

# **Future Trends in Global Higher Education: The impact of the internet of things, artificial intelligence and virtual campus on campus based universities**

Chair: Professor Mansoor Al Aali,  
President, Ahlia University

# Getting Ready for the Virtual Intelligent Campus

Prof. Mansoor Alaali  
President  
Ahlia University  
Kingdom of Bahrain

# Ahlia University New Campus



# Challenges of ...

## Higher Education in the 21<sup>st</sup> Century

- 4<sup>th</sup> and 5<sup>th</sup> Industrial Revolutions
- Numerous knowledge sources
- Variety of Methods for getting and passing knowledge
- Gradual diminishing of classical legacy teaching and learning systems
- The concept of the Professor as a lecturer will evolve in unpredictable forms

# Shape of ...

## Future Higher Education

(1)

- Collaborative/Collective
- Empowering through alternative opportunities and multiple sources
- Knowledge-based and granular
- Technology-based
- Diverse
- New forms of governance
- New forms of operations/processes

# Shape of ... Future Higher Education

(2)

- **Combination of:**
  - **Virtual campus**
  - **Intelligent tools-based learning**
  - **Physical campus**
  - **Many players**
  - **Many sources**
  - **Diminishing lecture-based**

# Campus Through...

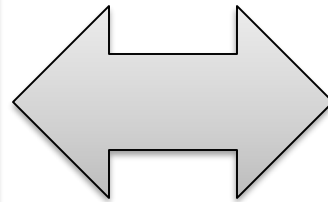
- **Distributed cognitive network**
- **Virtual academic staffing:**
  - **Virtual Professors**
  - **Local and International**
- **Virtual learning space/environment**

**Ladyshewsky (2016), Masciniak (2015) and Fildman (2018)**

# Current Assessment of H.E. institutions

(1)

- QA
- Ranking
- Alumni follow-up
- Reputation Surveys
- Research Output



- Subjective
- Sample based
- Opinion based
- No real assessment from stakeholders
- No real measures of dynamism of curriculum

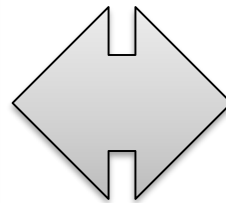
# Current Assessment of H.E. institutions

(2)

## Confusion:

Universities have a daunting task of adapting to the rapid change in the job market and skills needed.

- How to teach?
- What to teach?
- When to teach?
- Where to teach?

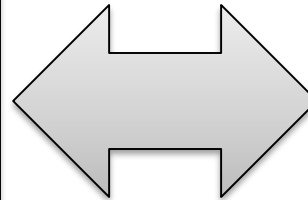


- Where does a degree begin & end (BSc & MSc?)
- Should a degree have an end or should be updated like a license?
- Competition with Professional certifications

# Future Degrees

(1)

- **Granular rather than course blocks**
- **Granular assessments**
- **Variety of assessors**
  - **Work-related**
  - **Skills-related**
  - **Personal-related**  
(confidence, commitment, interest, etc.)
  - **Intellectual & academic-related**



- **Industry**
- **Society**
- **Academic**

# Future Degrees

(2)

## Threatened:

- Chapter
- Course
- Degree
- Degree duration/length

## Building blocks of knowledge:

- Acquisition
- Build-up
- Assessment

## Physical and Virtual Supporters:

- Professor
- Industrialist
- Society experts (social)
- Governance of leadership
- Different guides:
  - Practical skills
  - Knowledge delivery
  - Intellectual & Academic

# Future Considerations

(1)

- **Classroom design (Physical/Virtual)**
- **Campus design (Physical/ Virtual)**
- **Teaching methods (Virtual Learning)**
- **Educators**
- **Technology teaching support**
- **Smart web & intelligent tools**
- **Social Student Life**

# Future Considerations

(2)

- **Student-University life**
- **Concept of the textbook**
- **Course design (granular/block)**
- **Lifelong learning assessment and degrees**
- **BSc, MSc and PhD .. time to replace these?**
- **Libraries (Virtual/Physical/Intelligent)**

# Major Anticipations

(1)

- Length of degrees
- Quality Assurance for future courses and programmes
- Disappearing jobs and related education
- Titles of qualifications
- Role of Professors in teaching

# Major Anticipations

(2)

- **Campus shape and environment**
- **Virtual Reality for teaching and learning (creating artificial reality)**
- **Augmented Reality (presenting new information over the reality)**
- **Personalised learning trajectories**

# Conclusion

- **University Campus shape, design and environment will slowly evolve, physically shrink but virtually grow**
- **Sematic and intelligent forms of knowledge will expand**
- **Roles of University Professors will change**

**THANK YOU**

# Some Experiences of AI and Virtual Campus in Higher Education

Ari Visa

Professor, Dr. Tech.

Tampere University

# Motivation to AI and Virtual Campus

- To cut expenses
- To improve quality
- To save working time
- To make distance studies possible

# In Mathematics

## Todennäköisyyslaskenta (luento-opetus, harjoitukset ja loppukoe, 26.8.-11.10.2019)

Työpöytä / Omat kurssini / Todennäköisyyslaskenta, syksy 2019 / Stack-tehtävät / Stack-tehtävät 4

### Kysymys 1

Ei vielä vastattu  
Kokonaispisteistä 1,00  
🚩 Merkitse kysymys

Satunnaismuuttujalla  $X$  on kertymäfunktio  $F: \mathbb{R} \rightarrow [0, 1]$ ,

$$F(x) = \begin{cases} 0 & , \text{ kun } x < 0 \\ x^2 & , \text{ kun } 0 \leq x \leq 1 \\ 1 & , \text{ kun } x > 1. \end{cases}$$

Määritä

$\mathbb{P}\{X \leq 0.05\}$ :

$\mathbb{P}\{X > 0.17\}$ :

$\mathbb{P}\{0.27 < X \leq 0.61\}$ :

Anna vastauksesi neljän desimaalin tarkkuudella.

### Kysymys 2

Ei vielä vastattu  
Kokonaispisteistä 1,00  
🚩 Merkitse kysymys

Satunnaismuuttujan  $X$  arvojoukko on  $\{6, 7, 8, 9\}$ . Satunnaismuuttujan pistetodennäköisyysfunktion tiedetään saavan seuraavat arvot:  $p_X(6) = 0.28$ ,  $p_X(7) = 0.17$  ja  $p_X(8) = 0.31$ .

Millä todennäköisyydellä satunnaismuuttuja  $X$  saa arvon 9?  
Anna vastauksesi tarkkana arvona.

Vastaus:

### Tentin navigaatio



Lopeta tentti

# In Computer Science



PLUSSA

TIE-23516 TIE-23516 Basic Web Applications

## Course

TIE-23516

Course materials

Exercise results

## Assignment

Assignment

Group formation

TIE-23516 / Exercise results

Filter view:  Material  Online exercises

1. Course arrangements, Setting Up Tools (git)

255 / 255

2. HTML & CSS

293 / 300

3. JavaScript

300 / 400

Fri, Sep 13 2019, 2 p.m. – Thu, Sep 26 2019, 11:59 p.m.  
*Late submission are allowed until Fri, Dec 13 2019, 11:59 p.m. but points are only worth 1%.*  
200 points required to pass the module.



Exercise	Category	Submissions	Points
3.1 JavaScript and JQuery Questionnaire	Online exercises	4 / 5	100 / 100
3.2 JavaScript Arrays and Functions	Online exercises	5 / 10	100 / 100
3.3 JavaScript Objects	Online exercises	4 / 10	100 / 100
3.4 JQuery Link Decoration	Online exercises	0 / 10	0 / 100

4. JavaScript and Ajax

Opens Fri, Sep 27 2019, 2 p.m. 0 / 200

5. WETO peer-review exercises in Period2

Opens Tue, Oct 22 2019, 2 p.m. 0 / 0

6. Lectures and videos

0 / 0

Online exercises

848 / 1155



# Conclusion

- It is not clear if automation will cut costs, improve quality or increase throughput
- The accessibility has improved

# Developing an Innovative and Interdisciplinary Applied Artificial Intelligence degree, differently!

**Professor Zahir Irani**

Pro-Vice-Chancellor (Academic, Innovation and Quality)

University of Bradford, UK

 @ZahirIrani1

 <https://bit.ly/2ROHDhF>

 Z.Irani@Bradford.ac.uk

# Future Trends in Global Higher Education:

- **Project Brief:**

Develop an Innovative and Interdisciplinary Applied Artificial Intelligence degree, differently.

- **Project Team:**

Me (sponsor), Prof Ugail, Dr Sivarajah, Faculty AI Leads.

- **Market Differentiator:**

a. Applied (not CS in nature), b. Project based, c. AI Techniques, Problem Solving, ethics, d. Interdisciplinary and, e. Pedagogy

- **Development Principles:**

Market insight, CDIO scaffolding, Co-created with students and corporates – market driven but employer focused.

# Future Trends in Global Higher Education:

## How do universities prepare graduates for jobs that don't yet exist?

Most children today will work in jobs that haven't been invented. They need their education system to keep up



▲ 'Half of the UK's digital tech business are already struggling with a shortage of highly skilled employees.' Photograph: Anton Novoderezhkin/TASS

**U**niversities determine the future: they shape it through their research and prepare students for tomorrow's jobs. But in the midst of the **fourth industrial revolution**, it's hard to know what the future will look like. Technological changes such as automation and artificial intelligence are expected to transform the employment landscape. The question is: will our education system keep up?

theguardian

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IMPROVING THE STATE  
OF THE WORLD

## The Jobs Landscape in 2022

emerging  
roles,  
global  
change  
by 2022

133  
Million

### Top 10 Emerging

1. Data Analysts and Scientists
2. AI and Machine Learning Specialists
3. General and Operations Managers
4. Software and Applications Developers and Analysts
5. Sales and Marketing Professionals
6. Big Data Specialists
7. Digital Transformation Specialists
8. New Technology Specialists
9. Organisational Development Specialists
10. Information Technology Services

declining  
roles,  
global  
change  
by 2022

75  
Million

### Top 10 Declining

1. Data Entry Clerks
2. Accounting, Bookkeeping and Payroll Clerks
3. Administrative and Executive Secretaries
4. Assembly and Factory Workers
5. Client Information and Customer Service Workers
6. Business Services and Administration Managers
7. Accountants and Auditors
8. Material-Recording and Stock-Keeping Clerks
9. General and Operations Managers
10. Postal Service Clerks

Source: Future of Jobs Report 2018, World Economic Forum

# Future Trends in Global Higher Education:

Principles that distinguish our Group based, relationship based programme:

- ❖ Market insight and Energy driven by like-minded people
- ❖ Developed with disruption in mind
- ❖ Co-created structure and content
- ❖ Spin *in-and-out* development (anti-disciplinary)
- ❖ Cultivate potential of industry partners
- ❖ Anchor to Strategic Priorities (Advanced Healthcare, Innovative Manufacturing, Sustainable Societies)
- ❖ 'Badge' with micro-credentials (ideally digital)
- ❖ Curriculum framework and placement opportunities
- ❖ Advisory Board



# Future Trends in Global Higher Education:

CoCreate  
@Bradford

Co-creation workshop that included:



THE  
POWER  
TO KNOW.



City of  
**BRADFORD**  
METROPOLITAN DISTRICT COUNCIL



# Future Trends in Global Higher Education:

Programme Learning Outcomes:

To be eligible for an award, students will be able to:

1. Describe the nature, scope and potential for AI applications along with the underpinning concepts and principles
2. Define user requirements as part of user centred design of AI solutions
3. Evaluate AI applications
4. Design, implement, test and evaluate AI applications
5. Apply AI to analyse a range of different data sources
6. Work effectively as part of a team

# Future Trends in Global Higher Education:

## Fundamentals

▪ Design, Test and Evaluate AI Solutions

▪ Fundamentals of AI and Data Analytics

▪ AI Methods and Models 1

▪ AI Methods and Models 2

## Intermediate

CDIO Subject Project

Data Science for AI

Discipline Specific AI

Safe AI - Ethics, legal and governance

Personal and professional skills

## Advanced

CDIO Industry capstone

Advanced machine learning

Entrepreneurship, Creativity and Innovation

Neural Networks and Fuzzy Systems\*

Financial and Project Management\*

AI for Games\*

Data Visualisation\*

\*Optional

# Future Trends in Global Higher Education:

Projects will be grouped into one of three themes:

- 1. Bradford Challenge:** Projects supplied by local companies
- 2. Industrial Strategy:** Data revolution, Ageing society, Clean growth (low carbon) and Future of Mobility.
- 3. UN SDGs:** Any of the 17 UN SDGs

Sample Project Title:



- Financial fraud analysis using AI techniques
- The ethics of using AI for skills-based hiring
- AI for optimising digital advertising campaigns
- AI applications for tackling food security
- Impact of AI application for small businesses
- Optimizing road gritting, cleaning and maintenance routes
- Using blockchain to prevent fraud and replication



# Preparing Universities for the Upcoming AI Innovations

Dr M M Ramya

Professor

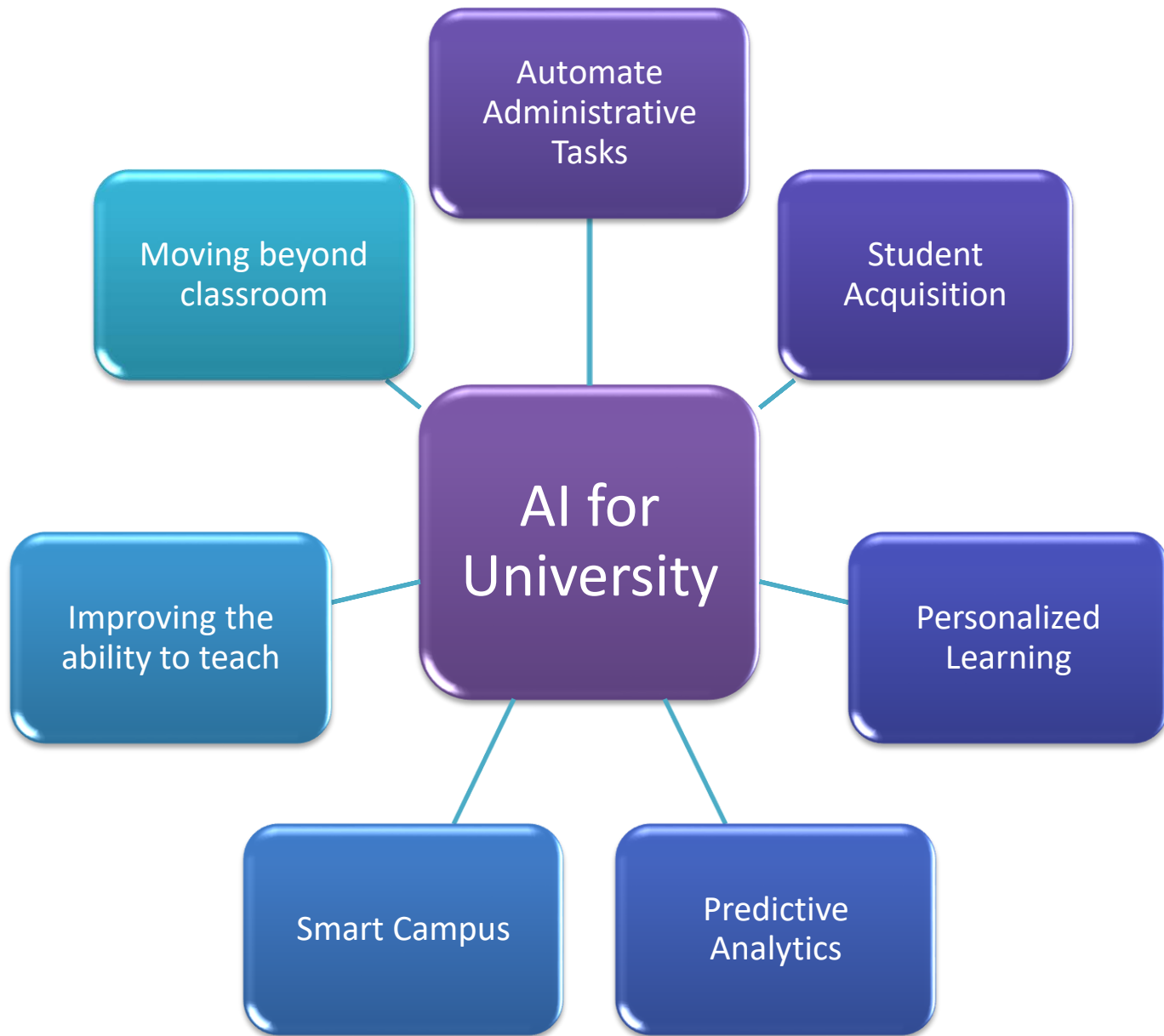
Centre for Automation & Robotics

Hindustan Institute of Technology & Science

India







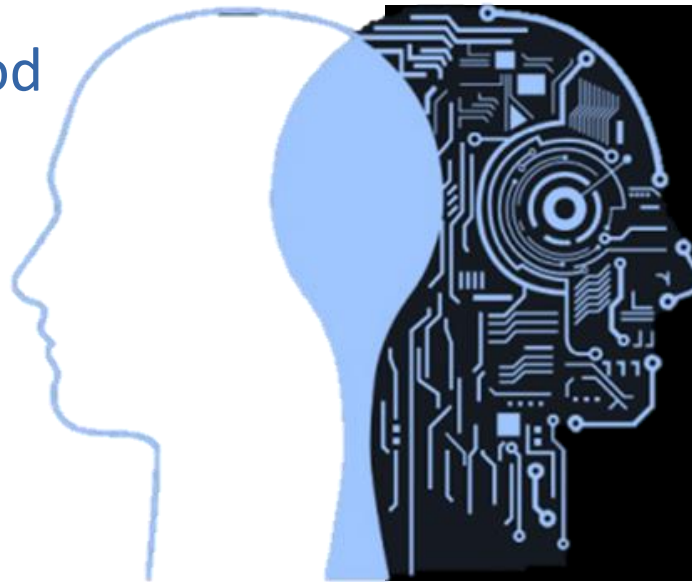
# Key areas that AI is Influencing in Universities

- **Student acquisition:** With personalized assistance around the clock, AI can help institutions achieve higher enrollment and retention rates.
- **Learning and instruction:** Faculty members could have more time to engage with students while AI helps with grading and supplying basic resources for students.
- **Student affairs:** With AI, students could receive resources such as tutoring or advising based on their previous and predicted academic performance.
- **Institutional efficiency:** AI could use information from multiple campus systems to guide administrative decisions and tailor curricula toward employers' hiring needs.

# Man Vs Machine Intelligence

Things Human are good at

- Creativity and reasoning
- Personal Connections
- Innovation and Flexibility



Things AI is good at

- Pattern Recognition
- Making data driven decisions
- Prediction

# Explainability

Student	Score	Status
Sheetal Jadhav	7	Not turned in
Siva	8	Done late
tula sridath	10	
Vignesh	10	Done late
Vishakh Cherian	8	Done late
Yuvaraj Gajendran	7	Done late

Category	Score
Creation of FIS	1/1
Membership Functions	4/6
Rule implementation	2/2
Evaluation of FIS	1/1

- Oxford Dictionary definition of ‘explainable’:
  - A statement or account that makes something clear, a reason or justification given for an action or belief

# Challenges in AI solutions for Academia



None of the AI systems are actually explainable!!

# Explainable AI (XAI)

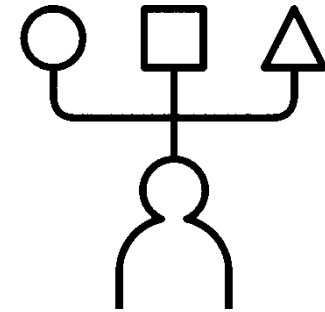
Explainability of complex machine learning models is crucial



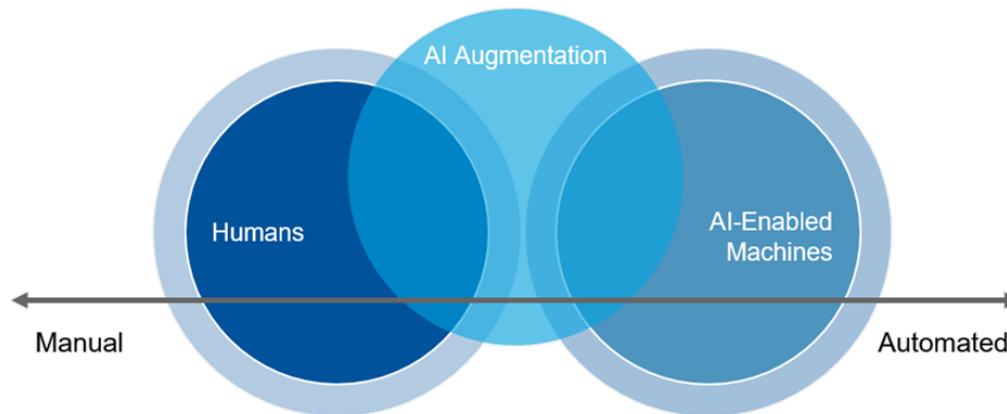
Trust

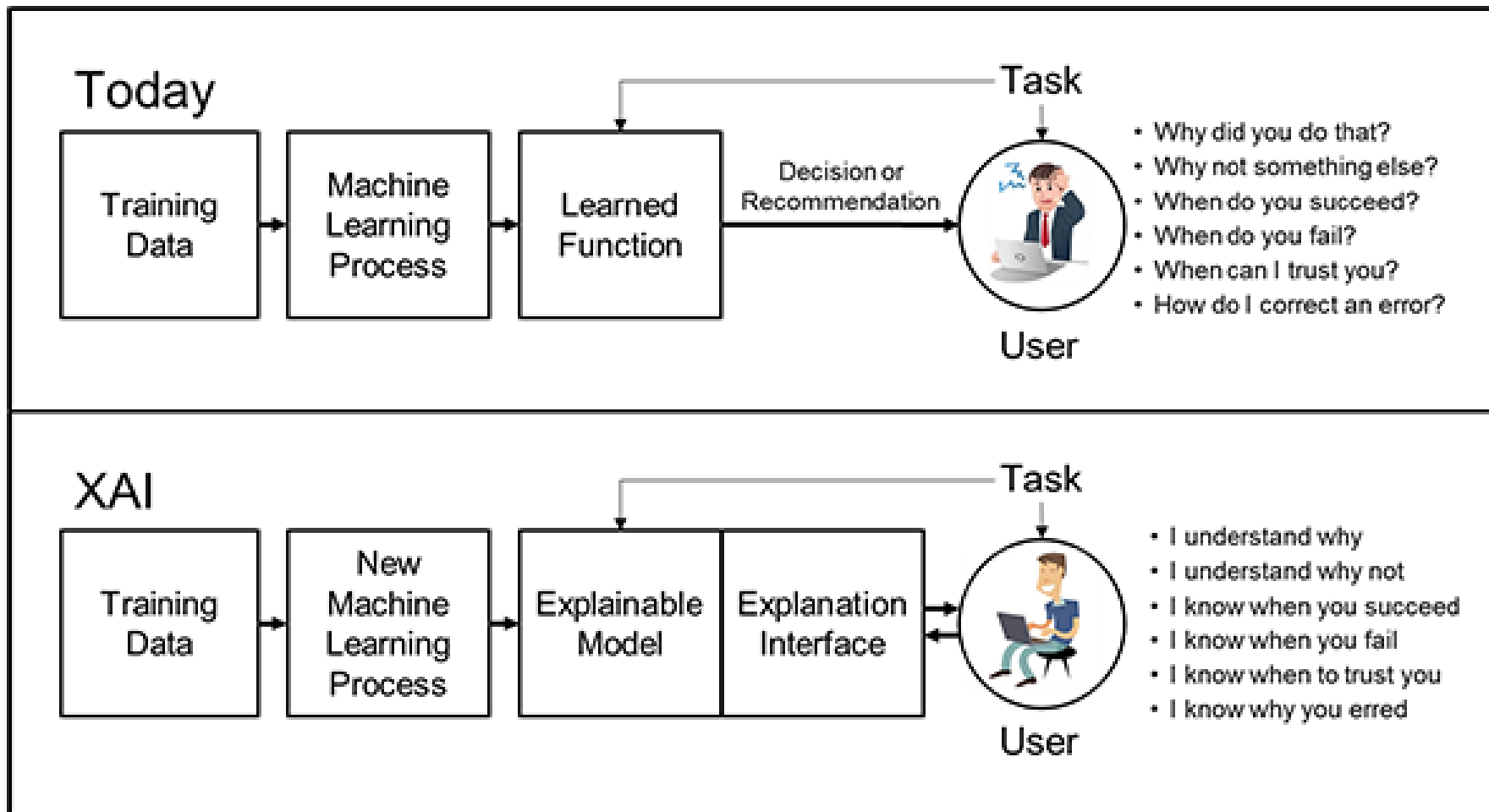


Justification



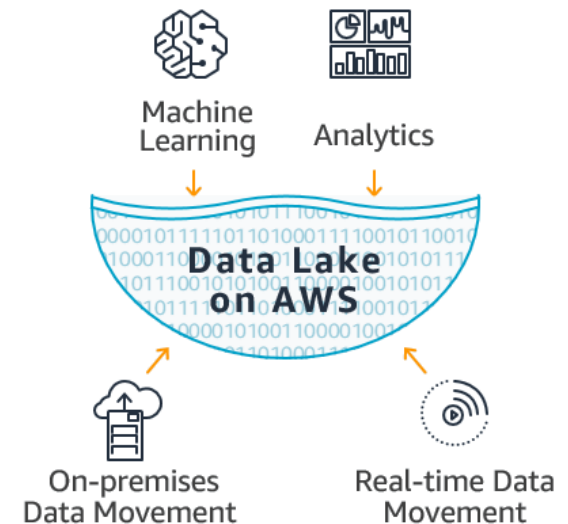
Derive robust Insights



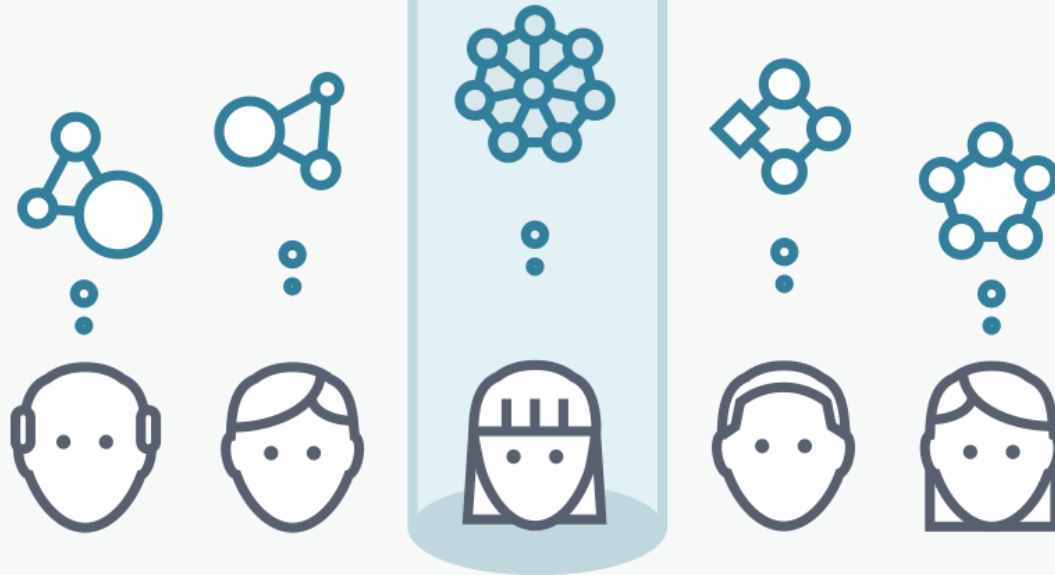


# Making XAI innovations a reality

- XAI tasks require massive amounts of data, universities should begin to aggregate and maintain their data
  - adoption of a data lake architecture
  - create robust machine-learning models capable of making far more accurate predictions to benefit Universities



# Competitions on XAI solutions



It is both fascinating and rewarding to find ways to put our technological capacity to use improving the offerings of higher education institutions

- Goal of all these incremental improvements is to make a difference in the lives of students, empowering them to earn their degrees and achieve their long-term goals
- Lets work together and build together, and as we do that, the real solution will begin!!

# Discussion