

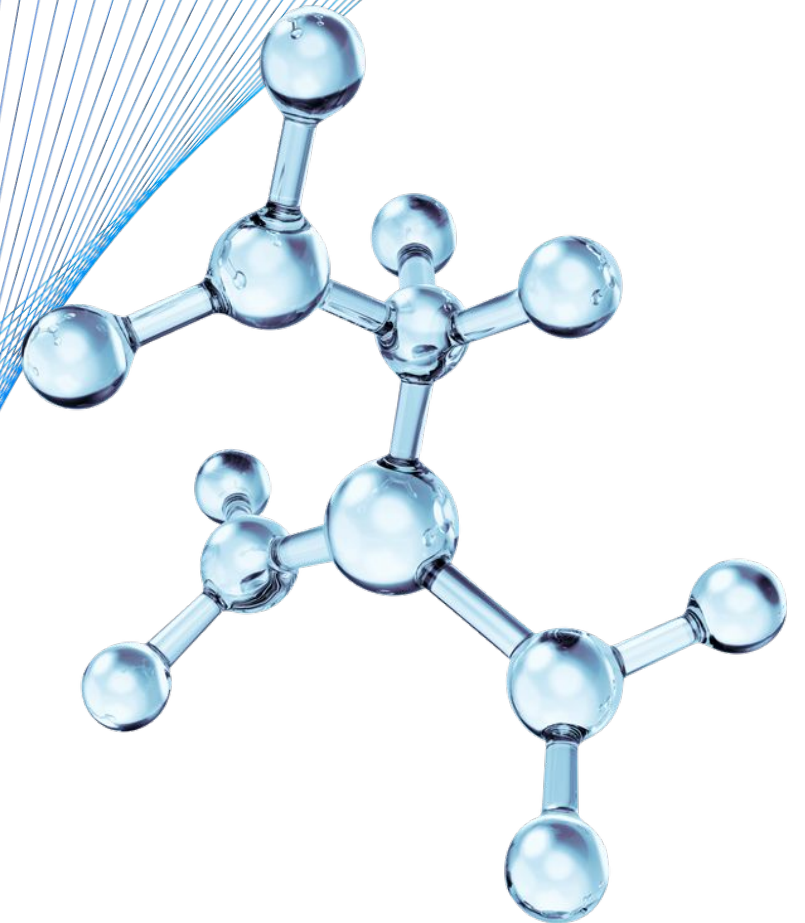
Driving Innovation at Scale: *Trends in innovation and best practices from global innovation hubs*

Global Innovation Summit 2021

November

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Agenda



Trends shaping global innovation landscape

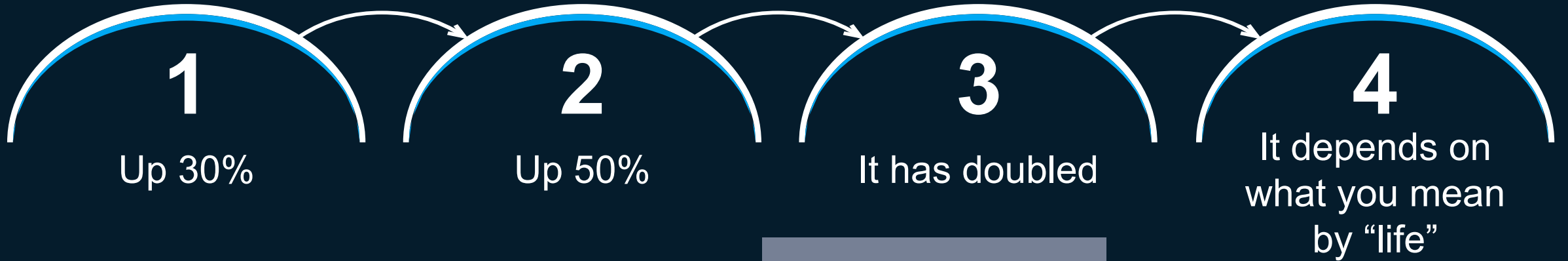


Learnings on building a vibrant innovation ecosystem



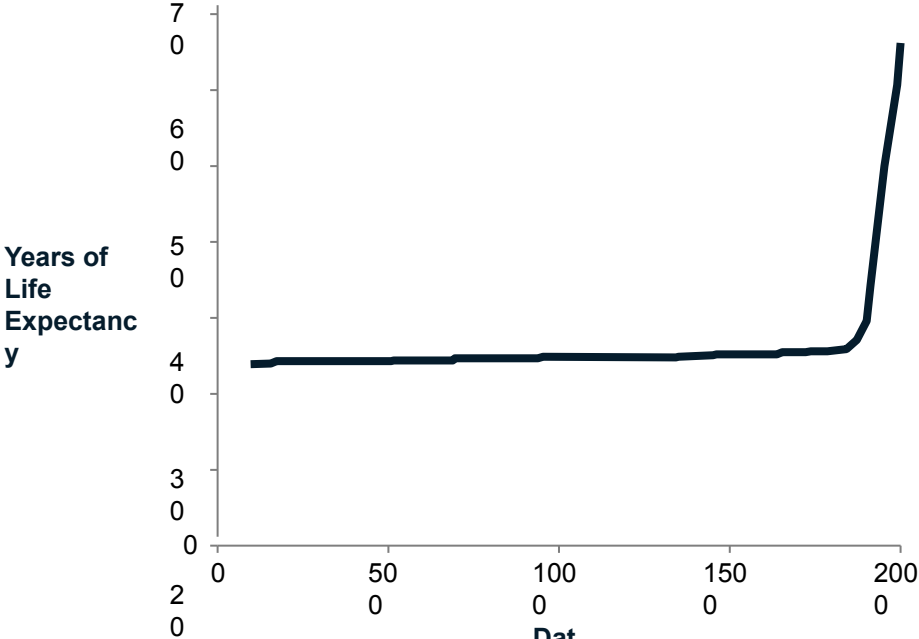
Reflections for India, as you accelerate your innovation journey

How has Life Expectancy Changed in the Last 100 years?



We are Living Twice as Long as We Have 100 Years Ago

Life Expectancy



	BC		1900		2000
Developed	22	$\xrightarrow{\sim 2.1 \times}$	46	$\xrightarrow{\sim 1.7 \times}$	78
Developing	22	$\xrightarrow{\sim 1.2 \times}$	26	$\xrightarrow{\sim 2.5 \times}$	64
Global	22	$\xrightarrow{\sim 1.4 \times}$	31	$\xrightarrow{\sim 2.1 \times}$	66

Note: Global life expectancy stood at 72 years in 2016 – it is forecast to increase to 78 years by 2055

Source: Angus Maddison's "Historical Statistics for the World Economy: 1-2004 AD"

Impact of Lifesciences Innovation has been Profound

Ovarian cancer

1990

12 deaths per 100,000

2010

9 deaths per 100,000

To drop by 42%

2030

5 deaths per 100,000

Bowel cancer

1990

26 deaths per 100,000

2010

17 deaths per 100,000

To drop by 23%

2030

13 deaths per 100,000

HOW BIOPHARMA SCIENTISTS SAVE LIVES GLOBALLY

Jul 15, 2019

November 08, 2017 | 5 min read

SAVE 

CAR T-cell therapy approved for B-cell lymphomas may save 'thousands of lives' in next few years

Stunning therapy lands knock-out blow to cancer by training immune cells to seek and destroy deadly threats in trials

By FIONA MACRAE FOR THE DAILY MAIL

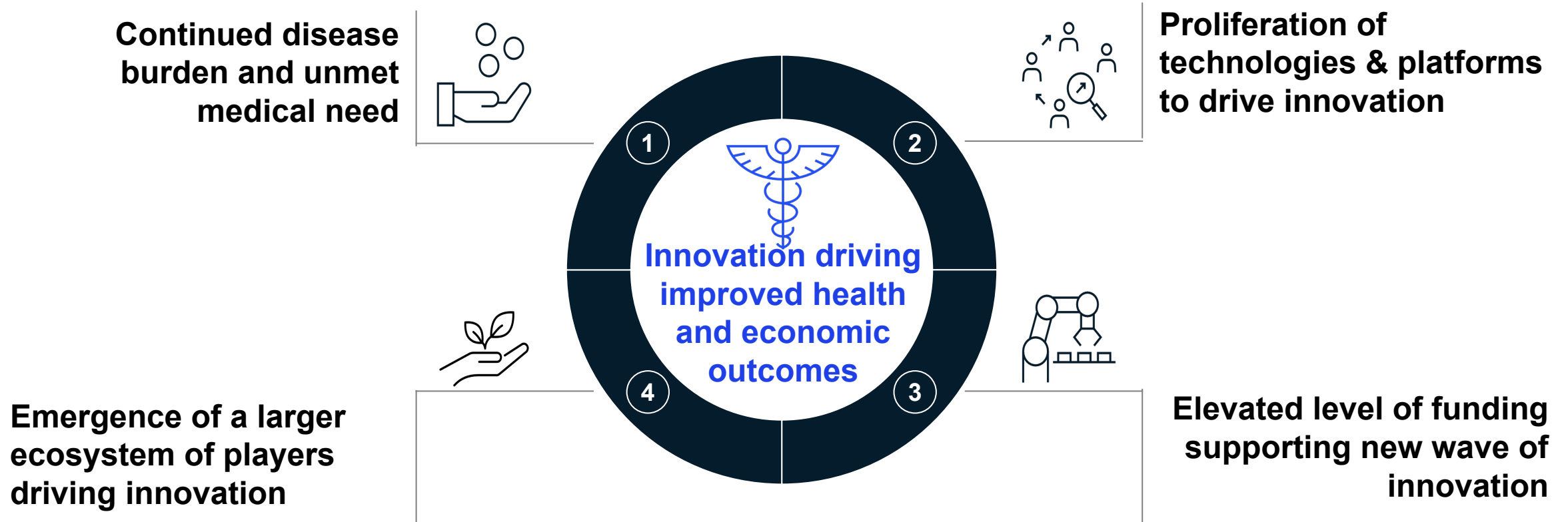
PUBLISHED: 22:03 BST, 3 May 2021 | UPDATED: 00:26 BST, 4 May 2021

Pioneering gene therapy freed her of sickle cell. Is a cure at hand?

By GINA KOLATA

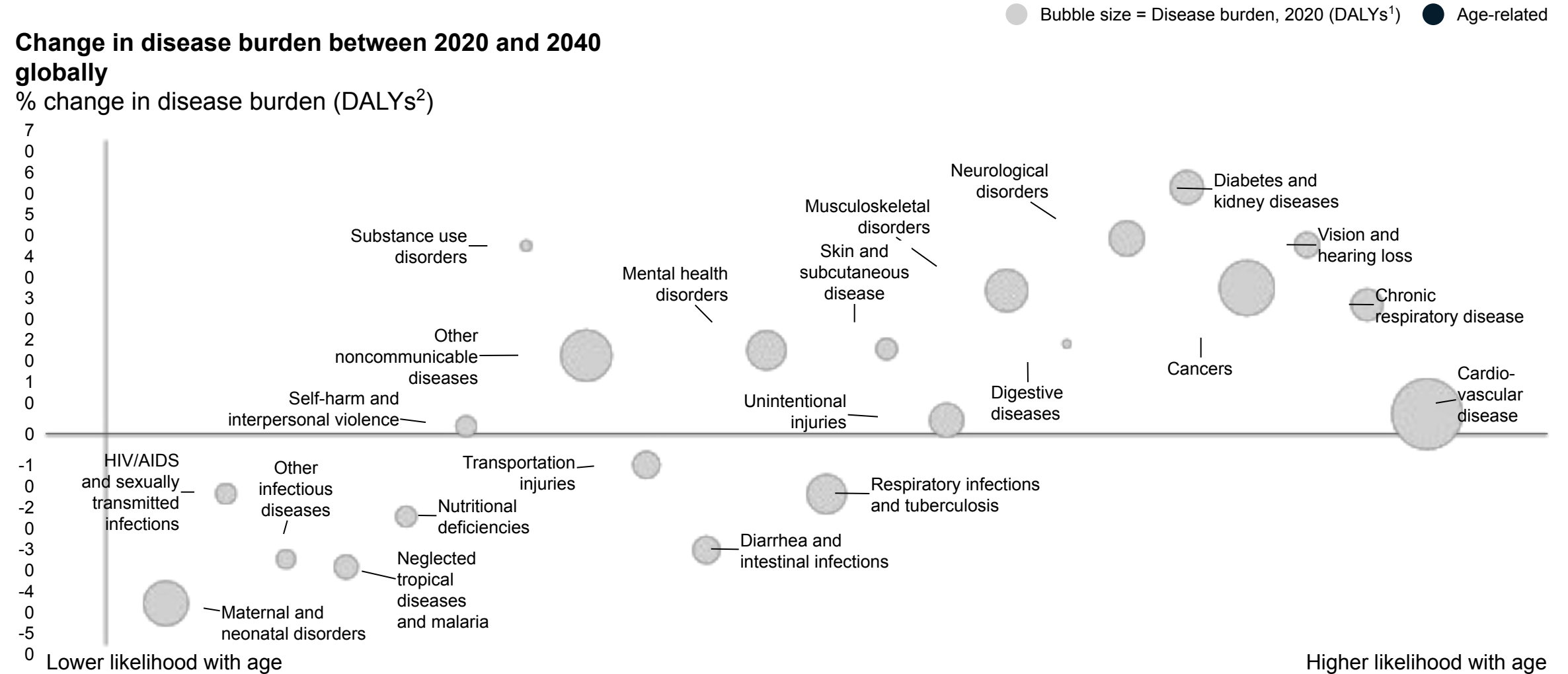
THE NEW YORK TIMES | SEP 14, 2021 AT 9:00 AM

4 key trends may continue to propel Innovation in Lifesciences



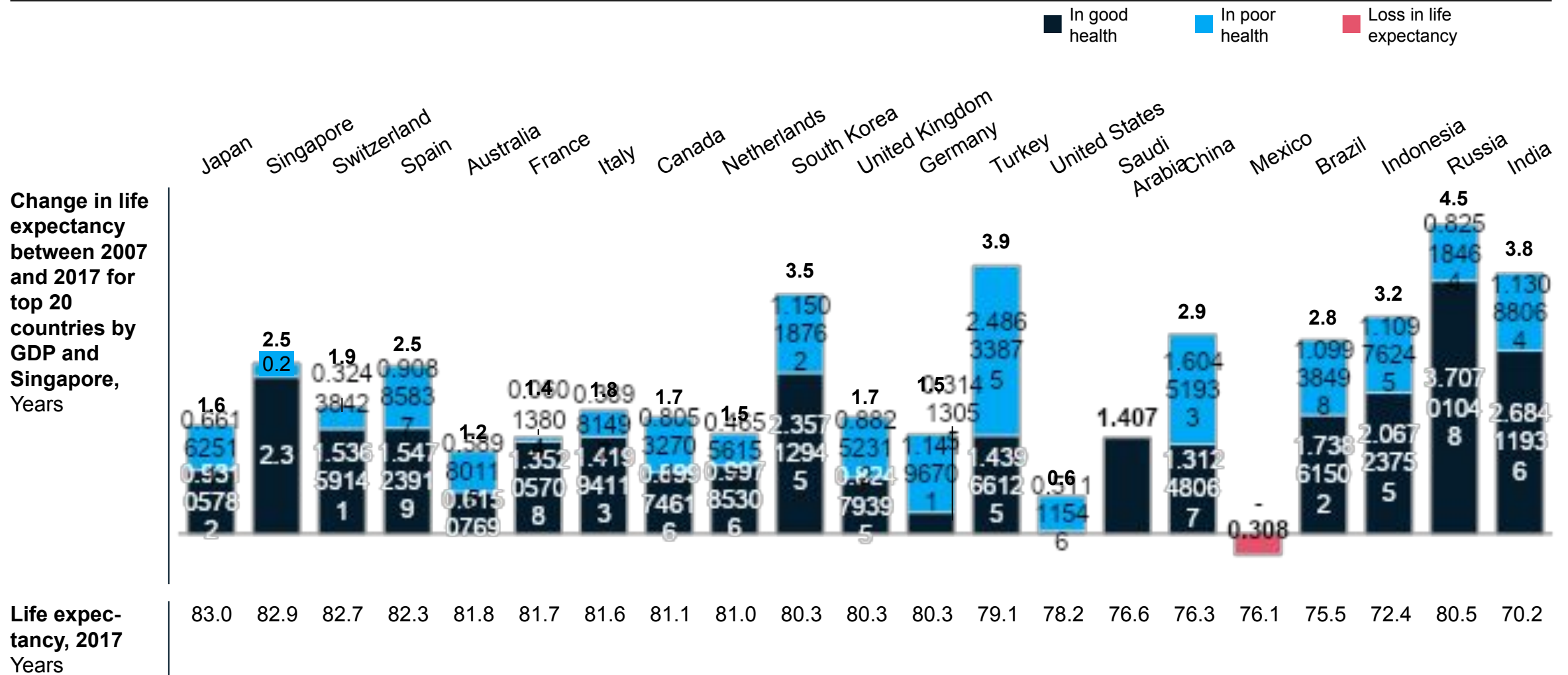
1. Incidence of Age and Lifestyle Related Diseases continue to rise

Disease baseline forecast



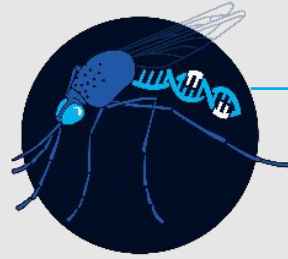
1. DALY = disability-adjusted life year.

1. While we are living longer...but not always in better health



Note: Healthy life expectancy, also called health adjusted life expectancy, is disability-free life expectancy where years lived with disability are subtracted from overall life expectancy as a share of life expectancy. Figures may not sum to 100% because of rounding.

2. Several innovations that may enter the market by 2040 expected to disrupt the healthcare landscape significantly



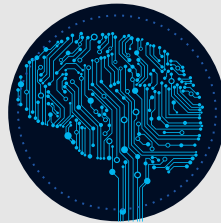
Omics and molecular technologies
CRISPR and
curbing malaria
Low-cost genetic sequencing



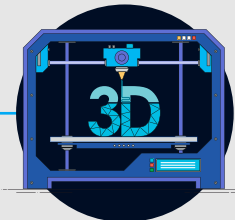
Cell Therapy and Re-generative Medicine
CAR-T Cell therapy for solid tumors
Gene editing



Advanced Surgical Procedures
Suspended animation for trauma patients
Robotic surgery



Artificial intelligence
Drug discovery
Diagnosis
Patient monitoring



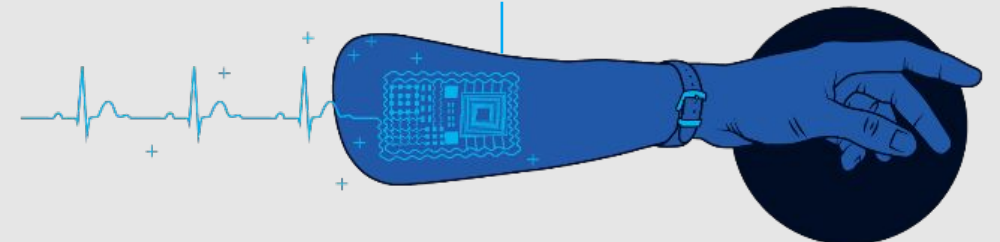
3D printing
Bioprinting - organs, bones, teeth
Surgical instruments
Devices, e.g., pacemakers

Innovative Vaccines
Cholesterol-lowering vaccine



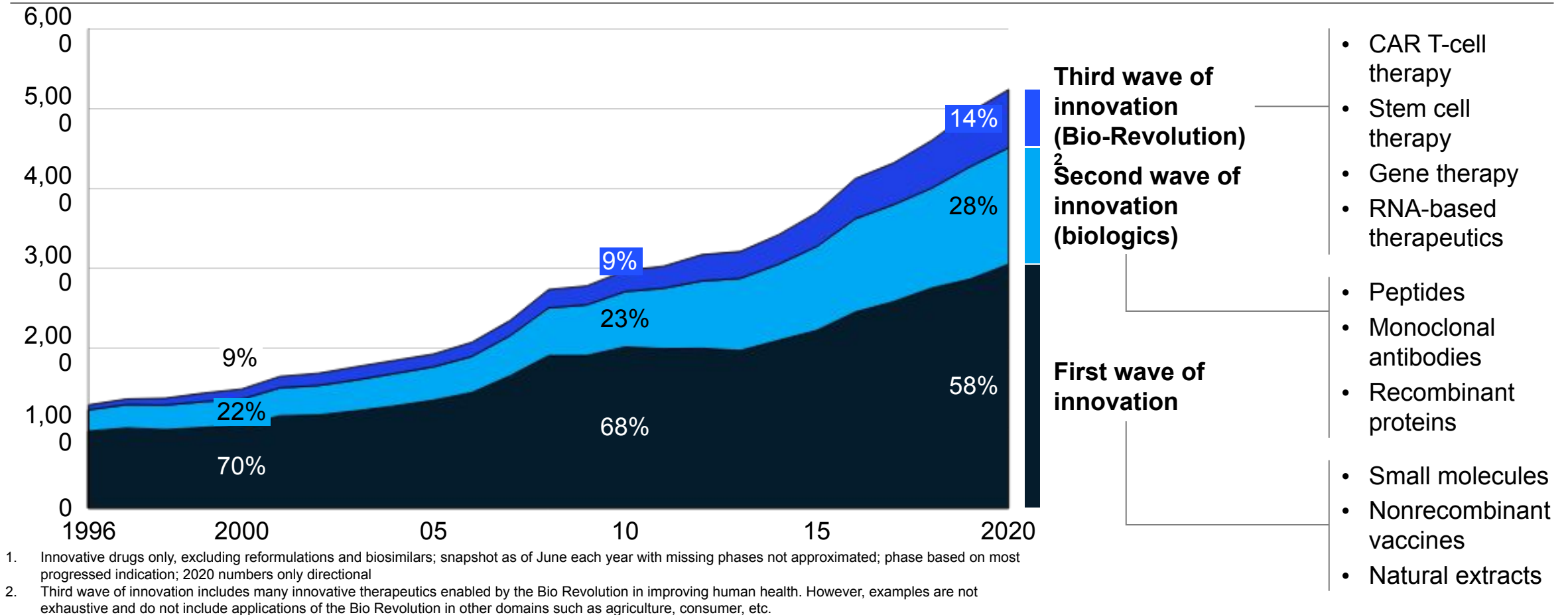
Tech-enabled care delivery
Multichannel care delivery
Digital therapeutics
Tech-enabled care settings
Hospital-at-home

Cognitive devices
Medical-grade wearables
E-tattoo for heart diagnostics
Prosthetics



2. Several of these technologies are already in the pipeline and fueling the next wave of innovation

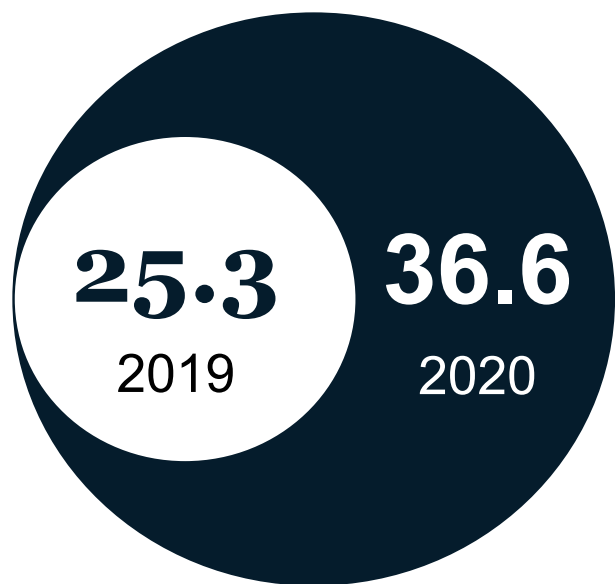
Not exhaustive
Pharma pipeline composition
 Number of products, from Phase I to III¹



3. Biotech VC Funding, Deals, and IPOs reached their highest levels in 2020

WW, \$ billion, CAGR vs 2019

VC funding



▲45%

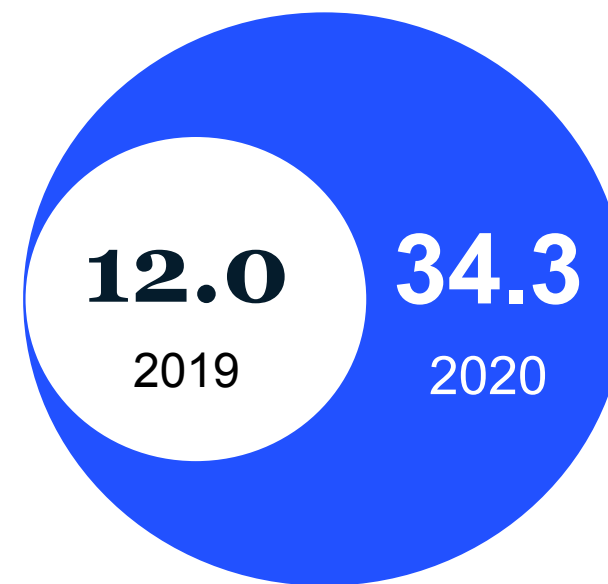
Deals¹

Only disclosed deal values (20-30% of deals)



▲83%

New IPOs

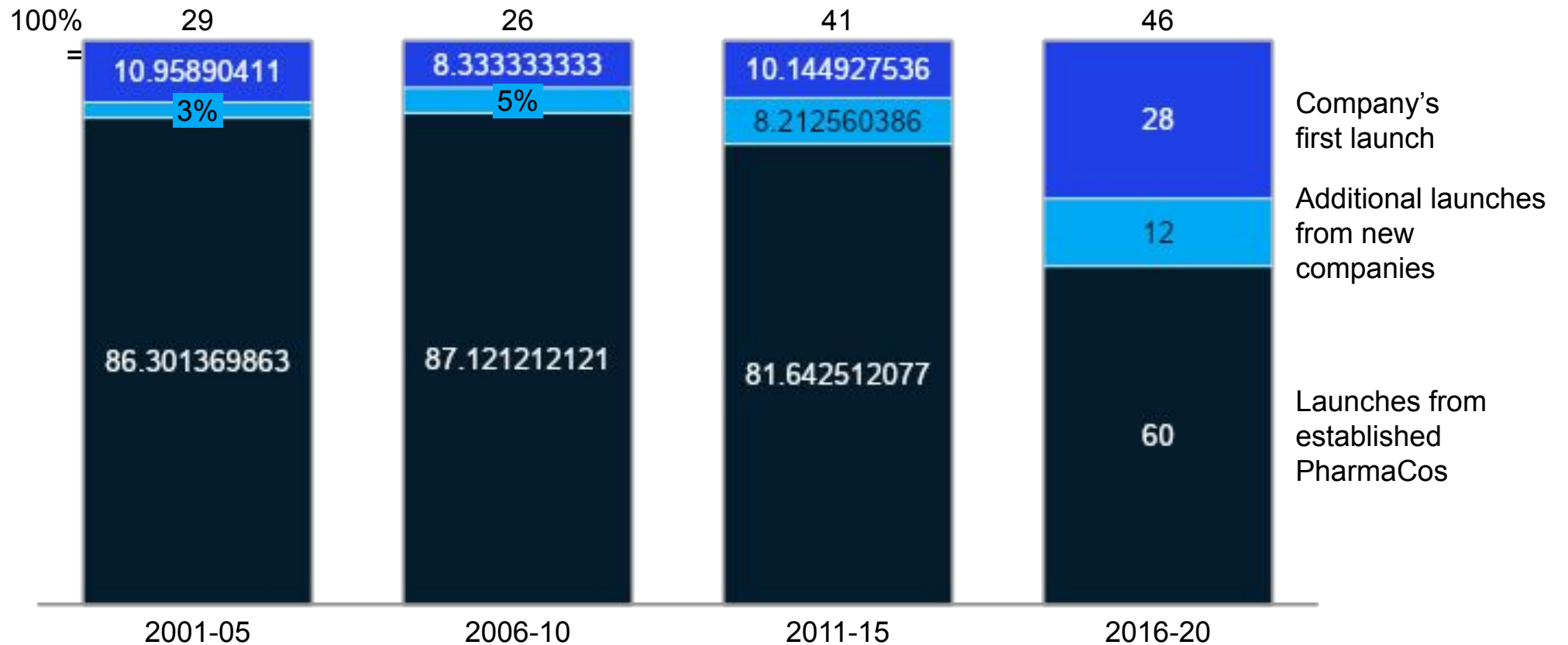


▲187%

1. Acquisitions, Partnerships, Co-Developments, JVs, etc.

4. Emergence of new biotechs and startups is accelerating the pace of innovation

NMEs per year, split by company type¹



1. Company type as per status on application date (companies may have been acquired thereafter)

Agenda



Trends shaping global innovation landscape



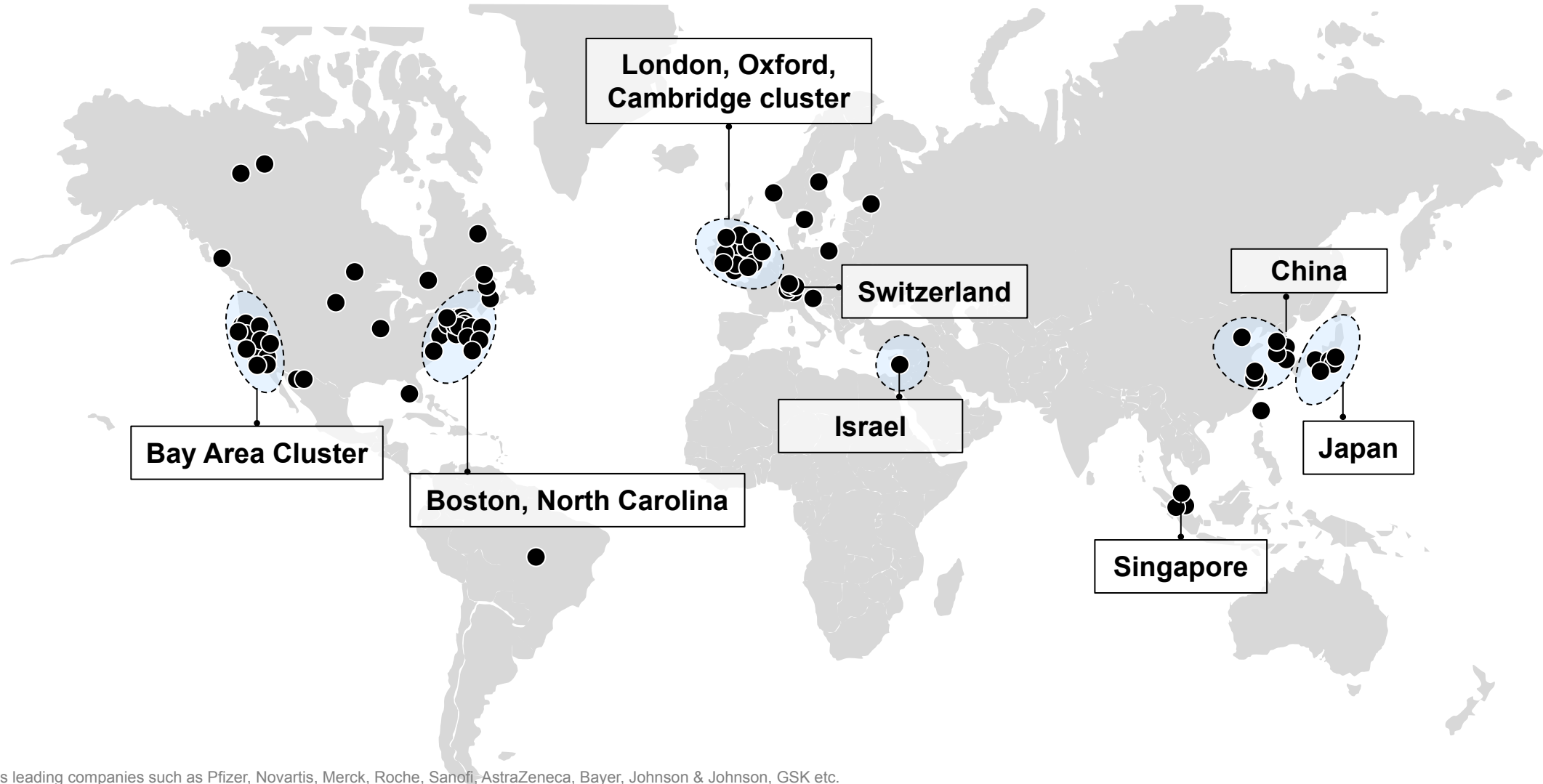
Learnings on building a vibrant innovation ecosystem



Reflections for India, as you accelerate your innovation journey

Innovation landscape in Lifesciences is fairly concentrated with few clusters driving bulk of the research

● Pharma R&D centres of top Pharmacos¹

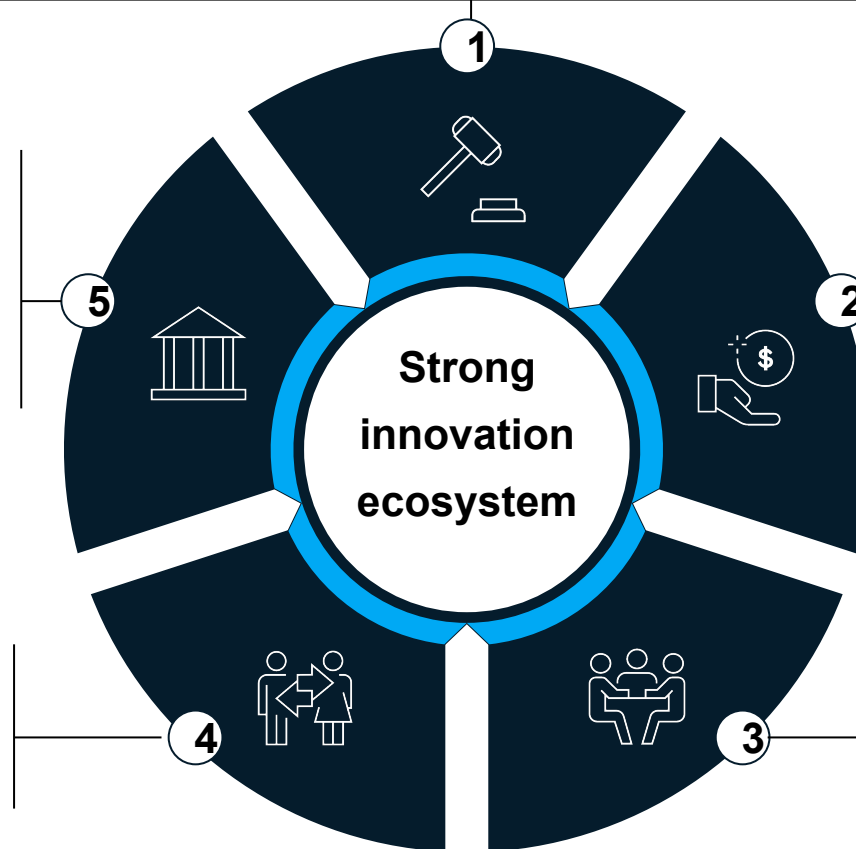


1: Includes leading companies such as Pfizer, Novartis, Merck, Roche, Sanofi, AstraZeneca, Bayer, Johnson & Johnson, GSK etc.

SOURCE: Nature Index 2019 Annual tables, Innography, Capital IQ, Global Innovation Index, Company websites, Press search

5 building blocks emerge from the journey of these successful innovation hubs

Enabling regulatory and policy landscape
to ensure accelerated approvals while
maintaining quality and consistency



High quality infrastructure
to ensure co-location/
collaboration and
“plug-and-play” infrastructure
support

Robust funding support
across government, industry and
external sources (e.g. VC/ PE)

**High-quality research by
anchor institutes
collaborating with industry**

Strong research talent pool
on back strong local talent base
and policies to attract back
global talent

Learnings from global best practices



1. Enabling regulatory and policy landscape



Clarity and consistency in a high quality review process



US

- **Detailed guidelines** to clarify approval requirements
- **Pre-/post-approval meetings** to further clarify pathway
- **Consistent panel of experts** to provide continuity in guidance



Israel

- **Policies harmonized with global regulatory standards** (US, Australia etc.)



Simplified and transparent process ensuring timely approvals



US

- **Streamlined process ensuring approvals in 10-20 months**
- **Dedicated project managers** to provide transparency and ease of communication



China

- **Approval timelines reduced** from 35 to 21 months



EU

- **Performance metrics** published regularly to maintain transparent governance



Augmented capacity and capability in regulatory bodies



Japan

- **Augmented reviewer capacity** by 2.5x (2005-13)



China

- **Augmented reviewer capacity** by 3X; **Focused capability building** (e.g. collaboration with Peking University, APEC)

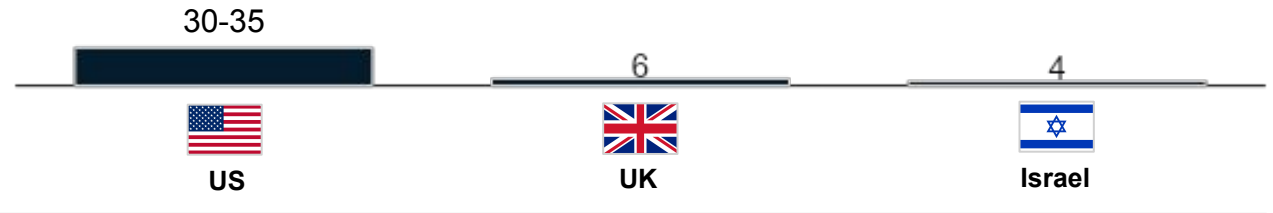
Learnings from global best practices



2. Robust Funding Support

Direct government funding to simulate fundamental research

Direct Govt funding, 2018, (USD bn)¹



Heavy private investment supported through favorable policies/schemes

- UK**
 - Super tax deduction on R&D - 230% for Small & Medium Enterprises; 140% for others

- Israel**
 - Direct research grant up to 85% of R&D expense
 - 15%+ lower corporate tax for companies engaging in R&D

Vibrant external funding (VC/ PE, secondary market) through streamlined policies and confidence building measures

- Israel**
 - Capital co-funding of upto 40% for new funds setup in Israel
 - Relaxed tax norms for foreign investors

- China**
 - Active outreach, e.g. BioCentury summit; VCs screening startups to incubate
 - Seed capital from government
 - Relaxed listing norms on HKEX

1. Govt. Funding: US: OECD (2017), Health at a Glance (R&D in Pharma); UK: .gov.uk; UK Medical Research Council, China: China Daily; Israel – Invest in Israel; Calcalistech, IATI

Learnings from global best practices



3. Strong research talent pool

 **Develop “anchor institutes” to be bedrock of research**



- **NUS, NTU** at the epicenter of Biopolis bio-medical research hub



- **C9 league** with 3% of researchers but 10% of national research expenditure and 20% of national publications

 **Attract experienced overseas talent**



- **Foreign researchers program** funds 50% of recruitments (relocation cost, salaries) for 2 years



- **“Thousand talents program”** offers grants to move to China for research; 7000+ researchers moved in last decade

 **Enhance quality of local talent**



- **National Centres of Competence in Research (NCCRs)** to promote innovative, interdisciplinary research in strategic areas




- **Singapore-MIT Alliance** for active collaboration and exchange of scientific talent (SMART – largest international lab of MIT)

Learnings from global best practices



- 4. Strong collaboration between academia and industry
- 5. High quality infrastructure

 <p>Policies to promote academic research</p>	 <p>US</p> <ul style="list-style-type: none"> • The Bayh-Dole Act or Patent & Trademark Law Amendment Act enacted for moving academic discoveries into the commercial landscape via exclusive licensing deals
 <p>Platforms to bring acad-emic research to market</p>	 <p>Germany</p> <ul style="list-style-type: none"> • Inventors' Law aimed to increase patenting activity and profit-sharing back with universities
 <p>Vibrant ecosystem to promote plug-and-play infra and financing support</p>	 <p>Israel</p> <ul style="list-style-type: none"> • Startup Nation 2 Enterprise (SN2E) as an IP and know-how marketplace for universities
	 <p>Singapore</p> <ul style="list-style-type: none"> • A*STAR facilitated 8000+ projects and 1000+ licensing agreements between Industry and Academia in the last decade
	 <p>Singapore</p> <ul style="list-style-type: none"> • Biopolis Research hub has 15 research institutes with 2000+ researchers, 40+ corporate research labs, incubators like Block71
	 <p>US</p> <ul style="list-style-type: none"> • Greater Boston Cluster has leading academic institutions (Harvard, MIT), several research labs, incubators like Mass Challenge (accelerated 1900+ startups)

Agenda



Trends shaping global innovation landscape



Learnings on building a vibrant innovation ecosystem



Reflections for India, as you accelerate your innovation journey

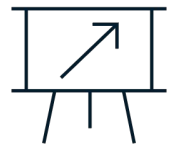
India has a vibrant Lifesciences Industry that has made significant contribution to health and economic outcomes

Strong and established local industry ...



USD 40Bn+

Size of overall Indian Pharmaceutical Industry¹



20+

Companies with USD 1+ Bn market capitalization²



1st (665)

In number of US FDA approved plants outside US³

... making significant health ...



36%

reduction in per person disease burden in India (DALY, 1990-2016)⁴



37%

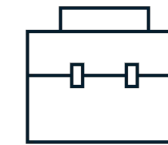
enhanced access to affordable AIDS treatment in Africa in 2009 through vs. 2% in 2003⁵



60%

Global vaccine demand supplied by India (pre-covid)⁶

... and economic contributions



~2.7 Mn

Jobs created directly and indirectly in India⁷



USD 13 Bn

Contribution to Indian annual trade surplus in 2019⁸

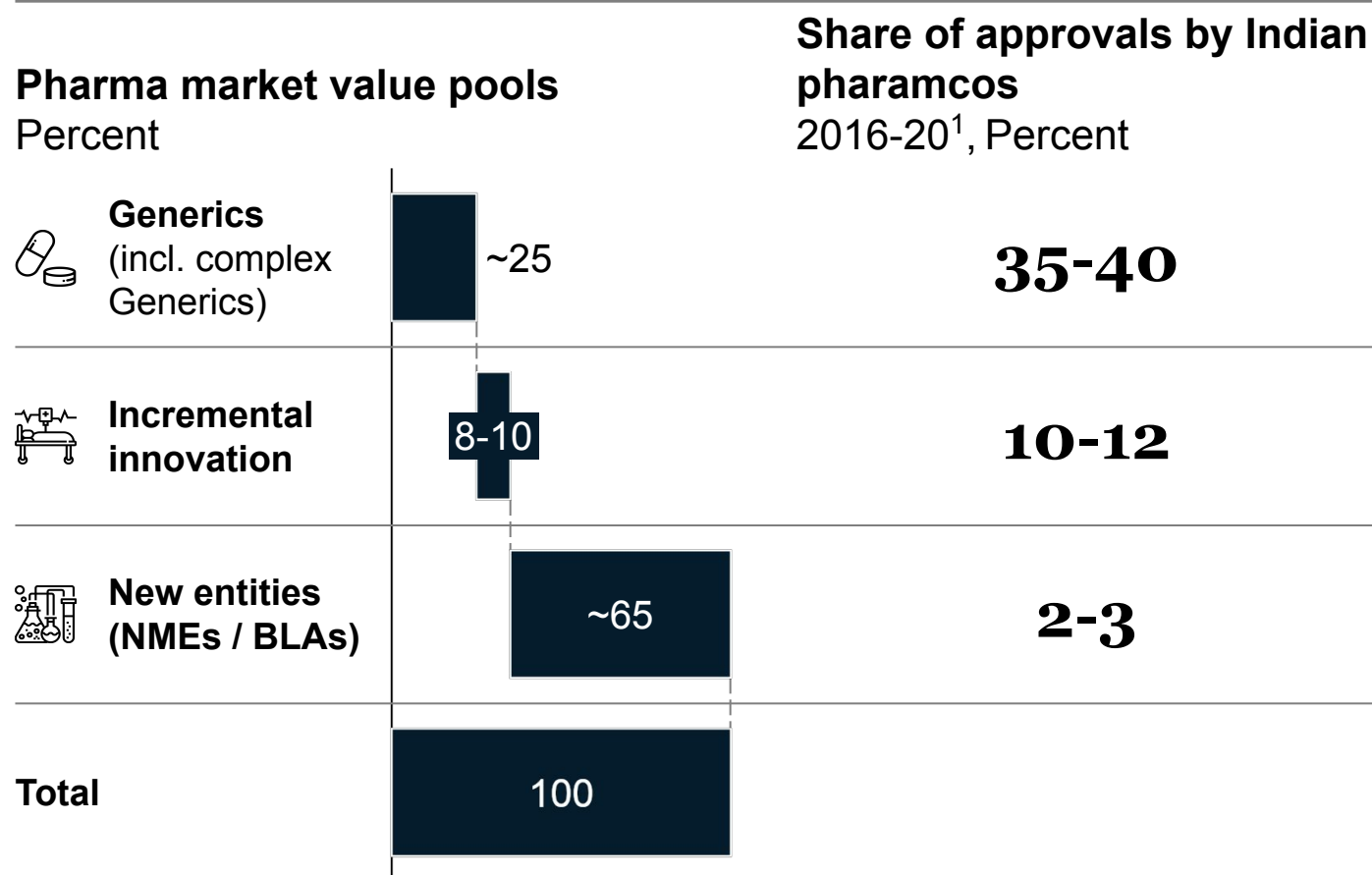
1. IBEF Report
2. Press search - Moneycontrol
3. Press search - www.thehindubusinessline.com
4. Measured as Disability Adjusted Life Years (DALYs) after adjusting for changes in population age structure; ICMR, Public Health Foundation and Institute of Health Metrics and Evaluation

5. African Business Magazine 2012
6. Press Information Bureau; IDMA report
7. Indian life sciences: Vision 2030, FICCI June 2015, Growth estimated by IHS Market
8. Export Import Data Bank, Department of Commerce, PHARMEXCIL, IDMA report on "Journey towards Pharma 2020 & beyond", Statista

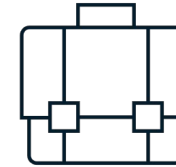
Exciting opportunity to grow from “Pharmacy of the world” to also “Innovate in India”

Shifting to innovation represents next S curve for the industry ...

... which can create multi-faceted impact both for India and globally



Help reduce disease burden both in India and globally



Create high-skilled, white collar jobs



Scale up contribution to the Indian economy even further

1. Share of market authorizations / approvals in the US

4 reflections from journey of other hubs as you work towards this aspiration



Maintain alignment and commitment across stakeholders – Build off the momentum and formalize this Summit to drive active dialogue (e.g., similar to NASSCOM’s Innovation Conclave)



It’s a crowded space, define clear source of distinctiveness for success – Leverage India’s existing strengths e.g.,

- Digital and Tech capabilities for agile and first to market innovation
- Cost position to disrupt cost structure of delivering innovation



Tackling all building blocks together is not easy, take a phased approach – Focus on elements which can create early momentum, e.g.,

- Create enabling regulatory and funding landscape to unlock industry potential
- Tap into India’s global talent pool with relevant experience to accelerate the journey
- Collaborate across industry, academia and startups to enhance quality of research e.g., co-innovation networks



It will be a long, multi-year journey – Establish holistic “Innovation index” as a yardstick to track progress across the building blocks and course-correct as necessary