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Border Force

Strategies for the use of Digitalisation and Artificial Intelligence in Border Processes

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SECURITY

Protect the UK’s physical and ideological border by detecting, deterring, and disrupting serious and organised crime, terrorism, harm and threats to people, businesses, health, and the environment.

PROSPERITY

Facilitate and promote the UK’s growth and prosperity by enhancing international trade from businesses of all sizes, while effectively collecting the revenue owed to the government.

EFFICIENCY

Adapt to the challenges of a changing world, by enabling the increasing stream of legitimate movement (people and trade), while safeguarding vulnerable people and preventing abuse of the system.

Each year Border Force processes;

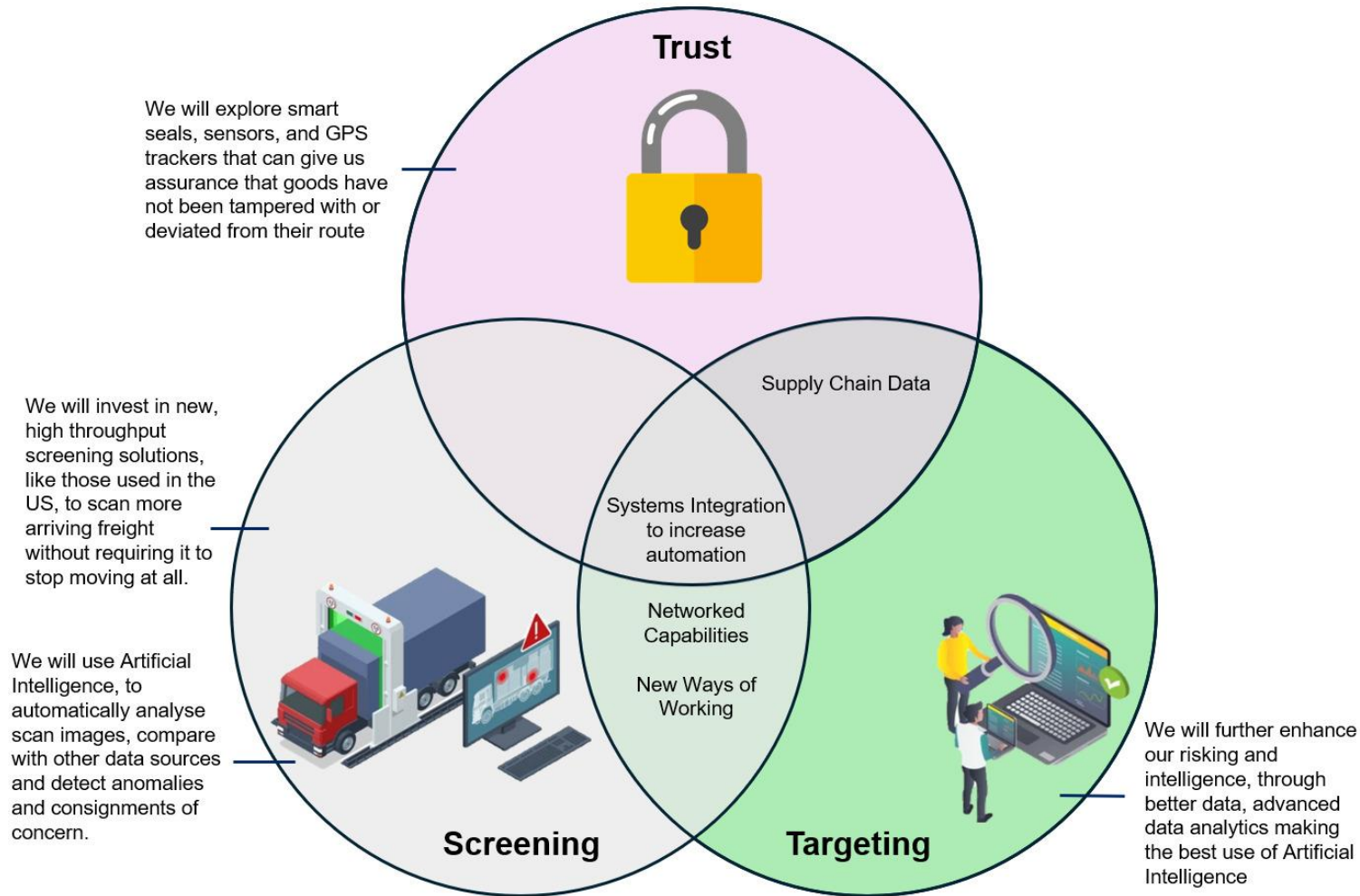
- Over 383 million tonnes of freight and over 21 million passengers via our 120+ seaports.
- Over 2.5 million tonnes of freight and over 255 million passengers via our 40+ airports
- Over 1.3 million tonnes of freight and over 22 million passengers via our rail ports (Channel Tunnel and Eurostar respectively)

As such, we must be resilient, innovative and capable of responding in an agile manner to major events and emerging trends.

We are therefore exploring innovative ideas, innovative technology, innovative ways of working and the transformational changes required for these.

Goods Transformation – An Overview

We have an ambitious vision for transformation, with investment in complementary capabilities that will enable us to deliver improved outcomes, while simultaneously ensuring security and enhancing the border crossing experience for legitimate traffic.



- Maximise risk and screening coverage across the goods border.
- Enhance automation and threat detection using AI-enabled systems.
- Increase seizures of harmful goods while maintaining trade flow.
- Modernise operations through integrated, scalable, and intelligent technologies.
- Taking our work force with us with new ways of working and skills.

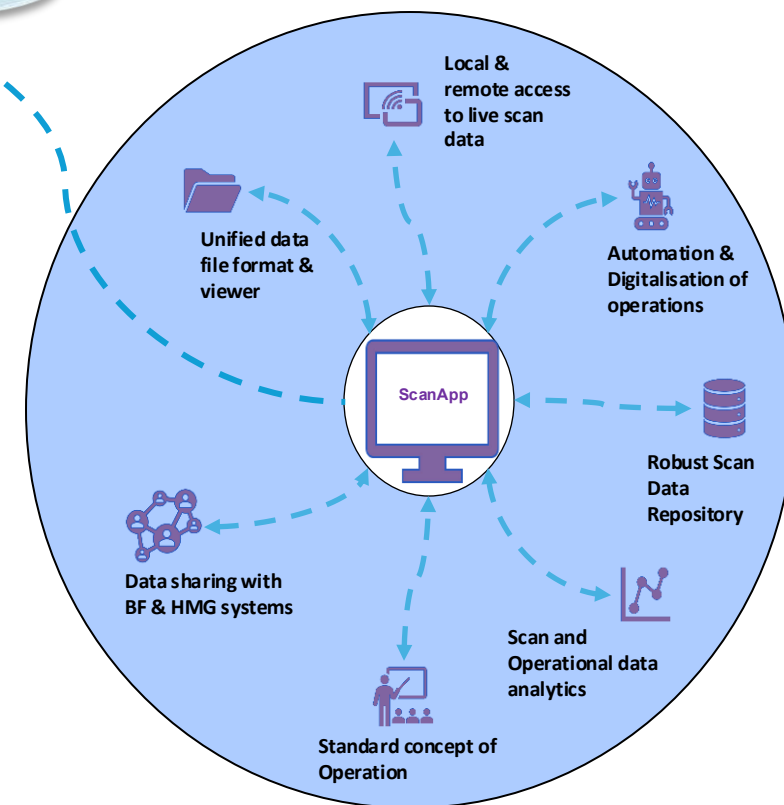
Networking and Integrating Capabilities

Setting the Foundation

In 2019, the UK began a programme to deliver capabilities that will transform the way detection capabilities are used in the Maritime Environment, through:

- upgrading x-ray scanning systems and software.
- integrating the scanners using a secure network.
- delivering **ScanApp** - an application acting as the central interface for BF officers to undertake the end-to-end x-ray scanning process.
- digitally connected to other systems to assure the right information is available at the right time for effective decision making and recording.

This work is a key element in transforming our goods border operations and sets the foundation for a more automated future; enabling smarter, faster detection and enable Border Force to scale up screening without impeding flow – bringing us closer to our ambition of a more secure, data-driven, and efficient border.



The Next Capabilities



Multiple Energy Portals (MEPs) enable us to “in-flow” scan vehicles and goods thus screening more and screening faster.



ScanApp provides the ability to centralise image analysis realising economies of scale, improving flow and increasing resilience

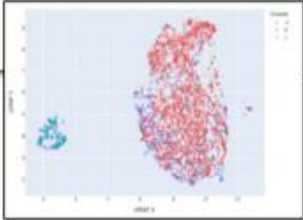
Introducing Artificial Intelligence

Scan More, Scan Faster, Scan Better

Use Case 1

Classification of Vectors & Confirmation of Integrity

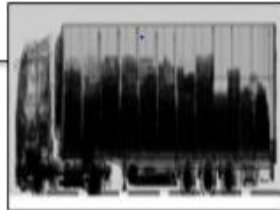
- Differences between trucks (e.g. full vs empty or refrigerated vs normal).
- Training models to recognise compromised integrity (e.g., false floors, roofs, walls and hidden compartments in the chassis, wheels, tyres and engine).



Use Case 2

Anomalous Pattern & Detection & High-Risk Cargo

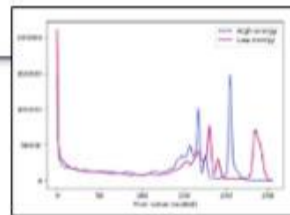
- Training models with labelled examples of high-risk cargo/goods and then evaluating its performance on unseen labelled examples.
- AI Algorithms to be able to detect anomalous patterns within cargo/goods.



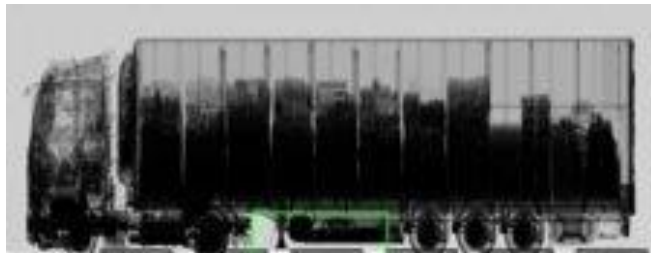
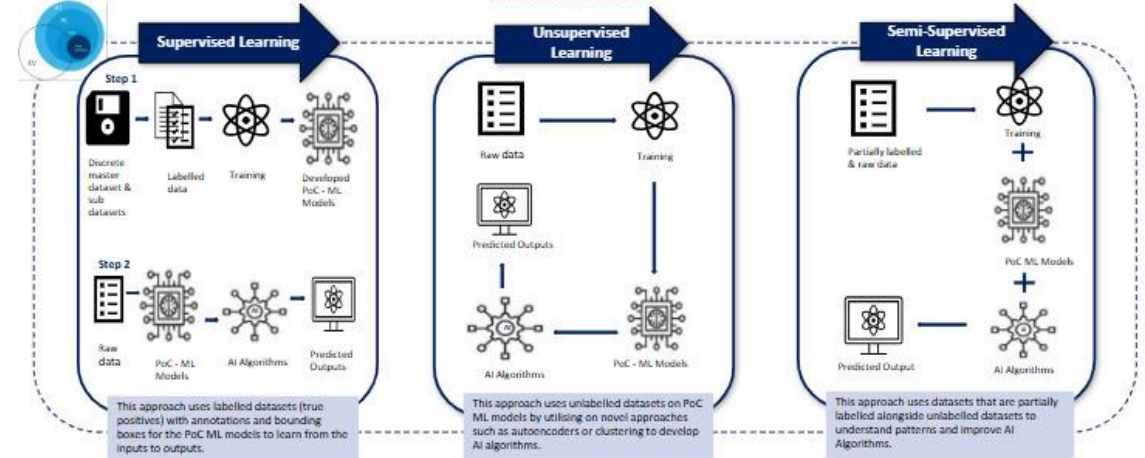
Use Case 3

Detecting high-density, high-risk cargo/goods

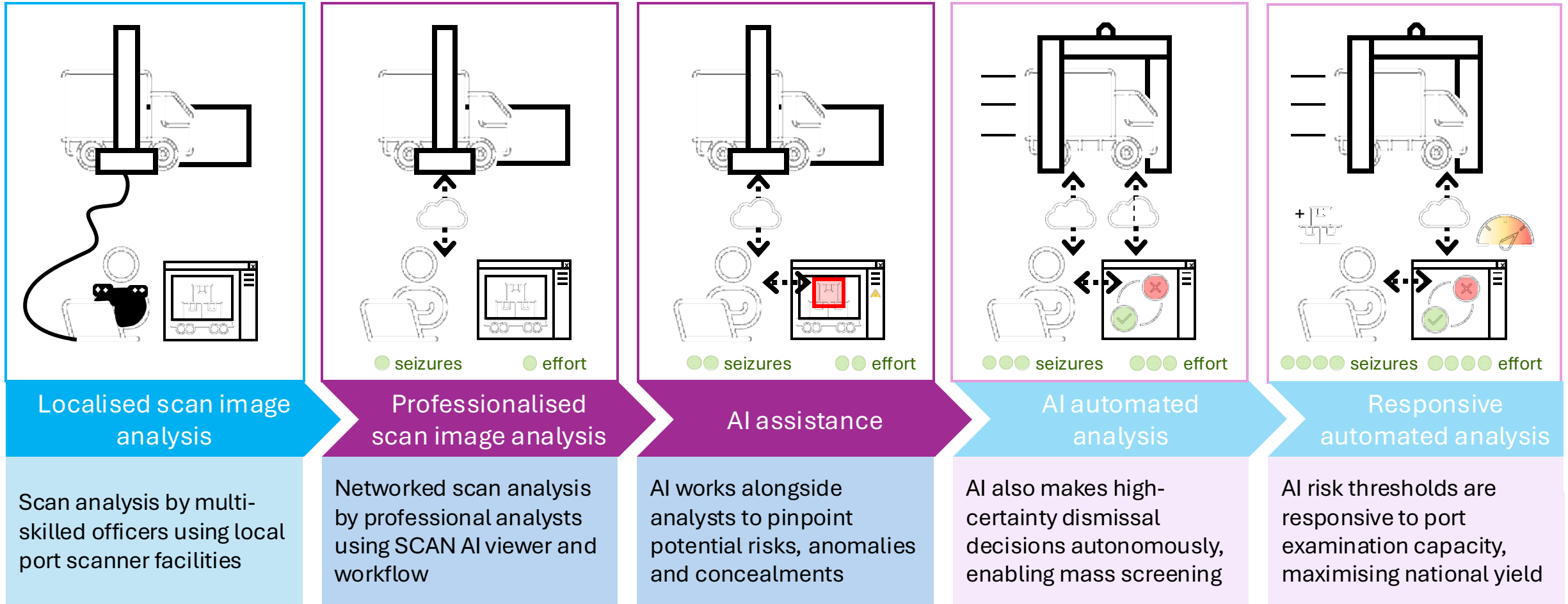
- X-rays absorb at difference rates for different materials (high and low energy images).
- Analysis of the attenuation/ absorption spectra for each material, the models and algorithm to be able to identify high-density materials within cargo/goods.



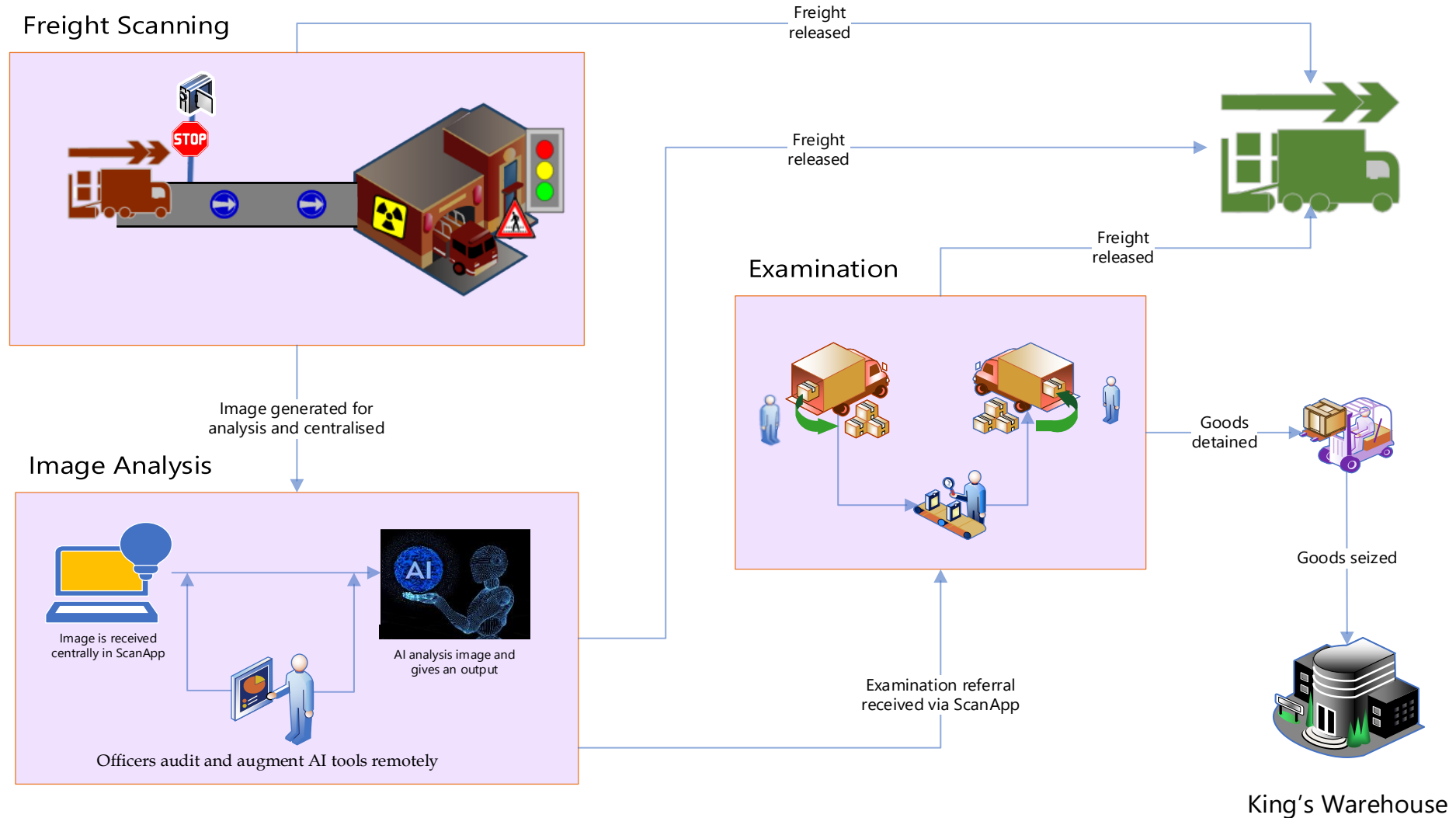
What we did: Developed AI Algorithms using Computer Vision (CV) and Machine Learning (ML) techniques and models.
Pilot Phases: PoC Model development (Vision Transformer, GANomaly, ResNET, Autoencoder) - Training, Testing and Validation cycles.



More seizures of higher threat concealments at a lower FTE cost



Digitally Enabled Automated Screening



Thank You



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