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Patient Status Engine

AI based on Vital Signs

StartUp- und Digitalisierungspreis der ENTSCHEIDERFABRIK

Medica 2018

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Digital Health?

Digitisation of Process and Information

- Hospital information systems (Electronic patient records etc)
- Electronic prescribing, billing, imaging etc
- Many apps – reminders for appointments, medications etc

Combine with connectivity ….

Business process engineering

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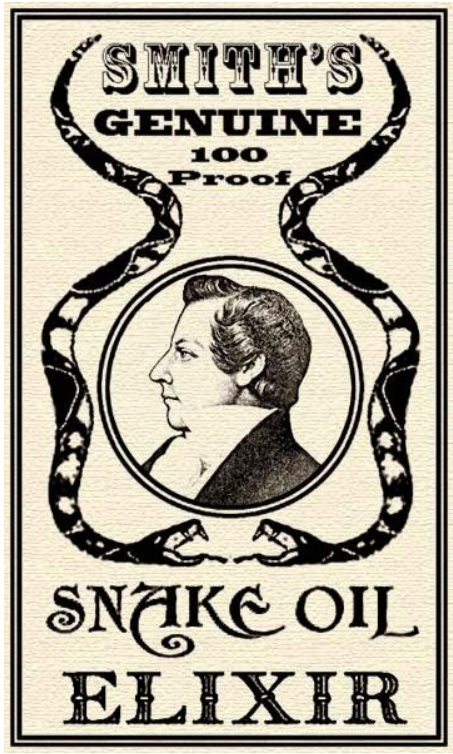
Digital Health?

"From ineffective electronic health records, to an explosion of direct-to-consumer digital health products, to apps of mixed quality.

This is the digital snake oil of the early 21st century."

Dr James Madara
American Medical Association CEO



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This clock has stopped.

But it is extraordinarily accurate. How?

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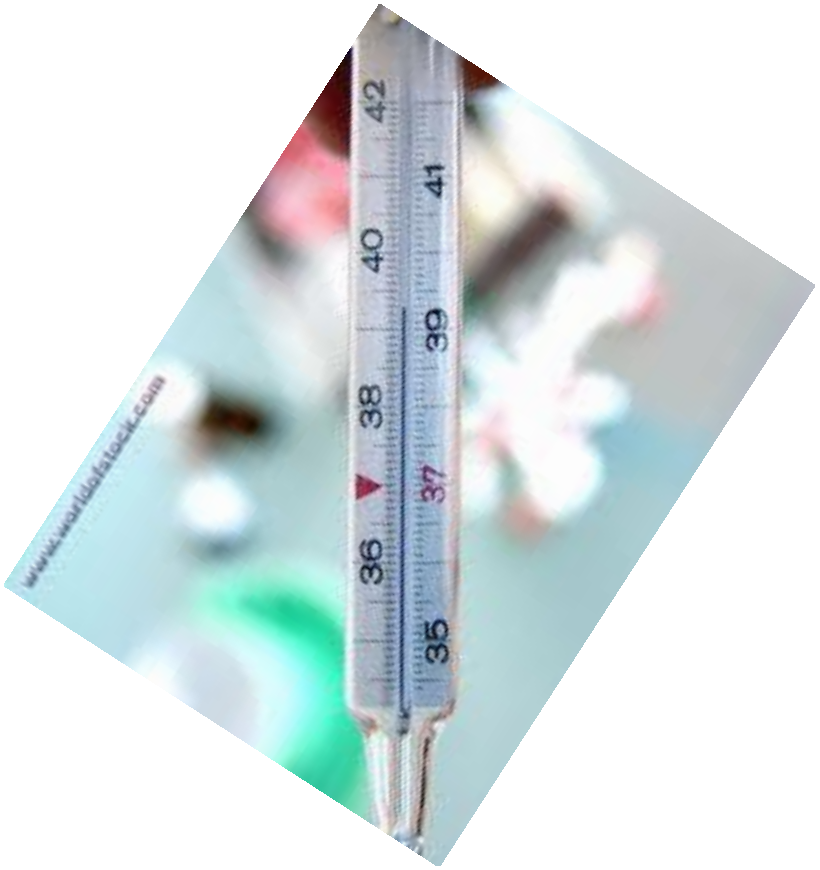
What do these numbers represent?

98.6

37.0



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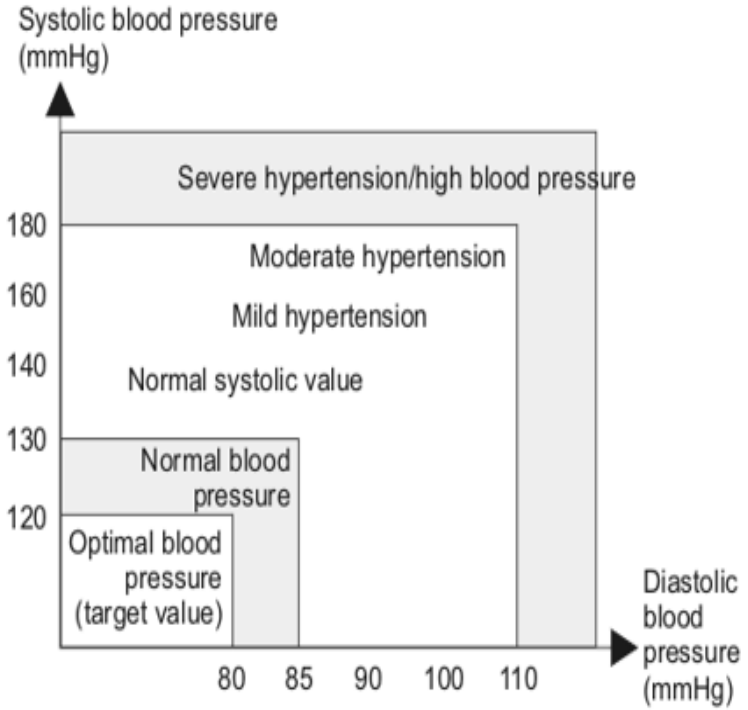
These numbers?

120 / 80



According to the blood pressure classification by the WHO/ISH.

These numbers?

60 - 80

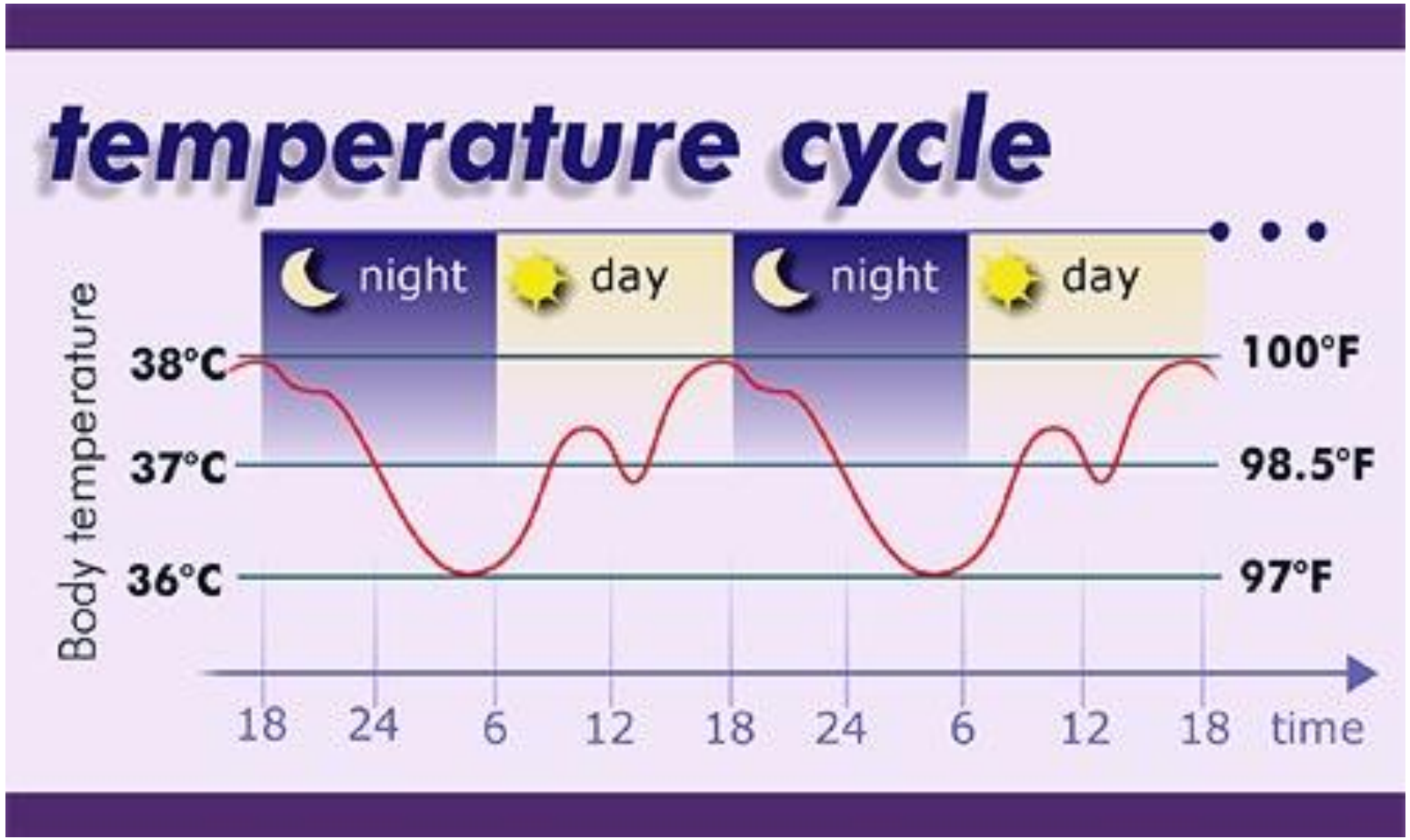
Are these numbers Right or Wrong?

Sometimes these numbers are right

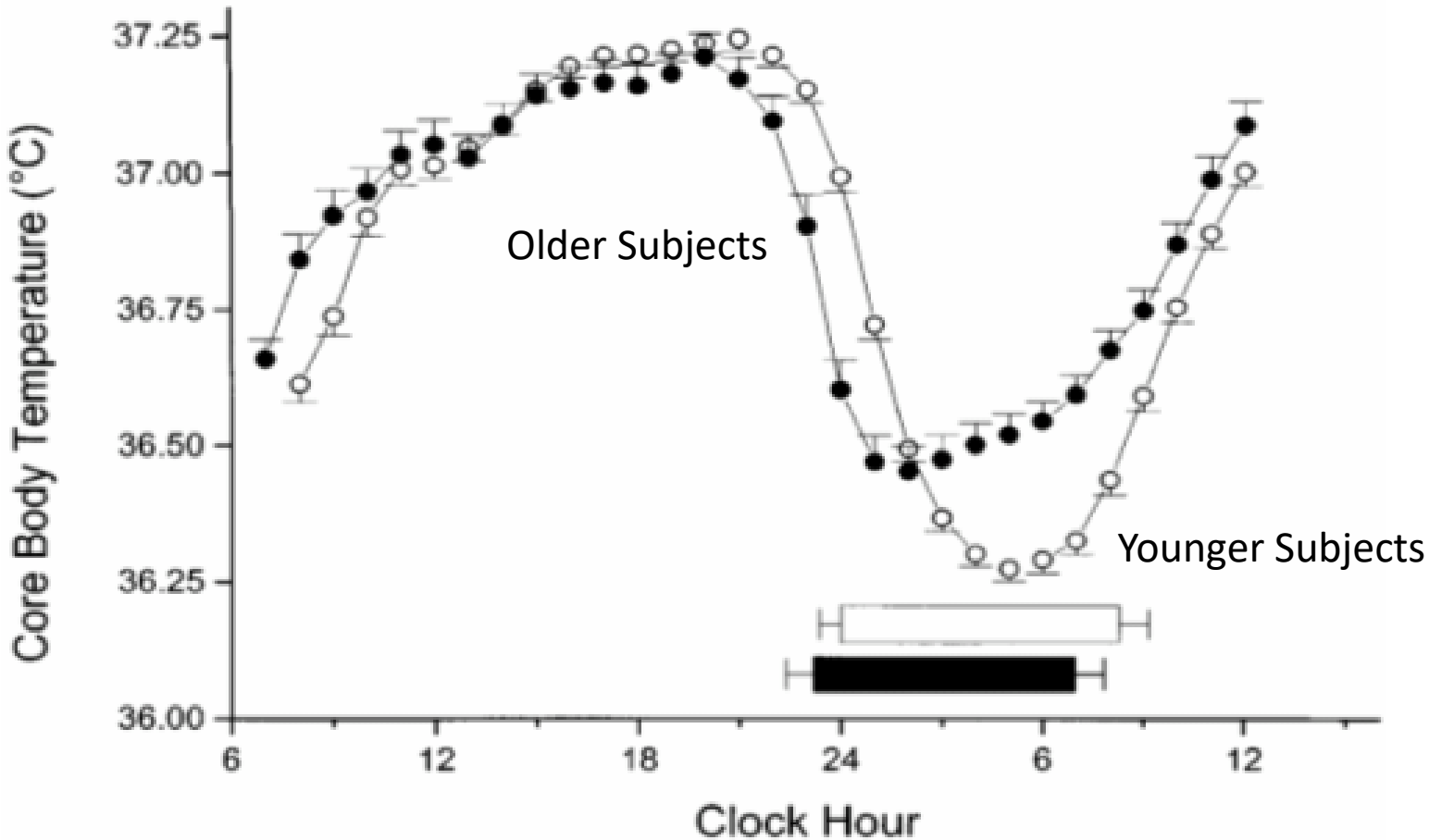
Most of the time they are wrong
and often misleading

It Depends on …….

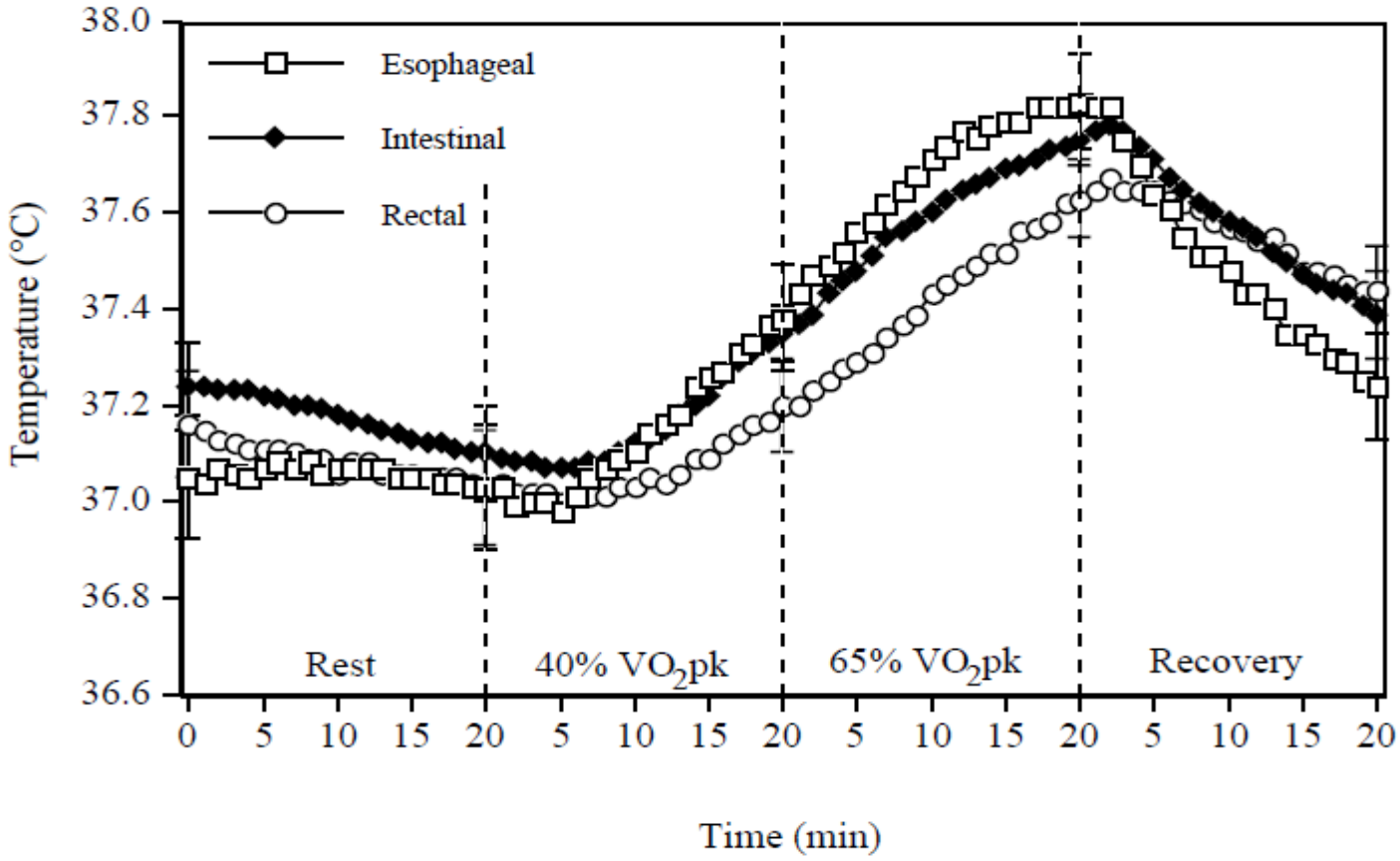
Time of Day (Circadian Cycles)



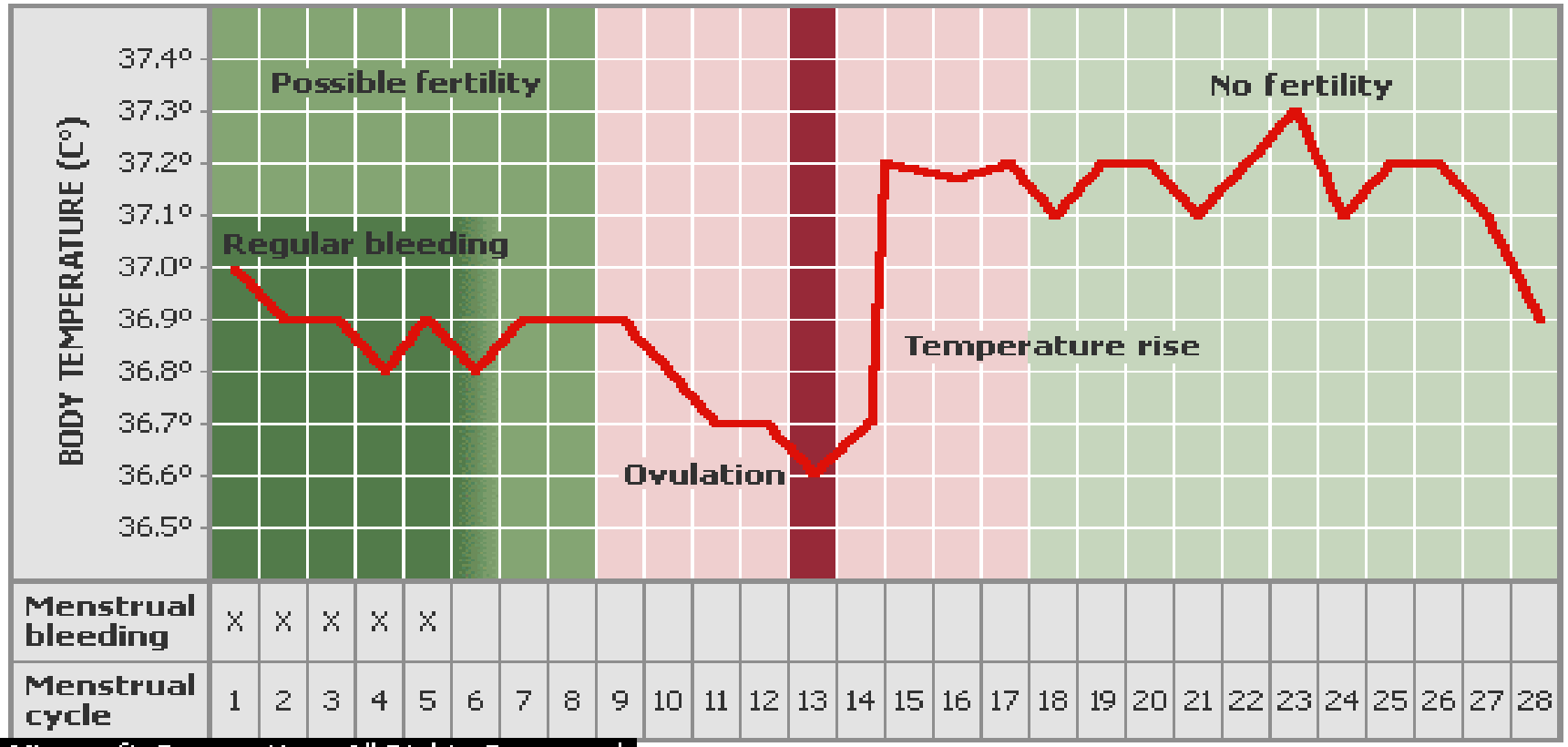
Age


Core Body Temperature (°C)
37.25
37.00
36.75
36.50
36.25
36.00
6
12
18
24
6
12
Clock Hour
Older Subjects
Younger Subjects

Activity / Exercise
(and where it's measured – *Ouch!)*



Time of Month (Menstrual Cycles)



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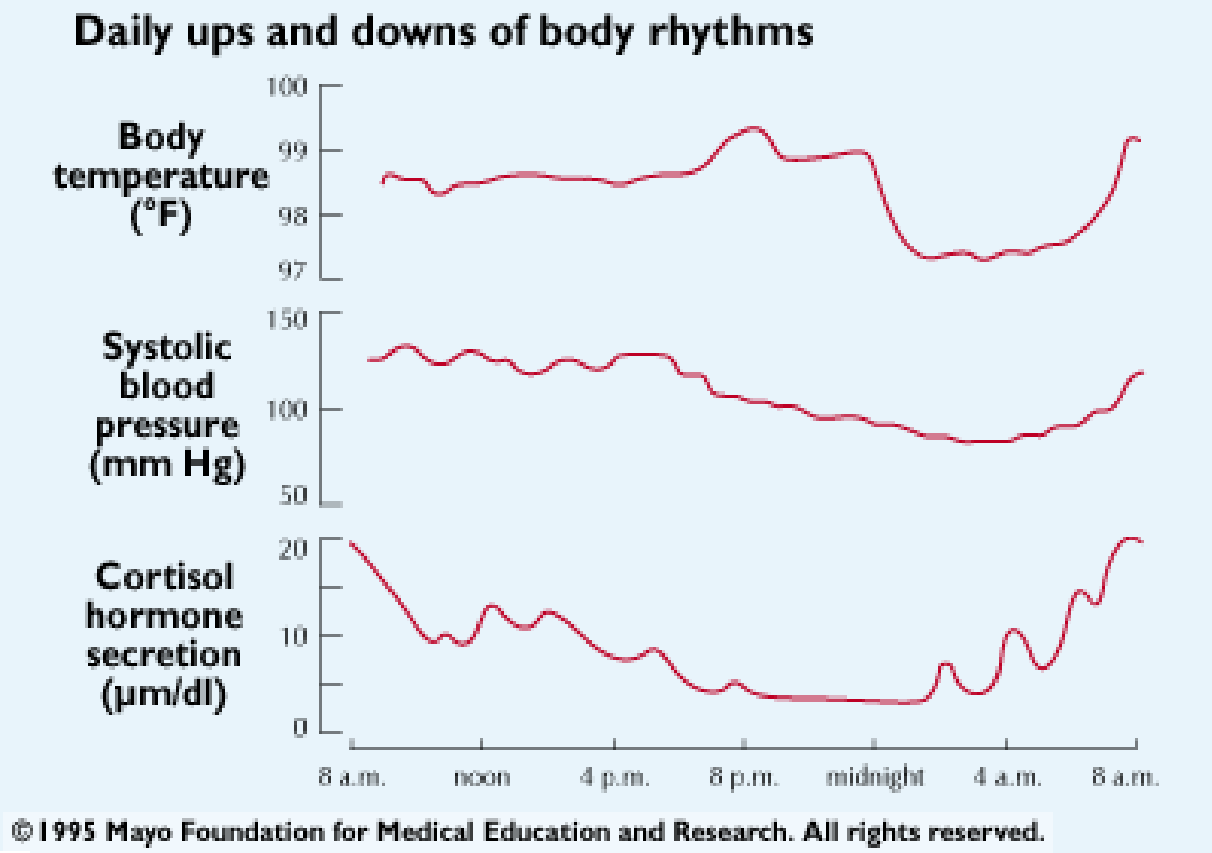
And Not Only Temperature



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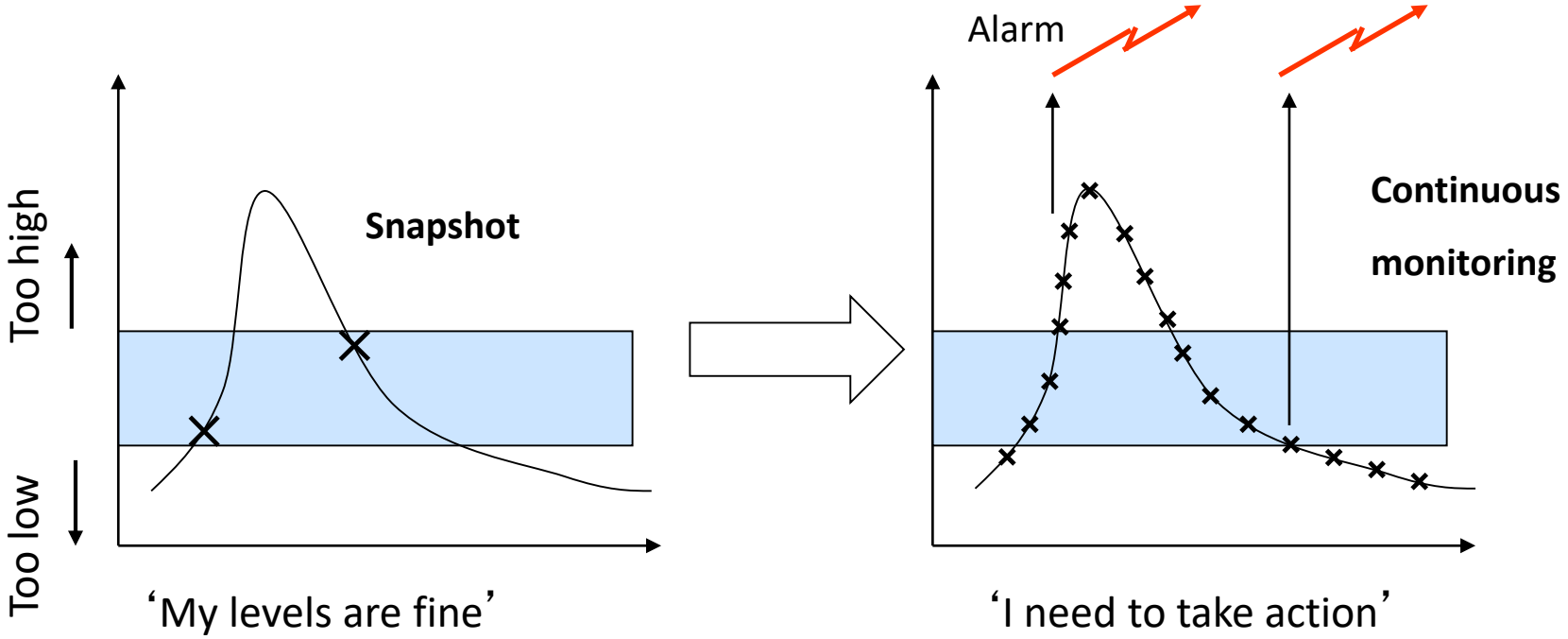
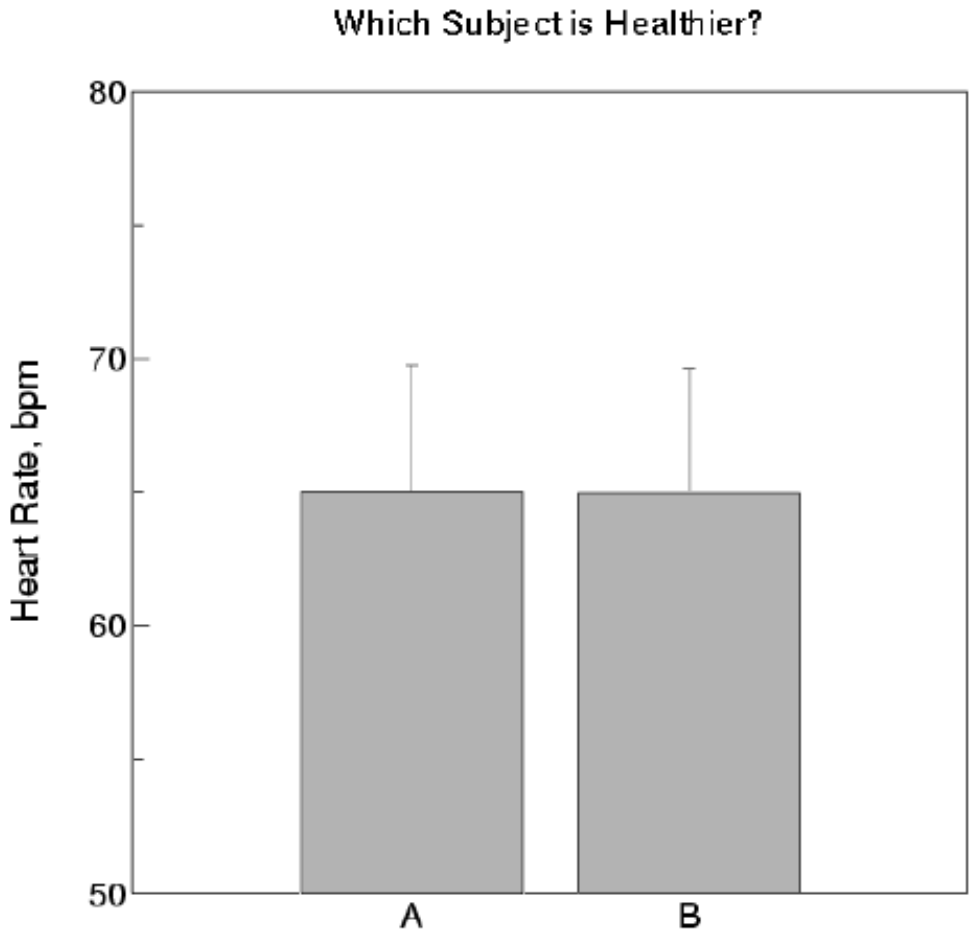
Our bodies have more than 100 circadian rhythms

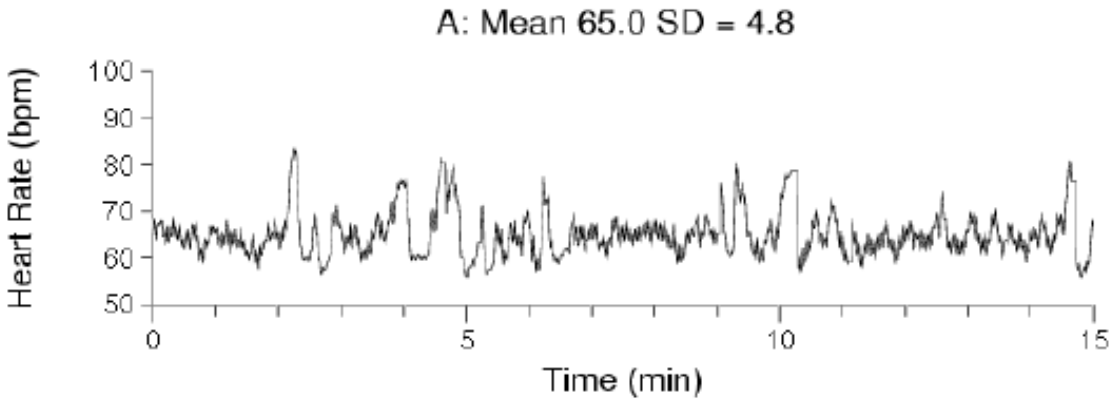
Looking Continuously



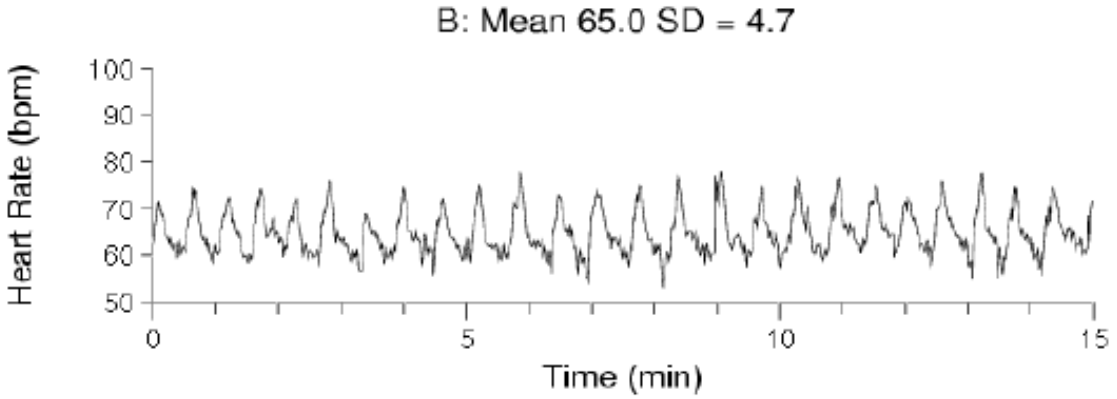
And Looking More Closely



Reveal What's Really Going On



Healthy



Sleep Apnoea

Digital Health?

Digitisation of Content

- Genome
- Epigenome
- What about your Physionome?

The truly disruptive step

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The Digital Future of Patient Monitoring

- *Anytime, anywhere, in hospital, at home*
- *Robust, accurate, wireless patient data capture and analysis*
- *Direct, real-time, quantitative patient outcome measures*

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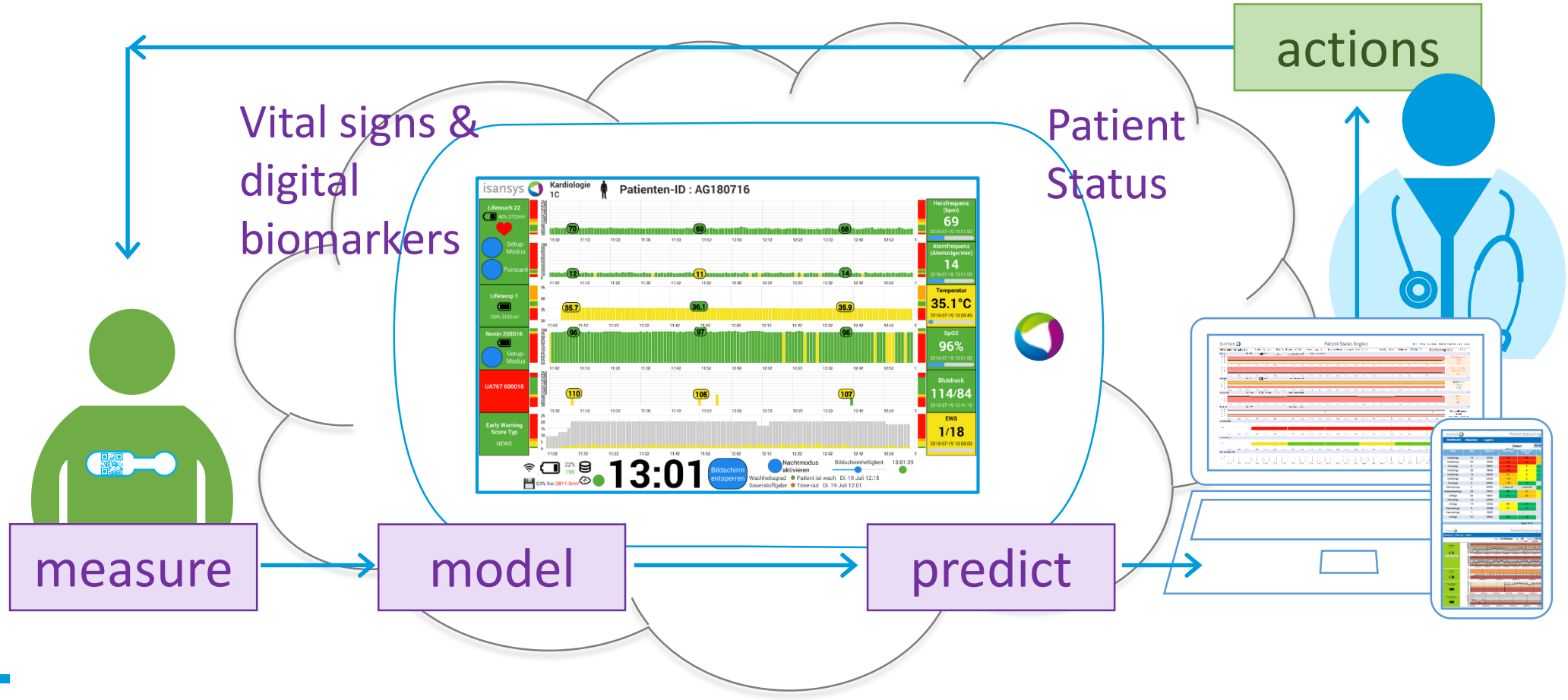
Enabling the Solution: The Patient Status Engine



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New Possibilities In Patient Monitoring
The Isansys Patient Status Engine PSE

Status quo:
- selective values
- time pressure
- mistakes & errors
- wired patients
- demobilizing
- interruptions

continuouse

algorithm

timesaving

digital biomarkers

unburden

Heart rate

PPG

ECG

Respiratory rate

Heart rhythm

SpO2

Temperature

Secured Server

SERVER

Sensors (Bluetooth)

Continues vital signs

precise

Motion and body position sensor

Blood pressure

ECG View

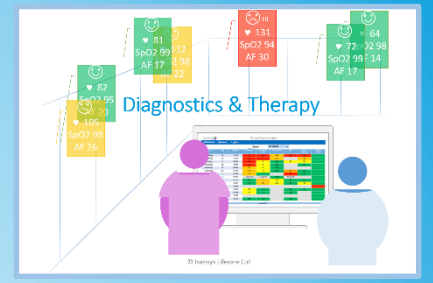
Early-Warning-Scores

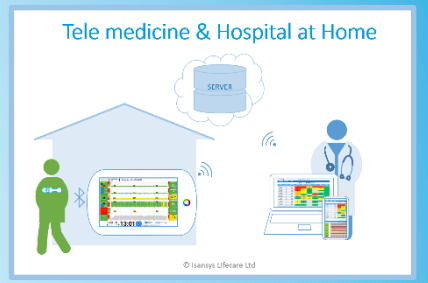
location-independent

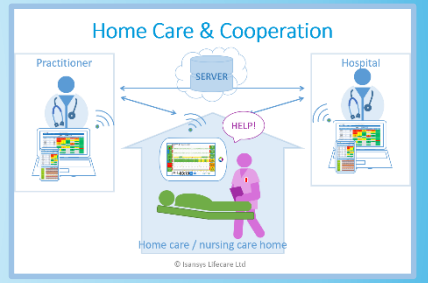
Arrhythmias (Poincaré)

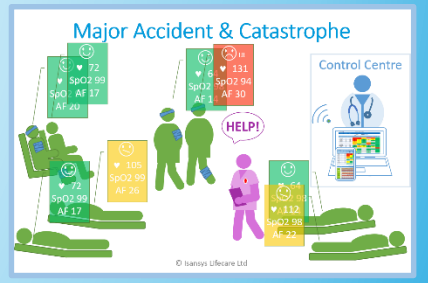
mobilizing

Transmission via WLAN, GSM









Location-independent access with authorised devices

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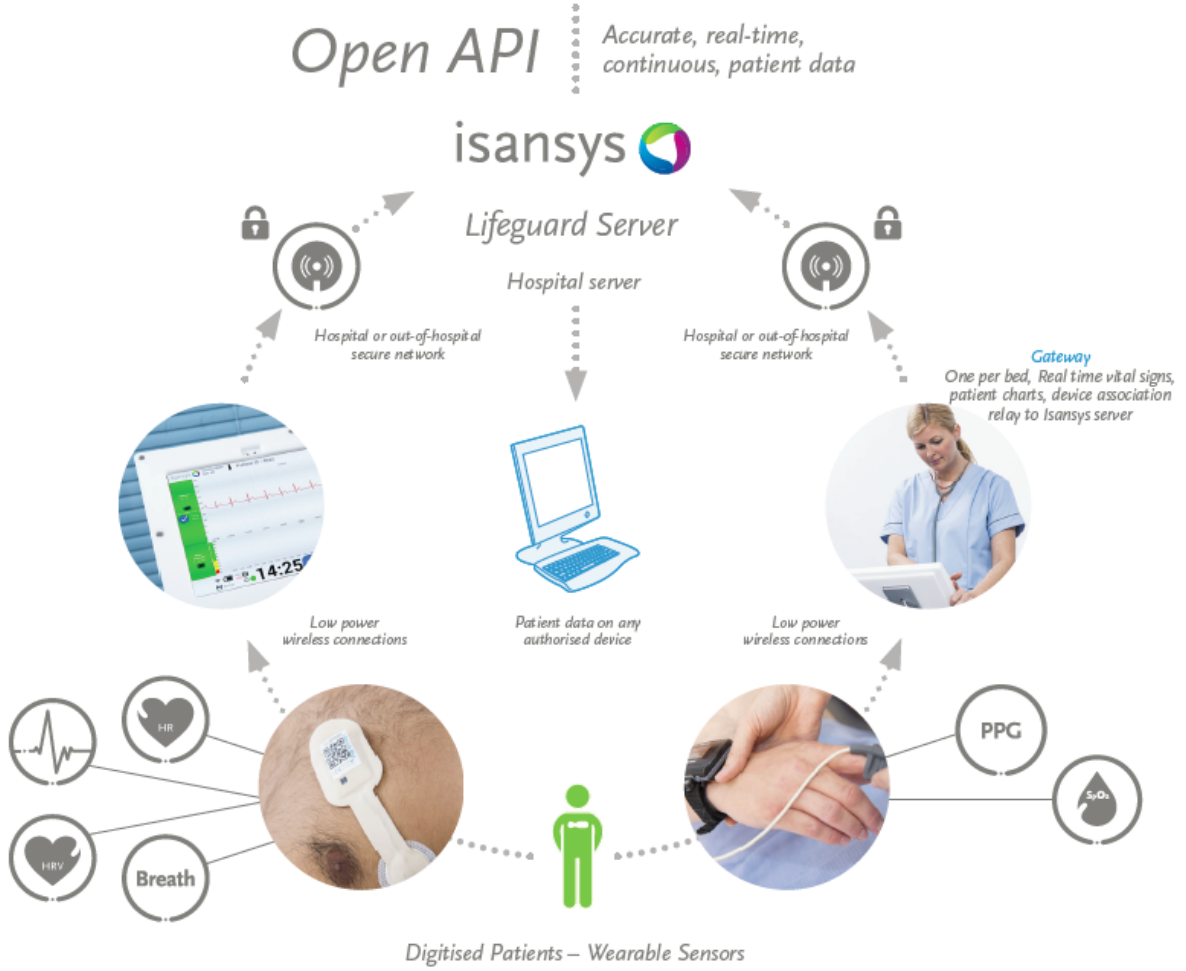
The Patient Status Engine (PSE)

New Possibilities in Patient Monitoring

A complete system:

- *Wireless wearable sensors:*
  - *Heartrate, Temperature, Respiration Rate*
  - *SPO2 – Oxygen Saturation*
  - *Blood Pressure (as required)*
- *Documentation:*
  - *Automatically filled patient charts*
  - *fast, accurately and correctly*
- *Interoperable:*
  - *Integration into the digital hospital IT infrastructure / electronical patient records*
  - *Telemedicine: authorized access from everywhere, remotely*
- *Early Warning Scores (EWS)*
  - *Critical data at a glance*



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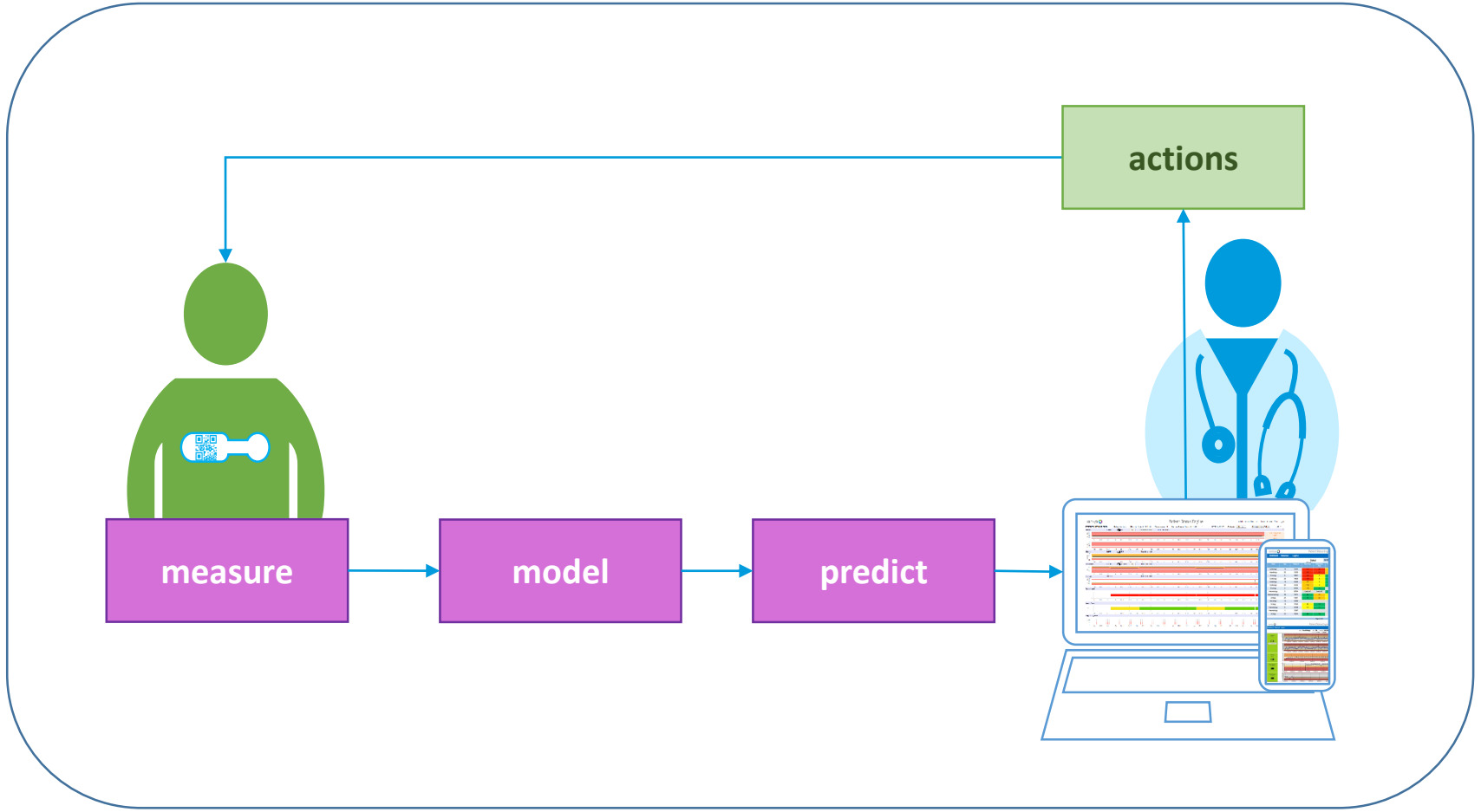
Notification Score: Digitizing the Patient: Digital Clinical Decision Support



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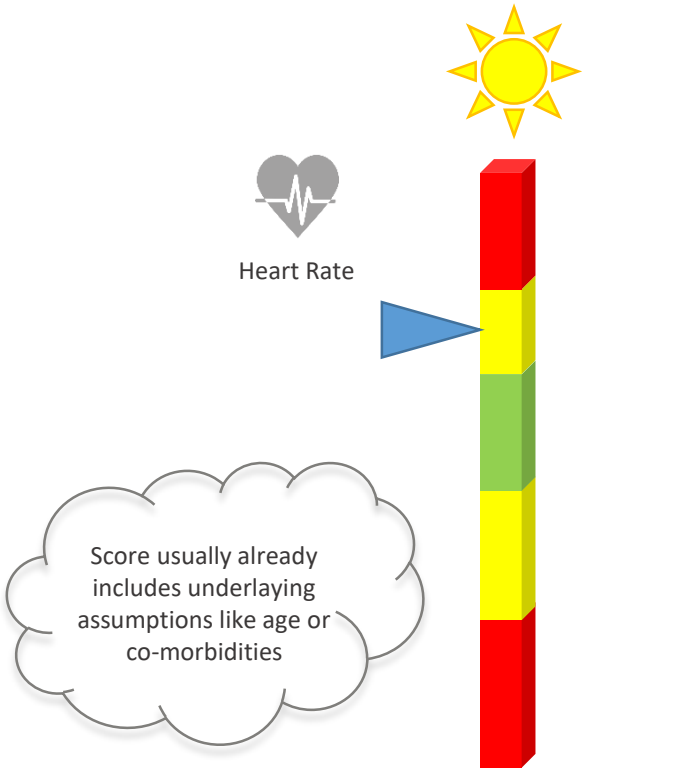
Notification Score: Single Vital Parameter

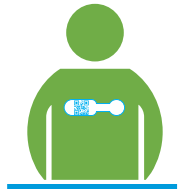


Continuous Snapshot

measure → model → predict

Current situation: Step 1 in digitizing the patient

- Advantage towards snapshots all 4 hours
- Physician has the chance to see patient status change
- Medical stuff has still to be active with their “Experience Algorithm”



Wireless Sensors

ISANSYS Patient Status Engine (PSE)

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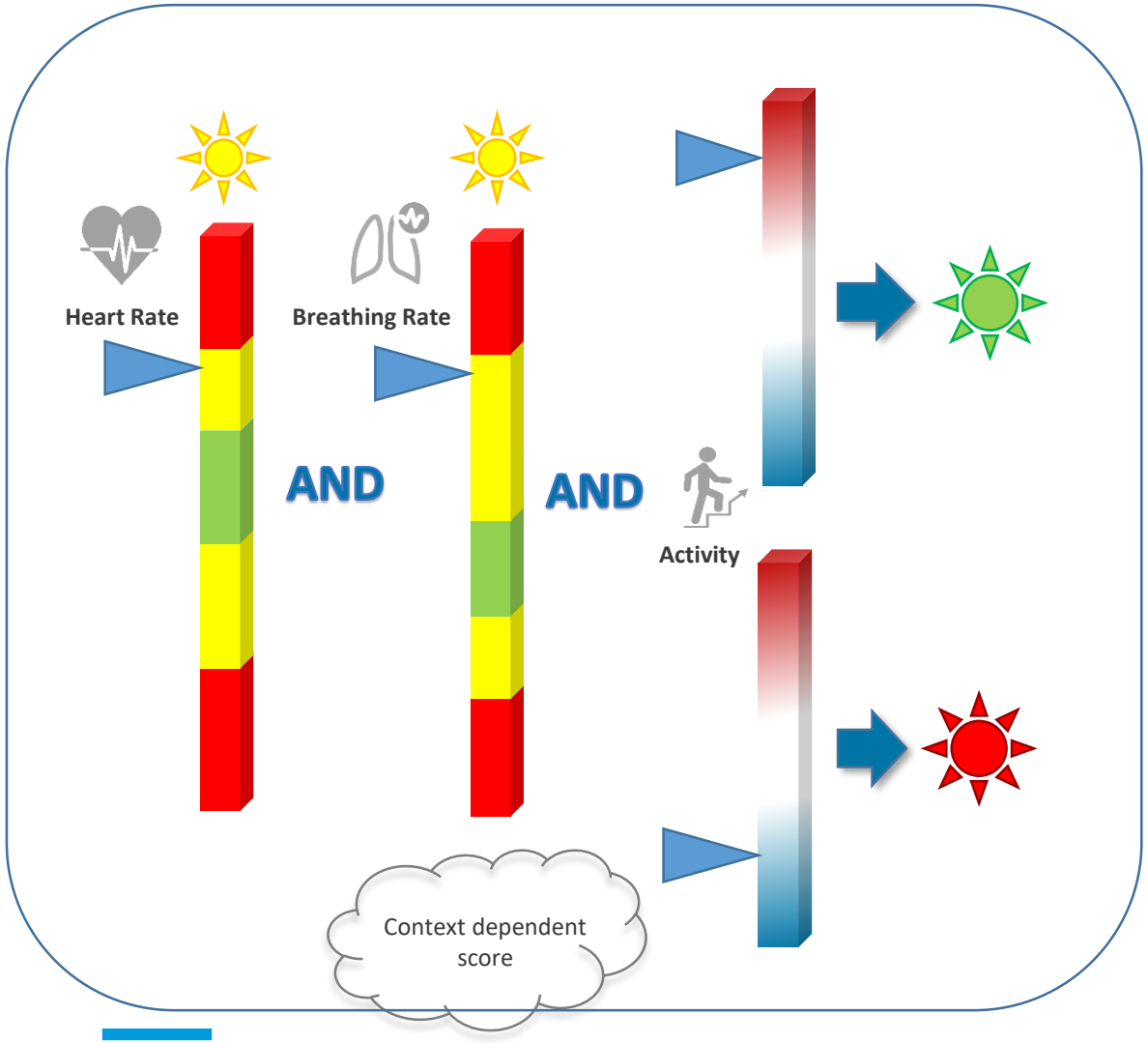
Notification Score: Single Parameter enhanced by Context



A further step:

- A combination of several vital data and additional information enables PSE to make more reliable estimation of actual patient condition

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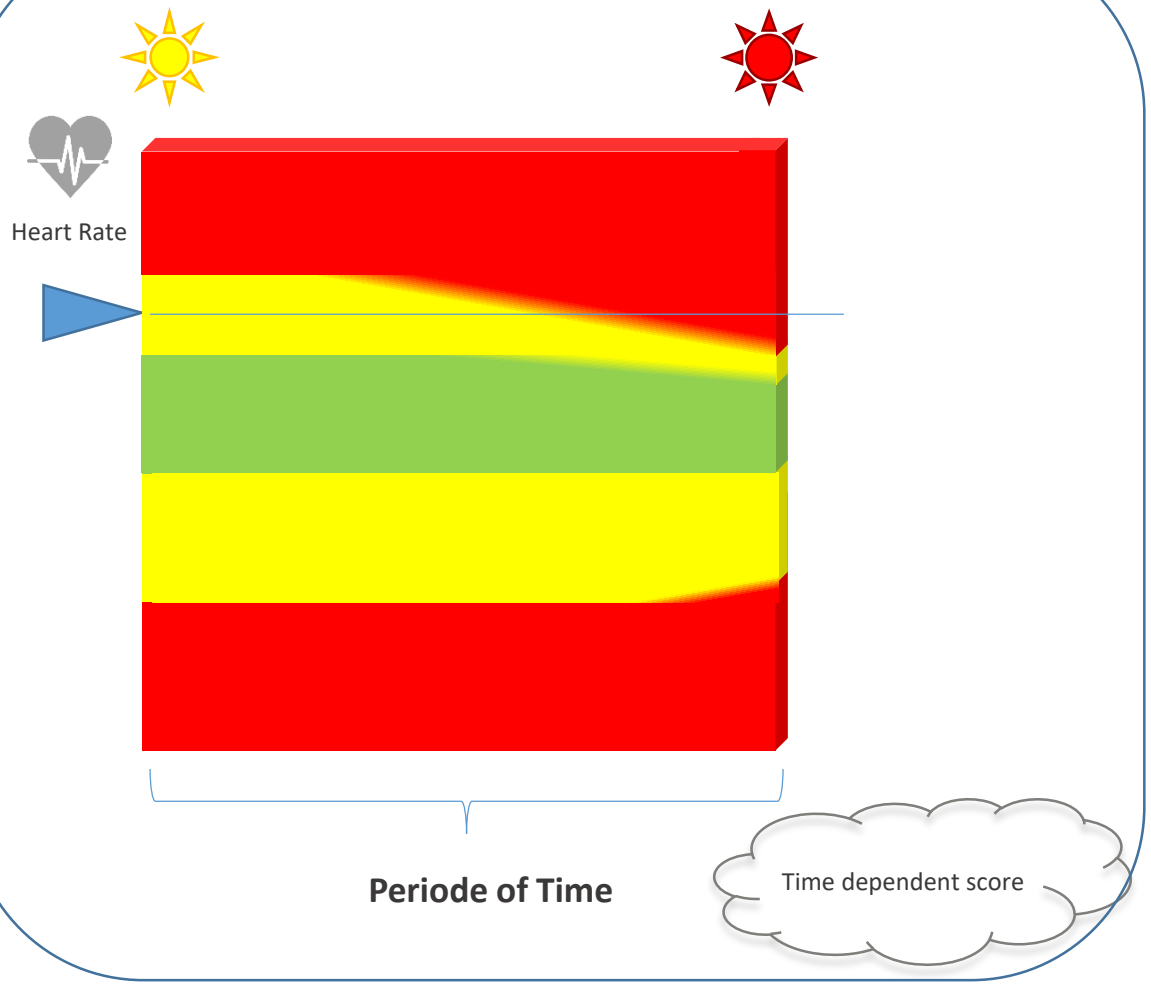
Notification Score: Single Vital Parameter over Course of Time



measure → model → predict

Next step towards digitization:

- Personal “Experience Algorithm” will be implemented as ward or hospital wide Standard Operating Procedure (SOP)

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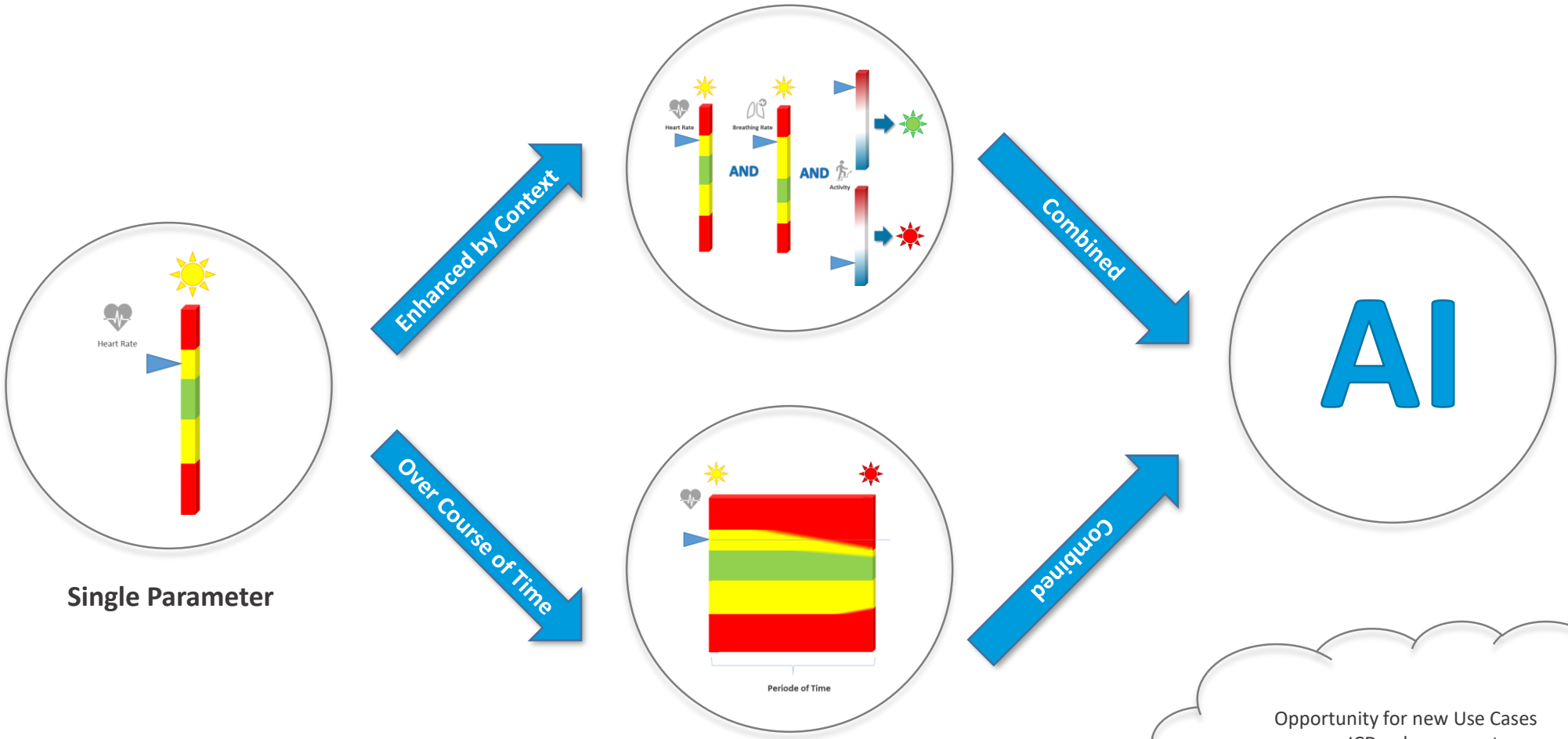
Notification Score: Single Vital Parameter over Course of Time
Our way to using Artificial Intelligence



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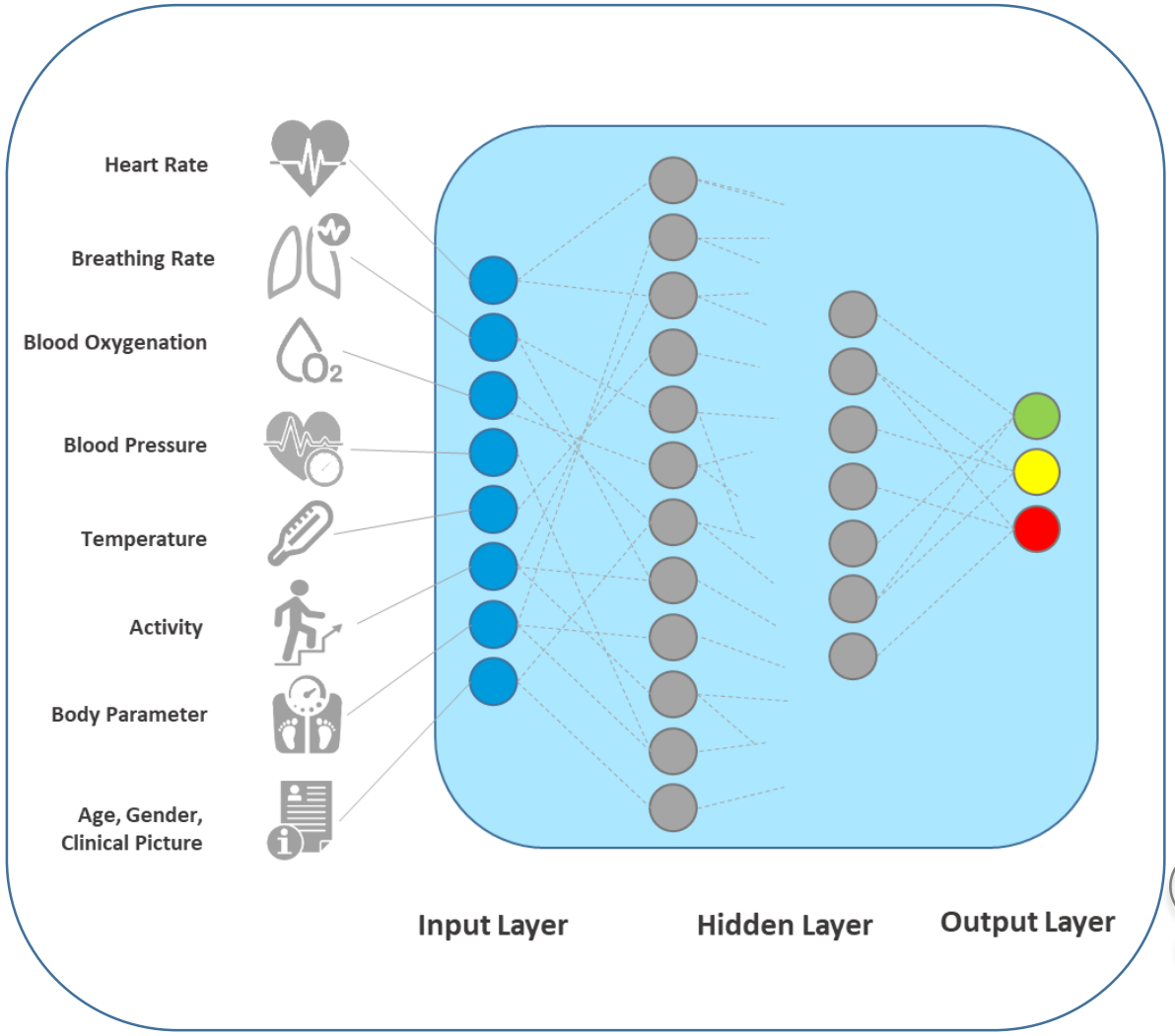
Notification Score: Neuronal Network (Algorithm) for Patient Status



measure → model → predict

Next step towards digitization:

- Mapping complex input of vital parameters to establish standardized scores

Robust outcome in presence of noise and lack of input parameter required

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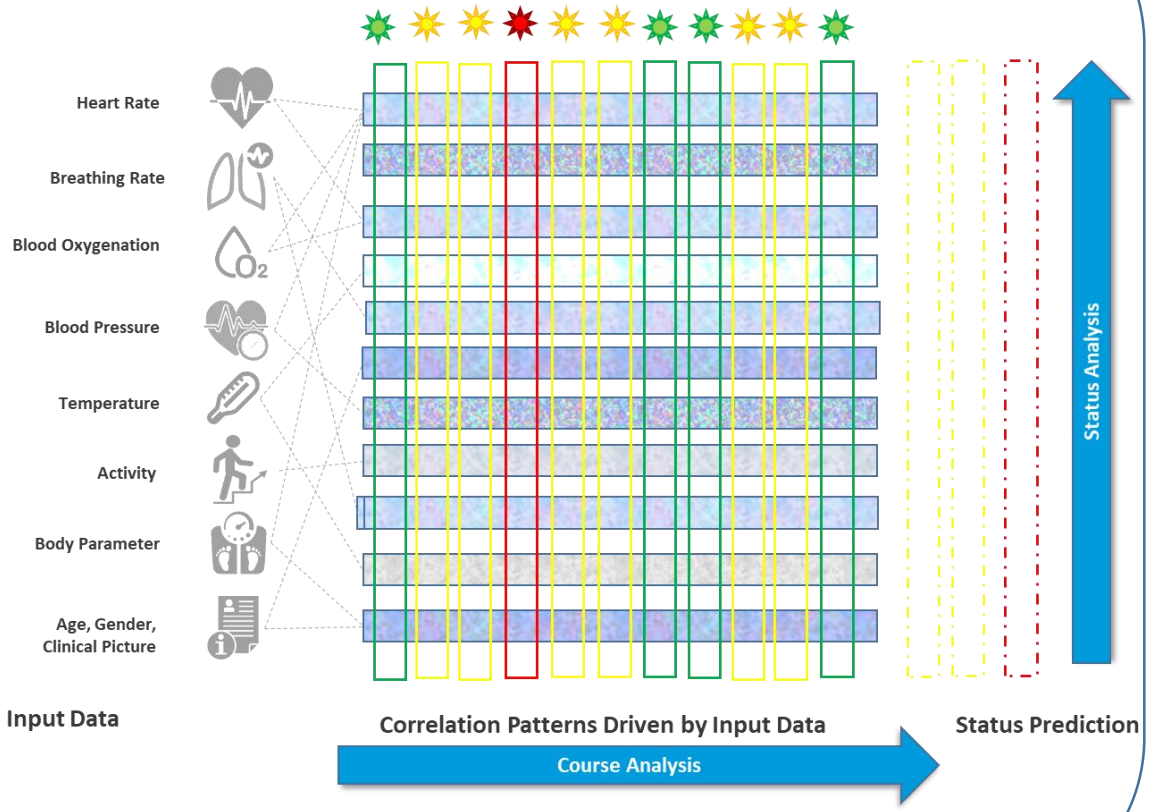
Notification Score: Patient Status Engine`s next evolutionary step

Neuronal Network (Algorithm) for Status Prediction



measure → model → predict

Digitizing the Patient: Digital Clinical Decision Support

- Medical experience of physicians is used through the digital health solution
- Algorithm can be used as SOP across clinical institutions
- New methods of medical learning possible

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