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AI for government permitting

Accelerating government environmental permitting with use of AI

While government permitting is crucial for ensuring safety, environmental compliance, and orderly development of energy projects, its complexity and time-consuming nature cause a significant delay in the transition to new energy sources.

An innovative project, developed through close collaboration between the Danish Environmental Protection Agency (EPA) and cBrain, presents a pathway to accelerate the government permitting process. This solution connects the power of AI Language models, integrated with a compliance-based digital platform, designed for the Danish government.

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The urgent need to accelerate government permitting.
Due to climate change and the geopolitical situation, there is heavy pressure to develop new energy sources.

The Danish EPA, or "Miljøstyrelsen", is responsible for environmental protection and regulation in Denmark. Striking a balance between regulatory thoroughness and agility is essential for ensuring a timely and successful energy transition. Therefore, the Danish EPA has initiated an ambitious digital transformation project to accelerate government permitting.

This digital transformation project has led to the development of a new digital platform that controls and optimizes the permitting process using AI models to meet compliance requirements and regulations.

As first step, the Danish EPA defined a best practice process for permitting.
While government permitting is a crucial element to ensure safety, environmental compliance, and orderly development of energy projects, many permitting processes are very complex and can be extremely time-consuming.

When initiating the permitting digitization project, it was realized that, due to process complexity, organizational history, and insufficient regulatory capacity, there was a common perception among employees that neither standardizing nor automating permitting was possible. Due to the detailed intricacies of environmental permitting, work routines and case processing were planned individually on a case-by-case basis, for each permitting application.

In recent years, the Danish EPA has undertaken an extensive standardization effort, based on a formalized best practices description method known as 'digital bureaucracy' to a wide range of processes, including grants management, inspections, approvals, and certifications. This method serves as the foundation for their ongoing digital transformation initiatives.

Applying the digital bureaucracy method as a framework for analyzing the permitting process, the agency successfully (in contrast to staff perception), developed best practice approach for permitting.

The process description defines all the steps of the permitting process end-to-end, from application self-service to case processing and filing, including checklists, communication, decision support, etc.

The complexity of government environmental permitting processes stems from the need to strike a balance between economic development and environmental protection, while ensuring public safety and legal compliance. Processing a permitting application often requires the involvement of multiple resources and time, with the type of work varying based on the specific application.

As a result, it represents a major achievement for the Danish EPA to have both developed and documented a best practice model for permitting and adopted this method as a new administrative standard within the organization. Recognizing the highly individual nature of application requirements, a key factor for successfully mapping and standardizing the complex permitting process is the concept of bureaucratic variance.

Variance is a fundamental component of the digital bureaucracy description method. It can be applied to any aspect of mapping based on case type and individual application characteristics, such as process steps, documents, checklists and fields. This generic process description, as a result, can accommodate a wide range of application types.

Fast track process digitization based on standard government software.
For the next step, the Danish EPA management decided to digitize permitting at a high speed. This was made possible by using cBrain's standard software which has been designed to support the digital bureaucracy model.

The Danish EPA runs their many processes on specialized standard software, called F2. A fully integrated digital platform, designed for government work and developed in close collaboration between the Danish government and cBrain. Today, more than 75 Danish government institutions use F2 as their digital platform, including most ministries.

The F2 standard software is purpose-built to support the digital bureaucracy method. This means that complex IT solutions can be delivered through configuration, reducing the need for extensive IT development and dramatically shortening the delivery time.

Using the F2 digital platform, a permitting solution that supports the entire process end-to-end, from self-service to case processing and filing was configured for the Danish EPA and went live within only a few months. While the process design laid the groundwork for streamlining, the speed of digitization was instrumental in implementing best practices for permitting within the organization.

However, this initial phase of digital transformation also laid the foundation for further optimization and automation of the permitting process. The architecture of the new permitting solution not only enabled traditional digitization-based improvements but also provided the groundwork for additional automation through the use of Large Language Models (LLMs).

AI offers further automation and speed of permitting.

Following the successful digital transformation, implementing a new standard for permitting and a new permitting software solution, the Danish EPA initiated work with AI to further optimize and automate the permitting process. Due to the architecture of cBrain's F2, this was a natural and straight forward next step, with respect to the administration as well as technically.

Technically, the F2 digital platform is designed for government, based on a 4-layer stack. At the lowest level, all data is stored in one shared data repository (the "database"). Next layer offers a repository of government work functions, like controlling cases, writing and communicating documents. The third layer offers a process library, which stores and executes process descriptions. The fourth level offers context driven user interfaces, supporting different types of devices from PCs to web, mobile and tablets.

Due to the architecture that simultaneously manages content (data) and user interactions (context), the logical next step was to enhance the permitting solution with LLMs for further automation. Data is neatly organized by case type within a shared repository, creating an ideal foundation for data training and eliminating the need for extensive data collection and verification.

A permitting solution that supports the permitting process end-to-end, from self-service to case processing and filing, was configured for the Danish EPA and went live within only a few months.

Moreover, the single, fully integrated interface provides the necessary context, making it effortless to offer and manage AI functions that directly support specific user responsibilities.

AI functions support permitting steps by use of both data and context.
The permitting process is based on a number of phases, which each consists of a number of steps, covering all work end-to-end, from receiving a new application to case working, decision reporting and filing.

With the use of LLMs, many of these steps can be optimized with respect to quality and productivity. For instance, tasks like drafting scoping reports and finding similar applications for reference can be enhanced with AI.

The application process begins once an application is received, leading to the creation of a new case. This stage involves an initial screening of the application. Part of this screening is automated through our self-service system, while case workers handle the rest by conducting a manual review.

Using AI to draft a scoping report.
When a new application is accepted, the next step is often the creation of a scoping report which outlines the strategy for a permit.

Like a checklist, the scoping report highlights areas that require evaluation during the permitting process. The content of this scoping report can vary significantly depending on the individual application, this can be type of assessment, limits, thresholds, and the specific zone or area.

As the scoping report defines the scope of the permitting work, the report is fundamental to successful and fully compliant permitting. Therefore, the creation of a scoping report often involves different departments, competences, and staff, and it often takes a long time to create.

Trained AI is like LEGO bricks. By feeding an AI Model with historic applications and their scoping reports it is possible to create a specialized AI brick (component) that takes an environmental permitting application as input and proposes another scoping report for comparison.

While it's important to verify the proposed draft scoping report, integrating a trained AI component for scoping reports into the permitting process can greatly reduce the workload associated with creating these reports. Not only reducing hours of work, but also eliminating weeks or even months off the turnaround time.

Using AI to find similarities across applications and decisions.
Case workers who are processing different elements of the permitting evaluation will often refer to previous applications and decisions for inspiration. By Instructing an AI to search historical applications and their scoping reports allows us to create a specialized AI component, that takes an actual permitting application case as input and identifies similar application cases.

Today case workers use their experience as an important source of insight for their permitting tasks. With the help of an AI component using a cosine relation calculation, in order to find and compare specific permitting application cases to other similar cases, it is possible to eliminate significant work.

Likewise, quality will be increased. It is well-known that each individual case workers tend to base their work on their personally learned experiences, thereby limiting referencing to cases they already personally know. In contrast an AI component, which has been trained for finding similarities and recommendations, will instantly look across all historic cases and thereby increase the quality of the applications based on previous experience.

Permitting is often business sensitive and requires on premise AI.
Confidentiality and privacy is a major challenge for government permitting with respect to AI. Permitting applications often contain business sensitive information or even person related data, which is subject to the data protection act.

It is therefore not possible for government entities to base AI usage on open services like ChatGPT as this involves sharing data outside the government entity IT environment.

The current project with the Danish EPA is centered around using the on-premises Llama2 model. This approach allows training on all Danish EPA cases without sharing data externally, ensuring compliance regulations are met. As a result, the Danish EPA is continuously training and building a comprehensive library of AI "Bricks", seamlessly integrating them as automation functions, extensions, and fully embedding them within their F2-based digital permitting solution.

Training AI to understand the permitting method may further accelerate permitting work.
The scoping report identifies specific areas of work and effectively serves as a checklist guiding the case worker with tasks related to a particular permitting case. With a scoping checklist, it is now possible to train AI components to carry out part of the tasks outlined by the checklist items.

This results in a cascading structure of AI components. While one AI component assists in drafting a report, another set of components can recommend permitting decisions based on historic cases, for each element of the scoping checklist.

Being able to support case workers across departments and competences with draft decisions accelerates permitting. Likewise, sharing functionality and information with applicants through self-service will accelerate their work and eliminate costly construction project changes.

On a path using AI to improve the permitting method itself.
The Danish EPA has successfully defined and digitized a new standard for environmental permitting. As a next step, AI will play a pivotal role in analyzing and advising on how to further optimize the permitting.

Using insights gained from AI, the permitting process will be optimized, and the digital platform will be adjusted to match the improved process. Through constant evaluation and continuous improvement, the Danish EPA is dedicated to regularly enhancing their permitting procedure, lead us to a fresh age of speed and transparency.

Permitting Further Information and Contact

For further information regarding Best Practice procedures for Environmental Impact Assessment, please contact Morten Østergaard, Head of Climate and Sustainability, cBrain.

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