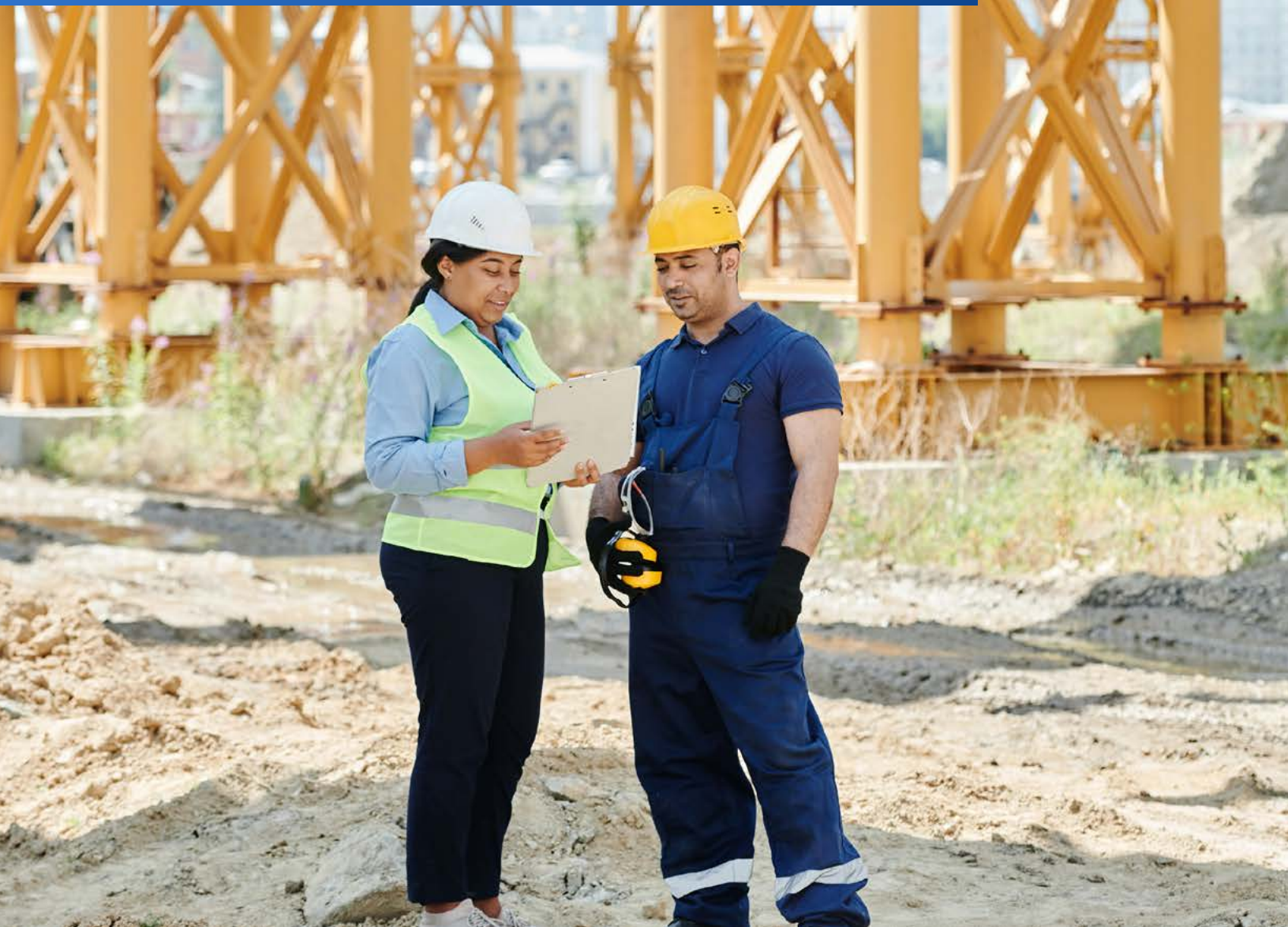




Worthy of your trust:

How ehsAI turns  
compliance documents  
into actionable output





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## Executive summary

The fact is: if AI, ML, and NLP aren't a part of your technology toolkit, you're potentially losing valuable time, money, and data.

Meet ehsAI: an AI-powered software that extracts accurate data from your EHS compliance documents, reducing the operational time from days to hours.

### Problem recognized, problem solved

ehsAI originated from the realization that Environment, Health, and Safety compliance was becoming an administrative burden that was holding companies back from sustainability and continuous compliance. And that's why we developed ehsAI—a revolutionary platform utilizing the power of AI and ML to help you reduce the cost and risks of poor EHS compliance. ehsAI works with your team, allowing you to process complex compliance documents with more accuracy and speed than any human could alone.

### What can ehsAI do?

Optical Character Recognition (OCR) and Natural Language Processing allow ehsAI to automatically perform the time-consuming, error-prone heavy lifting of manual extraction, including:

- Identifying a compliance document's structural elements
- Extracting text (including from tables and figures)
- Identifying citations/conditions
- Mapping the document's hierarchy
- Extracting requirements
- Extracting additional contextual information (e.g. dates and frequencies/periods)
- Recognizing linguistic joins and negations (e.g. and/or, non/not)



There's always that pressure to do more with less. So, when a tool comes along that can provide more efficiency, more risk mitigation—can let you do your job better and focus on providing value added—it's a strategic advantage. It's going to fundamentally change our job.

— Carlos Garcia, General Counsel, Government Affairs and Corporate Secretary with Nissan Canada Inc.





# Introduction

The number of global regulations for environmental, health, safety, and quality practices is increasing every year, as are the penalties for noncompliance.

And these trends are driving an exponential rise in the resources required to understand and extract the requirements listed in thousands of pages of permits, regulations, and standards.

Adding to the complexity and cost, different owners within the organization can be responsible for hundreds of overlapping regulatory changes at each stage of the compliance process.

The cost of failing to comply with regulations is high and can be measured in terms of money, brand damage, environmental damage, and human lives.

## Compliance automation in environmental, health, safety, and quality (EHSQ)

The demanding and dynamic regulatory environment, combined with rising consumer expectations for corporate environmental responsibility, mean that traditional methods of manual document analysis are no longer viable.

Fortunately, huge advances in the field of artificial intelligence (AI) have created practical and economical alternatives. While such solutions were already



# \$3.2 B

The digital EHS services market is expected to reach \$3.2 billion by 2025.<sup>1</sup>

being embraced by innovators and early adopters, the COVID-19 pandemic drastically accelerated their adoption as part of a wider digital transformation. Environmental health, safety, and quality (EHSQ) was no different from other domains in this regard: driven by ever-more-capable EHS software and the adoption of new EHS technologies, the digital EHS services market is expected to reach \$3.2 billion by 2025.<sup>1</sup>

## The question of trust

However, despite the significant and demonstrable advantages enjoyed by those who adopt innovative AI-powered solutions, many organizations are held back by one simple question: “Can we trust your platform to understand, interpret, and organize our compliance requirements?”

This document will demonstrate that—at least when the question is asked of ehsAI's solutions—the answer is yes.

1. See [Verdantix says spending on digital EHS services will reach \\$3.2 billion in 2025 \[Verdantix\]](#)





## Augmenting and accelerating existing processes

The patented ehsAI algorithm mimics the thought process of an EHS permitting and compliance professional, quickly and accurately standardizing what has traditionally been an expensive, manual, and error-prone task.

More specifically, ehsAI analyzes complex compliance documents such as permits, regulations, standards, procedures and plans—in a range of languages—and produces a detailed, structured output that highlights what organizations need to know and do to ensure compliance on every project. The structured output is available as an .xlsx (Microsoft Excel) or .csv (comma-separated values) file, or via APIs, that can be used as an input to an EHS management system (e.g. Intelex).

In other words, ehsAI reads massive amounts of documentation—sometimes thousands of pages—and surfaces, in a structured way, only the essential information organizations need. The whole process takes only a matter of minutes, thereby lowering the cost of identifying compliance requirements by as much as 80 percent.

# 80%

Integrate AI to save up to 80% of your time and money with accurate Environment, Health, and Safety compliance automation.

These capabilities are applied in a range of common scenarios, including:

- **Automating the identification of data and actions** necessary for permits management
- **Supporting internal or external compliance audits** by streamlining manual preparations and increasing structure, consistency, and accuracy, so time spent on-site is minimized and laser-focused
- **Creating site-specific compliance registers** based on applicable industry and government regulations at the country, state, or municipal level
- **Generating a comprehensive list of tasks associated to each compliance requirement** for tracking in third-party EHS software systems and workflows, enabling organizations to track specific regulatory requirements against details such as ownership, calendar dates, reporting triggers, and real-time compliance status updates

“ehsAI offers robust cost savings and efficiency gains by automating the parsing and data population of EHS compliance requirements. All users of EHS software who require permits management or compliance status tracking and audits actions management would benefit from leveraging ehsAI’s automation capabilities for EHS compliance management.

— Verdantix





**Figure 1**—ehsAI augments and accelerates an organization's existing regulatory compliance processes by automating highly manual tasks and increasing structure, consistency, and accuracy<sup>2</sup>

## Disrupting costs, preserving processes

Importantly, ehsAI doesn't change the existing, proven regulatory compliance processes on which so many organizations rely (Figure 1); instead, the solution augments and accelerates these processes by quickly and correctly providing the information at their heart.

### Track

Deconstruct regulatory documents to identify information and actions required to maintain compliance

### Map

Map deconstructed regulatory content parts and subparts to internal database sources such as EHS software solutions

### Analyze

Assess deconstructed regulatory documents to identify, assign, and complete compliance action items and audit requests

### Create

Complete compliance documentation requirements such as reporting, task management, permit approvals, or audit preparation

### Maintain

Maintain ongoing compliance by quickly and accurately assessing compliance actions and tasks on an ongoing, as-needed basis, including monitoring of changing documents

2. This process diagram is adapted from *ehsAI Supports compliance management processes*, in the Verdantix report, [ehsAI Seeks to accelerate EHS compliance management through automation](#) [ehsAI]



# From unstructured document to structured output

While the ehsAI platform automates requirements extraction, the process executes as a guided “human-in-the-loop” workflow.

## The guided processing workflow

To begin the conversion process, a user simply uploads regulatory content into ehsAI and then indicates what type of document the content represents (e.g. Permit, Regulation, Plan, Procedure, Material SDS/SDS, Other).

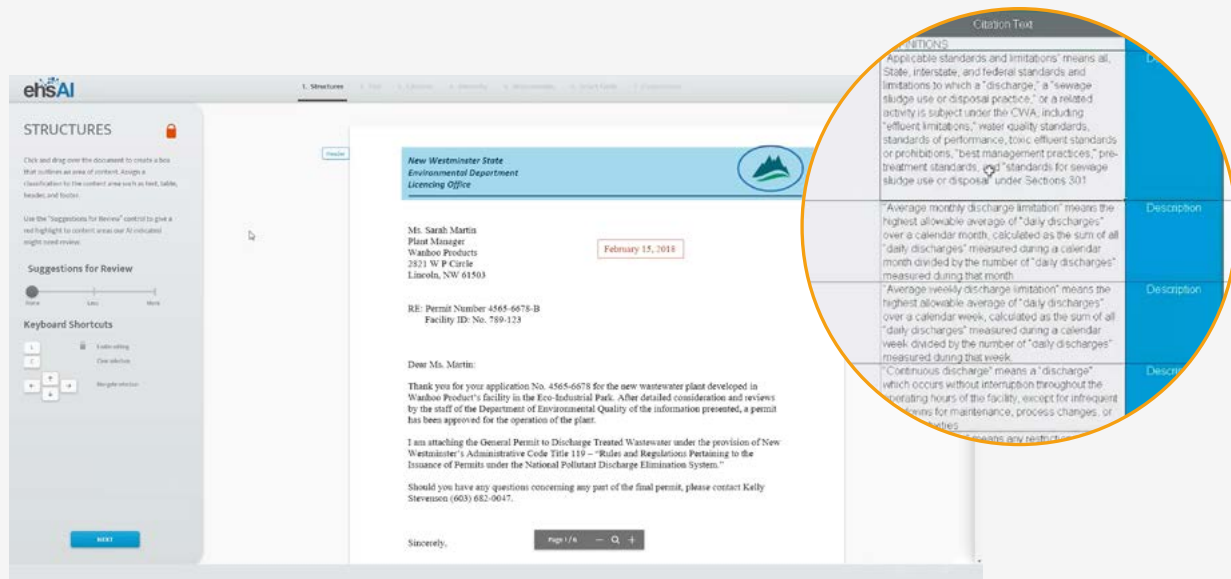
Next, the ehsAI platform performs the guided processing workflow, if needed, for documents that are hard to read (e.g. an image file):

1. **Document structure identification:** The ehsAI platform examines the document to identify elements including text, tables, citation/condition numbers, visual formatting, internal and external references, and more.
2. **Text extraction:** Using the knowledge of the document's structure gained from the previous step, ehsAI ignores extraneous content and passes only the necessary elements (e.g., tables, figures, text blocks, etc.) to subsequent processing modules for text extraction.
3. **Citation/condition identification:** The ehsAI platform recognizes the document's citations.
4. **Hierarchy classification:** The platform recognizes each discrete section, subsection, etc., allowing it to build a complete and accurate hierarchical citation tree.
5. **Requirements extraction:** Using advanced domain-specific natural language understanding, the platform extracts requirements—even allowing users to choose the granularity of requirements extraction.



6. **Smart Fields recognition:** Some requirements, and even some descriptive text, include additional information—like requirement types and frequencies—needed for compliance, which the ehsAI platform extracts and stores within “Smart Fields.”
7. **Audit for embedded “and/or” requirements:** The ehsAI platform detects complex parent/child relationships and conditional language, to assemble complete requirements—in context—with references to related requirements.

With the conversion process complete—in only seconds per page, rather than the 10 minutes or so required by manual examination—the user can preview the results before downloading as a spreadsheet or importing into an EHS management system.



**Figure 2**—In a matter of minutes, the ehsAI platform turns complex, unstructured compliance documents into structured results that can be used by compliance personnel and imported directly into an EHS management system.



## Most advanced natural language processing engine in EHS

While the ehsAI platform incorporates many technologies in the processing workflow (e.g. to recognize different types of content, to identify citations, to create the hierarchy, etc.), the ability to read and understand complex regulatory text is the foundation of the solution's value.

This patented capability leverages familiar, everyday AI technologies, but combines them in a unique processing pipeline and optimizes them for the specific problem domain of reading compliance documents. Moreover, a mature quality assurance process and a cycle of continuous improvement ensure that the already-capable ehsAI platform is always getting smarter.

## Familiar technologies, optimized for a unique challenge

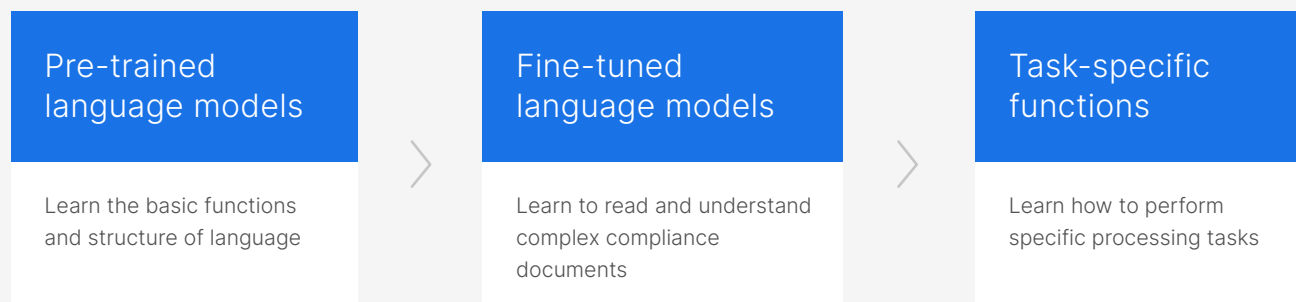
Natural language processing (NLP) combines linguistics and computer science—often using artificial intelligence—to enable computers to process, analyze, and understand natural language.

In recent years, NLP has been incorporated into a whole host of familiar technologies and services, including IBM's Watson, Amazon's Alexa, Apple's Siri, Google's search, and the customer service chatbots that have become omnipresent.

Moreover, traditional NLP methods rely upon simple machine learning models that are calibrated by manually labeling raw data. This time-consuming and costly process often leads to misrepresenting the analysis of the input

3. See [Curse of dimensionality \(machine learning\)](#) [Wikipedia]





**Figure 3**—The ehsAI platform is trained in multiple stages to instill the capabilities needed to understand complex compliance documents

data by applying too many high-dimensional categories, and results in an output that provides no real insights—a phenomenon known as the Curse of Dimensionality.<sup>3</sup>

ehsAI overcomes this obstacle by combining multiple deep learning methods into an EHS domain-specific training pipeline (Figure 3).

This approach begins by teaching the model using large amounts of unlabeled data (e.g. from scientific publications, books, Wikipedia, etc.) so it can learn the basic functions and structure of language without the need for manual labeling or human supervision.

This multilingual, pre-trained language model is then fine-tuned using massive unlabeled regulatory contents (e.g. state regulations and permits, federal regulations, standards, etc.) from multiple languages, enabling the ehsAI platform to process regulatory documents in many languages.

Finally, a task-specific dataset—which leverages a massive amount of labeled EHS data—teaches the platform how to recognize Smart Fields, classify text, detect citations, link paragraphs, analyze sentiments, and perform other functions needed to process compliance content.

This rich training procedure creates a document processing platform that doesn't rely on manual page range selection, doesn't assume any predefined sequence of formats, and allows for irregularities in the document—thereby enabling it to handle a vast range of compliance resources.

Importantly, this framework also allows the platform to automatically get better over time.

## Continuous improvement

The ehsAI platform continuously learns from each compliance documents it analyzes, while preserving the security and privacy of customer data.

This feedback loop is part of a mature quality assurance process that leverages a number of metrics and KPIs to ensure the accuracy of the system is maintained or improved before an updated machine learning model enters the production environment.

This process ensures that the solution's capabilities are always improving and that the platform can handle the full array of compliance content that organizations need to process.

# Conclusions

ehsAI's approach is revolutionizing EHS compliance with AI.

Non-compliance can cost your organization millions of dollars in fines, damage to your reputation, and even loss of life. We mitigate as many of these consequences as possible with leading-edge technology, freeing up time and resources for your team to improve your bottom line.



## The ehsAI difference

ehsAI	Other EHS tools
<b>AI machine learning for accuracy</b> Automates the interpretation and extraction of complex regulations	<b>Manual process</b> Prone to errors and lacks accuracy and consistency
<b>Speed</b> Automatically analyzes a complex permit or any compliance document on the fly, saving months of your time	<b>Waste of time</b> Makes auditing or review of new permits and regulations much longer and more grueling on your team, often months of effort
<b>Self-serve platform</b> Allows for the least tech-savvy users to easily upload and scan documents with no training required	<b>Complex reviews</b> Has shown that even the most well-versed EHS professional is likely to miss important data given the massive amount of new EHS and ESG obligations
<b>Low cost</b> Provides a quick ROI at an affordable cost, helping you put time and money back into your business	<b>Waste of money</b> Puts your team to work sifting through documents for weeks on end, time that could be best put to high-level analysis, not manual data transfer





## About ehsAI

ehsAI is an AI-powered software that extracts accurate data from your EHS compliance documents, reducing the operational time from days to hours. We're not about losing human touch—we value freeing EHS businesses up to spend time on what really matters, like sustainability, growth, and ESG. ehsAI was created *by EHS professionals for EHS professionals*. Expediting and enhancing your critical compliance processes drive everything we do.



For more information about ehsAI, please visit [ehsAI.com](https://ehsAI.com).

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