



WANDA:

An End-to-End Remote Health Monitoring and Analytics System for Heart Failure Patients

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Outline

- Figures cardiovascular diseases
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- WANDA: Application
- WANDA: Technology
- Conclusion
- 2012 till now
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Figures cardiovascular diseases

The Netherlands has around 1.4 million heart and vascular patients.

Every day:

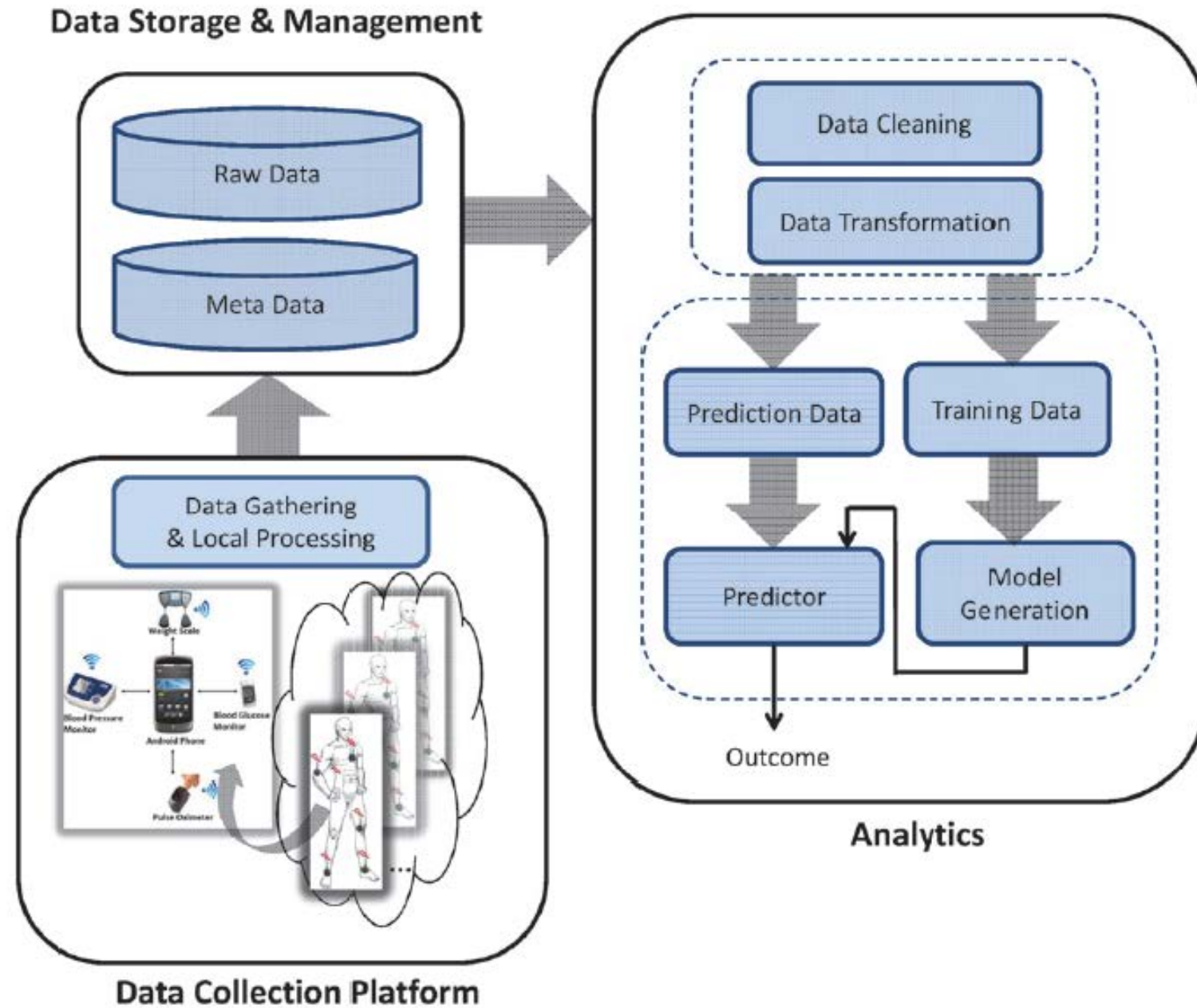
- 105 people die of cardiovascular disease: more women than men
- 50 men and 55 women die from a heart or vascular disease
- 24 people under the age of 75 die of cardiovascular disease
- 730 people are admitted to hospital because of cardiovascular disease

(Hartstichting , 2019)

WANDA: Goal

Demonstration of a smartphone based data collection gateway with a backend analytics engine for telemonitoring of heart failure patients.

WANDA: Architecture



WANDA: Application

- Wireless Scale
- Blood glucose monitor
- Pulse Oximeter
- Blood Pressure Monitor



(a)



(b)



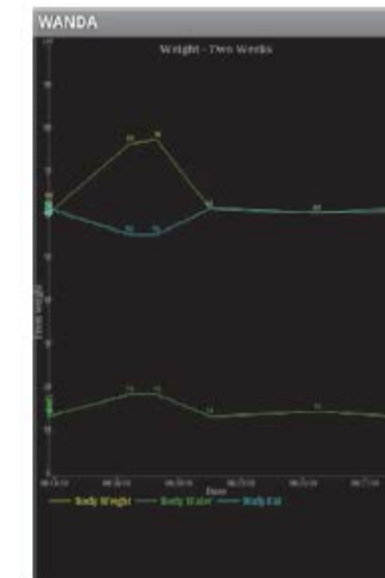
(c)



(d)



(e)



(f)

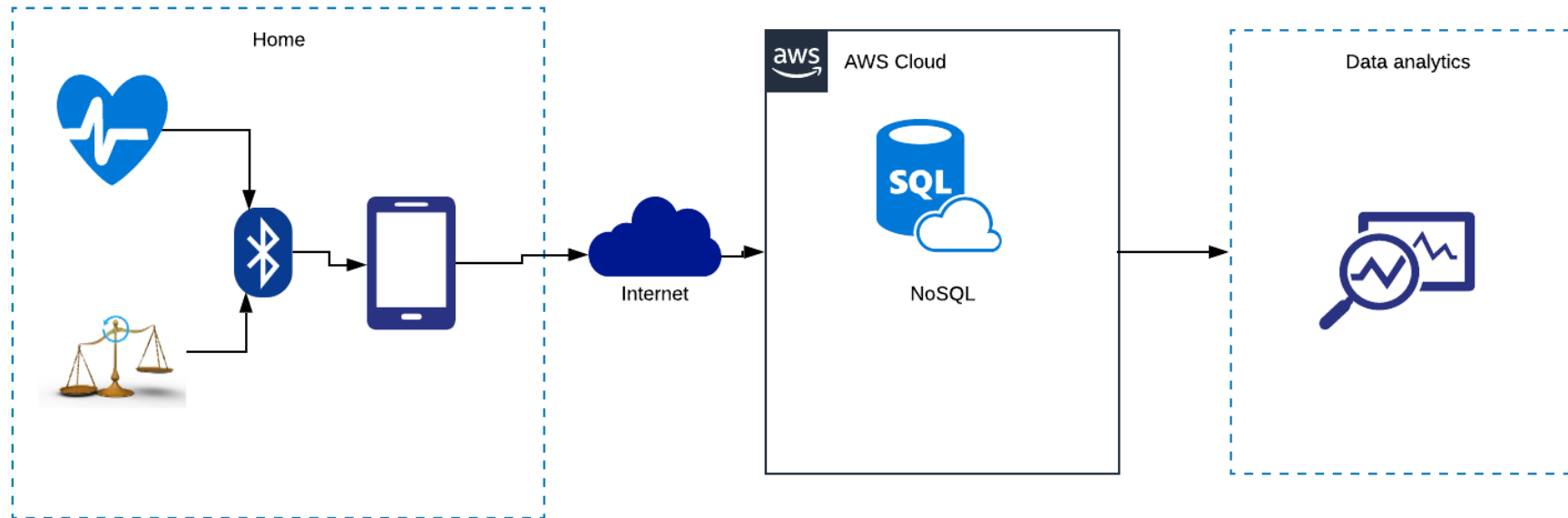
WANDA: Application

#	Question
1	Are you coughing more than usual?
2	Are you more tired than usual?
3	Did you use an extra pillow last night?
4	Did you eat a low-salt diet?
5	Did you take your heart medications?
6	Did you take your water pill this morning?
7	Did you walk or exercise today?
8	Have you noticed increased difficulty in breathing?
9	Have you noticed increase in swelling of feet or ankles?



WANDA: Technology

- Connected to an Android smartphone via Bluetooth connection
- Questionnaire System
- Android smartphone sends data to Amazon S3 Cloud solution
- Data analytics platform processes data and offers predictions



WANDA: Technology

Administrative Portal for Medical clinicians and nurses where they can easily enter information including patient demographics, like gender, age and ethnicity, as well as notes of events like hospital discharge, hospitalization or death.

A Facebook application was developed in-house to offer two motivating factors:

- cooperation
- Competition

WANDA: Conclusion

“Using real data collected from a pilot clinical trial, we have demonstrated the strength of WANDA’s analytics engine by accurately predicting the worsening of HF symptoms in patients.”

“As a result, the WANDA analytics engine is able to build prediction models that are up to 74% accurate, which is more than 20% higher than using daily weight change alone.”

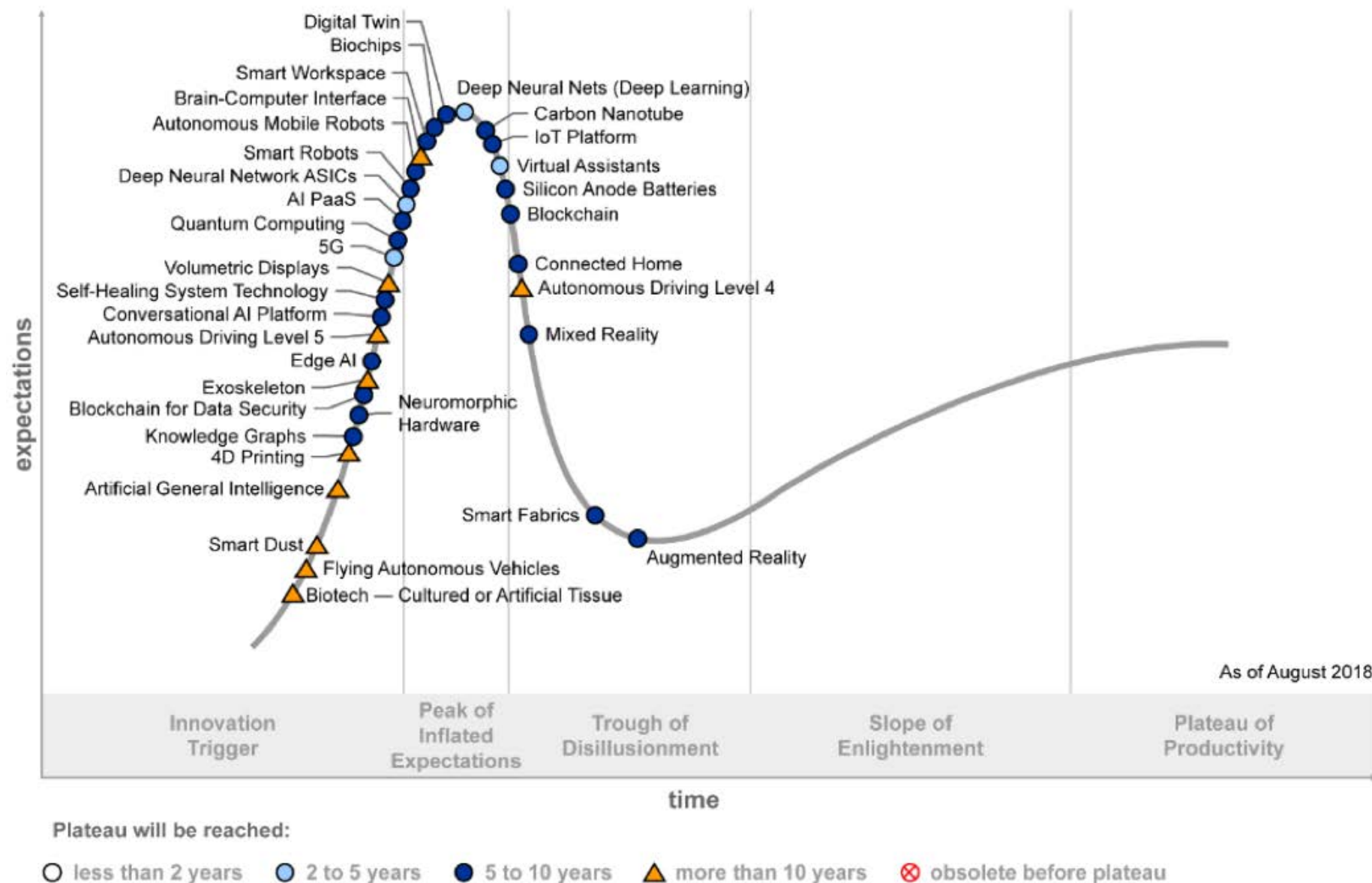
“The prediction approach presented in this paper is only an example of intelligent analytics that our remote monitoring system offers.”

Future work:

Taskoptimization, unsupervised learning, individualized health guidance for patients, context-aware prediction, and long-term pattern discovery.

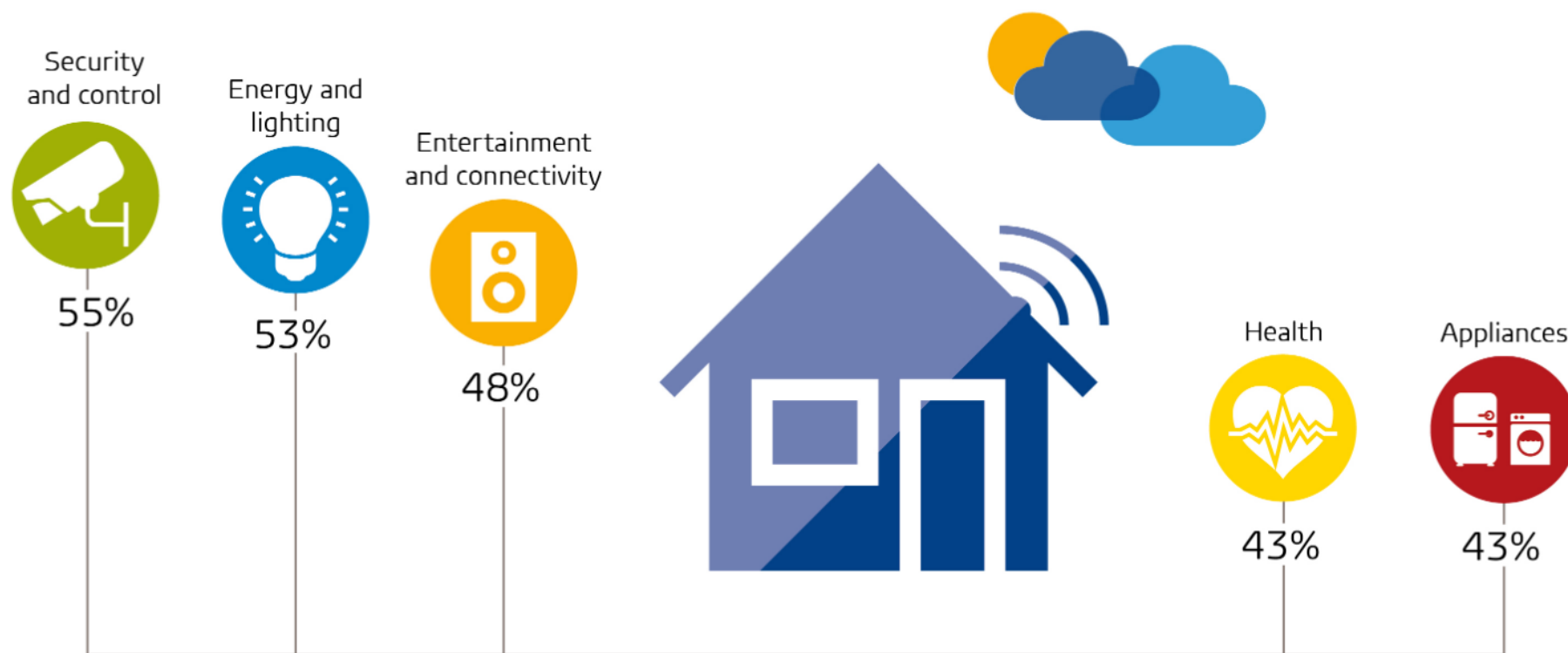
2012 till now:

Telemonitoring Opportunities



2012 till now : Smart home and health monitoring

MOST APPEALING SMART HOME SERVICES AND SOLUTIONS ACCORDING TO CONSUMERS

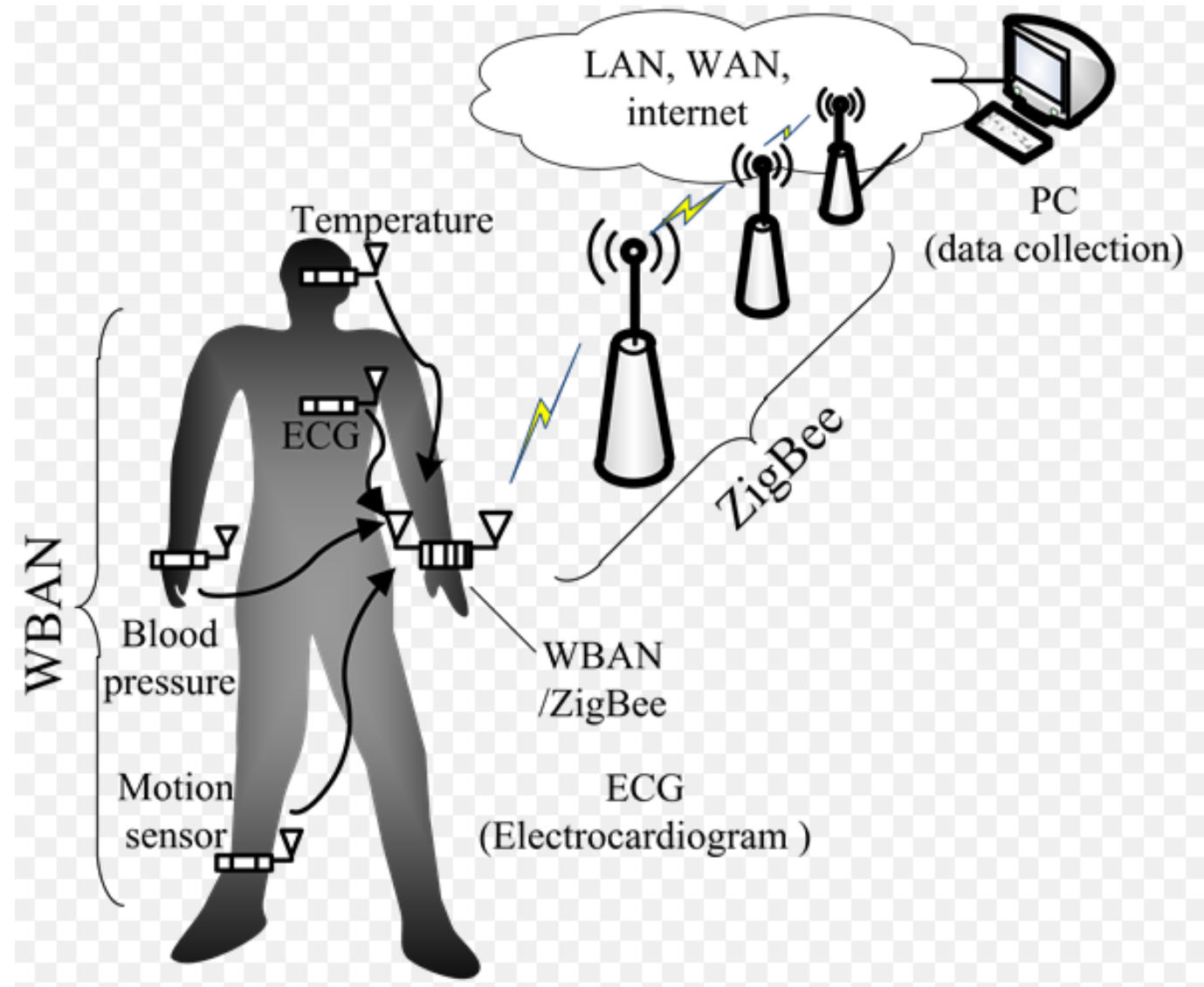


Source: GfK smart home study 2015, +7000 consumers surveyed in September and October 2015 in Brazil, China, Germany, Japan, South Korea, UK and US (China and Japan data not included in this graphic)

© GfK 2015



2012 till now :
Standalone
sensors using
new connectivity
possibilities



2012 till now

Staff pick



Best value

Eufy BodySense

At under fifty bucks, the Eufy BodySense is *quite* fully-featured, giving you 12 measurements, including weight, body fat percentage, BMI, bone mass, muscle mass, and a bunch more. The BodySense supports up to 20 separate users, and every user gets their personal results on the scale automatically. It also fully integrates with Google Fit and Apple Health. **\$40 at Amazon**

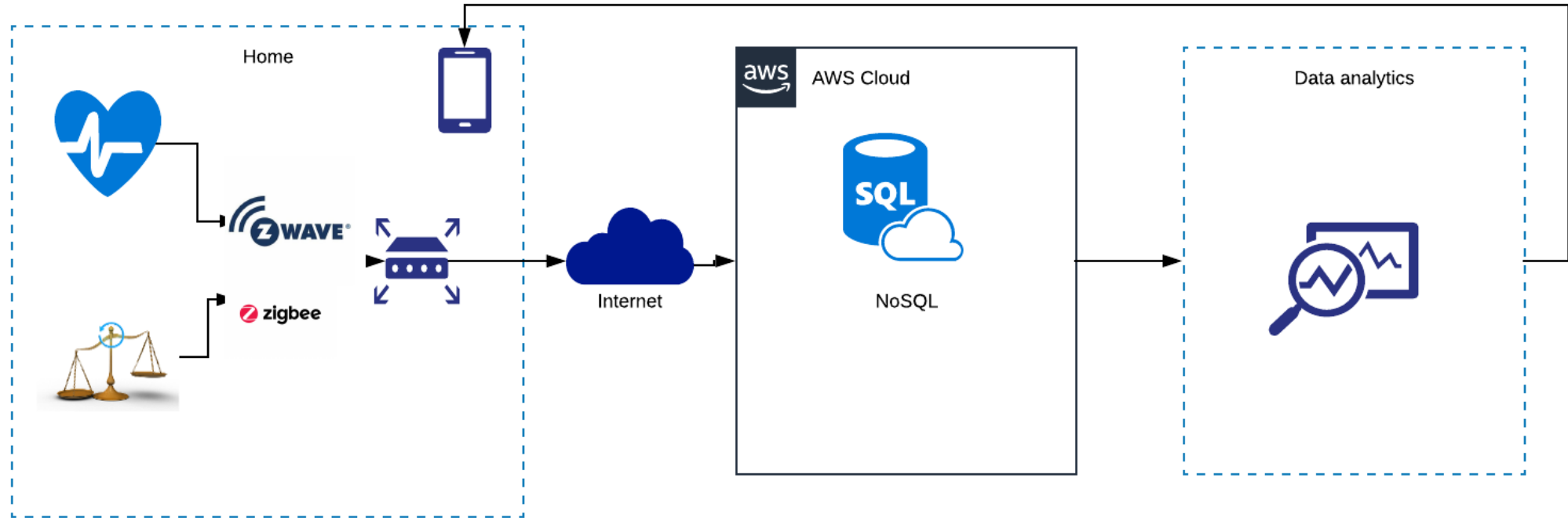


ZigBee Wireless Blood Pressure Monitor, Fully Automatic Measurement and Wireless Transmission

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Utrecht University



Questions

Do you see some link between the system presented in this article and fit4life?

Could this system be possible expanded to incorporate other failures?

Don't you think putting sensitive data on amazon storage could be problematic?





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