AMAZEC PHOTONICS

high-resolution blood temperature sensing

EPIC
April 2024

REALIZING LIFE-SAVING DIAGNOSTICS OF CIRCULATORY- AND CARDIOVASCULAR FUNCTION/FAILURE

Amazec Photonics B.V.
The Netherlands

Non-confidential

RETIREMENT OR….?

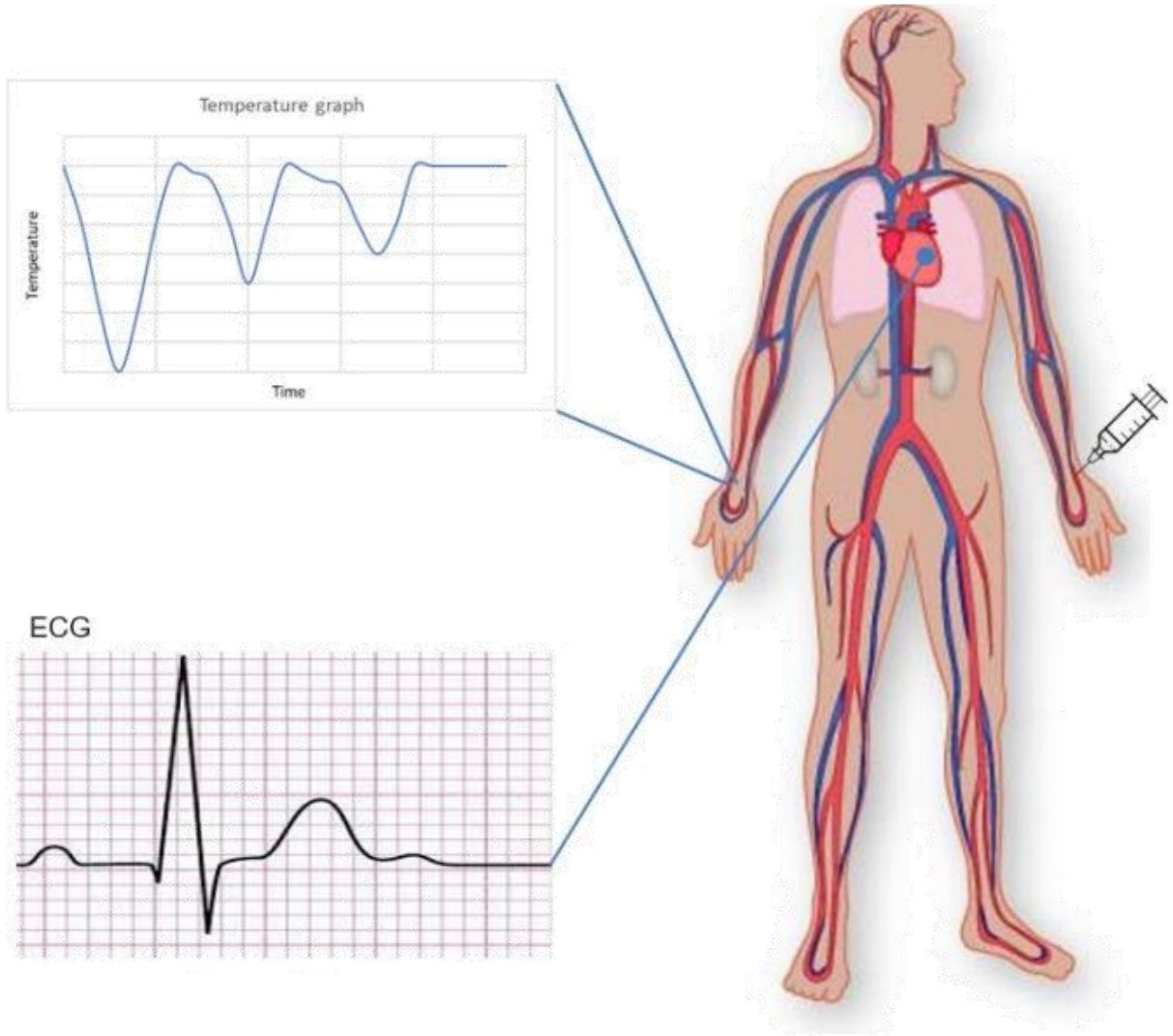
2019 Last month at Technobis

Approached by two professors @Medtech with a brilliant idea:

- Measuring hart failure with thermal dilution at high resolution (I<<0.001 °C)
- First check with world-wide questionnaire

WHAT TO MEASURE?

- Inject 10 cc of saline solution at 4 °C
- Measure the temperature drop, after passing the heart

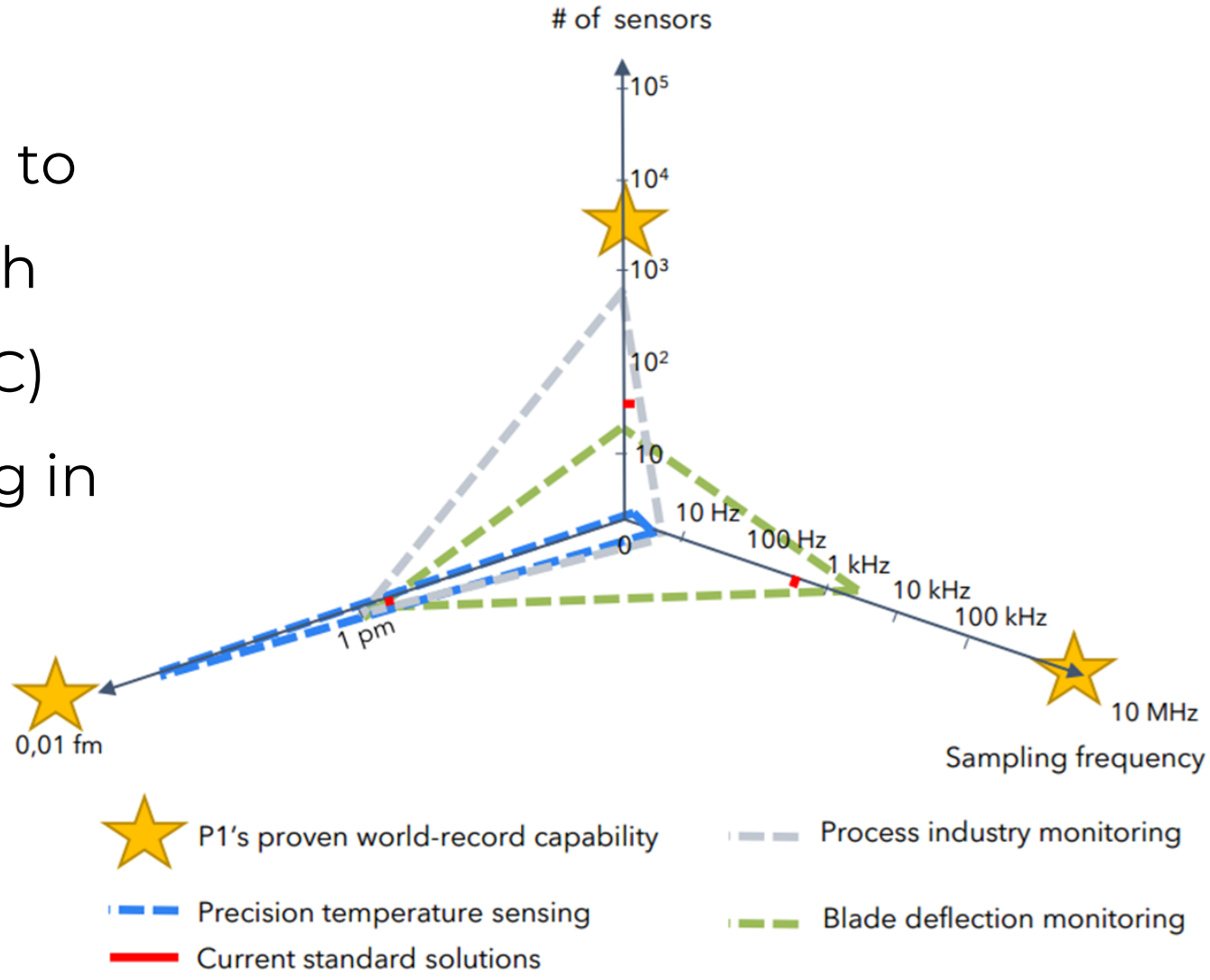


THE SIGNAL, MEASUREMENT DATA

- FBG sensor measures $\Delta T = 0.0001\ ^{\circ}C$, which equals 1 femtometer wavelength shift
- Measuring 1st and 2nd pass of the cold bolus (after 1 complete circulation through the body)
- This enables to calculate the total thermal circulating blood volume (The Holy Grail)

WHY INTEGRATED PHOTONICS?

- Proven technology down to 100 attometer wavelength shift detection (~0.0001 °C)
- All records of FBG sensing in the hands of PhotonFirst (Technobis)



SIMULATION AND RESULTS

- Digital twin blood circulating system
- Digital twin FBG sensor assembly
- Simulation shows even 3rd pass of the cold bolus
- Measurement shows clear 2nd pass of cold bolus
- Understanding of the real behavior of the FBG sensor assembly at 1 femtometer scale
- Optimizing sensor assembly with COMSOL for skin sensor and esophagus sensor

FUTURE OUTLOOK

- Measurement of 10 volunteers at Catharina Hospital
- Measurement on 100 patients at Catharina Hospital and 2 other hospitals with pre-series product
- Certify medical system, launch product, sell company and: Retire…or ???

ACKNOWLEDGEMENTS

- This development was made possible by:
  - Our investors
  - Interreg OIP4NWE (Packaging)
  - PhotonHub (Next generation PICs)
  - Innovatiefonds Noord-Holland (INH)/TheRaFiSe (sensors)
  - PhotonDelta (pre-series)
  - PPS (Pre-clinical & clinical Trials)
  - Our partner suppliers:
    - PhotonFirst
    - TeraXion
    - Ligentec
    - PHIX
    - Relitech
    - Lens R&D Systems
    - MD^2
    - TUe
    - Catharina Hospital

March 2024

Realizing life-saving diagnostics of circulatory- and cardiovascular function/failure

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