

# Digital transformation in clinical pharmacy

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Slovenia win silver at volleyball European Championship



Adria Airways temporarily suspends flight operations



Adria Airways has temporarily suspended the majority of its flight operations on 24 and 25 September as the airline faces financial challenges and seeks a solution to ensure future operations.

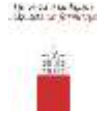
## Neil Harbisson- first cyborg

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Achromatopsia: colour blindness- seeing in greyscale. Antenna sends audible vibrations through his skull; measurements of electromagnetic radiation, phone calls, and music, images, signals and data from satellites.

*Digital transformation*



Changes associated with the **application of digital technology** in all aspects of human society, **fundamentally changing** how we operate and deliver value to customers, including patients.


*Digital transformation*

<https://enterpriseproject.com/what-is-digital-transformation>

## Availability of DATA





New business models, relations  
and management strategies 





1. digital competence=  
technical proficiency



1. digital competence=  
technical proficiency



<https://digital-competence.eu/>



1. digital competence=  
technical proficiency



2. digital literacy= perform tasks  
effectively in a digital environment

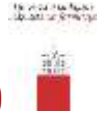
New types of **innovation and creativity**,  
rather than simply enhance and support  
the traditional approaches.

3. Digital transformation=  
the final, although ongoing stage.



A substantial **cultural change** with the blurring of boundaries between the physical, digital, and biological worlds.

3. Digital transformation=  
the final, although ongoing stage.



## Clinical Decision Support Systems (CDSS)

“like the revolutions that preceded it, **the Fourth Industrial Revolution** has the potential to *raise global income* levels and *improve the quality of life* for populations around the world.”

Klaus Schwab, 2016  
Founder and Executive Chairman of the World Economic Forum

3. Digital transformation=  
the final, although ongoing stage.

## The First Industrial Revolution: The Age of Mechanical Production

*around 1760*



Steam was powering everything.

<https://trailhead.salesforce.com/en/content/learn/modules/learn-about-the-fourth-industrial-revolution/meet-the-three-industrial-revolutions>



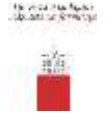
## The Second Industrial Revolution: The Age of Science and Mass Production

*early 20th century*



Inventions that helped us go faster and do more.

<https://trailhead.salesforce.com/en/content/learn/modules/learn-about-the-fourth-industrial-revolution/meet-the-three-industrial-revolutions>





The Third Industrial Revolution:  
The Digital Revolution



*Beginning in the 1950s*



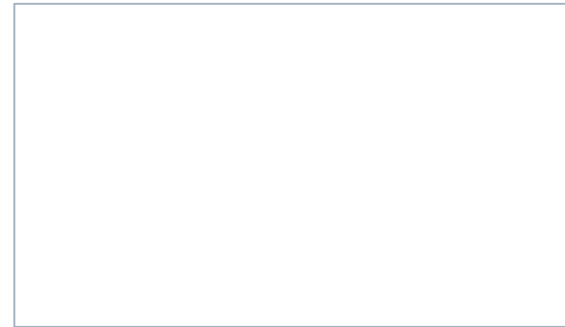
Things that used to be analog moved to digital

<https://trailhead.salesforce.com/en/content/learn/modules/learn-about-the-fourth-industrial-revolution/meet-the-three-industrial-revolutions>

The Fourth Industrial Revolution:



*Digital transformation*

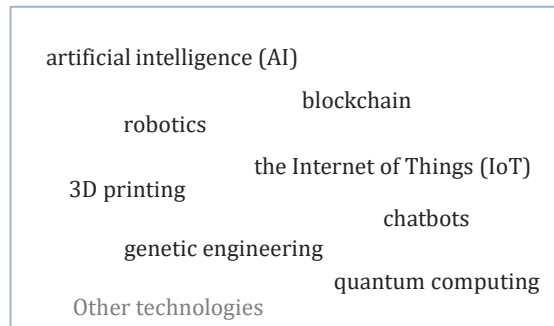


Digital transformation in Healthcare?

Digital transformation in Healthcare?



## Challenges?



Digital  
transformation  
in Healthcare?

Digital  
transformation  
in Healthcare?

## Challenges?

It went as fast as 30 kilometers per hour, which was described in the newspaper as "tearing along the street at a lively rate, dodging people and teams."

The very first gasoline-powered vehicle driven on the streets of Detroit in 1896.



around the corners

Digital transformation in Healthcare?



## Amazon Is Developing a Wristband That Tracks Your Emotions

By Jason Daley May 23, 2019 Amazon

The alleged device is labeled as a "health and wellness" product but it also raises privacy concerns.



I don't know if we need a wearable device that can track emotions like joy, anger, fear, or sadness but Amazon seems to be thinking we need an emotion-reading wristband for "health and wellness purposes."

Oh, and to better sell you more stuff, of course.



Whether digital transformation will also embrace clinical pharmacy is not the question!



mHealth  
*Wednesday*

Big Data  
*Friday*

Clinical Decision Support Systems (CDSS)  
*Thursday*

Clinical decision support systems *link* health observations with health knowledge to influence health choices by clinicians for improved health care.

## Clinical Decision Support Systems (CDSS)

- **electronic** rather than paper-based templates
- **automatic** electronic prompts rather than requiring user activation of the system
- **integrated** into the clinical workflow rather than as a separate log-in or screen etc.
- provide decision support **at the time and location of care** rather than prior to or after the patient encounter
- provide **recommendations for care**, not just assessments

## Clinical Decision Support Systems (CDSS)

## Clinical Decision Support Systems (CDSS)

### Knowledge-based:

1. the knowledge: rules e.g. IF-THEN
2. an inference engine: rules + patient's data
3. a mechanism to communicate: show + record in the system.



### Non-knowledge-based:

- artificial intelligence: machine learning from past experiences and/or find patterns in clinical data
- cannot explain the reasons for their conclusions "black boxes" e.g. Artificial neural networks

## Clinical Decision Support Systems (CDSS)

Who is going to develop CDSS in the area of clinical pharmacy?

The practice of medicine and public health supported by mobile devices

## mHealth



## mHealth

standards & interoperability








## Digital therapeutics

FDA approved apps

Trial= evidence  
of clinical benefits

rely on behavioral  
and lifestyle changes



**PEAR**  
THERAPEUTICS

Press Releases

**PEAR OBTAINS FDA CLEARANCE OF THE FIRST PRESCRIPTION DIGITAL THERAPEUTIC TO TREAT DISEASE**

**reSET™ is the First Prescription Digital Therapeutic Cleared with Data Demonstrating Improved Outcomes of Abstinence and Treatment Retention in Patients with Substance Use Disorder (SUD)**

**BOSTON, and SAN FRANCISCO, September 14, 2017:** Pear Therapeutics, the leader in a new era of prescription digital therapeutics, today announced that the U.S. Food and Drug Administration (FDA) has granted Pear's De Novo request, allowing the company to market reSET™ for the treatment of patients with substance use disorder (SUD) under a new class of treatment. This is the first time that the FDA has cleared a Prescription Digital Therapeutic with claims to improve clinical outcomes in a disease.

by Pear Therapeutics and Sandoz, a division of Novartis

The 1<sup>st</sup> digital therapeutic to treat opioid use disorder (OUD).  
Based on cognitive behavioral therapy.  
A valid prescription from their licensed provider!

<https://peartherapeutics.com/fda-obtains-fda-clearance-first-prescription-digital-therapeutic-treat-disease/>



## Germany's new law allows doctors to prescribe apps with health benefits



Richard Stokes

July 11, 2019

Germany has passed a law allowing doctors to prescribe digital apps with health benefits, which can be reimbursed by the country's health insurance system.

The new system is made possible by the Digitalisation and Innovation Act (Digital Supply Act), drawn up in draft by federal health minister Jens Spahn and approved by the federal cabinet yesterday.

<https://pharmaphorum.com/news/germanys-new-law-allows-doctors-to-prescribe-apps-with-health-benefits/>

### Germany expanding digitisation with the new Digital Care Act



Ministering the new Digital Care Act (Digital Healthcare Supply Act) in view of Germany's efforts to support the digitisation of the national healthcare system.

<https://www.healtheuropa.eu/germany-expanding-digitisation-with-the-new-digital-care-act/92510/>

### Germany expanding digitisation with the new Digital Care Act



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1. Health app **tested for data security, data protection and functionality** by the German Federal Institute for Drugs and Medical Devices ('BfArM').
2. Statutory health insurances will **reimburse the costs provisionally for one year**.
3. During this period, the manufacturer of the health app must prove to the BfArM that its **health app improves patient care**.
4. The **reimbursement amount will be negotiated** with the German Association of Health Insurance Funds (GKV-Spitzenverband).

<https://www.healtheuropa.eu/germany-expanding-digitisation-with-the-new-digital-care-act/92510/>



*3V's: high volume, high velocity, high variety*

*Doug Laney, 2001*

90% of all data ever created, was created in the past two years.

The amount of data in the world will double every two years.

Every minute over 200 million emails are sent

Change from structured to unstructured data e.g. posts: sentiment analysis, sensory data: how it is used

*3V's: high volume, high velocity, high variety*

Other V's important when developing a big data strategy.

<https://datafloq.com/read/3vs-sufficient-describe-big-data/166>



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Your transformation process has started today.

Future digital possibilities?  
*Friday*