

ML² - Deliverable 12.4

»Technology roadmap aligning technology development targets with future product, cost and market requirements«

Contents



Market Analysis



Cost Analysis



Demonstrator 1
pathogen diagnostics



Technology Field 1
Quantitative Polymerase Chain Reaction

Demonstrator 2
enviromental testing



Technology Field 2
Bacteria toxins Detection

Demonstrator 3
Immunodiagnostic rapid test



Technology Field 3
Lateral Flow Immunoassay

Market analysis – Market definition

Application options for technologies

Each device from every technology field can be produced for up to 6 different applications

Home testing

Tests to be performed at home for the monitoring of chronic diseases

Forensic and Military

Bio threat agents identification, DNA identification on crime scene or pre-screening of DNA samples

Doctor office screening

Patient screening for early diagnosis

Third world infections

Detection and identification of infectious diseases in remote environment such as third world

Decentralized hospital tests

Tests that can be done out of the central laboratory to save costs (mainly due to logistics)

Emergency testing

Tests that have to be performed in life threatening situations to provide the most appropriate care



Target - What needs to be tested?

Human:

- Known diseases and other human health factors categorized by the International statistical classification (ICD-10)

Environmental:

- Environmental quality indicators for different environmental issues e.g. Water quality

Agro Food:

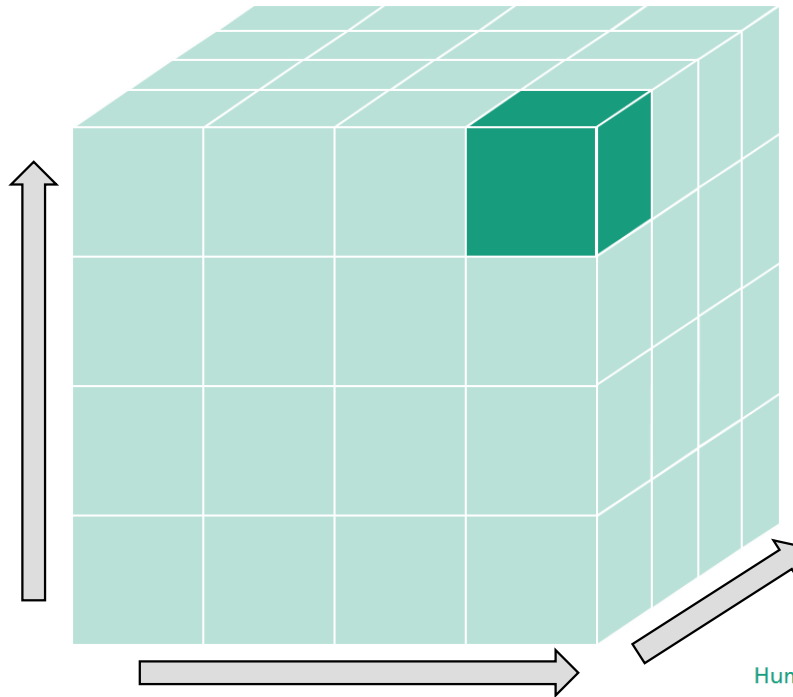
- Indicators for the detection of spoiled food

Market analysis – Market definition

3 dimensions of PoC application

PoC Technology

Technology Field 1	Quantitative Polymerase Chain Reaction <i>Relatively slow</i>
Technology Field 2	Bacteria toxins Detection <i>Continuous Flow Detection aimed</i>
Technology Field 3	Lateral Flow Immunoassay <i>Relatively fast</i> <i>Wide price range</i>



Target of application

Human:

- Known diseases and other human health factors categorized by the International statistical classification (ICD-10)

Environmental:

- Environmental quality indicators for different environmental issues e.g. Water quality

Agro Food:

- Indicators for the detection of spoiled food

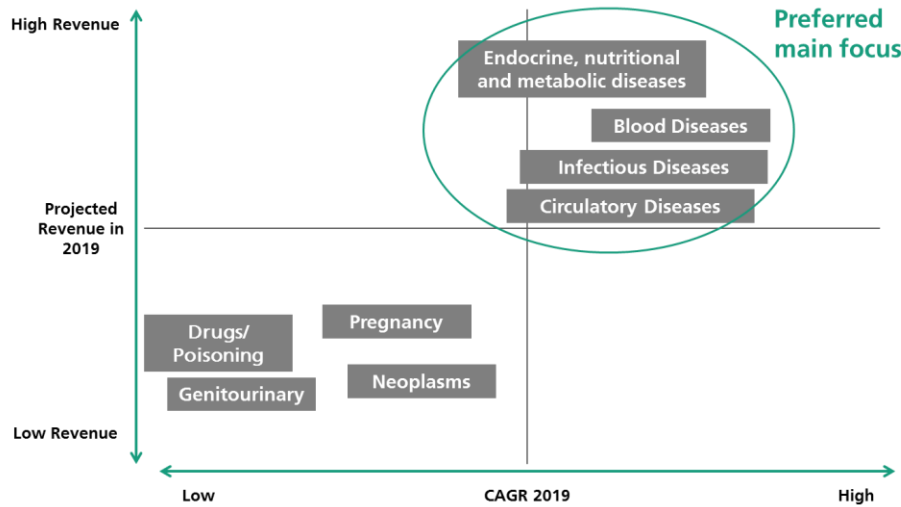
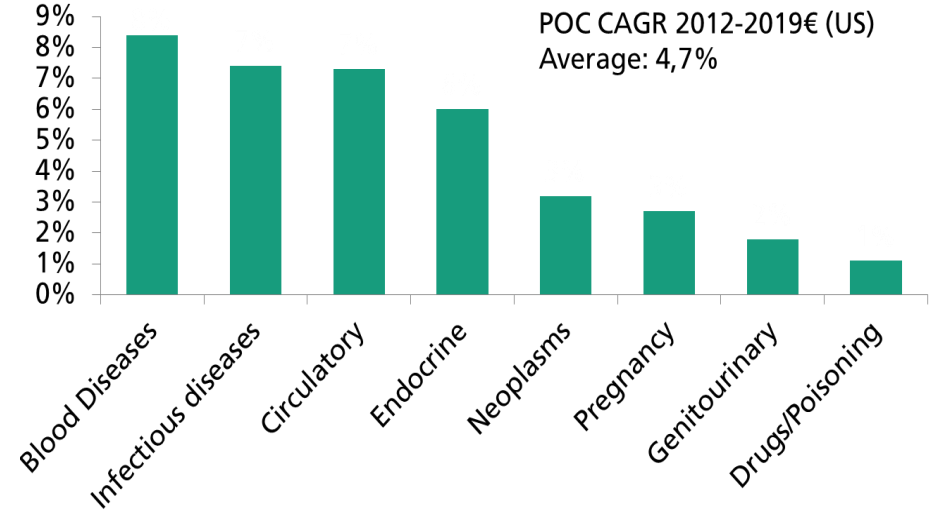
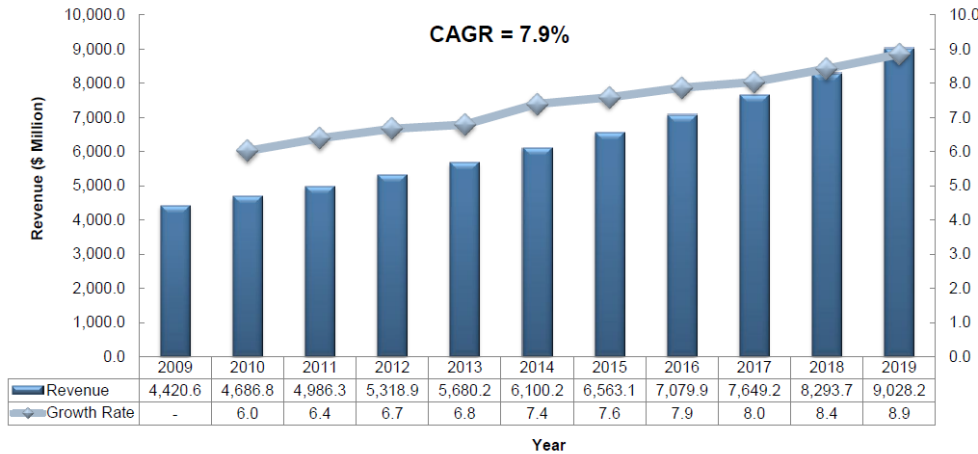
Place of application

Home testing	Forensic and Military
Tests to be performed at home for the monitoring of chronic diseases	Bio threat agents identification, DNA identification on crime scene or pre-screening of DNA samples
Doctor office screening	Third world infections
Patient screening for early diagnosis	Detection and identification of infectious diseases in remote environment such as third world
Decentralized hospital tests	Emergency testing
Tests that can be done out of the central laboratory to save costs (mainly due to logistics)	Tests that have to be performed in life threatening situations to provide the most appropriate care

Market analysis – Market development

Market Forecast

Total POCT Market: Revenue Forecast, Global, 2009–2019



→ The POCT Market shows a very steady growth rate for the next 5 years

Source: Frost&Sullivan

Market analysis – Market development

Drivers and Restraints of PoC



Drivers

Quick Turnaround Time

Generating results to take quick decisions for treatment/critical care

Increased data management and connectivity

Central oversight and minimized human errors due to manual data transfer

Growing screening and initial diagnosis usage

Improved early intervention for appropriate treatment

Restraints

Physicians preference for conventional testing methods

Physicians are familiar with traditional tests and perceive these methods as more accurate

Cost advantage in central laboratory testing

Unit costs per test of POC are higher than central laboratory tests

Inconsistent reimbursement schemes in smaller countries

Complex reimbursement structures and differences among countries

➤ **Beside the improvements by further developments in the biotech field as well as in the IT, existing restraints due to psychological preferences and insurance systems need to be overcome**

Source: Frost&Sullivan

Contents



Market Analysis



Cost Analysis

Cost analysis

First PMMA Prototypes – cost comparison

PMMA Chips offered by
Microfluidic ChipShop:

PMMA

R2R

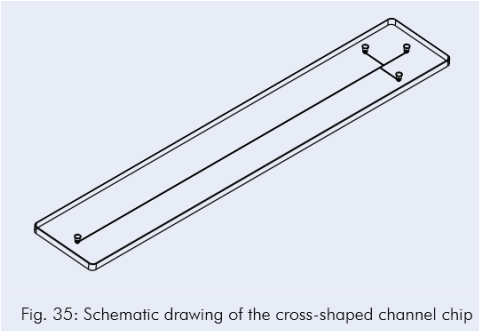


Fig. 35: Schematic drawing of the cross-shaped channel chip

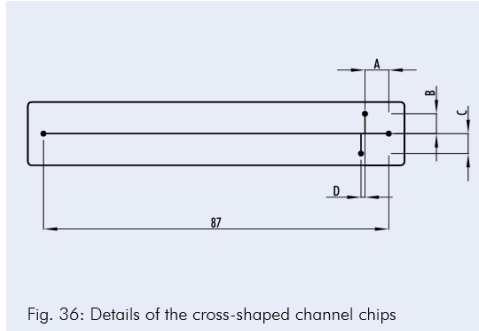


Fig. 36: Details of the cross-shaped channel chips

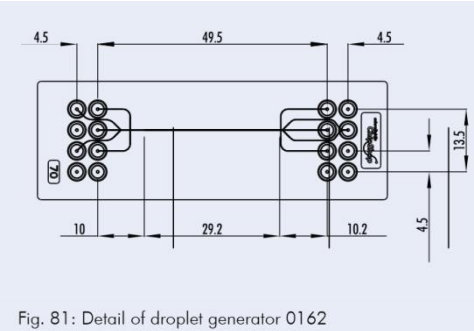


Fig. 81: Detail of droplet generator 0162

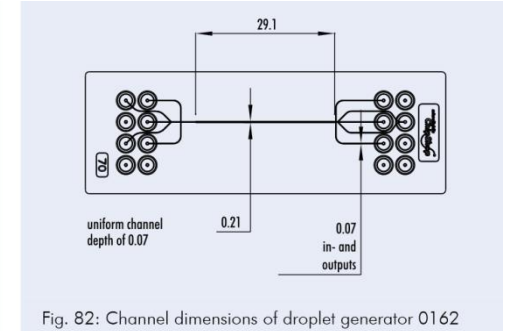


Fig. 82: Channel dimensions of droplet generator 0162

Channel Width [μm]	Channel Depth [μm]	Length [mm]	Hole Dia- meter [mm]	Geometry				Lid Thick- ness [μm]	Mate- rial	Price [€/chip]			
				A	B	C	D			1+	10+	100+	1000+
50	50	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
50	50	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98

Input Channel Width [μm]	Collection Channel Width [μm]	Channel Depth [μm]	Lid Thickness [μm]	Material	Price [€/chip]		
					1+	10+	100+
70	210	70	140	Topas	42.20	34.30	26.10
70	210	70	175	PC	42.20	34.30	26.10

**Cross-shaped channel
chip** → Price = 9,98€ each
(@1000off)

Droplet generator
→ Price = 26,10€ each
(@100off)

Source: Microfluidic ChipShop

Cost analysis

First PMMA Prototypes – cost comparison

Cross-shaped channel chip →
Price = 9,98€ each (@1000off)

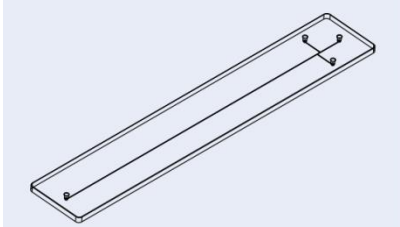


Fig. 35: Schematic drawing of the cross-shaped channel chip

Droplet generator
→ Price = 26,10€ each
(@100off)

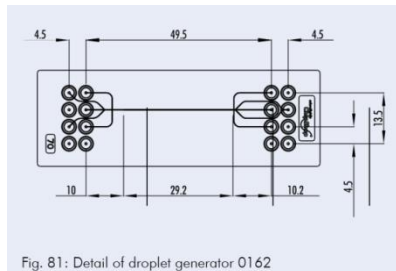


Fig. 81: Detail of droplet generator 0162

PMMA – alternative with similar functions:

- Material: PMMA
- Fabrication process: Roll-to-Roll
- Footprint of the chip (module): 15 x 45 mm
- Overall thickness (depending on the top layer thickness 0.25/0.5 mm) is 0.35/0.6 mm.
- Target price for the PMMA chips: 12,50€ each (@10 off)

PMMA

R2R

➤ Current market-prices of PMMA chips serves as a first guideline for a maximum target price for chips made with the roll-to-roll process