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| Assignment Details | |
| Course title | **NCFE Level 3 Certificate in Data (603/7882/7)** |
| Unit | **01 Understand how to source data (L/618/8650)** |
| Task | **End of unit assessment** |
| Tutor | **Komal Karir** |
| Learner | ***Ladan Annette Mehrvarz*** |
| Date submitted | ***March 2025*** |

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| Candidate Statement | |
| All work submitted in your portfolio must be your own.  If you copy from somebody else or allow another candidate to copy from you then you may be disqualified. | |
| **I have read and understood the Notice for Candidates**  **I confirm:**   1. **This submission is my own work**   **b) Any help from others, excluding the tutor(s), has been explained below.** | |
| **Signature: Annette Ladan Mehrvarz** | **Date: 25/03/2025** |

Notes:

* Please answer using full sentences. Make sure to check spellings.
* Please ensure you rename this file to include your name at the beginning.

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| Question 1.0: Understand where common sources of data can be found |
| **Outline how and where can you obtain the information required to prepare a report for the potential client. Include URLs to publicly available data services.**  **(You do not need to prepare the report yourself).** |

*Enter your answer here:*

To prepare a report for a potential client, it's crucial to gather relevant, reliable, and up-to-date data. Below is an outline of how and where one can obtain the information required, including URLs to publicly available data services. The process involves understanding the client’s industry, business, and supply chain, and using various data sources to gather contextual information.

**1. Understanding the Client's Industry**

Before collecting specific data (static/dynamic/historical/structured/unstructured/hybrid) for the client, one must gather insights into the broader industry in which the client operates. This helps provide context for the client’s position in the market and informs the recommendations we make. We also need a comprehensive list of data providers and digital services across sectors such as Real-time Information, Commerce, Public Services, Education & Training, Entertainment, and more.

**Sources for Industry Data:**

* **Statista**: Provides access to statistics on over 60,000 topics across 170 industries, covering key metrics such as market trends, growth projections, and consumer behavior.
  + URL: [https://www.statista.com](https://www.statista.com/)
* **IBISWorld**: Offers industry reports that include market research, statistics, and analysis on a wide range of industries. You can find data on industry performance, trends, and forecasts.
  + URL: [https://www.ibisworld.com](https://www.ibisworld.com/)
* **World Bank Data**: Offers global economic and development data, including industry-level statistics for different countries and regions. It can be especially useful for understanding economic indicators that may impact your client’s industry.
  + URL: [https://data.worldbank.org](https://data.worldbank.org/)
* **Eurostat**: The European Union’s statistical office offers data on a wide range of industries, including detailed reports and analysis.
  + URL: <https://ec.europa.eu/eurostat>

**2. Client-Specific Business Data**

For a more tailored report, it's important to gather information directly related to the client's business, including financials, performance metrics, and strategic goals.

**Sources for Client Data:**

**Company Website**: The company's own website often has reports, press releases, and other details about its business operations, products, services, and market strategies.

**Annual Reports**: Most public companies publish annual reports containing financial statements, strategic objectives, and performance metrics.

**Investor Relations Pages**: For publicly traded companies, the investor relations section often includes quarterly earnings reports, SEC filings, and other business performance indicators.

**Third-party Data:**

* **Crunchbase**: A comprehensive directory of businesses, including details on funding rounds, key executives, and mergers/acquisitions.
  + URL: [https://www.crunchbase.com](https://www.crunchbase.com/)
* **Hoovers**: Offers detailed company profiles, including financials, industry classification, key executives, and market analysis.
  + URL: [https://www.dnb.com](https://www.dnb.com/)

**3. Supply Chain Data**

Understanding the client's supply chain, including suppliers, logistics, and inventory management, is critical to providing a holistic report.

**Sources for Supply Chain Data:**

* **ThomasNet**: A directory of suppliers and manufacturers, especially useful for finding suppliers in the U.S. and Canada.
  + URL: [https://www.thomasnet.com](https://www.thomasnet.com/)
* **Import Genius**: A resource for tracking shipping and supply chain data, including import/export data for businesses globally.
  + URL: [https://www.importgenius.com](https://www.importgenius.com/)
* **Panjiva**: Offers supply chain data, focusing on international trade and supplier information.
  + URL: [https://panjiva.com](https://panjiva.com/)

**4.** **Economic and Market Data**

For broader economic and market context, one can gather data from government and non-government sources that track economic indicators, industry performance, and consumer behavior.

**Sources for Economic and Market Data:**

* **Trading Economics**: Provides macroeconomic data for countries, including GDP growth rates, inflation, unemployment, and other economic indicators.
  + URL: [https://tradingeconomics.com](https://tradingeconomics.com/)
* **Bureau of Economic Analysis (BEA)**: A source of U.S. economic data, including GDP, personal income and outlays, and economic projections.
  + URL: [https://www.bea.gov](https://www.bea.gov/)
* **U.S. Census Bureau**: Offers detailed demographic, economic, and geographic data for the United States, which can be useful in understanding market size and consumer behavior.
  + URL: [https://www.census.gov](https://www.census.gov/)
* **OECD (Organisation for Economic Co-operation and Development)**: Provides economic reports, forecasts, and analysis on a range of topics relevant to multiple industries.
  + URL: [https://www.oecd.org](https://www.oecd.org/)

**5. Consumer Behavior and Public Opinion**

Data on consumer preferences, buying habits, and public opinion can be valuable when making recommendations for investments or strategic shifts.

**Sources for Consumer Data:**

* **Pew Research Center**: Provides data on social trends, demographics, and public opinion across a variety of topics.
  + URL: [https://www.pewresearch.org](https://www.pewresearch.org/)
* **Nielsen**: Offers insights into consumer behavior, market trends, and media consumption across different industries.
  + URL: [https://www.nielsen.com](https://www.nielsen.com/)
* **Google Trends**: A free tool that allows you to track the popularity of search queries over time, providing insights into consumer interests and trends.
  + URL: [https://trends.google.com](https://trends.google.com/)

6. **Geospatial and Location-Based Data**

If the report requires geospatial data, such as location analytics or regional market conditions, there are several resources that provide such data.

**Sources for Geospatial Data:**

* **OpenStreetMap**: A free, open-source mapping platform that offers geographical and location-based data.
  + URL: [https://www.openstreetmap.org](https://www.openstreetmap.org/)
* **USGS (United States Geological Survey)**: Provides data on natural resources, topography, and geographic features in the U.S. and globally.
  + URL: [https://www.usgs.gov](https://www.usgs.gov/)
* **Google Maps API**: Allows integration of location and map-based data for applications.
  + URL: <https://developers.google.com/maps>

**7.** **Publicly available datasets**

* **Government and official websites**

**DEFRA:** https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

**Office for National Statistics (ONS):** <https://www.ons.gov.uk/>

* **United Nations:** <https://www.un.org/en/global-issues/population>
* **CIA World Factbook**: <https://www.cia.gov/the-world-factbook/>

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**Conclusion**

To prepare a comprehensive report for a potential client, one can obtain data from a variety of sources, such as government portals, industry reports, market data services, consumer research tools, and even geospatial platforms. The combination of these sources will allow to provide relevant, accurate, and context-rich insights tailored to the client’s specific industry and business operations.

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| Question 2.0: Understand data formats |
| **What tools, charts and diagrams could you use to explain your reasons for recommending the five tech investments?** |

*Enter your answer below:*

To explain the reasons for recommending five tech investments for a specific client in its industry, one would need to use tools, charts, and diagrams that clearly convey data and support our analysis. We also need a solid understanding of IoT and how to optimize its use in our analysis and recommendations. Here’s an outline of what tools and visual aids one could use to present our recommendations effectively.

1. **Tools to Analyze Data**

Before presenting recommendations, it’s essential to have the right tools to analyze data. Some commonly used tools for data analysis include:

**Excel or Google Sheets**: For data organization, analysis, and basic charting. You can create pivot tables, apply filters, and perform simple calculations to analyze investment potential.

**Power BI or Tableau**: For more advanced data visualization. These tools help create interactive dashboards and allow for deep analysis of trends, patterns, and correlations.

**Python (Pandas, Matplotlib, Seaborn)**: If you need to perform advanced statistical analysis, Python libraries can help process data and generate visualizations (e.g., bar charts, line graphs, histograms).

**Google Data Studio**: A free, user-friendly data visualization tool that integrates with various data sources like Google Analytics, Sheets, and other data connectors.

**2. Charts and Diagrams to Present the Recommendations**

To make case for tech investments, the following charts and diagrams will be helpful:

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**1. Bar Charts**

**Purpose**: Show KPI (Key performance Indicators) and clear comparisons across different tech investments, such as potential ROI (Return on Investment) or the cost vs. benefit of each option.

**Use**: A bar chart can easily illustrate how different tech solutions compare on key metrics like cost savings, efficiency improvements, or projected market share increase.

**Example**: Compare the five tech investments across parameters like ROI, market share growth, or customer satisfaction improvement.

**Tool Example**: Excel, Google Sheets, Power BI, Tableau

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**2. Line Graphs**

**Purpose**: Display trends over time, such as how the tech investments are expected to impact the company’s performance in the coming years.

**Use**: If you're analyzing growth potential, a line graph could show projections for revenue, cost reduction, or customer growth over time.

**Example**: Show the forecasted return on investment over a 5-year period for each of the five tech investments.

**Tool Example**: Excel, Google Sheets, Power BI, Tableau

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**3. Pie Charts**

**Purpose**: Illustrate the proportion of benefits or investments, such as the allocation of budget or the impact of each technology on key business outcomes.

**Use**: A pie chart is a simple way to show how each of the five tech investments contributes to the overall strategy.

**Example**: A pie chart that divides the tech investments into percentages based on how they contribute to overall revenue growth or operational efficiency.

**Tool Example**: Excel, Google Sheets, Power BI

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**4. SWOT Analysis (Diagram)**

**Purpose**: Show a clear breakdown of each tech investment’s Strengths, Weaknesses, Opportunities, and Threats.

**Use**: This is useful for showing the risks and benefits of each recommended tech investment, providing a balanced view.

**Example**: A visual SWOT analysis for each of the five tech investments, which helps highlight both the potential rewards and challenges.

**Tool Example**: PowerPoint, Google Slides, Lucidchart

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**5. Scatter Plots**

**Purpose**: Visualize the relationship between two variables, such as cost and projected return or market size and technology adoption.

**Use**: Scatter plots are excellent for highlighting how different tech investments relate to key performance indicators (KPIs).

**Example**: A scatter plot showing the relationship between initial investment cost and long-term ROI for the five tech investments.

**Tool Example**: Excel, Google Sheets, Power BI, Tableau

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**6. Gantt Chart (Timeline)**

**Purpose**: Display the timeline of implementing the tech investments.

**Use**: A Gantt chart helps in planning the stages of tech adoption and implementation over time, illustrating when each tech investment will have the most significant impact.

**Example**: Display a timeline for the rollout of each tech investment, highlighting phases such as pilot testing, full implementation, and expected milestones.

**Tool Example**: Microsoft Project, Excel, Google Sheets

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**7. Heat Maps**

**Purpose**: Show areas of high priority or concentration in relation to various factors (such as market demand, cost savings, or technology adoption rate).

**Use**: Heat maps can help you identify the areas where each investment will have the most significant impact and highlight potential risks.

**Example**: Use a heat map to display the intensity of impact for each tech investment across different business units or regions.

**Tool Example**: Power BI, Tableau

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**8. Cost-Benefit Analysis Table**

**Purpose**: Show a detailed comparison of the costs and benefits for each tech investment in a structured table format.

**Use**: This table should include initial costs, ongoing maintenance costs, projected savings, and other relevant metrics to demonstrate the financial viability of each investment.

**Example**: A side-by-side table showing the cost and benefits of each technology, including both short-term and long-term impacts.

**Tool Example**: Excel, Google Sheets, Power BI

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3. **Flowchart for Decision-Making Process**

**Purpose**: A flowchart can visually represent the decision-making process or the steps involved in implementing each tech investment.

**Use**: This can help explain how one investment leads to the next step in achieving broader business goals.

**Example**: A flowchart showing the process from identifying the need for tech investment to the final implementation and expected outcomes.

**Tool Example**: Lucidchart, Microsoft Visio, Google Drawings

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***Conclusion***

To effectively communicate the reasons for recommending the five tech investments to the client, we use a combination of charts, diagrams, and tools that make our analysis clear, visual, and easy to understand. Bar charts, line graphs, and pie charts are great for numerical comparisons, while SWOT (Strength/Weakness/Opportunity/Threat) analysis, flowcharts, and heat maps are useful for illustrating more qualitative insights.

By combining these tools, we can provide a compelling case for each tech investment and demonstrate their value in the context of the client's specific business needs and industry trends.

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| Question 3.0: Purpose and Functions of Data Architecture |
| **Considering your company’s database system, list 3 entities for which data must be held.**  **Prepare a brief table of the type of information (i.e. attribute) you would store for ONE of the entities you mentioned above. For each attribute define its data format (e.g. client’s first name, 20 characters, string)**  **How would you ensure clients’ information is secure from unauthorised access and maintenance?** |

*Enter your answer below:*

Before our analysis, we need a clear understanding of the data used for our company scenario, including the format of data such as:

* **Alphabetic, Numeric, and Alphanumeric:**
  + **Character Strings, Integers, and Decimals**
* **Temporal Data:**
  + Data recording events or changes over time (e.g., user logins/logouts, stock market prices)
* **Geospatial Data:**
  + Mapping coordinates, 3D referencing, GPS locations
* **Media Data:**
  + Data from social media and news outlets
* **Logical Data:**
  + Data defining rules and conditions for decision-making
* **Reference Data:**
  + Fixed, unchanging data used to classify or categorize (e.g., Dewey Decimal system, animal kingdom classification)

We also need a clear understanding of the following when **selecting appropriate data formats**:

* **Data Consistency:**
  + Using the same data format when merging datasets
  + Ensuring consistency in data types (e.g., integer vs decimal) within the same dataset
  + Converting data to a common unit of measurement (e.g., inches vs centimeters)
* **Measure Calculation:**
  + Using the appropriate format for specific purposes (e.g., integer format for vehicle speed on a motorway, decimal format for population statistics)
* **Unit Conversion:**
  + Converting to standard units of measurement (e.g., inches to centimeters, Celsius to Fahrenheit)
  + Assigning numeric values to ordinal data (e.g., Grade A = 5 units, Grade B = 3 units)

**1.** **Entities for Data Storage**

Considering our company’s database system scenario example, here are **three entities** / **tables** for which data must be held:

**Clients**

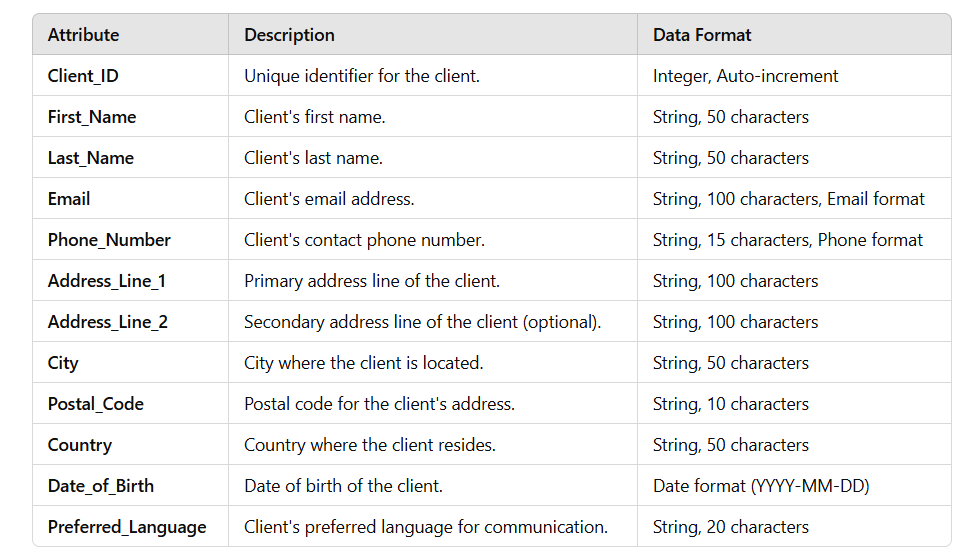
**Products**

**Orders**

For this example, I’ll focus on **Clients** and the attributes to be stored for this entity.

**2.** **Client Entity: Attributes and Data Formats**

Here's a table of the **attributes** and their **data formats** for the **Client** entity:



**3. Ensuring Clients' Information is Secure from Unauthorized Access and Maintenance**

To ensure that clients' information is secure from unauthorized access and maintained properly, the following strategies can be implemented:

**a. Encryption**

**At Rest**: Encrypt client data stored in the database using robust encryption algorithms (e.g., AES-256). This ensures that even if the database is compromised, the data remains unreadable without the decryption key.

**In Transit**: Use HTTPS (SSL/TLS) for encrypting data being transmitted between the client’s application and the server. This prevents eavesdropping and man-in-the-middle attacks.

**b. Access Control**

**Role-Based Access Control (RBAC)**: Implement RBAC to restrict access to client data based on user roles (e.g., administrator, manager, user). Only authorized personnel should have access to sensitive client information.

**Least Privilege Principle**: Grant users the minimum level of access they need to perform their job functions. For example, sales representatives may only need access to client names and email addresses, not sensitive data like credit card numbers.

**c. Authentication and Authorization**

**Multi-Factor Authentication (MFA)**: Require MFA for users who need access to client data. This adds an extra layer of security by requiring two or more forms of authentication (e.g., password and one-time passcode sent to the user’s phone).

**Strong Password Policies**: Enforce strong password policies, requiring users to create complex passwords and change them regularly.

**d. Regular Security Audits and Monitoring**

**Database Monitoring**: Continuously monitor access logs to detect unusual activity such as unauthorized access attempts, excessive failed login attempts, or changes to sensitive data.

**Penetration Testing**: Regularly conduct penetration tests to identify vulnerabilities in the database system or its associated applications and fix them before they can be exploited.

**e. Backup and Disaster Recovery**

**Regular Backups**: Ensure regular backups of the database are taken to avoid data loss in case of system failure or breach. Backup data should also be encrypted.

**Disaster Recovery Plan**: Have a well-documented and tested disaster recovery plan in place that includes steps for securing data, restoring databases, and recovering operations in the event of a security breach.

**f. Data Masking and Anonymization**

**Data Masking**: Mask sensitive client data (e.g., credit card numbers, social security numbers) so that unauthorized users cannot view the full value of the data. For example, showing only the last four digits of a credit card number.

**Anonymization**: When working with client data for testing or development purposes, anonymize sensitive information to prevent it from being exposed during non-production use cases.

**g. Legal and Compliance Measures**

**Data Privacy Regulations**: Adhere to relevant data privacy laws such as GDPR (General Data Protection Regulation) in the EU, CCPA (California Consumer Privacy Act), or other local data protection regulations. Ensure that clients are informed about how their data is used and obtain proper consent.

**Data Retention Policy**: Establish a clear data retention policy and ensure client data is stored for only as long as necessary for business purposes. Once it's no longer needed, it should be securely deleted.

**i. Data Architecture**

**Data Architecture: Helps to** define the structure of data within an organization, guiding the development, storage, and operation of information systems. It uses diagrams like Entity-Relation and Data Flow Diagrams to show relationships and data movement. Its purpose is to ensure organized data, define rules, and manage access, security, and sharing. Key principles include data access, management, and security, as well as organizing data types, formats, and storage. Integration challenges, such as legacy systems and third-party apps, can cause redundancy, but a single platform reduces this while being costly to implement. Security focuses on data confidentiality, integrity, and availability, with controls for both users and system administrators.

**h. Data Standard Protocols (SDP)**

**Data Standard Protocols (SDP):** are established guidelines and frameworks that ensure consistency and interoperability when exchanging data between different systems, platforms, or organizations. By implementing SDPs, our company can streamline data sharing, reduce errors, and ensure that information is exchanged in a standardized format, regardless of the system used. In our industry, this helps improve data accuracy, enhances collaboration with partners and clients, and supports compliance with regulatory standards, ultimately optimizing operations and decision-making.

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**Conclusion**

By using encryption, implementing robust access controls, ensuring regular audits, and following industry best practices for data security, we can ensure that our clients' information is protected from unauthorized access and that it remains secure throughout its lifecycle.