

Bringing consequence modelling to the Cloud

Unlocking real-time insights with Phast APIs

Introductions



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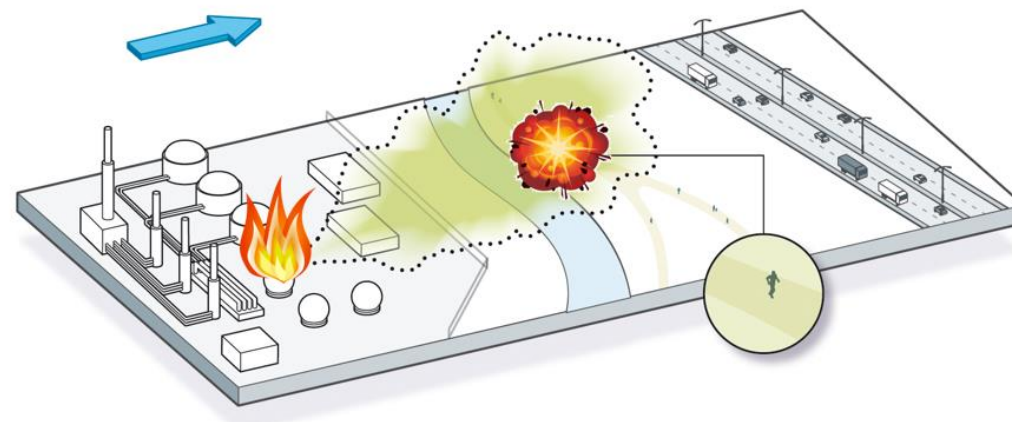
Background to the paper

Technological advancements are enabling deeper integration of consequence and risk modelling into process safety workflows.

Discharge, dispersion, fire and explosion modelling following a loss of containment of flammable and/or toxic materials

Readily available consequence and risk data will improve process safety, whether that's making decision-making processes more efficient or providing better insights.

For example, emergency response...



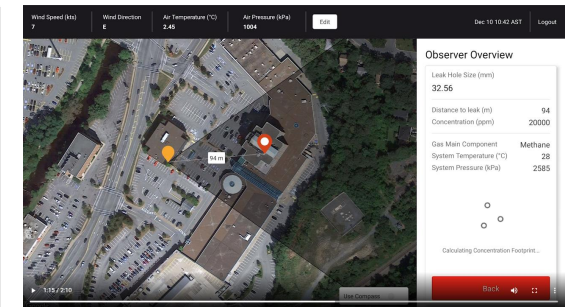
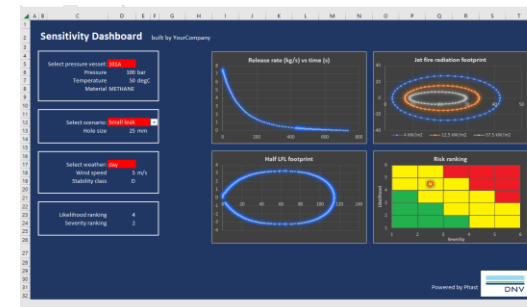
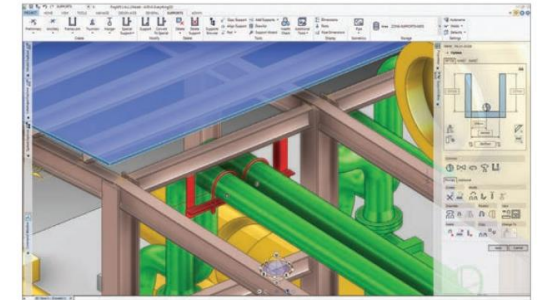
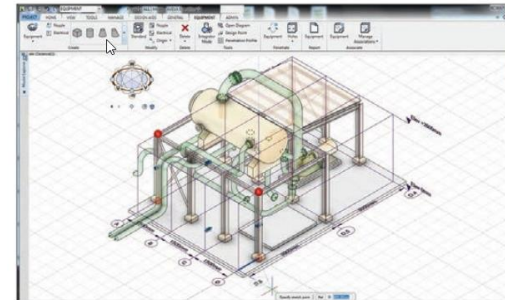
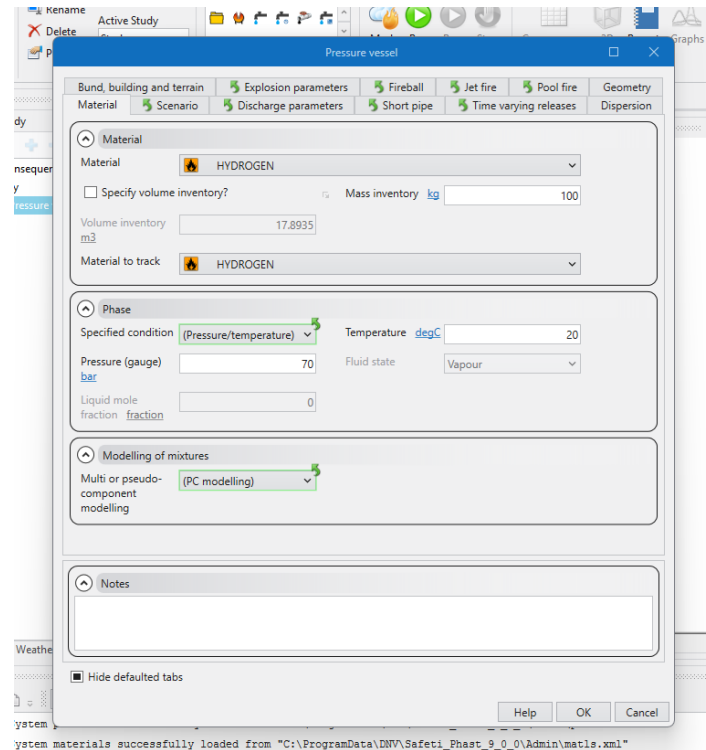
Background to the paper

The limitations of traditional, desktop-based modelling tools are becoming more apparent.

Consequence and risk insights are most powerful when they can be accessed at the point of need – during operations, maintenance and emergency response, for example.

Digital transformation is ensuring we meet the demand for more agile and bespoke solutions for decision-making processes.

Background to the paper



Single interface



Multi interface
at scale

A brief history of Phast consequence modelling



Phast



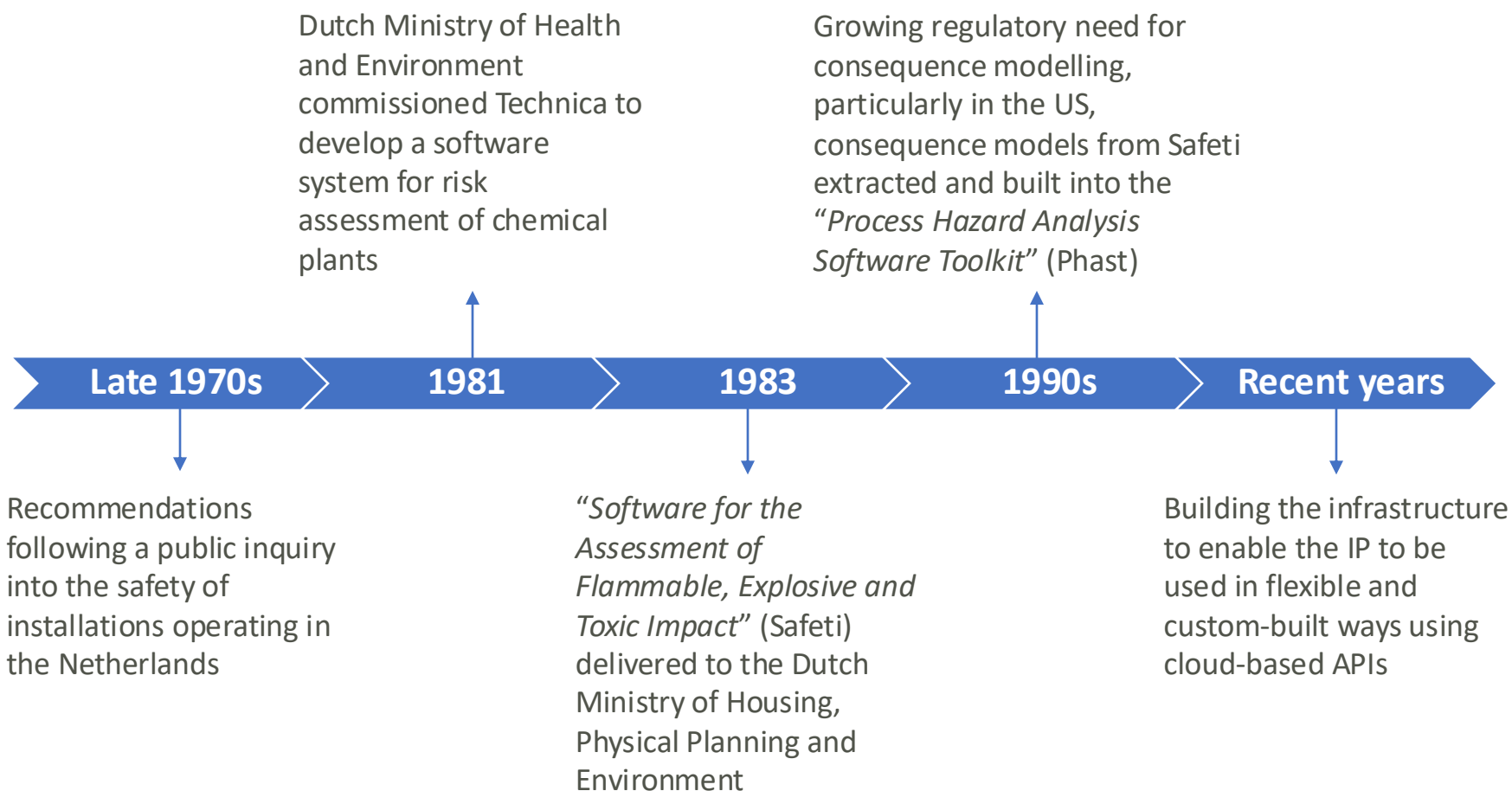
Safeti



KFX



EXSIM



Limitations of existing approaches



VS



- GUI not tailored to individual needs
- The user must adapt to the GUI
- Less good for the user
- Easy to scale

VS

- GUIs tailored to individual needs
- The GUI adapts to the user
- Great for the user
- Difficult to scale

Technological advancements

Rapid advances in computing infrastructure and software architecture have transformed how models can be delivered and consumed.

The API is central to this.

What is an API?

An Application Programming Interface (API) is a structured way for software systems to communicate with one another. Rather than a person clicking through menus in a desktop program, an API allows another piece of software to send a request — for example, asking a consequence model to calculate the dispersion of a gas release under certain conditions — and to receive a structured response.

The key advantage is consistency: the rules for sending requests and receiving responses are clearly defined. This means APIs can be used by many different systems, from custom-built web applications to automated scripts and enterprise dashboards, without each one needing its own specialised version of the modelling software. In effect, APIs turn the underlying consequence models into services that can be plugged into a much wider range of digital workflows.

Technological advancements

Models hosted in the cloud can be accessed via an API

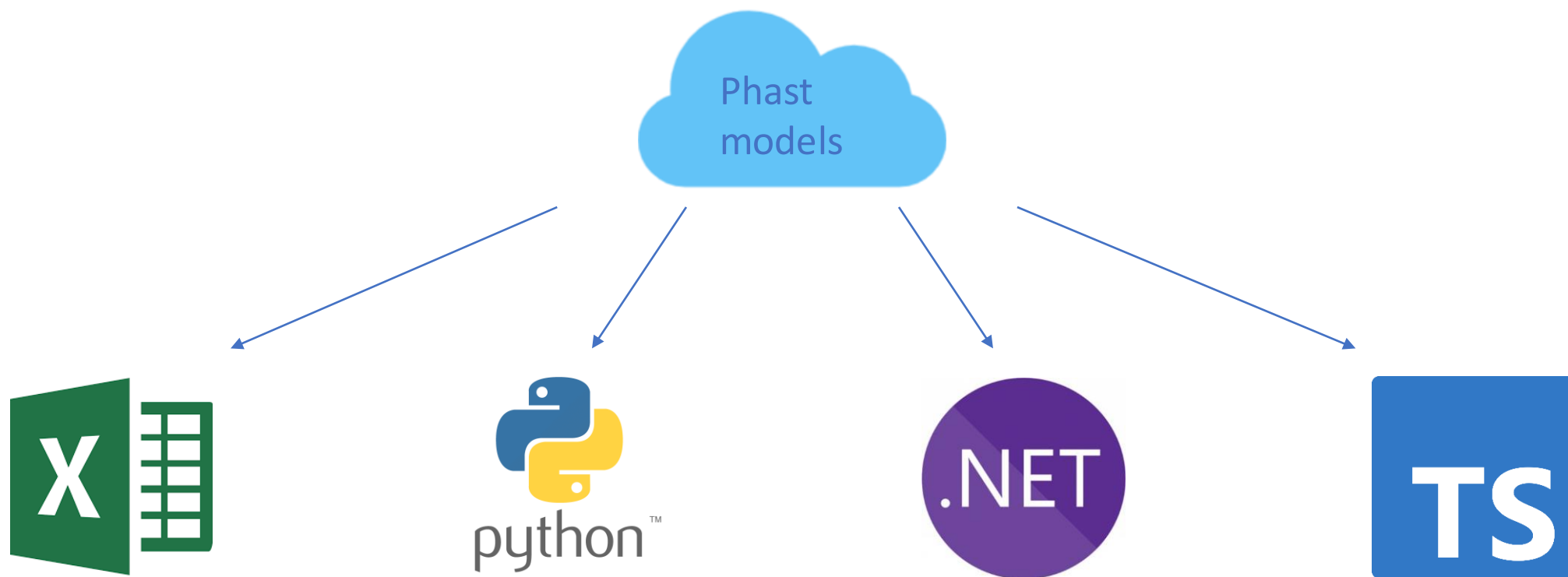
Enterprise-grade security, performance and monitoring

Rapid scaling of computing resources to deal with the demand on the API

No longer limited to the computing resources of the user's laptop

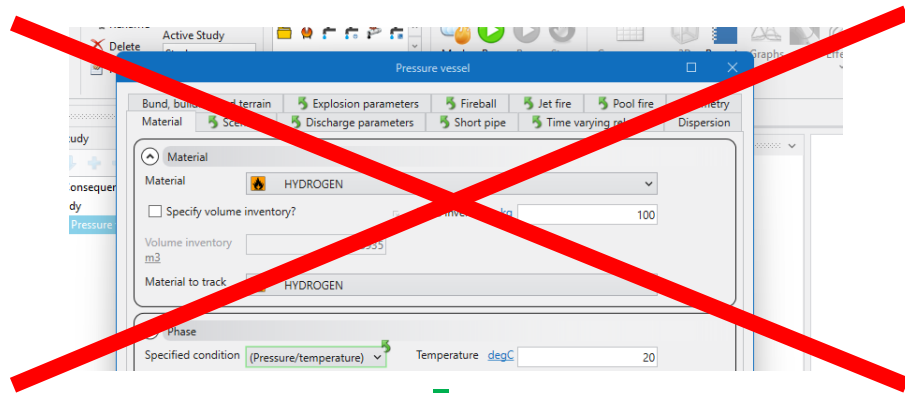


Technological advancements

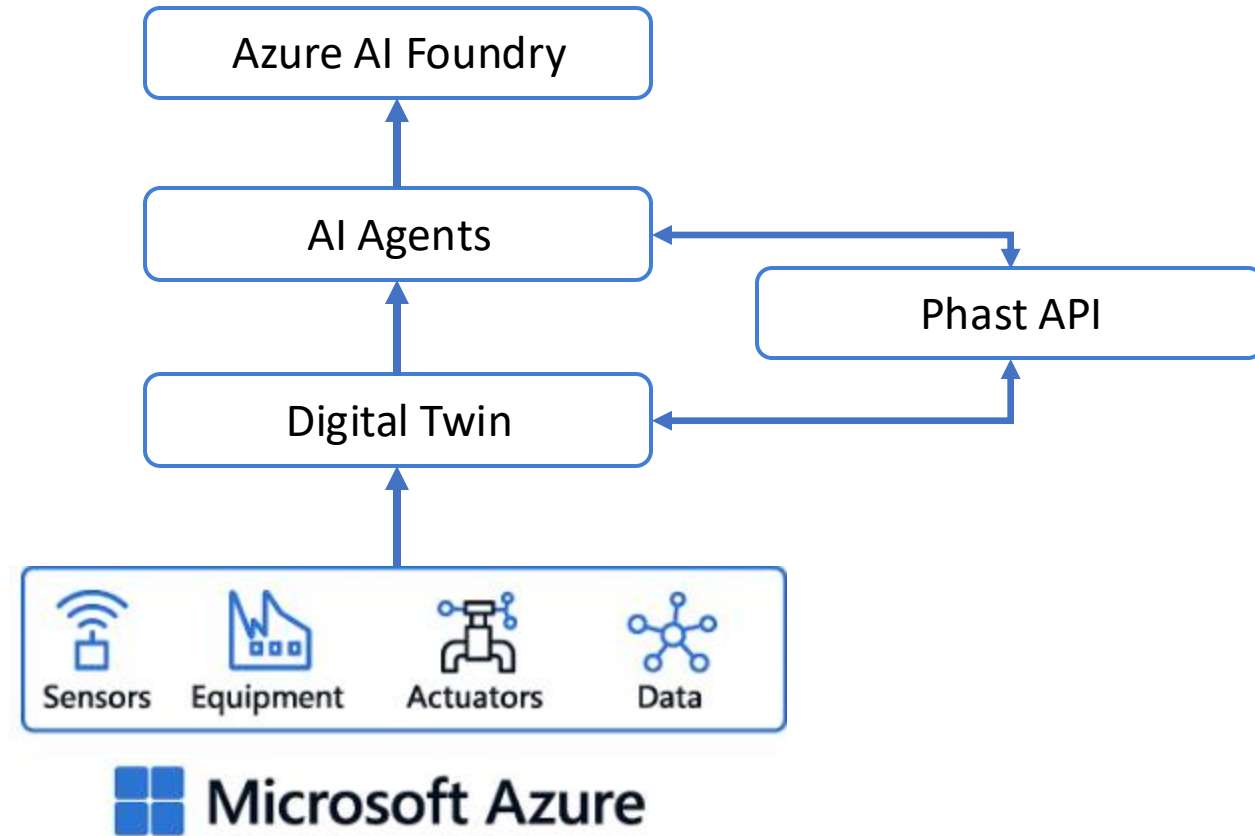


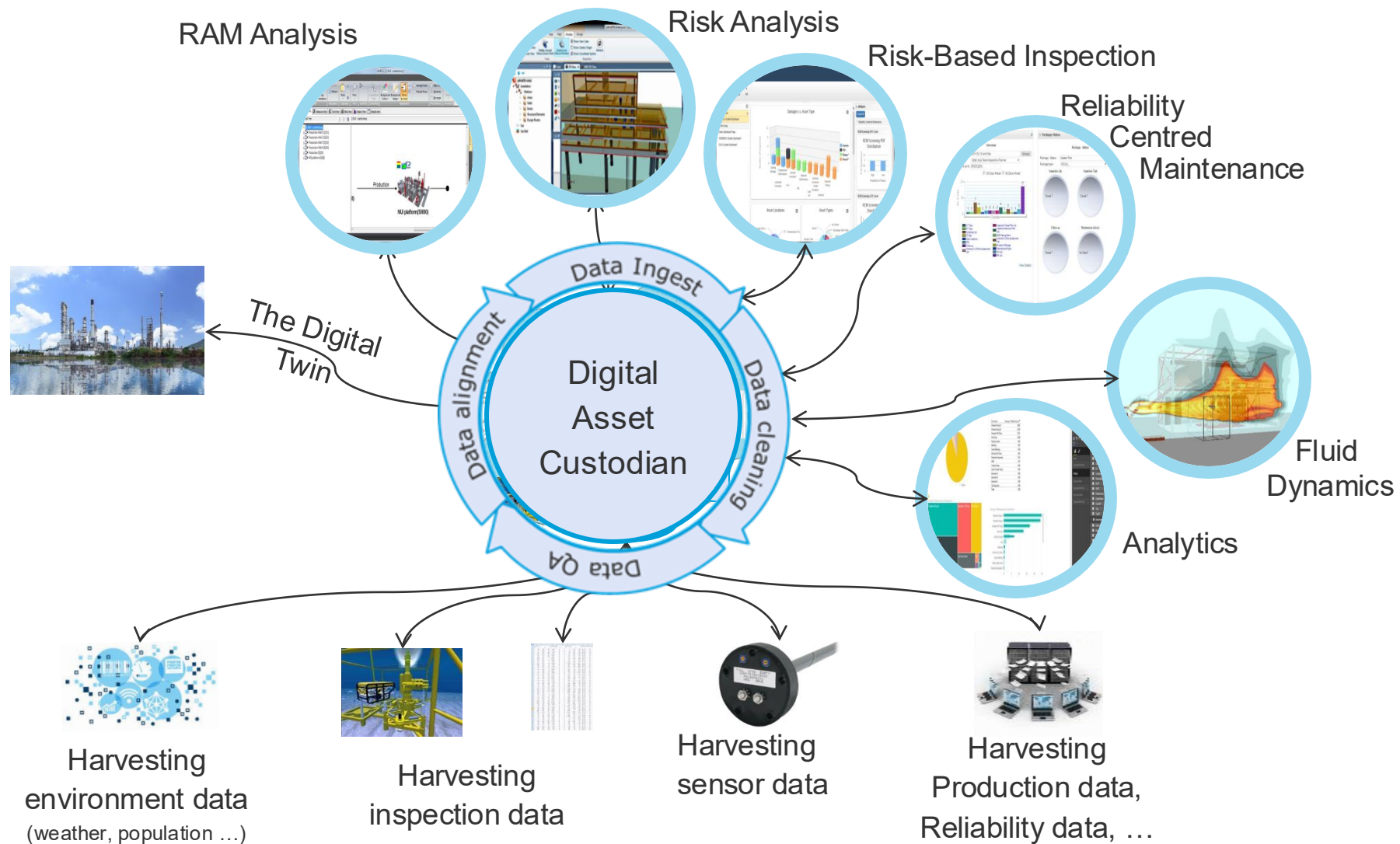
Technological advancements

The availability of LLMs such as ChatGPT changes our relationship with computers



What can I help with?





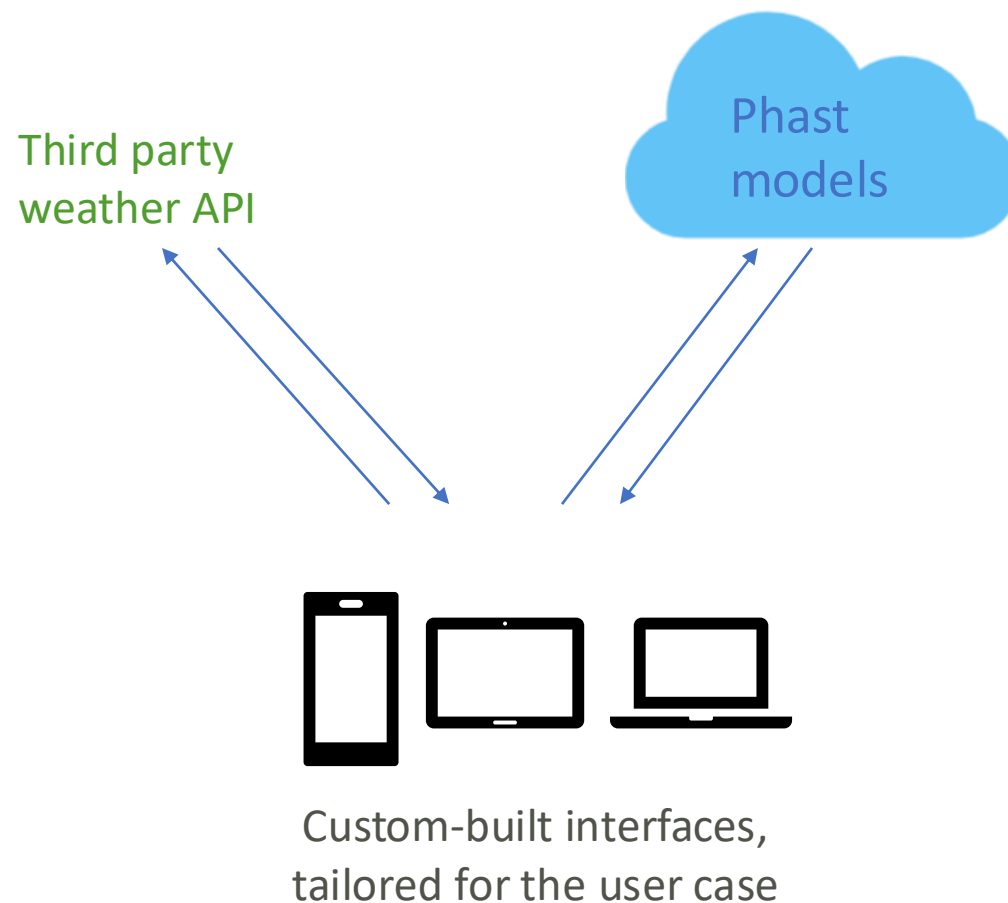
Better integration and unlocking real-time insights

Cloud-based consequence models open new possibilities for integration with other data sources and digital platforms.

A common example is a weather API, providing real-time and forecasted weather.

Use cases:

- Emergency response
- Discussing potential hazards when planning activities

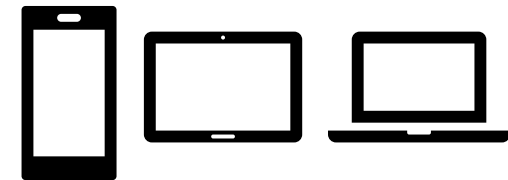
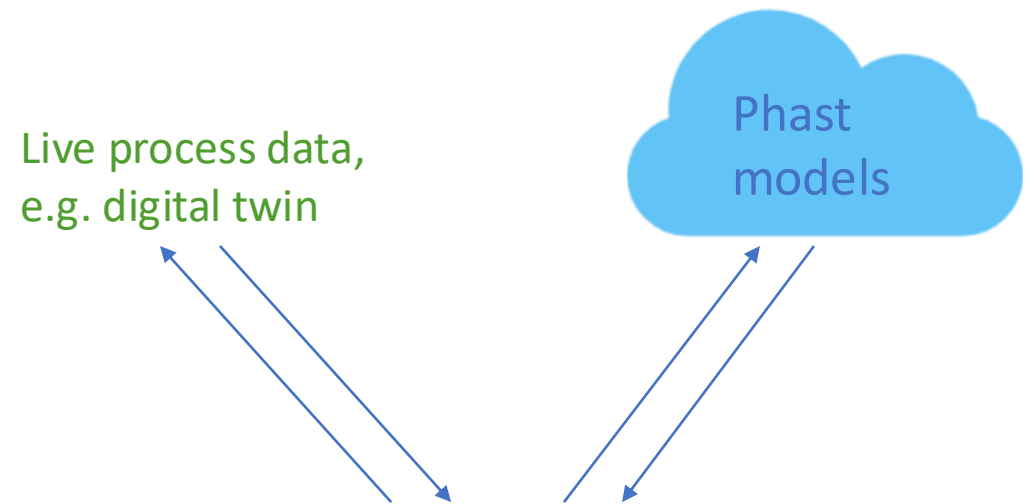


Better integration and unlocking real-time insights

Using live and historical process data, e.g., from digital twins, as input into consequence models.

Use cases:

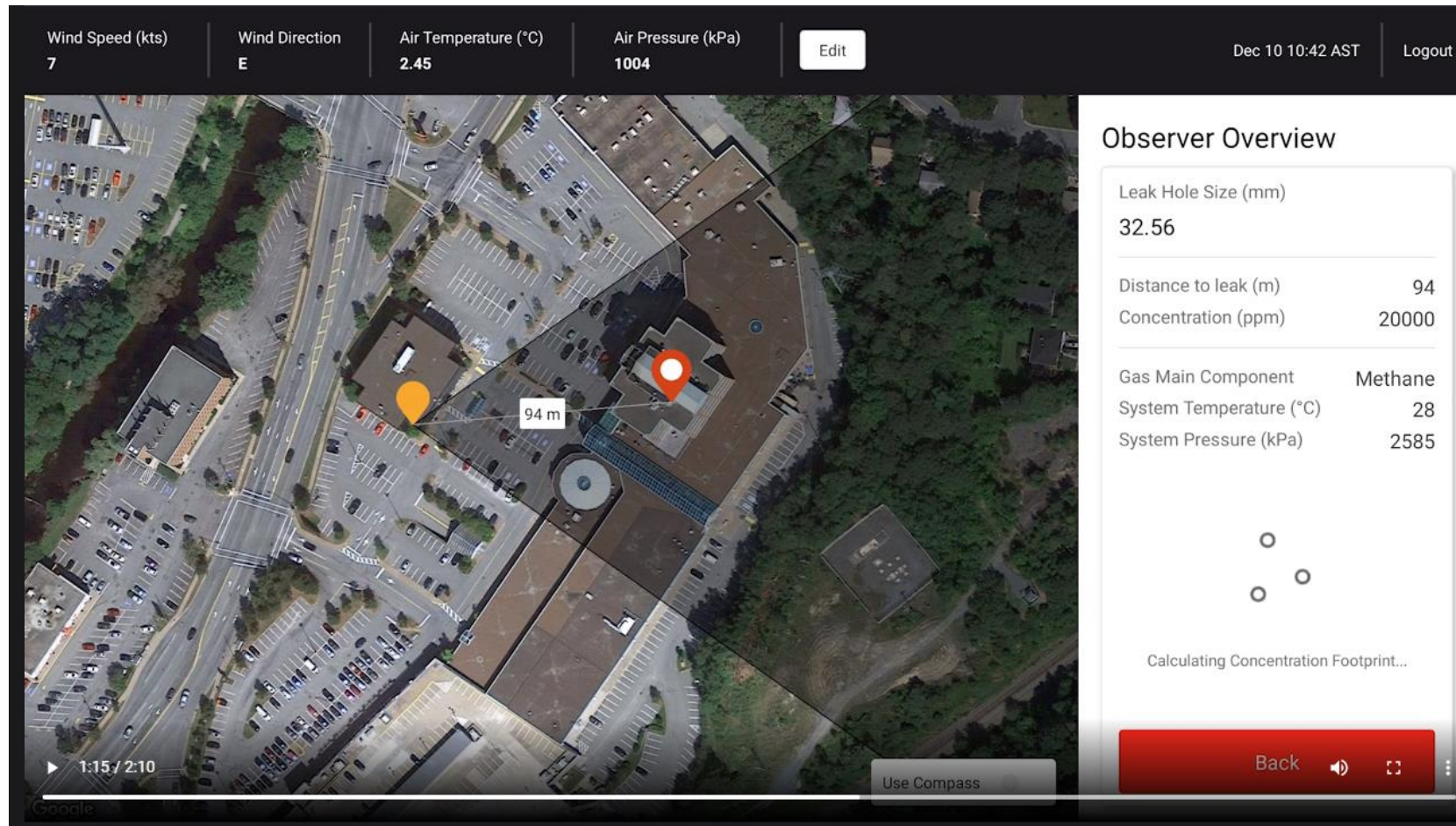
- Efficiency improvements – no manual data entry
- Planning activities
- Emergency response



Custom-built interfaces,
tailored for the user case

Better integration and unlocking real-time insights

Data from services and sensors...

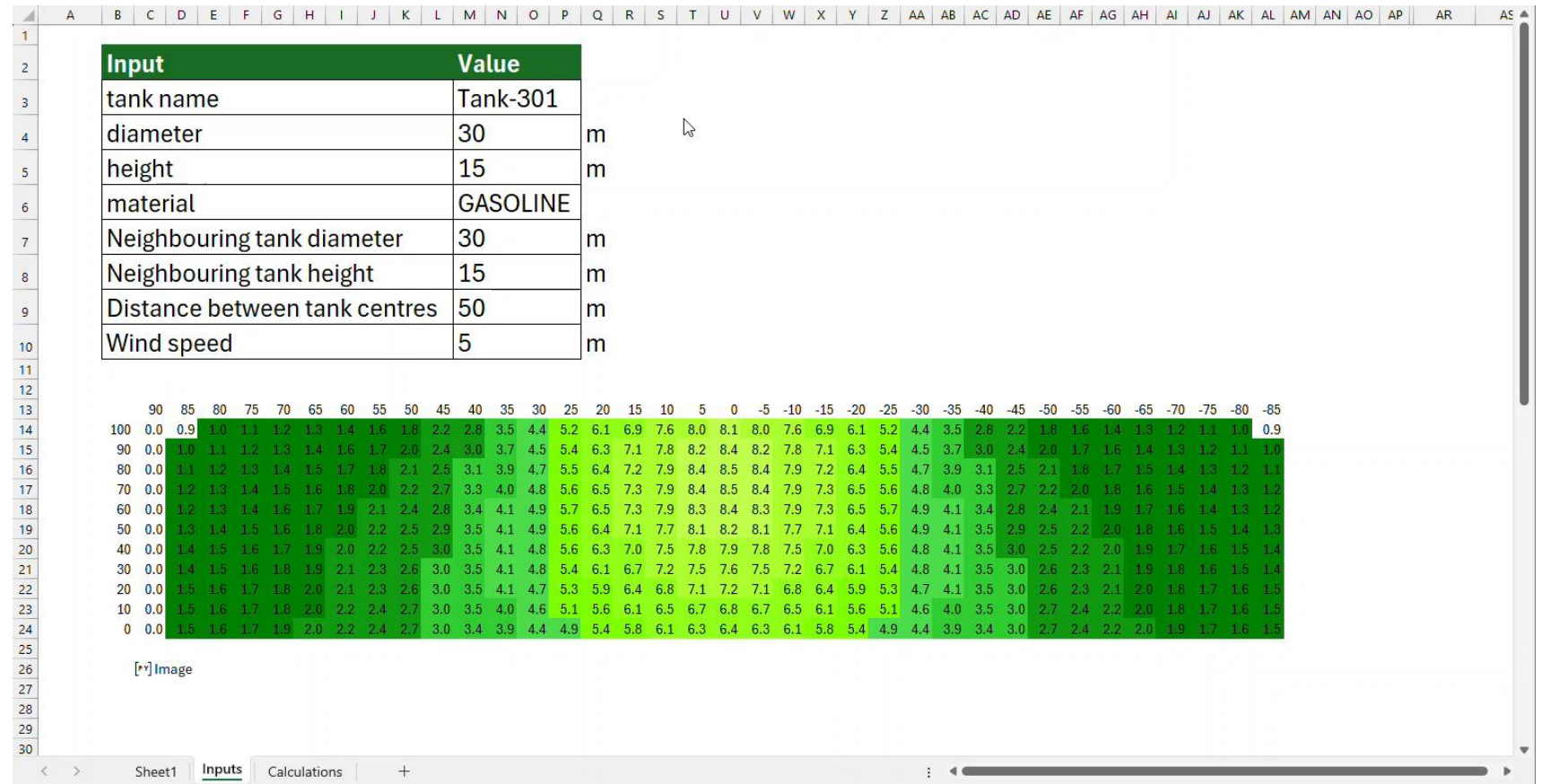


Better integration and unlocking real-time insights

Rapid sensitivity analysis

...this new way of accessing consequence models means spending less time wrestling with the software and more time being safety engineers. As it is now much faster to “play” with risk models to understand the level of uncertainty in calculated risk results, and the impact that design changes can make on the risk profile of a facility, it frees up more time to use this information to make thoughtful and robust safety recommendations that improve the safety of our client’s facilities.”

- Abbott Risk Consulting Ltd



Better integration and unlocking real-time insights

Eastman Chemical Company uses APIs to transform established workflows.

Conducting Process Hazard Analysis (PHAs) on a regular basis across its global sites and facilities, requiring estimates of the likelihood and severity of potential hazardous events.

Challenges:

- Limited availability of experts, lack of control over inputs, inconsistency in modelling approaches

Solution:

- They developed their own web application for PHAs, integrating the Phast APIs and exposing only the necessary inputs for their process.

Exemplifies the shift from software vendors providing a one-size-fits-all interface to organisations – or third parties – building tailored solutions that meet specific needs.

Conclusions

Organizations are already realizing the benefits of this new approach – from accelerating sensitivity analysis to standardizing hazard assessments across global facilities.

These use cases demonstrate that APIs do not just replicate what desktop software could do; they unlock entirely new ways of working, with greater speed, flexibility, and accessibility.

Further opportunities will emerge as consequence modelling APIs are combined with other technologies such as IoT platforms and large language models.

In the near future, conversational agents will be able to call APIs directly based on natural-language prompts, making consequence insights available to a wider range of stakeholders in more intuitive ways.