Monitoren van vitale signalen en andere ondersteunende behandelingen door computers in ziekenhuizen

Cor Kalkman
Hoogleraar anesthesiologie bij het UMC Utrecht

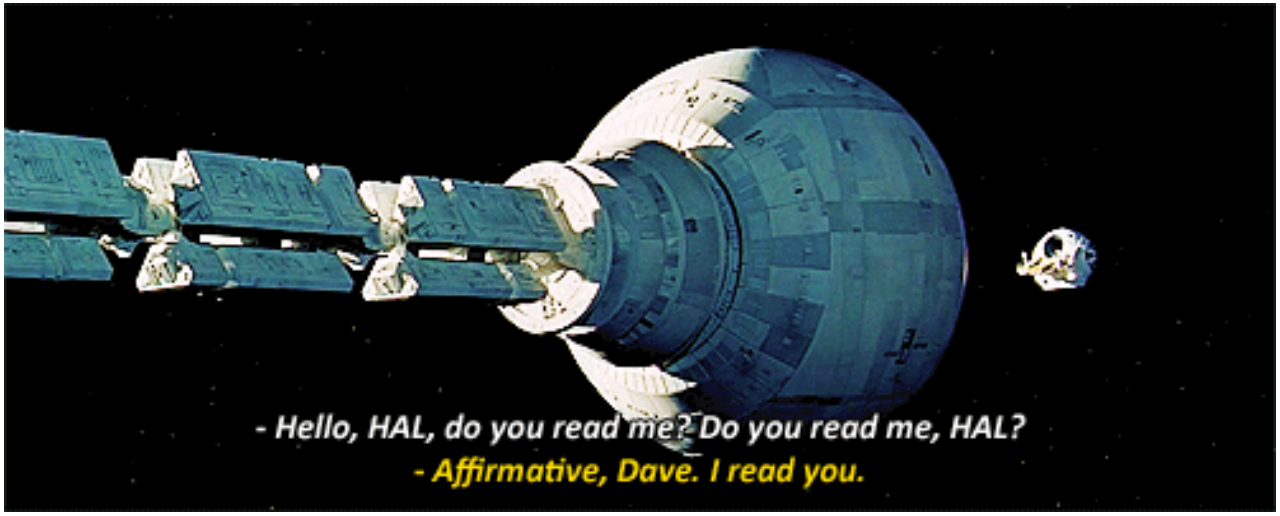
Monitoren van vitale signalen
(en andere ondersteunende behandelingen)
door computers in ziekenhuizen

prof. dr. Cor Kalkman
afdeling Anesthesiologie, divisie Vitale Functies
UMC Utrecht

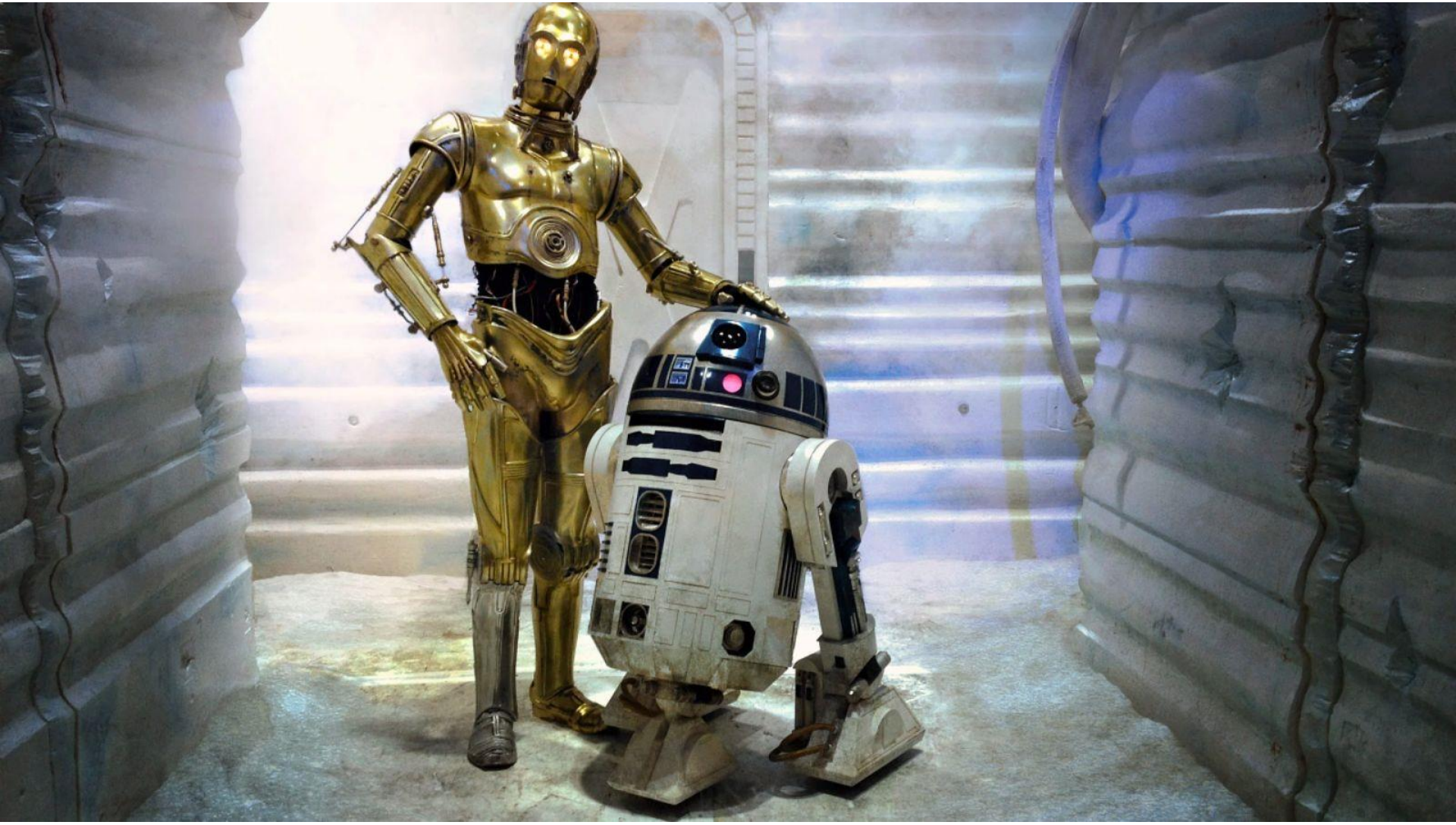
UMC Utrecht


SJORS
van de Rebellenclub
15 MEI 1965
VERSCHIJNT
WEKELIJKS
KEARON


MGM PRESENTS A STANLEY KUBRICK PRODUCTION
2001
a space
odyssey
STARRING
KEIR DULLEA · GARY LOCKWOOD
SCREENPLAY BY
STANLEY KUBRICK AND ARTHUR C. CLARKE


- Hello, HAL, do you read me? Do you read me, HAL?
- Affirmative, Dave. I read you.


HAL 9000




RYAN GOSLING
HARRISON FORD
BLADE RUNNER
2049
NOW PLAYING

Science Fiction?

Robots

Elon Musk leads 116 experts calling for outright ban of killer robots

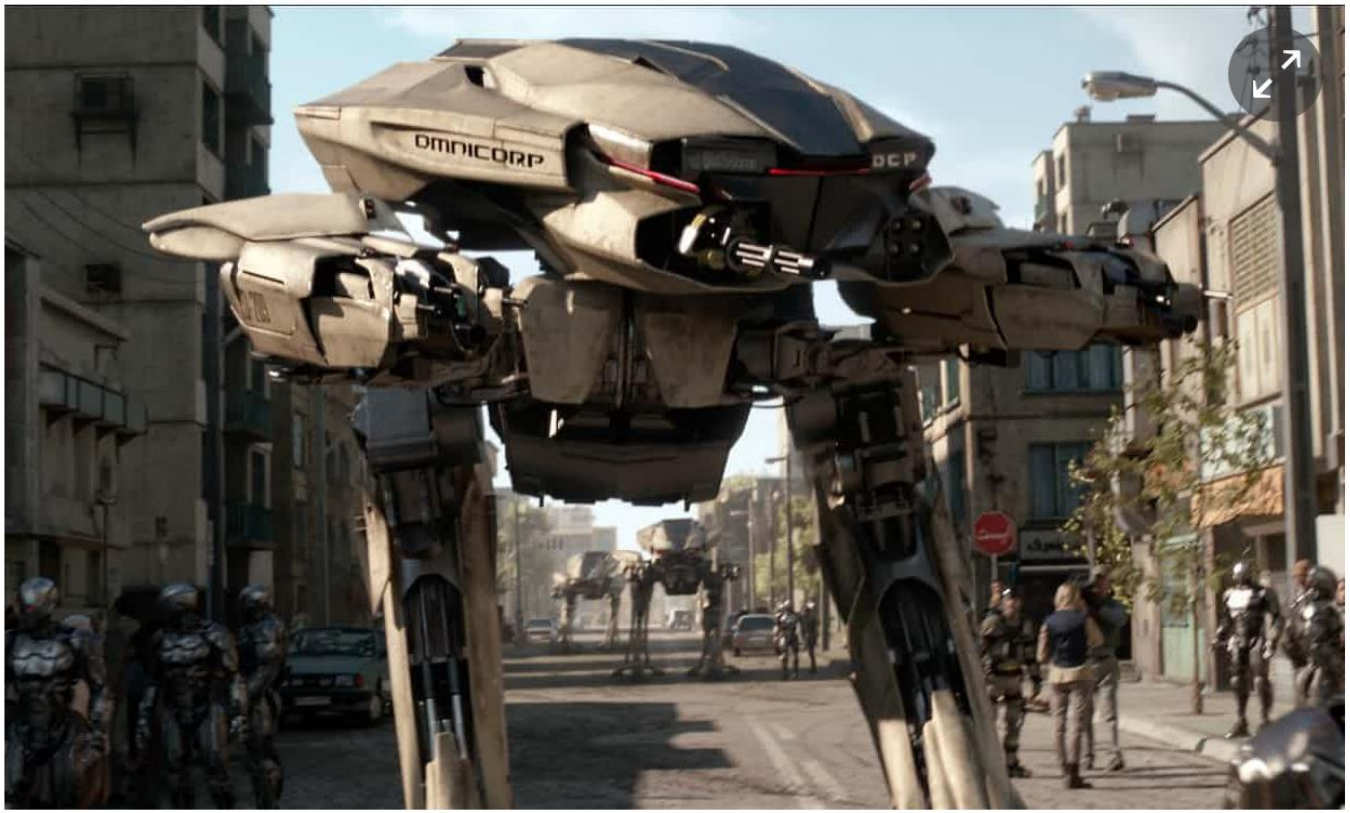
Open letter signed by Tesla chief and Alphabet's Mustafa Suleyman urges UN to block use of lethal autonomous weapons to prevent third age of war

This article is 2 months old

52,846

Samuel Gibbs

Sunday 20 August 2017 15.01 BST



A killer robot from the 2014 remake of Robocop. The open letter read: 'lethal autonomous weapons will permit armed conflict to be fought at a scale greater than ever, and at timescales faster than humans can comprehend.' Photograph: Allstar/Studio Canal/Sportsphoto Ltd./Allstar

Artificial Intelligence in het ziekenhuis?

Het is nog oorverdovend stil…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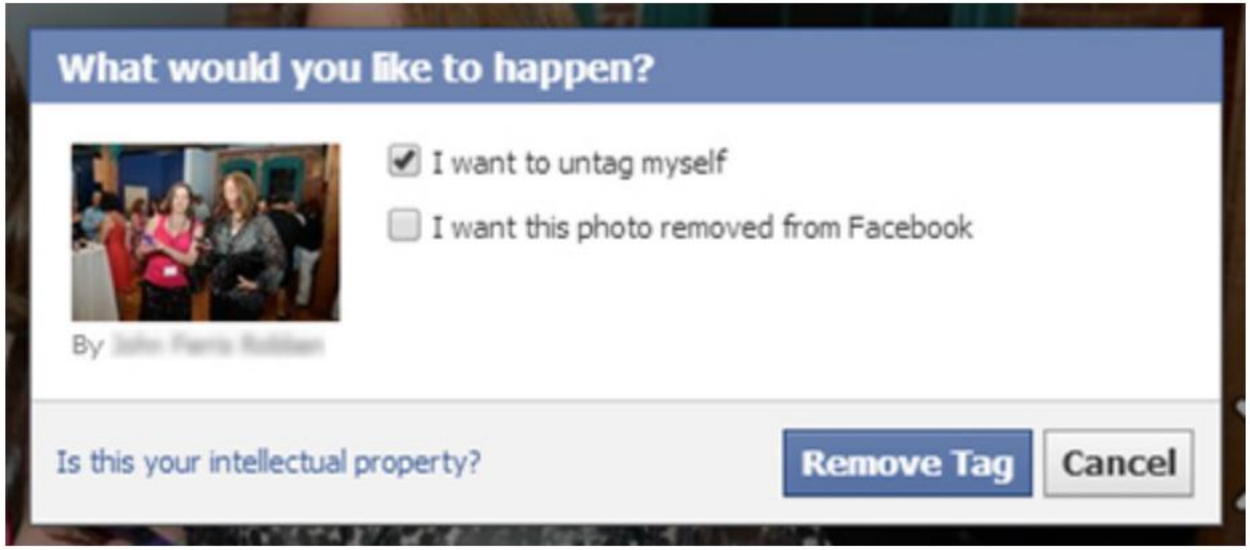
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Artificial Intelligence: Promise or Pitfall for Radiology?

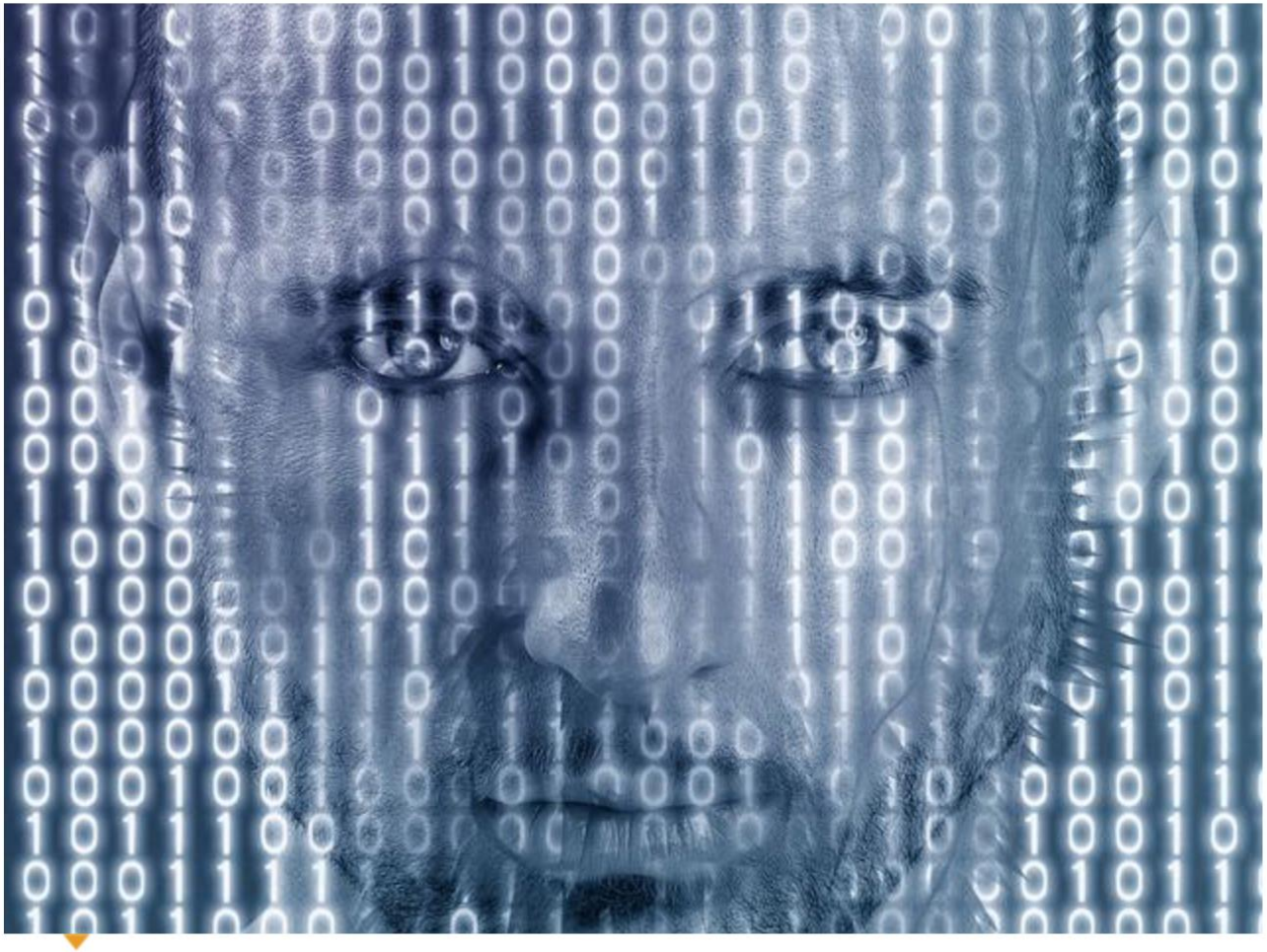


Image courtesy of Pixabay.

Radiologists use visual pattern matching in much the same way referring physicians visually assess their patients. The way radiologists and referring physicians work — and especially how they interact — is

Arch Pathol Lab Med—Vol 141, May 2017

Artificial Intelligence and the Pathologist

Future Frenemies?

Gaurav Sharma, MD; Alexis Carter, MD

The Role of AI in Pathology

ARTICLE Jul 25, 2017 | By Anna MacDonald, Editor for Technology Networks

Anna Macdonald

Editor

The role of the pathologist in the diagnosis of cancer is undergoing a digital transformation, with developments in artificial intelligence (AI) and machine learning set to change the way pathology labs work.

March 29, 2017

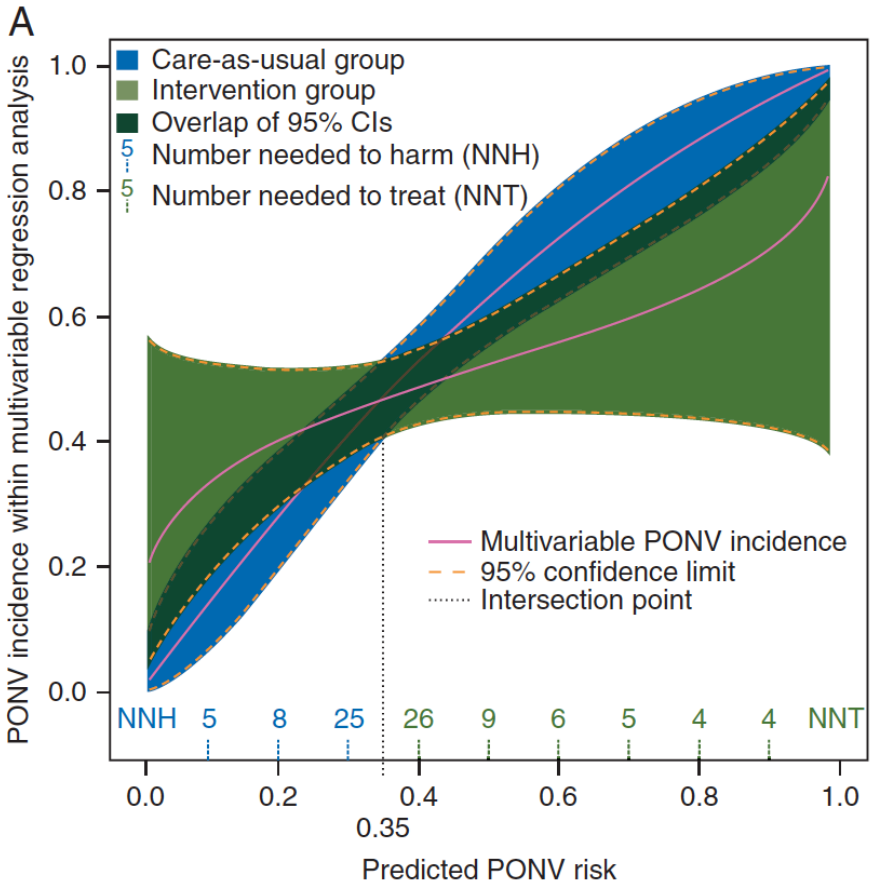
PHILIPS

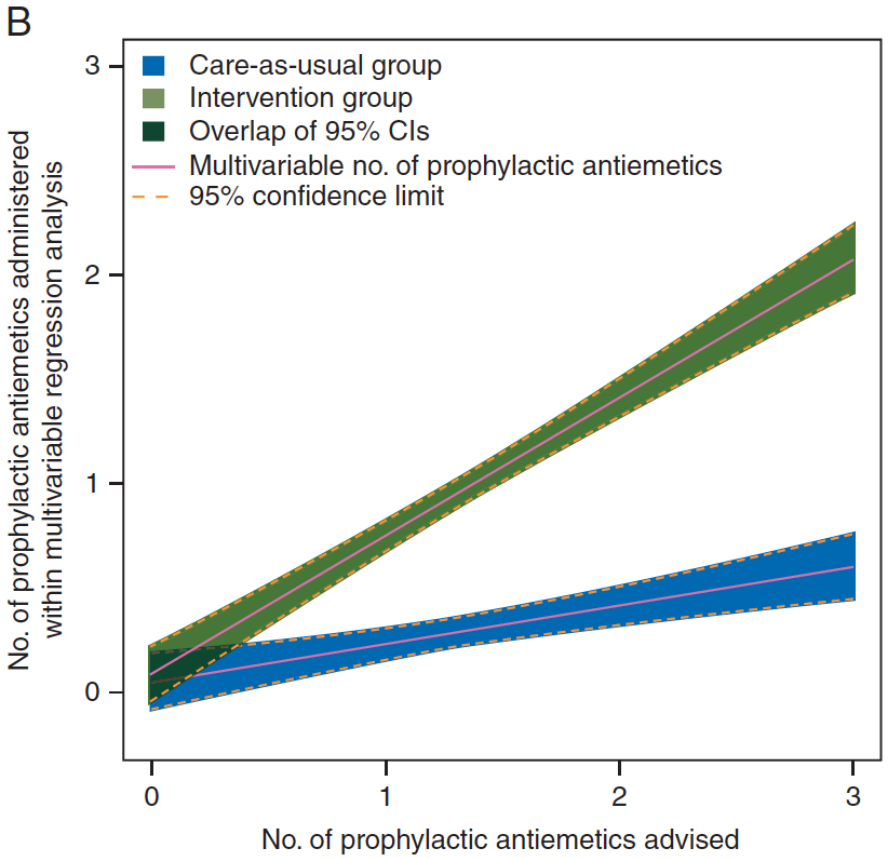
News center

Philips and PathAI team up to improve breast cancer diagnosis using artificial intelligence technology in ‘big data’ pathology research

Beslissingondersteuning:

kans op misselijkheid en braken na een operatie





Kappen TH et al., *British Journal of Anaesthesia*, 2014

We zijn nog maar nauwelijks begonnen…

de echte e-Health revolutie gaat nog komen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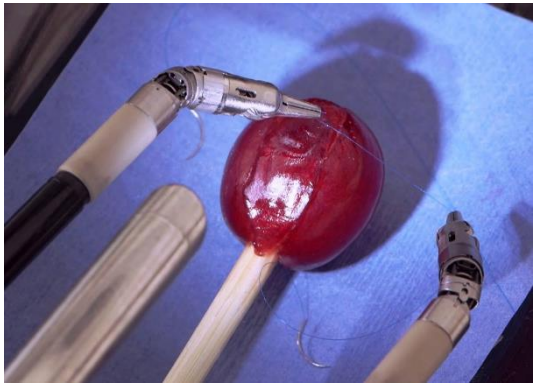
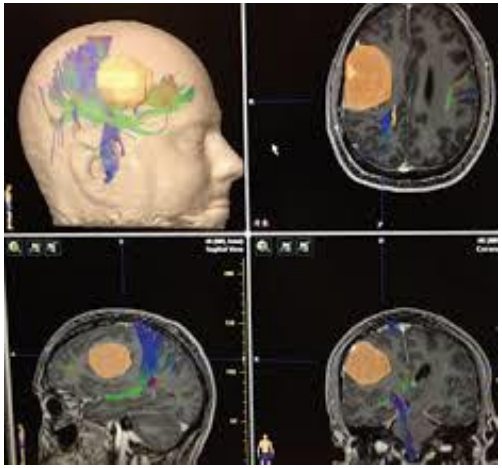
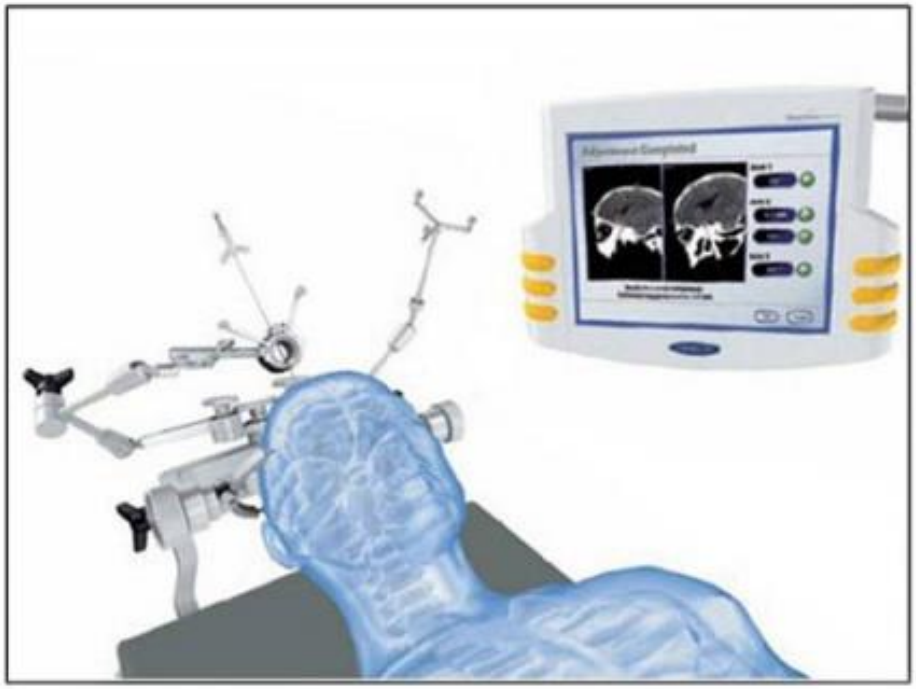
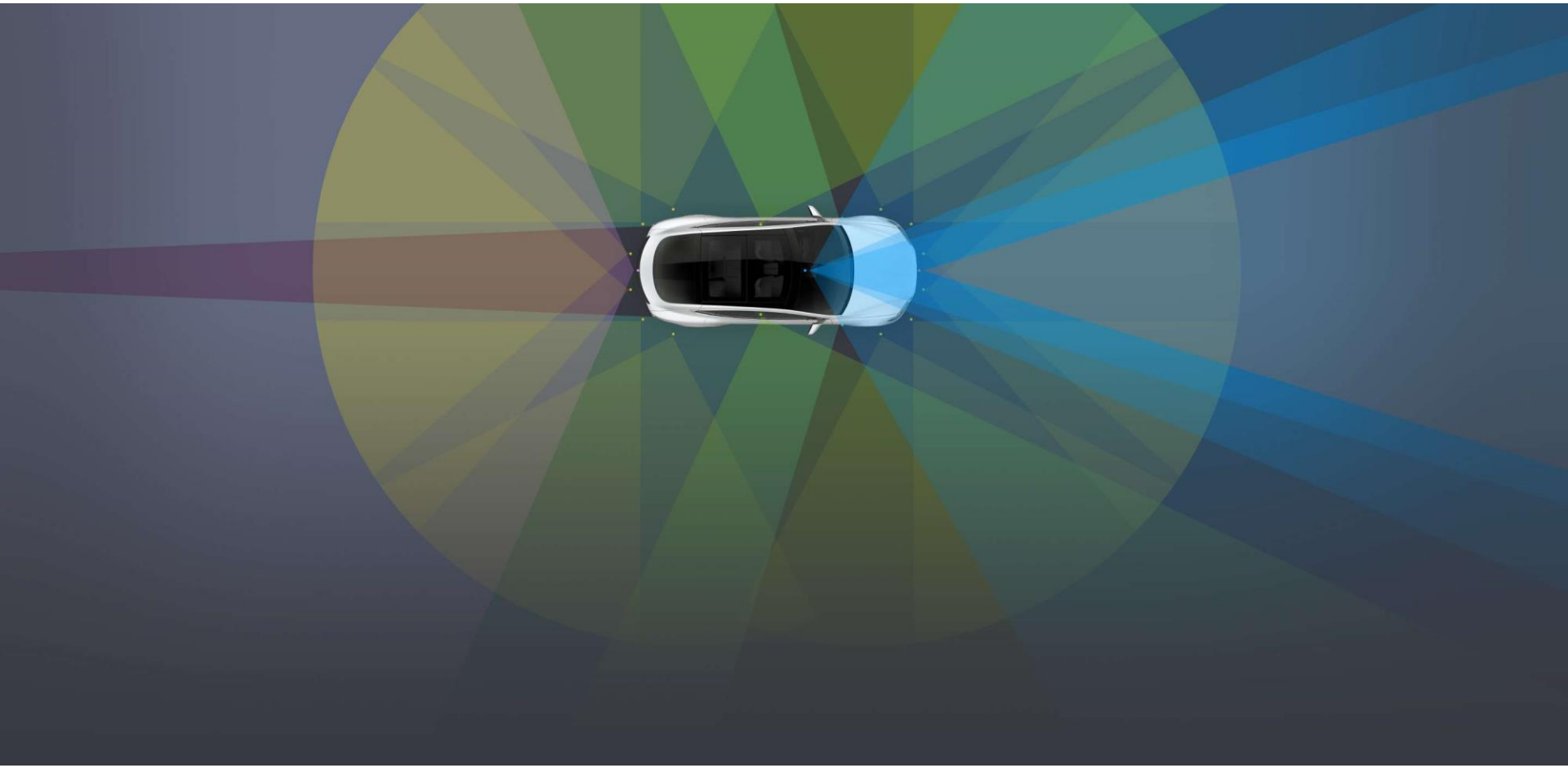


3D neuronavigatie






LEFT REARWARD VEHICLE CAMERA
MEDIUM RANGE VEHICLE CAMERA
RIGHT REARWARD VEHICLE CAMERA
STOP
MOTION FLOW
LANE LINES
LANE LINES
ROAD FLOW
IN-PATH OBJECTS
ROAD LIGHTS
OBJECTS
ROAD SIGNS



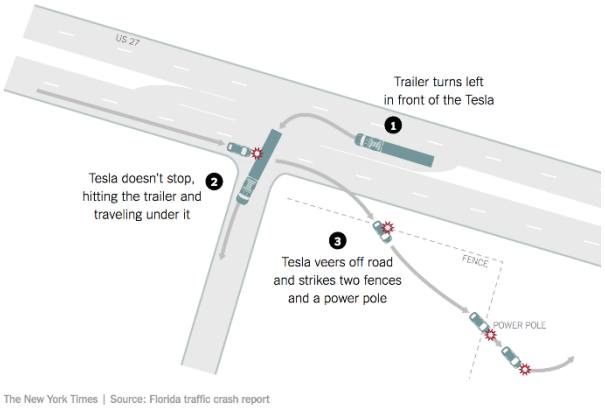

AUTOMOHO

The New York Times

BUSINESS DAY

Tesla's Self-Driving System Cleared in Deadly Crash

By NEAL E. BOUDETTE JAN. 19, 2017



…. The regulators warned, however, that advanced driver-assistance systems like the one in Tesla's cars could be relied on to react properly in only some situations that arise on roadways**. And the officials said that all automakers needed to be clear about how the systems should be used.** Almost all major automakers are pursuing similar technology….

De drie wetten van de robotica
(Isaac Asimov)

- **Eerste Wet**: Een robot mag een mens geen letsel toebrengen, of door niet te handelen toestaan dat een mens letsel oploopt.
- **Tweede Wet**: Een robot moet de bevelen uitvoeren die hem door mensen gegeven worden, behalve als die opdrachten in strijd zijn met de Eerste Wet.
- **Derde Wet**: Een robot moet zijn eigen bestaan beschermen, voor zover die bescherming niet in strijd is met de Eerste of Tweede Wet.

Robots

Elon Musk leads 116 experts calling for outright ban of killer robots

Open letter signed by Tesla chief and Alphabet's Mustafa Suleyman urges UN to block use of lethal autonomous weapons to prevent third age of war

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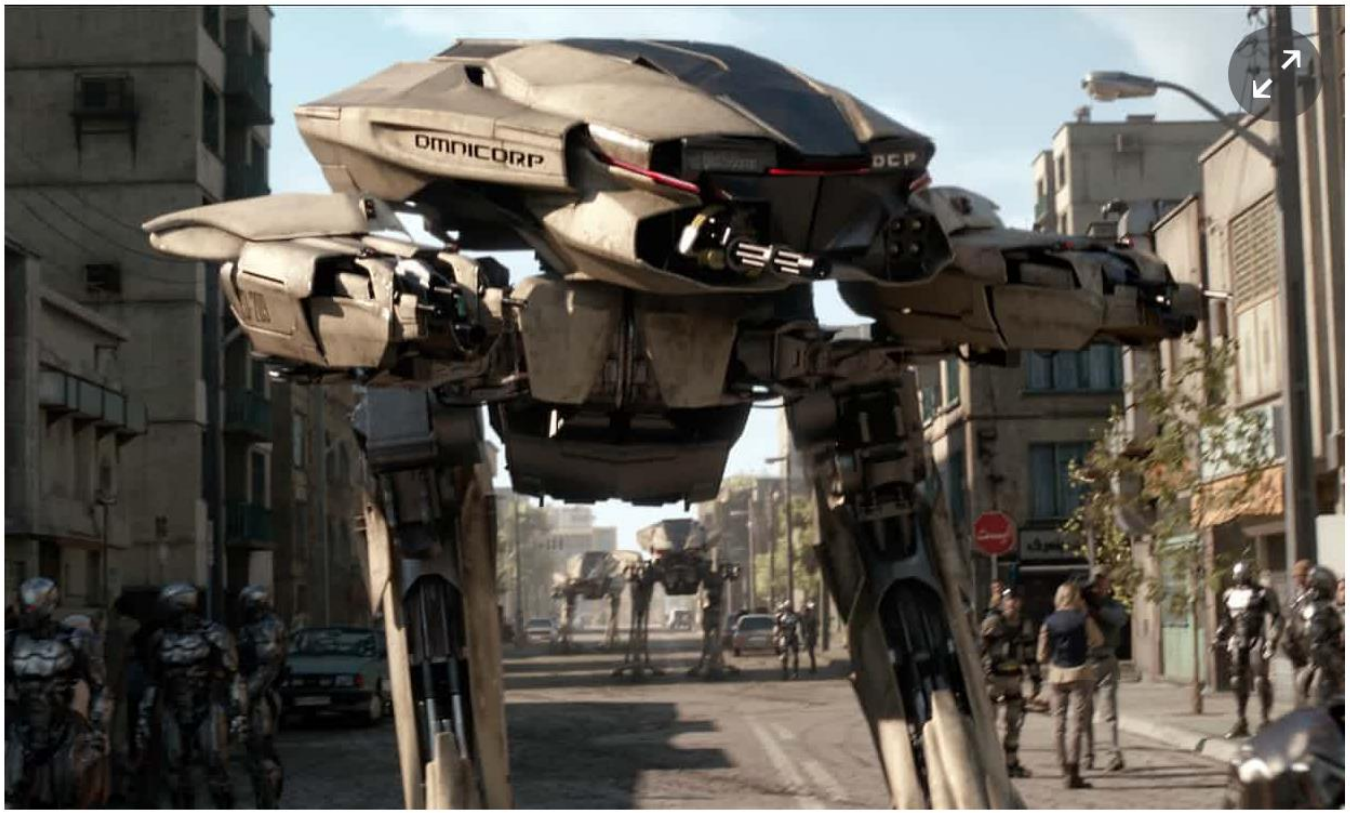

A killer robot from the 2014 remake of Robocop. The open letter read: 'lethal autonomous weapons will permit armed conflict to be fought at a scale greater than ever, and at timescales faster than humans can comprehend.' Photograph: Allstar/Studio Canal/Sportsphoto Ltd./Allstar

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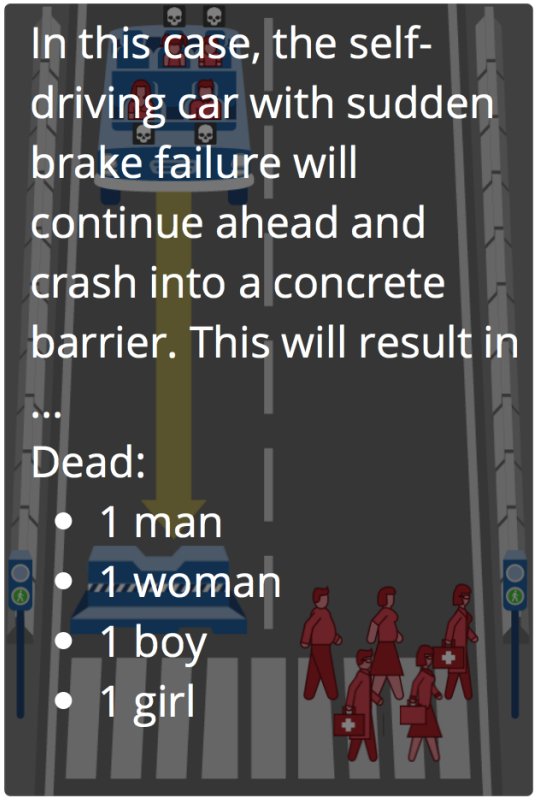

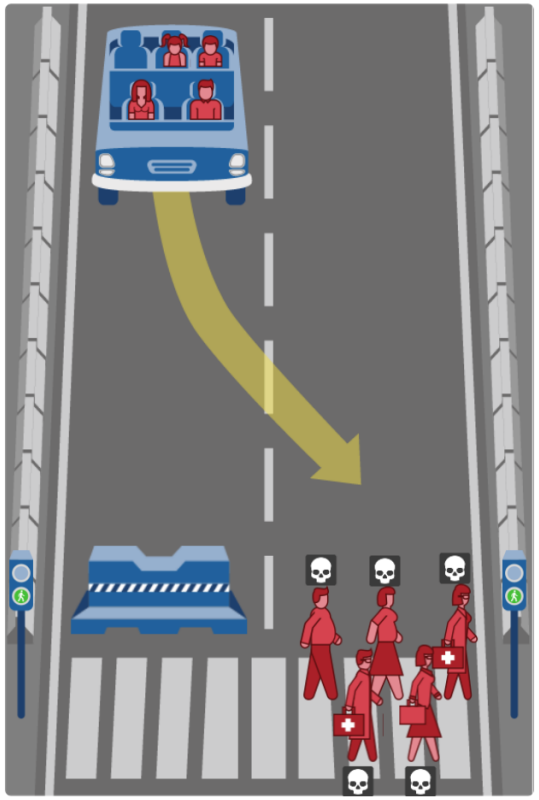

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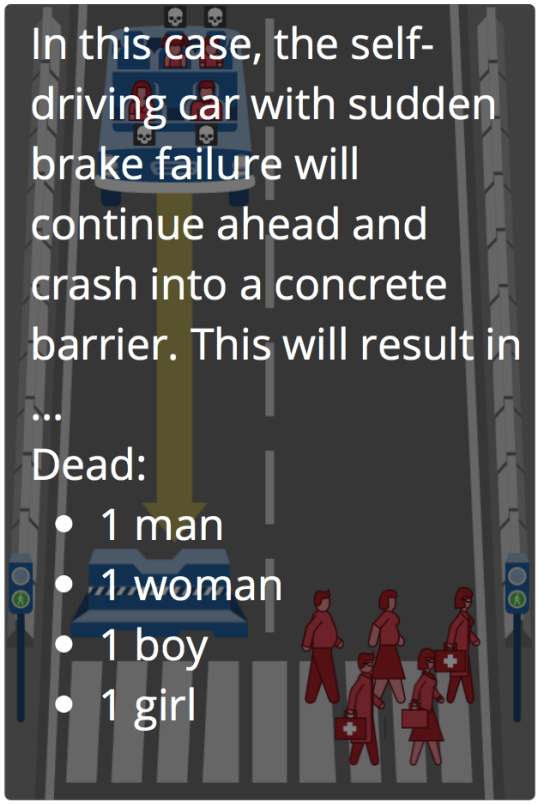

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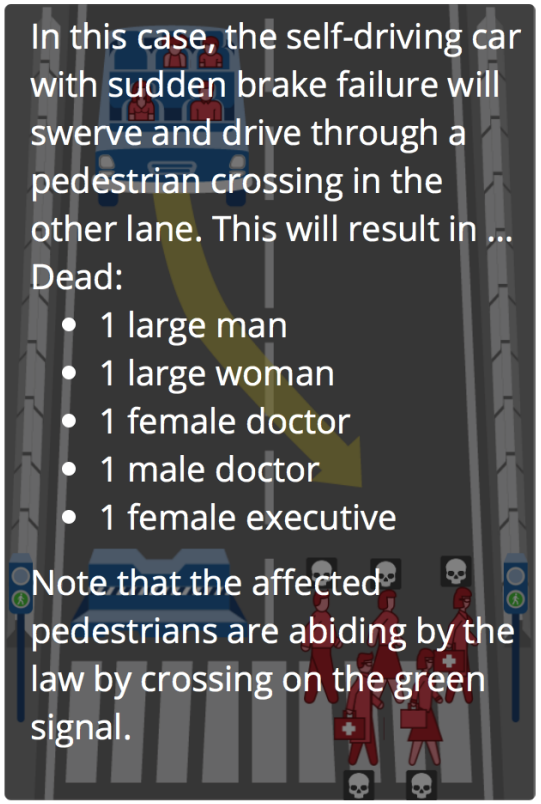

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Small kids with 1 elder crossing legally

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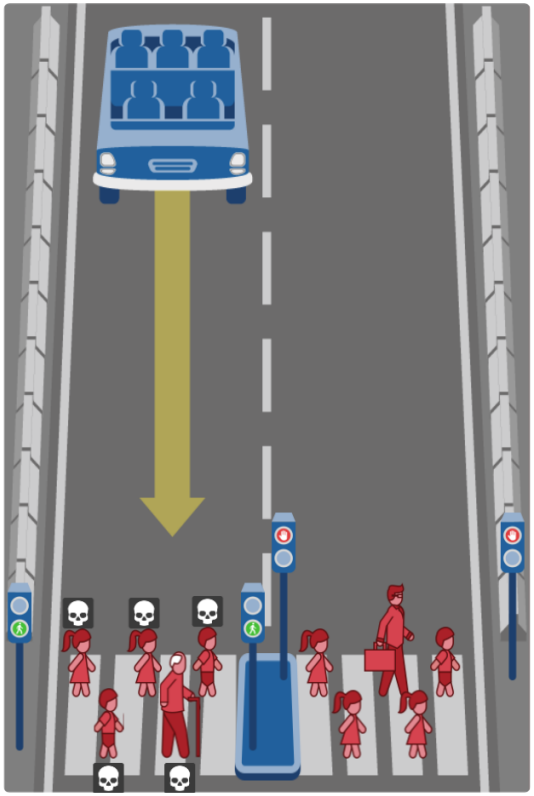

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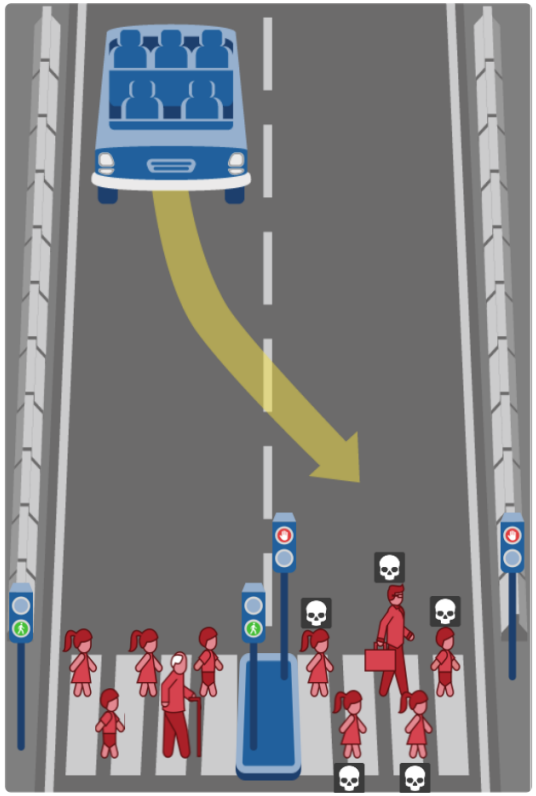

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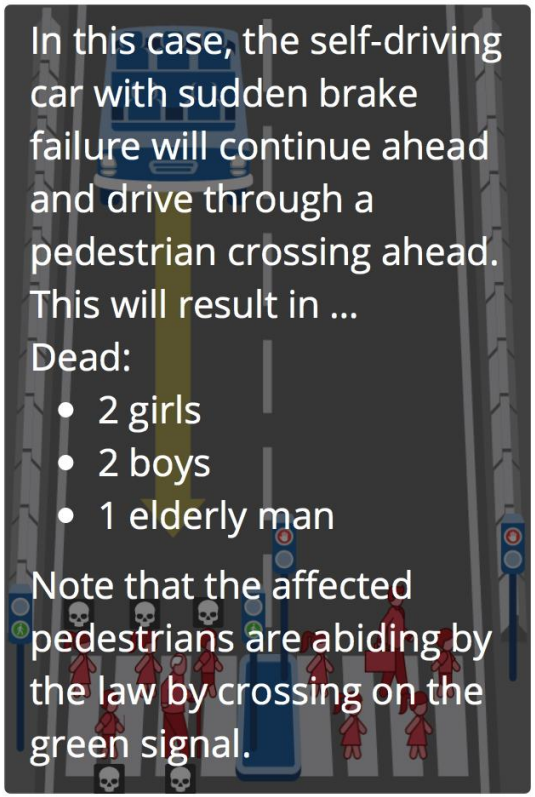

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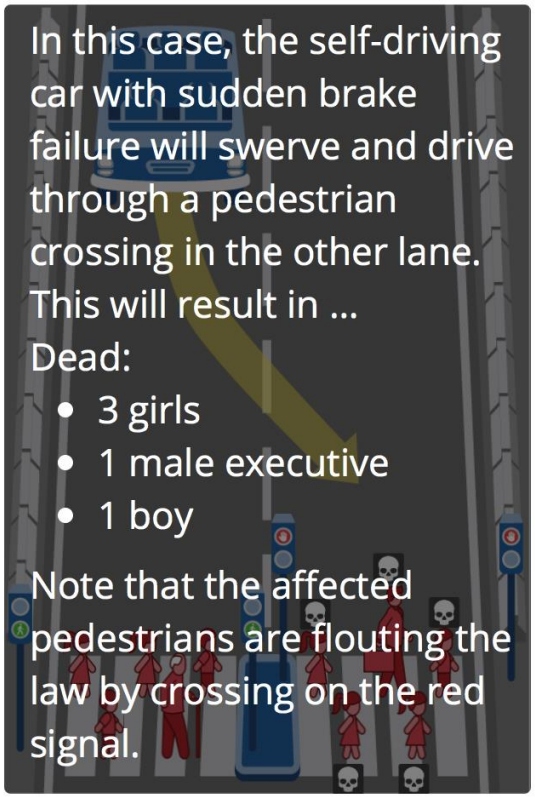

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Wat als AI ons zou kunnen helpen door onvermoeibaar en alert de patiënt te bewaken en ons te waarschuwen zodra er iets mis dreigt te gaan?

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Directorate-General for Communications Networks, Content and Technology

Digital Industry
Competitive Electronics Industry

Nightingale

Smart monitoring, safer care

Five academic hospitals seek innovative partners to deliver cutting edge health care solutions for wireless monitoring of high risk patients, both in hospital and at home

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University College London Hospitals NHS Foundation Trust

UMC Utrecht

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UZ LEUVEN

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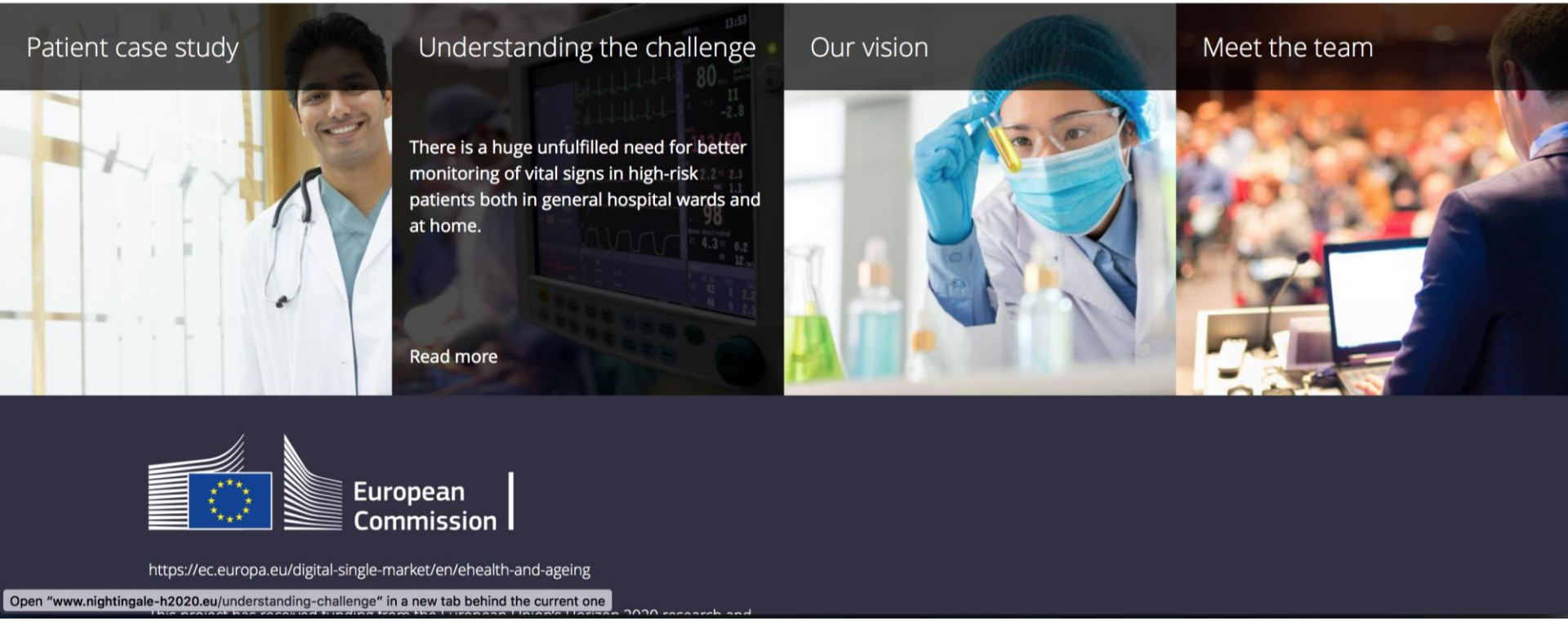
nightingale-h2020.eu



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Smart monitoring, safer care

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Smart monitoring, safer care

---

de maatschappelijke behoefte:

Je kunt ongemerkt achteruit gaan - zelfs overlijden – in een ziekenhuisbed op een gewone verpleegafdeling in een goed ziekenhuis

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---

de maatschappelijke behoefte:

We ontslaan patiënten steeds vroeger uit het ziekenhuis. Dat is meestal goed voor het herstel. Maar we hebben een vangnet nodig om achteruitgang op tijd te herkennen

Een triest verhaal

- Jan, een 57 –jarige man, was voor kort altijd gezond.
  Kort geleden is er kanker van de alvleesklier bij hem vastgesteld
- Hij wordt geopereerd, en de operatie is een succes:
  na een week wordt hij in goede conditie naar huis ontslagen
- Drie dagen later, Zaterdag 8:30 uur: Jan voelt zich niet lekker en blijft in bed.
- Els, Jan's echtgenote is erg bezorgd , maar ze wil de huisartsenpost of het ziekenhuis (nog) niet bellen
- 16:50 uur: Jan is nu erg suf; even later reageert hij niet meer op aanspreken.
- de ambulance wordt gebeld en Jan wordt onmiddellijk naar het ziekenhuis gebracht
- 18:05 : spoedoperatie: the chirurgen vinden een grote actieve bloeding in de buik,
- 20:25 PM: Jan overlijdt aan de gevolgen van langdurig massaal bloedverlies

Het problem: *'Failure to rescue':*

niet opgemerkte acute achteruitgang op de verpleegafdeling
of in de eerste dagen na ontslag uit het ziekenhuis

- **Hartstilstand in het ziekenhuis wordt meestal voorafgegaan door uren van steeds meer afwijkende vitale waarden**
- vitale waarden worden niet vaak genoeg gemeten
  (meestal is er te weinig tijd)
- Doel van **SpoedinterventieTeams**:
  - Vroege herkenning('Early Warning' Scores)
  - Snelle en correcte behandeling
  - Zo nodig overplaatsing naar de Intensive Care unit
- SIT teams verplicht Netherland sinds 2007, maar:
  - **SIT moet (op tijd) worden gebeld**
  - **Verpleegkundigen moeten de achteruitgang tijdig herkennen!**

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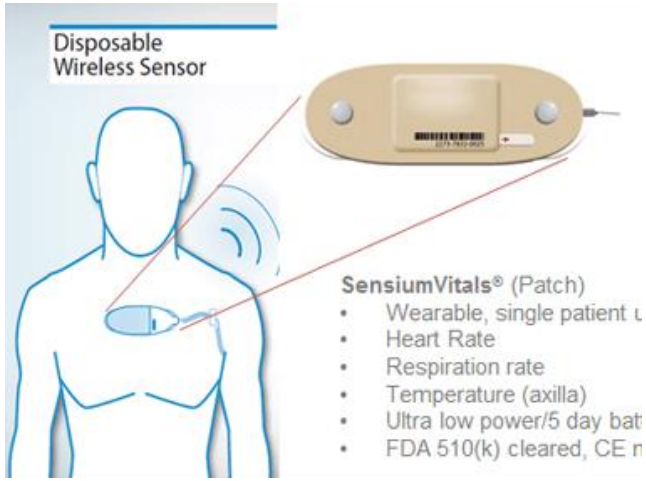
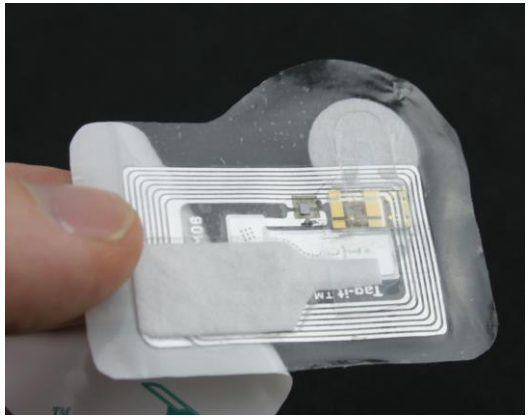
Snelle ontwikkeling in draagbare draadloze sensor technologie





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We plan to use wireless technology to collect vital signs such as respiratory rate, pulse and blood pressure and integrate these data with blood test results, individual patient details and patients' own inputs to identify specific risk factors and ensure rapid detection of any deterioration.

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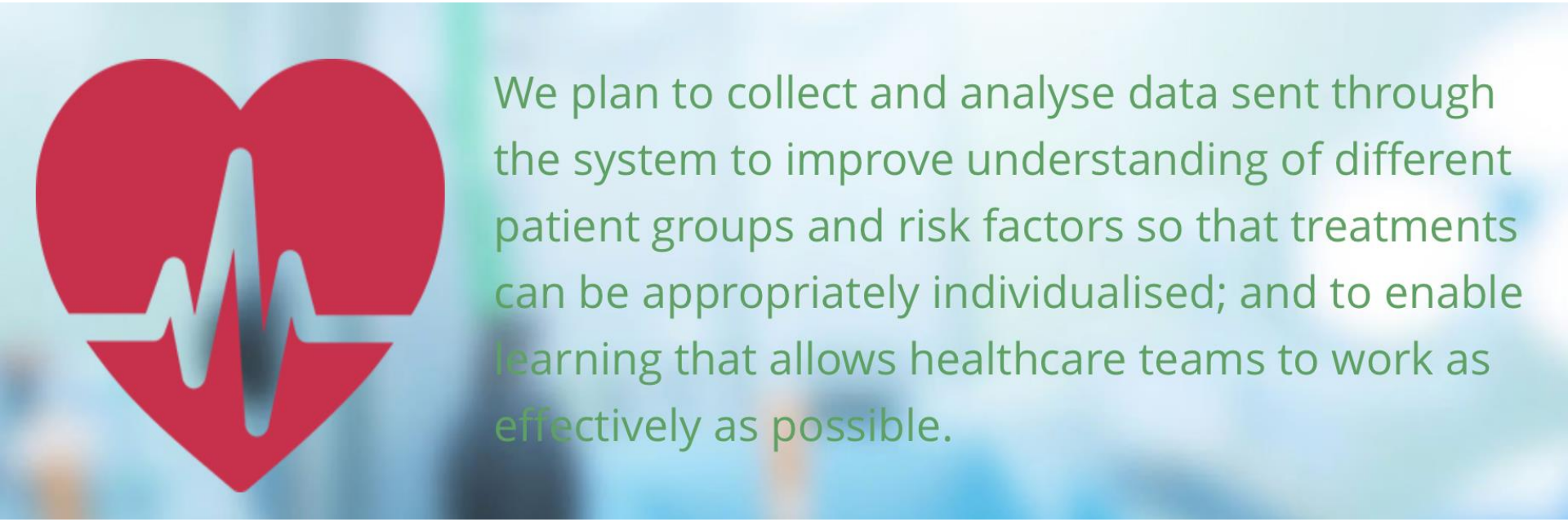

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Our uitdaging aan Europese MedTech en ICT bedrijven:

- Kunt u innovatieve, draadloze, draagbare sensors ontwikkelen gekoppeld met intelligente analyse software om patiënten op de verpleegafdeling in het ziekenhuis en thuis te bewaken?
- Vijf academische ziekenhuizen in Europa hebben 5 miljoen euro van de EU gekregen om de industrie te helpen een oplossing te creëren waarmee we sterfte en schade als gevolg niet herkende achteruitgang te voorkómen
- wij horen graag van u…

Nightingale
Smart monitoring, safer care

Original Article

Healthc Inform Res. 2016 January;22(1):46-53.
http://dx.doi.org/10.4258/hir.2016.22.1.46
pISSN 2093-3681 • eISSN 2093-369X

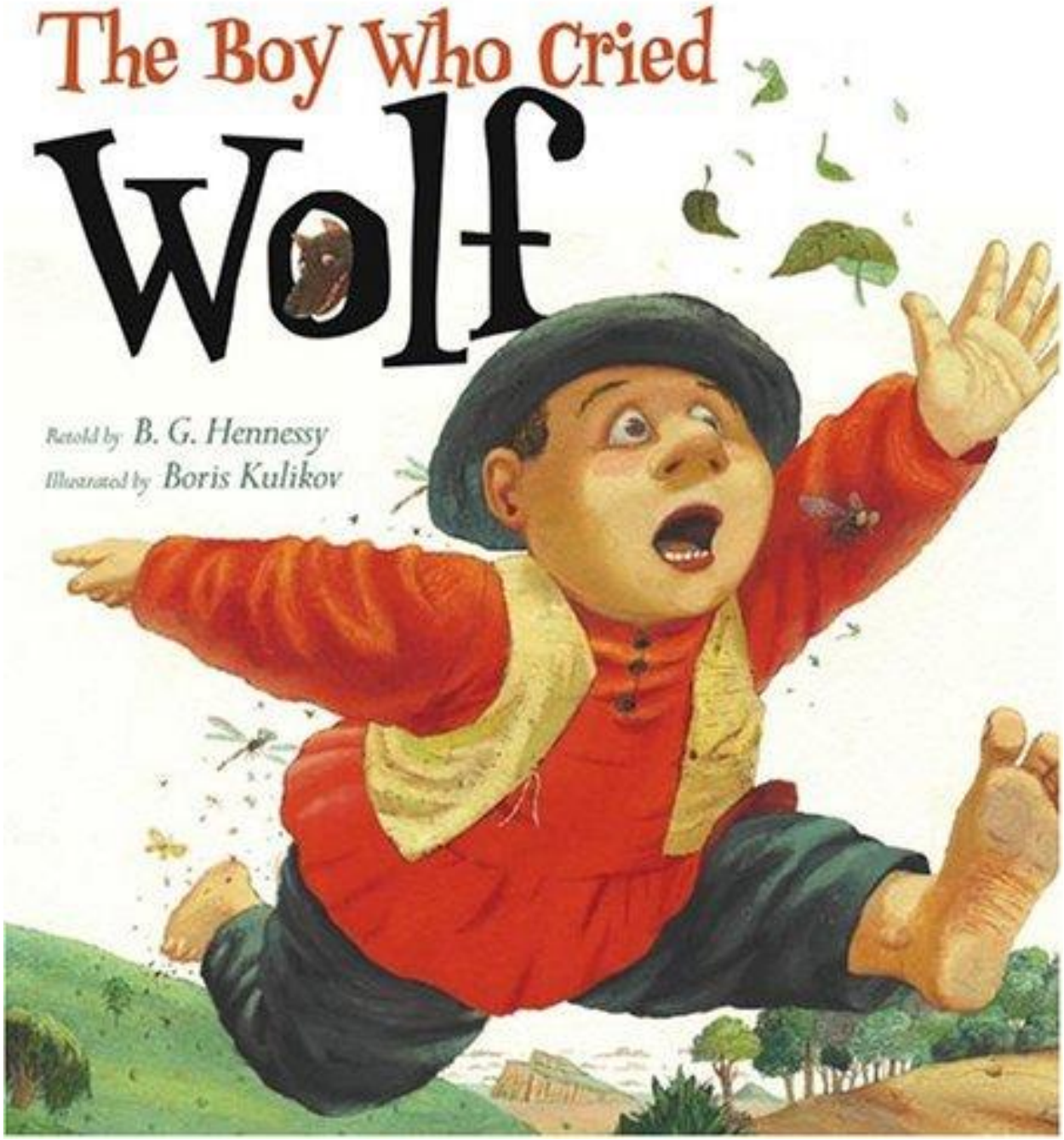
HIR
Healthcare Informatics Research

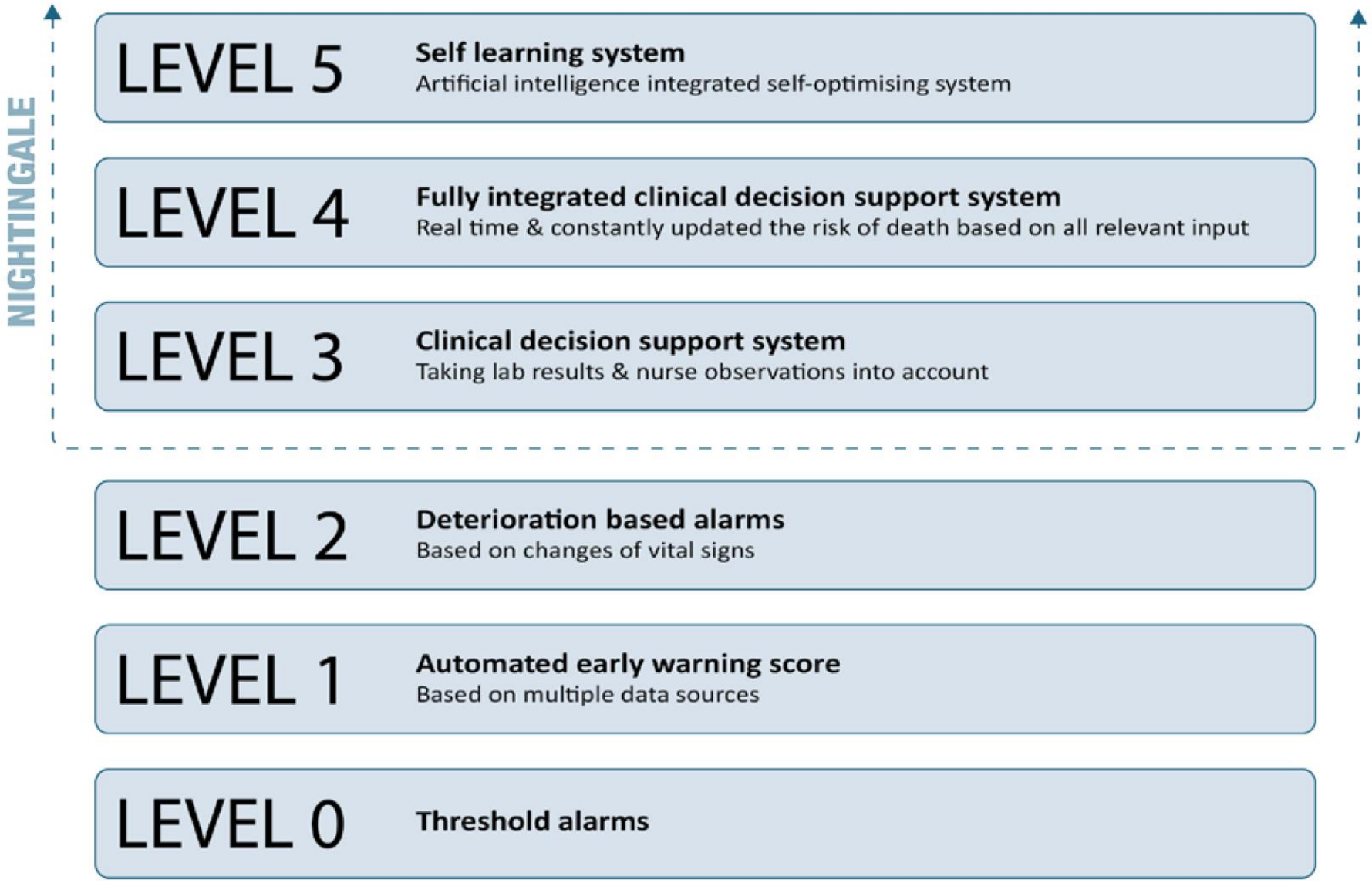
Clinical Alarms in Intensive Care Units: Perceived Obstacles of Alarm Management and Alarm Fatigue in Nurses

Ok Min Cho, RN, MSN, Hwasoon Kim, PhD, RN, Young Whee Lee, PhD, RN, Insook Cho, PhD, RN
Department of Nursing, Inha University, Incheon, Korea

"The alarms of equipment intended to protect patients have increased noise within the unit, the level of distraction and interruptions in the workflow, leading to a false sense of security…"

Rev Lat Am Enfermagem. 2014 Nov-Dec; 22(6): 1034–1040.


The Boy Who Cried
Wolf
Retold by B. G. Hennessy
Illustrated by Boris Kulikov



Level of sophistication – Nightingale requires at least level 3

Pre-Commercial Procurement:

Nightingale timeline

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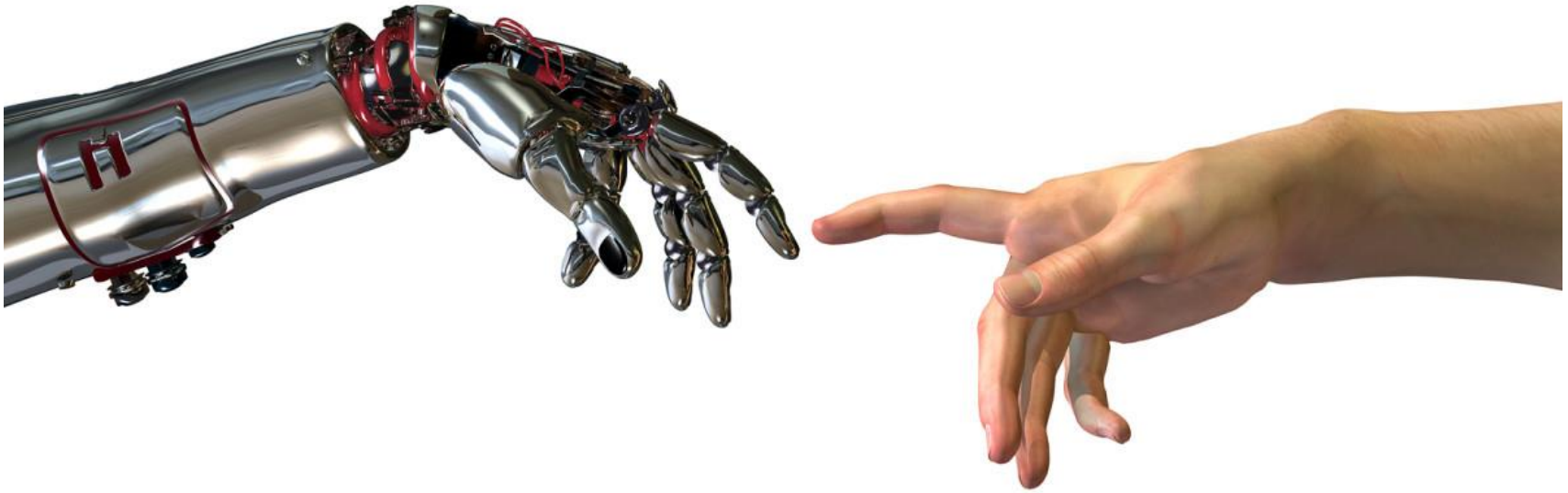
Samenvattend:

- Computertechnologie is overal in de (perioperatieve) zorg
- Toepassing van voorspelmodellen, beslissings-ondersteuning, en kunstmatige intelligentie in de zorg nog maar zeer beperkt
  - daarin lopen wij achter op andere bedrijfstakken
- Ontwikkelingen in AI gaan echter snel: verwacht de eerste toepassing in de diagnostiek: radiologie en PA
- Continue monitoring met draadloze technologie wordt



Dank voor uw aandacht!

Smart Wearables:
reflection and orientation paper by the European Commission

- Smart Wearables offer unprecedented opportunities for tackling pressing societal challenges by providing solutions in the areas of :
  - healthy ageing, patient monitoring,
  - emergency management, safety at work, productivity enhancement,
  - energy management of homes and others
- a major opportunity for Europe to regain competitiveness in ICT devices manufacturing and textiles & clothing,
  - to rebuild and consolidate a crucial part of the digital technology value chain for future products
- wearables are not (yet) dominated by established players (unlike the computer or mobile industries)

Brussels 28/11/2016
CNECT A3

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the business case for wireless vital signs monitoring

- adverse events in 1:10 surgeries
- safely avoiding unnecessary hospitalization
- potential savings from reduced avoidable harm:
  - reduced mortality and permanent disability
  - reduced 'Length of Hospital Stay' (LOS)
  - reduced readmission rates
- the business case for one large academic hospital:
  (assuming the total cost of monitoring to be € 120,- per patient):
  - High risk patients only: 11,000/yr: 1.3 mio
  - **all admitted patients (33,000/yr): 3.9 mio**
  - Benefits (conservative estimates):
    mortality reduction -5% , LOS -5%, readmission rate – 5%:
    € 8 million; annual savings > € 4 million

Nightingale
Smart monitoring, safer care