A CASE STUDY

ON

CHANNEL 4: NAVIGATING BIG DATA ANALYTICS WITH SCRUM METHODOLOGY IN THE BROADCASTING INDUSTRY

COURSE NAME

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1. INTRODUCTION

1.1. Background of Channel 4: Evolution and Challenges

Channel 4 has established itself as an important player in the broadcasting industry by adeptly adapting to the constantly changing entertainment market. Initially focused on telecasting, Channel 4 quickly adapted to the evolving habits of its viewers. The transition from traditional TV broadcasting to the digital era marked a major turning point for the company. With the arrival of social media platforms like Twitter and Facebook, Channel 4 welcomed a new challenge for audience engagement with its content and promoted constant interactions between broadcasters and viewers. This transition not only encompassed technological progress but also included the changing trends of how people access, consume, and interact with media content. (Hadida & V.Astandu, 2013)

1.2. Problem Statement: Utilization of Big Data for Profit and Marketing

As Channel 4 moved into the realm of internet-based delivery of content, it faced a crucial challenge to deals with Big Data generated by online interactions. CEO David Abraham recognized the opportunity to maximize profits by analysing data, and therefore started company's journey to utilize Big Data for targeted advertising and marketing strategies. However, the initial infrastructure was not sufficient to manage the scale and complexity of the data. In response to this challenging scenario, Channel 4 made the decision to switch to cloud-based solutions and specifically chose the popular Amazon EMR service. (Hadida & V.Astandu, 2013) This strategic move aimed at building strong foundation for taking advantage of Big Data analytics effectively and efficiently. To execute this transition, Channel 4 decide to implement Agile framework, specifically the Scrum methodology, to ensure efficient and progressive implementation of the new service.

1.3. Aim and Objectives of the Study

In this study, the objective is to examine potential application of Big Data and analysis in the context of Channel 4's transition to internet-based content delivery. The scope covers the theoretical frameworks with the practical application, with strong focus on applying the Scrum framework for the development of the new service. This study tries to provide a comprehensive overview of how Big Data analytics and Agile techniques can be integrated in the broadcasting sector. It will further examine the entire process, from data collecting and analysing to the agile development.

This study examines the practical implementation of Agile concepts in Channel 4's project by exploring different Scrum events and roles, such as the Product Owner, Scrum Master, and cross-functional teams. The study offers a detailed comprehension of how Scrum facilitates teamwork, flexibility, and adaptive development in complex project environments, beginning with sprint planning and continuing through execution. The study aims to provide organizations with valuable insights and best practices taken from Channel 4's experience. It attempts to inform and motivate companies that are implementing Agile methodology in order to achieve innovation and achieve a competitive advantage.

2. INTRODUCTION TO SCRUM FRAMEWORK

The Agile framework is a software development method based on flexibility, collaboration, and customer feedback. It is defined by its cyclic and incremental approach. Unlike traditional waterfall model, Agile allows teams to adapt to changing demands and deliver value for clients more rapidly. Scrum is one of the most widely used Agile methodologies. (Lemay, 2018)

2.1. Overview of Scrum Methodology

Scrum is a concise framework which provides an organized method to managing complex tasks. Scrum divides work into small time frame called sprints. Every sprint starts with a planning session in which the team assigns the tasks to be achieved, and ends with an assessment and retrospective to assess the process to make improvements. (Sachdeva, 2016)

The primary objective of Scrum is to deliver valuable product increments repeatedly and progressively. Scrum methodology enables the delivery of high-quality products that meet client requirements by breaking down work into smaller parts and continually integrating customer and stakeholder's feedback. (PATARY, 2019)

2.2. Advantages for using Scrum in Channel 4 Case scenario

Scrum framework is more favourable for this case study due to its unique features like Iterative Approach, focus on delivering value, cross-functional collaboration and encouraging collaboration across teams. (Doshi, 2016)

a. **Iterative Approach:** Given the dynamic nature of the media industry discussed in the case study, implementing an iterative methodology such as Scrum allows Channel 4 to efficiently adapt to changing consumer preferences and technical improvements.
b. **Focus on Value Delivery:** Scrum framework focus on delivering additional benefits fits with Channel 4's objective of utilizing Big Data for analytical insights and profit maximization. Which can be possible through feedback and improvement cycles.
c. **Cross-functional Collaboration:** Scrum's collaborative approach allows teams from different departments at Channel 4 to actively collaborate, including insights from data analysts, technical experts, and business stakeholders.
d. **Continuous Improvement:** By doing regular sprint reviews and retrospectives, Scrum enables Channel 4 to continually improvement in Big Data management and analytics abilities.

In order to effectively implement Scrum at Channel 4, it is crucial to align with the company's culture, create teams with diverse skill sets, involve stakeholders, provide training, and stay flexible in adapting the process as needed. Effective communication, constructive feedback, and continuous growth are important aspects of this framework.

3. BIG DATA MANAGEMENT USING AMAZON EMR

3.1 Difficulty in Big Data Management and Analysis: Channel 4

Initially, Channel 4 realized the huge opportunity in using the large amount of data (Big Data) generated by customer interactions with its digital and video-on-demand (VOD) services. The company decided to analyse data with its own infrastructure. When attempting to perform data analytics using existing on-premise infrastructure, the company faced several challenges. The amount of unstructured data was too large to handle with existing resources like data analytics software and other physical infrastructure. The process of data collection and analysis was complex and challenging, which led to significant delays and difficulties in extracting valuable insights.

To resolve such issues, management of Channel 4 make a strategic decision to migrate to a cloud-based solution, specifically Amazon Elastic MapReduce (Amazon EMR). This step offered the scalability, flexibility, and processing power, which was needed to efficiently manage and analyse large volumes of data in an efficient way. Channel 4 selected AWS EMR to improve its data analytics processes, resulting in quicker decision-making and better interaction with viewers and partners.(*AWS Case Study: Channel 4*, n.d.)

3.2. Data Management and Analysis using Amazon EMR

In 2012-13, Channel 4 faced issues handling increasing volume of unstructured data. Channel 4 selected AWS EMR for its capabilities for data analytics, flexibility in scaling, and cost effectiveness. There are several advantages to this decision.

3.2.1 Advantages of Amazon EMR

a. **Reduced Time-to-Insight:** Channel 4 faced major delays in collecting and analysing relevant data, which led to a time period of up to eight months. After adopting AWS EMR, Channel 4 reduces processing time by one to two days, which allowed Channel 4's analysts to make faster and more precise decisions for the installation, scheduling, and monetization of content.
b. **Comprehensive Data Analysis:** Amazon EMR allowed Channel 4 to analyse 100% of the data, compared to just a portion of it with on-premise analytics methods. It allows Channel 4 to obtain more insight into audience tastes and behaviours, which helps in scheduling and marketing.
c. **Enhanced Scalability:** By running on a cluster of Amazon EC2 instances with Intel Xeon E5 family processors, AWS EMR provided Channel 4 with almost limitless power to process large volumes of data efficiently. This scalability assured that Channel 4 could handle the Big Data without significant investments for additional infrastructure.
d. **Cost Efficiency:** By using AWS EMR, Channel 4 avoid the cost of additional infrastructure like servers, disks, and CPUs. The pay-as-you-go pricing model of AWS allowed Channel 4 to reduce costs by paying only for the resource consumed, thus maximizing cost efficiency and maximum return on investment. (*Amazon EMR Features - Big Data Platform - Amazon Web Services*, n.d.; *AWS Case Study: Channel 4*, n.d.)

3.2.2 Data Collection using Amazon EMR

Amazon EMR played an important role for data collection for Channel 4, including both structured and unstructured data. Structured data is usually data that is organized in a pre-defined format, like databases or worksheets. On the other side, unstructured data does not have a specific data model and can include things like text, images, videos, and social media interactions. For Channel 4, structured data includes viewer demographics, viewing habits, and advertising metrics for engagement. On the other hand, unstructured data includes social media interactions, viewer comments, and sentiment analysis etc.

Amazon EMR comes with following features for Data collection and Management.

a. **Amazon S3 (Simple Storage Service)**: Channel 4 can have a reliable and scalable storage capacity for data collected from different sources which can be possible with Amazon S3 services. Which provide Channel 4 with security to store large volumes of data with seamless integration.
b. **Apache Hive and Apache Pig:** Both these frameworks come with data processing tools, which allow Channel 4 to efficiently handle and analyse the large and complex data sheets.
c. **EC2 Services:** Amazon EC2 features powerful Intel Xeon E5 family processors, which provide high-performance computing capacity with faster data processing and analysis.

3.2.3 Data Analytics using Amazon EMR

Amazon EMR enabled Channel 4 to efficiently analyse a wide range of data, including structured as well as unstructured data. Structured data analysis includes querying and processing data in table format, while unstructured data analysis involves extracting insights from text, images, and multimedia content. In this case, Channel 4 used Amazon EMR to analyse viewer engagement statistics, like the number of clicks, views, and interactions with content (structured data). In addition, they employed EMR to conduct viewer's sentiment analysis on social media comments and content posted by users (unstructured data). The table 3.1 shows examples of structured and unstructured data analysed by Channel 4 with Amazon EMR:

Table 3.1: Data Analysis using different feature of Amazon EMR*

Source of Data	Data Type	Feature of Amazon EMR
Viewer engagement metrics (e.g., clicks, views)	Structured	Hive, Apache Pig
Social media comments and interactions	Unstructured	Hadoop, Apache Spark
Content preferences based on viewing history	Structured	Spark SQL, HBase
User-generated content sentiment analysis	Unstructured	Apache Flink, TensorFlow

Source: (*Amazon EMR Features - Big Data Platform - Amazon Web Services*, n.d.; *AWS Case Study: Channel 4*, n.d.)

***Note:** Appropriate literature about Source of data for channel 4 is not available. Table 3.1 is created by general information available on various sources.

3.2.4 Development of Big Data Control Panel (BDCP) for Data Management

Amazon EMR allowed Channel 4 to use advanced data analysis techniques to extract valuable insights from both structured and unstructured data. The Big Data Control Panel (BDCP) developed by Channel 4 allowed analysts to manage and monitor Amazon EMR clusters, submit queries, and extract data for modelling applications. Channel 4 used different services in Amazon EMR to create the BDCP. They used Apache Hive for querying structured data, Apache Pig for data processing, and Apache HBase for storing and retrieving large-scale structured data. The combination of these services provided analysts with the necessary tools to extract valuable insights from the extensive data collected by Channel 4. (*Amazon EMR Features - Big Data Platform - Amazon Web Services*, n.d.; *AWS Case Study: Channel 4*, n.d.)

In addition to data collection and analysis, Amazon EMR provides a range of other features that can improve the data analytics process for Channel 4. Amazon EC2 (Elastic Compute Cloud) offers scalable compute resources for running data processing tasks, while Amazon S3 (Simple Storage Service) provides scalable and secure storage for large volumes of data. In addition, Amazon EMR offers support for machine learning frameworks such as Apache Spark MLlib and TensorFlow. This allows Channel 4 to conduct advanced analytics, forecasting, and recommendation systems. The data analytics capabilities of Amazon EMR are complemented by these features, offering Channel 4 a comprehensive platform to derive insights from their data. (*Amazon EMR Features - Big Data Platform - Amazon Web Services*, n.d.)

3.3 Legal Considerations in the UK and Europe

For this case study, Channel 4 operates in the UK and Europe, complying to regulatory acts such as the General Data Protection Regulation (GDPR), the Data Protection Act 2018 (DPA 2018), the EU Data Protection Directive (Directive 95/46/EC), and ePrivacy Directive (Directive 2002/58/EC) to ensure compliance with data protection and privacy laws. (*EUR-Lex - 02002L0058-20091219 - EN - EUR-Lex*, n.d.; *The History of the General Data Protection Regulation | European Data Protection Supervisor*, n.d.)

3.3.1 Legal Framework and Compliance Requirements

a. **General Data Protection Regulation (GDPR):** GDPR is a comprehensive data protection regulation applicable in the European Union (EU) and the European Economic Area (EEA). It regulates the handling of personal data while enforcing stringent standards for organizations concerning data protection, privacy, and individual rights. (*What Is GDPR, the EU's New Data Protection Law? - GDPR.Eu*, n.d.)
b. **Data Protection Act 2018 (DPA 2018):** DPA 2018 is the UK's implementation of GDPR, in addition to additional provisions specific to UK data protection laws. It ensures that personal data processing in the UK is regulated and that GDPR standards are followed. (*Data Protection Act 2018*, n.d.)

c. **EU Data Protection Directive (Directive 95/46/EC):** The EU Data Protection Directive, despite being replaced by GDPR, established guidelines for safeguarding personal data within EU member states prior to the implementation of GDPR. (*EUR-Lex - 02002L0058-20091219 - EN - EUR-Lex*, n.d.)
d. **ePrivacy Directive (Directive 2002/58/EC)**: The ePrivacy Directive regulates privacy and electronic communications in the EU, addressing areas like the protection of communication confidentiality, the use of cookies, and electronic marketing. (*EUR-Lex - 02002L0058-20091219 - EN - EUR-Lex*, n.d.)

3.3.2 Amazon EMR for Legal Compliance, Data Security, and Privacy

Amazon EMR provides a wide range of features that ensure legal compliance, data security, and privacy in big data management. EMR provides advanced security features, including encryption, data confidentiality, and compliance with tools like Amazon CloudWatch. These capabilities allow organizations to meet regulatory requirements such as GDPR and DPA 2018. In addition, features like access controls and audit logging help maintain data governance, guaranteeing compliance with legal and regulatory standards for data processing operations. Using Amazon EMR, organizations may minimize privacy issue, improve data security, and accomplish regulatory compliance. (*GDPR - Amazon Web Services (AWS)*, n.d.)

3.4 Sales and Profit Maximization using Data Analytics

Through the analysis of data obtained by the Amazon EMR platform, Broadcasting company can effectively improve its profit margins in different ways. Firstly, by targeting advertising based on viewer preferences, habits, and demographics, (Mohbey et al., 2020) Channel 4 can maximize the efficacy of its advertising strategies, which leads to higher ad revenues. Channel 4 can improve viewer engagement and ad sales by customizing advertising content to align with the interests and needs of different target groups. Channel 4 can also provide premium advertising features to businesses looking to reach specific audiences by identifying high-value viewer groups, this helps channel 4 to charge higher ad rates and increase revenues. (Walker, 2015)

In addition, by the examination of viewer data to detect trends and patterns in viewing habits, Channel 4 can improve its content production and development strategies. This ensures that the channel 4 invests in content that strongly attracts to its audience and promotes viewer engagement and interest. Channel 4 can use data-driven insights for improving its marketing strategies, help to identify the most viewed content, advertising, and timing to improve the reach and engagement of its content and services among the audience. By using data analytics, Channel 4 can reach new sources of profits, boost the efficiency in advertisements, and improve viewer engagement, eventually help to increased profits. (Kambatla et al., 2014)

4. IMPLIMENTATION OF SCRUM FOR CHANNEL 4

This chapter discuss the implementation of the Scrum framework for Channel 4's project to development using cloud service Amazon EMR. Starting with the project's vision and mission, this chapter will explore the strategic objectives and various aspects of Scrum events and various roles.

4.1. Project Vision and Mission Statement

In the Scrum framework, the project vision and mission statement work as core values that define the overall goals and objectives of the project. The vision statement clearly defines the ultimate objective and expected outcomes of the project, while the mission statement provides a precise guidance for achieving those objectives.(PATARY, 2019)

4.1.1 Project Vision

“Empower Channel 4's future with Agile Scrum on Amazon EMR, turning data into dynamic insights.”

This vision shows the implementation of Scrum methodology to support the development of a system on Amazon EMR specifically designed for Big Data Analysis. This aligns with Channel 4's strategic goals of utilizing data analytics to make better decisions and enhance company productivity.

4.1.2 Project Mission

The mission of this project is to create a platform called Big Data Control Panel (BDCP) that allows Channel 4 to derive important insights through data analysis. Channel 4 intends to increase its profitability by using these insights to make appropriate decisions and implement focused initiatives, therefore improving its competitive advantage. By following Scrum principles with well-defined vision and mission, the project team can work together efficiently to achieve Channel 4's strategic goals.

4.2. Role of Product Owner and Scrum Master

The Product Owner and Scrum Master play important roles in ensuring the successful completion of the project.

4.2.1 Product Owner

The Product Owner in this case reflects the objectives of Channel 4 and works as the bridge between the stakeholders and the Scrum Team. Their main duty is maximizing the value of the system that is being developed by prioritizing and monitoring the product backlog. (Sverrisdottir et al., 2014)The Product Owner will have responsibility for Channel 4's project, handling the following duties:

a. Defining the vision and mission for the service on Amazon EMR, ensuring they are in line with Channel 4's strategic objectives of improving viewer engagement and maximizing profits.
b. Participating in collaboration with stakeholders, such as managers, marketing groups, data analysts, and IT teams, to collect demands and obtain feedback.
c. Making sure the increments are supplied in a way that satisfies the quality standards and acceptance requirements set by Channel 4.
d. Attending sprint planning, review, and retrospective meetings to offer support, address queries.

4.2.2 Scrum Master

The Scrum Master serves as a leader who supports and guides the Scrum Teams in implementing and adopting Scrum principles and methods. Their primary responsibility is to remove difficulties, promote teamwork, and ensure that the Scrum Team maintains its focus on providing additional value. (Ereiz & Music, 2019) For Channel 4's task, the Scrum Master would be responsible for:

a. Provide an assistance to the Scrum Team to understand and accept Scrum concepts, procedures, and roles.
b. Ensuring the efficacy and productivity of sprint planning, daily stand-up, sprint review, and sprint retrospective sessions.
c. Eliminate barriers and blockages that block the development of the Scrum Team, provide guidance to overcome technical problems, resources limitation and reduce communication gape.
d. Supervising and monitoring the team's progress, identify areas of improvement, and ensure work efficiency of teams.

4.3. Role and Composition of Different Scrum Teams

To successfully execute the project of developing the platform on Amazon EMR for Channel 4, it is important to have multiple teams with different responsibilities and expertise while utilizing the Scrum framework. Table 4.1 shows an overview of various teams that require with specific role and responsibility in given case scenario:

Table 4.1 Role and Responsibility of different scrum team

Sr. No.	Scrum Teams	Team Members	Responsibility
1	**Development Team**	Software engineers, developers, programmers	Designing, coding, and implementing the platform on Amazon EMR
2	**Data Analytics Team**	Data scientists, analysts, researchers	Analysing large volumes of data from various sources to extract insights and trends
3	**Infrastructure Team**	Cloud architects, system admin., DevOps engineers	Setting up and maintaining the infrastructure required to support the platform on AWS
4	**Quality Assurance (QA) Team**	QA engineers	Testing the platform's functionality, performance, and security to ensure quality standards
5	**Data Privacy and Compliance**	Data privacy and compliance experts, legal advisors	Ensuring compliance with data privacy regulations and guidelines, developing and enforcing policies
6	**Marketing and Sales Team**	Marketing strategists, sales representatives	Promoting the platform to potential users and stakeholders
7	**Research and Development**	Research scientists, innovation specialists	Exploring new technologies and methodologies, perform research to enhance platform

Source: (*Agile Software Development Team Structure in 2024: Guideline*, n.d.; *Software Development Team Structure: Roles & Responsibilities — ITRex*, n.d.; Hoda et al., 2013)

4.4. Importance of Scrum Events in the Development Cycle

In the implementation of the Scrum framework to develop a platform on Amazon EMR for Channel 4, each Scrum Event plays an important part in ensuring effective growth and successful delivery of the project. (Doshi, 2016)

a. **Sprint:** The Sprint is a time-boxed iteration during which a potentially shippable product increment is created. In this case study, Sprints help the scrum team to focus on particular tasks and final products within a specific time duration, ensure progress toward the project objectives.
b. **Sprint Planning:** It is general meeting in which the Scrum Team plans and organizes the tasks to be completed during the sprint, including addressing the product backlog and making a plan to archive targets. In this case, Sprint Planning ensures that team efforts are in line with company goals and objectives. It allows the team to prioritize tasks according to their importance.
c. **Sprint Goal:** It is a brief statement that specifies the goals that the Scrum Team need to achieve within the specified time period. It offers a distinct and precise objective and guidance for the team's activities. In this case study, describing a Sprint Goal assures that all team members work together for a similar objective, with teamwork and coordination during the Sprint session.
d. **Daily Scrum:** The Daily Scrum is a short and regular meeting in which the Scrum Team coordinates their actions and plans for the day's tasks. It provides a chance for team members to discuss development, identify any challenges, and modify their plans as per requirements. For Channel 4, the Daily Scrum help to increases transparency and communication among team members, allow them to resolve issues as quickly as possible which help team to Sprint goals in limited time duration.
e. **Sprint Retrospective:** It is a final meeting conducted at the end of the Sprint to analyse the team's progress and identify areas for improvement. In our case study, the Sprint Retrospective helps Channel 4 to continuously improve the development process, helps to address any difficulties, and improve teamwork and productivity over time.

The building Channel 4's system on Amazon EMR will proceed more efficiently with regular opportunities for collaboration, feedback, and improvement if above mentioned Scrum events are implemented in systematic way. The Scrum framework allows the team to provide value in small increments and successfully adjust to changing requirements by adopting the principles of flexibility and innovation.

5. CONCLUSION

This case study focuses on Channel 4, a key player in the broadcasting industry that navigates the shift from traditional television broadcasting to delivering entertainment over the internet. The company faces the challenge of effectively utilizing big data for profit maximization. After facing some challenges with on-premise solutions, Channel 4 decides to use Amazon EMR, a cloud-based solution, to build a new platform using Agile methodologies, particularly the Scrum framework. This study tries to examine the integration of big data analytics and Agile methodologies in the broadcasting industry, specifically Channel 4's transition towards internet-based content distribution and the implementation of Scrum methodology for project management.

The Scrum framework is selected because it provides a structured approach to managing complex tasks, making it ideal for this case study. The agile methodology, specifically Scrum, mainly focused on providing value, team collaboration, and continuous improvement, is ideal for Channel 4's objectives of increasing revenues through data analytics and improving customer engagement. Channel 4 can effectively respond to evolving customer preferences and technological advancements using the Scrum framework, as well as provide high-quality products that satisfy client specifications.

For big data management, Amazon EMR emerges as the most efficient technology for Channel 4 because it offers scalability, flexibility, and computing power to handle large volumes of data effectively. Channel 4 uses Amazon EMR to analyse both structured and unstructured data, extract important insights, and develop strategies to enhance user engagement and increase profitability. The implementation of the Big Data Control Panel (BDCP) expands Channel 4's data management capabilities, enabling analysts to manage, monitor, and extract insights from big data sets. Additionally, Amazon EMR facilitates the process of addressing regulatory requirements in the UK and Europe, ensuring compliance with data protection and privacy regulations like GDPR and DPA 2018. Moreover, Amazon EMR allows Channel 4 to improve sales and profitability by utilizing advanced data analytics, adapting advertising to viewer habits, improving content creation, and enhancing marketing methods.

The implementation of Scrum for Channel 4's project highlighted the significance of clear vision and mission statements, effective role of Product Owner and Scrum Master, and Scrum teams. By using strategic planning, coordination, and collaboration, Channel 4 effectively achieved its project goals, which led to increased productivity and innovation in its operations. Scrum events were important in promoting communication, planning, and execution.

In summary, the combination of Big data analytics, Amazon EMR, and the Scrum methodology allows Channel 4 to transform its operations, improve viewer engagement, and optimize revenues in the broadcasting sector. By effectively using these technologies and methods, Channel 4 can stay ahead in terms of innovation and competitive advantage.

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