THE LEARNING HEALTH SYSTEM:

Leveraging the Power of Collective Data and Al-driven Research for Individual Impact

DIGITAL TWIN FIRST USE CASE: With an estimated 1 in 20 COVID-19 survivors experiencing long-term symptoms* such as profound fatigue, brain fog, headaches, cardiac arrhythmia, fevers and shortness of breath, Post-Acute Sequelae of SARS-CoV-2 (PASC) is the next public health crisis. The COVID-19 Long-Hauler Project, a partnership between Dell Technologies and i2b2 tranSMART is applying the power of research—accelerated by Al and other advanced technologies—to understand the causes of PASC and develop effective treatments. The Digital Twin effort has the potential to expand with data for up to two million digital twins in the next four years.

MARIA CACELLI ** PATIENT ENROLLMENT: Maria Cacelli from Italy was healthy before COVID-19 but since her diagnosis and initial recovery she developed cardiac and respiratory conditions accompanied by mental fatigue and memory issues. After seeing several specialists and having a battery of tests, she has no clear diagnosis let alone a unified path to recovery. Maria learns she's considered to be a 'long-hauler' and finds an opportunity to accelerate PASC research. She provides consent for her de-identified health data to be utilized for large scale international studies. DIGITAL TWIN DATA COLLECTION AND DE-IDENTIFICATION: The Data Enclave collects Ms. Cacelli's existing health data in all forms and organizes it into a single record to create a de-identified digital twin that replicates Ms. Cacelli's health status. INDIVIDUAL TWINS CREATE POPULATION LEVEL DATA AND Images • • • • • EHRs • • • • • Test results • • • • • Medications • • ENABLE POPULATION RESEARCH: Ms. Cacelli's digital twin resides in the Data Enclave, along with the digital twins of other patients from around the world. Similar digital twins are grouped in population based sets. All data is de-identified for patient privacy. Blood pressure monitor • • • • Fitness tracker • • • DATA ENCLAVE CONTINUOUS UPDATES REFINE THE DIGITAL TWIN: Ms. Cacelli monitors her The Data Enclave is powered by an integration symptoms with at home and mobile devices and continues to visit her doctors. The of Dell Technologies - PowerEdge, PowerStore, **UPDATES** PowerScale and VMware Workspace ONE - that data from the devices, diagnostics, etc. are enables researchers to power 70,000+ patients' tests, captured and de-identified by the Data Enclave, and the population level data is updated. simulations and analyses, which will be shared with an international coalition of more than 200 hospitals. This is where researchers gather, store and analyze de-identified data sourced from various monitoring systems and electronic health records and update the digital twins with real-time clinical data such as that collected through ventilators and cardiac monitors. **CONTINUOUS DATA ANALYSIS** Comparison with other digital twins gives AND FEEDBACK: As the Data Enclave doctors valuable insights about key issues continues to evaluate digital twins for such as risk management and potential disease development. This knowledge, similarities, the analysis reveals a drug combined with traditional data, enables that has been highly effective in patients better-informed clinical decisions. who resemble Ms. Cacelli. A new pharmaceutical trial with a protocol linked to genetics is announced and Ms. Cacelli DATA FEEDBACK is recruited to participate. She opts in. UPDATES FOLLOW-UP: De-identified data from **OUTCOME:** As a result of the new clinical research and new therapies, long-haulers such as Ms. Cacelli follow-up visits to monitor Ms. Cacelli's have a shot at better health and quality of life while additional symptoms will be used to further refine and shape the population-based also contributing to the health of others. statistical and mechanistic models.