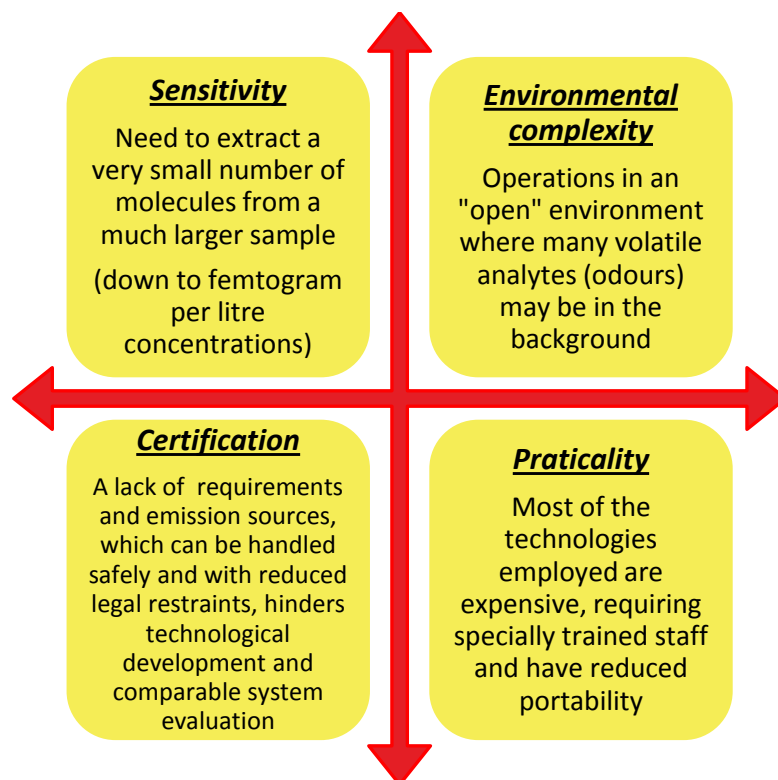




Evaporation Based Detector

The C-BORD Technology Sub-System evaporation based detector will develop detection technologies for volatile chemicals that may be present in a container, giving warning of hazard or contraband. These are expected to complement X-ray imaging by enabling molecular specific detection (chemical information instead of physical properties), improving the discrimination power of the scanning system.

Previous sniffing approaches failed because of the complexity of the problem at hand:



The New Approach

- A new biomimetic approach to detection and identification of volatile chemicals shall be employed. This approach couples selective binding elements from biological systems – such as OBP (Odorant Binding Proteins) – with highly sensitive diamond microcantilever and machine learning. It also increases the selectivity of the detector by arranging the biosensors in an array.
- Each individual sensor in the array contains a specific OBP featuring a fairly broad selectivity to some chemicals or families of chemicals. The combination of the response of the sensors to a particular odour is translated into a pattern which is a fingerprint of the specific odour.
- A multiparametric software uses a database built during an initial calibration phase of the system to recognise and classify the volatile chemicals.

Expected Results

- New OBPs will be functionalized to detected analytes to cover the priority targets identified by customs.
- Sampling methods will be developed to allow the use of the device in the context of cargo screening. Many targeted substances have very low volatility or may be in sealed packets. Detection of these substances will require the integration of a large scale pre-concentration and sampling system. COTS large volume sampling methods as well as evaporation based detection systems will be investigated.
- Test standards and procedures will be designed. To date these are not available for large cargo inspection. Reliability of sniffing detectors (not only the C-BORD ones) will be increased by in-field evaluation and testing.
- A laboratory test-bed for the simulation of hidden illicit material in large volume cargo will be built for the evaluation of sampling systems and evaporation based detector technologies.
- Based on information from users, emission sources with defined emission rates for a variety of explosives and narcotics which can be handled safely with reduced legal constraints will be developed. This will include point sources as well as large volume or area sources which could be placed into large volume freight to mimic the emission of contraband.

Partners Involved

CEA	COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
BRSU	HOCHSCHULE BONN-RHEIN-SIEG
ESIEE	CHAMBRE DE COMMERCE ET D'INDUSTRIE DE RÉGION PARIS - ÎLE-DE-FRANCE
UNIMAN	THE UNIVERSITY OF MANCHESTER

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 653323.

This text reflects only the author's views and the Commission is not liable for any use that may be made of the information contained therein. This document and its contents remain the property of the beneficiaries of the C-BORD Consortium and may not be distributed or reproduced without the express written approval of the Coordinator, the Commissariat à l'énergie atomique et aux énergies alternatives.