ML is here. AI is coming.

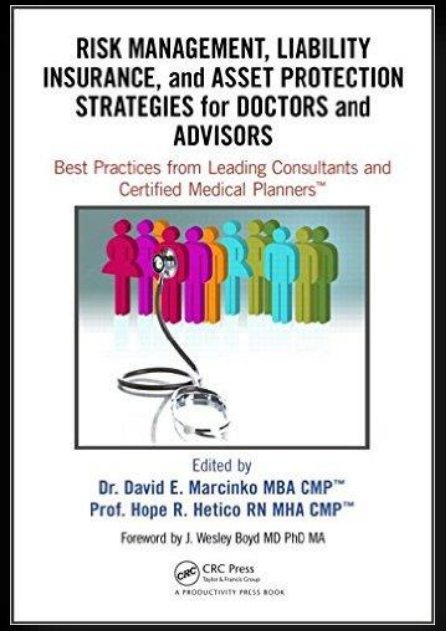
How will the medical profession change in the next 10 years and what opportunities will it create for healthcare innovators?

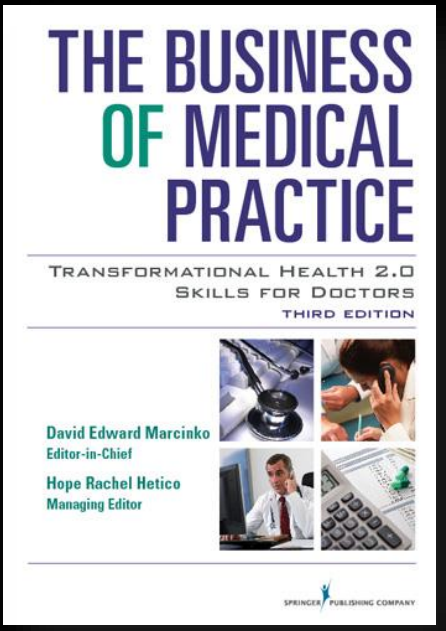
Data democratization and liberation does for medical science what social media did for news

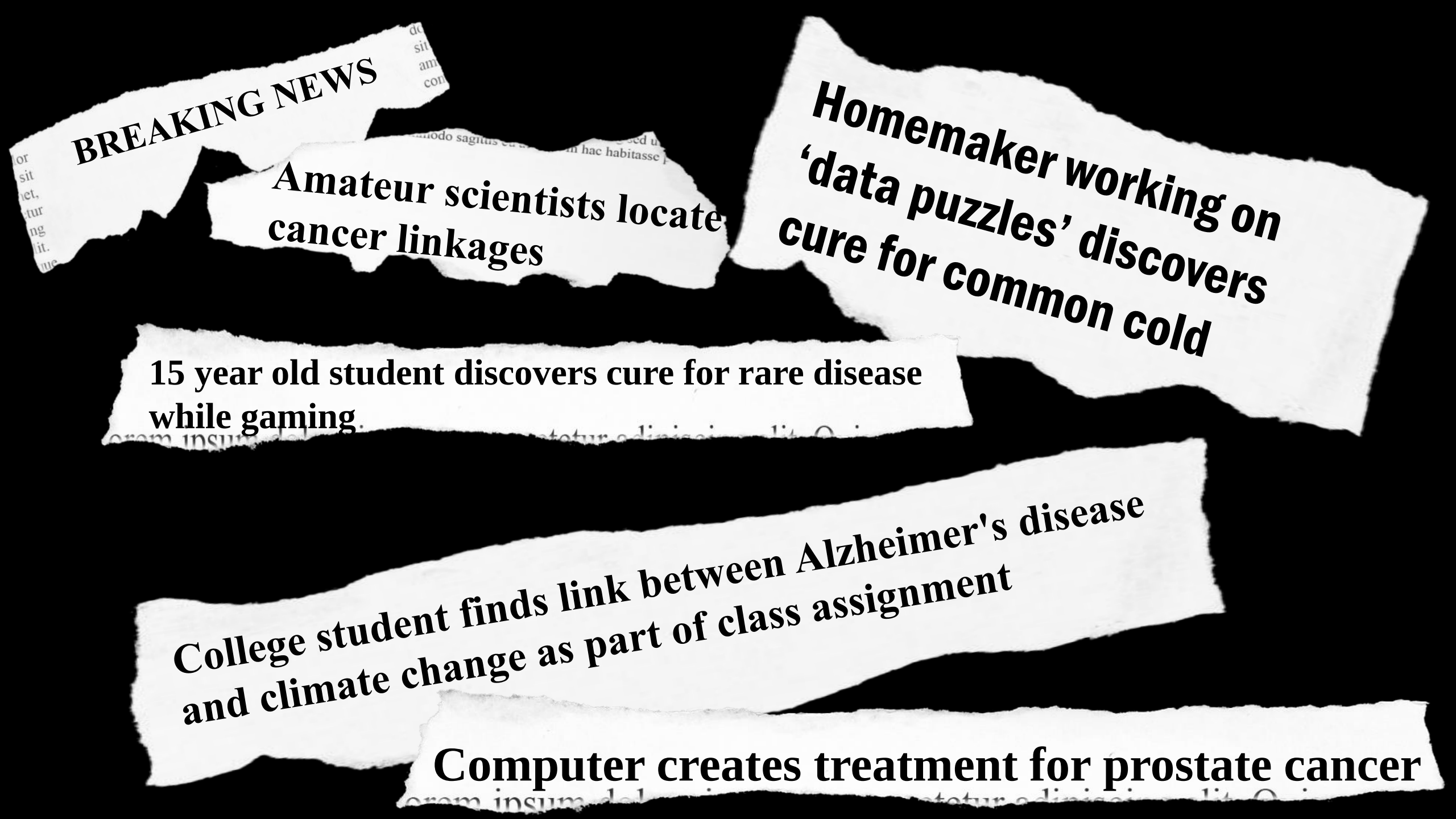
Shahid N. Shah

Who is Shahid?

- Chairman of the Board of Netspective Communications, Publisher at Netspective Media and serial entrepreneur.
- Angel investor, board member, in several digital health and Internet startups.
- 32+ years of software engineering and multi-site healthcare system deployment experience in Fortune 50 and public sector (Fed 100 winner).
- 15 years of healthcare IT and medical devices experience (blog at http://healthcareguy.com)
- 15 years of technology management experience (government, non-profit, commercial)






BREAKING NEWS
Amateur scientists locate cancer linkages
Homemaker working on 'data puzzles' discovers cure for common cold
15 year old student discovers cure for rare disease while gaming
College student finds link between Alzheimer's disease and climate change as part of class assignment
Computer creates treatment for prostate cancer

Technology has digitized our experiences

Last and past decades

Digitize mathematics & engineering

Digitize maps, literature, news

Digitize purchasing, social networks

Predict crowd behavior

Gigabytes and petabytes, all sharable

This and future decades

Digitize biology

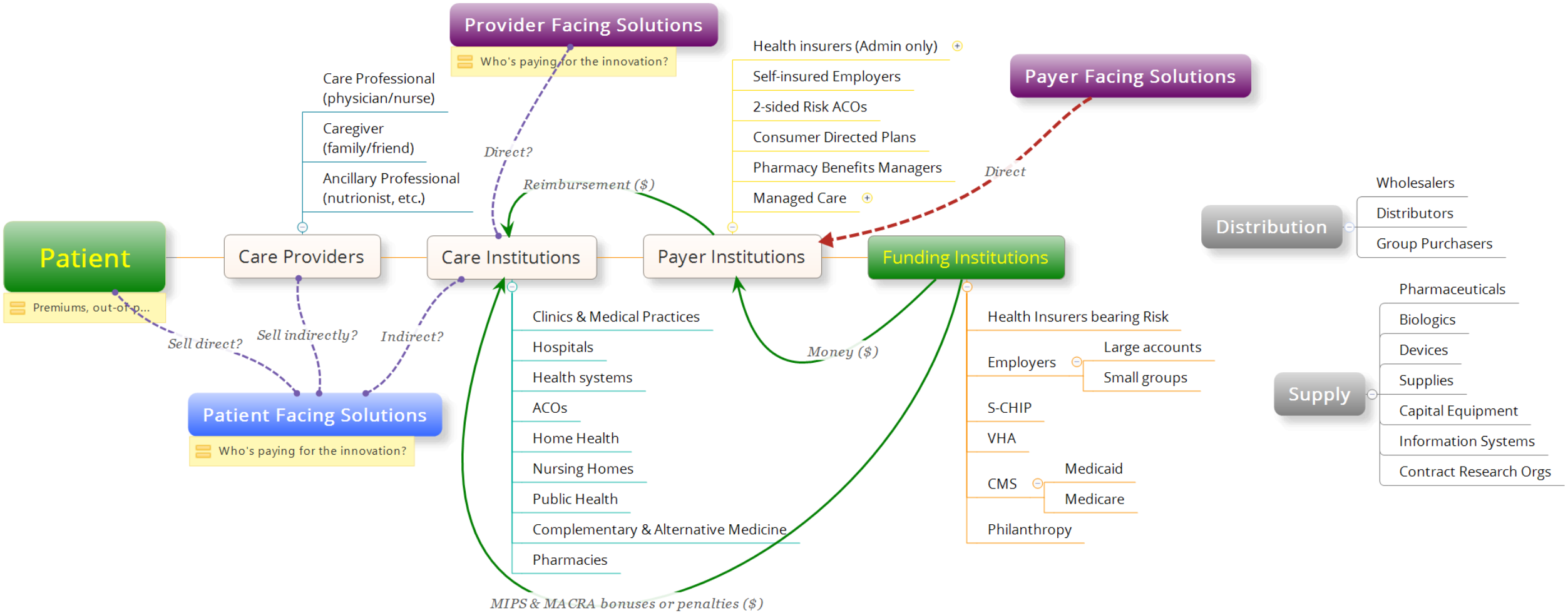
Digitize chemistry

Digitize physics

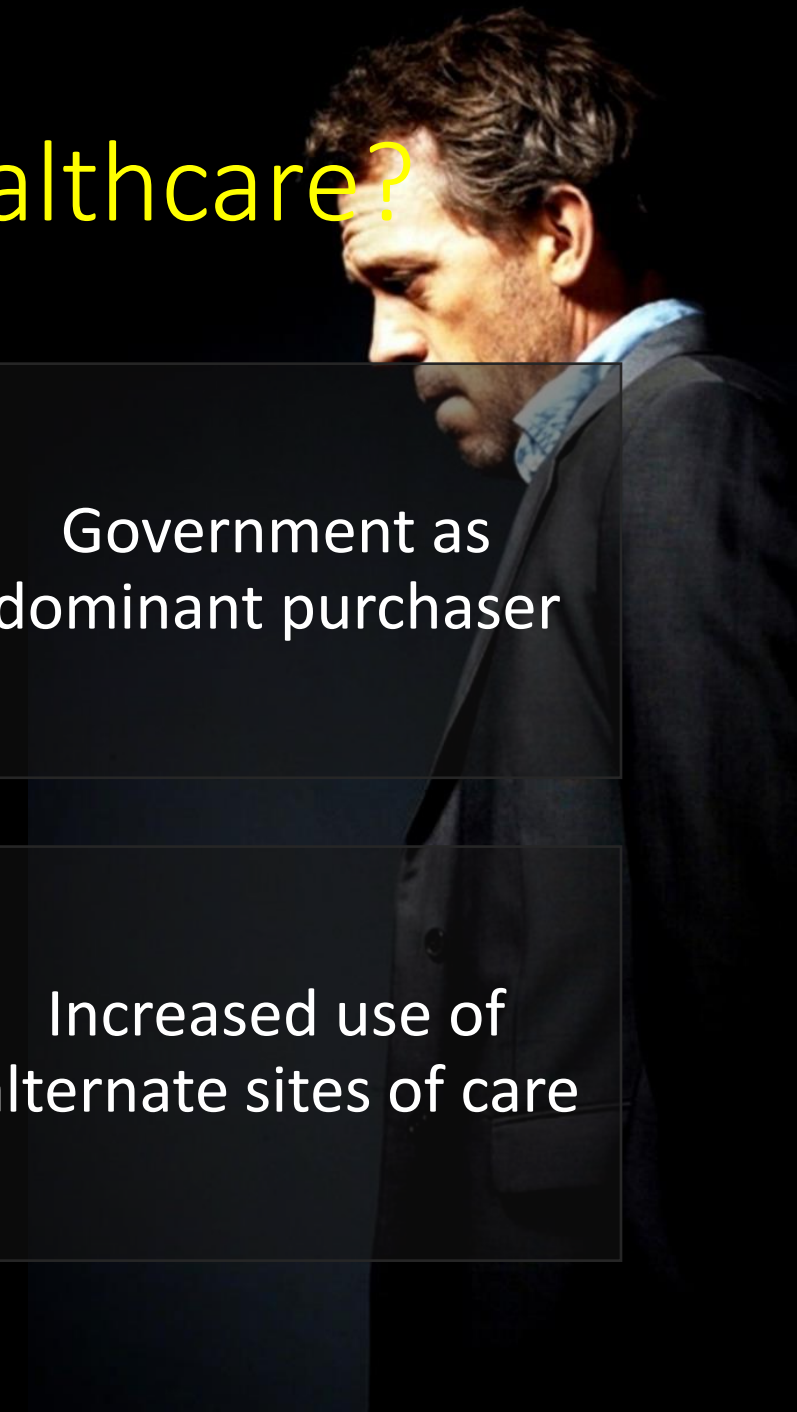
Predict human behavior

Petabytes and exabytes, not shareable

Machine Learning and AI in healthcare will be slowed by *intermediated business models*, *misunderstood regulations* such as HIPAA / FDA QSR and *protective regulations* such as licensure and credentialing.



What's not going to change in healthcare?



Do no harm, safety first, and reliability effect on standard of care

Statutory cruft & regulatory burdens increase over time

Government as dominant purchaser

Outcomes based payments intermediation & pricing pressure

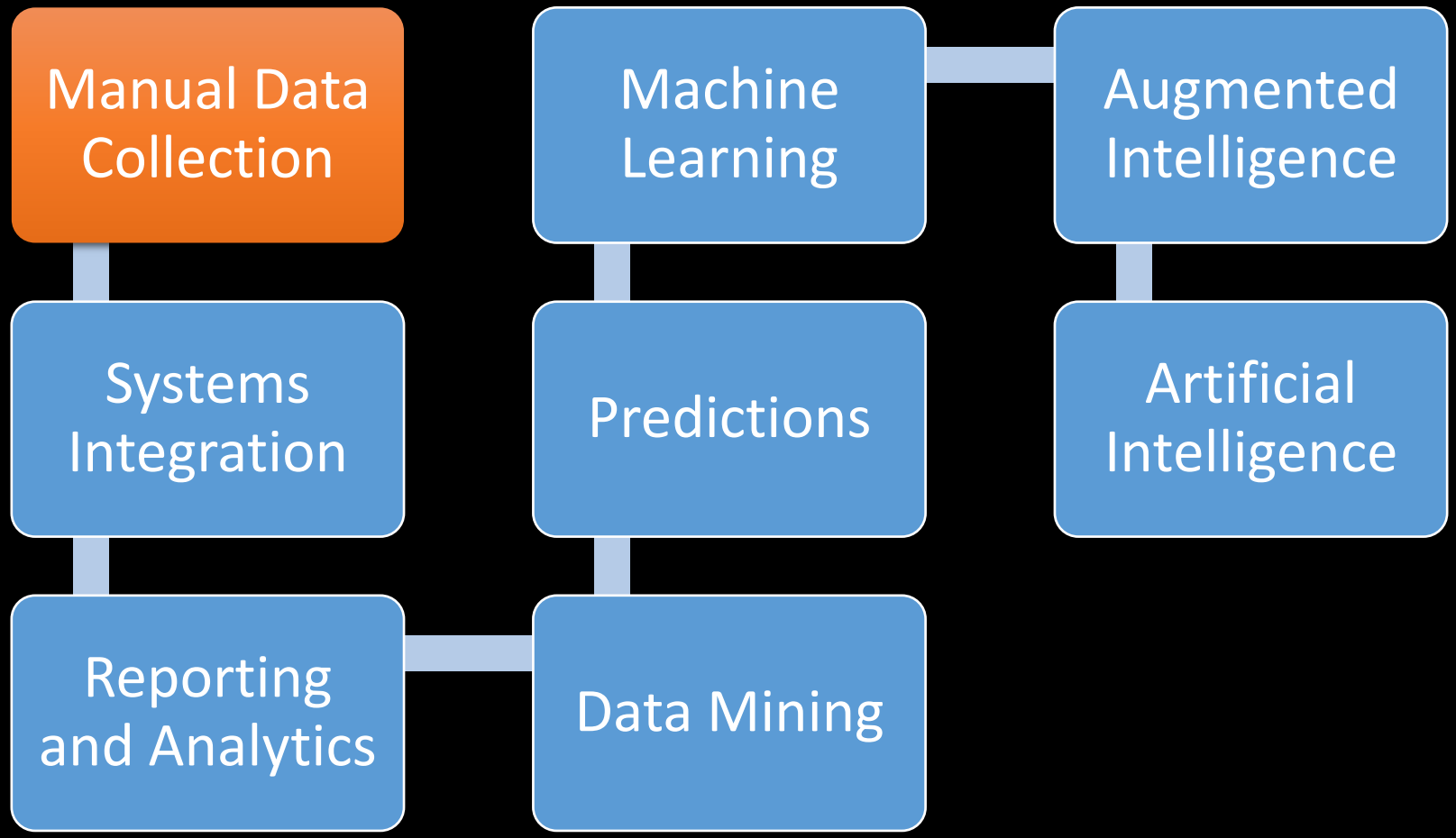
Eminence & consensus driven decisions as collaboration increases

Increased use of alternate sites of care

Regulations and data privacy will hold AI at bay…only for a little while

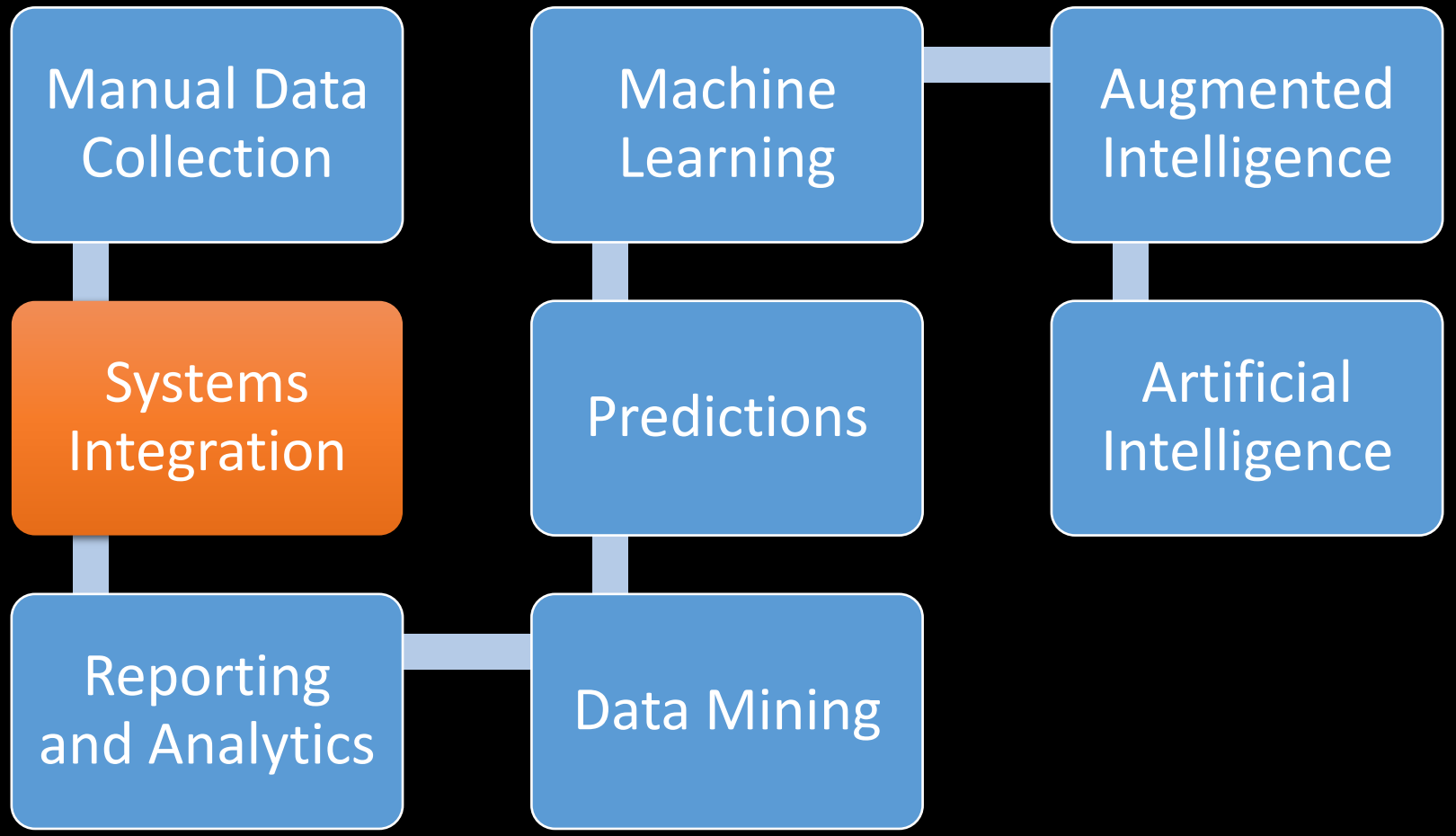
The Digital Transformation Spectrum

Docs and nurses as clerical staff TODAY

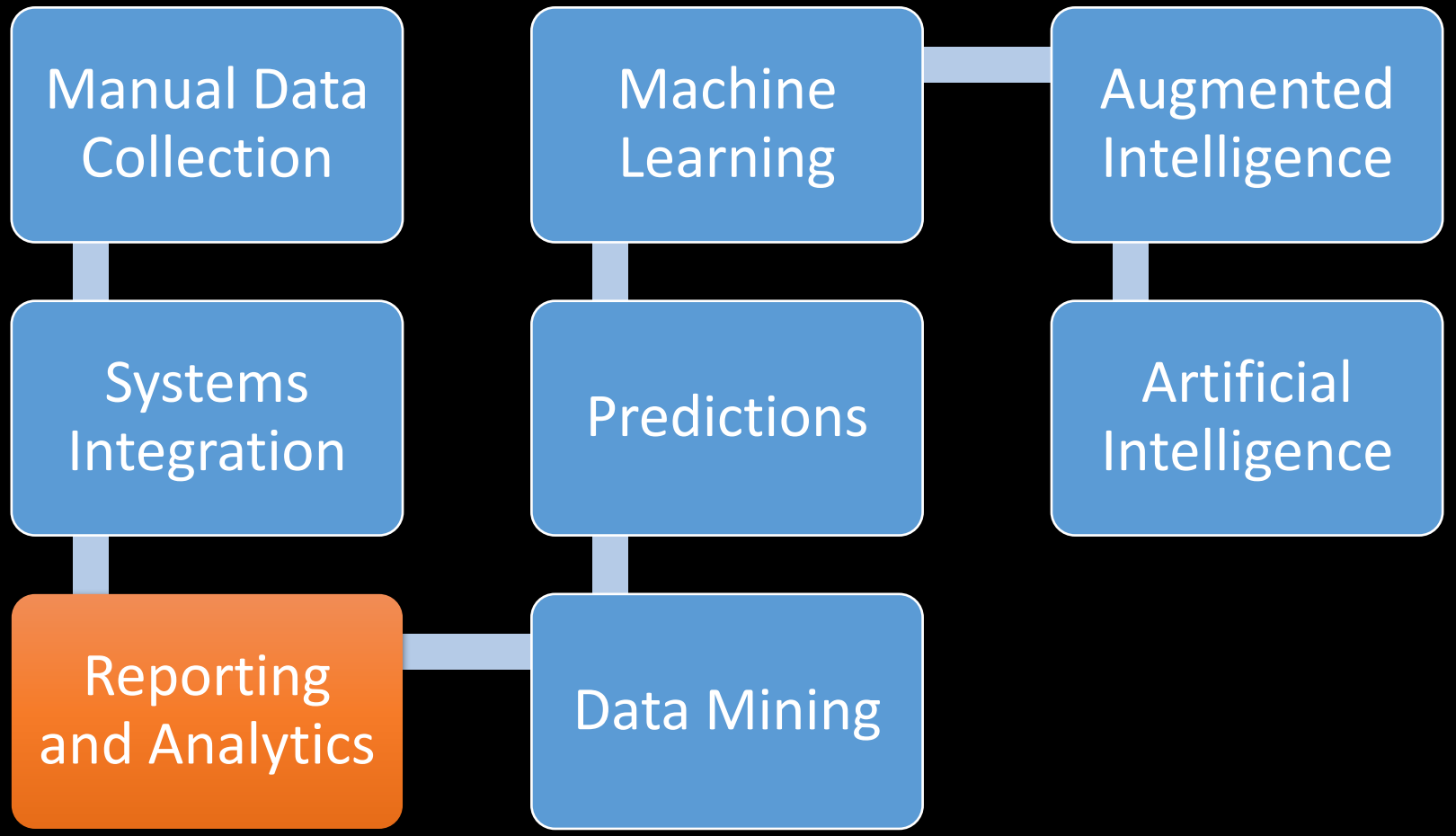


The Digital Transformation Spectrum

PGHD, Med Device Connectivity
TODAY, ACCELERATING

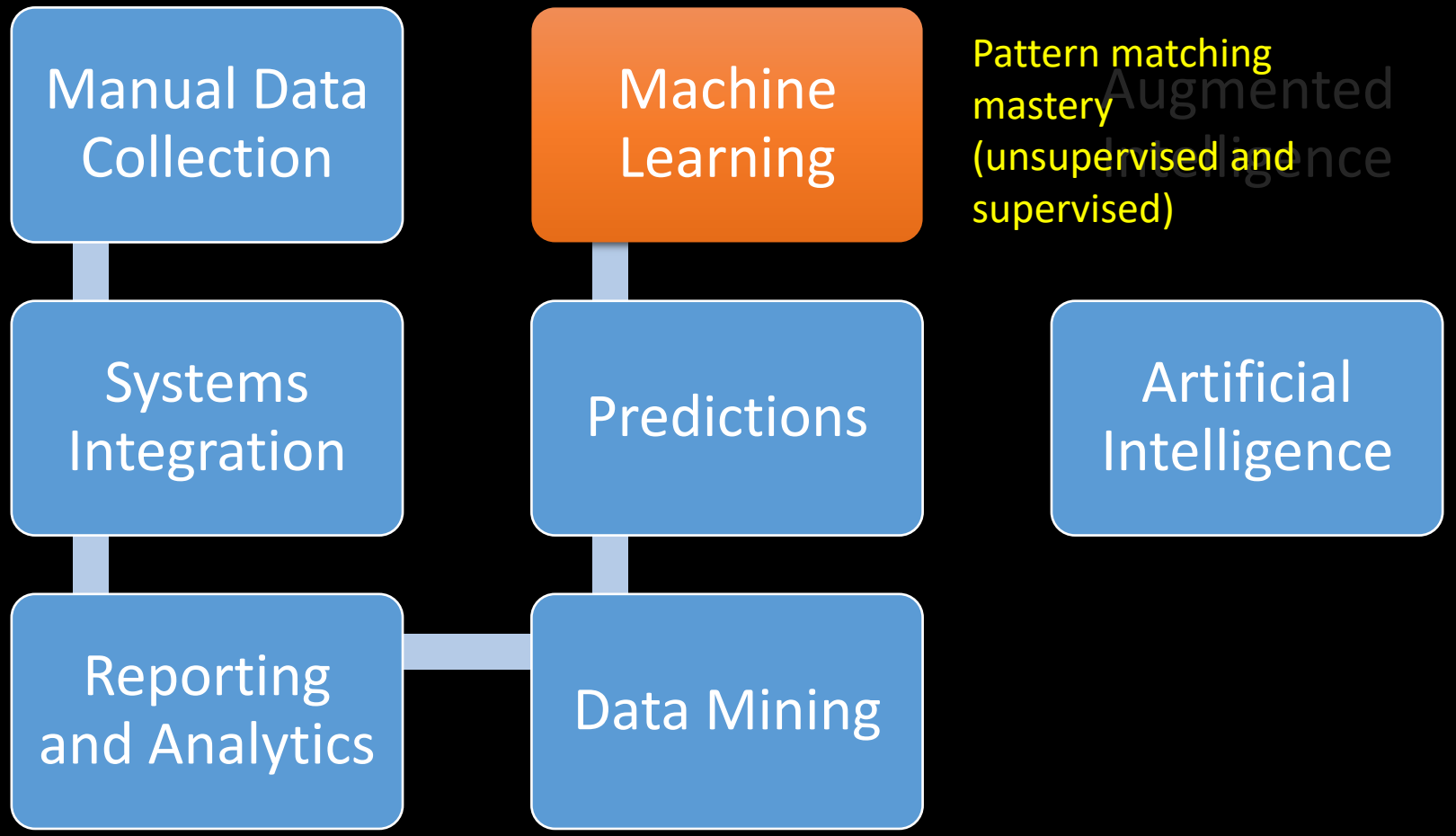


The Digital Transformation Spectrum

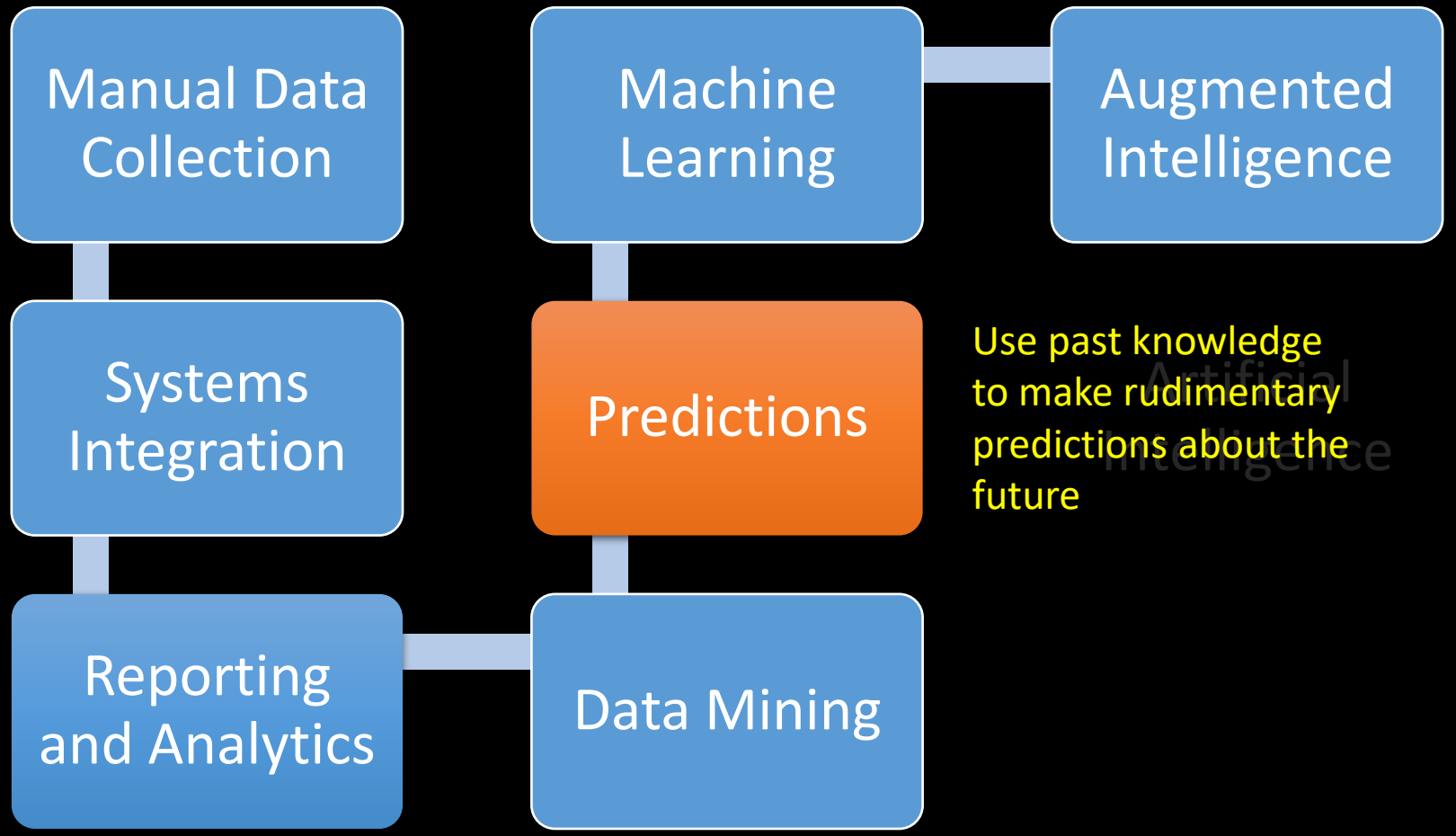


Automating retrospective visibility TODAY

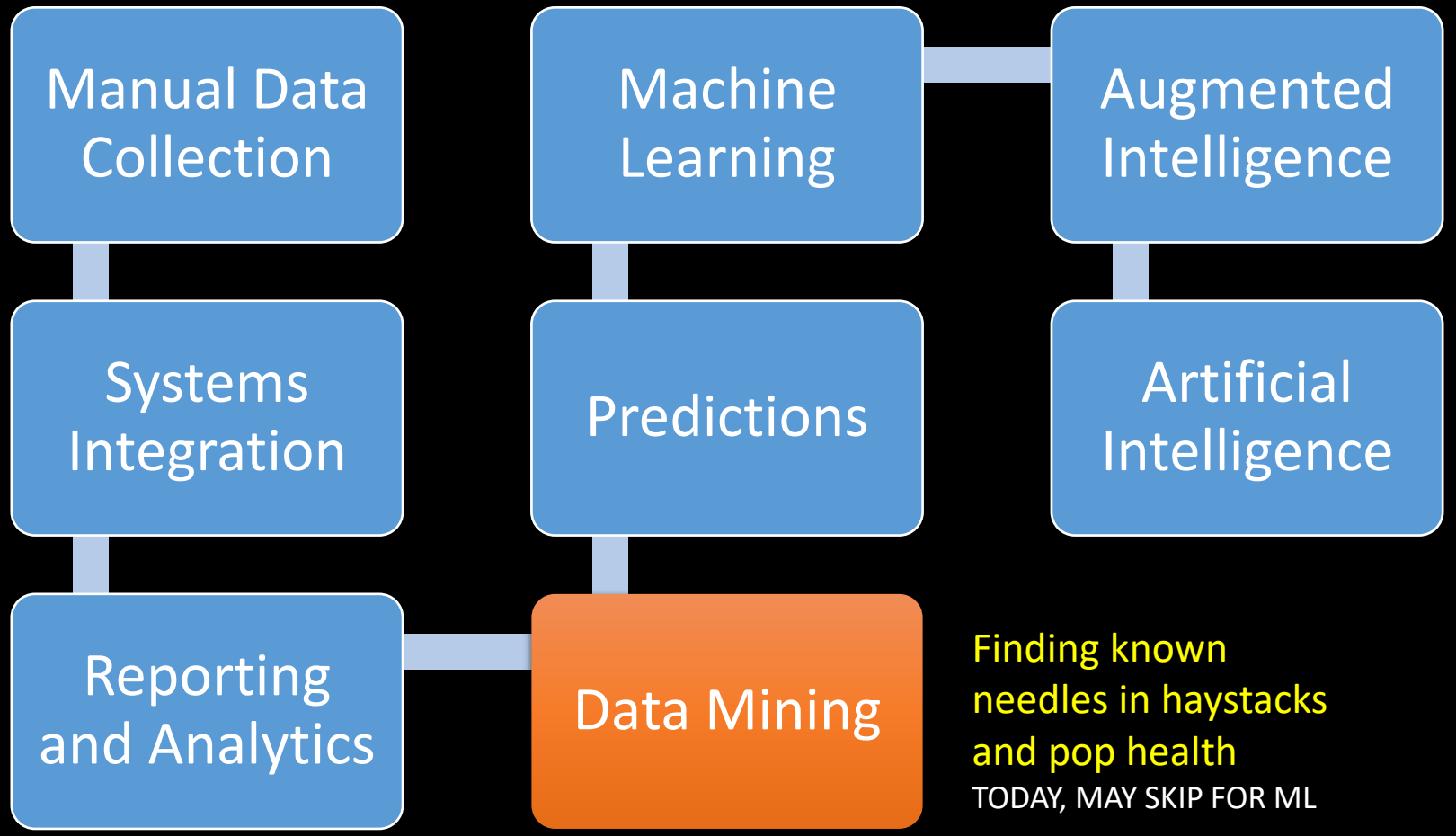
The Digital Transformation Spectrum



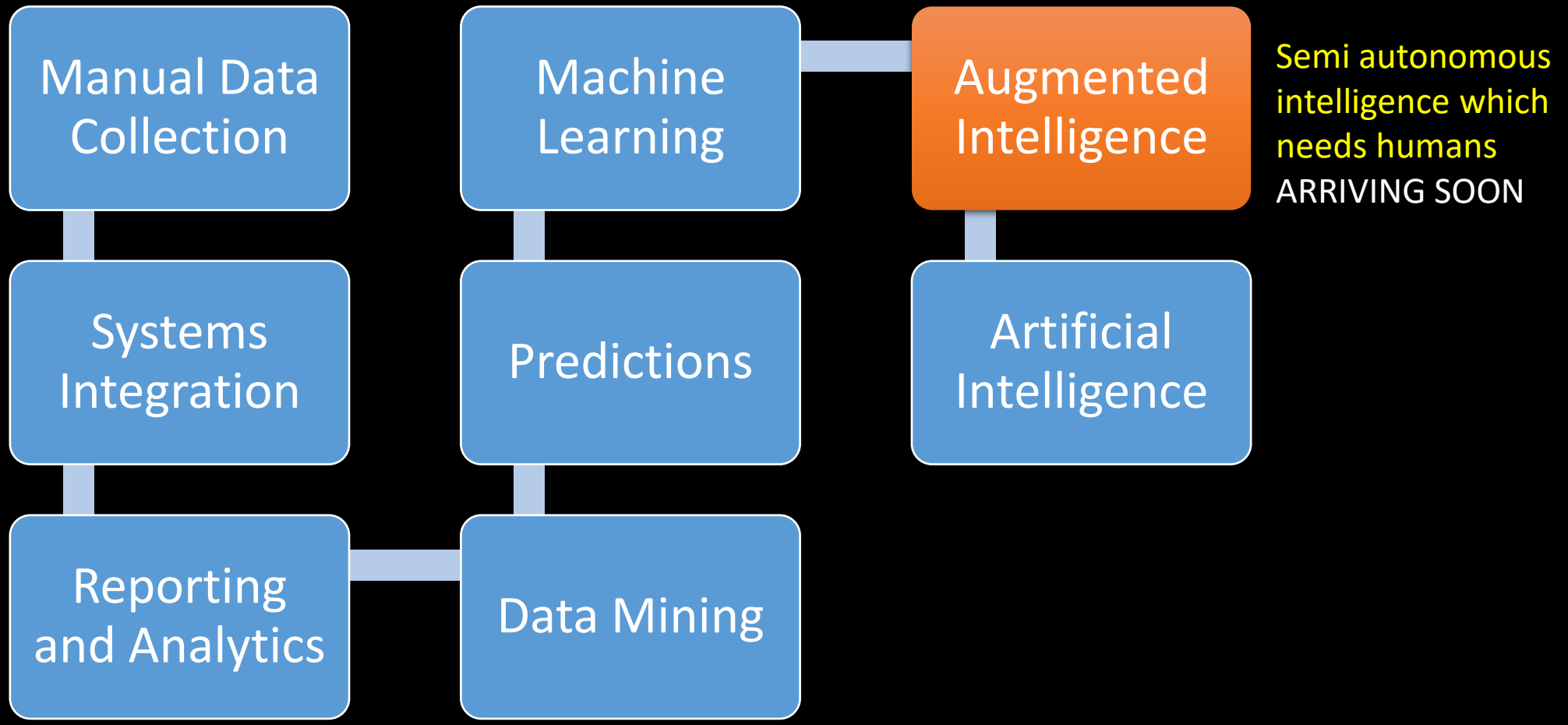
The Digital Transformation Spectrum



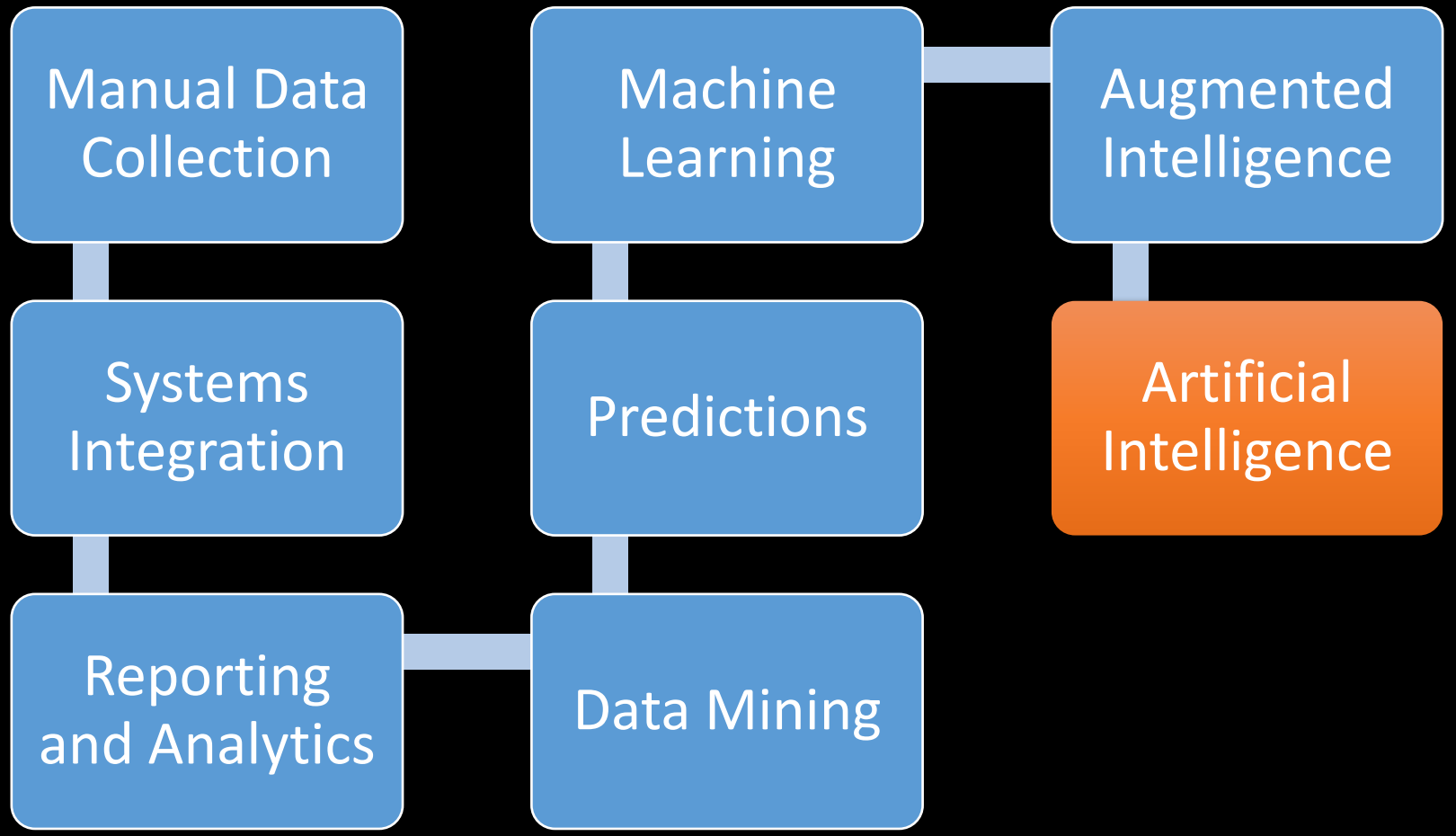
The Digital Transformation Spectrum



The Digital Transformation Spectrum

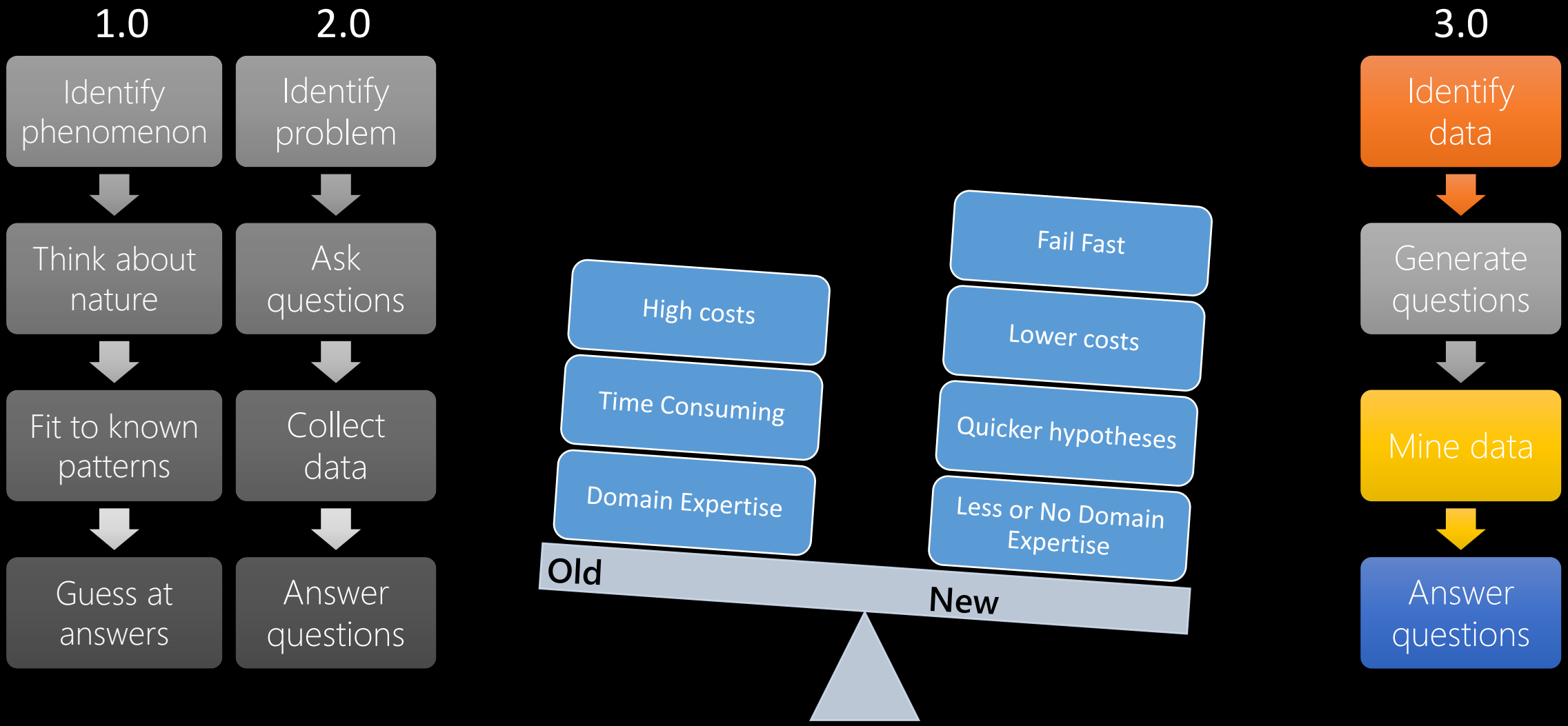


The Digital Transformation Spectrum



Real intelligence indistinguishable from humans and fully autonomous
YEARS AWAY

Data ushering in Scientific Method 3.0

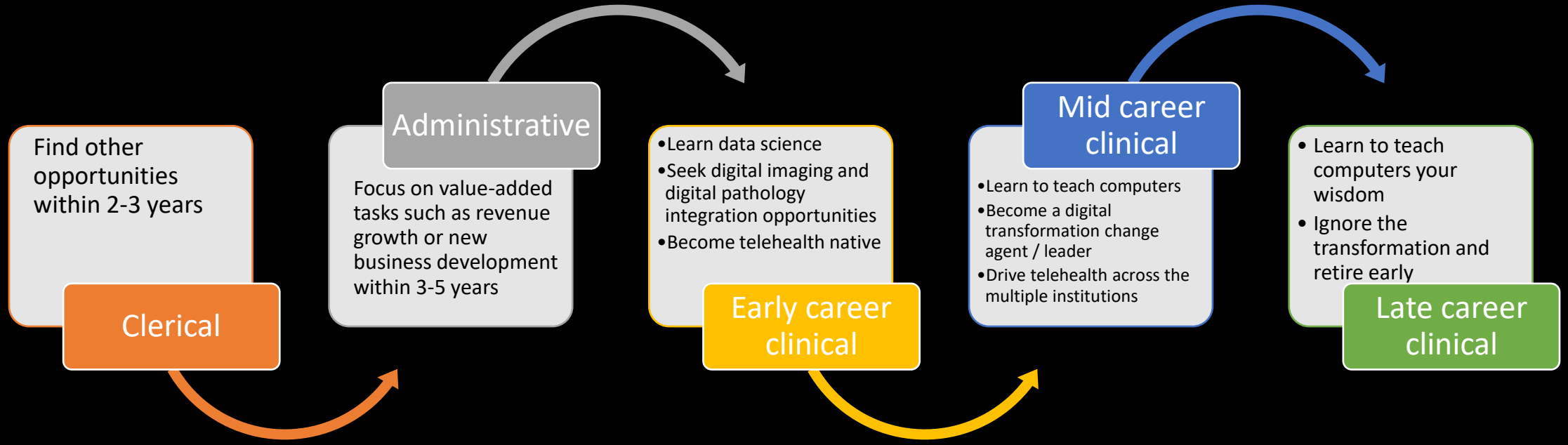


How will we know if we've reached 3.0?

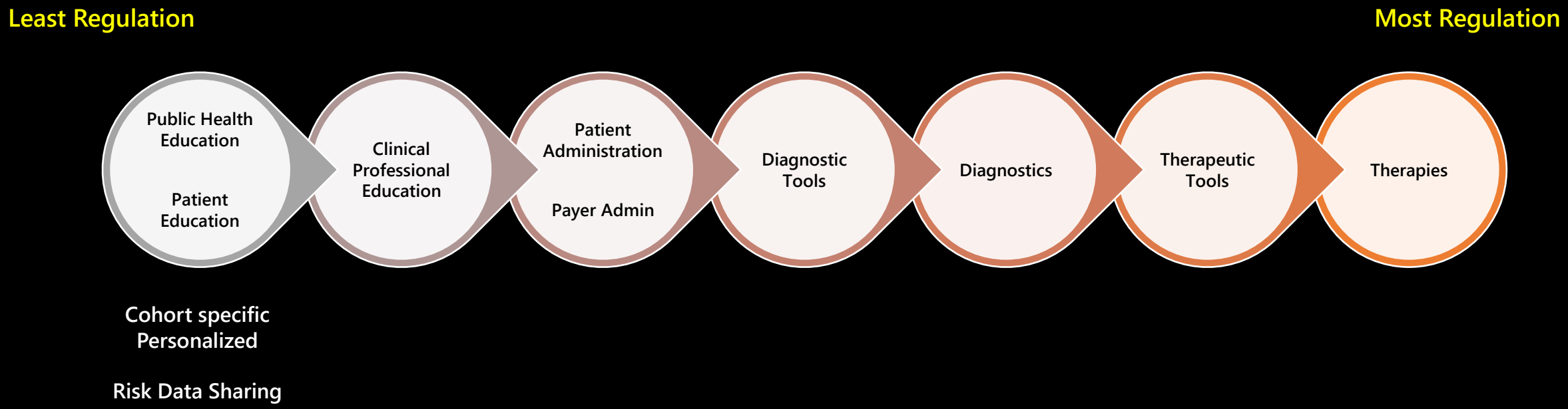
RESPONSIBLE AND ACCOUNTABLE

OUTCOMES MATTER

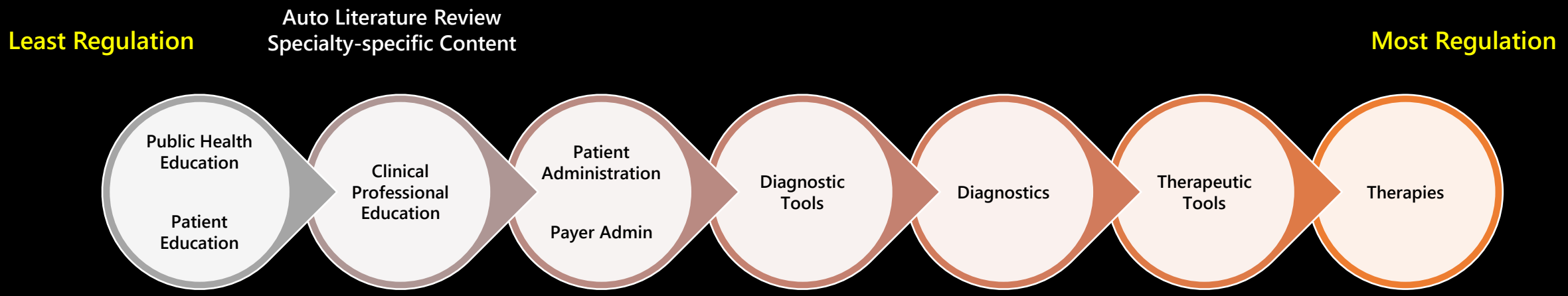
How will medical roles evolve or be eliminated?



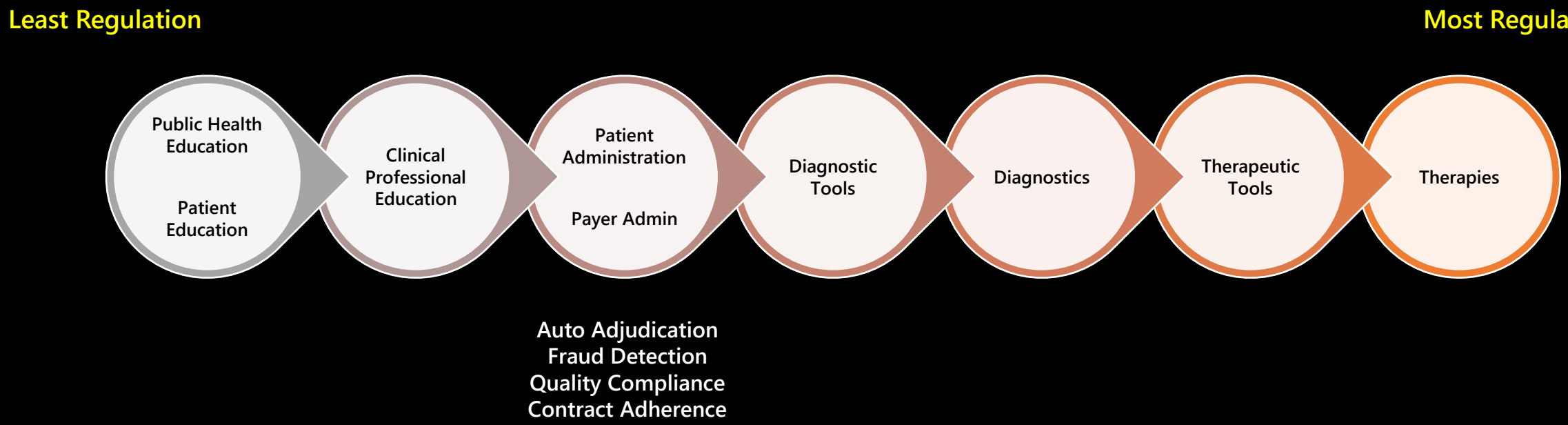
Where ML and AI are applicable (care)



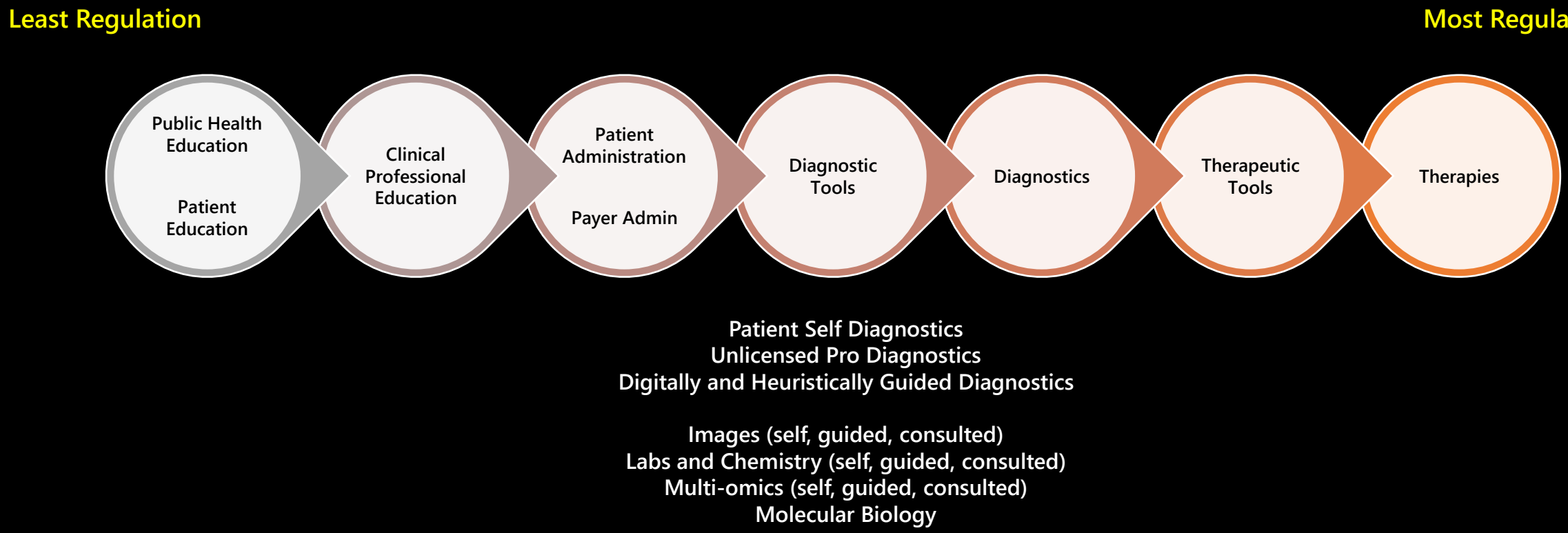
Where ML and AI are applicable (care)



Where ML and AI are applicable (care)



Where ML and AI are applicable (care)



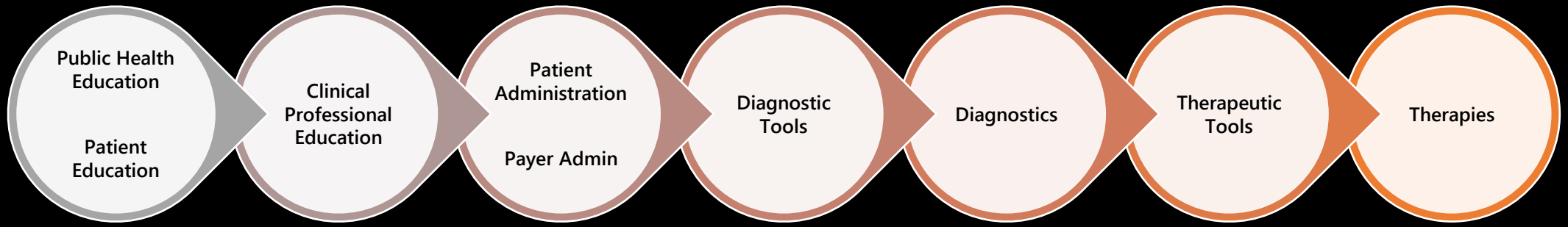
Patient Self Diagnostics
Unlicensed Pro Diagnostics
Digitally and Heuristically Guided Diagnostics

Images (self, guided, consulted)
Labs and Chemistry (self, guided, consulted)
Multi-omics (self, guided, consulted)
Molecular Biology

Where ML and AI are applicable (care)

Auto Triage for Low-risk
Augmented Triage for Higher risk
Infection control / Anti-microbial Stewardship
Consulted Tele Diagnostics
Med Device Continuous Diagnostics

Least Regulation

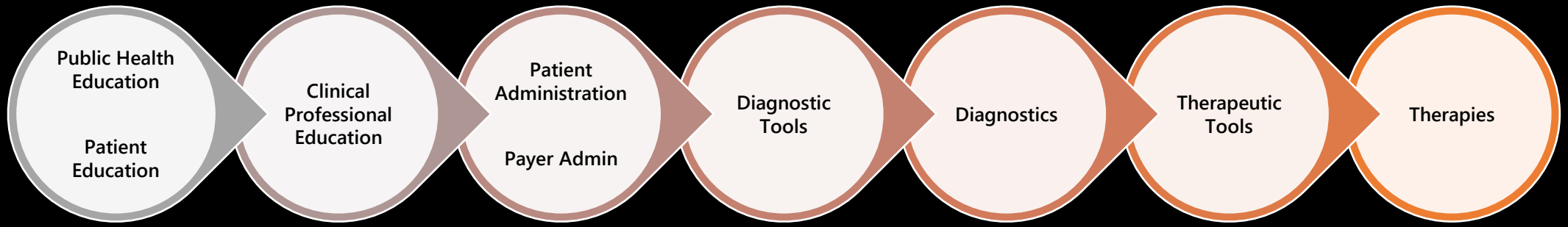


Most Regulation

Where ML and AI are applicable (care)

Least Regulation

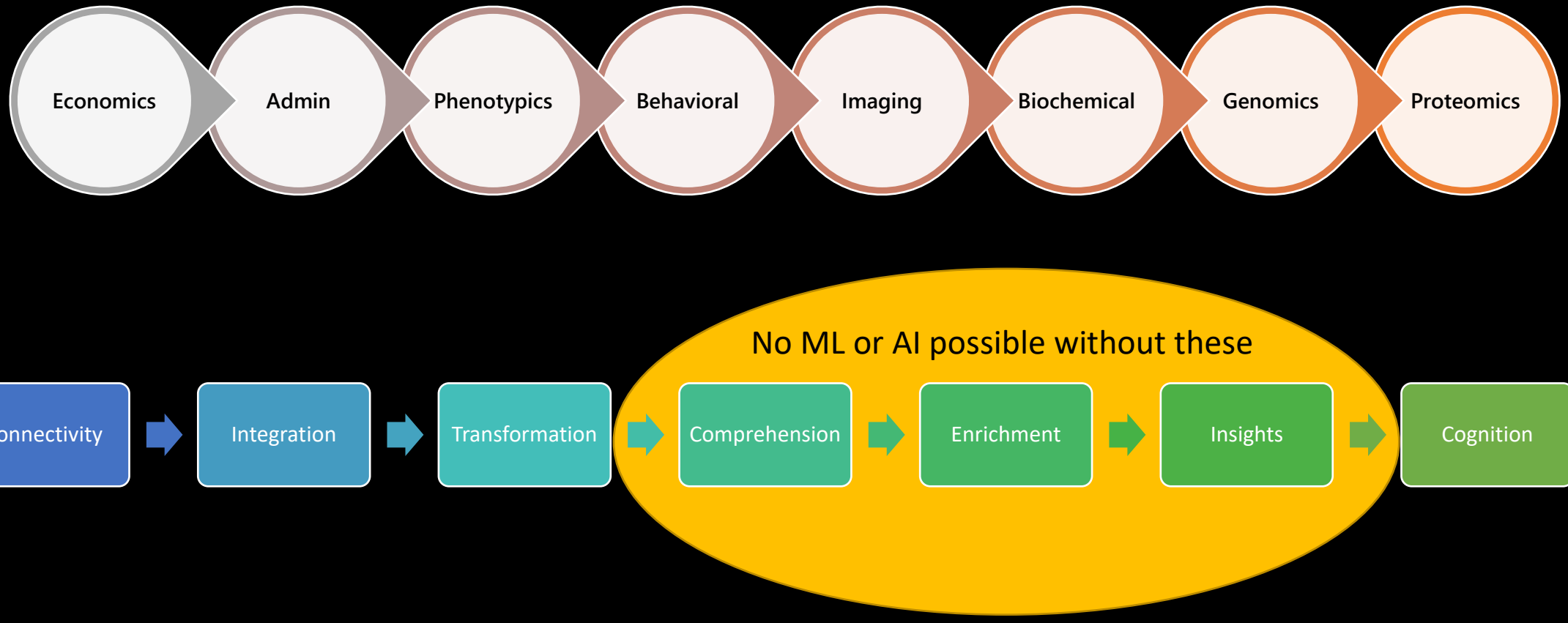
Most Regulation

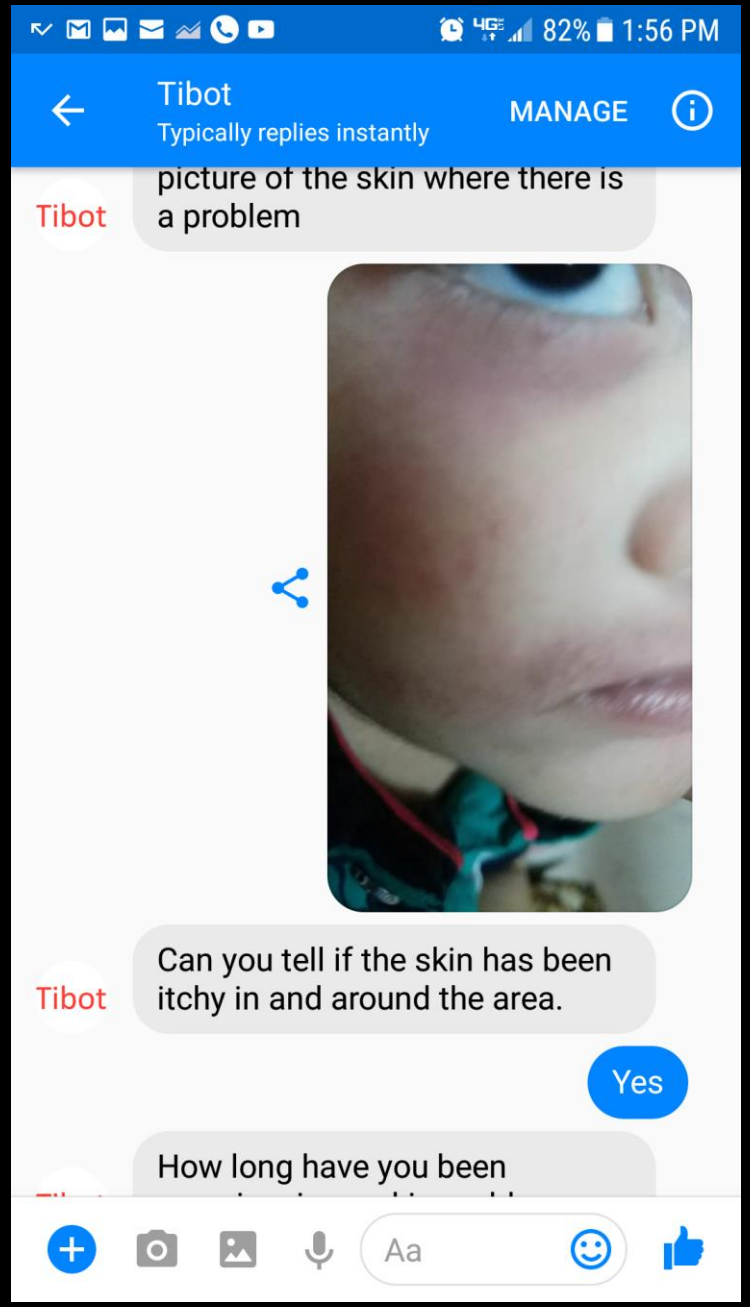


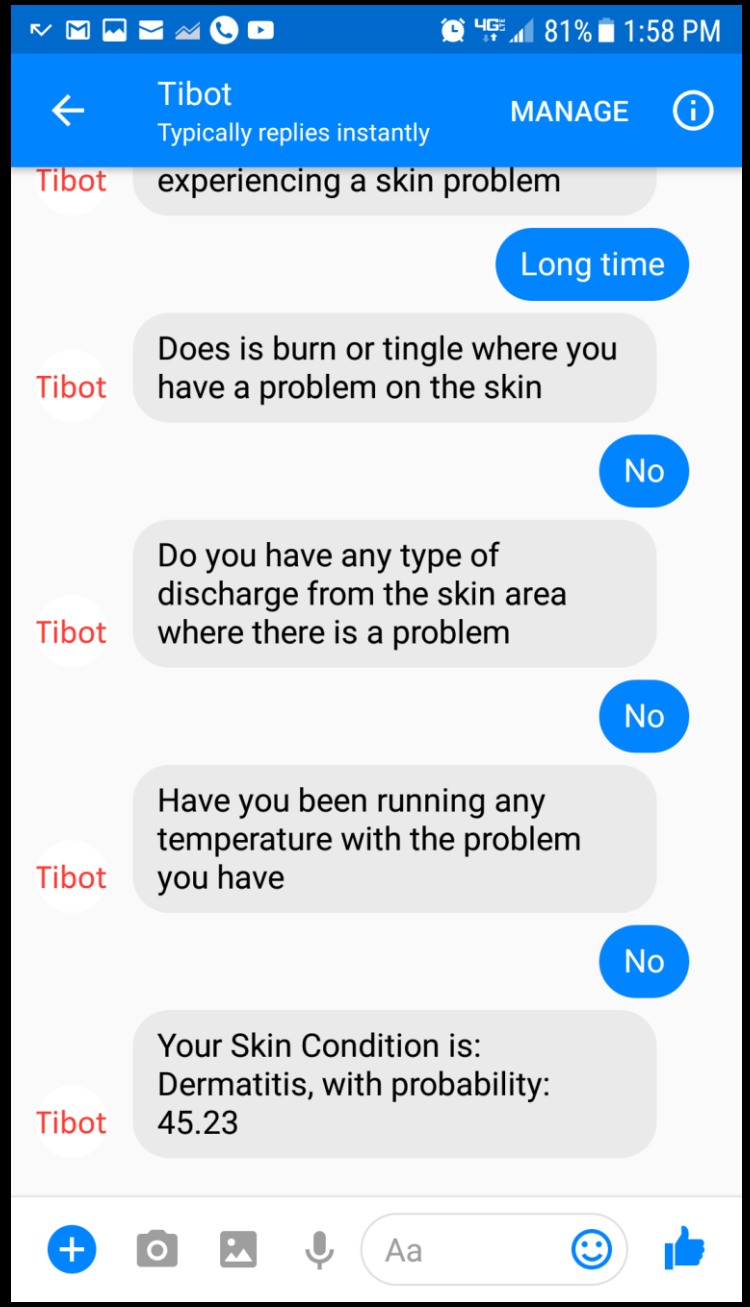
Physical
Mental (chat, VR, etc.)
Digital (nutritional, etc.)

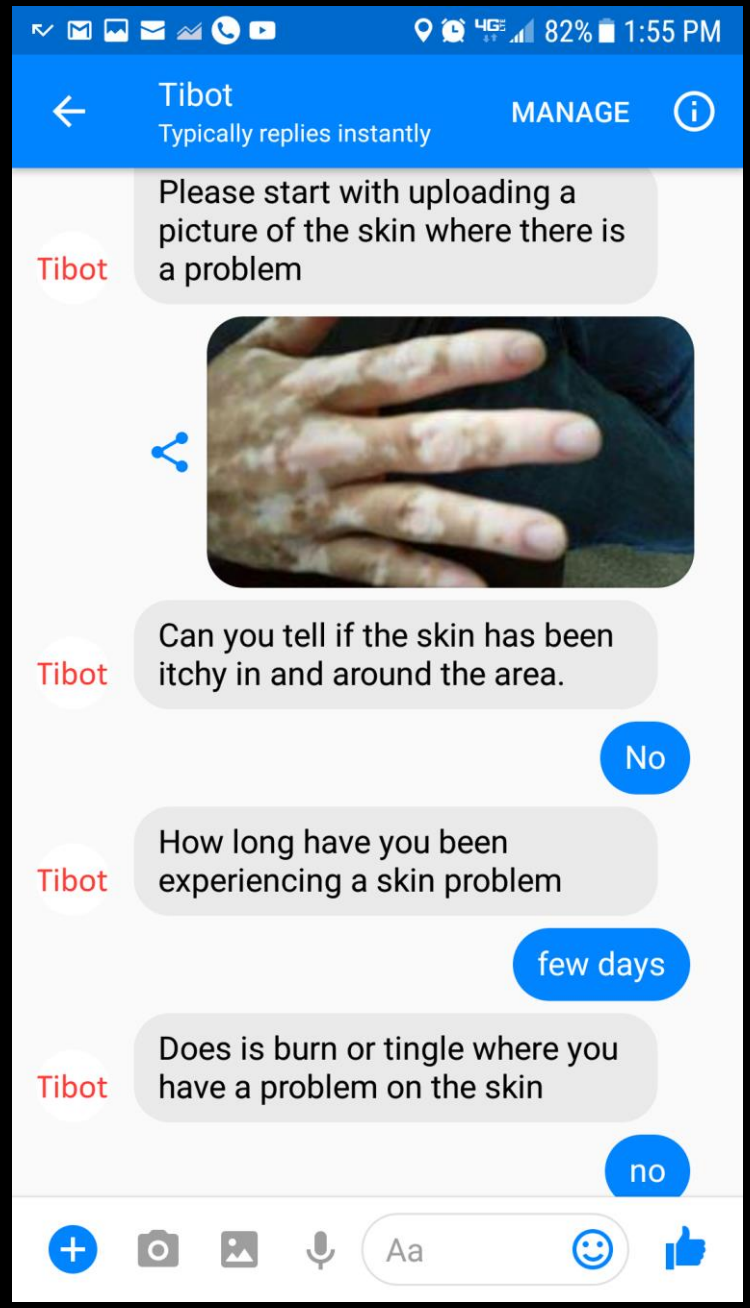
Clinical Research (“systematic review automation”)
Drug Development
Clinical Discovery (unattended and digital)

Where ML and AI are applicable (data)




82% 1:56 PM
Tibot
Typically replies instantly
MANAGE
Tibot
picture of the skin where there is a problem
Tibot
Can you tell if the skin has been itchy in and around the area.
Yes
How long have you been
Aa


81% 1:58 PM
Tibot
Typically replies instantly
MANAGE
Tibot
experiencing a skin problem
Long time
Tibot
Does is burn or tingle where you have a problem on the skin
No
Tibot
Do you have any type of discharge from the skin area where there is a problem
No
Tibot
Have you been running any temperature with the problem you have
No
Tibot
Your Skin Condition is: Dermatitis, with probability: 45.23
Aa


82% 1:55 PM
Tibot
Typically replies instantly
MANAGE
Tibot
Please start with uploading a picture of the skin where there is a problem
Tibot
Can you tell if the skin has been itchy in and around the area.
No
Tibot
How long have you been experiencing a skin problem
few days
Tibot
Does is burn or tingle where you have a problem on the skin
no
Aa

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Copay: Tier 1/2/3
$10 $30 $45
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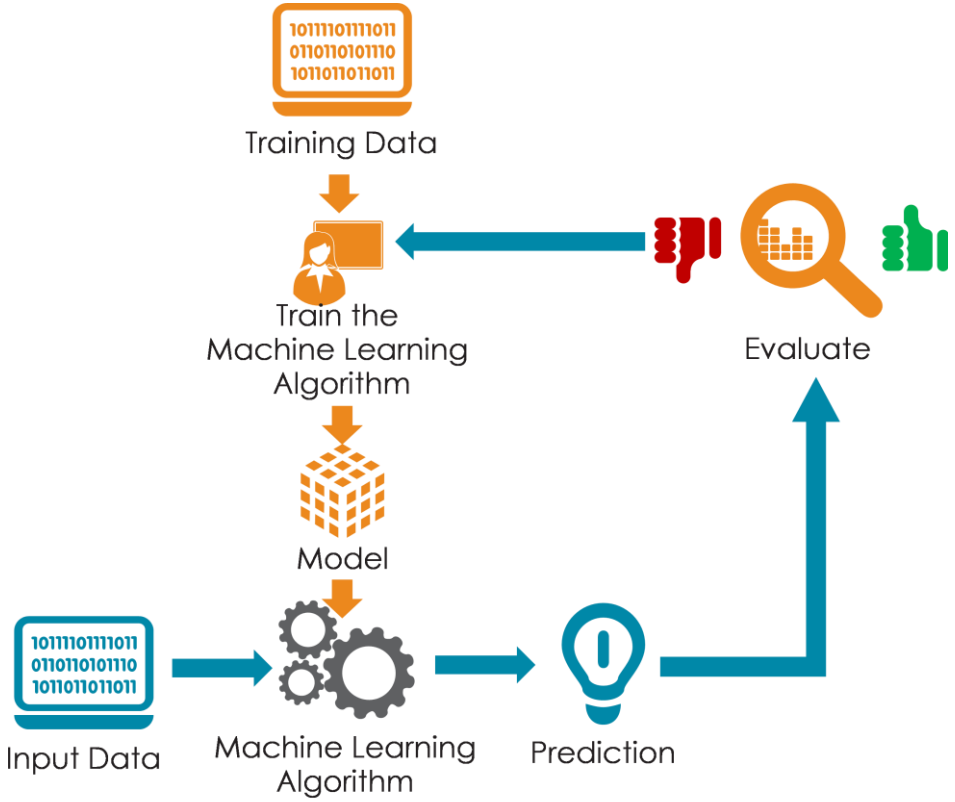
How should machines go through medical training?

Which medical school will have the first machine learning algorithm training department?



HOW CAN WE BEAT AI?
$L_v = (i)K_c + (v)S_{pj} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$

Here's the formula that can keep you relevant

$$L_v = \frac{K_c + S_{pj} + C^2 + (a)T_i^2 + R_{pfu} + E_{wo}}{SQ}$$

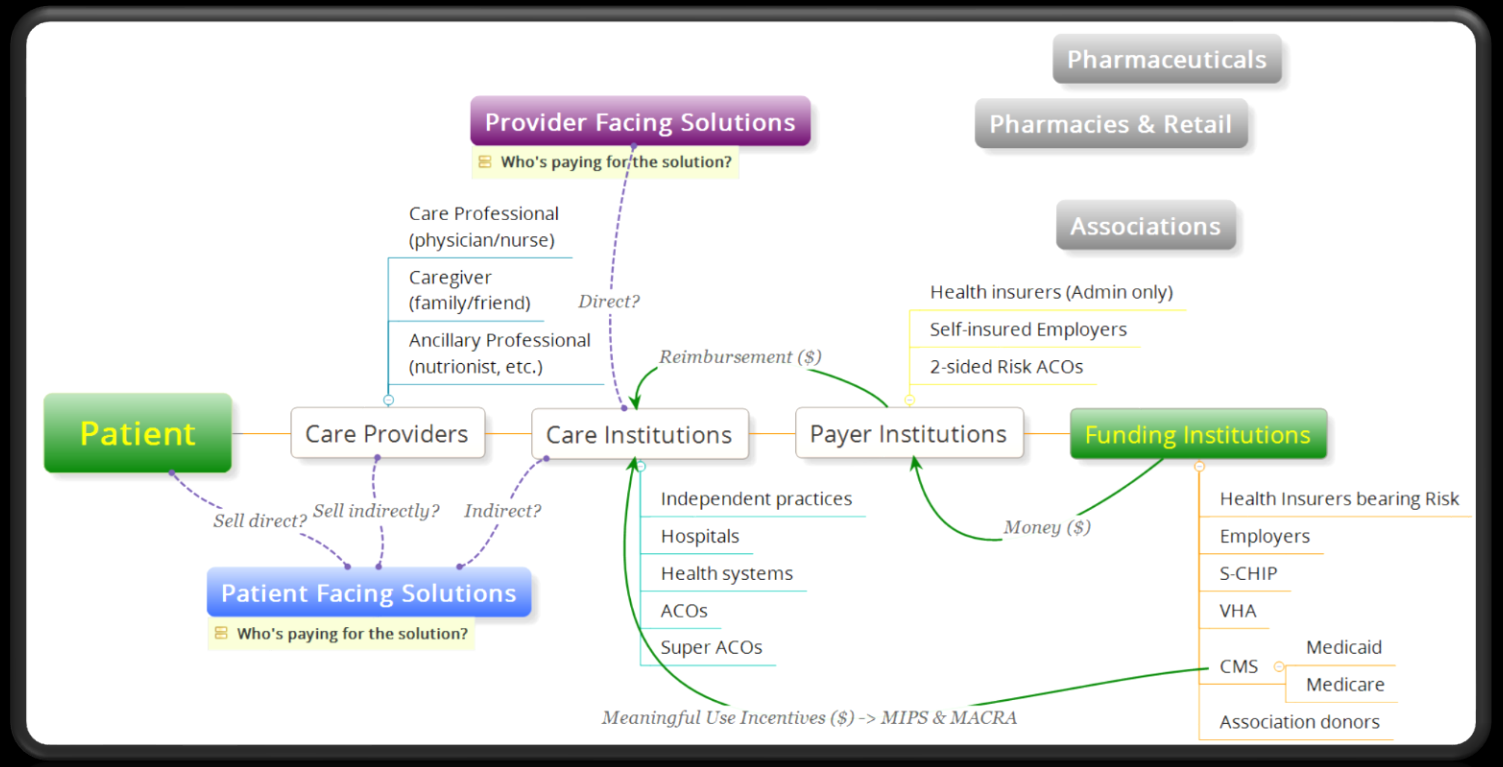
L_v → Leadership value = (*target a large number greater than 1*)

- K_c → inquisitive knowledge of industry led by curiosity about why things are the way they are +
- S_{pj} → visionary strategy informed by problems to be solved and jobs to be done +
- C^2 → communication & coordination +
- $(a)T_i^2$ → application of actionable transformative technology fully integrated into complex workflows +
- R_{pfu} → understanding performance, financial, and utilization risk (shared, one-sided, two-sided)
- E_{wo} → execution through workforce optimization

- **SQ** → status quo is a constant, the size of which depends upon your organization. It means do no harm, focus on patient safety, reliability, intermediation, & maintain eminence and consensus based decision making

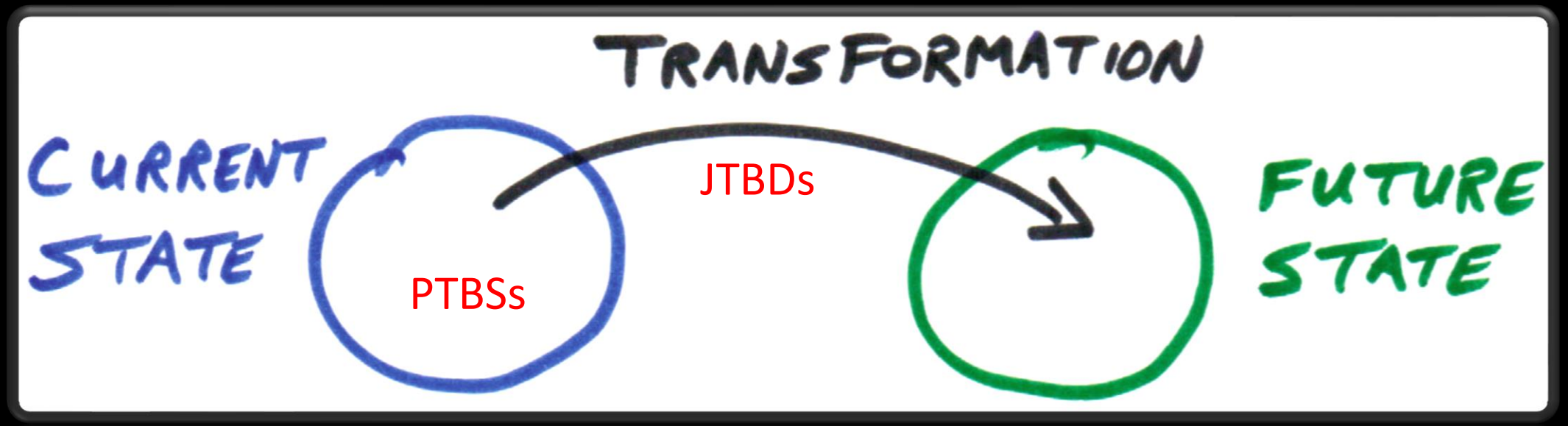
Inquisitive knowledge of healthcare industry led by curiosity

WONDER WHY



$$L_v = (i)K_c + (v)S_{pJ} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

Visionary strategy informed by PTBSs & JTBDs



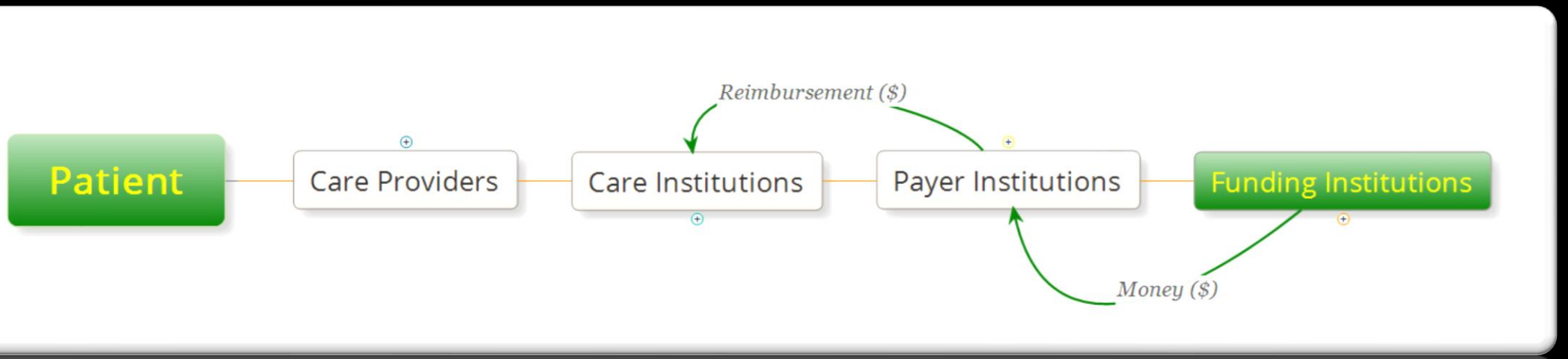
$$L_v = (i)K_c + (v)S_{pj} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

Coordination and communication

$$L_v = (i)K_c + (v)S_{pi} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

Actionable transformative technology fully integrated into workflows

$$L_v = (i)K_c + (v)S_{pJ} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$



Financial Risk is shifting from payers more to providers and patients

Utilization Risk is being shared

Performance Risk is now borne by providers

$$L_v = (i)K_c + (v)S_{pJ} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

Execute with ruthless attention to workforce optimization

$$L_v = (i)K_c + (v)S_{PJ} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

“Learn how to craft strategy, apply it to corporate culture, master workforce change management, and you’ll be in demand for life.”

-Shahid Shah ☺

$$L_v = (i)K_c + (v)S_{pj} + C^2 + (a)T_i^2 + R_{PFU} + E(wo)$$

Thank You.

Find this and many other of my decks at
http://www.SpeakerDeck.com/shah

ML is here. AI is coming.

How will the medical profession change in the next 10 years?

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shahid@shah.org

Netspective
EXTENDING THE ENTERPRISE