

Challenges to Develop Diagnostics for Treatment of MDR Pathogens

Herman Goossens

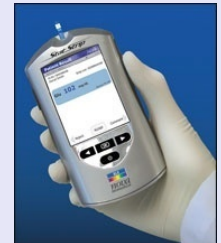
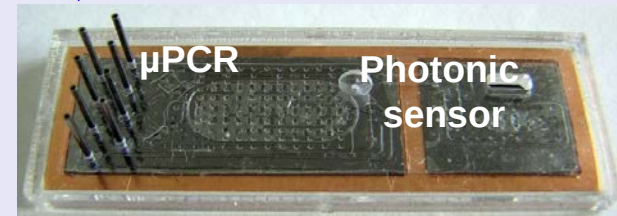
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Paradigm Shift in Diagnostics

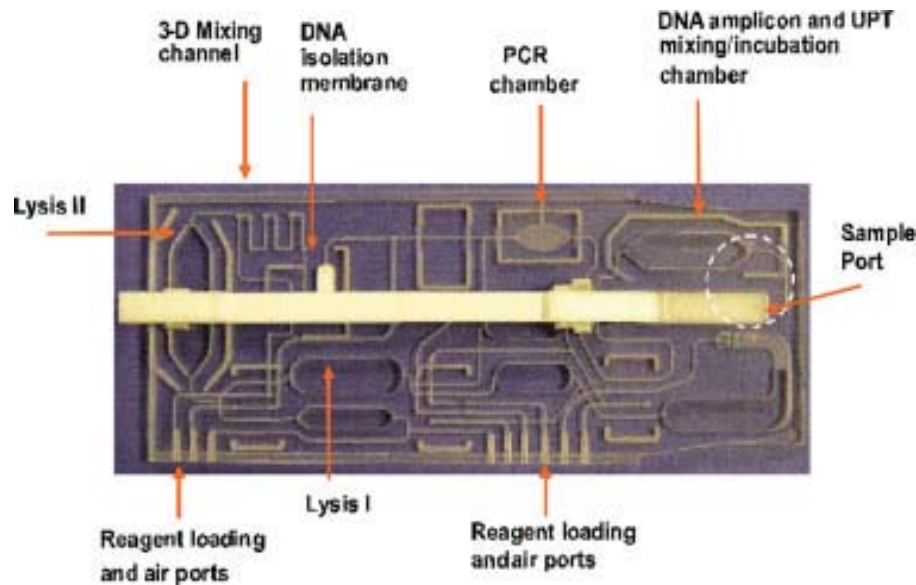


Integrated point of care test/
personalized medicine



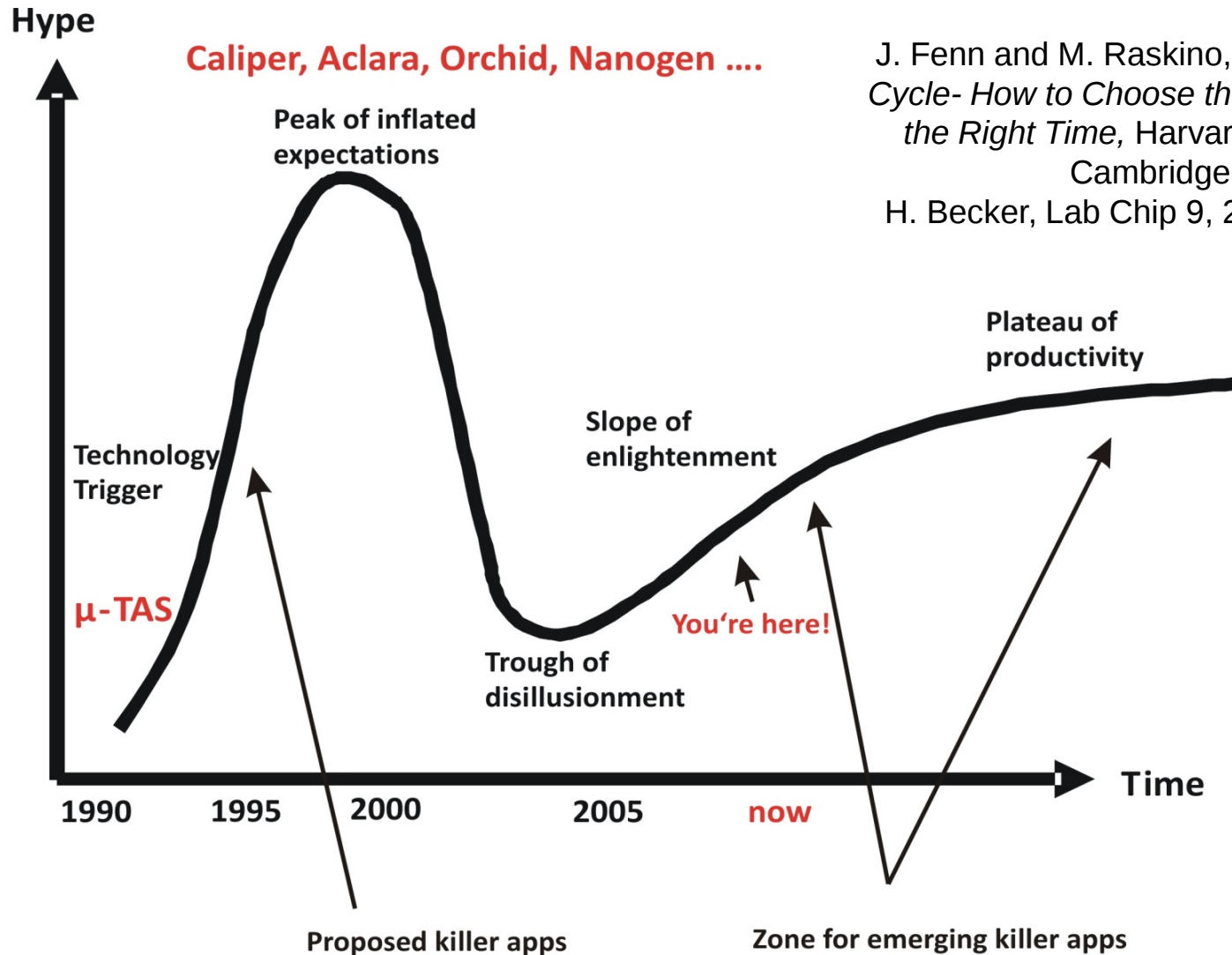
Why Has Paradigm Shift Not Happened Till Now?

Can you imagine the challenges of shrinking a huge laboratory filled with people and equipment onto a single chip the size of a matchbox?



Neither industry, nor academia can do this on their own!

Gardner Hype-Cycle



J. Fenn and M. Raskino, *Mastering the Hype Cycle- How to Choose the Right Innovation at the Right Time*, Harvard Business Press, Cambridge, 2008.

H. Becker, Lab Chip 9, 2119 – 2122 (2009).

Which Specimen?

Pathogen	Sample ranking	Method	Age (yr)	Total no. of specimens/ no. of patients	Reference
<i>M. pneumoniae</i>	Sputum > TW > NPS > OPS	PCR	20-93	552/144	(1)
	OPS > NPS	PCR	NSp	132/66	(2)
	OPS > BAL > Sputum	PCR	NSp	325/197	(3)
	Sputum > OPS	Gene-probe test	>18	160	(4)
	Sputum > NPA	Ag-EIA	>18	102/51	(5)
	Sputum > OPS	Culture, PCR, NASBA	NSp	302/180	(6),(7)
	NPS = OPS	PCR	NSp	63	(8)
	Sputum > NPA = OPS	PCR	22-29	96/32	(9)
	OPS > NPA	PCR	NSp	102	(10)

(1) J. Clin. Microbiol. 2001, 39: 1184-6

(2) Scan. J. Infect. Dis. Suppl. 1997, 104: 11-2

(3) J. Clin. Microbiol. 2000, 38: 1382-4

(4) J. Infect. Dis. 1990, 162: 70-5

(5) Eur. J. Clin. Microbiol. Infect. Dis. 1993, 12: 872-5

(6) J. Microbiol. Methods 2008, 73: 257-62

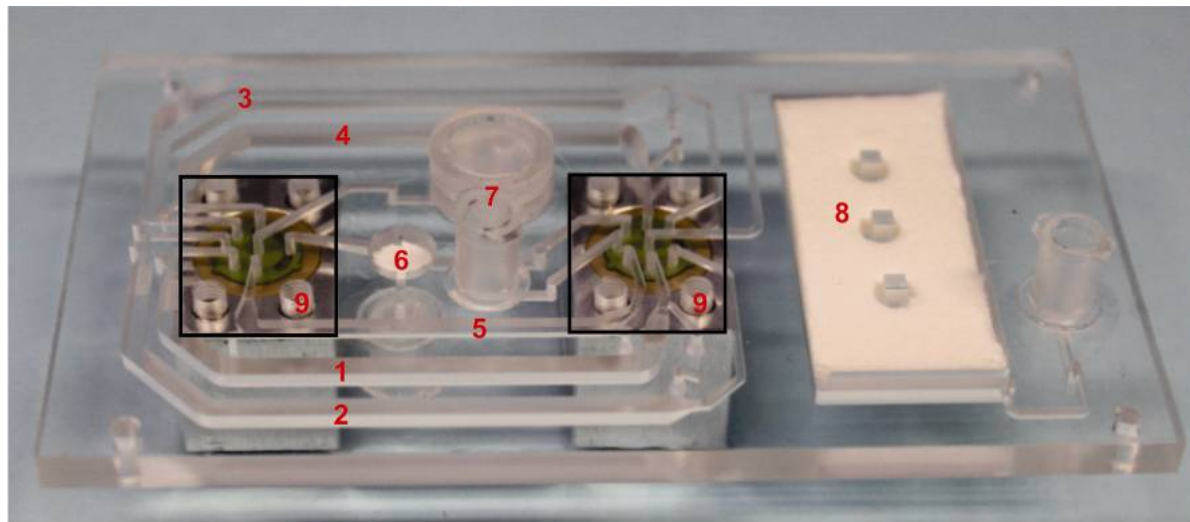
(7) J. Clin. Microbiol. 2008, 46: 185-91

(8) J. Clin. Microbiol. 2004, 42: 3339-41

(9) J. Med. Microbiol. 2005, 54: 287-91

(10) Eur. J. Clin. Microbiol. Infect. Dis. 1995, 14: 58-61

On-chip Bacterial Lysis and DNA Purification



1. Enzymatic pretreatment buffer reservoir
2. Lysis buffer reservoir
3. Ethanol reservoir
4. Wash buffer reservoir
5. Elution buffer reservoir

6. DNA purification membrane
7. Elution chamber
8. Waste chamber
9. Valves to establish fluidic interactions

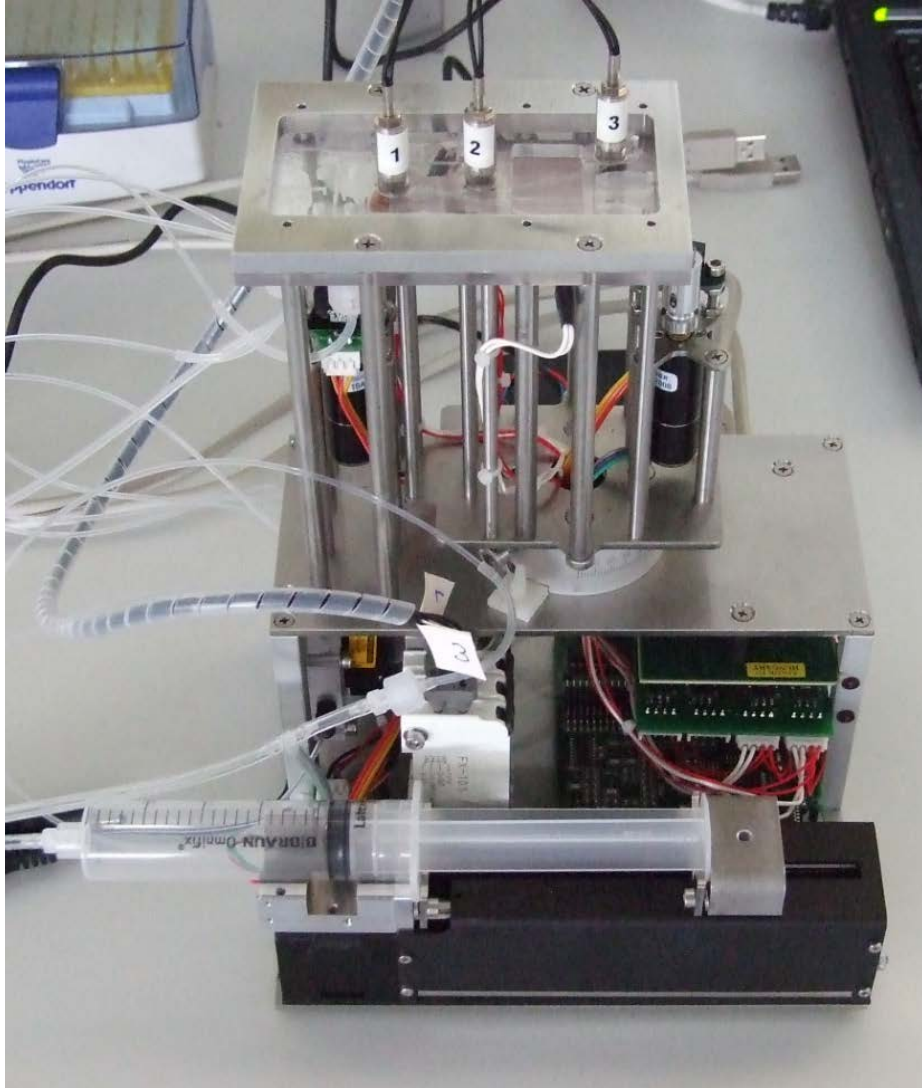
 TheraEDGE



In collaboration with Institut für
Mikrotechnik, Mainz, Germany

Van Heirstraeten et al., Integrated DNA extraction and purification on an automated microfluidic LOC from bacterial pathogens causing CA-LRTI, Analytical Chemistry, Submitted

Semi-automated Demonstrator



RAPP-ID: Public Private Partnership

www.rapp-id.eu

Contact Details

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PROJECT WEBSITE: www.rapp-id.eu

Development of Rapid Point-of-Care Test Platforms for Infectious Diseases



RAPP-ID will develop a Point-of-Care Test (POCT) for rapid (hospital <2h, primary care <30min) detection of **bacteria, mycobacteria, fungi**, as well as **viruses** and **host biomarkers** by combining novel specific probes, novel methods of sample preparation, and demonstrated ultra-high sensitive detection methods. The platforms will also determine **resistance** to antimicrobial drugs



The RAPP-ID Project

Development of Rapid Point-of-Care Test Platforms for Infectious Diseases: BSI, LRTI (CA-LRTI and VAP), TB

EFPIA member companies

- GlaxoSmithKline Research and Development LTD, United Kingdom.
- Janssen Research & Development, Belgium
- Merck, United States
- Novartis Vaccines and Diagnosis Srl, Italy
- Sanofi-Aventis Research and Development, France



Universities, research organisations, public bodies & non-profit

- Cardiff University, United Kingdom
- Catholic University of Leuven, Belgium
- Imec, Belgium
- University of Cambridge, United Kingdom
- Geneva University, Switzerland
- Ghent University, Belgium
- Royal Institute of Technology, Sweden
- University of Antwerp, Belgium
- University of Twente, Netherlands
- Uppsala University, Sweden

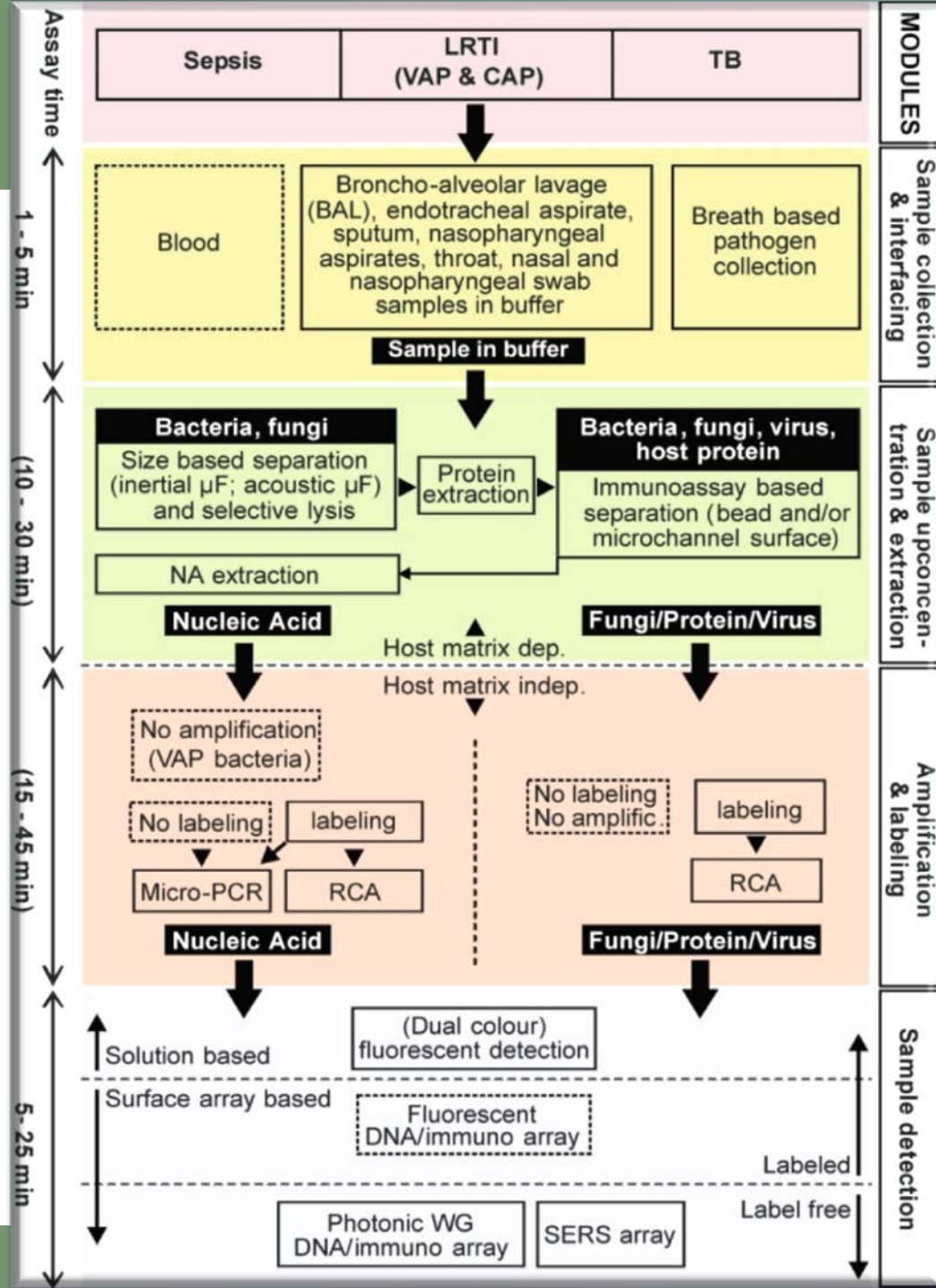
SMEs

- Lionex, Germany
- microfluidic ChipShop, Germany
- Mobidiag Ltd, Finland
- Q-linea, Sweden



STARTING DATE	01/04/2011
DURATION	60 months
FINANCING:	
IMI funding	€ 6.828.438
Other contributions	€ 1.771.853
EFPIA in kind contribution	€ 5.848.470
TOTAL PROJECT COST	€ 14.448.761

Website: www.rapp-id.eu



RAPP-ID Project Phases

Phase 1

Screening/Assessment Programme

Technology audit in which a number of proof of concept assays will be outlined for the target infectious diseases



Phase 2

Development and evaluation of Core Techniques

Second technology audit, in which one specific set of “best of class” technologies will be selected for each of the target infectious diseases

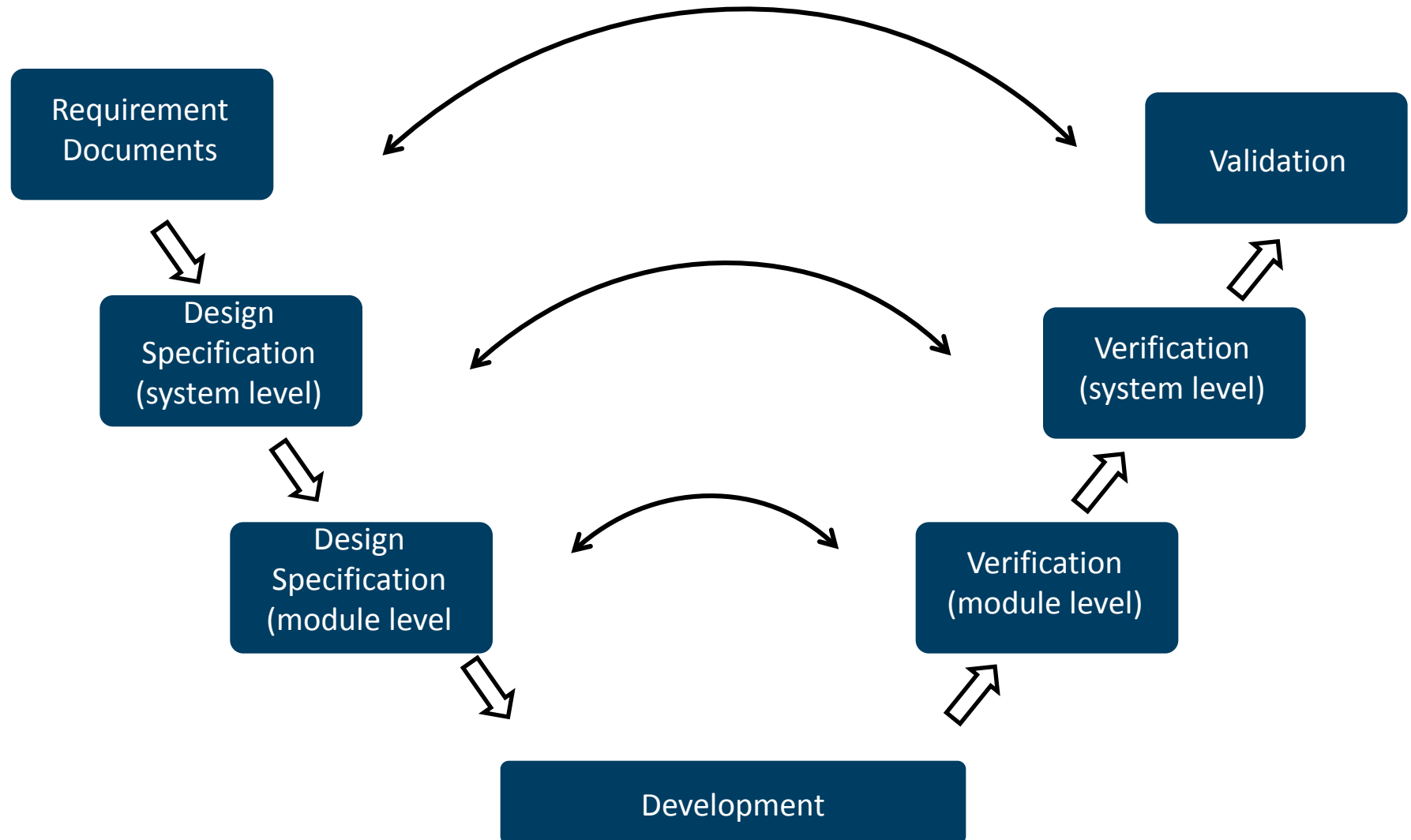


Phase 3

Focused Development of Point of Care Tests

Integrated diagnostic tests for target

The V-model of Development in Medical Device Industry



Many Other Challenges...

- **Regulatory:**
 - Different approaches of FDA and EU to compliance of IVDs and related systems.
 - Latest EU IVD Regulation (announced 26th September 2012) has moved much closer towards FDA requirements.
 - Global regulatory trends mirror EU-CE/FDA trends
 - Prospective clinical performance studies will be demanded by the EU and FDA regulators.
- **IPR**
- **Exploitation**
- **“Resistance” of the clinician**

Collaboration and Communication is Improving Bridging the Gap

Biotechnologies

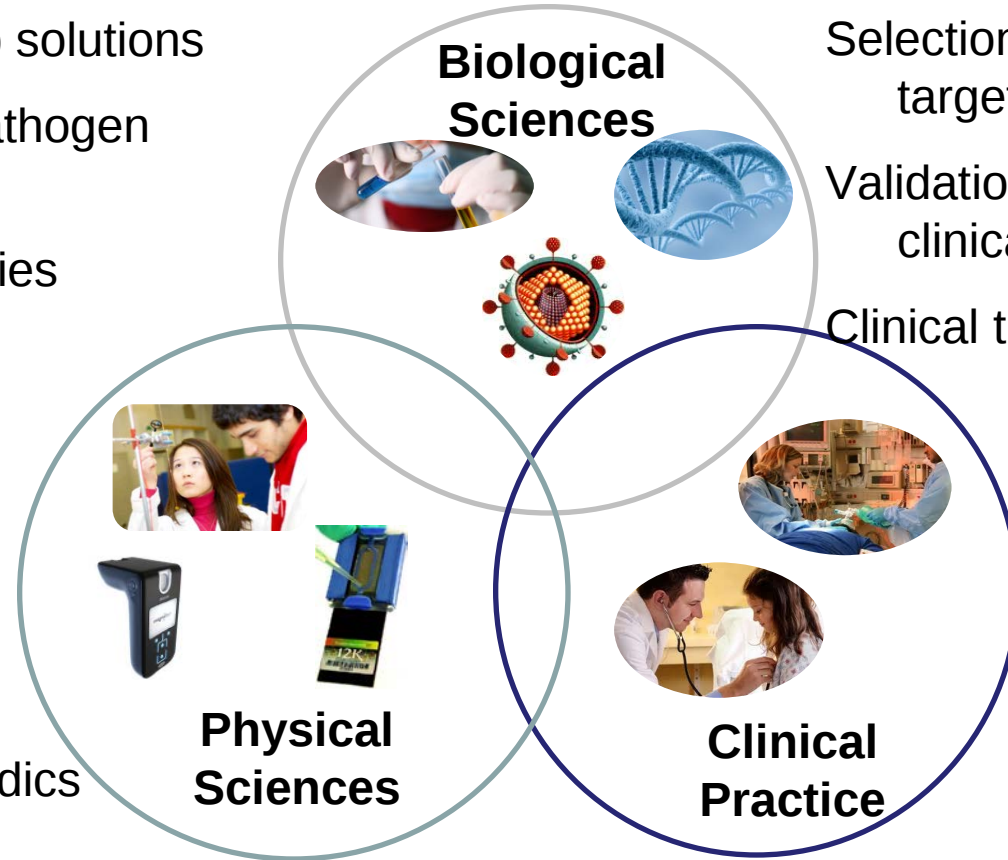
Integrated sample prep solutions
Targeting NA + host/pathogen biomarkers
Novel surface chemistries

Clinical practice

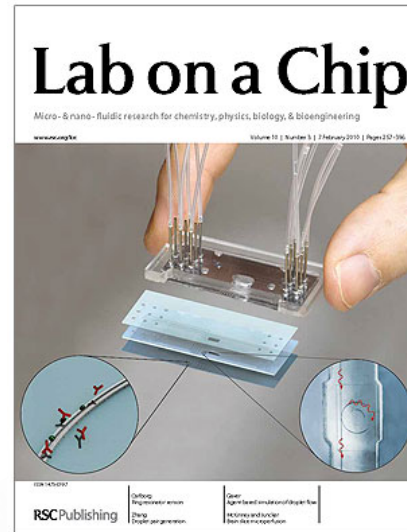
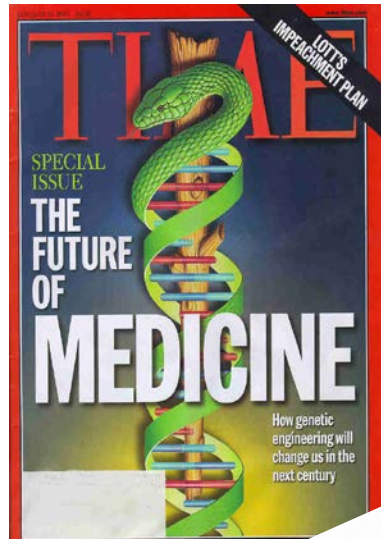
Selection of relevant targets/applications
Validation of analytical, clinical performance
Clinical trials (IMI)

(Micro)technologies

Lab-on-a-chip/microfluidics
Photonics
Biosensors



High Expectations...



But we are here!

