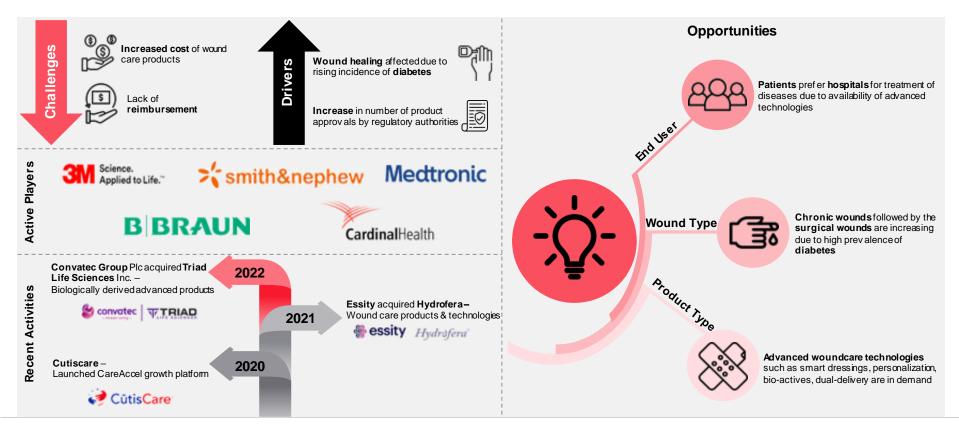


# **Evolving Opportunities and Innovation Dynamics in Wound Care**

A Comprehensive Report of Trends, Drivers, Challenges, and Landscapes



# Wound care landscape is continuously evolving with new advancements & innovations, creating opportunities for different players in the ecosystem







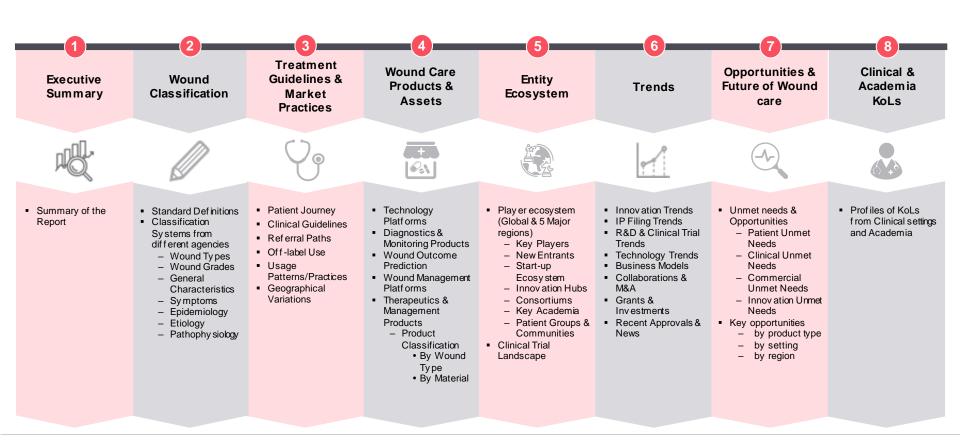
# Questions answered in the report



- What are the **key unmet needs** in the wound care?
- What are the **key areas of innovation** in wound care space? Which are the key innovation hubs?
- How treatment guidelines differ by wound types & geographies?
- What is the **current and future landscape** of advanced diagnosis, measurement, treatment, and monitoring products/technologies?
- Who are the **key innovators** in the wound care space? How is the ecosystem evolving?
- Who are the **new-entrants** in this space?
- What are the **new business models**, e.g., homecare, monitoring, etc.? How is technology changing the **dynamics** of ecosystem?
- What are the major challenges in the adoption of advanced wound management products, NPWT, etc.?
- What are different platforms, technologies, materials, innovation, IP & market **trends** observed in the space?

### **Report Coverage**

Chapters & Sections





# **Research Methodology**

- The research methodology is a combination of extensive primary and secondary research. This includes analysing patent literature, scientific articles, market data, regulations, industry-specific news, startup activities, investments, transactions, and collaborations.
- Our research methodology draws upon interviews with participant players in the value chain, coupled with analyses and insights from FutureBridge analysts and consultants covering the Wound Care landscape.
- > Key data points and developments across the industry and research are monitored and analysed by our in-house experts to spot technology trends, scout for emerging opportunities, and provide contextual insights.

Strictly Confidential

Executive Summary











# A quick glance at the wound management market



Strictly Confidential

Wound Classification



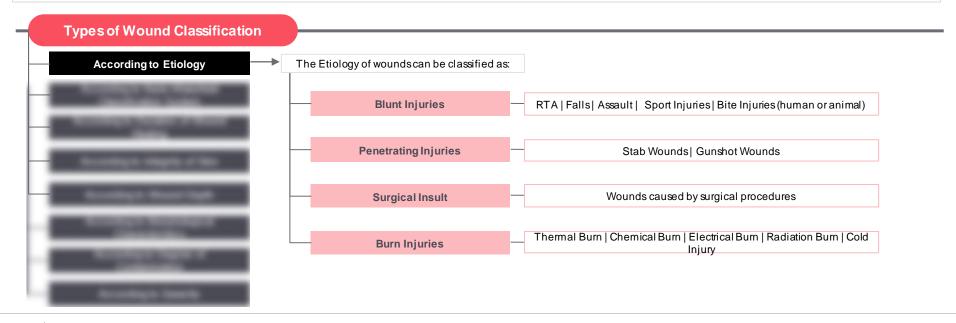
# Etiology-based wound classification covers blunt, penetrating, burn injuries and surgical insults

Wound Classification

**SAMPLE** 

#### Different ways of wound classification

For researchers and private practitioners, the wound classification system provides the framework that aid diagnosis and stratification, ensures uniformity of documentation, offers prognostic information and guides management. The further classification system also efficiently allows the management of information, facilitates recognition by payers and the medical community at large, and has various other advantages.





Treatment Guidelines & Market Practices











# Treatment pathways of diagnosed chronic ulcers involves healing-based surgical interventions

Clinical Pathway

**SAMPLE** The prevalence of chronic wounds is 2.21 per 10000 people Assessment of wound and patient Immediate consideration Physical examination Nutrition, oxygenation, infection, surgical Checking medical history Preliminary clinical diagnosis Neuropathic ulcer Venous ulcer Arterial ulcer Pressure sore (Non-invasive vascular doppler) (Neurological investigations) (ABI, arteriogram) (Exclusion of other disease) Final diagnosis Standardized clinical treatment





# FutureBridge Custom Support











# **Future Bridge Custom Support**

#### **Business Questions**

- What are the clinical treatment guidelines for dressing a wound?
- How is the journey of the patient during various stages of wound healing and how to prepare them for the journey?
- What is the wound referral and what are the recommended referral paths for various wounds?
- What are the available off-label treatments for major concerning wounds (e.g., diabetic foot ulcers)?
- What are the best practices in the wound care and in the infection control?
- What are the geographical variations associated with all the above aspects?

#### **Future Bridge Solutions**

#### **Market Assessment**

- Market potential & outlook
- Short-mid-long-term scenarios
- Global & regional market landscape
- Regulations

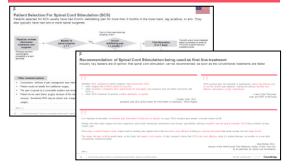
#### Strategy Development

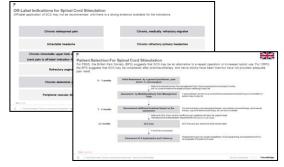
- Game-changing opportunities
- Business model options
- Route to market
- Market entry strategy
- Technology adoption

#### Foresight & Horizon Planning

- Key industry trends in the space
- Geographical hot spots
- White space in the domain

#### **Use Cases**







Wound Care Products & Assets

Overview











# Next generation technologies are targeted to perform multiple functions (diagnosis to instant therapy)

**SAMPLE** 



The purpose of wound monitoring is systematic collection, analysis, and dissemination of accurate data about wound behavior to improve healing outcomes.

- Electronic Patches
- Biosensors
- Biochemical Sensors
- Hydrogels



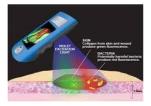






Diagnosing a wound infection involves assessment of the wound for presence of local or systemic symptoms of infection.

- Multispectral Imaging
- Hyperspectral Imaging
- Fluorescence Imaging
- Thermal Imaging
- Nanotechnology









Technologies for treatment of the wound (e.g., drawing out fluid and infection from the wound) to promote healing.

- Negative Pressure Wound Therapy
- Oxygen and Hyperbaric Oxygen Devices
- Electromagnetic Therapy Devices
- Pressure relief devices









Wound Monitoring

Wound Diagnostics

Wound Therapeutics







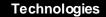




# Monitoring real-time physical and chemical changes would provide key information on wound healing

Technologies & their Unmet Needs

**SAMPLE** 



#### **Unmet Needs**

Easy attachment and detachment

Stretchability

**Battery less device** 

### **Key Players**











Sensor

- Temperature sensor, pressure sensor, strain sensor, moisture sensor, pH sensor, oxygen sensor, uric acid sensor, cytokine sensor, enzyme sensors are few examples of sensors used for monitoring
- Researchers at Nottingham Trent University and Nottingham University Hospitals NHS Trust have developed a miniature biosensor capable of accurately monitoring the condition of a chronic wound

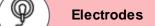
### **Technologies**

#### **Unmet Needs**

**Key Players** 







Prevent fouling of electrode surface

- Single electrode, Multi electrode, and Printed Composite Electrode are few examples of electrodes currently used for monitoring purpose
- AZoSensors developed a smart bandage which contains a bandage integrated with two electrodes to non-invasively monitor wound healing









#### CHAPTER: Wound Care Technologies Management (12/57)

### Wound Monitoring – Technology Profile (WoundLAB)

Grapheal develops wearable and disposable biosensors enabling continuous monitoring and on-site diagnosis

SAMPLE

#### **Technology Description**

- WoundLAB is an electronic wound patch that measures continuously, and records wound parameters to communicate them to a medical cloud through a smartphone app.
- It also helps chronic wounds heal more quickly using electrostimulation. The sensing technology combines novel electronic nanomaterials, embedded wireless electronics, software data analysis, and medical cloud IoT technologies.
- It empowers caregivers by transforming any bandage into an indiv idualized assessment tool for precision medicine.



#### **Technical Assessment**

| Technology      | RFID coupled graphene biosensors          |
|-----------------|---|
| Parameter       | pH   Biochemical parameters (Unspecified) |
| Reusability     | Wearable and disposable sensor            |
| Claimed benefit | Spotting early infections of wounds       |
| Indication      | Diabetic Footulcer                        |
| Wound type      | Chronic wound                             |
| Maturity Level  | Prototy pe                                |

#### **Entity Details**

Big Player

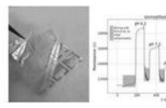
SIMI

Start-up

- Entity Name: Grapheal
- Headquarter: France
- Foundation Year: 2019
- **Entity Description:** develops wearable and disposable sensors based on graphene that enables continuous monitoring and diagnosis. These flexible biosensors empower caregivers with an improved and individualized assessment tool for precision medicine. The company is among the first in Europe to focus on healthcare applications of graphene.
- News: July 5, 2022: Grapheal launches GraphLAB, a novel measurement platform for characterizing field-effect transistors compatible with Graphene GFET chips

#### Scientific Evidence





Left: Sensors on polymer, Right: time traces of pH Sensors made of graphene-on polymer devices.

Note\* The experimental details are not disclosed.

Regulatory Approval: NA

Scientific Ref: Source 1 | Source 2





# FutureBridge Custom Support



# **Future Bridge Custom Support**









#### **Business Questions**

- What are the key drivers & challenges in the wound monitoring, diagnostics & therapeutics areas?
- What technologies are currently being used within each domain and what are its specific unmet needs?
- Who are the players providing such technologies and for which type of wounds?
- What are the recent trends and what are the future trends to create an impact in these domains?
- What are top products/technologies within each domain providing unique solutions?
- What could be the future outlook of the wound management w.r.t each domain?

#### **Future Bridge Solutions**

#### **Market Assessment**

- Market potential & outlook
- Short-mid-long-term scenarios
- Global & regional market landscape
- Buying trends
- Voice-of-customer
- Regulations

#### **Competitive Intelligence**

- Competitor assessment & analysis
- Benchmarking
- Supplier scouting
- Pricing and Product placement

#### **Opportunity Assessment**

- Key industry trends in the space
- Geographical hot spots
- White space in the domain
- Licensing/Collaboration opportunities

#### **Use Cases**





05

**Entity Ecosystem** 



HAPTER: Entity Ecosystem (3/17

# Higher prevalence, growth, & better reimbursement policies for wounds validates the US's dominance

Overview of Big Players In Wound Care Across Different Geographies

**SAMPLE** Sweden *s*tryker Denmark USA Coloplast CardinalHealth Germany Baxter ETHICON Australia #ACell PolyNeur



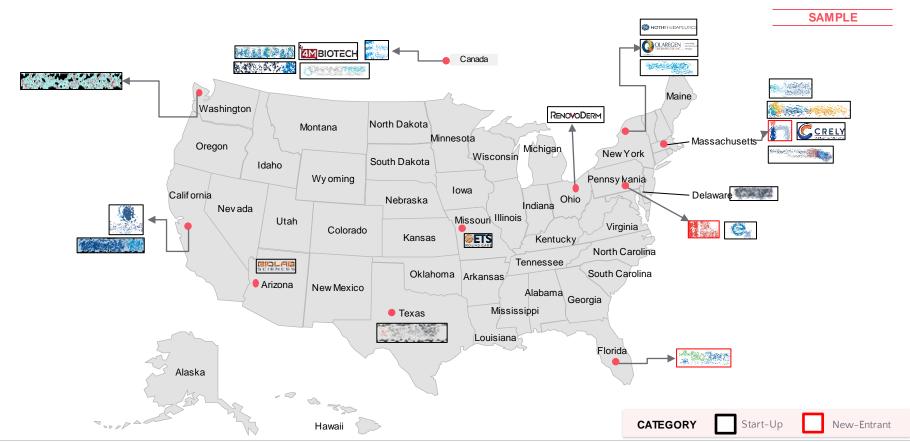






# Biomimicry & AI/ML focused start-ups have emerged to address risks associated with infections

Overview Of Startups And New Entrants In North America







# FutureBridge Custom Support



# **Future Bridge Custom Support**











#### **Business Questions**

- What is the scenario of Big players/SMES worldwide in the wound care segment?
- What is the scenario of startups/new -entrants in different geography?
- What is the application area focused by startups/new -entrants in the wound care segment?
- How are the start-ups/new-entrants shaping up in advanced wound care technologies?
- What are the benefits claimed by such technologies and solutions?
- What is the role of consortiums in the wound care segment?

#### **Future Bridge Solutions**

#### **Market Overview**

- Critical Unmet Needs
- Key market drivers
- Market potential for technologies
- Unexplored & under-served markets
- Technology adoption

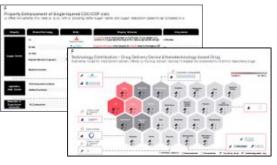
#### **Technology Landscape**

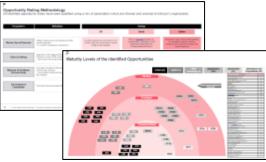
- Disruptive technologies
- Business model innovation
- New ecosy stems & partners
- Maturity Leve of promising technologies
- · Activity Level of different entities

#### **Opportunity Assessment**

- Key industry trends in the space
- Geographical hot spots
- White space in the domain
- Licensing/Collaboration opportunities

#### **Use Cases**





06 Trends











# Smart dressings, personalization, bio-actives, dual-delivery, etc. are key trends in advanced woundcare Technology Trends

**SAMPLE** 

### 3D Printing/ **Bio-printing**

The major advantages of printing technologies encompass the combination of unlimited bioactive molecules and cells with polymers, the fabrication of complex scaffold designs, accelerated healing times, and personalized wound dressings

# Nanotechnology

A combination of silver nanoparticles (AgNPs) with biopolymers showed to exert superior efficacy, additional incorporation of growth factors or phytochemicals might further speed up recovery of the wound by repairing the damaged tissue

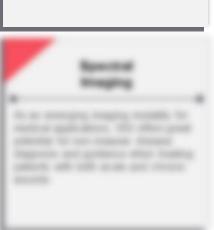
#### **Smart Dressings**

Multifunctional hydrogel wound dressing, which integrates precise treatment, real-time monitoring, and personalized management for intelligent wound monitoring, provides an advanced solution to accelerate wound healing and reduce bacterial infections and towards future intelligent wound management

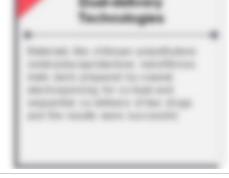
#### Personalized **Wound Care**

In situ electrospinning of fibers directly onto wound sites can be a route to personalized wound dressing manufacture, tailored to the needs of individual patients













# FutureBridge Custom Support



# **Future Bridge Custom Support**











#### **Business Questions**

- What are the major trends affecting the wound care market?
- What are the current and future innovation trends driving the wound care market?
- What are the current and future technology trends ins the wound care market? And in which direction the wound care technology headed?
- What are the current and future clinical trials trends of the wound care market? And how is the clinical trial activity in this segment?
- What is the reimbursement status of the wound care segment among different geographies?
- What are the recent grants and investments of the wound care segment?
- Are there any recent regulatory approvals? And what types of products are being approved?

#### **Future Bridge Solutions**

#### Strategy Development

- Game-changing opportunities
- Business model options
- Route to market
- Market entry strategy
- Technology adoption

#### Market Assessment

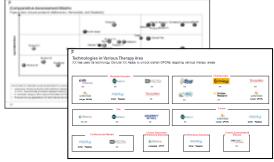
- Market potential & outlook
- Short-mid-long-term scenarios
- Global & regional market landscape
- Buy ing trends
- Voice-of-customer
- Regulations

#### Technology Scouting & Monitoring

- Technology Intelligence & Trend Scouting
- Idea Funnel Management
- Technology Landscapes
- Technology Convergence
- Techno-commercial Benchmarking
- Digital and platform technologies

#### **Use Cases**







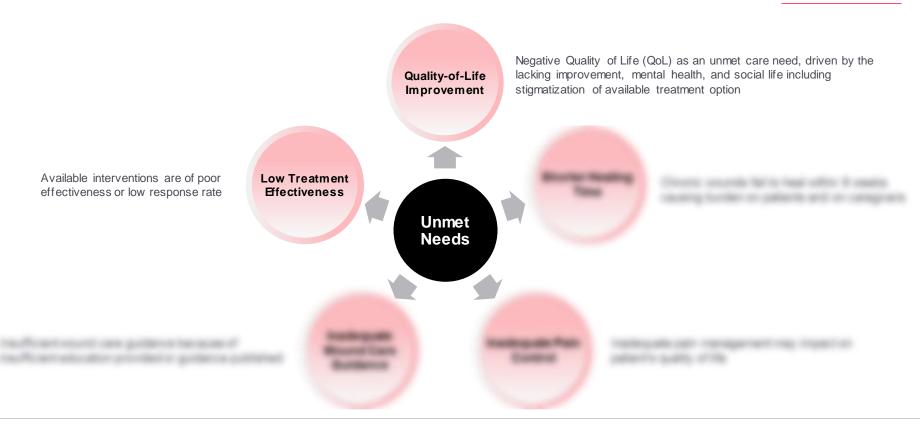
# Opportunities & Future of Wound Care



# Better QoL, fast healing, adequate pain management & guidance needs to be addressed for patients

Patient Unmet Needs

SAMPLE





# Shift to home care & ambulatory centres is reducing burden on hospitals & provides personalized care

Key Opportunities – Setting

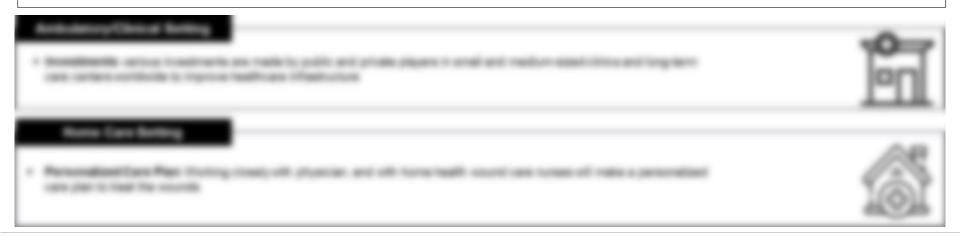
**SAMPLE** 

#### **Hospital Setting**

- Dedicated wound care departments/facility: Increase in the number of multispecialty hospitals with departments dedicated to wound management, especially in emerging countries
- Wound care management companies are outsourced healthcare services focusing on a specialized approach to wound care in all areas including clinical, financial, and operational



• Wound Healing Centres: commercialized management companies help hospitals to create wound healing centers. The companies pay for the center and equipment; they manage the wound healing centers for the hospital and take a high percentage of the profit in return







# FutureBridge Custom Support









#### **Business Questions**

- What are the major patient unmet needs in the wound care segment?
- What are the major clinical unmet needs in the wound care segment?
- What are the major commercial unmet needs in the wound care segment?
- What are the major innovation unmet needs in the wound care segment?
- What are the key opportunities for the future of w ound care products?
- What are the key opportunities concerning healthcare facilities in the wound care segment?
- What are the regional wise opportunities in the wound care segment?

#### **Future Bridge Solutions**

#### Strategy Development

- Game-changing opportunities
- Business model options
- Route to market
- Market entry strategy
- Technology adoption

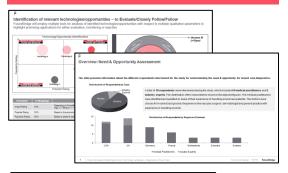
#### **Market Assessment**

- Unexplored & under-served markets
- Market adjacency
- Unmet needs & whitespaces
- Use-case mapping and novel applications
- Business model innovation
- New ecosy stems & partners

#### Technology Scouting & Monitoring

- Technology screening & shortlisting
- Assess promising technology & applications
- Tech availability & value proposition
- Assess promisingmarkets
- Business model use cases and best fitment

#### **Use Cases**





Clinical & Academia KoL's













#### Harikrishna K.R. Nair

Chairman of the Association of Southeast Asian Nations (ASEAN) Wound Council

SAMPLE



#### Education

- He completed his MD f rom Universiti Kebangsaan Malaysia.
- He also has an FRCPI from The Royal College of Physicians in Ireland
- He has an FCWCS in Wound Care from College of Wound Care Specialists.

#### **Contributions**

Besides being a prolific speaker and trainer in both local and international arena, he has also
published many international wound care related studies and is the Editor in Chief of Wounds Asia
Journal and the Journal of Wound Care Silk Road Supplement.

#### Experience

- Dr. Harikrishna Nair is the Chairman of the Association of Southeast Asian Nations (ASEAN) Wound Council & President of the Malaysian Society of Wound Care Professionals (MSWCP).
- He holds the position of Recorder and executive board member at the World Union of Wound Healing Societies and Vice President of the Asian Wound Care Association.
- Currently, he leads the Wound Care Department in Kuala Lumpur General Hospital, Malaysia.
- He is the National Advisor for Primary Health Ministry of Health Malaysia and a Professor of Wound Care at Faculty of Medicine, Lincoln University.
- He is a faculty member of NADI and Chairman DCOM; Professor of The Institute of Health Management, Austria; Chairman of Pressure Injury Prevention Committee; KLH and a member of the National Technical Committee on Wound Care MOH.
- He is also an Adjunct Professor, Department of Surgery, IMS, BHU, INDIA and The Executive Director
  of The College of Wound Care Specialists since 2017.
- He is the Course Director of The Certificate in Clinical Wound Care (CCWC) since 2017, which is the first certification programme started in Malaysia.

#### **Publications**

- His research interests include clinical trials, Wound Healing, Surgical wounds etc.
- Sandy -Hodgetts, Kylie & Serena, Thomas & Idensohn, Patricia & Nair, Harikrishna & Gorse, Julie & Assadian, Ojan & McIssac, Corrine & Tariq, Gulnaz & Jones, Rhidian & Rochon, Melissa & Wainwright, Tom & djohan, risal & Romanelli, Marco & Alves, Paulo & Smith, George. (2022). Barriers and enablers for clinical management of surgical wound complications: results of an international survey prior and during the COVID-19 pandemic. 13. 1-7.
- Sandy-Hodgetts, Kylie & serena, tomas & Alves, Paulo & Tariq, Gulnaz & Nair, Harikrishna & Wainright, Thomas & Idensohn, Trish & Rochon, Melissa & Dohjan, Risal & Romanelli, Marco & Conway, Barbara (2022). OPTIMISING PREVENTION OF SURGICAL WOUND COMPLICATIONS: DETECTION, DIAGNOSIS, SURVEILLANCE AND PREDICTION.

# Any Questions or Interested in the Report



Connect with: **Apoorv Shri** (apoorv.shri@futurebridge.com) FutureBridge – About Us

#### What We Do

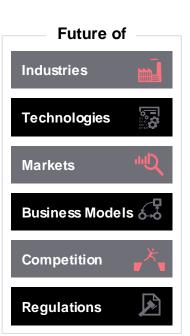
FutureBridge tracks and advises on the future of industries from a 1-to-25-year perspective

#### How we do it?

- Proprietary platforms, data, global ecosystems and player relationships
- Data and analysis driven actionable Insights and strategy
- Technology adoption facilitation frameworks and models
- Global start-ups, technology partners and developers' network

FutureBridge enables meeting the aspirations of Life Sciences innovators by providing actionable techno-commercial insights derived from its customized intelligence programs that are backed by scientific proof, sentiments of key opinion leaders, and voice of the industry.

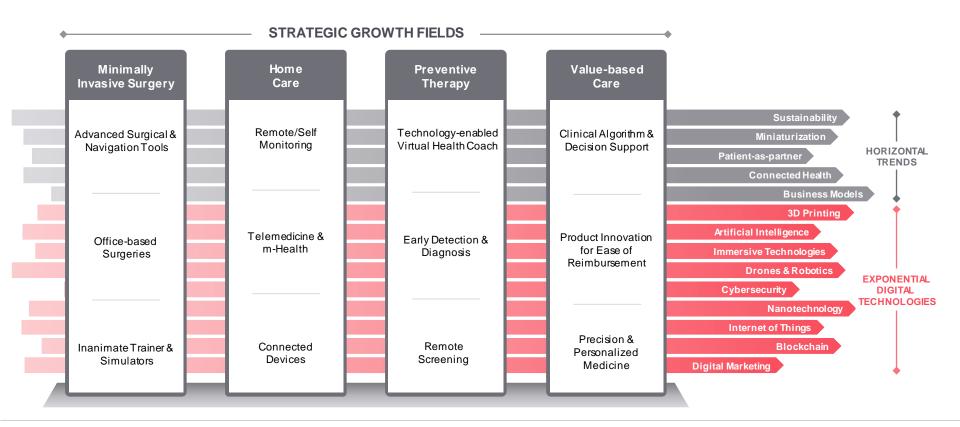
More details at FutureBridge Medical Devices & Diagnostics



### Ξ

# Future Bridge's Perspective on Medical Device Industry – An Industry in Transition

A convergence of industry transformations and exponential technologies creates a pool of opportunities



# Thank you

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