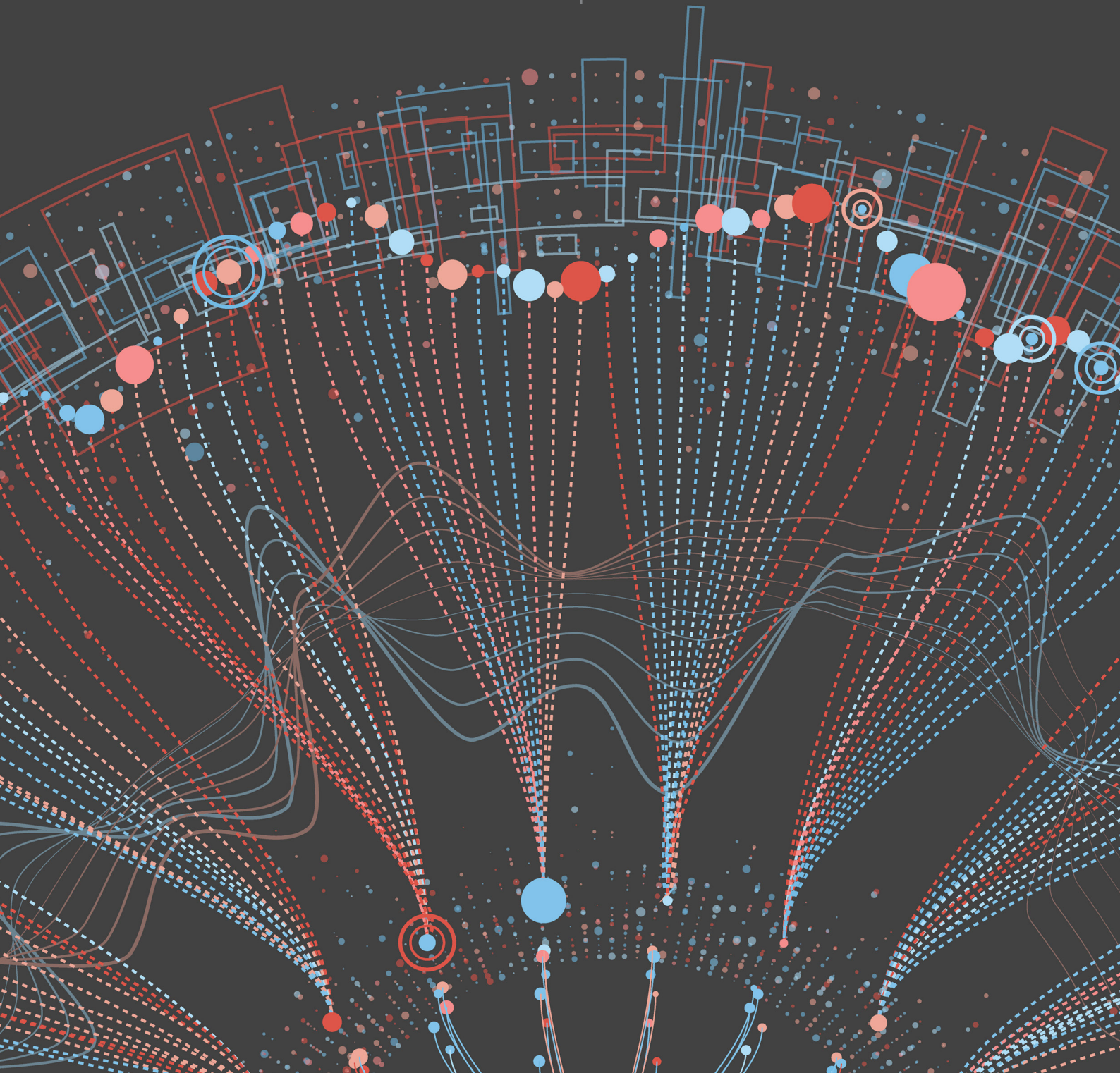# Synechron

Digital / Business Consulting / Technology

Data Visualization for Financial Services

A Pragmatic Approach to Harnessing Business Insight

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Executive Summary

A Pragmatic Approach to Harnessing Business Insight

Data visualization is entering a new era. While the premise of visualization remains the same – to generate actionable insight from complex datasets – the ever-increasing volume of data available and technological advancements are changing the way financial institutions approach visualization.

It is easy to become overwhelmed when embarking on your data visualization journey. The quality and comprehensiveness of your visualization depends almost entirely on the datasets you are looking to consume and the ability to synthesize and explore these environments successfully can be challenging.

However, data visualization remains a key tool that keeps big data consumable, and the ability to apply effective visualization within an institution has essentially progressed from an art into a science. Diverse methods can be used to generate insight from your data and as organizations begin to augment their visualizations with new, innovative techniques, their approach for formulating visualization projects must remain pragmatic.
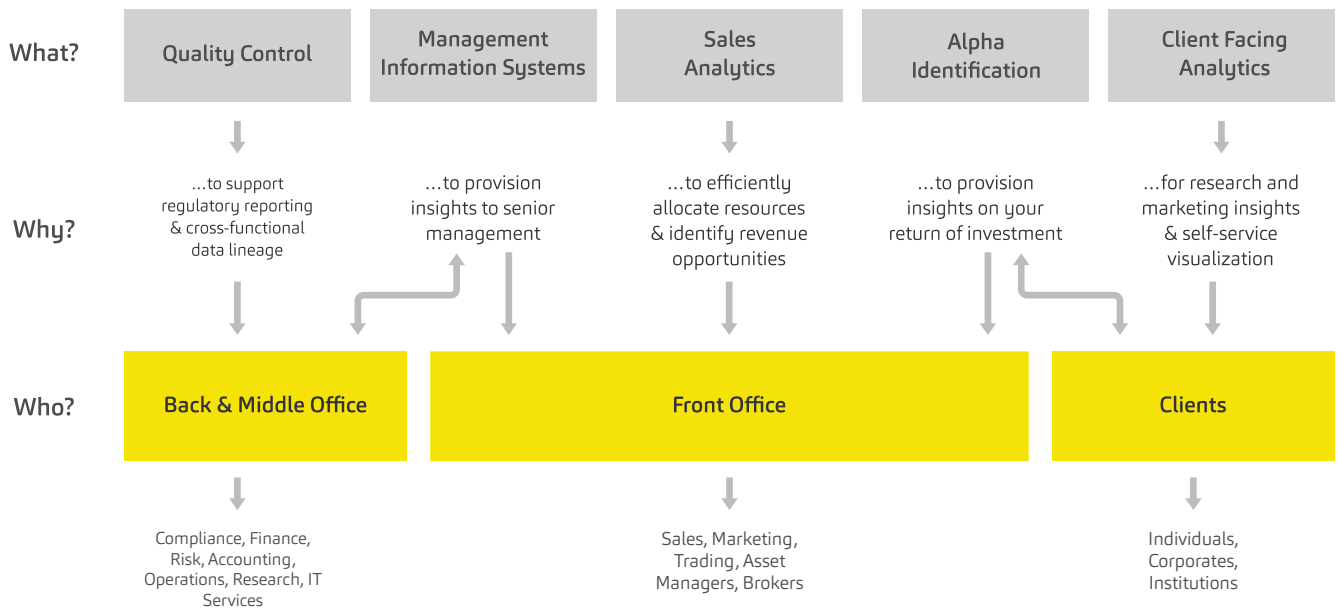
Data Visualization Framework

Identifying your business uses

Visualization projects across financial services are particularly varied and can range from analysis of basic historical trends to real-time, multi-dimensional network analytics.

There is no definitive or 'one size fits all' methodology for a successful data visualization project. We do, however, recommend that you build your visualization framework around clear answers to the following questions up-front:

- Understand **'what'** the uses of visualization are across your business

- Identify **'why'** the visualization is important

- Recognise **'who'** the consumers of your visualization are

- Identify **'how'** sophisticated your visualization needs to be

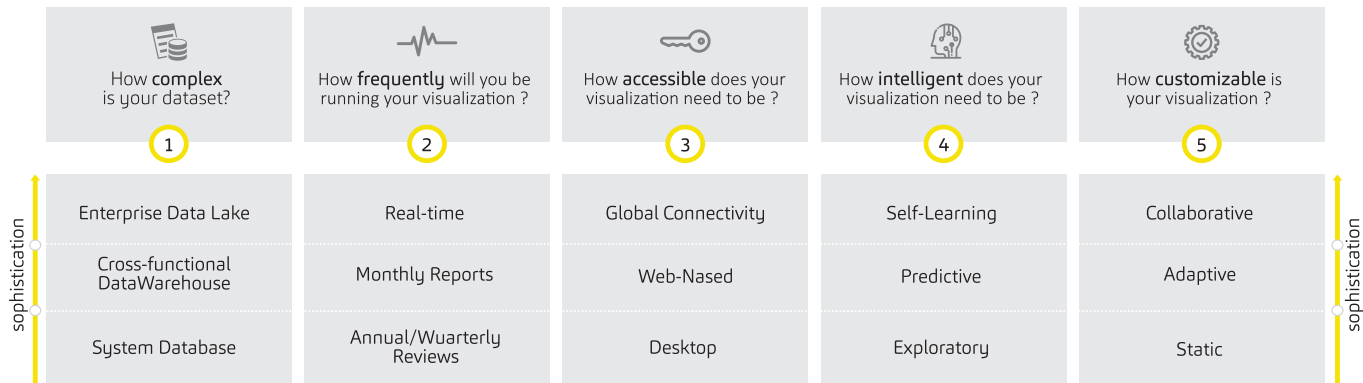| What?	Quality Control	Management Information Systems	Sales Analytics	Alpha Identification	Client Facing Analytics
Why?	…to support regulatory reporting & cross-functional data lineage	…to provision insights to senior management	…to efficiently allocate resources & identify revenue opportunities	…to provision insights on your return of investment	…for research and marketing insights & self-service visualization
Who?	Back & Middle Office	Front Office			Clients
	Compliance, Finance, Risk, Accounting, Operations, Research, IT Services	Sales, Marketing, Trading, Asset Managers, Brokers			Individuals, Corporates, Institutions

Key considerations

We are beginning to see innovative visualization techniques such as cognitive frameworks, automation, interactivity and storytelling being applied across organizations. Even though these can be powerful and insightful tools, they only reach their full potential if they are calibrated carefully to their respective operating environments, taking into account organisational maturity and readiness across a number of factors.

In order to identify the relevant data visualization techniques for your business, there are 5 key considerations that should be taken into account when defining the complexity, scope and shape of your visualizations:

• How complex is your dataset?

• How frequently will you be running your visualization?

• How accessible does your visualization need to be?

• How intelligent does your visualization need to be?

• How customisable does your visualization need to be?

In addition, for your projects to be successful, your business should be supported by an enterprise technology framework and be aware of the analytics maturity required to execute best-practice visualization.

How **complex** is your dataset?	How **frequently** will you be running your visualization ?	How **accessible** does your visualization need to be ?	How **intelligent** does your visualization need to be ?	How **customizable** is your visualization ?
1	2	3	4	5
Enterprise Data Lake	Real-time	Global Connectivity	Self-Learning	Collaborative
Cross-functional DataWarehouse	Monthly Reports	Web-Nased	Predictive	Adaptive
System Database	Annual/Wuarterly Reviews	Desktop	Exploratory	Static

sophistication

Enterprise Technology Frameworks

Data Visualization Techniques

Applications across Financial Services

Subsequent to defining your data visualization framework, you should be in a position to correctly identify the appropriate techniques and provide your business with the opportunity to harness pertinent, high-value insight. Within the Financial Services industry, there are a number of compelling examples where powerful visualization techniques have been applied. With the appropriate frameworks in place, there is a significant opportunity of not only utilizing individual techniques, but of combining multiple instances of visualization to maximise the value from your data.

In this paper, we identify examples where visualization has been successfully applied and dive into these use cases in detail, mapping them to our five key considerations (data complexity, frequency, accessibility, intelligence and customizability).

1 | Quality Control; AML Detection
- Dynamic entity networks
- Intelligent workflow orchestration
- Near real-time AML / Fraud detection & insights

Use Case explained

1 | Quality Control – AML Detection

The prevention and detection of money laundering remains a key focus across financial services. As criminals are developing complex ways to fund illegal activities, financial institutions can apply multiple visualization techniques to proactively enhance the discovery of fraudulent activity between entities.
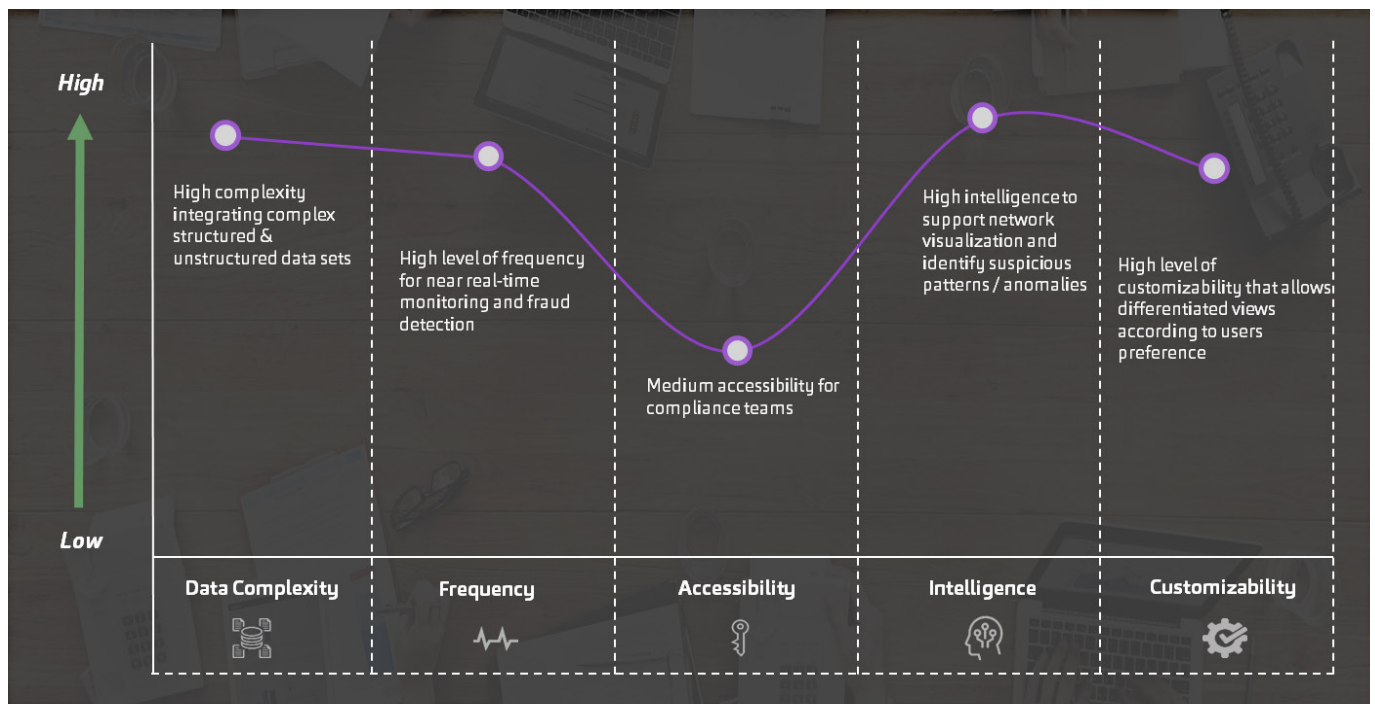
| Purpose

For the prevention and detection of money laundering.

| Users

- Head of Compliance
- Compliance Team

| Requirement

Visualization needs to highlight beneficial owners, detects suspicious activities, maps entities and networks and identifies anomalies in a single glance.

High complexity integrating complex structured & unstructured data sets

High level of frequency for near real-time monitoring and fraud detection

Medium accessibility for compliance teams

High intelligence to support network visualization and identify suspicious patterns / anomalies

High level of customizability that allows differentiated views according to users preference

| Data Complexity | Frequency | Accessibility | Intelligence | Customizability |

2 | Quality Control; Data Lineage

- Simplified web-based authoring
- Visualization of end-to-end data landscape
- Customizable view of attribute lineage

Use Case explained

2 | Quality Control – Data Lineage

Understanding your data and being able to map data lineage across your enterprise is a critical data governance component for any institution. With frequent technology changes and increasing regulatory pressures, it is important that your data is tracked effectively and networks are built around your datasets. Applying the right visualization techniques allows you to track your data end-to-end and identify consumption across your enterprise.
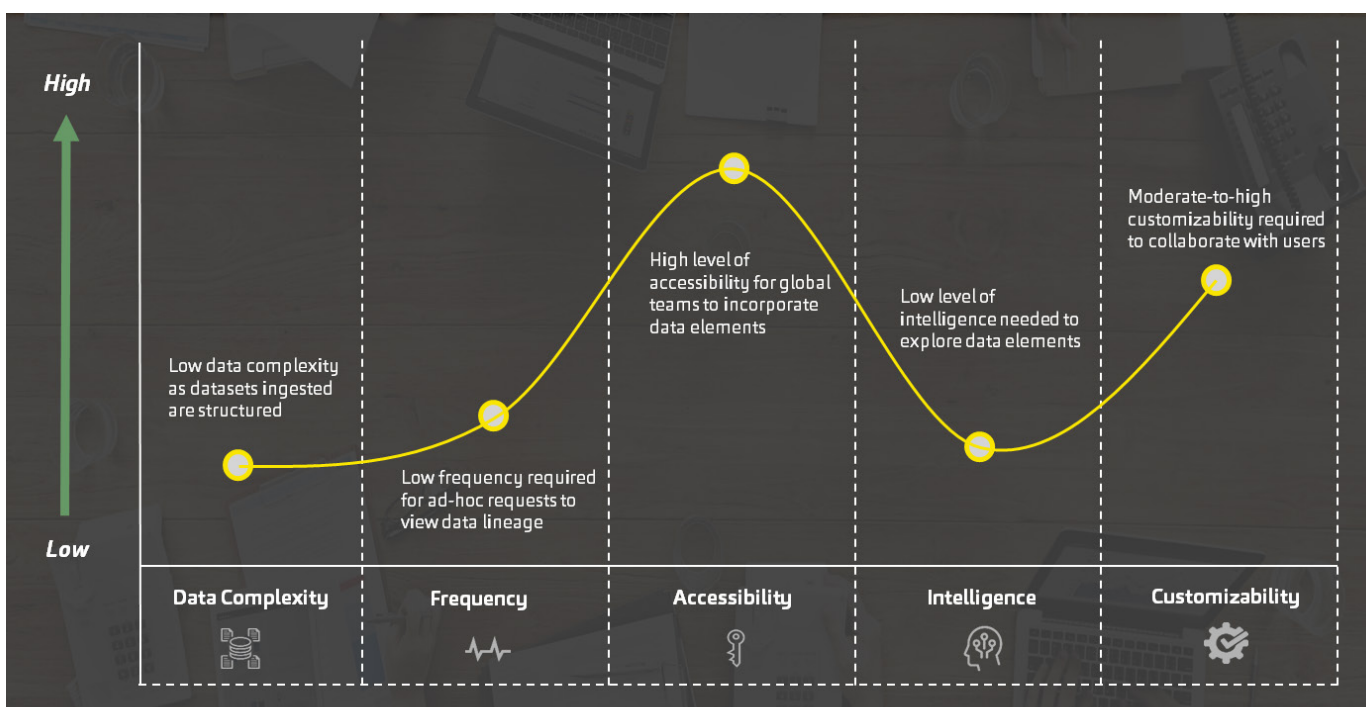
| Purpose

Used to understand data lineage and dependencies across institutions technology landscape.

| Users

- Chief Data Officers
- Data Teams & Architects
- Business Owners
- System Owners

| Requirement

Visualization has to highlight data lineage from origination to consumption in a single glance.

High

Low data complexity
as datasets ingested
are structured

Low frequency required
for ad-hoc requests to
view data lineage

High level of
accessibility for global
teams to incorporate
data elements

Low level of
intelligence needed to
explore data elements

Moderate-to-high
customizability required
to collaborate with users

Low

| Data Complexity | Frequency | Accessibility | Intelligence | Customizability |

3 | MIS; Liquidity Risk Reporting

- Seasonal Auto-regressive Integrated Moving Average
- Intelligent forecasting
- Interactive dashboard
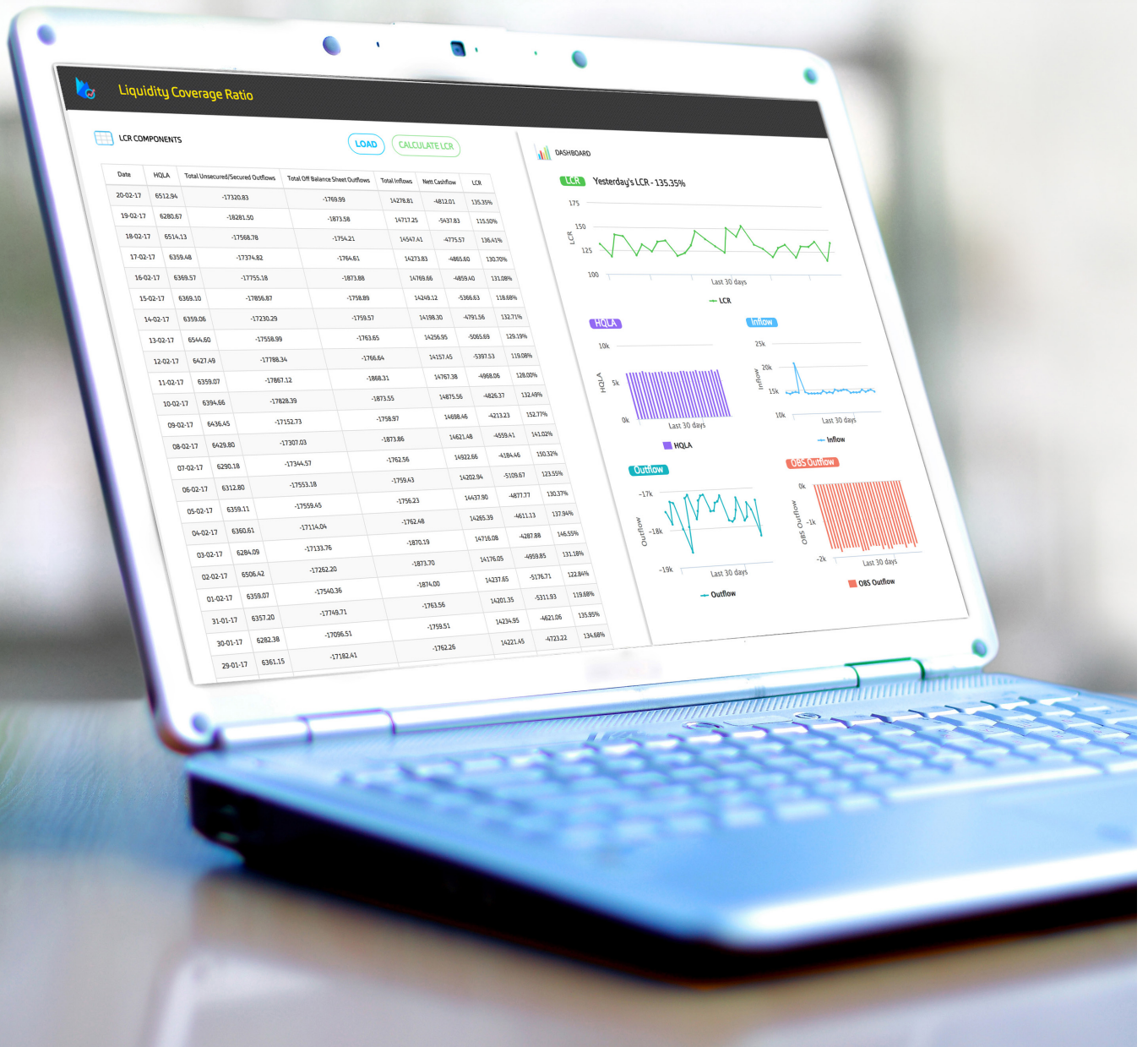
Use Case explained

3 | Management Information Systems – Liquidity Risk Reporting

Liquidity Risk reporting often may not be timely and accurate due to inaccurate data sourced from a multitude of systems. Showcasing machine learning outputs with powerful data visualization will allow you to run valuable insights on rudimentary data and use data as an approximation for processing.

| Purpose

To obtain a quick overview of the risk levels of the bank and to provide intelligent forecasting. Key contributors to risk are highlighted and variances explained.

| Users

* Risk management
* Liquidity
* Compliance

| Requirement

The data visualization needs to be able to perform back test approximations based on internal data, identify historical and behavioural patterns and break down the clients by industry sector, geography, concentration levels etc.

High

High data complexity integrating large structured & unstructured datasets

High-to-moderate level of frequency due to daily monitoring

Moderate-to-low level of accessibility for liquidity risk team & management

High level of intelligence required for forecasting

Low level of customizability required as reporting will remain standard

Low

| Data Complexity | Frequency | Accessibility | Intelligence | Customizability |

4 | Sales Analytics; Cross-selling

- Behavioral topography charting
- Customizable Dashboard
- Intelligent insights across consumer behavioral patterns
- Near real-time sales insights

Use Case explained

4 | Sales Analytics – Cross-selling

Financial institutions have a considerable amount of data related to existing and prospective customers. By harnessing data science and applying specific visualization techniques, firms are able to intelligently cross-sell to existing clients and increase their success rate of converting new clients.

| Purpose

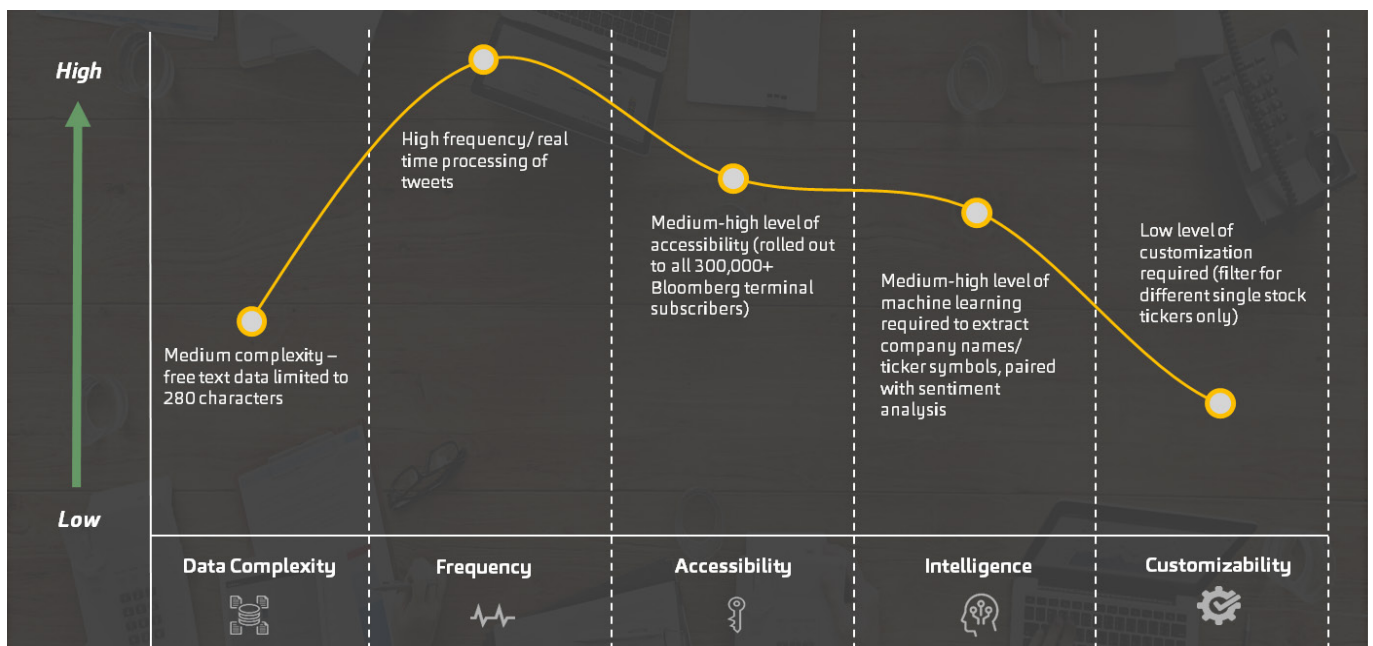Visualize customer and transaction data trends for targeted sales, marketing and account management.

| Users

- Sales Team
- Marketing
- Account Management
- HR

| Requirement

The visualization needs to be supported by internal and external data to allow for a bespoke dashboard, customized messaging, and intelligent targeting based on behavior.
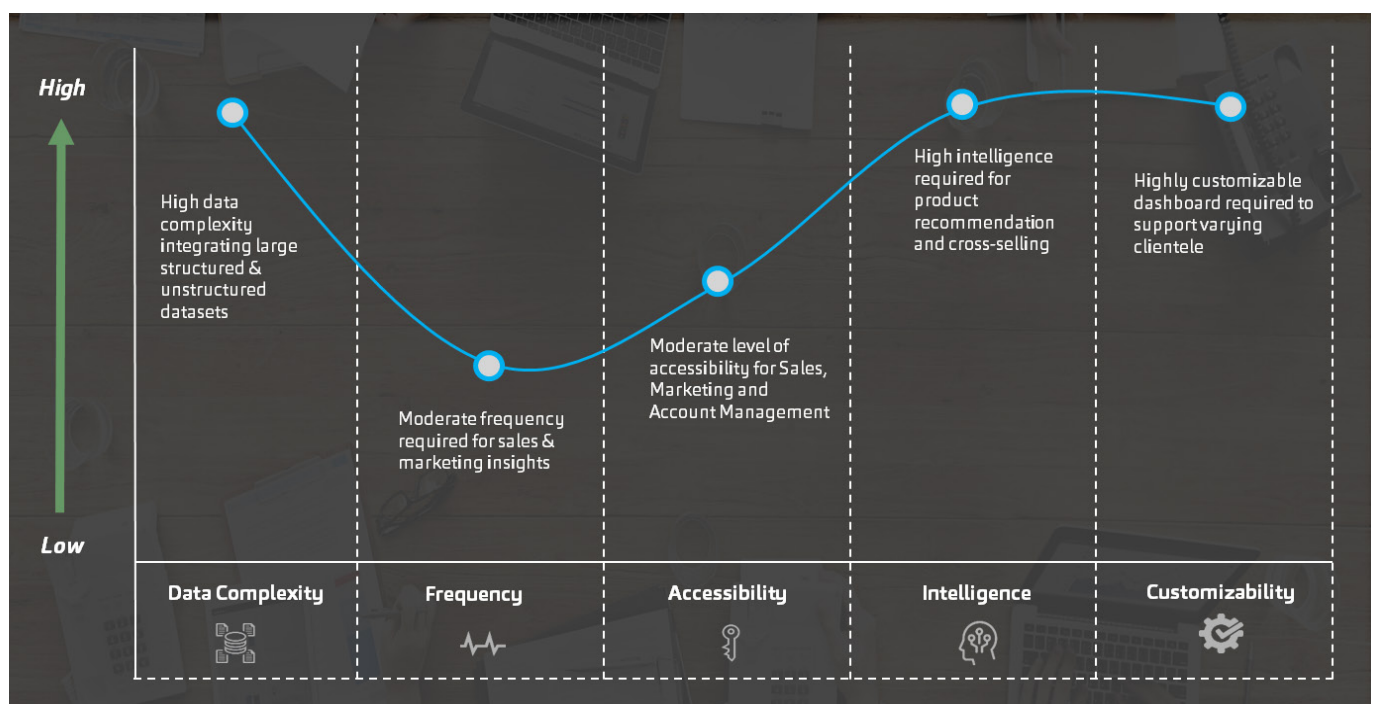
5 | Alpha Identification; Social Media Optimization

- Social Media Integration
- Real-time Trend Analysis
- Sentiment insights
- Social velocity monitoring
- Curation and translation of non-English tweets

Use Case explained

5 | Alpha Identification – Social Media Optimization

In this example, data visualization is being used to show the outputs of social media sentiment analysis based on live twitter feeds for specific stock tickers (with the hypothesis that this sentiment will contain actionable alpha).

| Purpose

Visualize customer and transaction data trends for targeted sales, marketing and account management.

| Users

- Financial Services Trading Technology vendors
- Sales & Trading
- Portfolio Managers

| Requirement

The visualization needs to be real time, filtering the feeds into positive vs. negative sentiment plotted over time.

High

Low

High frequency/ real time processing of tweets

Medium-high level of accessibility (rolled out to all 300,000+ Bloomberg terminal subscribers)

Low level of customization required (filter for different single stock tickers only)

Medium complexity – free text data limited to 280 characters

Medium-high level of machine learning required to extract company names/ ticker symbols, paired with sentiment analysis

| Data Complexity | Frequency | Accessibility | Intelligence | Customizability |

6 | Client Facing Analytics; Smart Statements

- Dynamic widgets
- Interactive charts
- Mobile-friendly
- Customizable view of portfolio
- NLG insights
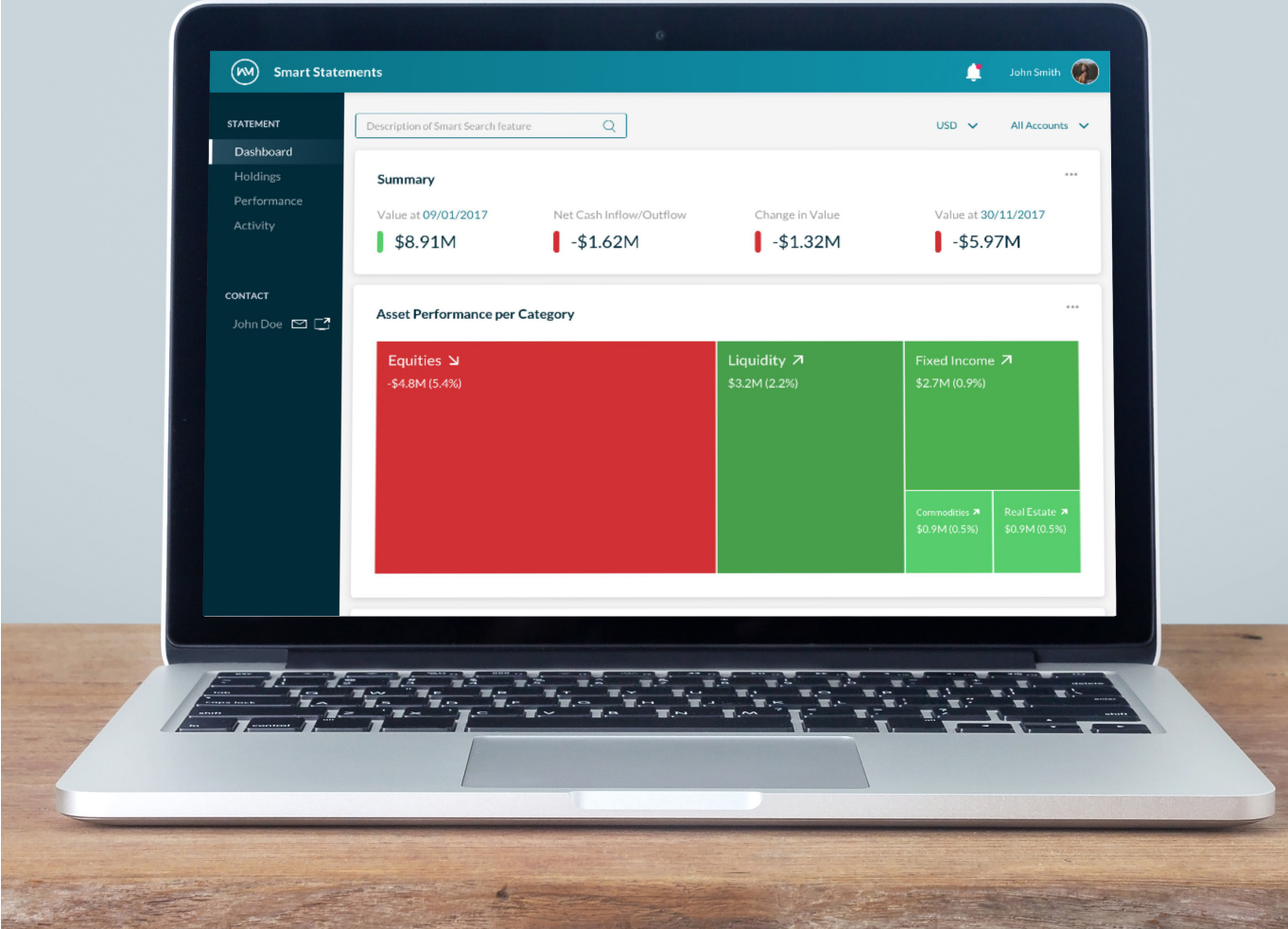
Use Case explained

6 | Client Facing Analytics – Smart Statements

Traditionally, wealth statements for private bank clients have been limited by two aspects:

1. Statements are non-interactive as often made available in a physical 'hard-copy' format.

2. Statements are homogeneous for all clients of the bank.

As a result, limitations in the client output functionality restricts the potential for customisation and smart insights.

| Purpose

Replacing the periodic static statements with an interactive and customizable version, offering intelligent visuals, smart recommendations and newsfeed personalized based on Clients' holdings, past behavior and market information, as well as opportunities for collaboration with their Client Advisor and smart search function.

| Users

• Wealth & Private Banking Clients

| Requirement

Needs to have a personalized, user-friendly interface with customizable and interactive widgets that support 'drill-down' into Clients' portfolio performance.
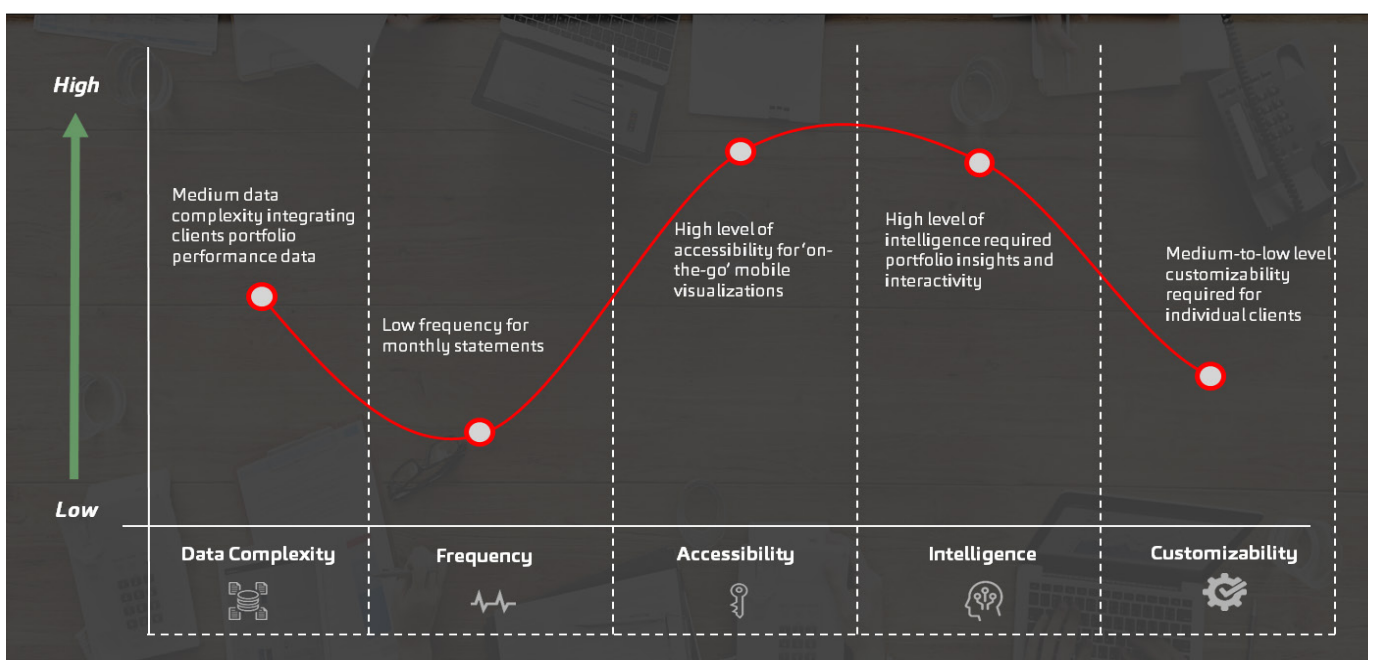
Visualization Trends & Tools

| Trends across data visualization platforms

It is easy to get lost with unprecedented amounts of data being created, stored and shared. As organizations seek to derive greater insights and present their findings with clarity, the premium placed on the right visualization framework will only continue to increase.

Data visualization is constantly changing and as new technologies and techniques push the boundaries of data, your organization should be flexible enough to not only adapt to these new requirements, but also remain pragmatic in your selection of visualization techniques. We have identified 6 keys trends across the industry and ran a comparative analysis on some of the visualization tools at the forefront of these trends.

Simplicity

This may seem contradictory to many highly-complex visualizations we observe in the market. As these can be very specific and often hard to apply in real-life business situations, simple, tailored charts remain amongst the most valuable techniques to successfully harness insight.

Visualization 'on-the-go'

Slick, configurable, user-friendly interfaces are making it easier for consumers to explore and manipulate datasets freely and with the increasing advancements in tooling, users are now able to run visualizations anywhere, anytime.

Data stories & Small multiples

Companies are beginning to create experiences that tell a more complete story using multiple types of data and visualization techniques. "Small multiples" is a simple, yet powerful technique that triggers your brain to pick up variations in data by running visualizations on the same image.

AI & ML allowing professionals to work smarter not harder

Smarter tools have made it easier to discover insights. Increasingly, tools are able to automatically suggest visuals to highlight insights, based on machine learning. ML systems are being utilised to create graphical comparisons, highlight anomalies and identify key insights based on prior user-based visualizations.

Interactivity; 'You draw it'

Visualizations are increasingly giving users the ability to discover and form their own hypotheses. This enables users to visually compare their predicted outcomes against real data and provide visual representations of expectations vs reality. Also, think about using techniques like Design Thinking and Usability Testing.

Bespoke datasets

With the increase in access to both open and private datasets, it is becoming more difficult for users to create unique visualizations. A trend that we are seeing is that consumers are starting to gain competitive advantages by combining multiple datasets that enable exclusive, personalised visualizations.

Comparative analysis of visualization tools

Our comparative analysis was based on two key dimensions;

- Sophistication (functionality, scalability, speed, deployment)

- Ease-of-use (accessibility, skillset required, UI, pricing)

Based on the results you're able to establish 4 distinct groups;

1. Enterprise BI Tools
Offer a suite of visualization capabilities suitable for both Developers & Non-Developers
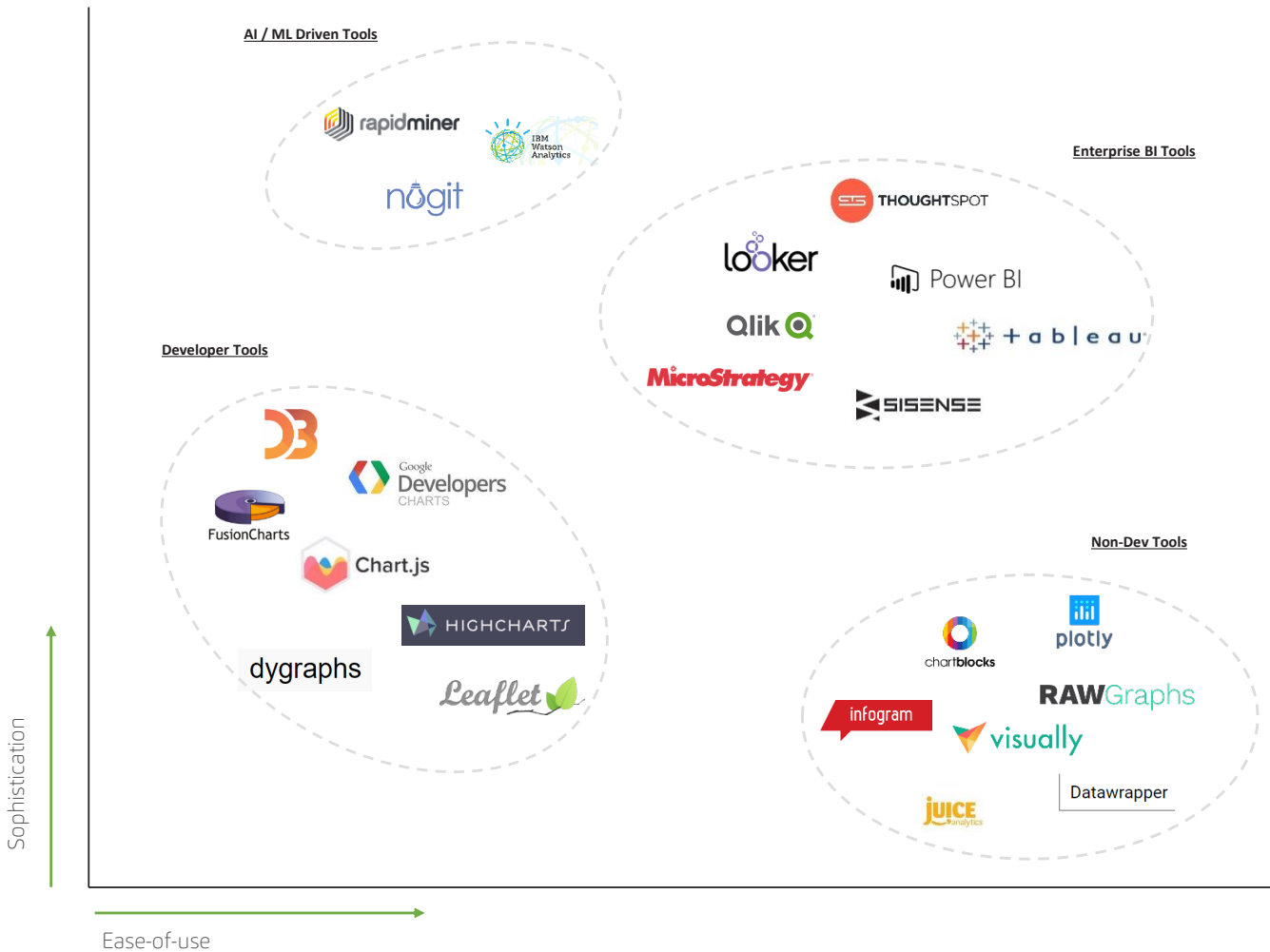
2. Developer Tools
Require coding; for IT Specialists & Data Scientists

3. Non-Dev Tools
For presentations, no coding required

4. AI / ML Driven Tools
Integrated AI techniques for smart insights

Overview of visualization tools

Enterprise BI Tools

looker — Cloud-based BI platform designed to explore and analyse data from multiple sources real-time.

MicroStrategy — Platform that offers a suite of products from real-time insights to mobile face ID recognition

Power BI — Provides a suite of business analytics tools that allows you to connect multiple data sources, simplify data prep and run sophisticated visualizations

Qlik Q — Hosts a comprehensive portfolio of solutions that provide advanced analytics across the spectrum of BI needs.

SISENSE — Agile BI solution that provides advanced tools to manage and support business data with analytics, visuals and reporting

tableau — Allows users to simply quickly connect, visualize, and share data from the PC to the iPad across a suite of visualization products & services

THOUGHTSPOT — Enterprise BI & big data analytics platform that is used to explore, analyse and share real-time business insights

AI / ML Driven Tools

IBM Watson Analytics — Smart data analysis and visualization service on the cloud that helps quickly discover patterns and meanings in datasets

nogit — Uses artificial intelligence to fill the gap between dashboards and stories for immediate insights

rapidminer — Platform for data science teams that unites data prep, machine learning, and predictive model deployment

Developer Tools

Chart.js — Opensource project for designers & developers to run JavaScript charting

dygraphs — Flexible, customizable open-source JavaScript charting library for handling huge data sets

D3 — JavaScript library for producing dynamic, interactive data visualizations in web browsers.

(icon) — JavaScript-based visualization tool capable of creating over 90 different types of charts

Google Developers CHARTS — Renders charts in HTML5/SVG to provide cross-browser compatibility and cross-platform portability

HIGHCHARTS — Charting library written in JavaScript that offers an easy way of adding interactive charts to websites and web applications

Leaflet — Open-source JavaScript library for mobile-friendly interactive visualizations

Non-Dev Tools

chartblocks — Online chart builder that allows you to build basic charts very quickly and pull in data from multiple external sources

Datawrapper — Simple, online tool for making interactive charts

infogram — Helps simplify the creation of engaging charts, infographics, maps and reports.

JUICE analytics — Next-generation platform for building data stories

plotly — Creates leading open source tools for composing, editing, and sharing interactive data visualizations via the web

RAWGraphs — Open source data visualization framework that simplifies the visualization of complex datasets

visually — Combined gallery and infographic generation tool that offers a simple toolset for building data representations

Complex Visualization

Interesting Concepts

Substantial increases in the volume of available data and data processing advancements means producing exceptionally complex visualizations have become increasingly accessible. We have come across a number of compelling, innovative examples of this and have chosen a few to highlight.

It must be noted that although some of these visualization techniques are able to immediately grab their audiences' attention, they are also highly complex and can be impractical due to the very nature of their complexity. Close attention must therefore be paid to the day-to-day usability and the practicalities of extracting high-value insight.

Node Diagrams
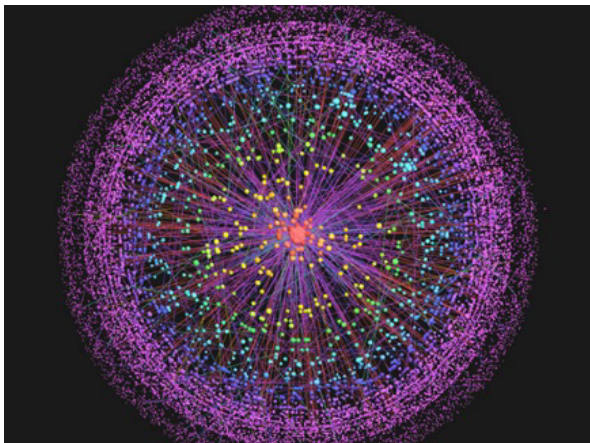
This example showcases the hierarchical structure of relationships. The distance from the center identifies the nodes level of relationship and the size of the node is proportional to the number of connections it has.

Live 3D Geospatial Diagrams
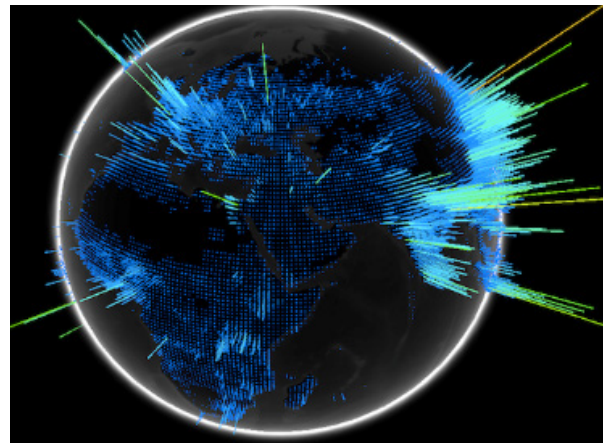
This example can be used to show trade activity on a real-time basis. Each high-volume transaction prompts an alert that is represented on the globe by its geographical location.

Flash Visualizations
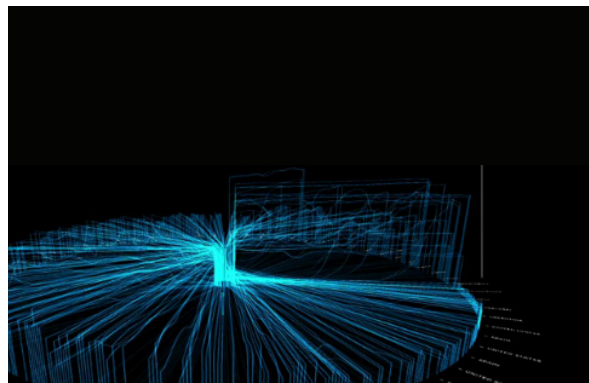
This example can be used to identify movements across an enterprise. When a new client is onboarded, the graph will flash and increase in height relative to the population. The 'wheel' can be dissected by business lines, regions, products etc.

Having access to large amounts of data does not necessarily create the need to focus on some of these emerging and overly complex visualizations. For a large amount of cases simple bar/column/line charts are still the best way of creating clear messages – even for large amounts of data.

From our perspective, simplicity still remains the biggest value component when applied to data visualization.

Global Footprint

CANADA

THE
NETHERLANDS
UNITED
KINGDOM
LUXEMBOURG
GERMANY
HUNGARY
FRANCE
SERBIA
USA
SWITZERLAND
ITALY
JAPAN
HONG KONG
UAE
PHILIPPINES
INDIA
SINGAPORE
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