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A Systemic Design Framework for AI-enabled Healthcare: Improving health and wellbeing of people with learning disabilities

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A Systemic Design Framework for AI-enabled Healthcare

Improving health and well-being of people with learning disabilities

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The aim of this presentation is to present a systemic design framework developed by a research team for a project funded by the UK National Institute for Health Research (NIHR), DECODE – *Data-driven machine-learning aided stratification and management of multiple long-term conditions in adults with learning disabilities.* DECODE will analyse healthcare data on people with learning disabilities from England and Wales to find out what multiple long-term conditions (MLTCs) are more likely to occur together and what happens to some of these MLTCs over time. The end goal of DECODE is to utilise the AI-enabled new knowledge and develop actionable insights for effective joined-up social and health care for people with learning disabilities. The framework we are proposing consists of four steps: i) context analysis to understand the context of AI application; ii) AI output visualisation to develop user-friendly visualisations to display the outputs of AI analysis in a meaningful and accessible way; iii) actionable insight exploration to explore leverage points to improve join-up care coordination; iv) change process planning to evaluate the feasibility and

ethical/legal risk of the usage scenarios. This framework will be of interest to many systemic designers who aim to develop a safe, ethical and cost-effective AI in healthcare.

KEYWORDS: artificial intelligence, health and social care, people with learning disabilities, systemic design

RSD TOPIC(S): Health & Well-Being and Sociotechnical Systems

Presentation summary

Expectations for the use of AI in healthcare are high. The focus of AI development has often been narrowly on the performance of AI algorithms, so the aspiration to develop safe, cost-effective and ethical AI in healthcare systems is currently weakened (Sujan et al., 2019). There is an increasing recognition that it is essential to consider the real challenges of integrating AI into existing healthcare workflows in collaboration with various stakeholders in healthcare systems, including healthcare workers and patients/carers. Some efforts have been made to propose key system principles and methods relevant to the design of AI in healthcare (Matheny et al., 2018), but it is important to demonstrate how these principles can be put into practice in the overall development process of AI applications in healthcare.

The aim of this presentation is to present a systemic design framework a research team developed for their UK's NIHR (National Institute for Health Research)-funded research project, DECODE (Data-driven machine-learning aided stratification and management of multiple long-term conditions in adults with learning disabilities).

The end goal of DECODE is to develop AI analytics-driven new knowledge on disease clusters and trajectories of people with learning disabilities and develop actionable insights and practical usage scenarios for effective joined-up social and health care. Ultimately we intend to utilise the new AI-driven knowledge and conduct systemic design with multiple stakeholders to come up with better policies, better commissioning

strategies, better pathways, and better decision support tools which aim to improve MLTC management and prevent additional long-term conditions from developing.

Four step framework

The framework we are proposing in this presentation consists of four steps.

The first step is context analysis. This step aims to understand the context of AI application by investigating existing barriers and enablers for effective care coordination through a narrative review of existing policies and reflective semi-structured interviews with relevant stakeholders. The SEIPS (Systems Engineering Initiative for Patient Safety)-based model and tools (Holden et al., 2013) will be used for data collection and context analysis.

The second step is AI output visualisation. This step aims to develop user-friendly visualisations to display the outputs of AI analysis in a meaningful and accessible way for health and social care professionals and people with learning disabilities and carers. A series of focus groups will be conducted to iteratively prototype various types of accessible and suitable visualisations, which will range from interactive dashboards to simple visual narratives or infographics.

The third step is actionable insight exploration. This step aims to co-develop actionable insights and practical usage scenarios informed/inspired by the accessible visualisations of AI outputs. A series of participatory design workshops will be conducted with various stakeholder groups: i) patients; ii) family carers; iii) health and social care providers; iv) charities and policymakers; v) innovators. The AI output visualisations will be presented in these co-design workshops to inform and inspire the participants. Various co-design methods will be used, such as persona, 'How Might We' questions, brainstorming, benchmarking, dot voting, journey maps, and interaction maps.

The fourth step is to evaluate/plan the change process. This step aims to evaluate the feasibility and ethical/legal risk of the usage scenarios. A full-day stakeholder workshop inviting all the participants of the previous workshops will be carried out to evaluate the feasibility and ethical risk of usage scenarios developed in the third step.

The World Café approach (Brown & Isaacs, 2005) will be used to engage large groups of participants together from different backgrounds and encourage participants to be actively empowered over the focus of conversations. The low-resolution prototypes will be made available so that the workshop participants can act out and experience usage scenarios. We will develop simple templates to support conversation/evaluation on feasibility and ethical risk and use them for group discussion. The *Design Thinking Toolbox* (Lewrick et al., 2018) and *Ethics Guidelines for Trustworthy AI* (European Commission, 2016) will inform the template development.

This framework will be of interest to many systemic designers who aim to develop a safe, ethical and cost-effective AI in healthcare.

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