

BIO-STREAMS: An Integrated Multi-layered Digital Intervention Approach to Tackle Childhood Obesity and Promote a Healthier Lifestyle

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Background: The incidence of childhood obesity is systematically increasing worldwide. The World Health Organization (WHO) European Obesity Region Report (2022) states that the prevalence of childhood obesity is at very high levels (29% boys, 27% girls). Increased prevalence has significant psychiatric and psychosocial consequences but is also associated with high rates of obesity in adulthood, premature death, and early markers of cardiovascular disease.

Purpose: BIO-STREAMS, a four-year duration project funded by the European Union (HORIZON No.101089718), aims to provide essential holistic solutions to tackle childhood obesity. It brings together 30 partners from 15 European countries to design, create, develop, and implement a multi-pillar framework for children's anti-obesity behavior.

Methods: A visual representation of BIO-STREAMS ecosystem is shown in Figure 1. The solution is based on three major modules.

Module A: Development of the first child/adolescent obesity Biobank in Europe to standardize data collection and enhance data sharing for better diagnosis and treatment.

Module B: Design and Development concerns the BIO-STREAMS platform, which will include an obesity risk assessment platform using Machine Learning (ML) techniques and a digital marketplace. In this marketplace, participants can use serious games through the Active Health App (Figure 2) that aim to provide recommendations for increasing Physical Activity (PA) to the desired levels, reducing sedentary behavior, and improving dietary habits incorporating the micro-moments concept. These recommendations resulted from a systematic review and meta-analysis conducted by partners of the BIO-STREAMS Consortium, aimed to investigate the association between nutrition, PA, and overweight/obesity, metabolically unhealthy obesity in children and adolescents.

Module C: Development of an EU social network (BIO-STREAMS social network) to facilitate communication and dissemination of best practices among stakeholders.

Results: The use of ML models will contribute to the identification of prognostic biomarkers (>15 new insights), while the personalized, gamified intervention aims to increase adherence (>50% of individuals). The validation of the platform will be carried out through a feasibility study in 7 pilot sites in 6 different countries in Europe that will examine the acceptability and usability of the Active Health App and the risk of metabolic dysfunction, reduction of body mass (>5%), and the improvement of health/food literacy and the quality of life using validated outcome measures.

Conclusions: BIO-STREAMS' integrated multi-level approach is anticipated to substantially contribute to promoting a healthier lifestyle, shaping appropriate health policies in the EU, and enhancing the standard of living for the underage population. Thus, is expected to be a beneficial tool in clinical environments.

Implications: In the BIO-STREAMS project, WHO's guidelines for promoting PA have been considered. ML models and innovative technology, are being applied to develop personalized interventions to prevent childhood obesity.

The Physiotherapy community can also benefit.

Figure 1: A visual representation of BIO-STREAMS Ecosystem

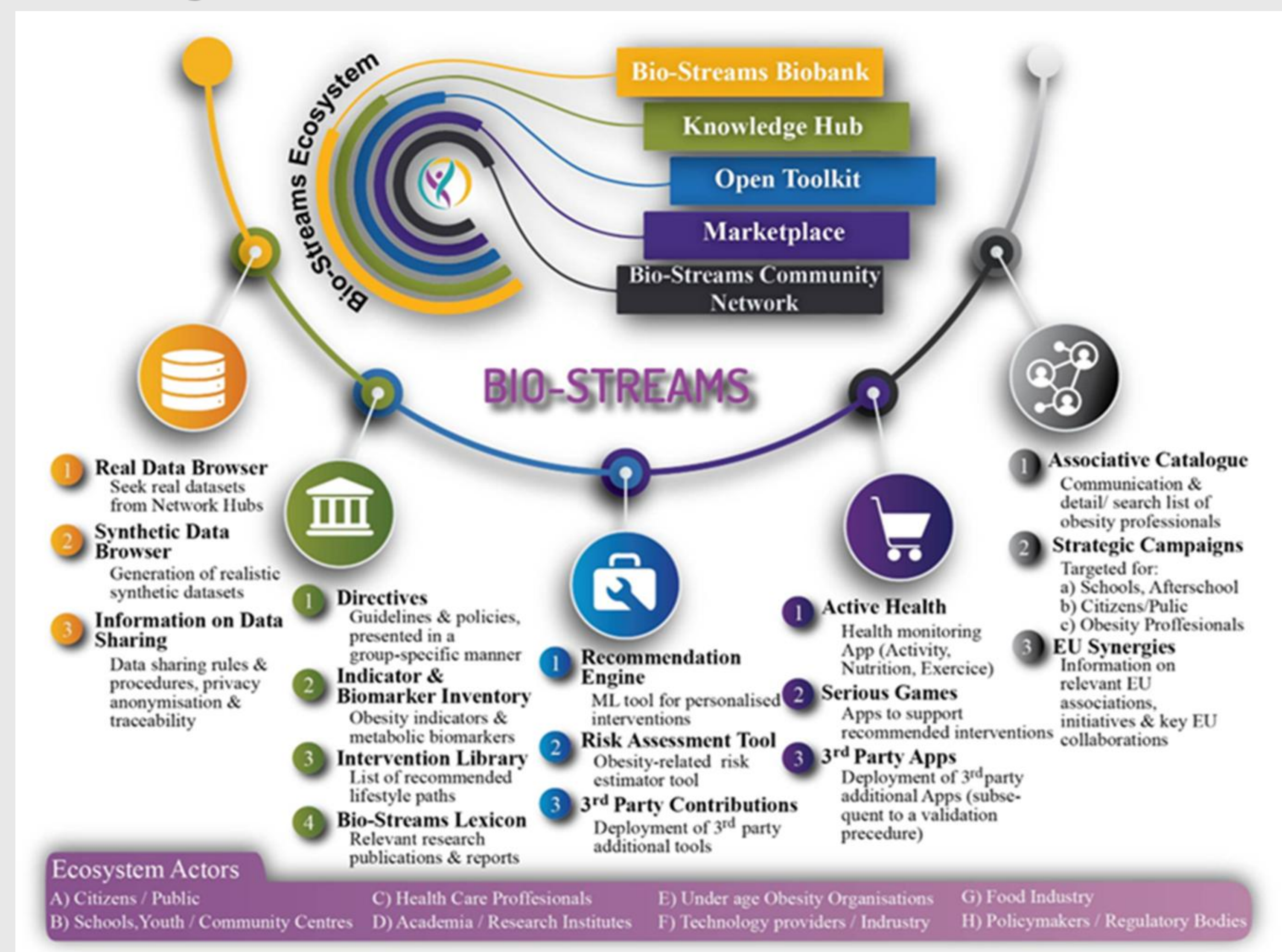


Figure 2: Screenshots of the BIO-STREAMS Active Health App

