One of the challenges in implementing the phygital experience is working with old buildings that require refurbishment to meet the needs of the disabled. A case worth noting in implementing the phygital experience in an old infrastructure of the New York subway system, first operated in 1904. In 2020 the Transit Tech Lab launched a startup competition, where they chose 9 companies to improve accessibility. Among them was Okeenea Digital with its audio-based indoor navigation app Evelity. It is adapted for all type of disabilities and can easily build the best route regarding person`s special needs. Later, the underground was equipped with beacons to advance the accessibility even more. Evelity cooperated with Régie des Transports Métropolitains (RTM), the Marseille metro operator, to improve the physical accessibility of its 2 lines and 29 stations. Evelity configured the geolocation infrastructure and the Evelity back office, installed bluetooth beacons at the proper places and set up app. Thus, the features enabled a user, even a blind one, to navigate through an unknown station, discovering the services available and reach them. The problems they solved included making underground inclusive for everyone, independent on type of disabilities, reducing cost of disability management, finding alternative to the quickly obsolete and non-dynamic signage and making travel safer. The field of interests of Okeenea Digital covers not only underground and public transport, but also includes workplaces, universities, museums and hotels.

In spite of having so many advantages, app isn’t popular worldwide. It has about 1000 downloads and no reviews on Play Market. On Apple store there are 20 mostly positive reviews, as a result average rate of the app is 4.3.

Another example worth mentioning is Tactile Studio, specializing in designing educational solutions enhanced by sensory experiences – touch, sound, smell. The Tactile studio promotes the phygital concept through the idea of the interactive hybrid between physical (gestures) and digital (screens). It requires programming, modern electronics, 3D modeling and involving the leading experts. One of their greatest projects was visualizing 16 stations, creating a tactile trail at the Pavilion de I’Horloge at Louvre. [2] On the path the visitors can find the archaeological sights and identify the specific period to which it belongs, as well as the explanation of the decorative elements with the ability to touch the reproductions. In this case, the sensitive consoles with infrared sensors are placed in every room, allowing interaction by passing the hand over it to light up the corresponding room and get the information about it. The Tactile studio provides a comprehensive experience with audio devices and Braille text. Furthermore, Louvre is equipped with video materials with sign language specifically for the hearing-impaired people. The actors in the videos wear historical costumes to make the experience more immersive and entertaining.

Another point we would like to cover is the significant progress in creating application for the visually impaired people. TUAT corp. – a South Korean company that introduced artificial intelligence in their application Sullivan+ in order to recognize and vocalize objects from photos. It helps blind and low-vision individuals experience the phygital concept and understand what is around them. Implementation of the artificial intelligence makes this app accessible all around the world, irrespective of a particular city or country. Furthermore, Sullivan+ makes it easier to get acquainted with a new person because of the built-in Face recognition that can identify the age and gender. Color recognition supports single-color mode, that describes what color is in the center of the photo, and full-color mode, that indicates what color covers a large part of the entire screen. Alongside that, the Light brightness function helps the visually impaired people facing problems with understanding how bright it is around them. It can also describe the surroundings and thus help to navigate the unfamiliar spaces. [3]

Sullivan+ is highly popular app among users with disabilities. It has more than 100 000 downloads on Play Market and the average rate of app is 4.6. Hovewer, reviews include a lot of complaints that AI doesn’t work properly, making the proposed solution ineffective. It is stated that AI can’t recognise faces propely, generating diffirent answers to the same photo. Moreover, it has problems with proccessing promts that creates poor phygital experience.

Similarly, an application Lazarillo aims to make commuting easier and more efficient for the disabled people. It offers audio navigation with real time updates and multiple layers of information with the concept of the smart city in mind. As a person walks, Lazarillo will announce places of interests, streets, intersections, restaurants, shops and transit areas. In addition, it can create routes within the map and guide the users on their way to the destination. The developers offer specific personalized services to particular businesses, which include not only mapping and creating the digital plan of the facilities, but also can add accessible and interactive digital information to their physical space. [4] Applications like Lazarillo are easily-applicable in smart cities as they do not require major refurbishment, but rather work with the existing environment and Big Data.

On Play market the average rate of Lazarillo is 4.2 and on Apple store is 3.8. Working as an extension to existing maps as Google maps, Apple Maps, Moovit, Waze, or others, Lazarillo is dependent on the quality of the map in that region or country. Thus, it causes some problems with accessibility for people from less developed region. According to Perkins school for the Blind, navigatiting tutorial through app is difficuclt, especially for the impaired people without previous experience. The major drawbacks of the app are outdated information about locations and impossibility to eliminate location from announcment list.

<https://www.perkins.org/resource/lazarillo-free-accessible-gps-app-blind-and-visually-impaired/>

<https://blog.evelity.com/en/success-story-rtm-metro-marseille>