Digital distruption of Dairy

Transforming milk production through innovation & technology.

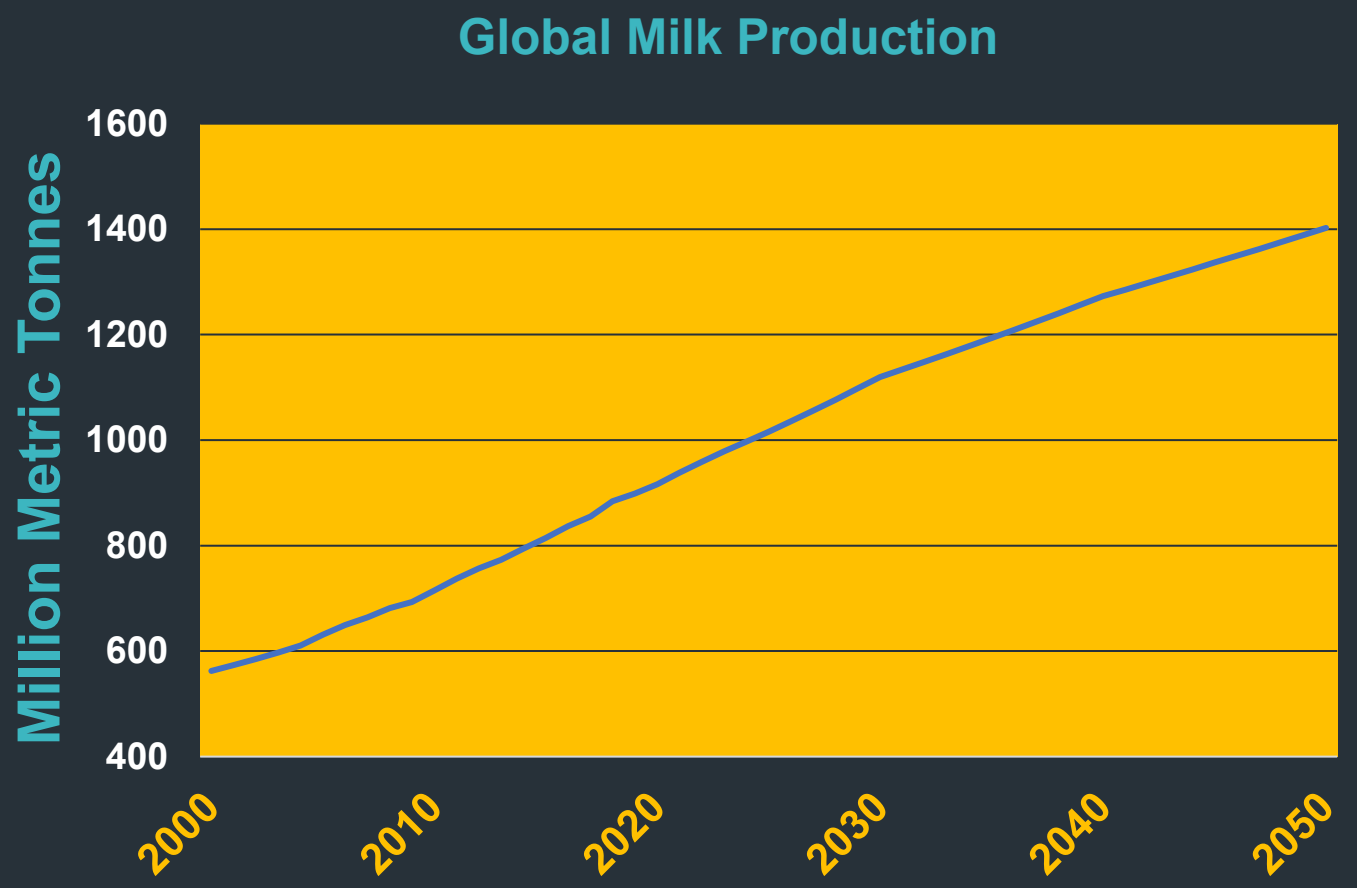
Aidan J. Connolly,
President, AgriTech Capital LLC
Author, Contributor Forbes

They aren’t making more of it..

- Sun,
- Land & Water
- Limited Resources

Milk consumption to grow 1.4% p.a., 2021 – 2050

- Global Population growth
- Rising incomes in emerging markets
- Westernization of Asian food habits
- Health-conscious consumers seeking the nutrients from dairy products



Source: IFCN

Uneven productivity across the globe

Average milk yield

Source: IFCN (SCM)

Who has already been disrupted?

World's largest taxi company, but owns no taxis

Largest accommodation provider, but owns no real estate

World's most valuable retailer has no inventory

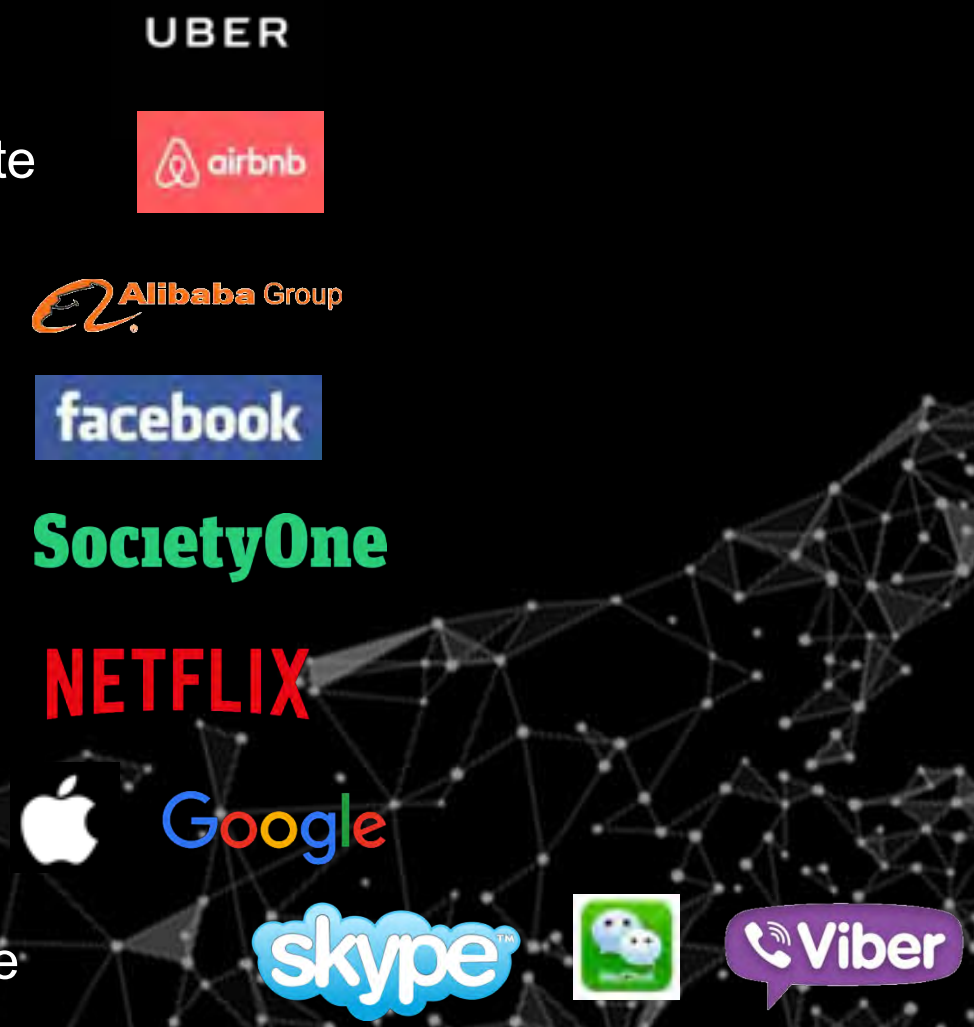
Most popular media owner creates no content

Fastest growing banks have no actual money

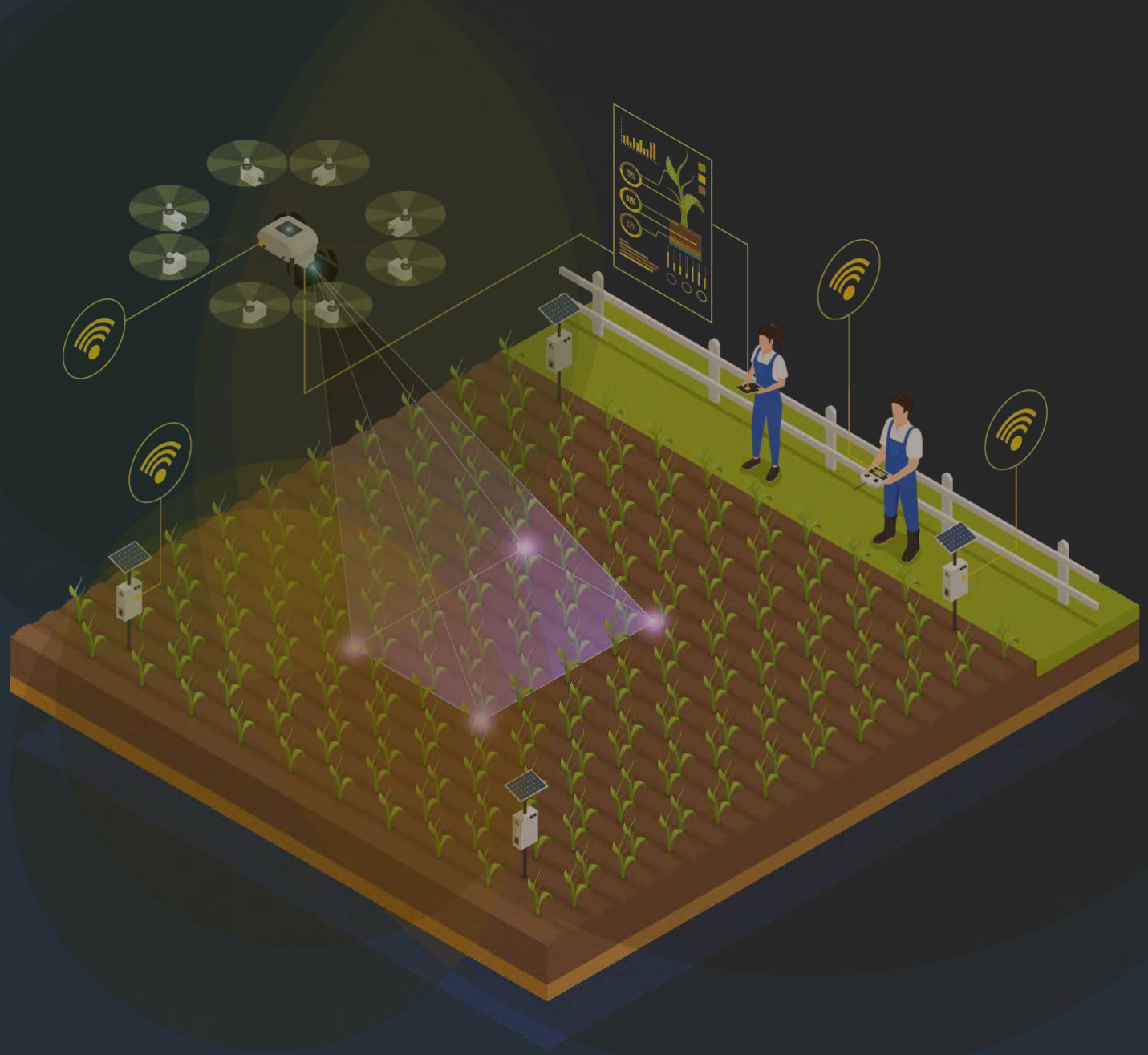
World's largest movie house owns no cinemas

Largest software vendors don't write the apps

Largest communication companies own no infrastructure



Precision technology = precision agriculture.



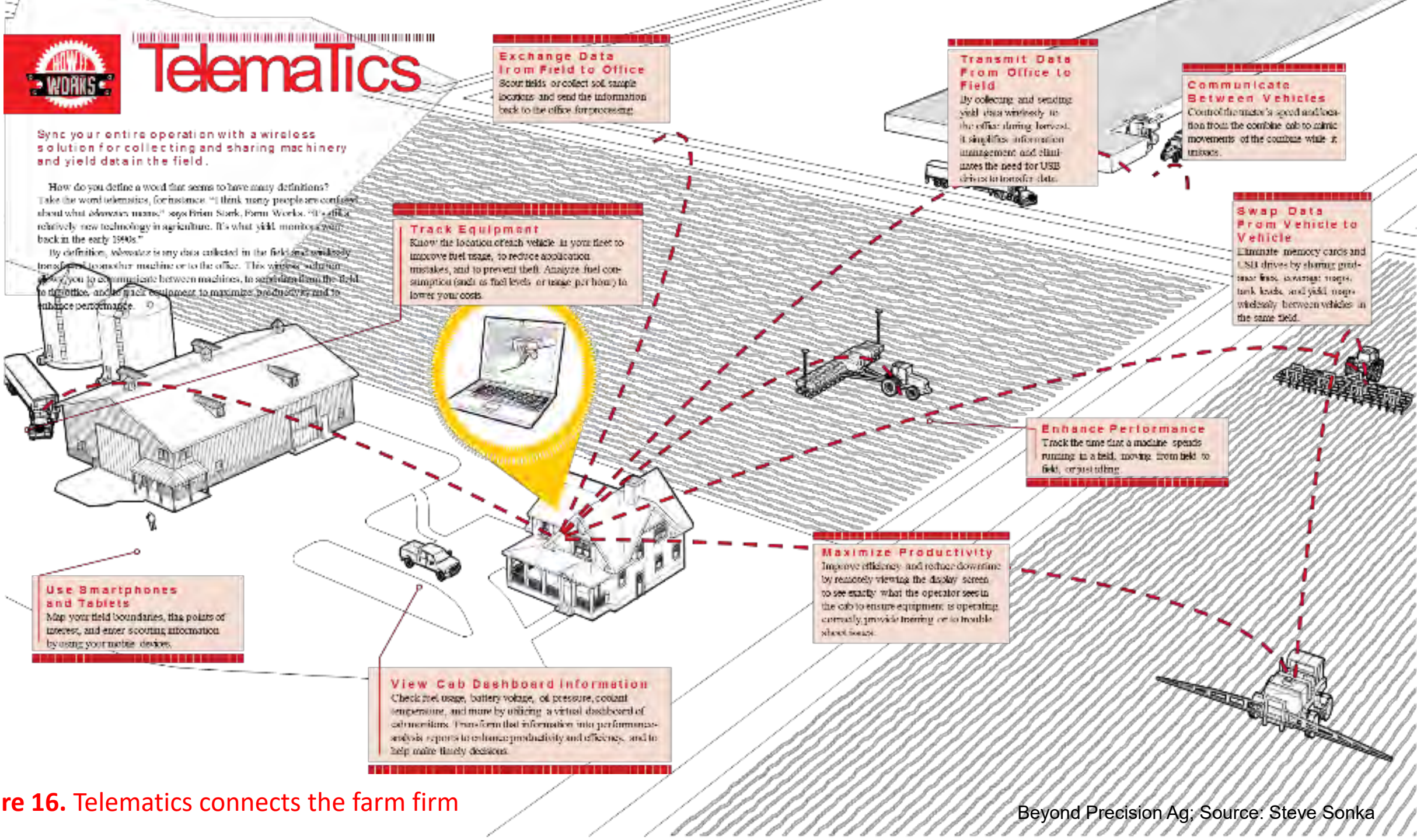
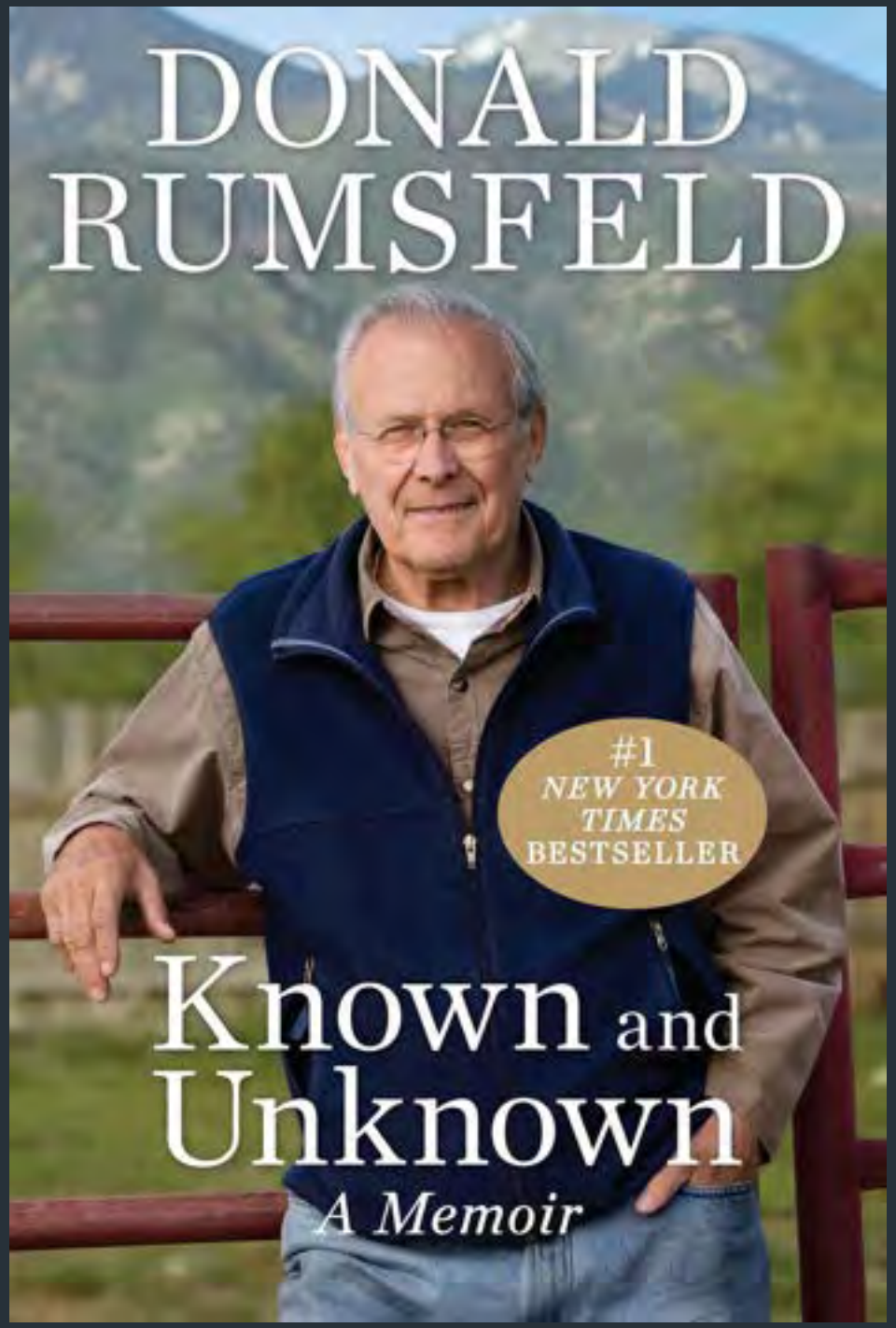


Figure 16. Telematics connects the farm firm

Beyond Precision Ag; Source: Steve Sonka

Disruptive technology essential for precision agriculture

Was Rumsfeld a farmer?



Dairy Farm technology adoption

Biggest problems dairy farmers face?

- Labor costs/access to labor
- Milk output-based management
- Waste management
- Scale
- Farm efficiencies
- Consumer false impressions

Dairy's Data Gaps

Individual data in real time?

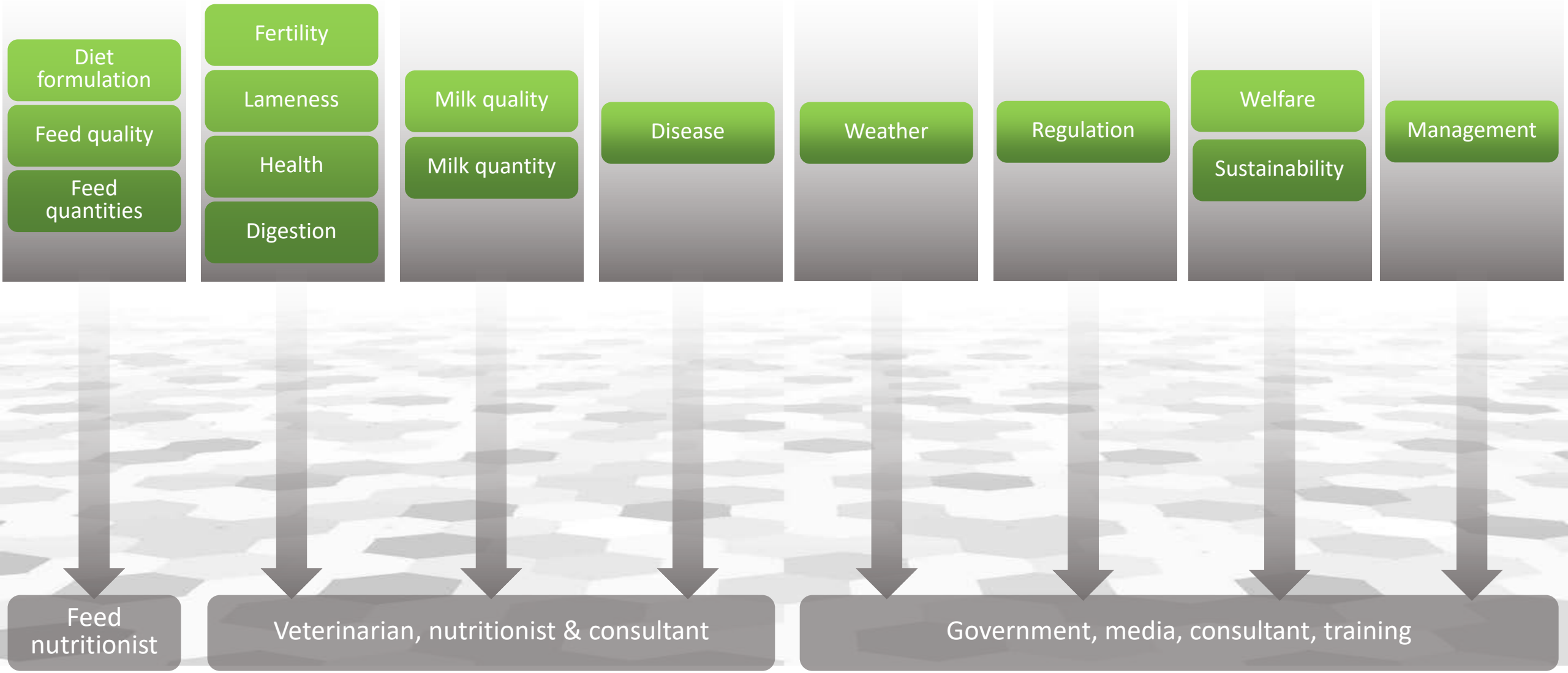
- Weight
- Feed & water consumption
- Cow Comfort
- Stress
- Health
- Livability
- Milk Quality

Real-time Environment?

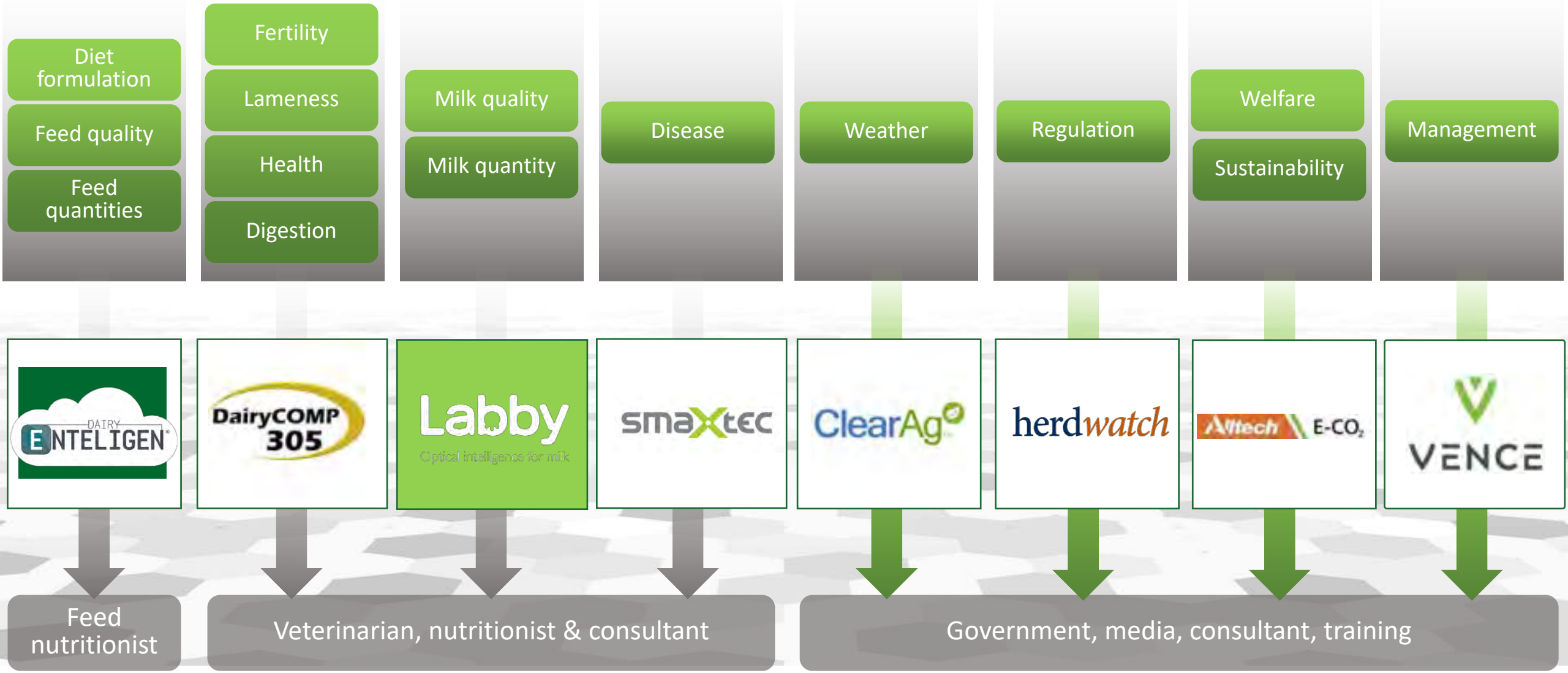
- Air quality: NH_3, CO_2, moisture
- Temperature
- Feed quality
- Safety: Campy, Salmonella
- Traceability; openness for 'Prosumers'

Farmers have a lot to think about!

Supported by EXPERTS…



Insight from SMART TECH…



25.7	33[illegible] + 4140	x	119	Elisa	16.11
~~[illegible]~~	~~[illegible]~~	~~x~~	~~[illegible]~~	~~Repetir~~	~~[illegible]~~
27.7	33630 + 971	x	5775		16.11
~~[illegible]~~	~~847~~	~~x~~	~~154~~	~~Repetir~~	~~[illegible]~~
1.8	42[illegible] + 4717	x	971		21.11
〃	97 + 124	x	〃		〃
〃	98 + 2254	x	971		〃
6.8	1621 + 155	x	4717	Elisa	28.11
〃	14251 + 〃	x	〃		〃
7.8	69 + 971	x	7502 P		27.11
~~11.8~~	~~[illegible]~~	~~[illegible]~~			~~[illegible]~~
~~〃~~	~~14253 971~~	~~x~~	~~7502~~		
16.8	33655 + 〃	x	971		5.12
30.8	8470 + 〃	x	〃		12.12
29.8	10057 + 4886	x	〃	Elisa	16 15.[illegible]
〃	2536 + 〃	x	971	Elisa	〃
1.9	14253 + 971	x	151		18.[illegible]
3.9	14156	〃	x	7502 P	
9.9	1684	5108	x	155 D	30.12
〃	3039	155	x	5108	〃
〃	743	971	x	124	〃

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11.9 34	971	x	7377		2.1
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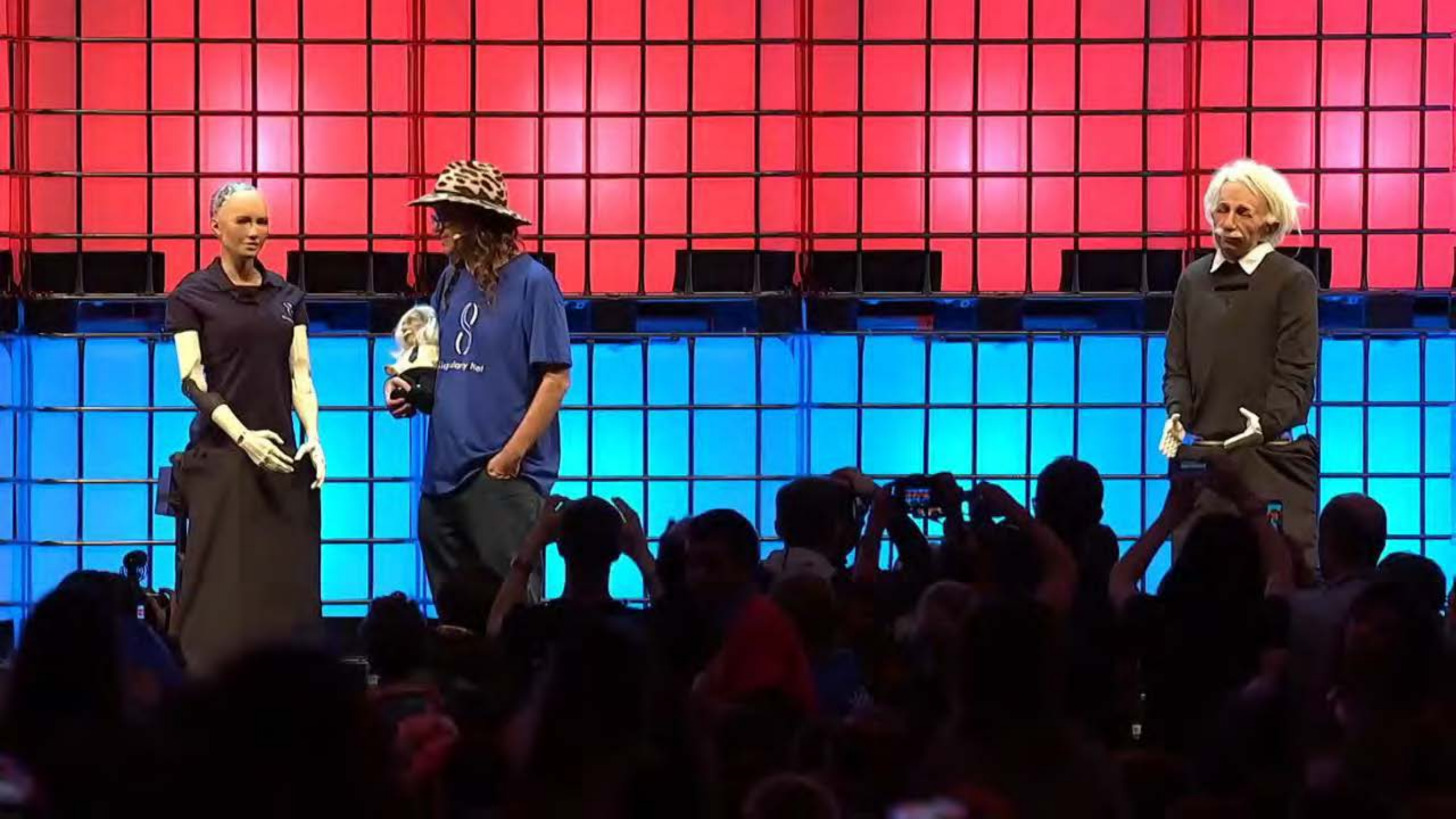
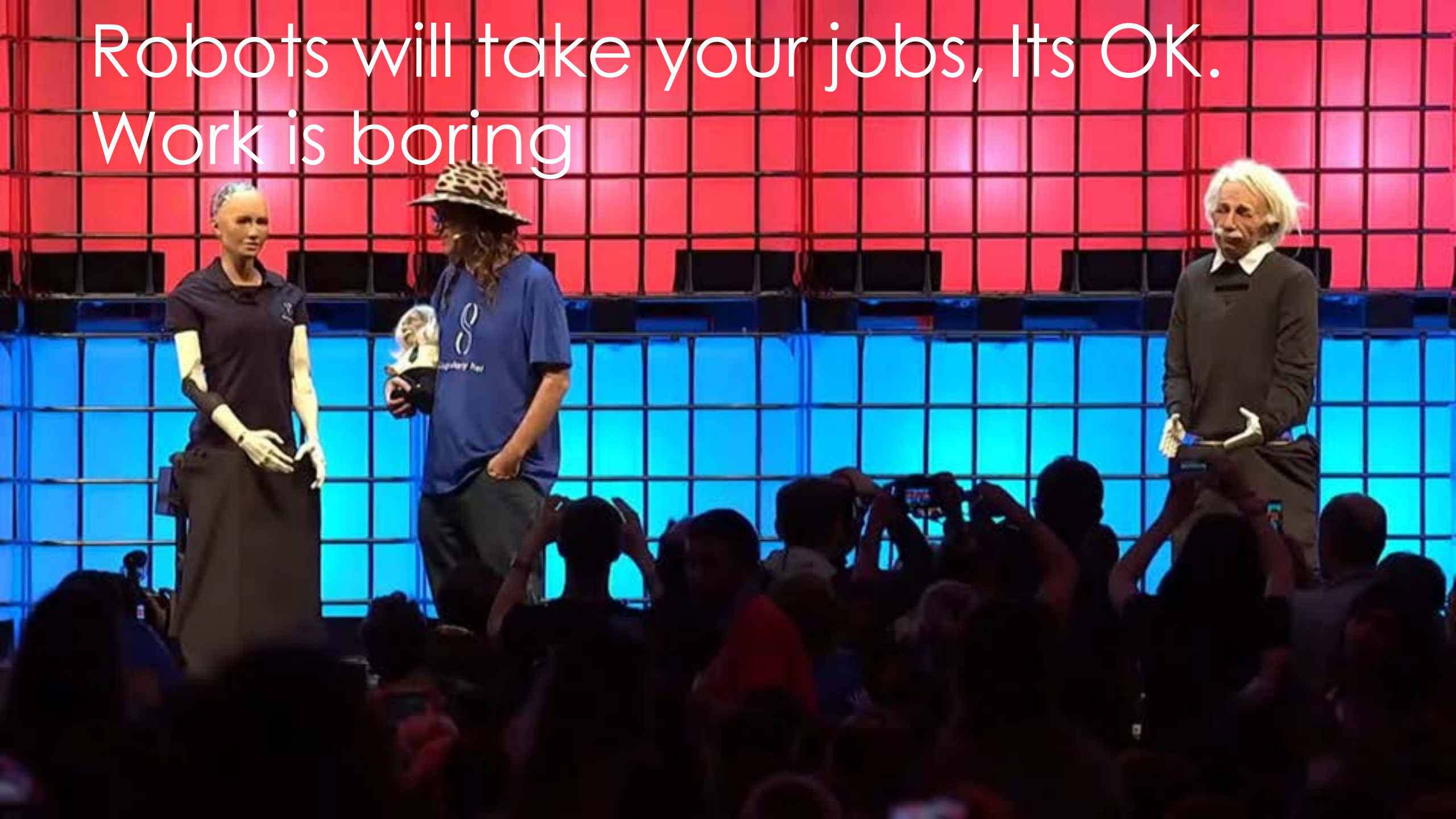
〃 10040	124	x	〃		〃
〃 11061	971	x	971		〃
19.9 1195	5775	x	5775		10.1
21.9 46	971	x	971		12.1
23.9 1466	2254	x	2254		14.1
〃 2549	〃	x	〃		〃
〃 1603	〃	x	〃		〃
〃 14155	〃	x	〃		〃
1.10 1586	124	x	124		22.1
〃 1488	〃	x	〃		〃
6.10 11281	154	x	154		27.1
〃 10153	971	x	〃		〃
7.10	154	x	〃		28.1
〃	〃	x	〃		〃

Two robots debate the future of humanity

Ben Goertzel, Hanson Robotics; Sophia the Robot, Hanson Robotics; Han the Robot, Hanson Robotics



Robots will take your jobs, Its OK.
Work is boring

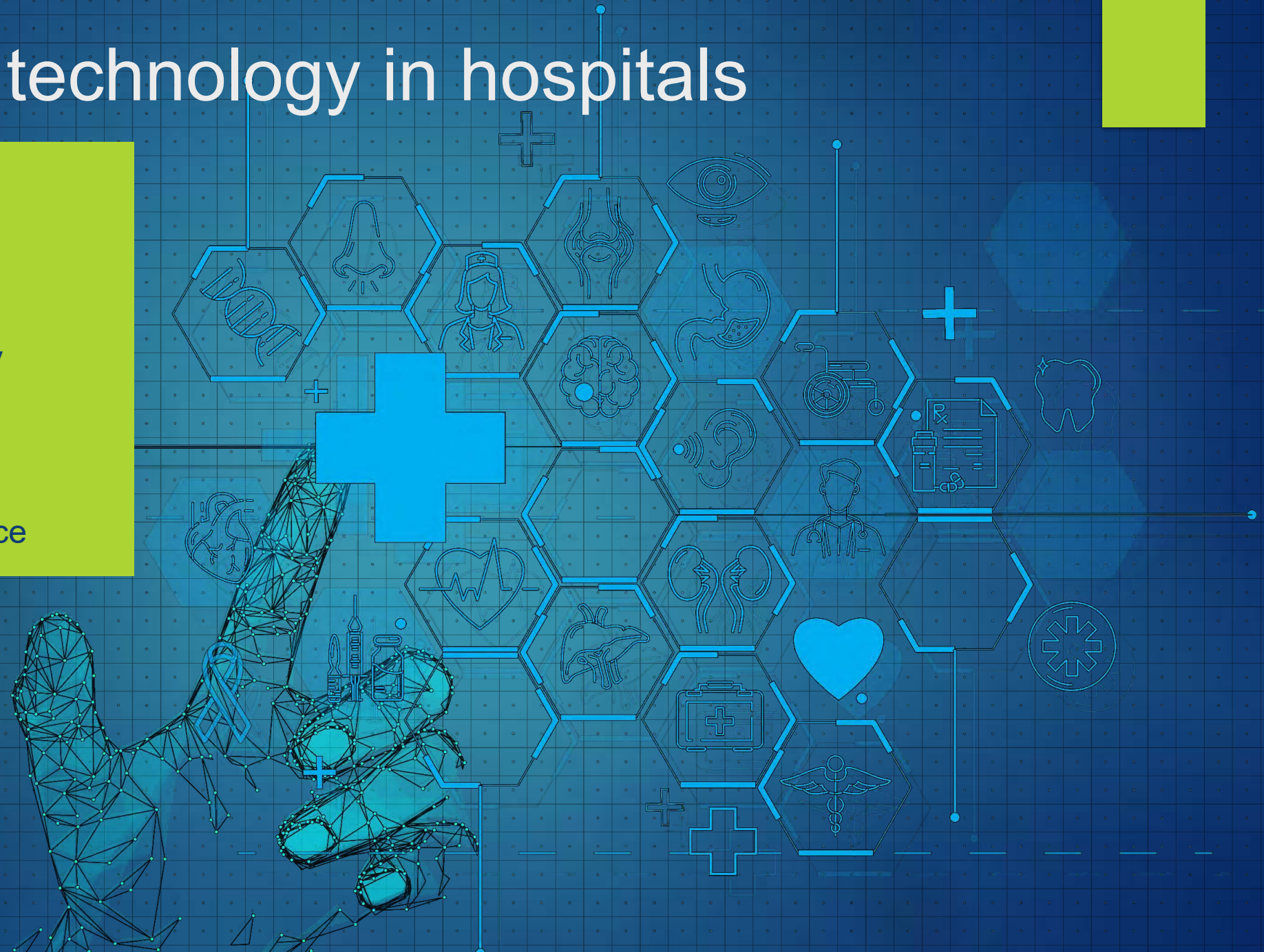


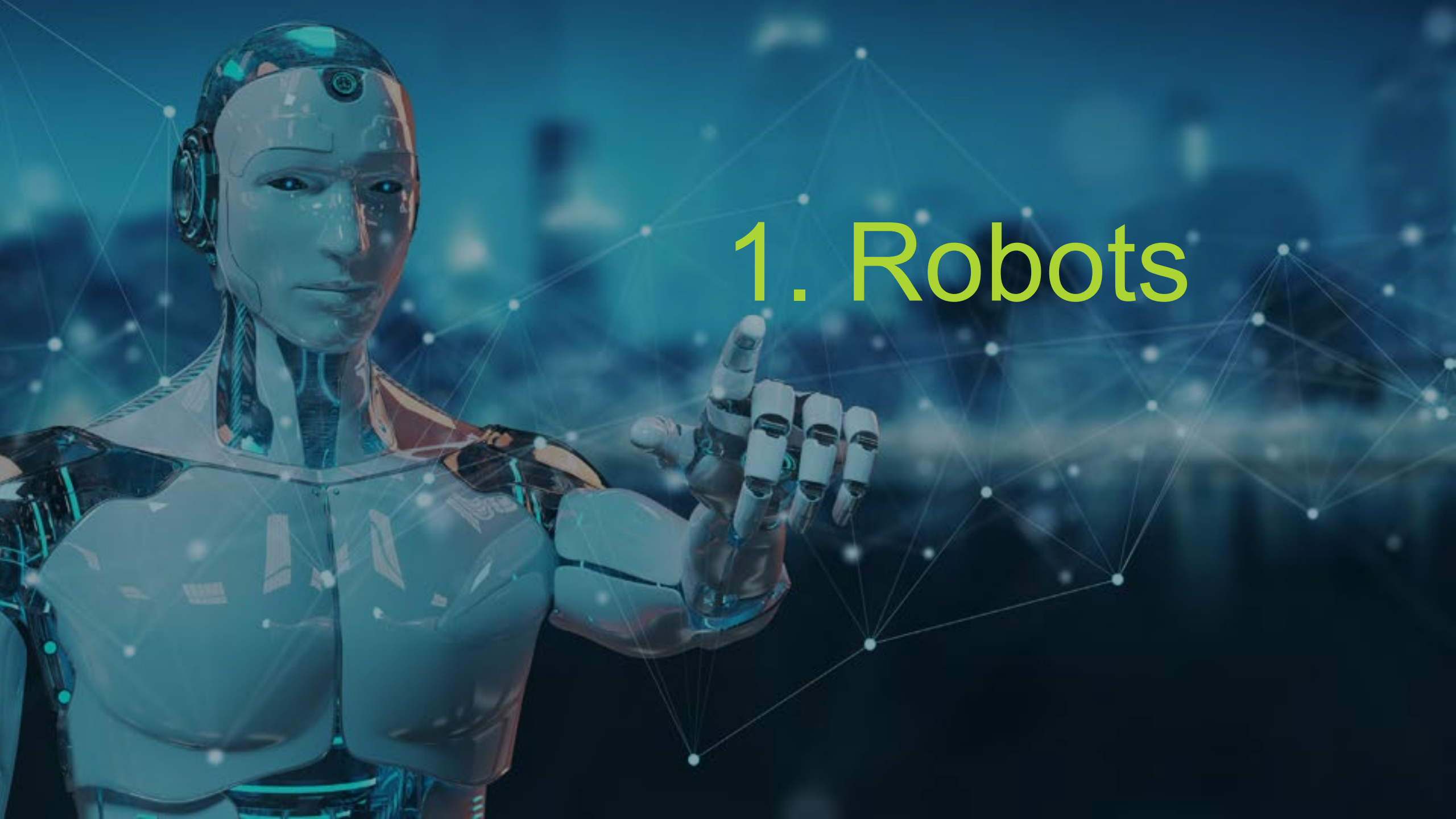
Technology in Hospitals, Healthcare

With technology do we have less doctors, nurses?

7 Uses of technology in hospitals

- Robots
- Sensors (IoT)
- 3D printers
- Augmented reality
- Virtual reality
- Data analytics
- Artificial intelligence





1. Robots

Robots in Healthcare

- Assist with Surgeries
- Hospital Logistics
- Workplace safety

Robots in Healthcare

- Robots have proven to better at orthopedic surgery than humans – e.g. knees & hips

Robot Logistics

- Robots delivery samples down corridors from ward to the laboratory more efficiently than, because they don't get distracted, pulled into other jobs!


Robotic cleaning
+ Disinfection*
*Covid accelerated use

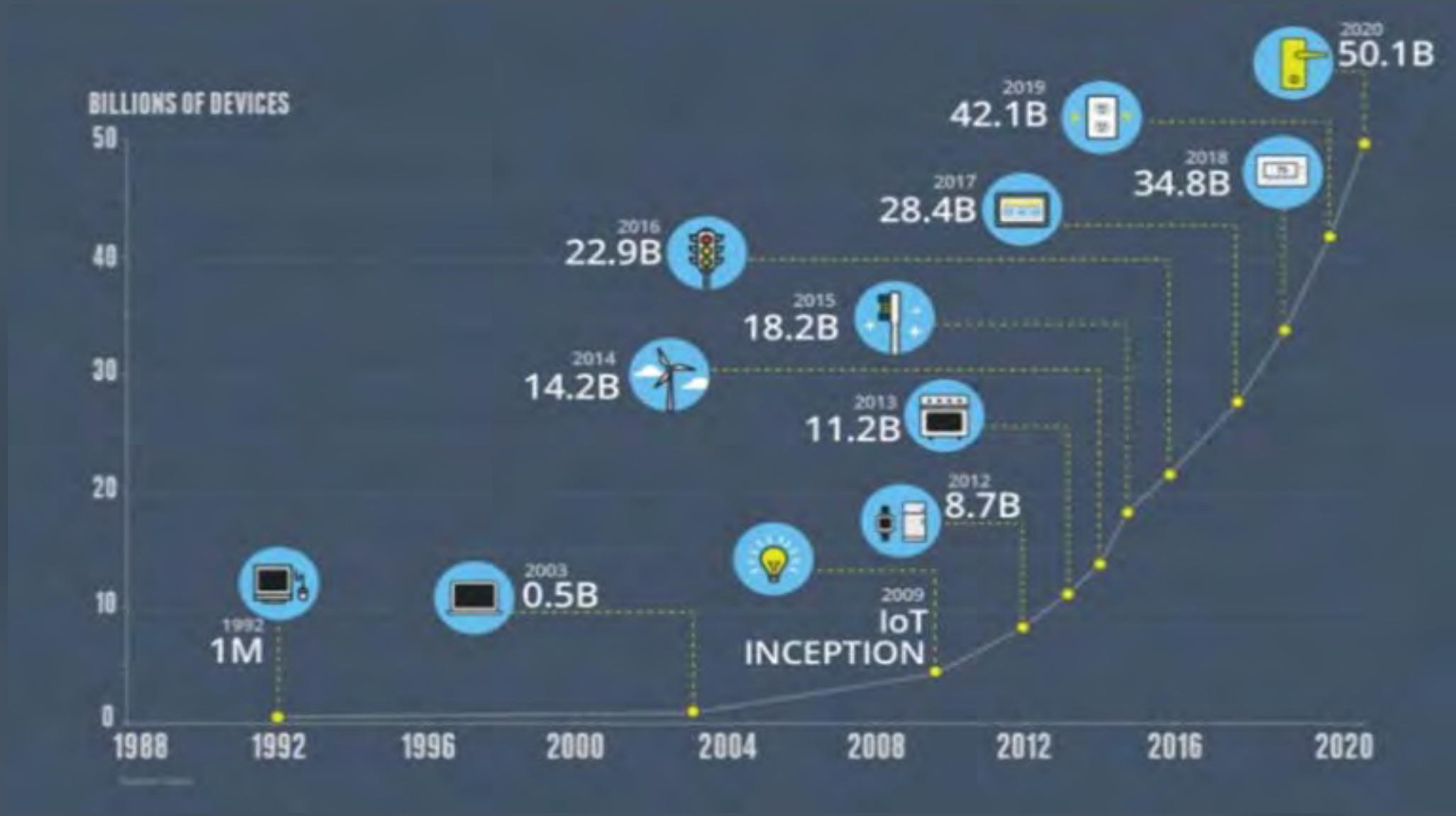
DeLaval Robotic Milking Machine

Lely Milking Machine

- New generation “soft robots”
- Not metal
- More delicate tasks

2. IoT Devices

Growth in the Internet of Things (IoT)



The number of connected devices will exceed **75 billion** by 2025

2. IoT Devices

- **Patients & Staff wear tracking devices**
  - Collect vital information on patients movement, health
  - Keep track of doctors, nurse to send them to the place where they are needed in emergency.
- **Healthcare Equipment**
  - Track location & usage of expensive hardware.

Tokihiro Fukatsu (Japanese pioneer)
TekWear, IntelliScout, MooCall

SCR
  -individual cow management

I.O.T. / SENSORS

Wearable sensors:

- Identification
- Monitor movement
- Estrus cycles
- Healthy vitals, coughing
- Rumen function

Who to look for?

- SCR – health monitoring
- EmBediVet – tracking devise under cows skin
- Ingenera – udder health sensors
- Moocall – Heat sensors and calving
- Afimilk – pedometer for cows
- Cow Manager
- Nedap

Also

- Labby – Hand held Milk SCC detection

Better data enables better control

Labby
Optical intelligence for milk

End-to-end Visibility, Transparency and Traceability

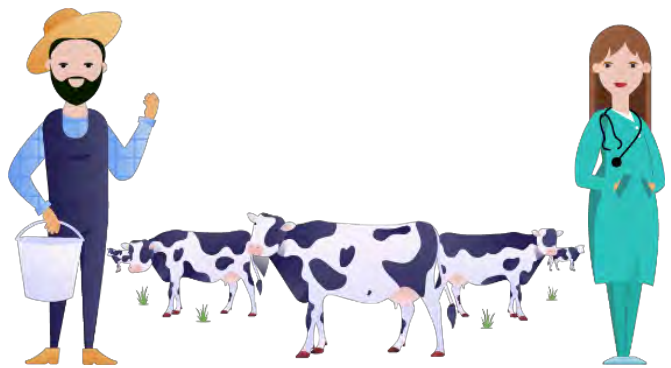
Real-time herd health monitoring

Milk quality management

Pathogen detection

Milk yield prediction

Supply chain optimization



Dairy Farmers

Vets group

Animal nutrition

Animal feed

Animal genetics

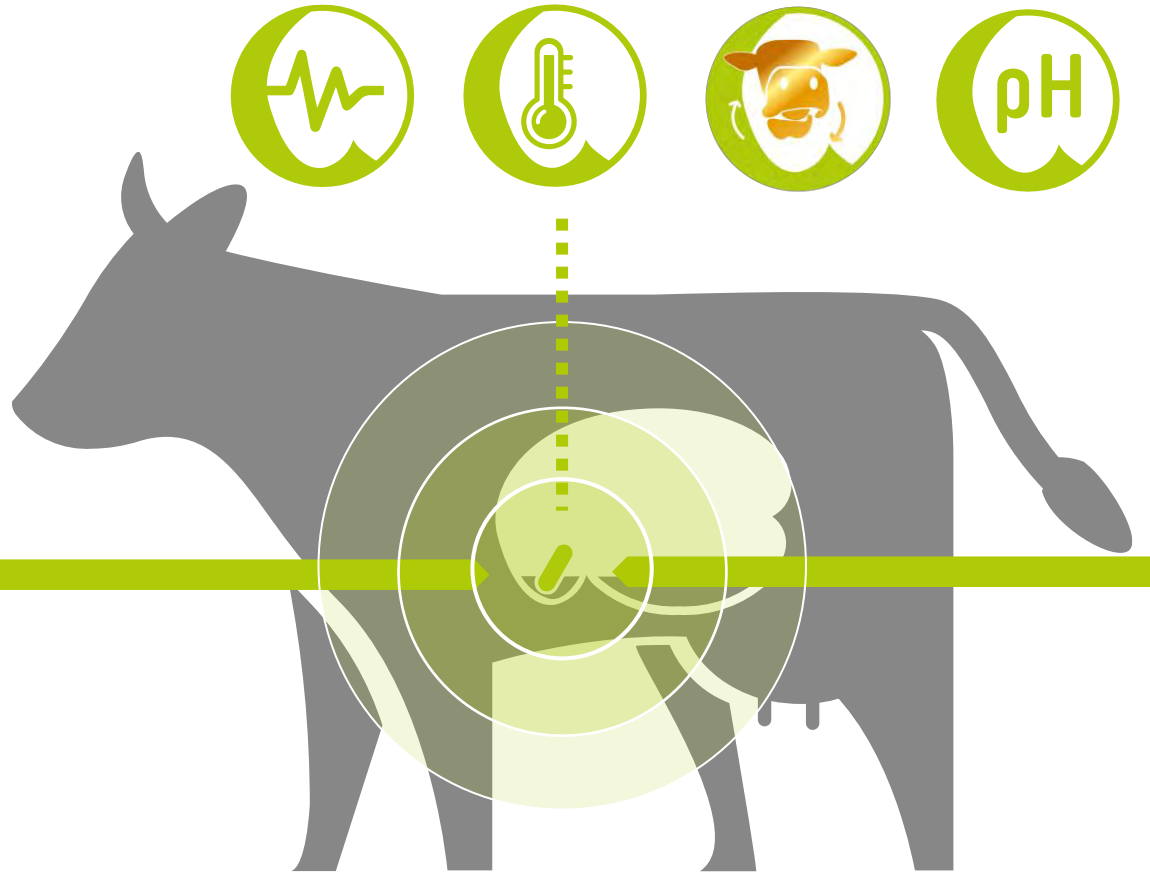
Dairy processing

Two Products Forms
work independently or seamlessly together

Labby
Optical intelligence for milk

SUCCESSFUL THROUGH PROVEN BOLUS MEASUREMENT.

+ OPTIONAL
RUMEN pH



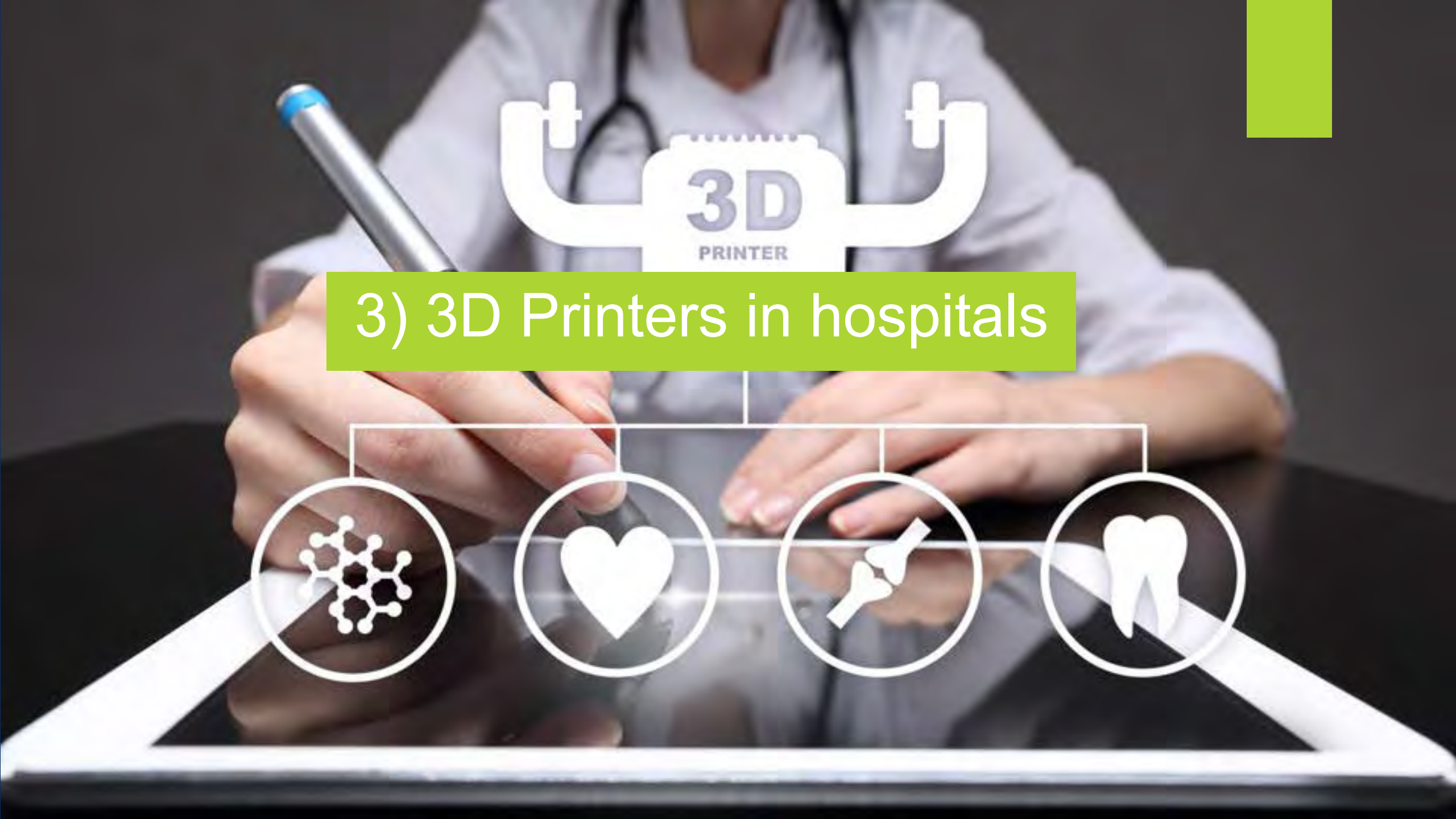
INNER BODY TEMPERATURE

+ MOVEMENT ACTIVITY

+ RUMINATION with smaXtec TruRumi™

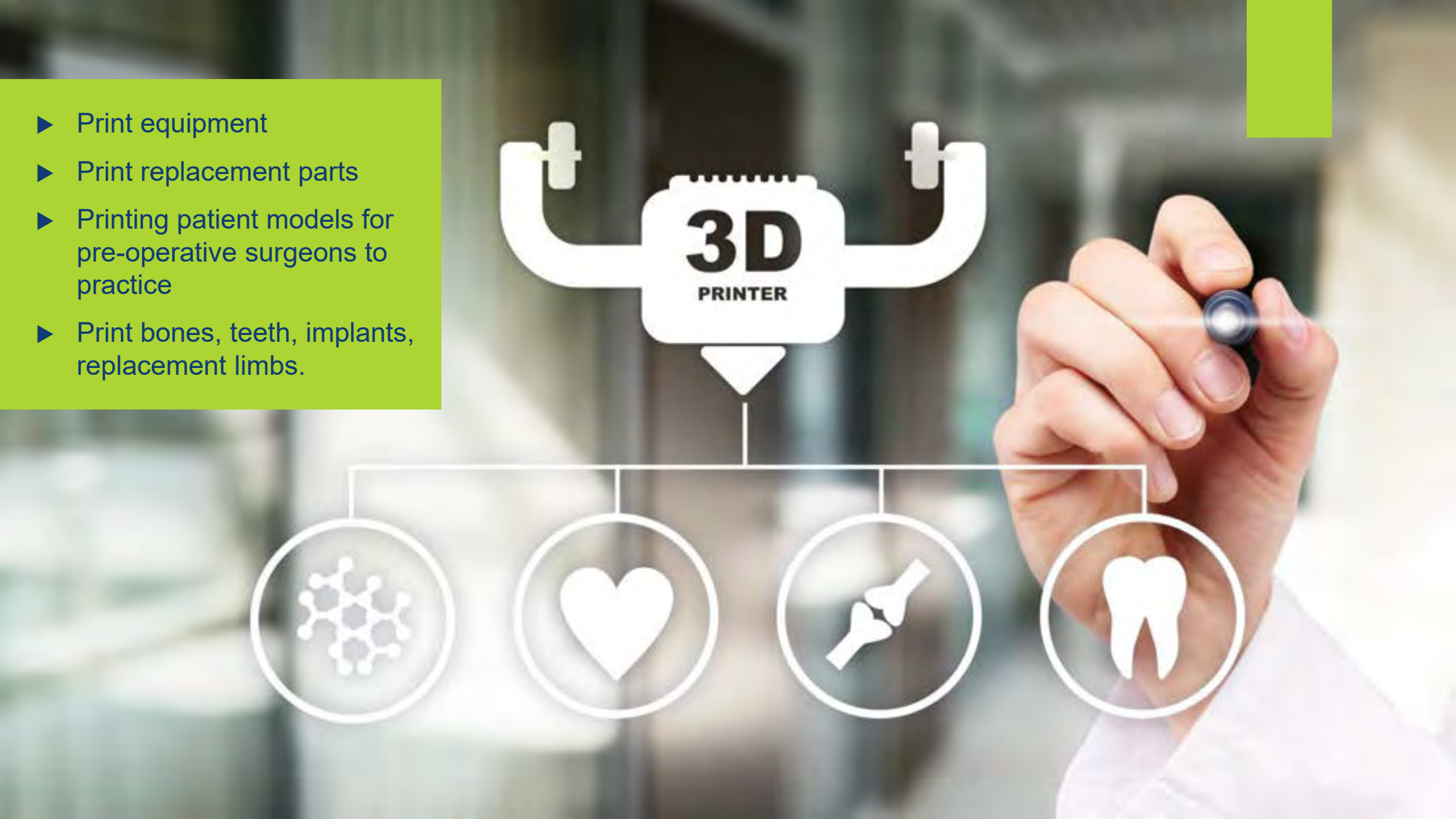
The unrivalled precise*, robust and reliable technology.

*see Performance study Raumberg-Gumpenstein, 2020



3) 3D Printers in hospitals

- Print equipment
- Print replacement parts
- Printing patient models for pre-operative surgeons to practice
- Print bones, teeth, implants, replacement limbs.



3D Printing Dairy

4) Augmented reality **in hospitals**


75%

Computers can see spectrums of light that humans cannot.

e.g. Identifying pathogenic bacteria in the food chain

Food producers can use AR to layout planting options in a field, or demonstrate the impact fertlizer could have on a field.

Use of QR codes

- Hema (the supermarket) owned by Alibaba uses QR codes to allow consumers to watch content, videos of the providence of the food on the shelf.

5) Virtual Reality in Hospitals



Who to look for?

- DeLaval virtual reality farms, 360 degrees
- “Haptic Cow” fiberglass model of the rear of a cow combining virtual reality with robotics

McDonald’s launched its ‘Follow our Foodsteps’ campaign in (UK)

Consumers & food:

- 74% want to know more about prod.
- 20% can’t explain food prod. Process
- 41% have never been on a working farm
- 83% never advised about careers in food/ag
- 60% never considered a career in food/ag

The Metaverse meets the Food Chain

5 applications of extended reality in the food chain

- Enhanced Observation
- Origin & Providence
- Operative Training
- Efficiency & Safety
- Consumer Experience

Global Data Creation is About to Explode

Actual and forecast amount of data created worldwide 2010-2035 (in zettabytes)

1 zettabyte is equal to
1 billion terabytes.

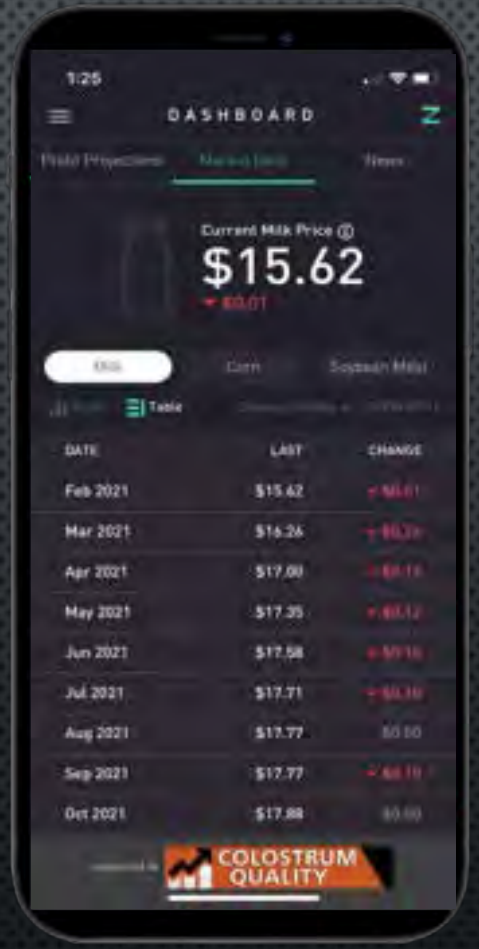
@StatistaCharts Source: Statista Digital Economy Compass 2019

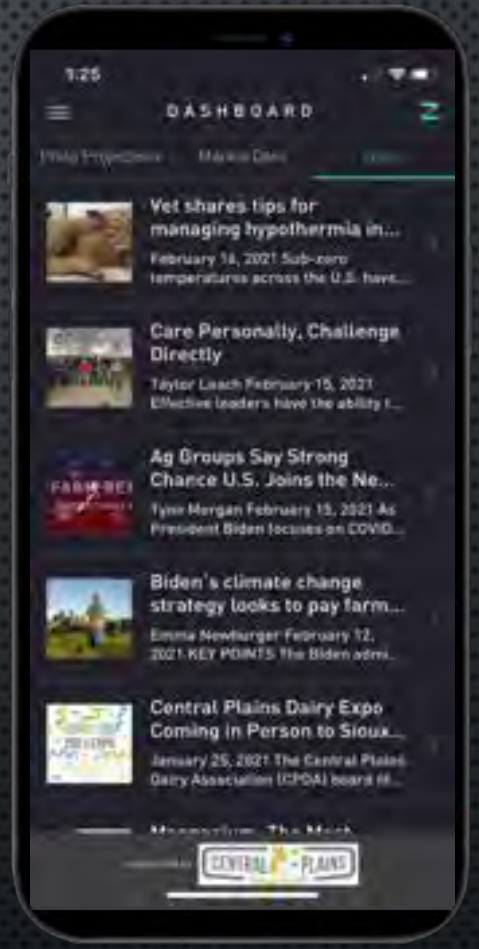
Is data the new oil?

Having more of it doesn't make you rich!

ZISK

DAIRY ■ NEWS ■ MARKETS ■ PROFITS





ZISK

'farms over 1000 cows are 5X more PROFITABLE'

7) Artificial Intelligence

WORLD ECONOMIC FORUM

AI is probably the most important thing humanity has ever worked on.

Sundar Pichai

CEO of Google

& its limitations

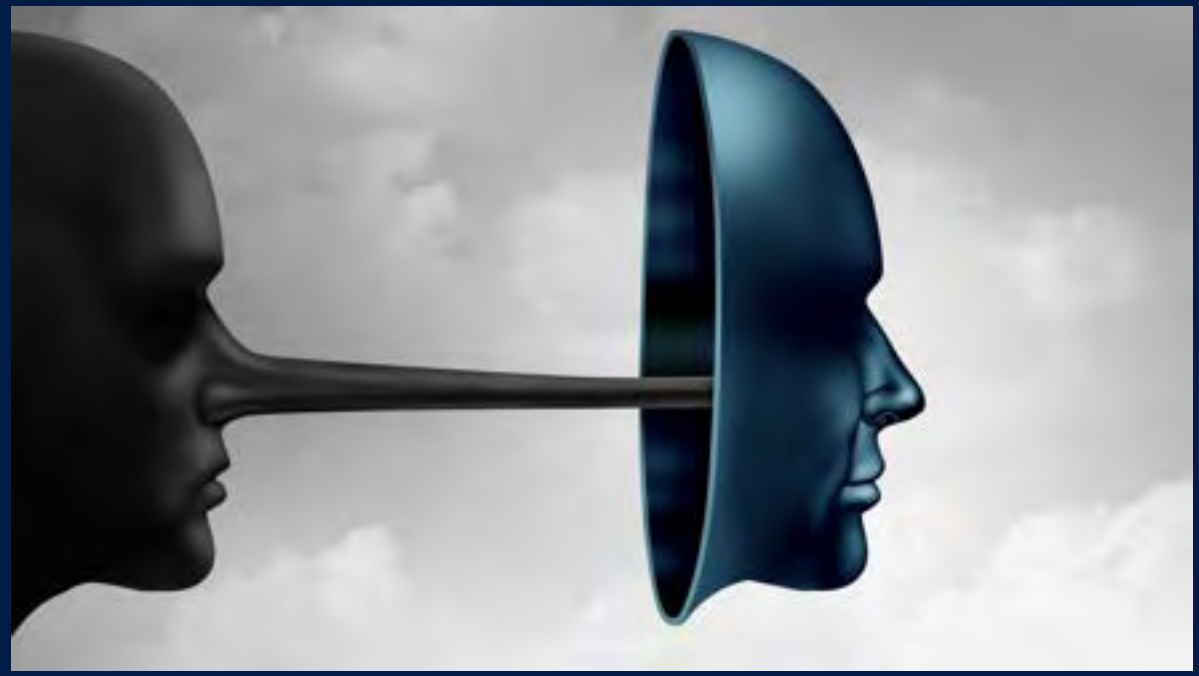
‘Artificial intelligence is

NEITHER Intelligent NOR Artificial!’

Seth Godin

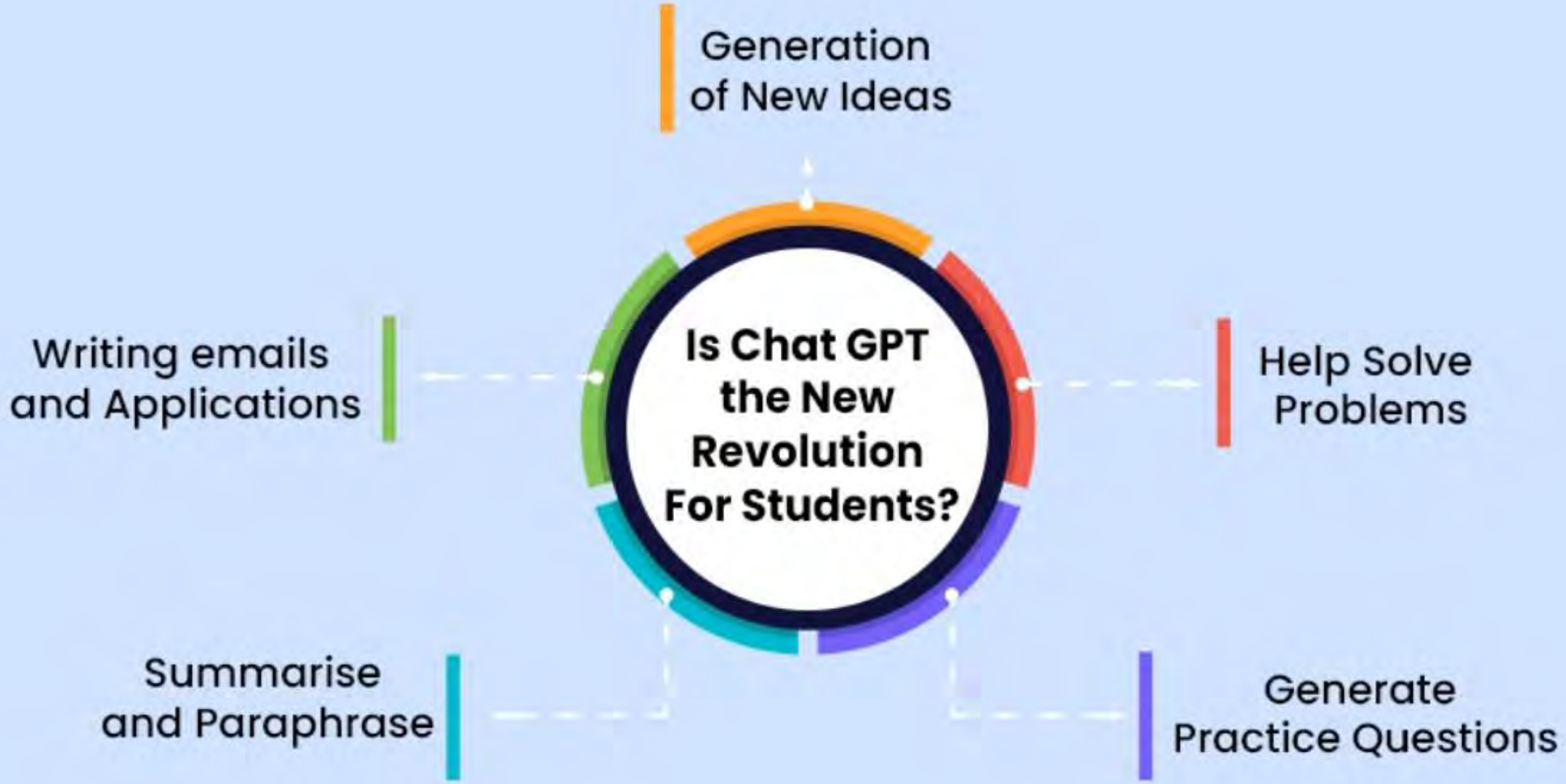
Is Artificial Intelligence really Intelligent?

- AI is an imprecise, misleading term.
- AI can sometimes fool humans, but it is not self-aware
- AI is highly prone to error & to making up results
- ‘Hallucinations’.



AGRITECH CAPITAL

Chat GPT

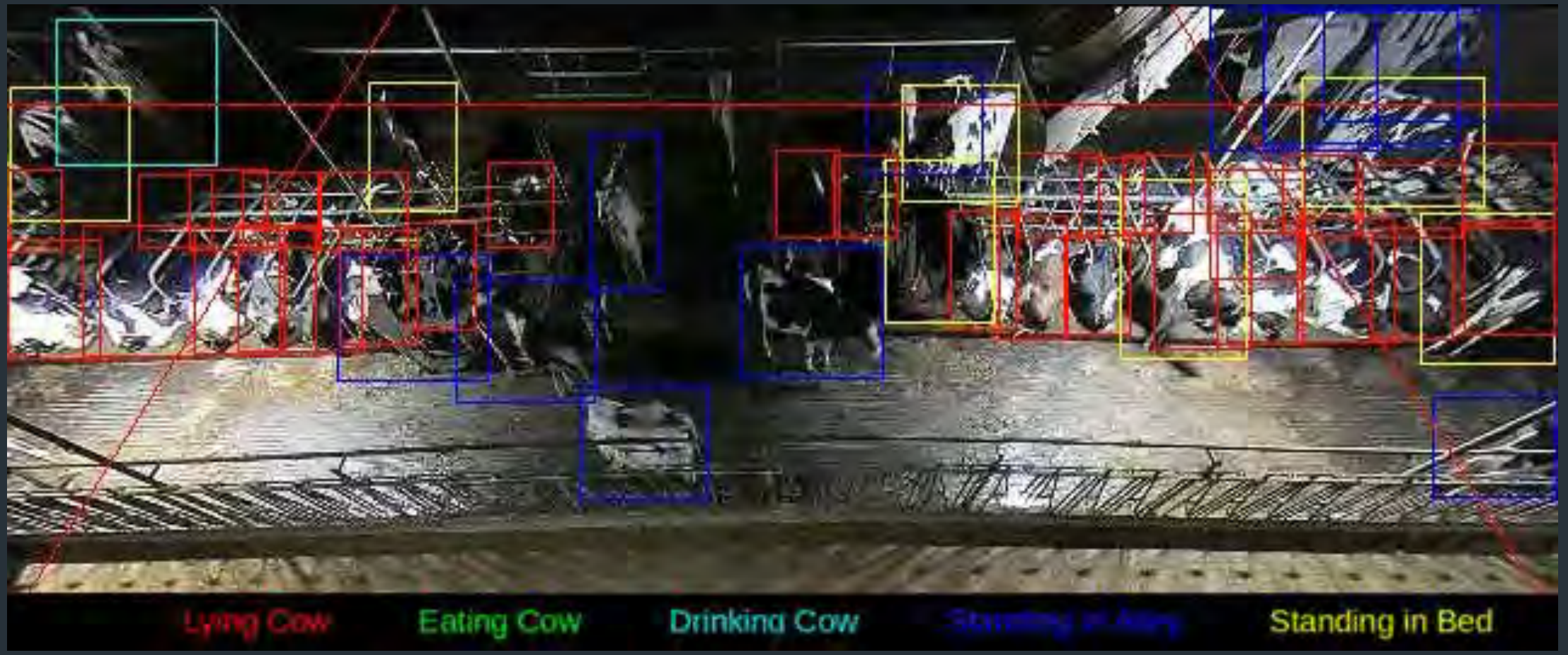

Generation of New Ideas
Writing emails and Applications
Is Chat GPT the New Revolution For Students?
Help Solve Problems
Summarise and Paraphrase
Generate Practice Questions

Simulating human intelligence & mimic actions

ARTIFICIAL INTELLIGENCE

- Constant monitoring herds
- Easily scalable, No hardware on the cows
- Monitoring staff – Milking, feeding
- Proactively find problems
- Eliminate human errors

Capture & analyze images from the barn


Lying Cow
Eating Cow
Drinking Cow
Standing in Bed

iCHASE

Application

Poultry house

- Avoid bird flu contact

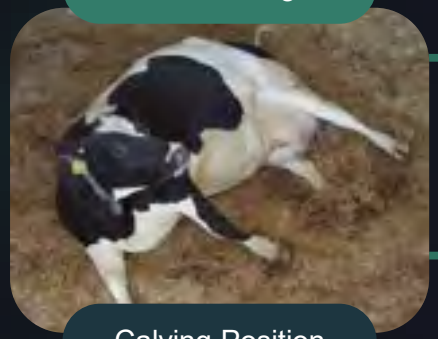
Feed mill

- Avoid contamination of feed

Dairy house

- Avoid bird flu contact
- Save feed cost

Tail Raising



Calving Position

Vaginal Discharge

Calving AI

The Maternity Warden monitors calving symptoms over time and alerts workers once a critical threshold is reached.

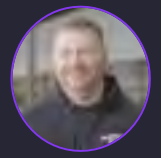
Latest labor events:

01:57 PM

02:11 PM

02:13 PM

Good Alert | Did not check | False positive



Fast Maternity Warden Payback

Unquantified benefits:

- Farms already pay labor to watch maternity, at large farms, these are full time positions
- If the calf dies, so does the farm's genetic investment.

Average US Dairy Farm

2-10%
Stillbirths

4-11%
Exits <60 DIM

Less Stillbirths

Calf deaths up to 48 hours after birth. Caused by dystocia, malformations, accidents, or acts of God.

Easier Calvings

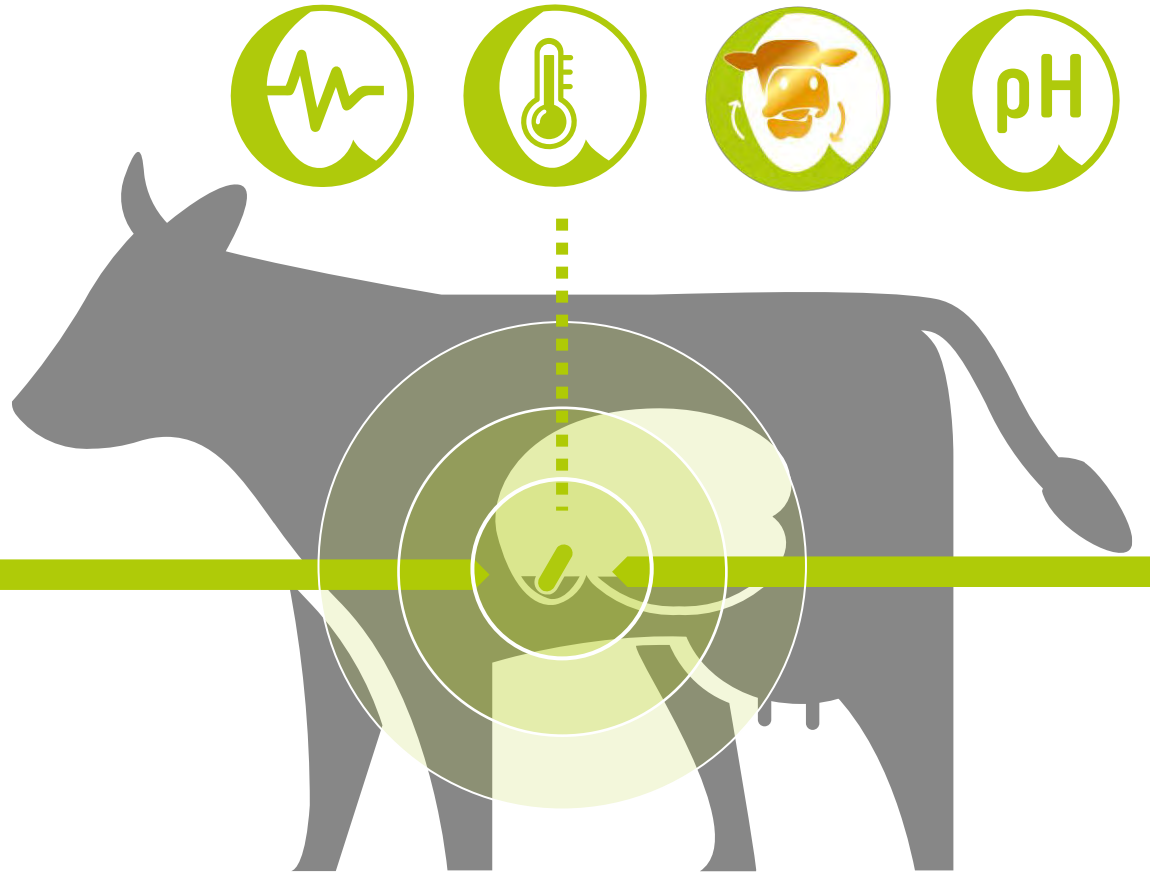
Abnormal or difficult birth at any stage in labor results in direct negative effect to dam (leads to culling) and calf (leads to stillbirths)

Less Exits <60 DIM

~7% of exits occur within the first 60 days in milk. Leading causes are dystocia, resulting in metritis and failure to breed back.

SUCCESSFUL THROUGH PROVEN BOLUS MEASUREMENT.

+ OPTIONAL
RUMEN pH



INNER BODY TEMPERATURE

+ MOVEMENT ACTIVITY

+ RUMINATION with smaXtec TruRumi™

The unrivalled precise*, robust and reliable technology.

*see Performance study Raumberg-Gumpenstein, 2020

OVERVIEW | ITEMS | EVENTS | TESTDAYS | LACTATIONS | DAILY MILK | PEN CHANGES | PEDIGREE | PARTNERS

View LAST 24HS LAST 7 DAYS LAST 30 DAYS

Need Help? Learn More About SmaXtec

Integrated with smaXtec

Premium smaXtec bolus provides three types of data: pH, temperature, and activity

2

3

4

5

6

°F

AC PH

140 130 110 90 70

100 80 60 40 20 0

7 6 5 4 3 2

05/22/19 07:00 PM sk of acidosis

05/22/19 07:00 PM crease in average pH

05/22/19 07:00 PM ed efficiency

JUN-08, 2:53 AM
PH : 5.77
Activity : 16.58
Temperature : 102.31

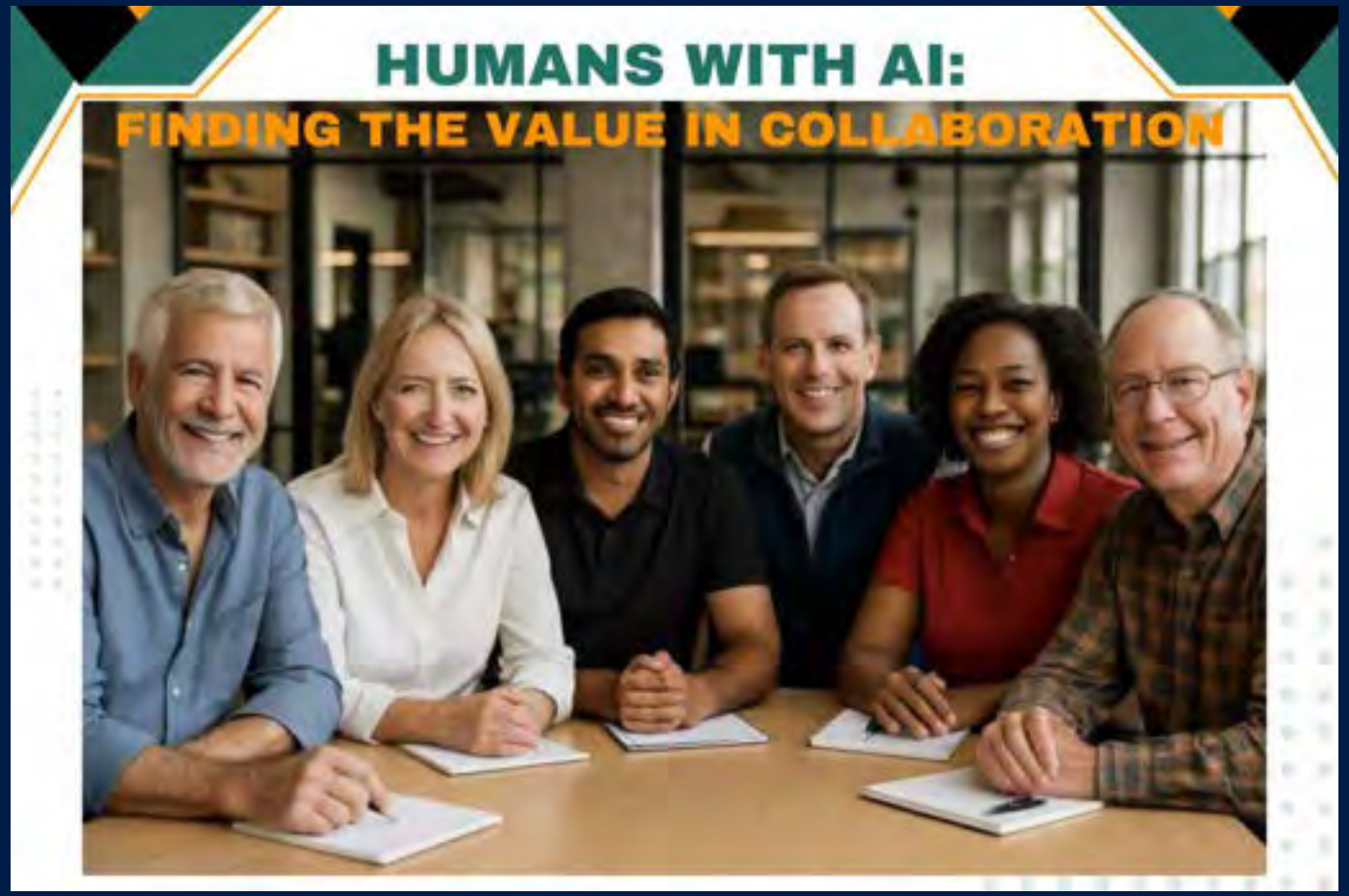
May-14 May-22 May-29 Jun-06 Jun-13

TEMPERATURE ACTIVITY PH

Contrasting the AI experts with Food & Agr Experts


Aaron Beydoun
Adrian Percy
AJ Shelman
Anthony Howcraft
Ashley Sweeting
Bonnie Brayton
Claudia Roessler
Damien McLoughlin
David Hunt
Dean Cavey
Ed Eggers
Ejnar Knudsen
Hadar Sutovsky
Haven Baker
Jack Bobo
Jason Lusk
AI EXPERTS V FOOD & AGRI EXPERTS
How do their predictions of the future vary?
Jean-Martin Bauer
Joe Jennings
João Ribeiro da Costa
John Foltz
John Herlihy
Jonah Kolb
Jose Tomas
Joseph Byrum
Julia Somerdin
Kevin Gohil
Marcos Fava Neves
Mary Shelman
Naira Hovakimyan
Pia Brantgarde
Rahul Mehendale
Rob Dongoski
Robert Wolcott
Rory McInerney
Shail Khiyara
Shari Rogge-Fidler
Shoumen Palit
Sylvain Charlebois
Tim Hassinger
Wolfram Schlenker

We created a virtual panel



Dairy Farmer, Row Crop Farmer, Midwest CoOp retailer, Major Grain Trader, Feed company, Food company Business Professor & Agtech startup.

‘DRIVE’

Data First (Fix your data)

Run Purposeful Pilots

Insiders Preferred (not consultants)

VIPs must follow the rules (esp. Boss)

Execute Now (JDI!)

TAKE HOMES?

1) Download ChatGPT today
2) Ideally, pay for the better version
3) Pratice learning how to develop Prompts

Jobs of the future are not about.. Your college – Who your parents are – Your IQ. They are about who can harness the power of AI. LEARN IT NOW

Better?

- Doctors
- Nurses
- Carers
- Homecare

What have we learned from healthcare?

- **Be customer-centric?**

  - don’t make our solution answer no real questions

- **What outcome do we want?**

  - don’t try to change their problem to fit with us

- **Cost-effective**

  - don’t fall in love with the tech

Cow centric

The survivors in farming will be the ones who adopt technology fastest.

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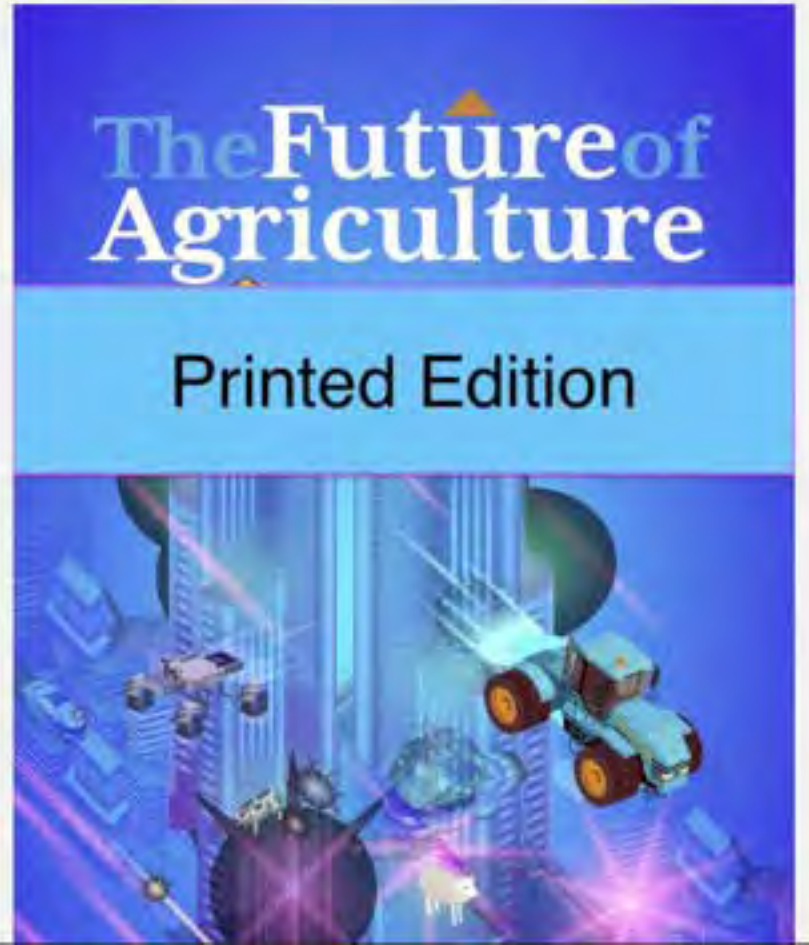

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