The 3 Cores of Location Intelligence

Management Summary
Location Intelligence is known as the use of spatial reference for the improvement of Data Visualization, Analysis, and Event Forecast. Through the connection of alphanumeric and spatial data an additional and intuitive view is created, which makes it possible to recognize spatial patterns, trends and potentials. Through the consideration of spatial conditions, Location Intelligence creates an optimized entrepreneurial decision-making base in Business Intelligence Solutions, and an improved customer interaction, as well as integrating a higher process quality in business processes in CRM Solutions.

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1. Content

Business Intelligence Solutions (BI) and Customer Relationship Management (CRM) have for a long time belonged to the important vital functions of modern businesses and organizations. The goal of BI Solutions is to get an insight into structures, tendencies and potentials that should enable to take better decisions, through intelligent evaluation of business relevant data. The not so commonly used today but still very striking DSS (Decision Support System) implies that with the help of data knowledge, and application of this knowledge, one can make sound business-relevant decisions.

In contrast, Customer Relationship Management, or abbreviated CRM, Solutions have an operative character most of the time. Ideally they support the consistent orientation of a business to its customers and the systematic shaping of Customer Relationship processes. This is accompanied by a systematic and unified documentation for the B2C processes, which as structured data in turn build the base for customer-centered Data Warehouse (DWH). Idealized, this cycle is in a learning organization referred to as “closed loop”. CRM applications and the data generated in turn through customer interaction keep BI solution actual and condition their prediction quality.

Parallel with that, Geo Information Systems (GIS), and Geo Marketing-Solutions have likewise created themselves, particularly in the last 15 years, a place, although somewhat smaller, in companies and organizations in the domain of visualizing, analysis and prediction through intelligent processing of spatial data. One can usually find such Geo-Solutions in expert departments specifically created for this purpose. Insights from spatial information systems are usually valued by a smaller circle of users. Location Intelligence builds a bridge between the alphanumeric and the spatial applications, and thereby provides the users with holistic information and a process tool.

In the era of Big Data, Location Intelligence is gaining even more importance. The mobile Internet brings a convergence of information, time and space. The use of smartphones and Social Media creates and constantly demands new information, not only in a timely context but also increasingly in a timely spatial context. WHERE someone is located at a certain moment becomes from the offering point of view more and more interesting. A big German telecommunications provider is thus advertising a new service, which is sending targeted discount offers to customers that are located in the vicinity of a Point of Sale (PoS). The art in analyzing data and in the operative control lies in how to filter the relevant information. In the times of increasing mobility with simultaneously increasing requirements of relevant information the spatial reference is becoming increasingly more important. With this explicit gain in importance the principles of Data Governance and the so called “Permission Marketing” – information and interactions with the customer must be requested for and expected.

2. The 3 cores of Location Intelligence

If one is searching the Internet for notions such as Location Intelligence (hereinafter called “LI”), Location Analytics, Geo BI or other catchwords, one will find a variety of interpretations and definitions. However, there is no clear representation of the necessary elements that determine Location Intelligence. In principle it is possible to describe in a closed loop with the 3 memorable words LOCALIZE-ANALYZE-ACT; WHAT one wishes to reach with LI. However, the question remains of HOW one can usefully establish LI in a company. Basically there are 3 cores to differentiate:
2.1 Location Discovery (Data Warehouse “Tuning”):

Ideally in B2C companies an integrated information source (Data Warehouse, hereinafter called “DWH”) exists in which relevant data from different sources for the corporate management are brought together in a uniform format. If it is a customer centered DWH, i.e. a dataset which describes processes between businesses and customers, then data or key performance indicators like turnover, customer profitability, customer rankings, site performance, sales, sales performance and customer satisfaction will usually be stored within it.

Traditional BI solutions give simplified answers to the questions “Who, What and How much”. The question of “Where” is however often neither asked nor answered. Yet the “Where” controls often the “When, Who and How much” and then makes possible an objective assessment where all important factors including the special reference are taken into account.

If one looks more attentively at a customer centered DWH, one discovers that spatial data is already available, such customer addresses, branch locations, sales areas, marketing target areas, risk areas, supply relationships, routes and competitive structures for example. Due to inadequate technology, however, the visualizing and analysis in traditional BI solutions are not available.

Location Discovery begins the so-called **Geocoding**. Every object with space reference will have one or more geo coordinate pairs (x/y) assigned in the database and will thus be made available on a geographic map for the subsequent spatial representations and analyses. This event takes place in the DWH every time a spatial data changes or a new one is added. Once the WHERE is known, once something is located, it is possible through simple intersection of spatial information for every point, every line or surface to inherit attributes (like product-related purchasing power, product affinities, socio-demographic indicators, risk class, area affiliations, etc.). This process is well described and identified as “Data Refining”.

The value and ROI of a dataset in a customer centered DWH is thereby significantly increased. The DWH turns from “single point of truth” to “single point of business value”. Location Intelligence begins therefore at the Back End of the data and not at the Front End.
2.2 Location Analytics

If the data in the DWH are spatially available through the process of Geocoding (and optionally Data Refining), this then lays the foundation for further steps. The goal is to expand the existing BI solutions with the spatial reference in such a way that implies no costly custom programming. Modern LI Solutions integrate seamlessly into existent BI applications and undertake thus the already established BI architecture, data structure, data management processes (ETL), authorization concepts and work methods. LI Solutions do not deliver any “new system” but a logical extension of the present BI (or DSS) solutions. In this manner the BI user receives a broader spatial view and new spatial visualization and analysis option. The BI solution is improved and thus the outcome quality is increased. Here again the “Tuning approach” is noticeable. Location Analytics are in turn also divided into 3 areas:

Visualizing (Mapping):

The first “Insight gain” on the user’s end is already set at a simple representation of a map. A users’ map (distribution) or a colorful representation of the customers by turnaround gives the user a view on his/her data, which until now, with the conventional viewing, was not available.

Fig 3 – below the traditional representation with tables and charts, and above the corresponding map
The map is interactive, i.e. the user can pan, zoom, select, and additionally, the map is bi-directionally joined with the BI report. That means that he/she can henceforth process his/her reports not only in the usual alphanumeric way, but can also spatially search and interpret reports. Report and map build an information unit. The pure visualization through the map is often described as “another representational form of known facts” and is in my opinion often underestimated. Just as a movie is more than a “visualized radio play” a map is more than a “visualized report”. On the map spatial disparities, templates, trends or potentials are discovered which in a diagram or a cross table remain concealed. Furthermore a map has a far better “information ergonomy” and provides the user with an intuitive view on his/hers data and processes.

Analysis

The spatial analysis goes beyond mere visualization. From the domain of geo-informatics comes the notion Layer. This means that one can superimpose various levels with different information that enables new insights and answers. The 3 spatial layers Customers, Locations and Product specific purchasing power can clarify, for example, why in Sales area A, in spite of a higher number of customers and a higher number of branches, there is a smaller turnaround and/or profit generated than in Sales area B which has a higher product specific purchase power. Of course, this information can also be represented as alphanumeric values in the conventional manner; however the spatial relationship is not clear.

If one takes additionally another layer with competition sites, or one discovers that their own locations are so close one to another that the catch areas are strongly intersecting each other and a cannibalization effect is present, then more answers to performance differences are possible.

The LI concept plays a very important function in the analytical aspect because in this context the entire BI and DSS process can be tremendously improved. Also, with the improvement of the analytical performance in the BI domain a higher number of users can be reached.

Fig 4 – Layer concept and through LI new analysis functions
Forecast

The “Visualization – Analysis – Forecast” series are of the most importance in Forecasts. Forecasts or “predictive models” in spatial context postulates that certain events do not occur randomly. The spatial context often characterizes the Type, the Extent, and the Frequency of Events. The knowledge and the influence of spatial factors is an important building block in the application of “predictive models” and the consideration of such influences leads to more transparency (what occurs where?) and also gives the user the possibility to make better forecasts. Such spatial factors can be socio-demographic parameter, topographic conditions or other environmental or socio-cultural spatial disparities. At the same time both deductive (simplified: it includes individual cases to general events) and inductive methods (simplified: it includes general cases to individual events) are applied. Much attention is given to the issue of “Geospatial predictive models” in the domain of police applications in order to attain better results in the prevention of offenses.

Deductive models in this domain describe the relation between an event and factors that describe the spatial environment variables to this event; e.g. car break-ins occur more frequently at a distance of 2-3 km from a highway connection or assaults occur more frequently within a district with a specific socio-demographic structure.

Modern LI solutions also work with “Time Sliders” which enable the user to identify incidents in a time/special context (WHERE were committed WHEN WHICH offences?). First experiences with predictive models in the fight against crime in the USA show that significant successes can be achieved in the avoidance of crimes. Today’s steadily increasing computer capacity can also particularly calculate inductive models quickly and accurately. LI solutions let themselves integrate both in traditional BI applications as well as in Data Mining or predictive models.

2.3 Location Optimization

Location Intelligence can be applied on analytic, dispositive issues and can also be embedded operatively in real time in business processes.
Examples for operative Location Intelligence can be found in Customer Relationship Management (Closing, Cross/Up Selling, Customer connection to Call Centers), in trades such as insurance (Claims management, Risk management) and transport (breakdown and rescue services as well as tracking and real-time route management).

Another example for Location Optimization embedded in CRM solutions can be found in LI optimized routing to customers/new customers on the basis of self-entered parameters, or when a member of staff can be made aware of potential customers exactly when he/she finds himself/herself in the vicinity thereof (Geofencing as basis). If a business knows its “Ideal customer profile” and can describe it (Purchase power, age, area, etc.) then it is possible to transmit such profiles spatially and thus obtain the regions with a high share of potential and desirable new customers. Some time ago I have coined the term “Geo on Demand”, which describes that individual spatial functions (Geocoding, Routing, Mapping) are integrated in a business process exactly when they are needed. This is how an insurance company could, during the recording of personal data in the business process of an insured, run a “Plausibility check”, which verifies if the entry “Single garage available” by the address of the insured is plausible or not. – it is enough to simply run the Geocoding in the background and a manual check through the internal services. If the Geocoding produces a result “densified downtown area” then further inquiries could be worth asking, while the result “Status-high single-family area” can prove the availability of a single garage plausible.

The following illustration gives an overview over the building block of Location Intelligence.

![Fig 6 - The 3 cores of Location Intelligence in overview](image-url)
3. Location Intelligence examples from practice

Example Outdoor Advertising (Location Analytics):

The customer has a BI solution from the provider Qlikview in use. The generated reports illustrate the capacity utilization, the renting time and turnover of the whole poster and outdoor advertising locations. With the integration our LI solution we will pursue the following goals:

- Show spatial representation of the capacity utilization situations of the poster sites (Hot Spots)
- Identify attractive sites through taking into consideration of frequency data (Communication)
- Support in the sales process through individual calculation of the available poster sites in a dedicated service area ("Show me all available poster sites that are within 5 minutes’ drive time from my market").

![West coast view](image)

**Fig 7 – The blue area shows the 5 minutes drive time service area from the sale location. The points within are outdoor advertizing locations.**

Example Pharmaceutical/Healthcare (Location Optimization):

A global player from the pharmaceutical trade (120.000 workers in 140 countries) required the integration of socio-demographic data for sales optimization. The target groups were ophthalmologists in private practices and hospitals, who practice in areas with an above average patient potential of a defined age group. This information is directly integrated in the CRM System and thus supports the field workers with regard to a targeted visit and sales planning.
Example Commerce (Location Discovery):

A leading European retail group equipped its sales team with mobile terminals and a mobile BI solution (MicroStrategy). The task was to geocode the existing customers, and also to geocode potential new customers from the same target group segment (e.g. restaurants and bars), which are in the direct vicinity of the existing customers, in order to promote synergy in the field: “next best customer – next best visit”.

Example oil and gas companies (Location Analytics):

The customer needed a combination of existing BI reports and data from the domain’s finance controlling, exploration planning, and workforce management with spatial data like proximity to the existing pipelines, infrastructure, exploration areas, and competition sites in order to implement “Advanced Analytics”.

Through the integration of spatial information in the existing BI solution the customer is able to make informed exploration decisions regarding re-planning, networking with transport routes like ports, railroads, and roads in order to meet its expansion strategy.

Example FMCG / Brewery (Location Optimization)

The offices in 250 countries and more than 70,000 workers generates this global player about $21 billion with approximately 250 own brands. Although the total consumption of beer in the considered region increased, the income underperformed the market trend. The customer needed a solution in order to recognize the interrelation between the stagnating sales performance and the spatial factors (demography, market potentials, accessibility, competition structures), analyze, and to take countermeasures.

The sales team was equipped with mobile solutions that supports and makes transparent the planning and optimizing of customer visits and acquisitions.

- The Location Intelligence solution was integrated in the existing CRM System and experienced, through the simple to use interface, a very high user acceptance.
- Efficient sales planning supported through spatial factors lead to significantly improved sales results.
- Sales activities were globally focused and easier to understand. Regional conditions (demography, competition, market penetration) were taken for the first time into consideration in the sales work.
Example Police Application (Location Analytics):

In a metropolitan area an LI solution should be integrated into an existing BI application for the representation of offences and for the improved prevention. On the basis of the various offenses spatial priorities could be better represented and correlated with the socio-demographic patterns. Furthermore the relationships between the crime scenes and their location in the transport area are examined.

4. Benefit and Contribution of Location Intelligence?

The subject of Location Intelligence as integral part of BI and CRM solutions or in business processes is still relatively new. Therefore, it is important to show potential customers the costs and benefits in a compact form.

Therefore, we offer 2-3 day workshops in order to present the customer specifically the 3 core areas:

- Location Discovery
- Location Analytics
- Location Optimization

and to adapt them to the company’s requirement. As a result we provide then our customers a roadmap from which one can get details, plan, and implement coordinated steps.
In summary, the benefits of Location Intelligence can be described as follows:

- **ROI** – improving the value of existing GIS, BI, and DWH
- **Data quality** – Geocoding and data refining to increase the value and the quality of existing data (DWH Tuning)
- **Decision quality** – making better decisions in a shorter amount of time due to comprehensive and spatial vision on business-relevant facts and data
- **Process quality** – optimizing business processes through the integration of spatial information or modularized geo-functions (Routing, Mapping or Geocoding as a single function in business processes) -Geo-On-Demand

**Location Intelligence makes a contribution for:**

- **Easy Analytics**: Simple spatial access to patterns, trends, and potentials
- **Advanced Analytics**: New, space-related analysis possibilities are available
- **Big Data** – Much more spatial data will be produced and analyzed in the future—maps are outstandingly suitable to simply and intuitively represent large amounts of data
- **Mobile Business Intelligence**: Maps are offering themselves as an introduction to data analysis due to the screen size of a mobile terminal (Smartphone or Tablet PC).
- **Social Media**: Production and evaluation of spatial related data give businesses the chance to offer timely and spatially relevant mobile services

*If there are questions in the context of analytic or operative subjects that begin with the word “WHERE”, Location Intelligence can bring a significant contribution.*
5. Outlook:

The private use of geo-data like GoogleMaps or BINGMaps, navigation devices and Geo-Apps for smartphones has found a high prevalence and acceptance for a long time. They are now a part of daily life in the domain of information gathering. Apps with maps belong to the most used applications, with an increasing tendency. According to an actual company survey from Ventana Research, for the current decade, Location Analytics will represent a key technology in the domain of BI. The majority of questioned businesses consider Location Analytics as very important in optimizing their own business processes as well as sales and marketing. Almost half of the businesses questioned by Ventana plan a change in the use of spatial information during 2013 for the improvement of the processes of sales, marketing and controlling. An SME survey conducted by the prestigious German company BI Research BARC from 2012 identifies the integration of geo-data in BI applications as one of the 6 most important trends for the next 2-3 years.

BI providers like Qlikview or Tableau that are set on a short implementing phase with a user friendly frontend and an intuitive access to information, are currently very successful. This trend of visualization and “easy analytics” is supported and extended through the use of Location Intelligence.

The explosion of data amounts (BIG DATA), the increasing number of interaction and communication channels between providers and customers, the fast changing customer behavior, and the existence of “Social Media” ensure that relevant geographic data are increasingly generated and asked for.

Two Words are important in this context:

1. **Relevance:** are the offers, that I receive mobile, desirable and relevant, i.e. does this information represent a real benefit for me as customer?
2. **Trust:** can I, based on my own experience and the experience of my “user group” (peer group), rely on a proper and legal use of my data?

Companies that are in the position to take into consideration relevance and trust in the same way as dealing with social media will generate, through the use of Location Intelligence, more proximity to the customer and more business.
About Galigeo

Galigeo is, with more than 12 years of experience and branches in Europe and the USA, a market leader in the domain of LOCATION INTELLIGENCE.

Through the existence of our LOCATION INTELLIGENCE Solutions:
- We extend your Data Warehouse with the “space” factor
- You integrate spatial and market data in your information systems
- You make from your Data Warehouse a real “single point of truth”

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