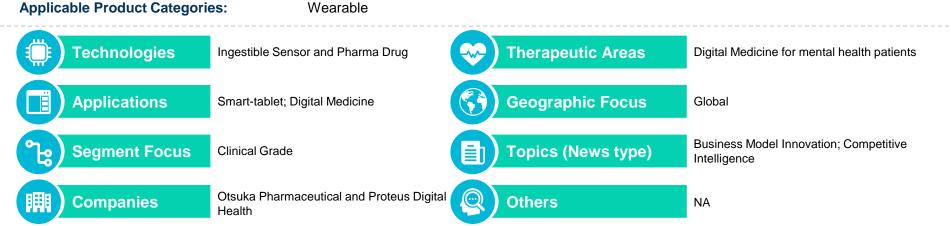




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### Otsuka and Proteus sign 5-year, \$88M digital pill partnership - October 2018 (1/2)



#### **ANALYST TAKE:**

- Synopsis: Otsuka Pharmaceutical and Proteus Digital Health have re-upped their global smart-tablet partnership for another five years, aiming to develop a new generation of ingestible sensors.
- Key Objectives/ Strategic Imperatives:
  - As part of this companion digital therapy, Otsuka has formulated the FDA approved Proteus Digital Health sensor directly into its antipsychotic drug Abilify. This drug (a \$6.5 billion drug in the US) which went off patent in 2015, is prescribed to patients with depression, schizophrenia, or bipolar disorder.
  - The 'Chip-in-a-Pill' technology will empower patients with medication adherence monitoring program and actionable data to understand health outcomes and efficacy.

## Otsuka and Proteus sign 5-year, \$88M digital pill partnership - 2018 (2/2)

- Value Proposition: To kick off the expanded collaboration, Otsuka has handed Proteus \$88 million in a mix of equity and other payments to help fund a
  portfolio of new digital medicines focused on mental health, including continuing commercial work for the sensor-laden Abilify MyCite pill approved by the
  FDA late last year. The expanded agreement covers the development and commercialization of digital medicines over the next five years.
- As per the Otsuka North America division President and CEO, Kabir Nath, they increasingly recognize the opportunities of integrating sensors and wearable technologies to further digital medicines into healthcare eco-systems and achieve the much-needed value-added outcomes for patients suffering from unmet medical needs in the mental health field.
- A collaborative team comprised of Otsuka and Proteus employees will be dedicated for commercial development and market coordination for the
  ABILIFY MYCITE System, software integration and standardization, manufacturing and supply chain integration, and coordination. This includes the joint
  development of an expanded portfolio of digital medicines consisting of other therapies such as atypical antipsychotics used in the treatment of serious
  mental illness integrated with Proteus sensors. The parties will also work on the joint development of next generation product features and sensor
  capabilities to expand the potential of digital medicine offerings.
- Frost & Sullivan believes, Otsuka and Proteus's roller-coaster experience in getting FDA approval for their digital pill concept marks a great milestone for
  the commercial feasibility of the digital medicine concept in the US market. This is expected to open up other progressive pharma/biopharma companies to
  explore the convergence opportunities of sensors/wearable with drugs/targeted therapeutics to move beyond the pill-only strategy given increasing cost and
  pricing pressures (especially given the high price tag of novel targeted therapies).
- Frost & Sullivan also believes that digital medicine concept also provides a unique price competitive advantage, especially with increasing competition from branded generic drugs, and provides for a never before opportunity for pharma to more directly engage with patients for tracking outcomes, adverse events and real world evidence. For example, Otsuka and Proteus's collaborative beyond-the-pill strategy is expected to make compliance monitoring efforts more actionable and efficient, creating a unique differential value proposition for Otsuka's Abilify drug against generic competition.
- · Target End-User: Pharma, Payers, Consumers

WEBLINK: https://bit.ly/2NynKbn

### PAREXEL announces new wearable, mobile tech for clinical trials – October 09, 2018 (1/2)



#### **ANALYST TAKE:**

- Synopsis: Biopharmaceutical service Parexel International Corporation is turning its attention to mobile and wearable technology to aid drug development and clinical research. Recently the company has announced that it has developed several new solutions that take a patient-centric approach to addressing drug development.
- Industry Need: Clinical trials are a slow and expensive process. Frost & Sullivan observes that over the years, especially from 2016 onwards, the number of drugs approved through successful clinical trials has reduced significantly. For example, about 80% of pharmaceutical trials do not meet enrolment deadlines, resulting in an average loss of up to \$1.3 million per day for a given candidate drug. Integration of emerging wearable and mHealth technologies to enable remote/virtual trials provide the potential to increase the trial success through adaptive clinical trials—providing patient-centric trials, improving value-based care, and facilitating faster and more cost-effective outcomes.

### PAREXEL announces new wearable, mobile tech for clinical trials – October 09, 2018 (2/2)

- Value Proposition: PAREXEL is leveraging its relationship with Microsoft to integrate mobile and wearable technologies into its Perceptive® Cloud platform and extend solutions to increase access to data and improve the patient experience in clinical research. For example, by leveraging Microsoft Azure App Services, the technology will generate health alerts through data transmission from mobile devices, gathered at the patient home or in the field and forwarded automatically whenever there is connectivity.
- The first solution is designed to enable health care staff and first line clinicians to communicate time-sensitive events to study staff such as automatically inform and proactively address any threat to patient safety, potentially decreasing risk of patient mortality and morbidity.
- Specifically, PAREXEL's Patient Sensor Solution capabilities now include an expanded list of connected medical devices, and integrations with DataLabs®,
  PAREXEL's electronic data capture technology and ClinPhone® RTSM, PAREXEL's interactive response solution for randomization and trial supplies
  management. Additionally, the Sensor Solution utilizes advanced Artificial Intelligence (AI) technology to support predictive monitoring of patient compliance
  and has been expanded to manage larger volumes of data transfer.
- Given the inefficiencies with traditional site-based clinical trials models, the emerging remote or virtual models enabled by emerging mHealth/wearable technologies provide more efficient and patient-centric models. Frost and Sullivan strongly believes that digitization will play a critical role in transforming the clinical trials model from traditional (centralized) high-cost and difficult-to-access settings to more patient-centric and efficient virtual models. For example, early application and integration of wearable devices and smartphones app data in clinical trials have demonstrated compelling benefits around reducing trial costs, streamlining trial processes, and demonstrating real-world efficacy (e.g. Sanofi VERKKO remote clinical study in Europe; Science 37 and AOBiome LLC—Virtual Trial Microbiome Acne Treatment).
- Entailing this, Frost & Sullivan recognizes PAREXEL's strategy leverage best-of-breed technologies to better facilitate communication during clinical trials. The platform that will use the Azure App was designed to specifically mitigate patient risks and decrease the chance of patient deaths, according to the company. As for the wearables and mobile technology, PAREXEL plans to use these to improve the speed and efficiency of clinical trials.

• Target End-User: Pharma Clinical trials Sponsors

WEBLINK: https://bit.ly/2yaNICb

### Walmart, Amazon patents could take biometric monitoring to a new level of October 10, 2018 (1/2)



#### **ANALYST TAKE:**

- Synopsis: Amazon and Walmart have both recently been granted patents for novel uses of biometric sensing Amazon for an Alexa feature that would allow the device to passively detect signs of illness and recommend remedies and Walmart for a connected shopping cart handle that can detect heart rate, palm temperature, grip force, and walking speed.
- Industry Need: One of the most transformative shifts we are starting to see in healthcare is the rise of a concept called 'Quantified-Self'. Digitization of products, services, and commerce models are democratizing current healthcare systems, manifesting a new era of healthcare consumerism. This entails an evolving ecosystem of connected health technologies such as wearables, telehealth, artificial intelligence, virtual reality, and others that support targeted health and well-being services. Scalability beyond traditional product offering and competing beyond a company's traditional industry will be important, as more companies will begin to converge products and services. Companies such as Apple, Google, and IBM will continue to compete outside their domain, pushing traditional healthcare companies to break their dominant business model.

## Walmart, Amazon patents could take biometric monitoring to a new level. October 10, 2018 (2/2)

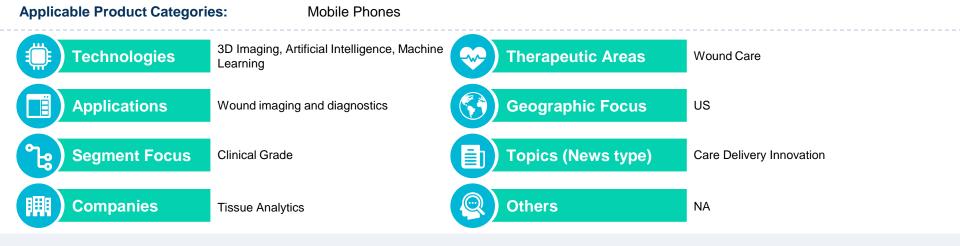
- Value Proposition: Amazon and Walmart have both recently been granted patents for novel uses of biometric sensing Amazon for an Alexa feature that would allow the device to passively detect signs of illness and recommend remedies and Walmart for a connected shopping cart handle that can detect heart rate, palm temperature, grip force, and walking speed.
  - Amazon USP Will Dr. Alexa offer up un-asked-for prescriptions? Amazon's patent, "Voice-based determination of physical and emotional characteristics of users", is a broad patent that covers a range of situations where a device like an Amazon Echo would listen not just for the user's words, but for things like tone of voice which could include fatigue, frustration, or stress and even things like coughs and sniffles, which might prompt the device to recommend remedies. For example, the voice interaction device may determine that the user coughed while uttering the phrase, and/or that the user sniffled after completion of the phrase (as per the patent). This will enable to capture the current physical and/or emotional condition of the user and may facilitate the ability to provide highly targeted healthcare content/education such audio content, digital therapy to promote preventive care practice and self-health management
  - Walmart USP Will Walmart's carts know you better than you know yourself? Walmart's patent, "System and method for a biometric feedback cart handle" provides a similar kind of passive monitoring, though the use of biometrics goes well beyond healthcare. It lays out a number of ways a connected, sensor-laden cart handle could learn things about consumers, which could then facilitate store associates in finding them and offering different kinds of assistance. For example, the biometric feedback server over time can build data driven insights on metric from the customers on the stress level. This stress estimate can, further be correlated with other biometric and non-biometric factors (purchase habits) to create individualized wellness index. As one example, if a customer's temperature is increasing while the customer's grip on the shopping cart handle simultaneously increases in force, the stress estimate may increase.
- Frost & Sullivan believes, with increasing trend of healthcare consumerism the retail industry giants such as Walmart, Amazon and Ali Health will further penetrate the healthcare market creating serious disruption both for existing business and care delivery models. This will provide a great opportunity for wearable and biosensors providers to collaboration on device layers for capturing/generate health vitals and biometric needed around these platform solutions.
- Target End-User: Insurance Companies, Consumers, Health Systems

WEBLINK: https://bit.ly/20hiQEI



### **Mobile Phones/ mHealth**

## Tissue Analytics Launches Smartphone Powered 3D Wound Imaging—October 8, 2018 (1/2)



#### **ANALYST TAKE:**

**Synopsis:** Wound and skin imaging and Al platform company, Tissue Analytics, unveiled a new 3D imaging feature which would use built in ML algorithms to create a 3D model of the wound and its underlying tissue with a 5 second video of the wound which could be captured on a smartphone.

#### **Industry Need:**

- Wounds, especially chronic wounds, represent a serious public health issue compounded by rising incidences of hospital-acquired infections, diabetes, and the increasingly complex problems associated with an aging population.
- Even to this date, wound care nurses and clinicians, rely on conventional methods of diagnosis based on physical examination and subsequent wound sampling and laboratory tests to ascertain the severity of wound, its underlying tissue damage and bacterial or fungal infections, if any.

## Tissue Analytics Launches Smartphone Powered 3D Wound Imaging - October 8, 2018 (2/2)

#### **Value Proposition:**

- The new solution, expected to be launched at the Cerner Health Conference, October 8-11, 2018 in Kansas City, MO, uses an android or iOS smartphone camera to take a short 5 second video of the wound. The system's underlying software uses machine learning and computer vision algorithms to generate a relevant and accurate 3D rendering of the wound to provide clinicians with volume and depth measurements at a claimed sub-millimeter resolution.
- The resultant data can be automatically shared to the hospital's EMR owing to the company's effective interoperability and documentation workflows through its partnerships with key vendors such as Cerner, Epic, athenahealth and Allscripts.
- Frost & Sullivan studies found that in United States alone chronic wounds affect 6.5 million patients annually, with a healthcare cost burden of more than \$25 billion. In the European Union, they affect between 1.5 and 2.1 million people. Approximately, 9.7 million venous ulcers, and 10.0 million diabetic ulcers in the world required treatment in 2015. The care of chronic wounds has been reported to account for 2% to 3% of the healthcare budgets in developed countries such as the UK, France and Germany. Appropriate and timely assessment of a wound as an ulcer, is imperative for its effective treatment. However, lack of reliable and easy-to-use diagnostic tools limits early wound assessment, complicating and delaying the healing process. In response to this, several digital wound assessment and management tools such as those from Moleculight:iX, WoundVision, Parable, WoundRounds and Bruin Biometrics have come up in recent years to augment the wound assessment process so as to enable appropriate care interventions. However, their adoption remains limited due to lack of effective commercialization models, inefficient data sharing, interoperability and storage standards as well as lack of clinician buy in. Amidst such a backdrop, it will be interesting to see how the current solution performs. While, its non-reliance on the crowded point of care space, and prompt data sharing is a big plus, the company has to carefully consider its commercialization model, such as risk sharing, data as a service, or platform as a service, etc. to gain sustainability.
- Target End-User: Hospitals; Primary Care Centers; GP Clinics; Patients

# Tencent Reaches Into London's Tech Hub for Parkinson's Partner – October 8, 2018 (1/2)



#### **ANALYST TAKE:**

**Synopsis:** Medopad, a London based tech firm, has teamed up with Chinese tech giant Tencent and the Parkinson's Centre of Excellence at King's College Hospital in London to develop advanced Al based application to hasten the diagnosis of Parkinson's disease.

#### **Industry Need:**

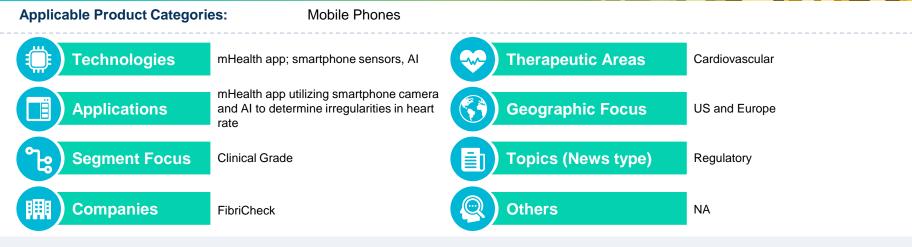
- Parkinson's disease is the second most common neurodegenerative disorder after Alzheimer's and is known to affect 1-2 per 1000 people globally. The
  disease prevalence increases with age, with a 1% prevalence rate for people aged 60 or above. Certain estimates peg the number of people suffering from
  Parkinson's at around 10 million people worldwide.
- Apart from a pathological examination of the brain, currently there are no other laboratory tests or imaging techniques that can diagnose Parkinson's with certainty. Its diagnosis is purely clinical, and relies on medical history and neurological evaluation, thereby significantly restricting the ability to manage the disease in an optimal fashion.

# Tencent Reaches Into London's Tech Hub for Parkinson's Partner – October 8, 2018 (2/2)

#### **Value Proposition:**

- The initiative is part of Medopad's several R&D deals worth more than £100 million signed with 15 Chinese firms, including Tencent. The project aims at using AI based movement assessments from sports and exercise to medicine and analyzing them for indicators of Parkinson's. The preliminary results of the project were recently presented at an event organized in Hong Kong.
- As part of the partnership, Tencent is providing the AI technology and capabilities to assess the motor function based on video of the Parkinson's sufferer's hand movements. The technology's mobile application is built by Medopad.
- The technology, which for the moment translates the video images from a patient's smartphone into graphs that doctors could further evaluate in real time, is claimed to enable doctors carry out remote assessments in 3 minutes, which is ten times faster than standard tests. The software is eventually aimed at enabling automatic scoring and assessment of results.
- Frost & Sullivan believes that, while this is not the only study testing smartphone based apps for early detection of Parkinson's disease (for example this study by Institute for Robotics and Intelligent Systems in Zurich), the names involved in this project add further veracity to the technology claims of AI and ML in diagnosis and management of neurodegenerative diseases such as Parkinson's. The effective remote monitoring of such patients will go a long way in solving the current unmet need, where in patients suffering from Parkinson's have to visit the doctor for regular assessments.
- Target End-User: Hospitals; Primary Care Centers; GP Clinics; Patients

### FDA Clears First App-Only Product for Detecting Atrial Fibrillation — 11, 2018 (1/2)



#### **ANALYST TAKE:**

**Synopsis:** Belgian company, FibriCheck received 510 (k) clearance for its smartphone based a-fib detection system, which received CE mark approval in 2016.

#### Industry Need:

- Atrial fibrillation, a chronic condition affecting an estimated 33.5 million people globally, has an estimated prevalence of 2.7-6.1 million in the US, as per CDC, affecting approximately 2% of people aged less than 65 years and 9% of people aged 65 or above.
- The condition, largely due to its asymptomatic nature (33% of cases don't experience any symptoms) as well as high chances of relapses once diagnosed, is a major threat to timely detect and manage and has possibilities to remain undiagnosed, unless monitored on a continuous basis.

# FDA Clears First App-Only Product for Detecting Atrial Fibrillation — October 11, 2018 (2/2)

#### **Value Proposition:**

- FibriCheck is a clinical grade, prescription based, software only monitoring solution that detects irregular heart rhythms, including a-fib. The system requires the patient to put his fingers on the smartphone camera lens and the app measures the patient's heartbeat via photoplethysmography to optically watch for changes in the vessels within the finger as blood pumps through with each beat.
- The app's underlying algorithm in turn analyses the heartbeat measurement to determine if it's a cause of concern. The system automatically shares the information thus gathered with the physician, thereby resulting in immediate care intervention as and when required.
- The app, which received the 510 (k) approval this week, has already been approved in the EU in 2016 and the company is planning to launch in the US in 2019.
- Frost & Sullivan analysis finds that easy-to-use, at home monitoring devices such as wearables from AliveCor, Apple, and Zio as well as other smartphone based ECG devices such as D-Heart have been adopted for periodic, home based monitoring of heart rate over the past few years. While, most of the abovementioned solutions require an additional hardware patch such as a wearable band, smartwatch or a sensor based device, the FibriCheck system is the only\* at home, software only monitoring solution, which doesn't require any additional hardware other than the user's smartphone. Additionally, the system is compatible with a number of iOS and android devices with a few exceptions. Frost & Sullivan views this as a significant competitive advantage considering the fact that the system is devoid of reimbursement related challenges as well as patients wont have to undergo significant out-of-pocket expenditure to buy the hardware patch.
- Target End-User: Patients

WEBLINK: https://bit.ly/2RKRwwY

<sup>\*</sup>Only such system approved currently. There is also an under development app by University of Turku, Finland which uses Sony Xperia to detect a-fib



### **Smart Home Devices & Appliances**

### Amazon patents new Alexa skill to detect when user is sick – October 10, 2018



#### **ANALYST TAKE:**

- Synopsis: Amazon has filed a patent for its virtual voice assistant, Alexa, aimed at detecting whether a user is sick and selling medicine in response.
- The concept of using voice to diagnose disease conditions is not new. Frost & Sullivan research has identified at least three startups that use the technology Beyond Verbal, Sonde Health and Cogito, apart from IBM Watson's research efforts. Some of these efforts tackle mental health conditions, while Beyond Verbal tech tackles something as complex as cardiac conditions. However, Amazon's play is very different, in the sense that it aims to help check basic health conditions such as a cold and cough, and suggest ordering OTC medication or provide chicken soup recipes. In the very near future, it is very likely that it may even connect you to a telemedicine provider to get a prescription, and then deliver the medication to your doorstep. Being a logistics expert, the last-mile delivery could be enabled by drones, to provide medications within the hour.

WEBLINK: https://bit.ly/2Edd02L

### Ground-breaking collaboration creates world-first smart home for people with intellectual disabilities – October 9, 2018

**Applicable Product Categories: Smart Homes** Technologies **Therapeutic Areas** IoT, Sensors Monitoring for Intellectually Disabled Patients Wearables, mHealh apps, voice assistants, **Applications Geographic Focus** Australia IoT, AI **Segment Focus Topics (News type)** Care Delivery Innovation Consumer Grade HomeStay, St John of God Health Care, **Others Companies** Samsung, Quantify Technology, Signify,

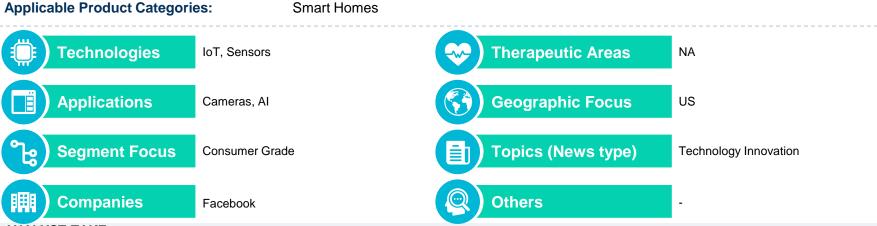
#### **ANALYST TAKE:**

- **Synopsis:** A partnership amongst several digital health companies and a healthcare provider has been formed to build a smart home specially designed for housing up to 5 residents with cognitive disabilities and conditions like epilepsy, cerebral palsy and blindness in Melbourne.
- Frost & Sullivan believes this is the most appropriate model of smart homes for delivering care (irrespective of the focus therapeutic areas). Partnerships amongst multiple stakeholders, including a provider, with each bringing best-in-class tools and services is crucial to enabling care delivery. In this particular model, Deakin University is set to conduct pre move-in and post-move study to assess impact on quality of life, which will be a great case study for future care delivery models.

WEBLINK: https://bit.ly/2CABf9s

BCDS Group, Work M8

### Facebook wants people to invite its cameras into their homes October 8, 2018



#### **ANALYST TAKE:**

- Synopsis: Facebook has launched its \$199 home use device, Portal, "as a way for its more than 2 billion users to chat with one another without having to fuss with positioning and other controls. The device features a camera that uses artificial intelligence to automatically zoom as people move around during calls."
- There are multiple points of view here. From the competitive perspective, it is interesting that the Google Home Hub doesn't have a front-facing camera at all, possibly as a cost cutting measure, and to counter privacy concerns apart from the auto-zoom function, it is unclear why a smartphone or existing tablet in the home cannot provide the same functionality using one of various video calling services including Facebook. From the privacy perspective, Facebook's track record with data breaches has made many users wary of how they use the service. But from the healthcare perspective, if the camera function could, in addition to the auto-zoom feature, leverage some new developments of using AI to diagnose and monitor health conditions (such as Fibricheck's Afib detecting solution, for example), there could be some traction even then, the value proposition wouldn't be strong enough to warrant buying another tablet or device.

WEBLINK: https://bit.ly/2ISOfaL

### Sense Closes \$18M Series B with Schneider Electric as Lead Investor October 5, 2018



| Applicable Product Categories: | Smart Home Appliances   | 3                  |                       |
|--------------------------------|-------------------------|--------------------|-----------------------|
| Technologies loT               | T, Sensors              | Therapeutic Areas  | NA                    |
| Applications End               | nergy & Device Activity | Geographic Focus   | US                    |
| Segment Focus Con              | onsumer Grade           | Topics (News type) | Technology Innovation |
| Companies Ser                  | ense                    | Others             | Schneider Electric    |

#### ANALYST TAKE:

- **Synopsis:** Startup Sense has an intelligent home energy monitor that provides real-time insights into energy and device activity in the home. The applications include "checking what time their kids get home, monitoring their home appliances, determining whether they left appliances running, and identifying how to reduce their energy costs."
- Frost & Sullivan believes the features could easily be applied for aging-in-place, to also enable caregivers and family to monitor loved ones remotely (similar to solutions by Evermind and 3rings). Also, the ability to monitor individual device behavior, though being pursued from a utility / energy monitoring perspective, if coupled with resident usage, can lead to interesting insights. A person drinking more coffee in a day, or staying up at night as monitored by fridge opening and use, can provide personalized data points that could help doctors to diagnose mental or physical health conditions.

WEBLINK: https://prn.to/20EYzIL

Companies

#### **Smart Kitchen News**



#### 2018 seems to be the year of the Smart Kitchen:

| News Title   | Region | Date                       | Link                    |
|--|--------|----------------------------|-------------------------|
| Electrolux Partners With Smart Kitchen Startup Drop                          | Europe | Oct 4 <sup>th</sup> , 2018 | https://read.bi/2NCGYg4 |
| Chefling is an Alexa-like sous-chef set to spice up smart kitchen appliances | US     | Oct 5 <sup>th</sup> , 2018 | https://bit.ly/2REes0N  |
| Silo Comes Out of Stealth at the Smart Kitchen Summit                        | US     | Oct 8 <sup>th</sup> , 2018 | https://bit.ly/2Pvac26  |
| LG is making cooking easy with added support for Innit and SideChef          | US     | Oct 9 <sup>th</sup> , 2018 | https://bit.ly/2pNRdVc  |

- There have been several news in the smart kitchen space this year, apart from the ones mentioned above. The objective is to tackle recipes, food freshness (and therefore nutrition to some extent), control of kitchen appliances (oven temperature pre-set, etc.), voice control, and other areas.
- Frost & Sullivan thinks that now that every major kitchen appliance maker is tackling some aspect of the kitchen space, one of the next steps they will focus on will be nutrition, dietary recommendations, dietitian support etc., in the coming one to two years, that will be the first step towards managing chronic condition patients' dietary needs in the long term.

#### **Aging-In-Place News**

Several 'Smart Homes for Aging-in-Place' initiatives are coming up across Europe and the US, and have been covered in previous newsletters. Since the theme remains the same, additional articles have been added here:

| News Title   | Region | Date                           | Link                   |
|--|--------|--------------------------------|------------------------|
| Smart High-Tech Solutions for Aging in Place                     | US     | Oct 10 <sup>th</sup> ,<br>2018 | https://bit.ly/2CFwlb0 |
| Masonic Villages Goes Big on Smart 'IQ Homes' for Aging in Place | US     | Oct 4 <sup>th</sup> , 2018     | https://bit.ly/2NHBFvW |