Research & Innovation for Digital Essex

Dr Mays AL-Naday (CSEE/IADS, University of Essex)

University of Essex

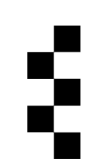6G SNS IA MEMBER

University of Essex

Introduction

- **Top University in Knowledge Transfer Partnerships (£10+M portfolio)**

- **Active in EU FP7→Horizon Europe: 5 projects in 2023, 2024**

- **9th in UK for research impact, 6th for research power (REF 2021)**

Me: Associate Prof. in edge-cloud services, networks and their cybersecurity (sustainability, Energy)

- **Research Overarching target :**

  - **Digital Transformation: Cloud middleware services and network**

  - **Scalable AI services**

  - **Energy efficiency, greenness and cost of services (including AI)**
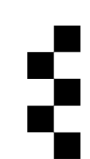
Research & Innovation Activities

- ## National

  - InnovateUK CyberASAP: enabling privacy-by-design AI services

  - IUK KTP with Entopy (Feb 2024): AI reusability, economic service, faster traction to support critical use-cases in Essex and UK in general

  - IUK Smart Grant with Entopy (under review): Federated AI, allow supporting use-cases, otherwise infeasible

  - Regular collaboration with BT on Telecommunications and cloud computing challenges

- ## International

  - Horizon Europe (HE): submissions in review (cybersecurity, smart management of digital energy networks)

  - HE Smart Networks and Services project (2024 - 2027): reliable/secure 6G services, empowered by AI

  - UEssex full research member:

    - 6G Infrastructure Association (6G-IA): overseeing HE SNS JU research and Innovation

    - Alliance for IoT and Edge Computing Innovation (AIOTI): overseeing HE research in Digital Transformation (IoT, data, cloud-edge computing, cybersecurity).
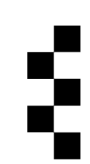
Public sector role in Research & Innovation

- Public services have the best knowledge of **community requirements**, **constraints** and **challenges**

- It is critical to embed these aspects in the design and development of digital services to address strategic challenges (societal, economical, environmental)

- Engagement of public sector is vital to:

  - Outline such requirements and engage in the iterative process of design, development and evaluation

  - Provide trial fields to test innovative solutions in a risk-controlled environment

  - Provide realistic data to enable research in AI and relevant services/enablers of digital transformation

Links and Contacts

- ## Comnet

  - https://www.essex.ac.uk/departments/computer-science-and-electronic-engineering/research/communications-and-networks

- ## Email: mfhaln@essex.ac.uk

- ## Linkedin: www.linkedin.com/in/mays-al-naday-07758940

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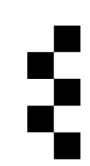IADS | The Institute for Analytics & Data Science

Digital Connectivity
Opportunities, Challenges, Research

Professor Haris Mouratidis

Institute for Analytics and Data Science (IADS) / School of Computer Science and Electronic Engineering (CSEE)

Opportunities

- Smart Cities
  - Infrastructure, transportation, sustainability
- Digital Health and Telemedicine
  - Remote patient monitoring, online consultations, 24/7 exchange of health data
- Remote work
  - Video conferencing, collaborative platforms
- E-Commerce/ Digital Marketplaces
  - Connect with customers anywhere at any time
- Smart Manufacturing, agriculture
  - Integration of technologies for efficient production and farming optimisation
- Environment and sustainability
  - Monitoring through smart devices, sustainable practices automation
- Digital Economy
  - Transactions, innovations

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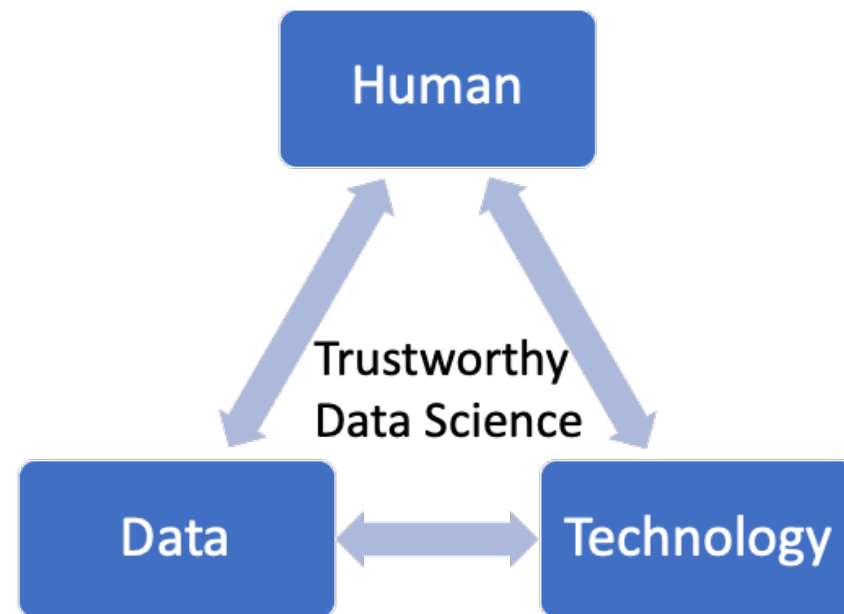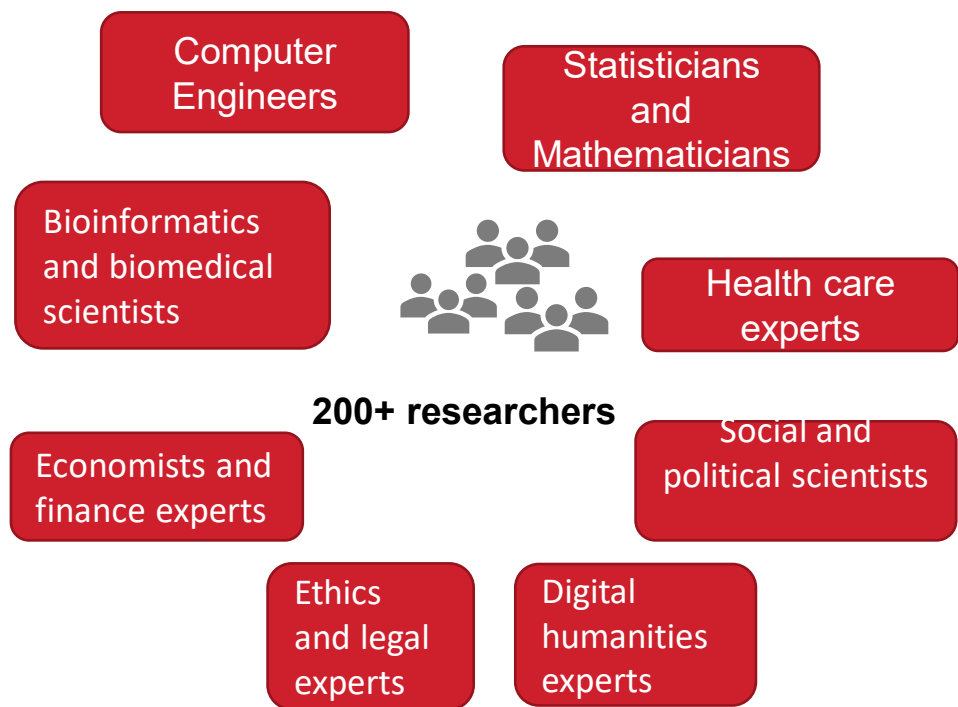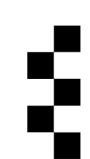IADS | The Institute for Analytics & Data Science
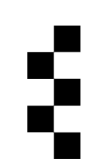
- Digital Divide
  - Unequal access to technology
- Affordability
  - Inaccessible to a portion of the community
- Digital Skills
  - Clear gap on digital skills with individuals lacking the necessary digital literacy and skills to fully embrace digital connectivity
- Environmental Challenges
  - Increasing demand on data storage and processing, larger digital footprint, energy consumption
- Infrastructure Challenges
  - Inadequate ICT infrastructure, lack of fast broadband
- Privacy and Security Concerns
  - New threats and vulnerabilities
- Misinformation
  - Fake news, online manipulation
- Ethical Concerns
  - Bias in technology, AI and potential misuse.
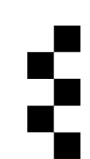
Institute for Analytics and Data Science (IADS) was created in July 2014 to use analytics and data science to develop lasting solutions that transform the worlds for the benefit of individuals and communities.

IADS Community

Computer Engineers

Statisticians and Mathematicians

Bioinformatics and biomedical scientists

200+ researchers

Health care experts

Economists and finance experts

Social and political scientists

Ethics and legal experts

Digital humanities experts

Human

Trustworthy Data Science

Data

Technology

Research Towards Digital Connectivity Challenges

Energy efficiency

Research is focused on minimizing energy consumption and CO_2 emissions by co-optimising machine learning models across algorithm, arithmetic and dataflow.

Cyber Security and Privacy

Intelligent threat analysis and mitigation, Dynamic Cybersecurity Risk Assessment and Incident handling, Privacy-by-design solutions, compliance with regulations.
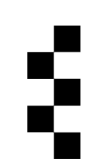
Digital HealthCare

AI and data science driven systems, algorithms and engines to support detection (e.g. melanoma-based skin cancer lesions), triaging (musculoskeletal services), and diagnosis and prediction (e.g. tooth decay, extraction).

Life Sciences and the Environment

Bioinformatic and statistical tools to highly complex genetic and genomic datasets to understand the potential impacts of environmental change on the microbial communities that support ecosystem and human health.

AI & Decision Making

Create optimal solutions that promote correct decision making (e.g. mechanism design) using AI. Designing self-optimising and self-healing service composition algorithms under high degrees of dynamism and uncertainty, and under various correlations among the interacting parties.

Thank you!

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https://www.essex.ac.uk/centres-and-institutes/institute-for-analytics-and-data-science