



QRIN  
DIAGNOSTICS

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Early detection of  
cancer in urine  
using photonic  
biosensors

Photonic Integration Conference

*1 October 2019*

Oncoloog Pinedo werkt aan revolutionaire vinding

## Urinetest voor vroege kanker

Door EVA GABELER  
18 nov. 2017 in BINNENLAND

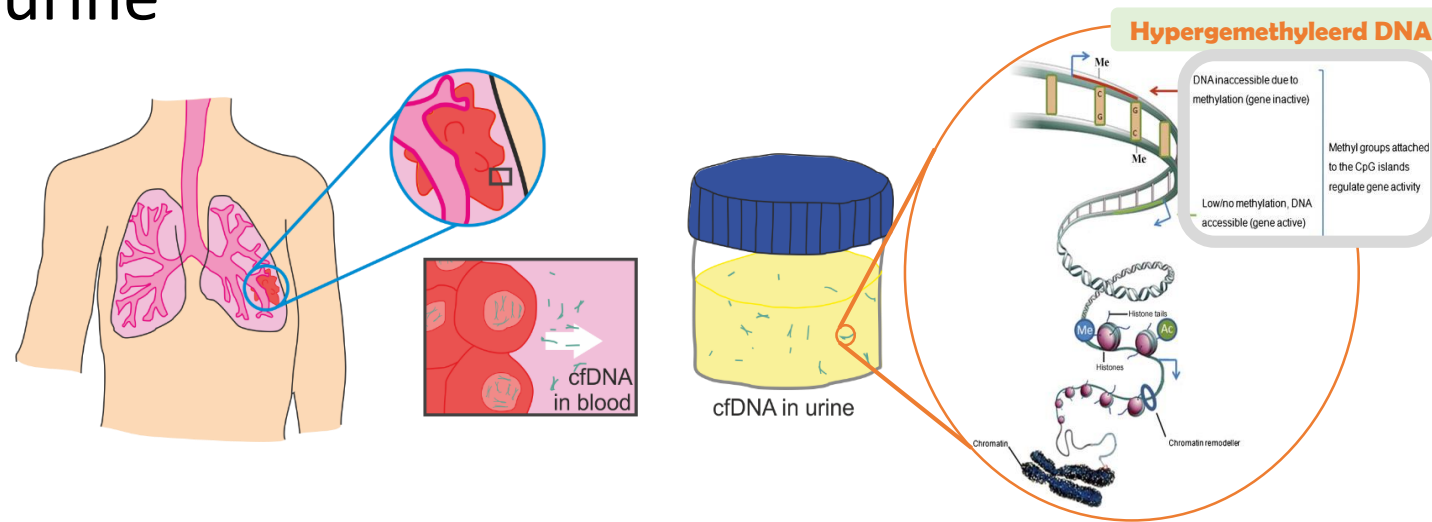


AMSTERDAM - Binnen enkele jaren komt er een urinetest beschikbaar waarmee 15 vormen van kanker in een zeer vroeg stadium kunnen worden vastgesteld.



Oncoloog Bob Pinedo  
© RENE BOUWMAN

## Early Detection of cancer specific DNA profiles in urine



In 2016, the Qurin founders discovered that cancer specific hypermethylated DNA profiles can be detected in urine.

Currently, marker panels for 4 cancer types are available.



**EARLY DETECTION**

Early Detection is about self-awareness. It's about knowing your risk level. It's about recognizing the early warning signs. It's about tuning in to what your body is telling you and reacting accordingly.

**90%**  
OF CANCERS  
**ARE CURABLE**  
IN STAGE ONE

CLICK THE TABS BELOW TO **START LOOKING FOR CANCER** INSTEAD OF JUST FINDING IT

The infographic features a silhouette of a person's head and shoulders on the left, looking towards the right. The main text is centered, with '90%' in a large, bold font. Below it, 'OF CANCERS' and 'ARE CURABLE' are also in bold, with 'ARE CURABLE' highlighted in a red banner. 'IN STAGE ONE' is at the bottom. On the right, a vertical black box contains the text 'CLICK THE TABS BELOW TO START LOOKING FOR CANCER INSTEAD OF JUST FINDING IT'.

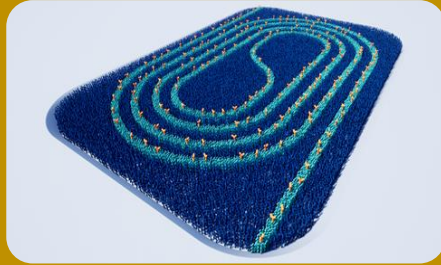
## An Unmet Medical Need:

Current health care systems wait for disease symptoms to occur. As a result cancer diagnoses are established in a (too) late stage of the disease. The Genova platform has delivered highly sensitive and specific biomarker panels able to discriminate early cancer from normal tissue in an unprecedented way. The results can revolutionize cancer diagnostics and therapy and save the lives of millions.

- › Developing low-threshold, low cost and sensitive molecular diagnostics that change the paradigm

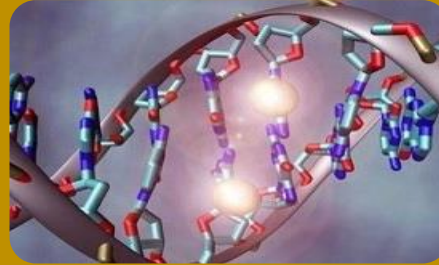
# Three Pillars of Qurin

## 1. Diagnostic Technology



Integrate and/or develop highly sensitive and specific analysis of selected marker panels in urine for the development and validation of selected indications and certified (CE IVD) diagnostic tests.

## 2. Biomarker Discovery

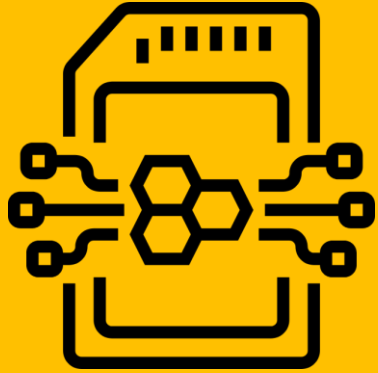


Identify or create access to advanced markerpanels for selected cancer types, including but not limited to: Cervical, Lung, Bladder, Prostate, Colon, etc.

## 3. Clinical Development



Establish easy-to-use urine cancer tests and urine sample procurement techniques. Access to biobanks for clinical validation/development.



*Bringing together the expertise for application-specific Biochip development*



Photonic chip technology



Nanocoating technology



Biomarker integration

# Qurin Pillar 1

Diagnostic technology for early cancer detection

## Dutch Biochip Alliance





[Home](#) > [News & events](#) > ***A leading Dutch alliance in biochip development: Qurin Diagnostics and LioniX International acquire Surfex***

## **A LEADING DUTCH ALLIANCE IN BIOCHIP DEVELOPMENT: QURIN DIAGNOSTICS AND LIONI INTERNATIONAL ACQUIRE SURFIX**

15-04-2019 - Enschede, the Netherlands



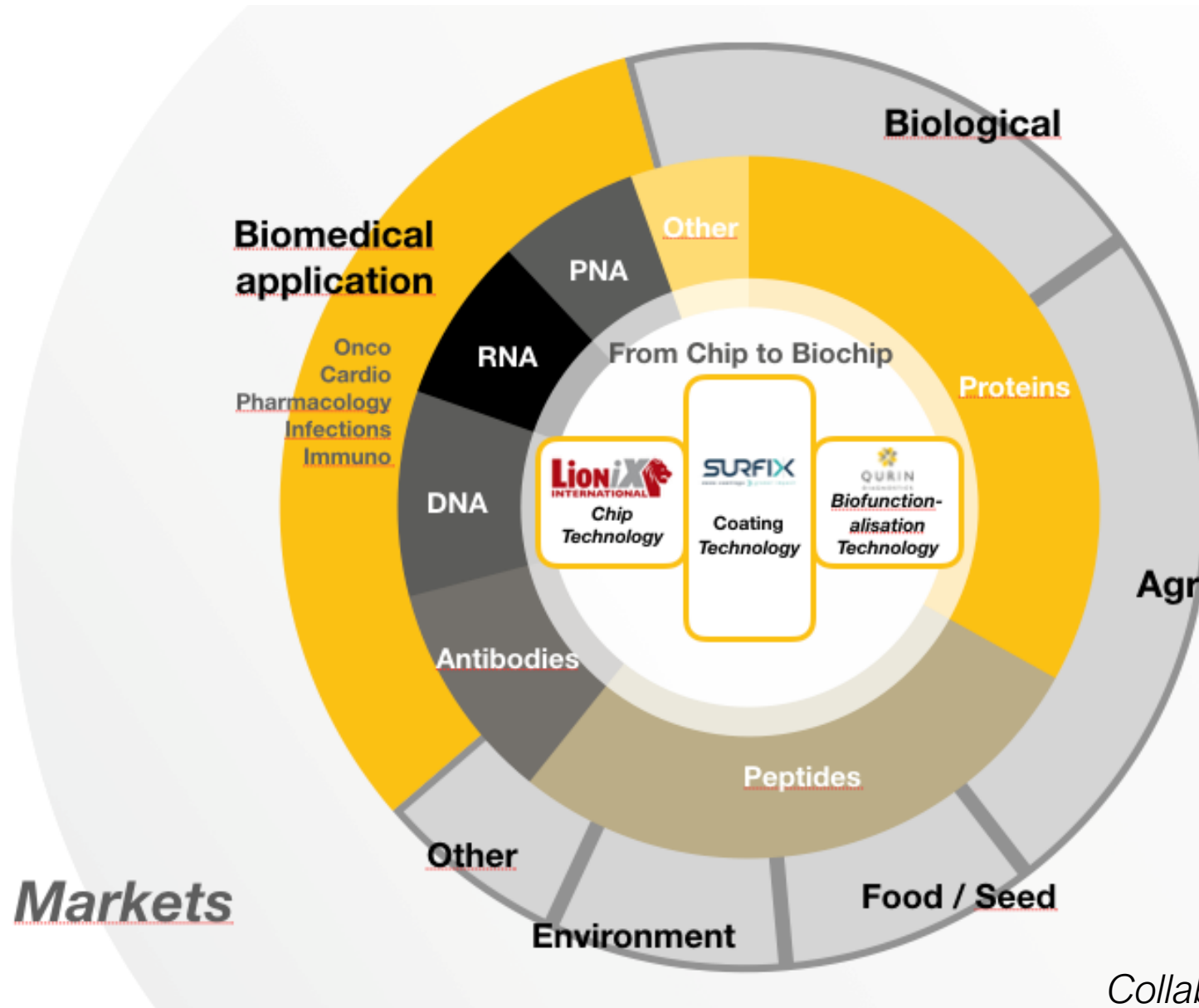
**SURFIX**

As of April 15, 2019, Qurin Diagnostics B.V. and LioniX International B.V. have acquired Surfex B.V. As a supplier of custom-made nanocoatings, the capabilities of Surfex are highly complementary to the products and services offered by Qurin and LioniX International. The companies are already working together closely on early cancer detection and have realized a sensitive biochip, bringing together their respective complementary technologies for this purpose. This acquisition strengthens their relationship and mutual commitment towards bringing this technology to the global biomedical market.

Molecular ("DNA") diagnostics holds great promise for early diagnosis and personalized medicine and has clear clinical added value. Nevertheless, market penetration falls short of expectations, as the costs of current diagnostic platforms are too high. Currently available diagnostic platforms based on Polymerase Chain Reaction and Next Generation Sequencing are very expensive, time consuming, and require extensive infrastructure and highly skilled personnel. A breakthrough is needed for the desired mass implementation of molecular



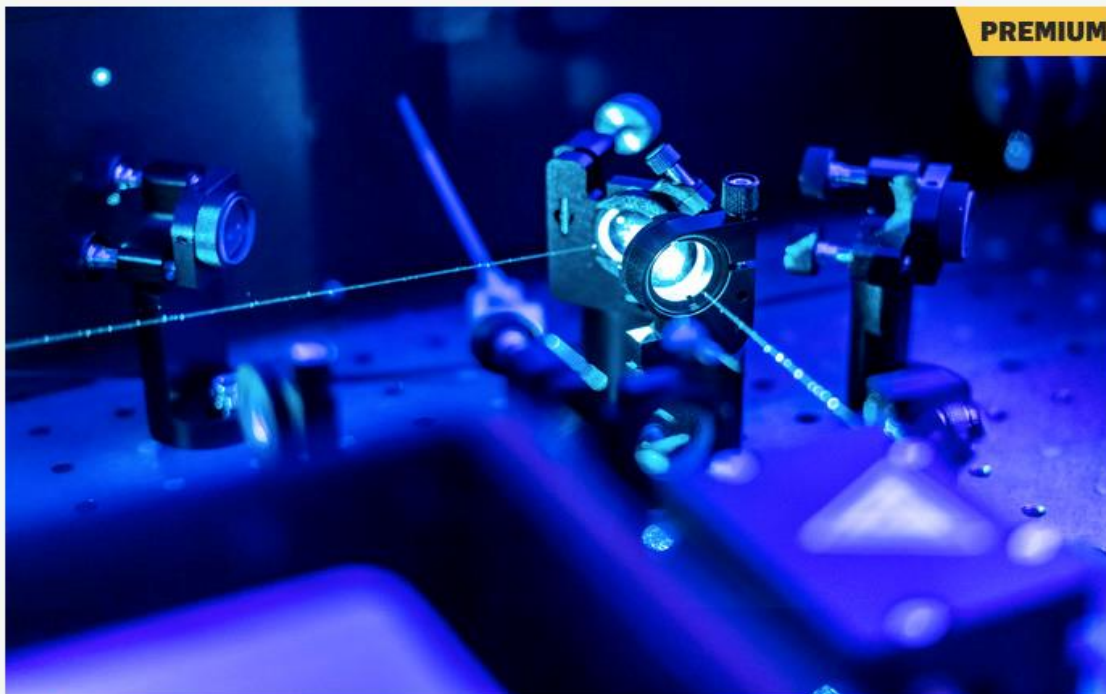
# Networking strategy



*Collaboration model and Markets*

# Which technology will pave the way?

Technology	Principle	Suitable for DNA analysis	Sensitivity	Specificity	Reproducibility	Cost	Multiplexing	Speed	Ease of use	Suitable for handheld	State-of-art
PCR	analyte amplification + detection	++	++	++	++	+/-	+/-	+/-	+/-	-	--
Digital PCR	analyte amplification + detection	++	+++	+++	++	-	+/-	-	-	-	+/-
micro/nano PCR	analyte amplification + detection	++	++	++	++	+	+/-	+	+	+	+
NGS	analyte amplification + detection	++	+	+	++	--	++	--	-	--	+
Microarrays	analyte amplification + detection + signal amplification	++	+	+	++	+/-	++	--	--	--	+
Lateral flow devices	detection + signal amplification	+	+	++	+/-	+	-	++	++	++	-
<b>(Nano)biosensors</b>	<b>detection + signal amplification</b>	<b>++</b>	<b>+</b>	<b>++</b>	<b>+</b>	<b>++</b>	<b>+</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>
SPR	detection + signal amplification	+	+	++	++	-	+	+/-	+/-	-	-
MS	detection	+/-	--	++	++	--	+	-	-	--	--
HPLC	separation	-	--	--	++	-	+	-	-	-	--
CE	separation	++	--	--	-	+/-	+	-	-	-	--
ELISA	detection + signal amplification	-	+	++	+/-	-	+/-	+/-	+/-	-	--
Immuno affinity assay	detection + signal amplification	+/-	+	++	+	-	+/-	+/-	+/-	-	--
Flow cytometry	detection	--	-	++	+	-	+/-	-	-	-	--



PREMIUM

▲ Fotonica, Shutterstock © Shutterstock

## Nederland zet vol in op fotonica

Fotonica moet de nieuwe miljardenindustrie worden voor Nederland. Qua kennis lopen we nu nog wereldwijd voorop in deze techniek, die licht en electronica combineert. Maar houdt ons land dat vol?

Peet Vogels 08-05-19, 10:30

### NET BINNEN

10:11 Europees Hof acht Duitse tolheffin...

09:00 Peet en Elza boeren veganistisch,...

06:10 Bedrijven die werken met gevaarli...

17-06 Voor deze ingenieuze vinding wint...

17-06 Explosie Moerdijk kost Shell 2,5 ...

17-06 Ron woont met zijn zoon en betaa...

17-06 Grote ontwikkelaar: 'Huizen zijn te...

17-06 Bitcoin op hoogste niveau in jaar: ...

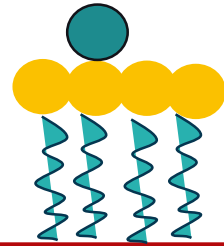
17-06 Deutsche Bank steekt risicovol mi...

17-06 Voedsel in de supermarkt fors du...



Klik hier voor de actuele koersen

## Bio-functionalization is required for diagnostic applications in wet environment



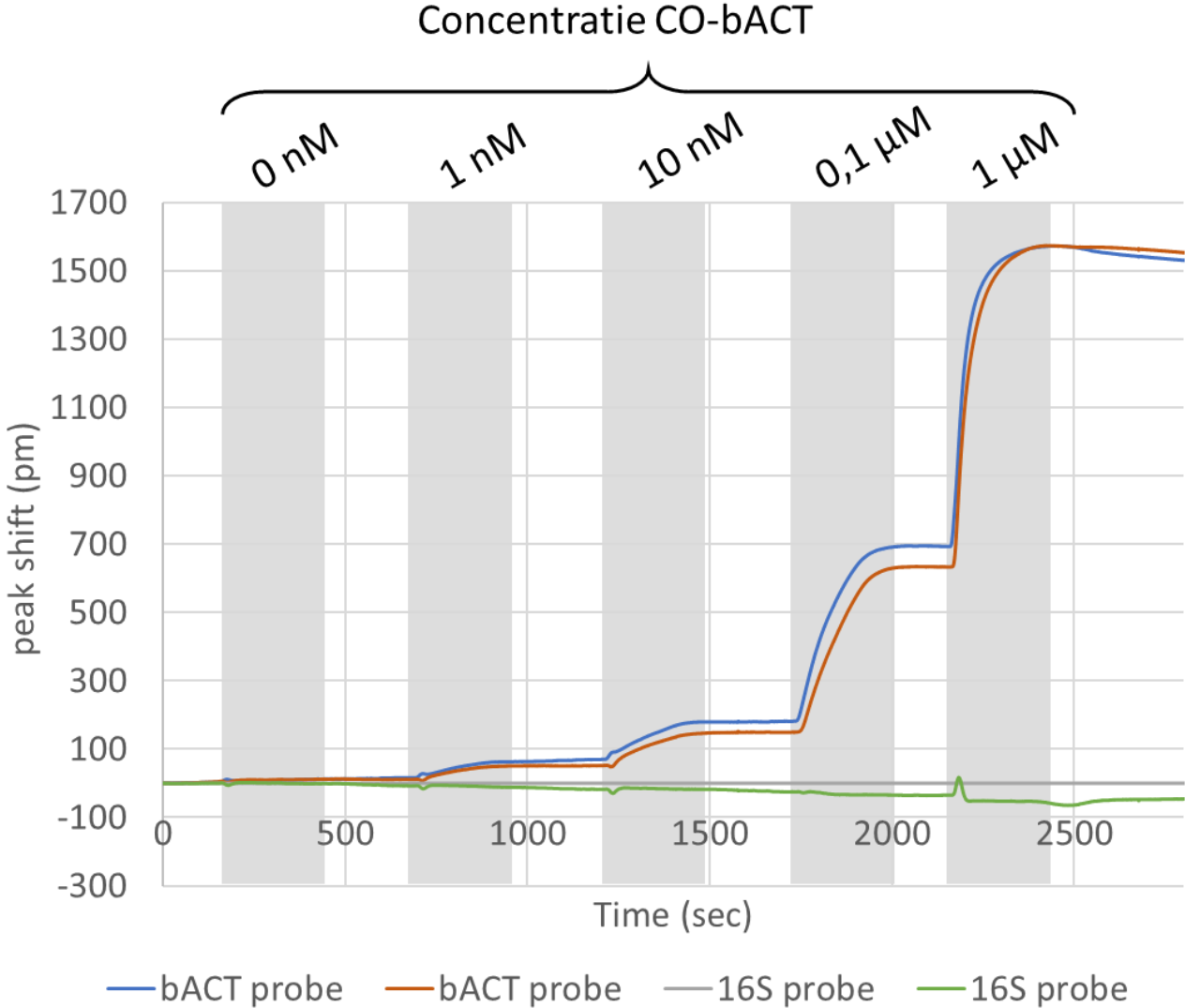
- ←----- Disease specific hmDNA capturing/detection to be tested by NYtor/Qurin
- ←----- Functionalized surface developed/optimized by Nytor/Qurin
- ←----- Nanocoating developed / applied by Surfix, optimized by NYtor/Qurin
- ←---- Balanced, aMZI Detection chip by Lionix

Optical waveguide source by Lionix

Optical waveguide detection + signal interpretation system by Lionix



Technical set-up incl. coated chips used and tested by Nytor/Qurin with support from Lionix and Surfix





## Qurin Pillar 2

Big Data Science accelerating breakthrough changes in cancer care

**Using FinTech for  
Bioinformatics applications**



**1V EenVandaag** Actueel ▾ Gemist ▾ Opiniepanel De Peiling Contact  

Actueel > Data-analisten van een bank helpen kanker genezen: hoe werkt dat?

## Data-analisten van een bank helpen kanker genezen: hoe werkt dat?

11-06-2018 | [Zorg en leven](#) | Verslag: [Mark de Bruijn](#) Redactie: [Frederica van Mastrigt](#)



[</> Dit item op uw eigen site plaatsen](#)

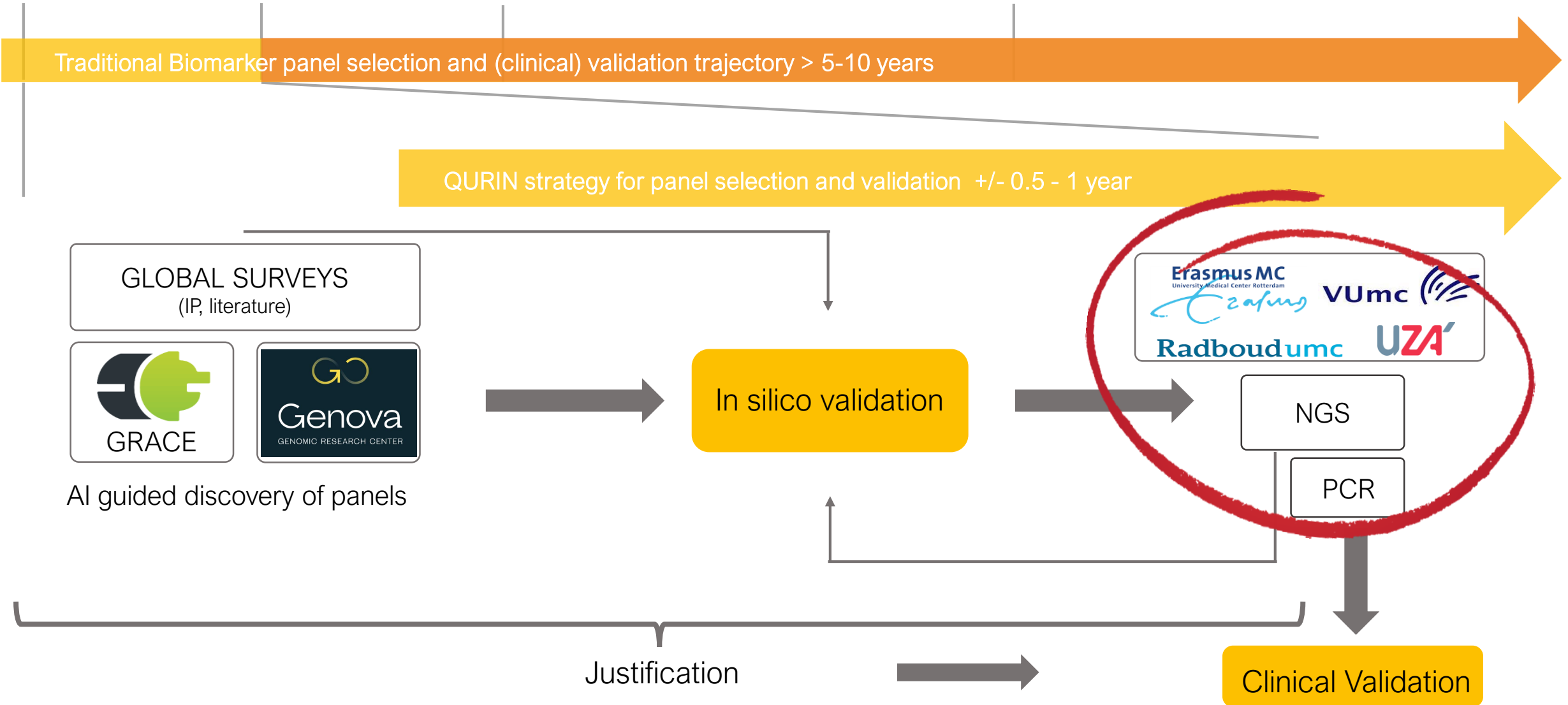
Het is een komische cultuurclash, maar ook een voorzichtige doorbraak in betere behandeling van kanker. ICT'ers die werken in de banksector een weekend lang samen opsluiten in een oude fabriek, waar ze non-stop data van kankerpatiënten analyseren. ABN Amro organiseerde samen met het Rotterdamse Erasmus MC een zogeheten hackaton: een marathonsessie in een oude suikerfabriek.

# ***Accelerating cancer research and personalized medicine***

## ***The Genova Approach***



# Clinical validation strategy





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DIAGNOSTICS

## Qurin Pillar 3

Developing accessible and low-cost diagnostic tests for early cancer detection in urine

## ***Cutting back R&D by multiple years***

Saving 3-5 years of research and development compared to traditional methods

### ***Target tumor type***

- Bladder cancer
- Prostate cancer
- Colorectal cancer
- Lung cancer
- Breast cancer

### ***The Genova Approach***

Phase 1: Identification  
Datamining | biomarker discovery

Phase 2: Insilico Verification  
Original matrix | intended matrix |  
intended technology

Phase 3: Clinical validation  
Integrating invitro and insilico data

## GLOBAL TECHNOLOGY SURVEY

### BIOMARKERS | CERVICAL CANCER

COMMISSIONED BY: **Nanomed Diagnostics**  
Cancer detection using Nanotechnology

#### 1 IP LANDSCAPE BIOMARKERS IN CERVICAL CANCER

Biomarker patents for cervical cancer

Cervix tumour marker types

Key IP stakeholders hmDNA

MDX Health SA [BE]  
SELF-SCREEN BV [NL]  
John Hopkins University [US]  
Oncnostics GmbH [DE]  
Genometree inc [KR]

#### 2 IP LANDSCAPE AND KEY IP STAKEHOLDERS hmDNA BIOMARKERS

hmDNA biomarkers literature published in the last 20 years

Key IP Stakeholders

Organisation	Total	<2010	*10-14	>2014	Patents
WU University [NL]	17	2	5	10	2
University Medical Centre Groningen [NL]	11	1	6	4	2
Taipei Medical University [TW]	11	0	1	10	1
University of California [US]	10	4	4	2	2
University of Texas [US]	6	2	1	3	0
Central South University [CN]	6	0	0	6	0
Queen Mary University of London [UK]	6	1	2	3	0

Publications and patents per biomarker

Emerging technologies

Genentech (Roche) [US]  
EpigenDX Inc. [US]  
Ventana Med. Systems (Roche) [US]  
Neumann Diagnostics Ltd [HU]  
Istat Biomedical [TW]

#### 3 STATE OF THE ART hmDNA analysis techniques literature\*

DNA Extraction	Bisulphite Treatment	Amplification/Analysis	Emerging technologies
DNA extraction procedures are predominantly based on column-based solid phase extractions using silica-containing spin-columns. Most used products are the DNA extraction kits provided by Qiagen GmbH (Germany).	Prior to downstream amplification methods, bisulphite treatment (to determine hmDNA patterns) has been used in the majority of studies. Preferred kits are provided by Zymo (EZ DNA methylation Kit) and Qiagen (EpiTect Bisulphite kit).	Methylation Specific PCR based methods are most frequently used to determine hmDNA patterns. Alternatively, pyrosequencing of bisulphite treated DNA is frequently used with PyroMark <sup>®</sup> technology (Qiagen).	Alternative hmDNA enrichment and analysis methods are available. The methylCap-seq method (Antibody based) from Diagenode (Belgium) has been utilized in at least three studies.

\*state-of-the-art methodologies for hmDNA analysis, most frequently used in literature as assessed from >01-01-2016.

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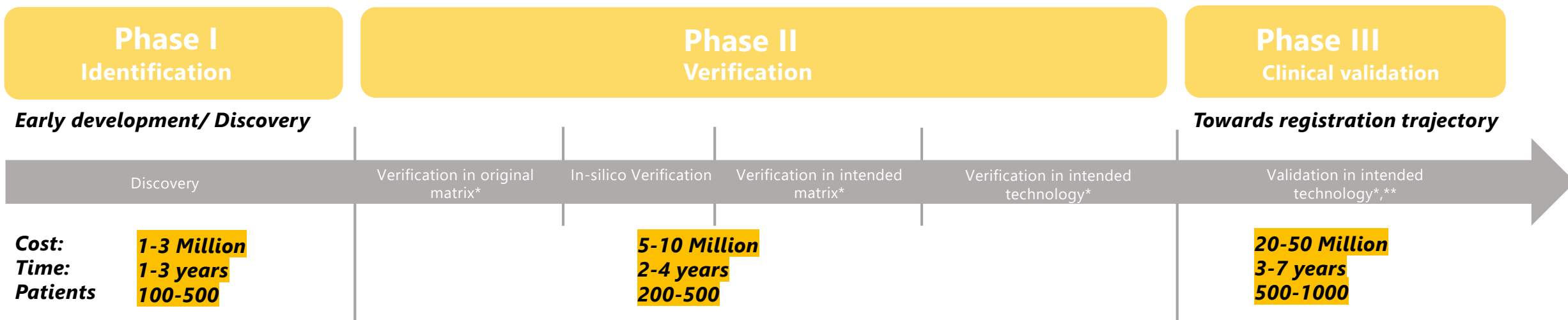
**FFUND** GLOBAL TECHNOLOGY SURVEY | NANOMED Dx | May 2018

1. Bladder cancer
2. Prostate cancer
3. Colorectal cancer
4. Lung cancer
5. Breast cancer

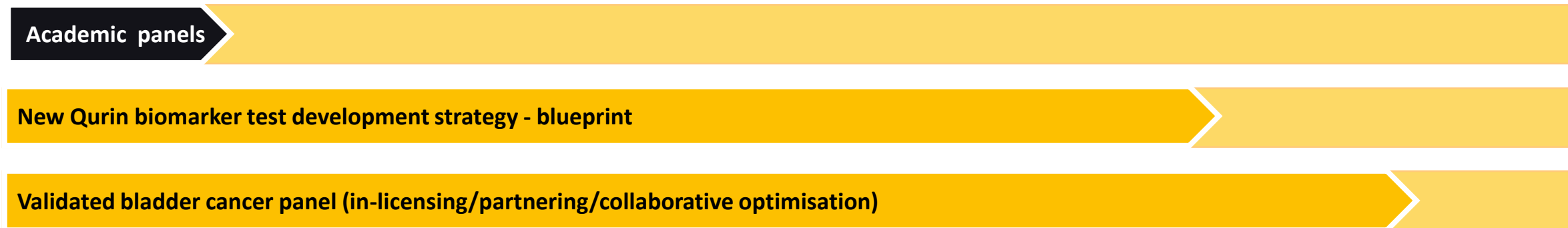
1. AI-guided preselection of 40+ panels per tumor type
2. Specificity & sensitivity > 95%
3. > Small clinical sample sizes
4. Validation by WGS & PCR
5. 4 clinical sites
6. Start Sept 2019



## Traditional vs. big data science-guided biomarker panel development model



## NEW APPROACH Biomarker Pipeline :



Traditional approach / available panels



Qurin approach

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