

ICT for Monitoring Sustainable Development

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ICT for Monitoring Sustainable Development

- Communication Network
- Computing Infrastructure
- Infrastructure to House Computing Resources
- Data Storage and Retrieval Facilities
- Data Analysis Tools
- Data Presentation Tools
- Data Viewing Devices
- Data gathering and collection Techniques

What Can Be Learned From Data Sets?

- Business Intelligence (BI) or Business Analytics (BA)
- Data analytics is an emerging technique that dives into a data set without prior set of hypotheses
- The data derive meaningful trends or intriguing findings that were not previously seen or empirically validated (Leventhal, 2010).
- Data analytics enables quick decisions or help change policies due to trends observed

Data Analytics

- Accumulation of raw data captured from various sources (i.e. discussion boards, emails, exam logs, chat logs in e-learning systems) can be used to identify fruitful patterns and relationships (Bose, 2009)
 - Exploratory visualization – uses exploratory data analytics by capturing relationships that are perhaps unknown or at least less formally formulated
 - Confirmatory visualization - theory-driven

Data Analytics vs. Statistical Analysis

Data Analytics

- 🌐 Utilizes data mining techniques
- 🌐 Identifies inexplicable or novel relationships/trends
- 🌐 Seeks to visualize the data to allow the observation of relationships/trends

Statistical Analysis

- 🌐 Utilizes statistical and/or mathematical techniques
- 🌐 Used based on theoretical foundation
- 🌐 Seeks to identify a significant level to address hypotheses

Why is analytics becoming more important now?

- Much more **operational** data is being created and captured because of the use of technology (structured)
 - Enterprise software
 - ERP (Enterprise Resource Planning)
 - CRM (Customer Relationship Management)
 - SCM (Supply Chain Management)
- Much more **unstructured** data is being captured and stored (social media data)
 - Facebook
 - Twitter
 - Web transactions

Dangers in Analytics

- Privacy
- Security
- Drawing decisions on incomplete data
- Drawing decisions on inaccurate data
- Using only data that supports our gut decisions
- Drawing the wrong conclusion from the data

Analytic Tools

- Data mining
- Statistical analysis, Regression, confidence levels
- Predictive analysis
- Process Modeling
- Optimization
- Simulation

Data Mining Tasks

- Classification [Predictive]
- Clustering [Descriptive]
- Association Rule Discovery [Descriptive]
- Sequential Pattern Discovery [Descriptive]
- Regression [Predictive]
- Deviation Detection [Predictive]
- Collaborative Filter [Predictive]

What it takes to succeed using this technique?

- Your (Top brass) support and commitment and desire to implement findings
- Collecting the right data (historical perspective)
- Developing a Data Warehouse (all data in one place)
- Having tools and staff to analyze the data
- Managers that understand the business & embrace managing by the numbers

Managing using Analytics

- The success of analytics can only be measured in terms of how well they help the firm achieve their strategic objectives
- So a managers role is to:
 - Identify business goals
 - Find the matrices that are correlated with achieving the business goals
 - Collect the data necessary to measure performance towards goals
 - Analyze the data
 - Establish weights for the each matrix element
 - Draw conclusion based on the information generated

The Business Analytics (BA) Field: An Overview

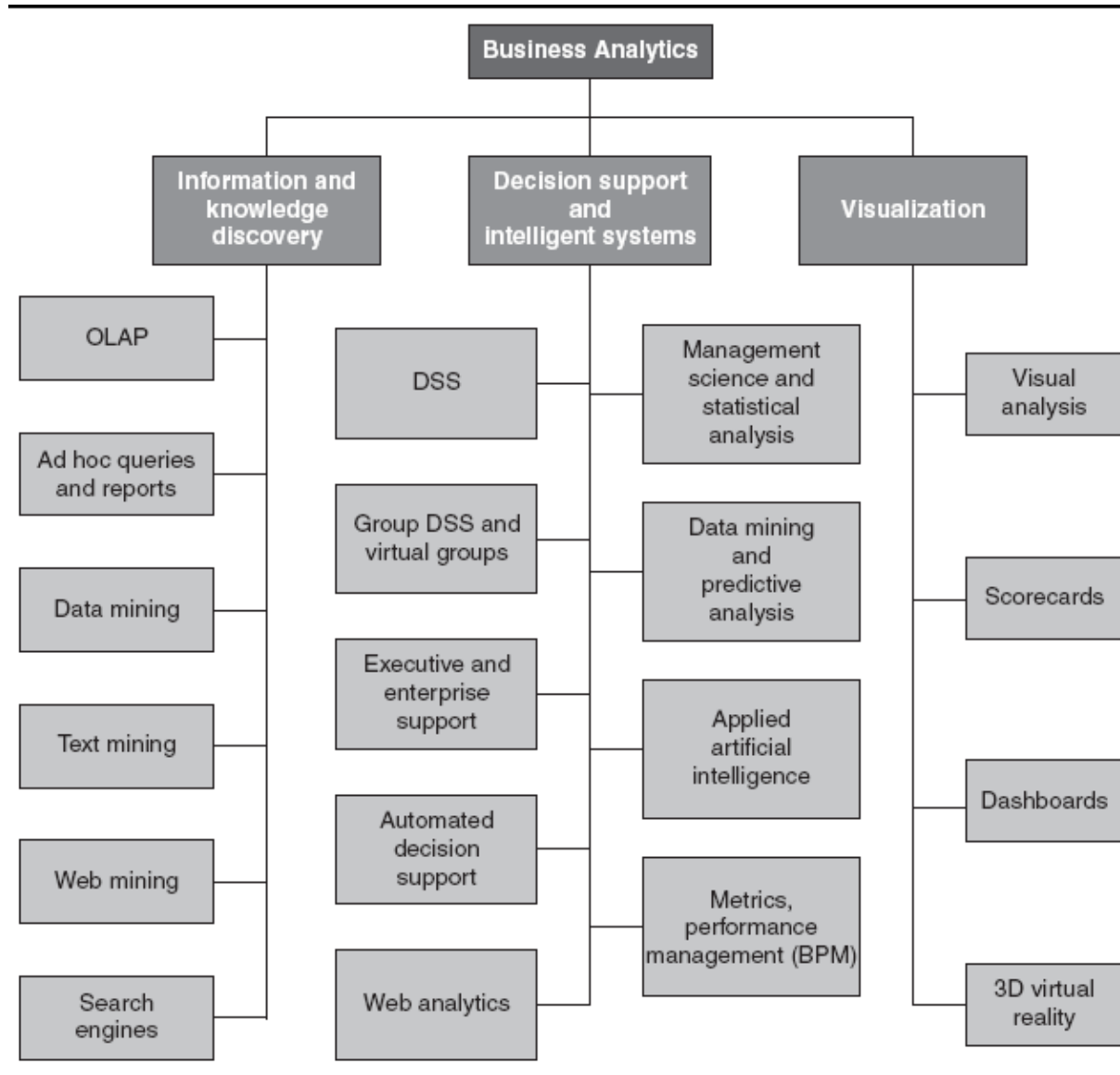


FIGURE 3.1 Categories of Business Analytics

The Business Analytics (BA) Field: An Overview

- **SAP's classification of strategic enterprise management**
 - Three levels of support
 1. Operational
 2. Managerial
 3. Strategic

The Business Analytics (BA) Field: An Overview

- **Executive information and support systems**
 - Executive information systems (EIS)
Provides rapid access to timely and relevant information aiding in monitoring an organization's performance
 - Executive support systems (ESS)
Also provides analysis support, communications, office automation, and intelligence support

The Business Analytics (BA) Field: An Overview

- **Drill-down**

The investigation of information in detail (e.g., finding not only total sales but also sales by region, by product, or by salesperson). Finding the detailed sources

Online Analytical Processing (OLAP)

- **Online analytical processing (OLAP)**

An information system that enables the user, while at a PC, to query the system, conduct an analysis, and so on. The result is generated in seconds

Online Analytical Processing (OLAP)

- **OLAP versus OLTP**
 - OLTP concentrates on processing repetitive transactions in large quantities and conducting simple manipulations
 - OLAP involves examining many data items *complex relationships*
 - OLAP may analyze relationships and look for patterns, trends, and exceptions
 - OLAP is a direct decision support method

Reports and Queries

- **Reports**

- Routine reports
- Ad hoc (or on-demand) reports
- Multilingual support
- Scorecards and dashboards
- Report delivery and alerting
 - Report distribution through any touchpoint
 - Self-subscription as well as administrator-based distribution
 - Delivery on-demand, on-schedule, or on-event
 - Automatic content personalization

Reports and Queries

- **Ad hoc query**

A query that cannot be determined prior to the moment the query is issued

- **Structured Query Language (SQL)**

A data definition and management language for relational databases. SQL front ends most relational DBMS

Multidimensionality

- **Multidimensionality**

The ability to organize, present, and analyze data by several dimensions, such as sales by region, by product, by salesperson, and by time (four dimensions)

- **Multidimensional presentation**

- Dimensions
- Measures
- Time

Multidimensionality

- **Multidimensional database**

A database in which the data are organized specifically to support easy and quick multidimensional analysis

- **Data cube**

A two-dimensional, three-dimensional, or higher-dimensional object in which each dimension of the data represents a measure of interest

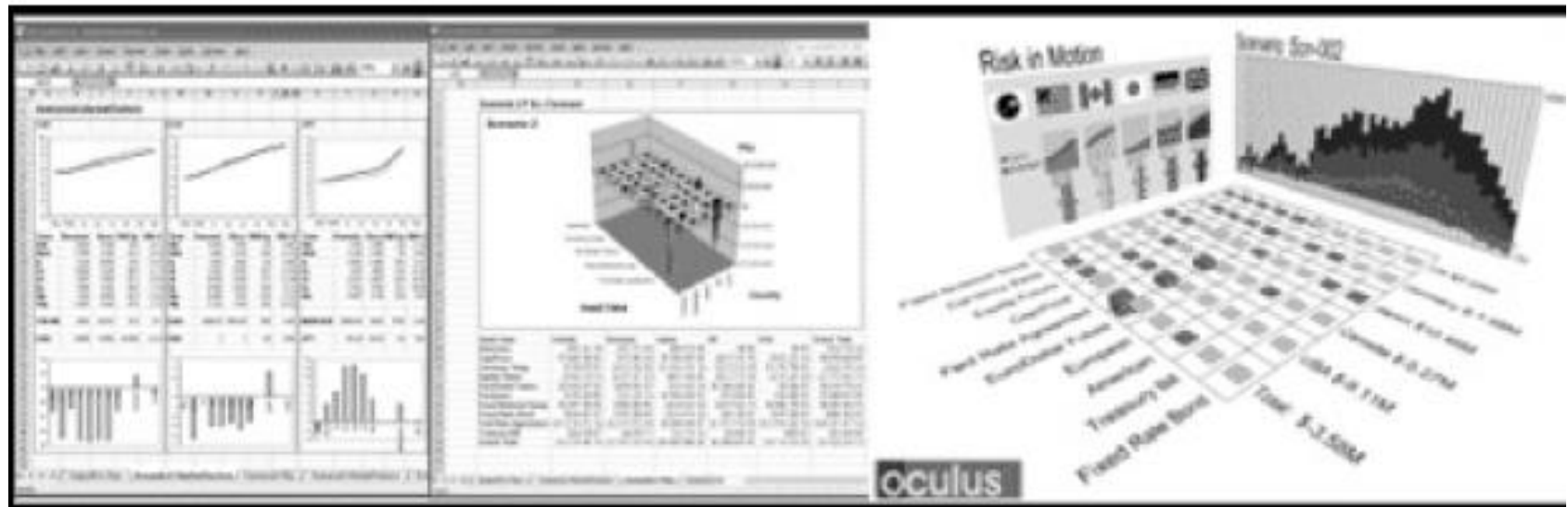
Multidimensionality

- **Cube**

A subset of highly interrelated data that is organized to allow users to combine any attributes in a cube (e.g., stores, products, customers, suppliers) with any metrics in the cube (e.g., sales, profit, units, age) to create various two-dimensional views, or *slices*, that can be displayed on a computer screen

Data Visualization

FIGURE 3.5 Visual Spreadsheet of Risk Analysis



Data Visualization

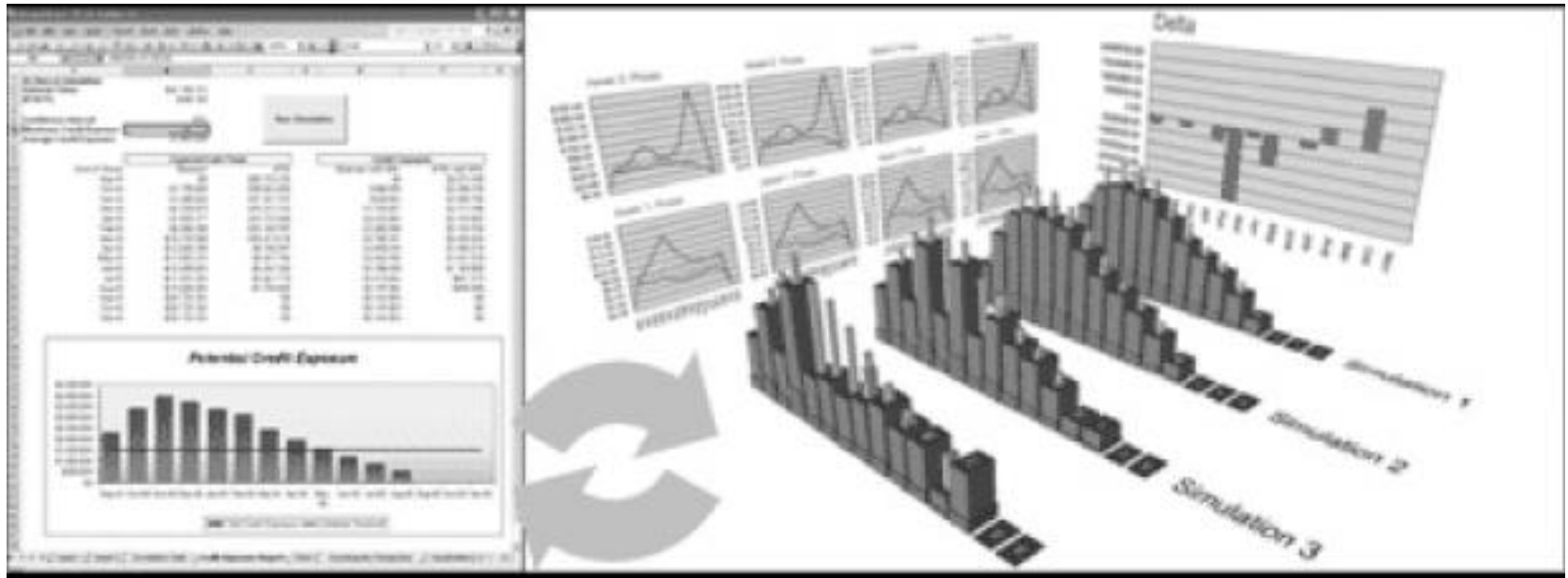


FIGURE 3.6 Visual Spreadsheet of Credit Modeling

Geographic Information Systems (GIS)

- **GIS and decision making**
 - GIS applications are used to improve decision making in the public and private sectors including:
 - Dispatch of emergency vehicles
 - Transit management
 - Facility site selection
 - Drought risk management
 - Wildlife management
 - Local governments use GIS applications for used mapping and other decision-making applications

Geographic Information Systems (GIS)

- **GIS combined with GPS**

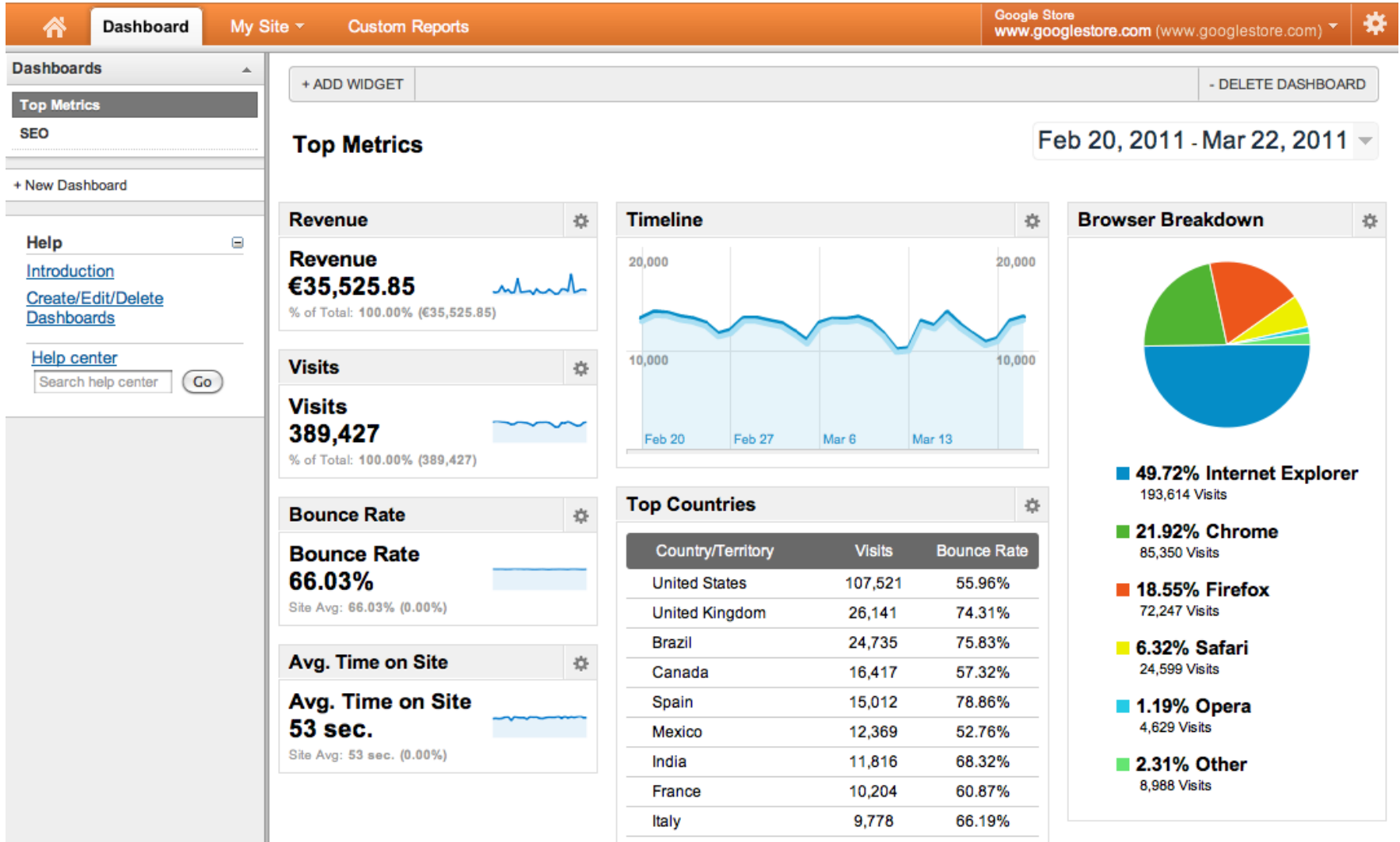
- **Global positioning systems (GPS)**

- Wireless devices that use satellites to enable users to detect the position on earth of items (e.g., cars or people) the devices are attached to, with reasonable precision

Geographic Information Systems (GIS)

- **GIS and the Internet/intranets**
 - Most major GIS software vendors provide Web access that hooks directly to their software
 - GIS can help the manager of a retail operation determine where to locate retail outlets
 - Some firms are deploying GIS on the Internet for internal use or for use by their customers (locate the closest store location)
 - http://www.360networks.com/includes/popups/rate_center_map/map.asp

Dashboard

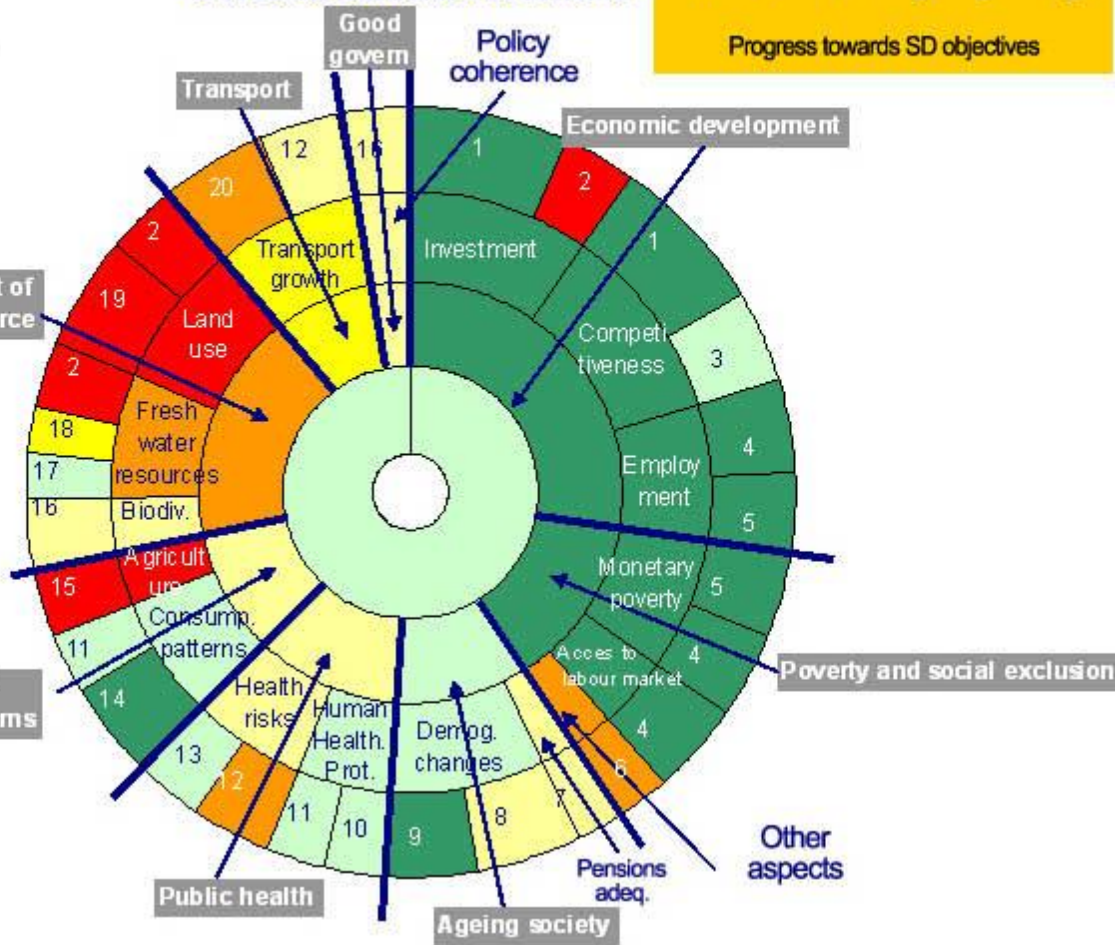
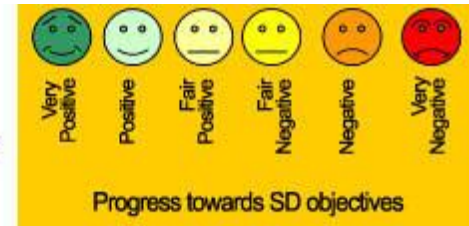


Sustainable Development Dashboard

Indicators

1. Number of starting companies
2. Agricultural land prices
3. Level of education of working population
4. Number of vacancies in limburg
5. Unemployment rate
6. Number of youth who are member of traditional community clubs
7. Spendable income of pensioners
8. Number of 20-30 year olds who move out of the province
9. House supply in limburg
10. Waiting lists in health care
11. Households with a low income
12. Weight of (road) transported goods in kilo tonnes
13. Investment per sector
14. Composition of the population
15. Land use in limburg
16. Biodiversity among birds
17. Implementation of measures for meeting the high water targets
18. (semi) built up areas
19. Area used
20. Traffic intensity

Limburg SD index By "Relevance" Based on Eurostat SDI scheme



User Interfaces

- Desktop web browsers
- Mobile Smart Phone / Tablet Apps
- SMS updates and Alerts
- Voice alerts and Information

Computing Infrastructure

- Data Centre to host data centrally
- Robust State-wide Network
- User interaction Devices
- Data Aggregation from different Applications

THANK YOU