**3*. Program's name:***

Living Lab for the Healthy Aged: The Boxenbaum Program for Detecting Early Deterioration and Frailty

***Program Description***

***Need***

Israel ranks in the top 5 countries around the world with the largest aging population. In 2035, the number of elderly is expected to reach 1.66M (~20% of Israel’s population) reaching established OECD levels.

Healthy aging means optimizing opportunities which enable older people to play an active role in society and enjoy an independenct and good quality of life. It focuses on prevention, early detection and timely, efficient and patient-centric treatment. Age related diseases includes conditions as hearing and visual loss, cognitive decline, personality and mood disorders, and frailty

To date, the healthcare system lacks the ability to intervene pro-actively at the early stages of functional, mental and cognitive disease development, and far too often, this intervention occurs ‘after the fact’, with results that are irreversible.

While the plethora of home monitoring tools being developed by Israel’s hi-tech sector provide important steps forward in the early detection process, there is an urgent need to develop a valid multi-dimensional prediction model for diagnosing and treating these illnesses. Such a model would draw from the latest advances in digital medical technology -- health simulation, health informatics, medical data mining, Internet of Things and more.

Given the demographic changes worldwide, with a silver ‘tsunami’ soon upon us, such a model, particularly as it relates to the healthy aging, is critical to the future of efficient and effective health care for this vulnerable population.

***Program Description***

The Holon Institute of Technology is establishing a Living Laboratory on campus – a fitted-out ‘smart’ apartment which will enable this significant study to take place. The Living Lab will serve as a basis for innovative research on aging from the physiological, cognitive, behavioral, mental and functional perspectives – including a person’s ability to meet their basic needs: learn, grow and make decisions, be mobile and independent; build and maintain relationships and contribute to society.

***Program Objectives***

Overriding Objective:

***Using digital medical technology, to sustain and enhance the wellbeing of the healthy aged, to find ways in which to encourage autonomy and independence which will allow them to control, cope with and make personal decisions about how they live on a day to day basis.***

1. To conduct clinical studies, in smart homecare environments which will enable collection of Patient Generated Data

(PGD) for identification of deterioration of the elderly at an early stage and at critical points for intervention.

1. To create a new, technologically-supported metrics to measure frailty based on a patient-centric home care model and development of a validated multi-dimensional prediction model for frailty that will serve as a Decision Support System (DDS) for care providers.
2. To increase awareness for prevention and early detection among the elderly population and caregivers by developing programs for healthy aging.

***Main guidelines in the implementation of the program:***

1. Year I – October 2019
* Set up & Organization:
* Installation and fitting-out of the Living Lab on campus, hiring of research, clinical and IT team.
* Engagement with hospitals and HMO’s, Holon municipality and assisted living establishments to establish collaboration and partnerships
* Integration of the project among each of the 5 HIT faculties
* Preparation of Research protocol and submission to IRB commitee
* Pilot project on small group of subjects
* Annual Boxenbaum Workshop
1. Year II (October 2020)
* Implementing research model
* Collecting and analysing data
* Developing healthy aging programs
* Annual workshop
* Invite Boxenbaum Visiting Lecturer in Digital Medical Technology
1. Year III (October 2021)
* Continuation of data collection and analysis- development of the risk model for frailty
* Field test for model validation and adjustment
* Implementing healthy aging programs
* Participation in conferences and preparation of scientific articles
* Organization of Boxenbaum Frailty Conference at HIT

***Success factors*:**

* Volunteer recruitment
* Year 1- 5 subjects
* Year 2- 15 subjects
* Year 3- 15 subjects
* Data collection and model development
* Collecting 5 hours of data from each patient while performing home tasks
* Identifying key frailty parameters using digital tools at "smart home" environment as compared to periodic clinical assessment.
* Development of technological frailty model
* Clinical assessment of elderly volunteers using frailty parameters, and comparison to traditional methods assessment.

*It is anticipated that the new model will double the ability to measure frailty by 50% as compared to traditional assessment, i.e., we expect the model to identify 50% frail patients than in the same region during the same period.*

* Healthy aging program
* Training of 100 elderly people for healthy ageing awareness and prevention’

***Planned follow-up and evaluation of the program:***

* The frailty model developed through the Boxenbaum Program will be used in several settings, hospital and HMO clinics and at the patients’ home, generating data for real life evaluation.
* Collaborations with HMOs and assisted living residences will enable implementation in these facilities
* Follow-up assessment and evaluation of the model and further adjustment for real life setting (within the grant period).
* Follow-up research of 3 years will be conducted to evaluate the validity of the model, the efficacy of the intervention program in preserving patients' condition (Prevention of deterioration) as well as system acceptance and efficacy of healthy aging program in creating awareness, compliance, and increase in self treatment

***Program Co-Directors***

Cv’s.