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Environment, Health & Safety

Best Practices: Creating A Data-Driven EHSQ Programme

By Nathan Goldstein
With Bill Pennington

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EHS and quality (EHSQ) programmes have undergone several evolutions over the past two decades, moving from a historical pen-and-paper and tick-the-box compliance standard, towards the goal of a modern, technologically advanced, proactive function. Throughout this transformation, data – and the management of data – have become foundational assets, which can elevate or prevent optimized operations. EHSQ functions face numerous challenges when upgrading their personnel, technology and processes, but efforts to do so will create a more robust and versatile programme in the long term.

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Organizations mentioned

Benchmark Gensuite, Compliance & Risks, ISN, Prometheus Group, VPWhite, YuzeData.

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While challenging, building strong EHSQ data management provides major benefits

Quality data can transform and accelerate business operations across a multitude of areas. Data and data management now permeate every aspect of operations and business, making it imperative to have a strong foundation for EHS and quality (EHSQ) practices. Building such a foundation from the ground up, and altering an operating system, can be resource-intensive – but is vital. The process of doing so is challenging; the relevant data cover a wide range of contexts, such as asset health, safety incidents, audits and inspections, permitting and regulations. The situation is further complicated by the number of solutions a firm may use and the industries in which it operates. Despite this, crafting a data-driven EHSQ operation can – and will – transform this function into a forward-looking, market-leading operation.

Access to quality data is more essential than ever in today's operational landscape

On their own, data constitute a powerful resource that has been leveraged across EHSQ operations since the inception of this function. However, with both macro- and micro-trends pushing the function to leverage data in more intensive ways, ensuring the accuracy and availability of information is critical. From incidents, safety, product development, manufacturing and permitting, to ESG-related metrics, high-quality data are a requirement for a strong and successful business. The need for this is evident in multiple areas; Verdantix finds that some of the most significant drivers of access to high-quality data are:

- **Exponentially expanding vectors of data and risks.**
  With the expansion of digital networks and the Internet of Things (IoT), firms and EHSQ functions are finding that the number of entry vectors for data streams is rapidly growing, with a simultaneous increase in risks related to those streams. The influx has been driven by both internal and external pressures, reflecting the global mega-trend of digitization, and illustrating how firms have had to evolve. The need to stay competitive requires functions to be agile in responding to – and before – changes in situations, and while this is not a new phenomenon for businesses, the pace of change is currently accelerating (see Verdantix Strategic Focus: The Evolution of EHS Risk Management).

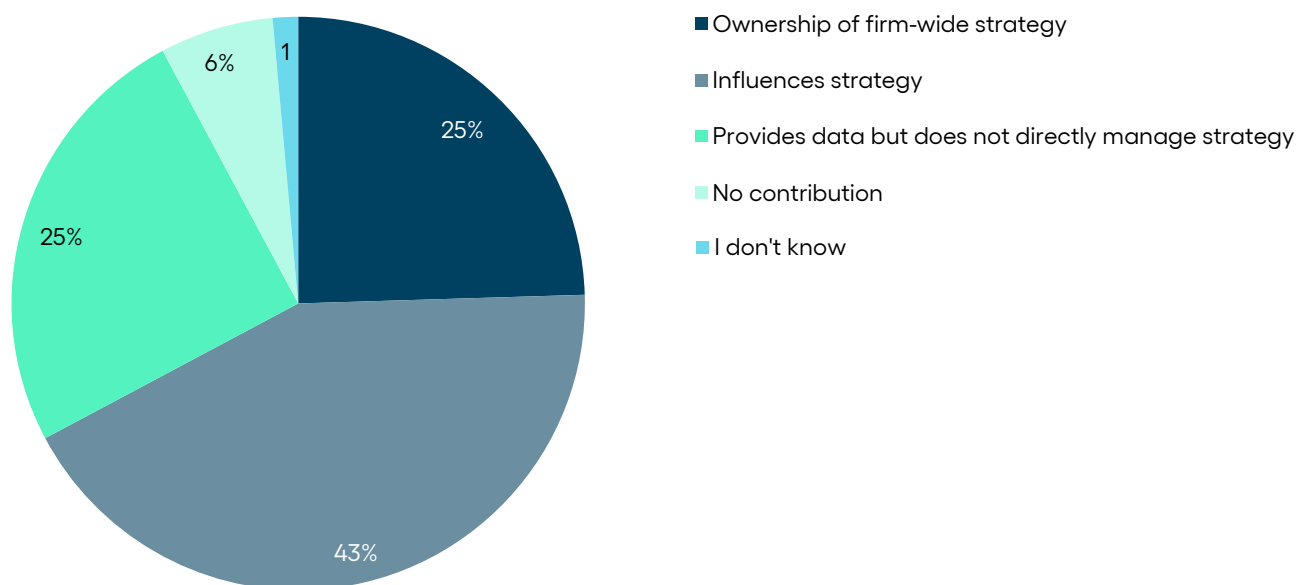- **Mandatory and voluntary ESG reporting requirements.**
  Organizations have extensively leveraged the EHSQ function to support, accelerate and achieve ESG goals. According to historical Verdantix EHS surveys, the EHSQ function has tended to 'own' the majority of ESG initiatives; however, this year's data display a leadership change. Regardless of the function that leads these initiatives, however, the EHSQ operation remains a major data provider, as evidenced in the Verdantix 2023 global corporate EHS survey (see **Figure 1**; see Verdantix Global Corporate Survey 2023: EHS Budgets, Priorities And Tech Preferences). With a global push towards scrutiny and audibility, EHS-to-ESG data must now undergo the rigours of financial-level data governance (see Verdantix Strategic Focus: ESG Reporting Will Force Firms To Consolidate Legacy EHS IT Systems).

- **Desire to provide a single source of truth.**
  The EHSQ function has transformed from a pen-and-paper operation to one that leverages a wide range of solutions, generates reports for cross-department review, and has a considerable amount of influence on public perception in relation to personal and environmental safety. The amalgamation of the data required for this on a daily basis fuels the demand for a strong data-driven foundation and process for the function. Without one, firms risk missing important signals, submitting incorrect reports, or creating misaligned internal KPIs. A data-driven EHSQ function eliminates these threats through the centralizing and standardizing of inputs and outputs on an adaptive basis. Firms such as Benchmark Gensuite and VPWhite continue to enhance their solutions through vigorous R&D to offer such a platform.

Figure 1
Overall EHS involvement in ESG initiatives

Legend:
- Ownership of firm-wide strategy
- Influences strategy
- Provides data but does not directly manage strategy
- No contribution
- I don't know

Pie chart values: 25%, 43%, 25%, 6%, 1

Note: Data labels are rounded to zero decimal places; percentages less than 6% are written as numbers.
Source: Verdantix Global Corporate Survey 2023: EHS Budgets, Priorities And Tech Preferences   N=301

Technology proliferation exposes gaps and barriers

EHSQ functions have long been rooted in tried and tested systems, with operational evolution tied to positive outcomes and returns on investment (ROI). Safety, a pillar of function goals, is grounded in correct repetition, and the introduction of any kind of disruption can lead to lapses. The integration of digital technologies is paramount to enhanced safety, and understanding where lapses can occur is mission-critical to ensuring a solid data platform. Verdantix research finds that:

- **Disparate solution deployment inhibits consolidation.**
  As firms aim to upgrade their operations, they face a significant hurdle in the form of their legacy systems, whether these are traditional Excel spreadsheets or outdated or inappropriate software. Verdantix data highlight how the majority of firms intend to consolidate operations under one global solution in the coming years (see **Figure 2**). This process tends to be instigated when challenges resulting from system incompatibility become a barrier to operations and incur serious investment in both time and funding to solve (see Verdantix Best Practices: Building The Business Case For EHS Platform Consolidation And Integration Projects). This situation can potentially be avoided through proper due diligence in managing solution ecosystems and by developing strong digital roadmaps to prevent a scenario in which problems escalate beyond control.

- **Data silos persist, despite awareness of structure and culture changes.**
  Despite a widespread understanding of the dangers of silo-ization, firms and functions continue to suffer from this problem. The issue can arise through deliberate action, as a result of particular management styles, but is more often inadvertently generated via improper workflows, poor or non-existent communication and misunderstandings. Verdantix research and advisory engagements also frequently highlight a lack of general understanding of data flow and governance within organizations, which likewise contributes to the problem. Even with the application and evolution of best practices, firms can fall foul of this challenge; to avoid it, practitioners must foster an awareness of the essential role of data management.

Figure 2

EHS function digitzation strategy over the next two years

What is the digitization strategy for your EHS software ecosystem over the next two years?
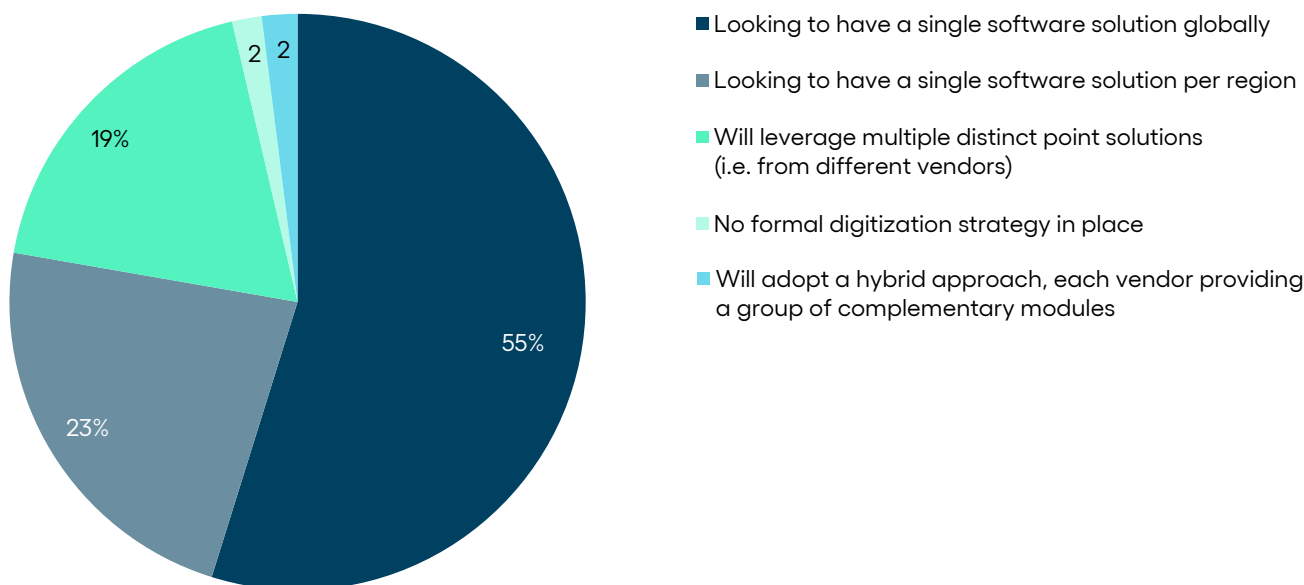
■ Looking to have a single software solution globally

■ Looking to have a single software solution per region

■ Will leverage multiple distinct point solutions (i.e. from different vendors)

■ No formal digitization strategy in place

■ Will adopt a hybrid approach, each vendor providing a group of complementary modules

Note: Data labels are rounded to zero decimal places; percentages less than 6% are written as numbers.
Source: Verdantix Global Corporate Survey 2023: EHS Budgets, Priorities And Tech Preferences   N=301

- **Firms must balance external needs versus internal wants.**
  Competing priorities can lead to misdirected request for proposal (RFP) development, with problems escalating if an RFP is then executed and an incorrect solution installed. When considering why specific data sets and high-quality data are vital, it is essential for firms to understand why these data need to be collected, and how they are disseminated. Understanding the most critical requirements to be digitized – compared with the 'nice to haves' – can help businesses create more targeted RFPs and lead to the implementation of higher-impact solutions. Communication around desired end-data-products is thus key to avoiding improper selection (see Verdantix Strategic Focus: Three Critical Steps To Complete For A Successful EHS Software Project).

- **Quality data management prevents disconnects between management and frontline operators.**
  As with any business function, goals and metrics are often filtered up and down the management chain – which, if done well, can deliver streamlined processes and realistic KPIs. However, data that are represented by overly simple KPIs and metrics can obscure the human side of operations and misrepresent initiatives. Quality data management means that data are conveyed with full contextual understanding, so that nuances are not lost in the clutter.

- **A focus on quantity over quality can risk clutter and misdirection.**
  New solutions that mine data sets for insights often require large volumes of data – simultaneously, certain processes generate large volumes of data in their execution. Historically, the quantity of data was seen as the desired outcome, with the view that a large amount would enable broad visibility. This viewpoint is changing, thanks both to the granular capabilities of the systems used, and the analytical functionality of solutions. Incorrect data within large sets can generate flawed reports – and result in resources being misdirected to rectify a problem that never existed.

A data-driven EHSQ function is an effective EHSQ function

There is a wide range of use cases for which the leveraging of data can bring benefits to the EHSQ function, and the firm at large. Understanding this interplay can provide decision-makers with sufficient evidence to instigate change within their organization and push the function and firm into the future. A data-driven EHSQ function allows firms to:

- **Seamlessly integrate data streams as solutions are adopted and piloted.**
  Given the various sectors and geographies in which the function operates, there is a broad variety of solutions across the diverse nature of EHSQ operations. Continued improvements – from both established vendors and start-ups – offer firms the opportunity to implement and improve their systems (see Verdantix Tech Roadmap: EHS Technologies 2023). Having a strong data management foundation can ease integrations and deliver a competitive advantage in terms of safety and bottom lines. In a diverse digital ecosystem, comprised of enterprise, point and edge solutions, interoperability is becoming ever more important to ensure effective data administration.

- **Enable the evolution from reactive to proactive safety management.**
  Serious injuries and fatalities (SiFs) remain a constant priority for EHSQ departments. Reducing and eliminating these revolves around tracking hazards and incidents and altering practices to prevent these from occurring. Such operations can be elevated by integrating advanced technology such as video analytics or system health monitoring. These technologies leverage large amounts of data to identify incidents in real time or to predict potential failures so that EHSQ professionals can act before incidents escalate (see Verdantix Strategic Focus: Improving Safety With Camera Analytics). Others, such as Benchmark Gensuite's PSI AI Advisor, leverage the vast amounts of data contained within historical incident reports, alongside new incoming reports, to identify dangerous trends in a more rapid manner than via manual identification.

- **Stay abreast of regulatory compliance requirements.**
  EHSQ functions that span city, state, regional and national regulations are beholden to multiple permitting agencies, requiring entire teams to be dedicated to obtaining, maintaining and updating permits as required. Data for permits are often locked internally within binders, manilla folders or a computer on site, but are not linked elsewhere – preventing, for example, swift updates in response to changes in waste types (see Verdantix Strategic Focus: Innovative Solutions To Manage PFAS Compliance). Vendors such as Compliance & Risks offer dedicated platforms that monitor, update and notify EHSQ professionals about regulatory shifts – massively decreasing the hours that need to be spent on this task and preventing costly errors.

- **Efficiently balance complicated and nuanced needs of third-party contractors.**
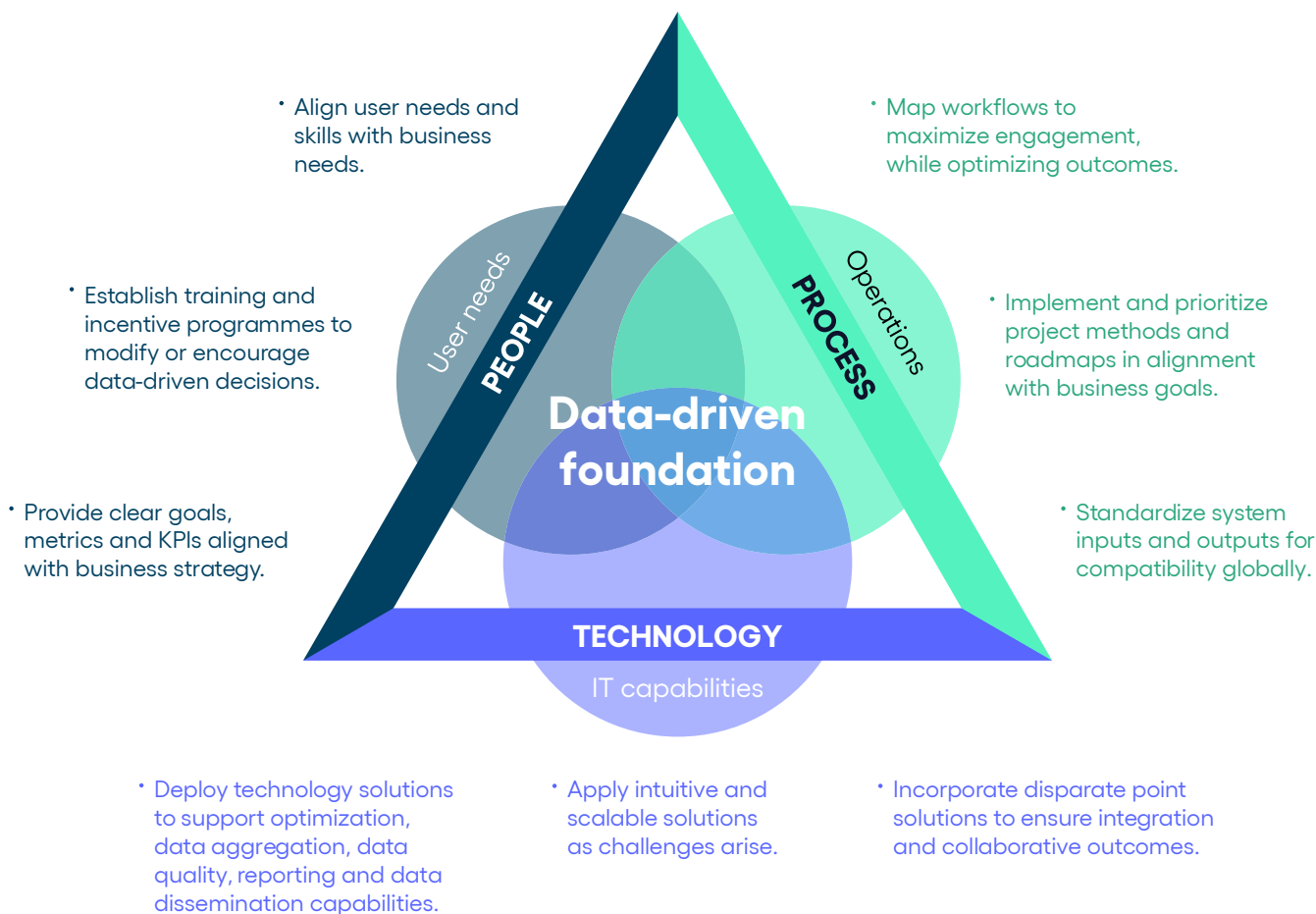 In today's operational space, third-party contractors – both on-site and remote – are a key part of project teams. Maintaining a database of permit work, capabilities and available teams can be a time-intensive, difficult and complex task for in-house teams. The problem is compounded when multiple contractors are leveraged in complex industries such as construction, or for specific operations such as on oil rigs in the North Sea. Vendors such as ISN offer solutions that allow firms to centralize credentials and associated tasks per contractor, thus enabling the granular management of diverse workforces (see Verdantix Market Insight: Using Technology Effectively For Holistic Contractor Safety Insight).

- **Enhance overall safety via truly connected platforms.**
  From the city warehouse to remote plains, EHSQ functions have workers engaged in operations that are rife with hazards. Currently, most operations have some form of sensors and applications that can monitor these groups and relay information about health and incident frequency. Leveraging and expanding on this kind of data in real time, and with advanced analytics, can enable functions to better prevent and react to incidents before they escalate to a significant status. Vendors such as Prometheus Group and YuzeData offer solutions that draw on multiple data sources and apply EHSQ expertise for direct EHSQ use cases and visualization, to expand coverage (see Verdantix Market Insight: The Future Of Connected Safety).

Figure 3
Foundational elements of a strong, data-driven EHSQ function

- Align user needs and skills with business needs.
- Map workflows to maximize engagement, while optimizing outcomes.
- Establish training and incentive programmes to modify or encourage data-driven decisions.
- Implement and prioritize project methods and roadmaps in alignment with business goals.
- Provide clear goals, metrics and KPIs aligned with business strategy.
- Standardize system inputs and outputs for compatibility globally.

PEOPLE — User needs
PROCESS — Operations
TECHNOLOGY — IT capabilities
Data-driven foundation

- Deploy technology solutions to support optimization, data aggregation, data quality, reporting and data dissemination capabilities.
- Apply intuitive and scalable solutions as challenges arise.
- Incorporate disparate point solutions to ensure integration and collaborative outcomes.

Source: Verdantix analysis

Developing a data-driven foundation for EHSQ programme success has its start in people, technology and processes

Like any large structure, the foundation of a strong EHSQ data programme is built on the people, processes and technology that operate within the larger system (see **Figure 3**). With many nuances, these three aspects interlock with and complement one another. Focusing too much on just one element of the triad can create imbalances that destabilize the foundation of the programme.

The human element is critical, no matter how advanced the technology

Even with advancements in AI, the vast majority of EHSQ tech requires input from human sources, or oversight by providers of workers on the ground. Much like any other tool, the efficiency and benefits of technology directly correlate with the quality of those using it and their own knowledge. A data-driven EHSQ programme relies heavily on its users; as such, Verdantix finds that:

- **Training is crucial: technology is only as good as the individuals using it.**
  EHSQ functions are no stranger to stringent training: from lock-out tag-out (LOTO) to emergency action plans, training is imbedded in the function as a core tenet. As the function evolves to incorporate more digital solutions, training will increase in relevancy. Proper training will enable workforce development, helping both EHSQ veterans and new hires understand a solution and thus leverage it to its fullest extent. Firms can also use tools such as AI or virtual reality (VR) for unique immersive training, to decrease risks in the field (see Verdantix Buyer's Guide: EHS Training Solutions 2022).

- **Firms must strive for a diverse, yet highly advanced knowledge base amongst employees.**
  As workforces turn over in the next five years, firms need to take action to stay competitive. They must strive to attract new hires who are not only technologically adept, but who carry a large base of subject-matter expertise. Regardless of their new hires' knowledge, organizations must ensure that they have a strong knowledge management and transfer programme, to allow for continuity within the business. Balancing knowledge between different roles is critical, to cover a range of responsibilities and to address factors specific to an organization's industry. This also ensures that the interplay between technological and sector knowledge can bridge any gaps, creating a synergistic workspace able to make good use of generated data.

- **Good data management is not a cultural change, but part of a cultural evolution.**
  The past decade has seen a trend of EHSQ operations instilling a culture of safety within their workforces. With the promotion of safety above all else, this has led to positive results that avoid workarounds and shortcuts, and enable every worker to return home at the end of the day. As EHSQ functions look to the future, they must further evolve to incorporate the data side of the operation into safety management. Good data management enables enhanced safety, instigating a positive feedback cycle and transforming the EHSQ function into an operation of the future.

Solutions, connected to the human element, accelerate operations exponentially

Technology has been incorporated across every sector in some way, from flow meters to drones, to video analytics that track things as diverse as temperature and vehicles. These solutions have the capacity to enhance operations, decrease injuries and fatalities, and foster better environmental stewardship via data collection, identification and dissemination. Verdantix has found that connecting these solutions with the human element, and generating a solid data foundation, requires:

- **Intuitive workflows taking priority over deep configurability.**
  When selecting software solutions to enable data collection, interaction and usability, it is imperative to consider who is going to be the primary user of the solution and what its main use will be. Tools should be designed and selected for the teams who will be using them, taking into account differences between direct field workers, for example, and back-office data analysts. Ensuring intuitive workflows within applications can increase engagement and sway those who are technologically averse. Avoiding antiquated interfaces will also increase accurate and timely data entry.

- **Appropriate application alignment, historically, now, and for the future.**
  The EHSQ technology market is saturated with a diverse range of vendors, with solutions running from the hyper-specific to the cross-sectoral. As firms look to build their data foundations, they need to conduct a critical examination of the tools they currently use or are planning to use. Ensuring that these provide a proper solution to the challenges they are facing right now is important – but firms should also look to the future, and consider how a tool fits into their growth plans (see Verdantix Market Insight: 5 Key Considerations When Buying EHS Software). As operations grow, the scalability of a solution is mission-critical, to avoid any cracks in a well-laid data foundation.

- **Strong bedrock of technological capabilities to fully leverage new tools.**
  Before firms even consider implementing new solutions, they need to critically examine their internal processing and storage capabilities. This means contemplating services such as data server storage, application programming interface (API) connectivity, local site internet speed, cloud connections and more – checking that they are all up to date and fit the necessary standards. The EHSQ function of the future will process data in real time, to provide proactive insights – and antiquated IT systems will serve to throttle progress.

The best-prepared people and most appropriate tools are lost if not aligned via proper workflows

It is a universal problem: if a function takes an excellent team and provides it with subpar technology, or, by contrast, uses superlative technology with an inexperienced team, that function will encounter below-average performance. The strongest data foundations have buttresses and bulwarks comprising the workflows and processes that enable optimized usage. Via our conversations and research, Verdantix has seen evidence that:

- **Workflow clarity and applicability intensify results.**
  Too often, workflows are designed with the best intentions, but do not match the processes on which they are overlaid. In other cases, they are not altered when on-the-ground practices change, leaving an outdated version in place. Workflows that are crafted with input from all stakeholders, however, and re-evaluated regularly, prevent such problems. Collaboration and communication are crucial in this respect, as are setting expectations and preventing scope creep at the design stage.

- **Proper governance prevents audit gaps.**
  As scrutiny from regulatory and finance bodies becomes increasingly stringent, with oversight of a broader range of data – including EHSQ data – functions will be required to take steps to ensure the accuracy of their data and to determine how information is shared. Both transparency and security will receive greater emphasis, to prevent firms falling foul of regulations such as the EU's General Data Protection Regulation (GDPR) or Corporate Sustainability Reporting Directive (CSRD) (see Verdantix Market Insight: The Role Of EHS In Corporate ESG Ratings).

- **Standardization produces dividends in the long run.**
  In a similar way to consolidation, the standardization of procedures, data flows, inputs, reporting and more can prevent discrepancies and confusion between teams and management. Standardization should enable teams to operate with minimal on-site training, and ensure a fair comparison between data points that can help identify outliers in performance and facilitate knowledge-sharing. While a potentially time-consuming task, standardizing procedures will thus give functions a competitive advantage.

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