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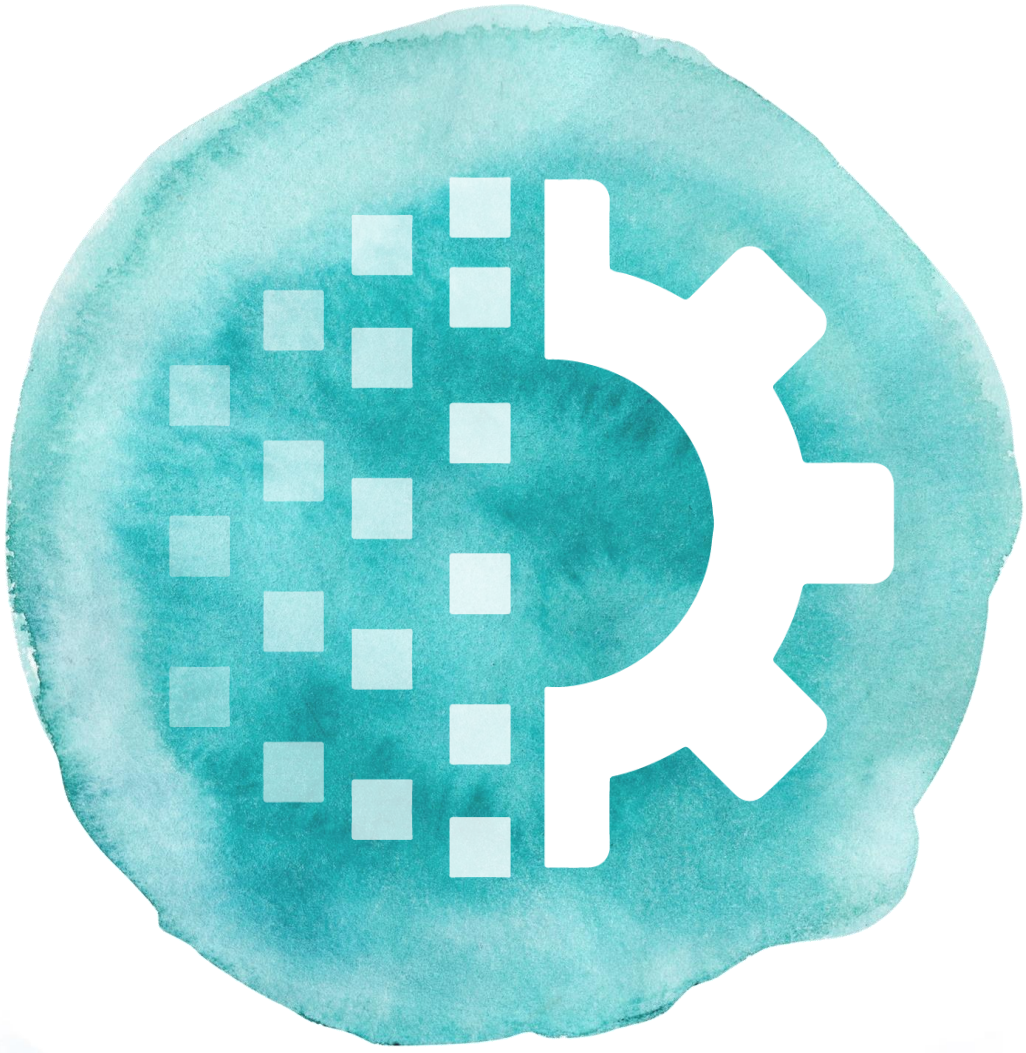

April 2024

Artificial Intelligence for humanitarian and development supply chains

Our AI solutions for humanitarian and development supply chains

Develop AI use cases for real supply chain impact

1 day on-site — 2 weeks — 2 hours on-site

1

Co-creation session

- Together we co-create **use cases** which make a **real impact** to your organisation's supply chain operations
- We combine this with perspectives on what leaders in the space are doing and the benefits they are seeing
- We end with a prioritised list of use cases

2

Accelerator Lab

- For up to **2 weeks**, your teams will be immersed in cutting edge AI techniques with our Scientists
- Together, you will build the Proof-of-Concept (PoC) of the use case of your choice
- Your team will be **the driver** of this development

3

Leadership session

- **Your team**, supported by our Scientists, present back the results of the Proof-of-Concept to your leadership
- Together, we agree on the next steps to develop the Proof-of-Concept into a Minimum Viable Product (MVP) and scale it

Readiness for scale-up

The typical benefits of scaling Artificial Intelligence (AI) in supply chains

8x	20%+	25%+	10%+
Reduction in human efforts for forecasting and planning	Increase in forecast accuracy	Reduction of stock-outs	Reduction of wastage

Typical AI use cases in humanitarian and development supply chains

AI can leverage your expertise and augment foresight, empowering you to make more informed decisions

Use Cases of AI/ML in non-profit supply chains

Planning | **Procurement/sourcing** | **Distribution**

AI-based demand forecasting

Stay on top of demand by generating accurate forecasts based on historical sales data, market trends, external factors, etc.

Ex: I need to place an order for Insecticide-Treated bed Nets (ITNs) for Malawi but I don't know how much to order.

Supply Chain surveillance

Improve your supply chain resilience to the unknown through scanning trustworthy online media channels to identify geopolitical risks that could threaten the supplier network.

Ex: A new conflict has just started in South Sudan, will this affect our next delivery of supplies?

Network optimisation

Create a supply chain that is flexible, responsive and cost-effective by designing a network that considers suppliers, transportation routes, distribution centres and inventory levels parameters.

Ex: I need to understand what would be the optimal location for our new vaccine warehouse serving the supported countries in South-East Asia.

Documents verification

Ensure the conformity of supplier and shipping documents using Natural Language Processing (NLP) and machine learning algorithms. The technology can check both the information and the compliance of the documents to relevant regulations.

Ex: I need to verify that the information on the shipping documents matches the information on the product labels, such as product name, quantity and weight.

Suppliers investigation

Reconcile vendors against sanctions list sources and identify last purchase dates from sanctioned vendors.

Ex: I need to check the reliability and reputation of a potential new local supplier for emergency orders of nutrition packages for refugee camps in Kenya.

Route optimisation with Gen AI

Augment the reliability of your network by generating optimised delivery routes based on multiple variables such as distance, current traffic conditions, delivery constraints, changes in weather conditions, floodings, etc.

Ex: With the latest floodings and the serious peak of malaria cases, due to the rainy season in Liberia, I need to understand what is the best route to take today for the shipment of sample specimen from communities to laboratory for severe malaria cases.

Predictive maintenance

Reduce laboratory equipment or machinery downtime by tracking operational network performance and predict break-downs to pre-emptively dispatch field technicians to perform maintenance.

Ex: I need to proactively schedule maintenance of laboratory equipments in the Philippines to reduce equipment downtime and ensure HIV testing services are available at all times for patients.

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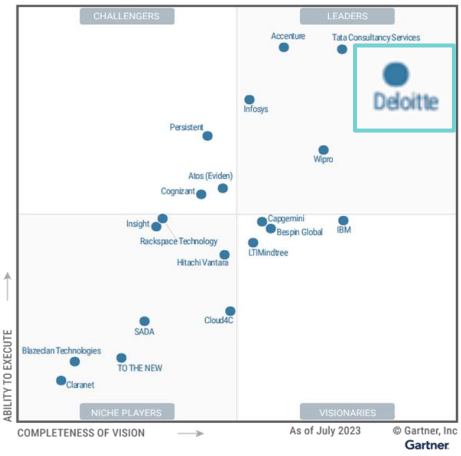
The expertise we offer

Deloitte is a recognised partner for Artificial Intelligence

Deloitte was awarded **Machine Learning/Artificial Intelligence (ML/AI) EMEA Partner of the Year at 2022 Regional and Global AWS Partner Award** for delivering customer's projects with a focus on facilitate data insights, automate AI capabilities and innovate, and to generate value to customers

Our recognition came from our extended presence at the drop of a dime, agile capacity that can anticipate and react to business change quickly, and a future-proof legacy just waiting to be fulfilled.

- Public Sector
  Partner of the Year - Global
- Industry Solution Services
  Partner of the Year - GenAI
- Services
  Partner of the Year – NA
- Specialisation
  Partner of the Year - Security



We have been repeatedly recognised as a Leader in Cloud IT, AI and transformations in 2023 Gartner® Magic Quadrant™ following up on the same recognition in previous year.

Our global presence, strategic client investments and considerable advisory capabilities. These attributes, combined with our industry depth and use of transformative technologies like generative AI, position Deloitte at the forefront of innovation.

Purpose beyond benefit

Empowering organisations, enriching communities: our commitment to ethical impact

Fully committed to our communities

We are as committed to our communities as we are to our clients. Our scale, knowledge and tools help transform and safeguard organisations across the globe, but we also use them, and other mechanisms, to promote human dignity and ethical behavior, advance learning and culture, and advocate the sustainable use of natural resources to protect the environment. We demonstrate this through investments in our people, the advice and services we provide to our clients, the way we run our internal operations and commitment to our communities. Examples of our professionals' involvement in multiple social programs include:

WorldClass is Deloitte's social impact goal. Our goal is to support 50 million people to get to where they want to be; whether it's in the classroom, the workplace or the boardroom, through raising aspirations, improving skills and developing leaders. In 2018, WorldClass provided 410,000 hours of time through volunteering and contributed $200m of which over $65m aligned to schools, charities and social enterprises;

Humanitarian and disaster relief projects have been supported by Deloitte member firms working alongside organisations such as AtrocityWatch, BRAC South Sudan, the International Organisation for Migration, MercyCorps, Oxfam New Zealand, Save the Children International, the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) and the World Humanitarian Summit; and

Global sustainability has never been more important or more at the forefront of how we operate. To play our part to help address the climate crisis and help the world achieve the goals of the Paris Agreement, Deloitte has launched WorldClimate, our global strategy to drive responsible climate choices within our organisation and beyond. Our WorldClimate commitments include: Net Zero (SBTI), Embed Sustainability, Empowering Individuals, and Engaging Ecosystems.

For more information check our Impact Report

Making an impact that matters

Impact Day
70,000
Deloitte professionals volunteering during Impact Day

Humanitarian Action
50+
humanitarian organisations supported

Program management costs
$20M

Total volunteer and pro bond work
$130M

Total donations
$89M

Pro bond
$42M
346,000 hours

Skills-based volunteering
$43M
568,000 hours

Traditional volunteering
$44M
444,000 hours

Deloitte donation
$60M

Deloitte people donations
$29M

Deloitte.

How your needs align with our experience

Our experience in **demand forecasting**

Helps you plan and respond to population needs

Building an AI-based demand forecasting model to improve forecast accuracy of a manufacturer

Challenge

The client was generating monthly forecasts used for their production planning. The exercise was significantly time-consuming and forecasts often highly inaccurate. They asked Deloitte to support them to build a new forecasting model, using Artificial Intelligence.

Solution

Deloitte built a Proof-of-Concept for a Machine Learning-based forecasting model to generate both category forecasts and by-products forecasts. After successful validation of this new model, we supported this client in selecting a vendor that would be in charge of the implementation of the model in the client's systems and of its maintenance. Deloitte was in charge of managing the vendor throughout the implementation phase and conducted all trainings necessary to reach business-as-usual.

Impact

- Created an AI Demand Forecasting Tool (AEB)
- Reduced forecasting exercise workload by up to 80% and improved forecast accuracy by an average of 38%

Implementing DemandBrain to build advanced forecasting capabilities

Challenge

A global food manufacturer selected Deloitte to help them better understand their demand and identify sales opportunities (e.g., numeric distribution, cross-sell / up-sell, product mix).

Solution

Leveraged a large variety of datasets to develop our client's advanced forecasting capability. The objective was to turn the client into an insight-driven organisation so they could optimise their value chain to ensure their reach to each potential customer is maximised.

Impact

- The client was able to make an informed-decision based on reliable forecasting capabilities and increased by 40% their number of point-of-sales.

Our experience in **supply chain surveillance**

Ensures transparency and accountability in your supply chain

Improving drug supply chain surveillance with Generative AI

Challenge

The Food and Drug Administration's Centre for Drug Evaluation and Research (CDER) receives millions of reports from pharmaceutical companies. These reports have valuable supply chain data but it was reported inconsistently and in a variety of formats, making it very difficult and time-consuming to identify information about disruptions. CDER asked Deloitte to help them analyse these materials and understand the downstream impact of supply chain disruptions.

Solution

We implemented the relevant Generative AI tools to deliver a solution for the CDER of the Food and Drug Administration: AWS Text Extract; OCR; NLP; NER; BioBERT; LLM; FLAN-T5.

Deloitte used Generative AI to identify documents, extract molecule information and suppliers and aggregate results.

Impact

- Unstructured data scanned through and identified based on their relevance at a less time-consuming rate than with human eyes
- Improved and faster surveillance
- New database built to store relevant information and make them readily accessible into different formats as per the user's requests.

Using Generative AI-based to provide market intelligence and insights for decision-making

Challenge

Deloitte was appointed by a leader in the technology industry to deliver Generative AI-based market intelligence and insights to guide their investment decisions, strategy development, competitive analysis and product roadmap.

Solution

We delivered a weekly newsletter of the most critical developments; a market tracker for rapid search and insights retrieval; deep-dives on "hot topics" across the industry; and a use case library.

Impact

- Enabled decision-makers to be informed of latest trends and insights at all times
- Brought clarity to complex topics for strategy, product, engineering, and go-to-market teams
- Helped our client to assess and identify potential areas for near-term and long-term investments

Planning

Our experience in **network and route optimisation**

Maximizes the efficiency and effectiveness of aid delivery

Optimising a global distribution network with Artificial Intelligence

Challenge

The client had no speedy way of accessing the overview of changes in their global distribution network. There was no clear approach to optimise the existing network and what impact it would bring; and it was not feasible to quickly measure important metrics in case of changes in the network. Deloitte was selected to identify a solution to address this challenge supported by machine learning technologies.

Solution

We implemented a Network Modeling Tool: a user-interactive web application enabling fast and accurate simulations of our client distribution network by calculating key metrics. The tool allows any user to simulate specific distribution network and route scenarios or situations, and easily compare its efficiency based on key metrics. The tool supported the Global Distribution & Logistics (GD&L) team in designing and comparing distribution networks across a variety of KPIs and metrics, including total transport/warehousing costs, CO2 emissions, service levels and more. Users are provided high level aggregations and visualisations to understand the "big picture" ramifications of the network changes but can also "drill down" and inspect business impact at individual site and route level.

The application was a Plotly Dash application deployed on Plotly Dash Enterprise Platform. It consumed data from Postgres tables via a PostgreSQL adapter on a Postgres application database, which serves as an intermediate cache for all relevant data sourced from the data lake. An end-to-end Machine Learning Operations pipeline was developed so that the machine learning model used to predict transportation costs could be easily retrained on a regular basis, with the underlying data used for training the model being regularly updated.

Impact

- Optimised network design: identified the correct number and location of suppliers, manufacturing sites, and distribution centres
- Improved supply chain resilience: helped assess resilience of the client's global and regional supply chains and set-up strategies to mitigate risks
- Enhanced customer satisfaction: helped ensure timely product delivery to meet demand by modelling and analysing the supply chain accurately
- Sustainability: supported the sustainability commitments by optimising routes and reducing waste contributing to lower CO2 emissions

Planning

Our experience in **document verification**

Protects your organisation from non-compliance

Using Generative AI to build a "virtual assistant" for malaria control and planning

Challenge

Our client, a Non-Governmental Organisation supporting global health selected Deloitte to address the challenge of the time-consuming task of searching and sifting documents and reports manually. They receive an average of 36+ country-level malaria reports that come in different formats and thus require unique accurate referencing for citing and decision-making purposes.

Solution

Deloitte deployed a technology to pre-process the different documents and reports and extract their texts. The technology then leveraged the Open AI API to structure the data to generate vector embeddings for the data using Open AI and perform cosine similarity search to retrieve and sort relevant documents based on user prompt/query. Finally, it was set-up to pass the enhanced information to the GenAI model to generate a Natural Language response to the user query.

Impact

- Streamlined decision-making for evaluation of funding requests for 12+ countries together accounting for more than 75% of malaria cases globally
- Gained insights into effectiveness of local malaria prevention programs
- Analysed national and subnational reports containing survey data such as demographics and health details

Our experience in **supplier investigations**

Protects your organisation from reputational and financial risks

Forensics AI to prevent and detect supply chain fraud

Challenge

Deloitte was appointed by a Non-Governmental Organisation to provide forensics investigation services for detecting anomalies based in the client's ERP data. Deloitte Forensic Team ran a list of agreed scenarios, leveraging AI and other technologies on the client's data, targeting breached segregation of duties. The team also conducted a due diligence of business relationships.

Solution

AI technologies were used to comb through processes such as vendor approval and retention, invoice processing, and payment preparation to detect abnormal patterns related to a breach of segregation of duties. Graph analytics have been enhanced through AI to reveal nontrivial links between suppliers and the organisation's own employees, leading to potential conflicts of interest.

Impact

- Identified the top twenty business relationships requiring immediate extended investigation
- Compiled the list of processes necessitating additional controls and oversight
- Provided a significant stride towards continuous monitoring with the implementation of customized scenarios refined to minimise false positives

Our experience in **predictive maintenance**

Guarantees uninterrupted access to vital infrastructure and services

Predicting machinery downtime and its root causes through advanced analytics and machine learning

Challenge

A pharmaceutical manufacturer was allocating increasingly significant time to uncover root causes behind machinery downtime and poor batch quality. The current analytical capabilities were not available at the individual level unit and therefore it was impossible to conduct an in-depth investigation.

Solution

Deloitte was called to build a customed tool hand-in-hand with the business and technical functions of the client organisation. The tool deployed allowed users to :

- understand root causes of breakdown at unit level
- investigate the impact of different process parameters, control systems and raw materials on the operations performance (all the way down to unit level)

Deloitte also created Machine Learning Operations best practices to ensure a sustainable performance from the models.

Impact

- Enabled a decrease in the time required by employees to identify reasons behind a breakdown or a poor-quality batch.
- Led to significant efficiency gains and improved product quality (through decrease of the numbers of poor-quality batches).

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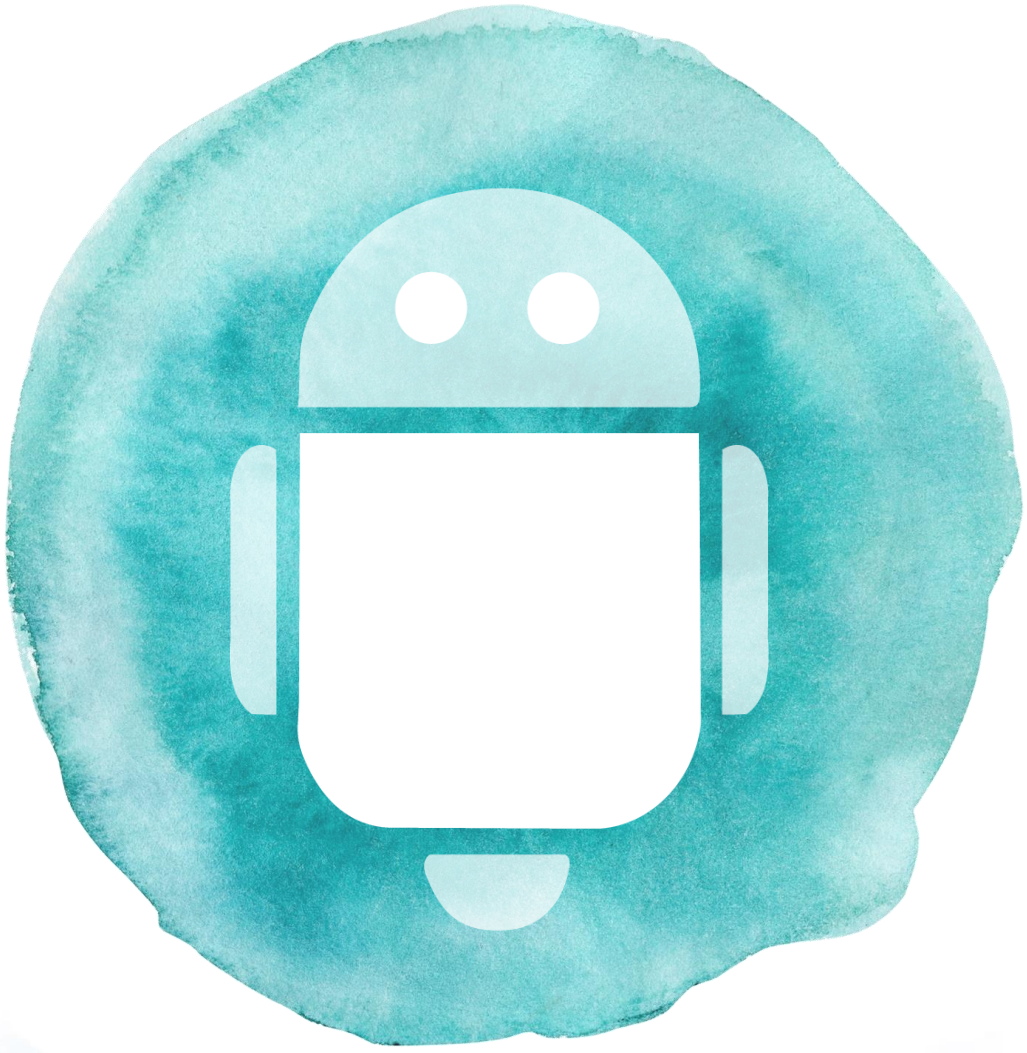


Our work and locations across the world

One of the largest professional services supplier to the NGO sector

We collaborate daily with the International Organisations in the public and private sector and at all levels and in varied technical areas to respond to a number of the organisation's needs. These experiences have allowed us to become familiar with the culture, organisational structure, policies and procedures, tools, methodologies, staff, rules and regulations, systems, controls, communication protocols, and other characteristics that typically define governance and oversight structures for multi-lateral and multi-national clients.

A focus on multi-lateral public sector organisations

We have achieved international recognition for dealing with significant public sector issues and have developed a large and prestigious public sector practice, even as some of our competitors have significantly reduced or eliminated theirs. Today, Deloitte has approximately over 37,300 professionals dedicated to serving national government, regional or state government, local government, education, international government organisations, and international not-for-profit entities in a variety of capacities worldwide.

A selection of our global NGO clients

World Health Organisation (WHO)	**United Nations High Commissioner for Refugees (UNHCR)**	WIPO's (World Intellectual Property Organisation)
UNITAID	UNAIDS	**The Global Fund**
International Committee of the Red Cross (ICRC)	International Federation of Red Cross and red Crescent societies (IFRC)	Gavi the Vaccine Alliance
International Organisation for Migration (IOM)	**United Nations Children's Fund (UNICEF)**	Roll Back Malaria
Drugs for Neglected Diseases Initiative (DNDi)	Foundation for Innovative New Diagnostics (FIND)	International Labor Organisation (ILO)
Geneva Centre for Security Policy (GCSP)	Millennium Foundation for Innovative Finance and Health	International Union for the Conservation of Nature and Natural Resources (IUCN)
CARE International	World Trade Organisation (WTO)	World Business Council for Sustainable Development
World Wide Fund for Nature (WWF)	Doctors Without Borders (MSF)	UN Office for Coordination of Humanitarian Affairs (OCHA)
United Nations Office for Project Services (UNOPS)	**United Nations Procurement Division (UNDP)**	United Nations Population Fund (UNFPA)
United Nations System Staff College (UNSSC)	United Nations Environment Programme (UNEP)	United Nations Educational, Scientific and Cultural Organisation (UNESCO)
UN Women	United Nations Framework Convention on Climate Change (UNFCCC)	**World Food Programme (FAO)**
United Nations Joint Staff Pension Fund (UNJSPF)	**World Economic Forum**	**UN Secretariat**
Department for International Development (DFID)	**European Patent Office**	Independent Inquiry Committee Into the UN Oil-for-Food Programme (ICC)
World Bank	United States Agency for International Development (USAID)	Centres for Disease control & Prevention (CDC)
UMOJA	European Union/Commission	Gates Foundation

Deloitte is the world's largest professional services firm

We will leverage the scale of Deloitte's global network of member firms to service the United Nations. This is comprised of over 411,900 professionals, working out of 744 offices, in over 159 countries across the globe; all acting as "One Firm" to deliver a single standard of quality and service consistency throughout this engagement. These firms bring world-class capabilities and high-quality service to clients, delivering the insights they need to address their most complex business challenges and make an impact that matters.

Our global network provides consulting, audit, tax, risk advisory and financial advisory services to a significant proportion of the world's largest public and private enterprises; across all industries and sectors. This experience provides those within our network with rich insights into the latest trends, solutions, challenges and helps us to keep our clients informed and ahead of reputational, regulatory, operational, financial and cyber risks to name but a few.

All of these firms are members of Deloitte Touche Tohmatsu Limited (DTTL), a UK private company limited by guarantee (which was incorporated in 1989); though DTTL does not itself provide services to clients. Each member firm provides services in a particular geographic area and is subject to the laws and professional regulations of the particular country or countries in which it operates. DTTL and each member firm are separate and distinct legal entities, which cannot obligate each other and are liable only for their own acts or omissions and not those of each other. Each member firm is structured differently in accordance with national laws and regulations.

Americas	Europe	Africa	Middle East	Asia Pacific
244 offices in	**318** offices in	**46** offices in	**33** offices in	**103** offices in
35 countries	**51** countries	**30** countries	**14** countries	**29** countries

Deloitte in numbers

More than **411,900+** professionals located in over **159** countries in **744** offices

Global revenue 2022 in excess of **US$59.3 billion**

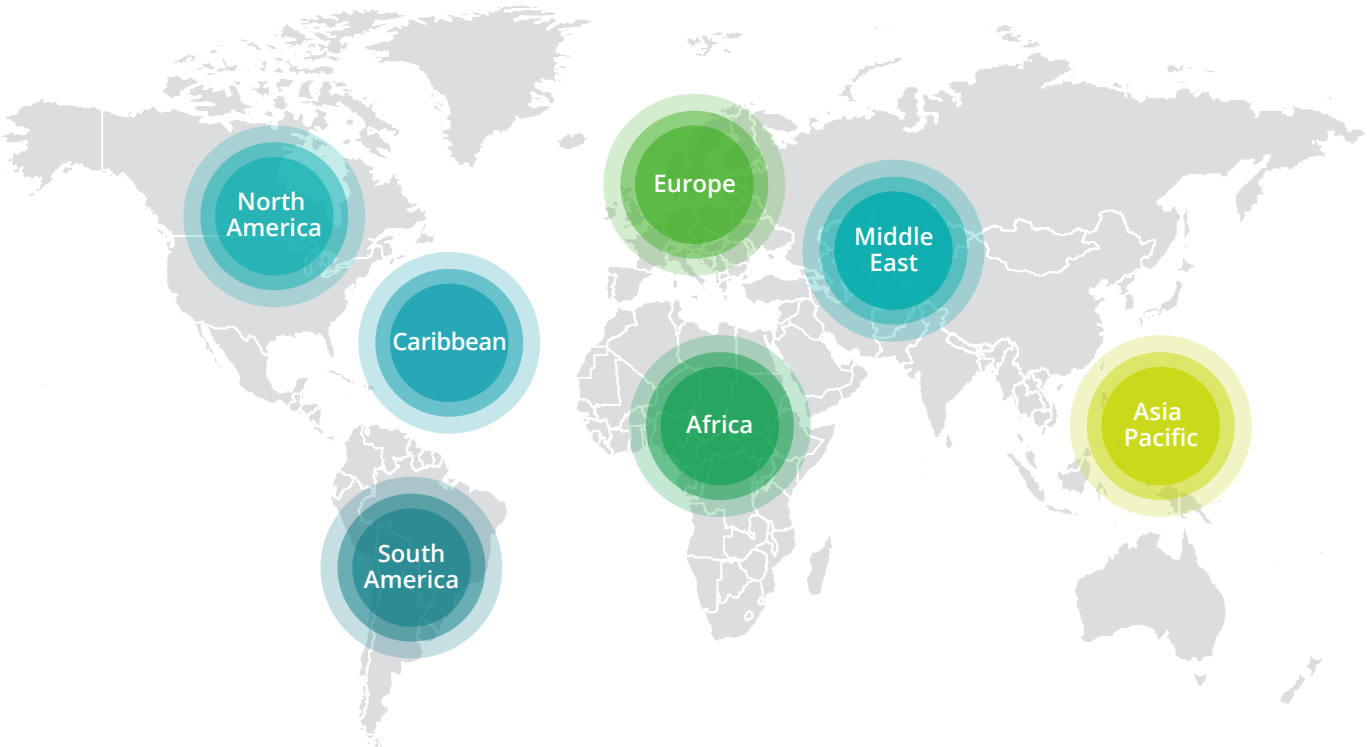
#1 Largest professional services organisation in the world

Long history and presence across regions

Over the course of the last 170+ years, we have worked tirelessly to support our clients to find solutions to their ever-changing needs and we are now a global leader in professional services today because, throughout our history, we have continuously sustained our clients' trust and exceeded their expectations. The table below details our prescience and history in each of the world's key geo-economic regions as well as the staff and country presence count around the world.

Our global network is underpinned by long established regional firms that have built a comprehensive understanding of the markets in which they operate and the cultural and linguistic unique elements that define it.

Region	Operational since
Asia Pacific	1968
Africa	1904
Middle East	1926
Europe	1845
North America	1896
South America	1908
Caribbean	1969



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Appendix: Machine Learning-based demand forecasting

Deep dive | ML-based demand forecasting

What is it?

Machine Learning (ML)-based demand forecasting is a **predictive analytics approach** that **leverages demand drivers** (i.e., internal/external factors) **to forecast future demand**

When is it applied?

DEMAND FORECASTING HORIZON

Short-term | Medium-term | Long-term

What are the benefits?

ML-based forecasting can **enable** your organisation to **accurately predict patient numbers** by **considering demand drivers** that influence the demand (e.g., reimbursement policies).
It also **reduces data latency** inherent in manual processes, **ensuring up-to-date insights** overcoming the limitations of traditional tools like Excel.

Demand forecasting maturity journey

No (or Naïve) Forecasting

1. Entirely reactive
2. The past is the indication of the future
3. Low capabilities
4. Planners are not skilled
5. Low SCP maturity
6. Medium time investment
7. No target measuring
8. No vision

Manual Forecasting

1. Excel hell
2. High risk of typo errors
3. No analytics
4. Medium capabilities
5. Medium maturity
6. High time investment
7. Few targets measuring
8. Unharmonised objectives across planning areas

Statistical Forecasting

1. Basic statistics algorithms
2. Demand planners are more skilled
3. Varying maturity by region
4. High time investment (incl. data chasing)
5. Focus on target achievement
6. Basic process in place

Advanced Forecasting

1. Advanced statistics algorithms
2. Challenge the plan
3. Plan by scenarios
4. Plan by segmentation
5. Plan by past performance
6. Planners are more skilled
7. Prioritisation processes
8. Financial planning
9. Sustainable processes

ML-based Forecasting

1. ML/DL techniques
2. Leveraging external/internal data
3. Relying on Demand Sensing
4. Systems are highly integrated
5. Orchestrated Supply Chain
6. Planners are more skilled
7. Root cause analysis
8. Analytics planning
9. Cross-functional process

Low Complexity → Medium Complexity → High Complexity

Low Forecast Accuracy → Medium Forecast Accuracy → High Forecast Accuracy

Low ROI → Medium ROI → High ROI

What is demand sensing?

External Inputs

- Population segmentation
- Expected regulatory approvals
- Physical prescription network

Internal Inputs

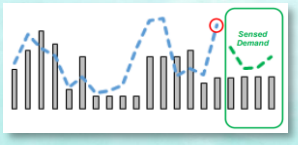
- Clinical trials
- Epidemiological data
- Trial outcomes
- Patient enrolment rates
- Drop-out rates
- Reimbursement policy

Machine Learning

- Weekly Matching & Balancing
- Daily Matching & Balancing

Pattern Detection

- Weekly Pattern Recognition
- Daily Pattern Recognition



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