Health Tech

Leveraging multi-disciplinary skills in science and technology to improve health outcomes by transforming the health ecosystem.

Ashraf Ul Kabir
Chief Technical Architect
IBM Pakistan

Can data heal healthcare?
IBM

Quadruple aim

Disruptive forces

Market forces are escalating the cost, quality, and experience crisis across health systems everywhere

Physician Shortage and Burnout Rising

12.9M

Expected global shortage of health-care workers by 2035

Data Explosion

Medical data expected to **double every 73 days** by 2020

How much health related data each person will generate in a lifetime:

300M Books

Caring for the aging and vulnerable, a demographic tsunami

>3x

Growth of global ”oldest old” population[1]

2 Billion

The number of people over the age of 60 by 2050[7]

Rising demands from empowered citizens to improve safety

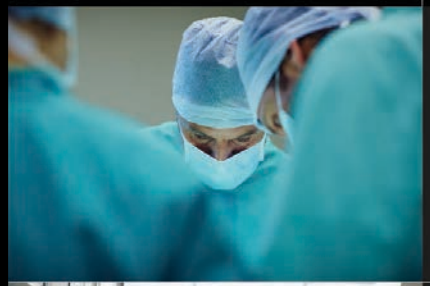
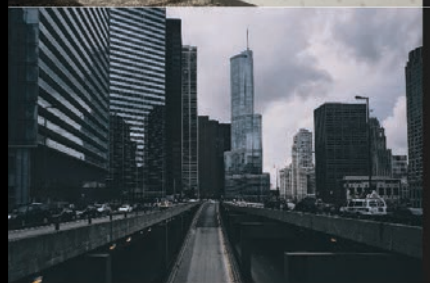
1 in 300

Chance of a patient being harmed during health care.[3]

HEALTHCARE & LIFE SCIENCES

Industry challenges

Digitization is transforming the entire sector and driving the research agenda.

	OLD PARADIGM	NEW PARADIGM
	**Doctors** • Take notes on paper • Incorporate into mind • Make decision based on experience and intuition	• Digital input • Electronic trail • Software does analysis • Gather quality data (rather than quantity)
	Scientists • Take genetic samples • Perform experiments • Observe, take notes, draw conclusions	• Fully sequenced genomes reduce need for samples • Diminished need for visual observation • Greater reliance on analytics/interpretation
	Patients • Episodic measurements subject to environmental influence: “the white coat effect”	• Persistent streams of non-medical grade data (fitbit) • Analytics solution must make sense of lower quality, higher-volume data
	**Payers** • Pay per service • Rising spend and decreased efficiency	• Pay per outcome • Designed for efficiency, integrated care and performance management

Humans + AI="Augmented Intelligence"

People excel at:

Common sense

Dilemmas

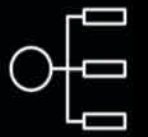
Morals

Compassion

Imagination

Dreaming

Abstraction


Generalization

Artificial Intelligence systems excel at:

Natural Language

Pattern Identification

Locating Knowledge

Machine Learning

Reduce Bias

Endless Capacity

Watson Health © IBM Corporation 2018

Generating insights from information

200M+ lives

100M+ patient records

explorys

30B+ images managed

MERGE Healthcare

1.2M medical abstracts

3B+ reference points

4M+ drug patents

40M+ research documents

Watson Health © IBM Corporation 2018

Using AI for Diabetes

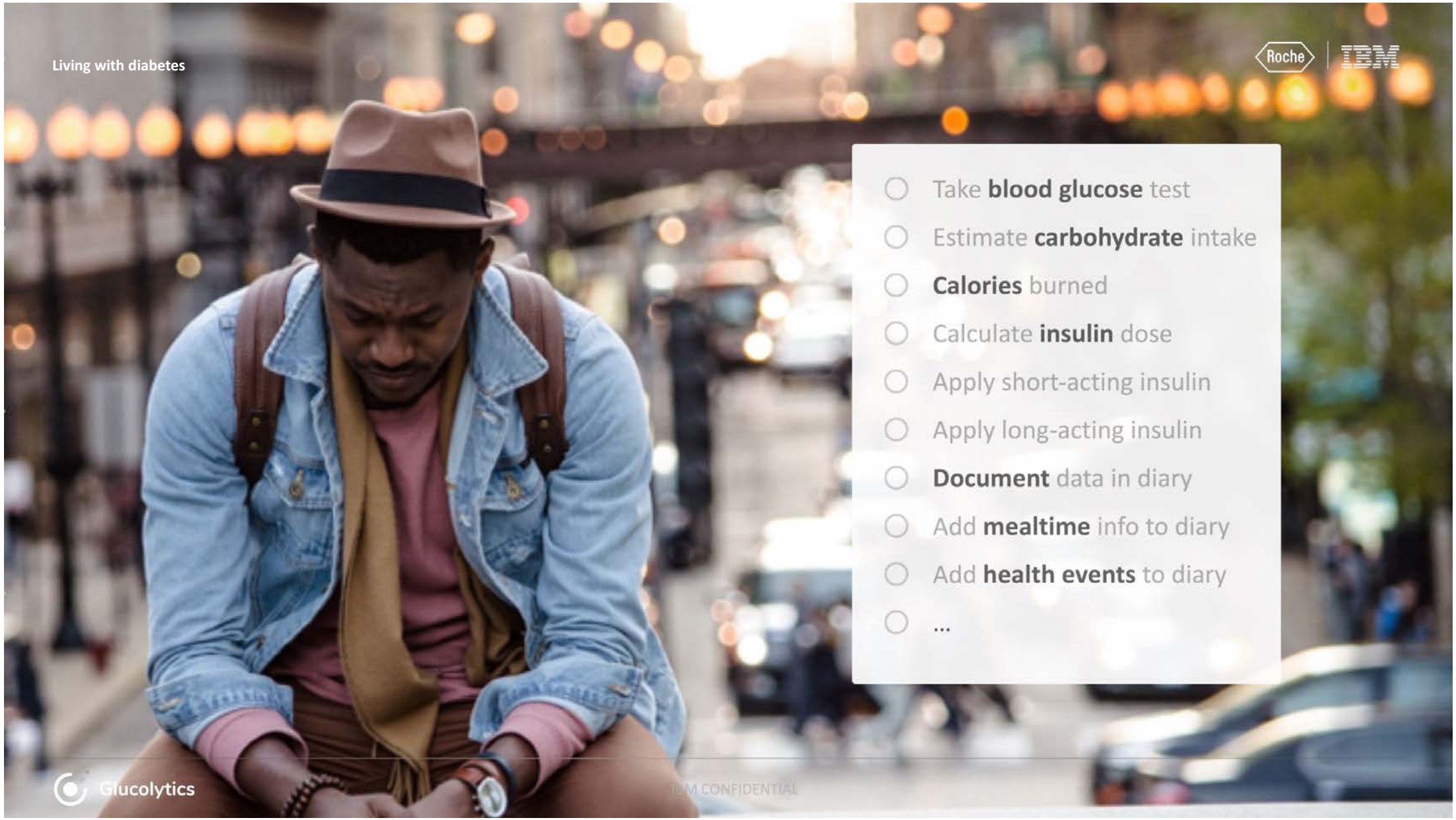
Gucolytics with Roche

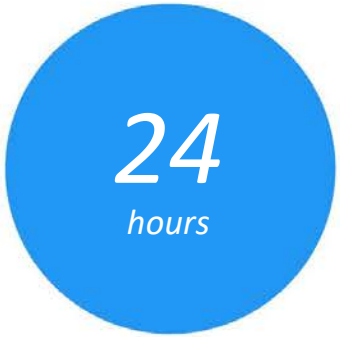
Epidemic of the 21st century

1 of 11 adults

has diabetes

SOURCE: IDF DIABETES ATLAS 7TH ED., INTERNATIONAL DIABETES FEDERATION, 2015


Living with diabetes
Roche
IBM
Take **blood glucose** test
Estimate **carbohydrate** intake
Calories burned
Calculate **insulin** dose
Apply short-acting insulin
Apply long-acting insulin
Document data in diary
Add **mealtime** info to diary
Add **health events** to diary
...
Glucolytics
IBM CONFIDENTIAL


24
hours

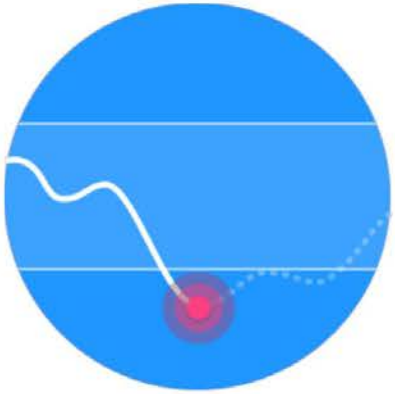
365
days

Prevalence worldwide

For the rest of your life.

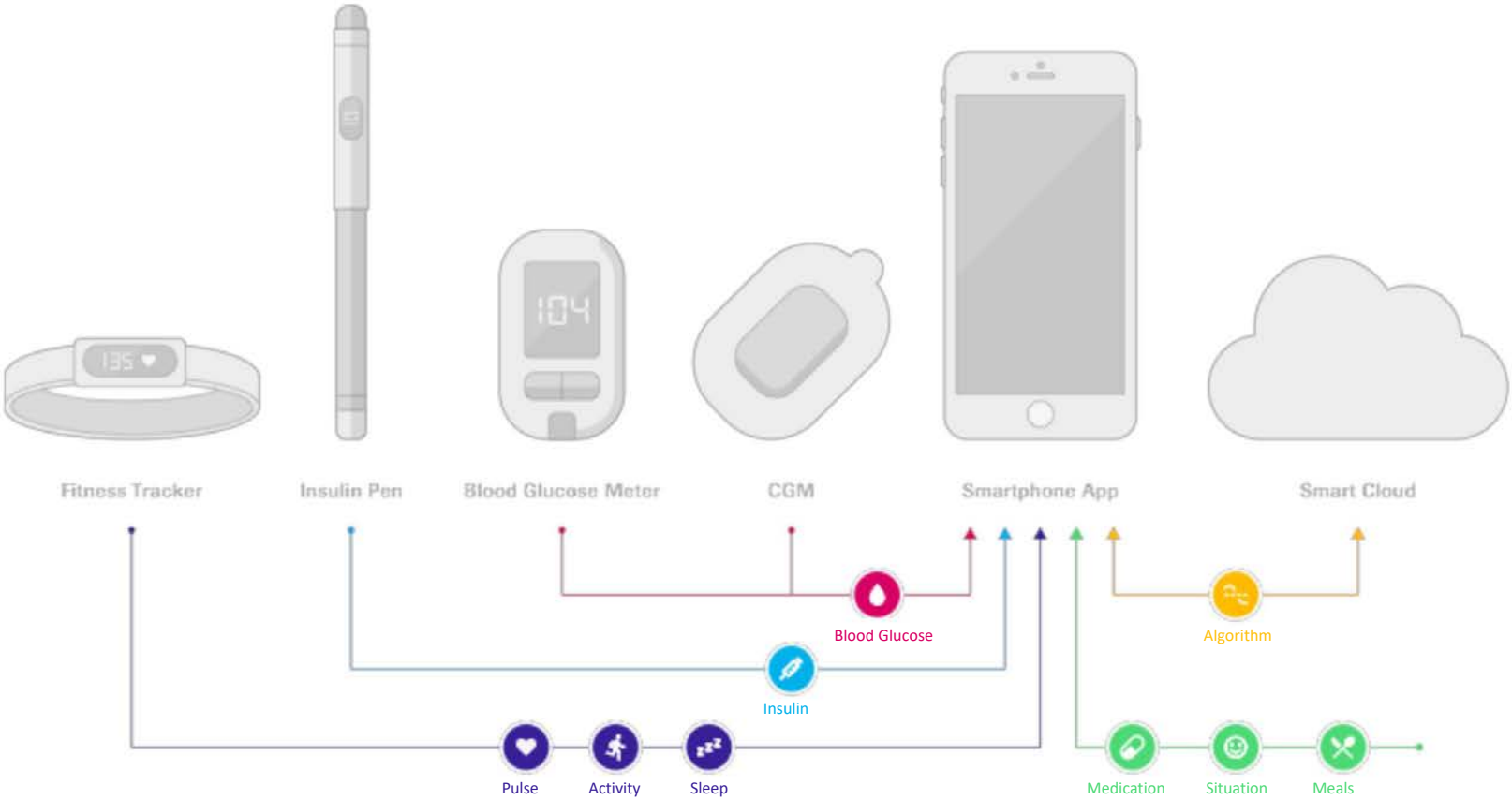
Job to be done: Keep glucose level in range

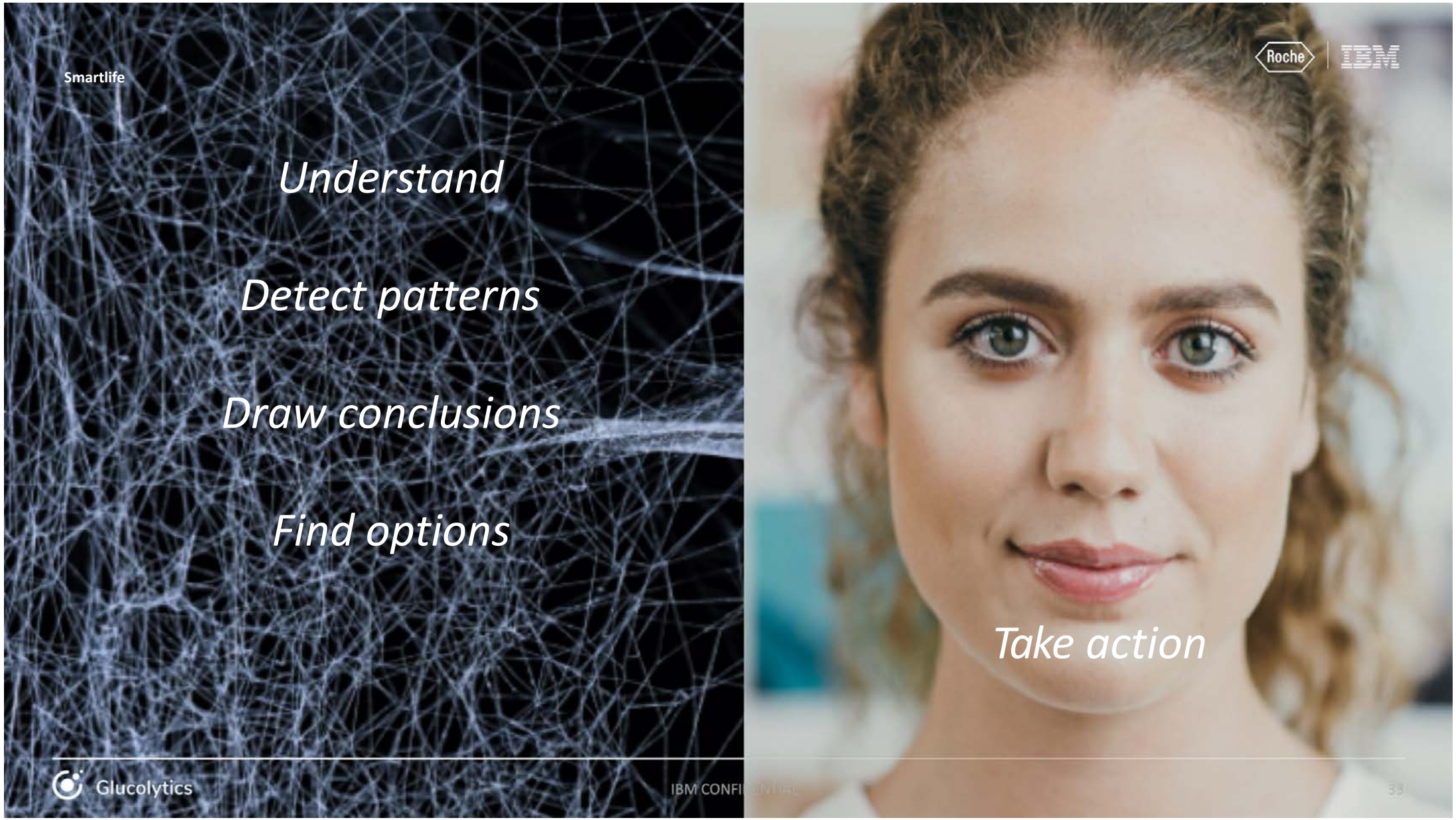
Hyper



Hypo

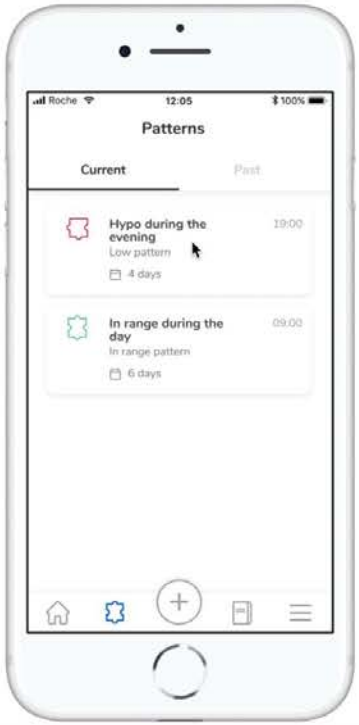
Components


Fitness Tracker
Insulin Pen
Blood Glucose Meter
CGM
Smartphone App
Smart Cloud
Blood Glucose
Algorithm
Insulin
Pulse
Activity
Sleep
Medication
Situation
Meals


Smartlife
Understand
Detect patterns
Draw conclusions
Find options
Take action
Roche
IBM
Glucolytics

Understanding the past | Pattern Detection to learn more about the individual therapy, change behavior accordingly and track progress

Patterns will help PwDs to enhance their therapy by stressing the ar of improvement and motivate them to change their routines by showing the areas of success.

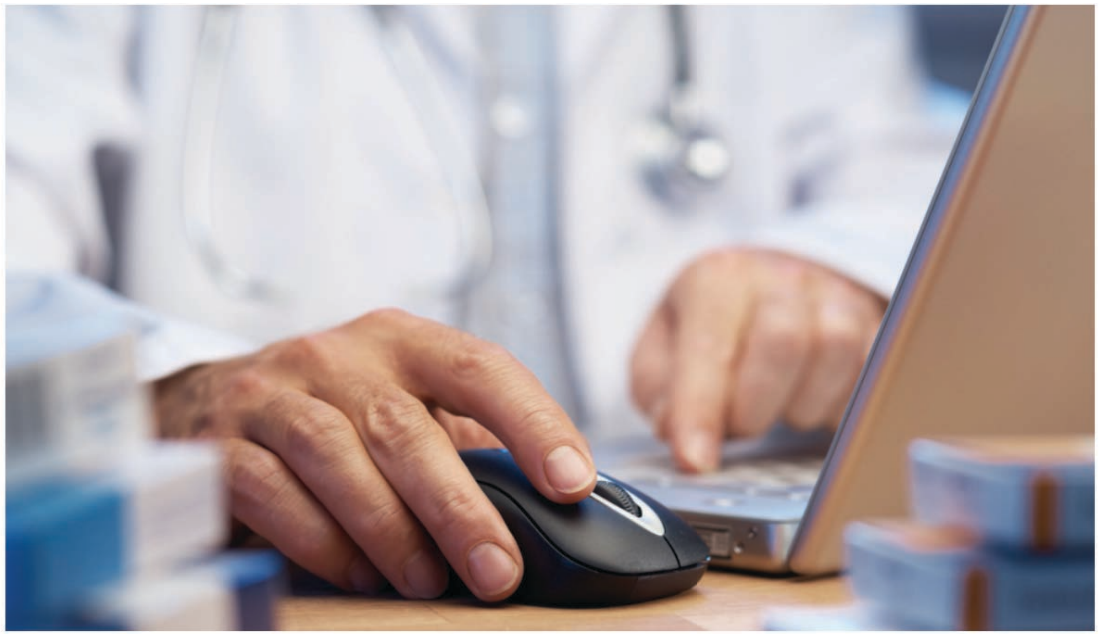


Looking even further | Prediction of nocturnal hypoglycaemia – Sleepgenius for the entire night

The goal is to provide PwDs the peace of mind for good nights sleep: During an eight hour window (night) the model shows the chance of nocturnal hypoglycemias.

Tackling Counterfreit Drugs

Trace and Track using Blockchain technology



In some countries, counterfeit pharmaceuticals account for

70 percent

of all drugs in the supply chain.

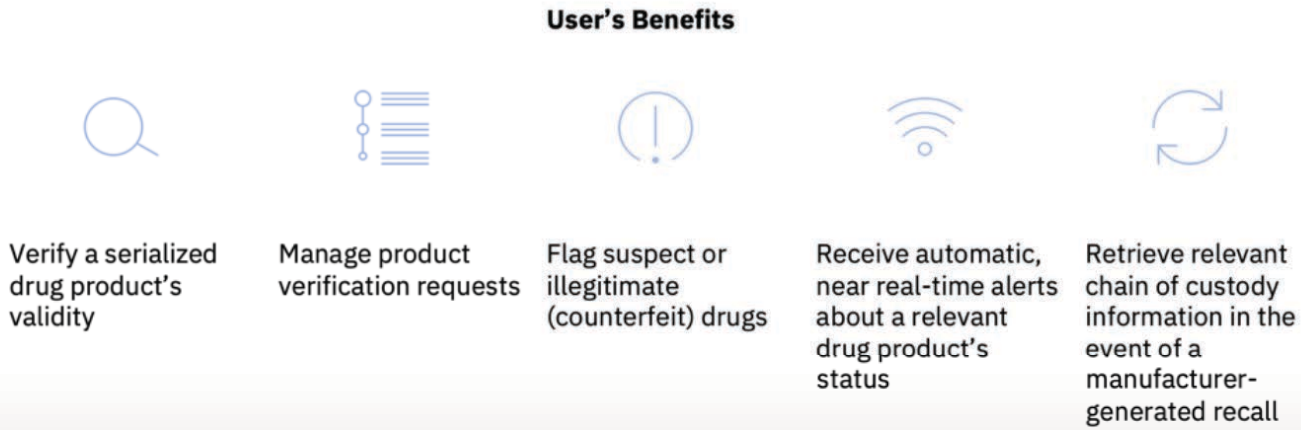
Source: National Crime Prevention Council (https://www.ncpc.org/resources/ip-theft/counterfeit-drugs/)

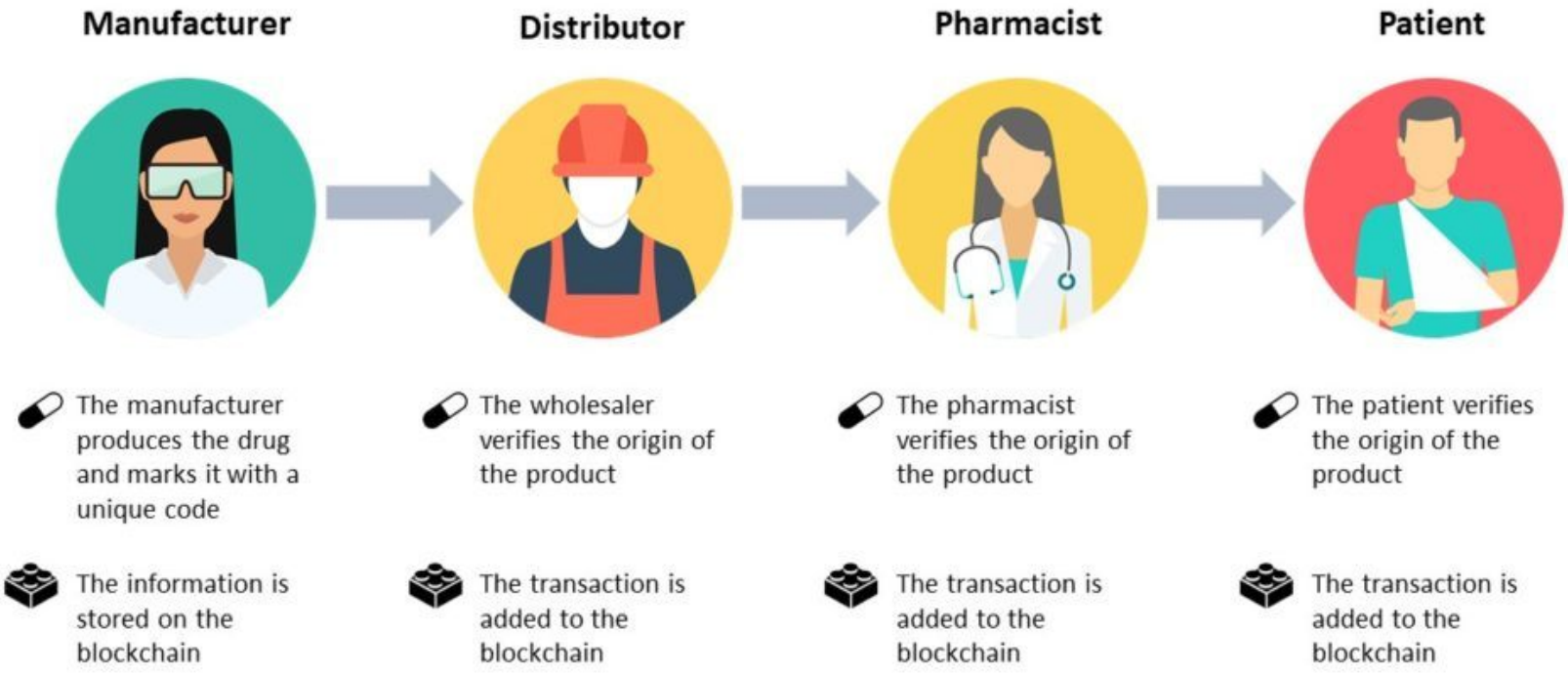
...the **Drug Supply Chain Security Act (DSCSA)**, outlines steps to build an electronic, interoperable system to identify and trace certain prescription drugs as they are distributed in the United States.

The FDA DSCSA Interoperability Pilot

IBM and its partners completed work for the FDA Drug Supply Chain Security Act (DSCSA) Interoperability Pilot, and aim to formally launch and scale the blockchain-enabled solution to streamline and facilitate DSCSA compliance for pharmaceutical supply chain stakeholders. To comply with the DSCSA, organizations must be able to digitally verify a drug product and its journey through the end-to-end supply chain. The pilot application uses blockchain technology to digitally store pharmaceutical product profiles and track and trace products at the serialized unit level from the point of manufacture to the point of dispense.

In addition to supply chain visibility, the pilot leverages blockchain to strengthen the protection of patients and patient safety. The application allows users the ability to quickly and effectively identify, investigate, and communicate about a relevant suspect or illegitimate drug product. This eliminates data siloes between supply chain actors and has strong potential to improve and expedite the drug recall process.




Manufacturer
Distributor
Pharmacist
Patient
The manufacturer produces the drug and marks it with a unique code
The information is stored on the blockchain
The wholesaler verifies the origin of the product
The transaction is added to the blockchain
The pharmacist verifies the origin of the product
The transaction is added to the blockchain
The patient verifies the origin of the product
The transaction is added to the blockchain

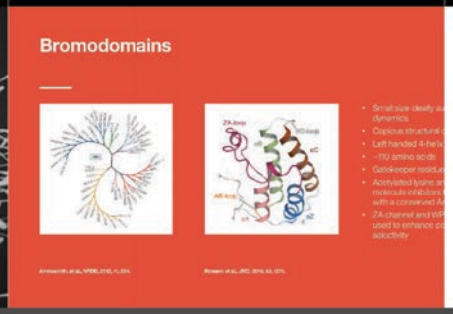
Future …

Immuno-oncology

IBM is combining artificial intelligence with protein simulations to design personalized immunotherapies. A massive breakthrough in oncology, currently works for a small percentage of patients.

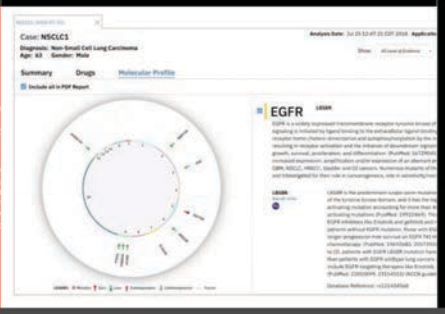
SmartRx

Small molecule lead finding and optimization guided by three-dimensional protein structure using deep learning. Bolsters docking performance and molecular dynamics simulation to assess binding modes.



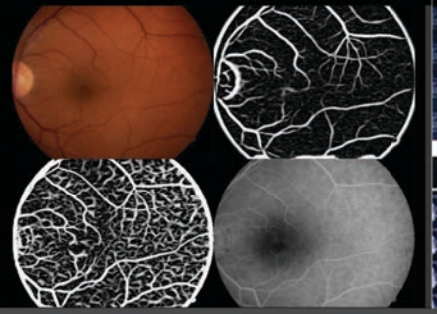
Watson for Genomics

With Watson Genomics, physicians will be able to recommend a hyper-personalized treatment plan targeted directly to the exact genetic mutation of an individual patient's tumor.



AI for the eye

AI is being used to identify eye abnormalities, including differences in eye pressure and distinguishing between left and right eye images. These insights could help identify diseases including glaucoma and melanoma.

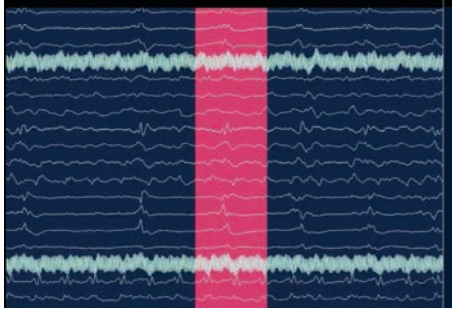


Cognitive radiology assistant

Combining the forces of doctors, computer vision researchers, engineers, and user experience experts we provide insights that improve decision-making for clinicians and radiologists.

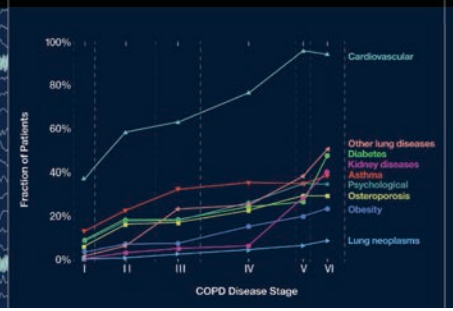
Digital Seizure

We developed patient-specific, mobile seizure detection, prediction, causal inference systems which automatically monitor the condition of individual patients using patient-specific data and AI.



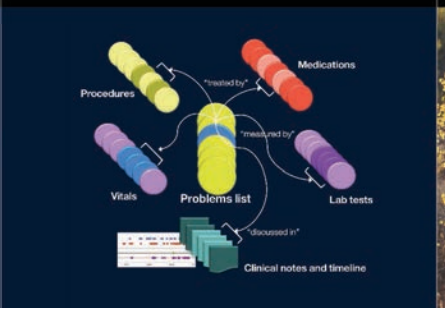
Disease progression model

Diverse population and patient data are combined to generate patient-specific models helping clinicians and researchers understand and predict the course of disease.



Electronic medical health record analytics

Our team is applying natural language processing and machine learning to longitudinal patient records to create insights to help clinicians at the point of care.

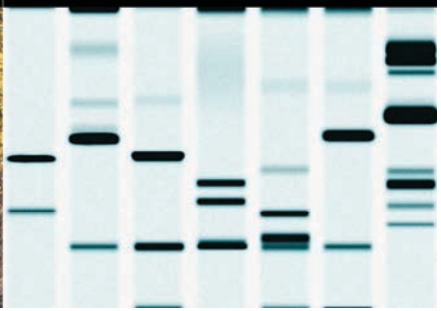


Health behavior

We aim to understand health behaviors from data, compare alternative interventions and deliver data-driven insights to individuals in a way that motivates and supports behavior change.

Personalized medicine

Provides insight to achieve optimal care decisions considering patient specific characteristics and disease progression trajectories by using a suite of analytic tools based on observational population data.



Let’s Partner to INVENT the Future …

" I am interested in the future because it is where I’m going to spend the rest of my life"

Woody Allen

Thank You!

Ashraf Ul Kabir

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