



# The development of microfluidic cartridges

How microfluidics is revolutionizing  
in-vitro diagnostics



# Introduction velixX GmbH

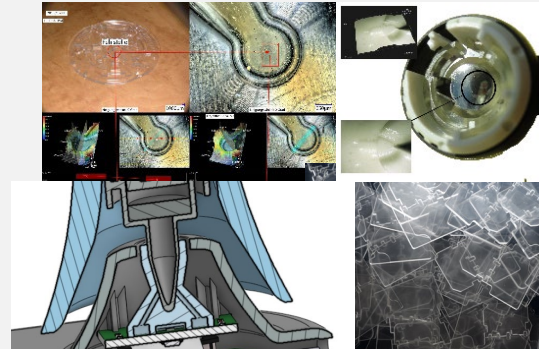
## Who we are

- Founded in Mannheim in 2010
- Currently approx. 10 employees
- Founder: Manfred Augstein  
CEO: Marc Augstein
- Office and laboratory space ~500sqm
- ISO 13485:2021 since 2019



## What we do

- **Developing** medical technology and in-vitro diagnostic products
- Our focus is the “**system interface**”
  - Disposables
  - Test carriers / plastic parts
  - Sample handling / microfluidics
  - Measurement technology / optics
  - Temperature control



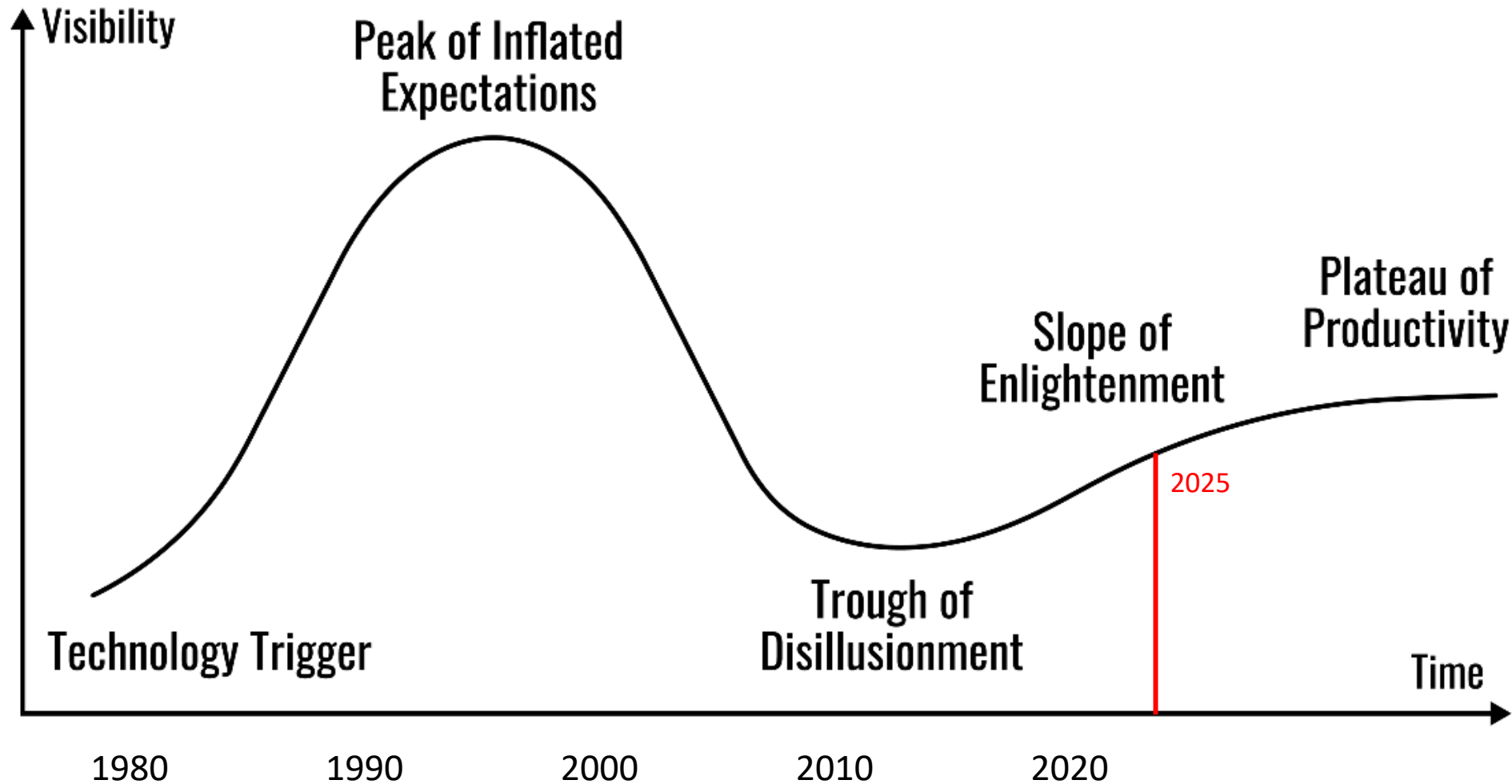
## Challenges

- Small multifunctional parts
- Analyze complex issues
- Short development times
- Cost-optimized series parts

## Strategy

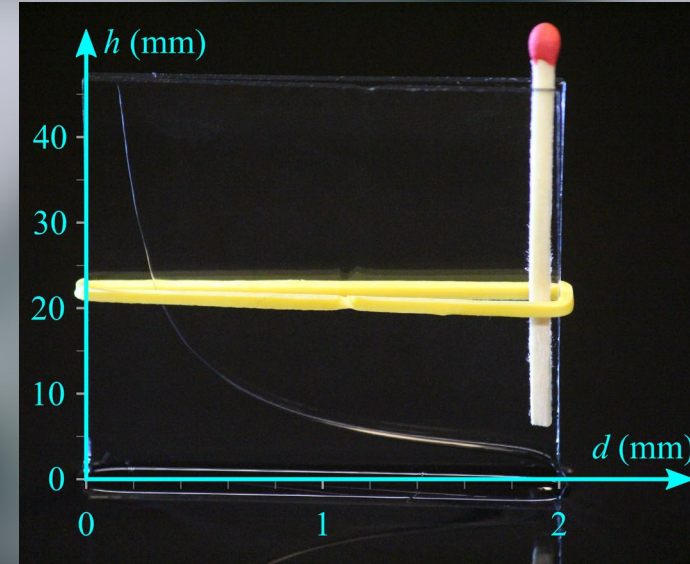
- Focus on manufacturability
- Fast and targeted development
- Benefit from a broad network
- Knowledge of the latest technologies

# Innovation of Microfluidic Systems





# What is micro fluidic?



## Fluid volume

Handling of fluid volumes in the dimensions of 1-999 $\mu$ l

## Capillary channels

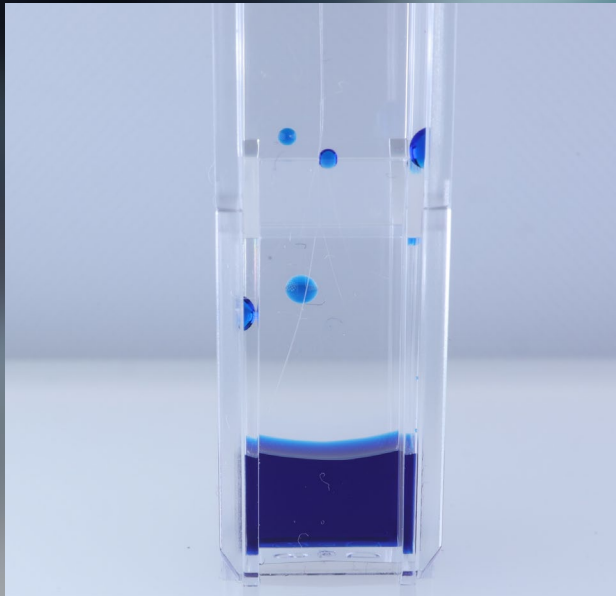
Micro-fluidic channels are normally  $< 500\mu$ m in diameter

The smaller the diameter of the capillary the stronger the capillary forces



# How is micro-fluidic

**Dominated by surface interactions**



# different to macro-fluidic?

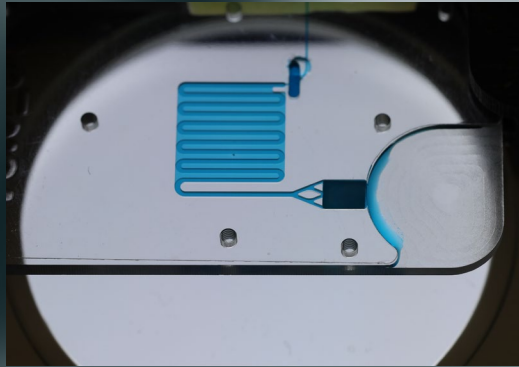
**Dominated by mass forces**



**The focus is not on mass forces but on surface interactions**

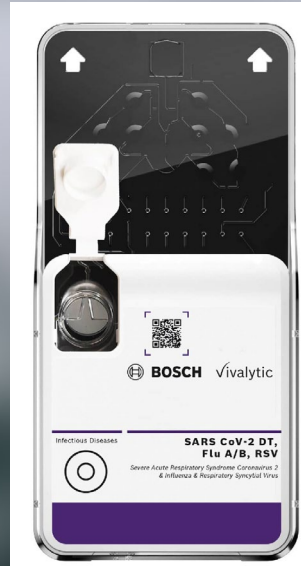


# Types of micro fluidic



## μ-fluidic chip

- Driven only by the capillary forces
- Simple μ-fluidic structures
- Can be used without a device



## μ-fluidic cartridge

- Driven mostly by pressure
- Complex structures possible
- Complex cartridge design needed
- Device needed



## μ-fluidic disc

- Driven by centrifugal and capillary forces
- Complex structures possible
- Simple disc design possible
- Device needed



# What is the advantage of micro fluidic systems?

## Small sample volume

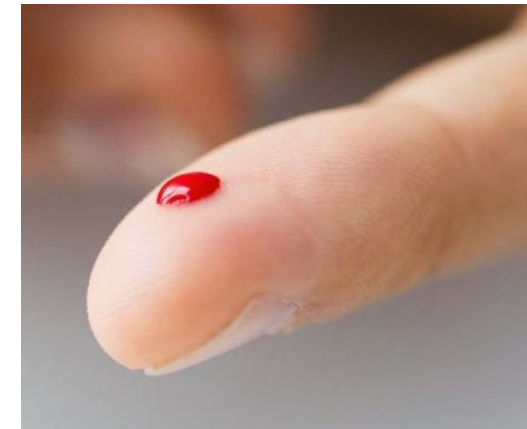
Because of the overall smaller volumes, also the sample volume can be reduced to 1-2  $\mu$ l



## Use of capillary blood

Its much easier to get capillary blood (Fingertip, Earlobe, etc)

Less sample  $\rightarrow$  less pain



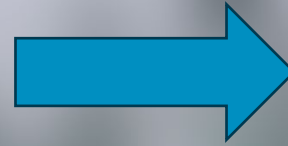


# What is the advantage of micro fluidic systems?

## $\mu$ -fluidic channels

The small channels allow more complex structures on the test carrier.

→ This allows the sample to be transported through different reaction chambers.



## Highly complex Test-systems

By using microfluidics, tests that normally require a laboratory can be carried out in a PoC device.

→ Lab on Chip, Lab on Disk





# What is the advantage of micro fluidic systems?

## Short time to result

Some tests need a fast time to result to increase the survival rate

Microfluidic diagnostic systems can minimize the time to result drastically.

## No Laboratory needed

If no laboratory is directly available, the transportation to the laboratory can take some time and falsify the samples.



## Lab on Chip/Disc

With a Lab on Chip/ Lab on Disk System you can rapidly perform complex tests which would normally take a few hours to get a result



# Development opportunities

- + Easy to manufacture first models as 3D-Print or milled Part
  - 3D-Print for fast adaptations of general geometries
  - Milled Parts for precise  $\mu$ -fluidic structures

→ Easy to test different variations
- + Easy to scale up the production
  - First 5 - 10 milled Parts
  - First 100 - 1000 Parts injection molded (aluminum tool)
  - Mass production in steel tools (injection molded)
- + The Invest is adaptable to the development phase



## $\mu$ -fluidic test system

The  $\mu$ -fluidic test system gives a lot of opportunities in the development process.



## Opportunities of microfluidic systems for the In-vitro-Diagnostics

- **Sample size can be minimized**
- **Micro fluidic test systems allow to have a laboratory test on small disposables**
- **The time to result can be minimized**
- **Easy to develop and manufacture the first tests**



velixX  
system development



#PERFECTHEALTHCARE SOLUTIONS



# GET IN TOUCH!

**velixX**  
system development

-  Wildbader Straße 7  
68239 Mannheim
-  +49 621 437 08 001
-  [mail@velixx.com](mailto:mail@velixx.com)
-  [www.velixx.com](http://www.velixx.com)