

Applying Agile and AI methodologies to incident management in mobile networks

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Abstract. *Effective incident management is important for maintaining service continuity and user satisfaction in the ever-changing telecommunications industry of today. Conventional methods frequently depend on strict, sequential workflows that impede responsiveness and delay resolution. To overcome these constraints, this paper suggests an improved incident management framework that incorporates AI and Agile approaches. We simulate both a traditional resolution model and an enhanced Agile and AI scenario using a critical fiber cut that impacts more than 15,000 ONUs as a case study. The improved model uses AI to automatically classify incidents, correlate data, and assign tasks based on roles, while Agile sprint planning allows for parallel execution and real-time progress monitoring. Time-boxed sprints are used to organise tasks, improving coordination and cutting down on escalation delays. In comparison to the conventional method, simulation results indicate a 20% reduction in overall expenses and a 1h 45m reduction in resolution time. The results imply that a more proactive, open, and effective response to network incidents is made possible by fusing AI automation with Agile principles. By showing how Agile and AI can work together to optimise incident workflows, increase resilience, and improve service quality in critical infrastructure environments, this study adds to the expanding body of research on digital transformation in telecom operations.*

Keywords: incident management, telecommunications, service, agile, network, workflow

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Introduction

The robustness and effectiveness of mobile telecommunications networks have become essential for social and economic stability in today's hyperconnected world. Network interruptions, whether brought on by hardware malfunctions, fiber outages, or congestion, can have a big effect on service-level agreements and user experience as the need for constant connectivity grows. Conventional incident management procedures, which are usually based on manual workflows and hierarchical escalations, frequently lead to slow response times, higher operating expenses, and disjointed team communication.

Automation, digitisation, and customer-centric service design are driving a rapid transformation in the telecommunications industry. Intelligent automation, Agile transformation, and continuous process improvement are important pillars for guaranteeing operational excellence and customer satisfaction in mobile network operations. These changes call for new approaches to team organisation and network incident response because they are not only technical but also profoundly managerial and procedural.

The exponential growth of data traffic, user expectations, and infrastructure density have made managing network incidents more difficult for the telecom sector in recent years. Fault resolution and customer notification are frequently delayed significantly by traditional incident management models, which are based on static workflows and sequential escalation chains. This study explores a hybrid incident resolution model based on AI-enabled automation and Agile principles in order to overcome these constraints.

The central research question guiding this work is: *To what extent can Agile methodologies and Artificial Intelligence (AI) enhance the efficiency and responsiveness of incident management processes in mobile telecommunications networks?*

The central hypotheses tested in this research are the following:

H1: The integration of Agile methodology and AI automation into mobile network operations leads to a significantly shorter incident resolution time compared to traditional linear escalation workflows.

H2: The Agile+AI incident management model improves task coordination and reduces the financial costs associated with high-severity (P1) incidents through early automation and cross-functional role assignment.

The fault resolution process in a mobile network is modelled in this study using a simulation-based methodology, with an emphasis on high-priority (P1) incidents involving extensive service degradation. Current research on Agile telecom transformations, Lean process optimisation, and AI-based network monitoring systems complements the practical implementation, which is motivated by real-world operational practices.

Literature review

Incident management techniques for modern telecommunications networks must be flexible and robust. Sequential escalations and strict hierarchies are key components of traditional workflows, which lead to slow fault resolution and little teamwork.

Originally created in software engineering, Agile techniques are now frequently used in complex operational areas like telecoms due to their adaptability and iterative nature. Agile approaches greatly increase project transparency, communication effectiveness, and delivery success while strengthening cross-functional team collaboration [1]. Scrum, one of the most popular Agile frameworks, organises development using iterative sprints, backlog-based task management, and clearly defined roles to facilitate transparent and effective delivery cycles [2].

According to recent studies, hybrid frameworks that combine iterative processes with architectural governance, change management, and minimum but necessary documentation are necessary for scaling Agile in complex organisational situations. Flexibility is made possible by this hybridization, which also maintains control and traceability across extensive engineering or telecom systems [3][4][5].

The use of AI-based automation systems (AIOps) to assist in incident detection and resolution has grown concurrently with the complexity of network infrastructure. This synergy is demonstrated by Vodafone's Intelligent Solutions platform, which is powered by OpenText: the system correlates logs and alarms from various systems, automatically creates incident tickets, lowers alarm noise by 70%, and initiates workflow automation based on patterns in historical data [6]. Proactive fault management is also supported by regulatory viewpoints. In its response to the Ofcom consultation on Ethernet and dark fiber service quality, Vodafone emphasises the importance of predictive service assurance and prompt repair coordination, particularly for vital services like healthcare infrastructure or finance [7].

All of these results point to the same conclusion: integrating AI-driven automation with Agile approaches can greatly increase the responsiveness and caliber of telecom incident management. While AI manages prioritisation, real-time status updates, and autonomous incident resolution, Agile facilitates clear role assignments, iterative feedback loops, and backlog-driven task distribution. This direction is further supported by recent research. AI can improve decision support and lower mean-time-to-repair (MTTR) [8]. The adoption of hybrid Agile project management in the telecom sector greatly improves cross-functional cooperation, as shown by Aydin et al. (2025). [9]. Wang et al. (2020) demonstrate that the integration of artificial intelligence into 5G and beyond networks enables real-time adaptation and optimisation of Quality of Experience (QoE), directly supporting faster and more efficient incident resolution [10].

Methodology

In order to assess how Agile frameworks and AI-driven automation affect incident management in mobile telecommunications networks, this study uses a comparative simulation-based methodology. The primary goal is to determine whether, in comparison to conventional linear workflows, process redesigns guided by Agile principles and automation technologies can lower resolution times and operational costs.

Two scenarios for incident resolution were modelled: a traditional workflow that reflects manual handoffs and standard escalation; an Agile + AI-Enhanced Workflow that includes sprint-style task assignment, automated dispatching, and intelligent triage.

Bizagi Modeller, a business process modelling and analysis tool that facilitates both time-based and cost-based evaluation, was used to run the simulation. Every procedure was divided into tasks related to particular roles, including Contractor Team, Field Engineer, NOC Engineer, and 2nd Line Engineer. The tool allowed for a direct comparison of the two methods by defining task durations, role assignments, and cost rates. Operational standards frequently seen in actual mobile network operations served as the basis for estimated task durations. Hourly rates that are common in the telecom sector were used to introduce cost estimations, as illustrated below: NOC Engineer: €10/hour, 2nd Line Engineer: €20/hour, Field Engineer: €35/hour, Contractor Team: €60/hour (per person, team of three).

These figures are estimates that represent market-based standards for roles that are in-house versus those that are outsourced in Europe. The goal was to support strategic decisions on automation and resource allocation by illuminating cost disparities brought about by process design, rather than to precisely quantify financial results. Because it significantly impacts end-user connectivity and necessitates immediate action, the simulation's incident: a mass service outage brought on by a fiber cut, is a representative Level 1 (P1) scenario. Standard incident steps such as alarm detection, diagnostics, escalation, on-site repair, and service validation are all included in the modelled process. Since all simulation parameters were based on realistic estimations rather than actual customer or network data, confidentiality was maintained while maintaining industrial relevance.

Results and further discussions

The simulation results and a comparison between the improved Agile-AI framework and the conventional incident resolution model are shown in this section. Using a realistic telecom failure scenario involving a fiber cut impacting 15,000 ONUs, the goal is to assess variations in cost, efficiency, and responsiveness.

Multiple levels of manual validation and ticket escalation are necessary in the linear structure of the traditional incident resolution process. The entire process flow is shown in Figure 1.

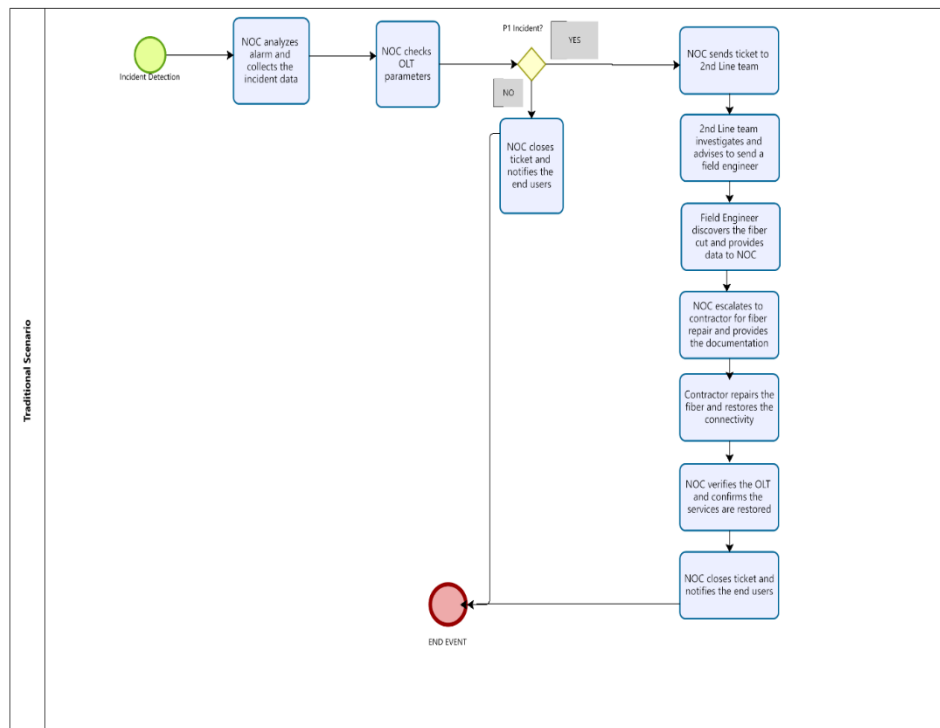


Figure 1: Traditional Incident Management BPMN Workflow
Source: Author's own contribution

Alarm detection and NOC (Network Operations Centre) analysis are the first steps in this scenario. The team determines whether the case is a P1 incident after verifying the alarm and examining OLT parameters. If verified, field engineer deployment and contractor intervention for fiber repair follow the incident's elevation through the DNOC and 2nd Line support. In the traditional scenario, NOC manually manages every decision-making step, including incident classification, ticket escalation, and field dispatch. NOC manually verifies a large-scale outage (15,000 ONUs offline) after detecting an alarm. The problem is then reported as a P1 incident. This dependence on human validation raises the overall cost of operations, creates numerous bottlenecks, and delays the time to resolution. The lack of automatic backlog creation and AI-driven impact assessment further postpones the deployment of technical resources, especially in emergency field scenarios.

The Agile and AI-based scenario makes use of a sprint-based framework with automated incident classification, backlog creation, and real-time alarm data correlation. At sprint planning, roles and tasks are assigned to ensure minimal context switching and faster response times. In addition to validating field data and automating closure, the AI engine helps with OLT verification and automatically initiates field despatch based on network impact thresholds. Together, these characteristics allow for more transparent tracking and flexibility throughout the incident lifecycle, while also lowering overall resolution time and human error.

The simulation output for the total task durations is shown in Figure 2. From detection to ticket closure, the conventional procedure takes about six hours and thirty minutes. Several manual handoffs and approval stages, particularly in steps like these, result in critical delays such as: Field Engineer diagnosis (1h 30m), contractor mobilization and repair (2h 45m), NOC coordination and documentation (1h). The average industry values for field interventions related to fiber and NOC response cycles in major telecom operations serve as the basis for these time estimates.

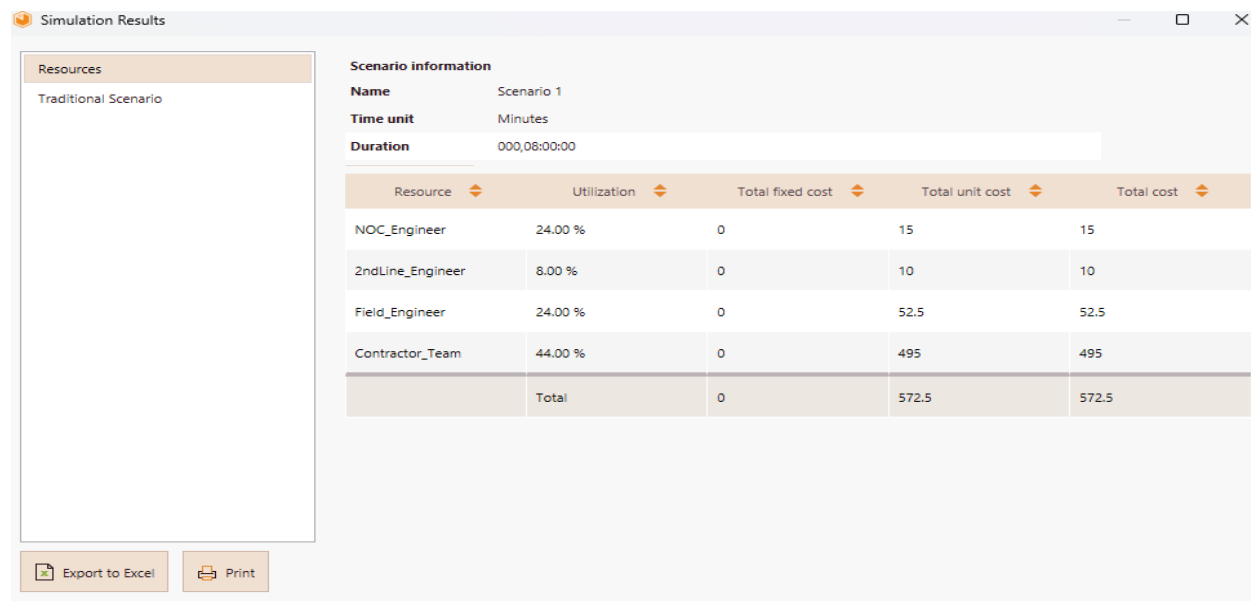


Figure 2: Task durations and execution time
Source: Author's own contribution

From detection to ticket closure, the conventional procedure takes about six hours and thirty minutes. Several manual handoffs and approval stages, particularly in steps like these, result in critical delays such as: Field Engineer diagnosis (1h 30m), contractor mobilization and repair (2h 45m), NOC coordination and documentation (1h). The average industry values for field interventions related to fiber and NOC response cycles in major telecom operations serve as the basis for these time estimates. Cost distribution and resource utilisation are summarised in Figure 3. Because of their lengthy engagement period and higher hourly rates (€60/hour), the contractor team bears the largest financial burden, accounting for €495 of the total €572.5 cost. The Field Engineer is responsible for €52.5, and the NOC Engineer and 2nd Line Engineer make only minor contributions (€15 and €10, respectively). This cost breakdown highlights the extent to which traditional models rely on labour that is outsourced, thereby increasing the costs associated with resolution.

Scenario Information								
Name	Scenario 1							
Time unit	Minutes							
Duration	000,00:00:00							
Name	Type	Instances completed	Instances started	Min. time	Max. time	Avg. time	Total time	
Traditional Scenario	Process	1	1	6h 30m	6h 30m	6h 30m	6h 30m	
Incident Detection	Start event	1						
NOC analyzes alarm and collects the incident data	Task	1	1	10m	10m	10m	10m	
NOC checks OLT parameters	Task	1	1	15m	15m	15m	15m	
P1 Incident?	Gateway	1	1					
NOC closes ticket and notifies the end users	Task	0	0	0	0	0	0	
DNOC sends ticket to 2nd Line team	Task	1	1	5m	5m	5m	5m	
2nd Line team investigates and advises to send a field engineer	Task	1	1	30m	30m	30m	30m	
Field Engineer discovers the fiber cut and provides data to NOC	Task	1	1	1h 30m	1h 30m	1h 30m	1h 30m	
NOC escalates to contractor for fiber repair and provides the documentation	Task	1	1	1h	1h	1h	1h	
Contractor repairs the fiber and restores the connectivity	Task	1	1	2h 45m	2h 45m	2h 45m	2h 45m	
NOC verifies the OLT and confirms the services are restored	Task	1	1	10m	10m	10m	10m	
NOC closes ticket and notifies the end users	Task	1	1	5m	5m	5m	5m	
END EVENT	End event	1						
NO	Task	0	0	0	0	0	0	
YES	Task	1	1	0	0	0	0	

Figure 3: Resource utilization and cost impact
Source: Author’s own contribution

In this second case, the AI engine automatically classifies the incident as P1, removing the need for manual triage and ticket creation. Agile sprint planning then makes it possible to assign backlog tasks to the appropriate roles (such as field engineers, NOC engineers, and second line engineers) right away, guaranteeing that duties are assigned clearly and without the need for restrictive escalation chains.

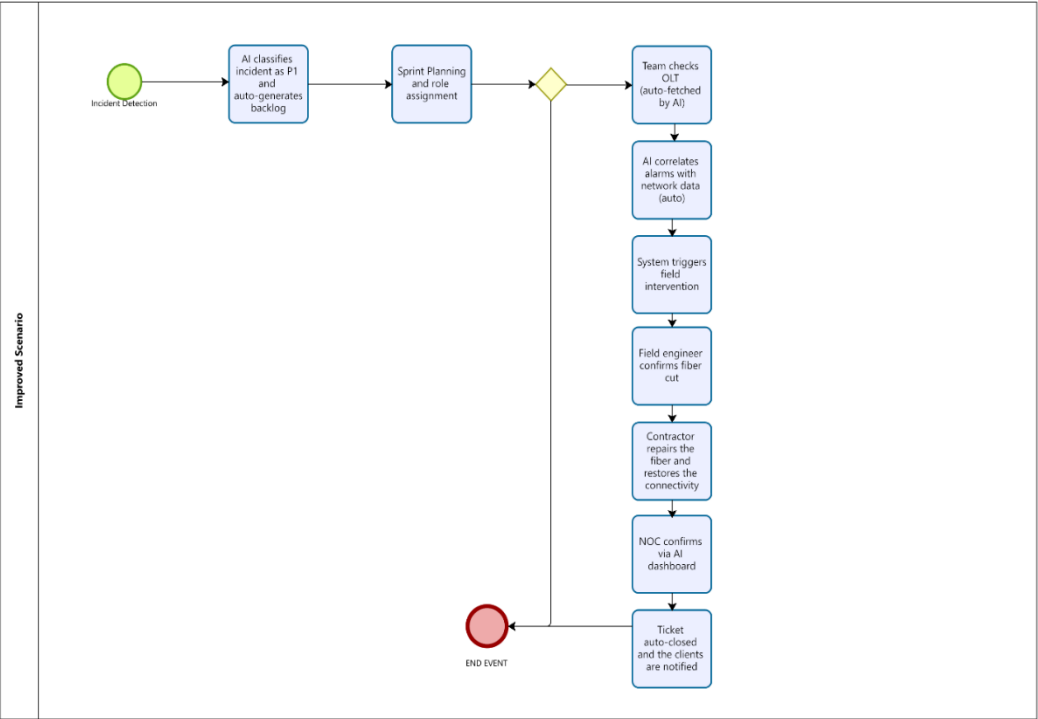


Figure 4: Agile + AI Incident Management Workflow (BPMN Model)
Source: Author’s own contribution

The static, hierarchical escalations present in traditional models are replaced by the essential Agile practice known as “Sprint Planning and role assignment”. As opposed to waiting for approvals at several levels (NOC → 2nd Line → Field, for example), the incident is handled as a time-boxed sprint in which tasks are distributed among the available resources right away according to predetermined Agile roles.

By enabling parallel task execution, this pre-alignment of responsibilities greatly reduces idle time and inter-role dependencies. For instance, field intervention and contractor dispatch can be initiated without awaiting further human approvals once AI validates the alarm pattern and compares it with historical data.

The AI system confirms the impact (e.g., 15k ONUs offline) by directly retrieving and correlating alarm and OLT parameters. The system eliminates needless waiting times and duplicate human approvals by automatically sending the field engineer after validation. Before initiating the repair sprint, the AI engine cross-checks the results to ensure consistency following the on-site confirmation of the fiber cut. The incident is automatically closed after service is restored, and customers receive notifications using pre-established communication templates.

As illustrated in Figure 5, the integration of Agile and AI modifies the resource allocation structure, with a significant portion of costs shifting from manual operations to automation, analytics, and AI-based coordination. This change supports the reduction in incident duration observed in the simulation.

Scenario information				
Name	Scenario 1			
Time unit	Minutes			
Duration	000,08:00:00			
Resource	Utilization	Total fixed cost	Total unit cost	Total cost
NOC Engineer	3.37 %	0	1.17	1.17
2nd line Engineer	3.37 %	0	2.33	2.33
Contractor team	50.48 %	0	315	315
Field Engineer	43.27 %	0	52.5	52.5
AI System	1.44 %	0	0	0
Total		0	371	371

Figure 5: Cost breakdown by resource in Agile + AI Scenario

Source: Author’s own contribution

The simulation output shows in Figure 6 that this enhanced workflow cuts the overall incident duration to about 4 hours and 45 minutes when compared to the traditional model.

Scenario information													
Name	Scenario 1												
Time unit	Minutes												
Duration	000,08:00:00												
Name	Type	Instances completed	Instances started	Min. time	Max. time	Avg. time	Total time	Min. time waiting resource	Max. time waiting resource	Avg. time waiting resource	Standard deviation waiting resources	Total time waiting resource	Total fixed cost
Improved Scenario	Process	1	1	3h 28m	3h 28m	3h 28m	3h 28m					0	0
Incident Detection	Start event	1											
AI classifies incident as PI and auto-generates backlog	Task	1	1	1m	1m	1m	1m	0	0	0	0	0	0
Sprint Planning and role assignment	Task	1	1	5m	5m	5m	5m	0	0	0	0	0	0
ExclusiveGateway	Gateway	1	1										
Team checks OLT (auto-fetched by AI)	Task	1	1	2m	2m	2m	2m	0	0	0	0	0	0
AI correlates alarms with network data (auto)	Task	1	1	2m	2m	2m	2m	0	0	0	0	0	0
System triggers field intervention	Task	1	1	1m	1m	1m	1m	0	0	0	0	0	0
Field engineer confirms fiber cut	Task	1	1	1h 30m	1h 30m	1h 30m	1h 30m	0	0	0	0	0	0
Contractor repairs the fiber and restores the connectivity	Task	1	1	1h 45m	1h 45m	1h 45m	1h 45m	0	0	0	0	0	0
NOC confirms via AI dashboard	Task	1	1	2m	2m	2m	2m	0	0	0	0	0	0
Ticket auto-closed and the clients are notified	Task	1	1	0	0	0	0	0	0	0	0	0	0
END EVENT	End event	1											

Figure 6: Time and cost simulation output in Agile + AI Scenario

Source: Author’s own contribution

Measurable gains in coordination and responsiveness were made possible by the implementation of Agile principles, especially those related to sprint structuring, role clarity, backlog visibility, and iterative feedback loops. Agile offered the process structure required to convert a reactive workflow into a proactive incident response framework, while AI took care of automation and decision support. These results demonstrate that the effectiveness, flexibility, and resilience of telecom incident management procedures can be greatly increased by combining Agile and AI. The AI system efficiently structures the incident as a micro-project with a narrow scope, well-defined goals, and stringent time constraints by automatically creating a backlog of tasks to be finished.

Several Agile-enabling factors are responsible for this improvement: sprint structure that presents incidents as short-term, fixed-duration micro-projects; unambiguous role distribution that removes unnecessary handoffs and ambiguity; parallelism in tasks, which reduces wait times; real-time dashboard visibility facilitates iterative feedback.

The process structure and cultural change required to transform reactive NOC workflows into proactive and adaptive incident response frameworks are provided by agile, and AI guarantees data-driven decision-making and rapid execution. When combined, they create a scalable and robust model for contemporary network operations, particularly in situations where failures have a significant impact.

Table 1: Comparative overview

Aspect	Traditional Scenario	Agile + AI Scenario
Incident detection	Manual alarm analysis by NOC	Automatic AI classification (P1) and backlog generation
Task assignment	Escalated sequentially: NOC → 2nd Line → Field	Sprint-based direct role assignment (NOC, Field, Contractor)
Ticketing	Manual ticket creation and forwarding	Auto-generated tickets linked to the sprint backlog
Approval flow	Hierarchical, multi-level approvals	Minimal approvals
Data validation	Performed by NOC and 2nd Line	AI correlates OLT/alarm data
Field engineer dispatch	After manual confirmation and multiple steps	Triggered immediately after AI validation
Repair coordination	Requires human coordination and documentation	Automated handover and repair sprint initiation
Closing and notification	Manual closure and user notification	Auto-closure and mass notification via AI dashboard
Total resolution time	~6h 30m (incl. delays)	~4h 45m (streamlined process)
Total estimated cost	€572.5	€447.5

Source: Authors' own research

These results offer compelling proof that the Agile and AI framework is a better option for mobile network operations than traditional incident resolution models. Automation, role alignment, and the removal of unnecessary human interventions are the main drivers of the significant savings in operational time (about 1 hour 45 minutes) and cost (about 22% reduction) shown in Table 1. Despite being linear and structurally familiar, the traditional method has underutilised resources, approval bottlenecks, and sequential handoffs. The Agile-inspired sprint model, on the other hand, makes sure that tasks are pre-assigned and carried out in parallel whenever feasible. These findings imply that reactive fault management can be successfully converted into a proactive response strategy by incorporating Agile principles into incident workflows.

By incorporating Agile sprint logic and early AI classification into the incident management process, the study's simulation showed a 36.55% decrease in engineer workload and an 11.1% per-shift cost optimisation. Vodafone's practical applications support these conclusions. Vodafone Intelligent Solutions platform, which is powered by OpenText AIOps, has resulted in automated prioritisation of critical incidents, a 70% reduction in alert noise, and a quicker identification of the underlying causes [6]. This is consistent with our simulation results, which showed that the incident sprint started right away following AI triage, avoiding manual escalations and allowing for parallel task execution.

Furthermore, Vodafone highlights the necessity of enhancing MTTD and MTTR (Mean Time to Detect and Mean Time to Repair) for business-critical network services in its formal response to Ofcom [7]. The improved scenario demonstrated a clear alignment with Vodafone's objective of enhancing resilience and preserving QoS under increasing service demands by successfully cutting incident resolution time from over 6 hours to roughly 4

hours and 45 minutes. According to these comparisons, the suggested Agile and AI model reflects both technological advancements and regulatory priorities in next-generation telecom operations.

Conclusion

This study investigated the use of artificial intelligence (AI) and agile approaches in the context of incident management for mobile networks. The results of a comparative simulation of enhanced and conventional fault resolution workflows showed that the Agile and AI approach greatly increases cost-effectiveness and operational efficiency.

The traditional incident management process is frequently limited by resource underutilization, delayed decision-making, and sequential escalation chains. The improved scenario, on the other hand, introduced a sprint-based model backed by AI-driven automation, allowing for continuous incident tracking, quick role assignment, and parallel task execution. Because of the decrease in idle time and human-caused delays, incident resolution time was shortened by roughly one hour and forty-five minutes, and overall costs were decreased by more than twenty percent.

These enhancements show how Agile frameworks can be useful process management techniques in critical infrastructure domains in addition to being software development tools.

According to the research, implementing an Agile and AI incident response model can result in increased organisational resilience, network dependability, and customer satisfaction. Future research might concentrate on expanding this strategy to incorporate machine learning-based prioritisation, predictive maintenance scenarios.

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