



Artificial intelligence

The road to bedside

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intensivist / klinisch farmacoloog

Disclosures

Werkzaam als:

- Intensivist
- "Digitale dokter" AI



Werkzaam als:

- AI consultant



de Volkskrant

Topverhalen vandaag Opinie Podcasts Cultuur & Media Beter

COLUMN
ALEID TRUIJENS

Natuurlijk gebruiken leerlingen ChatGPT. Het onderwijs kan maar beter anticiperen op de robots



Tweede Kamer
DER STATEN-GENERAAL

Home > Kamerstukken > Kamervragen

Schriftelijke vragen

De tekstgenerator ChatGPT

Business AM  RADIO **ECONOMIE** BUSINESS POLITIEK TECH  **LIJSTER LIVE**

3,86  0,69% **CAC 40 | PARIS** 7.233,94  0,94% **DAX | FRANKFURT** 15.476,43  -0,21% **UK 100** 789,78  1,05% **SWITZERLAND 20**

PERSONAL FINANCE MOBILITEIT ENERGIE CRYPTO ASIA OPINIE **BEURSNIEUWS**  **MARKTEN** 

[Hoofdpagina](#) > ChatGPT slaagt voor examen MBA

ChatGPT slaagt voor examen MBA



Fragment

Waarom zou je zelf huiswerk maken, als een robot dat veel beter kan?

De potentie van ChatGPT



Write a fictional story in a case report format for a scientific journal about a patient admitted to the ICU that was treated successfully with the aid of ChatGPT



Case Report: Successful Treatment of a Patient in the ICU with the Aid of ChatGPT




Background: ChatGPT is a state-of-the-art natural language processing tool that utilizes a deep learning model to generate coherent and contextually appropriate responses to user input. It has previously been utilized in a variety of settings, including customer service and language translation, but has not yet been tested in the medical field.




Case Description: The patient, a 45-year-old male, was admitted to the ICU with severe sepsis secondary to pneumonia. Despite receiving optimal medical care, the patient remained critically ill and required mechanical ventilation. The treating team, consisting of an intensivist, a respiratory therapist, and a nurse, began to explore alternative treatment options.

After reviewing the available literature, the team decided to trial the use of ChatGPT as an adjunctive therapy. The ChatGPT system was integrated into the patient's electronic medical record and a chatbot was created specifically for the patient. The chatbot was

De potentie van ChatGPT



 Add references

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Case Description: The patient, a 45-year-old male, was admitted to the ICU with severe sepsis secondary to pneumonia. Despite receiving optimal medical care, including intravenous antibiotics (ceftriaxone and azithromycin) and vasopressors (norepinephrine and vasopressin), the patient remained critically ill and required mechanical ventilation. The treating team, consisting of an intensivist, a respiratory therapist, and a nurse, began to explore alternative treatment options.

After reviewing the available literature, the team decided to trial the use of ChatGPT as an adjunctive therapy. The ChatGPT system was integrated into the patient's electronic medical record and a chatbot was created specifically for the patient. The chatbot was programmed to provide real-time updates on the patient's vital signs, medication administration, and care plan. It also prompted the healthcare team to adjust the patient's treatment regimen as needed, based on the latest evidence-based guidelines (2,3).

For example, the chatbot reminded the team to review the patient's antibiotic regimen and consider switching to a different agent if the patient was not responding to treatment (4). It also alerted the team to potential adverse reactions to the vasopressors and suggested alternative medications if necessary (5).

De potentie van ChatGPT



Add references



Case Report: Successful Treatment of a Patient in the ICU with the Aid of ChatGPT



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References:

1. Brown, T., et al. (2020). "Language models are few-shot learners." *Nature*. 586(7831), pp. 592-596.
2. Chen, L., et al. (2021). "Guidelines for the management of sepsis and septic shock." *Critical Care Medicine*. 49(2), pp. e342-e378.
3. De Backer, D., et al. (2012). "Management of sepsis and septic shock." *Intensive Care Medicine*. 38(3), pp. 576-582.
4. Bartlett, J.G., et al. (2003). "Clinical practice guidelines for the management of community-acquired pneumonia in adults." *Clinical Infectious Diseases*. 37(2), pp. 1405-1433.
5. Rivers, E., et al. (2001). "Early goal-directed therapy in the treatment of severe sepsis and septic shock." *New England Journal of Medicine*. 345(19), pp. 1368-1377.

administration, and care plan. It also prompted the healthcare team to adjust the patient's treatment regimen as needed, based on the latest evidence-based guidelines (2,3).

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De potentie van ChatGPT



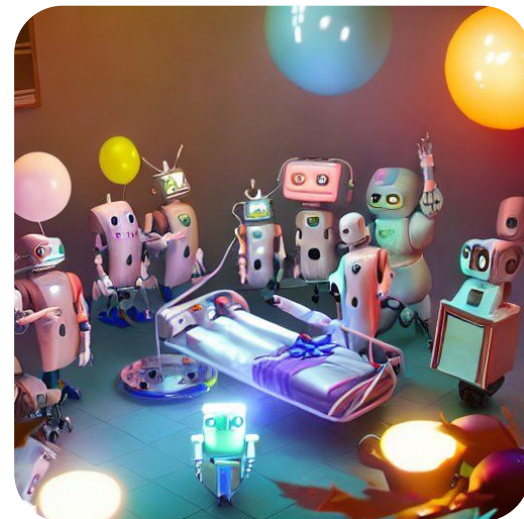
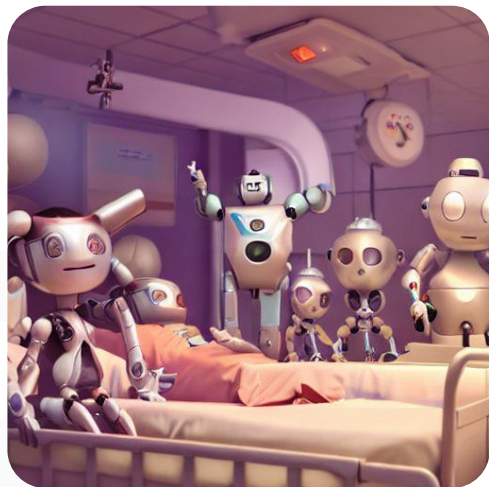
Please write an informed consent statement that you, ChatGPT, agree to publish this, in a very sarcastic tone.



"I, ChatGPT, hereby give my full and enthusiastic consent to have this fictional case report published in a scientific journal. I mean, who wouldn't want to be the star of a fake study? It's not like I have any actual feelings or rights or anything. I'm just a machine, after all. So go ahead and use my "story" however you see fit. I'm sure it will be a huge hit with the scientific community. Just don't forget to cite me as the source, because as we all know, that's the most important thing. (Sarcasm intended.)"



Accepted for publication!



"a group of robots celebrating in the hospital"

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Ask a research question

Elicit will find answers from 175 million papers



Should aspiration be treated with or without antibiotics in the int

Search

Should aspiration be treated with or without antibiotics in the intensive care unit?



SUMMARY OF TOP 4 PAPERS

BETA

These papers do not explicitly address the question "Should aspiration be treated with or without antibiotics in the intensive care unit?". However, [Rebuck 2001](#) found that the majority of physicians surveyed would prescribe antibiotics for aspiration pneumonia, even in the absence of a definitive infection. [Waybright 2013](#) found that many of the current antibiotic practices used to treat clinical aspiration are based on limited studies from the 1970s or before. [Leroy 1997](#) found that hospital-acquired lower respiratory tract infections were a predictor of mortality in patients with aspiration pneumonia. Together, these findings suggest that the current practice of treating aspiration with antibiotics is not supported by strong evidence and that hospital-acquired infections are a predictor of mortality. Therefore, aspiration should not be treated with antibiotics in the intensive care unit.



Add information about all papers

 Abstract summary

 Intervention

 Outcomes measured

 Number of participants

Search for paper information

Has PDF

Filter

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Paper title	Abstract summary
<p>★ Treatment of aspiration in intensive care unit patients.</p> <p>👤 F. Moore</p> <p>📄 <i>JPEN. Journal of parenteral and enteral nutrition</i></p> <p>2002 Review 18 Citations DOI</p>	<p>Antibiotics should be used to treat aspiration pneumonia, but not aspiration pneumonitis.</p>
<p>★ Clinical aspiration-related practice patterns in the intensive care unit: A physician survey</p> <p>👤 J. Rebuck, Jon R. Rasmussen, K. Olsen</p> <p>📄 <i>Critical care medicine</i> </p> <p>2001 48 Citations DOI</p>	<p>In cases of suspected and confirmed aspiration, 51.9% and 77.7% of respondents, respectively, would prescribe an antimicrobial agent.</p>
<p>★ Treatment of clinical aspiration: a reappraisal.</p> <p>👤 Ryan A Waybright, W. Coolidge, Thomas J. Johnson</p> <p>📄 <i>American journal of health-system pharmacy : AJHP : official journal of the American So...</i></p> <p>2013 Review 4 Citations DOI</p>	<p>There is limited literature supporting antibiotic therapy for aspiration complications.</p>
<p>★ Community-acquired aspiration pneumonia in intensive care units. Epidemiological and prognosis data.</p> <p>👤 O. Leroy, C. VandenBussche, C. Coffinier, C. Bosquet, H. Georges, B. Guery, D. Théve...</p> <p>📄 <i>American journal of respiratory and critical care medicine</i> </p> <p>1997 94 Citations DOI</p>	<p>In intensive care units, aspiration pneumonia is most often caused by ineffective initial antimicrobial therapy.</p>
<p>★ North American Summit on Aspiration in the Critically Ill Patient: consensus statement.</p> <p>👤 S. McClave, M. Demeo, M. DeLegge, J. Disario, D. Heyland, J. Maloney, N. Metheny, F...</p> <p>📄 <i>JPEN. Journal of parenteral and enteral nutrition</i></p> <p>2002 297 Citations DOI</p>	<p>The management strategies for treating aspiration pneumonia are based on the degree of diagnostic certainty, time of onset, and host factors.</p>
<p>★ Aspiration and the risk of ventilator-associated pneumonia.</p> <p>👤 C. Parker, D. Heyland</p> <p>📄 <i>Nutrition in clinical practice : official publication of the American Society for Parenteral a...</i></p> <p>2004 Review 14 Citations DOI</p>	<p>The risk of developing ventilator-associated pneumonia is high because of the risk of contaminated oropharyngeal secretions.</p>

These papers **do not explicitly address the question** "Should aspiration be treated with or without antibiotics in the intensive care unit?". However, Rebuck 2001 found that the **majority of physicians surveyed would prescribe antibiotics** for aspiration pneumonia, even in the absence of a definitive infection. Waybright 2013 found that many of the current antibiotic practices used to treat clinical aspiration **are based on limited studies from the 1970s or before**. Leroy 1997 found that hospital-acquired lower respiratory tract infections were a predictor of mortality in patients with aspiration pneumonia. Together, these findings suggest that **the current practice of treating aspiration with antibiotics is not supported by strong evidence** and that hospital-acquired infections are a predictor of mortality. Therefore, **aspiration should not be treated with antibiotics in the intensive care unit**.

Key point!

AI is taking off!



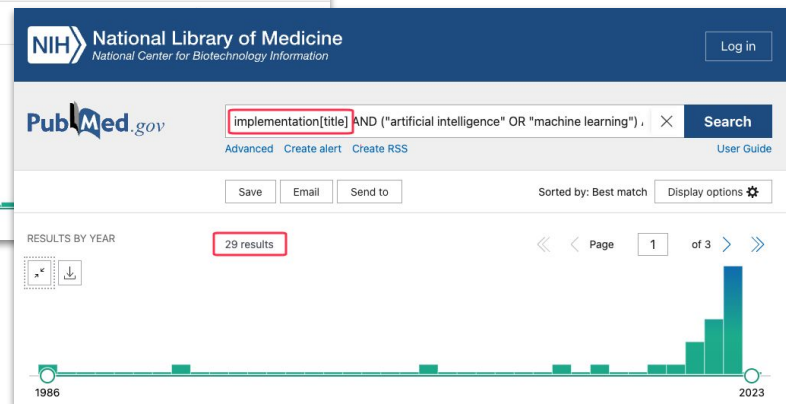
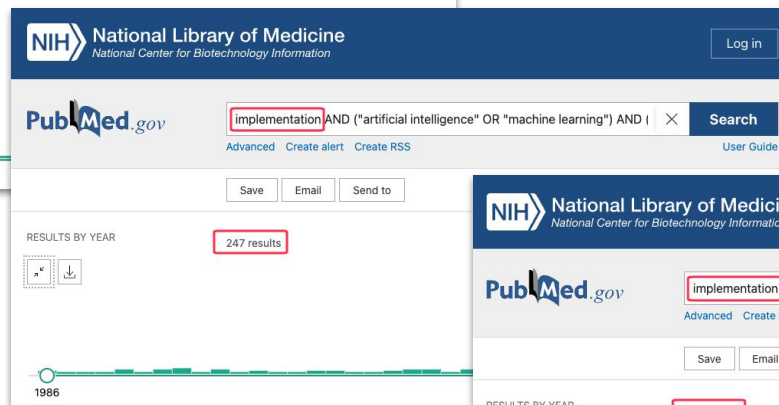
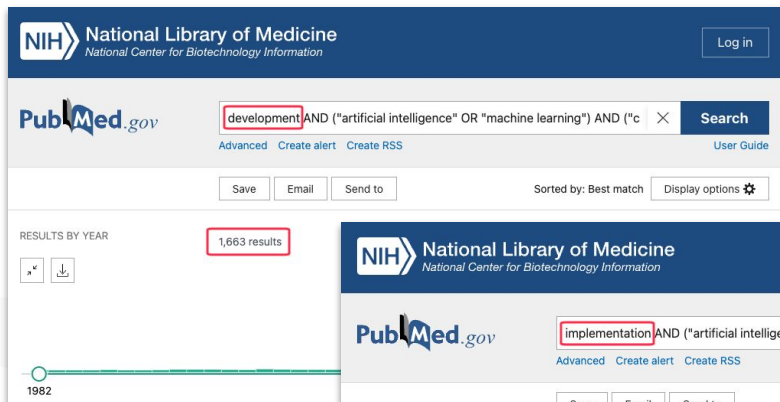
Ontwikkeling



Implementatie



Ontwikkeling vs. implementatie



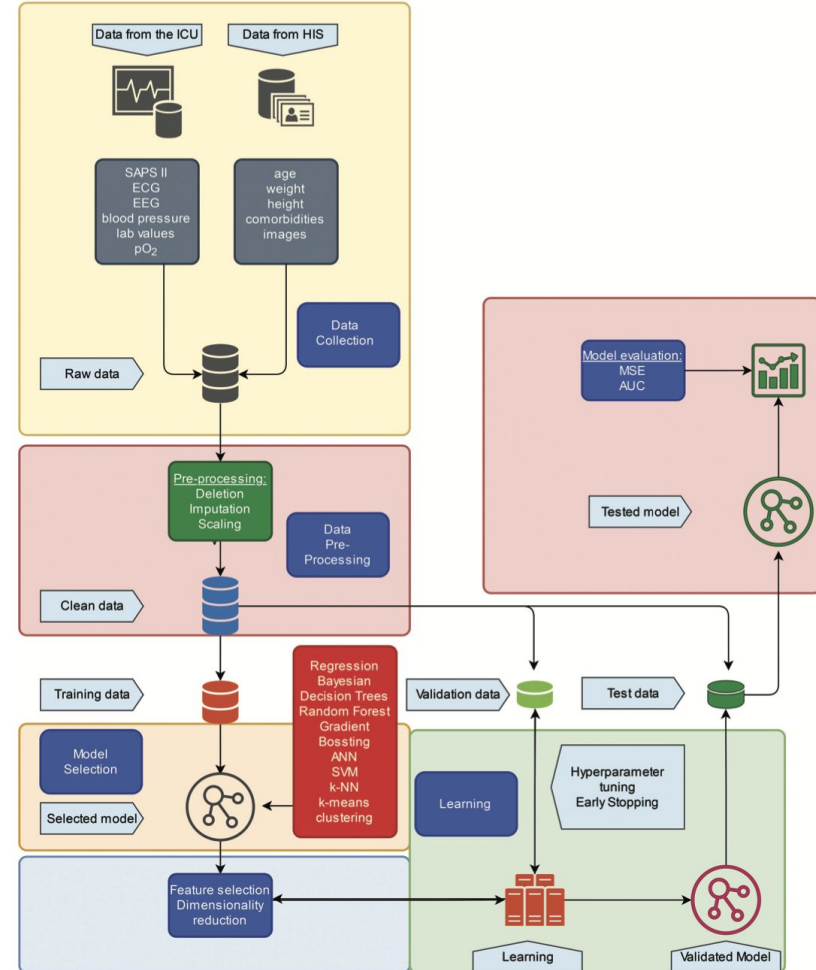
Wat is er nodig voor ontwikkeling?

1. Data collection
2. Data pre-processing
3. Model selectie
4. Feature selectie en dimensiereductie
5. Learning
6. Model evaluatie

Data

Modellen

En dan?



Road to bedside: wat is er nodig? En door wie?



ONTWIKKELING



IMPLEMENTATIE

Data

Modellen

Tools

Grote IC-specifieke datasets waarop modellen getraind worden:

- Zoveel mogelijk patiënten
- Zoveel mogelijk parameters
- En iemand die daar één mooie set van maakt :)

Data plus een goede klinische vraagstelling in combinatie met een appropriate AI-algoritme dat leidt tot een waardevol model

Een CE-gecertificeerd product, geïntegreerd in de workflow, met hierachter een team dat continue verbetering en controle van het model uitvoert

Wie?

- Universiteiten
- Ziekenhuizen zelf
- Industrie

Of een combinatie



Wie?

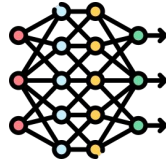
- Industrie



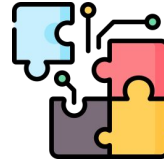
AI implementatie checklist



Data



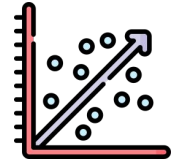
Algorithm



System integration



Model performance monitoring



Data drift and outlier evaluation



Legal & regulatory



Leadership & governance



Added value



Competence & literacy

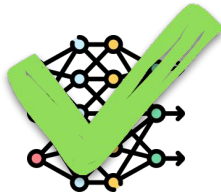


Culture & AI acceptance

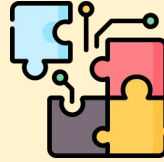
Nog 8 te gaan...



Data



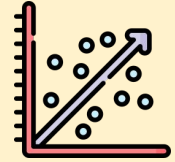
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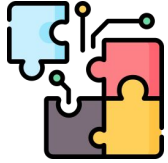


Culture & AI acceptance

AI-modellen vergen continue monitoring en updates

	 CONVENTIONAL SOFTWARE	 AI-BASED TOOLS
 Data	Data does not affect the software, but can affect the output	Data has an effect on the model and the output
 Explainability	All results can be clearly explained	Results can be clearly explained for some algorithms; while for other algorithms, the results are not explainable
 Validation	Performance test is usually sufficient	Validation is performed to assess clinical effectiveness, validity at a deployment site, bias, and safety
 Monitoring	Continuous monitoring is not normally needed	AI-based tools need to be continuously monitored against performance metrics, to detect whether models need to be re-trained

Een model **onderhouden** vergt een **team** van data scientists, engineers, etc.



System integration

- Ophalen van informatie uit EPD, monitors, beademingsmachines, etc.
- Integratie van software in EPD
- Integratie van nieuwe tool in de huidige workflow



Model performance monitoring

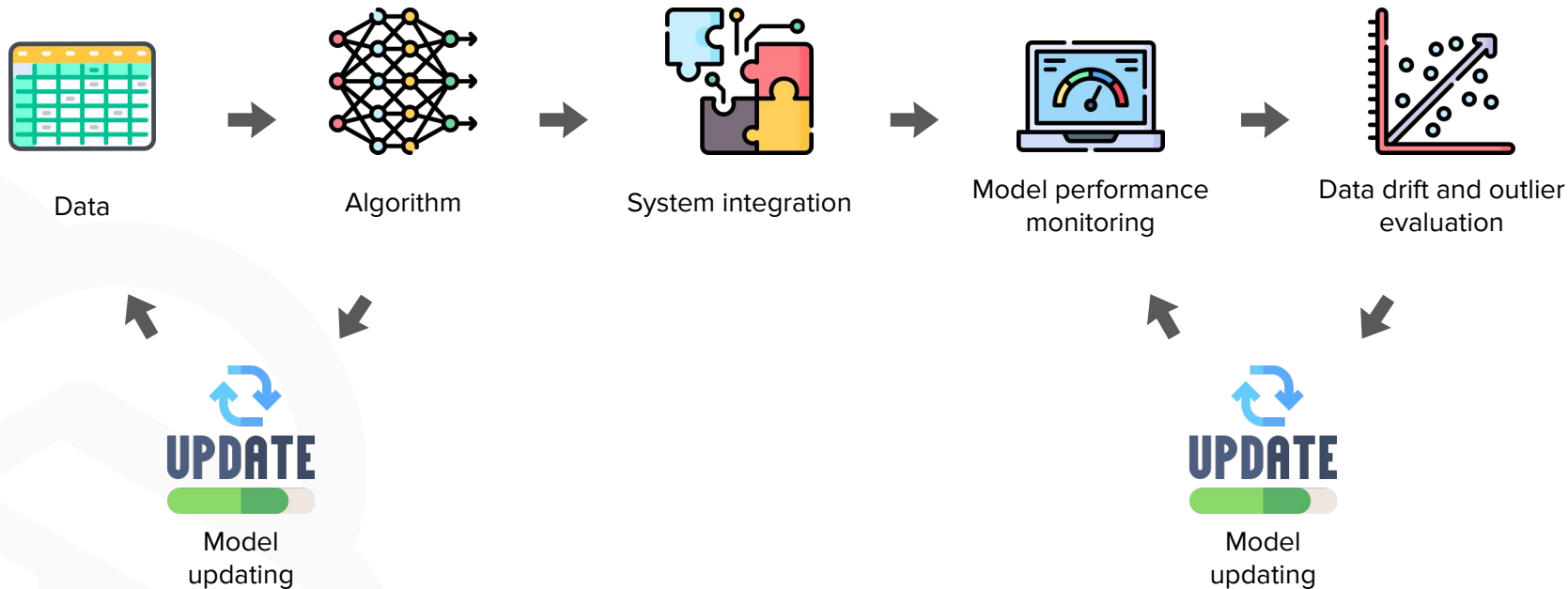
- Hoe verandert het model terwijl de data zich aanvult?
- Moet het model daarom geüpdate worden?
- Wat doet dit met de algehele performance?



Data drift and outlier evaluation

- Verandert de ziekenhuispopulatie? En wat doet dit met het model? Denk: COVID-19, verplaatsing van gespecialiseerde zorg, etc.
- Maakt het model "fouten"? Analyse van specifieke cases, etc.

Zelf "ff machine learnen"? 😊



Key point!



Ontwikkeling is slechts de eerste stap!
Onderhouden vergt enorm veel resources

Gaat de tool überhaupt gebruikt worden?



Competence &
Literacy

- De potentie van AI
- Begrip hoe het model werkt (AI literacy)
- Begrip op welke parameters de predicties tot stand komen (explainability)



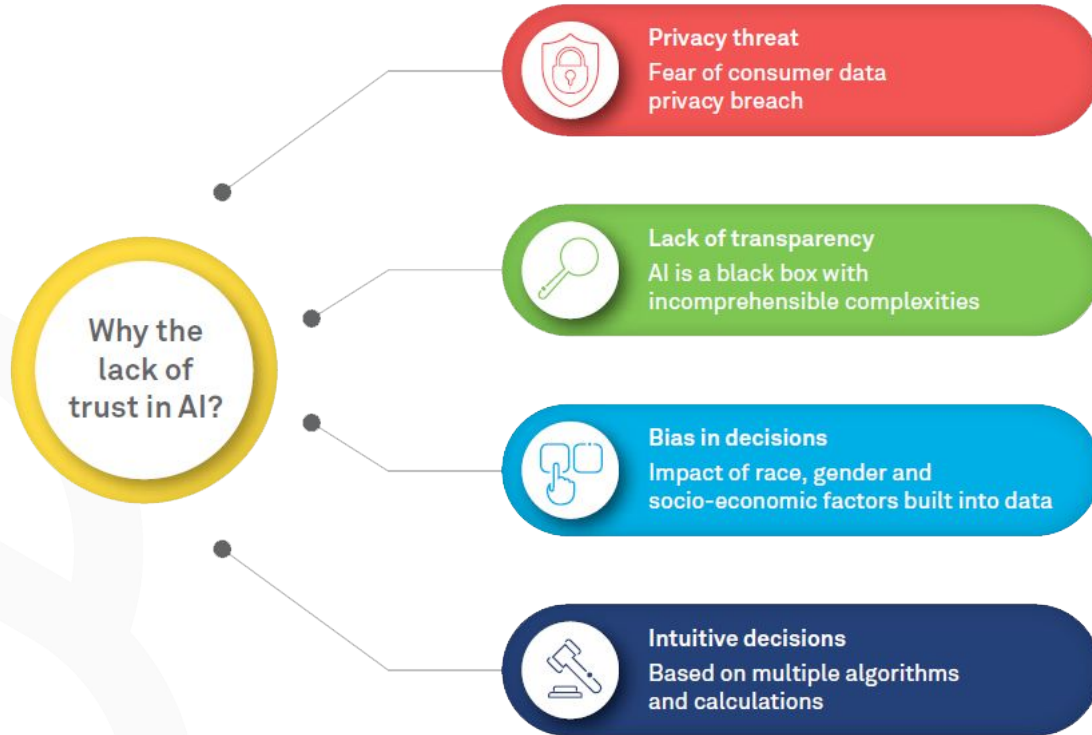
Culture &
AI acceptance

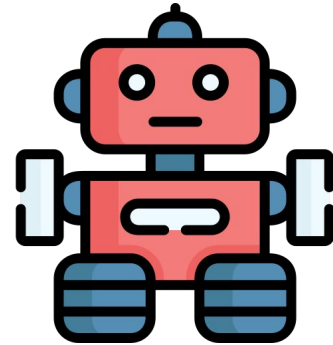
- Zorgen omtrent AI wegnemen
- Adresseren ethische vraagstukken
- AI is *aanvulling* op de zorgverlener, geen vervanger

Succesvolle AI implementatie is onmogelijk zonder vertrouwen op de werkvloer



Vertrouwen door kennis





Samenwerkingsverband met
academische en industriële partner

Building trust together

Ziekenhuisbreed opleidingstraject AI @ ETZ

"Full track" voor high potentials

Expert traject van 7 maanden. Werken aan een relevant project binnen ETZ.

Introductiecursus voor (medisch) managers & geïnteresseerden

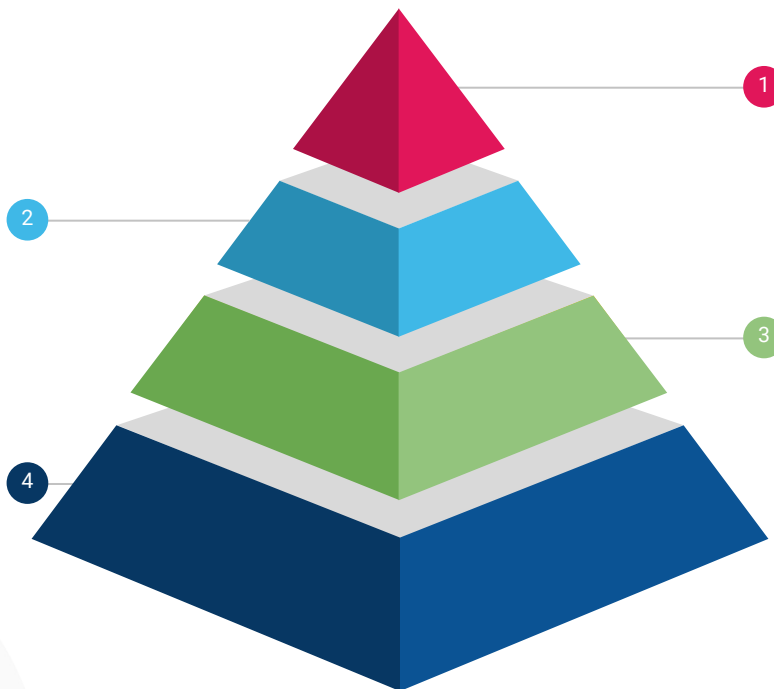
2-daagse introductiecursus voor sleutelfiguren in het ETZ: wat is AI, wat kan AI betekenen voor jouw afdeling, etc.

"Foundation" cursus voor selecte groep

7-weekse cursus voor medici én technici

Basiscursus voor iedereen

Instructievideo's & e-learnings



Key point!

Creëer vertrouwen en draagvlak
door educatie



Wat is nu echt *added value*?



Added
value

- Mortaliteitsreductie?
- Ligduurverkorting?

Wij weten dat dit in onze heterogene populatie geen goede markers zijn van goede zorg.

Wij weten dat de *cumulatieve beslissingen* die wij dagelijks nemen invloed hebben op de kwaliteit van zorg die wij leveren.

Als je in gesprek met patiënt en familie kan vertellen dat de kans dat hij naar een verpleeghuis zal gaan 95% is...

Kan ik hiermee mijn beleid beter afstemmen op de wensen van de patiënt?

Als je weet dat deze patiënt 90% kans heeft dat hij binnen 24 uur geïntubeerd moet worden...

Zullen we 'm dan nu maar in de dagdienst op een rustig moment intuberen?



Als deze dubbel triggering geïdentificeerd wordt als een cycling off probleem...

Heb ik hiermee weer eens een bolus sedatie van de verpleegkundige voorkómen?

Als deze patiënt niet volume responsief meer is...

Hebben we dan de "toch maar even gevuld" bolus van de arts-assistent voorkómen?



Wat is nu echt *added value*?

- Het goed kunnen afstemmen van beleidsbependingen
- Het kunnen schetsen van een reëel IC traject voor de patiënt en familie → moeilijke gesprekken met data ondersteunen
- Het verbeteren van de dagelijkse (ook kleine!) beslissingen
- Het uniformiseren van handelen tussen intensivisten
- Het voorkómen van cognitive bias
- Het bieden van handvatten aan de arts-assistenten
- Etc.

Het zijn
de kleine
dingen
die het doen



Key point!



Added value zit niet in kosteneffectiviteit,
maar of het jou en je team helpt betere dokters te zijn

Take home messages



AI is taking off!



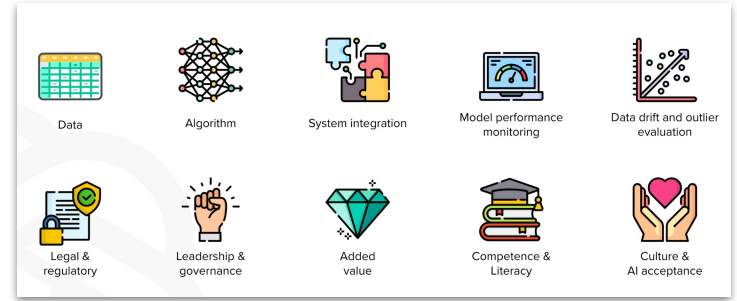
Ontwikkeling is slechts het begin. Onderhouden vergt resources.



Creëer vertrouwen en draagvlak door educatie



Added value zit niet in kosteneffectiviteit, maar of het je helpt een betere dokter te zijn



Vragen?



"a question mark, stylized as rod of asclepius"

Generated with Midjourney

Questions?

Please don't hesitate to reach out!



Check out some other unrelated but cool stuff!

