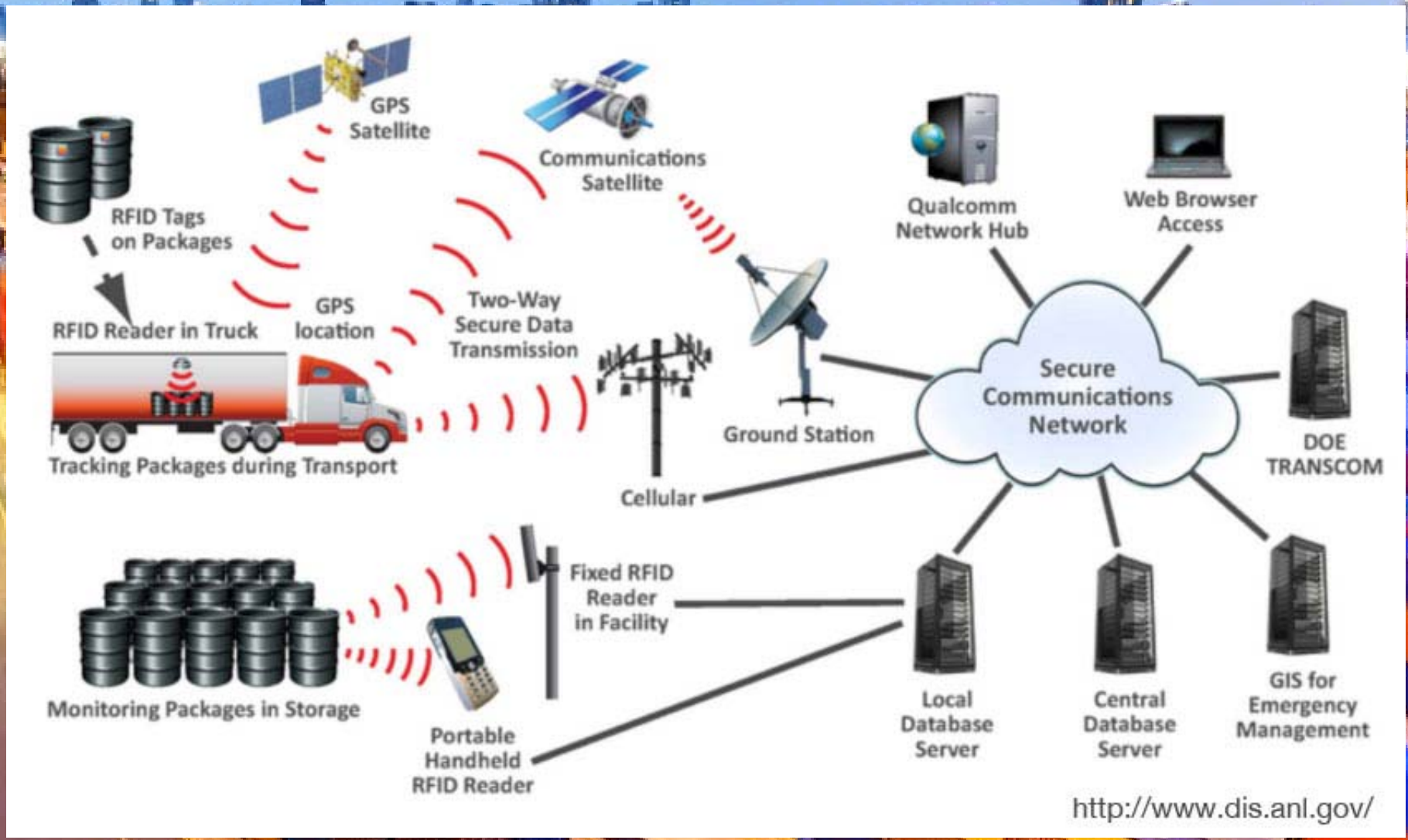
Remote Sensing in Logistics



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Radio Frequency Identification (RFID)

- *RFID* uses electromagnetic fields to automatically identify and track tags attached to objects.
- The tags contain electronically stored information.
- Passive tags collect energy from a nearby RFID reader's interrogating radio waves.
- Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader.
- Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object.
- RFID is one method for Automatic Identification and Data Capture (AIDC).

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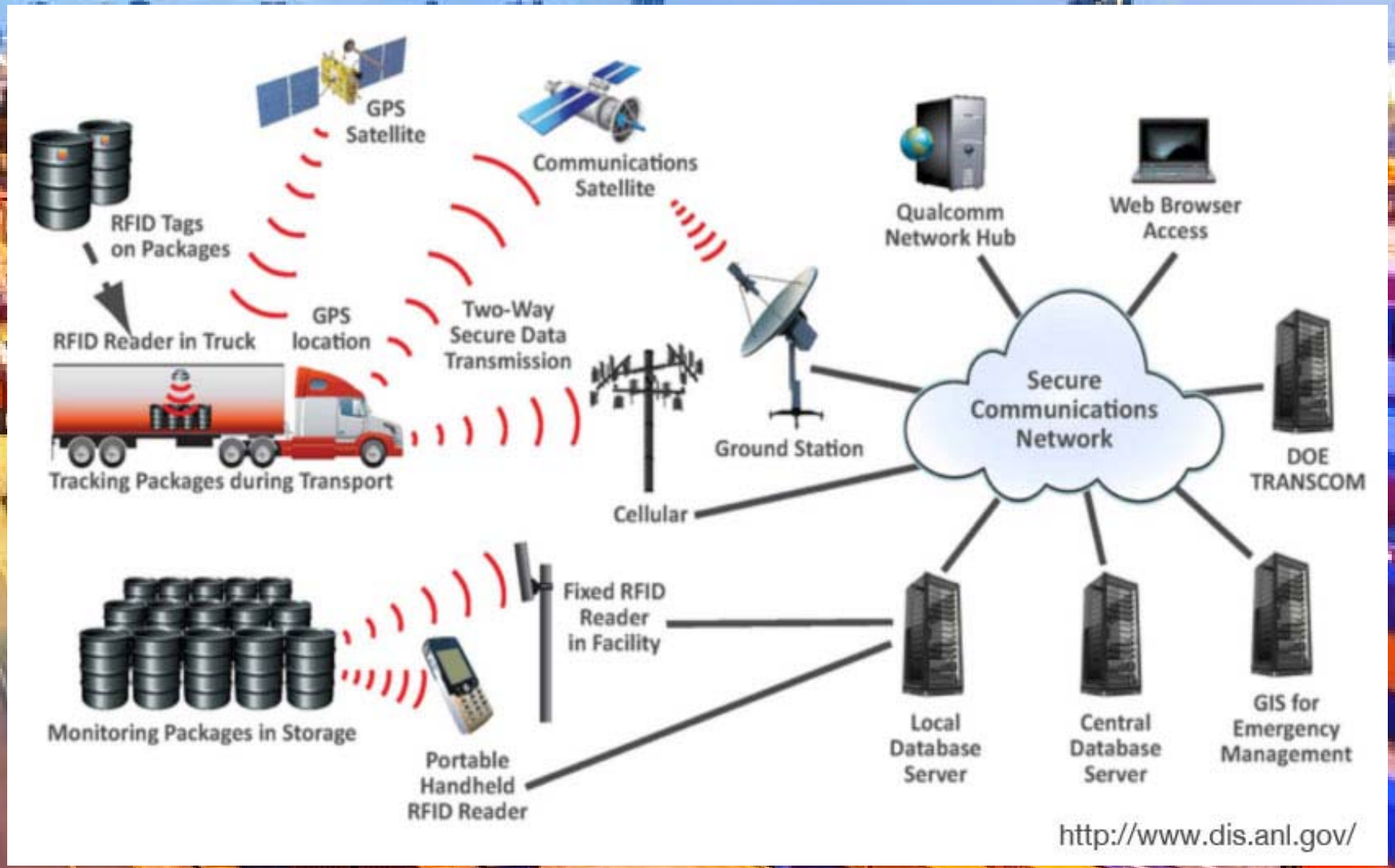
Remote Sensing in Logistics



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Integrated Logistics Tracking

Siemens IT Solutions and Services has conducted a proof-of-technology test on RFID-based equipment that can be utilized to monitor shipping containers while they're at sea.

Source www.esri.

Integrated Logistics Tracking

Table 1 GIS in the value chain. *Source: Hendriks, 1998*

ADMINISTRATION & INFRASTRUCTURE: GIS as a tool for strategic planning; as a spatial decision support tool for asset management HUMAN RESOURCES MANAGEMENT: Flexible workforce management based on project location PRODUCT / TECHNOLOGY DEVELOPMENT: Examination of effects of spatialization in process/product PROCUREMENT: fleet management, supply management				
INBOUND LOGISTICS: optimization of warehouse usage; logistics modelling	SALES & MARKETING: GIS as a market analysis tool; simulation of dispersion of new products; target marketing and advertising	SERVICES: route planning; dealer network maintenance; customer complaints; dispatch; maintenance forecasting	OPERATIONS: enhancing the spatial content of process or product	OUTBOUND LOGISTICS: route planning; fleet management; delivery assessment

Source www.esri.

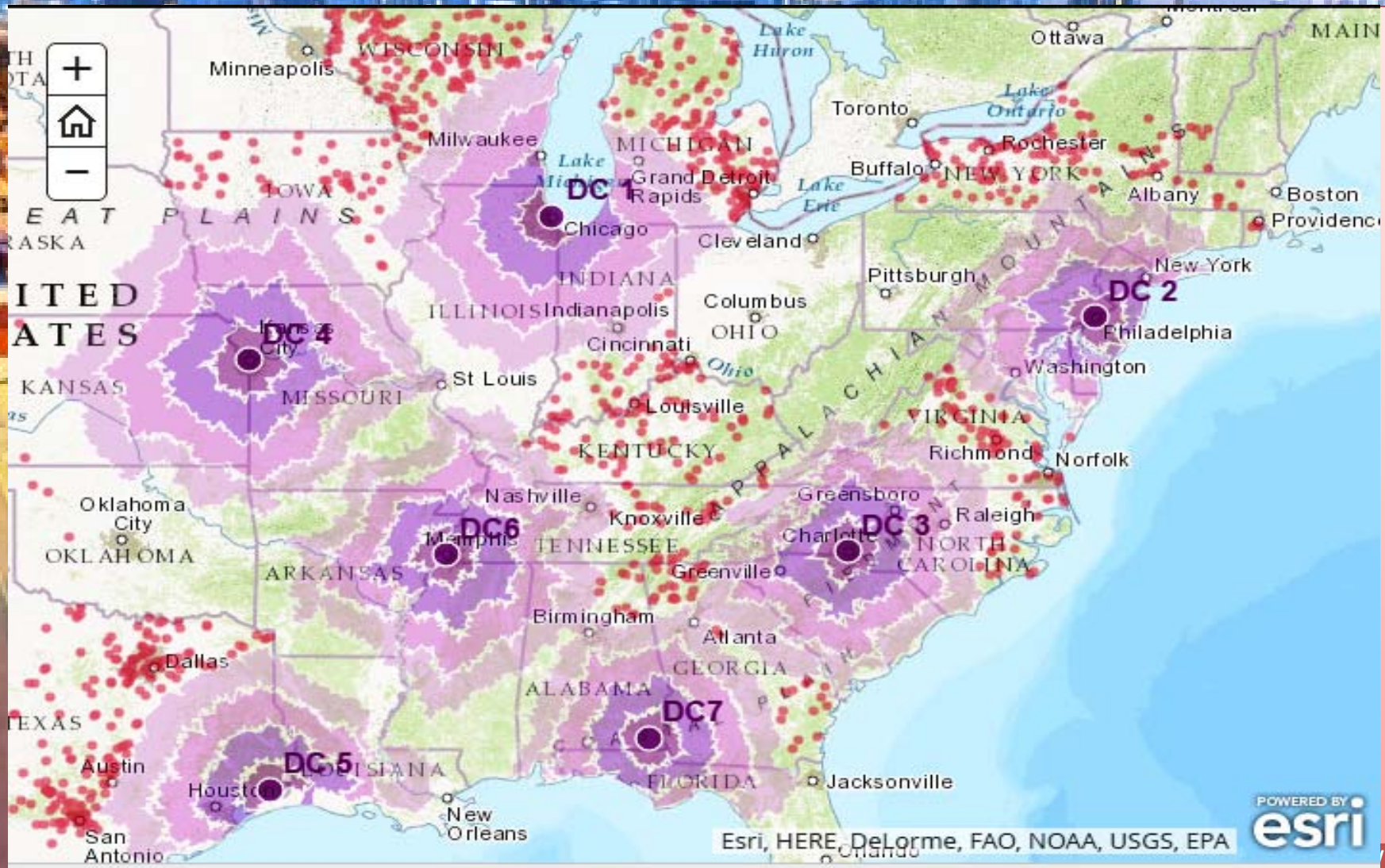
Integrated Logistics Tracking

Table 2 A taxonomy of logistics decisions. *Source: McKinnon 1998*

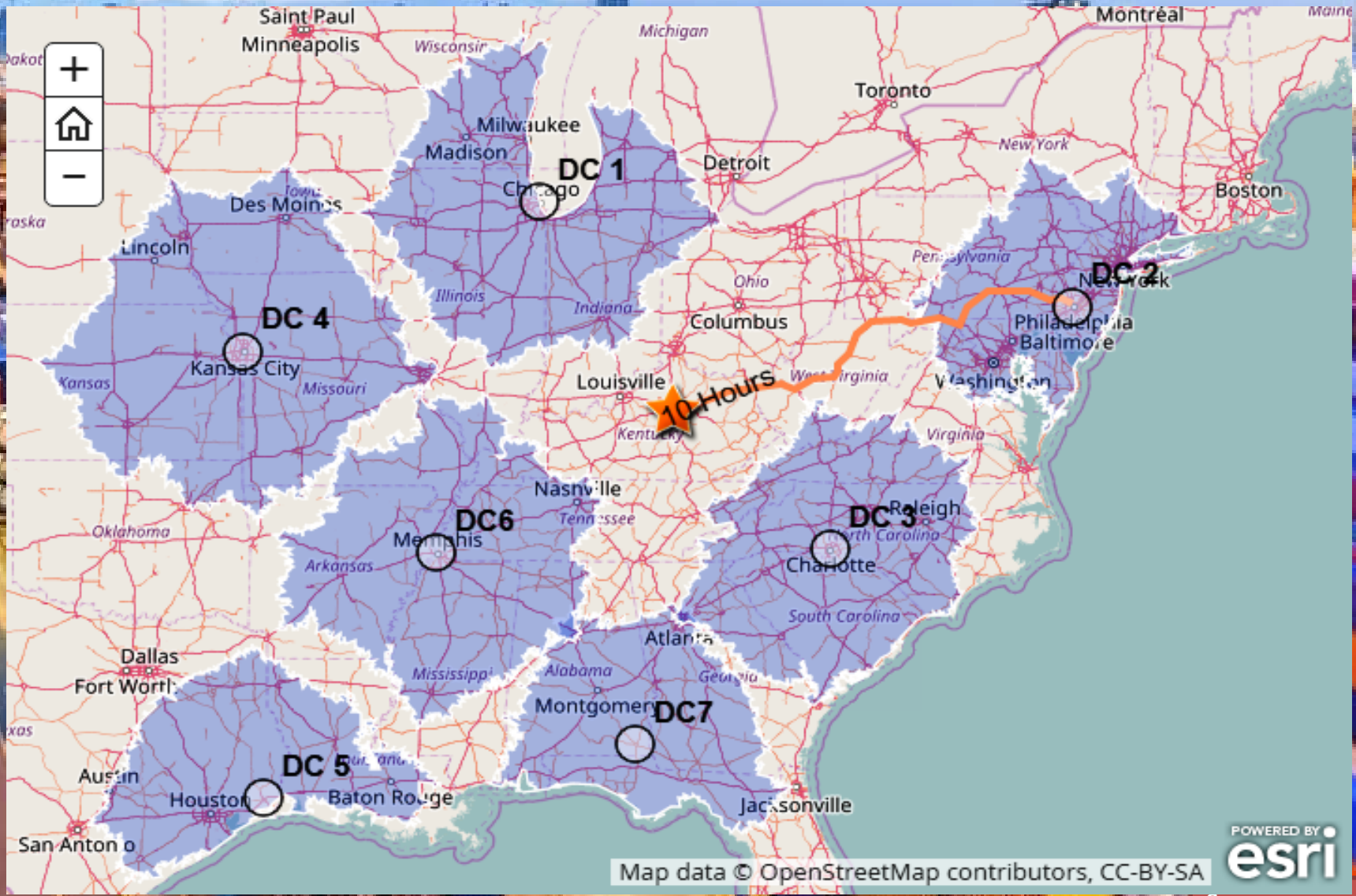
Level	**Description**
Logistics structures	Numbers, locations and capacity of factories, warehouses and terminals
Pattern of trading links	Created by commercial decisions on sourcing, sub-contracting and distribution, and manifest as a freight network linking a company'' premises to those of its trading partners
Scheduling of product flow	The programming of production and distribution operations translate trading into discrete freight flows. Adherence to a just-in-time (JIT) regime, for example, usually requires frequent delivery of small orders
Management of transport resources	Within the framework defined by decisions at the previous three levels, transport managers still have discretion over the use of transport resources.

Source www.esri.

Integrated Logistics Tracking



Integrated Logistics Tracking



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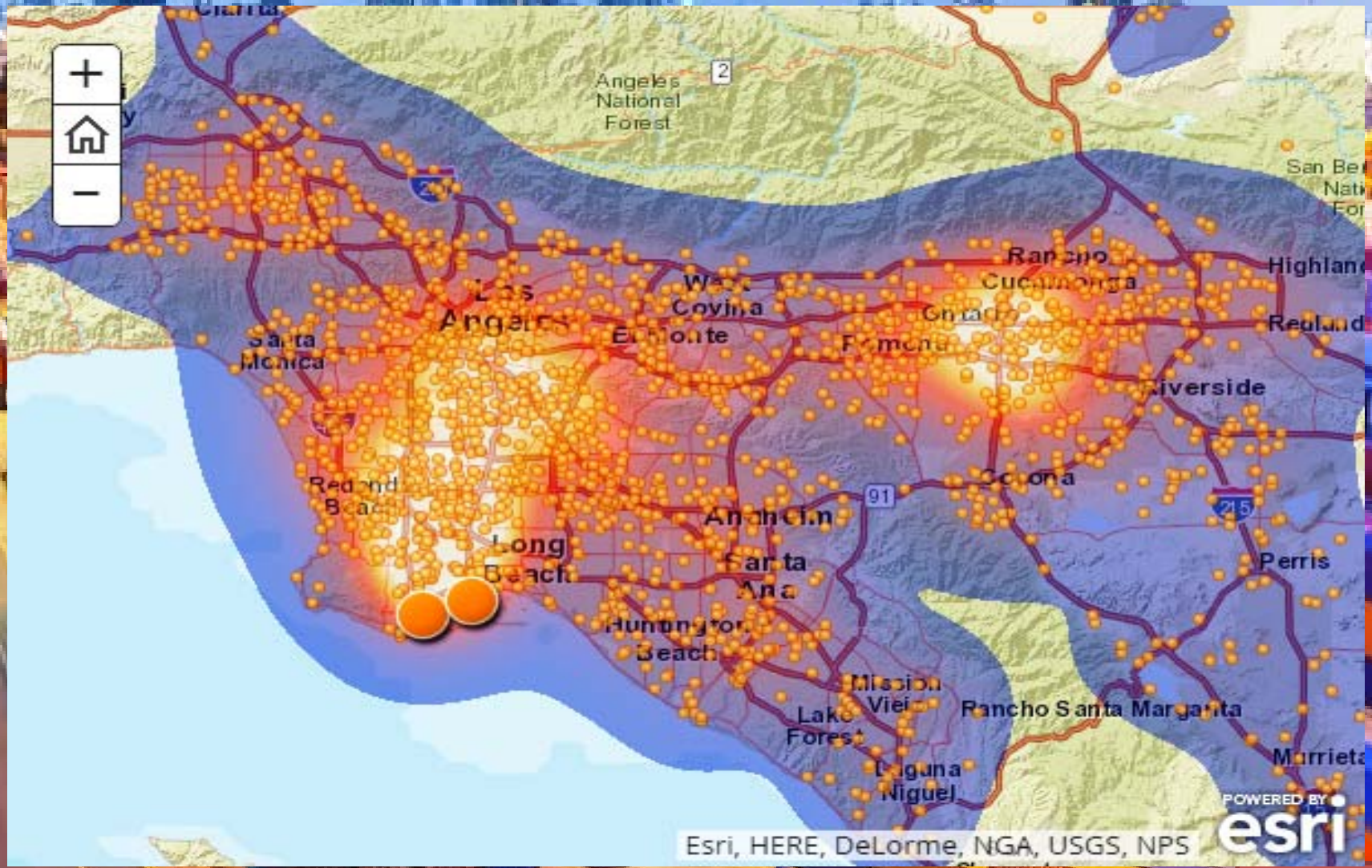

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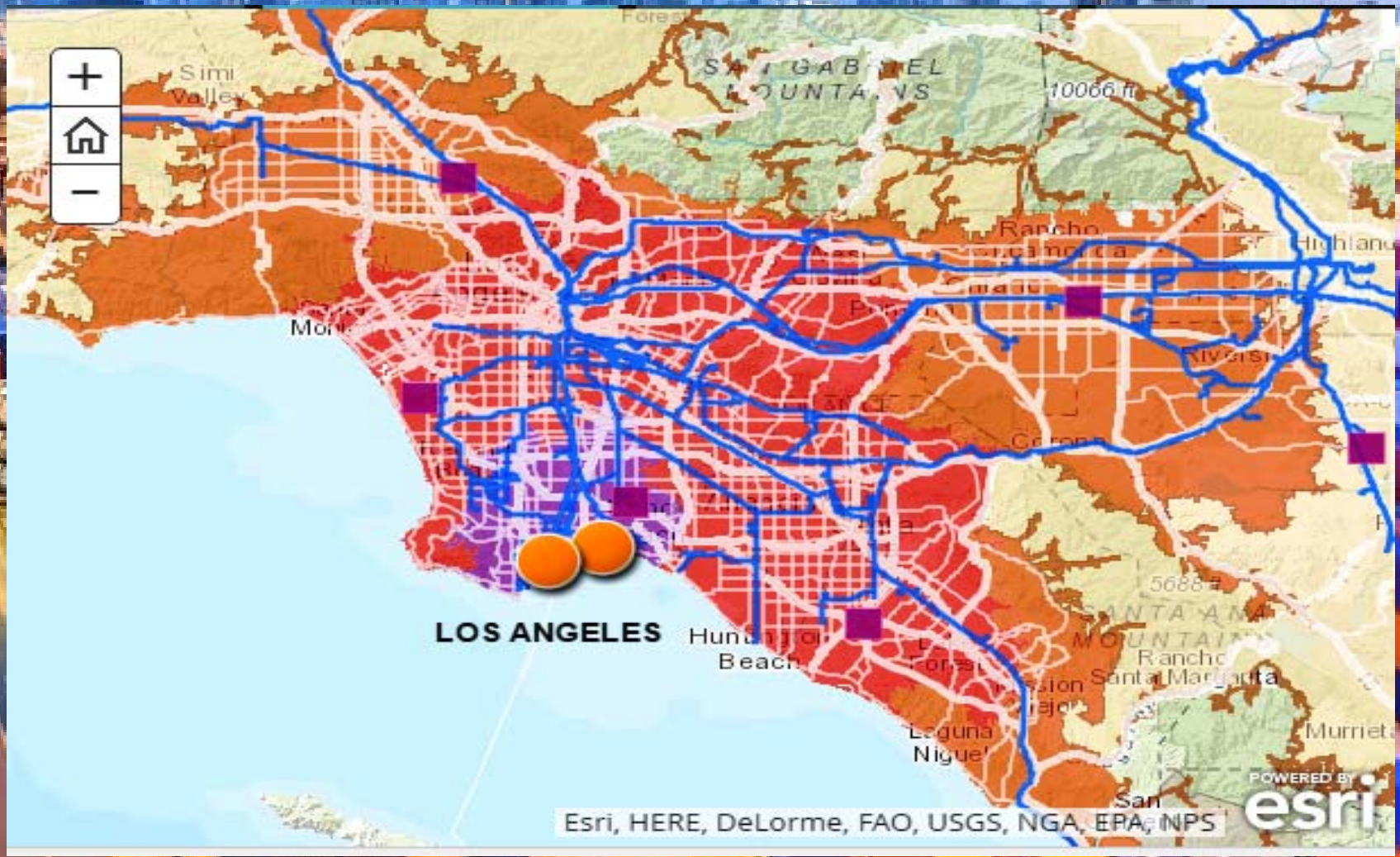

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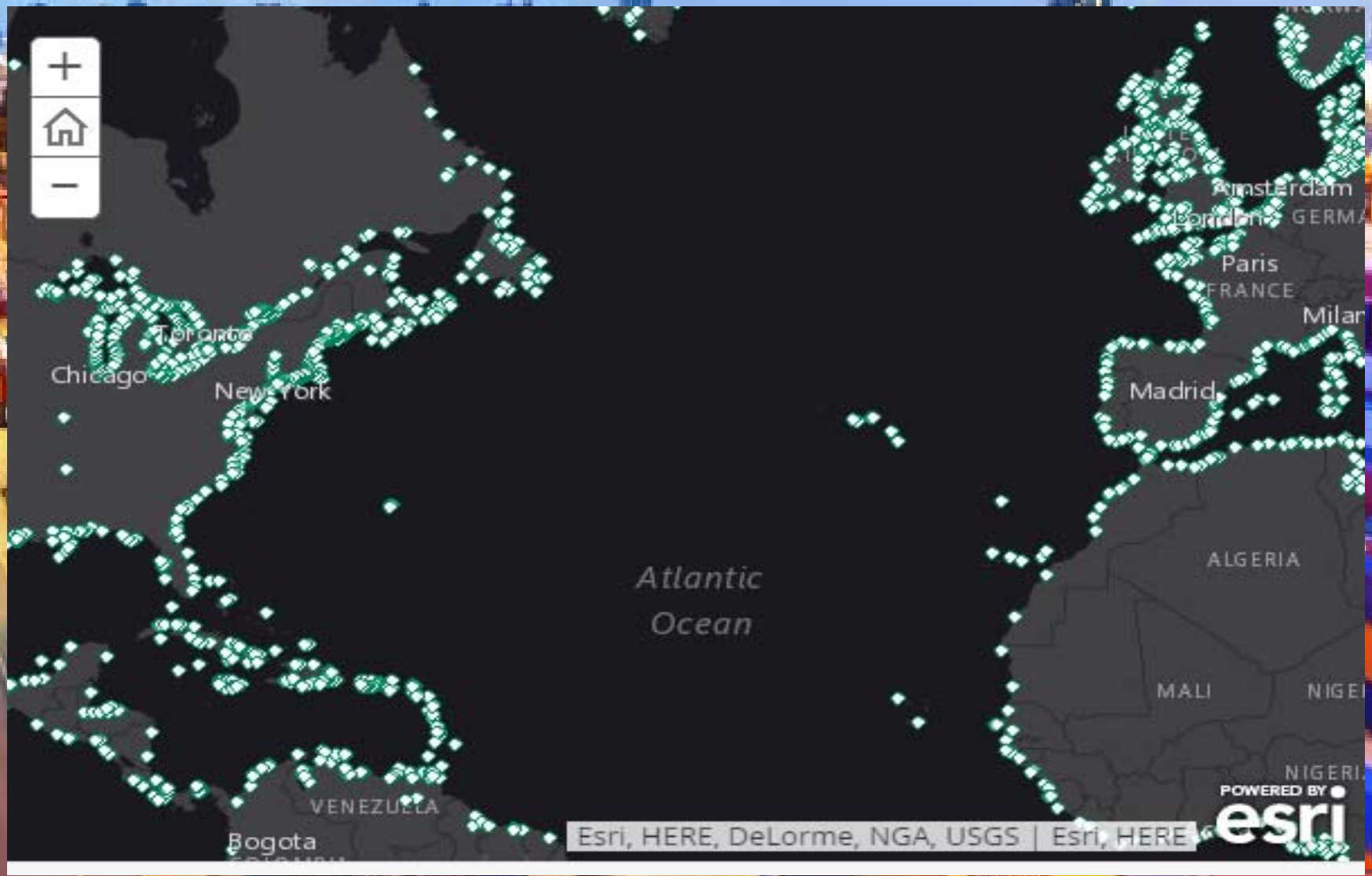

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Integrated Logistics Tracking

Routes can be instantly changed to avoid traffic, severe weather conditions, and other delays.

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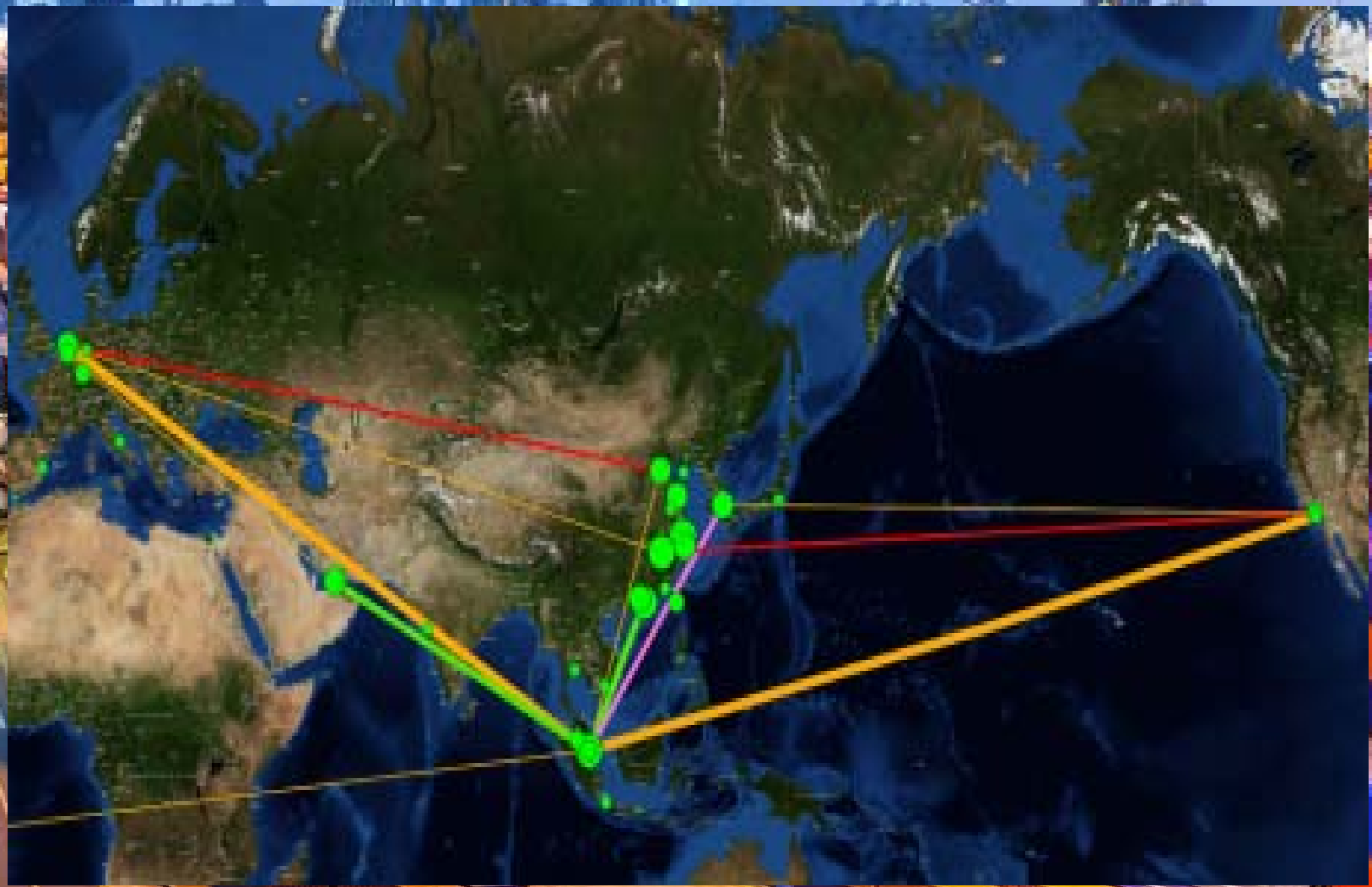
Integrated Logistics Tracking



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Strengths of Location-based Logistical Tracking

- Robust
- Effective
- Easy deployable and easy to use
- High rate of return
- Standardized to far extent
- Accessible worldwide
- Considered to be a major infrastructure in many large corporations.

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Conclusions

- Increasing Use of IoT, RFID, and AIDC
- Increasing Use of Bluetooth Technology
- Increasing Popularity of e-Commerce Solutions
- Identifying Companies That Follow Trends and Provide the Best Shipping Solutions

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Thank you!

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