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# Disruptive, Non-Intrusive Inspection technology for security screening

*For a safer world*

WCO – June 29, 2021

## Dynaxion

- Dynaxion is a start-up with the mission to improve global safety.
- Dynaxion is developing a non-intrusive identification system for explosives and drugs in parcels, suitcases and small freight.







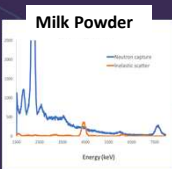
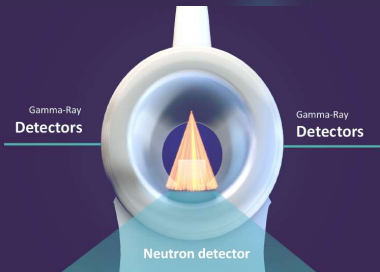


# The Dynaxion solution:

Fully automated and accurate identification of materials

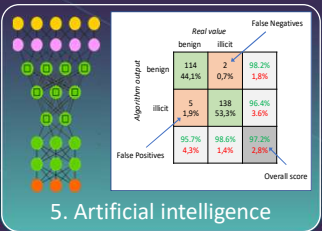
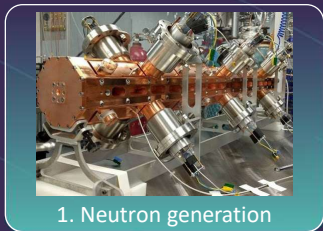


- Particle acceleration technology to generate neutrons
- Neutron beam creates atom-specific reactions
- Multiple detection systems extract data on content
- AI algorithms identify material:
  - Accurate and up to atomic level. Fully automated
  - Dynaxion sees difference between Cocaine and Milk Powder
- No expensive operators to look at images
- Much less opening of parcels and suitcases
- Increased efficiency, safety and security
- Improved border control and protection

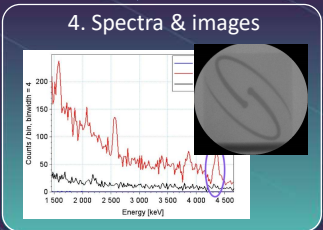
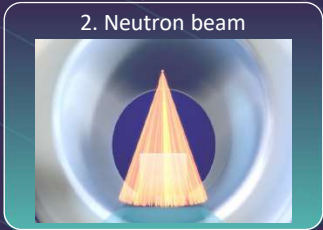


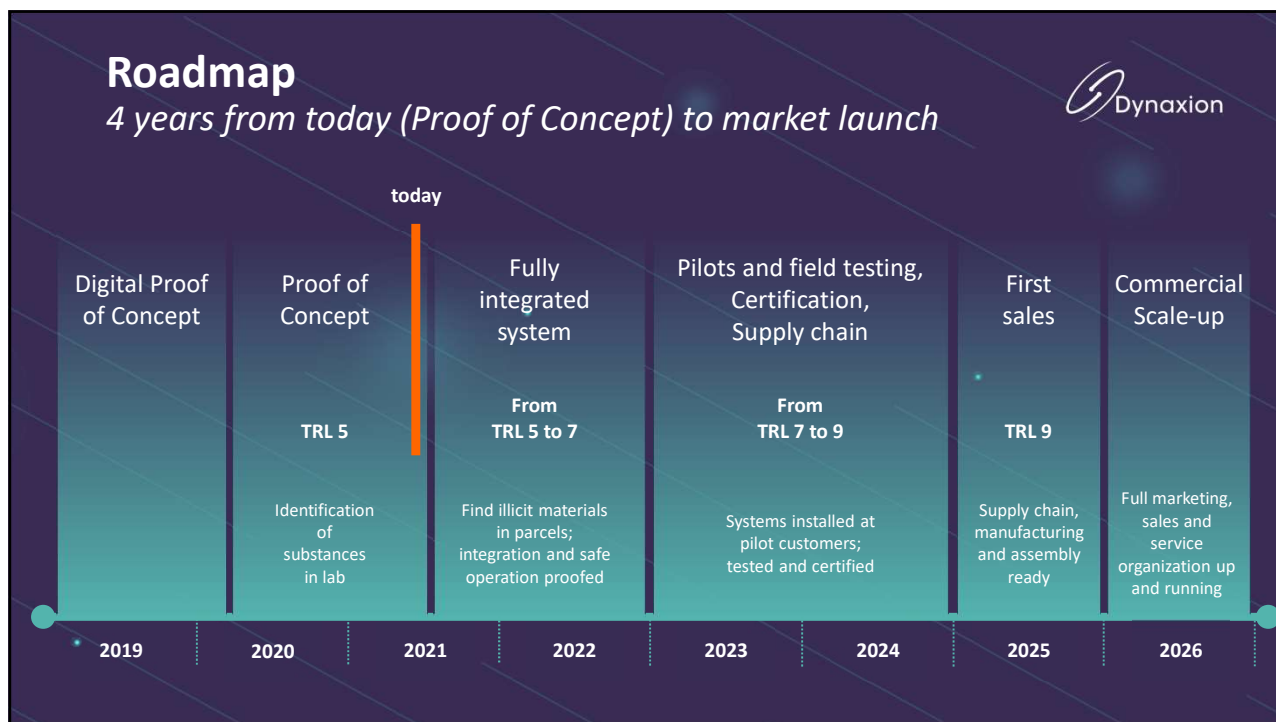
# Working principle

Fully automated and accurate identification of materials



All steps within 6 to 10 seconds maximum





## Example: daily dilemma for customs

*Dynaxion gives certainty; no guess work, no false opening*

- Problem: screening shows organic product that resembles drugs
- What to do?
  - Open parcel, open product.
  - Sample the product for drugs
    - Visual inspection, sometimes smell / taste...
    - Electronic analysis (mass spectroscopy, electronic trace detection)
    - In some cases: danger expected, send sample to special laboratory
  - Most cases: no threat; 'costly' false alarm
- Dynaxion: non-invasive, few seconds of scanning and will provide >97% accurate answer

## Example: The Yemen Bomb Plot

*Spoofing with Dynaxion very difficult*



- 2010; 300 and 400 grams IED (Improvised Explosive Device) in toner cartridge in printer on UPS and FedEx cargo planes; Timed to detonate mid-air over the USA.
- After intelligence tips, package and printer where subjected to X-ray, Explosive Trace Detection and Explosive Detection Dogs.  
→ The explosives inside were not detected.
- Explosives were very well concealed and hidden; The explosive was very similar to cartridge ink.  
→ Report: 'Impossible to detect by X-ray'.
- Dynaxion would have 'easily' detected and identified the explosive, even when only 50 to 100 grams.

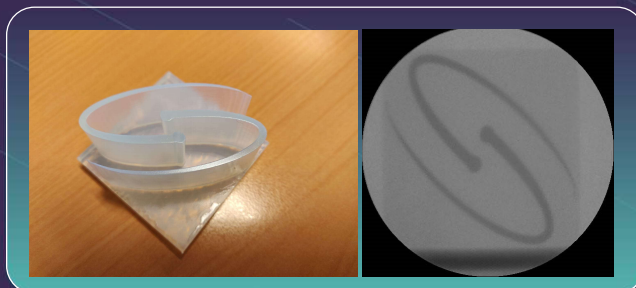


## Proof of Concept – Neutron imaging

*The power of neutrons looking through metal*



- Goal: sub-millimetric fast neutron imaging to locate objects
- Object: plastic 3D printed logo (5x5cm)
- **Imaging through 5cm of lead**
- Spatial resolution: 700  $\mu\text{m}$



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## The team

*Divers team, strongly motivated to make the world a safer place*

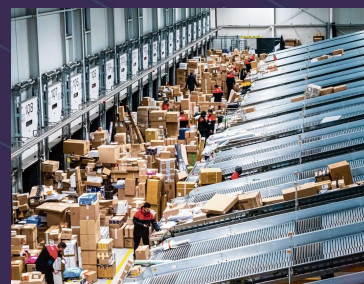


- 2 founders
  - Multi-year startup, technical, business and leadership experience
- 8 team members
  - Neutron generation and detection
  - Modelling and simulations
  - Artificial intelligence
  - System design & engineering
  - Financial
  - Business and marketing
- Female CTO; 4 PhD's; 4 nationalities
- +5 students / interns
- Several advisors
  - ASML; HighTechXL; CFOlab; VDL-ETG



## Customs – considerations (1)

- High accuracy and specificity, in combination with automated identification.
- Large numbers and increase of 'direct' shippings
  - More unknow shippers = more pressure on screening
- Drugs, Tobacco, Ivory, 'animal/plant related', radioactive materials, .....
- TNO independent expertise report: 'Spoofing very difficult'.



## Customs – considerations (2)

- Much faster import checks than current manual handling and ad-random checks, plus:
  - Less (costly) human handling
  - Immediate identification
- Import but also export control on drugs.
- Higher efficiency, higher effectiveness, lower overall costs.
- Effective way to help stop the flow of illegal goods coming into and going out of country.



## Customs – considerations (3)

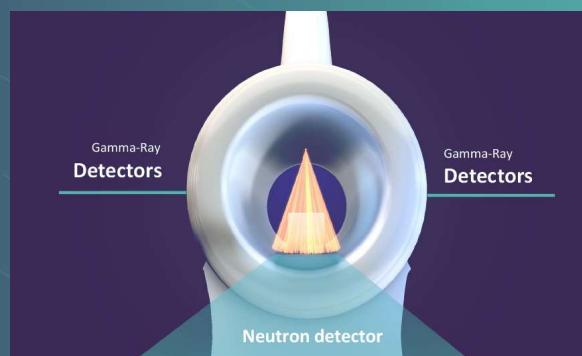
- Improved border control and protection
  - Higher efficiency
  - More secure supply chain
  - Less physical interventions and inspections
  - Better decision making
  - Securing revenue collection
- We would very much want to cooperate with the WCO in its mission to reach a safer and more prosperous world.



## Highlights



- Highly accurate identification
  - Drugs, explosives, tobacco, other
- Saving time and costs
- Effective border protection
  - Illegal as well as dangerous goods
- Looking for support to further develop our product



Security Screening Technology  
**For a safer world**

Company video:

<https://vimeo.com/406183078>

Animation of technology:

<https://vimeo.com/387908188>

Website:

[www.Dynaxion.nl](http://www.Dynaxion.nl)

