



Introduction

CapCell addresses one of the greatest challenges in forensic science: the interpretation of mixed DNA evidence. Sexual violence is widespread in Europe and disproportionately affects women and girls. In many sexual assault cases, traces contain biological material from both victim and perpetrator(s), making it difficult to extract a single, usable DNA profile from the perpetrator(s).

1 in 3

women in the EU have experienced physical or sexual violence

243 715

sexual violence offences registered in the EU in 2023

€290 billion

estimated annual costs of violence against women in the EU-27

Innovations

- 01 Novel collection devices and protocols for postcoital swabs and trace evidence to maximise intact cell recovery and transfer.
- 02 Microfluidics systems (MicroLyseFX and MicroSortFX) for the selection and isolation of sperm and male nucleated cells.
- 03 New single-cell DNA sequencing tools using capillary electrophoresis, massively parallel sequencing, and long-read sequencing.
- 04 Integrated analysis and interpretation tools including machine-learning-based automation for forensic data processing.
- 05 A validated modular CapCell toolkit implemented and demonstrated in operational forensic environments.

Network

Led by Maastricht University, CapCell brings together 13 partners from 8 European countries, including universities, forensic institutes, companies, and police forces, to jointly develop, validate, and implement the proposed innovations in real forensic environments



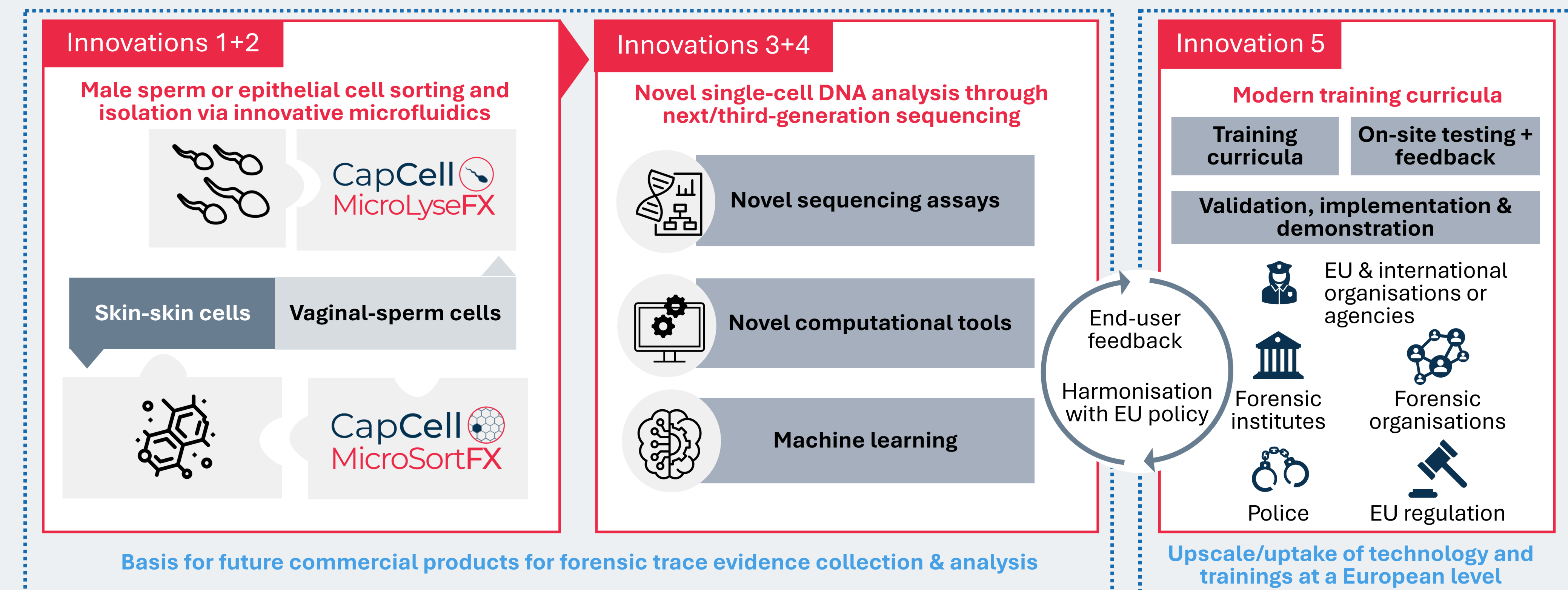
Objectives

Through innovative microfluidic devices and single-cell sequencing technologies, CapCell will make it possible to capture, isolate and analyse individual cells from these complex mixtures, ensuring more accurate and legally sound evidence. CapCell's objective is to revolutionise forensic DNA analysis to deliver more justice for victims of sexual violence and assault.

- Revolutionised Forensic DNA Profiling**
New approaches for investigating complex mixed biological traces from sexual violence cases
- Innovative Modular Prototype Toolkit**
10 validated and implemented tools based on microfluidics and single-cell genomics
- One male cell, one DNA profile**
Automated, AI-based and more precise human identification across Europe

Concept

CapCell's new standard of mixed trace investigation via microfluidics and single-cell genomics in Europe



Sources: Eurostat gender-based violence statistics, crime statistics, the costs of gender-based violence in the European Union

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