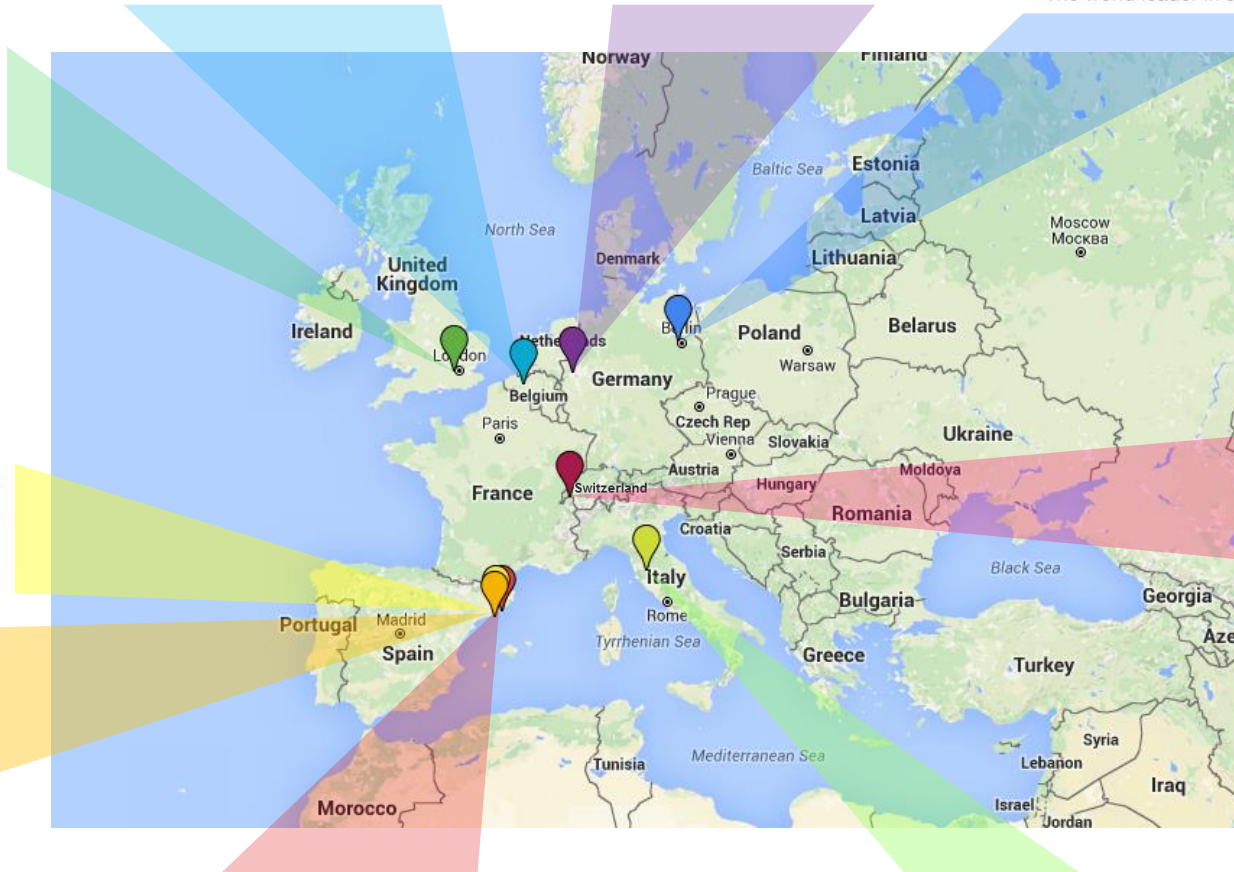




RAIS: Scalable, point-of-care and label-free microarray platform for rapid detection of Sepsis

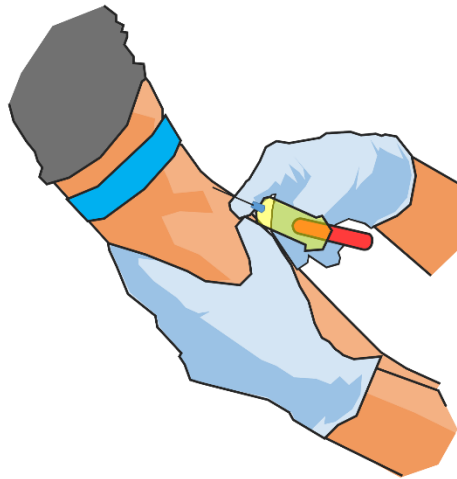


THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

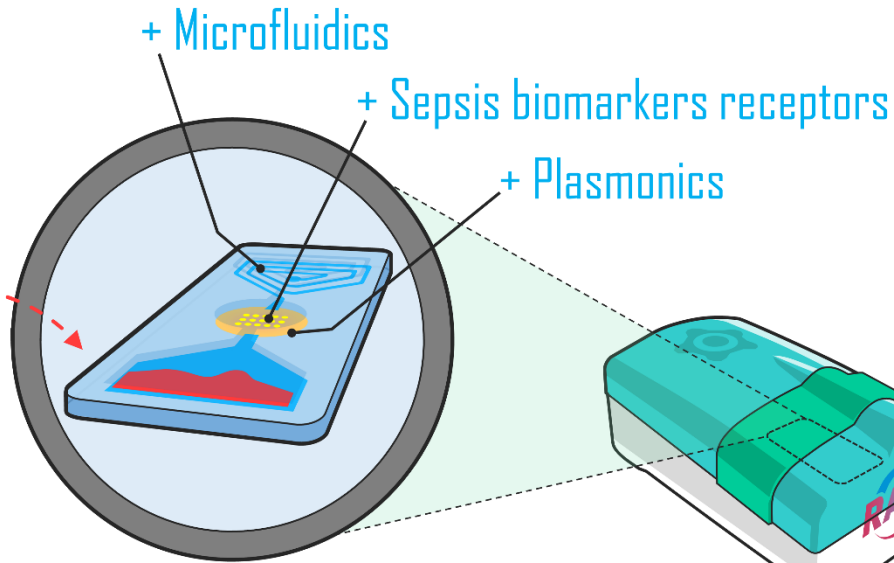


RAIS Concept

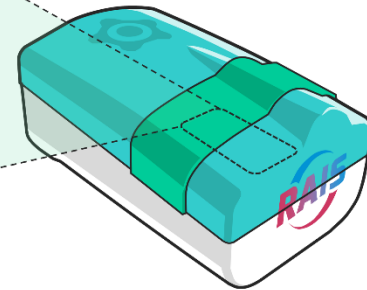
Low-cost
< 30 minutes
Sepsis diagnostic



Patient blood



Disposable cartridge

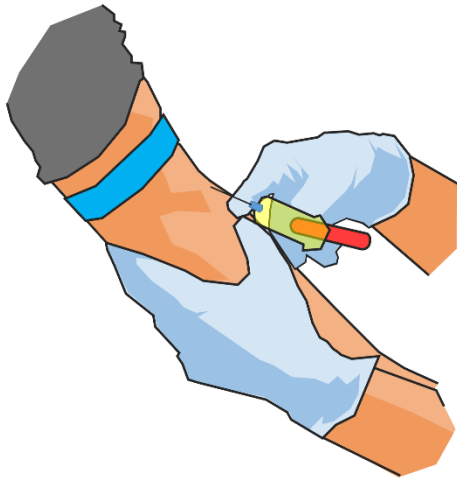


Patented optical reader
+ Software



Sepsis

Low-cost
< 30 minutes
Sepsis diagnostic



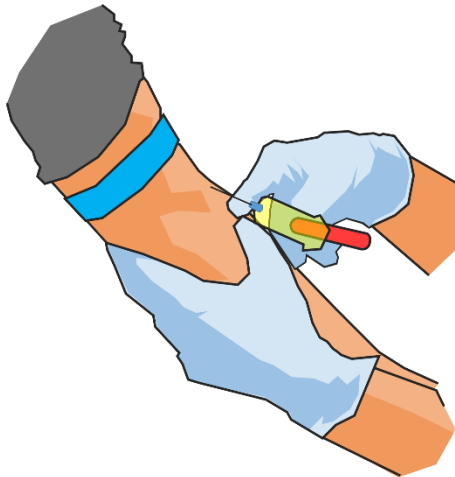
Patient blood



- **Sepsis** is a potentially fatal whole-body inflammatory reaction caused by severe infection
- **35% mortality**
- **> 7 million deaths/year**
- The cost of Sepsis is high, and rising. In 2008, > €10 billion were spent on hospitalizations for Sepsis in both Europe and the USA.

Sepsis

Low-cost
< 30 minutes
Sepsis diagnostic

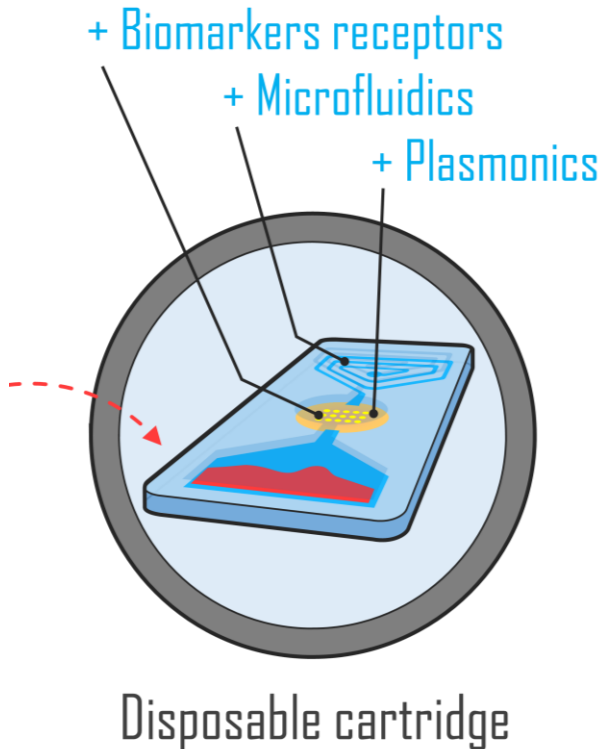


Patient blood

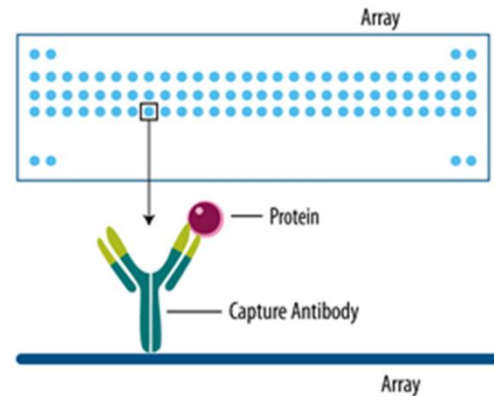
- During the course of a Sepsis infection, the blood of patients will contain specific **biomarkers**.
- In The RAIS project, we will initially focus on the following Sepsis biomarkers:

Biomarker		Comments
C-reactive protein	Sepsis	170 to >200 µg/ml
Procalcitonin	Sepsis	>0.5 ng/ml
Interleukin-6	Sepsis	>120 pg/ml
MR-pro-Adrenomedullin	Sepsis	>1.1 nmol/L
miRNA146a, miRNA223, miRNA15a, miRNA16	Sepsis	Low fM range (broad range 0.1fM-pM)
Antimicrobial resistance mechanisms	CTX-M-type betalactamase, CMY-type betalactamase, VIM-type carbapenemase, OXA-48-type carbapenemase, Penicillin binding protein 2a (PBP2a)	
Bacteria	Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, Pseudomonas aeruginosa	

Cartridge

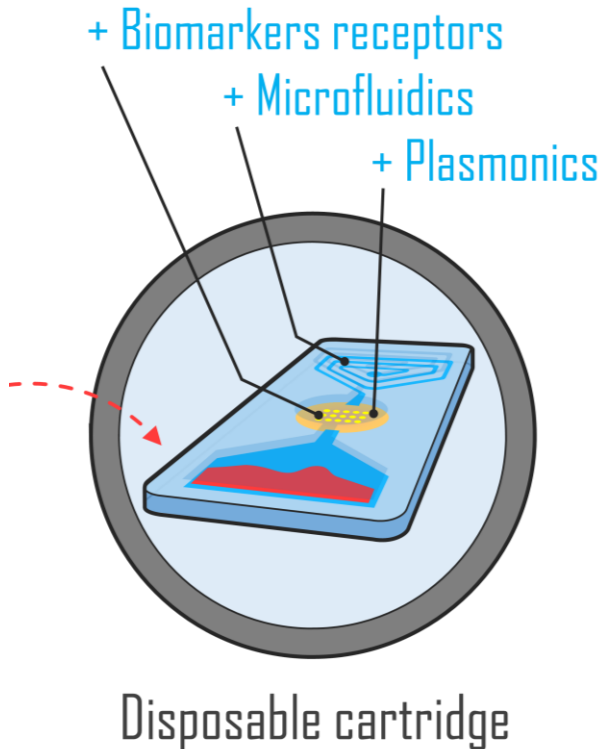


- The Sepsis biomarkers can be captured by **specific receptors** deposited on a transparent micro-array plate.

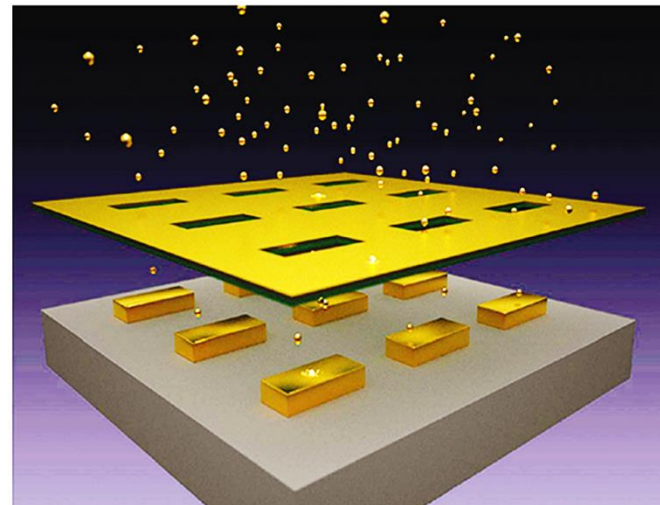


- A disposable cartridge combining the microarray plate and **microfluidics** will be used to bring the patient blood into contact with the specific receptors.

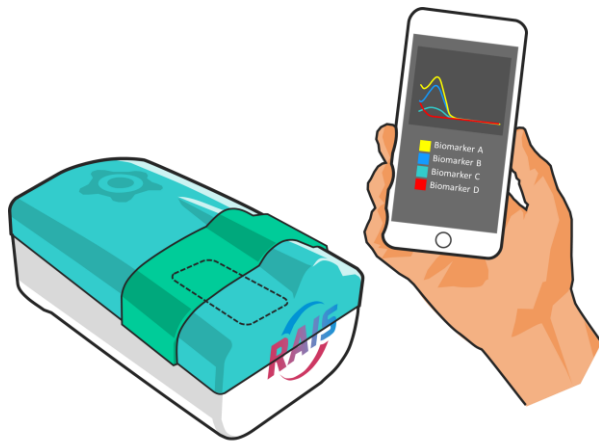
Cartridge



- **Plasmonic** nano-structures will be designed to facilitate the detection of Sepsis biomarkers in the micro-array reader, by enhancing the light interaction with the protein array.

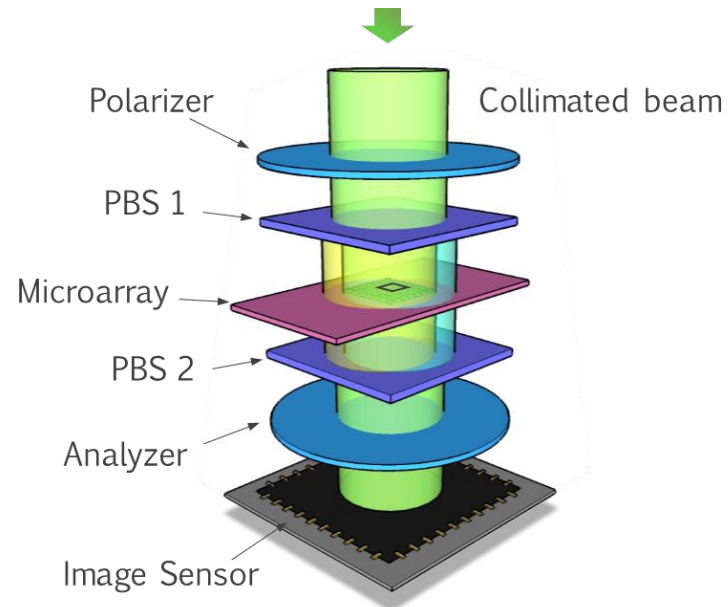


Reader

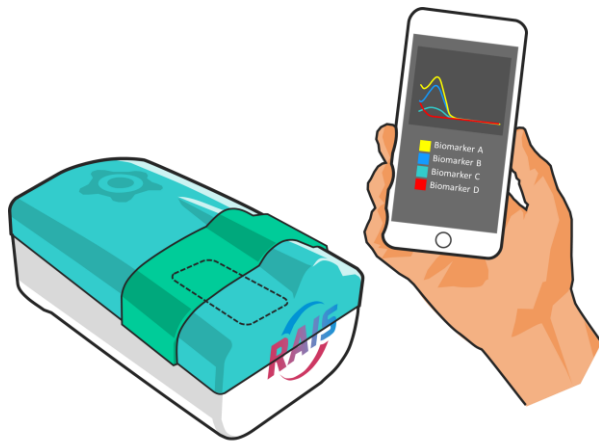


Patented optical reader
+ Software

- The RAIS platform will use an optical **microarray reader** based on interferometric lens-free microscopy and large-area CMOS image sensing.
- Thanks to the large field-of-view of the image sensor, potentially > 1 million targets can be probed at the same time, allowing **high-throughput**, rapid detection of many proteins or pathogenic microorganisms.



Reader



Patented optical reader
+ Software

- Contrary to ELISA tests, the RAIS technology is based on a very high-sensitivity interferometric configuration, which means it can do without protein amplification → **very short time to result**
- The proposed system will have a very small form factor, be battery powered and manufacturing will cost around €1000, making it very suitable for **point-of-care** applications.



Acknowledgements



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www.rais-project.eu

