# **Technical Infrastructure and Security Posture Analysis of Exxon Mobil**

## **1. Introduction**

Exxon Mobil, a preeminent entity in the global energy sector, operates a vast and intricate network of technical infrastructure that underpins its extensive operations, encompassing the entire value chain from upstream exploration and production to downstream refining and distribution, as well as its significant chemical manufacturing business. This infrastructure is also crucial for facilitating interactions with a global customer base and managing complex supply chains. Given the essential role of energy in modern society and the increasing reliance on digital technologies within the industry, the technical landscape of a major player like Exxon Mobil is inherently critical. Furthermore, the escalating sophistication and frequency of cyber threats targeting critical infrastructure necessitate a robust and continuously evolving security posture to safeguard operations, assets, and data 1.

The energy sector has become an increasingly attractive target for malicious actors, ranging from nation-states seeking strategic advantages to cybercriminal organizations aiming for financial gain. The potential ramifications of successful cyberattacks on energy companies are substantial, including disruptions to energy supply, environmental damage, financial losses, and risks to public safety 3. Consequently, a thorough understanding of Exxon Mobil's technical infrastructure and the security measures it employs is of paramount importance for stakeholders, including technology analysts assessing the company's digital maturity and investment strategies, and investment professionals evaluating potential risks and opportunities associated with the company's technological foundation.

This report endeavors to provide a comprehensive analysis of Exxon Mobil's technical infrastructure and security posture based on publicly available information. The analysis will delve into key aspects of their enterprise systems, including Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) solutions, their utilization of cloud service providers and cloud technologies, the architecture of their network and the locations of their data centers, the primary hardware and software vendors they engage with, their operational technology (OT) environment with a focus on industrial control systems and SCADA systems, their digital transformation projects and technology modernization roadmaps, their strategic technology partnerships, any publicly documented security breaches or incidents, and the security frameworks, policies, certifications, and compliance statuses they adhere to 5.

## **2. Enterprise Resource Planning (ERP) Systems**

Exxon Mobil has strategically embraced Enterprise Resource Planning (ERP) systems to manage its complex business processes and resources. The company's ERP landscape is undergoing a significant modernization, reflecting a commitment to leveraging advanced technologies for improved efficiency and decision-making 8.

### **2.1. Identification of ERP Solutions**

Recent information indicates that ExxonMobil selected **SAP S/4 HANA for ERP Financial** in 2023, a move that involved displacing legacy systems 9. This selection of a contemporary ERP platform from a leading vendor like SAP signifies a strategic investment in upgrading their core financial infrastructure. The implementation of SAP S/4 HANA is likely aimed at streamlining financial operations, enhancing data integration across different financial modules, and providing real-time insights into the company's financial performance 10. This modernization effort suggests a focus on improving operational efficiency and potentially enabling more sophisticated data analytics for financial decision-making.

Historically, ExxonMobil has had a long-standing relationship with SAP, as evidenced by the mention of the use of **SAP R/3** in its U.S. petrochemical operations 11. SAP R/3 was a widely adopted ERP system, and its deployment in a critical business unit like petrochemicals underscores the historical reliance on SAP solutions within the company. This history suggests that ExxonMobil likely possesses a degree of in-house expertise and infrastructure related to SAP systems, which could influence their ongoing ERP modernization strategy and facilitate the transition to the newer S/4 HANA platform 12.

Furthermore, there are indications that ExxonMobil is exploring or implementing cloud-based ERP solutions. A "modernized and transformed ERP system ERP landscape" enabled by Rosa (Red Hat OpenShift on AWS) suggests a deployment of ERP functionalities within the cloud environment 13. The use of Rosa, a managed OpenShift service on Amazon Web Services (AWS), clearly points towards leveraging cloud infrastructure for at least a portion of their ERP landscape. This hybrid approach, combining on-premises and cloud deployments, could allow ExxonMobil to capitalize on the benefits of both models, such as the scalability and agility offered by the cloud for specific business units or functionalities, while maintaining on-premises control for other critical processes 13.

### **2.2. Integration Strategies and B2B Connectivity**

ExxonMobil places a strong emphasis on robust integration strategies to ensure seamless connectivity both within the organization and with its external business partners. A key aspect of this strategy is the focus on **Application Programming Interfaces (APIs)** for advanced Business-to-Business (B2B) integration 14. APIs offer real-time, system-to-system advantages over more traditional methods like **Electronic Data Interchange (EDI)** and XML options, enabling more dynamic and efficient data exchange. The company states that the technological advantages of system-to-system integration through APIs enable a more seamless customer experience through the digital journey 14. By utilizing APIs, ExxonMobil aims to work seamlessly as one team with its business partners, accessing capabilities and capturing efficiencies not available via EDI 14. APIs provide the flexibility to tailor features and notifications, creating customized workflows and data streams that best suit their operations and expedite the path to future enhancements 14.

While APIs are the preferred method for advanced integration, ExxonMobil continues to support traditional integration methods. EDI and XML remain available for eligible customers who connect through value-added networks or point-to-point, serving as effective foundation-level solutions for businesses not yet prepared to advance to the more robust integration of APIs 14. Regardless of the integration method employed, ExxonMobil emphasizes the importance of data safety protocols to ensure that data moves securely between sender and receiver 14. This commitment to secure data exchange underscores the critical nature of the information being shared with business partners.

### **2.3. Modernization Towards a Single ERP System**

A significant long-term strategic initiative for ExxonMobil is the plan to move "to a single ERP for the entire corporation" 8. This ambitious undertaking, which has never existed before in the company's history, reflects a desire for greater data consistency, standardized processes, and improved operational efficiency across all of ExxonMobil's diverse business units. Part of this transition involves aligning all the data across the company to a single structure, making it compatible for comprehensive data mining and analysis 8. The implementation of a single ERP system is a complex and extensive project that will likely span several years and require substantial investment and organizational change management. However, the potential benefits, such as a holistic view of the business, enhanced reporting capabilities, and streamlined workflows, are considerable for a company of ExxonMobil's scale and complexity. This initiative also involves leveraging enterprise-wide software to further simplify, standardize, and automate some of the major business processes across the company 8.

### **2.4. Key Takeaways**

The analysis of publicly available information indicates that ExxonMobil is actively engaged in modernizing its ERP landscape. This includes the adoption of SAP S/4 HANA for financial operations and the exploration of cloud-based ERP solutions on AWS. The company prioritizes API-based integration for B2B connectivity, reflecting a focus on real-time and flexible data exchange with its business partners. A major long-term strategic goal is the consolidation of all business units onto a single ERP system, a transformative project aimed at enhancing data consistency and operational efficiency.

### **2.5. Second/Third-Order Insights**

The transition to a single ERP system for a company of ExxonMobil's size and complexity presents a significant undertaking with far-reaching implications. This project will necessitate meticulous planning, robust data migration strategies, and comprehensive employee training to ensure a successful implementation and minimize disruption to ongoing operations. The phased approach, indicated by the historical use of SAP R/3 and the current adoption of S/4 HANA, suggests a strategic and measured modernization effort. The emphasis on API-based integration will likely facilitate the connection of the future single ERP system with a wide array of other internal and external applications, including CRM systems, supply chain management tools, and specialized industry-specific software, ensuring continued agility and interoperability within their digital ecosystem.

### **2.6. Valuable Tables**

**Table 1: ExxonMobil ERP Systems**

| **ERP System Name** | **Vendor** | **Primary Function/Business Unit** | **Implementation Status** |
| --- | --- | --- | --- |
| SAP R/3 | SAP | U.S. Petrochemical Operations (Historical) | Legacy |
| SAP S/4 HANA | SAP | ERP Financial | Current |
| Cloud-Based ERP | AWS | Modernized ERP Landscape (Potential Specific Units) | Exploring/Implementing |
| Single ERP (Target) | TBD | Entire Corporation | Planned |

## **3. Customer Relationship Management (CRM) Systems**

Exxon Mobil employs various Customer Relationship Management (CRM) systems and platforms to manage its interactions with customers across its diverse business lines, including retail fuel, chemical products, and other services 15. The company's CRM strategy involves a combination of established systems and ongoing modernization efforts to enhance customer engagement and drive loyalty 16.

### **3.1. Identification of CRM Solutions**

Information suggests that ExxonMobil has had CRM systems in place for a considerable period. A Backend Developer at the company was involved in developing and maintaining a "customer relationship management system," although the specific vendor or platform was not disclosed 15. This indicates an early recognition of the importance of managing customer relationships, potentially through a custom-built solution or a less widely known CRM platform.

Furthermore, ExxonMobil successfully integrated with its "CRM management system" as part of a customer service solution implemented by Udesk Global 17. While the name of the CRM system was not specified, this integration highlights the company's focus on providing a unified customer experience across different service channels. The ability to integrate with a third-party customer service platform suggests that ExxonMobil's CRM system likely possesses API capabilities or supports standard integration protocols, allowing for seamless data exchange and process coordination.

In a significant modernization move, ExxonMobil selected **Salesforce Sales Cloud** for Sales Automation, CRM, and Sales Engagement in 2024, replacing a legacy system 16. The adoption of a leading cloud-based CRM platform like Salesforce signifies a strategic decision to enhance sales effectiveness, improve customer engagement, and leverage the advanced features offered by modern CRM solutions. Salesforce Sales Cloud provides a comprehensive suite of tools for managing sales processes, customer interactions, and sales analytics, which can contribute to increased sales productivity and improved customer satisfaction.

The use of the Salesforce ecosystem extends beyond sales, as evidenced by the mention of **Salesforce Marketing Cloud** as a preferred qualification for a Marketing Enablement Analytics Advisor role at ExxonMobil 18. This indicates that ExxonMobil utilizes Salesforce for its marketing functions as well, suggesting a comprehensive approach to managing customer relationships across both sales and marketing departments. The integration of Sales Cloud and Marketing Cloud within the Salesforce platform enables a unified view of the customer journey, from initial marketing contact to sales conversion and beyond, facilitating more personalized and effective customer interactions.

### **3.2. Customer Loyalty Programs and Digital Marketing Platforms**

ExxonMobil actively engages with its retail customers through the **Exxon Mobil Rewards+ program**, a loyalty program designed to reward customers for everyday purchases at Exxon and Mobil stations 19. This program, managed through the **Speedpass+ app**, allows customers to earn points on fuel and store item purchases, redeem rewards, and manage their accounts digitally. The Exxon Mobil Rewards+ program also incorporates a built-in CRM system that enables customer segmentation based on preferences and the creation of targeted marketing strategies 19. This demonstrates ExxonMobil's focus on customer retention and leveraging data to understand customer behavior and personalize marketing efforts. The Speedpass+ app provides a convenient digital interface for customers to interact with the loyalty program, track their points, and even pay for fuel, highlighting the importance of mobile channels in their customer engagement strategy.

### **3.3. CRM Integration with Other Systems**

ExxonMobil recognizes the importance of integrating its CRM systems with other enterprise applications to provide a seamless customer journey. The company emphasizes the use of APIs for system-to-system integration to enhance customer experience 14. This would likely include integration between their CRM platforms (Salesforce, Rewards+ CRM, and potentially others) and back-end systems such as order management and ERP systems. Integrating CRM with these systems allows for a holistic view of customer interactions, from initial marketing and sales activities to order fulfillment, customer service inquiries, and loyalty program engagement. This unified view enables better informed decision-making, improved operational efficiency, and ultimately, enhanced customer satisfaction.

### **3.4. Key Takeaways**

ExxonMobil employs a multi-faceted CRM strategy that includes the adoption of Salesforce Sales Cloud and Marketing Cloud for sales and marketing automation, the operation of the Exxon Mobil Rewards+ program with its built-in CRM system, and the potential use of legacy or other CRM systems. The company prioritizes the integration of these CRM platforms with other enterprise applications through APIs to provide a seamless customer experience. The focus on the Rewards+ program and the Speedpass+ app underscores the importance of customer loyalty and digital engagement in their retail business.

### **3.5. Second/Third-Order Insights**

The transition to Salesforce as a primary CRM platform suggests a strategic move towards a more scalable and feature-rich solution, potentially phasing out older or less integrated systems. Effectively integrating Salesforce with the existing Exxon Mobil Rewards+ program and other back-end systems will be crucial for achieving a unified and comprehensive view of the customer. The strong emphasis on the Rewards+ program indicates the significance of customer loyalty in the highly competitive retail fuel market. The data collected through this program provides valuable insights into customer preferences and purchasing behaviors, which can be leveraged for more effective targeted marketing campaigns and personalized offers, ultimately driving customer retention and increasing revenue. The use of the Speedpass+ mobile app highlights the growing importance of digital channels in customer interactions, aligning with consumer expectations for convenient and accessible services.

### **3.6. Valuable Tables**

**Table 2: ExxonMobil CRM Systems**

| **CRM System Name** | **Vendor/Platform** | **Primary Function** | **Integration Status** |
| --- | --- | --- | --- |
| Salesforce Sales Cloud | Salesforce | Sales Automation, CRM, Sales Engagement | Current |
| Salesforce Marketing Cloud | Salesforce | Marketing Automation | Current |
| Rewards+ CRM | ExxonMobil (Built-in) | Customer Loyalty, Targeted Marketing | Current |
| Legacy/Other CRM (Potential) | Various/In-house | Various Customer Management Functions | Legacy/Current |

## **4. Cloud Service Providers and Usage**

Exxon Mobil has adopted a multi-cloud strategy, leveraging the services of several leading cloud providers to support its diverse business needs, ranging from upstream operations and scientific research to customer-facing applications and enterprise systems 7. This approach allows the company to capitalize on the specialized strengths and capabilities of different cloud platforms.

### **4.1. Identification of Primary Cloud Providers**

**Microsoft Azure** emerges as a key cloud provider for ExxonMobil, particularly in the realm of upstream operations. A strong partnership exists between the two companies, with Azure playing a pivotal role in Internet of Things (IoT) initiatives within the Permian Basin 7. This collaboration underscores the trust and reliance ExxonMobil places on Microsoft's cloud platform for mission-critical applications in a significant production region.

**IBM Cloud** also features prominently in ExxonMobil's cloud strategy. It serves as the platform for the Exxon Mobil Rewards+ app, a customer-facing application requiring scalability and security 7. Additionally, ExxonMobil is collaborating with IBM in the advanced research area of quantum computing, indicating a foray into cutting-edge technologies that could provide a future competitive edge 7.

**Amazon Web Services (AWS)** represents another significant component of ExxonMobil's multi-cloud approach. AWS supports various workloads, including the modernization of ERP systems through the Rosa platform (Red Hat OpenShift on AWS) and the transformation of spatial computing for global 3D data management 13. The utilization of AWS for diverse and data-intensive applications highlights its importance in ExxonMobil's cloud ecosystem.

### **4.2. Cloud Technology Usage Across Business Functions**

ExxonMobil extensively utilizes cloud technologies to enhance efficiency and innovation across its various business functions. In the **Permian Basin**, a critical upstream region, the company leverages Microsoft Azure for IoT data collection and analysis 7. This cloud-based IoT infrastructure enables real-time monitoring and optimization of oilfield operations, leading to improved performance, workflow automation, and enhanced leak detection capabilities. The insights derived from this data are crucial for making faster and better decisions related to drilling optimization, well completions, and the deployment of personnel.

For its **ERP systems**, ExxonMobil is exploring and implementing cloud solutions, as indicated by the use of the Rosa platform on AWS for ERP modernization 13. Hosting ERP components in the cloud can provide numerous benefits, including increased scalability, reduced infrastructure management overhead, and accelerated deployment of updates and new features, ultimately enhancing the agility and efficiency of these core enterprise systems.

In the realm of **spatial computing**, ExxonMobil utilizes AWS to manage and analyze large-scale 3D data sets 26. This cloud infrastructure facilitates secure collaboration among geographically dispersed teams while maintaining data integrity and regulatory compliance, overcoming the limitations of traditional on-premises storage systems and enabling more efficient workflows for complex projects.

The **Exxon Mobil Rewards+ app**, a critical customer-facing application, is hosted on IBM Cloud 23. The IBM Cloud platform provides the necessary scalability, security, and reliability to support millions of users and handle a high volume of transactions, ensuring a streamlined and positive user experience.

ExxonMobil has also established a massive **data lake** for collecting and analyzing over six trillion data points from its refineries and chemical plants 7. While the specific cloud platform for this data lake is not explicitly mentioned, the sheer scale suggests that cloud infrastructure is a likely component, providing the necessary storage capacity and processing power for advanced analytics aimed at improving operational efficiency and reliability.

Furthermore, Microsoft Azure serves as the cloud infrastructure for ExxonMobil's subsidiary, **XTO Energy**, supporting IoT data collection and providing efficient systems for big data management and analytics 20. This highlights the widespread adoption of Azure across different business units within ExxonMobil.

### **4.3. Future Cloud Strategies and Data Center Initiatives**

Looking ahead, ExxonMobil is exploring significant new avenues related to cloud and data centers. The company has announced plans to leverage its expertise in carbon capture and storage (CCS) to potentially generate low-carbon electricity for data centers 8. This could involve building its own natural gas-fired power plants equipped with CCS technology to supply electricity directly to data centers, representing a potential diversification of its business into the digital infrastructure energy market. This initiative aligns with the increasing demand for power from data centers, particularly those supporting artificial intelligence (AI) workloads, and ExxonMobil's capabilities in low-carbon energy solutions.

In a related effort, ExxonMobil is collaborating with Intel to develop and certify next-generation, energy-efficient, liquid-based data center cooling technologies 34. The company has also launched its own portfolio of data center immersion fluid products. These initiatives indicate a strategic move towards providing solutions for improving the energy efficiency and sustainability of data centers, potentially positioning ExxonMobil as a key technology provider in this rapidly growing sector.

### **4.4. Key Takeaways**

ExxonMobil employs a strategic multi-cloud approach, utilizing Microsoft Azure for upstream operations and big data analytics, IBM Cloud for customer-facing applications and quantum computing research, and AWS for ERP modernization and spatial computing. Cloud technology is integral to various business functions, including IoT in oilfields, ERP systems, spatial data management, and customer engagement. The company is also exploring significant future opportunities in providing low-carbon power and cooling solutions for data centers.

### **4.5. Second/Third-Order Insights**

ExxonMobil's adoption of a multi-cloud strategy likely enables them to optimize costs by selecting the most suitable platform for specific workloads, leverage the unique services and capabilities offered by each provider, and mitigate the risks associated with vendor lock-in. This approach, however, necessitates robust cloud governance and management frameworks to ensure security, compliance, and operational efficiency across multiple cloud environments. The strong focus on cloud-based IoT in the Permian Basin could serve as a successful model for similar deployments in other operational areas, potentially leading to significant efficiency gains and improved safety across ExxonMobil's global operations. ExxonMobil's potential entry into the data center power and cooling markets represents a strategic response to the evolving energy landscape and the increasing demands of the digital economy, potentially creating new and significant revenue streams while aligning with the growing emphasis on sustainability within the technology sector. This diversification also introduces new security considerations related to ensuring the reliability and resilience of critical infrastructure for data centers.

### **4.6. Valuable Tables**

**Table 3: ExxonMobil Cloud Service Providers and Usage**

| **Cloud Provider** | **Primary Use Cases within ExxonMobil** | **Key Snippets (References)** |
| --- | --- | --- |
| Microsoft Azure | IoT in Permian Basin, Big Data Analytics (XTO Energy), AI/ML, Cloud Infrastructure | 7 |
| IBM Cloud | Exxon Mobil Rewards+ App, Quantum Computing Research, Watson Campaign Automation | 7 |
| Amazon Web Services (AWS) | ERP Modernization (Rosa), Spatial Computing, Global 3D Data Management | 13 |

## **5. Network Architecture and Data Center Locations**

Exxon Mobil's network architecture is a critical component of its operational technology (OT) and information technology (IT) infrastructure, supporting a wide range of activities from industrial control systems to retail operations 39. The company is actively evolving its network architecture, particularly within its OT environment, with a focus on open standards and enhanced security 39.

### **5.1. Open Process Automation (OPA) Initiative**

A significant aspect of ExxonMobil's network strategy is its pioneering work with **Open Process Automation (OPA)** 39. OPA represents a new control system architecture based on open standards for industrial control systems, aiming to replace traditional closed, proprietary systems. ExxonMobil has been leading the development and adoption of OPA, with a commercial-scale deployment in its Resin Finishing Plant in Baton Rouge 39. The architecture of this OPA Lighthouse Project includes a control room operator console, an advanced computing platform functioning as an OT data center, and a Data Center Network (DCN) connecting to the OPA connectivity framework 41. This initiative reflects a strategic move towards greater flexibility, interoperability, and security within their OT network infrastructure, potentially leading to lower costs and increased innovation 39. ExxonMobil is also moving towards an "open data infrastructure" and "open digital twins," aligning with the principles of OPA to enhance data accessibility and integration across the enterprise 48.

### **5.2. Retail Network Solutions**

For its retail operations, ExxonMobil relies on managed network services provided by **Hughes Network Systems** 40. Hughes offers various network options for ExxonMobil branded wholesalers, including fully managed solutions and BYOB (Bring Your Own Broadband) options, providing primary connectivity, 4G backup, and Managed Network Service Provider (MNSP) solutions. These solutions are designed to ensure fast and secure Point of Sale (POS) transactions and system upgrades, with a strong emphasis on Payment Card Industry (PCI) compliance 40. ExxonMobil is also in the process of transitioning to certified MNSPs and replacing legacy security products at its retail locations to further enhance network security and support initiatives like outdoor EMV transactions 40. This highlights the importance of a secure and reliable network infrastructure for ExxonMobil's retail business, ensuring the protection of customer payment data and the smooth operation of retail locations.

### **5.3. Data Center Strategies**

As discussed previously, ExxonMobil is exploring a potential foray into the data center market as a low-carbon power provider 8. This strategy involves the potential development of its own natural gas-fired power plants equipped with carbon capture technology to supply electricity directly to data centers. While specific locations for these potential facilities have not been publicly disclosed, this initiative indicates a significant consideration of data center infrastructure in ExxonMobil's future plans, not as a colocation provider but as a key energy supplier to this growing sector. This move leverages ExxonMobil's expertise in energy generation and carbon capture to address the increasing power demands of data centers, particularly those supporting AI workloads.

### **5.4. Key Takeaways**

ExxonMobil is modernizing its OT network architecture through the pioneering OPA initiative, focusing on open standards and interoperability. For its retail operations, the company utilizes managed network services from Hughes, emphasizing security and PCI compliance. ExxonMobil is also strategically considering data center infrastructure as a potential future business area, exploring the development of low-carbon power plants to supply electricity to these facilities.

### **5.5. Second/Third-Order Insights**

The adoption of OPA in ExxonMobil's OT environment could serve as a catalyst for broader adoption of open standards in the industrial automation industry, potentially breaking down vendor lock-in and fostering greater innovation. The reliance on Hughes for retail networking underscores the unique security and connectivity requirements of distributed retail operations in the energy sector. ExxonMobil's potential investment in data center power generation with carbon capture represents a significant strategic diversification, positioning them at the intersection of the energy and digital infrastructure markets and potentially contributing to a more sustainable energy supply for the rapidly growing data center industry.

### **5.6. Valuable Tables**

**Table 4: ExxonMobil Network Architecture Solutions**

| **Network Architecture/Solution** | **Primary Area of Application** | **Key Features/Technologies** | **Primary Goals** |
| --- | --- | --- | --- |
| Open Process Automation (OPA) | Operational Technology (OT) | Open Standards, Modular Design, Interoperability, Advanced Computing Platform (OT Data Center), DCN | Flexibility, Interoperability, Security, Innovation, Lower Costs |
| Hughes Network Solutions | Retail Operations | Managed Network Services, BYOB, Primary Connectivity, 4G Backup, MNSP, PCI Compliance | Fast and Secure POS Transactions, System Upgrades, Reliability, Security |
| Potential Gas-Fired Power Plants with CCS | Data Centers | Natural Gas, Carbon Capture and Storage (CCS) | Low-Carbon Electricity Supply for Data Centers |

## **6. Primary Hardware and Software Vendors**

Exxon Mobil collaborates with a diverse range of hardware and software vendors to support its extensive IT and OT infrastructure. These partnerships are crucial for maintaining operational efficiency, driving innovation, and ensuring the security of its systems 49.

### **6.1. Key Hardware Vendors**

**Intel** is a significant hardware vendor for ExxonMobil, particularly in the areas of data centers and industrial computing. They partner on developing data center immersion cooling technologies and provide processors for the OPA initiative 37.

**Dell Technologies** plays a key role in ExxonMobil's OT infrastructure by providing hyper-converged infrastructure and networking switches for the OPA Advanced Computing Platform 43.

For its retail network, ExxonMobil relies on **Verifone** and **Gilbarco** as leading providers of Point of Sale (POS) hardware, including POS terminals and related equipment at Exxon and Mobil stations 40.

In the realm of advanced research, **IBM** provides quantum hardware for ExxonMobil's exploration of quantum computing applications 25.

**Materia Inc.** supplies specialized hardware in the form of Proxxima™ thermoset systems, which are potentially used in ExxonMobil's manufacturing processes for their lightweight and high-performance properties 50.

### **6.2. Key Software Vendors**

**SAP** is a core software vendor for ExxonMobil, providing the foundational software for its ERP and HCM systems, managing critical enterprise resource planning and human resources functions 10.

**Microsoft** is a strategic software partner, offering a wide array of solutions including Azure cloud services for IoT, data analytics, and general cloud infrastructure, Power BI for business intelligence, Dynamics 365 for CRM-related functionalities, and various IoT technologies 7.

**IBM** also serves as a key software vendor, providing the IBM Cloud platform, Watson Campaign Automation for marketing, and collaborating on the development of quantum algorithms for advanced research initiatives 23.

**Salesforce** is the provider of Sales Cloud, a critical software platform for managing ExxonMobil's sales processes and customer engagement activities 16.

**Hughes** offers managed network services and security solutions for Exxon and Mobil retail locations, including software for network management, security protocols, and PCI compliance 40.

**VMware by Broadcom** is a partner in the OPA initiative, providing virtualization software essential for running OT workloads on IT infrastructure, facilitating the convergence of these two environments 43.

**Schneider Electric** and **Yokogawa** collaborate with ExxonMobil on the OPA initiative, likely providing software and hardware components for industrial automation, contributing to the development of open and interoperable control systems 43.

**Udesk Global** provides a customer service platform that integrates with ExxonMobil's CRM system, enhancing their customer support capabilities across various channels 17.

**Esri** is the vendor of ArcGIS Monitor, a software solution used by ExxonMobil to manage and monitor the health and performance of its global enterprise GIS system, crucial for managing geographically dispersed assets 52.

### **6.3. Key Takeaways**

ExxonMobil maintains a diverse ecosystem of hardware and software vendors spanning various technology domains. Strategic partnerships with major technology companies like Intel, Dell, SAP, Microsoft, IBM, and Salesforce are central to their IT and OT strategies. Specialized vendors such as Verifone, Gilbarco, and Hughes support the unique requirements of their retail operations. The OPA initiative is underpinned by collaborations with key OT vendors including VMware, Schneider Electric, and Yokogawa.

### **6.4. Second/Third-Order Insights**

The selection of these vendors reflects a strategic alignment with industry leaders and specialized providers to meet the complex and varied technological needs of a global energy company. The partnerships in emerging areas like quantum computing and advanced data center technologies indicate a forward-looking approach to innovation. The collaboration within the OPA Forum highlights a commitment to industry-wide standards and interoperability in the critical domain of industrial automation.

### **6.5. Valuable Tables**

**Table 5: Key Hardware Vendors of ExxonMobil**

| **Vendor** | **Primary Hardware Provided** | **Relevant Snippets** |
| --- | --- | --- |
| Intel | Data Center Immersion Cooling Technologies, Processors for Industrial Computing | 37 |
| Dell Technologies | Hyper-converged Infrastructure, Networking Switches for OT | 43 |
| Verifone | Point of Sale (POS) Terminals (Retail) | 40 |
| Gilbarco | Point of Sale (POS) Hardware (Retail) | 40 |
| IBM | Quantum Hardware | 25 |
| Materia Inc. | Proxxima™ Thermoset Systems | 50 |

**Table 6: Key Software Vendors of ExxonMobil**

| **Vendor** | **Primary Software Provided** | **Relevant Snippets** |
| --- | --- | --- |
| SAP | ERP, HCM Systems | 10 |
| Microsoft | Azure Cloud Services, Power BI, Dynamics 365, IoT Technologies | 7 |
| IBM | IBM Cloud Platform, Watson Campaign Automation, Quantum Algorithms | 23 |
| Salesforce | Sales Cloud (CRM) | 16 |
| Hughes | Managed Network Services Software (Retail) | 40 |
| VMware by Broadcom | Virtualization Software (OT) | 43 |
| Schneider Electric | Industrial Automation Software (OPA) | 43 |
| Yokogawa | Industrial Automation Software (OPA) | 43 |
| Udesk Global | Customer Service Platform | 17 |
| Esri | ArcGIS Monitor (GIS Management) | 52 |

## **7. Operational Technology (OT) Environment**

Exxon Mobil's Operational Technology (OT) environment is critical for managing its industrial processes, including exploration, production, refining, and transportation. The company is actively modernizing this environment, focusing on enhancing efficiency, safety, and security through the adoption of new technologies and architectures 1.

### **7.1. Industrial Control Systems (ICS) and SCADA Systems**

ExxonMobil is in a phase of transition regarding its Industrial Control Systems (ICS) and SCADA systems. Historically, the company has relied on traditional proprietary systems for automating its operational processes in refineries and chemical plants 42. However, recognizing the limitations of these closed systems, such as high replacement costs and restricted access to modern technologies, ExxonMobil is pioneering the adoption of open standards through its **Open Process Automation (OPA)** initiative 1. OPA aims to create a more flexible, interoperable, and secure architecture for industrial control, allowing for the integration of best-in-class components from various vendors 41. A significant milestone in this journey is the commercial-scale deployment of an OPA system at ExxonMobil's Resin Finishing Plant in Baton Rouge, which includes over 100 controllers and 1000 input/output points 41.

For its extensive pipeline network, ExxonMobil Pipeline Company utilizes a **Supervisory Control and Data Acquisition (SCADA) system** 53. This system provides real-time operating data about the pipelines to operators in a 24/7 Operations Control Center (OCC), enabling them to monitor and control critical parameters such as valves, pumps, and tanks 53. The OCC is connected to regulated facilities through a multi-layer, bi-directional communications system, underscoring the importance of reliable and secure communication for pipeline operations 53. ExxonMobil has recently installed a new SCADA system and is continuously working to improve related procedures, such as P2P verification between SCADA displays and field equipment, to ensure data accuracy and operational safety 55.

### **7.2. OT/IT Convergence Initiatives**

ExxonMobil is actively pursuing **OT/IT convergence**, aiming to integrate the traditionally separate worlds of operational technology and information technology 43. The adoption of open standards like OPA is a key enabler of this convergence, allowing ExxonMobil to bring the programmability, upgradability, and other benefits of modern IT systems into its OT environment 43. The OPA architecture includes an "advanced computing platform, an operational technology (OT) data center," which utilizes IT technologies such as virtualization, containerization, Linux, mesh networks, firewall rules, and VLANs 41. This convergence aims to enhance efficiency, security, and innovation within ExxonMobil's industrial operations by breaking down silos and facilitating better data sharing and collaboration between IT and OT teams. The goal is to develop standardized blueprints that can be deployed across various types of facilities, creating IT systems with the flexibility to bring net new value to the business 43.

### **7.3. IoT Deployments in OT Environments**

The **Internet of Things (IoT)** plays a significant role in ExxonMobil's OT environment, particularly in upstream operations 7. In the Permian Basin, for example, ExxonMobil collaborates with Microsoft to use IoT technologies for monitoring and optimizing a vast number of widely dispersed field assets 7. Data collected from an extensive network of sensors is stored in the cloud, allowing engineers, scientists, and analysts seamless, real-time access from anywhere. The insights gained from this data enable performance optimization, workflow automation, and improved leak detection 22. ExxonMobil is also moving towards **closed-loop automation** in areas like drilling, leveraging AI and IoT data to enable systems to recognize and respond to events without human intervention, ultimately enhancing safety and efficiency 7. An industry-leading IoT project has been rolled out to collect all operating data from refineries and chemical plants – over 6 trillion individual data points – into a high-performance computing environment "data lake" for advanced analytics 7.

### **7.4. Key Takeaways**

ExxonMobil is actively modernizing its OT environment through the adoption of open standards like OPA and continuous upgrades to its SCADA systems. OT/IT convergence is a strategic priority, aiming to leverage IT benefits within the OT domain. Extensive IoT deployments, particularly in upstream operations, enable real-time monitoring, optimization, and a move towards greater automation.

### **7.5. Second/Third-Order Insights**

The transition to OPA represents a fundamental shift in how ExxonMobil approaches industrial automation, potentially leading to significant long-term cost reductions and increased agility in adopting new technologies. The convergence of OT and IT, while offering numerous benefits, also presents unique cybersecurity challenges that require a unified and robust security strategy. The vast amounts of data generated by IoT deployments in the OT environment offer immense opportunities for advanced analytics and machine learning to further optimize operations, predict equipment failures, and enhance safety protocols, driving continuous improvement across ExxonMobil's industrial operations.

### **7.6. Valuable Tables**

**Table 7: ExxonMobil Operational Technology (OT) Environment**

| **OT System/Initiative** | **Primary Purpose** | **Key Technologies Used** | **Relevant Snippets** |
| --- | --- | --- | --- |
| Open Process Automation (OPA) | Modernize Industrial Control Systems | Open Standards (O-PAS), Advanced Computing Platform, IT Technologies (Linux, Networking) | 39 |
| SCADA Systems | Pipeline Monitoring and Control | Multi-layer Bi-directional Communications, Real-time Data Acquisition | 53 |
| IoT Deployments (Permian Basin) | Oilfield Monitoring and Optimization | Sensors, Cloud Computing (Azure), Data Analytics, Machine Learning | 7 |
| Closed-Loop Automation | Autonomous Drilling and Oilfield Operations | AI, Machine Learning, IoT | 7 |
| OT Data Lake | Centralized OT Data Storage and Analytics | High Performance Computing Environment, Advanced Analytics | 7 |

## **8. Digital Transformation Projects and Technology Modernization**

Exxon Mobil is engaged in a comprehensive digital transformation across its various business segments, leveraging advanced technologies to enhance efficiency, safety, sustainability, and customer experience 7. These projects span upstream, downstream, and chemical operations, as well as consumer-facing applications and new energy solutions.

### **8.1. Key Digital Transformation Projects**

ExxonMobil's digital transformation initiatives are diverse and impactful:

* **Autonomous Drilling:** Utilizing AI to optimize drilling parameters in deep water operations, currently deployed in Guyana 7.
* **AI and IoT in Permian Basin:** Collaborating with Microsoft to monitor and optimize field assets using IoT and AI for enhanced performance, workflow automation, and leak detection 7.
* **Digital Twins:** Building a Digital Reality Ecosystem with open architecture and reality capture to improve asset visualization and cross-departmental data access 48.
* **Data Lake:** Collecting and analyzing vast amounts of operational data from refineries and chemical plants to gain actionable insights 7.
* **Consumer Applications:** Developing mobile apps for payment options, customer loyalty programs, and digitally enabled car maintenance experiences 7.
* **Predictive Maintenance:** Employing AI and machine learning to analyze equipment conditions and predict potential failures, reducing unplanned downtime 58.
* **Spatial Computing:** Transforming spatial computing for global 3D data management and collaboration using AWS cloud services 26.
* **Closed-Loop Automation:** Moving towards systems that can autonomously recognize and respond to events in operational environments 7.
* **Low Carbon Solutions:** Developing and deploying technologies for carbon capture and storage, hydrogen production, and advanced recycling of plastics 59.
* **Power Platform Solutions:** Utilizing Microsoft's Power Platform to develop solutions like Digital Shift Handover (DSH) and Enterprise Annual Maintenance Plan (AMP) to streamline internal processes 61.
* **Smart Refinery:** Implementing smart technology upgrades, including voice recognition and machine learning, in chemical and refining plants to reduce emissions and increase energy efficiency 7.
* **Quantum Computing Exploration:** Collaborating with IBM to explore the potential of quantum computing for solving complex challenges like maritime routing optimization 25.

### **8.2. Technology Modernization Roadmap and Strategic Goals for 2030**

ExxonMobil's Corporate Plan to 2030 outlines ambitious goals for technology modernization 59:

* Achieving an additional $7 billion in structural cost savings through business process simplification and modernization of IT and data management systems 59.
* Transitioning to a single ERP system for the entire corporation to enhance data consistency and operational efficiency 8.
* Increasing Upstream production significantly with a focus on advantaged assets, leveraging technology for capital efficiency and resource recovery 59.
* Growing high-value product sales by 80% through innovation and advanced materials 59.
* Investing up to $30 billion in lower emissions opportunities, including carbon capture, hydrogen, and biofuels, with technology playing a crucial role 59.
* Making substantial capital investments in major projects and the Permian Basin development program, with an emphasis on technology deployment for increased returns 63.
* Expanding LNG sales and advancing world-class LNG projects through efficient execution and technological advancements 59.
* Scaling up advanced plastics recycling capacity using Exxtend™ technology to promote circularity 60.
* Developing and commercializing advanced battery anode materials for electric vehicles 59.
* Establishing a large-scale low-carbon hydrogen production facility in Baytown, Texas, leveraging advanced carbon capture technology 59.

### **8.3. Investments in IT and Data Management Systems**

ExxonMobil recognizes the critical role of IT and data management systems in achieving its strategic objectives. The company's estimated annual ICT spending was $1.8 billion in 2024, with network infrastructure being a significant area of investment 27. Furthermore, the plan to achieve $7 billion in structural cost savings by modernizing these systems underscores their strategic importance in driving efficiency and reducing operational expenses 62. These investments are essential for supporting the company's extensive digital transformation initiatives and providing the robust technological foundation required for future growth and innovation.

### **8.4. Key Takeaways**

ExxonMobil is undertaking a broad and ambitious digital transformation across its operations, with a clear roadmap outlined in its Corporate Plan to 2030. Technology modernization, particularly in IT and data management, is a key focus, driven by the goals of enhancing efficiency, increasing production, expanding into low-carbon solutions, and improving overall business performance. Significant investments are being made in these areas to support the company's strategic objectives.

### **8.5. Second/Third-Order Insights**

The sheer scale and scope of ExxonMobil's digital transformation projects indicate a fundamental shift towards becoming a more technology-driven organization. This transformation requires not only significant financial investment but also a cultural change within the company, fostering a mindset of innovation and agility. The integration of technology modernization into the core business strategy reflects a recognition that technology is no longer just a support function but a key enabler of future success and competitiveness in the evolving energy landscape. The focus on cost savings through IT modernization suggests a strategic approach to optimizing technology investments and ensuring that they deliver tangible business value.

### **8.6. Valuable Tables**

**Table 8: Key Digital Transformation Projects at ExxonMobil**

| **Business Segment/Area** | **Project Name** | **Primary Objectives** | **Key Technologies Involved** |
| --- | --- | --- | --- |
| Upstream | Autonomous Drilling | Optimize drilling parameters, increase efficiency | AI, Machine Learning |
| Upstream | AI and IoT in Permian Basin | Monitor and optimize field assets | IoT, Cloud Computing (Azure), AI, Machine Learning |
| Cross-Business | Digital Twins | Asset visualization, data integration | Open Architecture, Reality Capture |
| Cross-Business | Data Lake | Centralized data analytics | High Performance Computing, Advanced Analytics |
| Downstream/Retail | Consumer Applications | Enhance customer experience | Mobile Apps, Cloud Computing |
| Cross-Business | Predictive Maintenance | Reduce unplanned downtime | AI, Machine Learning |
| Cross-Business | Spatial Computing | Global 3D data management and collaboration | Cloud Computing (AWS) |
| Cross-Business | Closed-Loop Automation | Autonomous operations | AI, IoT |
| Cross-Business | Low Carbon Solutions | Develop sustainable energy technologies | Carbon Capture, Hydrogen, Advanced Recycling |
| Internal Operations | Power Platform Solutions | Streamline internal processes | Microsoft Power Platform |
| Downstream | Smart Refinery | Reduce emissions, increase energy efficiency | AI, Machine Learning, IoT |

**Table 9: ExxonMobil Corporate Plan to 2030 - Technology Modernization Goals**

| **Strategic Goal** | **Description** | **Target Metric/Timeline** |
| --- | --- | --- |
| Structural Cost Savings | Modernize IT and data management systems, simplify business processes | $7 billion vs. 3Q2024 |
| Single ERP System | Consolidate all business units onto one ERP platform | Long-term goal |
| Upstream Production Increase | Leverage technology for capital efficiency and resource recovery | 5.4 million oil-equivalent barrels per day by 2030 |
| Low Carbon Solutions Growth | Develop and deploy sustainable energy technologies | Pursuing up to $30 billion in investment (2025-2030) |
| Advanced Plastics Recycling | Scale up capacity using Exxtend™ technology | Up to 500,000 metric tons per year by 2027 |
| Advanced Battery Materials | Commercialize high-performance battery anode product | First commercial-scale plant online in 2028 |
| Low-Carbon Hydrogen Production | Establish world's largest facility in Baytown | Startup anticipated in 2029 |

## **9. Strategic Technology Partnerships**

Exxon Mobil actively engages in strategic technology partnerships to accelerate its digital transformation, drive innovation, and address the evolving challenges and opportunities in the energy sector 66. These collaborations span a wide range of technology domains and involve major technology companies, specialized vendors, academic institutions, and industry consortia.

### **9.1. Key Strategic Technology Partners**

ExxonMobil has established significant partnerships with several leading technology companies:

* **Microsoft:** Focuses on cloud technologies (Azure), IoT, AI, and machine learning to drive digital solutions across upstream operations and other business areas 28.
* **IBM:** Collaborates on quantum computing for advanced problem-solving, provides cloud services for customer-facing applications, and partners on AI initiatives 25.
* **Intel:** Works with ExxonMobil on developing energy-efficient data center cooling technologies and in the context of open process automation for industrial control systems 37.
* **AWS:** Provides cloud solutions for spatial computing, global 3D data management, and ERP modernization initiatives 26.

ExxonMobil also partners with academic and research institutions:

* **Universities and National Labs (NREL, NETL):** Collaborations focused on research and development of lower-emissions technologies and sustainable energy solutions 68.
* **Global Thermostat:** Joint development agreement for direct air capture technology, a key component of carbon capture efforts 68.

For its industrial automation initiatives, ExxonMobil collaborates with:

* **Dell Technologies:** Partner in building the OPA Advanced Computing Platform 43.
* **Schneider Electric:** Involved in the OPA Forum, offering solutions for open process automation architecture 46.
* **VMware by Broadcom:** Provides virtualization software for OT workloads within the OPA framework 43.
* **Yokogawa:** Collaborates on system integration and support for the OPA initiative 46.

In the retail and automotive service sectors, ExxonMobil has partnerships with:

* **Hughes Network Systems:** Provides managed network services and security solutions for Exxon and Mobil branded wholesalers 40.
* **Tencent and Tuhu:** Teaming up to establish a digitally enabled car maintenance experience in China 7.
* **Amazon:** Collaborating to offer new payment options at service stations through Alexa integration 7.

Finally, for its low-carbon hydrogen project, ExxonMobil has partnered with:

* **Mitsubishi Corporation:** Project Framework Agreement to advance the world's largest low-carbon hydrogen project in Baytown, Texas 65.

### **9.2. Objectives and Potential Impact of Collaborations**

The objectives of these strategic partnerships are multifaceted. They aim to accelerate ExxonMobil's digital transformation by leveraging the expertise and technologies of leading tech companies. Collaborations in areas like AI, quantum computing, and cloud computing seek to drive innovation and solve complex challenges within the energy sector. Partnerships focused on sustainability and low-carbon solutions are crucial for addressing environmental concerns and exploring new business opportunities in the evolving energy landscape. The OPA Forum collaborations are intended to foster industry-wide standards and interoperability in industrial automation, reducing costs and increasing flexibility. Partnerships in the retail and automotive service sectors aim to enhance customer experience and expand ExxonMobil's digital service offerings. The potential impact of these collaborations is significant, ranging from improved operational efficiency and cost savings to the development of new revenue streams and a stronger competitive position in the global energy market.

### **9.3. Key Takeaways**

ExxonMobil strategically partners with a diverse range of technology companies, academic institutions, and industry consortia to advance its digital transformation and innovation agenda. These collaborations are crucial for achieving its ambitious goals in areas like cloud adoption, AI/ML implementation, quantum computing, industrial automation, sustainability, and customer engagement.

### **9.4. Second/Third-Order Insights**

The extensive network of strategic partnerships underscores ExxonMobil's understanding of the need to collaborate and leverage external expertise to navigate the complexities of digital transformation and the energy transition. These collaborations allow ExxonMobil to access cutting-edge technologies and specialized knowledge that might not be available internally, accelerating the pace of innovation and reducing the risks associated with developing new solutions in-house. The focus on partnerships in emerging areas like quantum computing and low-carbon hydrogen indicates a long-term vision and a proactive approach to shaping the future of the energy industry. Effective management and integration of these diverse partnerships will be critical for maximizing their value and ensuring alignment with ExxonMobil's overarching strategic objectives.

### **9.5. Valuable Tables**

**Table 10: ExxonMobil Strategic Technology Partnerships**

| **Partner Company/Institution** | **Area of Collaboration** | **Primary Objectives** |
| --- | --- | --- |
| Microsoft | Cloud Computing (Azure), IoT, AI/ML | Digital Transformation, Operational Optimization |
| IBM | Quantum Computing, Cloud Services, AI | Advanced Research, Customer Engagement |
| Intel | Data Center Cooling, Industrial Computing (OPA) | Energy Efficiency, Open Automation |
| AWS | Cloud Computing, Spatial Computing, ERP Modernization | Scalable Infrastructure, Data Management |
| Universities & National Labs | Lower-Emissions Technologies, Sustainable Energy | Research and Development |
| Global Thermostat | Direct Air Capture Technology | Carbon Capture Solutions |
| Dell Technologies | OPA Advanced Computing Platform | Open Industrial Automation |
| Schneider Electric | OPA Forum | Open Industrial Automation Standards and Solutions |
| VMware by Broadcom | OPA Forum | Virtualization for OT Workloads |
| Yokogawa | OPA Forum | System Integration and Support for OPA |
| Hughes Network Systems | Retail Network Solutions | Secure and Reliable Connectivity |
| Tencent & Tuhu | Digital Car Maintenance Experience (China) | Enhance Customer Service Offerings |
| Amazon | Payment Options at Service Stations (Alexa) | Improve Customer Convenience |
| Mitsubishi Corporation | Low-Carbon Hydrogen Project | Develop Sustainable Hydrogen Production |

## **10. Security Breaches, Incidents, and Vulnerability Disclosures**

Exxon Mobil, like any large organization, faces ongoing security challenges. Publicly available information provides some insights into past security breaches, incidents, and external assessments of its vulnerability landscape 69.

### **10.1. Publicly Documented Security Breaches and Incidents**

In 2012, the hacktivist group **Anonymous** claimed to have targeted ExxonMobil as part of "Op SaveTheArctic," alleging a compromise of company data and the leakage of email addresses and hashed passwords 70. The attack was reportedly in response to environmental concerns, and ExxonMobil did not comment on the security-related inquiries at the time. The breach was believed to have occurred on a smaller web server and involved a limited number of accounts.

A **security breach** occurred at ExxonMobil's plant in Baytown, Texas, in April 2016, when an unauthorized individual entered the complex, leading to a temporary lockdown 71. Authorities responded to the incident, but no arrests were reported. ExxonMobil stated that they take such matters seriously and were working closely with law enforcement. This incident appears to be a physical security breach rather than a cyber security event.

In 2024, reports emerged that **DCI Group**, a lobbying firm that had worked with ExxonMobil, was under investigation by the FBI for its alleged involvement in the "Dark Basin" spear phishing operation 72. This operation targeted thousands of individuals and organizations globally, including environmental advocacy groups. ExxonMobil reportedly ended its contract with DCI in 2020 after the hacking investigation became public. While ExxonMobil was not directly implicated in initiating the hacking, there were allegations that the corporation used information obtained through the operation.

### **10.2. Analysis of External Security Posture Assessments**

UpGuard, a security ratings service, continuously monitors the security posture of ExxonMobil using open-source and proprietary threat intelligence feeds 69. Their analysis results in a security rating, with ExxonMobil receiving a rating of "B," indicating a generally good security posture based on their external attack surface 69. The UpGuard reports also highlight specific findings across various risk categories.

In terms of **website security**, UpGuard noted that server information headers and ASP.NET version headers were not exposed, which is a good security practice 69. The website's Referrer Policy was also configured appropriately 69. However, HTTP Strict Transport Security (HSTS) was not enforced, which could make users more susceptible to man-in-the-middle attacks 69.

Regarding **email security**, Sender Policy Framework (SPF) was strictly enforced, which helps prevent email spoofing 69. A DKIM record was found, but the DMARC policy was not set to quarantine or reject, suggesting an area for potential improvement in preventing email-based attacks 69.

For **network security**, no open ports were detected, which is a positive finding 69. However, DNSSEC was not enabled, and a CAA record was not present, which could leave the domain more vulnerable to certain types of attacks 69.

In the area of **encryption**, SSL was supported, and HTTP requests were redirected to HTTPS, ensuring encrypted communication 69. The SSL certificate was valid, trusted, and used a strong algorithm and key length 69. Weak cipher suites were supported in TLS 1.2, which could potentially be exploited by well-resourced attackers 69.

UpGuard's **IP/Domain Reputation** analysis indicated no recent reports of botnet activity, brute force login attempts, or phishing activity associated with ExxonMobil's domains 69. However, there were some reports of malware distribution in the preceding 90 days 69.

Finally, the **vulnerability management** assessment showed that ExxonMobil's servers were not vulnerable to several known exploits like Heartbleed, POODLE, FREAK, and Logjam 69.

### **10.3. Key Takeaways**

ExxonMobil has been the target of hacktivist activity and experienced a physical security incident. An external lobbying firm associated with the company was also under investigation for cyber espionage. External security assessments indicate a generally good security posture, but areas for improvement exist, particularly in enabling DNSSEC and HSTS and strengthening email authentication protocols.

### **10.4. Second/Third-Order Insights**

The hacktivist attack highlights the need for energy companies to be vigilant against ideologically motivated cyber threats, in addition to traditional criminal and state-sponsored actors. The investigation into the lobbying firm underscores the importance of third-party risk management in cybersecurity. The vulnerabilities identified in the external security assessments, while not critical, represent potential areas of exposure that ExxonMobil should address to further enhance its security posture. Continuous monitoring and remediation of these types of vulnerabilities are essential for maintaining a strong defense against evolving cyber threats.

### **10.5. Valuable Tables**

**Table 11: ExxonMobil Publicly Documented Security Breaches and Incidents**

| **Date** | **Type of Incident** | **Description** | **Source (Snippet)** |
| --- | --- | --- | --- |
| 2012 | Cyberattack (Hacktivist) | Anonymous claimed to compromise data and leak credentials | 70 |
| April 2016 | Physical Security Breach | Unauthorized entry at Baytown plant, temporary lockdown | 71 |
| 2024 (Reported) | Cyber Espionage Investigation (Third-Party) | Lobbying firm DCI Group investigated for spear phishing operation; ExxonMobil reportedly used hacked material | 72 |

**Table 12: ExxonMobil External Security Posture Assessment Findings (UpGuard)**

| **Risk Category** | **Finding** | **Status** |
| --- | --- | --- |
| Website Security | Server Information Header Exposed | Not Exposed (Good) |
| Website Security | ASP.NET Version Header Exposed | Not Exposed (Good) |
| Website Security | HTTP Strict Transport Security (HSTS) | Not Enforced |
| Email Security | SPF Record | Strictly Enforced (Good) |
| Email Security | DMARC Policy | Found, but not Quarantine or Reject |
| Network Security | Open Ports | None Detected (Good) |
| Network Security | DNSSEC | Not Enabled |
| Network Security | CAA Record | Not Enabled |
| Encryption | Weak Cipher Suites (TLS 1.2) | Supported |
| IP/Domain Reputation | Malware Distribution | Some Reports (Past 90 Days) |

## **11. Security Frameworks, Policies, Certifications, and Compliance**

Exxon Mobil employs a comprehensive approach to security, guided by established frameworks, policies, and adherence to relevant certifications and compliance standards 73. This reflects a commitment to managing risks and ensuring the integrity of its operations and the safety of its stakeholders.

### **11.1. Security Frameworks**

ExxonMobil's primary framework for managing security, safety, health, and environmental risks is its **Operations Integrity Management System (OIMS)** 1. OIMS provides a systematic and disciplined approach to identify, assess, mitigate, and manage these risks across all aspects of the company's business, from offshore platforms to offices. Security is an integral component of OIMS, with specific elements and expectations designed to address security risks to personnel, facilities, and information. The framework emphasizes strong leadership, proactive risk management, and continuous improvement in performance.

In addition to OIMS, ExxonMobil integrates cybersecurity risks into its overall **enterprise risk management system** and leverages industry standard frameworks, including the **National Institute of Standards and Technology Cybersecurity Framework (NIST CSF)** 78. The NIST CSF provides a structured approach to managing cybersecurity risks across five core functions: Identify, Protect, Detect, Respond, and Recover. By adopting this framework, ExxonMobil aligns its cybersecurity program with recognized best practices and ensures a comprehensive approach to preventing, detecting, and responding to cyber threats.

### **11.2. Security Policies and Standards**

ExxonMobil has established various policies and standards that guide its security practices. Its **Safety, Security, Health, Environmental and Product Safety policies** document the company's commitment to protecting its employees, contractors, communities, customers, and the environment 1. These policies are put into practice through the OIMS framework.

The company also has comprehensive **privacy policies** in place to address the collection, use, and safeguarding of personal information, complying with applicable data protection laws such as GDPR and CCPA 80. These policies outline the principles and procedures for handling personal data responsibly and transparently.

ExxonMobil's **Standards of Business Conduct** define the global ethical conduct expected of the Corporation and its subsidiaries, encompassing values related to human rights, labor, the environment, and anti-corruption 84. While not solely focused on security, these standards include expectations for legal compliance and ethical behavior, which are foundational to a strong security culture.

### **11.3. Security-Related Certifications and Compliance Statuses**

ExxonMobil demonstrates compliance with several key regulations and holds relevant certifications:

* **Sarbanes-Oxley Act and NYSE Listing Standards:** ExxonMobil's company-wide financial controls meet or exceed the requirements of these regulations, as independently assessed by PricewaterhouseCoopers LLP 1. This ensures effective internal controls over financial reporting.
* **PCI Compliance:** ExxonMobil's retail operations adhere to the Payment Card Industry (PCI) Data Security Standard to ensure the secure handling of payment card data at Exxon and Mobil stations 40.
* **ISO 9001 Certification:** ExxonMobil Chemical's Global Product Quality Management System (GPQMS) is certified to ISO 9001 standards by Lloyd's Register Quality Assurance (LRQA), demonstrating a commitment to quality management principles 85.
* **ISO 14001 and ISO 45001 Certifications:** ExxonMobil's OIMS framework is certified by Lloyd's Register Quality Assurance, Inc., as being consistent with ISO 14001:2015 (environmental management systems) and ISO 45001:2018 (occupational health and safety management systems) 1. These certifications indicate adherence to internationally recognized standards for environmental and safety management, which are closely linked to operational security and integrity.

### **11.4. Key Takeaways**

ExxonMobil employs a robust and multi-layered approach to security, anchored by its OIMS framework and alignment with the NIST Cybersecurity Framework. The company has established comprehensive policies and standards covering various aspects of security, safety, and data privacy. Furthermore, ExxonMobil maintains compliance with key industry regulations and holds relevant ISO certifications, demonstrating a commitment to best practices and legal obligations.

### **11.5. Second/Third-Order Insights**

The strong emphasis on security within ExxonMobil's OIMS framework indicates that security is deeply integrated into the company's operational culture and risk management processes. The adoption of the NIST Cybersecurity Framework further underscores their commitment to aligning with industry best practices for managing cyber threats. Compliance with a diverse set of regulations and certifications demonstrates ExxonMobil's dedication to meeting its legal and industry obligations, fostering trust among stakeholders and ensuring the long-term sustainability of its operations.

### **11.6. Valuable Tables**

**Table 13: ExxonMobil Security Frameworks, Policies, Certifications, and Compliance**

| **Framework/Policy/Certification/Compliance** | **Description** | **Relevance to Security** |
| --- | --- | --- |
| Operations Integrity Management System (OIMS) | Overarching framework for managing safety, security, health, and environmental risks | Integrates security considerations into all business operations |
| NIST Cybersecurity Framework | Industry standard framework for managing cybersecurity risks | Provides a structured approach to prevent, detect, respond to, and recover from cyber threats |
| Safety, Security, Health, Environmental and Product Safety Policies | Document the company's commitment to these areas | Provides foundational principles for security practices |
| Privacy Policies | Address the collection, use, and safeguarding of personal information | Ensures compliance with data protection laws |
| Standards of Business Conduct | Define global ethical conduct | Includes expectations for legal compliance and ethical behavior relevant to security |
| Sarbanes-Oxley Act and NYSE Listing Standards | Regulations for financial controls | Ensures effective internal controls over financial reporting, including IT systems supporting financial data |
| PCI Compliance | Payment Card Industry Data Security Standard | Ensures secure handling of payment card data in retail operations |
| ISO 9001 Certification | Quality Management System | Demonstrates commitment to quality principles that can contribute to operational security |
| ISO 14001 Certification | Environmental Management System | Addresses environmental risks and impacts, which can be related to security in industrial operations |
| ISO 45001 Certification | Occupational Health and Safety Management System | Focuses on health and safety risks, closely linked to personnel and operational security |

## **12. Conclusion**

ExxonMobil is undergoing a significant transformation driven by digital technologies across all facets of its operations. The company has embraced a multi-cloud strategy, partnering with leading providers like Microsoft Azure, IBM Cloud, and AWS to support diverse workloads ranging from upstream oil and gas operations to customer-facing applications and advanced research. A key aspect of their technological evolution is the pioneering Open Process Automation (OPA) initiative, which aims to modernize industrial control systems through open standards, promising greater flexibility, interoperability, and security within their operational technology environment.

Security is a paramount concern for ExxonMobil, deeply embedded within its comprehensive Operations Integrity Management System (OIMS) framework. The company aligns its cybersecurity efforts with industry best practices, including the NIST Cybersecurity Framework, and maintains compliance with a range of relevant regulations and certifications, such as Sarbanes-Oxley, PCI, and ISO standards. While ExxonMobil has been the target of security incidents in the past, external assessments indicate a generally strong security posture, with ongoing efforts to address identified vulnerabilities and continuously improve their defenses.

For technology analysts, ExxonMobil presents a compelling case study of a major energy company strategically leveraging digital technologies to enhance efficiency, sustainability, and innovation. Their significant investments in IT infrastructure, data management systems, and emerging technologies like AI and quantum computing signal a commitment to long-term competitiveness. The company's exploration of new business models, such as providing low-carbon power and cooling solutions for data centers, highlights its adaptability to the evolving energy landscape. Investment professionals should recognize ExxonMobil's proactive approach to technology modernization and its commitment to security and regulatory compliance as crucial factors in mitigating risks and capitalizing on future opportunities in the energy sector. The strategic technology partnerships forged by ExxonMobil further underscore its collaborative approach to innovation and its recognition of the need to leverage external expertise to achieve its ambitious goals.

#### Works cited

1. Management systems, standards and controls | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations/energy-technologies/risk-management-and-safety/management-systems-standards-and-controls>
2. Risk management and safety | ExxonMobil - ZenithMobil, accessed March 22, 2025, <https://www.zenithmobil.com/who-we-are/technology-and-collaborations/energy-technologies/risk-management-and-safety.html>
3. The digital watchtower | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/locations/european-region/european-newsroom/cybersecurity-digital-watchtower>
4. Exxon CEO on preparing for cyber threats after Colonial Pipeline hack - YouTube, accessed March 22, 2025, <https://www.youtube.com/watch?v=yebEnhmQER0>
5. Exxon Mobil Digital Transformation Strategy Analysis Report - GlobeNewswire, accessed March 22, 2025, <https://www.globenewswire.com/news-release/2024/01/11/2807670/0/en/Exxon-Mobil-Digital-Transformation-Strategy-Analysis-Report-2023-Insights-into-Technology-Centers-Initiatives-Estimated-ICT-Budget-and-Partnership-Network-Map.html>
6. Exxon Mobil Digital Transformation Strategy Analysis Report 2023: Accelerators, Incubators, and Other Innovation Programs - ResearchAndMarkets.com - Business Wire, accessed March 22, 2025, <https://www.businesswire.com/news/home/20240111587114/en/Exxon-Mobil-Digital-Transformation-Strategy-Analysis-Report-2023-Accelerators-Incubators-and-Other-Innovation-Programs---ResearchAndMarkets.com>
7. Digital technologies | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations/digital-technologies>
8. Gas and hot air? Exxon talks up “surging” data centre power demand - The Stack, accessed March 22, 2025, <https://www.thestack.technology/gas-baby-exxon-talks-up-surging-data-centre-power-demand-2/>
9. Top 10 ERP Software Vendors, Market Size and Market Forecast 2023-2028, accessed March 22, 2025, <https://www.appsruntheworld.com/top-10-erp-software-vendors-and-market-forecast/>
10. ExxonMobil selects SAP S/4 HANA for ERP Financial, accessed March 22, 2025, <https://www.appsruntheworld.com/customers-database/purchases/view/exxon-mobil-united-states-selects-sap-s-4-hana-for-erp-financial>
11. Chapter 14 Flashcards - Quizlet, accessed March 22, 2025, <https://quizlet.com/514752052/chapter-14-flash-cards/>
12. Legacy Software Review: SAP ERP Software, accessed March 22, 2025, <https://www.erpadvisorsgroup.com/blog/legacy-software-review-sap>
13. AWS re:Invent 2024 - Modernizing & integrating ExxonMobil's ERP systems & apps with ROSA (HYB101) - YouTube, accessed March 22, 2025, <https://www.youtube.com/watch?v=DmMi2ytHjKE>
14. Business system integration | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/resources/ebusiness-services/business-system-integration>
15. ExxonMobil - Intch, accessed March 22, 2025, <https://intch.org/company/exxonmobil-1>
16. ExxonMobil selects Salesforce Sales Cloud for Sales Engagement - apps run the world, accessed March 22, 2025, <https://www.appsruntheworld.com/customers-database/purchases/view/exxonmobil-united-states-selects-salesforce-sales-cloud-for-sales-automation-crm-sales-engagement>
17. Provides EXXON MOBIL With Fast And Convenient Services Center For Customer - Udesk, accessed March 22, 2025, <https://my.udeskglobal.com/customer-case/exxon-mobil>
18. Marketing Enablement Analytics Advisor Job Details - Careers at ExxonMobil, accessed March 22, 2025, <https://jobs.exxonmobil.com/ExxonMobil/job/Spring-Marketing-Enablement-Analytics-Advisor-TX-77024/1268979900/>
19. What Is the Exxon Mobil Rewards+ Program and How It Works - Loyally.ai Blog, accessed March 22, 2025, <https://blog.loyally.ai/posts/what-is-the-exxon-mobil-rewards-program-and-how-it-works>
20. How Cloud Computing is Being Used by ExxonMobil, American Airlines, Samsonite, Forbes, and Discovery+: Business Case Studies - Datamation, accessed March 22, 2025, <https://www.datamation.com/cloud/cloud-computing-case-studies/>
21. ExxonMobil to increase Permian profitability through digital partnership with Microsoft, accessed March 22, 2025, <https://corporate.exxonmobil.com/news/news-releases/2019/0222_exxonmobil-to-increase-permian-profitability-through-digital-partnership-with-microsoft>
22. ExxonMobil to Increase Permian Profitability Through Digital Partnership with Microsoft, accessed March 22, 2025, <https://investor.exxonmobil.com/news-events/press-releases/detail/214/exxonmobil-to-increase-permian-profitability-through>
23. www.ibm.com, accessed March 22, 2025, <https://www.ibm.com/case-studies/exxon-mobil-corporation-cloud#:~:text=%E2%80%9CWhen%20we%20say%20IBM%20is,history%20as%20a%20service%20innovator.>
24. ExxonMobil - IBM, accessed March 22, 2025, <https://www.ibm.com/case-studies/exxon-mobil-corporation-cloud>
25. ExxonMobil strives to solve complex energy challenges - IBM, accessed March 22, 2025, <https://www.ibm.com/case-studies/exxonmobil>
26. ﻿Exxon Mobil + AWS | ﻿Transforming Spatial Computing for Global 3D Data Management and Collaboration - CERAWeek, accessed March 22, 2025, <https://www.ceraweek.com/en/program/exxon-mobil--aws--transforming-spatial-computing-for-global-3d-data-management-and-collaboration-1060-48825/>
27. Exxon Mobil Corporation - Digital Transformation Strategies - GlobalData, accessed March 22, 2025, <https://www.globaldata.com/store/report/exxon-mobil-corporation-enterprise-tech-analysis/>
28. ExxonMobil and Microsoft Announce Dynamics, Azure, AI and IoT Partnership - Datanami, accessed March 22, 2025, <https://www.bigdatawire.com/this-just-in/exxonmobil-and-microsoft-announce-dynamics-azure-ai-and-iot-partnership/>
29. ExxonMobil to increase Permian profitability through digital partnership with Microsoft, accessed March 22, 2025, <https://news.microsoft.com/2019/02/22/exxonmobil-to-increase-permian-profitability-through-digital-partnership-with-microsoft/>
30. Oil giant ExxonMobil eyes data centre energy with carbon capture & natural gas, accessed March 22, 2025, <https://www.capacitymedia.com/article/2e55ft4a0vtiacr6j24u8/news/article-oil-giant-exxonmobil-eyes-data-centre-energy>
31. ExxonMobil Pioneers Large-Scale Carbon Capture on U.S. Gulf Coast, accessed March 22, 2025, <https://corporate.exxonmobil.com/news/viewpoints/a-breakout-year-for-our-carbon-capture-and-storage-business>
32. ExxonMobil to Generate Low-Carbon Electricity for Data Centers - Smart Energy Decisions, accessed March 22, 2025, <https://www.smartenergydecisions.com/energy-management/2024/12/12/exxonmobil-to-generate-low-carbon-electricity-for-data-centers>
33. ExxonMobil plans large gas plant with CCS for data center power, accessed March 22, 2025, <https://www.power-eng.com/gas/exxonmobil-plans-large-gas-plant-with-ccs-for-data-center-power/>
34. ExxonMobil plots natural gas power plant to exclusively power data centers - DCD, accessed March 22, 2025, <https://www.datacenterdynamics.com/en/news/exxonmobil-plots-natural-gas-power-plant-to-exclusively-power-data-centers/>
35. What can't our CCS help decarbonize? | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/what-we-do/delivering-industrial-solutions/carbon-capture-and-storage/steel-ammonia-ai-what-cant-ccs-help-decarbonize>
36. Exxon Wants To Satiate Power-hungry Data Centers With Natural Gas & Carbon Capture, accessed March 22, 2025, <https://carbonherald.com/exxon-mobil-power-data-centers-natural-gas-carbon-capture/>
37. ExxonMobil + Intel | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/solutions-by-industry/industrial-applications/data-center-immersion-fluids/intel>
38. Data Center Cooling | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/solutions-by-industry/industrial-applications/data-center-immersion-fluids>
39. Pioneering a new automation technology | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/news/corporate-news/pioneering-a-new-automation-technology>
40. Hughes Network for ExxonMobil Branded Wholesalers, accessed March 22, 2025, <https://www.hughes.com/exxon-network-options>
41. New insights: 100-controller ExxonMobil Open Process Automation - Control Engineering, accessed March 22, 2025, <https://www.controleng.com/new-insights-100-controller-exxonmobil-open-process-automation/>
42. ExxonMobil: Improving Industrial Control Systems - Intel, accessed March 22, 2025, <https://www.intel.com/content/www/us/en/customer-spotlight/stories/exxonmobil-customer-spotlight.html>
43. ExxonMobil, VMware on running OT workloads on IT systems - RCR Wireless News, accessed March 22, 2025, <https://www.rcrwireless.com/20240826/telecom-software/exxonmobil-vmware-on-running-ot-workloads-on-it-systems>
44. Next Generation IT OT Convergence A Pilot with ExxonMobil and CPLANE - YouTube, accessed March 22, 2025, <https://www.youtube.com/watch?v=FNRpHj8DybE>
45. The Future of OT Security - Sygnia, accessed March 22, 2025, <https://www.sygnia.co/blog/the-future-of-ot-security/>
46. Five Industry Leaders Are Teaming with ExxonMobil on Open Process Automation. This Changes Everything. - Schneider Electric Blog, accessed March 22, 2025, <https://blog.se.com/industry/energies-and-chemicals/2022/05/25/five-industry-leaders-are-teaming-with-exxonmobil-on-open-process-automation-this-changes-everything/>
47. Exxon Mobil Corporation | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/>
48. ExxonMobil Uses Digital Twins and Open Architecture in the Industrial Metaverse, accessed March 22, 2025, <https://innovateenergynow.com/resources/exxonmobil-uses-digital-twins-and-open-architecture-in-the-industrial-metaverse>
49. Suppliers | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/procurement/exxonmobil-for-suppliers>
50. Proxxima | ExxonMobil, accessed March 22, 2025, <https://www.materia-inc.com/>
51. ExxonMobil Software Purchases and Digital Transformation Initiatives, accessed March 22, 2025, <https://www.appsruntheworld.com/customers-database/customers/view/exxon-mobil-united-states>
52. ExxonMobil Leverages ArcGIS Monitor to Manage Global Enterprise GIS System and Maximize Performance - Esri, accessed March 22, 2025, <https://www.esri.com/en-us/lg/industry/petroleum-and-pipeline/stories/exxonmobil-arcgis-monitor-case-study>
53. Our work: Monitoring and leak detection - ExxonMobil Pipeline Company, accessed March 22, 2025, <https://www.exxonmobilpipeline.com/en/our-work/monitoring-and-leak-detection>
54. Pipeline construction, accessed March 22, 2025, <https://www.exxonmobilpipeline.com/en/our-work/pipeline-construction>
55. NOTICE OF AMENDMENT - Pipeline Risk Management Information System (PRIMIS), accessed March 22, 2025, <https://primis.phmsa.dot.gov/enforcement-documents/32021026NOA/32021026NOA_Notice%20of%20Amendment_04082021_(20-187008)_text.pdf>
56. Top 10: Uses of IoT in Energy, accessed March 22, 2025, <https://energydigital.com/top10/top-10-uses-of-iot-in-energy>
57. ExxonMobil: Closed-Loop Automation & The Digital Ecosystem, accessed March 22, 2025, <https://manufacturingdigital.com/articles/exxonmobil-closed-loop-automation-and-digital-ecosystem>
58. Case Study: Transforming Energy Operations with AI at ExxonMobil - AIX | AI Expert Network, accessed March 22, 2025, <https://aiexpert.network/case-study-transforming-energy-operations-with-ai-at-exxonmobil/>
59. ExxonMobil announces plans to 2030 that build on its unique advantages, accessed March 22, 2025, <https://corporate.exxonmobil.com/news/news-releases/2024/1211_exxonmobil-announces-plans-to-2030-that-build-on-its-unique-advantages>
60. Advanced Recycling with Exxtend™ technology | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/brands/signature-polymers/exxtend_technology>
61. ExxonMobil Upstream IT Leads with Expertise and Collaboration on Power Platform Wins, accessed March 22, 2025, <https://msdynamicsworld.com/story/exxonmobil-upstream-it-leads-expertise-and-collaboration-power-platform-wins>
62. Exxon Mobil unveils Corporate Plan to 2030, sees $20B share repurchases in 2026, accessed March 22, 2025, <https://www.nasdaq.com/articles/exxon-mobil-unveils-corporate-plan-2030-sees-20b-share-repurchases-2026>
63. ExxonMobil Unveils Operational & Financial Roadmap to 2030, accessed March 22, 2025, <https://nogenergydirectory.com/view-posts/821>
64. ExxonMobil announces plans to 2030 that build on its unique advantages - Markets data, accessed March 22, 2025, <https://markets.ft.com/data/announce/detail?dockey=600-202412110700BIZWIRE_USPRX____20241210_BW516473-1>
65. Mitsubishi Corporation and ExxonMobil sign Project Framework Agreement to advance world's largest low-carbon hydrogen project | News Release, accessed March 22, 2025, <https://www.mitsubishicorp.com/jp/en/news/release/2024/0000054472.html>
66. Technology and collaborations - ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations>
67. ExxonMobil and Intel announce collaboration to bring data center immersion cooling solution to market, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/resources/library/library-detail/111994/collaboration_to_bring_data_center>
68. University and National Labs partnerships | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations/university-and-national-labs-partnerships>
69. ExxonMobil Security Rating, Vendor Risk Report, and Data Breaches - UpGuard, accessed March 22, 2025, <https://www.upguard.com/security-report/exxonmobil>
70. Anonymous Targets Oil Giants ExxonMobil, Shell and BP - SecurityWeek, accessed March 22, 2025, <https://www.securityweek.com/anonymous-targets-oil-giants-exxonmobil-shell-and-bp/>
71. Authorities respond to security breach at ExxonMobil plant in Baytown | 12newsnow.com, accessed March 22, 2025, <https://www.12newsnow.com/article/news/authorities-respond-to-security-breach-at-exxonmobil-plant-in-baytown/502-264527912>
72. ExxonMobil Lobbying Firm Reportedly Investigated Over Cyberattack Targeting Climate Accountability Advocates - Union of Concerned Scientists, accessed March 22, 2025, <https://www.ucsusa.org/about/news/exxonmobil-lobbyist-dci-cyberattack-investigation>
73. Management systems, standards and controls | ExxonMobil - ZenithMobil, accessed March 22, 2025, <https://zenithmobil.com/who-we-are/technology-and-collaborations/energy-technologies/risk-management-and-safety/management-systems-standards-and-controls.html>
74. Operations integrity management system - ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations/energy-technologies/risk-management-and-safety/operations-integrity-management-system>
75. Safety, environment and community | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/exxonmobil-chemical/about-us/health-and-safety>
76. Risk management and safety - ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/who-we-are/technology-and-collaborations/energy-technologies/risk-management-and-safety>
77. Operations Integrity Management System - ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/-/media/global/files/risk-management-and-safety/oims-framework-brochure.pdf>
78. EXXON MOBIL CORP 10-K Cybersecurity GRC - 2025-02-19, accessed March 22, 2025, <https://www.board-cybersecurity.com/annual-reports/tracker/20250219-exxon-mobil-corp-cybersecurity-10k/>
79. EXXON MOBIL CORP 10-K Cybersecurity GRC - 2024-02-28, accessed March 22, 2025, <https://www.board-cybersecurity.com/annual-reports/tracker/20240228-exxon-mobil-corp-cybersecurity-10k/>
80. Privacy and Cookie Policy - ExxonMobil Store, accessed March 22, 2025, <https://www.exxonmobilstore.com/privacy-and-cookie-policy>
81. Exxon Mobil Rewards+: Privacy Policy, accessed March 22, 2025, <https://www.exxon.com/en/privacy-policy>
82. Privacy policy and statement | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/global-legal-pages/privacy-policy>
83. Privacy policy and statement | ExxonMobil - Exxon Resources, accessed March 22, 2025, <https://corporate.exxonmobilresources.com/global-legal-pages/privacy-policy.html>
84. Code of ethics | ExxonMobil, accessed March 22, 2025, <https://corporate.exxonmobil.com/corporate-governance/code-of-ethics>
85. ISO 9001 | ExxonMobil Product Solutions, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/exxonmobil-chemical/quality/iso-9001>
86. ISO 9001 Certificate - ExxonMobil Chemical, accessed March 22, 2025, <https://www.exxonmobilchemical.com/en/resources/library/library-detail/2900/iso_certificate_of_approval>