AI and the New Data Analysis

Emergence of Structural Data Analysis

AI Business Analyst's Missing Link

What is the Point? *For too long, we have treated data as a monolithic entity, focusing our efforts on the clean, predictable world of **structured data**. While foundational, this is now just table stakes. The true deep, game-changing insights organizations need—lies in mastering the full data structure and AI Analytic spectrum. This document is a brief introduction to 3 core data structures of interest to AI business analysis today.*

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Data structure Meets AI - New World of Data Analysis

Today there is an emerging need for business analysts to morph into AI business analysts. Business analysts and consultants are trusted advisors that deliver a clear path to competitive advantage. They use AI transformation methods for a more robust organizational competitive and business continuity position. This requires an understating of the data structure capabilities that significantly enable the AI transformation using the accumulated digital resources of an organization.

Up until now **structured** data has been the backbone of business analytics. The availability of financial, operational, and external structured data such as government statistics has reached an elevated level of maturity. Related BI type reporting and statistical analysis and neural net of objective data have provided keen insight into past performance and potential trend tracking. This is the entry point for AI into many organizations.

Meanwhile, **semi-structured data,** the digital nervous system of the modern enterprise, has received little attention. It sits at the intersection between the rigid organization of structured data and the fluidity of unstructured data. Semi structured data has been used for developing the digital twins; models of the organization favored today by business analysts. Analytics based on AI have evolved to take advantage of semi-structured data. However while suitable for architecture analysis of an organization, the context of the data is limited. It does enable firm's ability to integrate, innovate, and respond to the market. A strategy without a semi-structured data plan is a strategy without an execution engine.

Now we have the world of unstructured data, dependent on NLP and linguistic AI capabilities. 80% of data is **unstructured**—the messy, human-centric text in reviews, reports, and social media—is where you uncover the *why* behind the numbers. It is where you find raw customer intent, nascent market trends, and hidden operational risks. To ignore it is to fly blind.

Guiding your organization to develop a proficient, integrated capability across all three data types is not an IT project; it is the central strategic imperative of our time.

AI Business Analyst Emerging Role

All business analysts are consultants to a large degree. Today we have the emergence of the AI Business Analyst. They are hired with AI solutions in mind by management. They are to solve problems by applying AI solutions. Whether the purpose is requirements for a business application, or market assessment for placing a product or service or analyzing the direction of an organization, the method is the same. The interesting part is the material the analyst gathers analyzes and makes sense of varies according to the focus of their efforts.

One key interest in business analysis today is the need to improve analysis productivity. There are two approaches to enabling an increase in productivity of an analyst or consultant:

1. *Develop tools that replace the analyst or consultant*. That assumes the tools can do the equivalent work. AI makes this a possibility. However that leaves the direction of the work to an internal staff analyst or manager. Often not a good option for a manager but useful for small to medium sized organizations that cannot afford prestigious consulting firms or maintain a staff of experienced analysts. It gives them the capability to manage and be competitive as a larger, better funded organization.

2. *Develop tools that augment the analyst or consultant* increase their productivity, provide for a more sophisticated and directed form of analysis and increase value to the organization while retaining employee corporate knowledge. This also allows a new generation of consulting firms to emerge that are much more cost effective than the ones that do this work today.

Both approaches are highly dependent on the use of emerging data structure analysis.

Modern Data Strategy - A Three-Legged Stool

Data proficiency is a three-legged stool which all future growth, efficiency, and innovation will rest. Those who can design this stool for their organizations will become indispensable. Those who cannot, will be offering *incomplete solutions* in an increasingly complex world. The priority is clear. The time to act is now. The AI Business Analyst needs a structural data analysis perspective. That implies a clear understanding that structures of data are on a spectrum:

Highly Structured ➔   Semi-Structured ➔   Unstructured

Semi-structured bridges the gap between structured and unstructured. The borders are fuzzy and tend to gradually blend into each other. The reality is that a hybrid analysis approach is best. It is a blend of all three data type analysis with major emphasis on the semi-structured approach.

Data structure and the AI Business Analyst/Consultant

The 3 types of data we hear so much about today; are an artificial classification because some of the data structures overlap based on the degree of structure. All data has some degree and type of structure. It is a spectrum from extraordinarily little (unstructured) to a lot (highly structured). Today, we are best at using the 2 ends for analysis and weakest in the middle, the semi-structured section. The semi-structured data is most important for the business analyst in dealing with analyzing the landscape, strategy, and tactics levels. Operational use tends to focus on historical data that is highly structured and has mature tools to analyze.

Structured Data Analysis – The Maturing Structure

Structured data analysis has the longest history and the greatest degree of automation. *Managers and analysts today view operational analysis as the key for managing the organization, hence a dependency on structured data.*

Business Value of Structured Data Analysis

Structured data analysis has well known value for many types of analysis, such as fraud detection, analysis of operational options, financial reporting, and process analysis. Structured data analysis is most useful for operational performance analysis and quantitative decision analysis. It is favored by management because it has a long history of evolution, it is mature, is well understood and has well developed tools and available skills for analysis. It also has a body of knowledge taught in universities in the preparation of data engineers and scientists.

Using Structured Data

Most structured analysis analytics are well known and taught in management science courses at universities and professional training offerings. Examples of the analytics used include classical statistics such as correlation, regression and affinity analysis, decision trees, value quadrants (the classic 4 box), and influence diagrams.

Structured data is very straightforward. It uses fixed data, usually stored in a relational database. There could be large volumes of transaction data (big data) and well-developed analytical methods, algorithms, and software tools to help you. Plus there is a lot of education available describing structured data use such as training courses, books, webinars, YouTube videos and so on.

AI Enabled Structured Data Example

Business analysis today includes several applications of Muti Criteria Decision making. A good example is using multiple criteria to evaluate a portfolio of projects. Below is an example that identifies Effectiveness (0.189) as the criteria with the most influence:

A key use of neural nets on structured data is the analysis of a portfolio of 17 AI projects for an organization. In this case the interest was to identify the most significant subjective criteria based on management rankings. The neural net considers a composite of all the criteria to determine the influence rank.

Influence Analytic

Criteria	NN Ranking
Difficulty	0.120
Effectiveness	0.189
Impact	0.036
Importance	0.122
Likelihood	0.086
Risk	0.126
Skill	0.082
Priority	0.086
Est no. of Goals	0.137
Risk Remediation cost	0.126

Issues With Structured Data Analysis

There are a few issues with the structured files, they are not very dynamic and have a historical base. Trend analysis requires care when estimating ranges with probability boundaries as the

trend goes forward. The trend of quality and accuracy for prediction depends a lot on the external stability of the business environment.

A lot of volatility and uncertainty in the landscape implies a wide probability with extensions of the trend. That makes it difficult to plan. Also, the relationships that you have are fixed in the design of the database. A chaos approach to trending would help with this as it considers nonlinear issues.

Semi-Structured Data Analysis – The Evolving Missing Link

Semi-structured data is important because it reflects the structure of an organization. It often consists of a large amount of meta data.

Semi-Structured data is the missing link because few analysts have a background to take advantage of the value of semi-structured analysis and analytics.

What makes semi-structured data analysis different is its matching, analytics and methods that focus on material organized into categories. Categories use diverse types of properties, such as quantitative objective types of criteria, properties (quantities and money), subjective criteria, and a lot of phrase-oriented text.

Business Value of Semi-Structured Data

Semi-Structured data is most useful for tactical, strategic. It also is used with unstructured data analysis in landscape analysis, often to create the categories for semi-structured analysis.

There are many points of value in using semi-structured data for business analysis. It is particularly useful for analyzing organization structure. The advantage of Semi-Structured analysis is that you can work with digital twins making analysis quicker and easier. Here are a few things you can do with semi-structured data: consolidation of models, developing business application requirements, identifying points of operational automation and AI opportunities, locating missing or hidden relationships, and enabling business architecture and enterprise architecture

Using Semi – Structured Data

Semi-structured analysis is at home with digital twins. That is because they consist of phrase-oriented text that describe things in an organization. For example, most processes use a 3-word phrase that describes the process steps like, 'prepare purchase order' or 'send invoice' . The same thing is true when you are looking at the names of organizations and names of operating units. Anything that is metadata is very descriptive like this and more amenable to attaching properties and defining relationships within and between categories when doing structural analysis of an organization.

Also this type of structure applies to the 4 layers or perspectives of management, Landscape, Strategy, Tactical and Operational. There can be as many as 18 to 20+ categories per perspective. That provides a lot of material for analysis. Structuring objects and categories with relationships

provides the basis of *digital twin models*. The models can have relationships between them also, adding another layer to the analysis. It is not unusual for an organization to have thousands of digital twins.

This is well known in the different approaches to business analysis such as *business architecture, enterprise architecture, Requirements analysis* and business models like value chain, 5 forces, balanced scorecard, and so on.

Business modeling gurus maintain that what is missing is the rigor of methods and analytic flows that let you relate what you gather into findings and transfer that to a solution, conclusion, decision and point of action.


There are some distinct types of analytics used when doing analysis of semi-structured data. Some of the key analytics used for analyzing semi-structured data are hybrid multi criteria analysis, multi-criteria decision-making, path to point and knowledge graph analysis, chaos-based trend analysis, and context analysis.

AI Enabled Semi-Structured Data Example

Semi Structured data is useful for identifying paths of relationships. The example below uses the path to point AI analytic to identify missing links or connections of management interest. Path to point is like knowledge graphs in that it can relate different objects.

In this example we see the relationship of multi criteria of various industries considered by an organization looking for industry entry as a new venture for strategic growth. The criteria are reflective of management perceptions. The management is assessing the competitive environment.

For example, the organization's insight is that they have only adequate skills to compete in the insurance industry which is difficult for them to compete in. This would negate that opportunity. However, in financial services they have moderate skills to compete in a market they consider easy. Should that be of interest they have a better chance of success in that industry.
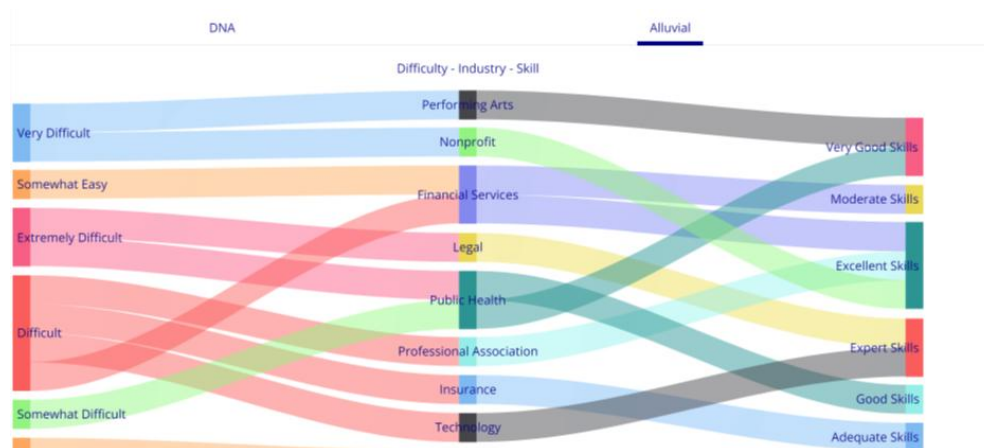
Issues with Semi-Structured Data Analysis

The key issue with semi-structured data is it is more difficult to work with than structured and unstructured data. There are several reasons for this:

1. They require some unique skills and special types of analytics. Evolution of analytics is more recent, covering the past 30 years or so.

2. Currently there are very few tools to work with.

3. Management also does not have a real grasp of how you would deal with analyzing semi-structured data.

4. There is a management perception that it is more costly to implement a semi-structured analysis capability than other approaches such as highly structured data analysis.

Unstructured Data Analysis - The Hot New Data Space

The least understood and most actively used data structure is unstructured data due to the easy-to-use prompt interface and the conversational mode of the related chatbot technology. The untrained user community leads to a variety of uses by the public, employees, students and so on. This large group of users also get results that may be unreliable.

With minimally predefined formats or structures you need natural language processing to analyze unstructured data. Unstructured data analysis covers most of human generated content, ergo, a large volume of all types of material often mashed together. This would include pdfs, Word documents, pictures, paintings, web pages, meeting transcripts and so on.

Business Value of Unstructured Data Analysis

Today there are particularly good emerging tools with synergy evolving between tool types that make analyzing unstructured data of excellent value.

Gen AI is primarily used for unstructured data analysis today. The value points in using unstructured data analysis are risk and compliance assessment, consumer and brand sentiment analysis, competitive and market intelligence analysis, relating between text, video, pictures, voice and so on and document summarization e.g., resumes and reports. Also, the analysis can focus on internal and external data requiring some relationship capability to connect the two.

Strategic intelligence is sharpened by using unstructured data. Unstructured data analysis and analytics provide insight into behaviors, trends, and risks. Successful implementation and execution of strategy is enabled by better alignment and innovation discovery leading to superior outcomes.

Tools like Gen AI and other techniques are great for generating documents and doing research. They provide a context-oriented response using large language models in natural language processing and well-developed algorithms. Gen AI is highly dependent on the prompt for quality of response. Some examples of useful applications of unstructured data analysis are image

content recognition, audio transcription, Text summarization, semantic search, and relationship extraction.

Using Unstructured Data – Its all About the Prompt

The large scope of unstructured data requires much more focused use of unstructured data analysis tools such as Gen AI. Prompts focused on the problem, the organization, the issues, and outcomes get quite large. These prompts are in the 250-to-500-word magnitude as they need requirements type profile of the analysis interest. This results in a much more effective and reliable response from LLM type tools.

Muti criteria decision making (MCDM) is typical of AI Business Analysis. Decision making based on inferior quality prompts for Gen AI tools can provide misleading information. Also, only using Gen AI and not including Semi-Structured and Structured analysis reduces the value of the decision. Effective decision making demands a proficient capability to apply analytical integration of all 3 data types. This results in a rich context for solutions and direction setting.

AI Enabled Unstructured Data Example

Often a strategic planning effort, a business analysis task or requirements development project needs a bit of research to get the thinking started or just to look for some innovative ideas. This is where Gen AI can be helpful. It is important to provide sufficient context in the prompt to get something useful and avoid hallucinations and unapplicable responses.

Using Gen AI, a list of technologies is developed as a starter point for evaluating technologies that are of interest as an opportunity or a threat for strategy situation analysis purposes.

This type of Gen AI use is also good for identification of generic requirements for categories of applications as part of AI business analysis when looking for new ideas.

Technology Trends

Communications Systems
Electric Motor Technology
Hand Held Devices
Heat Application Technology

Information Technology
Internet of Things
Knowledge Management Technology

Manufacturing Tracking
Material Move Systems
Metal Fabrication Methods
Microwave Communications Systems

Motor Control SP Controllers

Networking
Neural Network Software
Paint Technology and Methods

Plastic Casing Methods
Plating Technology
Robotic Process Automation

Issues With Unstructured Data Analysis

Unstructured data has several issues that are quite critical when you are dealing with unstructured data analysis. Here are a few of the issues:

1. The most significant issue is that you cannot do this without a good deal of very sophisticated artificial intelligence capability such as Gen AI.

2. The user must learn how to use prompts. The better you are at doing prompts the better your results will be.

3. Large language models require an exceptionally large degree of computer capability. The IT infrastructure required to manage large language models is quite extensive and expensive.

4. Implementation cost could be quite high not just in developing a custom large language model but in operation.

Embarking on a journey to master all forms of data—from rigid spreadsheets to complex human language—is the defining business challenge of the next decade. This path promises transformative rewards, but it is also fraught with risks that demand your direct attention. Proactively managing this through proper skill development and planning is the key to long-term success.

Developing AI Capability

Managing the AI transformation requires key knowledge capabilities. Capitalize on the maturing field of digital transformation by applying a coherent a coherent AI approach the builds on the digital space and supports the organization.

This brief article starts you on the AI transformation journey. An added value to understanding the 3 types of data structures is integrating all three as part of AI Business Analysis. Tools, training, and analytic methods exist today that support the AI Business Analyst and AI Practitioner needs. This provides a complete AI business analysis result.

Knowledge Consultants, Inc. (KCI) has over 30 years of international experience applying AI solutions to public, government, and private organizations. KCI provides a series of AI business analysis courses for analysts and consultants: *AI Business Analysis , AI Business Analyst, AI Practitioner, and The New World of Data Structure Analysis*

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