

Emerging sensor technologies and metrics for homeland security

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Los Angeles

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2 Outline

- **Threats**
- **Statistics**
- **Standards**
 - **Responsibilities**
 - **System metrics**
 - **Definitions**
 - **Cross-correlation: existing and emerging technologies**
- **Discussion**



2 Threats – homeland security

- **Terrorism**
 - MANPADS
 - IEDs – vehicle or person
 - Chemical and biological – substance, vectors
- **Pirates**
 - Sabotage and smuggling – cargo and personnel
 - Transport of illegal cargo: drugs, WMDs, firearms
- **Technical and human error**
 - Software / hardware sabotage or failure; human psychosis
 - Runway debris
- **Screening**
 - Staff and passengers; cultural differences
 - Methodologies and training of staff
- **Standards**



2 Statistics – ports and harbours

■ Airports

- Two terrorist attacks on airliners in 2004
- Reduction in total accident rate and fatal accident rate over last 25 yrs
- 1791 fatal and non fatal accidents in past 15 yrs
 - 91% flight related - 61% during landing alone
- 95% air cargo carried on passenger flights

■ Harbours

- Piracy – increase in 20% to 445 incidents: 2002-2003
- ISPS code – July 2004
- 2 billion tons freight each year (US maritime)



2 Standards – why bother?

- **Standards contribute £2.5 billion / annum to UK economy**
- **Standards**
 - Encourage innovation
 - Increase labour productivity
 - Facilitate technological change: emerging technology to market
 - Should enhance, not inhibit economic growth / trade



2 Responsibilities – defining and implementing

- Are homeland security standards and metrics necessary?
- What is the purpose of the standard?
- Who defines the standards?
- Who pays for defining the standards?
- Who is going to take responsibility for:
 - Creation?
 - Implementation?
- How do you create and implement, accounting for variety of sensors and systems?
- Impact on operational effectiveness and innovation?
- Who pays for implementing the standards?

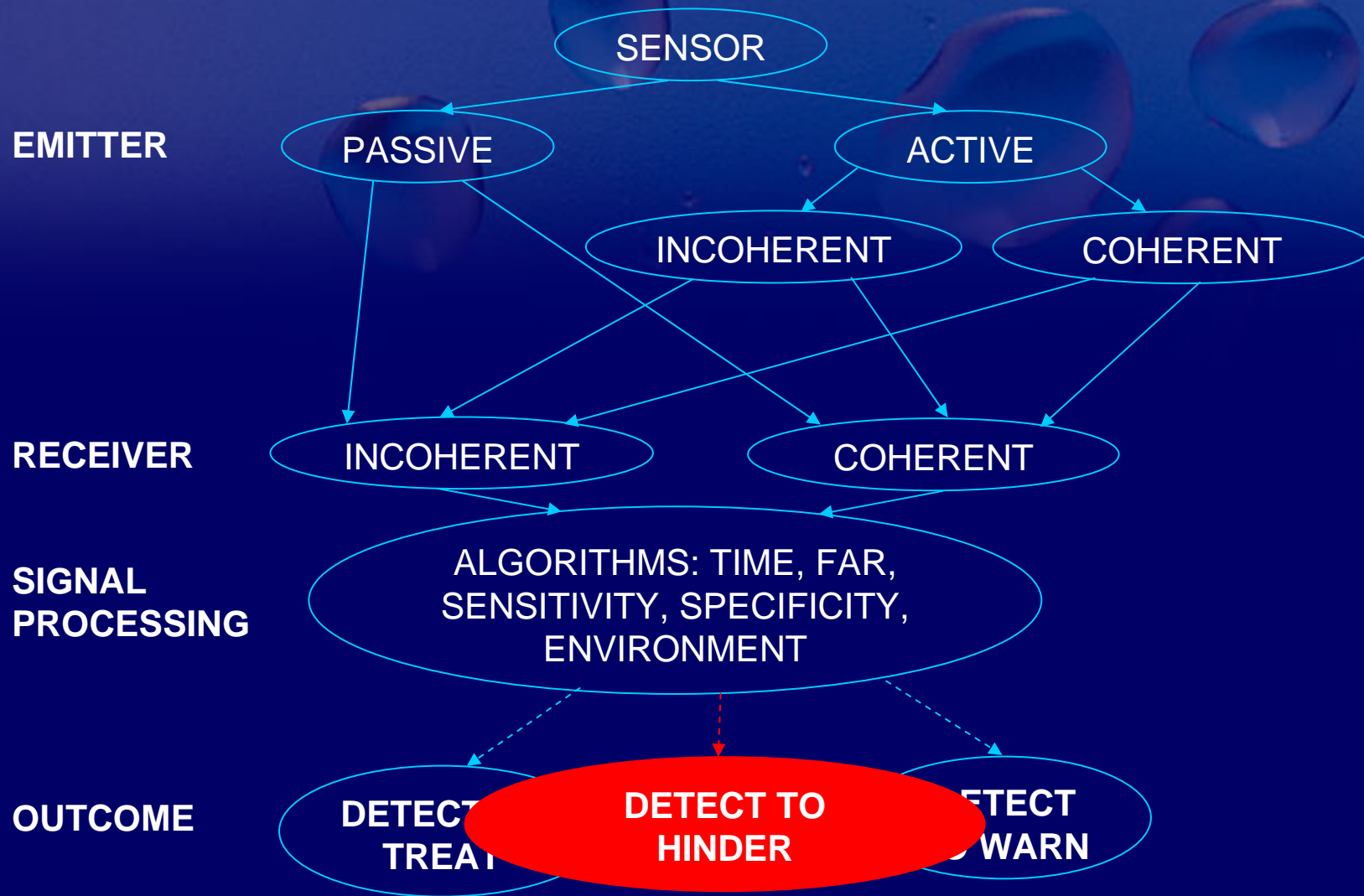


2 System metrics and standards

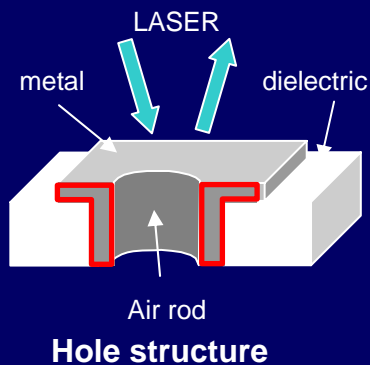
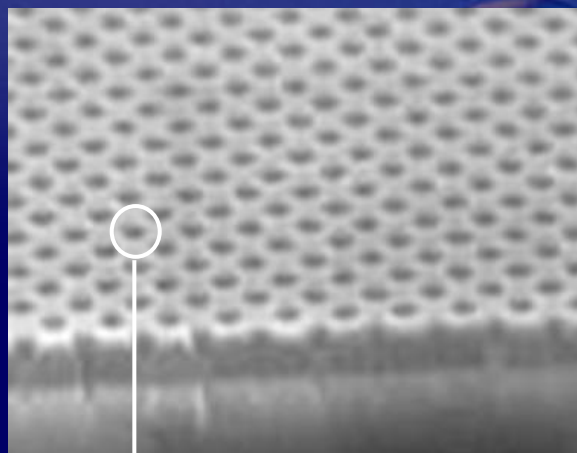
- **MISSION**
 - Facilitate comparison of existing systems versus emerging systems in order to determine whether system selection enhances or reduces operational effectiveness
- **System**
 - Product, methodology or technique or combination thereof
- **System metric**
 - Parameter used to define the quality of a system
- **Guideline**
 - Procedure used to determine system metric
- **Standard**
 - Threshold level defined by end user which must be reached
- **Baseline**
 - Minimum standard necessary for a system to be considered



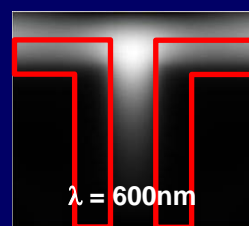
2 Sensor metrics – emerging technologies



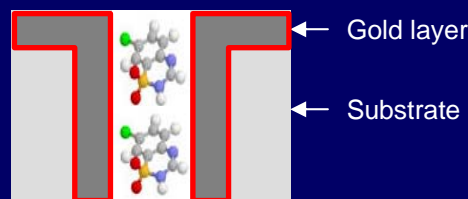
Surface Enhanced Raman Spectroscopy: liquid and gas detection



Hole structure



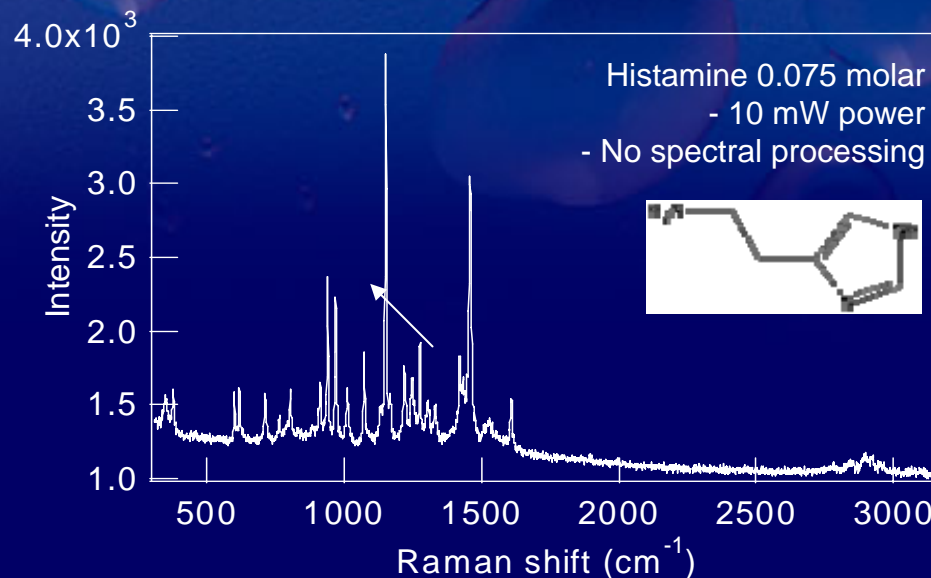
Field enhancement



Tailored substrate design



Disposable substrates

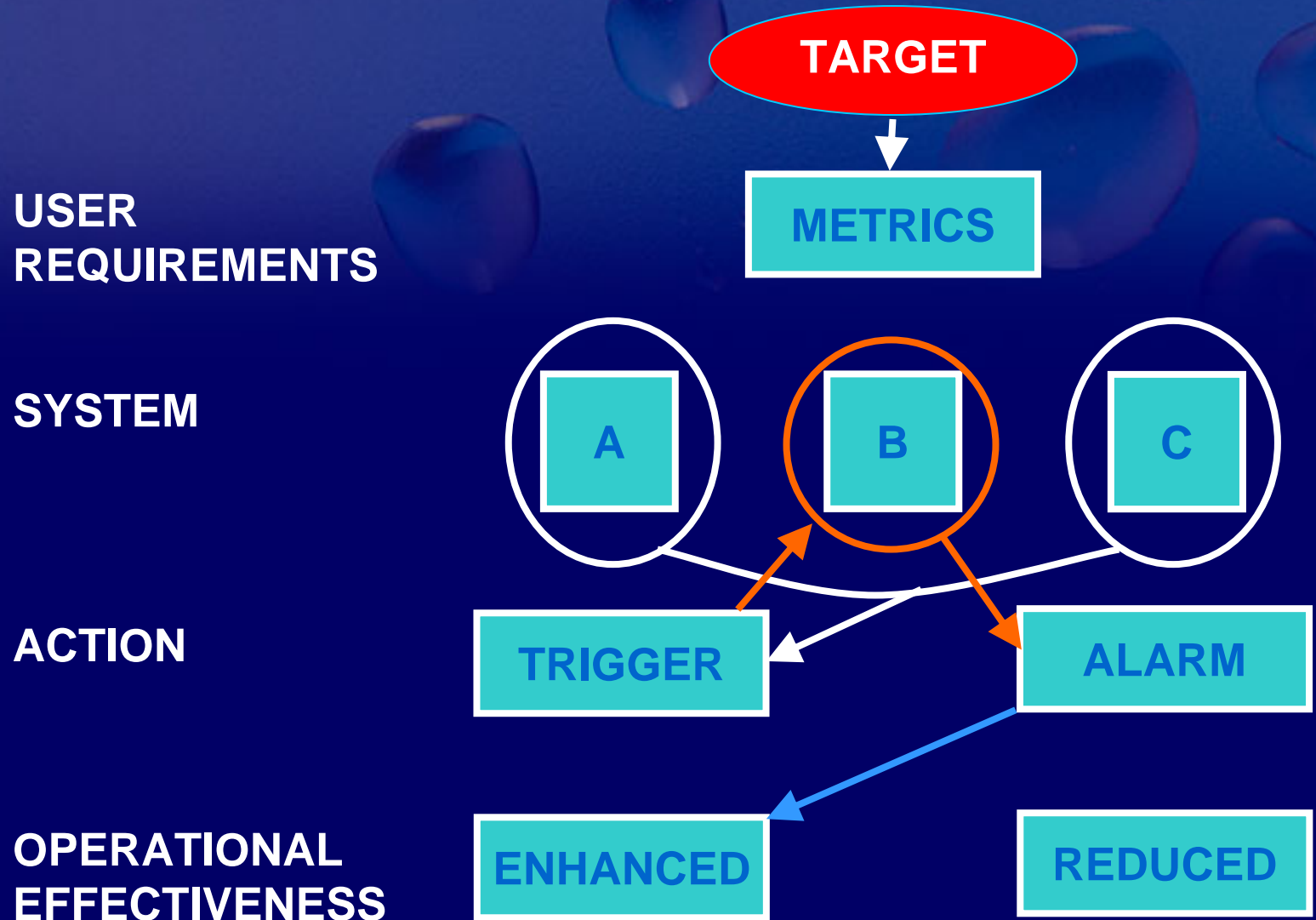


Histamine 0.075 molar
- 10 mW power
- No spectral processing





2 Process – sensor implementation





2 Discussion

- **System metrics**
 - Cross-correlation between existing and emerging systems
- **Government verses private sector – interaction**
 - Support from government essential since economics intertwined
- **Reactive verses proactive**
- **Statistics verses egotistics (in vogue technologies)**
- **International collaboration**
- **Assistive not dictatorial approach**



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